Notch Reference Manual

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10bit FX Limited

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Introduction

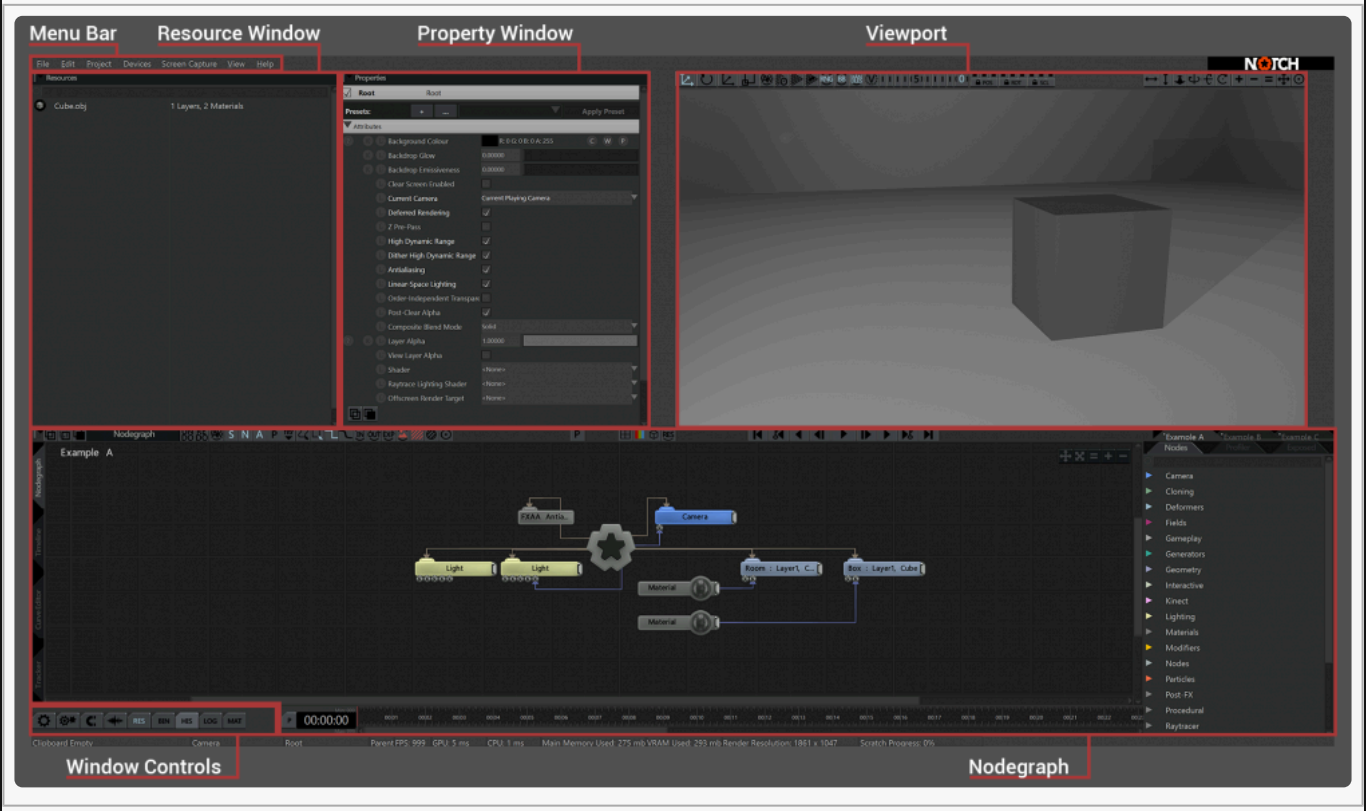
Welcome to the Notch Reference Manual. You can navigate the reference manual by using the menu to the left.

If you have any comments or corrections, please feel free to email us at: info@notch.one

In addition to the reference manual, we also have a large sample archive and a video learning series.

User Interface

Overview



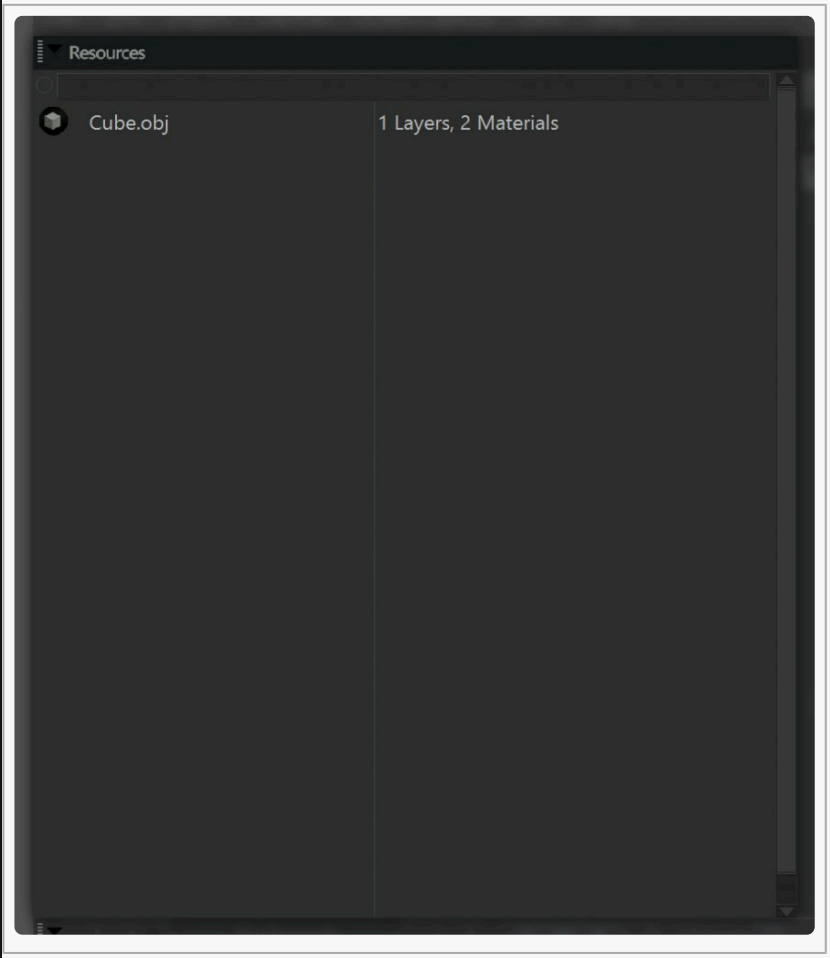
The Notch User Interface is broken into several main sections:

- Resource Window, Where all the media files can be imported for use in Notch.
- Properties Window, Where attributes of nodes can be changed or altered for different variations on an effect.
- Viewport, Where the scene is assembled and results are shown.
- Nodegraph Window, Where the nodes are combined to create the effect.
- Timeline, For editing together multiple effects in the same project.
- Curve Editor, For editing animation keys and interpolation.
- Tracker, For tracking animation keys and timings.

Other Windows can be opened through the View menu Item, or the Window Controls Bar.

Resources Panel

Panel



Contains all the resources used by Notch in the current scene.

Resources are all the custom models, sounds, fonts or images that can be imported into Notch. To import a file, right-click in the resources window, select the file type and select the file from your chosen folder. If its compatible, it will appear in the resources window. The left side of the window shows the name of the resource, while the right size shows other details like file type, contained materials, and resolution, depending on the type of resource.

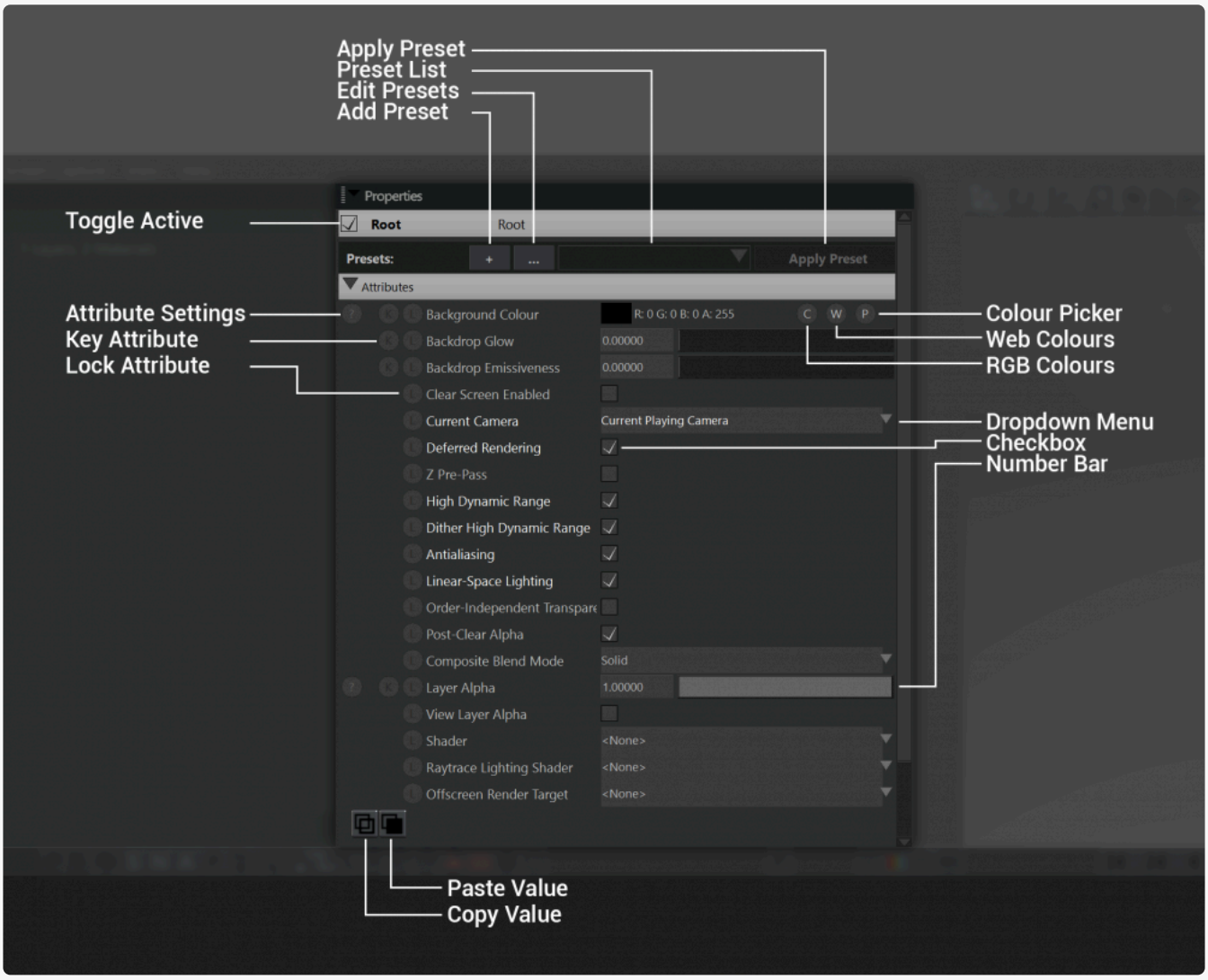
By default, most media types will be copied and saved with the project file, however with video files and other large files, Notch will instead only remember their path location, so moving or deleting the file will lose the connection, and it will need to be reloaded or re-imported. Files which cannot be found appear in red.

For information on which file types are supported, check out the Features page on our website.

Properties Panel

Window

This window lists all of the changeable properties for a node. From here they can be modified, keyed, or exposed for use by other tools.



Presets

Presets allow you to save all the properties current values to a file for later use in other projects. These are saved to the “Documents > Notch > Notch Presets” folder.

Label	Description

Add Preset	Save the current property values as a preset.
Edit Presets	Opens the Edit Presets window, for deleting and renaming presets.
Preset List	Select which preset to apply to the node.
Apply Preset	Apply the selected preset.

Attributes Frame

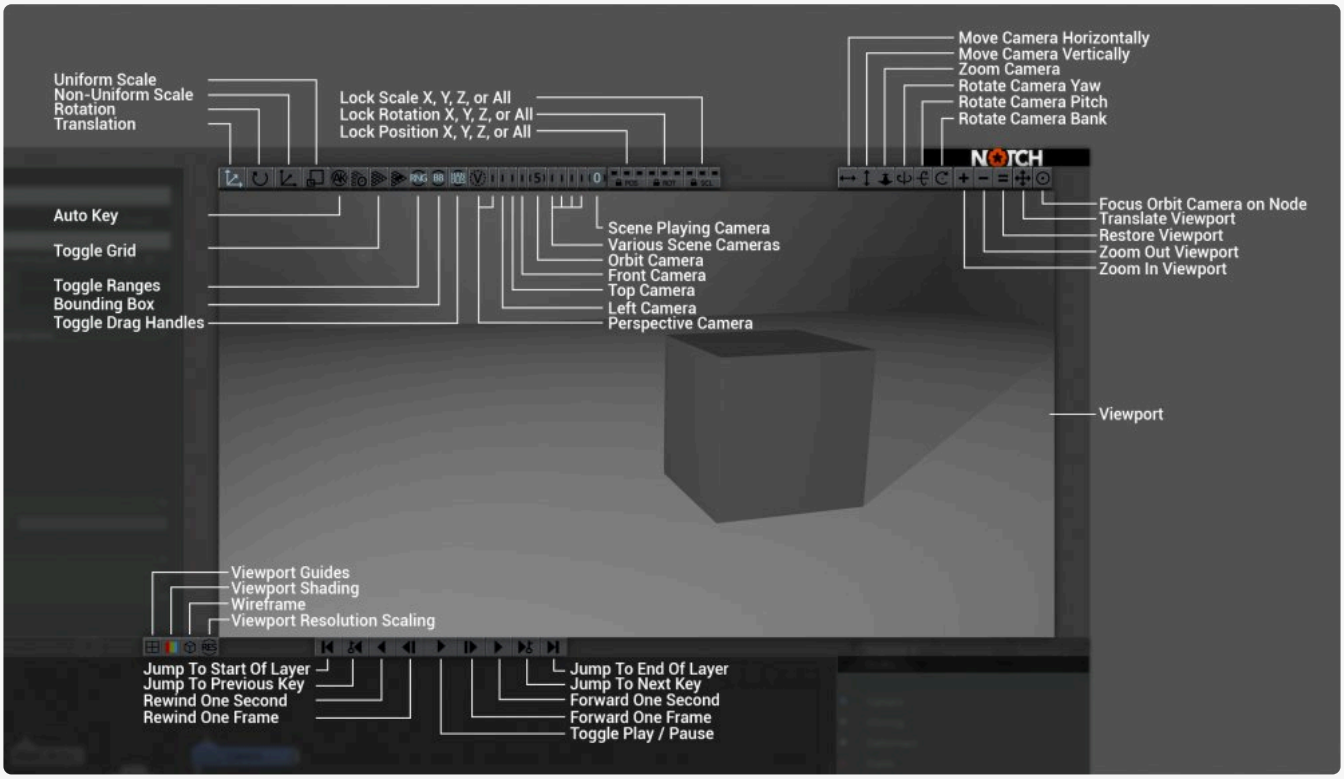
This frame contains all the properties for a node and different ways to change their values. Their effects will vary, depending on what the properties function is.

Label	Description
Toggle Active	Toggle whether the node is active or not.
Attribute Settings	Open the property settings window. From here, various settings of the properties can be changed, including how to expose it for control outside Notch.
Key Attribute	Key the selected property at the current time.
Lock Attribute	Lock the property, so it cannot be changed.
Dropdown Menu	Drops down a menu of items to select from.
Checkbox	Toggle a property on or off.
Number Bar	Drag the bar to change the number, or use the number box to set specific values. Holding Shift allows you to change the maximum and minimum ranges. Holding Alt allows you to drag the value outside the maximum and minimum ranges.
RGB Colours	Select a colour from RGB or HSB Values.
Web Colours	Select a colour from the web colour set.
Colour Picker	Select and drag over to a particular colour in the Project to select it.
Copy	Copy the property values.
Paste	Paste the property values.

Viewport

Window

This window show the actual scene, and what will be rendered / output by Notch into other tools.



Top Bar

Label	Description
Translation	Switch to the translate gizmo.
Rotation	Switch to the rotate gizmo.
Non-Uniform Scale	Switch to the non-uniform scale gizmo, which scales the object axis by axis.
Uniform Scale	Switch to the uniform scale gizmo, which scales all axis by the same amount.
Toggle Auto Key	After an attribute is changed, it is automatically keyed to animate to that value at the current time.
Toggle Grid	Turn the Viewport grid on and off.
Toggle Ranges	Toggle whether range indicators are displayed in the Viewport.
Bounding Box	Toggle whether the bounding box appears around selected nodes in the Viewport.

Toggle Drag Handles	Toggle whether the Gizmo appears in the Viewport.

Camera Options

Label	Description
Perspective Camera	Default perspective camera in the scene.
Left Camera	Default orthographic camera facing along the -X direction.
Top Camera	Default orthographic camera facing along the -Y direction.
Front Camera	Default orthographic camera facing along the -Z direction.
Orbit Camera	Default camera that orbits around a movable point in the scene.
Various Scene Cameras	Choose from the cameras added in the nodegraph. Order of cameras is decided based on when the cameras were added to the nodegraph.
Scene Playing Camera	The highest priority camera in the scene, based on either the priority attribute in the camera or the Y / X position of the camera in the nodegraph.

Transformation Locks

Label	Description
Lock Position X, Y, Z, or All	Lock the currently selected nodes X, Y and Z position attributes, so they cannot be altered.
Lock Rotation X, Y, Z, or All	Lock the currently selected nodes X, Y and Z rotation attributes, so they cannot be altered.
Lock Scale X, Y, Z, or All	Lock the currently selected nodes X, Y and Z scale attributes, so they cannot be altered.

Camera Movement Controls

Label	Description
Move Camera Horizontally	Moves the camera along its local X axis in the scene.
Move Camera Vertically	Moves the camera along its local Y axis in the scene.
Zoom Camera	Moves the camera along its local Z axis in the scene.
Rotate Camera Yaw	Rotates the camera along the Y axis. Does not function with the Orbit Camera.
Rotate Camera Pitch	Rotates the camera along the X axis. Does not function with the Orbit Camera.
Rotate Camera Bank	Rotates the camera along the Z axis.

Viewport Controls

Label	Description
Zoom In Viewport	Zooms into the Viewport video without re-scaling the render size.
Zoom Out Viewport	Zooms out of the Viewport video without re-scaling the render size.
Restore Viewport	Re-centres the Viewport and restores the Viewport to 1:1 pixel size.
Translate Viewport	Move around the Viewport in the Viewport Frame.
Focus Camera On Node	Changes the orbit camera's rotations to focus on the currently selected node.

Key	Description
1	Switch to the Perspective Camera.
2	Switch to the Left Camera.
3	Switch to the Top Camera.
4	Switch to the Below Camera.
5	Switch to the Orbit Camera.
6 – 9	Switch to user added cameras from the Nodegraph.
0	Current playing camera in the nodegraph.
E	Translation
R	Rotation
T	Non-uniform Scale
Y	Uniform Scale
Alt + G	Turn the Viewport grid on and off.
Ctrl + Plus	Zoom into the viewport.
Ctrl + Minus	Zoom out of the vieewport.
Tab	Change the gizmo mode, going forwards through translation, rotation, non-uniform scale and uniform scale.
Ctrl + Tab	Toggle World or Local Gizmo movement.
Shift + Tab	Change the gizmo mode, going backwards through translation, rotation, non-uniform scale and uniform scale.

Viewport Visual Options

Label	Description
Viewport Guides	Toggle visual guides that help with placing the camera and objects in the scene.

Viewport Shading	Choose a way to shade the scene in the viewport. • Default, Scene is rendered with full lighting and colour options. • Alpha Channel, Only the alpha channel of the scene is rendered. • Normals, Scene is rendered with the normal colours place on the surfaces of all objects in the scene. • Materials Colours, Scene is rendered with the material colours of the objects, and lighting information is ignored. • Texture Coordinates, Scene is rendered with objects shaded based on their texture coordinates. • Material IDs, Scene is rendered with the objects coloured based on their material ID. • Object IDs, Scene is rendered with the objects coloured based on their Object ID. • Lit Multisamples, Renders the scene showing areas of the scene where MSAA was used. • Shader Cost, Estimates the cost of the shader used to render the objects in the scene and outputs them as a colour gradient. • Tangents, Scene is rendered with objects tangent vectors as colours. • Roughness, Scenes are coloured in greyscale based on each materials Roughness values. • Metallicness, Scenes are coloured in greyscale based on each materials Metallicness values. • Diffuse Illumination Map, The baked lightmaps and diffuse illumination channels of each object are rendered. • Normal Maps, Objects are coloured based on their Normal Maps, if any are in use. • Specular Colour, The specular colour channels of each object are rendered. • Motion Vectors, The motion vectors of each object are rendered, if Motion Blur or Temporal Antialiasing are enabled.
Wireframe	Displays the objects in the scene as wireframe, where the edges are coloured their material colours.
Viewport Resolution Shading	Re-scale the viewport render size.

Playback Controls

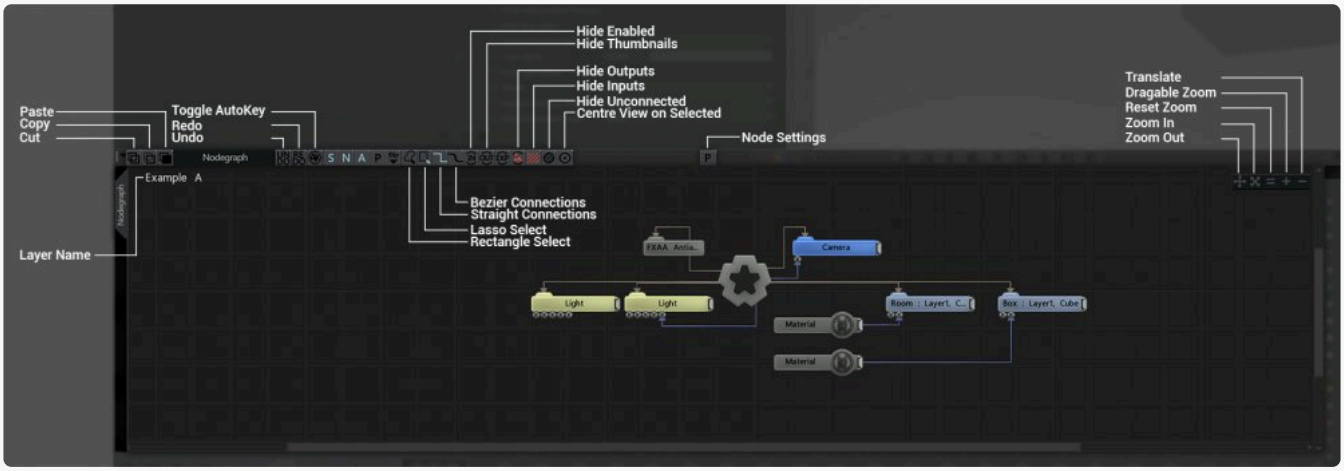
Label	Description
Jump To Start Of Layer	Jump the playhead to the beginning of the current layer.
Jump To	Jump the playhead to the selected attributes nearest key backwards.

Previous Key	
Rewind One Second	Jump the playhead one second backwards.
Rewind One Frame	Jump the playhead one frame backwards.
Toggle Play Pause	Toggle whether the scene is played forwards or backwards in time.
Forward One Frame	Jump the playhead one frame forwards.
Forward One Second	Jump the playhead one second forwards.
Jump To Next Key	Jump the playhead to the selected attributes nearest key forwards.
Jump To The End Of Layer	Jump the playhead to the end of the current layer.

Nodegraph

Main Window

This window contains the node based scripting tools for Notch.



Nodegraph Controls

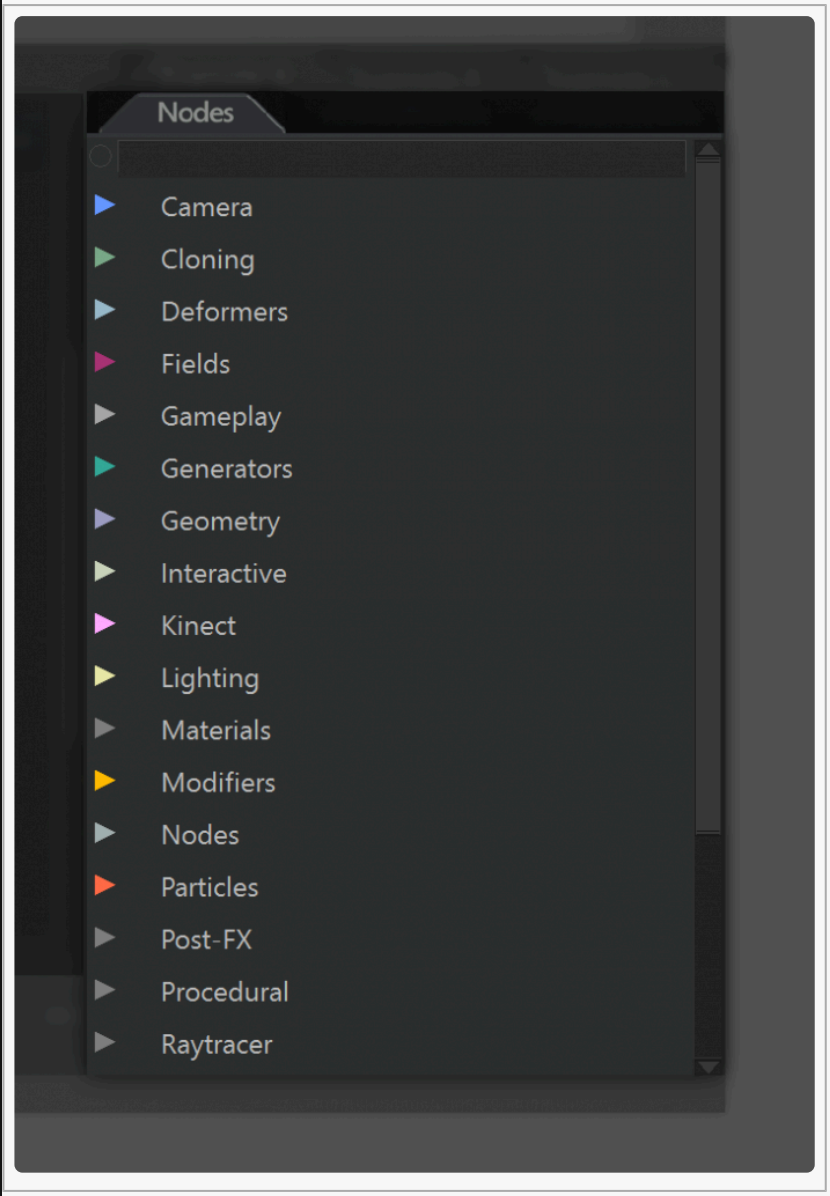
Label	Description
Copy	Copy the currently select node or nodes.
Cut	Copy and delete the currently selected node or nodes.
Paste	Paste a node from the clipboard.
Undo	Undo the most recently taken action.
Redo	Redo a previously undone action.
Toggle Auto Key	After an attribute is changed, it is automatically keyed to animate to that value at the current time.
Rectangle Select	Draw a rectangular region to select nodes.
Lasso Select	Draw a custom region to select a group of node.
Straight Connection	Connection lines in the nodegraph follow straight lines to get to their end points.
Bezier Connections	Connection lines in the nodegraph follow a bezier splines to connect their end points.
Hide Input Connections	Hide all input connections.
Hide Output Connections	Hide all output connections.

Hide Thumbnails	Hide preview thumbnails, which can be enabled on the Material and Video nodes.
Hide Disabled	Hide all nodes which are disabled.
Hide Unconnected	Hide all nodes with no connecting path to the root node.
Center View On Selected	Center the nodegraph on the currently selected node.
Node Settings	Open up the node settings window for the selected node.

Nodegraph

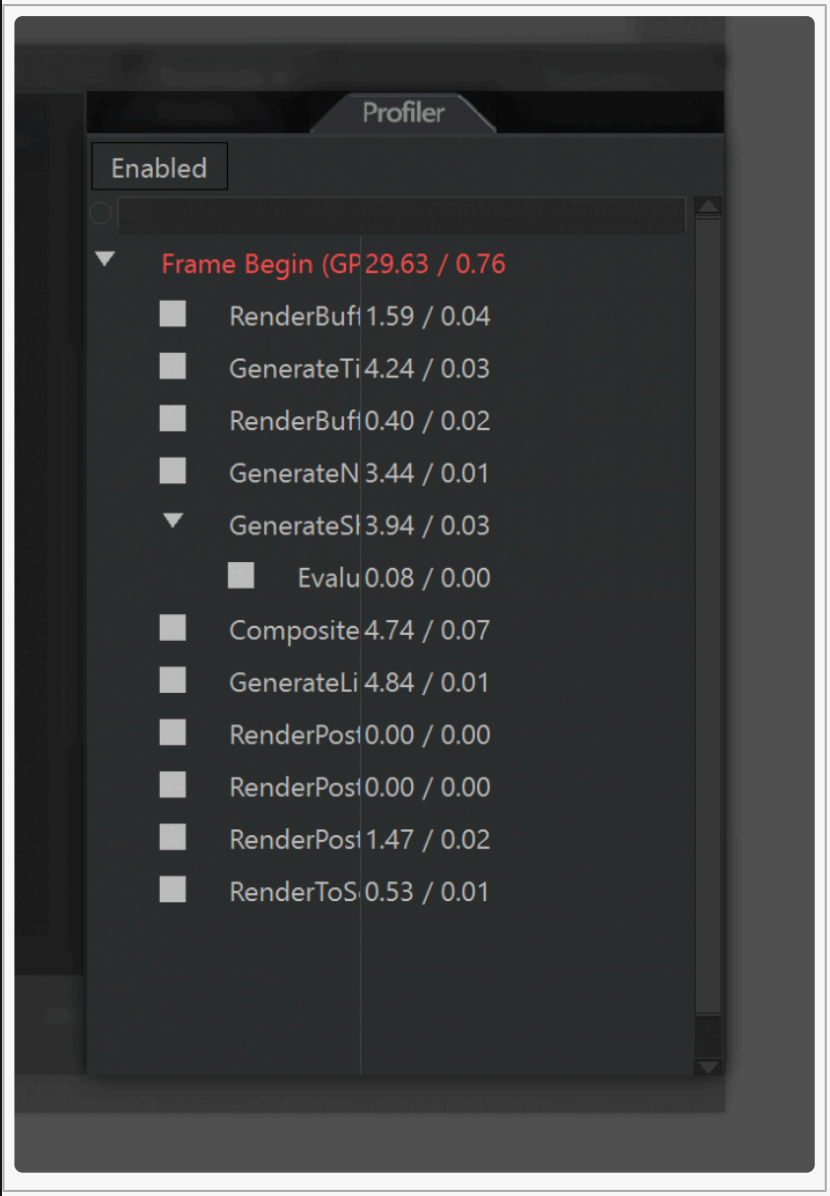
Label	Description
Translate	Drag to move around the nodegraph.
Dragable Zoom	Drag to zoom into the nodegraph.
Reset Zoom	Resets the zoom in the nodegraph.
Zoom In	Zoom into the nodegraph.
Zoom Out	Zoom out of the nodegraph.

Node List



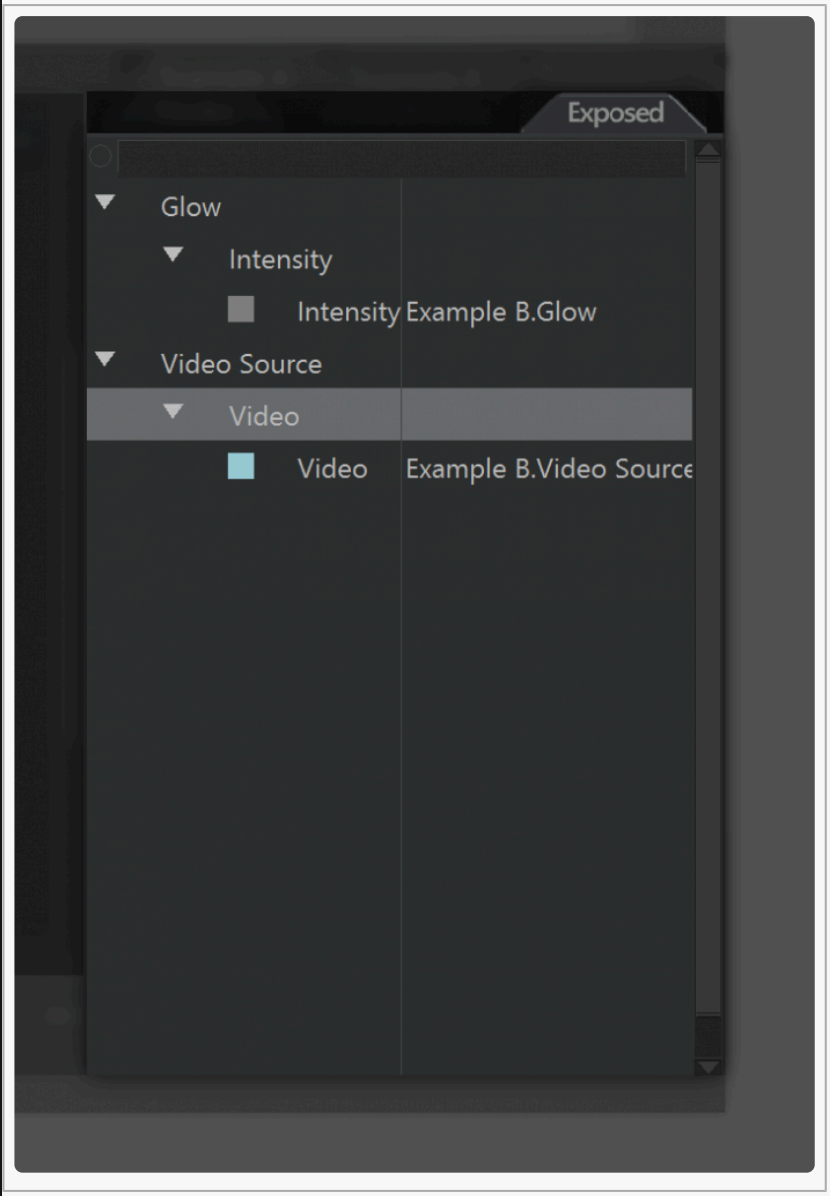
This window contains a list of all the nodes available in Notch. You can go through the dropdown list of grouped nodes, or use the search bar to find specific nodes.

Profiler



This window helps identify where performance is being impacted the most. With enabled selected, Notch will keep track of how long each node takes to calculate and for nodes where this is significant, it is written underneath their name in the Viewport. You can read more on increasing performance on the Managing Performance In Media Servers page.

Exposed Properties

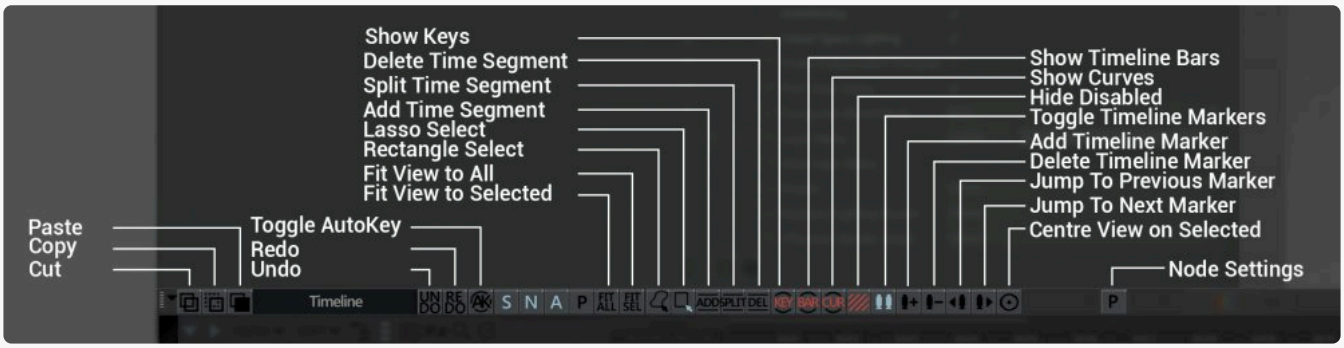


This window shows all the properties that will be exposed to other applications from Notch, once the project is compiled. If you have multiple layers each with lots of exposed properties, you can solo to show only one layer's exposed properties by right-clicking and selecting "Show Only Selected Layers".

Timeline

Top Bar

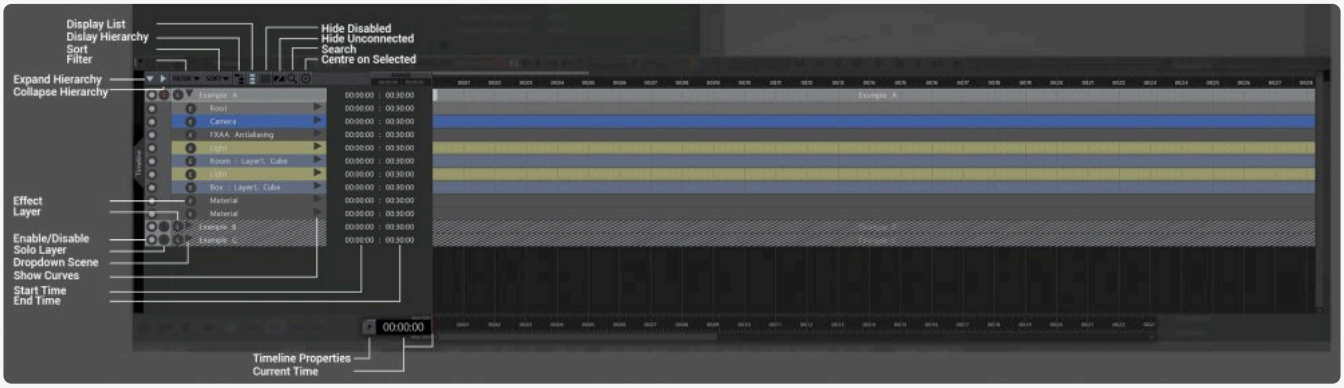
This window lists all of the layers and effects in the current project, useful for sequencing and timing effects to run together.



Timeline Controls

Label	Description
Copy	Copy the currently select node or nodes.
Cut	Copy and delete the currently selected node or nodes.
Paste	Paste a node from the clipboard.
Undo	Undo the most recently taken action.
Redo	Redo a previously undone action.
Toggle Auto Key	After an attribute is changed, it is automatically keyed to animate to that value at the current time.
Rectangle Select	Draw a rectangular region to select nodes.
Lasso Select	Draw a custom region to select a group of node.
Add Time Segment	Add a new time segment to the timeline for this layer.
Split Time Segment	Split the current time segment into two at the position of the playhead.
Delete Time Segment	Delete the selected time segment.
Show Keys	Show the key positions in the timeline along the relevant segments.
Show Timeline Bars	Show the coloured bars which represent the time segments.
Show Curves	Show the key curves of various attributes for effects in a layer.
Hide Disabled	Hide all nodes which are unconnected to the root, or disabled.

Toggle Timeline Markers	Show or hide time markers in the timeline.
Add Timeline Marker	Add a timeline marker to the timeline.
Delete Timeline Marker	delete a timeline marker at the current time.
Jump to Previous Marker	Jump to the nearest marker before the playhead.
Jump to Next Marker	Jump to the nearest marker after the playhead.
Center View On Selected	Center the timeline on the currently selected layer or effect.
Node Settings	Open up the node settings window for the selected node.



Timeline

Label	Description
Expand Hierarchy	Expand the hierarchy of the selected layer or effect.
Collapse Hierarchy	Collapse the hierarchy of the selected layer or effect.
Filter	Filter certain nodes or node groups from being shown in the timeline..
Sort	Change the order in which nodes are listed in the layer.
Display Hierarchy	Indent the list of effects based on the hierarchy they are ordered in the nodegraph.
Display List	Display the effects as a simple list, ordered by hierarchy in the nodegraph.
Hide Disabled	Hide all nodes which are disabled.
Hide Unconnected	Hide all nodes with no connecting path to the root node.
Search	Search for a specific node or effect in the timeline for the selected layer.

Centre Selected	Centre the timeline on the selected time segment.
Effect	Denotes segments which are effects or nodes, contained by layers..
Layer	Denotes segments which are layers, and therefore contain multiple effects.
Enable / Disable	enable or disable the effect.
Solo Layer	focus on this layer, and hide all others. By default, Notch is only set up to show one layer at a time, but this can be changed by disabling “Layers As Separate Effects”. But this can be changed in the project settings.
Dropdown Scene	Show all the effects and nodes in this layer.
Show Curves	Show the key curves of various attributes for effects in a layer.
Start Time	Start time of the layer or effect.
End Time	End time for the layer or effect,

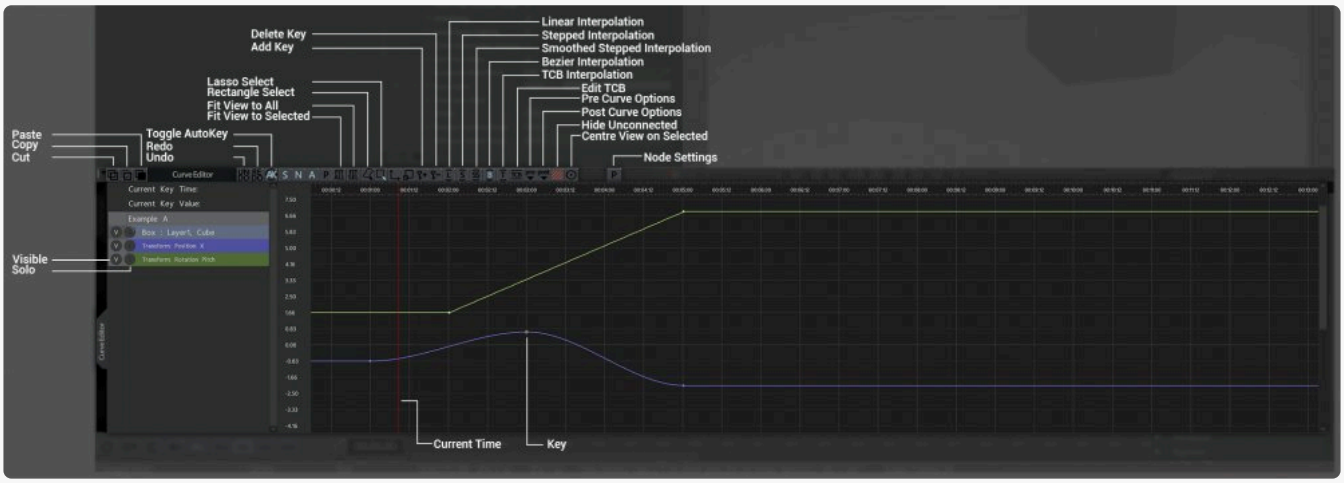
Timeline Bar

Label	Description
Timeline Properties	Open the Timeline Properties window. From here, you can set the minimum and maximum frame rate limits.
Current Time	The Current Time in the scene.

Curve Editor

Main Window

This window lists all of the keyed attributes for the selected nodes and shows how the values between the keys will be interpolated. Note that “interpolation” is also known as “easing”.



Curve Editor Controls

Label	Description
Copy	Copy the currently select node or nodes.
Cut	Copy and delete the currently selected node or nodes.
Paste	Paste a node from the clipboard.
Undo	Undo the most recently taken action.
Redo	Redo a previously undone action.
Toggle Auto Key	After an attribute is changed, it is automatically keyed to animate to that value at the current time.
Fit View To All	Fit the view to all the keys of the attributes visible.
Fit View To Selected	Fit the view to the selected attributes keys only.
Rectangle Select	Draw a rectangular region to select nodes.
Lasso Select	Draw a custom region to select a group of node.
Add Key	Add a key to the currently selected node at the current time.
Delete Key	Delete the currently selected key.

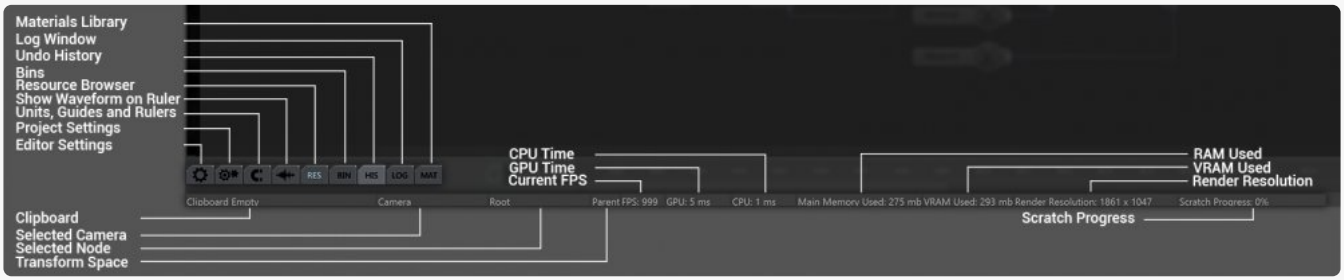
Linear Interpolation	The value changes linearly from its previous value to the key value.
Stepped Interpolation	Previous value stays the same, and then jumps to the key value.
Smoothed Stepped Interpolation	Previous value the same, and quickly moves to the key value.
Bezier Interpolation	The values between two points are interpolated based on a bezier curve.
TCB Interpolation	Make the selected key ease in with TCB Interpolation.
Edit TCB	Open the TCB Controls window, where you can manually change the Tension, Continuity and Bias values at the key. Only functions with “TCB Interpolation” selected.
Pre Curve Options	How the attribute should behave before the key.
Post Curve Options	How the attribute should behave after the key.
Hide Unused	Hide all nodes that are either disabled or have no connecting path to the root node.
Center View On Selected	Center the view on the currently selected node.
Node Settings	Open up the node settings window for the selected node.

Curve Editor Graph

Label	Description
Visible	Toggle whether the attribute is shown in the curve editor.
Solo	Toggle this attribute to be the only attribute in the curve editor.
Current Time	Represents the current time in the scene.
Key	A point at which a value has been set.

Other Windows

Performance Bar And Window Controls



Window Controls

This menu controls some of the window options for various windows in Notch.

Label	Description
Editor Settings	Settings for the Notch Editor.
Project Settings	Settings for the current Notch project.
Units, Guides, Rulers	Change the Grid and Guide units.
Show Waveform On Ruler	Toggle whether the waveform of audio in the scene is shown on the timeline.
Resource Browser	Toggle the Resource Browser frame from being viewed.
Bins	Toggle the Bins frame from being viewed.
Undo History	Toggle the Undo History frame from being viewed.
Log Window	Toggle the Logs frame from being viewed.
Materials Library	Toggle the Material Library frame from being viewed. Currently under construction.

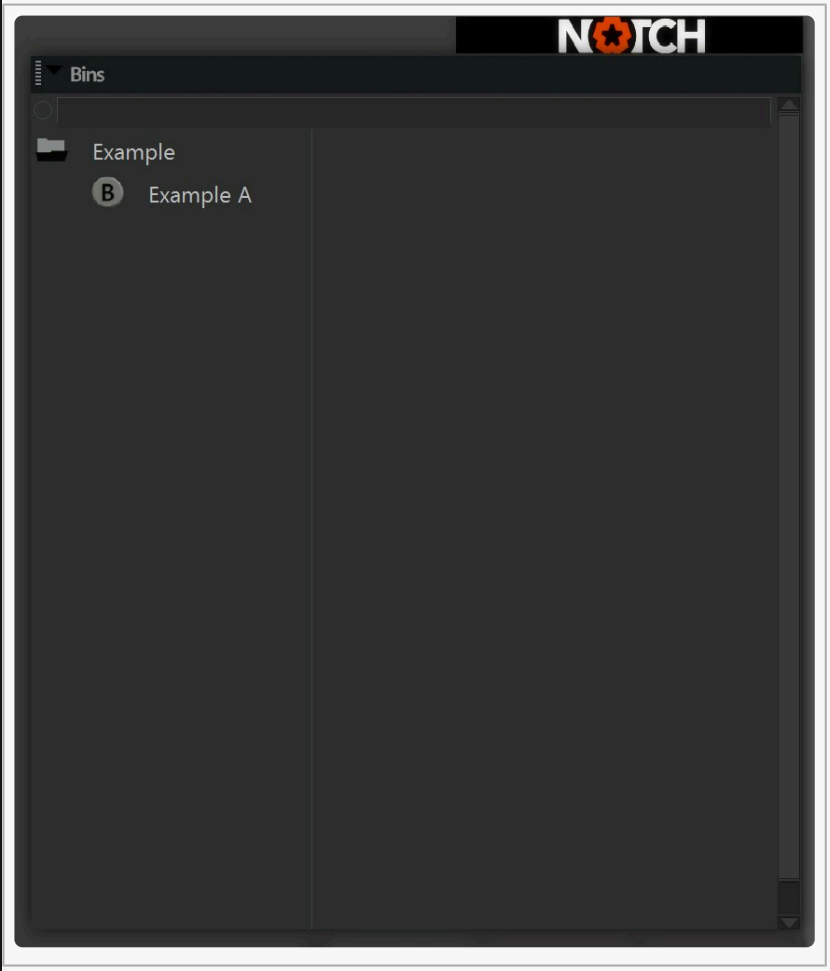
Performance Bar

This bar shows how notch is currently performing and can help identify where performance problems maybe arising. For more on managing performance, take a look at the Managing Performance On Media Servers page, or the Profiler tab in the Nodegraph.

Label	Description
Clipboard	Shows the node that is currently in the copy/paste clipboard.

Selected Camera	Shows the currently viewing camera in the scene.
Selected Node	Shows the currently selected node in the scene.
Transform Space	Shows which transform space is being used for transformations; World, Parent or Local.
Current FPS	The current frame rate of the scene when being played.
GPU Time	How long it takes for the GPU to render the scene.
CPU Time	How long it takes for the CPU to render the scene.
RAM Used	How much RAM is being used by Notch.
VRAM Used	How much VRAM is being used by Notch.
Render Resolution	The resolution at which Notch is being rendered at.
Scratch Process	Under heavy load, shows how far ahead notch has cached future frames while Idle.

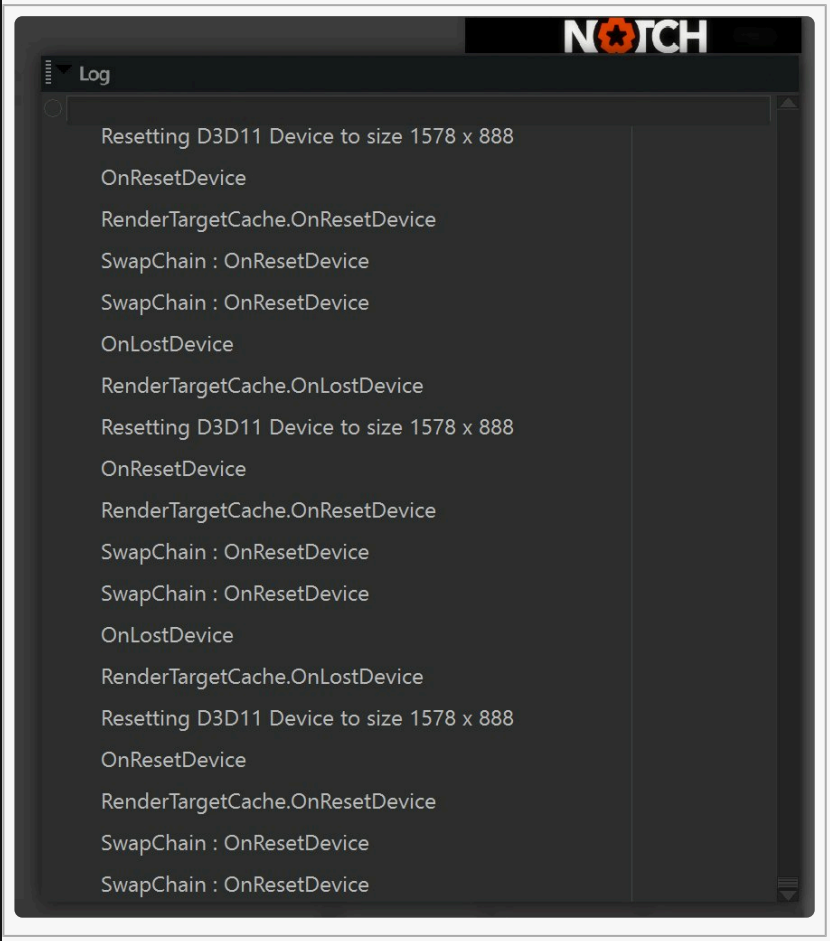
Bins



Bins are saved node arrangements that can be saved and opened again for later use in different projects. Bins are saved to a folder specified in the *Editor Settings Window*. To save a bin, select a group of nodes,

right-click and select “Send To Bin”. Alternatively, the whole layer can be sent to a bin by right-clicking in the nodegraph and selecting “Send Layer To Bin”.

Log Window

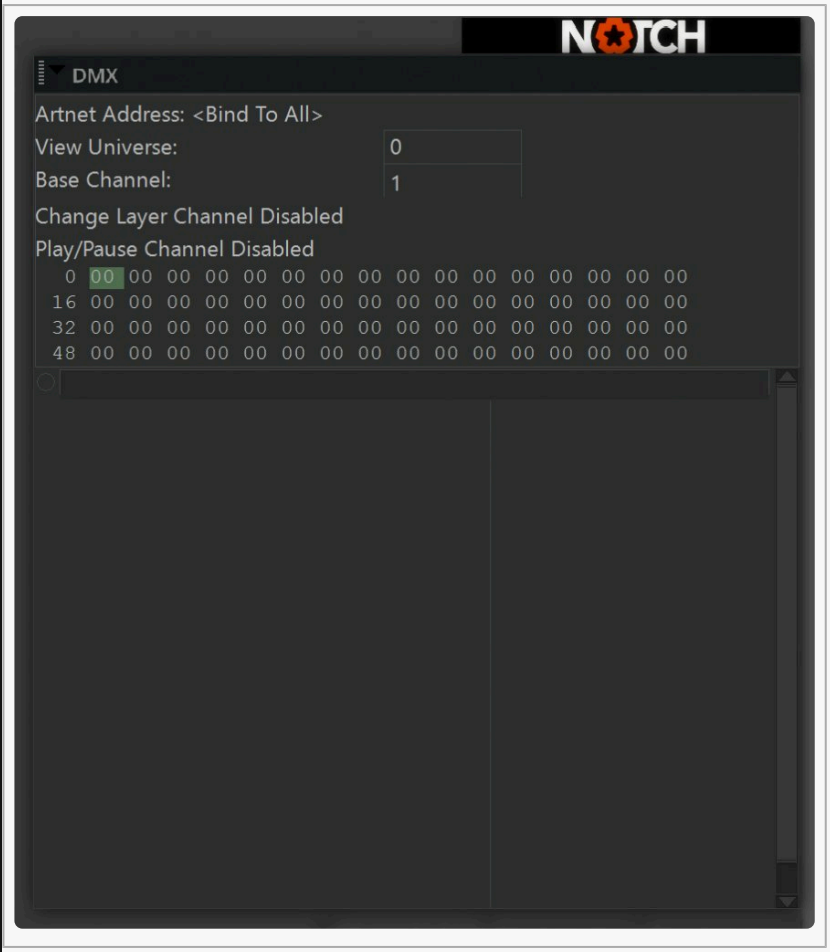


Shows the log window for Notch, useful for understanding performance Issues and debugging. For more on managing performance, take a look at the Managing Performance On Media Servers page, or the Profiler tab in the Nodegraph.

Undo History

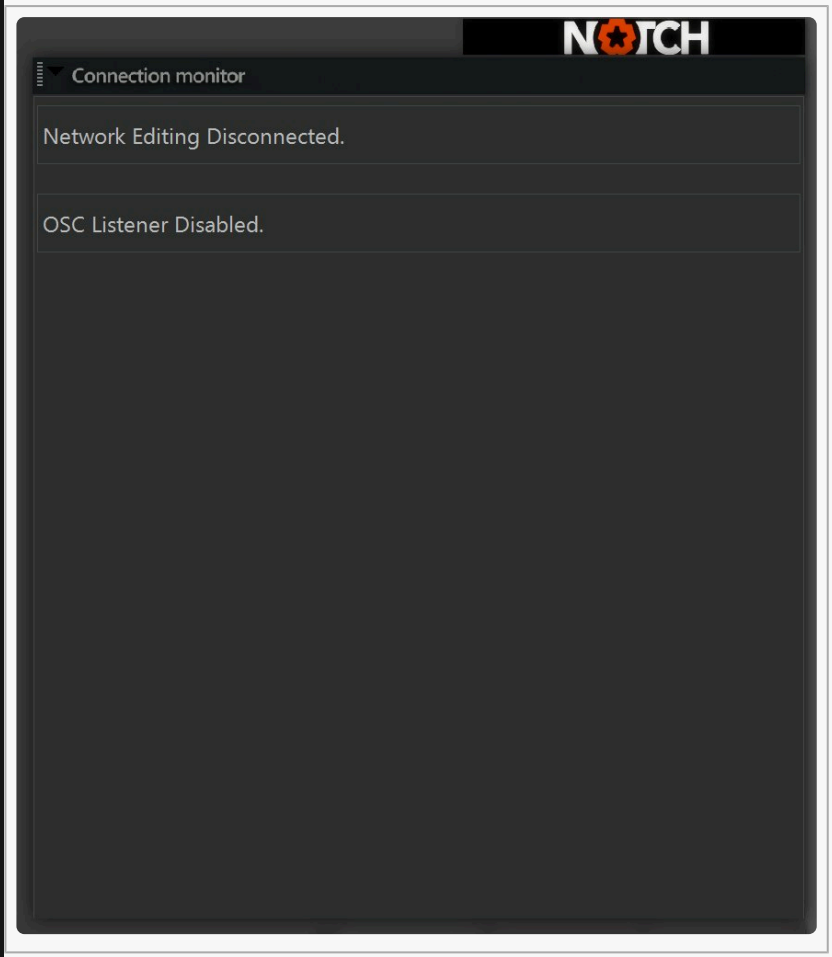
Shows previous actions that have been taken in the project, and can be undone back to.

ArtNet Monitor



See: ArtNet section

Connection Monitor



Shows details about incoming connections from outside sources. Including:

- Remote Network Editing
- ArtNet
- OSC

Performance Panel

The *Performance Panel* allows you to estimate the performance of your project on a target GPU or media server and is accessible via the menu *View -> Performance*

To be able to use the Performance Panel, you must have benchmarked your existing system. To do this:

1. Go to *Help -> Benchmarking…*
2. Click *Run Benchmark*
3. Click *Close*
4. Restart Notch Builder

The top half of the panel allows you to see the performance on your current machine. Specifically, it measures the time taken by the GPU to render each frame: *GPU ms*. The bottom half allows you to select a *Target System* and estimate the GPU time per frame of the current project running on that machine.

It is important to note that **performance prediction is based on the resolution of render on your current machine**. To lock to a specific resolution:

1. Go to *Project -> Settings… Rendering*
2. Set the *Output Resolution*
3. Set the *Output Resizing* to “Scale/Filter Output to Window”
4. Ensure your *Viewport Pixel Scale* is set to “1×1 Pixels”

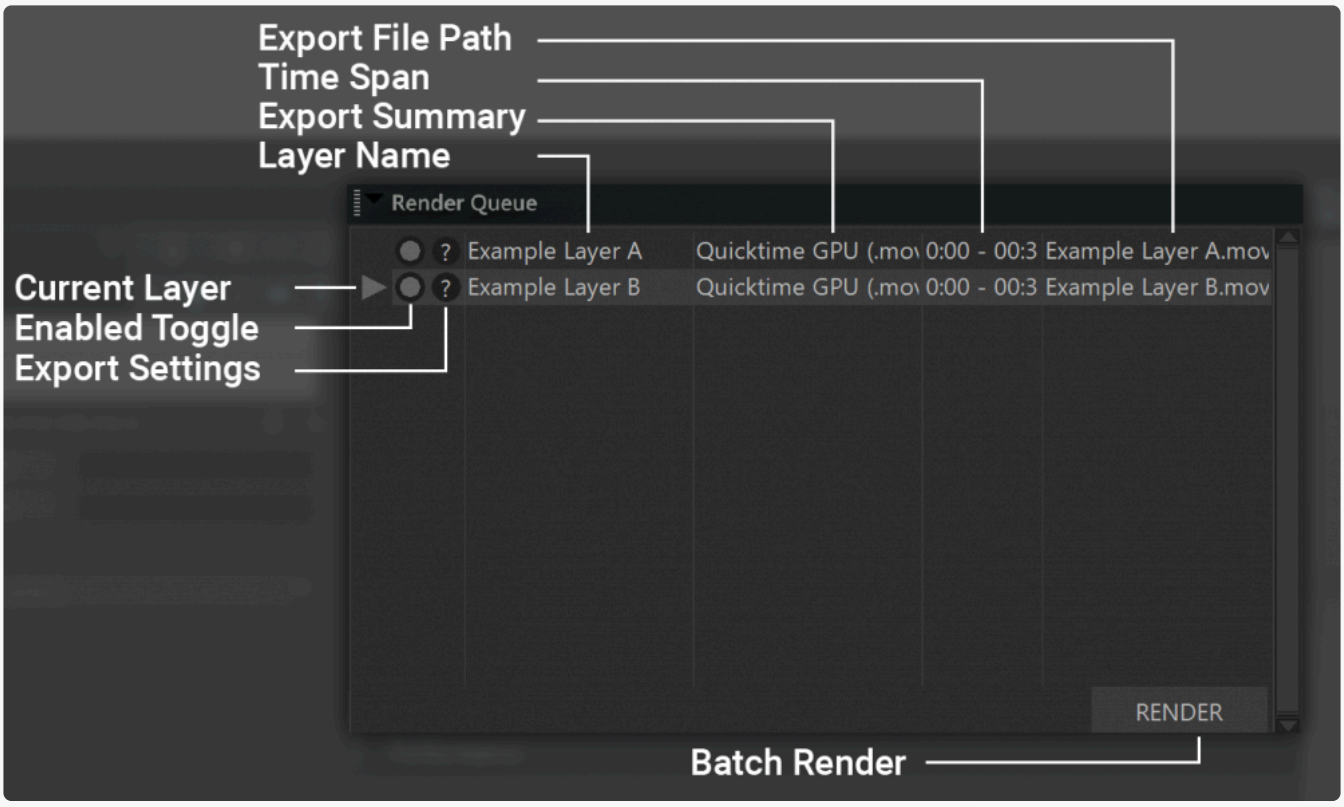
For a more in-depth look at performance see our section: Managing Performance in Media Servers

Render Queue

Method

This window allows you to queue up multiple renders from a notch scene to run sequentially.
To add a layer to the render queue, simply drag it from the timeline to the render queue. The same can be done with videos from the resources window.
To edit the render settings, double-click the layer you wish to edit to open the Export Video Settings Window. These will be set per layer.

> Render Queue is only available in Notch Builder Base and Pro.



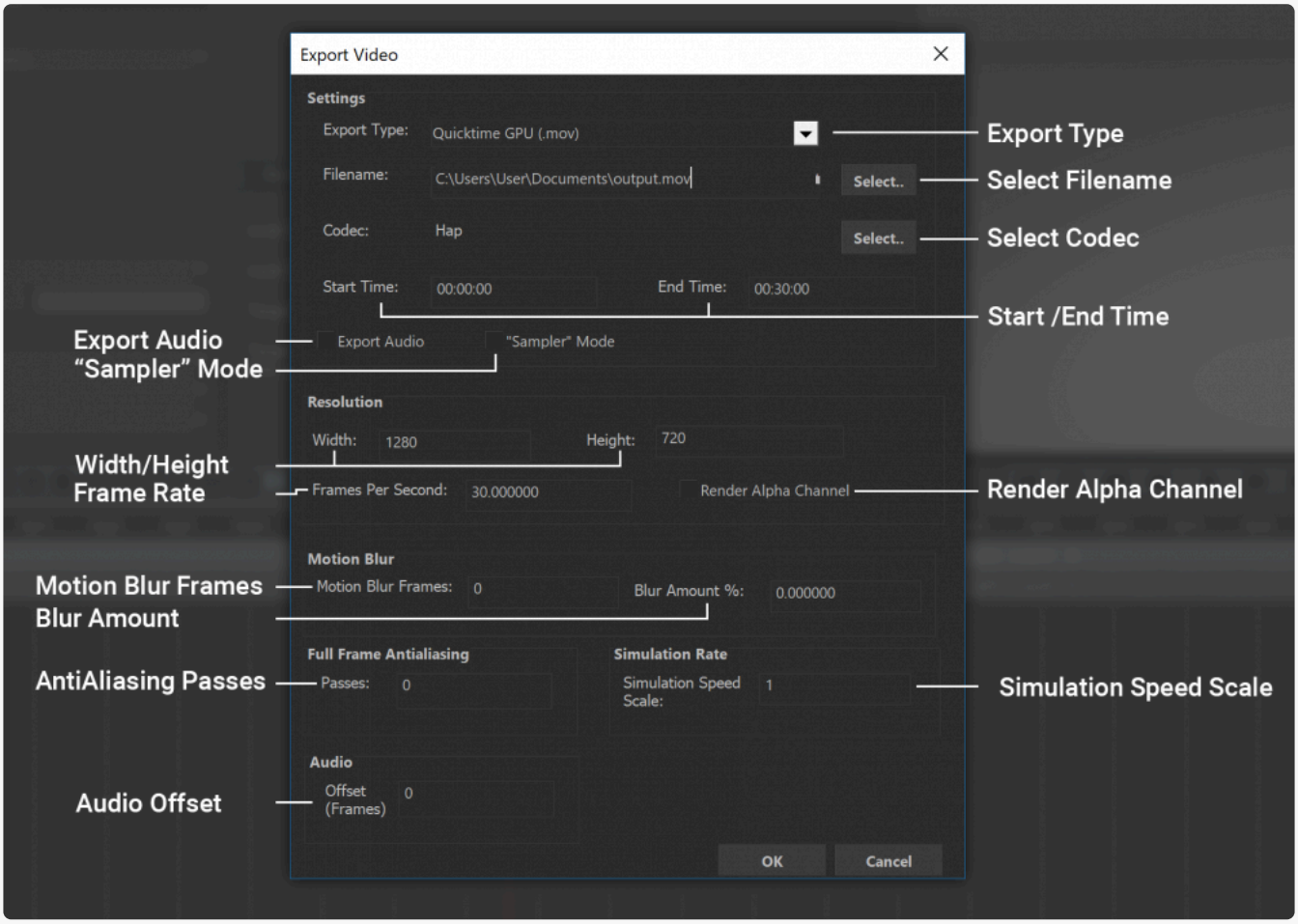
Label	Description
Current Layer	The currently selected layer being processed.
Enabled Toggle	Toggle whether this layer will be enabled or disabled, and therefore rendered or skipped in the queue.
Export Settings	Opens the Video Export Settings window.
Layer Name	Name of the queued layer.

Export Summary	A summary of key details about the export settings including the codec, resolution, and frame rate.
Time Span	Start and end time to be rendered.
Exported File Path	Path location and filename for the exported file.

Exporting Video

Method

How to export a video from Notch.



Settings

Label	Description
Export Type	Choose various export file types.
Filename	Choose the file name and path to the file will be saved once rendered.
Codec	Choose which codec you want to use, dependent on the file type chosen and the codec you have installed.
Start / End Time	Time period which will be rendered. Some effects will need some time to build up, so keep this in mind when deciding render times.

Export Audio	Toggle whether to export audio along with the video.
“Sampler” Mode	Generates a continuous video containing 10 seconds of each layer in the current project. Ignored during the render queue.

Resolution

Label	Description
Width / Height	Change the image resolution for the rendered video.
Frame Rate	Frame rate for the rendered video.
Render Alpha Channel	Toggle whether the Alpha channel is rendered with the video. This may not function, depending on which codec you choose.

Other

Label	Description
Motion Blur Frames	How many frames are overlapped to generate motion blur.
Blur Amount	Scales the time frame between the frame before and following, within which motion blur will be calculated.
Antialiasing Passes	An extra layer of antialiasing, calculated by re-rendering the frame with a sub-pixel offset. Increasing the passes increases the number of samples taken per pixel.
Simulation Speed Scale	Scales the number of simulation passes vs the number of render passes.
Audio Offset	Offset the audio from the video playback. Can be useful with certain codecs.

Keyboard Shortcuts

Viewport

Keys	Orbit Camera	Regular Camera
Alt + LMB	Rotate around pivot point	Rotate around camera axis
Alt + MMB	Pan	Pan
Alt + RMB or Alt + Scroll or Ctrl + Alt + LMB	Dolly in and out	Dolly in and out
Alt + F	Move focus & pivot point to selected object	Frame camera on selected object
Ctrl + Alt + RMB	—-	Bank Camera
Alt + Shift + LMB	Walking Pan on X + Z	Rotate around camera focal point
Alt + Shift + RMB	Walking Pan in Y	—-

Keys	Description
1	Switch to the Perspective Camera.
2	Switch to the Left Camera.
3	Switch to the Front Camera.
4	Switch to the Top Camera.
5	Switch to the Orbit Camera.
6 – 9	Switch to user added cameras from the Nodegraph.
0	Current playing camera in the nodegraph.
E	Translation
R	Rotation
T	Non-uniform Scale
Y	Uniform Scale
P	Node Picking
Alt + G	Turn the Viewport grid on and off.
Ctrl + Plus	Zoom into the viewport.
Ctrl + Minus	Zoom out of the viewport.
Tab	Change the gizmo mode, going forwards through translation, rotation, non-uniform scale and

	uniform scale.
Ctrl + Tab	Toggle World or Local Gizmo movement.
Shift + Tab	Change the gizmo mode, going backwards through translation, rotation, non-uniform scale and uniform scale.

Nodegraph

Keys	Description
Ctrl + LMB	Zoom in and out of the nodegraph.
Alt + LMB or Alt + RMB	Pan around the nodegraph.
A	Centre the nodegraph on the currently selected node.
I	Invert the node selection.
L	Swap lasso type (freehand or rectangular).
Shift + A	Zoom/fit and centre the nodegraph onto the currently selected nodes.
Ctrl + F	Find a specific node in the scene.
Ctrl + E	Focus on the new node search box, so you can start typing to find the new node you want
LMB Drag	Create a region to select multiple nodes in the nodegraph.
Ctrl + R	Connect the node to the nearest relevant root node.
Ctrl + A	Select all nodes.
Ctrl + 1	Toggle Disable / Enable the the selected nodes.
Ctrl + H	Disable the selected nodes.
Ctrl + Shift + H	Enable the selected nodes.
F5	Access node settings.
Ctrl + G	Combines all the selected nodes under a group node.
Ctrl + Shift + G	Remove the group node, and directly connect the child nodes to their parents.
Ctrl + K	Insert a key for the selected attribute.
Ctrl + Shift + K	Insert key all attributes that are already keyed attributes in the scene.
Page Up	Select the previous node in the nodegraph.
Page Down	Select the next node in the nodegraph.

Timeline

Keys	Description
Alt + Left arrow	Move a key back in time.
Alt + Right arrow	Move a key forward in time.
Ctrl + M	Add timeline marker.
Ctrl + Alt + Left arrow	Move to previous timeline marker.
Ctrl + Alt + Right arrow	Move to next timeline marker.
Ctrl + Home	Go to start of selected node.
[/]	Trim a nodes start / end to time
Shift + [/ Shift +]	Move the start / end time back by one frame
Ctrl + [/ Ctrl +]	Move the start / end time forward by one frame

Curve Editor

Keys	Description
Enter or Ctrl + K	Insert a key for the selected attribute at the current time. Only functions if the attribute has already been keyed.
Shift + Enter or Ctrl + Shift + K	Insert a key for all keyed attributes in the scene at the current time. Only functions for attributes that have already been keyed.
Ctrl + Enter	Insert keys for the transformation attributes at the current time. Only functions if the attribute has already been keyed.

General

Keys	Description
Ctrl + N	Start a new Project.
Ctrl + O	Open a new Project.
Ctrl + S	Save the current Project.
Ctrl + Shift + S	Save the current Project as a new file.
Ctrl + Shift + N	Create a new Layer.
Ctrl + Shift + M	Open export video dialog.
F8	Capture a screenshot. Screenshots are saved into the `Documents\Notch\Notch Screenshots`

	folder unless another folder is selected in the Preferences
F1	Jump to the Nodegraph.
F2	Jump to the Timeline.
F3	Jump to the Curve Editor.
F4	Jump to the Tracker.
F9	Toggle Render Window to go Fullscreen.
F10	Toggle Render Window to go Fullscreen on a second window.
F11	Toggle Nodegraph Fullscreen.
F12	Open the Units, Guides and Grids window.
Ctrl + F1-F10	Toggle various attributes depending on the node selected.
Ctrl + C	Copy
Ctrl + Shift + C	Copy a node and all its child nodes.
Ctrl + Alt + C	Copy all the attributes from the selected node.
Ctrl + Alt + M	Copy the Material Attributes from the selected node.
Ctrl + Alt + T	Copy the Keys from an attribute.
Ctrl + X	Cut
Ctrl + Shift + X	Cut a node and all its child nodes.
Ctrl + V	Paste
Ctrl + D	Duplicate
Ctrl + Z	Undo the most recently taken action.
Ctrl + Y	Redo a previously undone action.
Ctrl + U	Copy to Clipboard.
Ctrl + I	Paste from Clipboard.
Shift + R	Toggle refine render.
Alt + R	Reset an attribute to the nodes default value.
Alt + K	Enable or Disable a connected Kinect Sensor.

Playback

Keys	Description
Space	Toggle playback of the scene.
Left / Right Arrow	Move one frame back/forward in the timeline.
Ctrl + Left/Arrow Arrow	Jump back/forward to the next Key Frame of a selected attribute.
Shift + Left/Right Arrow	Jump back/forward by 1 second.
Home	Jump to the beginning of the layer.
Shift + Home	Jump to the beginning of the project, regardless of the layer start time.
End	Jump to the end of the layer.
Shift + End	Jump to the end of the project, regardless of the layer end time.
Ctrl + End	Jumps the playhead to the end of the timeline.
Ctrl + T	Toggle time stretching in the scene.

Text Fields

Keys	Description
Shift + Enter	Add a new line.

Shortcuts Download

Shortcuts Pamphlet

Nodes

This is the Notch node reference.

Notch node types:

Cameras:
Cameras define the point of view, perspective and aspect from which the scene is rendered.

Cloning:
Cloners instantiate multiple copies of geometry nodes – such as 3D Objects, Text Nodes and Shape 3D nodes – that are parented to them.

Deformers:
Deformers modify the vertex positions of geometry nodes – such as 3D Objects, Text Nodes, Shape 3D nodes and particle systems – that the deformer is parented to. The deformation state is reset every frame.

Fields:
Fields discretise 2D or 3D areas of space into texels / voxels and store colour and velocity data for them. They are often used for simulations of volumetric and fluid-like effects.

Generators:
Generators create patterns mathematically in 2D or 3D, either direct to a parent canvas if connected to one (Fields, Render to Texture, Video nodes), or to their own canvas for use as image sources in their own right.

Geometry:
Geometry nodes are used to generate and/or render meshes, animated geometry and skeletal rigs.

Interactive:
Interactive nodes allow external inputs to be used in scenes. Sources include direct inputs such as keyboard and mouse, system inputs like the clock time, and Internet sources like Twitter and RSS feeds.

Lighting:
Lighting nodes control how the scene is lit.

Logic:
The Logic nodes are used to create a meta logic system within Notch.

Materials:

Material nodes control surface appearance and response to the lighting environment of the scene.

Modifiers:
Modifier nodes can be attached to numeric value inputs in order to affect and change them, e.g. to give them a value of a mathematical function or that of an external input source such as a MIDI controller.

Nodes:
This section contains a group of mostly miscellaneous nodes.

Particles:
Particle nodes perform simulation of particle-like effects. A Particle Root node is the root of the particle system; emitters emit particles into the system; affectors control the movement of particles; shading nodes are used to colour and affect them for rendering; and rendering nodes render them in various ways.

Physics:
The nodes in this section allow you to create simple physics systems and dynamic movements for objects in your scene.

Post-FX:
Post FX nodes perform image processing on the node they are parented to if suitable – Video Processing nodes, Fields and Render to Texture. Otherwise, they are considered to work on “everything” – i.e. they are applied to the result of the full scene render. PostFX nodes do not store copies of the image they are processing, they only modify the image stored by the parent.

Procedural:
Procedural nodes are used to generate geometric and volumetric forms implicitly using signed distance fields.

Scripting:
Scripting nodes allow for project behaviour to be scripted using Javascript.

Shading Nodes:
Shading nodes are used to generate shader code used for rendering 3D objects and other types of geometry.

Sound:
These nodes control sound and sound output in Notch.

Video Processing:
Video Processing nodes perform image processing while also storing a new copy of the image. This allows processing chains with multiple branches to be created. They must ultimately be connected to a video processing source node – such as a Video Source or Video In Source – which forms the start of

the processing chain.

Cameras

Method

Cameras are used to view a 3D scene.

Cameras are generally hooked into the Root node, although they can be applied to any node – they will still appear in the scene as long as there is a path to a Root node; they will inherit the transformation values of parent nodes.

Cameras can be used within a Render To Texture setup to use the view from a camera, which can output a texture to be reused within the scene.

Most Post-FX nodes applied to a camera will only be visible when viewed through that camera.

List of Nodes:

- Camera
- Camera Focus Target
- Cylindrical Camera
- Exposable Camera
- Fisheye Camera
- Hardware Tracking Camera
- Multi Camera
- Orbit Camera
- Proxy Camera
- Region Camera
- Stereo Camera
- UV Camera
- VR 360 Camera
- VR Headset Camera

Tip

Connecting a Null to a cameras Target Node input is a useful way to quickly point a camera at something.

Camera

Method

Places a standard 3D camera in space.

> ✻ Focal parameters, are only effective when used in combination with the Depth of Field nodes.

> ✻ Attach the *Target Node* input to any object, to have the camera track that object.

> ✻ To move the Camera to the Orbit Cameras current position, right click the camera and select Camera Options > Set To Current View.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Zoom	The zoom, of the camera. Increasing the size, increases the FOV.
Field Of View Y	The angle to modify the FOV with. Only functions with Use Field OF View Y enabled.
Use Field Of View Y	Measure the FOV using an angle along the Y axis and the scene Aspect Ratio.
Use Field Of View Y As X	Modify the FOV using an angle along the X axis instead of Y. Only functions with Use Field OF View Y enabled.
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Orthographic	Toggle the camera to be an orthographic camera with parallel perspective.
Lock Aspect Ratio	Locks the aspect ratio of the camera to a define ratio, as opposed to those inherited from the project settings
Aspect Ratio	Defines the aspect ratio, as a decimal when locking the aspect ratio.
Film Offset X	Offsets the camera view across the directional plane of the film in the local X axis.
Film Offset Y	Offsets the camera view across the directional plane of the film in the local Y axis.

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform	Override the transformation values of the node, relative to its	Null

Override	parent.	

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions:

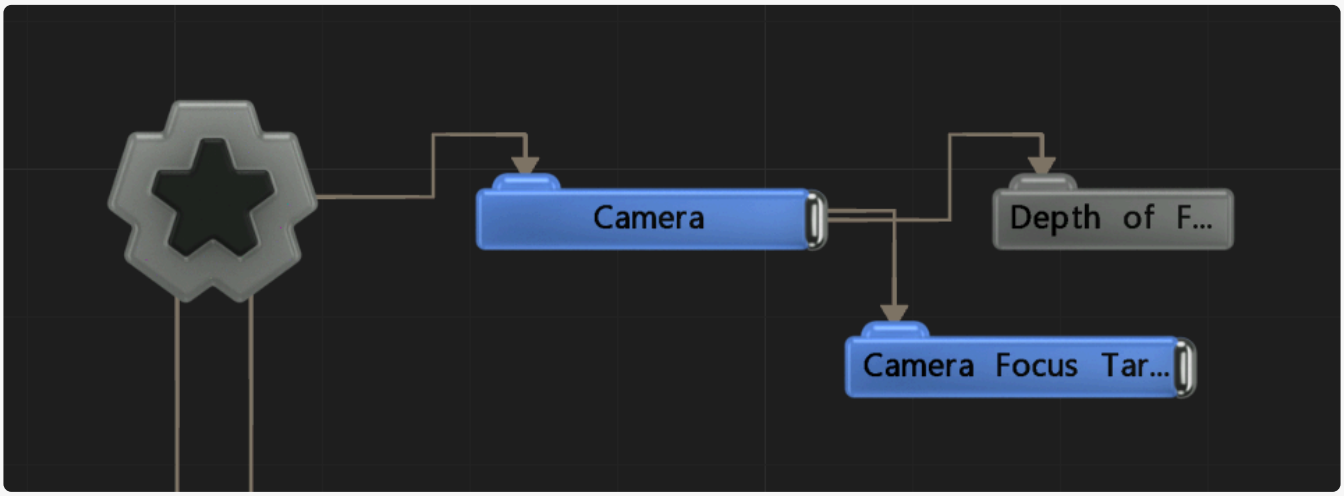
- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Camera Focus Target

Method

A Null position used as a reference for the depth of field focus plane of a camera. Only functions when used with a Depth Of Field node.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
DOF Amount	How strong the depth of field is.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Cylindrical Camera

Method

Cylindrical Camera enables a 360 degree panoramic render.

> Focal parameters are only effective when used in combination with the Depth of Field nodes.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.

Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Cube Face Resolution	The resolution of each face of the multiview cube being rendered to enable 360 rendering (higher is better).

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions:

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Exposable Camera

Method

This camera is designed to be controlled directly by a media server when running as a block. This is useful for use with Augmented Reality camera tracking setups, where the media server is receiving the camera tracking data.

> See this video to see this feature in action.

When the *Exposable Camera Values* attribute is exposed, it is recognised by the media server as a controllable camera and it provides higher-level controls in the media server.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Field Of View Y	The angle to modify the FOV with. Only functions with Use Field OF View Y enabled.

Aspect Ratio	Defines the aspect ratio, as a decimal when locking the aspect ratio.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Flip Z Axis	Flip the Z axis of the values passed by the media server
Exposable Camera Values	You must expose this value for the media server to be able to control the *Exposable Camera*

! Note: All transforms are overwritten by the host media server. If you need to transform the incoming values, use a parent/child Null with the *Exposable Null* depending on the transform order you want.

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions:

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Fisheye Camera

Method

Places a camera with a wide fish-eye lens into the scene. This is done by rendering the scene six times based on a cube map, and stitched together. using the cube map resolution, you can increase the resolution for this render, but this should be done once an overall scene resolution is chosen.

> ✻ Focal parameters, are only effective when used in combination with the Depth of Field nodes.

> ✻ Attach the *Target Node* input to any object, to have the camera track that object.

> ✻ To move the Camera to the Orbit Cameras current position, right-click the camera and select Camera Options > Set To Current View.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Angle	View angle of the camera in the scene.
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Cube Face Resolution	Resolution of the cube used to generated the fish-eye effect. Be careful when using this as a slider, as regenerating the cube face many times quickly can cause crashes.

Inputs

Name	Description	Typical Node Input
Included Objects	Select objects to be included in the final rendered image.	3D Object
Excluded Objects	Select objects to be ignored in the final rendered image.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions:

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Hardware Tracking Camera

Method

Hardware Tracking Camera receives data from external camera tracking systems and currently supports the NCAM system.

Camera Frustum data is received from the tracking system (Position, Rotation, Field of View) and updates the camera in real time.

Set up the NCAM receiver utilising *Devices -> NCAM*. Please note that access to the NCAM SDK is required for use.

> ! The play head must be playing for the camera to update its position.

> ✻ Focal parameters are only effective when used in combination with the Depth of Field nodes.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

NCAM Properties

Connected NCAM Positional Data.

Attributes

Name	Description
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Field of View	The FOV of the camera. NB: Only utilised when *Override FOV* is enabled.
FOV Offset	Adds or Subtracts X degrees from the FOV reported by the tracking system. Used to create a 'safety'.
Use Colour Data	Use the NCAM colour data.
Use Depth Data	Use the NCAM depth data for compositing.
Use Distort Data	Use the NCAM distort data for warping.
Override FOV	Override the camera FOV.
Lock Aspect Ratio	Locks the aspect ratio of the camera to a defined ratio, as opposed to those inherited from the project settings.
Aspect Ratio	Defines the aspect ratio, as a decimal when locking the aspect ratio.

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions:

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Multi Camera

Method

The Multi Camera node enables multiple camera views to be rendered simultaneously, for example for output to a single media server canvas. Multiple cameras are passed in via the Camera Nodes input and combined into the main canvas with the views arranged horizontally. The order in which cameras are selected is decided by the order of operations. Connected cameras do not need to be connected to the root to be used.

Any connected cameras with post-fx applied to them will no longer have the post-fx applied when viewed through the multi camera. For this, you should look at the render to texture node and image 2D.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Width Resolution	The pixel resolution of each camera horizontally. When set to 0, the scene resolution is used.
Height Resolution	The pixel resolution of each camera vertically. When set to 0, the scene resolution is used.

Inputs

Name	Description	Typical Node Input
Camera Nodes	The cameras which will be displayed in the multi camera display.	Camera
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Orbit Camera

Method

This node adds a Camera with a target the camera always faces and orients around, similar to the scene editing Orbit Camera.

> ✻ Focal parameters, are only effective when used in combination with a Depth of Field node.

> ✻ Attach the *Target Node* input to any object, to have the camera track that object.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Distance	Distance from the orbit point to the Camera.
Zoom	The zoom, of the camera. Increasing the size, increases the FOV.

Field Of View Y	The angle to modify the FOV with. Only functions with Use Field OF View Y enabled.
Use Field Of View Y	Measure the FOV using an angle along the Y axis and the scene Aspect Ratio.
Use Field Of View Y As X	Modify the FOV using an angle along the X axis instead of Y. Only functions with Use Field OF View Y enabled.
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Orthographic	Toggle the camera to be an orthographic camera with parallel perspective.
Lock Aspect Ratio	Locks the aspect ratio of the camera to a define ratio, as opposed to those inherited from the project settings
Aspect Ratio	Defines the aspect ratio, as a decimal when locking the aspect ratio.
Film Offset X	Offsets the camera view across the directional plane of the film in the local X axis.
Film Offset Y	Offsets the camera view across the directional plane of the film in the local Y axis.

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions :

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Proxy Camera

Method

This node copies the camera transformations of the highest priority camera from the previous layer in the project. Only functions with “Layers As Separate Effects” turned off, as for this to work there must be a previously rendered layer to take the camera view from.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform	Override the transformation values of the node, relative to its	Null

Override	parent.	

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain. This includes the transformation values of the driving camera in another scene.

Region Camera

Method

Creates a camera whose view is fixed to a particular plane/region of space. This is very useful for generating content for tracking effects in physical space (e.g. Blacktrax). You can use real world measurements to set up the plane of space and then set a camera distance from the plane.

> Use the Axis, to set the direction of shooting to the plane. Most commonly Y, which is a top down view.

Attributes

Name	Description
Top Left X	The top left X coordinate of the region
Top Left Y	The top left Y coordinate of the region
Bottom Right X	The bottom right X coordinate of the region
Bottom Right Y	The bottom right Y coordinate of the region
Distance	Distance of the camera from the planar region being viewed
Axis	Choose which axis the planar region views the scene from. i.e. X = Front On, Y = Top Down
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Orthographic	Toggle the camera to be an orthographic camera with parallel perspective.

Depth Of Field

Name	Description
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.

Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions:

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Stereo Camera

Method

Places a 3D Camera in the space, which records two perspective views using the *Interoccular distance*, focused at a point in the centre of the camera and displaced from the camera by the *Convergence Distance*.

The Images are then combined together, using the method described by the *Stereo Output Mode*.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Stereo Output Mode	Which kind of stereo output is used. • Side By Side, The Left and Right Eyes are rendered next to each other in the viewport. • View Left / Right, Only one eyes perspective is rendered to the viewport. • Anaglyph, Filters the images so that the left eye blocks out all cyan, and the right eye blocks out all red. When viewed through anaglyph glasses, the resulting image

	is 3D. • Checkerboard, The right eye is overlayed onto the left eye in a checkerboard pattern, which can be interpretted by some hardware so that the the eye views it in 3D.
Interoccular Distance	Distance between both the cameras and therefore, both eyes.
Convergence Distance	Distance from the camera at which both camera perspectives converge.
Zoom	The zoom, of the camera. Increasing the size, increases the FOV.
Field Of View Y	The angle to modify the FOV with. Only functions with Use Field OF View Y enabled.
Use Field Of View Y	Measure the FOV using an angle along the Y axis and the scene Aspect Ratio.
Use Field Of View Y As X	Modify the FOV using an angle along the X axis instead of Y. Only functions with Use Field OF View Y enabled.
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Orthographic	Toggle the camera to be an orthographic camera with parallel perspective.
Lock Aspect Ratio	Locks the aspect ratio of the camera to a define ratio, as opposed to those inherited from the project settings
Aspect Ratio	Defines the aspect ratio, as a decimal when locking the aspect ratio.
Film Offset X	Offsets the camera view across the directional plane of the film in the local X axis.
Film Offset Y	Offsets the camera view across the directional plane of the film in the local Y axis.

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object

Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions :

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

UV Camera

Method

Renders the contents of a connected 3D objects surface back into its UV texture map.

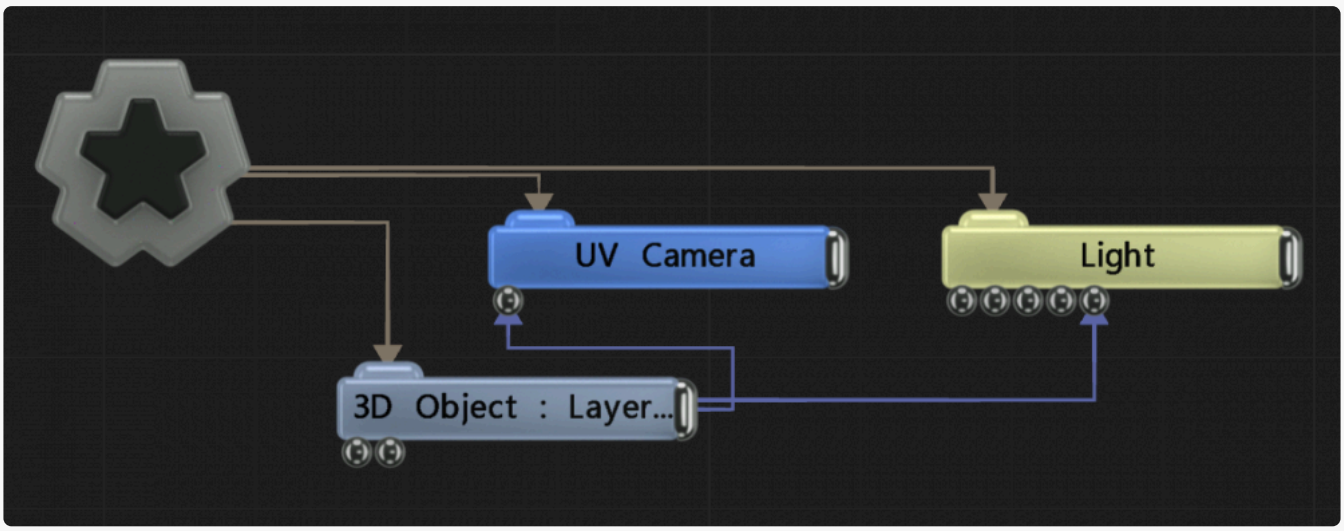
This is most commonly used with media servers for projection mapped objects, where Notch renders the contents of the object's surface and passes it to the media server as a UV texture map for application onto the same mesh in its projection system.

> ! The input object must have been appropriately UV mapped (unwrapped) in a modelling package for this mechanism to be successful.

> ! Typically anti-aliasing should be disabled on the Root node to ensure the UV texture map contains hard edges.

> ✻ See the Car sample project for an example of UV Camera use.

Example Nodegraph



Transform

Not commonly used by this node.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
UV Channel	The channel to be rendered to the UV texture map
Flip X	Flip the output UV texture along the X plane.
Flip Y	Flip the output UV texture along the Y plane.
Invert Normals	Flip the normals of each face, so the lighting is tested against the inside face.
UV Border (Pixels)	Dilates the edges of the UV mapped regions in the texture to prevent 'black' areas when reapplied to the object.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.

Inputs

Name	Description	Typical Node Input
Object Nodes	The UV texture mapped 3D object to be rendered	3D Object
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with the exception that most Post-FX nodes will only run when viewed through a camera when connected to the camera.

VR 360 Camera

Method

VR 360 Camera enables every direction of view to be rendered at the same time in a spherically mapped manner, allowing the creation of VR 360 Videos for use with a wide range of viewers.

Stereoscopic 360 videos can also be generated, which utilise two spherical views (one for each eye) placed on top of each other, which is the common convention for stereoscopic 360 players.

To learn more about 360 Video see the following resources:
Wikipedia Page
YouTube 360 Video Instructions

> ! Not all Post-FX nodes are currently compatible with the VR 360 Camera. Development is continuing to bring compatibility for all relevant effects. If your immediate project needs a specific effect supported, please contact us directly.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Blurriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Interocular Distance	The distance between each eye (in metres) when rendering stereoscopic
Convergence Distance	The point in the distance where the direction/beam of the two eyes meet
Max Near Separation	The maximum distance of the near separation
VR180 Mask Angle	Changes the mask angle when in Warped mode
VR180 Warp Amount	Changes the warp amount when in Warped mode
VR180 Zoom	Changes the zoom amount
Mesh U Scale	Scales the mesh UVs on the U axis
Mesh V Scale	Scales the mesh UVs on the V axis
Projection Mode	Select which kind of projection to use. • 360 (Equirectangular) • 180 (Fisheye) • Cube 6×1 • Cube 3×2 • Cube 2×3 • 180 (Warped), • Camera Object (Positions) • Camera Object (UVs)
Stereoscopic	Toggles on and off Stereoscopic mode
Stereo	Toggles the layout between Top/bottom and Side by side

Layout	
Cube Face Resolution	The resolution of each face of the multiview cube being rendered to enable 360 rendering (higher is better)
Invert X	Flip each render view horizontally
Invert Y	Flip each render view vertically

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions :

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

VR Headset Camera

Method

VR headset camera, currently compatible with the Oculus Rift Consumer Edition and HTC Vive.

The camera reads the head tracking data from the VR headset and renders the appropriate view inline with the headset vendors specifications.

See Using Headset VR for instructions on how to create a VR enabled scene.

> ! VR Headset support is under active development. Please contact us if you are planning to use this feature so that we can work with you to achieve your goal.

> ! Not all Post-FX nodes are currently compatible with the VR Headset camera. Development is continuing to bring compatibility for all relevant effects. If your immediate project needs a specific effect supported, please contact us directly.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Focal Plane Distance	The distance from the camera that is sharp, when utilising Depth of Field. Requires a Depth of Field Post-FX to be used.
Focal Range	The range around the focal plane that is sharp. Requires a Depth of Field Post-FX to be used.
Focal Bluriness	How blurry the focal point is. Requires a Depth of Field Post-FX to be used.
Near Clip	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Priority	Change the priority of the camera. If two cameras have the same priority, the highest camera in the nodegraph is used.
Recentre Headset X/Y/Z to 0	Recentres the coordinate position to 0.

Dynamic Resolution

Name	Description
Use Dynamic Resolution Scaling	Toggles on and off the dynamic scaling of the resolution
Dynamic Min Scale	Sets the minimum scale of the resolution
Dynamic Max Scale	Sets the maximum scale of the resolution

Inputs

Name	Description	Typical Node Input
Included Objects	Select nodes to be included in the final rendering from this camera.	3D Object
Excluded Objects	Select nodes to be omitted in the final rendering from this camera.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes Parented to this node will generally follow the standard parent-child relationship with nodes in Notch, with a couple exceptions :

- Most Post-FX nodes will only run when viewed through a camera when connected to the camera.
- The Camera Focus Target controls the focus position and attributes or the camera.

Cloning

Method

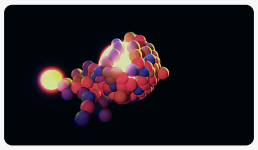
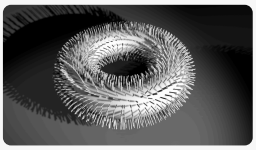
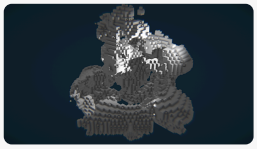
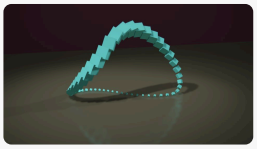
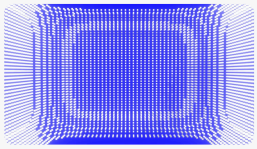
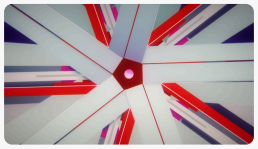
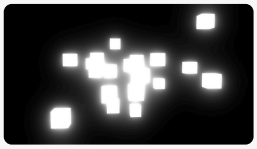
Cloning nodes clone 3D objects in various ways. Cloning is supported for 3D Objects, 3D Shapes, and Image Planes. Cloning is rendered using hardware instancing on the GPU, making it performance efficient. To clone an object it must be parented to the output of the Cloner node.

Cloners can be affected by Effector nodes, which modify the transformation values of each clone.

Cloners are generally hooked into the Root node, although they can be applied to any node – they will still appear in the scene as long as there is a path to a Root node; they will inherit the transformation values of parent nodes.

Gallery

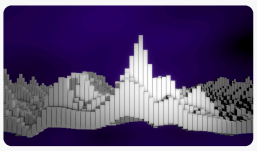
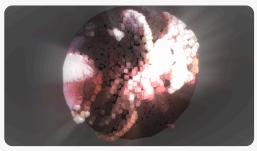
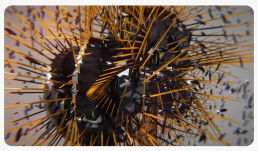
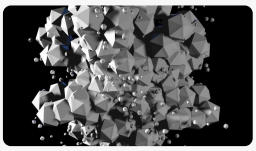
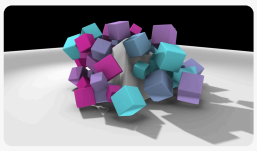
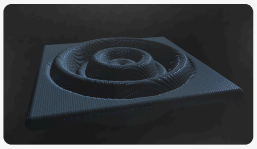
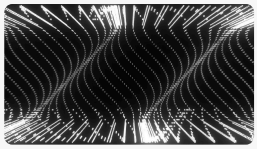
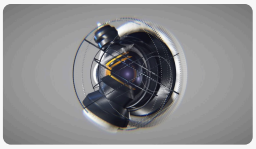
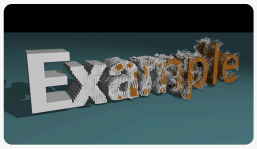
Cloners

				
Clone To Image	Clone To Mesh	Clone To Particles	Clone To Point Cache	Clone To Procedurals
				
Clone To Spline	Clone To Volume	Cloner	Convert Geometry To Boxes	Random Cloner

- Clone To Transform Array

Gallery

Effectors

				
FFT Effector	Image Effector	Plain Effector	Randomise Effector	Rigid Body Effector
				
Ripple Effector	Sine Effectors	Spring Effector	Target Effector	Turbulence Effector

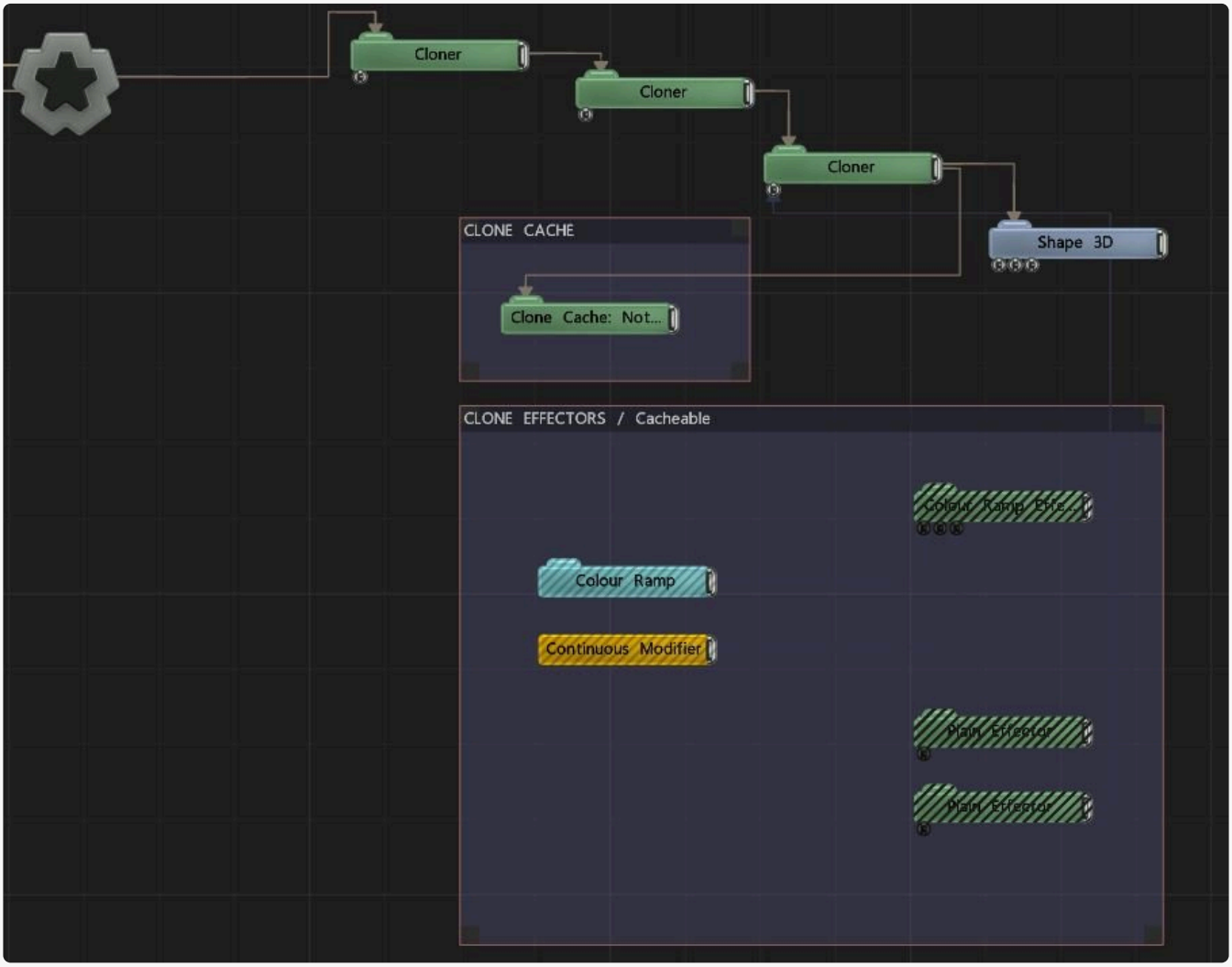
- Colour Ramp Effector
- Kill Box Effector
- Quantise Effector
- Randomise Effector

Clone Cache

Method

The Clone Cache node allows baking of cloner animations to disk, and playback of baked cloner animations.
Clone caches playback deterministically with minimal resources required for simulation.

Example Nodegraph



When the baking is finished the effectors can be disabled.

Step 1

Prepare your clone scene with cloners, affectors.

Step 2

Add the _clone cache _ node and connect the output of the cloner that uses affector to the input of the _clone cache.

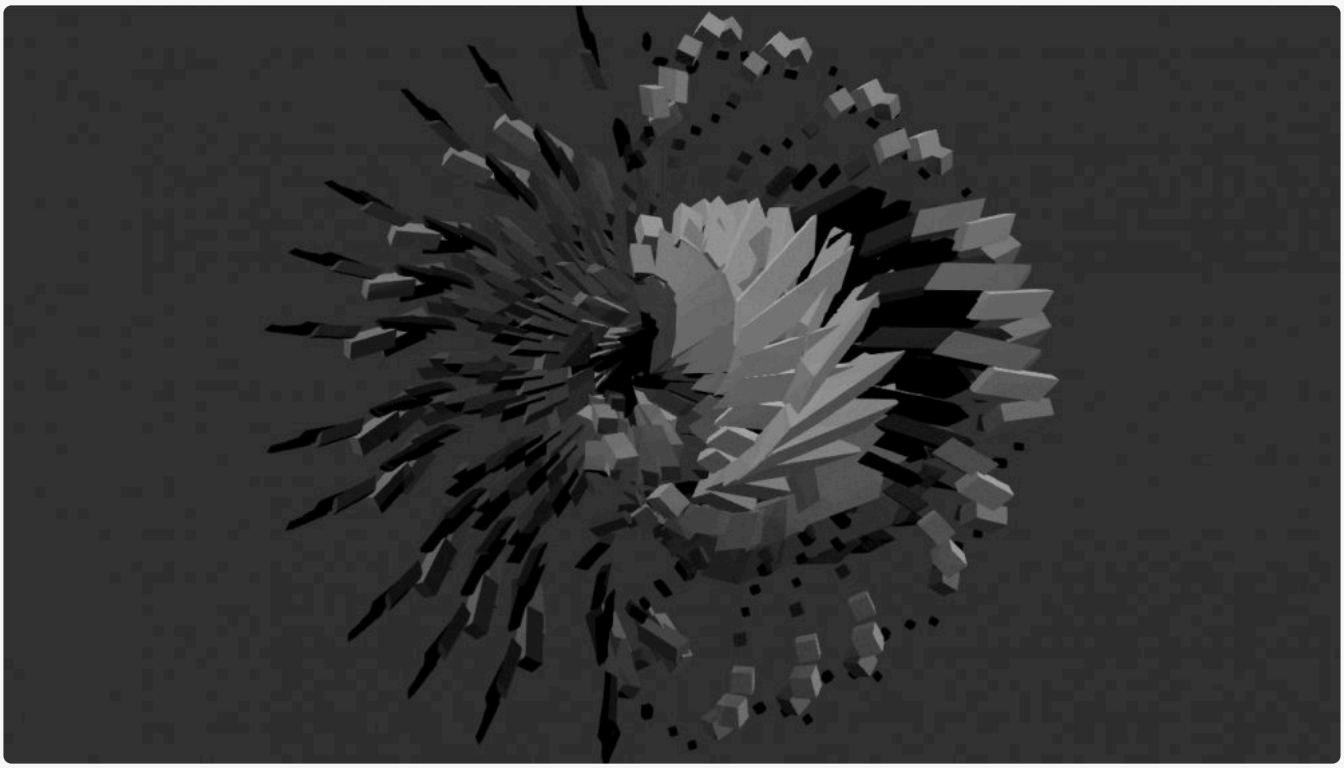
Step 3

In *clone cache* node click on the“bake now” button and choose file destination, and baking rate.

Step 4

Once the baking is finished you can disable all affectors.

Cloning meshes using only cached animations



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.

Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

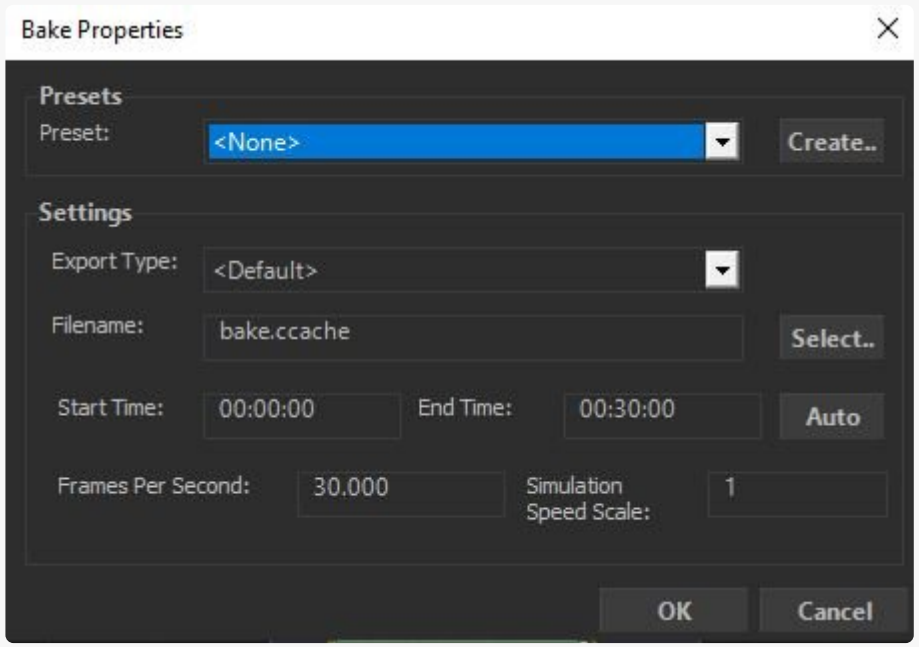
Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Bake Now..	open baking panel
Clone Cache	Cached file

Baking Panel



the file extension for particle cache is *.ccache

Outputs

There are no outputs from this node.

Notes

Cloner baking can generate very large files . The frame per second, complexity, numbers of clones will influence the size of the baking file.

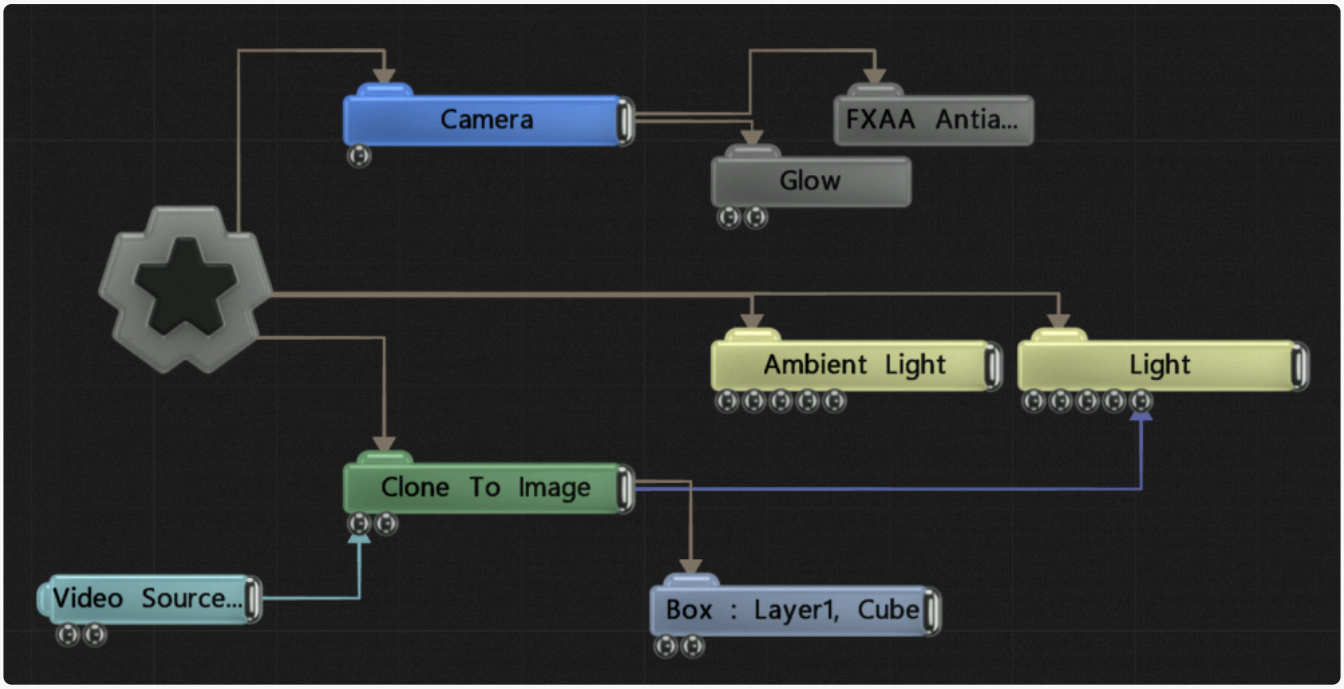
Clone To Image

Method

This node is used to clone 3D objects to pixels in an image or video, using the pixel colours to scale, offset or colour the clones. 3D objects are cloned to positions in a regular 2D grid in the XY plane, with the number of cells defined by the Num Clones X and Num Clones Y parameters. Clones are automatically scaled so that a unit cube would fill one cell exactly, and the Clone Scale parameter is multiplied with this to control the size of the clones. The cell locations are used to sample pixels of an image or video which may be connected to the Image Node input. The colour of the sampled pixel can control the scale of the clone using the Clone Scale Brightness parameter; it can offset the clone in the Z axis using the Clone Offset By Brightness parameter, and it can be applied to the material colours of the cloned objects when the Colour Clones parameter is enabled.

Example

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Image	Select a source Image for the clones to be spawned from. Can be overwritten by

	adding an image input.
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random points from the clone system.
Num Clones X	Number of clones created along the X axis.
Num Clones Y	Number of clones created along the Y axis.
First Clone X	Select which clone is the first clone spawned along the X axis.
First Clone Y	Select which clone is the first clone spawned along the Y axis.
Image Scale X	Scale the image along the X axis.
Image Scale Y	Scale the image along the Y axis.
Scale Image By Aspect	Scale the image based on its aspect ratio.
Scale Image By Pixel Size	Scale the image based on thew relative size of a pixel.
Brightness Channel Mode	Change how the brightness threshold calculates brightness. • Luminance, The luminance values of the image are used. • Alpha, The alpha values of the image are used. • Luminance * Alpha, Luminance values multiplied by the alpha values are used.
Brightness Threshold	Limit how bright regions of the image must be for the clones to be spawned.
Clone Scale Brightness	Scale the individual clones based on the luminance of the image at that point.
Clone Scale By Brightness Affects X/Y/Z	Toggle whether the clone scaling affects the X/Y/Z axis.
Clone Offset By Brightness	Offset the individual clones based on the luminance of the image at that point.
Clone Scale	Scale the size of all the clones.
Filter Image	Applies a Bilinear filter to the image, making it smoothing out some of the values when the image is scaled.
Colour Clones	Toggle whether the clones are coloured based on the image, or retain their material values.
Output Shape	Select what kind of shape to create the clones in.

	• Plane, Generates clones on a flat square plane. • 360 Spherical, Generates clones on to a 360 degree sphere about its center.

UV Clone Deltas

These parameters change how the image will be applied to the child clones.

Name	Description
UV Mode	Change how the cloned objects UV chanel and Material inputs are affected by the cloner. • Linear (Using Clone Index), Each clone keeps unique UV's. • Use Texture Page (Using Clone Index), Speads the UV's over a number of clones defined by the Texture Num Frames Attribute, and repeats it along the clone index. • Use Texture Page (Using Random Index), Randomises the UV's over the range of clones in the Texture Num Frames Property, and repeats it. • Use Texture Page (Using Luminance), Spits up the UVs, and uses different sections depending on the brightness of the Image driving the cloner. • Clone UV, Cumulatively changes the clone scale and position using the offset and scale delta properties.
Texture Num Frames X/Y	How many columns and rows to split the UV by.
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/ Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Image Node	The image used to drive the cloner.	Video Loader
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Depth Image Node	Overwrite the image brightness with a different image to control clone offset / scale by brightness.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

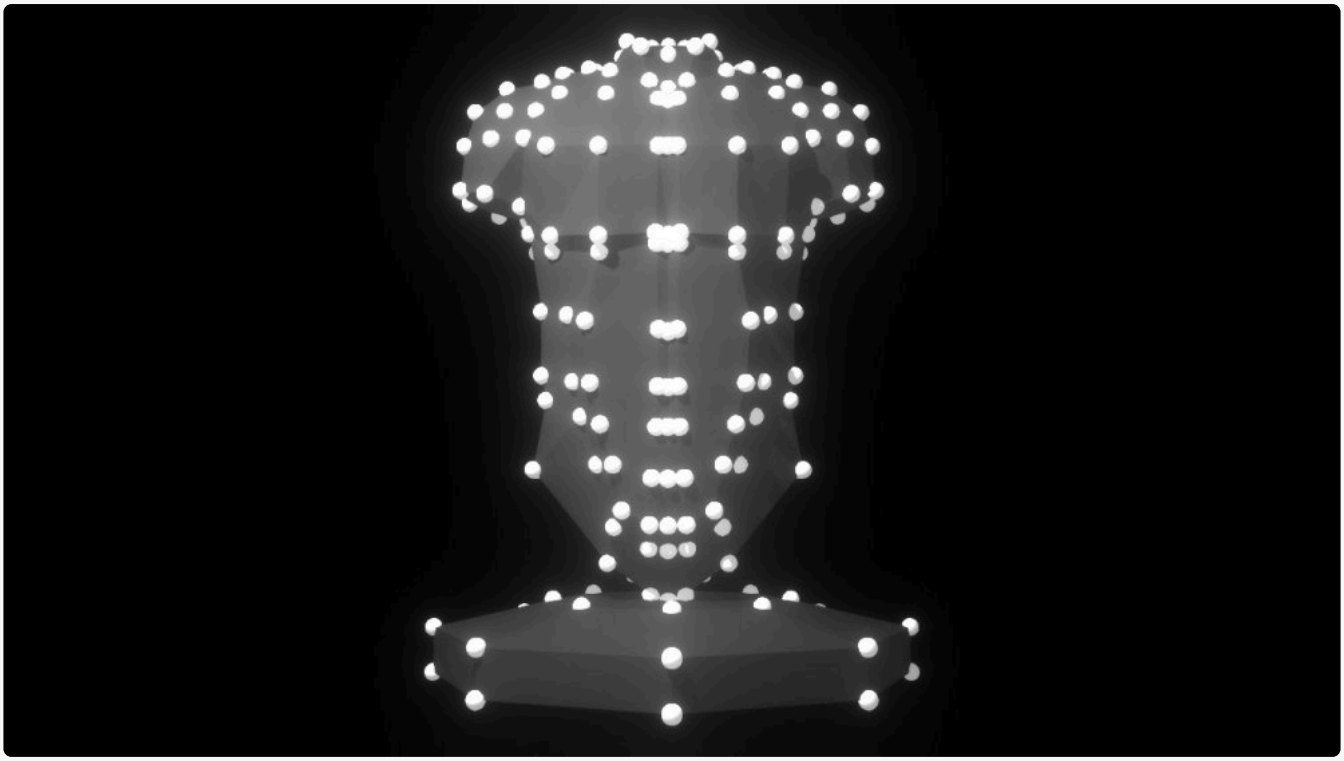
Clone To Mesh

Method

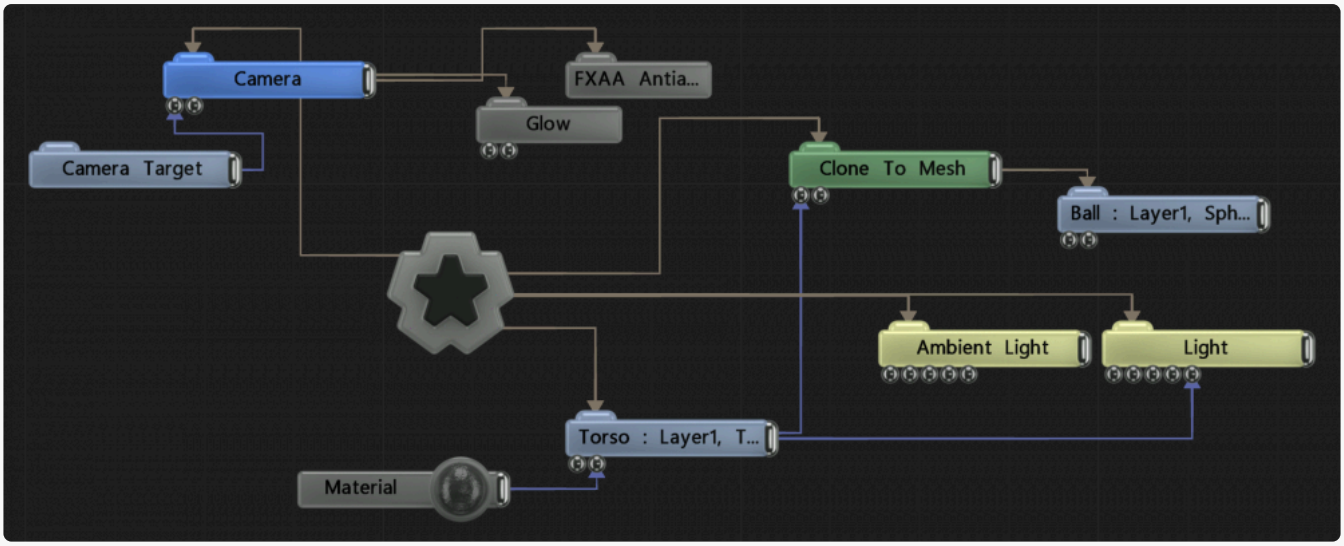
This node clones 3D objects to positions defined by the vertices or polygon centres of another 3D object. A 3D object node must be connected to the Source Objects input to define the voxelised shape the clones are arranged in for this node to be operational. The connected node must be either a 3D Object, a 3D Shape or a Text node. The object must be active in the scene by being connected to a valid path to the root node. The Mode parameter defines the mechanism in which clone positions are generated from the connected object: Vertex will use the vertex positions of the object and Polygon uses the centre positions of the polygons of the object.

The number of clones is defined by the Num Clones parameter and limited by the total number of vertices / polygons in the object. If Rotate Clones By Normals is enabled the clones are rotated to face along the normal direction of the vertex / polygon they are spawned from.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mode	Select how the cloner clones from the source object. • Vertex, Clone the object to the source objects vertexes. • Polygon Centre, Clone the object to the centre of the polygons in the source object.

	• Edge Centre, Clone objects to the centre of the edges in the source object. • Spread Over Surface, Clones are spawned randomly on the surface of the object. • Spread Over UV Map, Spreads the clones across the UV map of the object.
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example, the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random points from the clone system.
Num Clones	Number of copies of the input object created by the node.
Randomise Mesh Order	Use a random seed to dictate the order in which clones are spawned.
Randomise Order Seed	Select a random seed to drive the effect,
Num UV Clones X/Y	Set the number of clones to spawn on the UV map and how many should spawn along the x and y axis.
First Clone	Chooses which clone is the first clone generated.
Rotation Mode	How the clones should be oriented once spawned. • None, Spawned objects ignore the rotation of the source object. • Object, Spawned objects use the rotation of the source object. • Align To Normals, Spawned objects align their rotations with the normals of the object.
Rotation – Use Heading/Pitch/ Bank	Enable or disable rotation for clones by their heading, rotation or bank.
Scale Clones By Poly/Edge Size	Toggle whether to scale the clones by the size of their poly/edge size (depending on which mode is selected in the “Mode” attribute).
Clone Scale	Scale the size of all the clones.
Clone Offset From Surface	How far the clones are spawned from the surface of the source object.
Use Undeformed Positions	Generates the clones before the shape is deformed, so the clones will animate correctly but may not be spread out as nicely after deformation.
Colour Clones	Allow the clones to be coloured at generation.
Use Vertex Colours	Use the colours of the nearest vertex to dictate colour.
Use Texture Colours	Use the colours of the texture at the clones generated location to dictate colour.
Colour Cutoff	Change how the mesh texture cuts off certain clones.

Mode	• Luminance, The luminance values of the mesh texture are used. • Alpha, The alpha values of the mesh texture are used. • Luminance * Alpha, Luminance values multiplied by the alpha values are used.
Colour Cutoff	Limit how bright regions of the image must be for the clones to be spawned.
Surface Spread Mode	How the clones are spread to the surface of the source object. Only functions when “Spread Over Surface” is selected in the “Mode” attribute. • Normalised, Clones are spread out to fill the source object.
Surface Spread Density	How dense the clones are once spawned. Only functions with “Normalised” chosen in the “Surface Spread Mode” attribute.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone’s material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone’s material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone’s material.

Inputs

Name	Description	Typical Node Input
Source Objects	Source Object from which all the clones will be generated..	3D Object
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

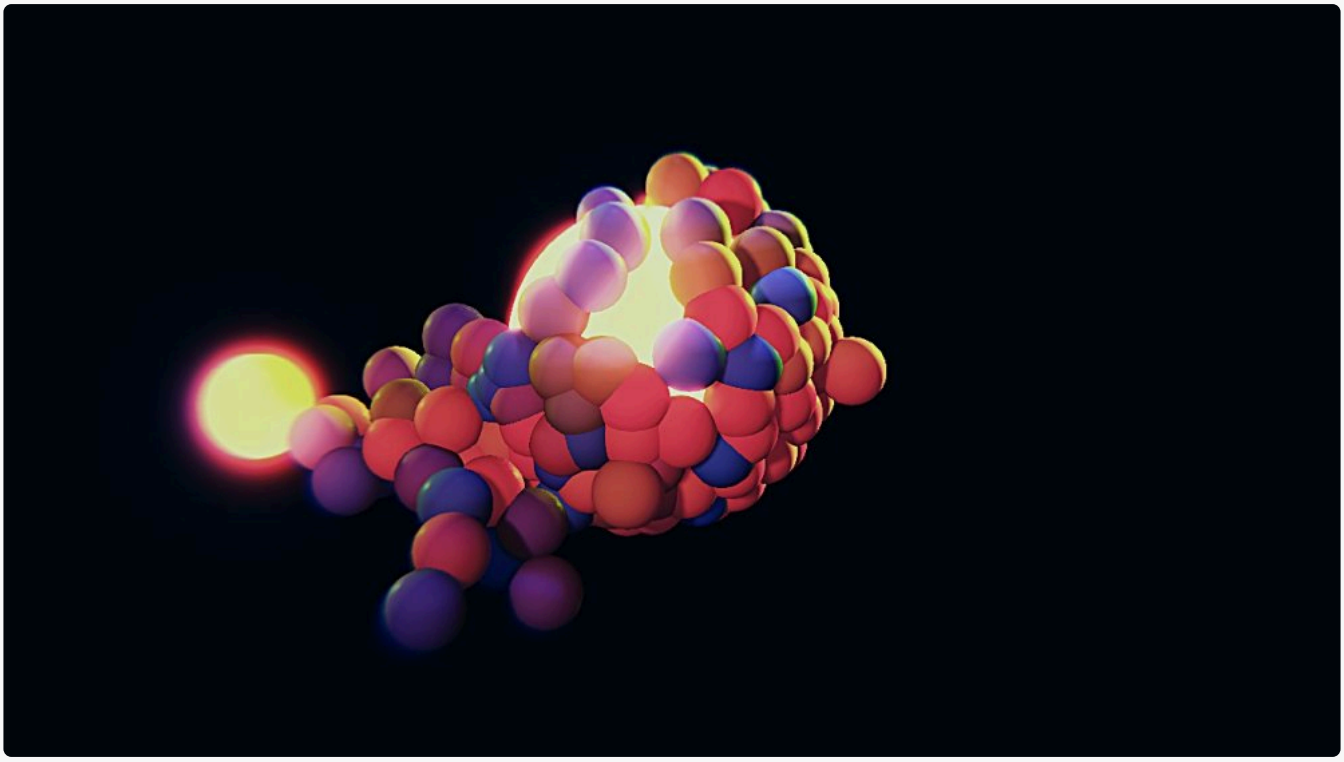
Clone To Particles

Method

This node clones 3D objects to positions defined by a particle system. A Particle Root Node or a Particle Emitter must be connected to the Particle Node input for this node to be operational. If a Particle Emitter is connected then only particles emitted from this emitter are used to generate clones; otherwise, if a Particle Root Node is connected all particles under that root node may be used to generate clones.

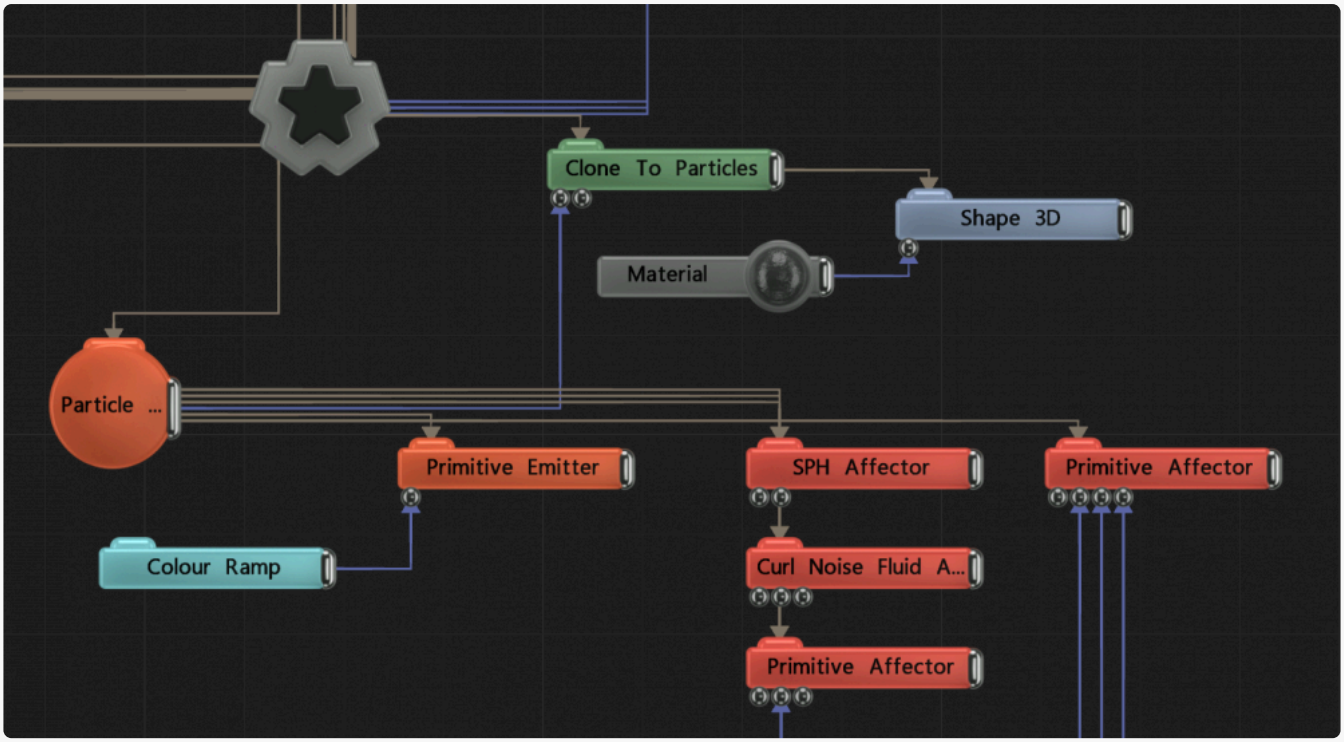
The number of clones is defined by the Num Clones parameter and limited by the total number of particles. In order to make the effect visually consistent, clones attach themselves to individual active particles and remain attached to that particle until the particle dies. The clone is attached to the particle, taking its position from the particle every frame. If Rotation Affects Clones is enabled the clones are rotated by the particle's rotation, which is generated from its velocity. If Scale Affects Clones is enabled the clones are scaled by the size of the particles which is also modulated by the particle alpha, so clones will scale down to 0 as the particle fades out. If Colour Clones is enabled the colours of the particles are transferred to the material colours of the cloned objects.

Example



This image is taken from the "cloner_spheres-b.dfx" sample project.

Example Nodegraph



There is much more to creating this effect, shown here is a section that is specifically relevant to this node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random points from the clone system.
Num Clones	Number of copies of the input object created by the node.
Rotation Affects Clones	The rotation of the source particles affects the cloned objects.
Scale Affects Clones	The scale of the source particles affects the cloned objects.
Colour Clones	The colour of the source particles is copied to the cloned objects.
Clone Scale	Scale the size of all the clones.
Size Randomness	Add randomness to the size of the objects.
Luminanace Randomness	Randomises the luminance values of the clones based on the particle colours. Only functions when “Colour Clones” is enabled.
Rotation Stiffness	How much clones resist rotating.
Scale Stiffness	How much clones resist rotating.
Particle Min Age	Minimum age a particle must have to generate a clone.
Particle Max Age	Maximum age a particle must have to generate a clone.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Mode	Change how the cloned objects UV chanel and Material inputs are affected by the cloner. • Linear (Using Clone Index), Each clone keeps unique UV’s.

	• Use Texture Page (Using Clone Index), Speads the UV's over a number of clones defined by the Texture Num Frames Attribute, and repeats it along the clone index. • Use Texture Page (Using Random Index), Randomises the UV's over the range of clones in the Texture Num Frames Property, and repeats it.
Texture Num Frames X/Y	How many columns and rows to split the UV by.
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/ Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Particle Node	Source particle node for the cloner.	Particle Root
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

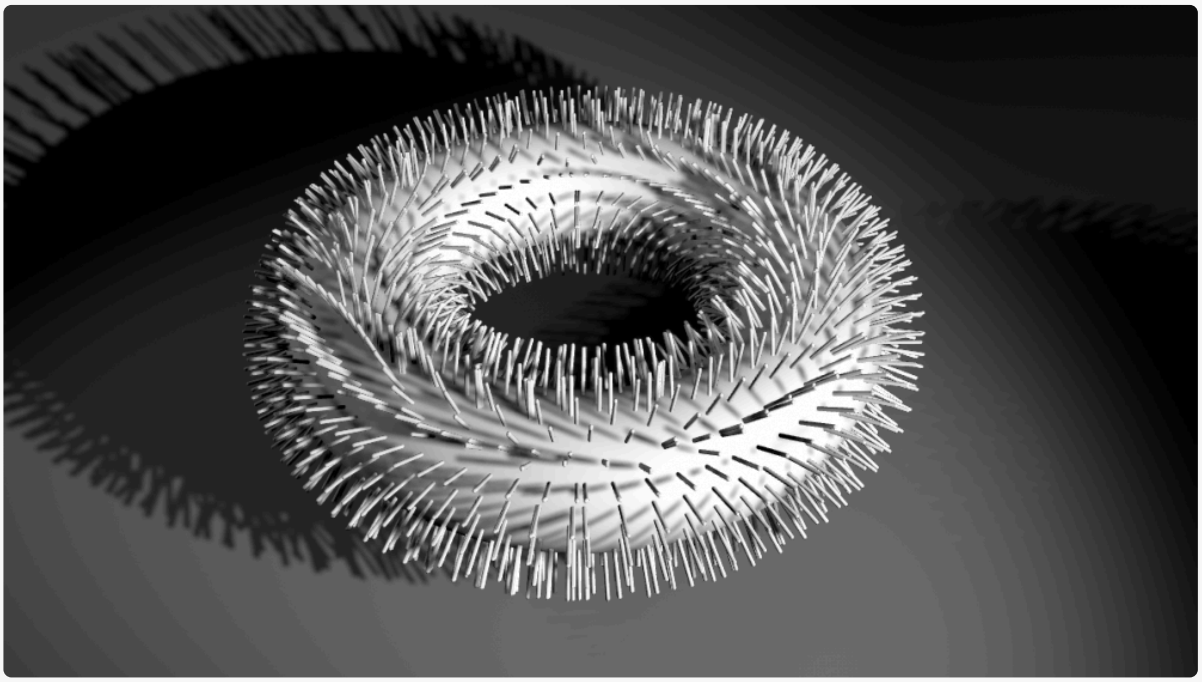
Clone To Point Cache

Method

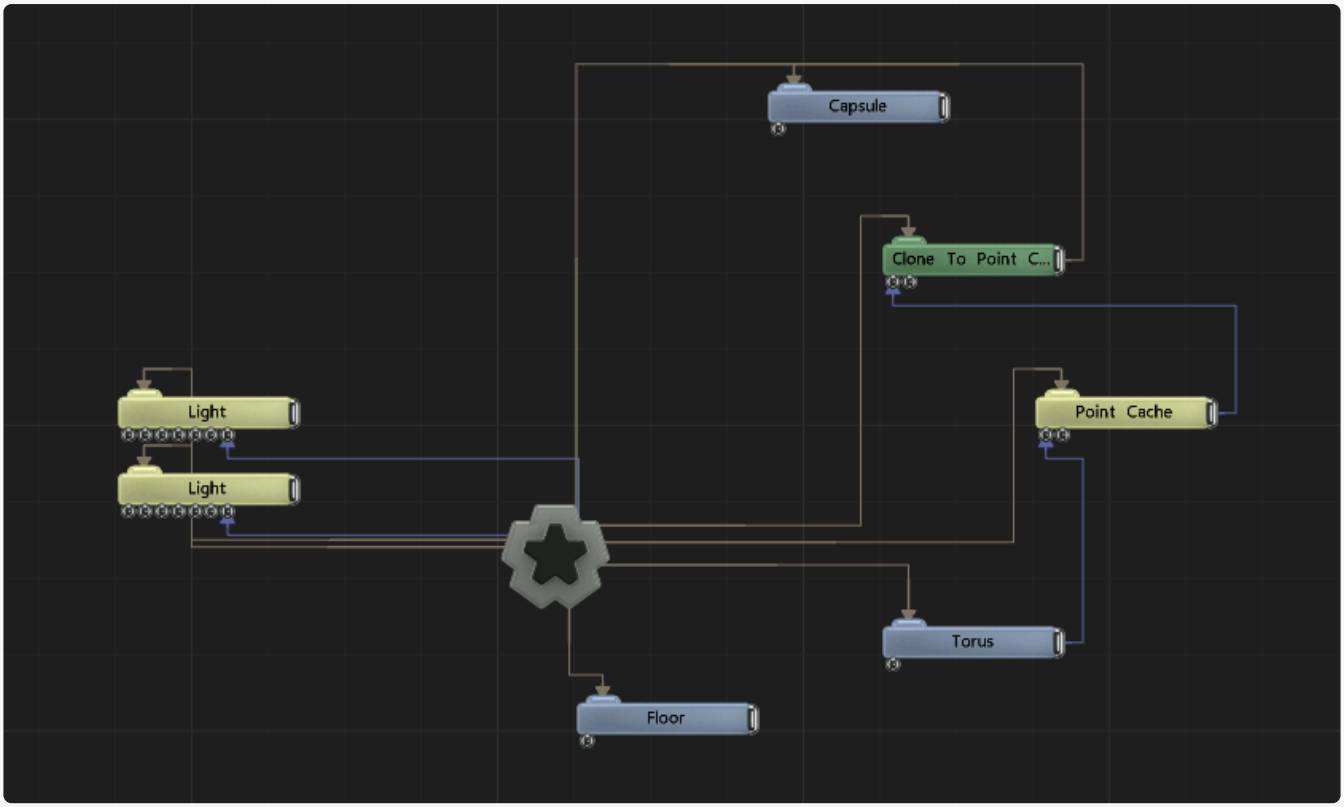
This node clones 3D objects to positions defined by a Point Cache node.

The number of clones is defined by the Num Clones parameter and limited by the total number of points in the Point Cache (accounting for the density attribute set in the Point Cache). If Colour Clones is enabled the colours of the points are transferred to the material colours of the cloned objects.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Rotation Mode	How the clones should be oriented once spawned. • None, Spawned objects ignore the rotation of the source object. • Object, Spawned objects use the rotation of the source object. • Align To Normals, Spawned objects align their rotations with the normals of the object.
Rotation – Heading/ Pitch/Bank	Enable or disable rotation for clones by their heading, rotation or bank.
Clone Scale	Scale the size of all the clones.
Clone Offset From Surface	How far the clones are spawned from the surface of the source object.
Colour Clones	Allow the clones to be coloured at generation
Colour Cutoff Mode	Change how the mesh texture cuts off certain clones. • Luminance, The luminance values of the mesh texture are used. • Alpha, The alpha values of the mesh texture are used. • Luminance * Alpha, Luminance values multiplied by the alpha values are used.
Colour Cutoff	Limit how bright regions of the image must be for the clones to be spawned.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Point Cache	Source points for the cloner.	Point Cache
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

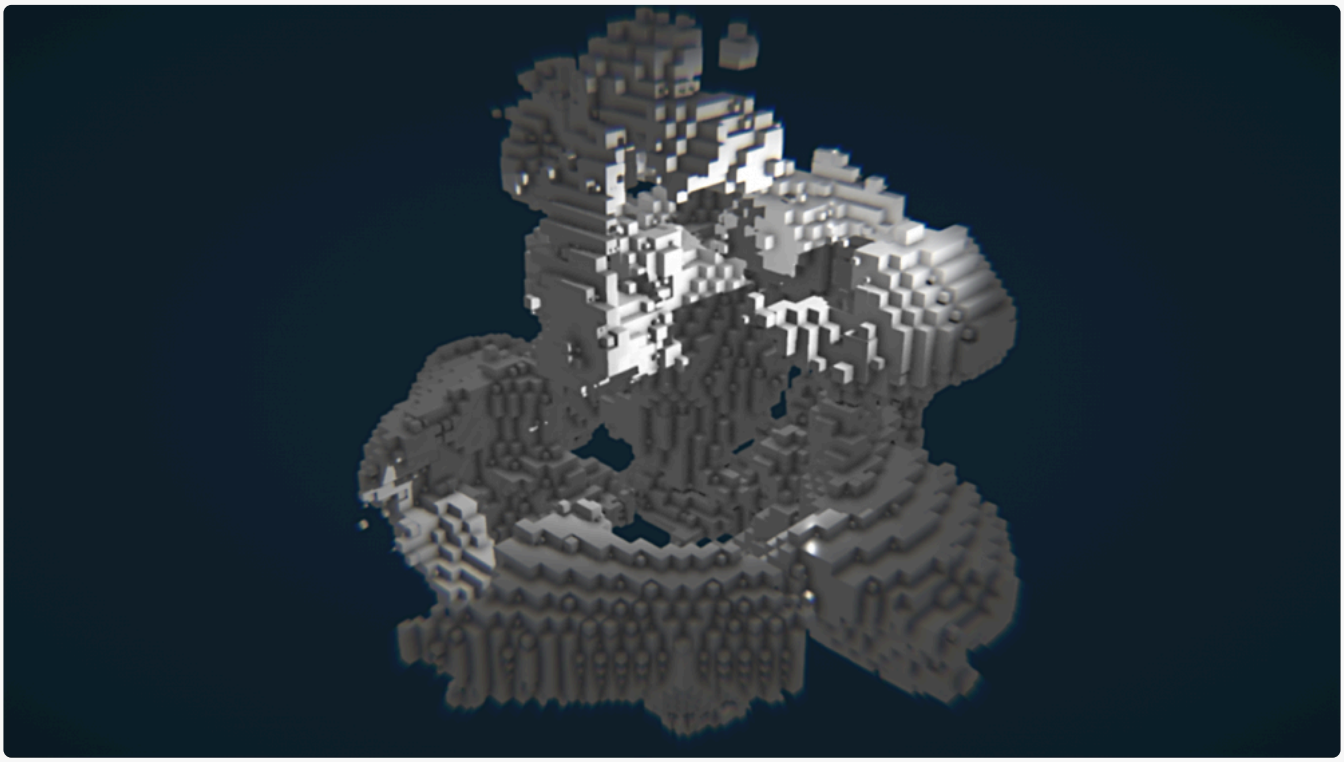
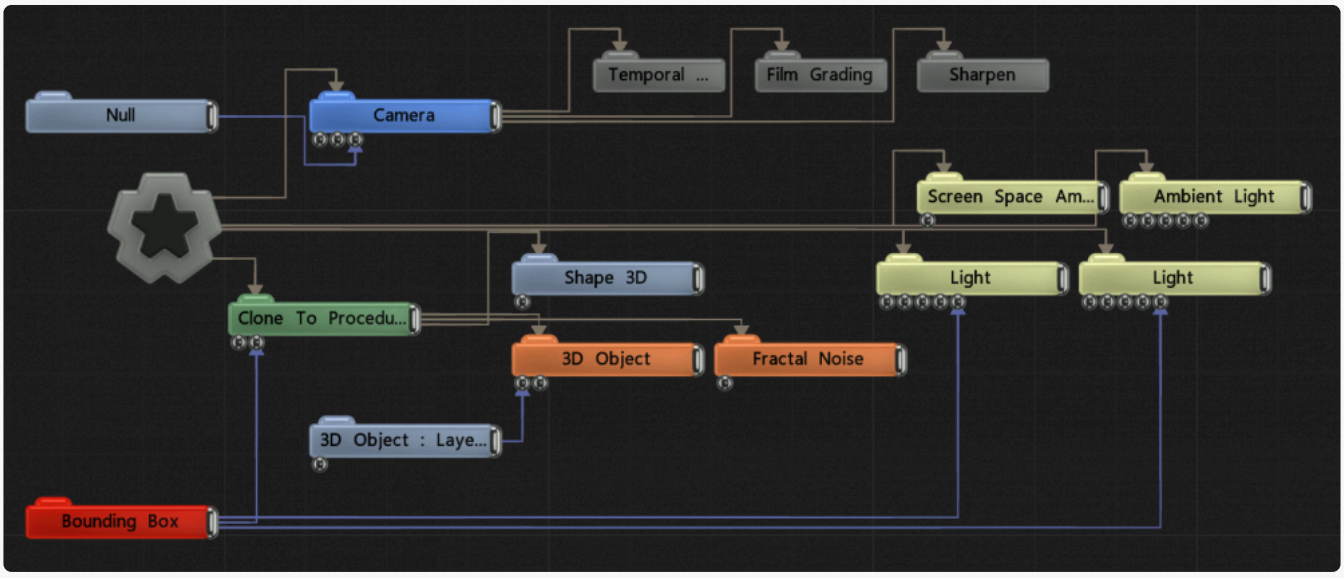
Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

Clone To Procedurals

Method

This node generates a clone system based on the procedural generator nodes. A clone is generated at every voxel inside the field.

Example



Transform

Name	Description
Position X	Changes the x position of all clones from the previous clone.
Position Y	Changes the y position of all clones from the previous clone.
Position Z	Changes the z position of all clones from the previous clone.
Rotation Heading	Changes the x rotation of all clones from the previous clone.
Rotation Pitch	Changes the y rotation of all clones from the previous clone.
Rotation Bank	Changes the rotation of all clones from the previous clone.
Scale X	Changes the x scale of all clones from the previous clone.
Scale Y	Changes the y scale of all clones from the previous clone.
Scale Z	Changes the z scale of all clones from the previous clone.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Num Voxels X / Y / Z	Voxel size along the X, Y, and Z axes.
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random points in the system.
Rotate Clones By Normals	Rotate clones to match the normals of the volume.
Scale Clones By Voxel Size	Scales the cloned objects to match the voxel sizes.
Clone Scale	Scale the size of all the clones.
Distance Threshold	Outer threshold for the distance field.
Min Distance Threshold	Inner threshold for the distance field.

Rotation Stiffness	How much clones resist rotating.
Scale Stiffness	How much clones resist rotating.
Clone Colours	Toggle whether the clones are coloured based on the procedurals colours, or retain their material values.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

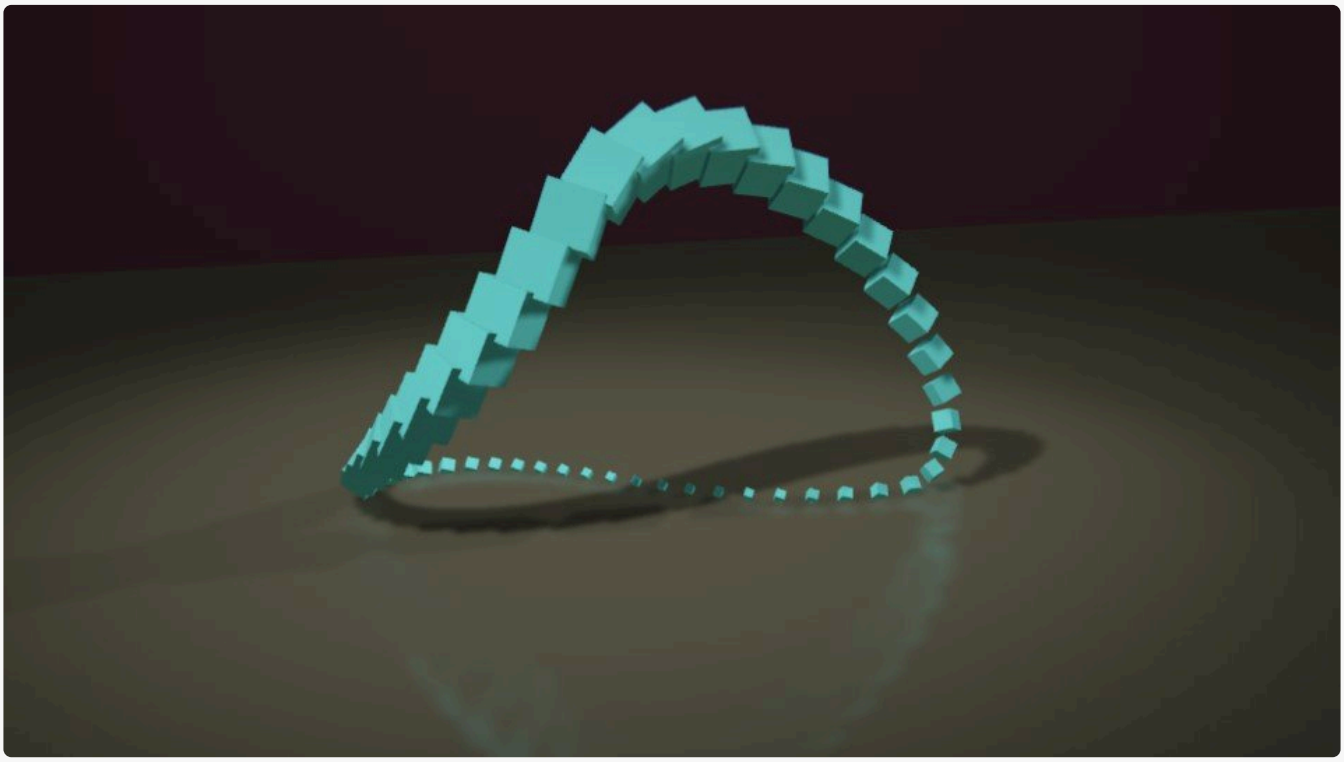
Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

Clone To Spline

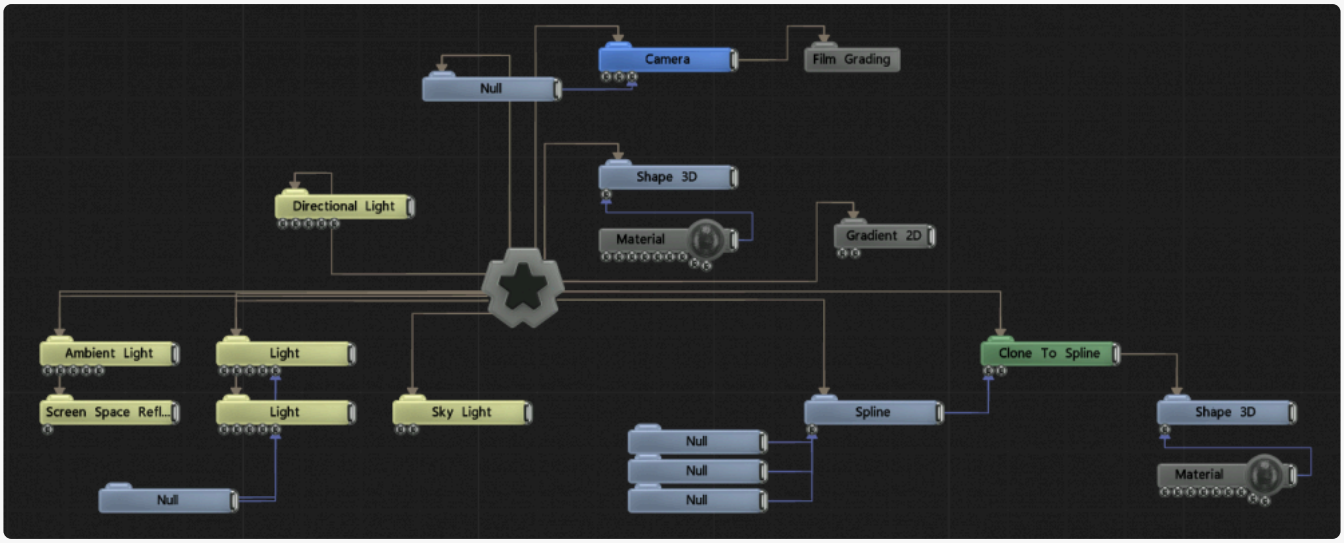
Method

This node is used to clone objects along the spline created by an input Spline node or other source of spline data – for example from a loaded Cinema4D scene.

Example



Example Nodegraph



Transform

Name	Description
Position X	Changes the x position of all clones from the previous clone.
Position Y	Changes the y position of all clones from the previous clone.
Position Z	Changes the z position of all clones from the previous clone.
Rotation Heading	Changes the x rotation of all clones from the previous clone.
Rotation Pitch	Changes the y rotation of all clones from the previous clone.
Rotation Bank	Changes the rotation of all clones from the previous clone.
Scale X	Changes the x scale of all clones from the previous clone.
Scale Y	Changes the y scale of all clones from the previous clone.
Scale Z	Changes the z scale of all clones from the previous clone.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example, the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random

	points from the clone system.
Num Clones	Number of copies of the input object created by the node.
First Clone	Chooses which clone is the first clone generated.
Spline Offset	Offset the clones along the Spline.
Spline Use Amount	What percentage of the Spline should be used
Spline Time Mode	Controls how the Spline Offset moves along the Spline. • Knots, followers take the same amount of time to move between each control point on the spline. • Length, the time followers take to move between each control point is normalised by the distance along the spline, so the follower will appear to move at a constant rate.
Clone Offset From Spline	Randomly offset the clones from the spline.
Clone Scale	Scale all cloned objects, useful for matching large objects to smaller cloner systems.
Rotation Mode	How the clones are rotated relative to the spine.
Rotation – Use Bank	Rotate the clones bank values to follow that of the spline.
Scale Clones By Splines	Scale the clones based on the X scale of each of the Spline control points.
Static Spline Spread	Keep nodes static, so they can be culled using Spline Offset and Spline Use Amount.
Colour Clones	Toggle whether the clones are coloured based on the Splines colour ramp, or retain their material values.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Source Spline	Spline to clone objects along.	Spline
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

Clone To Transform Array

Method

This node generates clones from the currently active elements in a Transform Array node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example, the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random points from the clone system.
Num Clones	Number of copies of the input object created by the node.
First Clone	Chooses which clone is the first clone generated.
Clone Scale	Scale the size of all the clones.

Rotation From Transform Arrays	Rotations will be inherited from the input transform array.
Scales From Transform Array	Scales will be inherited from the input transform array.
Colour Clones	Determines whether colour data from the transform array should be used to colour the clones.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Transform Array Source	Source Object from which all the clones will be generated..	3D Object
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

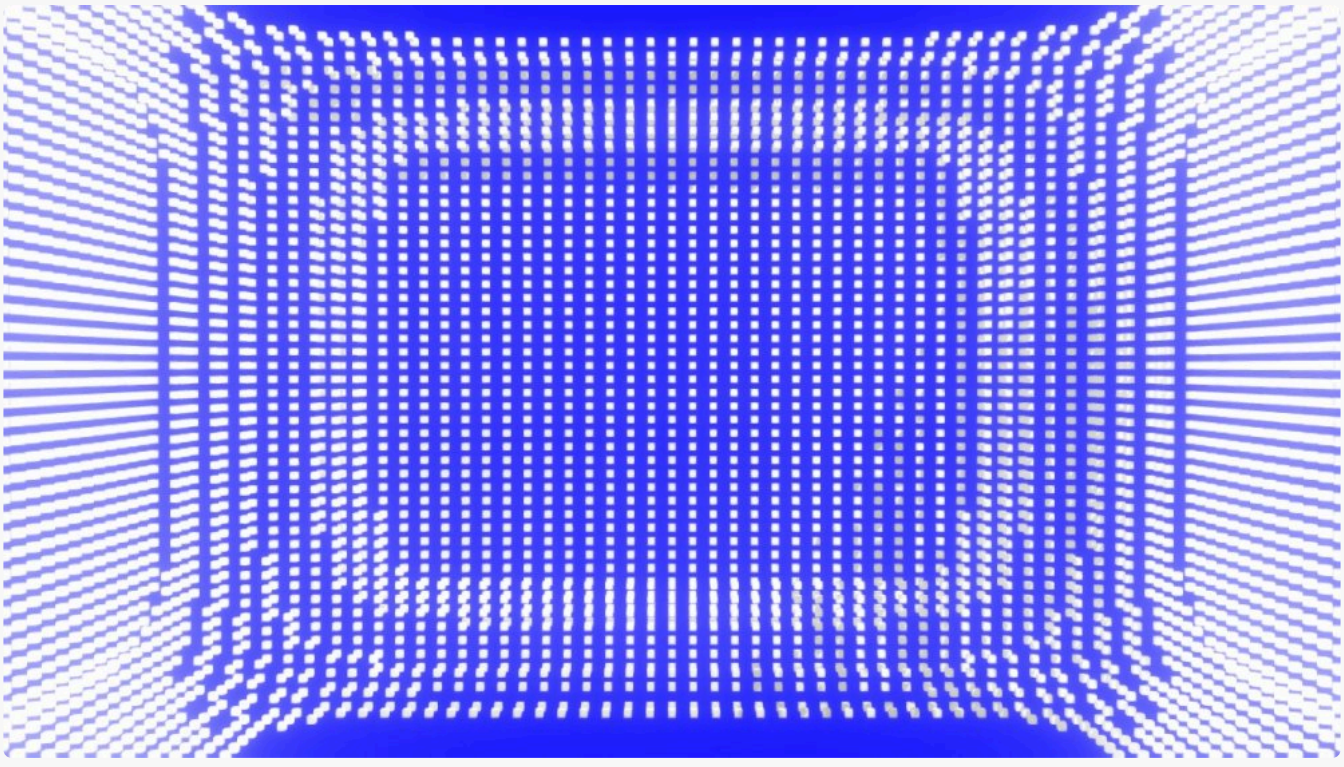
Clone To Volume

Method

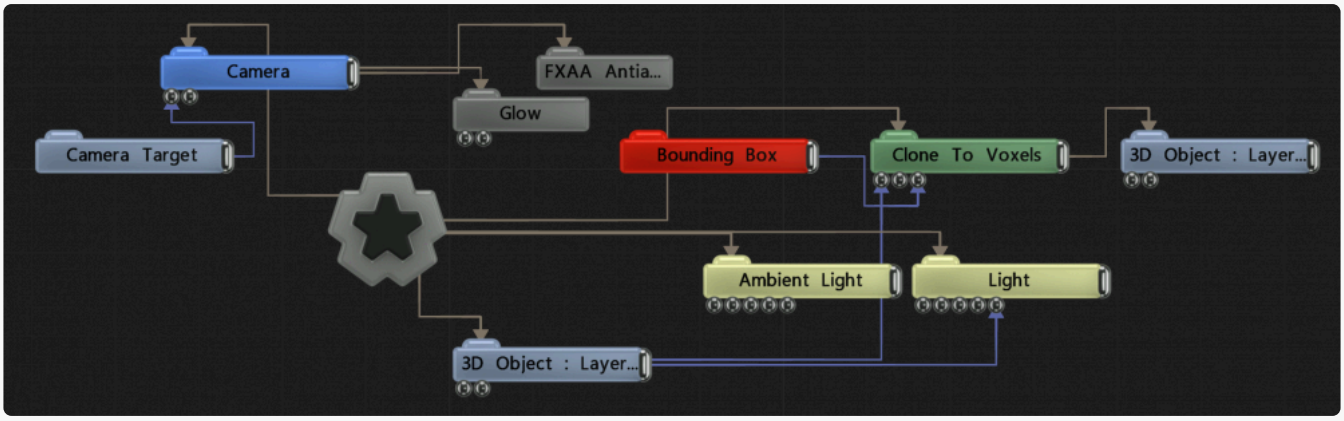
This node clones 3D objects in a regular 3D grid arrangement, using the shape of a 3D object to define the region of space that is filled. The resolution of the grid is defined by the Num Voxels X/Y/Z parameters. A 3D object node must be connected to the Source Objects input to define the voxelised shape the clones are arranged in for this node to be operational. The connected node must be either a 3D Object, a 3D Shape or a Text node. The object must be active in the scene by being connected to a valid path to the root node.

If Scale Clones By Voxel Size is selected the clones are automatically scaled so that a unit cube would fit a single voxel cell. If Rotate Clones By Normals is selected the clones are orientated so that they face along the normal direction of the closest point on the mesh to each voxel.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Num Voxels X / Y / Z	Voxel size along the X, Y, and Z axes.
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example, the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at

	random points from the clone system.
Rotate Clone by Normals	Rotate clones to match the normals of the volume.
Scale Clones By Voxel Size	Scales the cloned objects to match the voxel sizes.
Clone Scale	Scale the size of all the clones.
Rotation Stiffness	How much clones resist rotating.
Scale Stiffness	How much clones resist rotating.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Source Objects	Source Object from which all the clones will be generated..	3D Object
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

Cloner

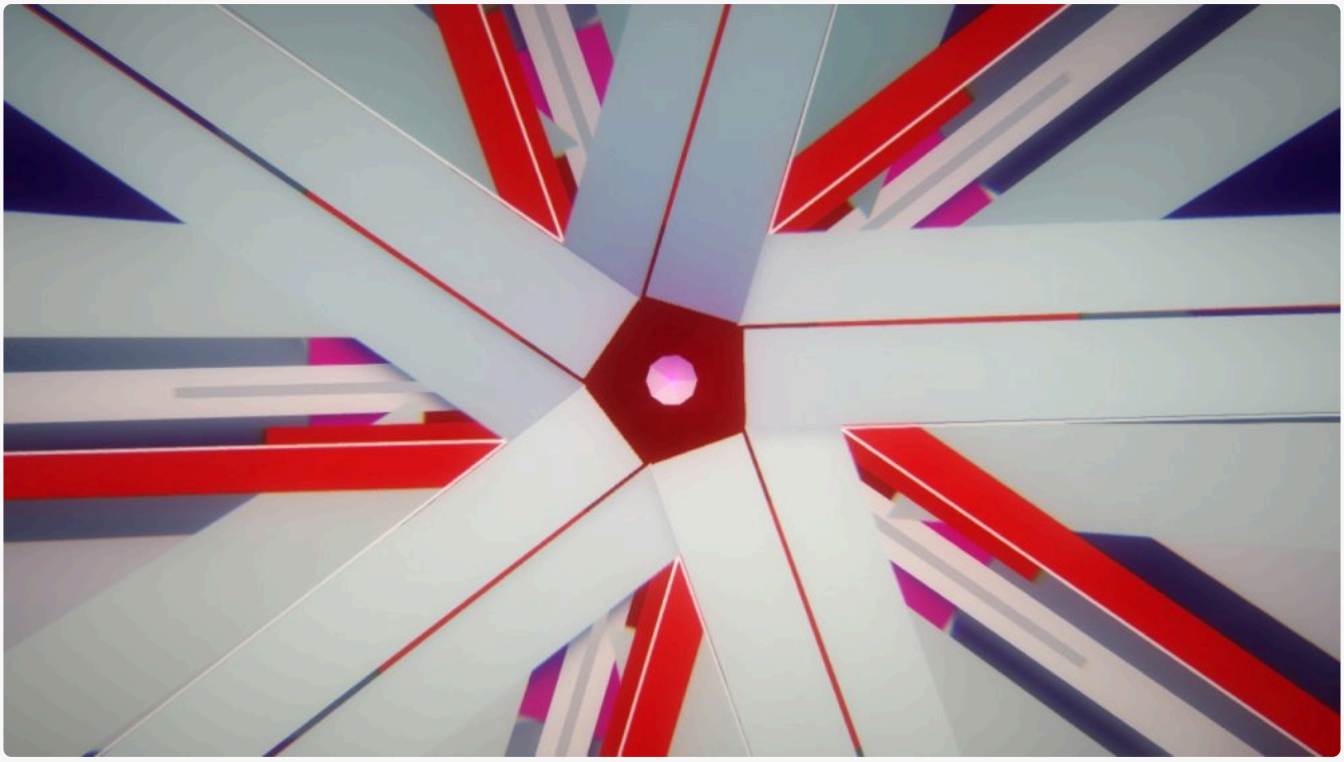
Method

This node clones 3D objects in a regular pattern in one of several ways depending on the Mode parameter. In Iterative Cloning mode, the Cloner node's transform is applied iteratively so each clone is offset from the one before it. In Radial mode, clones are arranged in a radial pattern, linearly distributed around a ring in an angle segment defined by the Radial Start Angle and Radial End Angle parameters. In Grid mode, clones are generated in a 3D grid pattern that may additionally be constrained to a sphere or cylinder shape. The number of cells in the grid is defined by the Grid Count parameters and the area over which the clones are distributed is defined by the Grid Size parameters.

In Iterative Cloning mode, the Transform parameters define the transform that is applied as a delta between the location of the last clone and the next. In Radial and Grid mode the Transform parameters transform the location of the ring or grid. In Iterative Cloning mode, it is possible to control the effect of transform rotations or scales on the individual clones. The Rotation Affects Position and Scale Affects Position parameters determine whether the rotation and scale of the Transform affect the positions of the clones. The Rotation Affects Clone Rotation and the Scale Affects Clone Scale parameters determine whether the transform's rotation and scale cause clones to be rotated and scaled. For example, a ring shape of unrotated clones can be created by applying rotation in the Transform, enabling Rotation Affects Position and disabling Rotation Affects Clone Rotation.

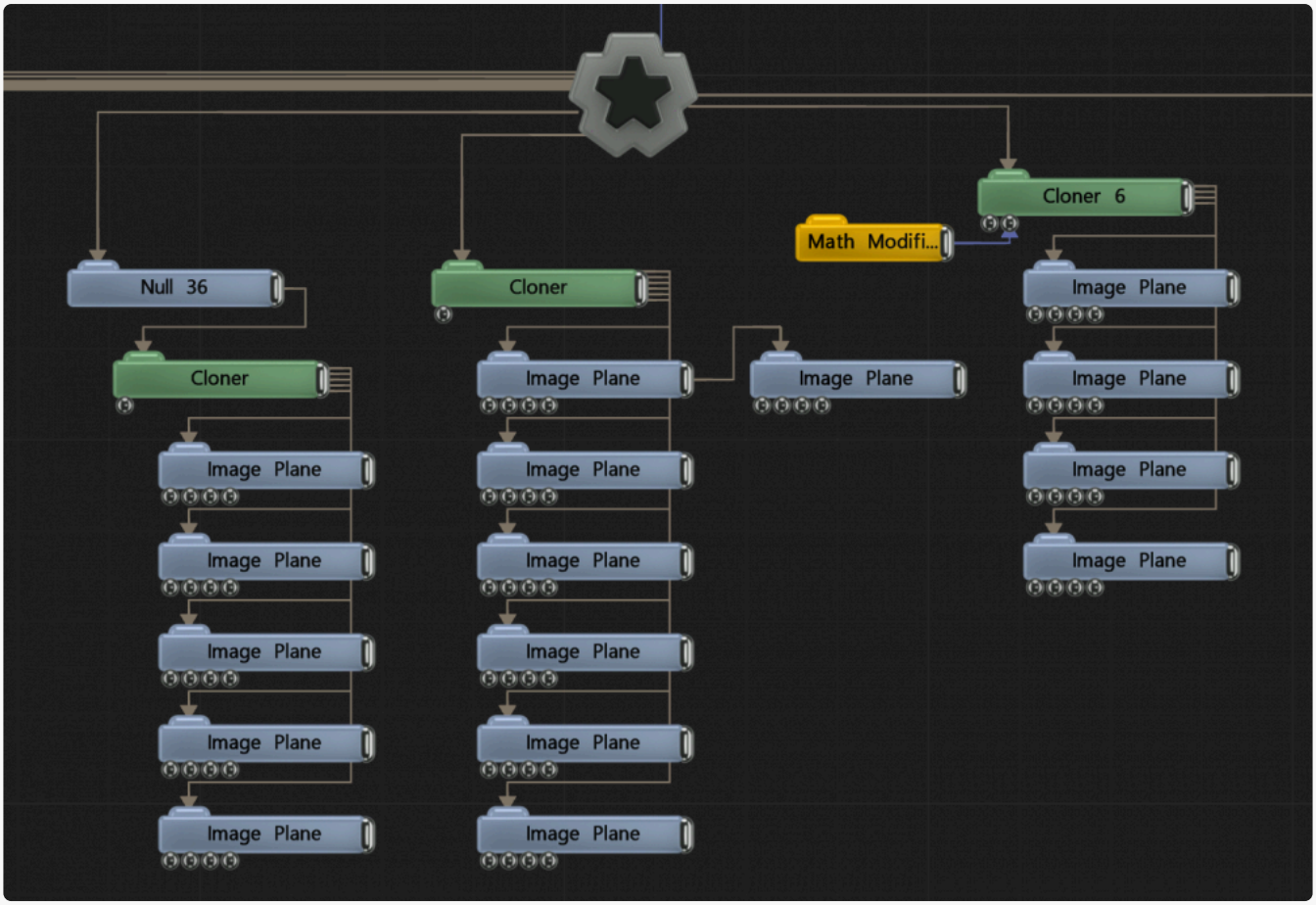
It is also possible to iteratively modify certain Material properties of the rendered objects for each clone, using the UV Clone Deltas parameters. These allow the UV Scale and Offset and the UV Crop material parameters to be offset for each clone so that for example each clone reads a different part of its material texture.

Example



This image is taken from the “cloner_imageplanes.dfx” sample project.

Example Nodegraph



There is much more to creating this effect, shown here is a section that is specifically relevant to this node.

Transform

Name	Description
Position X	Changes the x position of all clones from the previous clone.
Position Y	Changes the y position of all clones from the previous clone.
Position Z	Changes the z position of all clones from the previous clone.
Rotation Heading	Changes the x rotation of all clones from the previous clone.
Rotation Pitch	Changes the y rotation of all clones from the previous clone.
Rotation Bank	Changes the rotation of all clones from the previous clone.
Scale X	Changes the x scale of all clones from the previous clone.
Scale Y	Changes the y scale of all clones from the previous clone.
Scale Z	Changes the z scale of all clones from the previous clone.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mode	Change how the clones are arranged after being spawned. • Iterative Cloning, The Cloner node's transform is applied sequentially, so each clone is translated, scaled and rotated from the previous using the Transform values. • 3D Grid, the clones are generated in a 3D Grid. • Radial, The clones are generated in a radial pattern.
Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example, the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random points from the clone system.
Num Clones	Number of copies of the input object created by the node.
First Clone	Chooses which clone is the first clone generated.
Rotation Affects Position	The rotation of the child object affects the position of the clones.
Scale Affects Position	The scale of the child object affects the position of the clones.
Rotation Affects Clone Rotation	The rotation of the clones increases with each clone added.
Scale Affects Clone Scale	The scale of the new clone increases with each clone added.

Grid

Only functions if "3D Grid" is selected in the "Mode" attribute.

Name	Description
Grid Count X	Number of sections in the grid in the X axis.
Grid Count Y	Number of sections in the grid in the Y axis.

Grid Count Z	Number of sections in the grid in the Z axis.
Grid Size X	The size of the grid in the X axis. The clones are distributed evenly within this size limit.
Grid Size Y	The size of the grid in the Y axis. The clones are distributed evenly within this size limit.
Grid Size Z	The size of the grid in the Z axis. The clones are distributed evenly within this size limit.
Grid Stagger X	Offset alternating clones along the X axis.
Grid Stagger Y	Offset alternating clones along the Y axis.
Grid Stagger Z	Offset alternating clones along the Z axis.
Grid Fill	How much of the grid is filled in, in its centre.
Grid Type	Which type of grid is generated. • Cubic, The clones are arranged in a regular grid inside a cube. • Spherical, The clones are arranged in a regular grid inside a sphere. • Cylindrical, The clones are arranged in a regular grid inside a cylinder.
Grid Size Mode	Changes how the Grid Size X/Y/Z affect the clones. • Total Size, Controls the whole size of the grid. • Size Per Clone, Controls the distance between clones on the grid.

Radial

Only functions if “Radial” is selected in the “Mode” attribute.

Name	Description
Radius	The radius of the ring shape.
Radial Start Angle	The angular location of the first clone around the ring.
Radial End Angle	The angular location of the last clone around the ring.
Radial Plane	The planar axis in which the ring is positioned.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone’s material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone’s material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone’s material.

Inputs

Name	Description	Typical Node Input
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

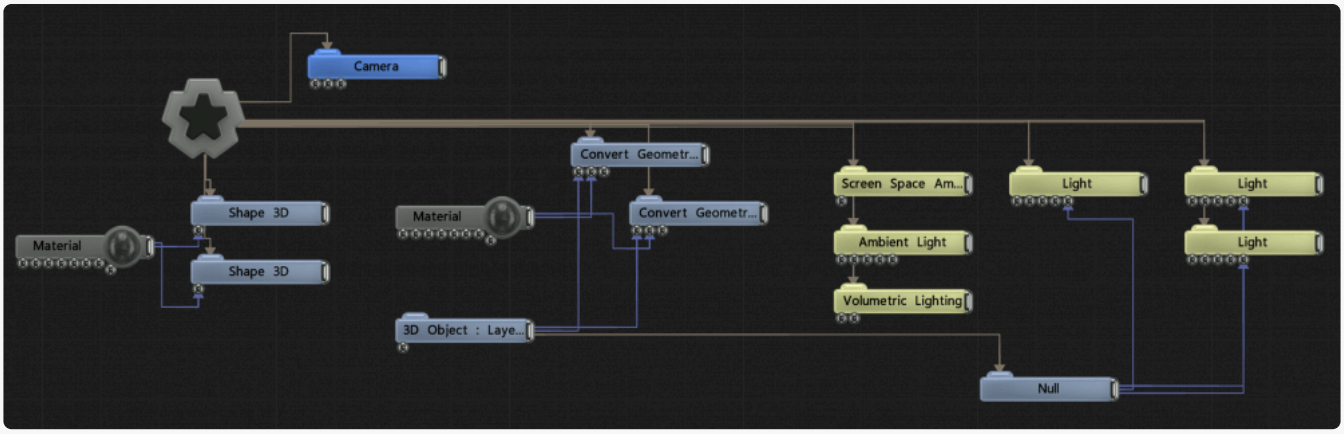
Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

Convert Geometry To Boxes

Method

This node generates boxes spawned over the surface of an input object. The boxes are spawned based on one axis, which can be chosen from the axis attribute. They will also re-scale and warp to fit the surface of the input object. The boxes can then be affected by Clone Effectors via the Effectors input.

Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Visible	Control whether the node is visible or not to the scene.
Block Size	Change the size of the boxes.
Axis	Which axis the blocks are spawned from.

Material

See Materials.

Inputs

Name	Description	Typical Node Input
Source Object	Source Object which dictates where the boxes will be generated.	3D Object
Effectors	Manipulates the clones after they are spawned.	Plain Effector
Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

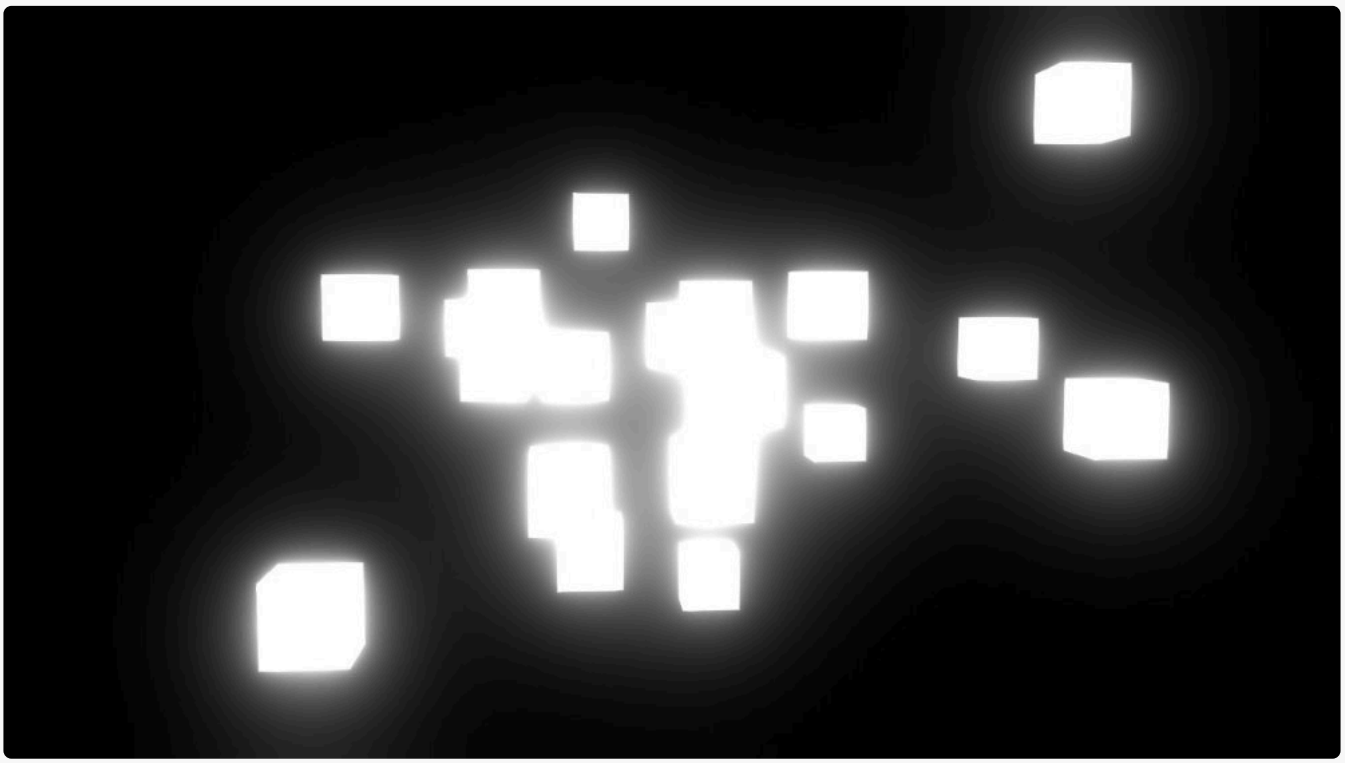
The outputs section for this node is currently being worked on.

Random Cloner

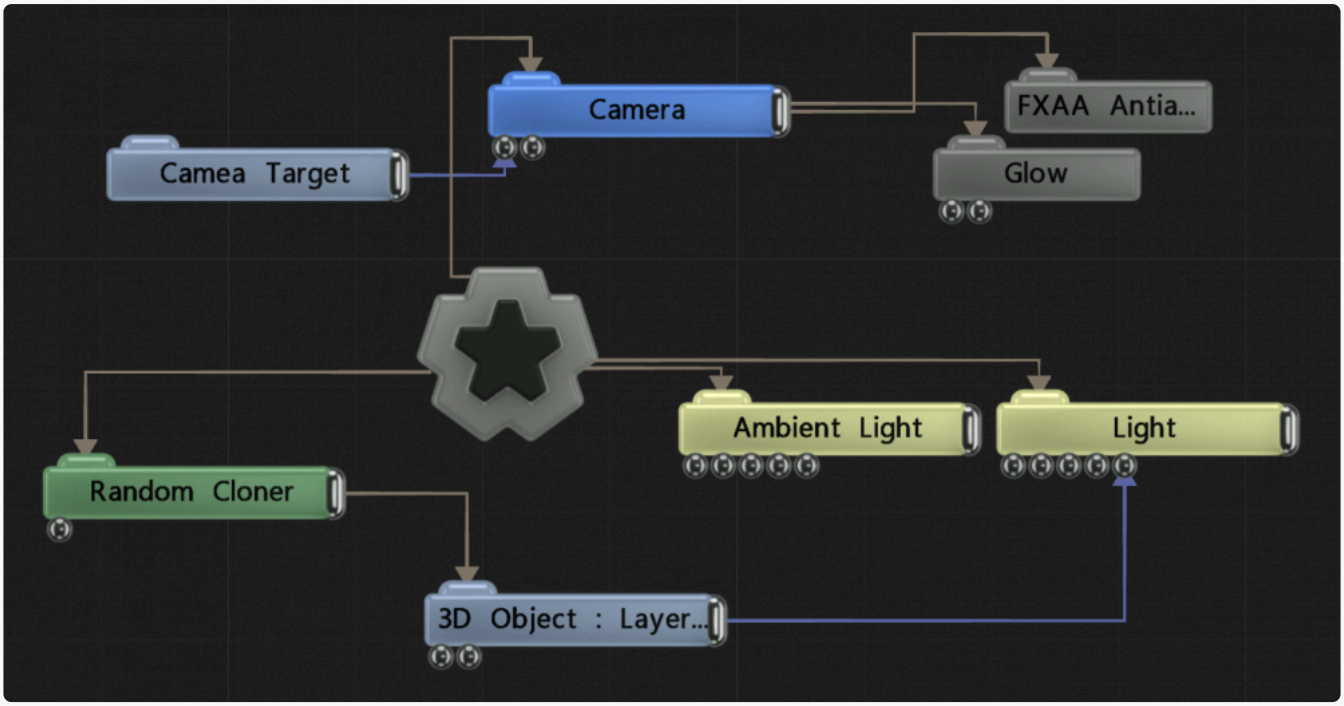
Method

Clones an object and gives the new clones random positions within a specified area.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Num Clones	Number of copies of the input object created by the node.

Node Spawn Mode	Change the order in which the cloned objects are assigned to individual clone instances. • All, All of the connected objects are rendered for every clone. • Iterate, The objects are rendered sequentially by clone. For example, the first clone renders the first object, the second clone renders the second object and so on. • Random, The objects are rendered randomly by clone, and are generated at random points from the clone system.
Clone Scale	Scale the size of all the clones.
Scale Randomness	Adds randomness to each clones scale.
Spread X	How much the objects positions are spread across X axis.
Spread Y	How much the objects positions are spread across Y axis.
Spread Z	How much the objects positions are spread across Z axis.
Spread Heading	How much the objects rotations are spread across X axis.
Spread Pitch	How much the objects rotations are spread across Y axis.
Spread Bank	How much the objects rotations are spread across Z axis.
Rotate Clones	Enable the cloner to rotate clones.
Scale Clones	Enable the cloner to scale clones.
Seed	Select a random seed for the cloner generation.

UV Clone Deltas

These parameters apply offsets to the UV Offset / UV Scale / Crop parameters of the materials of each rendered clone.

Name	Description
UV Scale X/Y Delta	Relative change to the uv scale of the clone's material.
UV Offset X/Y Delta	Relative change to the uv offset of the clone's material.
Crop Left/Right/Top/Bottom Delta	Relative change to the crop on each side of the clone's material.

Inputs

Name	Description	Typical Node Input
Effector	Manipulates the clones after they are spawned.	Plain Effector
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Nodes that are to be cloned by a Cloner should be connected to the output of this node. 3D Objects, 3D Shapes, and Image Planes may be connected, as well as other Cloners.

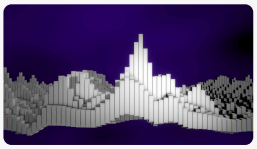
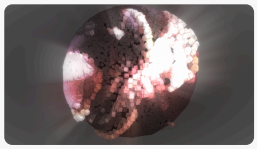
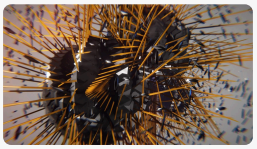
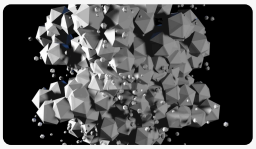
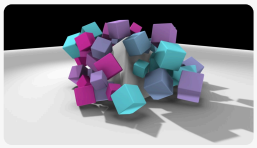
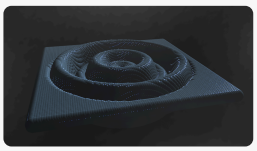
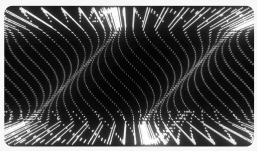
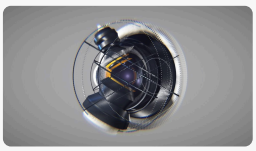
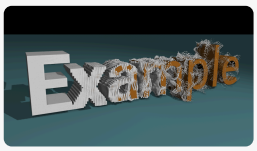
Effectors

Method

Effector nodes modify the transformation values of clones in cloner node systems.

Effectors are hooked into Cloning nodes as inputs.

Gallery

				
FFT Effector	Image Effector	Plain Effector	Randomise Effector	Rigid Body Effector
				
Ripple Effector	Sine Effectors	Spring Effector	Target Effector	Turbulence Effector

- Colour Ramp Effector
- Kill Box Effector
- Quantise Effector
- Randomise Effector

Colour Ramp Effector

Method

This node modifies the colour values of connected cloner systems based on an input Colour Ramp.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the Effector is processed. • Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Color Blend Amount	How much the colour blends with the original clones colour.
Source Channel	What property of the clones in relation to the effector should be used to dictate colour.

	• Position X / Y / Z, Clones are coloured based on their X, Y or Z position. • Distance, Clones are coloured based on their radial distance from the effector. • Fractal Noise, Clones will be coloured based on a simple fractal noise function. • Clone Index, Clones will be coloured based on their index. • Random Value, Clones are coloured completely randomly with the input colour ramp.
Source Scale	Scale the size of the source Colour Ramp.
Source Offset	Offset the values from the source Colour Ramp.
Modulate Function	The method by which the colour ramp is sampled / repeated. • Clamp, The sample locations are clamped from 0 to 1. • Repeat, The sample locations are repeated. • Sine, The sample locations are modulated with a sine wave.
Noise Scale	Scale the size of any noise generated. Only functions with Fractal Noise selected in the Source Channel Attribute.
Lacunarity	How large the gaps between the generated noise is. Only functions with Fractal Noise selected in the Source Channel Attribute.
Gain	The smoothness of the generated noise. Only functions with Fractal Noise selected in the Source Channel Attribute.
Animation Rate	The speed at which the noise is animated. Only functions with Fractal Noise selected in the Source Channel Attribute.
Update Time Mode	Change how the clones are affected with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated separated to the timecode.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.

Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Uniform Scale	Scale the clones by the same value along all axes.
Apply To Position	Apply the position changes from the cloner to the clones.
Apply To Rotation	Apply the rotation changes from the cloner to the clones.
Apply To Scale	Apply the scale changes from the cloner to the clones.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation . • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the

	clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Controls the colours and ranges of colours used for this effect.	Colour Ramp
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

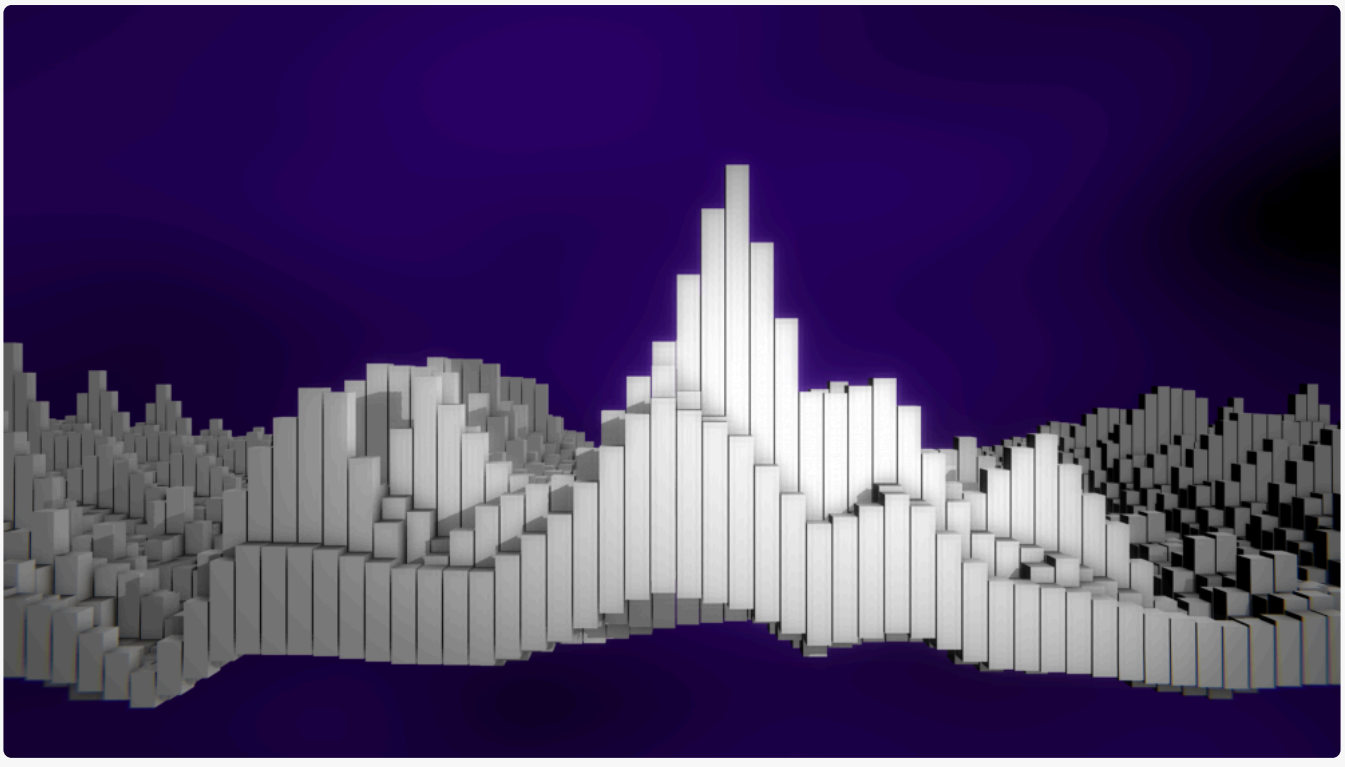
FFT Effector

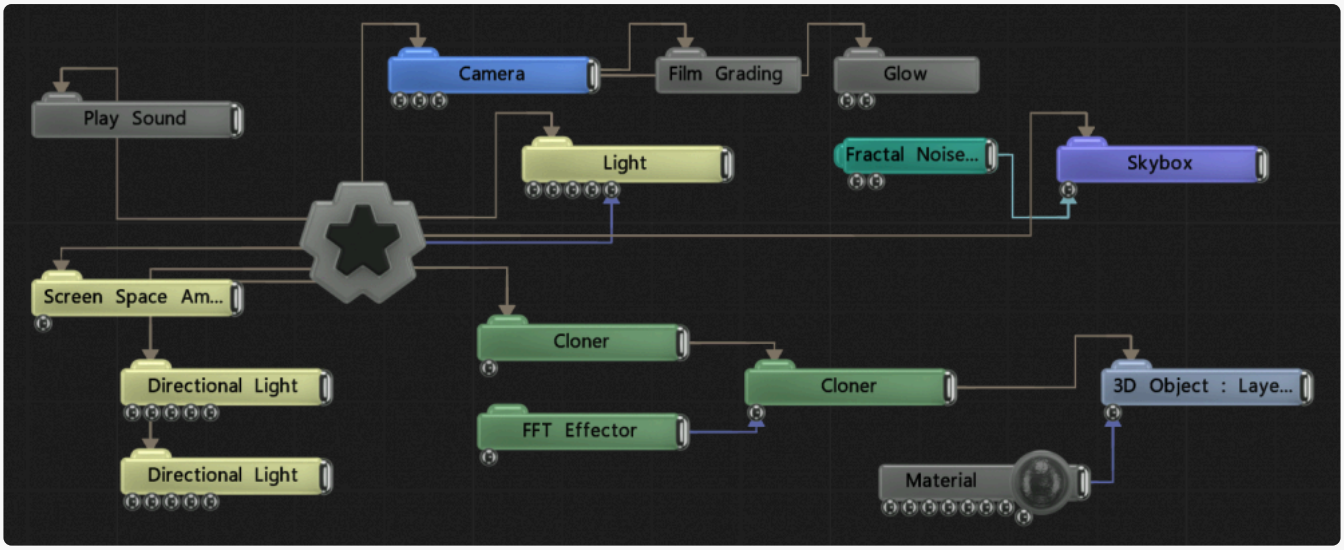
Method

This node applies a rotation, scale and translation to clones based on the analysis of an audio input or file. The waveform is processed using a set of parameters in the same way as the Sound Modifier.

The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones. The amount the translation, scale and rotation are applied to each clone is weighted depending on the falloff function. The effector's falloff is generated using the effector node's transform and the Falloff parameters. The falloff shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
The way in which the effector's rotation, scale and translation are applied to the clone is determined by the Position/Rotation/Scale Apply Mode parameters.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed. • Node, use the cloner's transform space.

	• Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Sound	Sound file used to drive the effect.
Channel	Which audio channel is used.
Frequency Band	Sets the Band EQ to one of the given presets.
Band EQ	Selects and weights the frequency bands to be used from the sound file.
Time Offset	Offset the time the clones are modified from the time the waveform is at.
Change Threshold	Changes the threshold for what counts toward the effect.
Attack	Controls the initial time between the current values to the peak.
Decay	Controls the time between the peak to the sustain level.
Min Value	Acts as a minimum threshold for extracting a range of values from the waveform.
Max Value	Acts as a maximum threshold for extracting a range of values from the waveform.
Max Clamp	A maximum value which values will be clamped if they go above.
Spikiness	Accentuates peaks in the waveform so they are sharper.
Scale	How much the output values are scaled.
Smoothness	How much smoothing is applied between differing values.
FFT Sample Scale	Scale the size of the waveform as it is applied.
Waveform	Visualises the waveform of of the sound.
Direction	Control how the FFT is applied to the Cloner system. • Linear, The bands are spread along the x axis, and time progresses in the positive z axis. • Radial, The bands spread out radially around the z axis, and time progresses in the positive z axis. • Spherical, The bands spread out radially around the z axis, and time progresses in the negative z axis. Only position x is used to affect the clones.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area.

	• Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Uniform Scale	Scale the clones by the same value along all axes.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation. • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.

Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.

Inputs

Name	Description	Typical Node Input
Sound	Use an input sound to override the sound attribute.	Play Sound
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

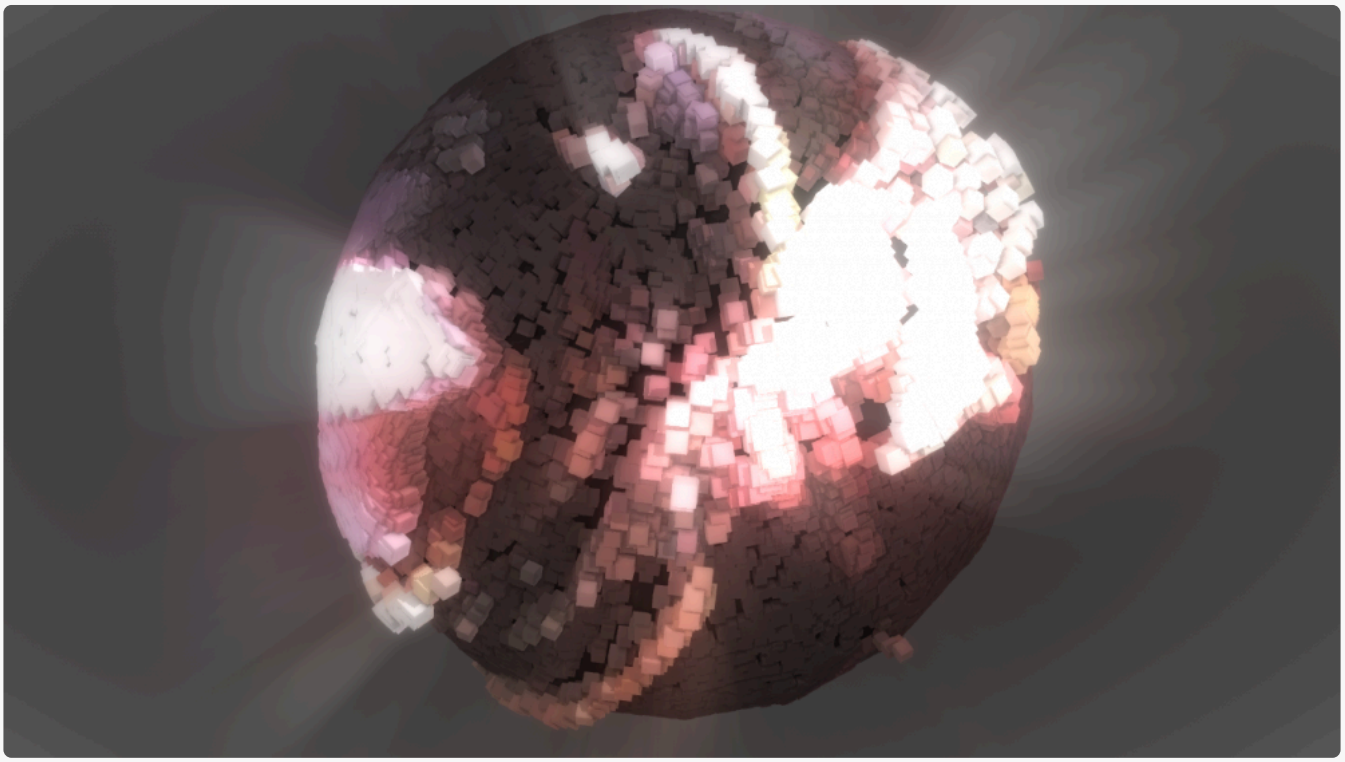
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

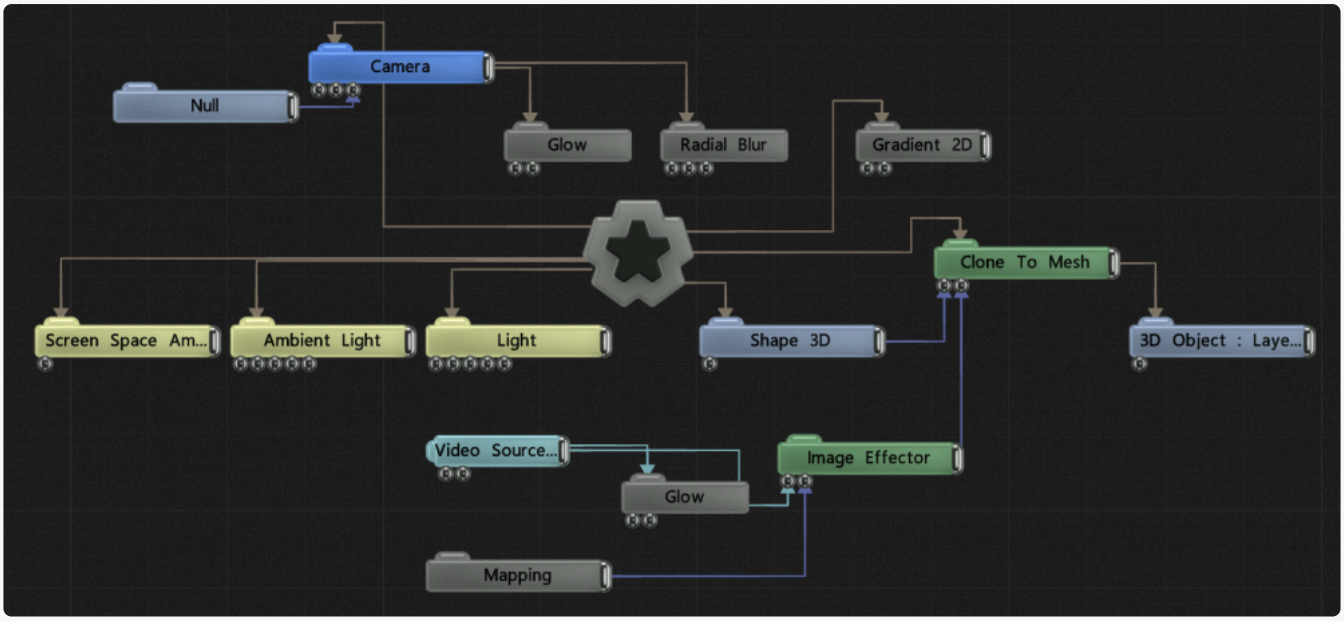
Image Effector

Method

This node changes the transformation and colour properties of a clone system based on an input image. The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones. The Effector's falloff is generated using the Effector node's transform and the falloff parameters. The Falloff Shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
Using a mapping node as an input, you can change the way that the image is mapped to all the clones in the system.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed.

	• Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Colour Blend Amount	How much the clones colours are blended with the image's colour.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Uniform Scale	Scale the clones by the same value along all axes.

Apply To Position	Apply the position changes from the cloner to the clones.
Apply To Rotation	Apply the rotation changes from the cloner to the clones.
Apply To Scale	Apply the scale changes from the cloner to the clones.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation. • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.

Inputs

Name	Description	Typical Node Input
Image Node	Add an image to effect the clones.	Image Plane
Mapping	Changes How the image is mapped to the effected clones.	Mapping
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Kill Box Effector

Method

This node limits areas that clones can be spawned in, using shapes described in the Falloff Attribute section.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed. • Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

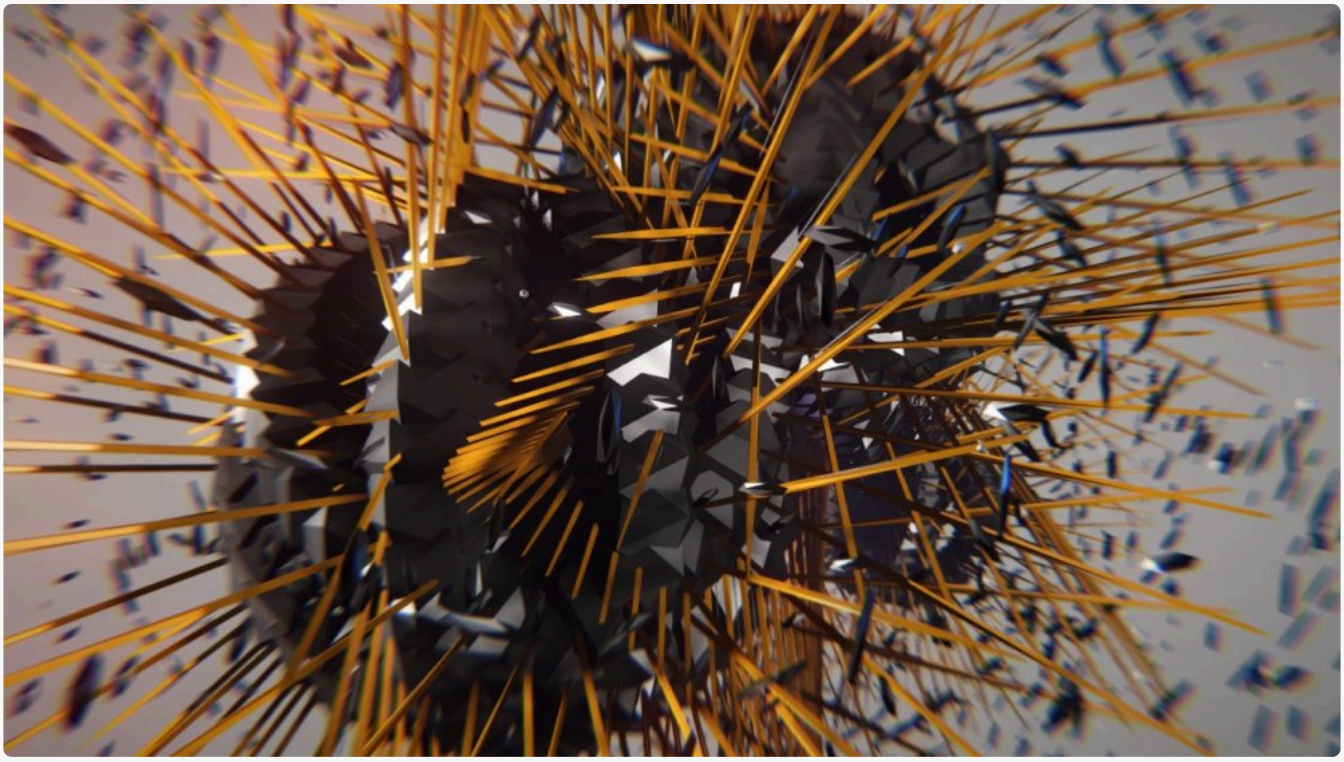
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Plain Effector

Method

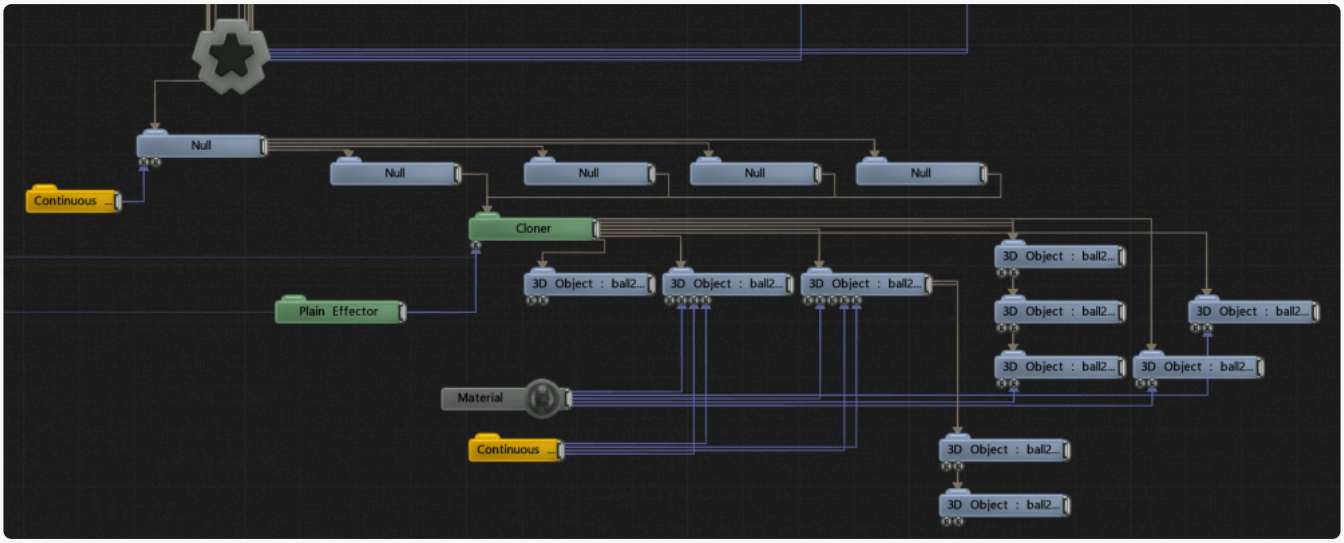
This node applies a rotation, scale and translation to every clone. The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones.
The amount the translation, scale and rotation are applied to each clone is weighted depending on the falloff function. The effector's falloff is generated using the effector node's transform and the Falloff parameters. The falloff shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
The way in which the effector's rotation, scale and translation are applied to the clone is determined by the Position/Rotation/Scale Apply Mode parameters.

Example



This image is taken from the "cloner_instancing" sample project.

Example Nodegraph



There is much more to creating this effect, shown here is a section that is specifically relevant to this node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed.

	• Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Uniform Scale	Scale the clones by the same value along all axes.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone

	position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation. • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Quantise Effector

Method

This node restricts the possible range of values a clone can be translated, rotated, or scaled to. The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones.
The amount the translation, scale and rotation are applied to each clone is weighted depending on the falloff function. The effector's falloff is generated using the effector node's transform and the Falloff parameters. The falloff shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
The way in which the effector's rotation, scale and translation are applied to the clone is determined by the Position/Rotation/Scale Apply Mode parameters.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.

Space	The transform space in which the effector is processed. • Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Uniform Scale	Scale the clones by the same value along all axes.
Apply To Position	Apply the position changes from the cloner to the clones.
Apply To Rotation	Apply the rotation changes from the cloner to the clones.

Apply To Scale	Apply the scale changes from the cloner to the clones.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

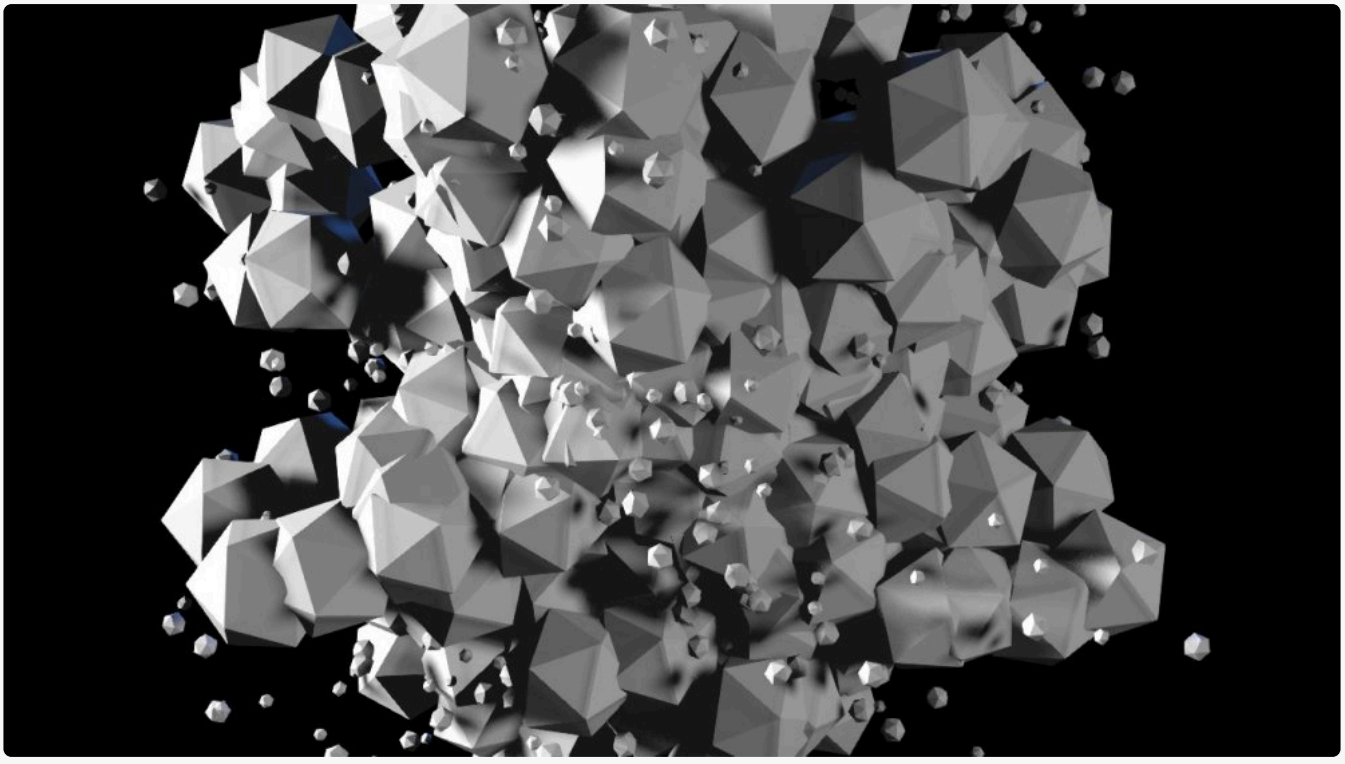
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Randomise Effector

Method

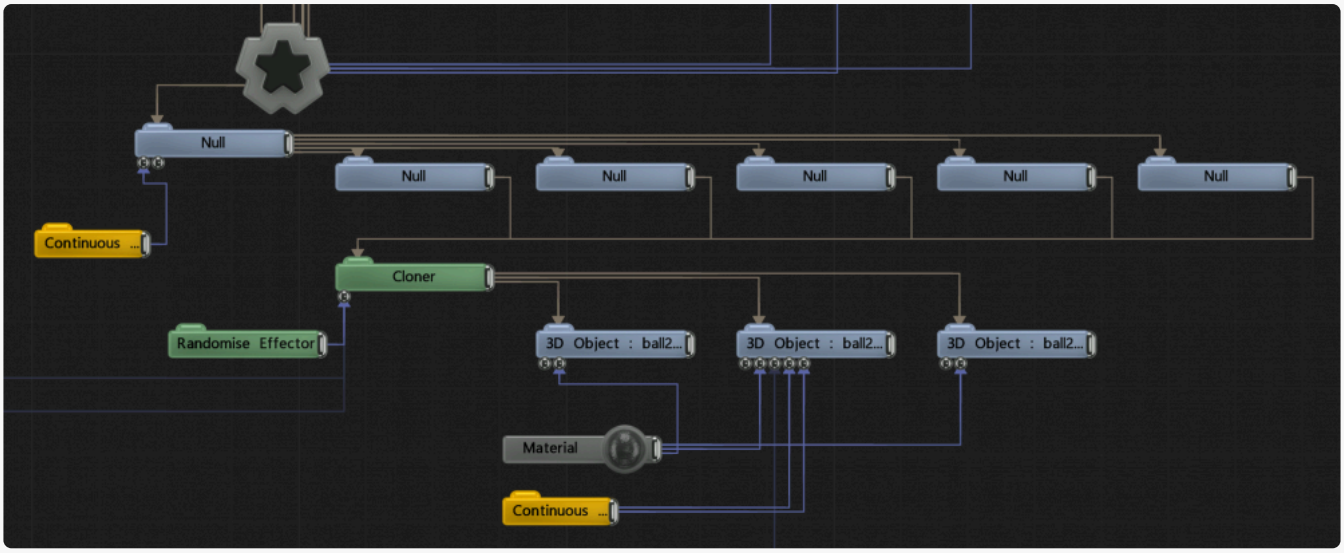
This node applies a randomised rotation, scale and translation to every clone. The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones; these values are used as ranges for generated random values. The random values are generated from a seed and the clone index, so are consistent between frames.
The amount the translation, scale and rotation are applied to each clone is weighted depending on the falloff function. The effector's falloff is generated using the effector node's transform and the Falloff parameters. The falloff shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
The way in which the effector's rotation, scale and translation are applied to the clone is determined by the Position/Rotation/Scale Apply Mode parameters. The Uniform Random Scale parameter uses the same random value for each channel of the applied scale, so the randomness of the scale of the clones will be uniform rather than differing per channel.

Example



This image is taken from the "cloner_instancing" sample project.

Example Nodegraph



There is much more to creating this effect, shown here is a section that is specifically relevant to this node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed.

	• Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Uniform Scale	Scale the clones by the same value along all axes.
Apply To Position	Apply the position changes from the cloner to the clones.

Apply To Rotation	Apply the rotation changes from the cloner to the clones.
Apply To Scale	Apply the scale changes from the cloner to the clones.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation. • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.
Uniform Random Scale	Use the same generated random value for each axis of scaling, so clones will be randomly scaled uniformly.
Seed	Select the random seed to generate randomised transformations from.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

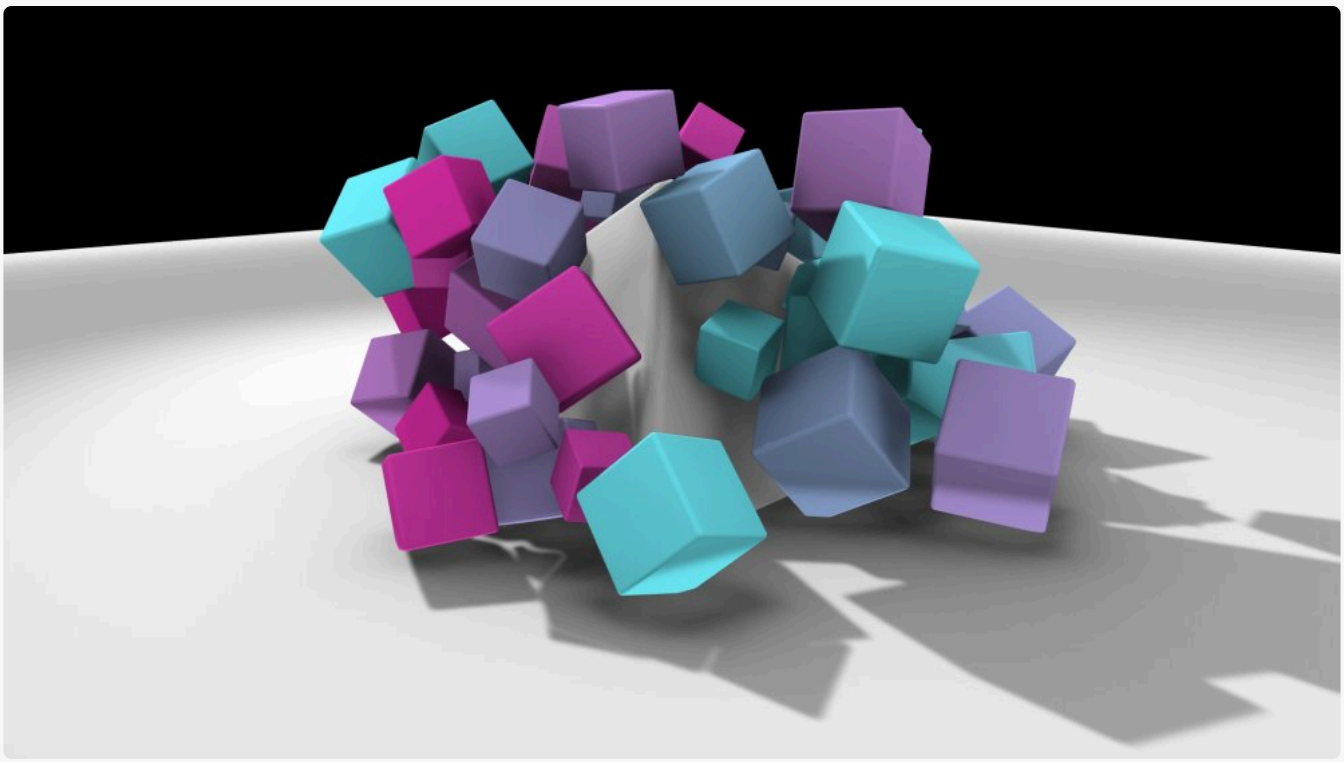
Rigid Body Effector

Method

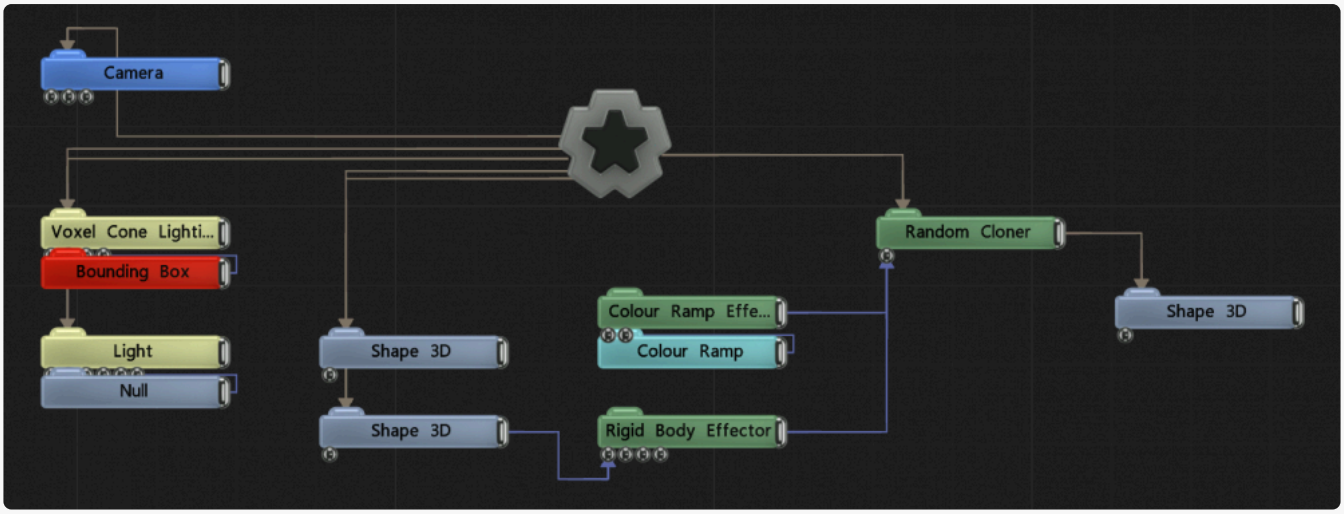
The Rigid Body Effector node turns clones into rigid bodies. The resulting bodies are able to collide with each other, or with other bodies that are part of the same physics system – under the same Rigid Body Root.
If this node is parented via a Rigid Body Root it will be part of the physics system of that Rigid Body Root. Otherwise, this node is capable of acting as its own physics system, allowing for easy rigging of a simple physics system with a single cloner.

For best results ensure that the clones do not overlap in their initial position before dynamics is applied.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mode	The rigid body mode • Static, the clones are not affected by physics but other bodies will collide by them • Kinematic, the clones are not affected by physics but other bodies will collide by them and be affected by the velocity of the clone. • Dynamic, the clones are affected by physics.

	• Dynamic After Collision, the clones are affected by physics only after first being hit by another body. They are treated as kinematic before being hit.
Shape Type	The shape used for the rigid bodies • Cloned Objects (Simplified / Convex Hulls), the cloned geometry attached to the parent cloner is used as rigid body geometry – but simplified convex hulls via the mode specified by Convex Hull Mode. Convex hull simplification is often necessary to ensure objects are suitably low poly and convex, as rigid bodies must be. • Boxes, boxes are used for the rigid body shape. • Spheres, spheres are used for the rigid body shape. • Input 3D Objects, The Collision Shapes input may be used to connect the meshes to use for the rigid body shapes. • Chunked 3D Object, A single, chunked 3D object is used – and each clone uses a chunk. This is suitable when the Rigid Body Effector is linked to a single chunked object via the Chunk Effector Deformer. • Cloned Objects (Original Geometry), the cloned geometry attached to the parent cloner is used as rigid body geometry.
Convex Hull Mode	Defines the convex hull method, when convex hulls are used for the collision shape. Choose the best fit for the cloned objects. Fewer faces will be more efficient. • 10 Faces (Cylinder) – X Axis, a cylindrical shape oriented along the X axis. • 10 Faces (Cylinder) – Y Axis, a cylindrical shape oriented along the Y axis. • 10 Faces (Cylinder) – Z Axis, a cylindrical shape oriented along the Z axis. • 14 Faces (Capsule) – X Axis, a capsule shape oriented along the X axis. • 14 Faces (Capsule) – Y Axis, a capsule shape oriented along the Y axis. • 14 Faces (Capsule) – Z Axis, a capsule shape oriented along the Z axis. • 18 Faces (Rounded Box), a rounded box shape.
Max Velocity	The maximum velocity any rigid body in this system can reach.
Max Angular Velocity	The maximum angular velocity any rigid body in this system can reach.
Dampening	Reduces the velocity and angular velocity of bodies over time, per frame.
Smoothing	Smooths motion of bodies over frames to remove the visual appearance of jitters in the physics system.
Gravity	Gravity strength. Defaults to 9.8 but should be adjusted to reflect the scale of the scene.
Floor Collision Enabled	Generates a default floor plane to collide all rigid bodies with.
Floor Height	The height of the default floor plane.
Show Rigid Bodies	Displays a debug view of the actual rigid body shapes being used to calculate collisions.

Physics Attributes

Name	Description
Friction	How much other rigid bodies will be able to slide along side this rigid body. When two rigid bodies of different frictions interact, the minimum value is used.
Bounciness	How much this rigid body will bounce off of other rigid bodies in the scene.
Density	The density of the rigid body. The density is scaled by the area of the shape to determine the mass of the body.
Spin X/Y/Z	The spin of the rigid body on the X/Y/Z axes. This scales the inertia tensor on the axes, making the body spin faster in that direction when torque is applied.

Inputs

Name	Description	Typical Node Input
Rigid Bodies	Input Rigid Bodies to collide the clones with.	Rigid Body
Rigid Body Affectors	Input forces which can move and transform the Rigid Bodies.	Rigid Body Force Affector
Collision Shapes	Use this input shape to calculate collisions against.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

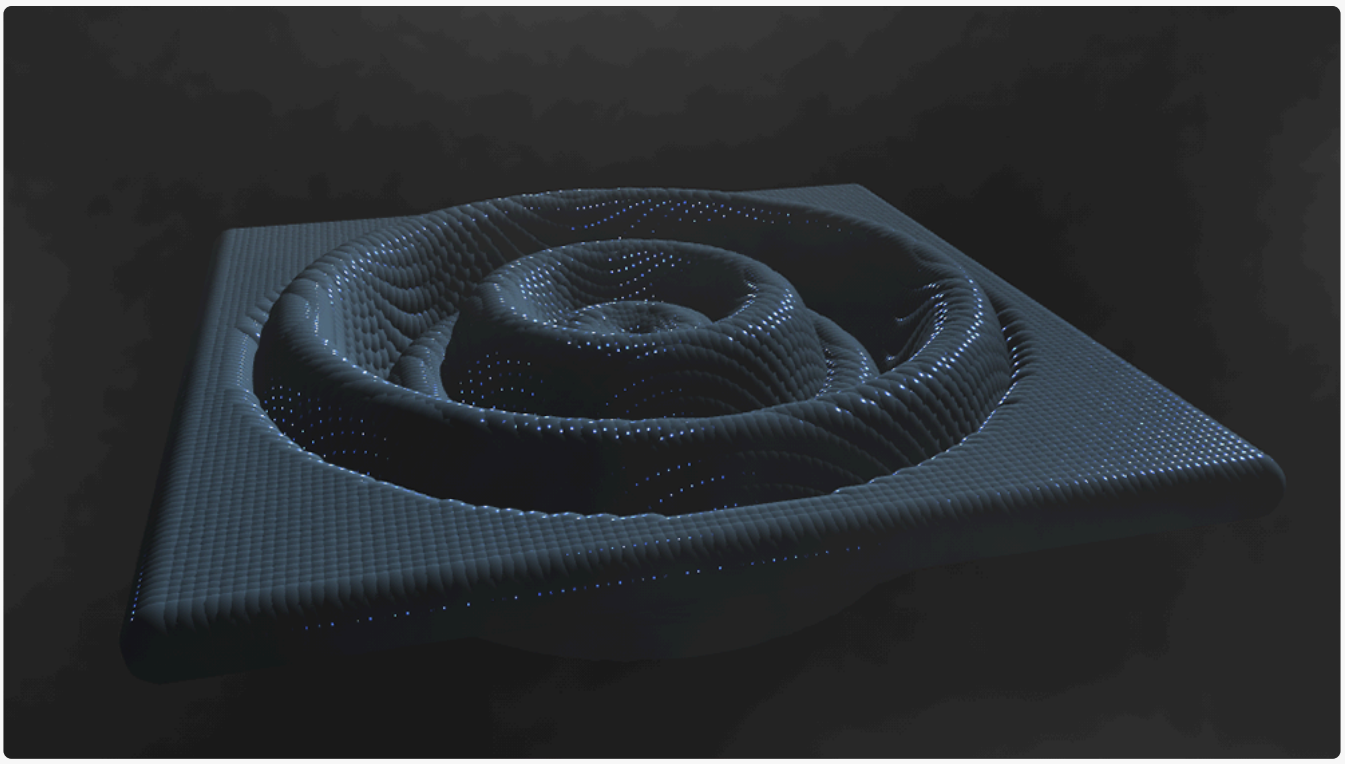
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Ripple Effector

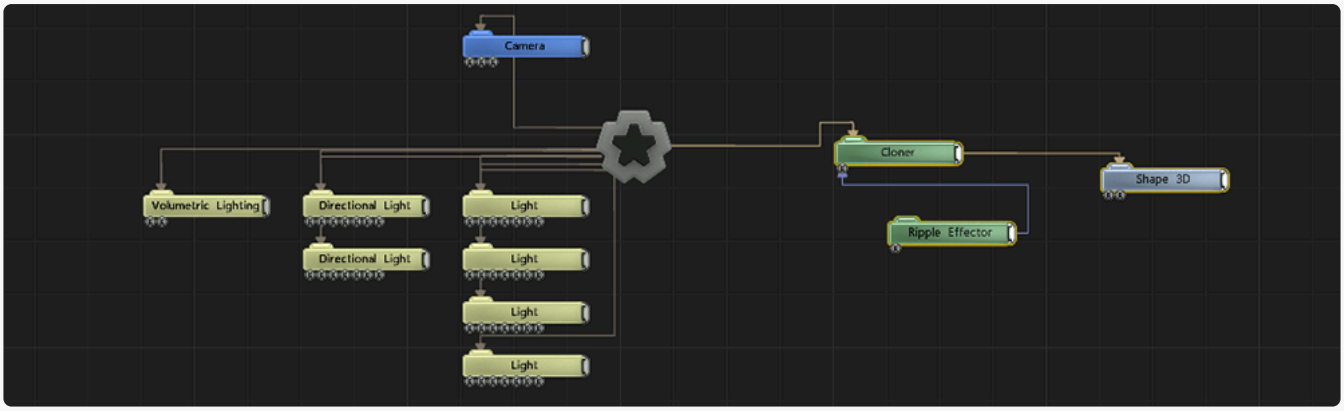
Method

This node applies a wave action of effects to the clone it is inputted into. The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones.
The amount the translation, scale and rotation are applied to each clone is weighted depending on the falloff function. The effector's falloff is generated using the effector node's transform and the Falloff parameters. The falloff shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
The way in which the effector's rotation, scale and translation are applied to the clone is determined by the Position/Rotation/Scale Apply Mode parameters.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed. • Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Animation Rate	How quickly the sine wave animates across the clones

Ripple Speed	How quickly the clones move through the animation of the ripple effect
Ripple Peak Sharpness	How quickly the animation of the ripple hits its peak point.
Ripple Scale	Scales the cloned object.
Ripple Repeat Rate	How long until the next ripple effect.
Direction	Control how the ripple is applied to the Cloner system. • Linear, The bands are spread along the x axis, and time progresses in the positive z axis. • Radial, The bands spread out radially around the z axis, and time progresses in the positive z axis. • Spherical, The bands spread out radially around the z axis, and time progresses in the negative z axis. Only position x is used to affect the clones.
Update Time Mode	Change how the clones are affected with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated separated to the timecode.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Apply To Position	Apply the position changes from the cloner to the clones.
Apply To Rotation	Apply the rotation changes from the cloner to the clones.
Apply To Scale	Apply the scale changes from the cloner to the clones.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation. • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

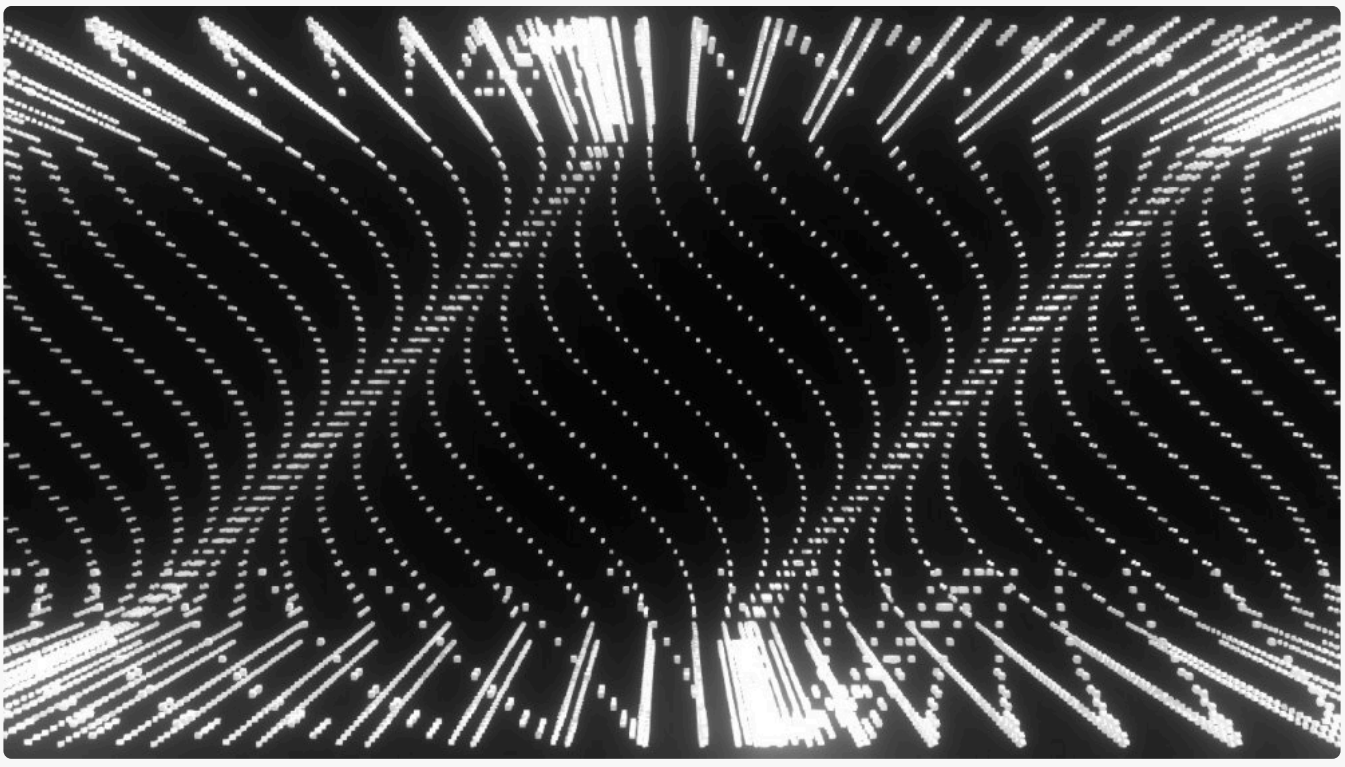
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Sine Effector

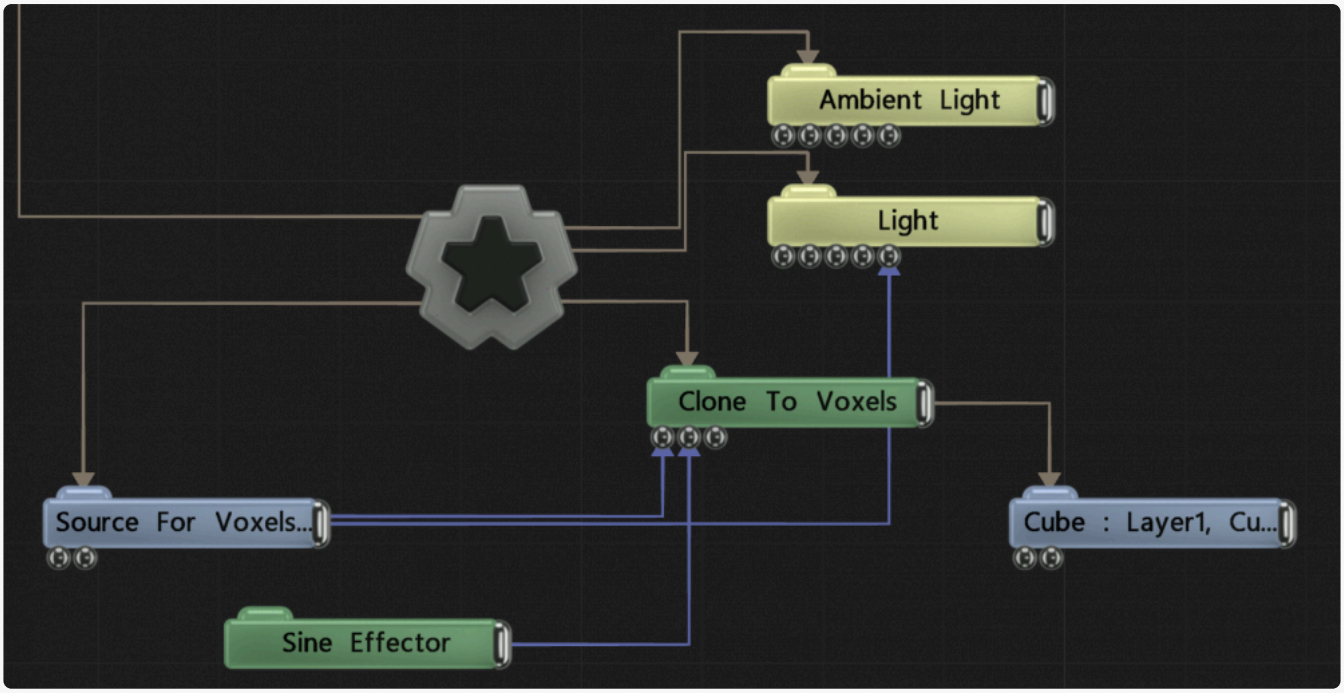
Method

This node applies a rotation, scale and translation to every clone. The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones.
The amount the translation, scale and rotation are applied to each clone is weighted depending on the falloff function. The effector's falloff is generated using the effector node's transform and the Falloff parameters. The falloff shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
The way in which the effector's rotation, scale and translation are applied to the clone is determined by the Position/Rotation/Scale Apply Mode parameters.

Example



Example Nodegraph



There is much more to creating this effect, shown here is a section that is specifically relevant to this node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed. • Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Animation Rate	How quickly the effector animates across the clones.
Sine Axis X	Change how much the sine wave propagates along the x axis.
Sine Axis Y	Change how much the sine wave propagates along the y axis.
Sine Axis Z	Change how much the sine wave propagates along the z axis.
Direction	Control how the FFT is applied to the Cloner system. • Linear, The bands are spread along the x axis, and time progresses in the positive z axis. • Radial, The bands spread out radially around the z axis, and time progresses in the positive z axis. • Spherical, The bands spread out radially around the z axis, and time progresses in the negative z axis. Only position x is used to affect the clones.
Update Time Mode	Change how the clones are affected with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated separated to the timecode.
Function	Sin or Cosine function.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector

Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Apply To Position	Apply the position changes from the cloner to the clones.
Apply To Rotation	Apply the rotation changes from the cloner to the clones.
Apply To Scale	Apply the scale changes from the cloner to the clones.
Uniform Scale	Scale the clones by the same value along all axes.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation. • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale.

	• Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

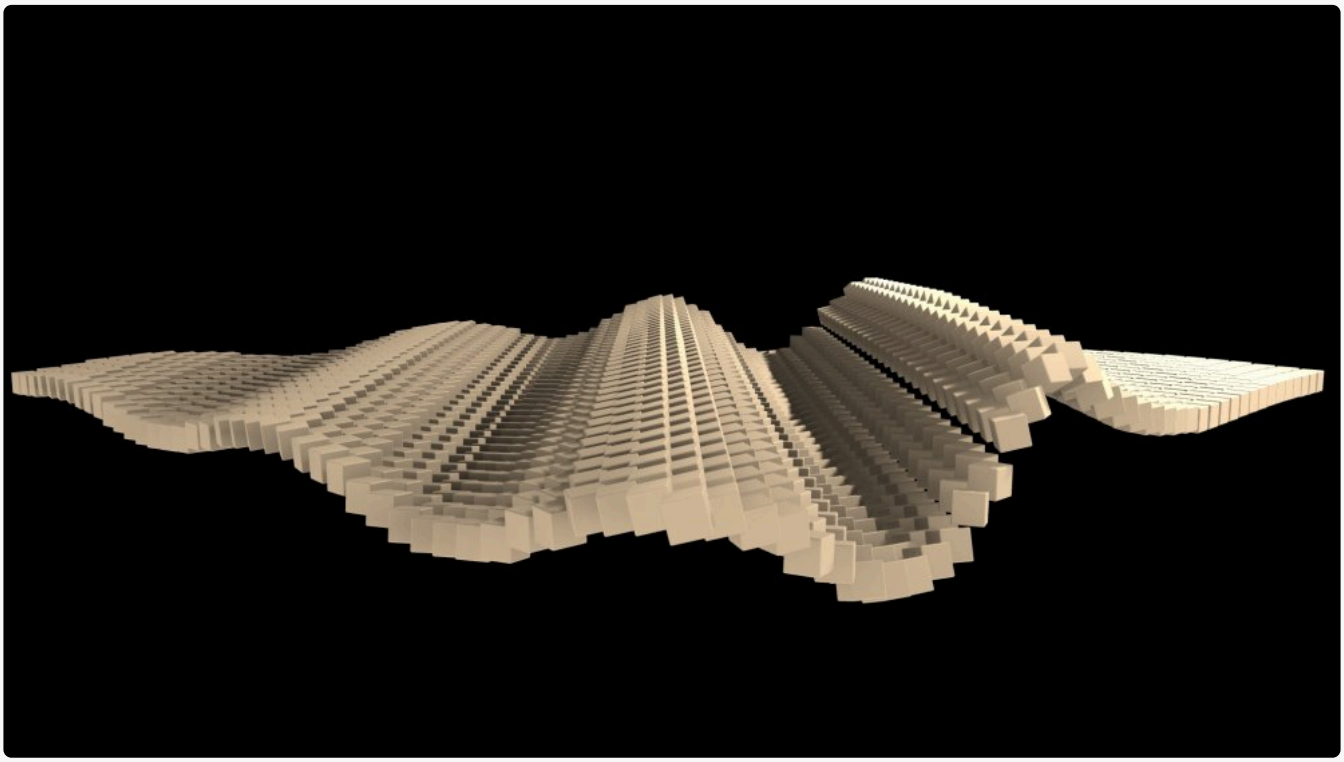
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Spring Effector

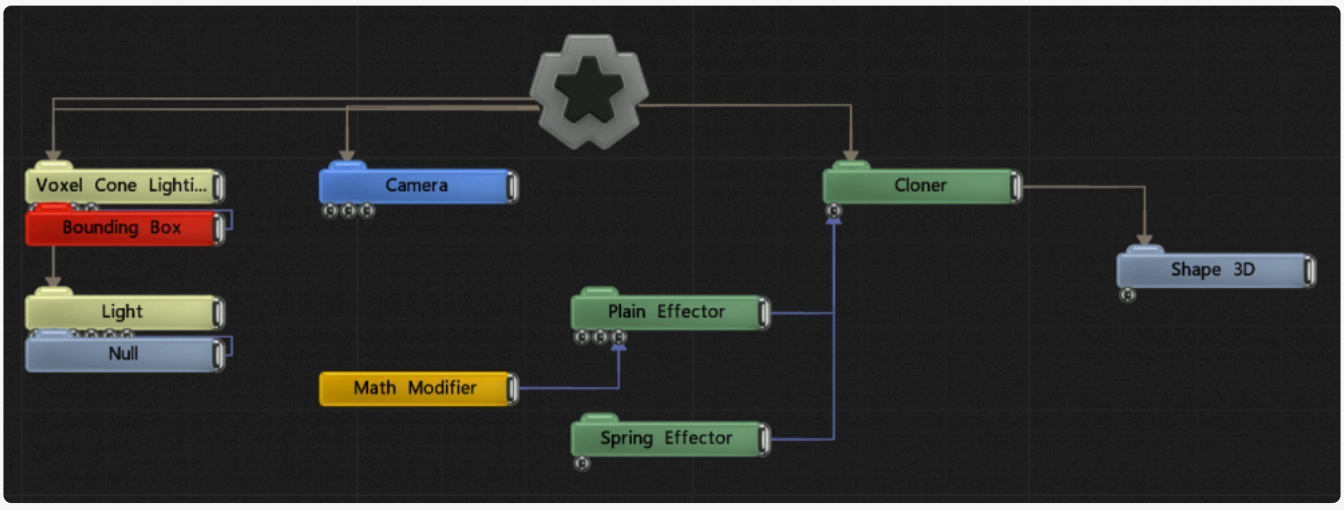
Method

This node provides a springiness to clones by keeping track of their original positions before being affected and pulling them back into position.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed. • Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Animation Rate	How quickly the effector animates across the clones.
Spring Speed	How quickly the clones are pulled back to their original positions.
Spring Dampening	How much dampening is applied to the movements of the clones, so that they eventually slow to a stop.
Update Time Mode	Change how the clones are affected with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated separated to the timecode.
Spring Mode	The method by which the clone position to spring back from is determined. • Effectors In Chain, All clone effectors before the Spring Effector in the chain – anything moving the clone away from its initial position – determine the spring

	position. • Effector Children, Only effectors parented to the Spring Effector will determine the spring initial position.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagated along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.
Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Apply To Position	Apply the position changes from the cloner to the clones.
Apply To Rotation	Apply the rotation changes from the cloner to the clones.

Apply To Scale	Apply the scale changes from the cloner to the clones.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation. • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

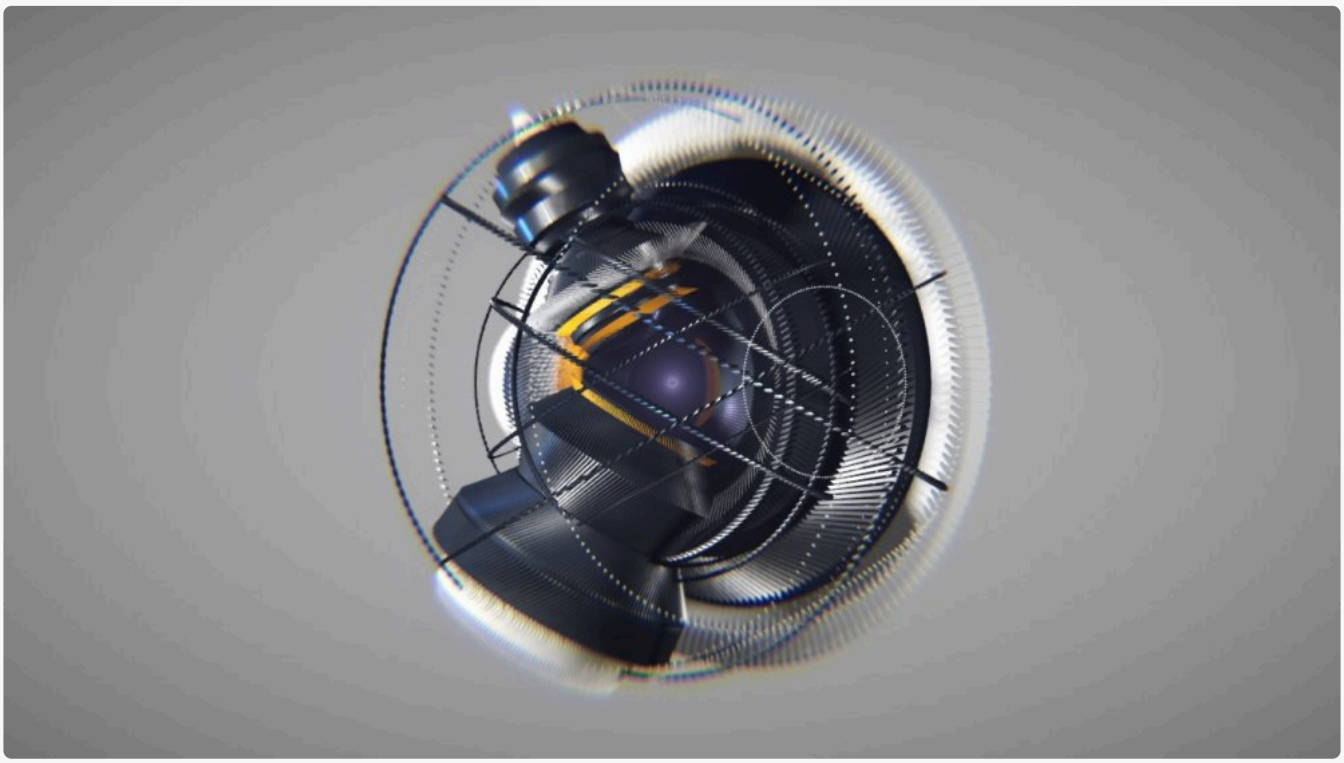
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

Target Effector

Method

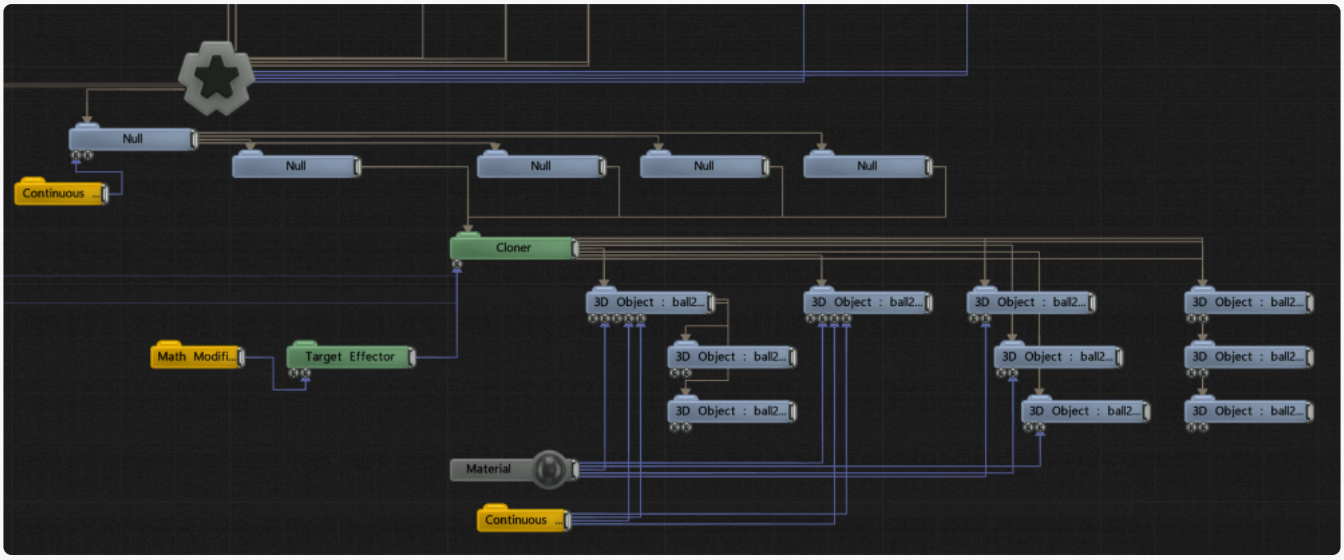
All clones affected will rotate to target a point described by an input.

Example



This image is taken from the “cloner_instancing” sample project.

Example Nodegraph



There is much more to creating this effect, shown here is a section that is specifically relevant to this node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed.

	• Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Affect Heading	Toggle whether the rotation of the clones along the y axis is affected.
Affect Pitch	Toggle whether the rotation of the clones about the x axis is affected.
Invert Direction	Invert the direction of the object's target.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Rotation Apply Mode	Changes how the rotations are applied to the cloned objects rotations. • Add, The rotation is added to the objects rotations. • Blend, The rotation is averaged with the objects rotations. • Replace, The rotation replaces the objects current rotations.

Inputs

Name	Description	Typical Node Input

Target Node	Input a node for the cloners to face.	Null
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

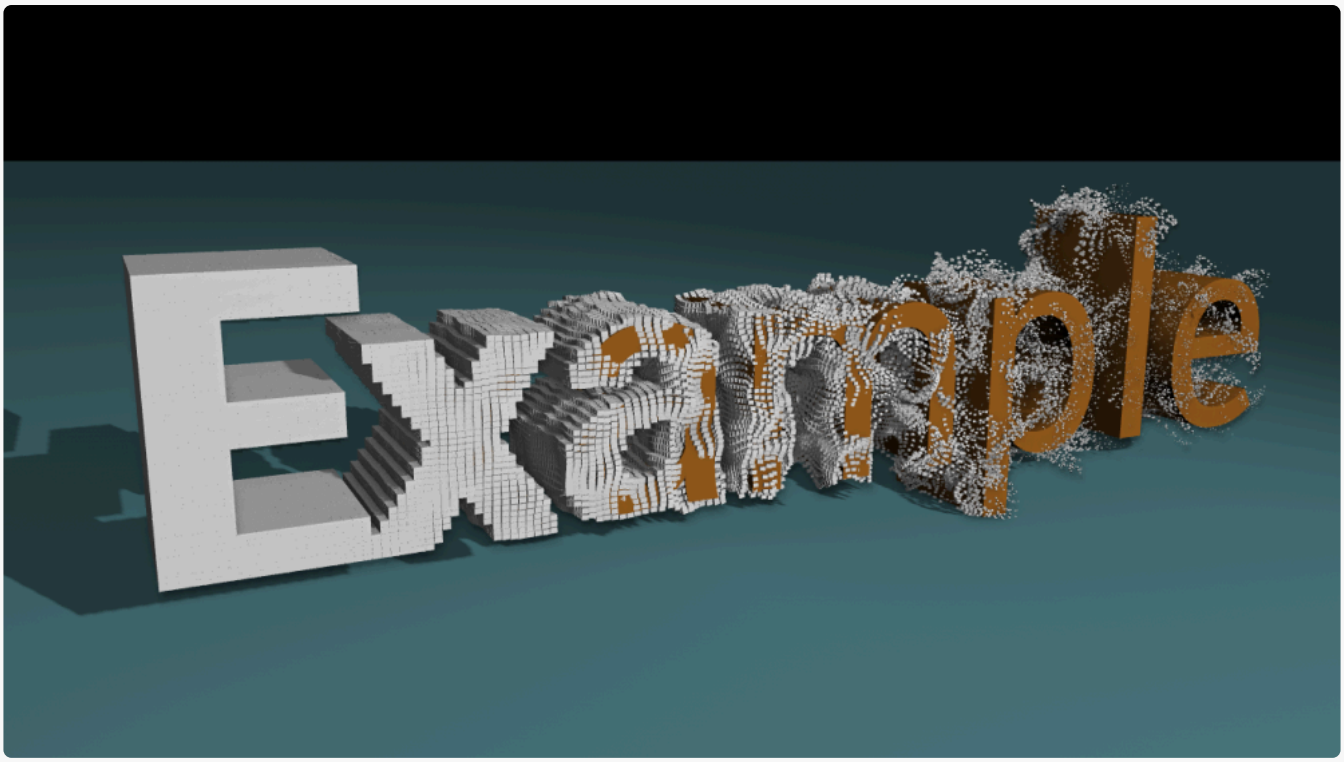
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

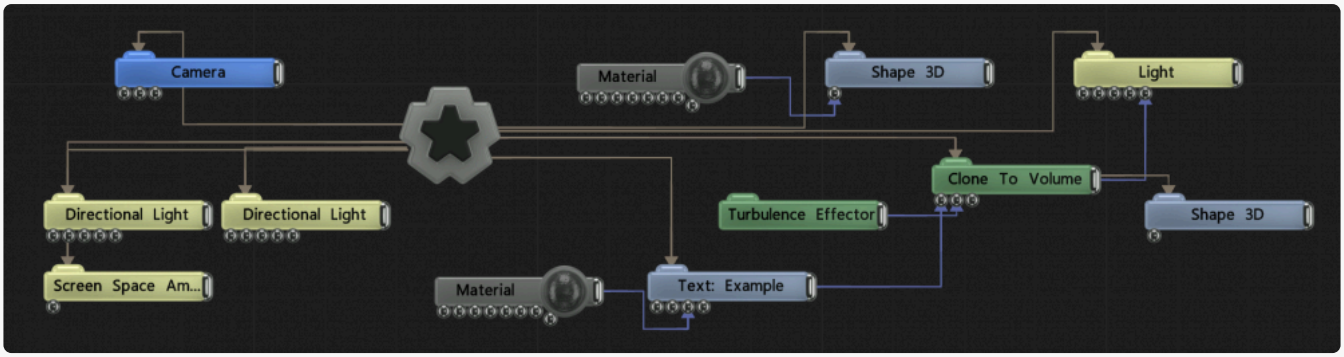
Turbulence Effector

Method

This node applies an animating turbulence to the rotation, scale and translation to every clone. The Effector Transform parameters determine the rotation, scale and translation that will be applied to the clones.
The amount the translation, scale and rotation are applied to each clone is weighted depending on the falloff function. The effector's falloff is generated using the effector node's transform and the Falloff parameters. The falloff shape is determined by the Falloff Mode parameter, with a radius provided by the Falloff parameter and a box falloff from the Falloff Size parameter.
The way in which the effector's rotation, scale and translation are applied to the clone is determined by the Position/Rotation/Scale Apply Mode parameters.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	Controls the amount in which the resulting rotation, scale and translation of each clone after the effector is applied is blended with the clone's original rotation, scale and translation.
Space	The transform space in which the effector is processed. • Node, use the cloner's transform space. • Effector, use the effector's transform space. • Object, use the cloned object's transform space.
Num Octaves	How many time the noise generation is iterated.

Lucanarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Noise Scale	Scale the size of any noise generated.
Animation Rate	The speed at which the noise is animated.
Update Time Mode	Change how the clones are affected with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.

Falloff

Name	Description
Falloff Mode	Change how the falloff from the original object is calculated. • Infinite, There is no falloff. • Linear, Falloff is propagates along the x axis. • Sphere, Falloff is based on distance from the plain effector origin. • Procedural, Use a procedural system to describe the falloff area. • Box, Falloff is based on a box.
Linear Falloff Axis	The axis to use for a linear axis falloff.
Falloff	The outer radius of the falloff, where the effector no longer effects the clones.
Inner Falloff	The inner radius of the falloff, where the effector effects the clones strongest.
Falloff Power	Change how quickly the nodes falloff from the effector
Falloff Size	The width, length and height of the falloff.
Invert Falloff	Invert the direction of the falloff.

Effector Transform

Name	Description
Position X	Offset the clones x position from the source object position.
Position Y	Offset the clones y position from the source object position.
Position Z	Offset the clones z position from the source object position.
Rotation Heading	Offset the clones y rotation from the source object rotation.
Rotation Pitch	Offset the clones z rotation from the source object rotation.
Rotation Bank	Offset the clones x rotation from the source object rotation.
Scale X	Offset the clones x scale from the source object scale.

Scale Y	Offset the clones y scale from the source object scale.
Scale Z	Offset the clones z scale from the source object scale.
Uniform Scale	Scale the clones by the same value along all axes.
Apply To Position	Apply the position changes from the cloner to the clones.
Apply To Rotation	Apply the rotation changes from the cloner to the clones.
Apply To Scale	Apply the scale changes from the cloner to the clones.
Position Apply Mode	The method by which the effector position offset is applied to the clone. • Add, the effector position is weighted by the falloff and added to the clone position. • Multiply, the effector position, multiplied by the clone position, is blended with the clone position by the falloff. • Replace, the effector position is multiplied by the falloff and replaces the clone position.
Rotation Apply Mode	The method by which the effector rotation offset is applied to the clone. • Add, the effector rotation is weighted by the falloff and added to the clone rotation . • Multiply, the effector rotation, multiplied by the clone rotation, is blended with the clone rotation by the falloff. • Replace, the effector rotation is multiplied by the falloff and replaces the clone rotation.
Scale Apply Mode	The method by which the effector scale offset is applied to the clone. • Add, the effector scale is weighted by the falloff and added to the clone scale. • Multiply, the effector scale, multiplied by the clone scale, is blended with the clone scale by the falloff. • Replace, the effector scale is multiplied by the falloff and replaces the clone scale.
Uniform Random Scale	Scale the clones by the same value along all axes.

Inputs

Name	Description	Typical Node Input
Procedural Falloff	Use a procedural system to generate falloff from.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform	Override the transformation values of the node, relative to its	Null

Override	parent.	

Outputs

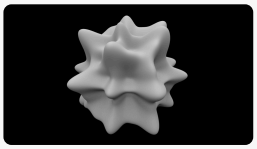
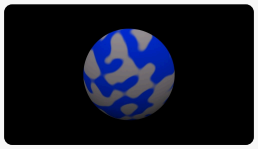
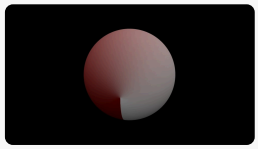
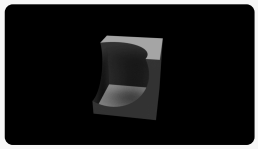
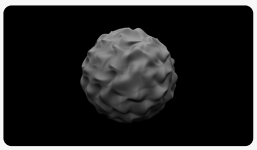
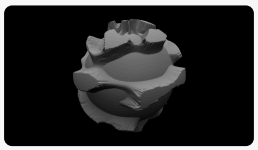
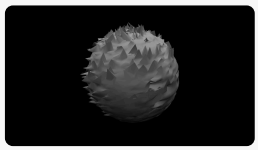
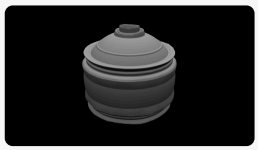
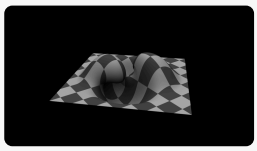
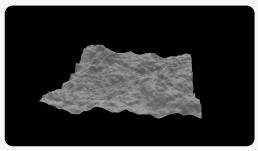
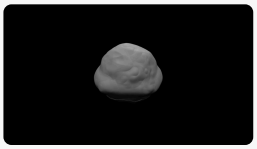
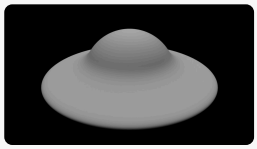
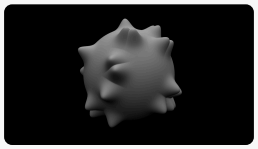
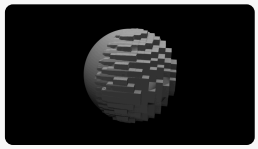
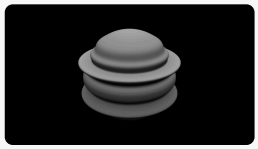
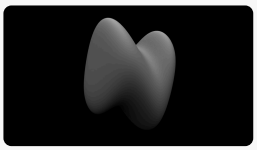
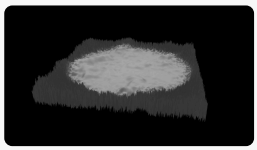
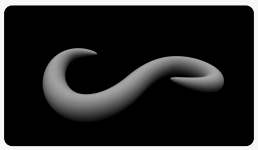
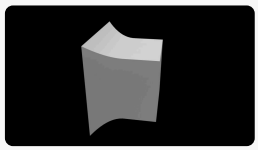
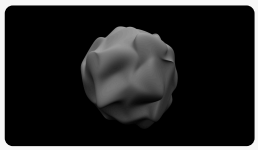
Connect the output to the effector input of any cloner node. Multiple effectors connected to the same output will stack, and order of operations chosen by positon on the nodegraph.

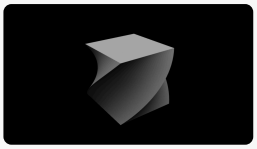
Deformers

Method

Deformers change the positions of vertices in a parent mesh. Generally it's used against the Shape 3D or 3D Object, or the Combine Geometry nodes.
uvs

Gallery

				
3D Plasma Deformer	Chunk Effector Deformer	Colour Map Deformer	Colour Ramp Deformer	Cull Deformer
				
Curl Noise Deformer	Displacement Deformer	Displacement Map	Distortion Deformer	FFT Deformer
				
Generate Fertilizer Times Deformer	Generate UVs	Generate Weightmap Deformer	Mirror Deformer	Ocean Wave Deformer
				
Particle Mesh Deformer	Plain Deformer	Point Deformer	Quantise Deformer	Ripple Deformer
				
Sine Deformer	Smoothing Deformer	Spline Deformer	Taper Deformer	Turbulence Deformer



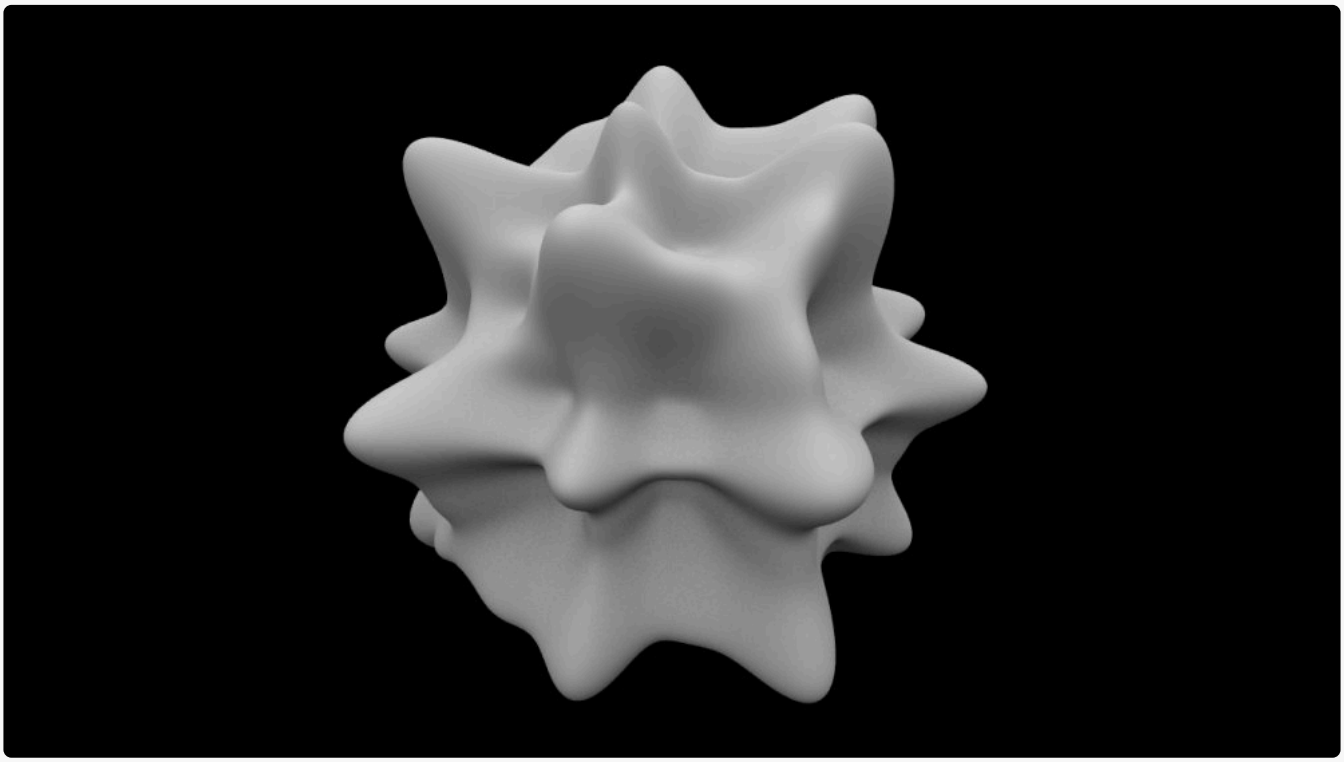
Twist Deformer

- Face Tracking Deformer
- MDD Deformer
- Morph Controller

3D Plasma Deformer

Method

This node deforms vertices based on a number of sine waves which form a plasma-like effect. This can be used to create soft spikes on the surface of an object.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Num Spikes X / Y / Z	Number of spikes along the x, y and z axis.
Spikiness	How sharp the spikes are in the deformer.
Animation Rate	Speed the deformer is animated at.
Displacement Amount	How much the deformer displaces the original mesh.
Max Displacement	Maximum distance the deformer can displace the mesh.
Displacement Direction	Change which direction the deformer displaces the objects mesh.

	• Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

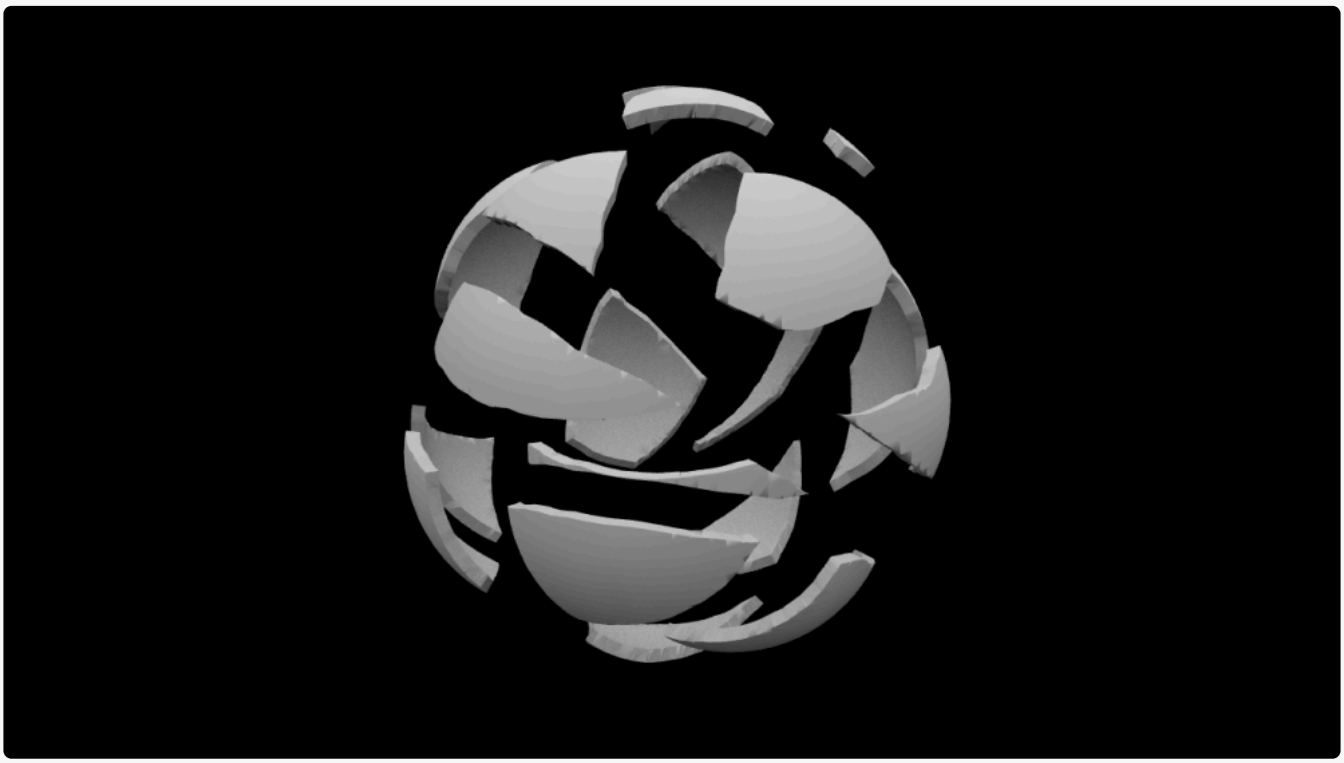
Outputs

There are no outputs from this node.

Chunk Effector Deformer

Method

This node moves unconnected sections of a mesh independently based on an input Cloning Effector.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.

Inputs

Name	Description	Typical Node Input
Effector	Connect a source effector to deform the mesh.	Sine Effector
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer

Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

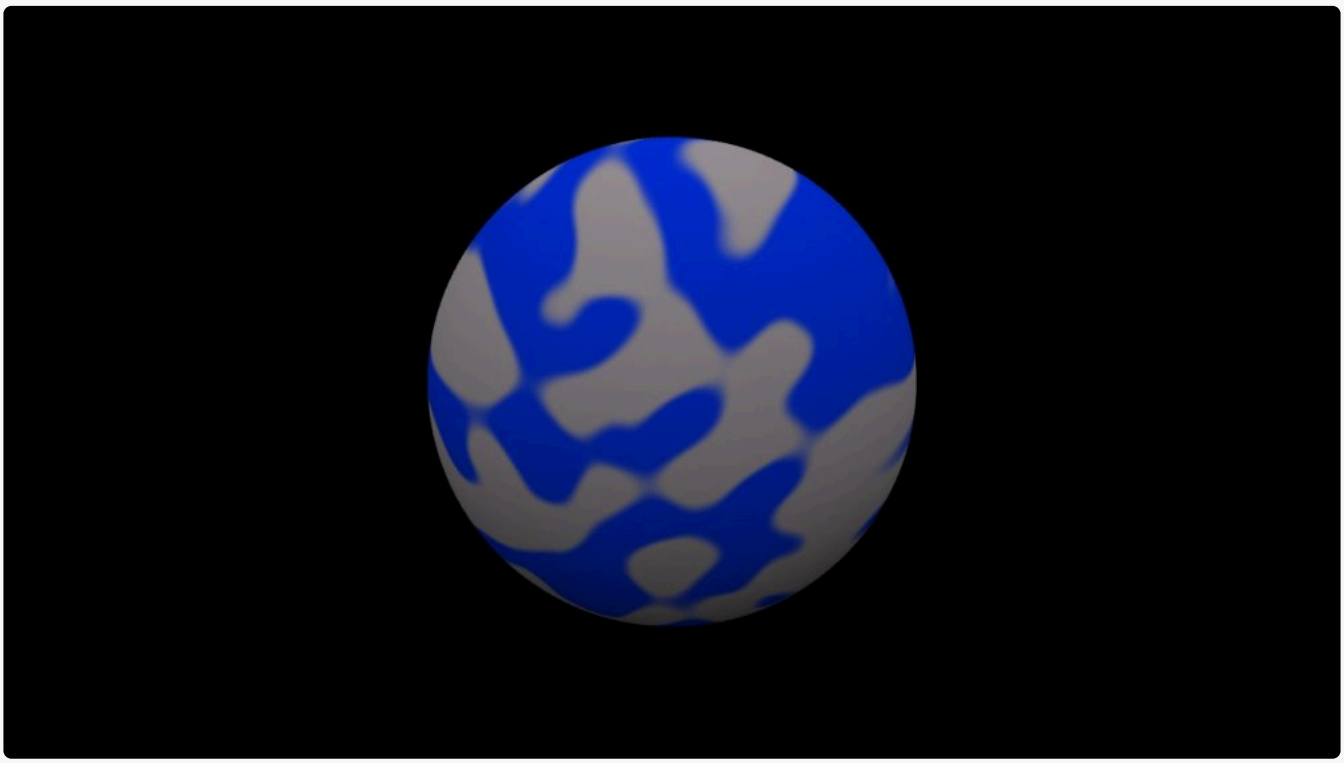
Outputs

There are no outputs from this node.

Colour Map Deformer

Method

This node recolours a mesh based on an input image or video source.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.

Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Image	Image used to recolour the mesh	Sine Effector
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

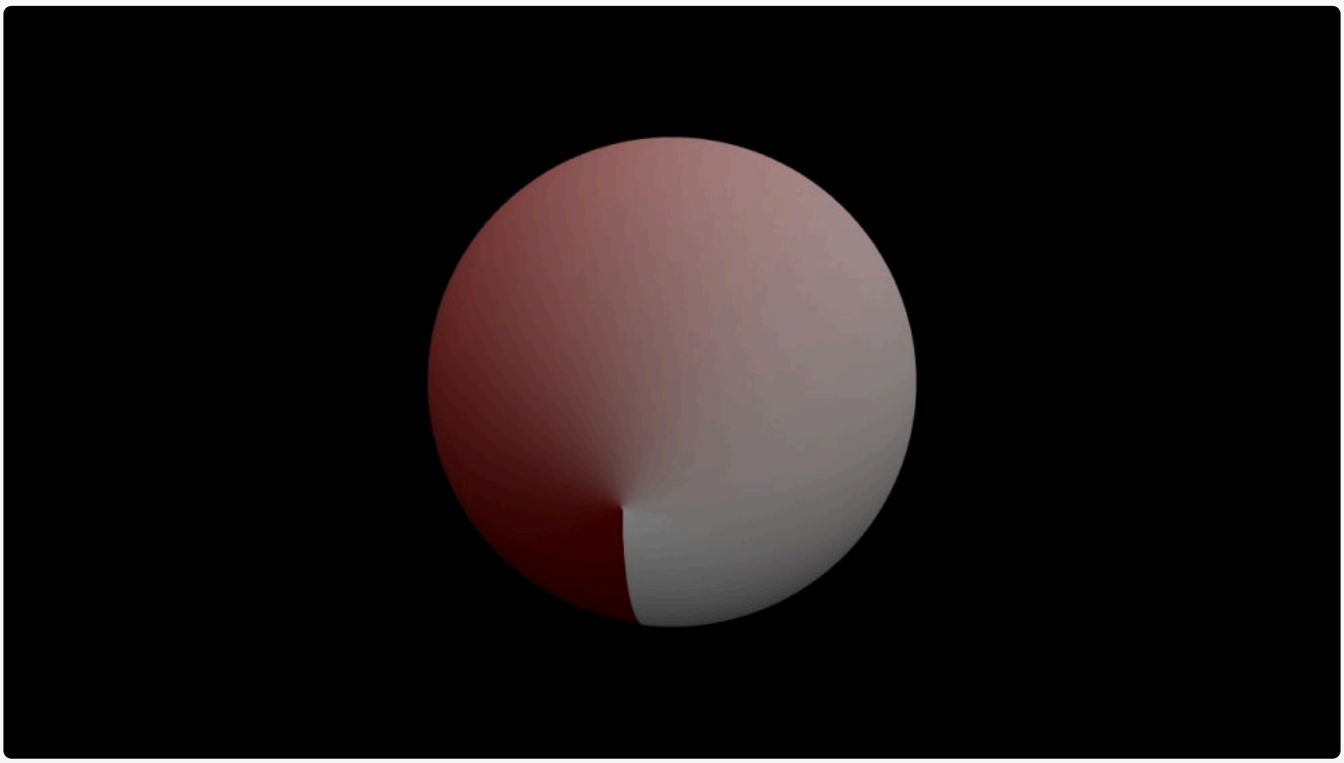
Outputs

There are no outputs from this node.

Colour Ramp Deformer

Method

This node recolours a mesh based on an input Colour Ramp.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Source Channel	Change how the colour ramp is applied to the parent mesh. • Texture Coordinate U / V, Apply the colour ramp to the UV map of the mesh along either the U or V axis. • Position X / Y / Z, Apply the colour ramp to the mesh dependant on the distance along a local positional axis. • Distance, Apply the colour outwardly from a point, fading away with distance. • Fractal Noise, Gives each vertex a random weight based on 3D fractal noise and applies the colour ramp based on those weights. • Vertex Index, Apply the colour ramp along the vertex index. • Weightmap Channel, Apply the colour ramp using an input weightmap on the object.

Source Scale	Scale the size of the input colour ramp.
Source Offset	Offset the start of the colour ramp.
Modulation Function	How colour should be applied at the end of the ramp. • Clamp, The final colour in the colour ramp is used to infinity. • Repeat, The ramp is repeated to infinity. • Sine, The ramp goes back to the beginning and starts again..
Noise Scale	Scale the size of any noise generated.
Lacunarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Animation Rate	How quickly the fractal noise animates.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Select a colour ramp to be the source for the colours.	Colour Ramp
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated	Add a weightmap to control the strength of the deformer	Generate

Weightmap	depending on the weightmaps vertex data.	Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

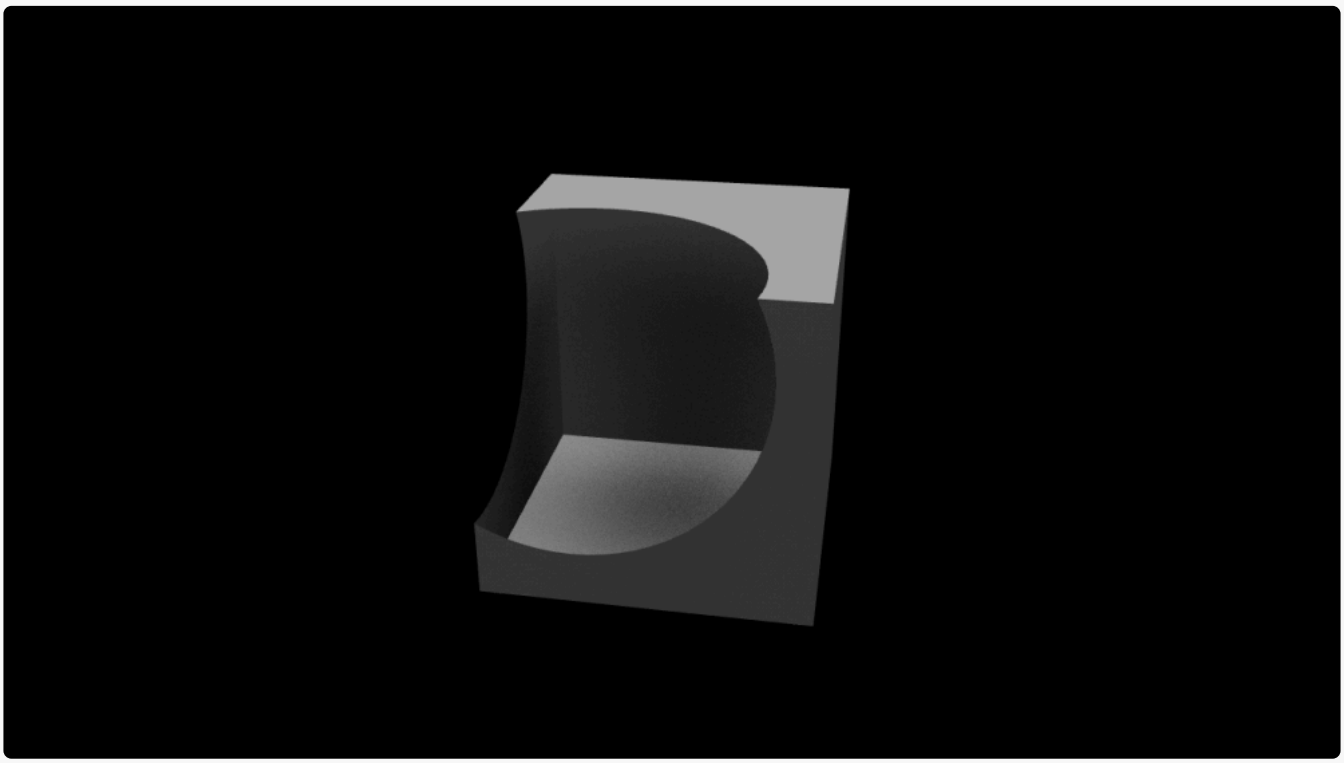
Outputs

There are no outputs from this node.

Cull Deformer

Method

This node cuts away the polygons of the affected object using a plane, box or sphere.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Vertex Source Mode	How vertices are selected to be used by the deformer. • Vertex Positions, Vertices are chosen based on their positions in the scene.l • Chunks, Vertices are chosen based on the enclosed section of the mesh they are used.
Cull Shape	Select a shape to cull the parent geometry with.
Invert Cull	Invert the direction or area that is culled.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

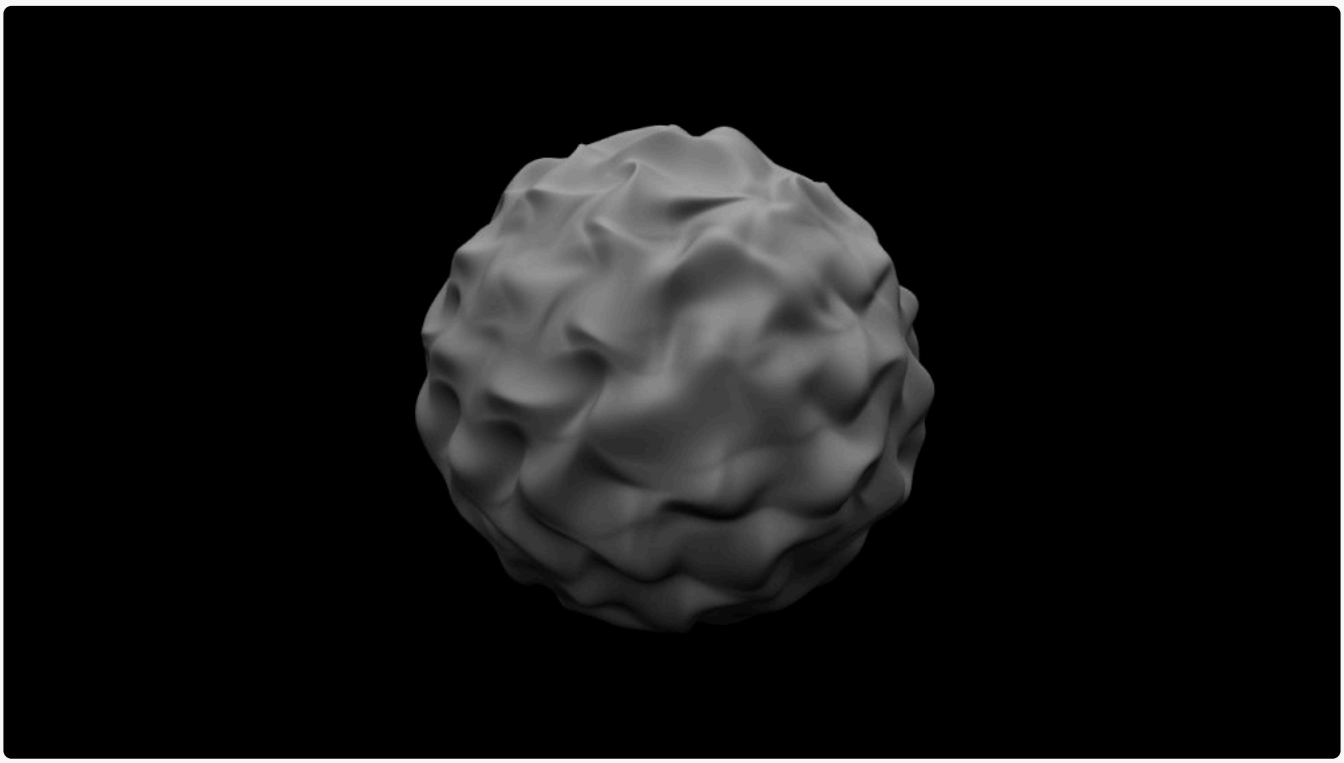
Outputs

There are no outputs from this node.

Curl Noise Deformer

Method

This node deforms a mesh based on a curl noise function.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Noise Scale	Scale the size of any noise generated.
Simulation Speed	Change the speed the deformer is simulated at.
Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Displacement Deformer

Method

This node displaces the vertices of a mesh using noise, fractal noise, a grid, an input image or a video node.

Example
Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Noise Amount	The amount of noise that is applied to the deformer.
Fractal Noise Amount	The amount of fractal noise that is applied to the deformer.
Fractal Noise Scale	The scale of the fractal noise that is applied to the deformer.
Fractal Noise Threshold	The threshold for the fractal noise.
Grid Amount	How much the deformer is limited to a grid.

Texture Amount	How much a video input into the node or an image selected in the image attribute affects the deformer.
Max Displacement	Maximum distance the deformer can displace the mesh.
Animation Rate	Speed the deformer is animated at.
Num Octaves	How many time the noise generation is iterated.
Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Image Node	Image used to displace the image.	Video Loader
Grid Node	A node used to control the transformation values of the grid attribute.	Null Node
Video Processing Node	Use a video input to modify the deformer.	Video Loader

Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

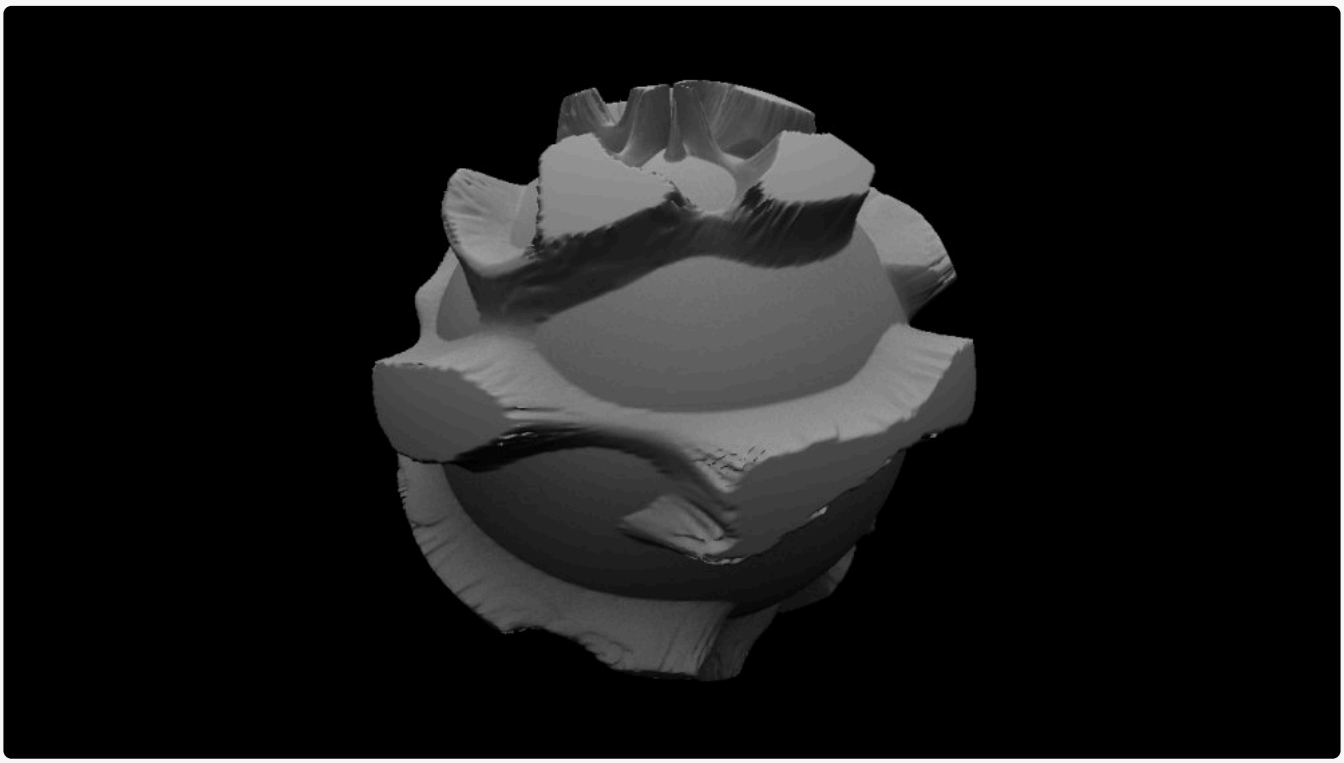
Outputs

There are no outputs from this node.

Displacement Map

Method

This node displaces the vertices of a mesh based on an image.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to drawn falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.

Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Displacement

Name	Description
Image	Image used in the deformer.
Displacement Amount	How much the deformer displaces the original mesh.
Max Displacement	Maximum distance the deformer can displace the mesh.
Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the objects origin. • Planar, all vertexes are displaced in the same direction.

Inputs

Name	Description	Typical Node Input
Image Node	Image used to displace the image.	Video Loader
Mapping	How the Generated Weightmap is Mapped to the Deformer.	Mapping
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

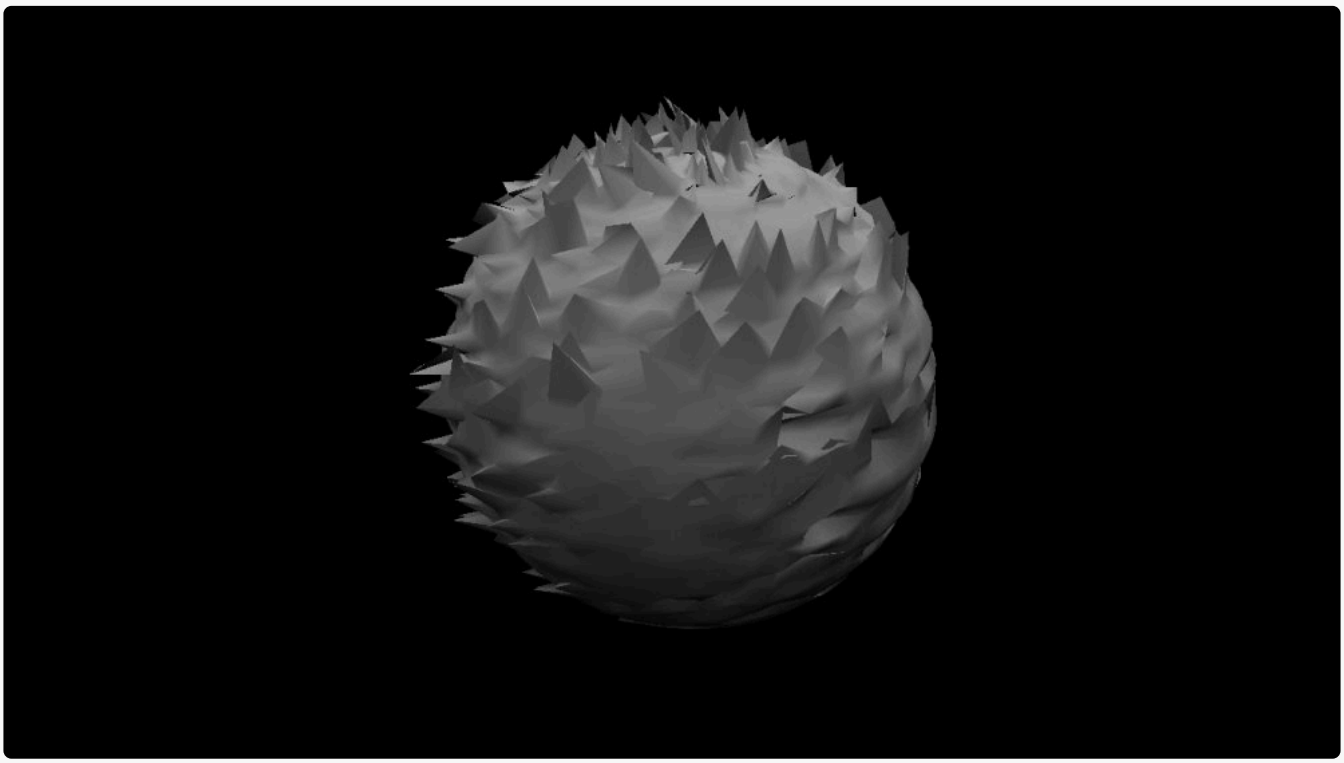
Outputs

There are no outputs from this node.

Distortion Deformer

Method

This node deforms a mesh based on a distortion function.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Noise Scale	The amount of noise that is applied to the deformer.
Sine Scale	Scale the sine wave used in the deformer.
Distort Y Scale	How much the mesh is distorted along the Y axis.
Animation Rate	Speed the deformer is animated at.

Falloff

Name	Description

Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Face Tracking Deformer

Method

This node uses the vertex data from a tracked face found by the Face Tracker node to override the vertex positions of the 3D object node the deformer is attached to – if that 3D object conforms to the structure of the geometry generated by the face tracker.

This allows face tracking to be used to deform a pre-created, imported 3D object that has been designed to be used with face tracking. An example of such an object is available here.

For more information on face tracking, see the Face Tracker node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.

Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Face Tracker	Source face tracking data for deforming the parent.	Face Tracker

Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

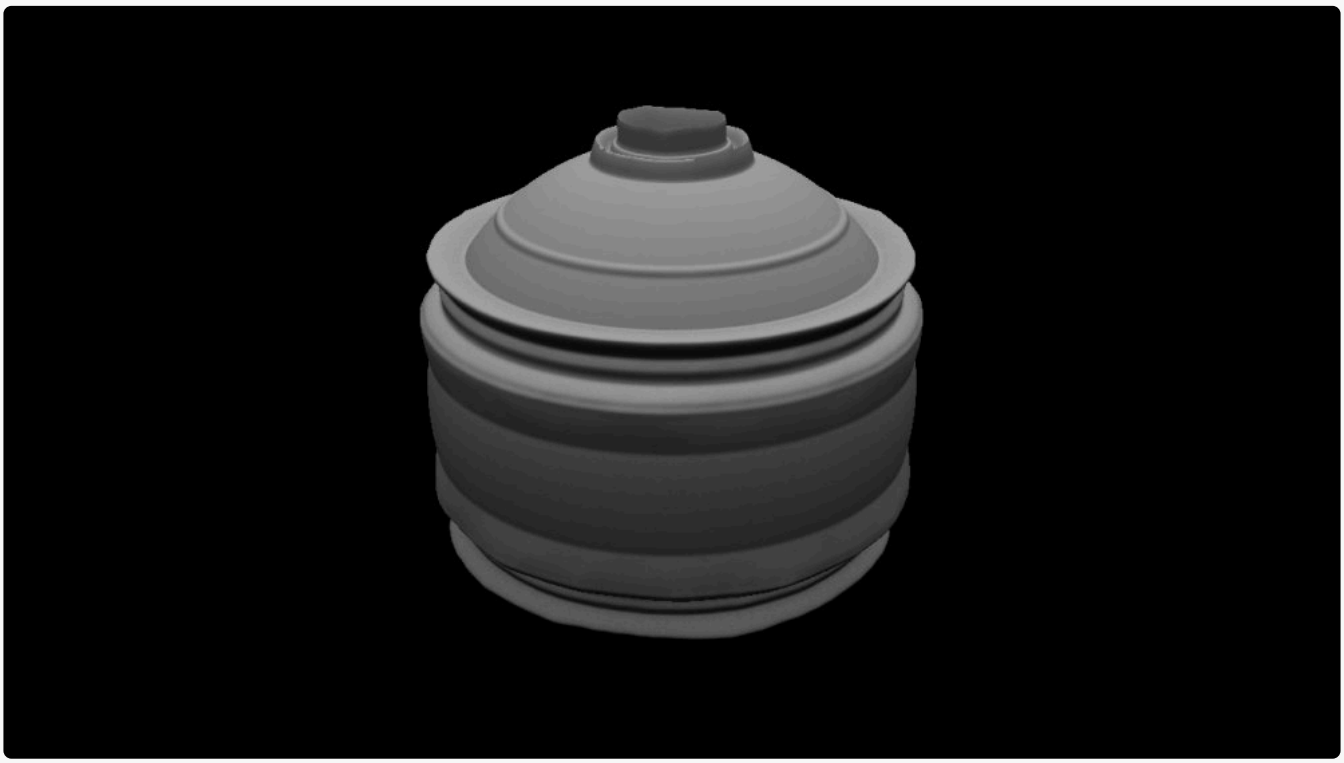
Outputs

There are no outputs from this node.

FFT Deformer

Method

This node deforms a mesh using the waveform of an audio file or a live captured audio input.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Sound	Sound file used to drive the effect.
Channel	Which audio channel is used.
Frequency Band	Sets the Band EQ to one of the given presets.
Band EQ	Selects and weights the frequency bands to be used from the sound file.
Time Offset	Offset the time the clones are modified from the time the waveform is at.
Change Threshold	Changes the threshold for what counts toward the effect.
Attack	Controls the initial time between the current values to the peak.
Decay	Controls the time between the peak to the sustain level.

Min Value	Acts as a minimum threshold for extracting a range of values from the waveform.
Max Value	Acts as a maximum threshold for extracting a range of values from the waveform.
Max Clamp	A maximum value which values will be clamped if they go above.
Spikiness	Accentuates peaks in the waveform so they are sharper.
Scale	How much the output values are scaled.
Smoothness	How much smoothing is applied between differing values.
Mapping type	Sets the mapping type for the deformer
FFT Sample Scale	Scale the size of the waveform as it is applied.
Waveform	Visualises the waveform of of the sound.
Displacement Amount	How much the deformer displaces the original mesh.
Noise Amount	The amount of noise that is applied to the deformer.
Max Displacement	Maximum distance the deformer can displace the mesh.
Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the objects origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.

Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Sound	Use the waveform from a given Play Sound or Capture Sound node.	Play Sound
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Generate Fertilizer Times Deformer

Method

This node generates fertilizer values for meshes without any built-in. Fertilizer uses point weightmaps to erode the surfaces of a mesh.

As this node works on the shader edges, so it is not affected by the Root nodes anti-aliasing. You can still use any of the Post-FX Antialiasing Nodes.

Example
Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.

Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Use Amount	Percentage of points used as a seed to calculate the fertilizer times.
Mode	How the fertilizer values are generated. • Single Point, Vertexes are weighted outward from a single randomly placed point. • Random Points, Points are added randomly to the surface of the mesh, and weights generated between them create the fertilizer values. • Weightmap, the weightmap selected in the “Weightmap” attribute. • Seed From Image, Use an image to dictate how the fertilizer weights are added

	to the vertices. • Image Direct, The image is used directly to apply the fertilizer weights across the mesh.
Seed	Change the random seed for the single point or random points modes.
Visualise Times	Visualise the fertilizer weightmap onto the surface of the object.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Image	Use an image to seed the generation of the fertilizer times.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

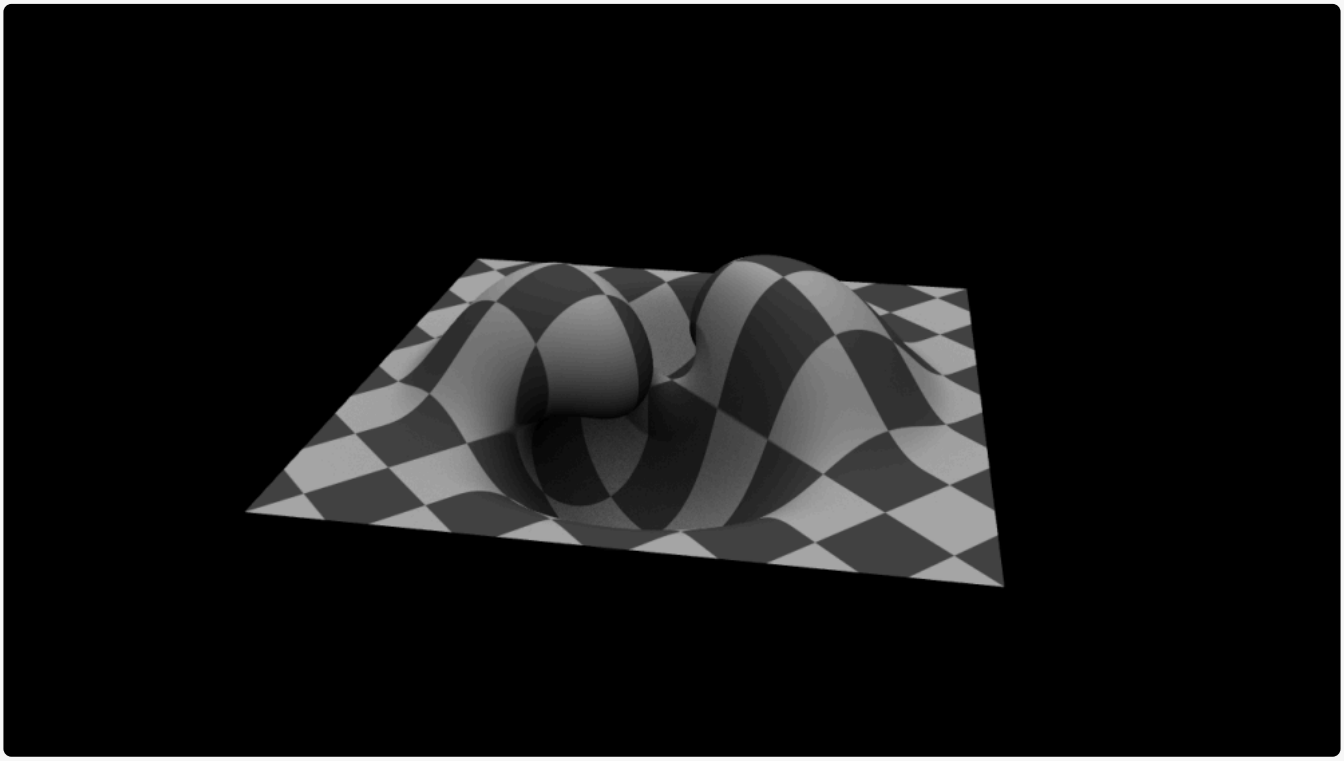
Outputs

There are no outputs from this node.

Generate UVs

Method

This node allows you to generate UV coordinates for the affected object using a mapping.
The UVs may be generated on a mesh before it is deformed, so the UVs will be deformed along with the mesh.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertices are selected to be used by the deformer. • Vertex Positions, Vertices are chosen based on their positions in the scene. • Chunks, Vertices are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Mapping Type	What kind of mapping is to be applied. • Original UV's, The source values are output directly. • Planar, The map is generated based on the planar view of the XY plane. • Cubic, the map is generated based on the planar views of the x, y and z planes.. • Spherical, the map is a 360 spherical mapping back out into space. • Normal Face-Map, the map is generated based on the normal. • Perspective, the map is generated based on the position and rotation of the mapping node. Generally used with a Camera connected to the Transform Modifiers input.

	• Equirectangular, the map is generated based on a cubic map, but smoothed to the shape of a sphere.
Source Channel	The linked 3D Objects source data that the mapping should use in it's application. • Local Position, the local position of the vertices before transformation. • World Position, the world position of the objects vertices (most commonly used with Spherical, Planar, Perspective mappings) • UV, the UV coordinates of the vertices. • Local Normal, the local normals before transformation. • World Normal, the world normals after transformations are applied. • Index, the vertex index is used as an input.
Dimension	The dimension in which the mapping is calculated – 1D, 2D or 3D.
Show Guides	Show a visual guide for the mapping from this node in the viewport.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

UV Transform

Name	Description
UV Scale X	Scale the object UV along the x axis.
UV Scale Y	Scale the object UV along the y axis.
UV Offset X	Move the object UV along the x axis.
UV Offset Y	Move the object UV along the y axis.

Inputs

Name	Description	Typical Node Input
Mapping	Attach a mapping node to control how the texture should be applied to the model	Mapping
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

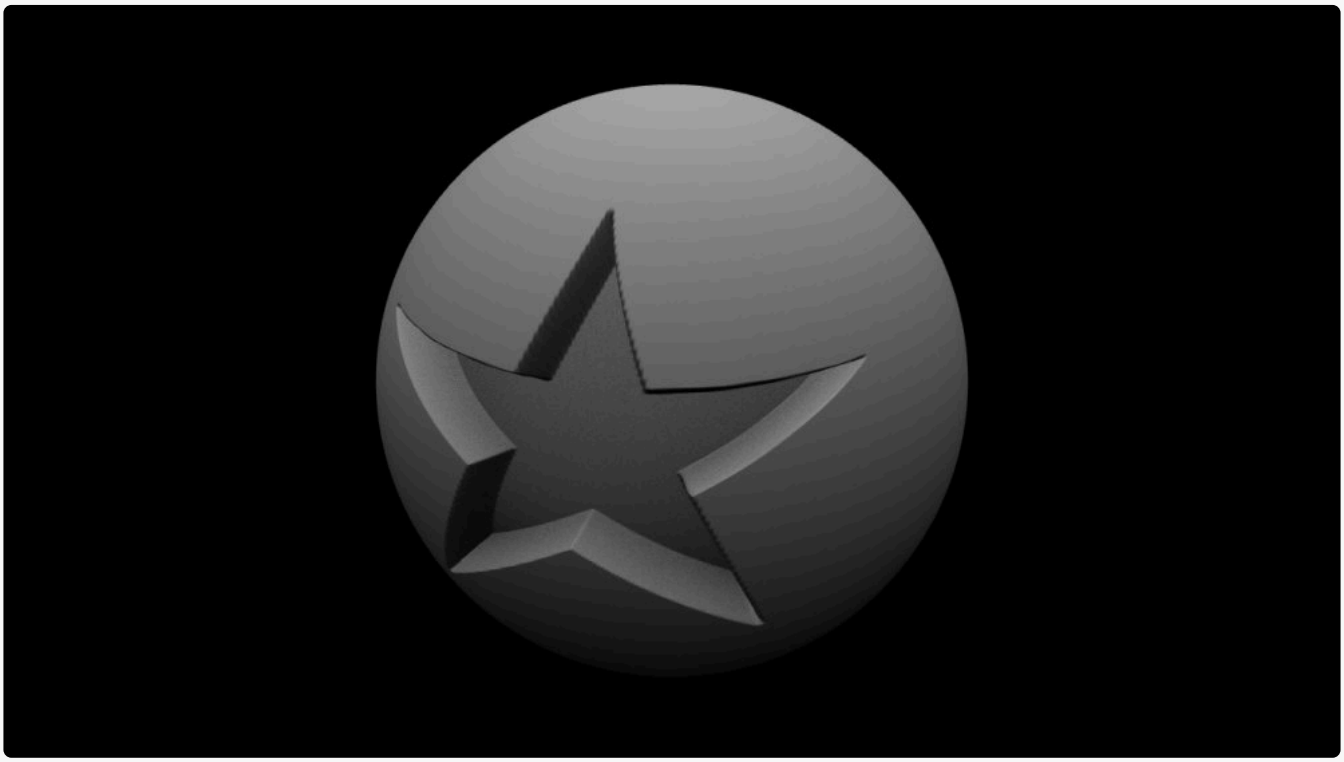
There are no outputs from this node.

Generate Weightmap Deformer

Method

This deformer node generates per-vertex weight values which can be used by other nodes – particularly other deformers – as part of their processing.

Deformers such as the 3D Plasma Deformer have an input called “Generated Weightmap” which takes a Generate Weightmap Deformer as input; the per-vertex weight is then used to scale the deformation.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.

Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the timecode. • Locked To Timecode, The deformer deformations are locked to the timecode and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Mode	The mode by which the value is generated. • Falloff Only, the deformer's falloff parameters are used to calculate the weight. • Texture Coordinate – X, the X component of the geometry's texture coordinate is scaled by the falloff and used as the weight. • Texture Coordinate – Y, the Y component of the geometry's texture coordinate is scaled by the falloff and used as the weight. • Texture, a texture is sampled using the geometry's texture coordinates and the

	luminance of the sampled pixel is scaled by the falloff and used as the weight.
Gain	Scale the generated value.
Offset	Offset the generated value.
Min Value	Limit the minimum value generated.
Max Value	Limit the maximum value generated.
Invert	Invert the generated weightmap values.
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Texture Wrap Mode U	Controls how textures used by Weightmap are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by Weightmap are wrapped when the V value range exceeds 0 to 1.

Show Weightmap	Visualise the weightmap as vertex colours on the source geometry.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Image	The image that is sampled when the mode is set to “Texture”.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Outputs a weightmap image that can be used to control where on a surface a Deformer node is allowed to modify the parent mesh.

MDD Deformer

Method

Deform a mesh based on an MDD file.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
MDD File	Source file for the MDD Deformation.
Playback Time	Absolute time the animation is played at.
Playback Speed	The speed at which the MDD deformer animates.
Playback Offset	Offset the time the MDD deformer starts at.
Loop Start	If the MDD Deformer loops, choose where it loops back to.
Loop Mode	Toggle if the Deformer loops.
Blend Mode	Choose how the falloff blends with the model.

	• None, no falloff is applied. • Blend, finds a middle value between its deformation and the model's current positions. • Additive, always adds the new deformation on top of the model's current positions.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

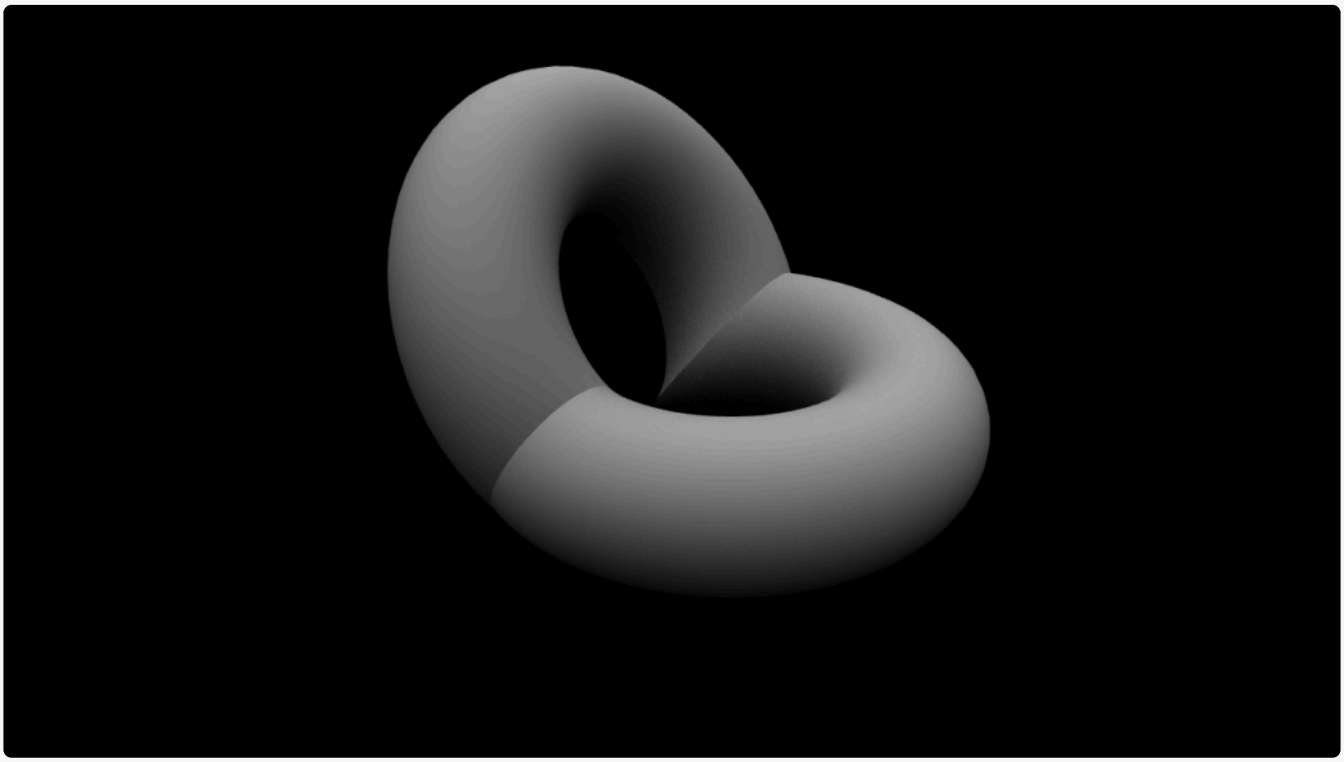
Outputs

The outputs section for this node is currently being worked on.

Mirror Deformer

Method

This node mirrors geometry from one side, and combines the output. This deformer generates new polygons – so using it with meshes with high polygon counts may substantially impact performance.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

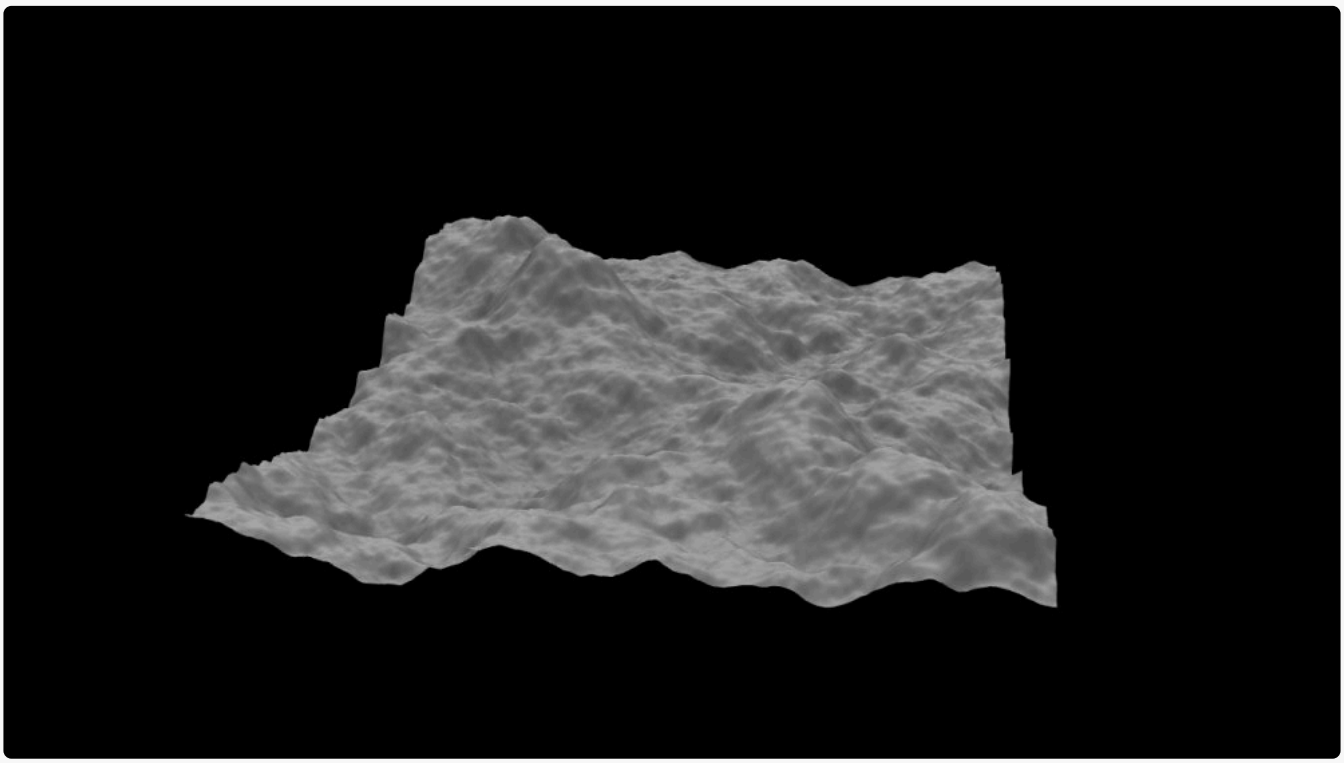
Outputs

There are no outputs from this node.

Ocean Wave Deformer

Method

This node displaces the vertices of a mesh based on an ocean wave function.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Choppy Displacement Amount	Controls the lateral displacement of the deformer.
Animation Rate	Speed the deformer is animated at.
Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Particle Bone Deformer

Method

Use a particle a particle system to affect the bones of a 3D Object or Shatter Primitive 3D nodes.

Attributes

Name	Description
Physics Velocity Dampening	Dampen the changes in velocity for smoother movement.
Fixed Update Rate Enabled	Force the deformer to update at a fixed rate.
Fixed Update Framerate	Choose what framerate the deformer is updated at.
Terminal Velocity	The maximum speed the deformer can move at before the mesh is distorted.
Motion Smoothing	How much motion smoothing is done to the deformer.

Deformer

Name	Description
Deformer Amount	How much the particles affect the deformer.
Deformer Velocity Amount	How much the particle velocities affect the deformer.
Rotation Velocity Amount	How much the particles are rotated along with their velocities.
Rotation Randomness	How much randomness can be found in their rotation.
Sub-Bone Separation Start	Distance at which the sub-bone separation begns.
Sub Bone Separation Randomness	Randomness in the sub-bone separation.
Source Mode	Select which part of the source mesh to deform based on. • Mesh Bones, Deform the mesh based on the imported skeletal structure. • Mesh Chunks, Deform the mesh based on any individual closed meshes inside the object (chunks).

Inputs

Name	Description	Typical Node Input

Mapping	How the Generated Weightmap is Mapped to the Deformer.	Mapping
Weight Image	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

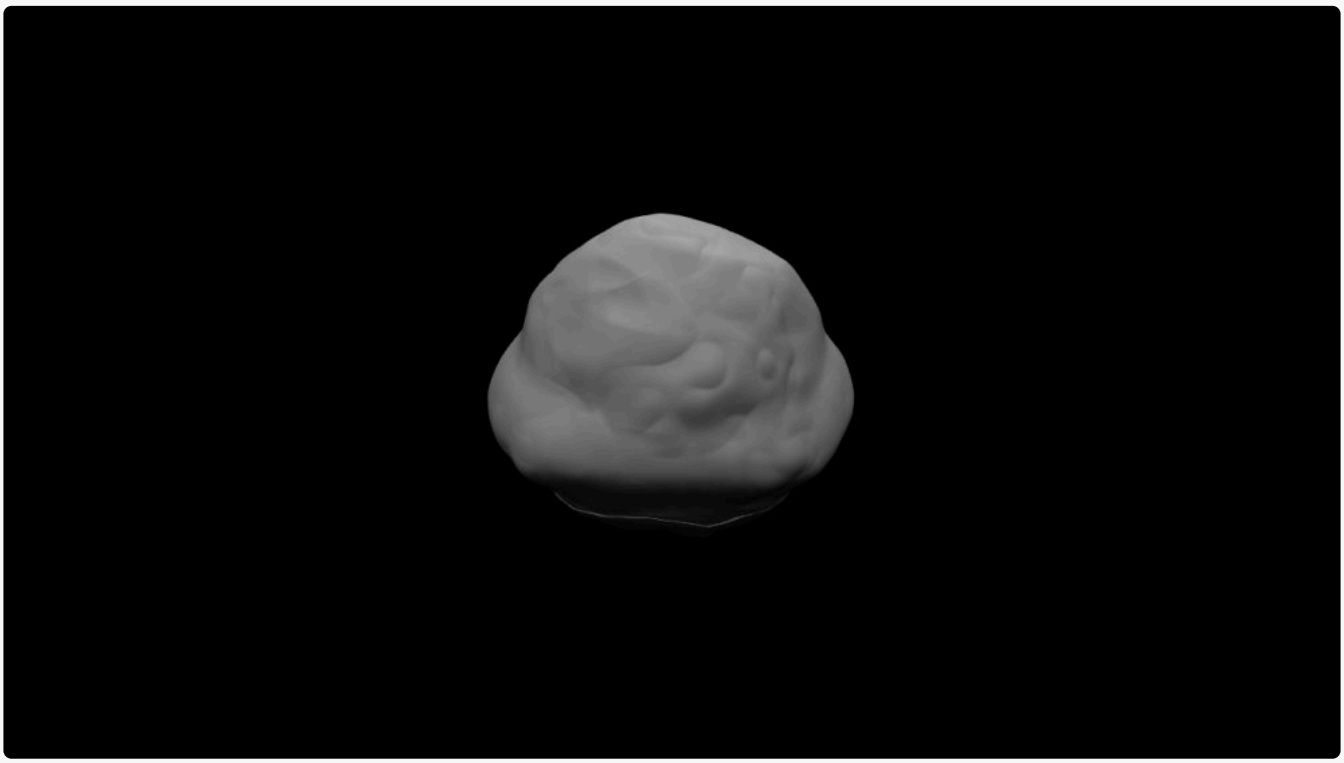
Outputs

There are no outputs from this node.

Particle Mesh Deformer

Method

Vertices of the 3D Mesh are manipulated as particles by a particle affector.

Example

Example Bin | Example Project

Attributes

Name	Description
Physics Velocity Dampening	Dampen the changes in velocity for smoother movement.
Fixed Update Rate Enabled	Force the deformer to update at a fixed rate.
Fixed Update Framerate	Choose what framerate the deformer is updated at.
Terminal Velocity	The maximum speed the deformer can move at before the mesh is distorted.
Motion Smoothing	How much motion smoothing is done to the deformer.

Deformer

Name	Description
Deformer Amount	How much the particles affect the deformer.
Deformer Velocity Amount	How much the particle velocities affect the deformer.
Apply After Subdivision	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.

Inputs

Name	Description	Typical Node Input
Mapping	How the Generated Weightmap is Mapped to the Deformer.	Mapping
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

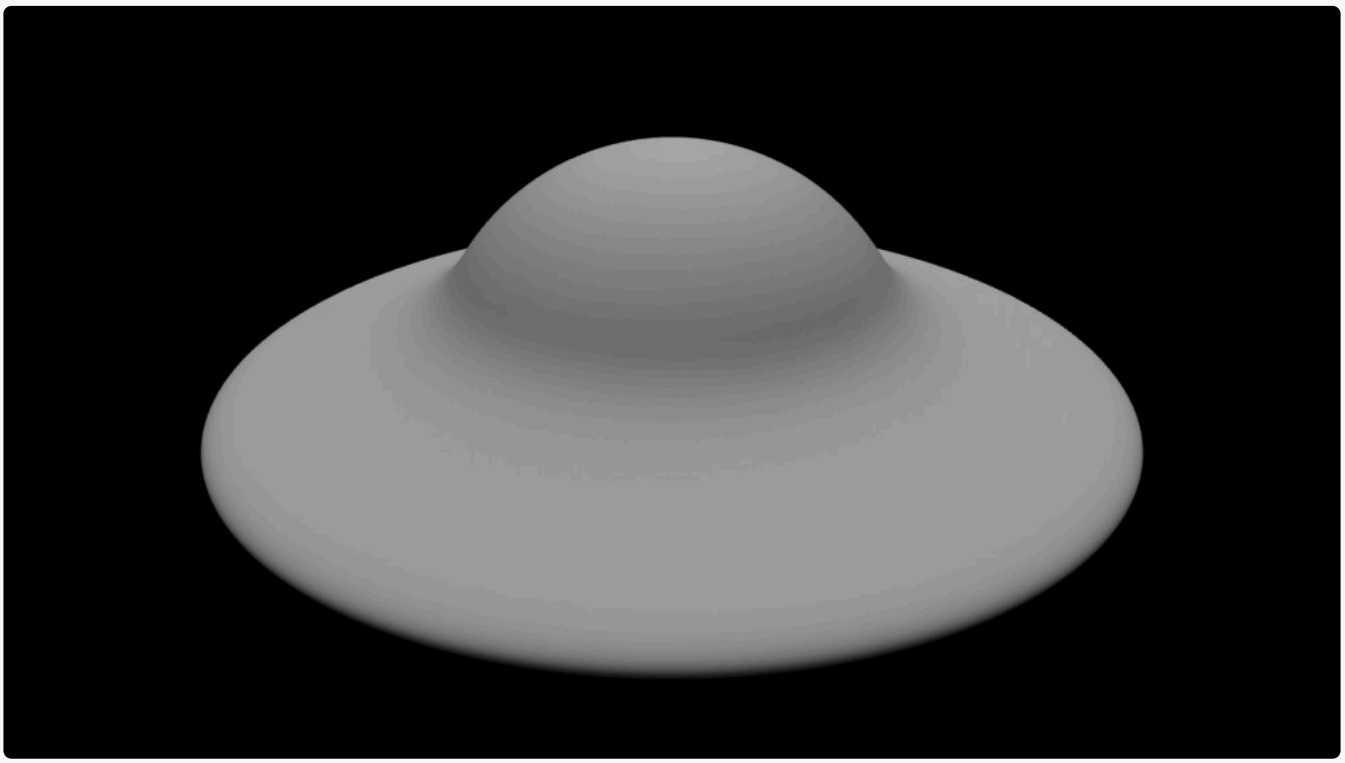
Outputs

There are no outputs from this node.

Plain Deformer

Method

Deforms a mesh based on an input position.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Amount	How much the deformer displaces the original mesh.
Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description

Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Effector Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inputs

Name	Description	Typical Node Input
Transform Node	Use an input node to drive the transformation values of the deformer.	Null
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer

Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

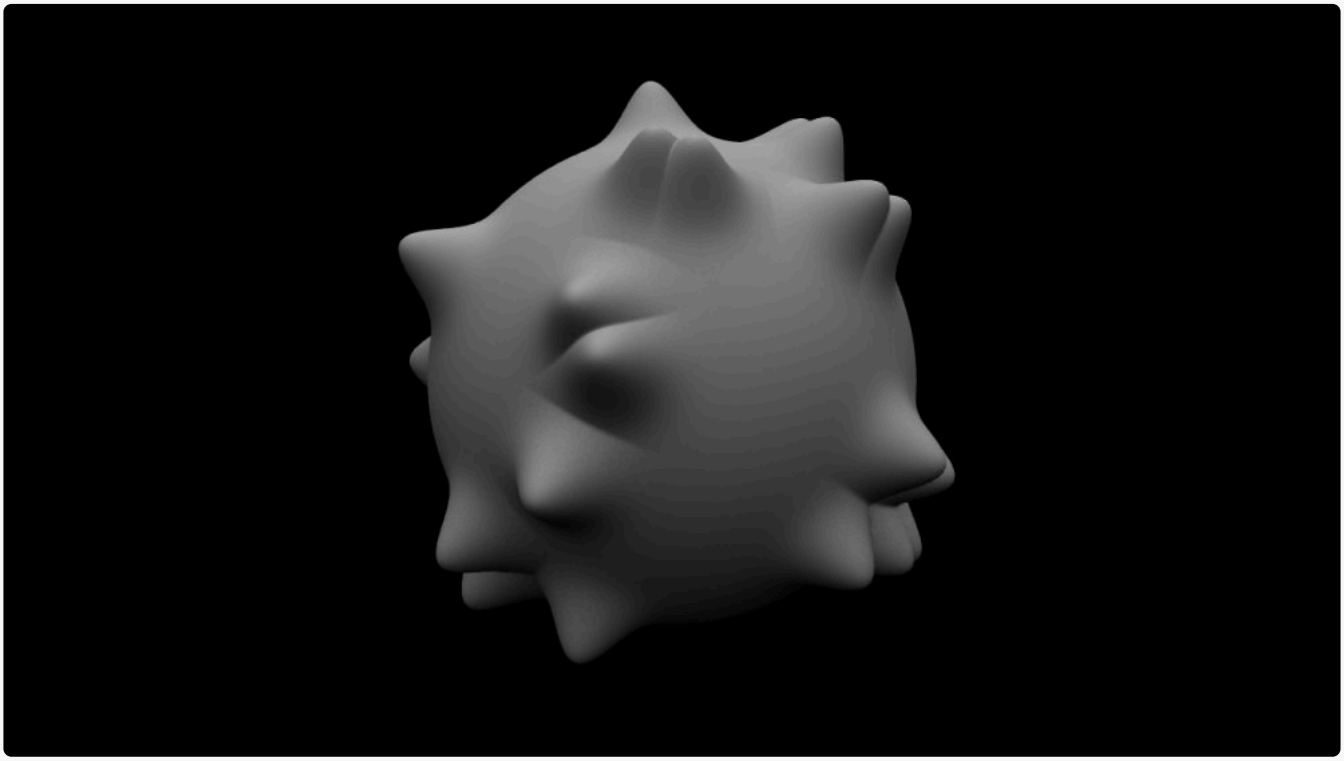
Outputs

There are no outputs from this node.

Point Deformer

Method

This node is used to deform vertices using points from a particle system or the vertices of another 3D object. The closest points to each vertex are determined and a falloff calculated using the distance to those points, then displacement and colour modifications are applied to the vertex.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Point Displacement Mode	The method by which the points are used to displace the vertices. • Displace, Move points along vertex normal. • Affect, Attract the vertexes to the point position. • Repel, Repel the vertexes to the point position.
Point Colour Mode	The method by which the points are used to colour the vertices. • Point Colour, Vertexes are coloured based on the point colours. • Distance, Vertexes are coloured based on their distance from the point.

Point Falloff Distance	The radius around each point in which the point affects vertices.
Point Falloff Power	The sharpness of the falloff around each point.
Point Normal Direction Weight	Weights the effect of the point on the vertex by how much the vertex normal points towards it. This allows points behind vertices to be ignored.
Colour Blend Amount	The amount the colour effect is applied to the vertex.
Colour	The colour to apply to the mesh.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Point Source	Point source from which to deform the Mesh.	Particle Root
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform	Links all transform properties to the input node.	Null

Modifier		
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

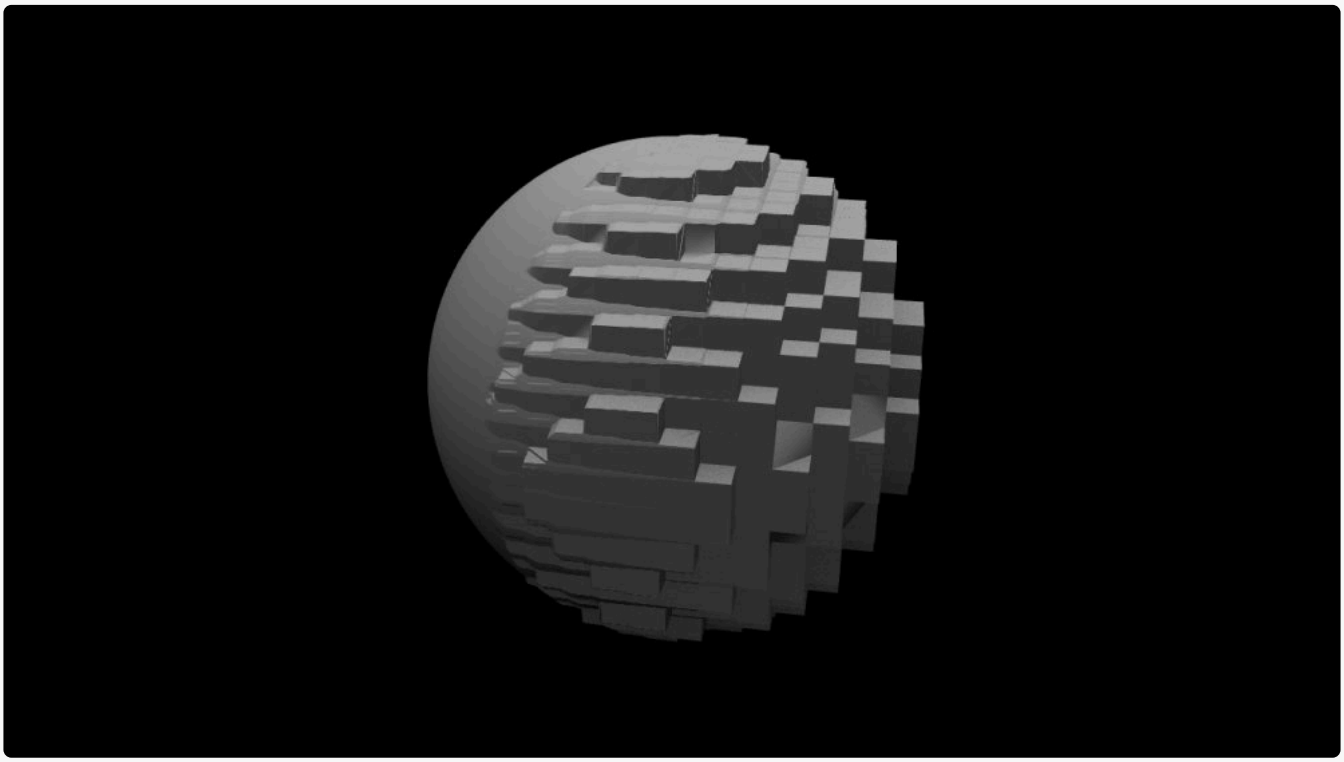
Outputs

There are no outputs from this node.

Quantise Deformer

Method

This node quantises the positions for each vertex of the mesh, rounding them to the nearest value set be the resolution attribute.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Amount	How much the deformer Affects the original mesh.
Resolution	Change the resolution for the quantisation.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to drawn falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical

	falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Transform Node	Use an input node to drive the transformation values of the deformer.	Null
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

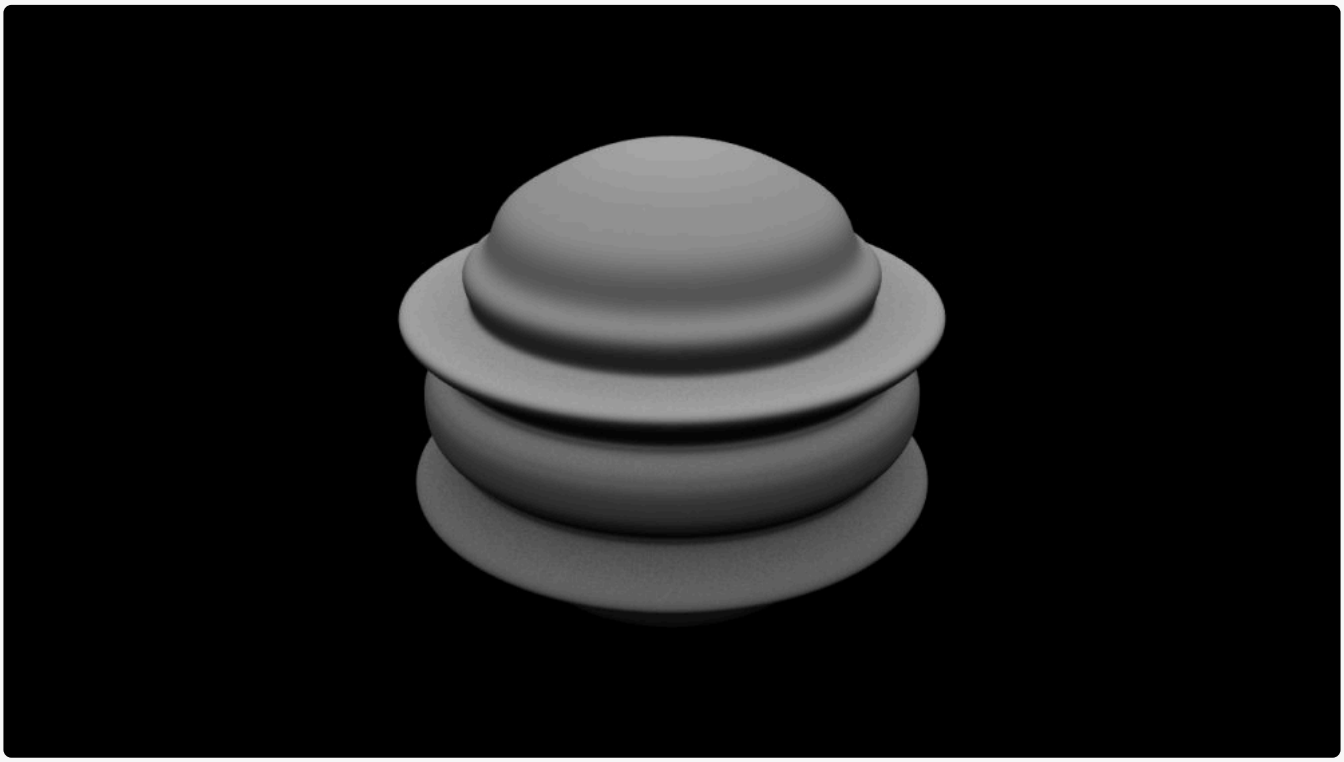
Outputs

There are no outputs from this node.

Ripple Deformer

Method

This node displaces a mesh using a ripple effect which grows from the centre of the deformer to the edge of the falloff.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Max Displacement	Maximum distance the deformer can displace the mesh.
Ripple Speed	The speed at which the ripple spreads.
Ripple Peak Sharpness	How sharp the peaks of the ripple are.
Ripple Scale	The scale of the ripples that are generated.
Ripple Repeat Rate	How often the ripples are re-spawned.

Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

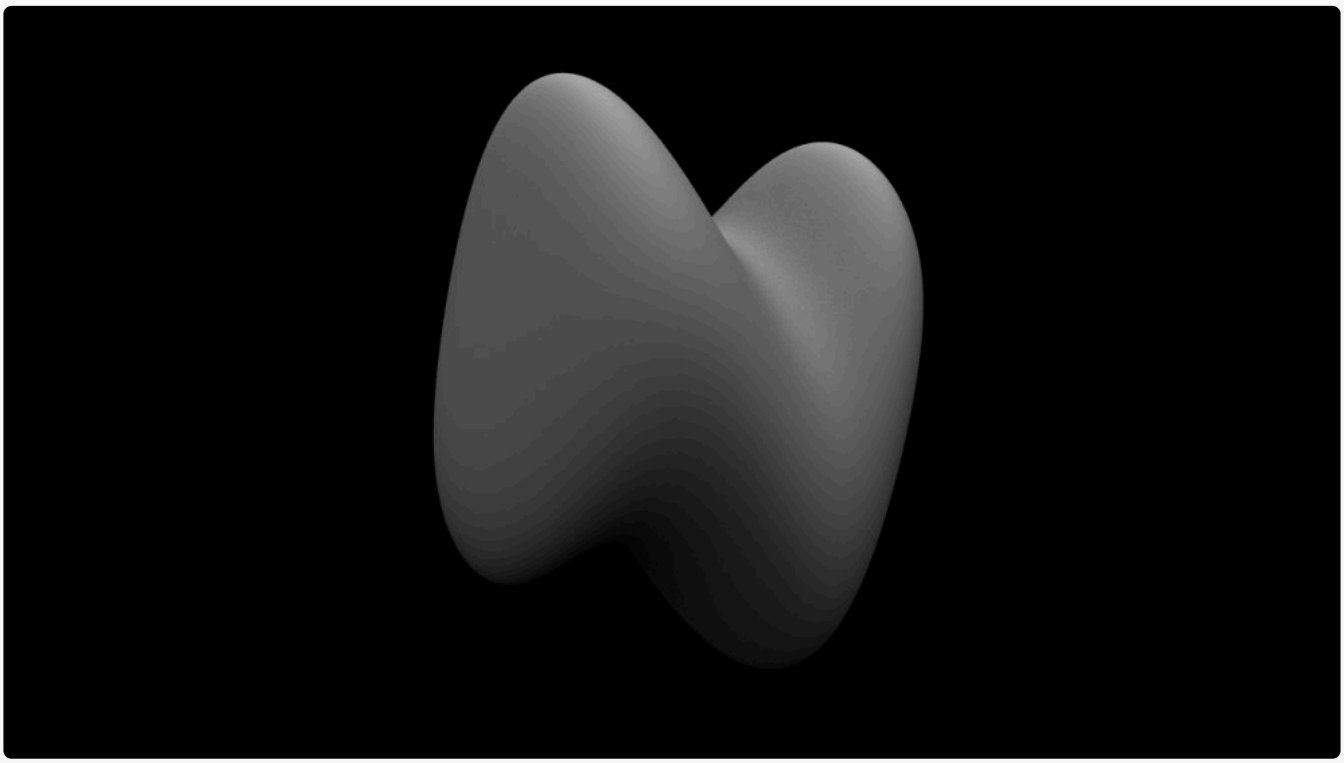
Outputs

There are no outputs from this node.

Sine Deformer

Method

Deforms a mesh based on a sine wave.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Sine Scale Major Axis	Change the scale of the larger wave on the deformer.
Sine Scale Minor Axis	Change the scale of the small wave on the deformer.
Displacement Amount	How much the deformer displaces the original mesh.
Noise Amount	The amount of noise that is applied to the deformer.
Max Displacement	Maximum distance the deformer can displace the mesh.
Animation Rate	Speed the deformer is animated at.
Displacement	Change which direction the deformer displaces the objects mesh.

Direction	• Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

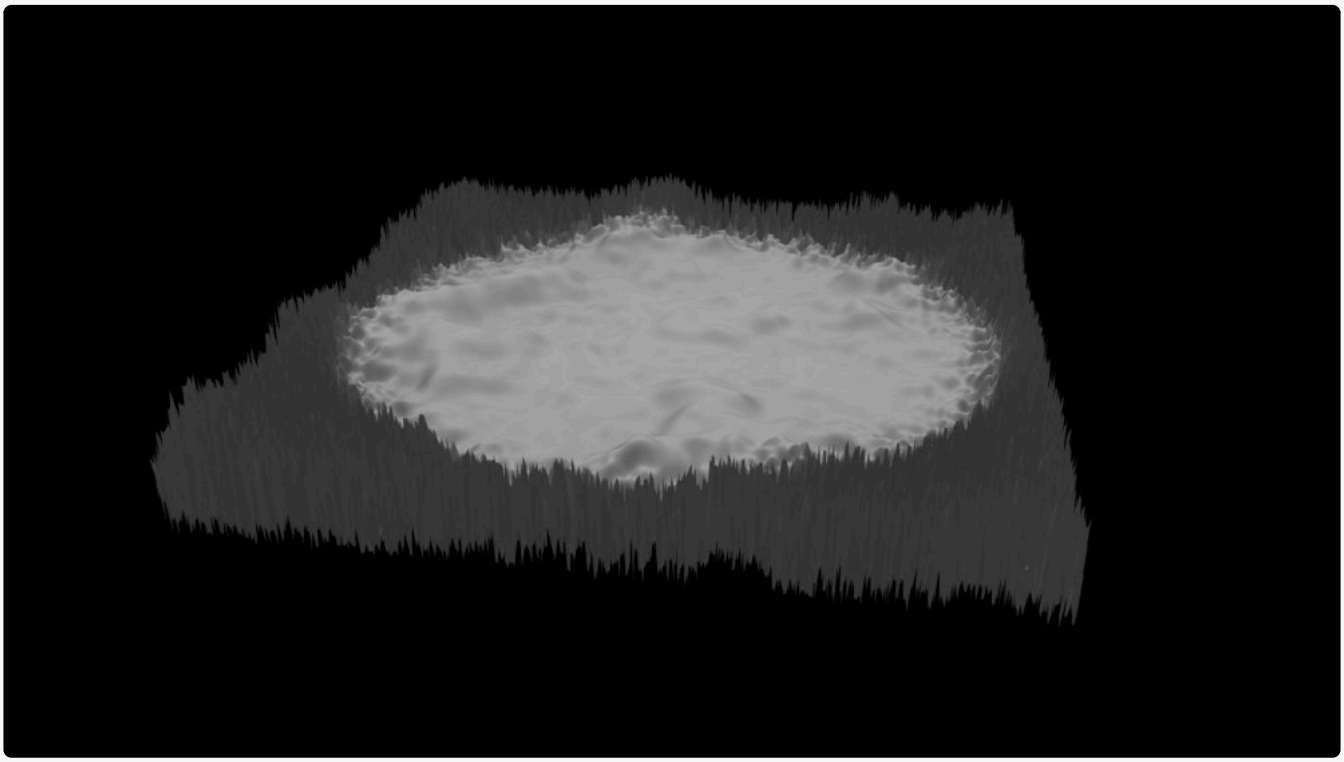
Outputs

There are no outputs from this node.

Smoothing Deformer

Method

This node applies iterative smoothing to the connected object, making sharp edges of the mesh rounder and smoother.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Smoothing Iterations	Causes the object's vertices to be smoothed by the number of levels specified. Smoothing is done before rendering.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	The primitive shape used to calculate the falloff weight. • Point / Sphere, Uses the distance from the origin of the node.

	• Line / Cylinder – XY / YZ / XZ, Uses the distance from an infinite line in the X axis at the origin of the node. • Plane – X / Y / Z, uses the distance from an infinite plane in the XY axis at the origin of the node.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

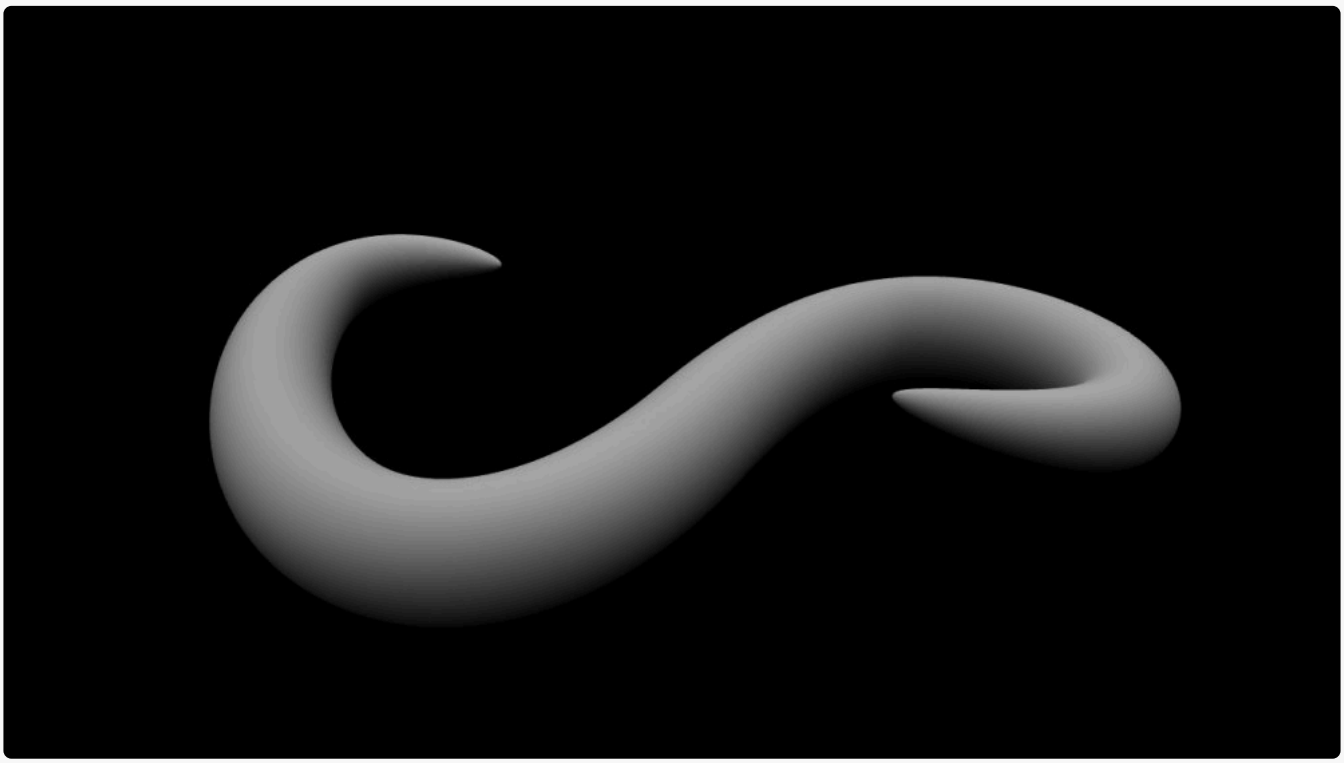
Outputs

There are no outputs from this node.

Spline Deformer

Method

This node deforms a mesh using input nodes that dictate the path of the spline.

Example

Example Bin | Example Project

Attributes

Name	Description
Shift Offset	Move the centre point of the deformed mesh.
Shift Scale	Scale the length of the mesh along the spline.
Spline Time Mode	Controls how the spline is evaluated by spline followers. • Knots, followers take the same amount of time to move between each control point on the spline. • Length, the time followers take to move between each control point is normalised by the distance along the spline, so the follower will appear to move at a constant rate.

Position Delta X/Y/Z	Offset the positions of the mesh from the spline before deformation.
Show Spline	Toggle whether the spline is visible while the scene is playing.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.

Inputs

Name	Description	Typical Node Input
Spline Nodes	Input nodes that dictate the path the spline should take.	Null
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

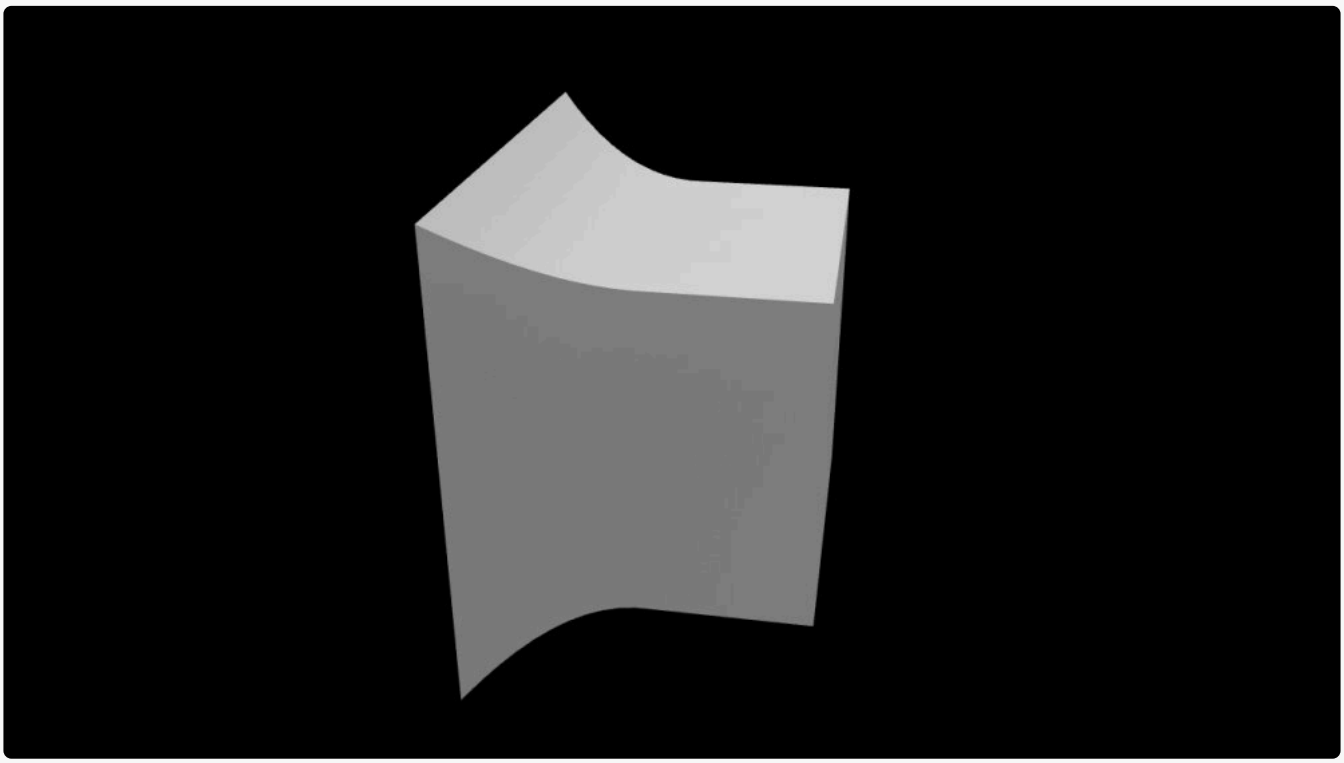
Outputs

There are no outputs from this node.

Taper Deformer

Method

This node tapers a shape so that one side is scaled smaller than the other.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Taper Length	Change how quickly the taper reaches its displacement amount.
Axis	Select an axis along which the deformation should apply.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from.

	• Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Curve

Name	Description
Shape	Select the interpolation between the mesh and its tapered position. • Linear, Taper is pushed out in a straight line. • Power, Taper is pushed out at a rate defined by the Power attribute. • Cubic, Taper is pushed and eased in a cubic curve. • Hermite, Taper curve is defined by the control points
Invert	Invert the direction the mesh is tapered.
Mirror	Reflect the taper in opposite directions to the shape.
Power	Control the power at which the taper curves outward at. Only functions in Power mode.
Start Tangent	Control the direction of change from the start of the Hermite curve. Only functions in Hermite mode.
End Tangent	Control the direction of change from the end of the Hermite curve. Only functions in Hermite mode.
Shape Curve	Previews the curve the taper takes.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer

Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

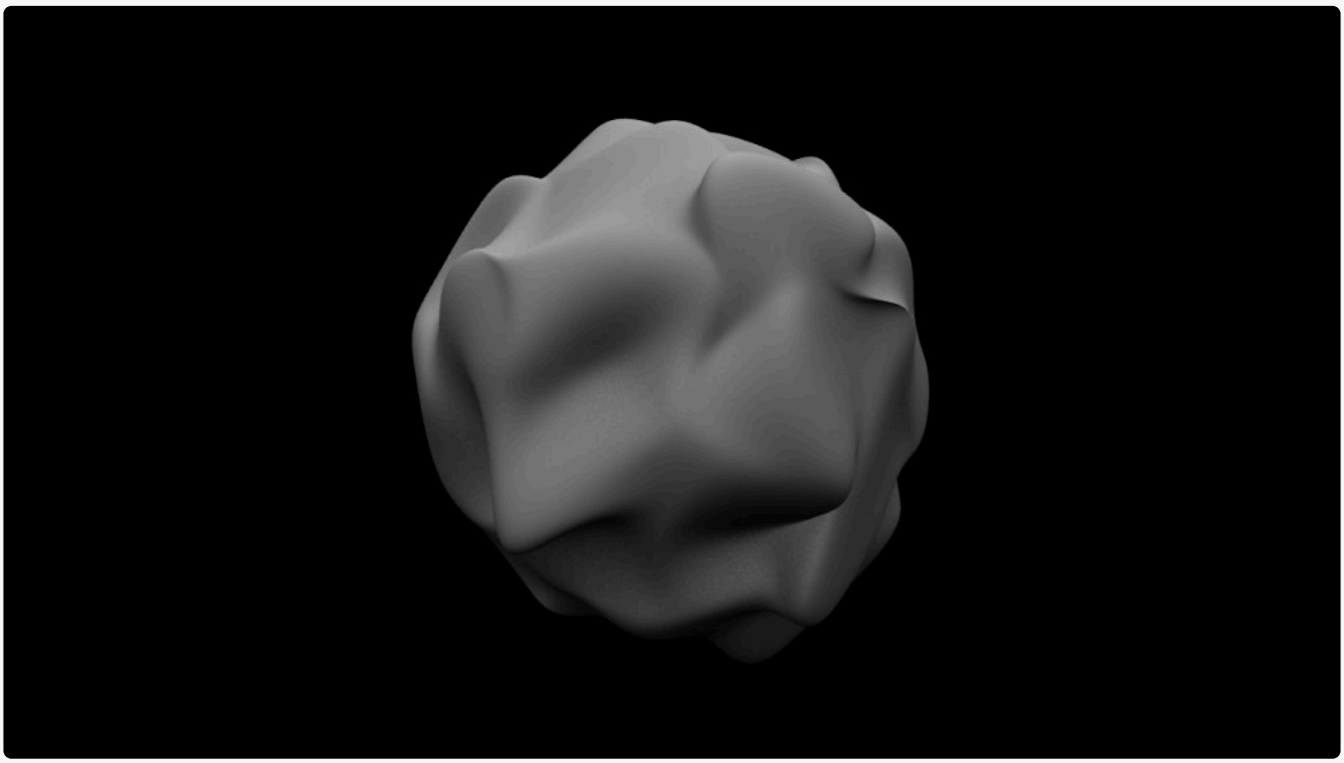
Outputs

There are no outputs from this node.

Turbulence Deformer

Method

This node deforms a mesh based on a turbulence function.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Noise Scale	Scale the size of any noise generated.
Displacement Amount	How much the deformer displaces the original mesh.
Lacunarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Animation Rate	Speed the deformer is animated at.

Falloff

Name	Description

Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

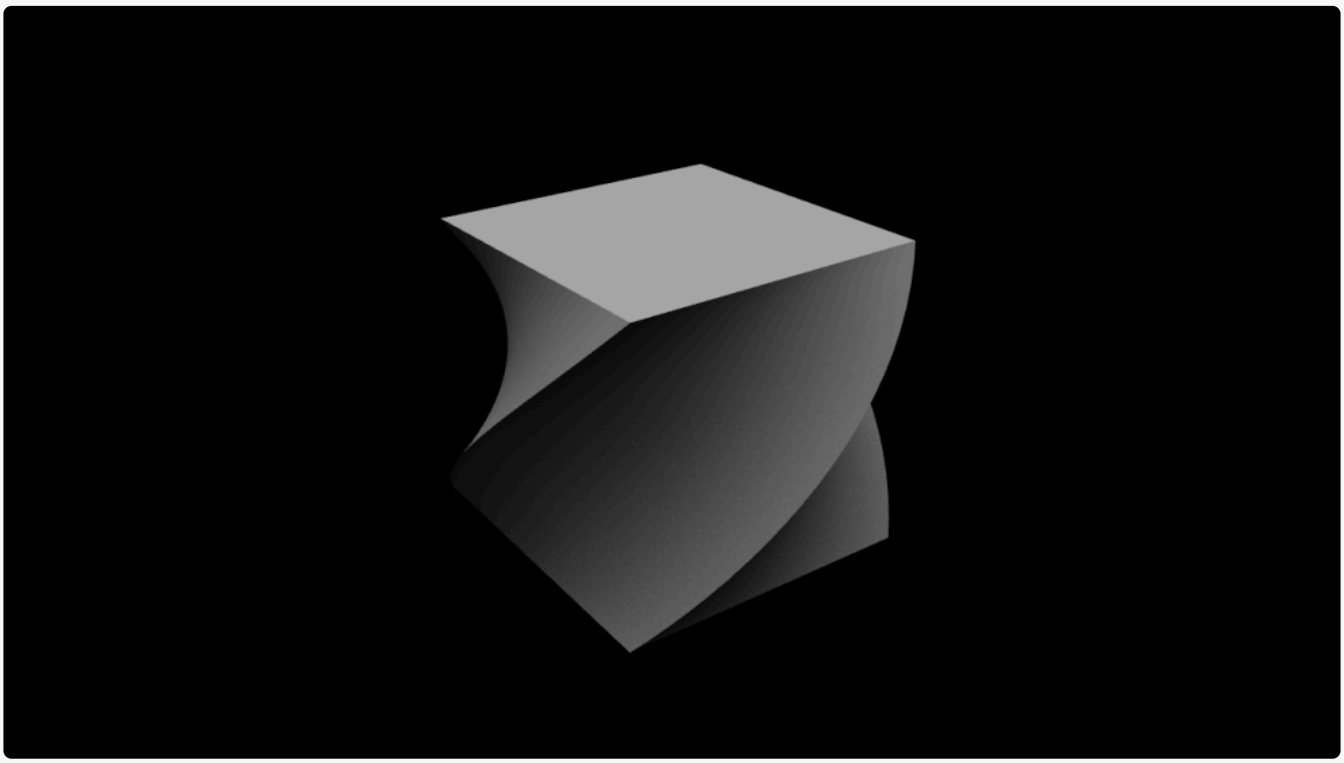
Outputs

There are no outputs from this node.

Twist Deformer

Method

This node twists a mesh so that one section is warped relative to another side.

Example

Example Bin | Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Blend Amount	How much the deformer affects the mesh.
Subdivision Order	Toggle whether the deformer is added before or after the object is subdivided.
Subdivision Level	The subdivision level at which the deformer is applied.
Weightmap	Use a weight map to determine where the deformer is more or less effective.
Vertex Source Mode	How vertexes are selected to be used by the deformer. • Vertex Positions, Vertexes are chosen based on their positions in the scene. • Chunks, Vertexes are chosen based on the enclosed section of the mesh they are used.
Deformer Transform Space	Select which transform space should be used to calculate the deformations. • Local, Deformations are calculated in the Local Space of the object. • World, Deformations are calculated in the World Space of the scene.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Displacement Amount	How much the deformer displaces the original mesh.
Clamp Start	Toggle a clamp which disables deforming of the mesh after a specified distance.
Start Distance	Change the distance from the node that the clamp start functions.
Clamp End	Toggle a clamp which disables deforming of the mesh before a specified distance.
End Distance	Change the distance from the node that the clamp end functions.
Axis	Select an axis along which the deformation should apply.

Falloff

Name	Description
Falloff Enabled	Enable falloff from the position of the deformer.
Falloff Shape	Select which shape to use to draw falloff from. • Sphere, Falloff is drawn outward from a central point, forming a spherical falloff. • Cylinder – X/Y/Z, Falloff is drawn outward from a line, forming a cylindrical falloff. • Plane – X/Y/Z, Falloff is drawn outward from a plane.
Falloff Range	Limits the range the deformer is effective at.
Falloff Inner Range	The inner range from which the falloff is calculated from.
Falloff Curve Power	How quickly the falloff drops to 0 at the outer falloff.
Invert Falloff	Invert the direction of the falloff.
Falloff Curve	Visualises the falloff curve, from being completely in effective to not at all.

Inputs

Name	Description	Typical Node Input
Mask Image	Use an image to mask out areas for the deformer to not function.	Video Loader
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Generated Weightmap	Add a weightmap to control the strength of the deformer depending on the weightmaps vertex data.	Generate Weightmap Deformer
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Fields

Introduction

A field is a grid of voxels. A voxel is a 3D pixel that contains the following data:

- *"Ink"* – RGBA Colour information
- *"Movement Vector"* – XYZ Vector

By holding colour / "ink" information in the voxel, we can render it, like a drop of ink suspended in a liquid or a puff of cloud. By holding a vector of movement we can simulate complex fluid-like motions through the grid.

With every newly rendered frame, the simulation of the field is stepped forward. During this simulation step, each voxel calculates it's *movement vector* by understanding how the movement of the surrounding voxels are affecting it. For example, if a voxel to the left has a *movement vector* pushing to the right it will transfer some of its movement into the voxels to it's right. In this way, it simulates the real world of motion in liquids or gases.

Likewise, in each step of the simulation, a portion of the *ink* follows the direction of the *movement vector.*

The way voxels are rendered can vary greatly, allowing smoke, clouds or more solid forms.

There are three primary types of field nodes:

- Emitters, these emit colour / "ink" into voxels in the grid.
- Affectors, these add movement to the "movement vector" of voxels in the grid.
- Rendering, these nodes render the voxels of the field in different ways.

You can also use the Movement Vector data from the field to affect particle systems using the *Particle -> Affectors -> Field Affector* node. This is very useful for fluid-like particle simulations.

Method

Field nodes are nodes used in a Field system. This system starts with a Root node, and is built out with Emitter and Affector nodes, before finally being rendered to the camera with a Rendering node.

Fields are generally hooked into the Root node, although they can be applied to any node – they will still appear in the scene as long as there is a path to a Root node; they will inherit the transformation values

of parent nodes.

Some commonly used terms

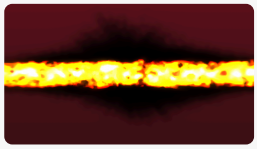
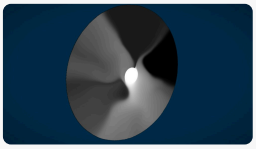
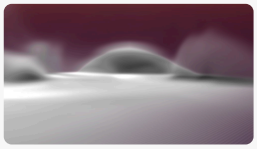
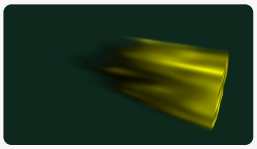
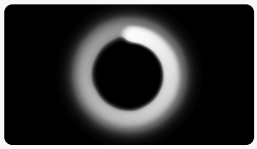
Node Spawn Mode

The shape of the affector falloff.

Mode	Description
Point	The affector falls off in distance from a point.
Line	The affector falls off in distance from a line.
Plane	The affector falls off in distance from a 2D plane.

Gallery

Affectors

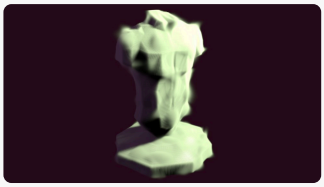
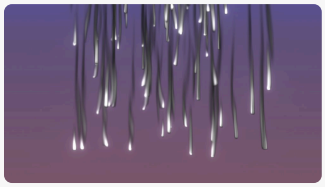
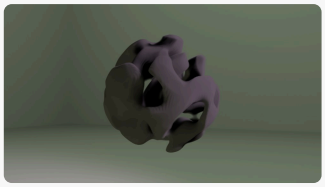
				
Curl Noise Affector	Fluid Affector	Image Affector	Primitive Affector	Turbulence Affector
				
Velocity Affector	Vortex Affector			

- Field Affector

Deformers

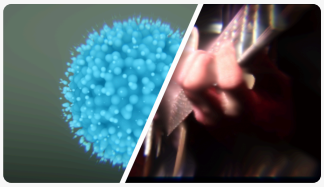
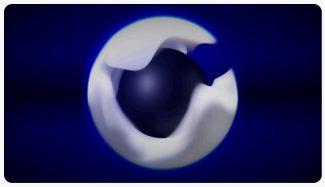
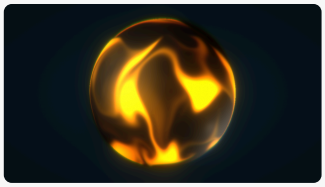
- Fbm Deformer
- Sine Deformer

Emitters

			
3D Object Emitter	Image Emitter	Particle Emitter	Primitive Emitter

- Field Emitter
- Procedural Emitter

Rendering

			
Field Lighting	Field Renderer	Field Shadows	Render To Object Surfaces

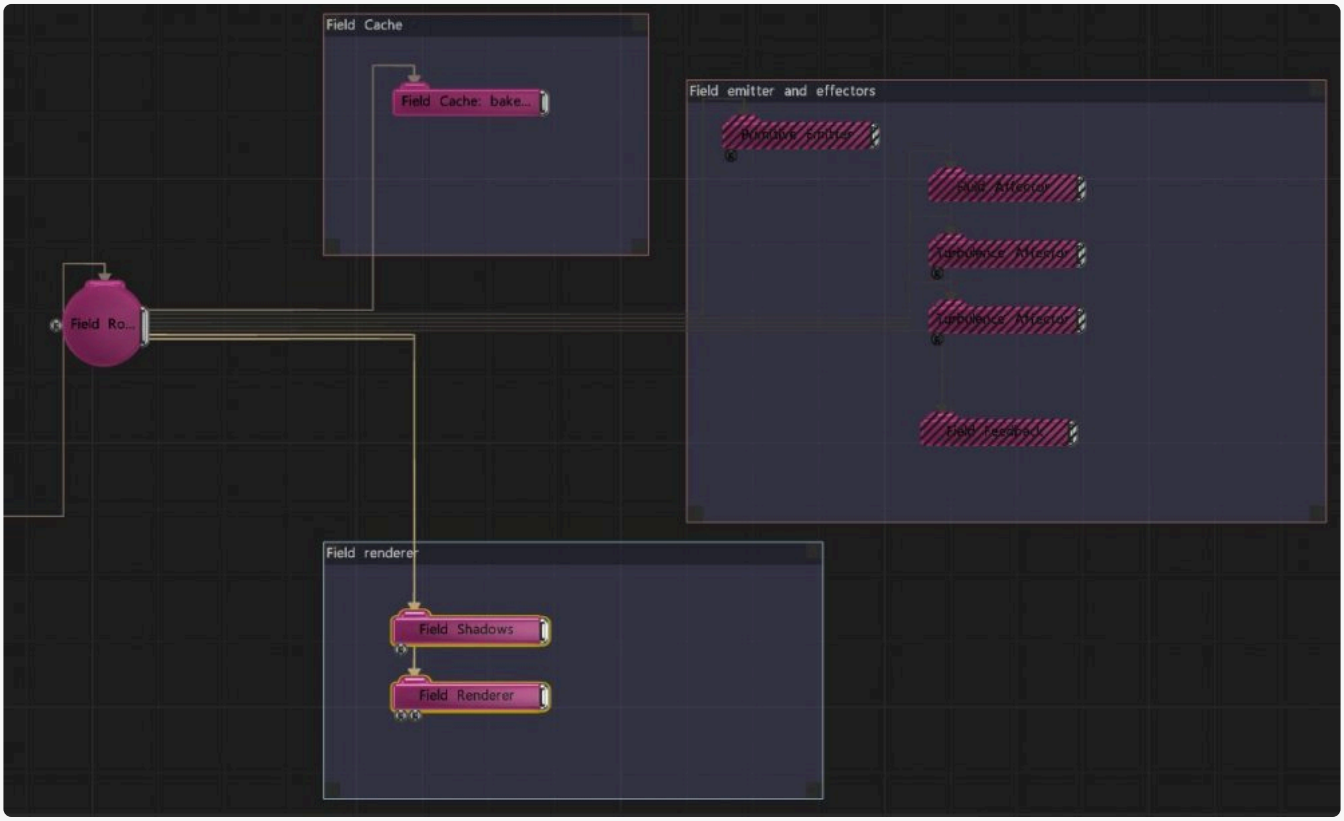
Field Cache

Method

The Field cache node allows you to store the animation of a field to disk. This allows the animation to be scrubbed in time, and for simulations to run deterministically without the need to use effectors. Cached fields may perform significantly better than running simulations live.

> ! Only Field Root Nodes using “Densities and Temperatures” mode are supported. Use of “Upres Density Field” on the Field Root node is not supported.

Example Nodegraph

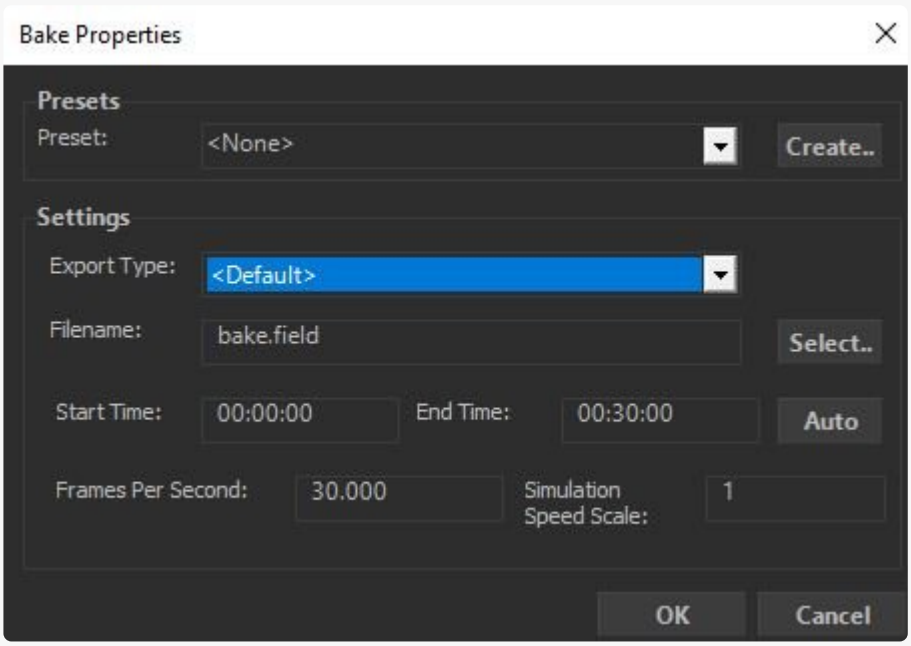


When the baking is finished the effectors may be disabled.

Attributes

Name	Description
Bake Now	Open baking panel

Field Cache	Cached File
Playback Rate	Playback speed
Playback Time Offset	Offset the playback Time
Looping	Enable loop playback

Baking Panel

the file extension for field caches is *.field.

Outputs

There are no outputs from this node.

Notes

Field caching can generate very large files. The frame rate and field resolution will influence the size of the cached file.

Field Level Set Root

Method

Field Level Sets use the same field structure as the Field Root Node – but instead of containing densities (“ink”), they contain an isosurface (distance field): each cell stores the distance to the surface. This means that while fields are typically used to model gas and smoke, level sets are an efficient way of modelling liquid simulation.

Field Level Sets can be used as procedurals via the Procedural Level Set node, allowing them to be rendered as meshes with the Procedural Meshing node.

Advecting and affecting the level set can cause it to lose accuracy and volume. Two mechanisms exist to improve this. Firstly, the “Renormalise Iterations” parameter controls a number of iterative renormalisation steps which improves the accuracy of the level set after being moved.
Secondly, in the case that the field is used to model a body of liquid in a container, the Floor Height and Floor Blend parameters control blending of a flat level of liquid into the level set each frame as a workaround to keep it from losing volume.

Setting the “Up-Res Distance Field” parameter will run the level set data at twice the width, height and depth of the velocity buffer. This typically allows for a more detailed visual result for the simulation, but without as great an increase in memory usage and impact on frame rate as running the whole field at twice the width, height and depth.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Width	Pixel resolution of the field horizontally.
Height	Pixel resolution of the field vertically.
Depth	Changes how much resolution the depth of the field has.
Velocity Dampening	How fast the velocities are dampened. Higher number = greater dampening
Lock Update Rate	Locks the update rate of the field to a particular frame rate.
Locked Update Framerate	Set the frame rate at which the field simulation is updated. Only functions with “Lock Update Rate” enabled.
Wrap Update At Edges	Allow ink and velocities to wrap around from the edges. i.e. velocities at the right edge can push through to left.
Clear Every Frame	Clears the ink and velocities of the field every frame. This means affectors will no longer function if connected to this node.
Visualise Field	Generates an optical flow image, and renders it to the veiwport.
Renormalise Iterations	The number of renormalisation steps to apply to the level set after it has moved.
Up-Res Distance Field	Causes the field’s level set to be twice the width, height and depth of its velocity data.
Floor Height	Controls the height of the “floor” plane in the field.
Floor Blend	Controls the amount that the “floor” plane is re-injected into the field.
Gravity	Add a gravity simulation to the level set animation.

Inputs

Name	Description	Typical Node Input
Bounding Box	Bounding box beyond which fields are killed.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

Outputs

The outputs section for this node is currently being worked on.

Field Root

Method

The field root node controls the physical dimensions and density of the voxel grid as well as its simulation properties.

Setting the “Up-Res Distance Field” parameter will run the density data at twice the width, height and depth of the velocity data. This typically allows for a more detailed visual result for the simulation, but without as great an increase in memory usage and impact on frame rate as running the whole field at twice the width, height and depth.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Width	Pixel resolution of the field horizontally.
Height	Pixel resolution of the field vertically.
Depth	Changes how much resolution the depth of the field has.
Colour Fade	How quickly the colour/ink fades.

Velocity Dampening	How fast the velocities are dampened.
Temperature Fade	How fast the temperature values are dampened.
Updraft Velocity	How quickly higher temperatures move upwards.
Lock Update Rate	Locks the update rate of the field to a particular frame rate.
Locked Update Framerate	Set the frame rate at which the field simulation is updated. Only functions with “Lock Update Rate” enabled.
Wrap Update At Edges	Allow ink and velocities to wrap around from the edges. i.e. velocities at the right edge can push through to left.
Clear Every Frame	Clears the ink and velocities of the field every frame. This means affectors will no longer function if connected to this node.
Visualise Field	Generates an optical flow image, and renders it to the veiwport.
Density Field Mode	Change how field density is visualised and simulated. • Colours, various colours from each emitter are generated into the field. • Densities, Only the alpha values from the field are emitted into the field. • Densities and Temperatures, Only the alpha values are used, and temperature values are simulated in the field.
Upres Density Field	When enabled, the Density field will be double in resolution, but the velocity field remain the same size. This will give much greater clarity to the image, with a smaller impact on performance.
Solver Shader	Ability to over-ride internal shader. See writing custom shaders.

Inputs

Name	Description	Typical Node Input
Bounding Box	Bounding box beyond which fields are killed.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

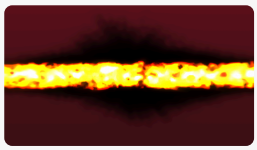
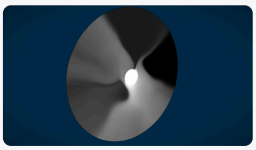
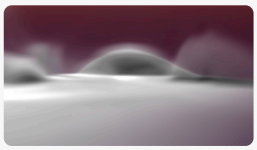
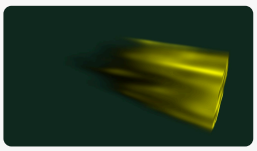
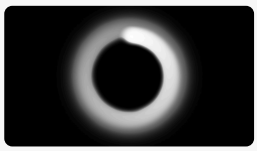
Fields can output into Particle Systems using the Particle Field Affector. Fields can also output their field velocities to other fields using the Field Affector, and can also output their colour values to other field systems using the Field Emitter.

Affectors

Method

Affector nodes modify the velocities of voxels in a field. Affectors need to be connected to a Field Root, and they will only affect voxels within that field system (unless modified appropriately).

Gallery

				
Curl Noise Affector	Fluid Affector	Image Affector	Primitive Affector	Turbulence Affector
				
Velocity Affector	Vortex Affector			

- 3D Object Collision Affector
- Derivative Feedback
- Field Affector
- Field Feedback
- Points Affector
- Primitive Collision Affector

3D Object Collision Affector

Method

This node allows fields to collide with polygonal 3D objects. The field will flow around or bounce off the object's surface and be prevented from entering it.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Collision Velocity.	How much the field bounces off the colliding surface.
Invert Shape	Invert the surface normals, changing the parts of the object which will interact with the field.

Inputs

Name	Description	Typical Node Input

Object	Input an object for the field to collide with.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

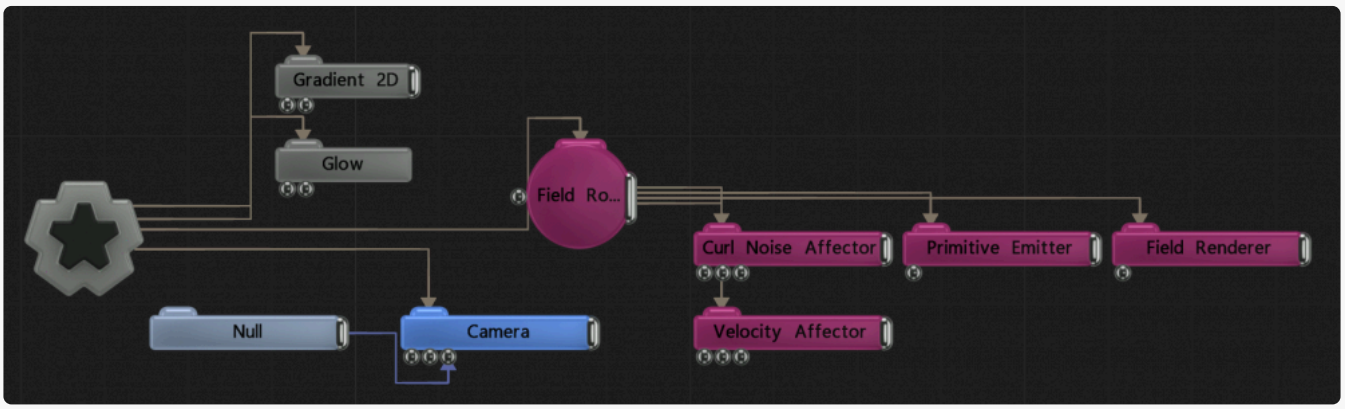
Outputs

The outputs section for this node is currently being worked on.

Curl Noise Affector

Method

Applies a curl noise function to the movement vectors of a field.

Example


Transform

Name	Description
Position X	Move its position along the x-axis in local space.

Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Fluid Simulation Speed	Controls the speed of the fluid simulation.
Curl Noise Amount	The scale of the velocity being applied to the voxels in the field.
Noise Size	Change the size of the generated curl noise.
Normalise Noise Parameters	The curl noise is normalised so that the vector velocities do not overlap with other voxels.
Radius	The radius of the curl noise – the tightness of the curls.
Randomness	The randomness of the affector.

Inputs

Name	Description	Typical Node Input
Velocity Transform	Scale the resulting velocities from the curl noise to exaggerate along certain vectors.	Velocity Affector
Mask Node	Masks the areas in which the affector won't apply.	Image Plane
Affected Emitters	Emitters that are affected by the noise affector. By default, all emitters in the field system are affected.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform	Override the transformation values of the node, relative to its parent.	Null

Override		

Outputs

This node primarily outputs its transformation values to its children. Otherwise, it has no useable outputs.

Derivative Feedback

Method

This node applies a feedback effect to a 2D field based on the gradient of the colours at each point in the field. This creates the effect of the field spreading out from or pulling into sharp changes in the image – e.g. lines and corners.
This node is only effective on 2D fields. The process is applied iteratively, so larger iteration counts will cause the effect to be stronger per frame.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Amount	The strength of the feedback effect.
Iterations	The number of iterations the effect is processed at per frame.

Inputs

Name	Description	Typical Node

		Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node primarily outputs its transformation values to its children. Otherwise, it has no useable outputs.

Field Affector

Method

This node applies a separate field system's movement vectors to the current field system.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Scale	Scale the amount the input field affects the field system.
Randomness	The randomness of the affector.

Inputs

Name	Description	Typical Node Input
Field Node	The field to be used by the affector.	Field Root
Mask Node	Masks the areas in which the affector won't apply.	Image Plane

Affected Emitters	Emitters that are affected by the noise affector. By default, all emitters in the field system are affected.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

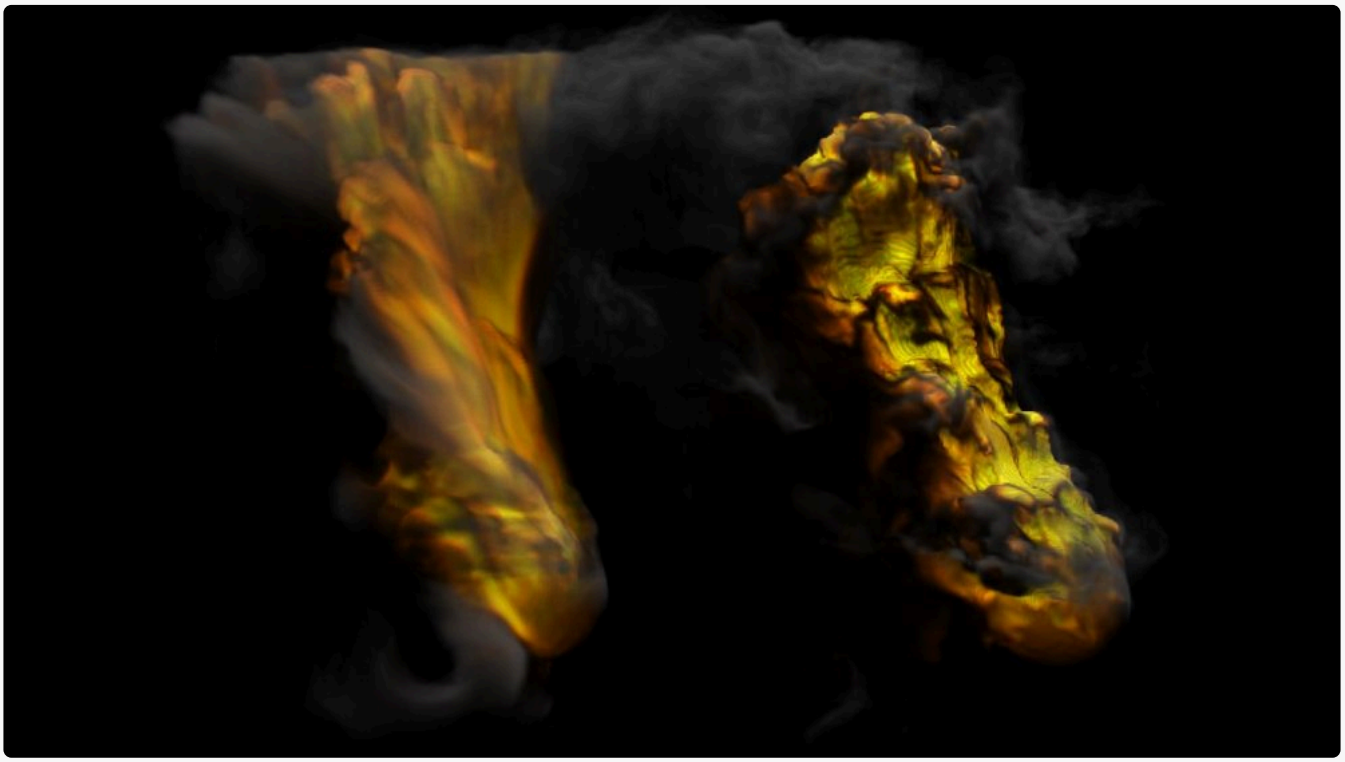
Field Feedback

Method

This node blends ink from the previous with the ink from the newly generated field systems.

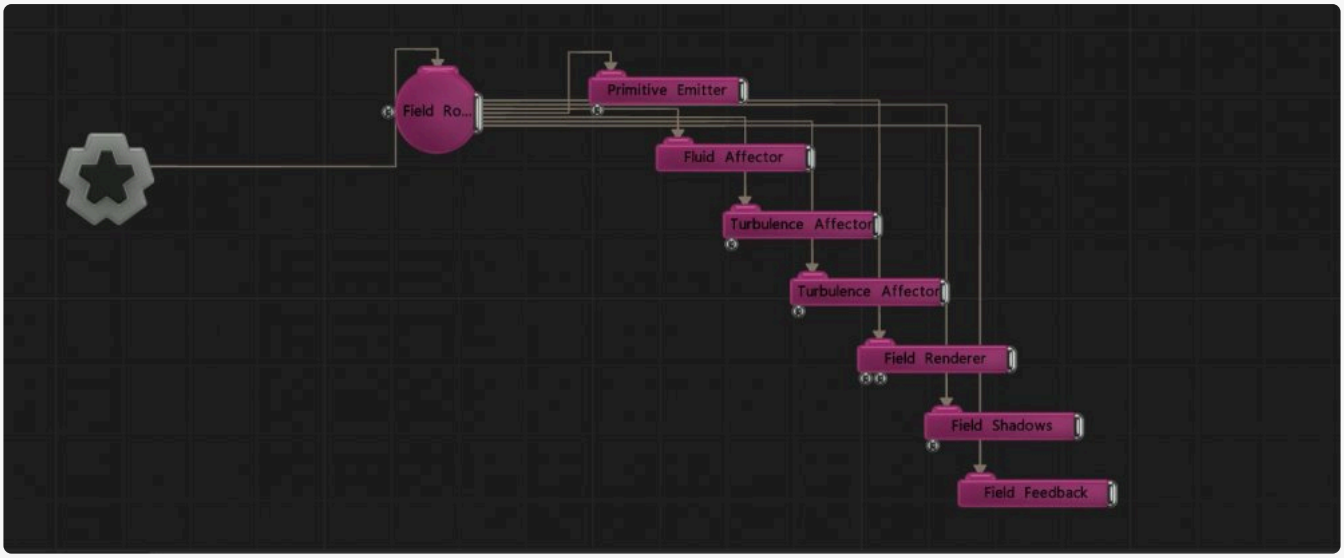
Attributes

Example



Feedback VS no Feedback

Example Nodegraph



Name	Description
Feedback Amount	How long the previous frames last within the field system.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

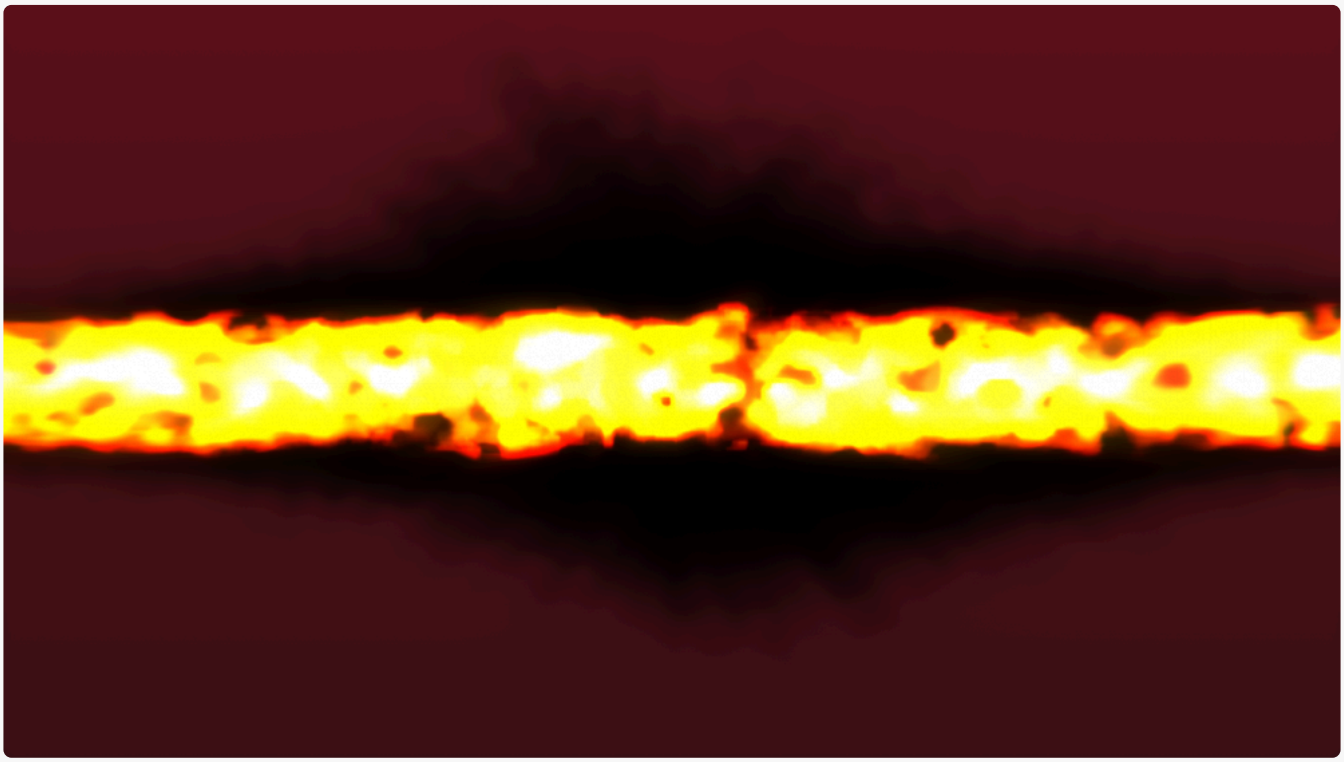
There are no outputs from this node.

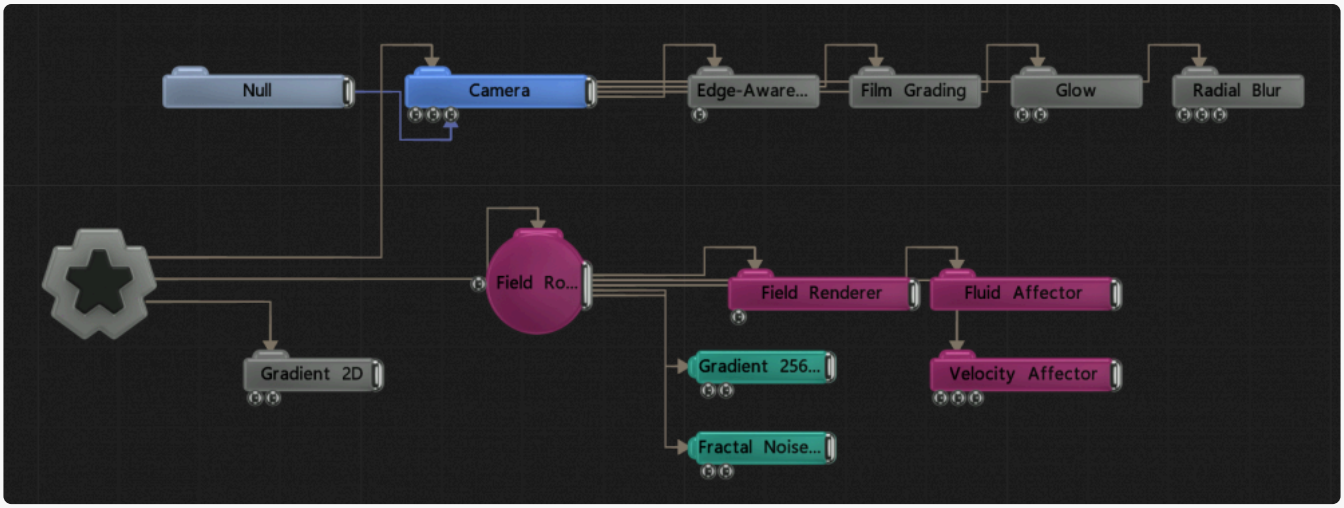
Fluid Affector

Method

This node applies a fluid solver to the velocities of the field system, creating eddies and swirls like a gas or liquid. This solver uses the grid-based Navier Stokes method, maintaining incompressible pressures using multiple iterations of a process over the field's voxel grid, and can have a sizeable performance impact with high-resolution fields.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Simulation Speed	Controls the speed of the fluid simulation.
Vorticity Confinement Scale	Controls the amount of vorticity confinement – which increases the number of small swirls in the fluid system.
Diffusion Amount	How much the field colours are diffused to neighbouring voxels.
Velocity Dampening	How much velocities are dampened and averaged across the field system.
Solver Iterations	How many times the fluid system solver is run. Higher values improve accuracy, but lower performance.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

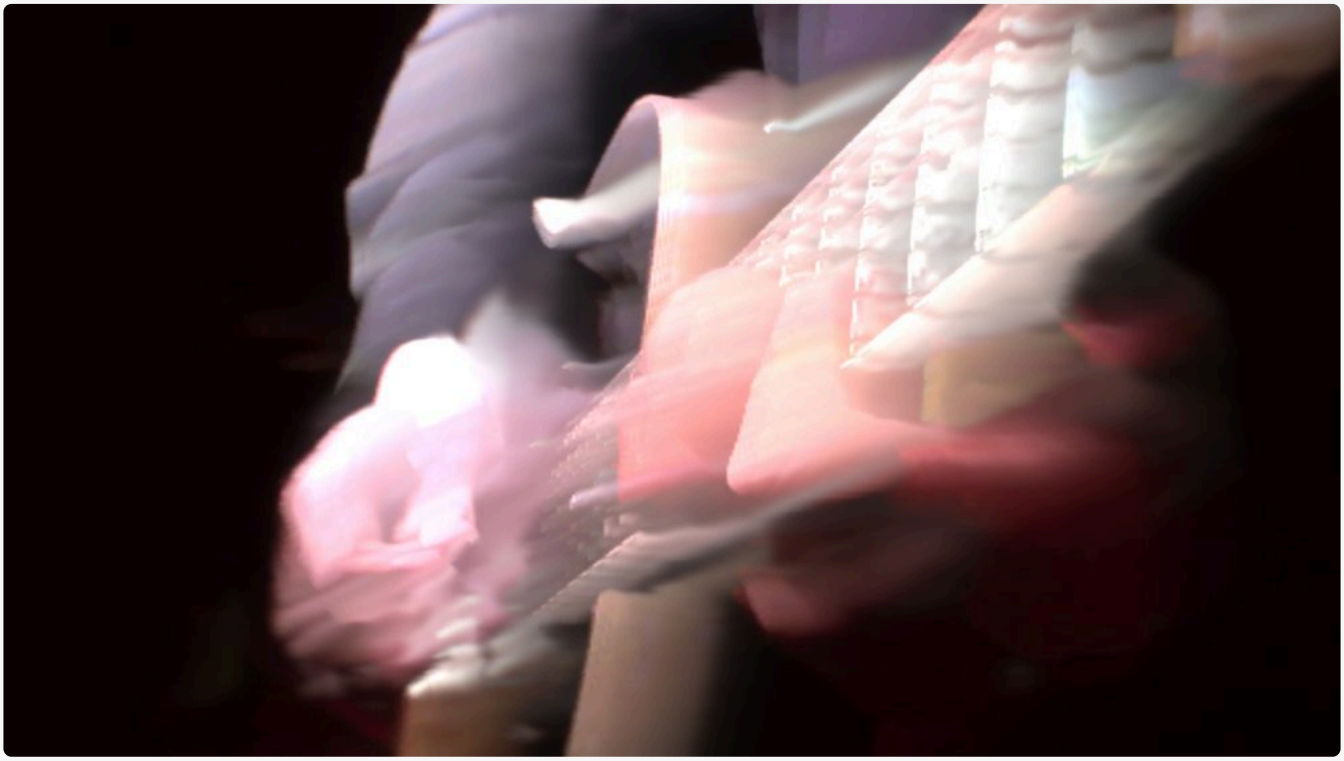
The outputs section for this node is currently being worked on.

Image Affector

Method

This node uses an input image to affect the movement vectors of a field system. The red and green channels of the image can be turned into directional velocity vectors, or the vectors can be derived from the gradient of the image's luminance.

Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour Image	Override the input image.
Amount	Changes how much the image affects the field.
Blend Mode	Choose how the image affects the field.
Use As Bump Map	Use the image as a bump map.

Inputs

Name	Description	Typical Node Input
Image Node	The image used to generate an effect.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Points Affector

Method

This node affects particles by positional vortex forces created around points from a particle system, or vertices of a 3D object. This can be used to make a particle system “move through” a field and appear to affect it.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Amount	Scale the strength of the affectors velocity on the particles.
Point Falloff Distance	The radius of falloff of effect from each point.
Point Falloff Power	The sharpness of the falloff from each point.
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	How much randomness is added in the particles movement.

Inputs

Name	Description	Typical Node Input
Point Source	The source of the point data.	Particle Root Node
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

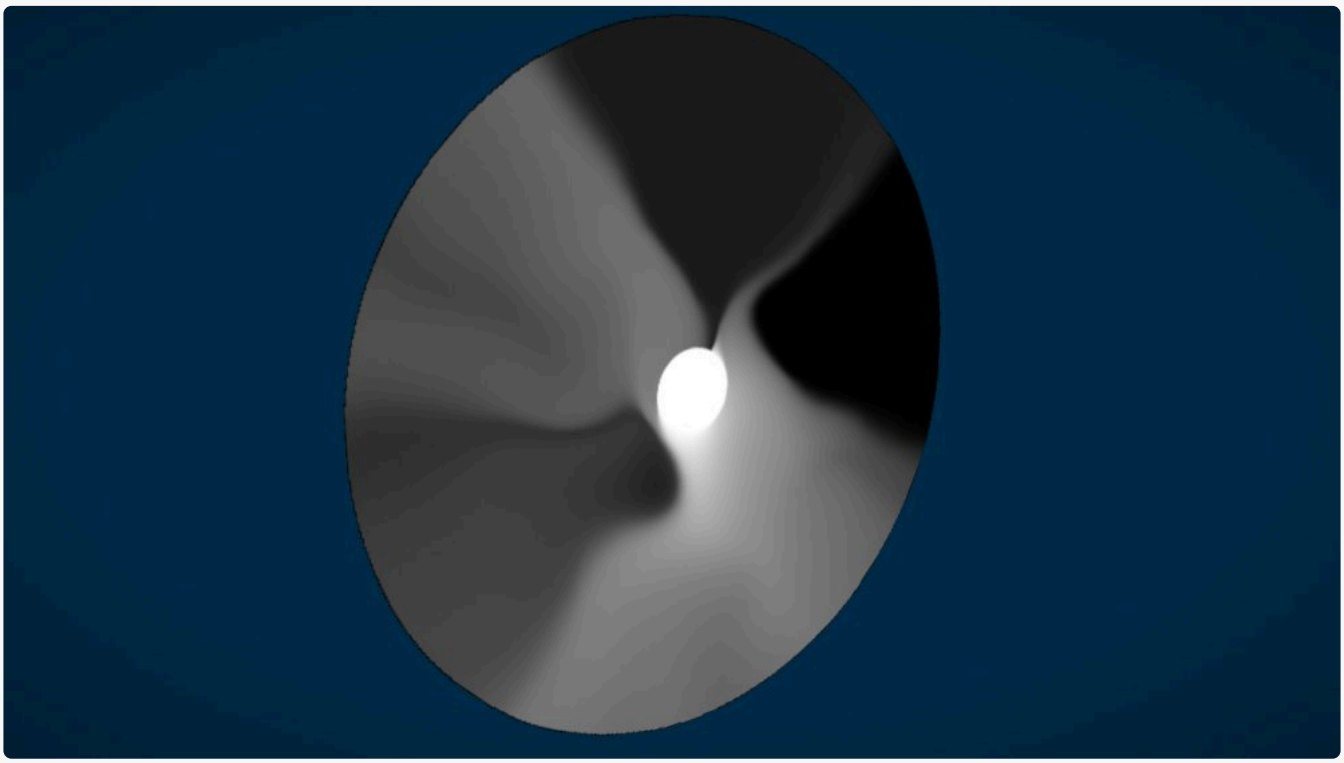
The outputs section for this node is currently being worked on.

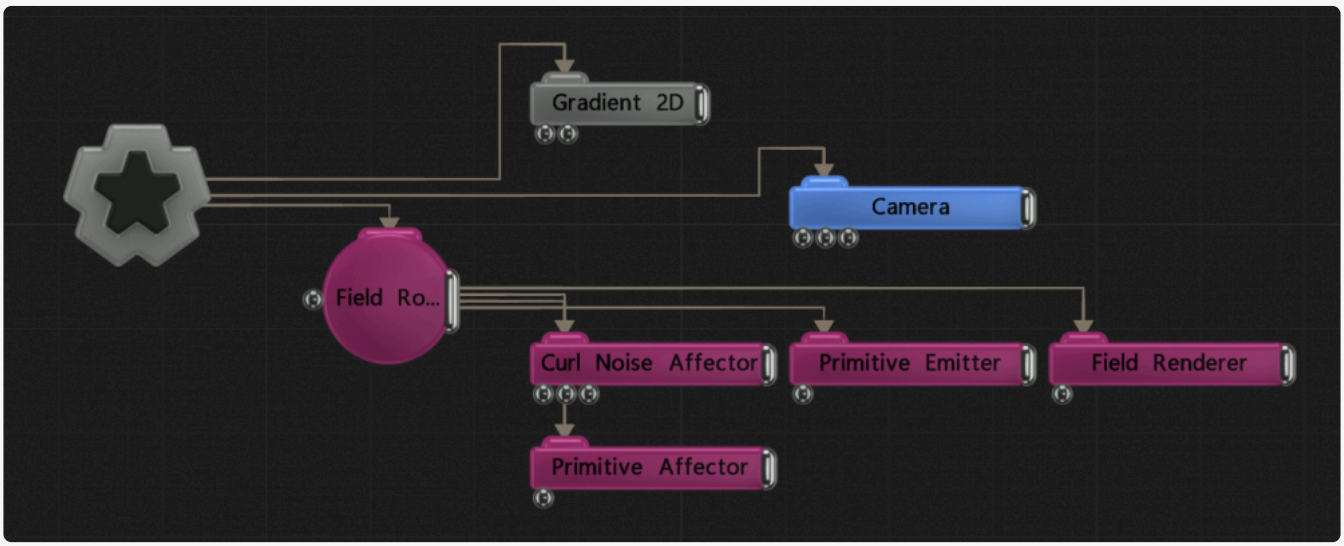
Primitive Affector

Method

This node uses basic geometric shapes to affect the field.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Primitive Type	Choose which primitive shape is used for the affector.
Velocity Mode	Toggle whether the velocity attracts to the primitive or repels away from a primitive.
Use Colours	Allows the colour of the primitive to be blended into the field.
Radius	The radius for which the affector is active.
Randomness	The randomness of the affector.
Velocity Randomness	Adds a randomness to the velocity of the field.
Velocity Scale	Scale the velocity of the field.
Weight	How much the affector affects the field system.
Colour Weight	The amount by which the colour of the primitive is blended into the field, if Use Colours is enabled.
Stickiness	Controls how much the particle sticks to the surface of the shape once it reaches it.

Blending

Name	Description

Blend Mode	Changes how the affector blends with the field.

Inputs

Name	Description	Typical Node Input
Affected Emitters	Emitters that are affected by the noise affector. By default, all emitters in the field system are affected.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

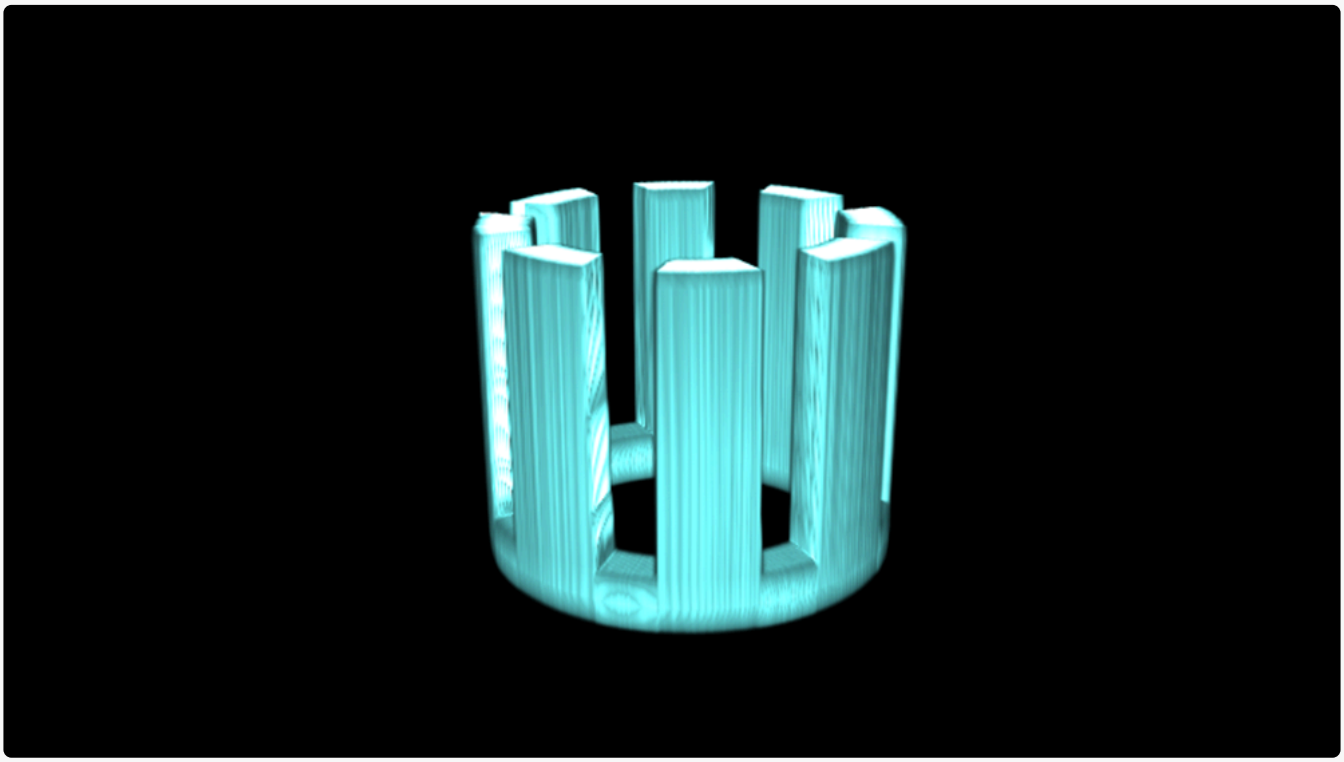
The outputs section for this node is currently being worked on.

Primitive Collision Affector

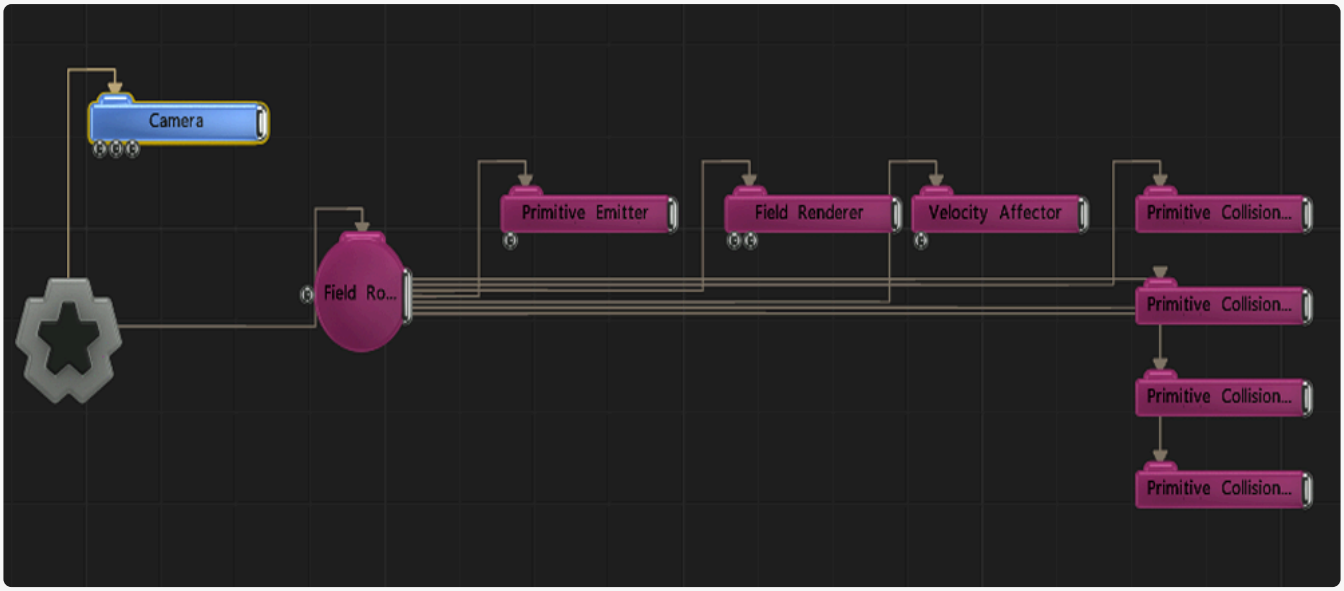
Method

This node allows fields to collide with the surface of primitive 3D shapes. The field will flow around or bounce off the shape's surface and be prevented from entering it.

Example Image



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Shape Type	Select a shape to model a collision with the field in.
Collision Velocity.	How much the field bounces off the colliding surface.

Radius Inner	Inner surface radius of the selected shape.
Radius Outer	Outer surface radius of the selected shape.
Invert Shape	Invert the surface normals, changing the parts of the object which will interact with the field.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

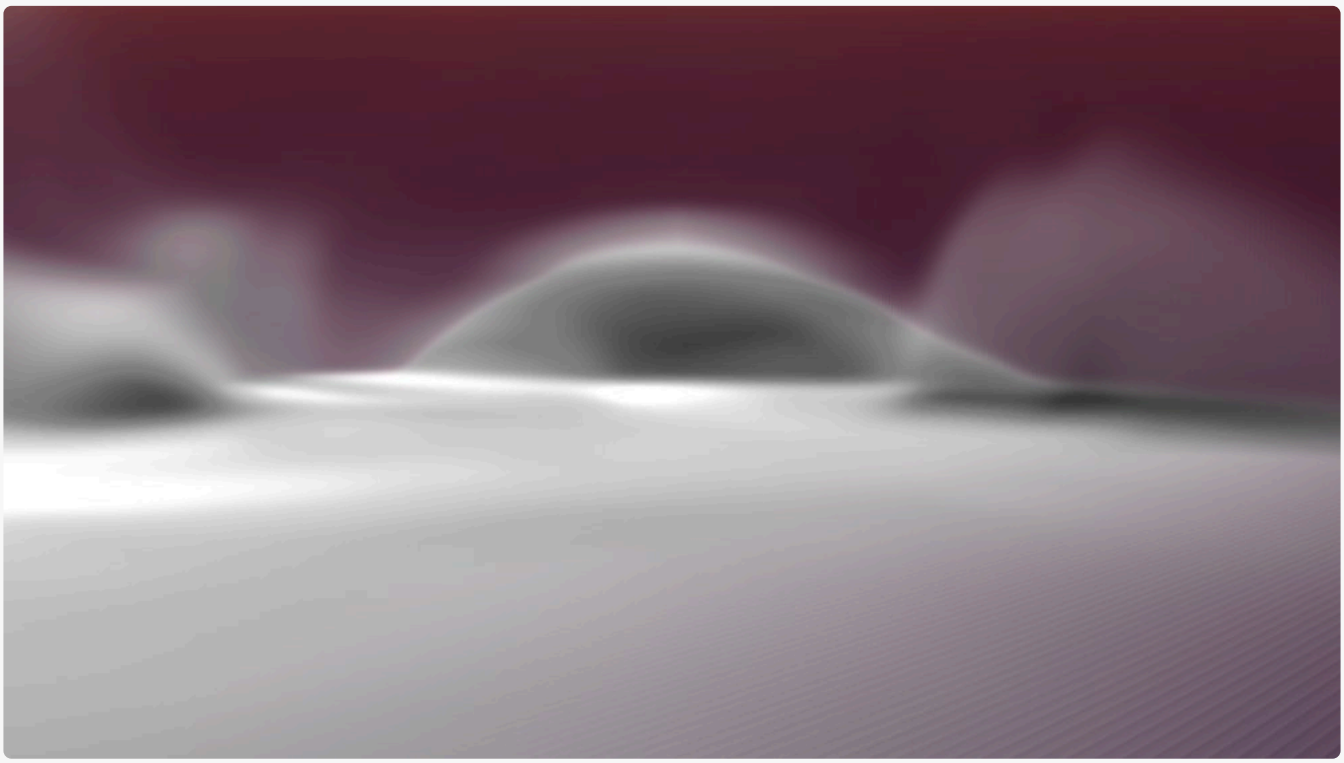
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

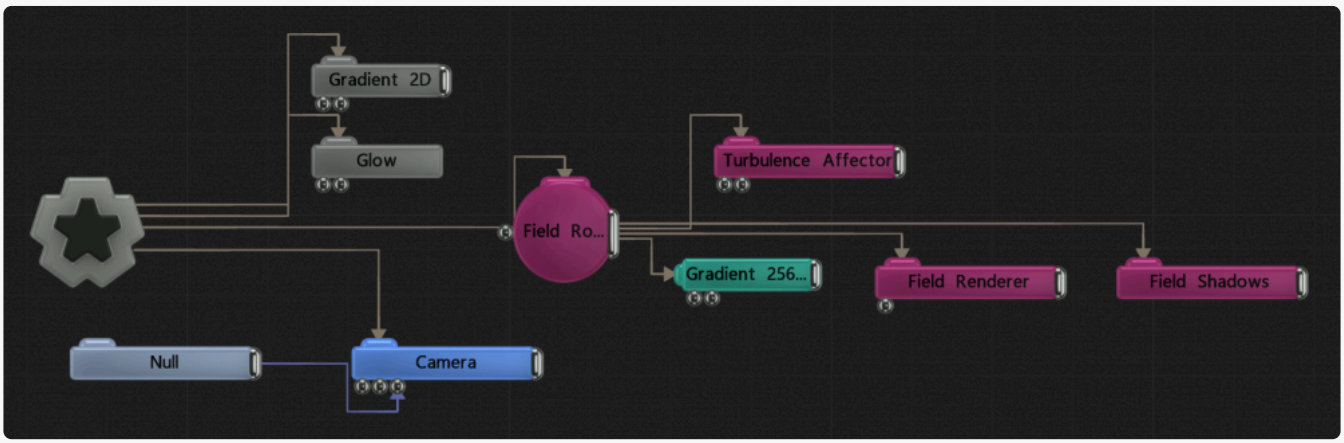
Turbulence Affector

Method

This node applies turbulence to the movement vectors of a field system.

Example





Transform

Name	Description

Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Amount	Scale the velocity of the field.
Radius	The radius for which the affector is active.
Inner Radius	Edit the size of the inner area the affector can affect.
Randomness	The randomness of the affector.
Noise Scale	Scale the size of the noise for the turbulence.
Noise Threshold	Limit the noise that will be output to the field.
Mode	Choose how the turbulence effect is calculated. • Repel, Pushes the fields away from the affector origin point. • Attract, Pulls the field towards the affectors origin point. • Turbulent, Pulls and pushes the field with turbulent forces.

Inputs

Name	Description	Typical Node Input
Velocity Node	Add a velocitiy affector to modify the affector.	Velocity Affector
Affected Emitters	Emitters that are affected by the noise affector. By default, all emitters in the field system are affected.	Primitive Emitter
Transform	Links all transform properties to the input node.	Null

Modifier		
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

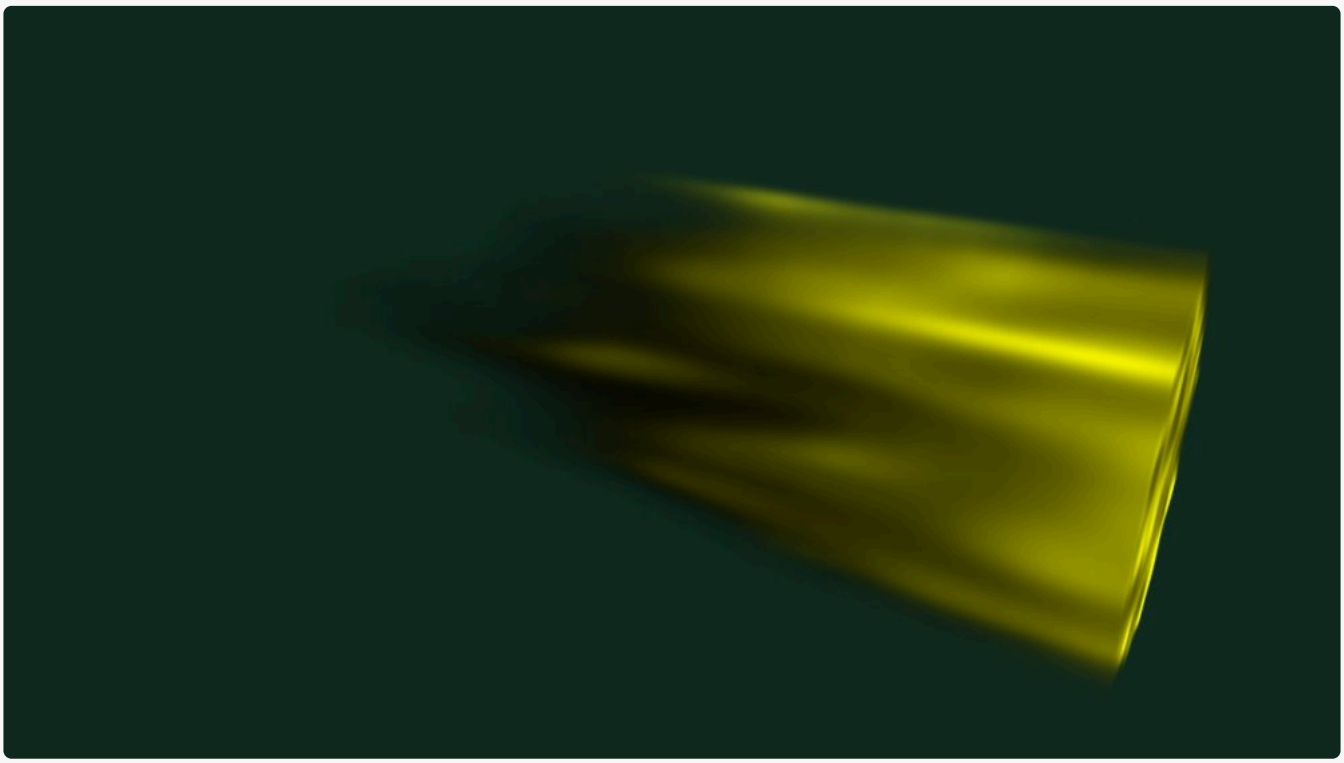
The outputs section for this node is currently being worked on.

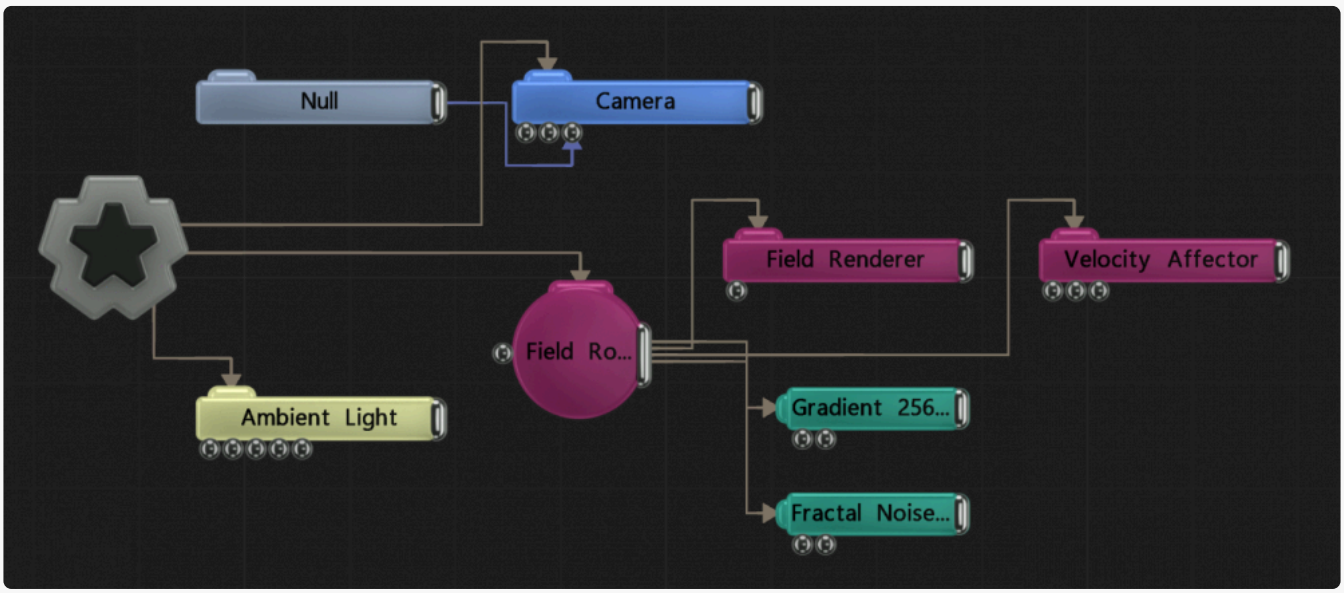
Velocity Affector

Method

This node applies a directional velocity to the movement vectors of the field.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Amount	Scale the velocity of the field.
Spread Angle	Change the angle of spread for the field
Radius	The radius for which the affector is active.
Inner Radius	Edit the size of the inner area the affector can affect.
Randomness	The randomness of the affector.
Mode	Choose what kind of velocity affects the field. • Directional Velocity, moves the field in a direction. • Repel, Pushes the fields away from the affector origin point. • Attract, Pulls the field towards the affectors origin point.
Falloff Shape	The shape of the affector falloff. • Point, the affector falls off in distance from a point. • Line, the affector falls off in distance from a line. • Plane, the affector falls off in distance from a 2D plane.

Inputs

Name	Description	Typical Node Input
Velocity Node	Add a velocitiy affector to modify the affector.	Velocity Affector
Mask Node	Masks the areas in which the affector won't apply.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

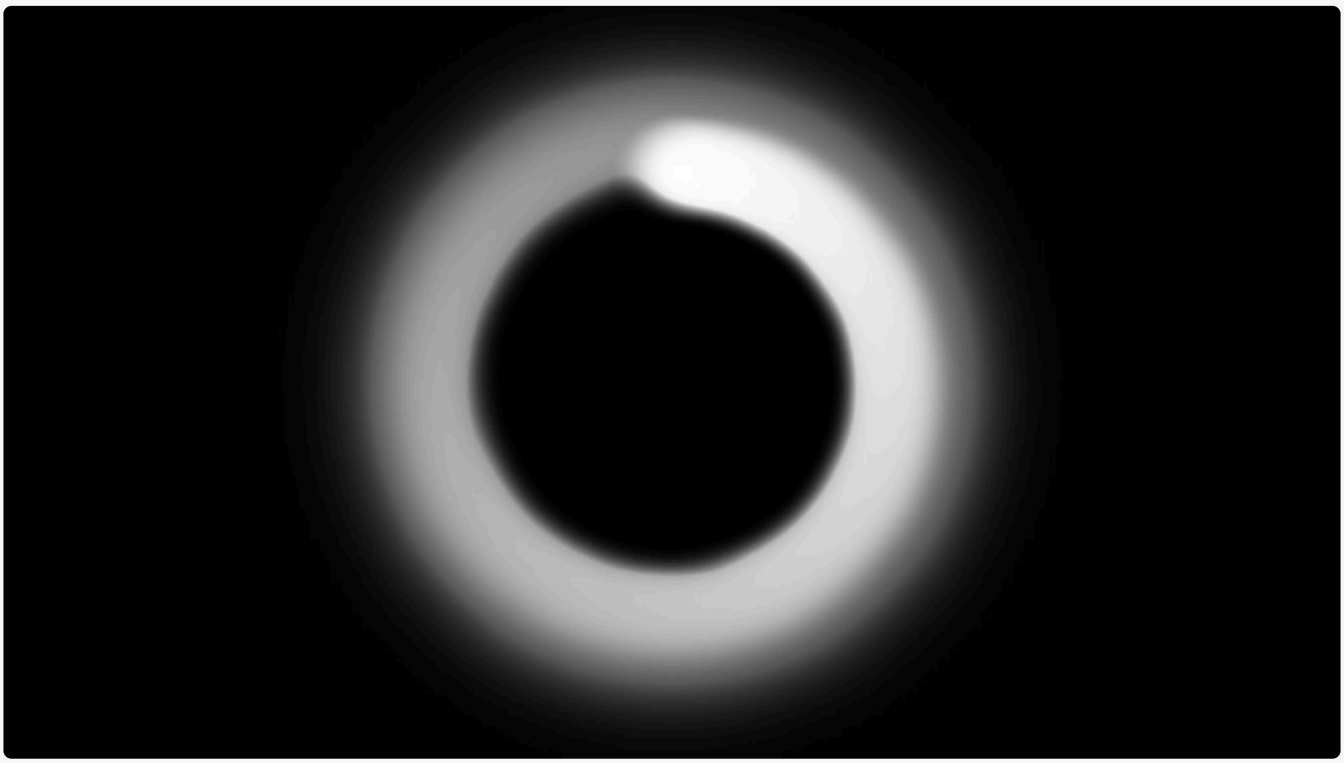
The outputs section for this node is currently being worked on.

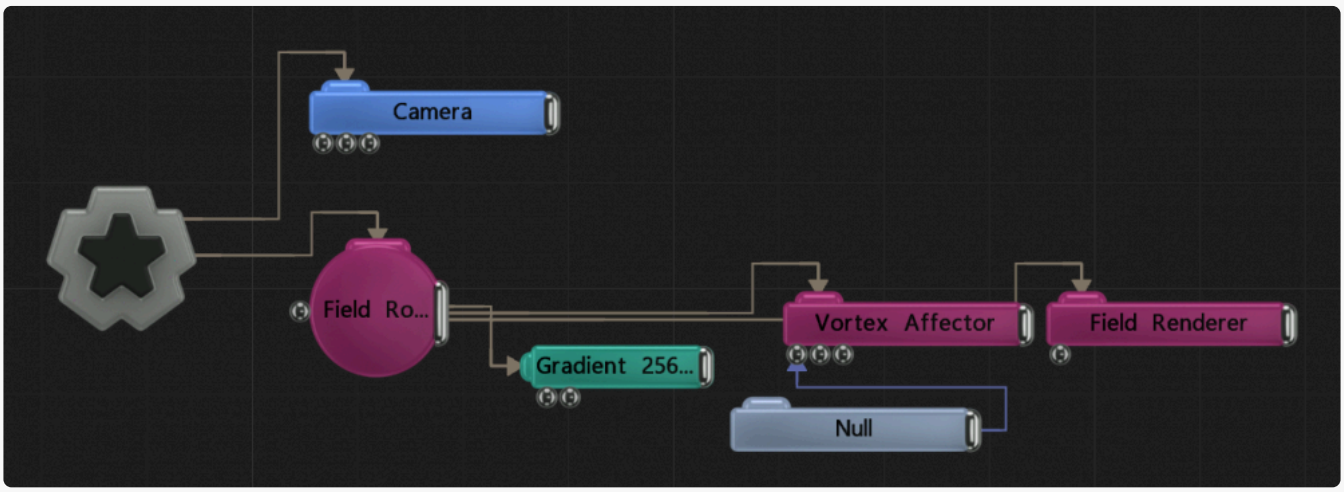
Vortex Affector

Method

This node modifies the movement vectors of a field to give a rotational velocity about a point.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Amount	Scale the velocity of the field.
Spread Angle	Change the angle of spread for the field
Vortex Angle Scale	Change how quickly field moves around the vortex centre dependant on distance from it.
Outward Velocity Amount / Blend	Control the speed at which the particles are pushed out from the vortex centre.
Radius	The radius for which the affector is active.
Randomness	The randomness of the affector.

Inputs

Name	Description	Typical Node Input
Vortex Position Node	Change the position of the point the field orbits around.	Null
Mask Node	Masks the areas in which the affector won't apply.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter

Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Deformers

Method

These nodes deform the entire field system at render time, without changing the underlying simulation.

- Fbm Deformer
- Sine Deformer

Fbm Deformer

Method

This node deforms the field based on a Fractional Brownian Motion algorithm. This allows extra fine detail and animation to be added to already-made field systems without changing the underlying simulation or requiring a higher resolution field.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Displacement Amount	How much the deformer displaces the original mesh.
Noise Scale	Scale the size of any noise generated.
Falloff Range	Limits the range the deformer is effective at.
Animation Rate	Speed the deformer is animated at.
Lacunartiy	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.

Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.
Upsample Densities	When enabled, the Density field will be double in resolution, but the velocity field remain the same size. This will give much greater clarity to the image, with a smaller impact on performance.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Sine Deformer

Method

This node deforms the field based on a sine wave.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Sine Scale Major Axis	Change the scale of the larger wave on the deformer.
Sine Scale Minor Axis	Change the scale of the small wave on the deformer.
Displacement Amount	How much the deformer displaces the original mesh.
Noise Amount	The amount of noise that is applied to the deformer.
Falloff Range	Limits the range the deformer is effective at.
Max	Maximum distance the deformer can displace the mesh.

Displacement	
Animation Rate	Speed the deformer is animated at.
Displacement Direction	Change which direction the deformer displaces the objects mesh. • Normal, The mesh will be displaced in the direction of the vertex normal's. • Spherical, The mesh will be displaced in a spherical direction from the object's origin. • Planar, all vertexes are displaced in the same direction.
Update Time Mode	How the deformer updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.

Inputs

Name	Description	Typical Node Input
Falloff Node	Use an input object to control the transformation values of the falloff.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

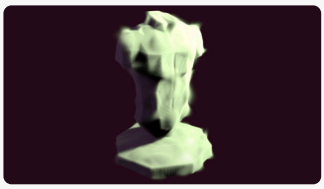
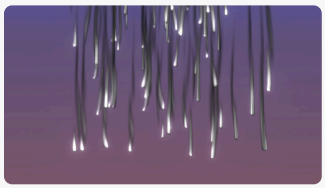
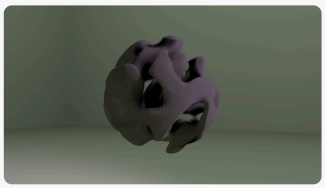
There are no outputs from this node.

Emitters

Method

Emitter nodes spawn the colour/Ink that can be manipulated in a field system. Any Emitters need to be connected to a Field Root node, and they will only spawn a field within that field system (unless modified appropriately).
Emitters constantly emit new ink into the field, and the ink already in the field decays over time thanks to the “Colour Fade” property in the Field Root. These need to be balanced to ensure that the field does not overflow with ink – e.g. by increasing the colour fade, by reducing the emitter amounts or by cropping the time bars of the emitters so they only emit at certain times.

Gallery

			
3D Object Emitter	Image Emitter	Particle Emitter	Primitive Emitter

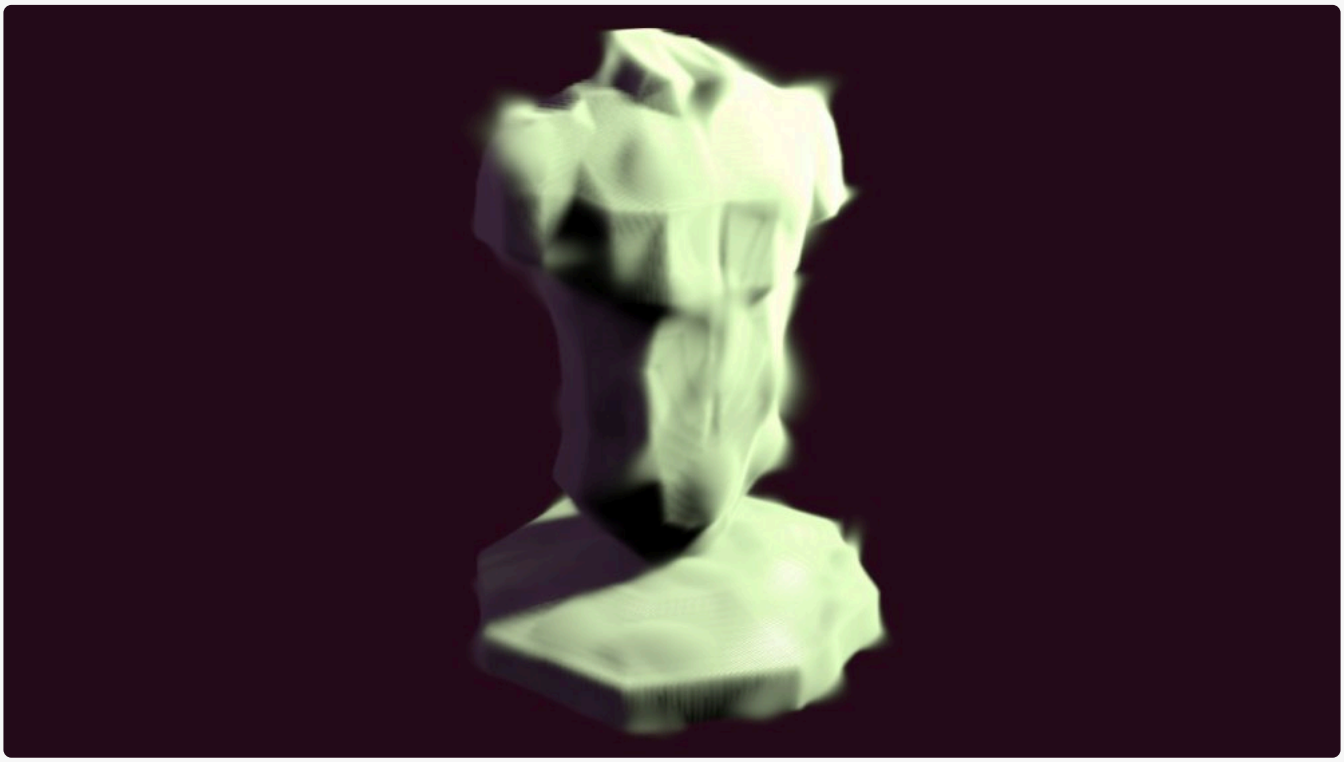
- Field – Field Emitter
- Procedural Emitter
- Reaction Diffusion

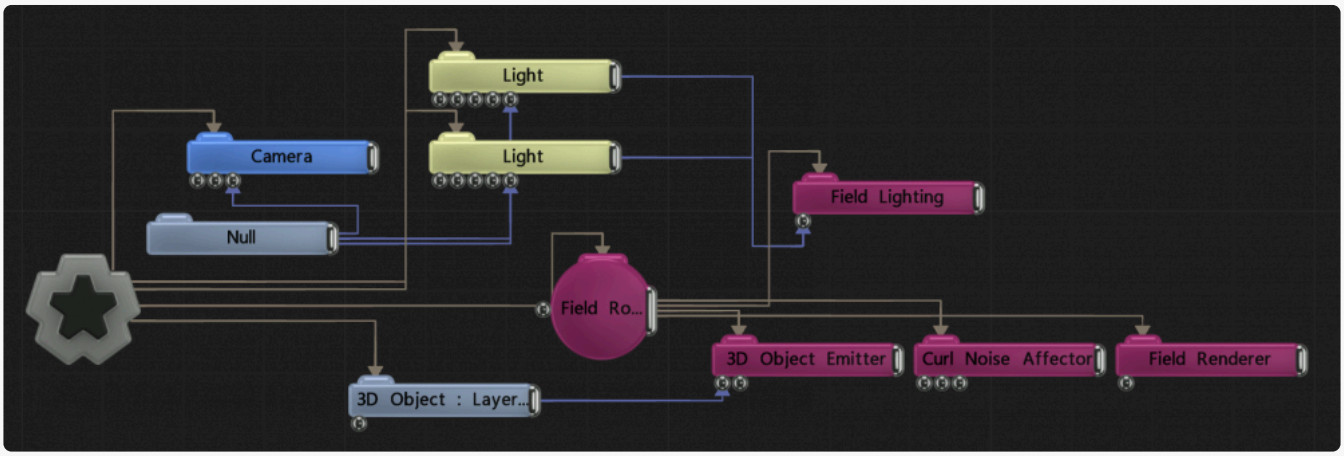
3D Object Emitter

Method

This node emits colour/ink into a field based on an input 3D object. The object is first voxelised, and the resultant voxels are used to contribute ink to the field.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	Select a colour for the emitted field.
Amount	How strong the emitter is on the field.
Blend Mode	How the emitter blends into the field. See Blend Modes for details.
Threshold	Set a threshold for how much of a mesh surface must overlap with a voxel for ink to be emitted.
Object Colours	The colours of the input object are retained in the field.
Object Lighting	The lighting affecting the object affects the fields colour/ink values.
Wireframe	The field emitted its based on a wireframe of the model.
Filled	Fill the emitted object with ink. For good results, use a closed mesh.
Emit Once	When enabled, the object will only emit ink once into the field.
Voxel Resolution	Resolution of the voxels used when generating the ink shape.

Inputs

Name	Description	Typical Node

		Input
Object	Object used to generate a field based off of.	3D Object
Colour Ramp	Adds a colour gradient to the field.	Colour Ramp
Object Bounds	Limit the region of the Mesh which will be emitted into the field system.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Field – Field Emitter

Method

This node emits colour/ink into a field by reading it from another input field.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Output Colours	Toggles whether the colours from the original field are output.
Output Velocities	Toggles whether the velocities from the original field are output.
Colour	Tint the colour of the original field system.
Blend Amount	How much the input field blends with the current field.
Velocity Scale	Scale the velocity of the field.
Blend Mode	How the emitter blends into the field. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Field	The field to be added into the current field system.	Field Root Node
Colour Ramp	Adds a colour gradient to the field.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

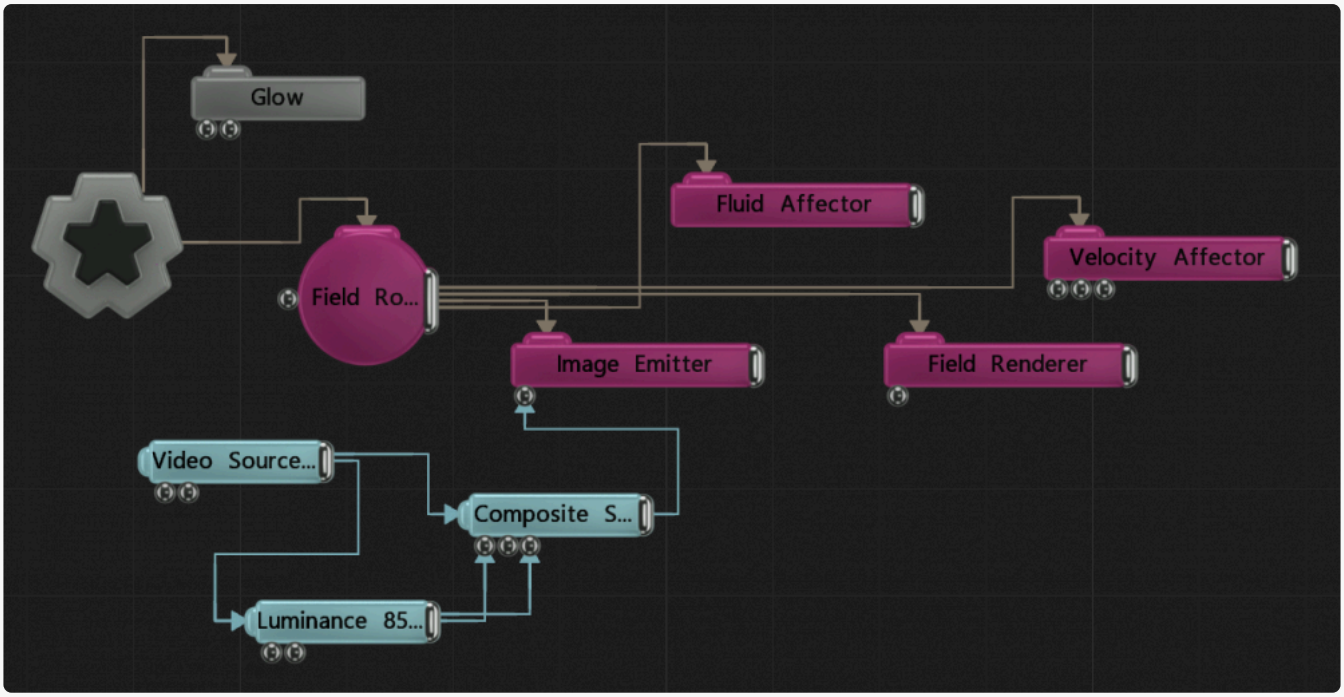
The outputs section for this node is currently being worked on.

Image Emitter

Method

This node emits colour/ink into a field based on an input image.

Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour Image	The image used for the field. Can be overrided by an input image.

Amount	How strong the emitter is on the field.
Blend Mode	How the emitter blends into the field. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Image Node	Image used to generate a Ink from.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

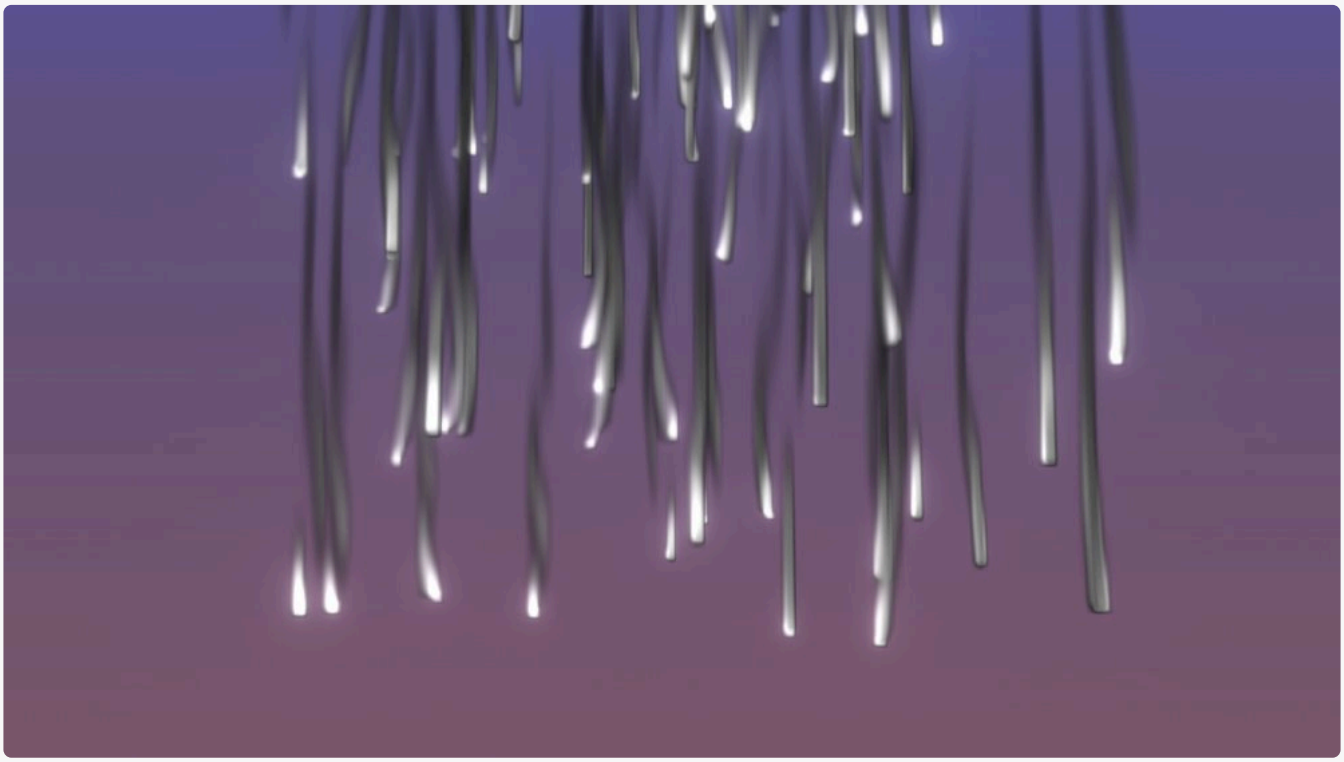
The outputs section for this node is currently being worked on.

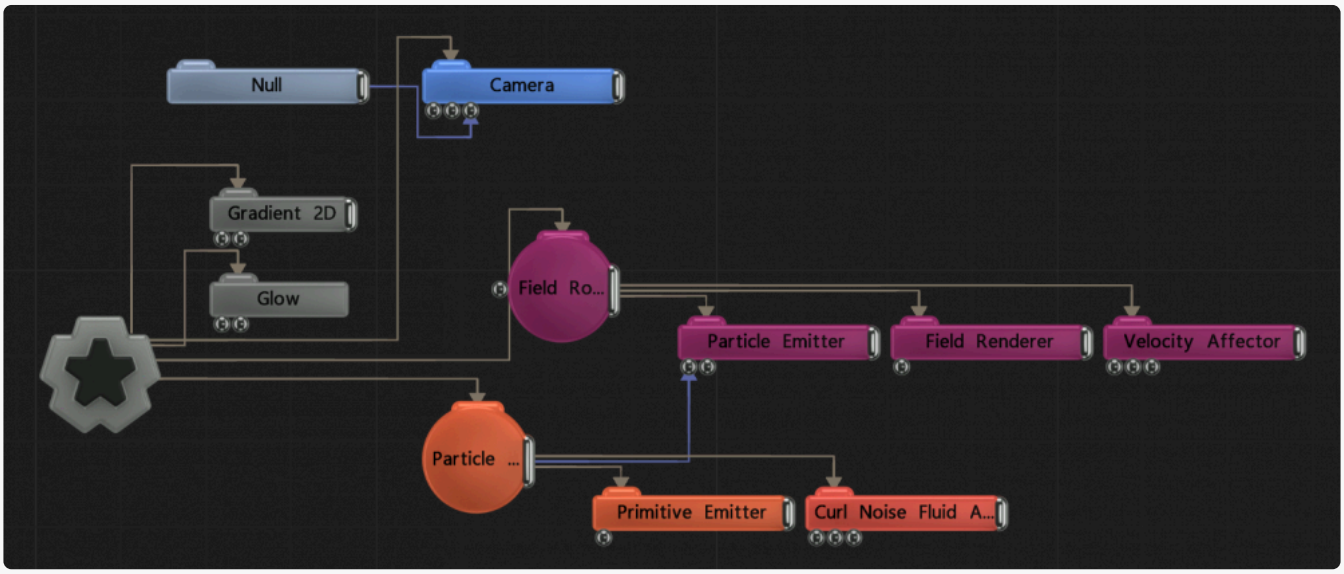
Particle Emitter

Method

This node generates colour/ink based on the positions and movement of particles from a particle system. The particles contribute both ink and velocities to the field.

Example





Attributes

Name	Description
Texture	Select a texture to be rendered at each particles position.
Output Velocities	Toggle whether the velocities from the source particle system should be used.
Intensity Scale	Modify how strong the emitted field is.
Velocity Scale	Scale the velocity of the field.
Particle Size	Edit the size of the particles once they are rendered.
Particle X Scale	Control the x-scale of the sprites emitted.
Particle Y Scale	Control the y-scale of the sprites emitted.
Particle Scale Coeffs	How much the particle scales are affected by the node at different stages of the particles life cycle. Values 1 and 2 are control points, and are used to control the curve between values 0 and 3.
Particle Alpha	Control the alpha value for each particle.
Visible	Control whether the node is visible or not to the scene.
Blur Mip Levels	The number of MIP levels in the emitted particles that may be used for blurring effects.
Size Randomness	Control the randomness in size of the particles.
Rotation Randomness	Give the meshes a randomised rotation.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.
Screen Size Limits	The minimum and maximum size of the rendered particle in normalised screen coordiates.
Motion Blur Amount	Control the amount of motion blur.
Lit	Control whether the particles are lit.
Cast Shadows	Control whether shadows are cast.
Sort Particles	Toggle whether the particles are sorted by depth from camera from back to front before rendering, enabling transparent particles to be rendered correctly.
Blend Modes	How the emitter blends into the field. See Blend Modes for details.
Mipmap	Toggle whether mipmaps are enabled.

Enabled	

Texture Animation

Name	Description
Use Texture Animation	Edit whether the texture animation is shown with the rendering.
Texture Animation Rate	Edit whether the texture animation is shown with the rendering.
Num Frames X	Change how many tiles the sprite image will be spread across the x axis.
Num Frames Y	Change how many tiles the sprite image will be spread across the y axis.
Texture Start Frame Mode	How the beginning frame for the texture animation is chosen.

Inputs

Name	Description	Typical Node Input
Particle Node	The particle root used to generate the field.	Particle Root
Sprite Transform Node	Change the position of the field emitter.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

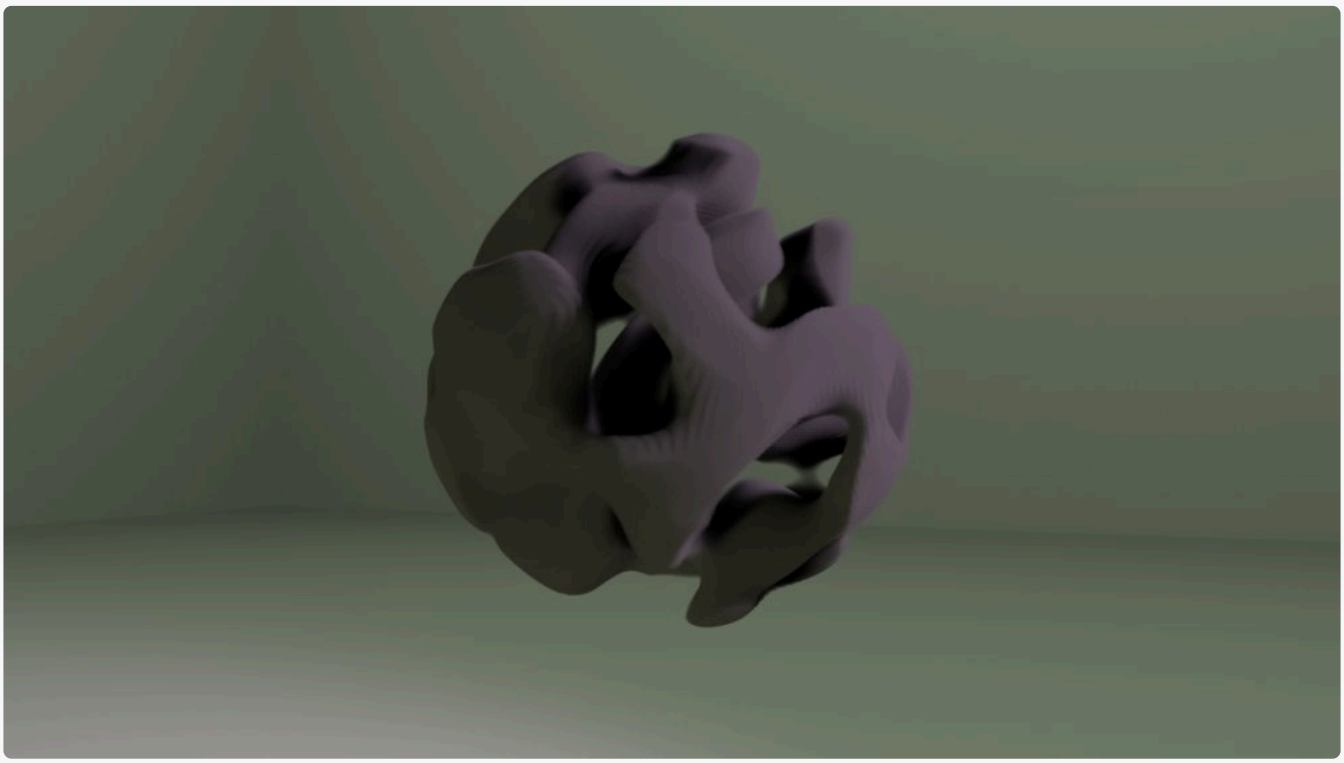
The outputs section for this node is currently being worked on.

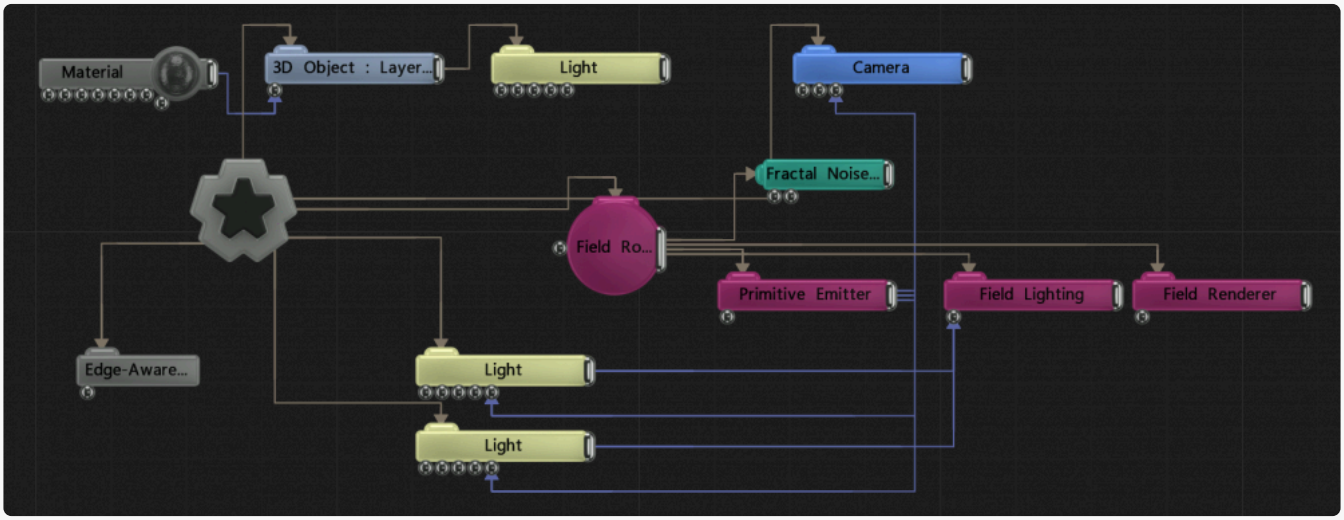
Primitive Emitter

Method

This node emits colour/ink into the field using the volume of a primitive shape.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

p. Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Shape Type	Choose which object the field is emitted from.
Colour	Select a colour for the emitted field.
Amount	How strong the emitter is on the field.
Hardness	How hard the edges of the shape are.
Radius Outer	Controls the outer radius of the shape.
Radius Inner	Controls the inner radius of the shape.
Angle	Change the angle difference in the fan blade, thus adding more or fewer fans.
Fan Blade Width	Change the width of the fan blades. Only functions when the Fan is selected in the Shape Type attribute.
Colour Ramp Angle Scale	Controls the spread of the colour ramp.
Blend Mode	How the emitter blends into the field. See Blend Modes for details.

Inputs

Name	Description	Typical Node

		Input
Colour Ramp	Adds a colour gradient to the field.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Procedural Emitter

Method

This node emits colour/ink into a field using a procedural node network. Procedural nodes should be parented to the Procedural Emitter in order to generate procedural forms that will be converted into field ink.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Distance To Alpha Scale	Controls how the distances defined by the procedural system are converted into transparency values in the field – which is analogous to the density of the shape.
Blend Amount	How much the emitter blends with the field.
Blend Mode	How the emitter blends into the field. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Procedural Root	Connect a source procedural node.	Procedural Root
Bounding Box	Limits the area that the procedural emitter will use.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Reaction Diffusion

Method

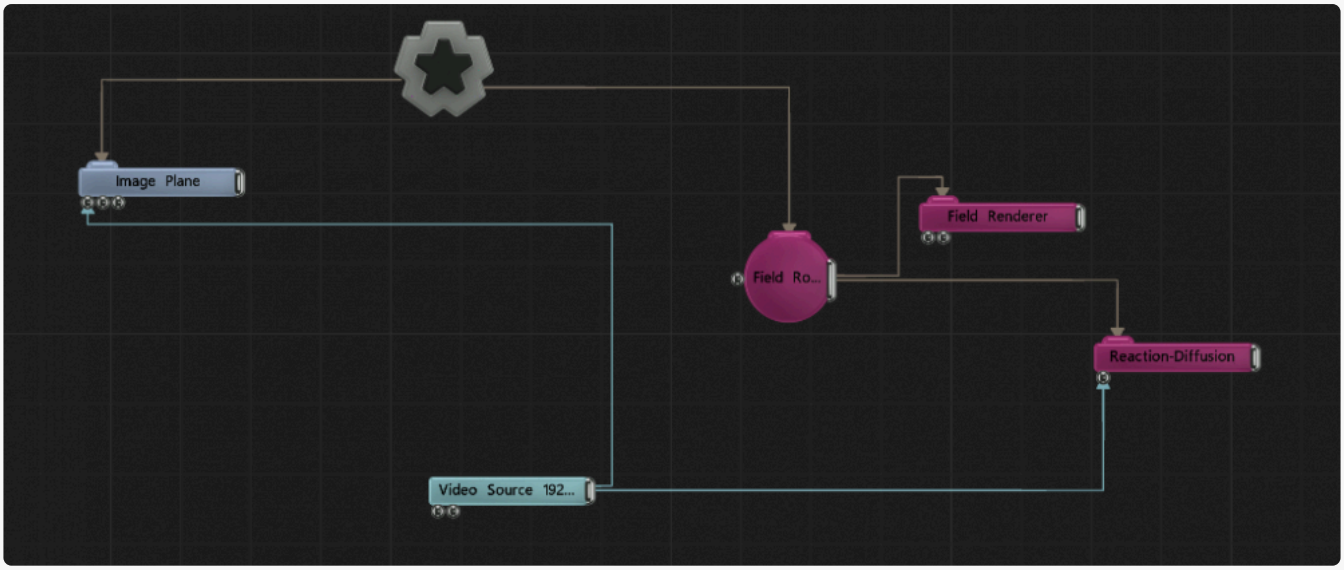
Performs reaction-diffusion simulation, using an image input as a seed.

This node simulates the Gray-Scott reaction-diffusion process, which can be thought of as a kind of fluid simulation with an extra step that creates organic-like patterns which grow out from seed points. Those points are created by sampling an input image, and seeds are created at the brighter parts of the image.

More information on the general topic of reaction-diffusion simulation can be found here

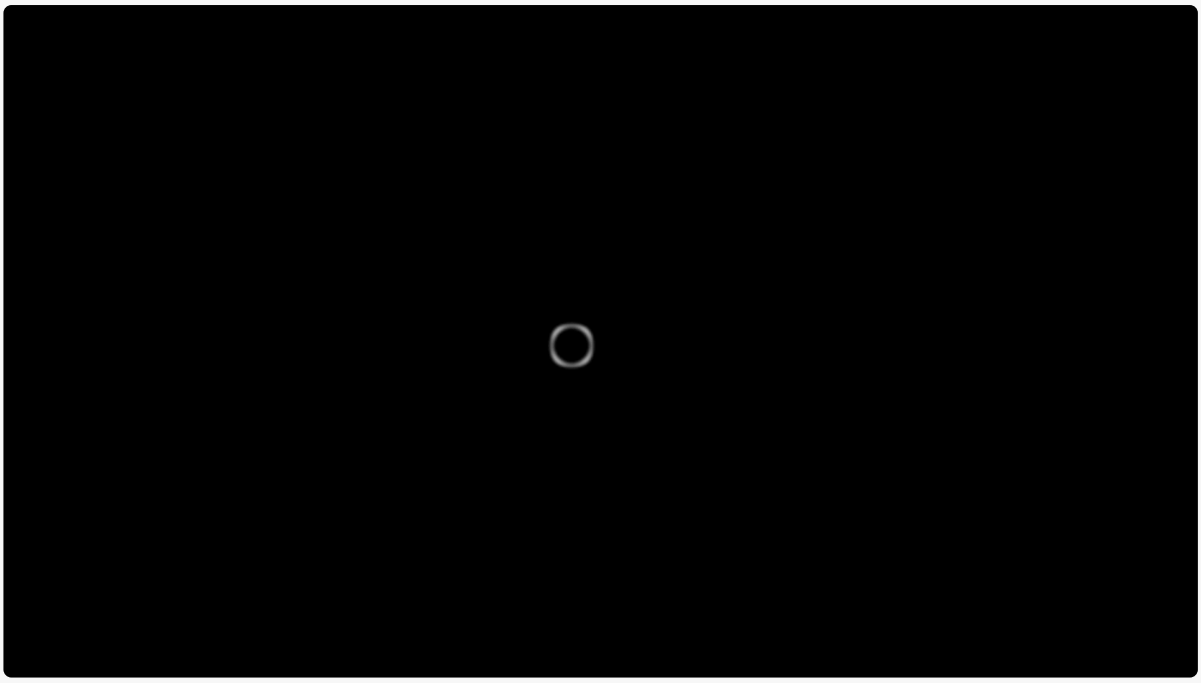
Example

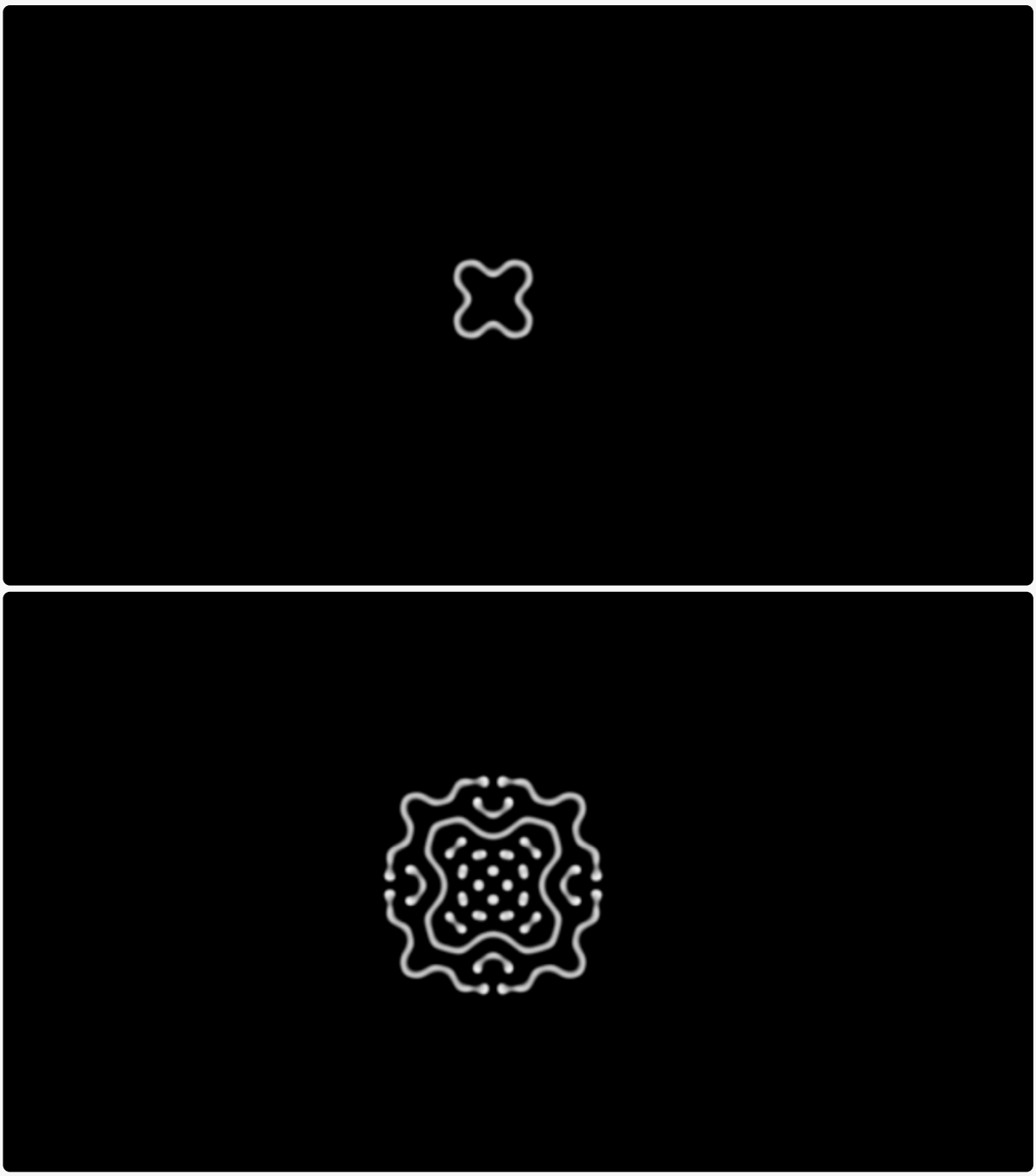
Nodegraph Example



The following image sequence shows how the pattern will grow out from a single point during the course of a simulation.

Growth Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Amount	The amount of the input image to use as seed.

Iterations	The number of simulation iterations to perform each frame.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

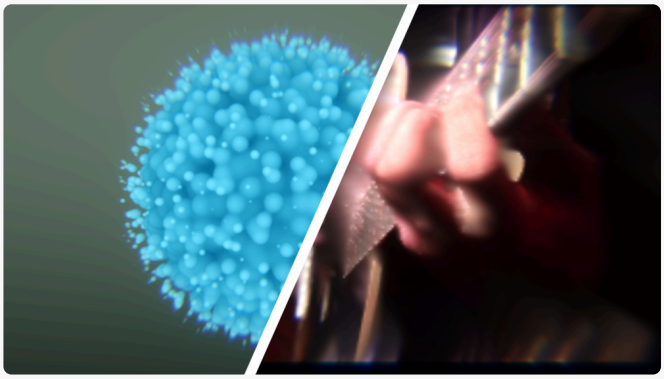
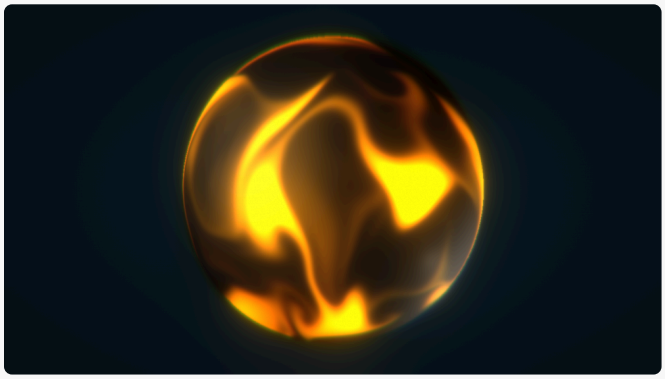
There are no outputs from this node.

Rendering

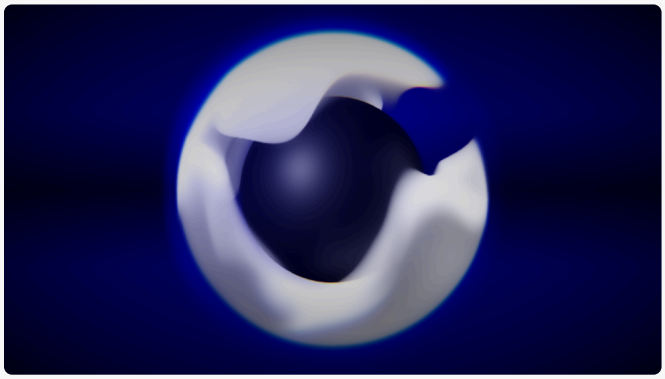
Method

Rendering nodes visualise the field or control how it is rendered and shaded. Any Rendering nodes need to be connected to a Field Root node, and will only render fields within that field system (unless modified appropriately).

Rendering

	
Field Renderer	Render To Object Surfaces

Lighting

	
Field Lighting	Field Shadows

Field Lighting

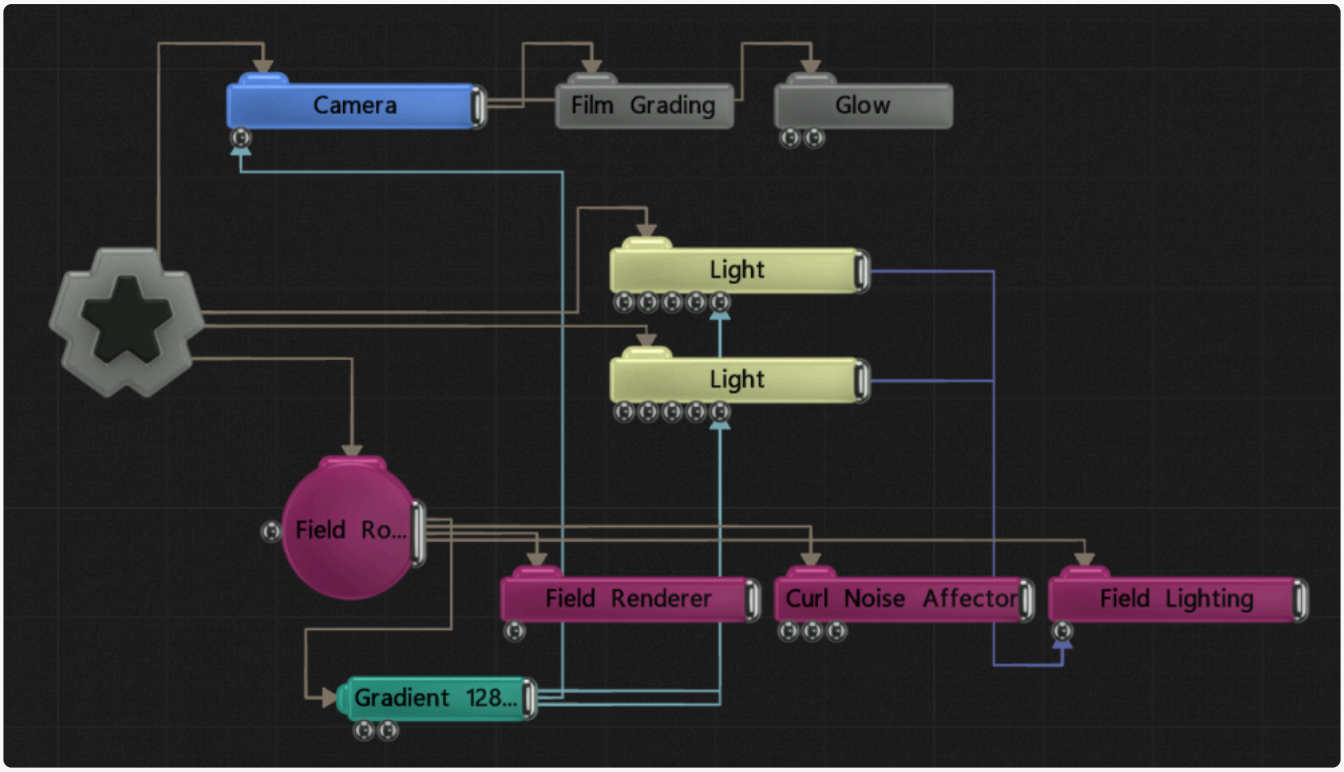
Method

This node adds lighting and self shadowing to fields based on input light nodes. It is used in conjunction with the Field Renderer node (which renders the field volume). Affecting lights need to be connected to Lights input of the Field Lighting node. The Field Lighting node calculates translucent shadows from the field it is applied to on a per-voxel basis.

The node should be parented to a Field Root node.

> This node is computationally heavy, and you might consider alternatively using the Field Shadows node which is computationally faster, but only supports lighting from above.

Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Shadow Density	Control the density of field, and how much light will be allowed to filter through.

Inputs

Name	Description	Typical Node Input
Lights	Lights that are affecting the field render	Light
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Field Renderer

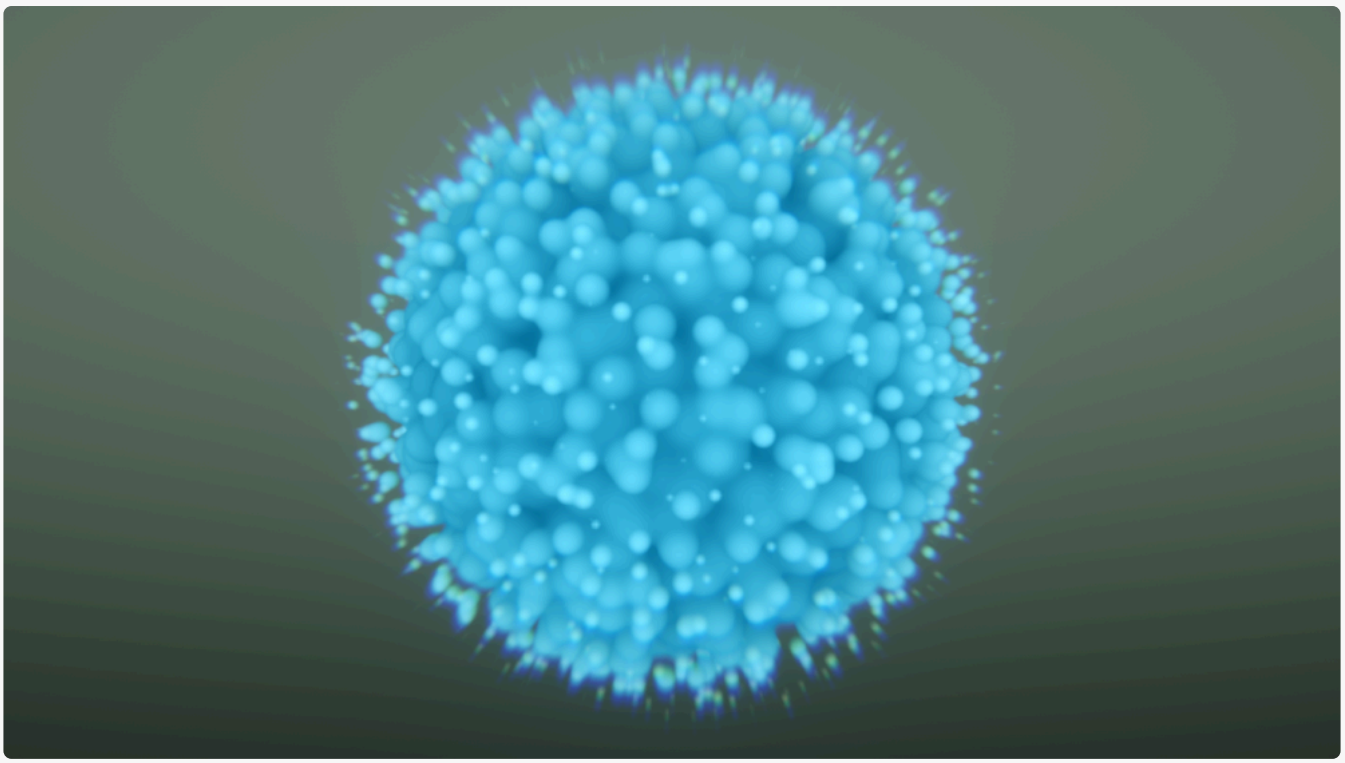
Method

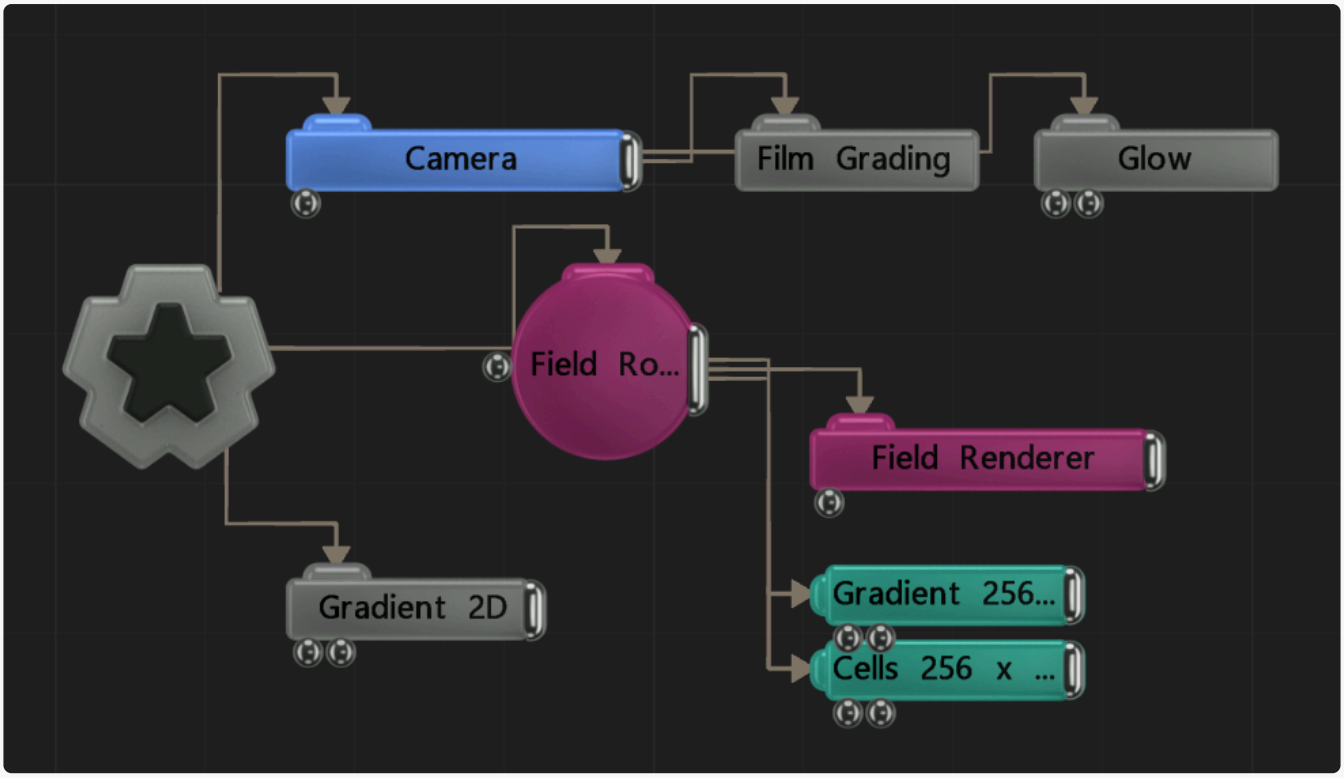
Renders a field system as a volume by rendering a series of slices through the field system.

Ink at each voxel is rendered into cells on each slice. The number of slices and resolution of the images are controlled in a parent Field Root node.

Once the slices are rendered they are then placed to face the camera along the x, y and z planes, and will automatically change plane depending on where the camera is (though this is only noticeable at low depth values).

The node should be parented to a Field Root node.

3D Example	2D Exam
	



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Alpha	Changes the alpha of the field.
Brightness	Changes the brightness of the field.
Visible	Control whether the node is visible or not to the scene.
Sort Bias	Biases the alpha sort in order to make it render in front or behind other transparent objects.
Velocity Alpha Scale	The amount the velocity of the field is scaled when it is used to modulate alpha.
Alpha Height Scale	Defines the thickness when a 2D field is rendered as a 2.5d volumetric form.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.
Velocity To Alpha	Toggle whether the velocity amount is used to modulate the alpha value, so areas of faster movement are more visible.
Volumetric	Controls whether a 2D field is rendered with thickness as a 2.5d volumetric form.
Num Slices	Defines the number of slices used when the 2D field is rendered as volumetric.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

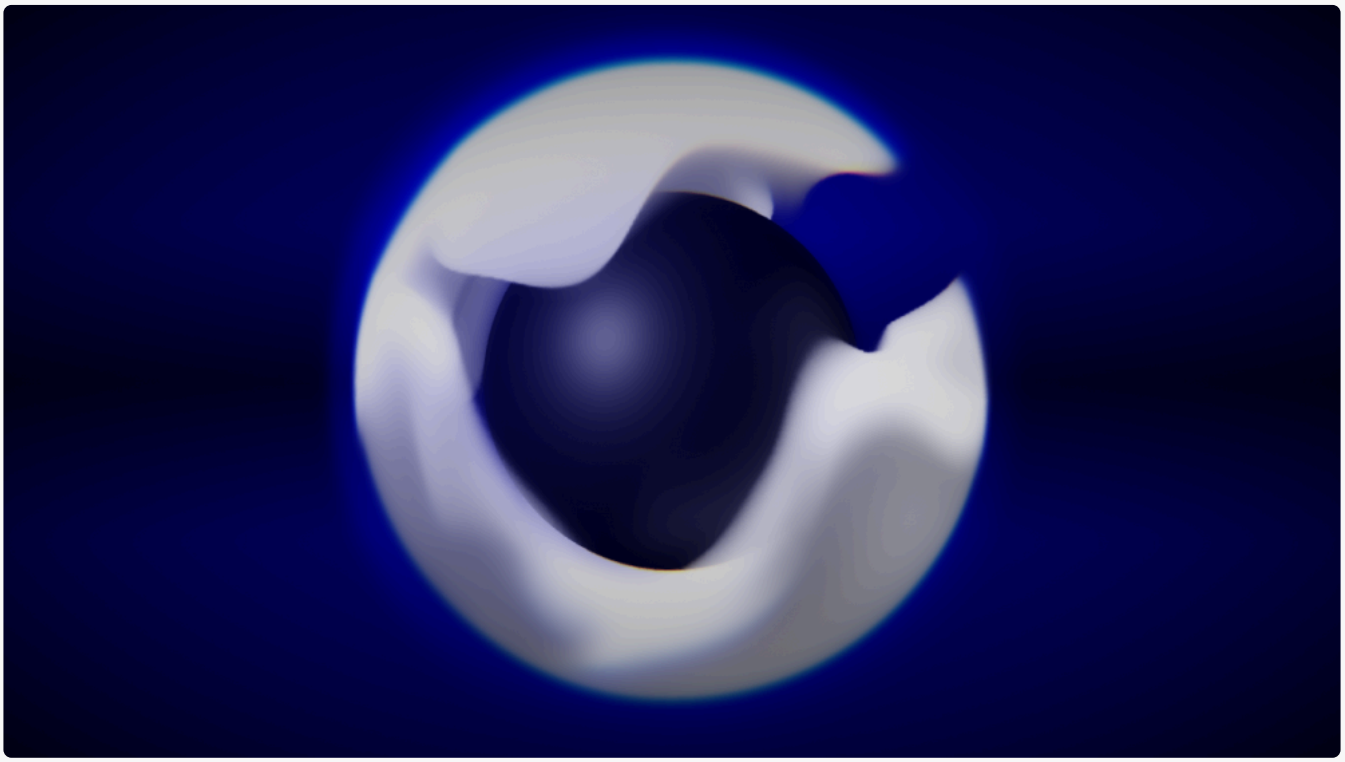
Field Shadows

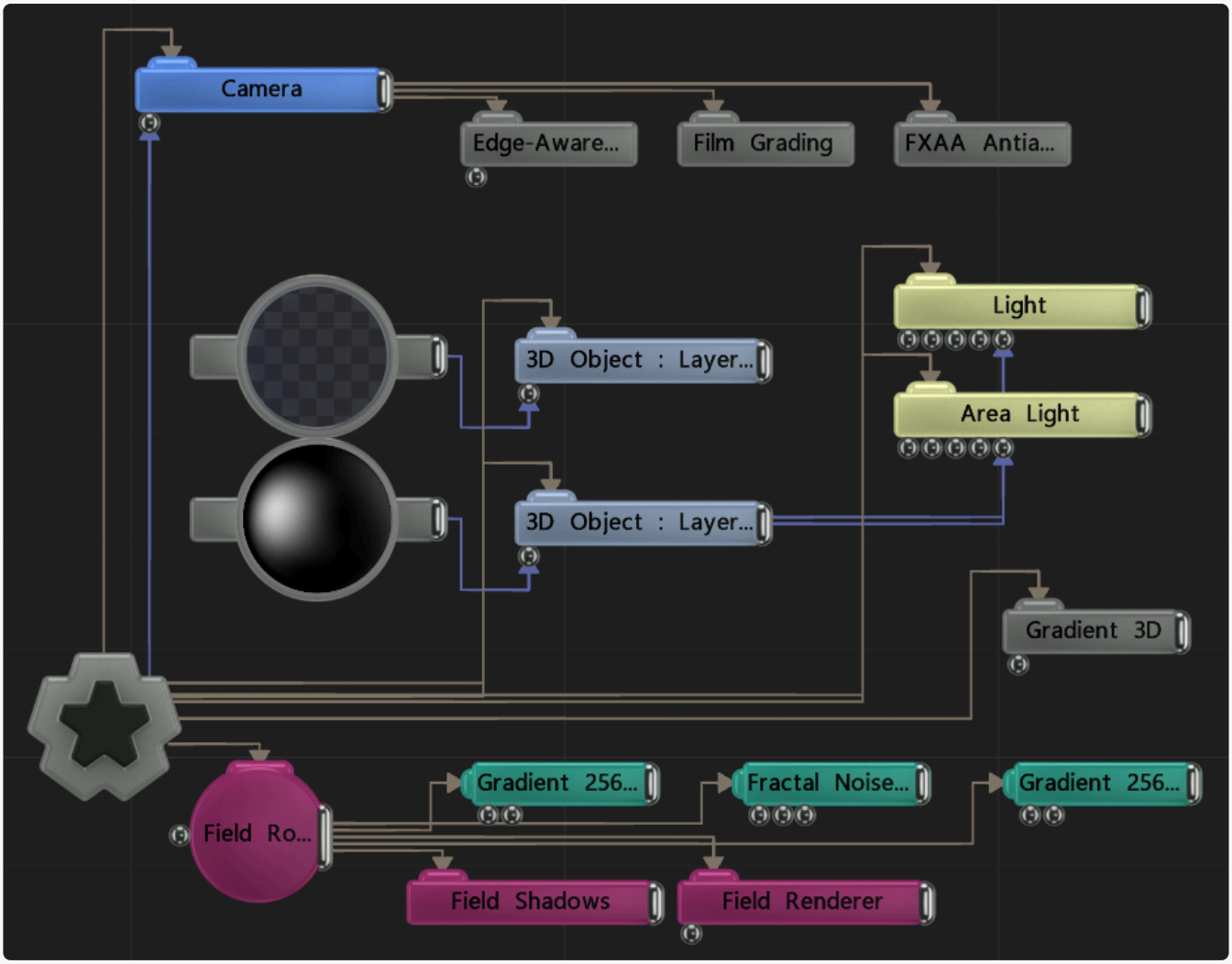
Method

This node lights and shades a field from above and is used in conjunction with Field Renderer. As the lighting direction is limited to this one direction, this node is significantly faster than the similar Field Lighting node which allows multiple light sources with arbitrary positions and orientations.

The node should be parented to a Field Root node.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Shadow Density	Control the density of field, and how much light will be allowed to filter through.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

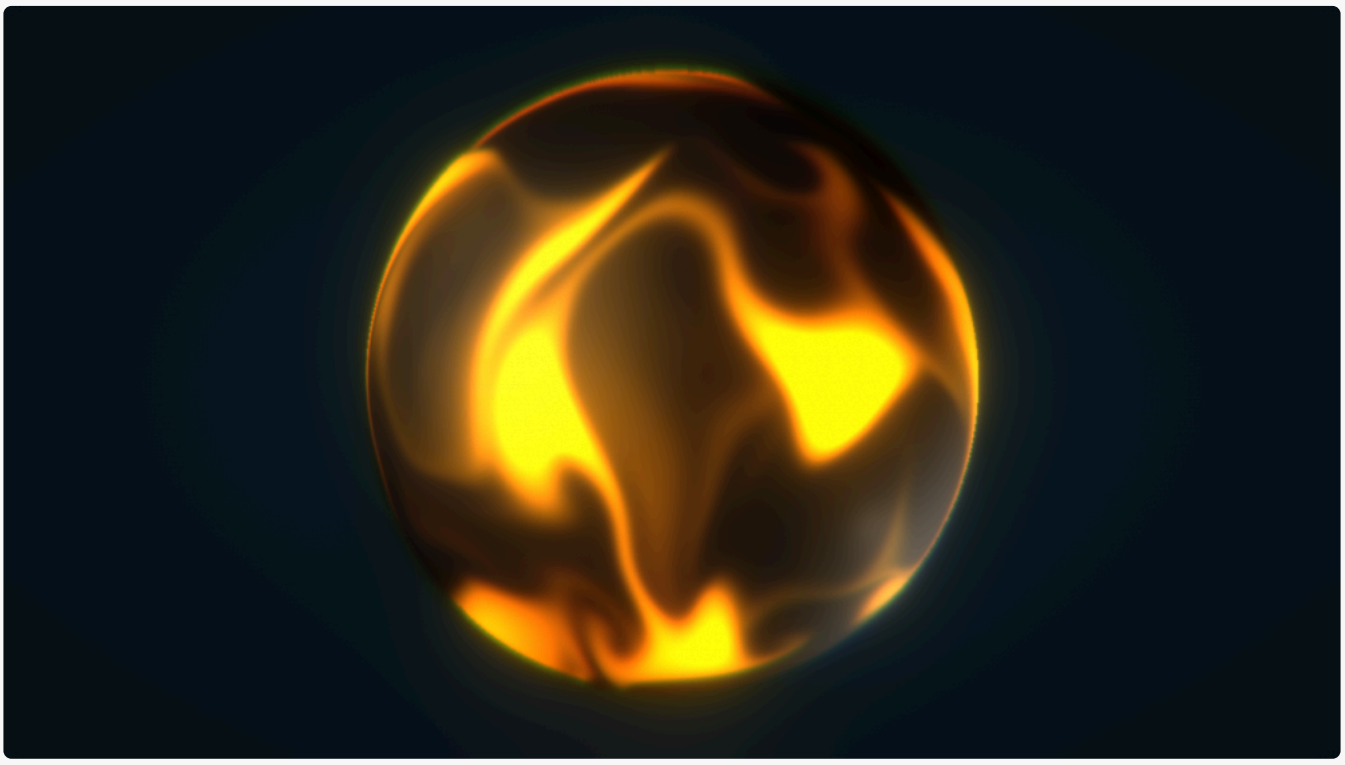
Render To Object Surface

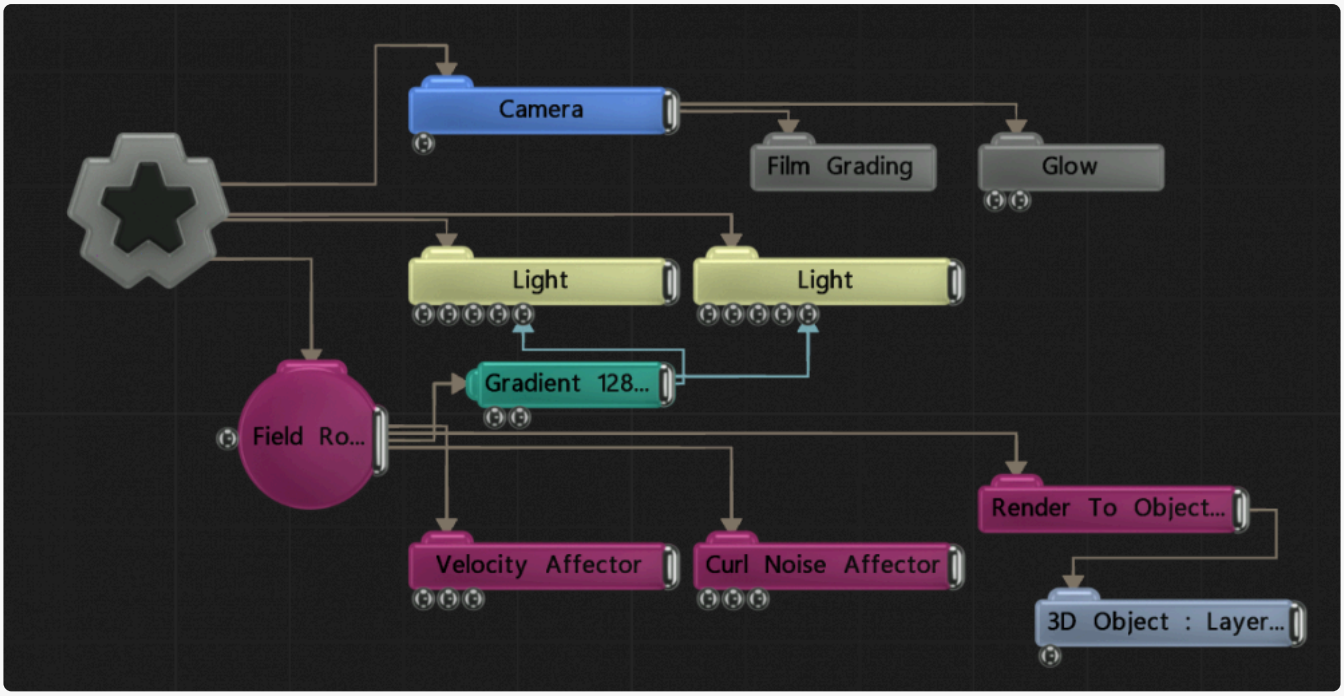
Method

The field is sampled spatially on to the surfaces of visible 3D objects.

The Render to Object Surface node should be parented to the Field Root node. Deferred Rendering must be enabled in the Layer Root node for this to work.

Example





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Alpha	Changes the alpha of the field.

Brightness	Changes the brightness of the field.
Visible	Control whether the node is visible or not to the scene.
Sort Bias	Biases the alpha sort in order to make it render in front or behind other transparent objects.
Velocity Alpha Scale	The amount the velocity of the field is scaled when it is used to modulate alpha.
Blend Mode	How the render UV Texture blends with the objects original material colours. See Blend Modes for details.
Velocity To Alpha	Toggle whether the velocity amount is used to modulate the alpha value, so areas of faster movement are more visible.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Generators

Method

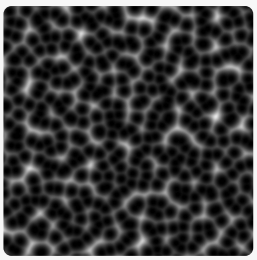
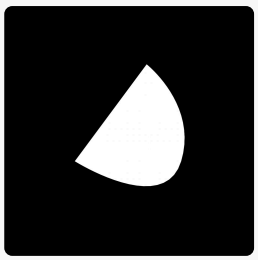
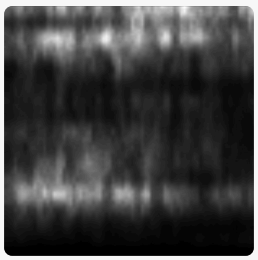
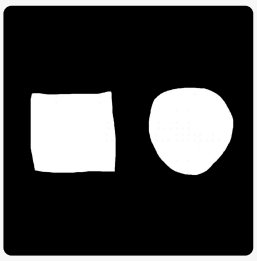
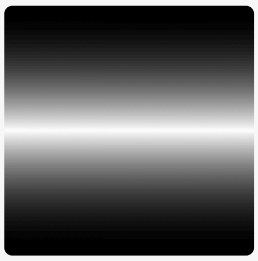
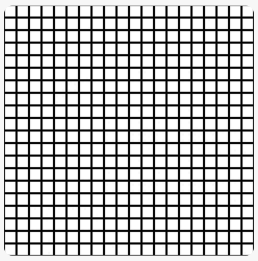
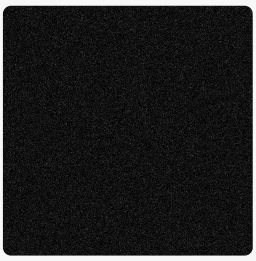
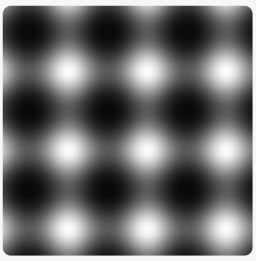
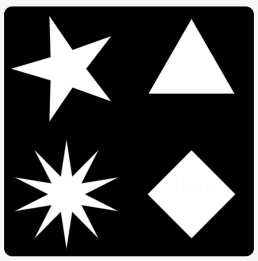
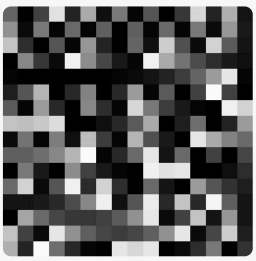
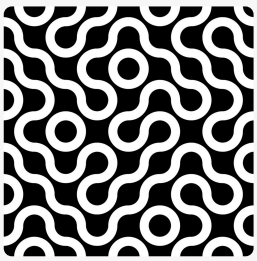
These nodes generate different black and white effects that can be overlayed, or used to modify other nodes.

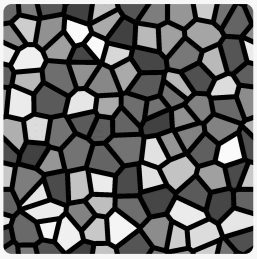
Also fields. Lots of cool stuff with fields.

Generators can be applied directly to these nodes, however, if applied to other nodes it will affect the whole scene in the background, not just the parent node.

- Field Root, the generator is generated in a 3D volume.
- Render To Texture

Gallery

				
Cells	Curve Mask	FFT Texture	Flat Colour	Fractal Noise
				
Freehand Mask	Gradient	Grid	Noise	Plasma
				
Polygon	Star	Tile Sheet	Tiles	Truchet



Voronoi

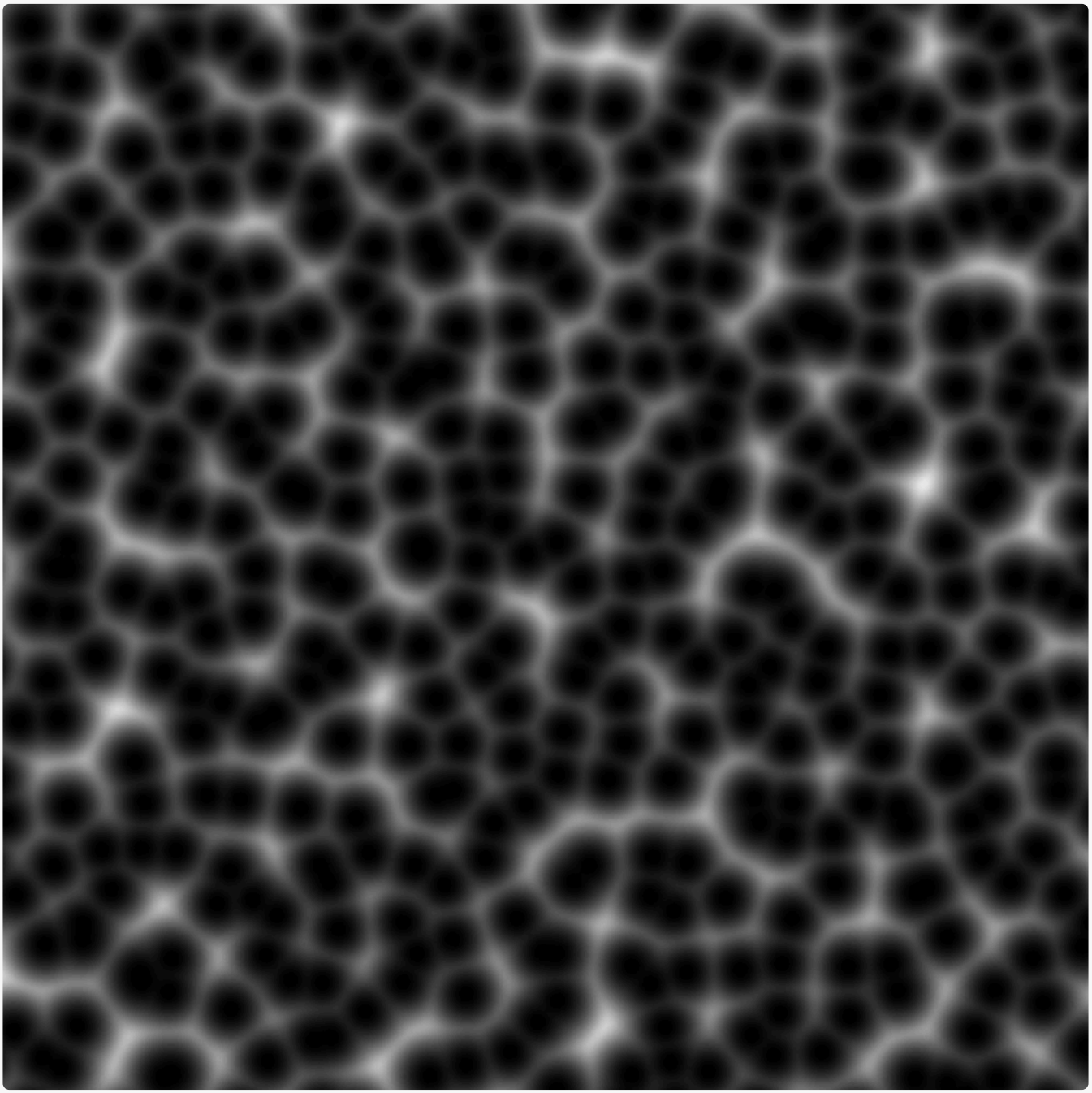
- MIDI Keyboard Texture

Cells

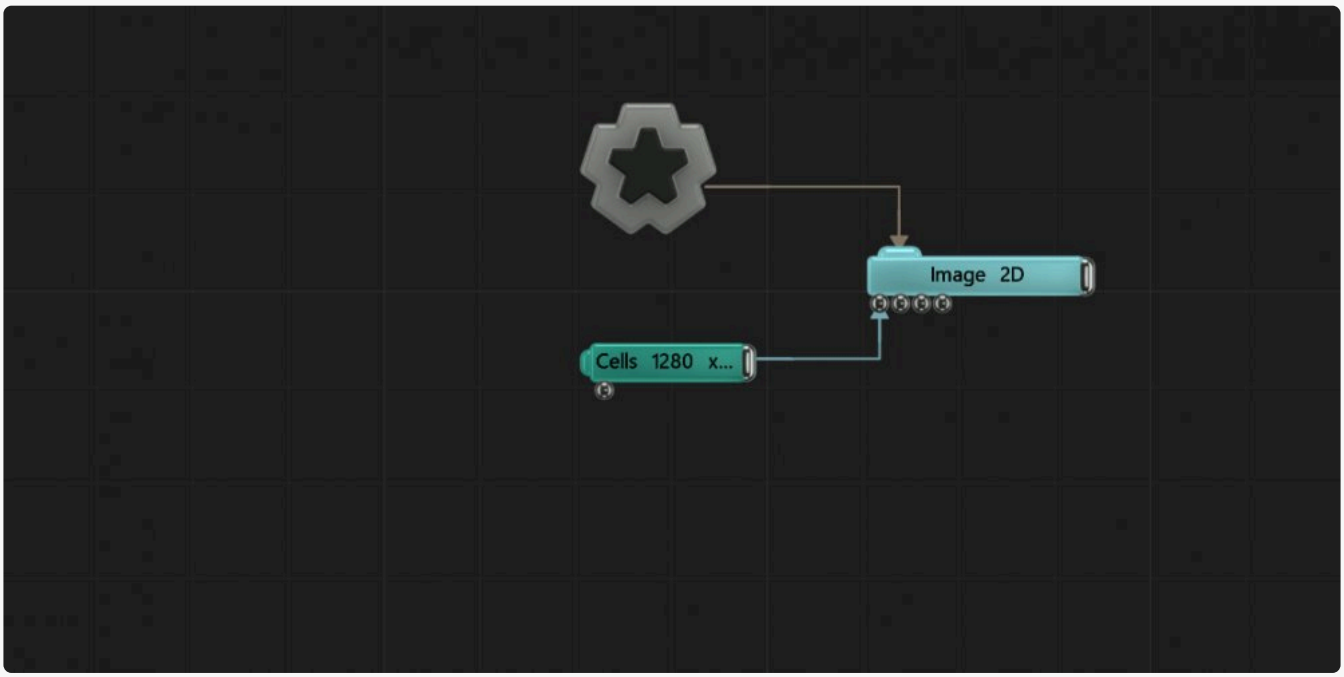
Method

This node generates a cellular pattern using a distance function, mapping a gradient to the distance to the closest of a set of random points

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Num Points X	Number of points generated along the x axis.
Num Points Y	Number of points generated along the y axis.
Num Points Z	Number of points generated along the z axis.
Hardness	How hard the edges of the cells are.
Pallete Animation Rate	How quickly the generator is animated through an input colour ramps palette.
Wrap	Wrap the bottom and right edges of the cells to merge seemlessly with the top and left sides respectively.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be connected to any node which requires an image input.

Curve Mask

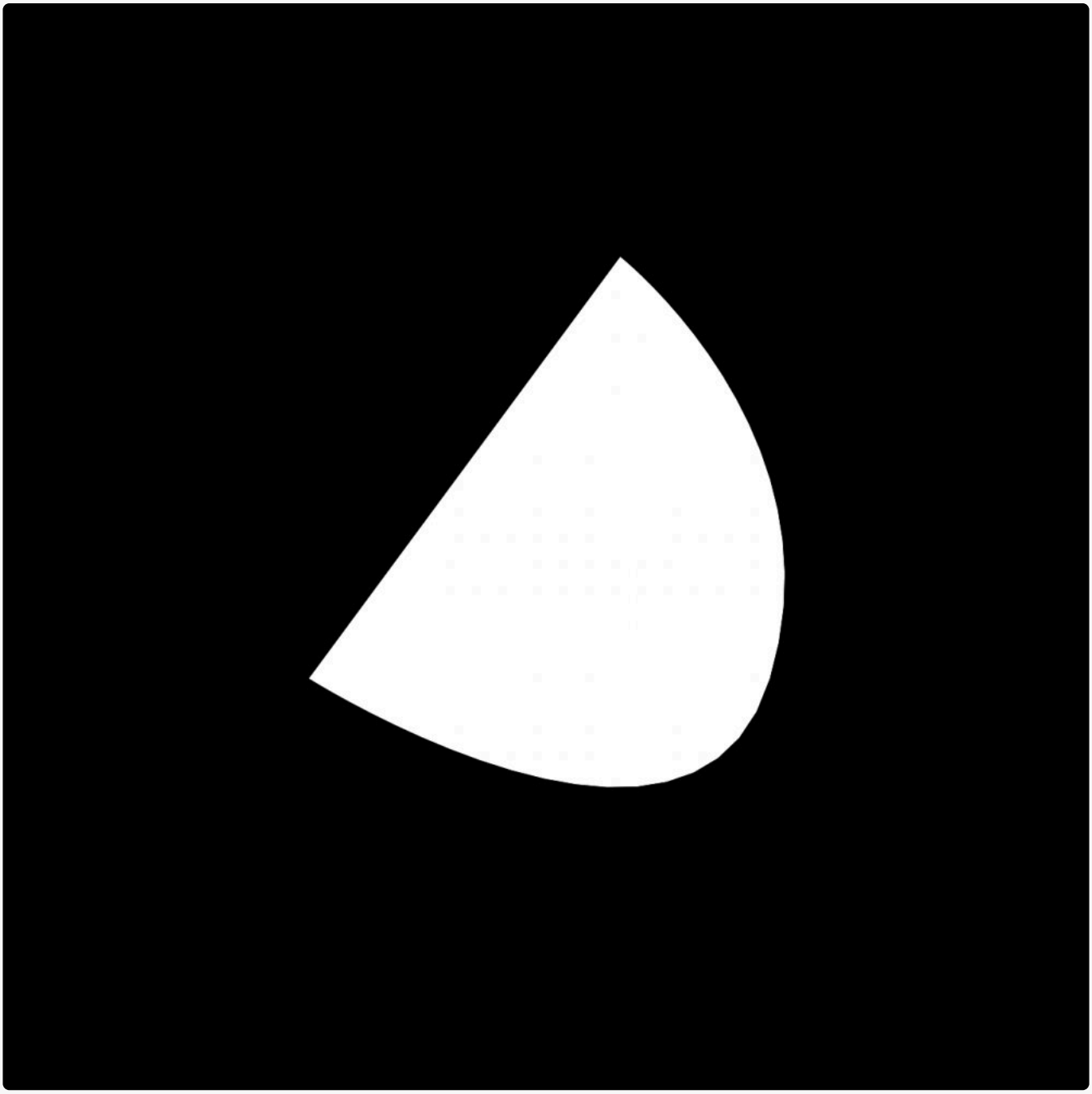
Method

This node generates a mask by using a shape created using user created points.

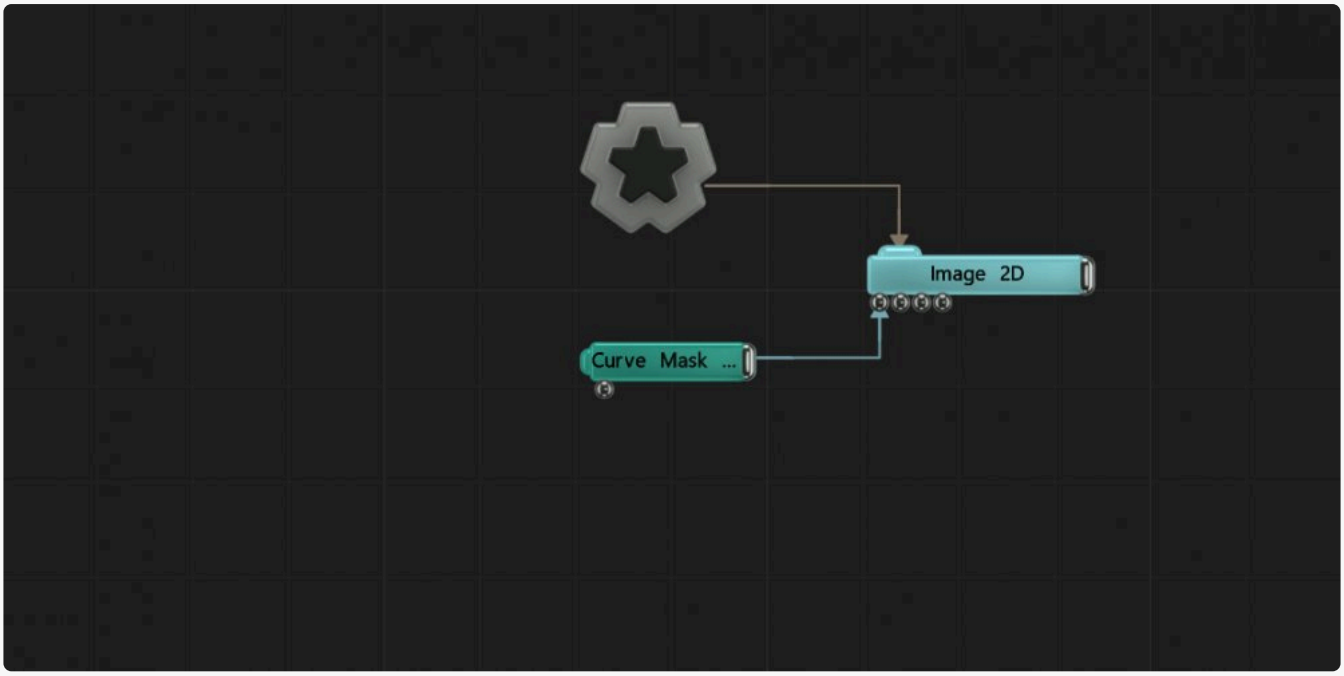
With the scene paused and this node selected, you can create new points by left clicking in the viewport.
Left click dragging moves the selected point around and right clicking a point will delete it.
Using ctrl left click dragging changes the curve of the line into and out of that point.

To close the mask you need to click on the first point.

Processed texture



Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Feather	Makes a blur which follows around the edges of the curve mask shape.
Animate Points	Allows the points to be keyframe animatable.
Show Point Properties	Shows the position and bezier controls for all the points individually in the property window.
Editor Colour	Change the colour of the curve mask line, visualised in the viewport.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Contours

Name	Description
Point # X/Y	X and Y position for each point creating the mask
Point # TX/TY	Bezier control curve point for each point of the mask.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

Outputs

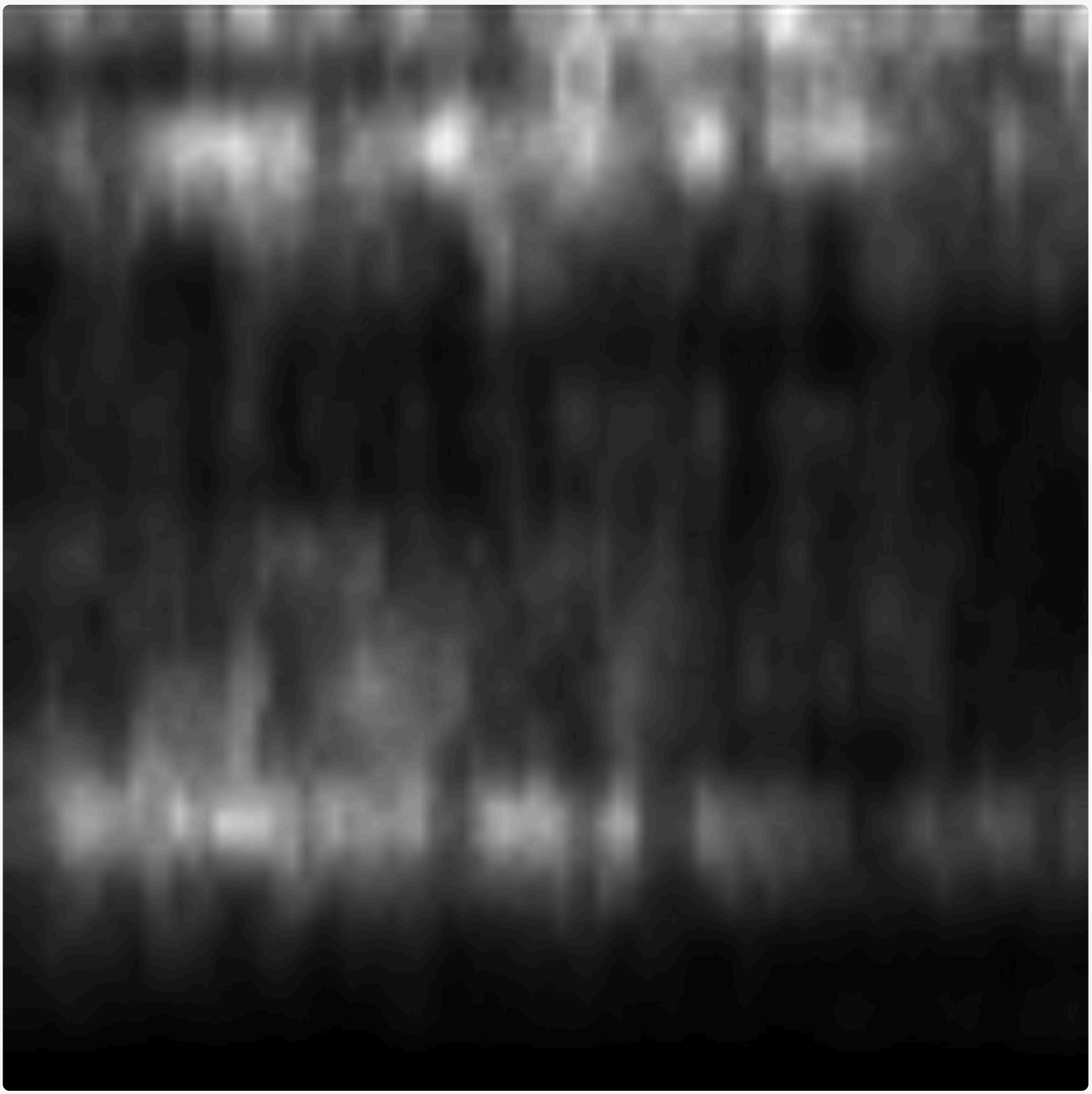
Can be connected to any node which requires an image input.

FFT Texture

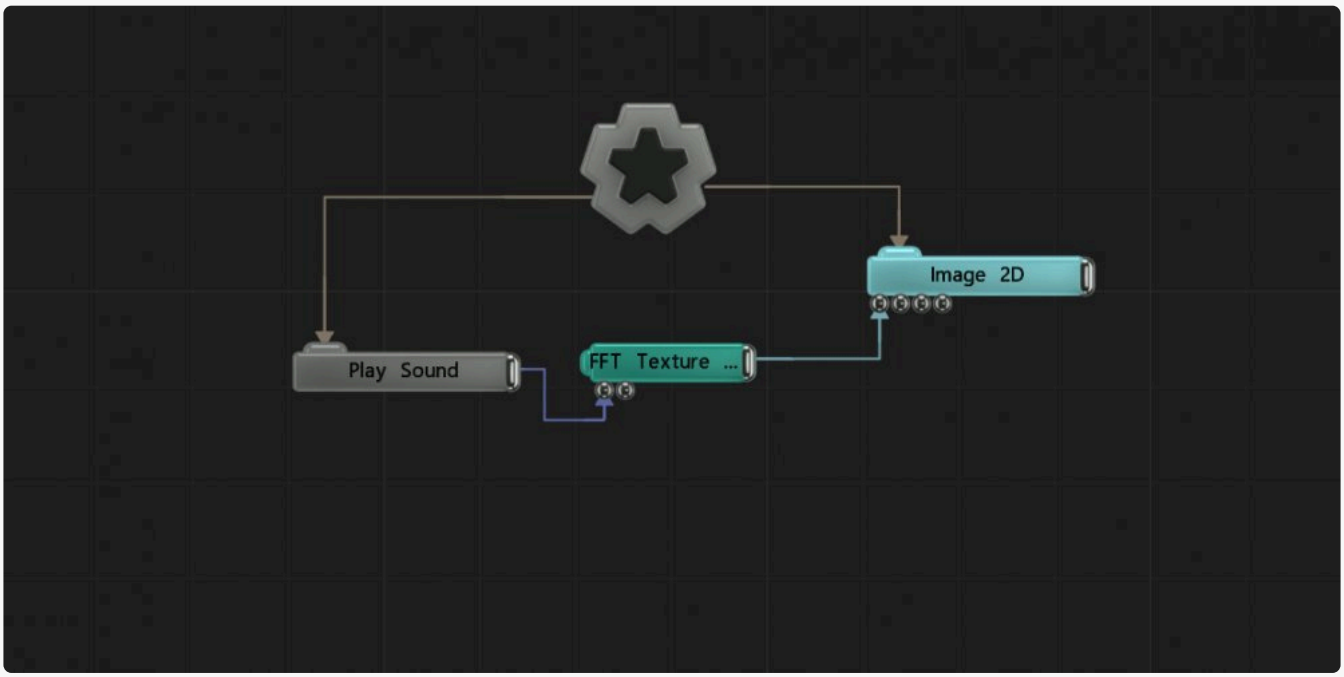
Method

Generates a texture based on the sound from either a selected or input audio source.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Sound	Sound file used to drive the effect.
Channel	Which audio channel is used.
Frequency Band	Sets the Band EQ to one of the given presets.
Band EQ	Selects and weights the frequency bands to be used from the sound file.
Time Offset	Offset the time the clones are modified from the time the waveform is at.
Change Threshold	Changes the threshold for what counts toward the effect.
Attack	Controls the initial time between the current values to the peak.
Decay	Controls the time between the peak to the sustain level.
Min Value	Acts as a minimum threshold for extracting a range of values from the waveform.
Max Value	Acts as a maximum threshold for extracting a range of values from the waveform.
Max Clamp	A maximum value which values will be clamped if they go above.
Spikiness	Accentuates peaks in the waveform so they are sharper.
Scale	How much the output values are scaled.
Offset	Offset all values output by the texture.
Smoothness	How much smoothing is applied between differing values.
Falloff Range	Range in which the sounds data will be tracked.
Waveform	Visualises the waveform of of the sound.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.

Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Sound	Use an input sound to override the sound attribute.	Play Sound
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

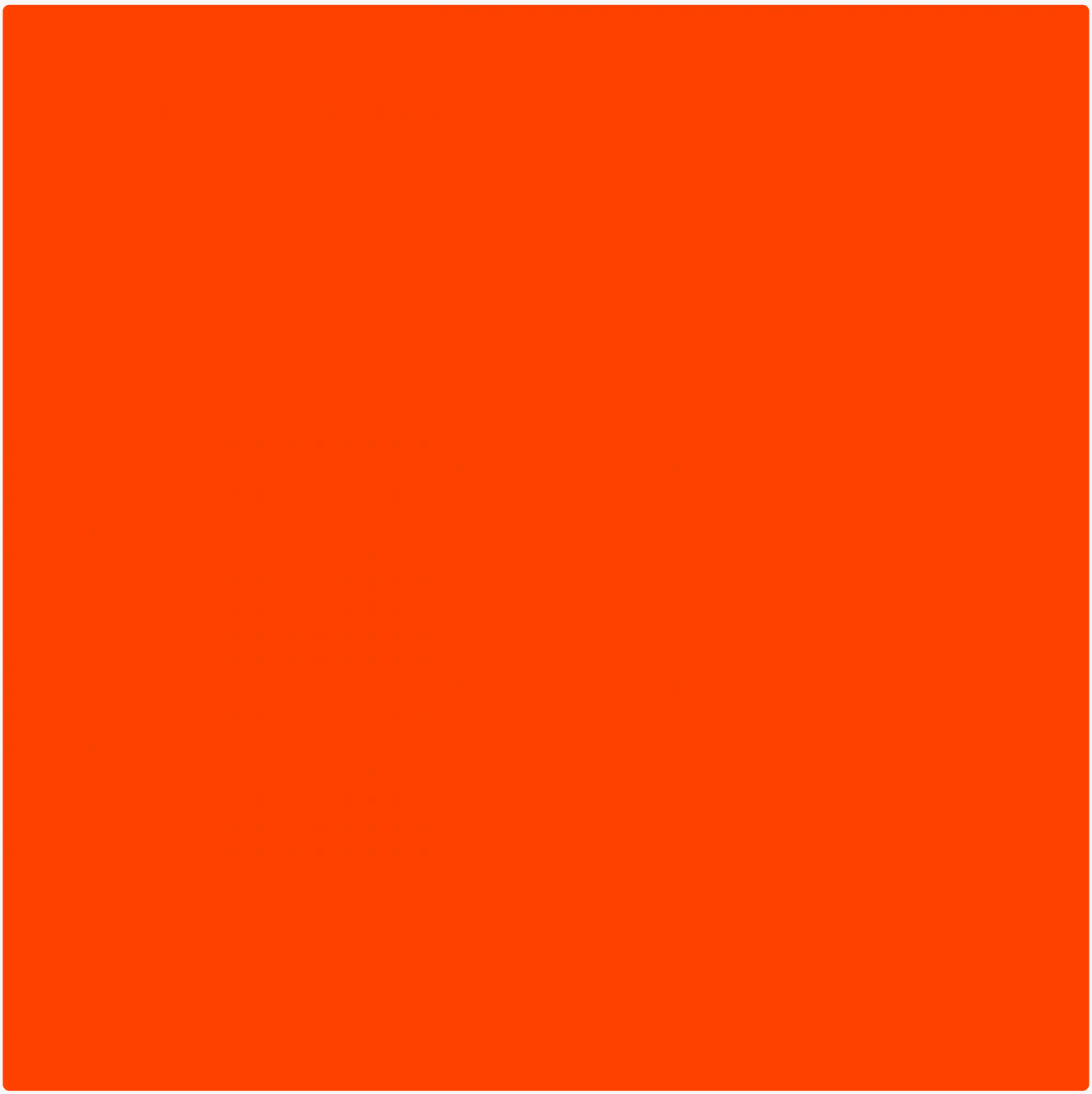
Can be connected to any node which requires an image input.

Flat Colour

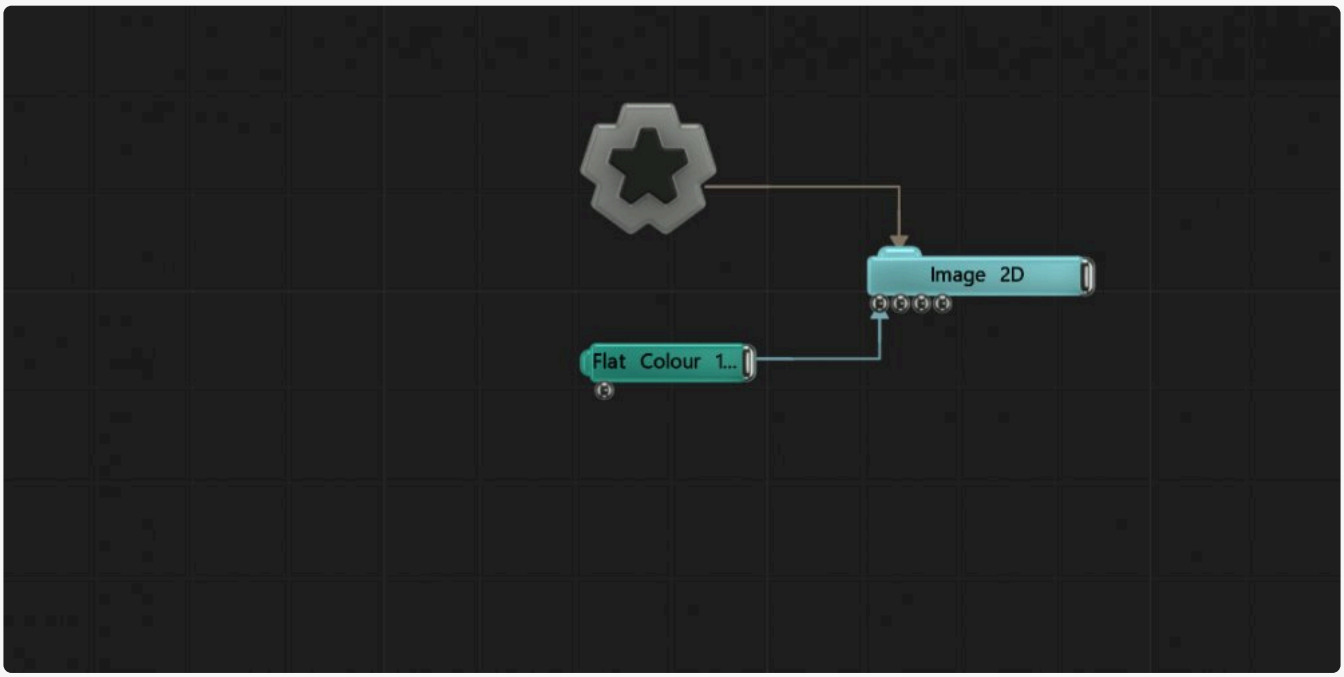
Method

This node generates a flat colour.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be connected to any node which requires an image input.

Fractal Noise

Method

Generates simple fractal noise.

Processed texture

Example Nodegraph
!{IMAGE-LINK+ node-generators-fractal-noise-ng}!

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Noise Type	Select the noise function to generate noise from. • FBM

	• Turbulence • Ridged Multifractal • Marble
Amount	Change how strong the fractal noise is.
Noise Threshold	Minimum value threshold for where the noise will be generated.
Noise Scale	Scale the size of any noise generated.
Lacunarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Animation Speed	The speed at which the noise is animated.
Num Octaves	How many time the noise generation is iterated.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be connected to any node which requires an image input.

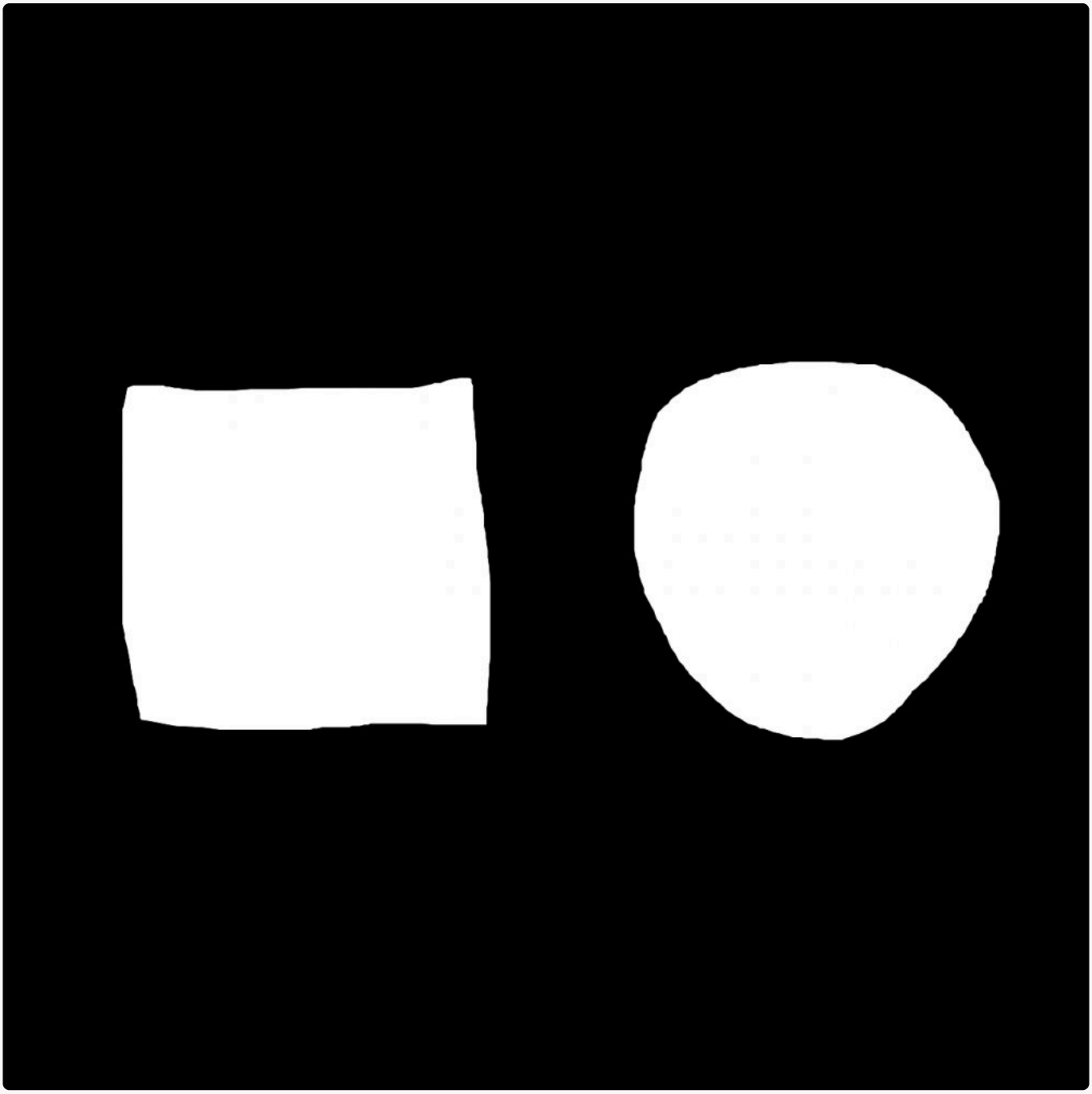
Freehand Mask

Method

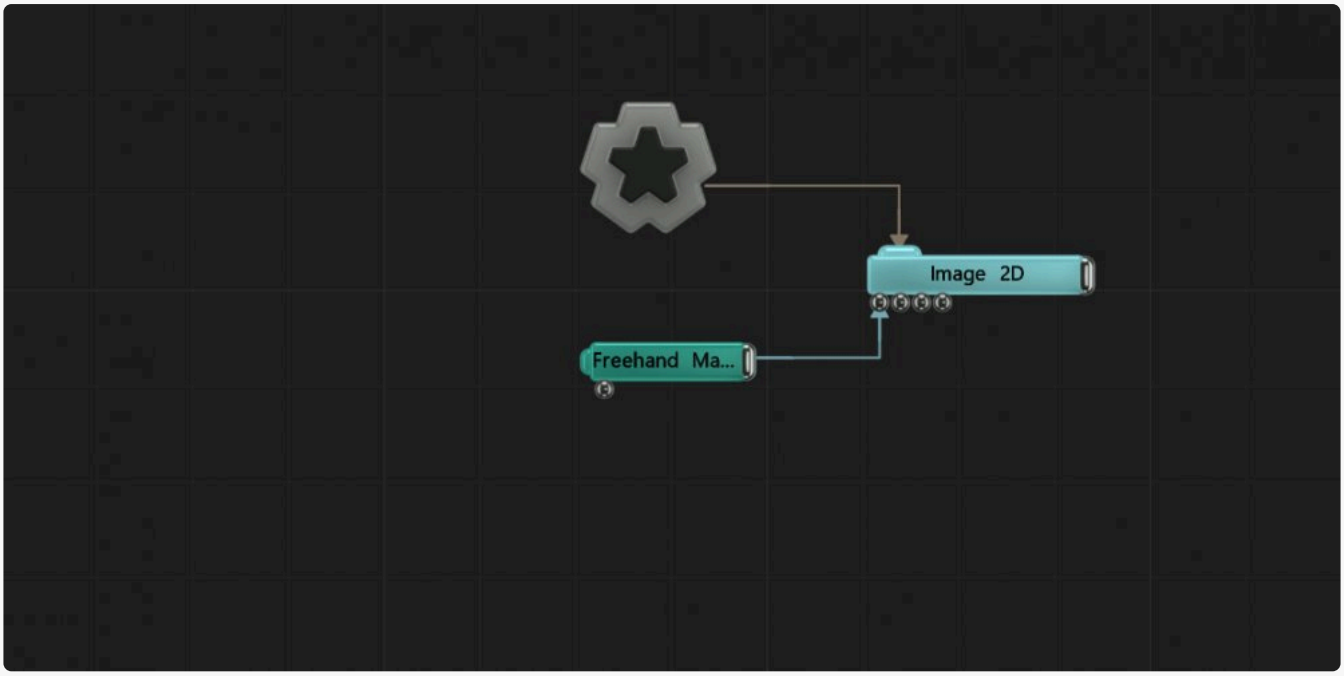
This node allows a black and white mask to be sketched by clicking and dragging with the left most button in the viewport. When the right button is pressed the mask is cleared.

Notch must be paused to draw new masks.

Processed texture



Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Feather	Makes a blur which follows around the edges of the curve mask shape.
Animate Points	Allows the points to be keyframe animatable.
Show Point Properties	Shows the position and bezier controls for all the points individually in the property window.
Editor Colour	Change the colour of the curve mask line, visualised in the viewport.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Contours

Contains an array of all the points included to create the mask, for internal use.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

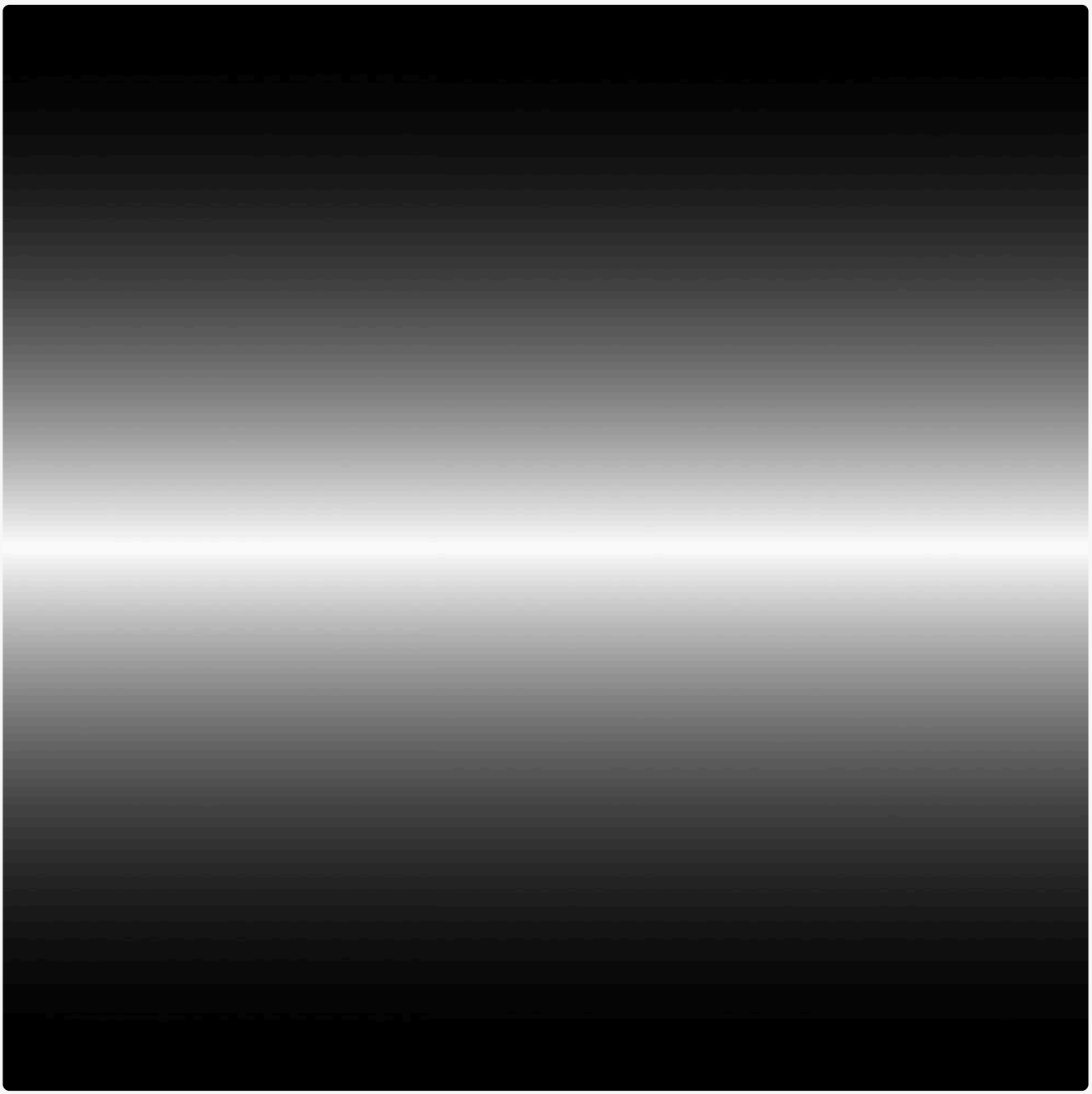
Can be connected to any node which requires an image input.

Gradient

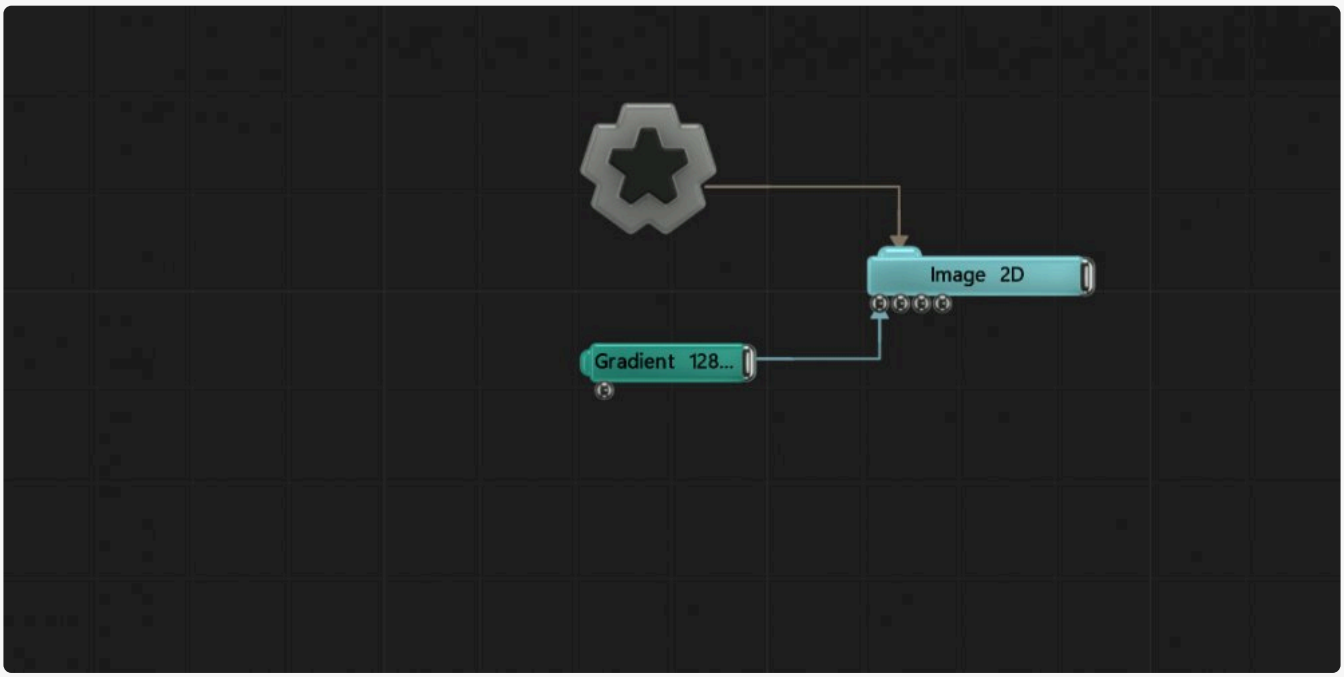
Method

Generates a gradient.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated separated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Mode	How the gradient is generated. • Linear, the gradient moves outward from a line. • Radial, the gradient moves outward from a point. • Linear Clamped, The gradient moves outward in one direction from a line.
Inverted	Invert the direction of the gradient.
Inner Range	Change the point the gradient starts internally.
Outer Range	Change the point the gradient ends at the gradient edge.
Falloff Range	The length of the falloff from the gradient.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

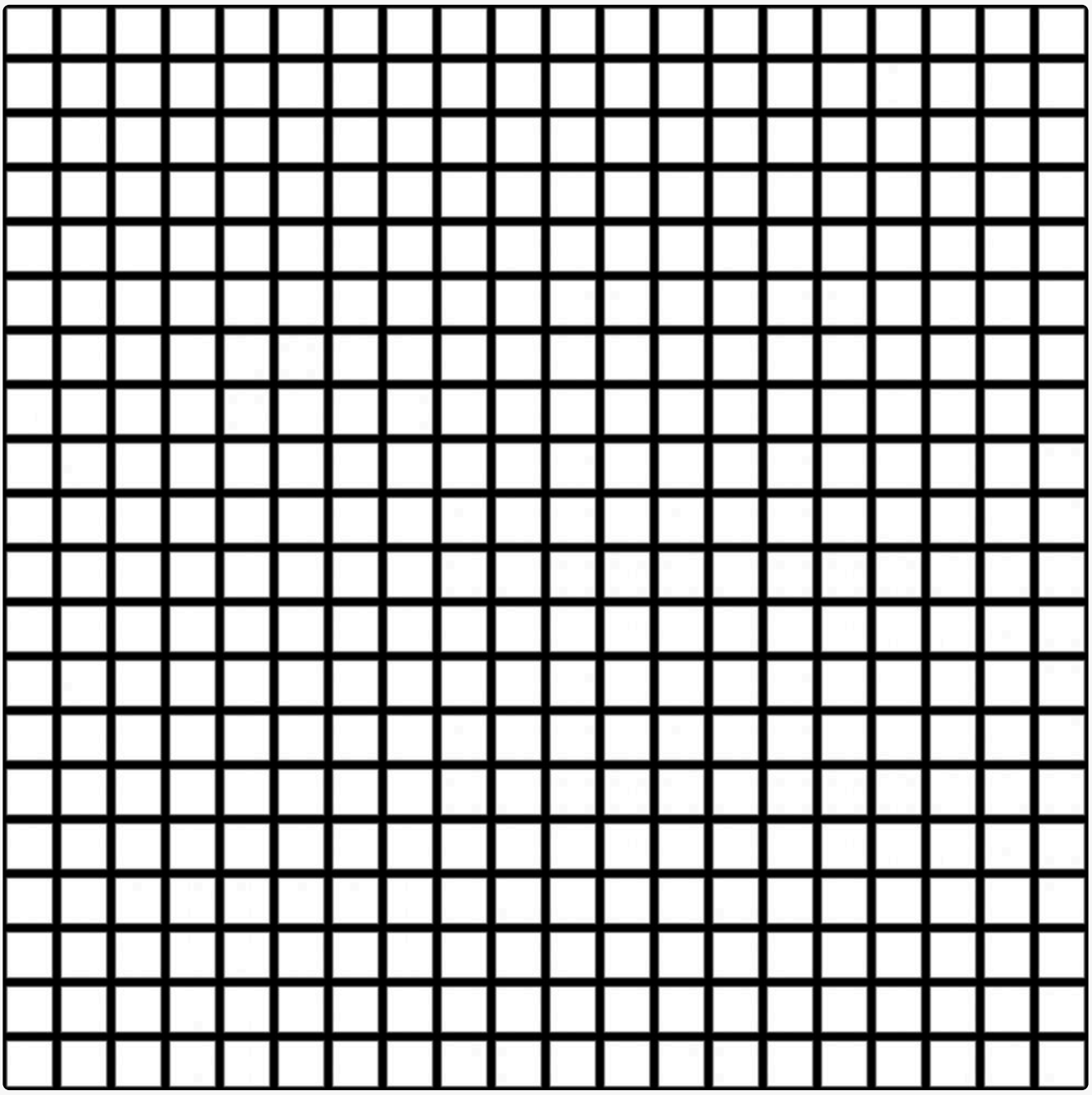
Can be connected to any node which requires an image input.

Grid

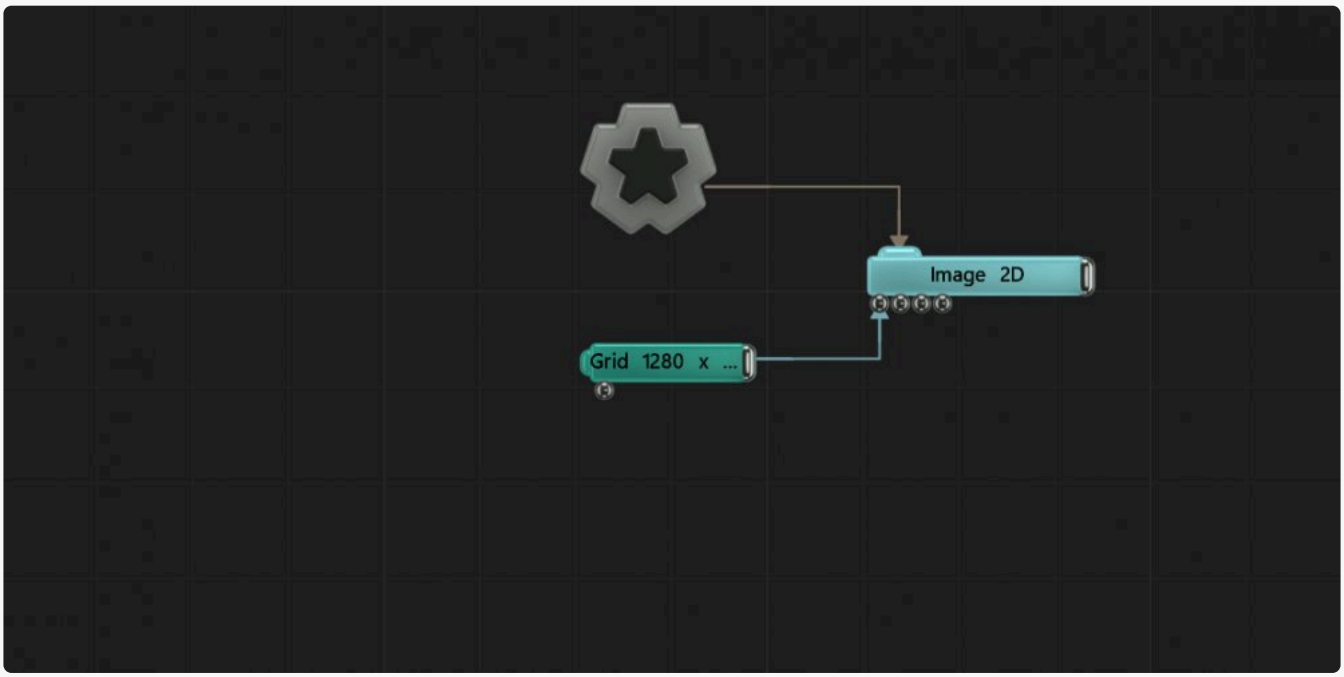
Method

Generates a grid.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Dimension	Change how many dimensions the grid is generated over.
Line Width	Width of the grid lines.
Contrast	Change the contrast between the lines and the background colour.
Hardness	How much of a gradient there is between the edges of the grid lines and the background colour.
Invert Grid	invert the colours of the grid.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

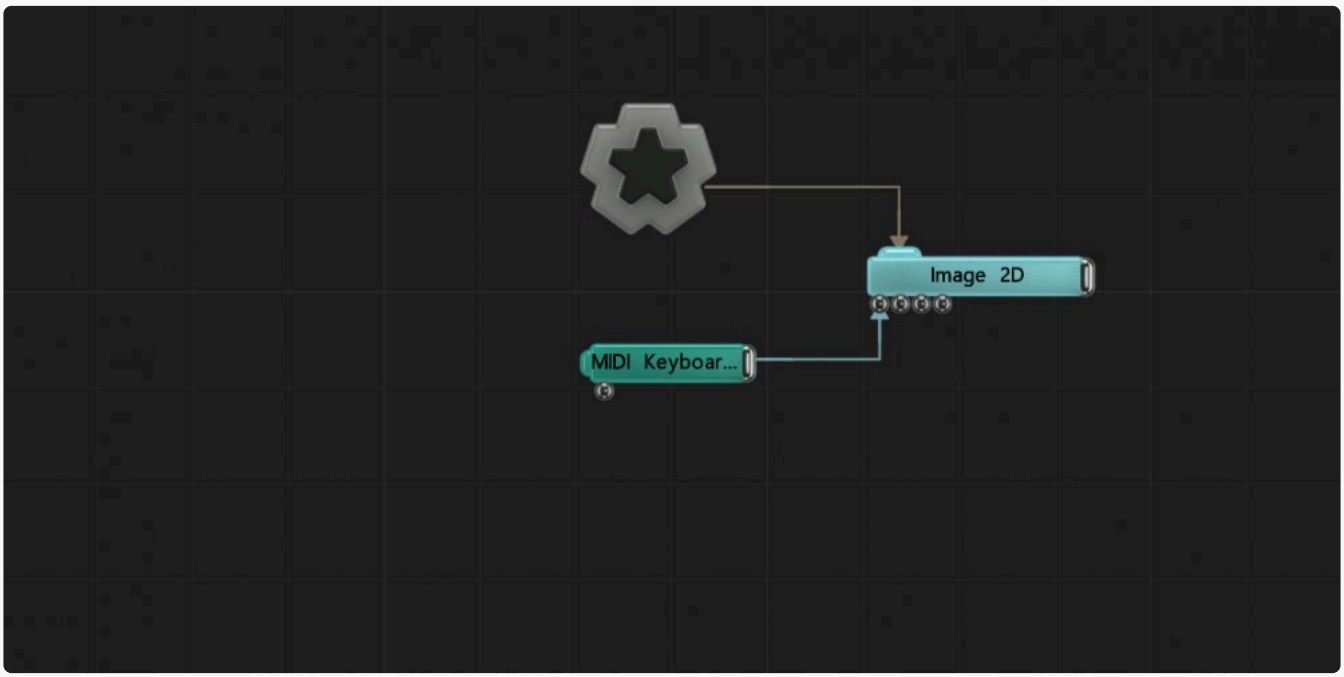
Outputs

Can be connected to any node which requires an image input.

MIDI Keyboard Texture

Method

This node generates a texture based on the output from a connected MIDI Device.

Example Nodegraph


Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Device	Select an input device to use.
Channel	Select a channel from the device to listen to.
Attack	Controls the initial time between the current values to the peak.
Decay	Controls the time between the peak to the sustain level.
Min Value	Acts as a minimum threshold for extracting a range of values from the waveform.
Max Value	Acts as a maximum threshold for extracting a range of values from the waveform.
Max Clamp	A maximum value which values will be clamped if they go above.
Spikiness	Accentuates peaks in the waveform so they are sharper.
Scale	How much the output values are scaled.
Offset	Offset all values output by the texture.
Smoothness	How much smoothing is applied between differing values.
Falloff Range	Range in which the sounds data will be tracked.

Rendering

Name	Description
Colour	Add a colour filter over the image.

Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

Outputs

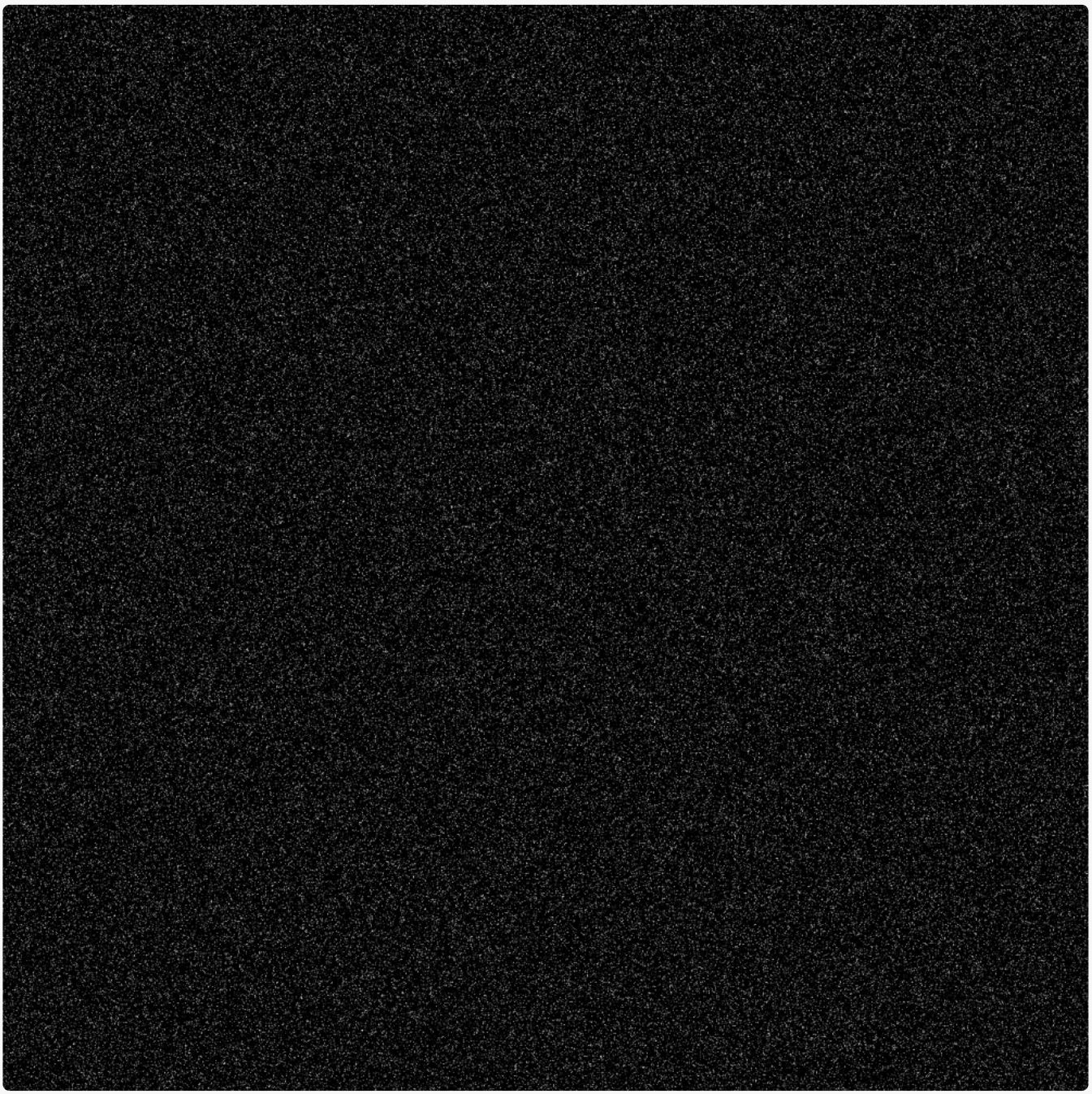
Can be connected to any node which requires an image input.

Noise

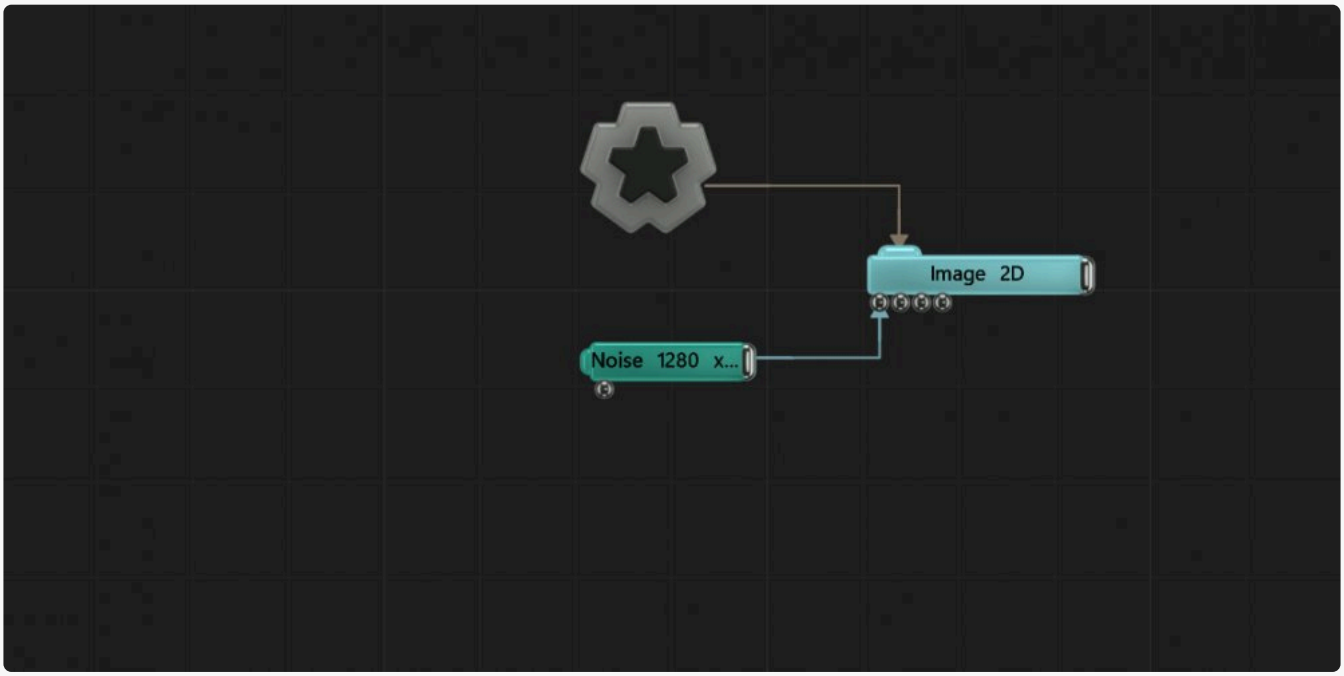
Method

Generates random static noise.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.

Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Intensity	How strongly the noise generated it.
Amount	How much noise is generated per pixel.
Scale	Scale the size of any noise generated.
Animation Rate	The speed at which the noise is animated.
Attack	How quickly a random point reaches its peak.
Decay	How quickly a random point decays.
RGB Noise	Toggle whether the noise is randomised colour, or randomised black and white..
Mode	Choose different kinds of noise. • Point, the noise generates random points of differing brightness for each frame. • Lines, the noise generates parallel lines of differing brightness. • Time Filtered Points, the noise is generated through random points at random times, allowing for the noise to be animated smoothly.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

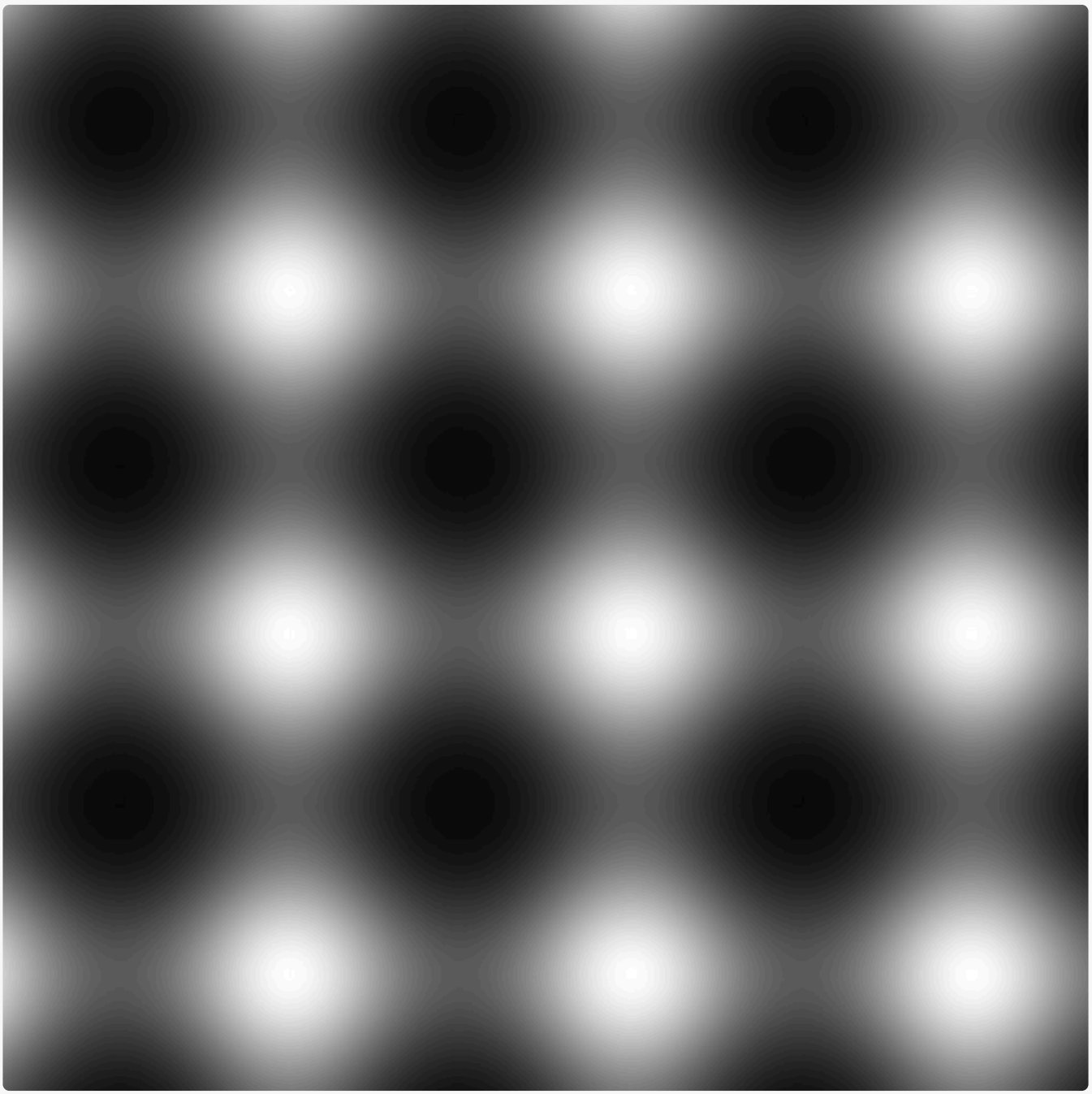
Can be connected to any node which requires an image input.

Plasma

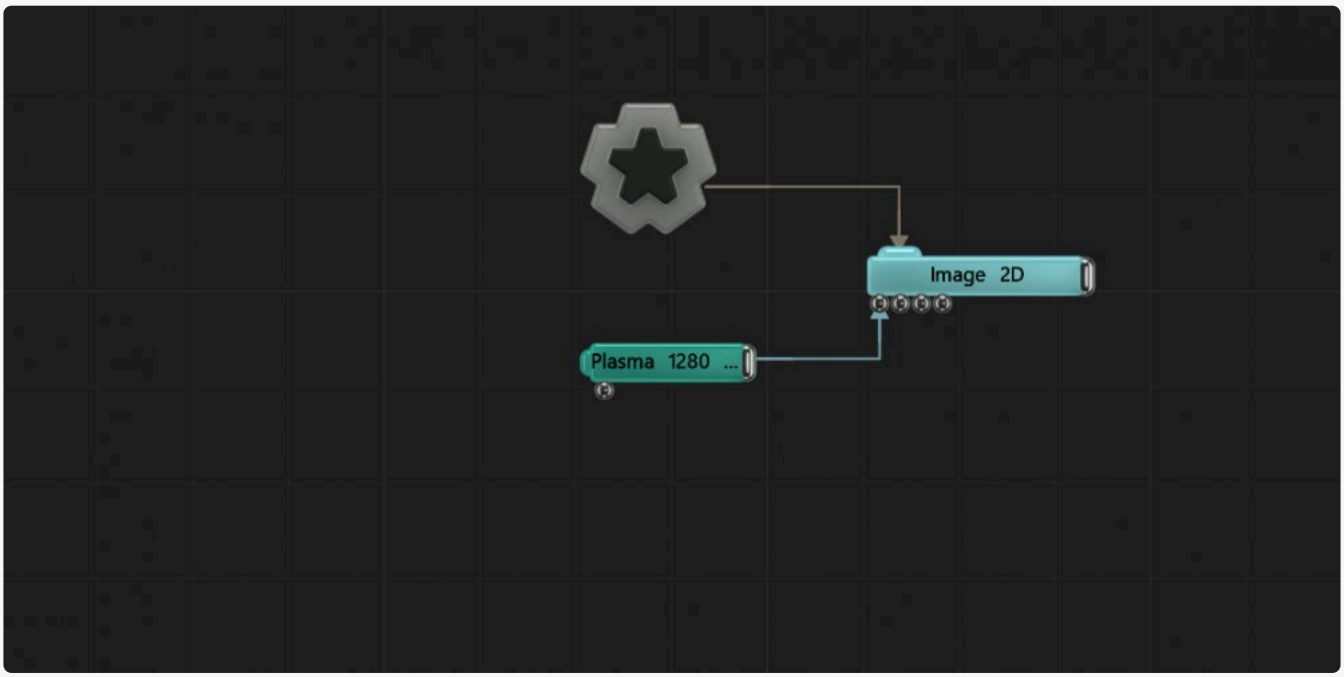
Method

Can be used to generate a few different wavy effects.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Mode	Cycle through different effects that can be generated.
Param 0 / 1 / 2	Depending on the mode selected, can change how the effect is generated.
Palette Animation Rate	How quickly the generator is animated through an input colour ramps palette.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

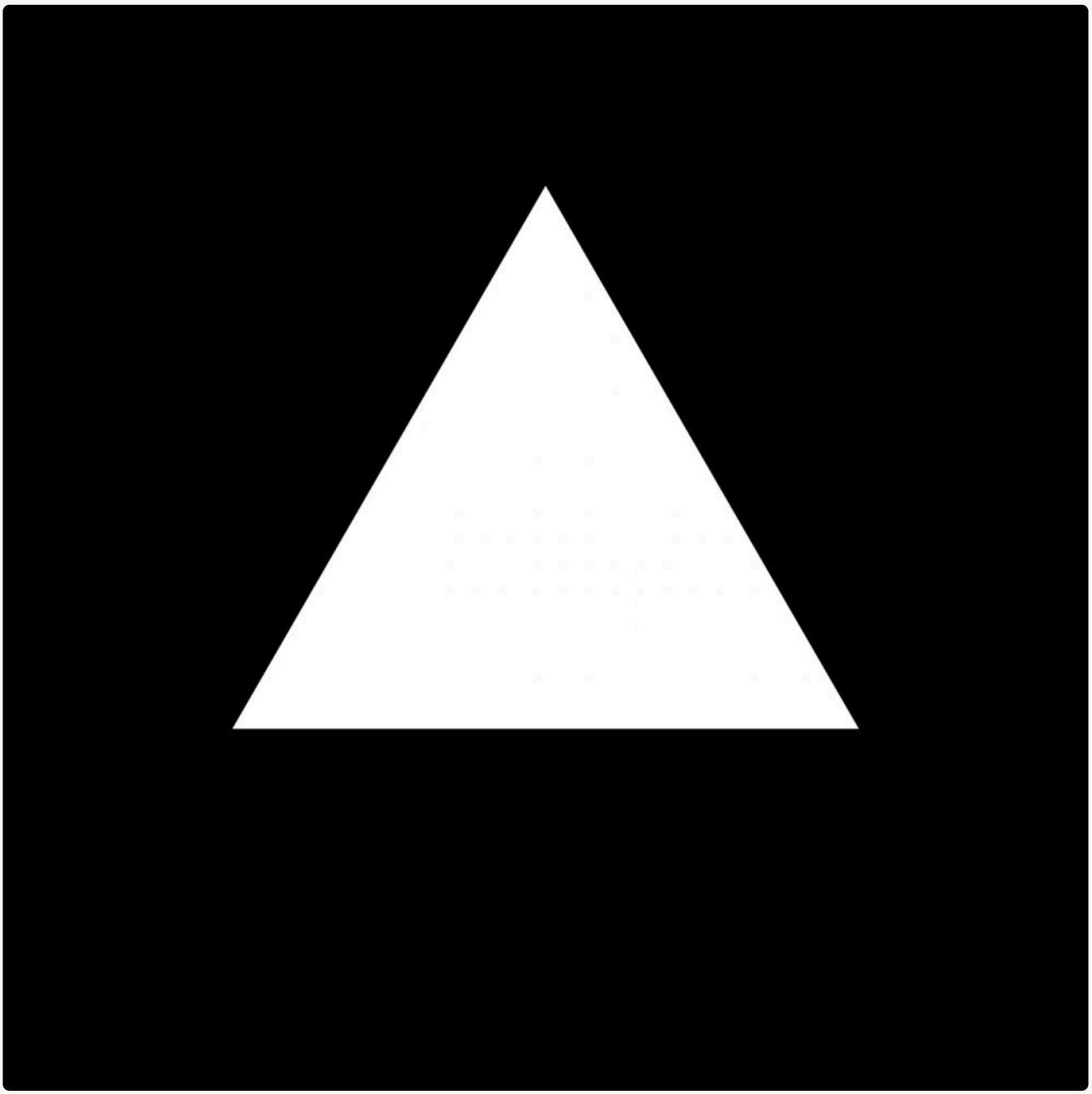
Can be connected to any node which requires an image input.

Polygon

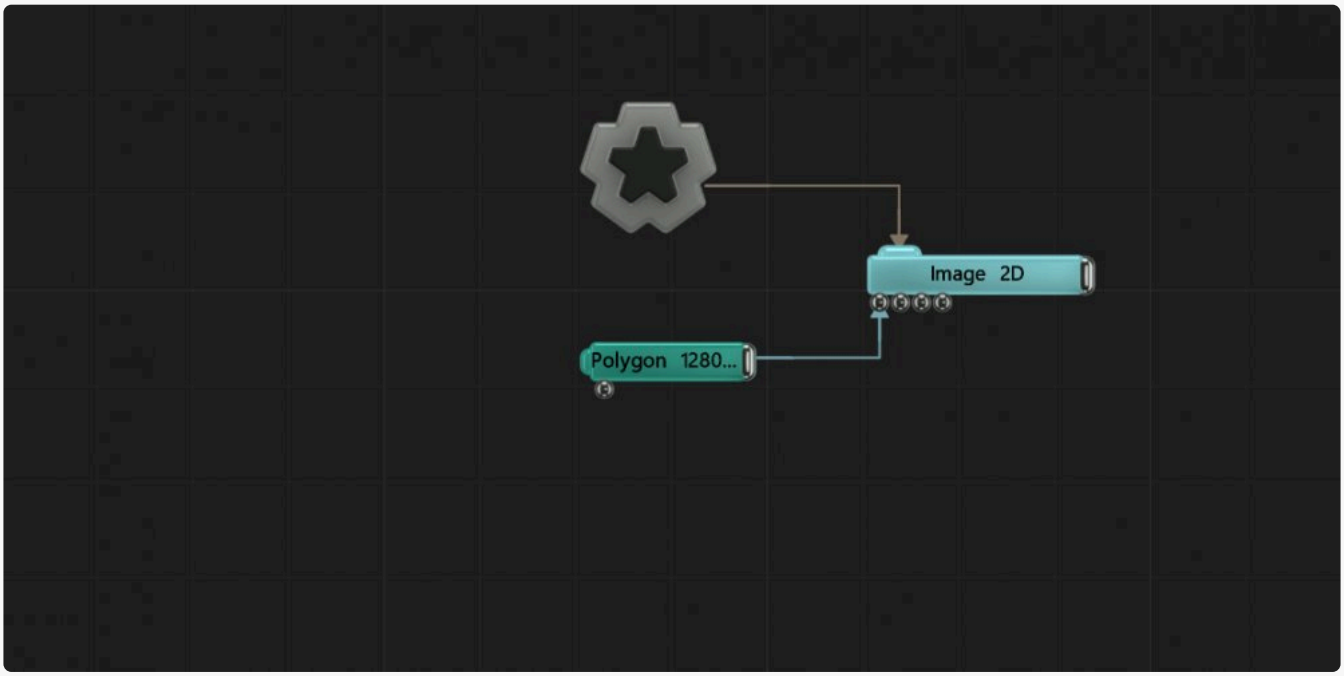
Method

Generates a single regular polygon as a texture image.

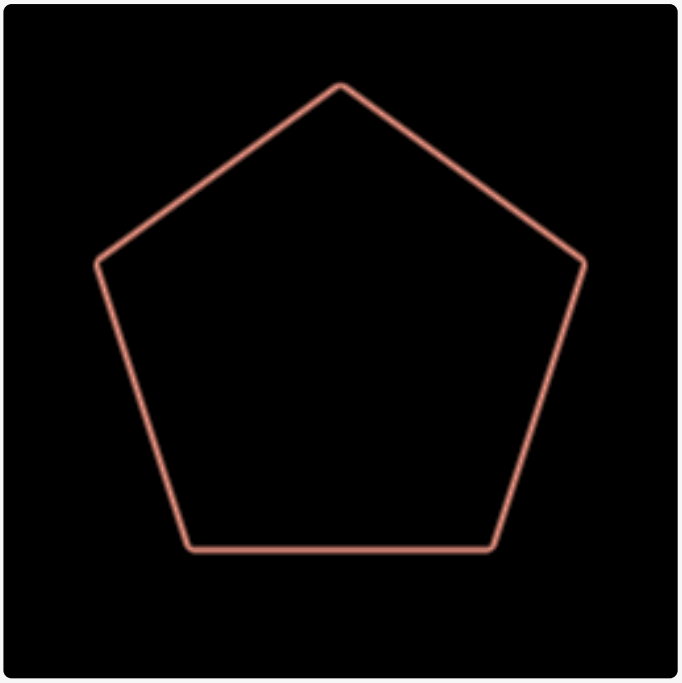
Processed texture

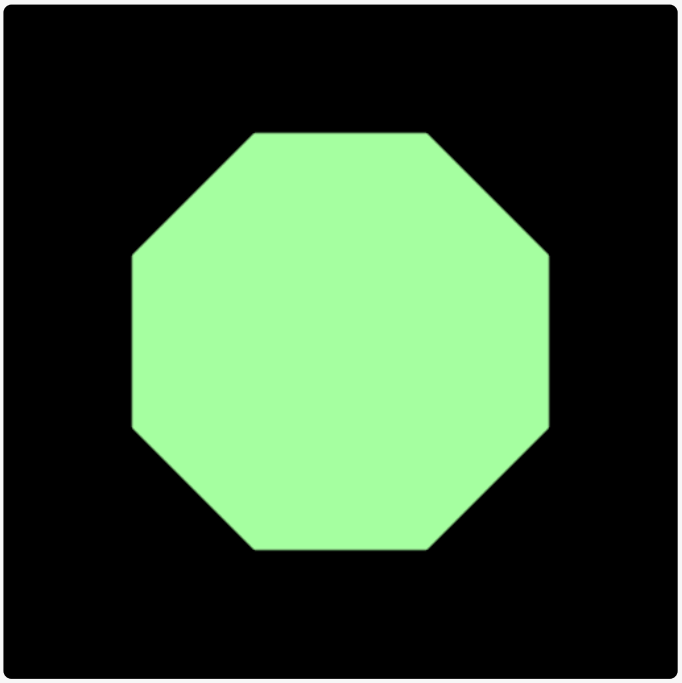


Example Nodegraph



Examples





Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.

Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Orientation	Sets the rotation of the shape independently from the transform controls.
Scale	A uniform scaling value. Use this rather than the transform controls to maintain the same level of softness (described below) at all scales.
Softness	The amount of feathering at the edges of the polygon.
Sides	The number of sides that the shape has.
Filled	Indicates whether the polygon should be filled in, or should be drawn as outlines only.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.

Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be connected to any node which requires an image input.

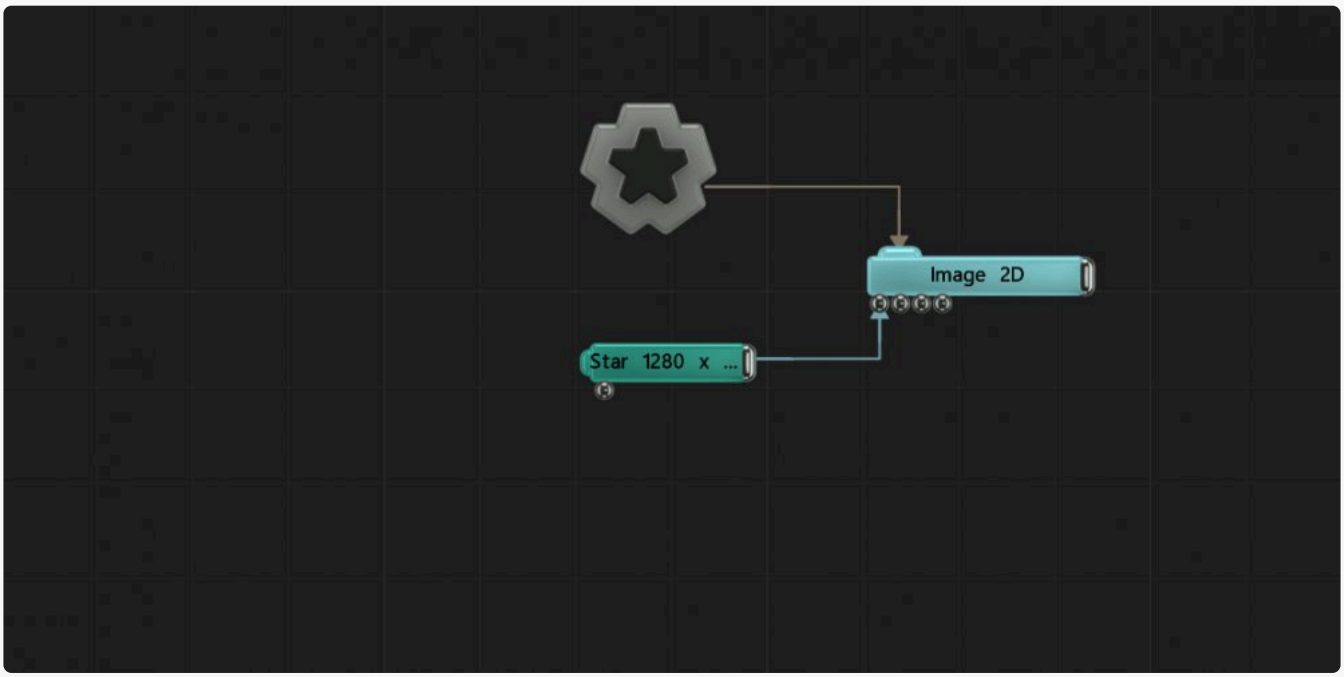
Star

Method

Generates a single regular polygon as a texture image.

Processed texture

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Orientation	Sets the rotation of the shape independently from the transform controls.
Inner Radius	Inner radius for the points of the star.
Outer Radius	Outer radius for the points of the star.
Sides	The number of sides that the shape has.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be connected to any node which requires an image input.

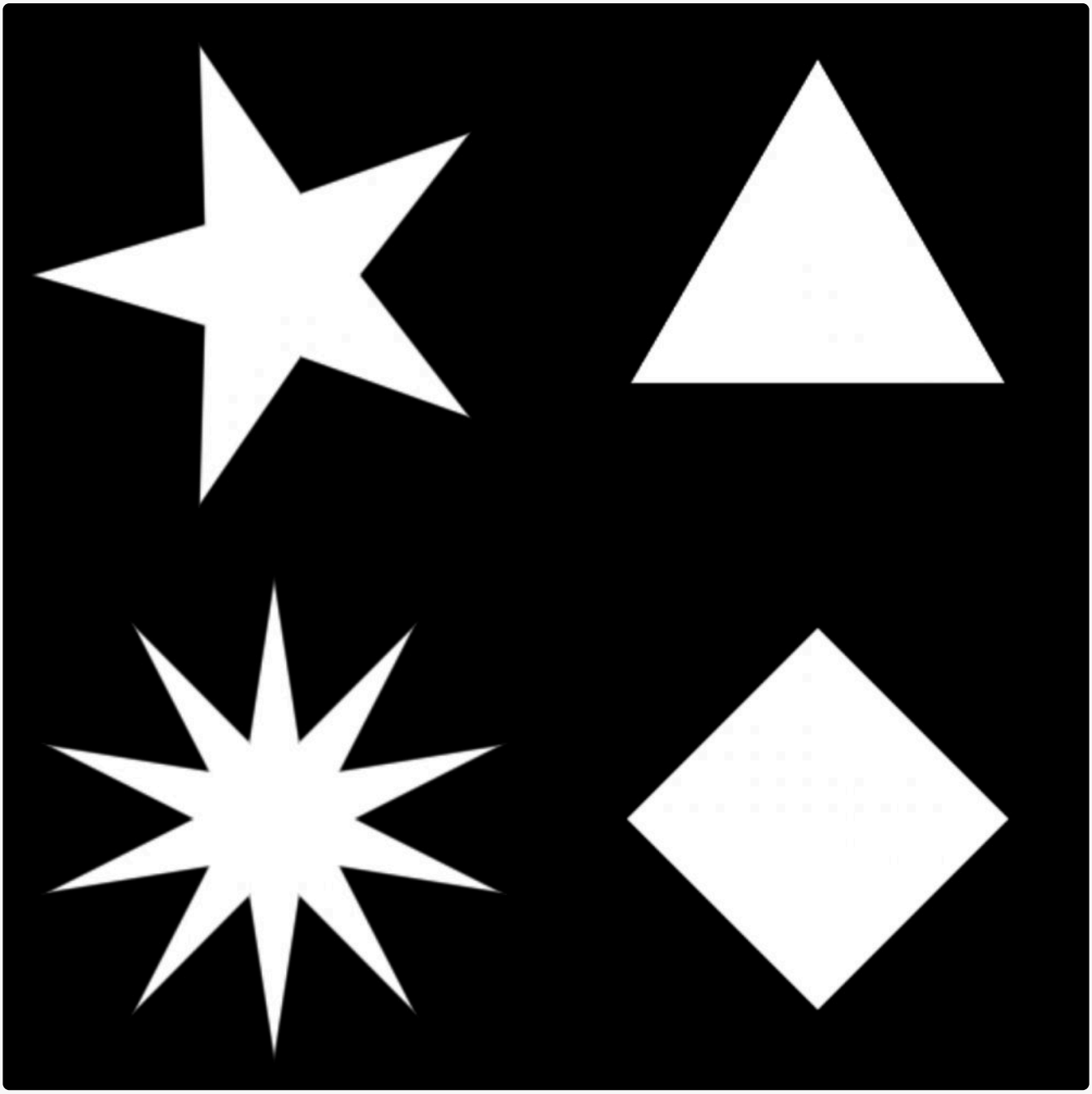
Tile Sheet

Method

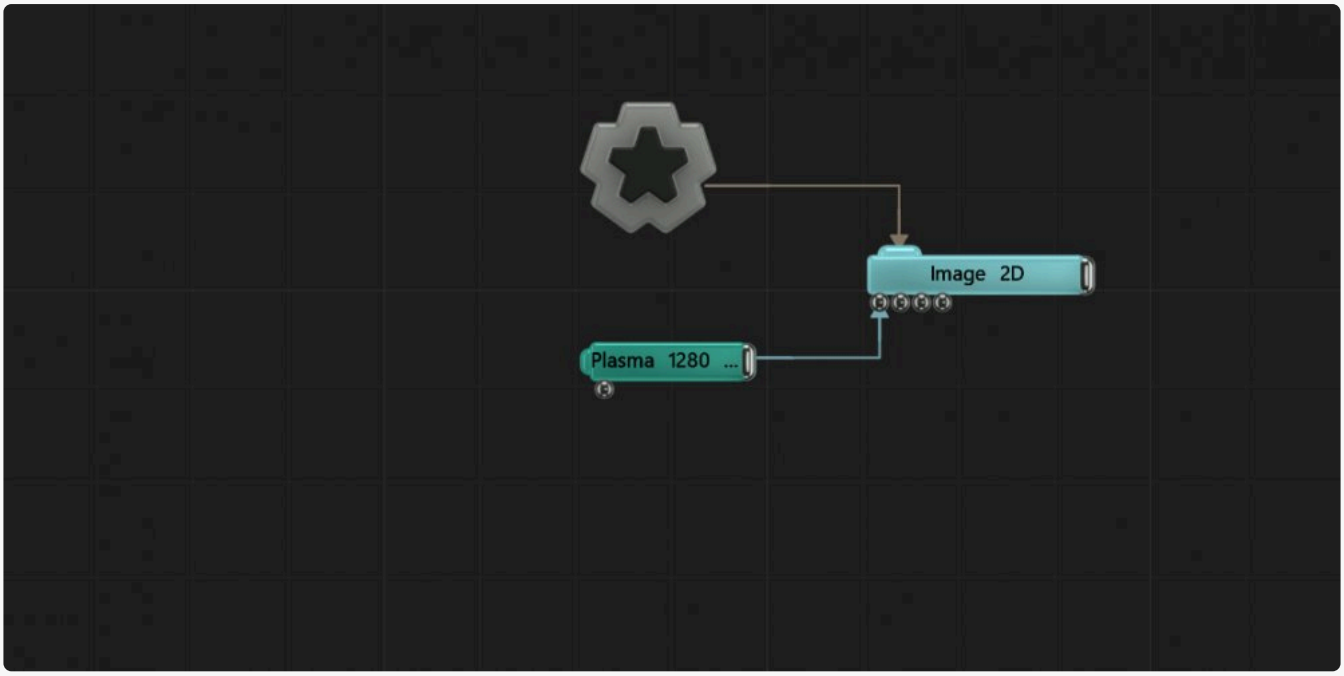
Generates a combined sheet of images (sometimes known as a sprite sheet) from multiple inputs.

The following example shows how to do this using Polygon generators, but any image node can be used as input. The number of connected input nodes is not limited.

Processed texture

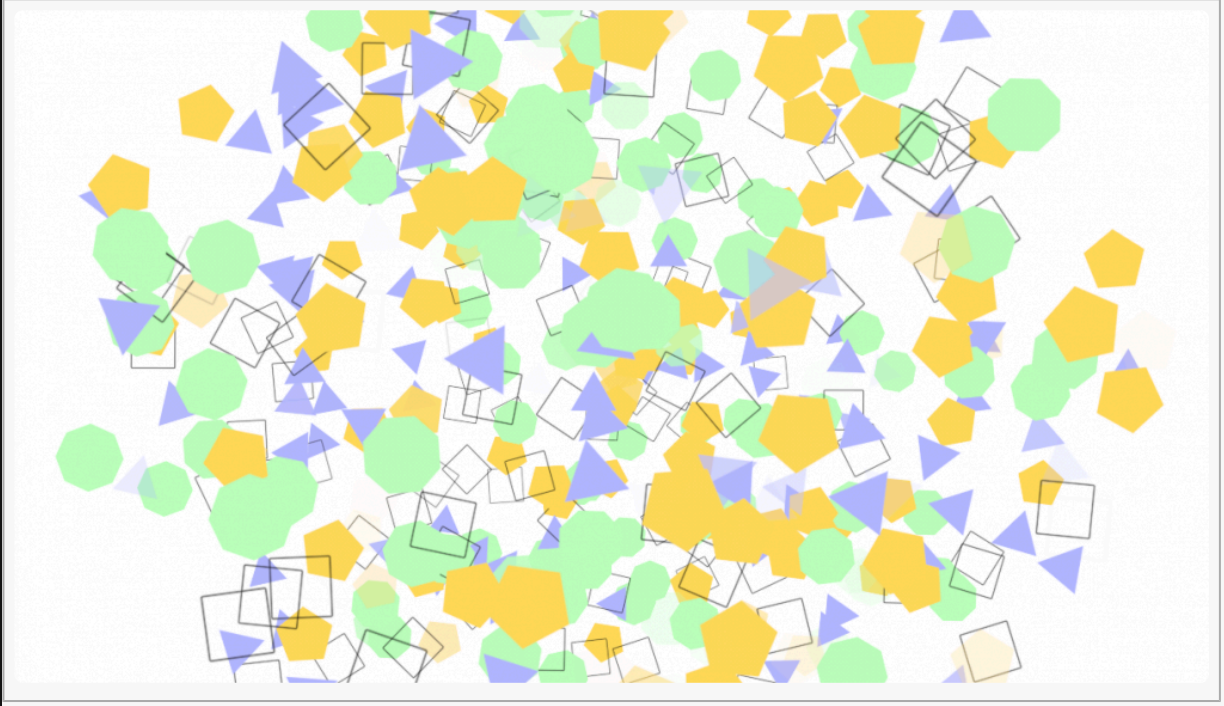


Example Nodegraph

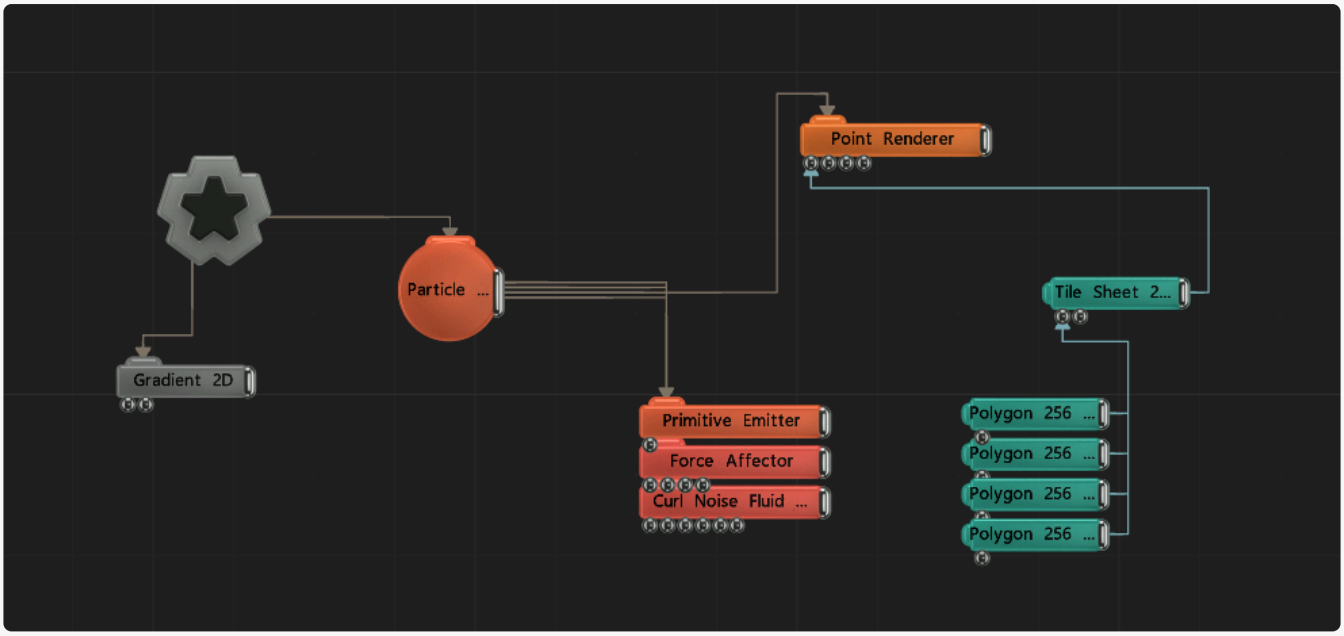


This can be used, for example, to set up a single particle system where each particle uses a randomly-selected image from a set. Note that the number of tiles in X and Y needs to be set on the Point Renderer manually.

Particles Example



Nodegraph Particles Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated separated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Num Tiles Mode	The method used to determine the arrangement of tiles. • Auto, Automatically determine the number of tiles in X and Y from the total number of input images • Use Num Tiles X Y, Uses the specified number of tiles in X and Y.
Num Tiles X	The number of tiles in X. This is ignored in auto mode.
Num Tiles Y	The number of tiles in Y. This is ignored in auto mode.
Tile Write Offset	An index offset for the tiles.
Clear Mode	The sheet clearing behaviour. Clearing less often can improve performance. • Every Frame • On Reset • Never
Border (Pixels)	The size of the border to add around each tile. This helps to avoid issues with filtering and interpolation at tile edges.
Tile Sorting	Control how the tile sheet should be sorted while being generated. • None, Unsorted. • Luminance, Sort the tiles by luminance.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Input

Tile Images	The individual images to combine in to one sheet.	Video Loader
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp

Outputs

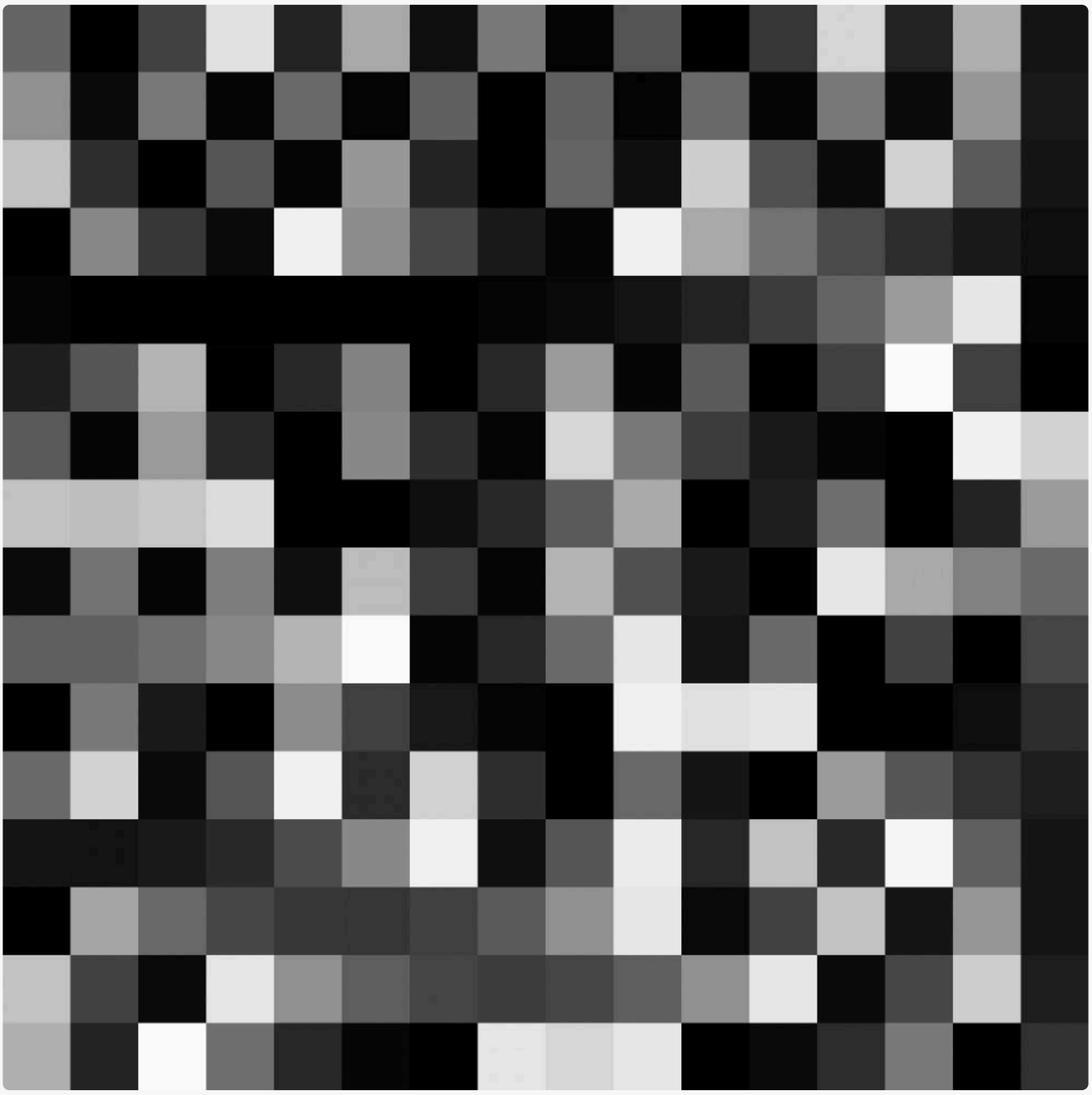
Can be connected to any node which requires an image input.

Tiles

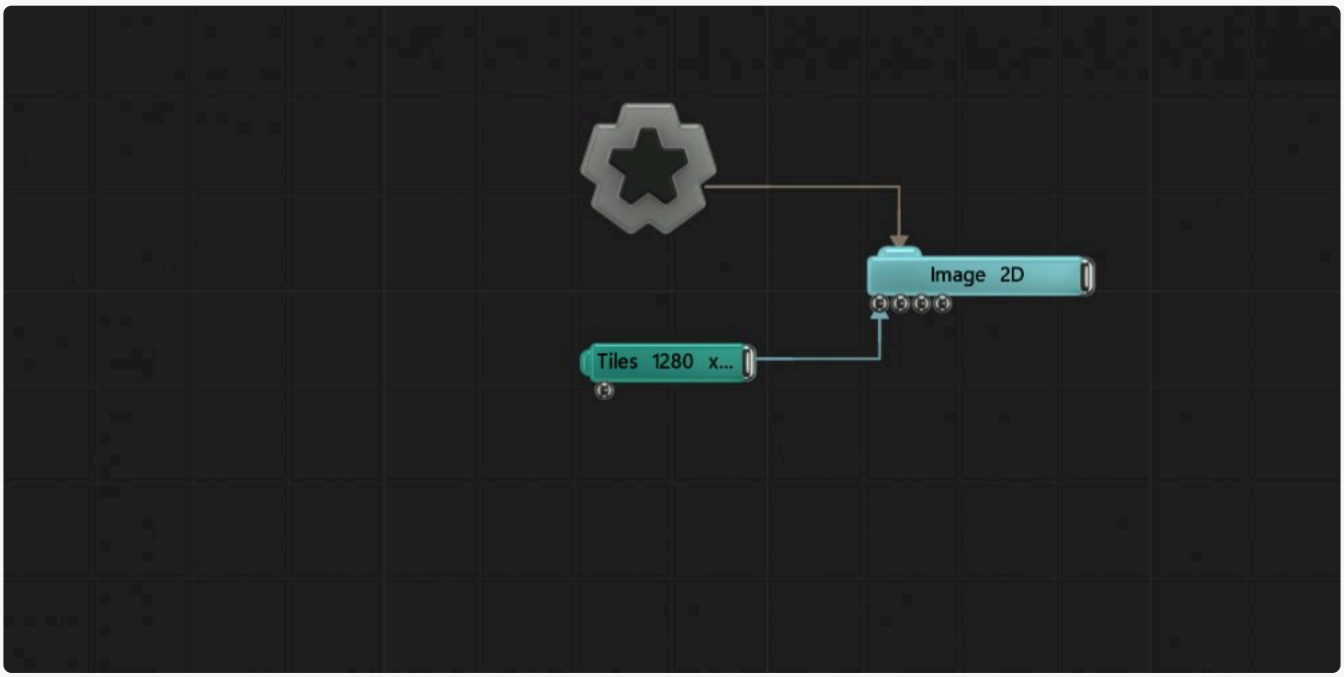
Method

Generates a grid of tiles that can be coloured randomly, or in a checkered pattern.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated separated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Use Num Tiles	Toggle whether the tiles are generated based on size, or based on numbers that fit into the viewport.
Tile Size X	Width of the tiles generated. Only functions with Use Num Tiles toggled off.
Tile Size Y	Height of the tiles generated. Only functions with Use Num Tiles toggled off.
Num Tile X	Number of tiles generated along the x axis. Only functions with Use Num Tiles toggled on.
Num Tile Y	Number of tiles generated along the Y axis. Only functions with Use Num Tiles toggled on.
Gap Width	Width of the gap between the tiles.
Tile Shading Mode	Change how the tiles are coloured. • Random, The colours for each tile are chosen randomly. • Chessboard, the tiles are coloured in a checkered pattern.
Animation Speed	How quickly the generator is animated through an input colour ramps palette.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.
Second Colour	Set a second colour for the generator to blend into.

Inputs

Name	Description	Typical Node Input

Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

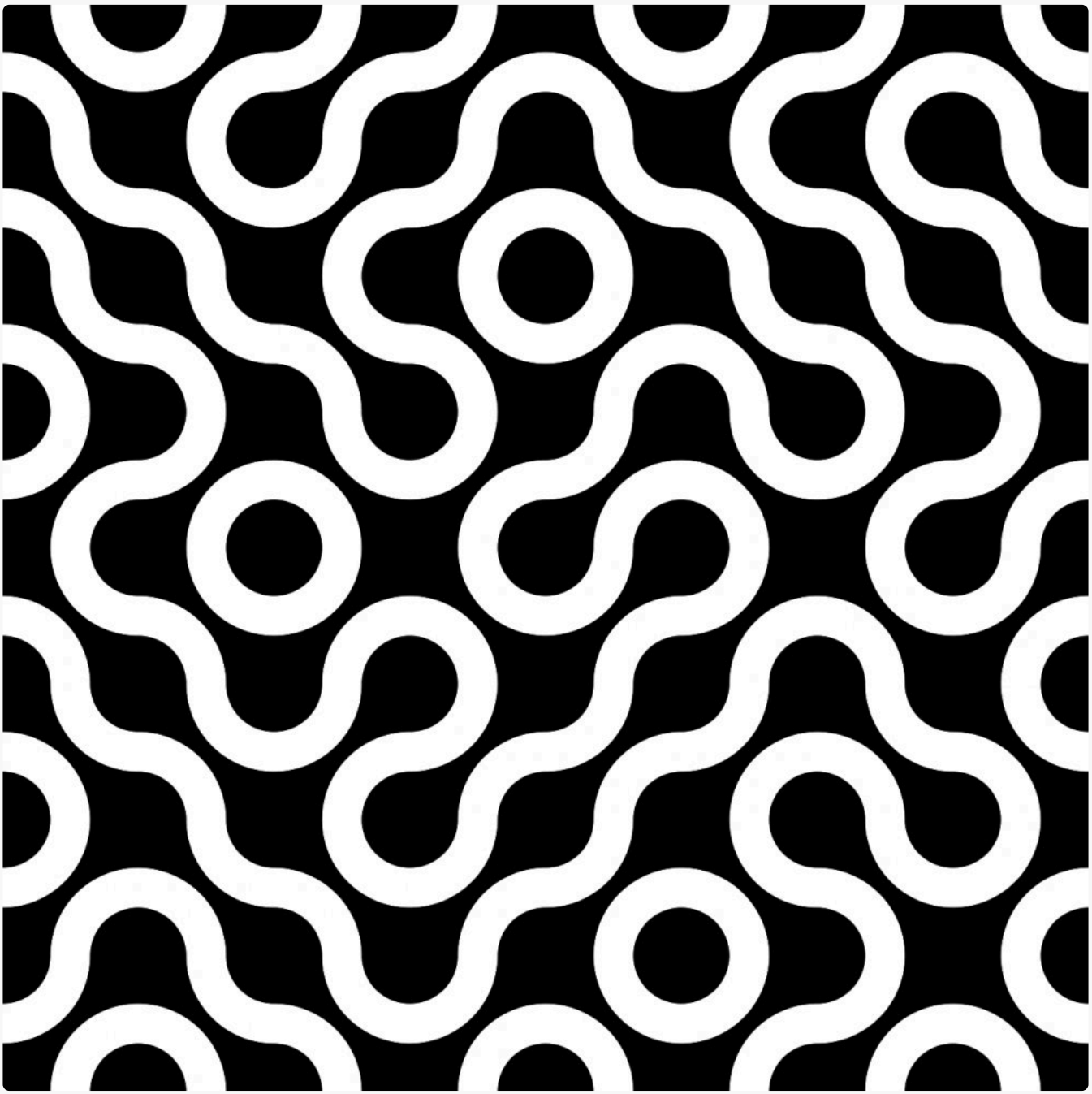
The outputs section for this node is currently being worked on.

Truchet

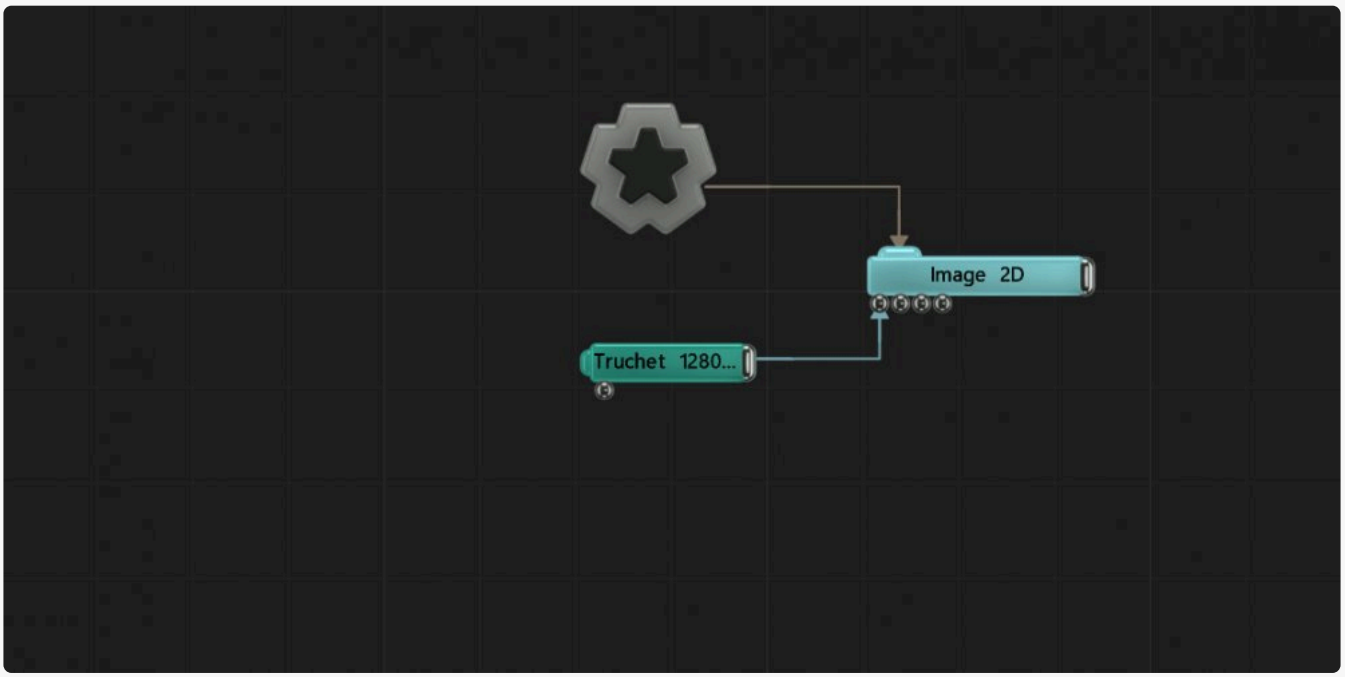
Method

This node generates a Truchet pattern.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Resolution	Determines how many cells are in the grid.
Thickness	Thickness of the lines generated by the Truchet.
Rounded	Generate with rounded corners.
Seed	Select a random seed to generate the truchet from.
Style	Select the style of truchet generated. • A, Uses a square grid of randomised shapes to generate the pattern. • B, Uses an array of octagons and connecting squares to generate generate pattern.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

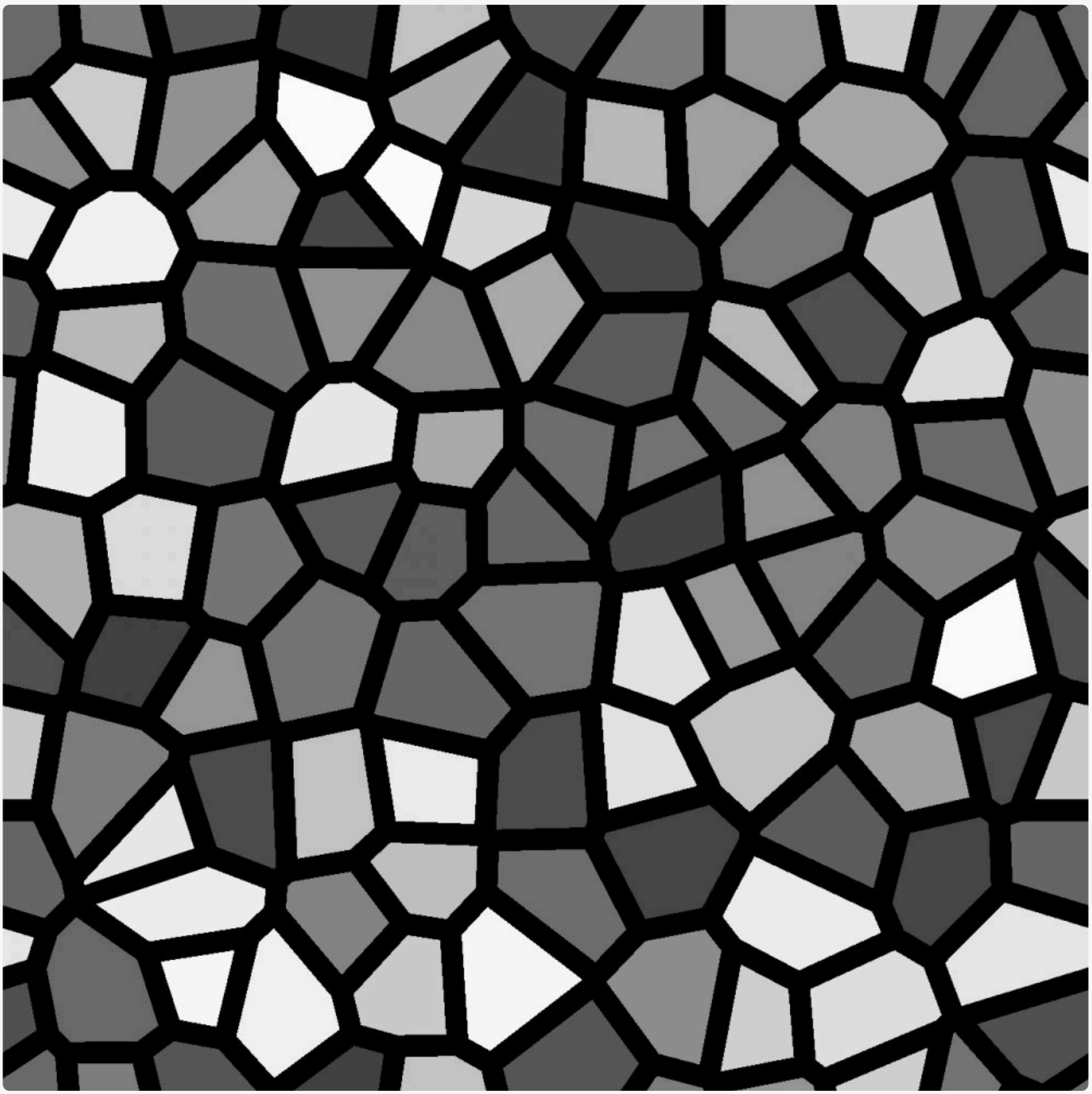
Can be connected to any node which requires an image input.

Voronoi

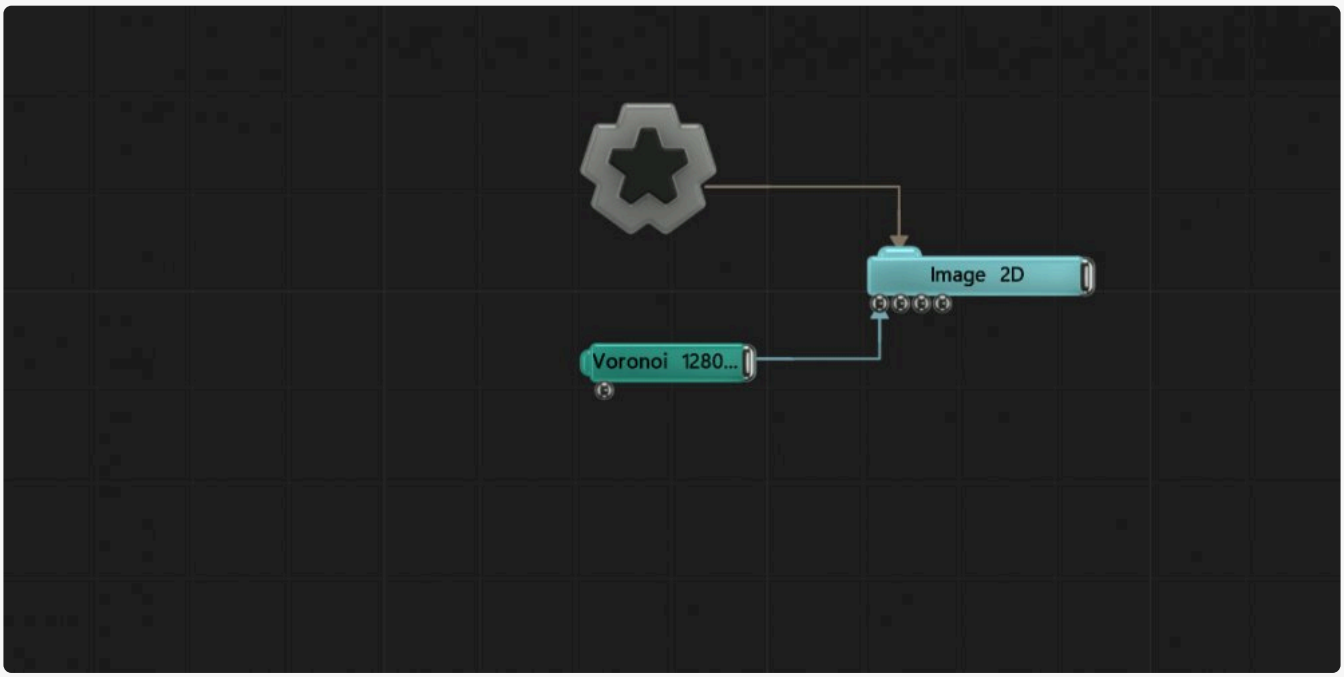
Method

This node generates a texture of a Voronoi pattern.

Processed texture



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Width	The resolution of the effect along its width.
Height	The resolution of the effect along its height.
Update Time Mode	Change how the effect is generated with respect to the scene's timecode. • Locked To Timecode, The effect is locked to the time code. • Running / Loopable, The effect is generated seperated to the timecode.
Static Image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Num Points X / Y / Z	Number of random points used to generate the voronoi pattern.
Edge Thickness	Thickness of the bordering edges between the voroni shapes.
Cell Luminance Variation	How much the luminance of each cell varies.
Seed	The random seed used for generating the voronoi points.

Rendering

Name	Description
Colour	Add a colour filter over the image.
Blend Amount	The amount the generator is blended with the output.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be connected to any node which requires an image input.

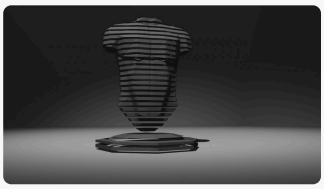
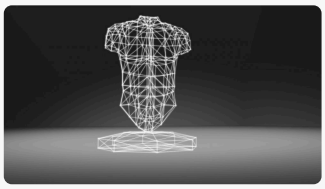
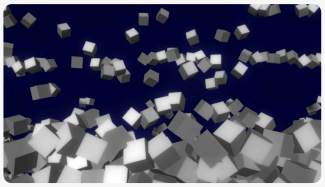
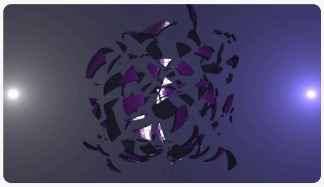
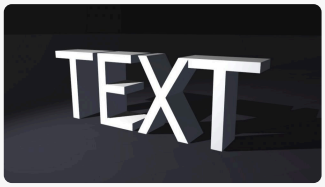
Geometry

Method

Geometry nodes all generate or are modified by geometry.

Geometry is generally hooked into the Root node, although they can be applied to any node – they will still appear in the scene as long as there is a path to a Root node; they will inherit the transformation values of parent nodes.

Gallery

			
3D Object	Slice Geometry	Image Plane	Line Renderer
			
Shape 3D	Shatter Primitive 3D	Skybox	Text

- Auto Bounding Box
- Bone
- Bounding Box
- Combine Geometry
- Decal
- Exposable Null
- Extruded Spline
- Face Tracking Geometry
- Geometry Exporter
- IK Chain
- Depth Camera / Kinect Mesh
- Kinect1 Skeleton
- Kinect2 Skeleton
- Imported 3D Scene
- Lines

- Mocap Stream
- Node Trail
- Null
- Perception Neuron Mocap Skeleton
- Spline
- Transform Array
- Tweening Null

3D Object

Method

This node renders a 3D object that has been imported from an external file in one of the supported 3D object file formats: Lightwave LWO, Wavefront OBJ, Cinema4D and FBX. As well as being rendered directly, 3D Object nodes may also be used as an input for various other nodes, including Particle Mesh Emitters, Field 3D Object Emitters, Clone To Mesh, Clone To Volume, Collision Affectors and numerous others.

The 3D Object resource must be set via the Object property. If no object is set the node will not render anything. Where the resource contains multiple meshes, for example, an FBX, LWO or Cinema4D file, the Layer Index parameter is used to select the mesh inside the scene. When a resource and mesh index are selected the properties for the materials that are used on that mesh are instantiated under the Materials property group, allowing each material's properties to be edited independently. Each material also has a corresponding input which allows Material nodes to be connected to them to set their parameters. See Materials for more information about material properties.

Deformers may be parented to Object nodes, causing the mesh to be deformed. The mesh may also be smoothed iteratively via the Smoothing Iterations parameter or subdivided iteratively via the Subdivision Levels parameter. Smoothing and subdivision are processed every frame alongside the deformers uniquely for each Object node, allowing multiple Object nodes to use the same underlying resource but process it independently. Smoothing and subdivision is interleaved with deformation so deformers may be applied to a certain subdivision level. Deformation results may also be smoothed temporally over multiple frames using the "Deformer Temporal Smoothing" parameter. Deformation and smoothing requires mesh normals to be regenerated for the new vertex positions. The Deformer Normal Mode parameter controls whether normals are completely smoothed or whether they obey existing breaks in normals due to smoothing groups. Subdivision, smoothing and deformation may have a noticeable memory and processing overhead.

GPU hardware tessellation is also supported via the Tessellation Enabled parameter. This causes the mesh to be subdivided at render time using the GPU hardware which does not incur a memory overhead and is also processed efficiently. Tessellation is adaptive based on distance from the camera, where the falloff is controlled via the Subdivision Distance parameter. This allows the mesh to become denser when close to the viewer. Tessellation is often useful in conjunction with displacement mapping, enabled by setting a displacement map on a material.

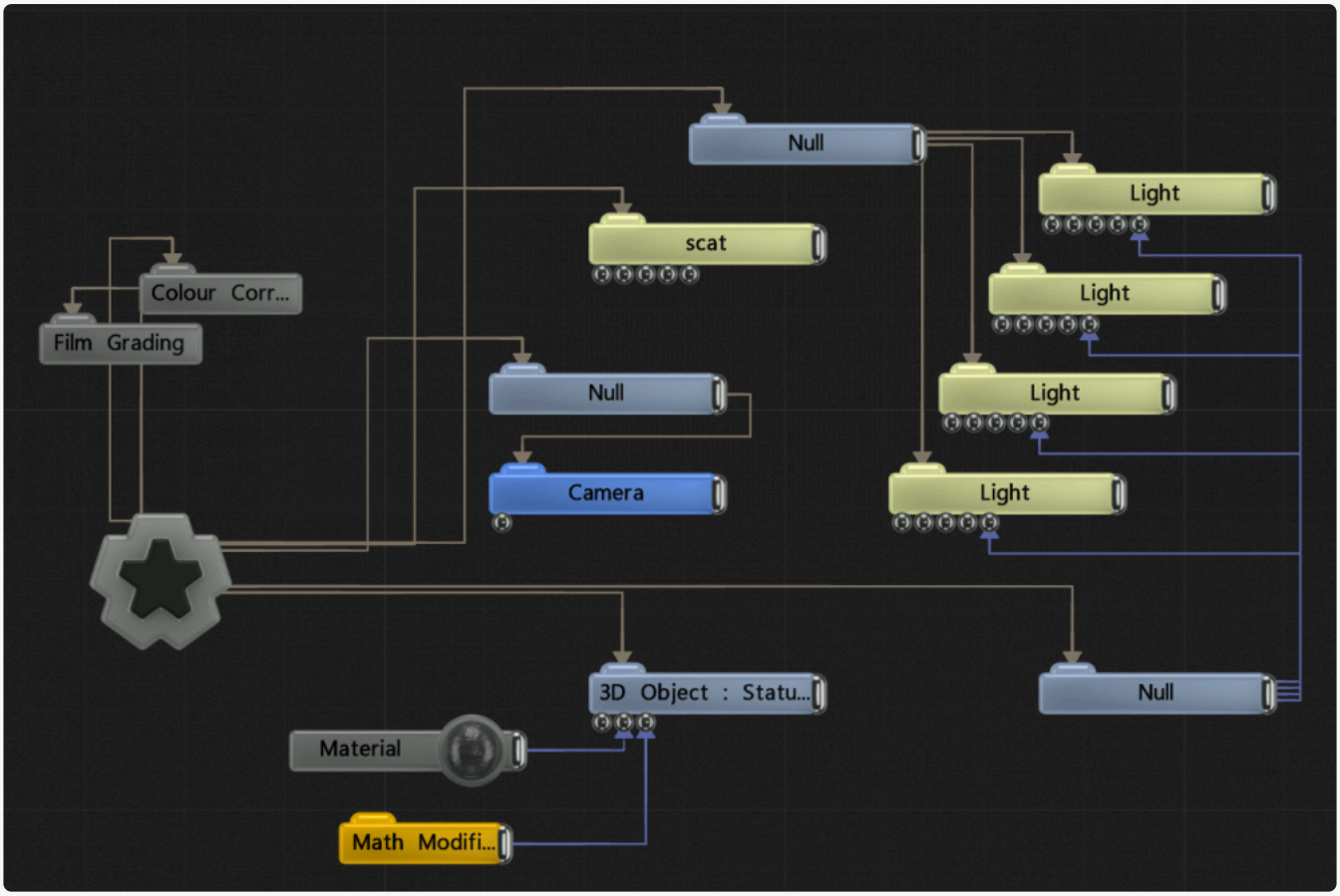
The 3D Object node supports the Lightwave Fertilizer plugin, which allows meshes to be grown outwards from a specified source point as defined by a suitably named weight map. The Fertilizer Value parameter controls the maximum extent of the visible grow value of the mesh, and the Fertilizer Back Value

controls the minimum visible grow value.

The 3D Object node may be used as a rigid body in a physics system via the Physics Attributes properties. It must be parented under a Rigid Body Root node for physics to be applied.

Example

Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Object	Select a 3D Object to be used.
Layer Index	Selects the layer from the 3D object resource to use for rendering.
Collision Layer Index	Selects the layer from the 3D object resource to use for collisions, if applicable.
Object Dissolve	Dissolves or disables the object from being rendered.
Visible	Control whether the node is visible or not to the scene.
Seen By Rays	Enable the mesh to be seen by the raytracer.
Fertilizer Value	Controls the Fertilizer plugin, used to grow vertices from specified source points.
Fertilizer Back Value	Controls the Fertilizer plugin, used to grow vertices from specified source points.
Motion Blur Velocity Scale	Scales velocity vectors when rendered to the motion vector pass for motion blur effects.
Lit	Toggle whether the object can be lit by scene lights.
Cast Shadows	Toggle whether the object can cast shadows.
Render Z Only	When enabled, the 3D object is only rendered to the depth buffer in the main camera render. No colour data is rendered.
Culling Enabled	When enabled, camera-based culling is disabled for the 3D object.
Render to Shadows Only	When enabled, the object is only rendered to shadow map passes, not to the main camera render.
Subdivision Levels	Causes the object's polygons to be subdivided by the number of levels specified. Subdivision may be done before, after or mixed in with deformation. Subdivision is done before rendering. Each level multiplies the number of polygons in the object by 4, which can greatly increase rendering time and memory overhead.
Smoothing Iterations	Causes the object's vertices to be smoothed by the number of levels specified. Smoothing is done before rendering.
Deformer Temporal Smoothing	Smooths the resulting vertex positions after deformation with previous frames.
Deformer Normal Mode	Choose whether the tessellation remains flat or tries to smooth the object.

Tessellation Enabled	Enables hardware tessellation, which subdivides the mesh efficiently at render time on the GPU. Tessellation does not consume memory resources and is more efficient than subdivision.
Max Tesselation Factor	The maximum tessellation factor for hardware tessellation. Controls the maximum number of polygons generated from each source polygon in the mesh.
Subdivision Near Distance	The near distance from the camera at which tessellation remains the tessellated mesh.
Subdivision Distance	The distance from the camera at which tessellation falls off to the original mesh polygons.
Lightmap Width	The width of the object's lightmap, if required.
Lightmap Height	The height of the object's lightmap, if required.
Reload Materials From LWO	Reload the material used from the original 3D object file.
Show Weightmap	Select which weightmap should be shown on the objects mesh. By default, none is shown.

UV Sets

Name	Description
Colour Texture UV Set	Change the UV set to use for the colour texture.
Diffuse Texture Set	Change the UV set to use for the diffuse texture.

Lines

Name	Description
Lines Visible	Control whether the node is visible or not to the scene.
Lines Alpha	Control the alpha value of the lines.
Colour	Control the colour value of the lines.
Use Vertex Colours	Colour lines based on the vertex colours of the geometry.
Blend Mode	Control how the lines blend with the rest of the scene.
Thick Lines	Use lines with thickness relative to their distance to the camera.
Hide Back Face Lines	Hides the lines around back faces of geometry.
Lock Width	Lock the line width to be consistent regardless of distance from the camera. Only

	functions with Thick Lines enabled.
Thick Line Width	Control the thickness of all the lines. Only functions with Thick Lines enabled.
Show Silhouette Lines	Draws lines along the edges of the object relative to the camera.
Show Normal Difference Lines	Draw a line along the edges of the mesh, depending on the angle difference between their mutual faces.
Show Unshared Lines	Draw lines along all edges of the shape.
Show Other Lines	Show all the lines for each edge of the Mesh.
Unshared Lines Weight	Greater control over the alpha of the unshared lines.
Silhouette Lines Weight	Greater control over the alpha of the silhouette lines.
Normal Difference Lines Weight	Greater control over the alpha of the normal difference lines.
Other Lines Weight	Greater control over the alpha of the other lines.
Line Normal Difference Angle	Change the threshold angle between two face normals that will generate a line along their common edge. Only functions with Show Normal Lines enabled.
Line Normal Fade Sharpness	How much the drawn normal lines will fade away the closer the edge angle is to the Line Normal Difference Angle.
Line Depth Bias	Exaggerate the width of the lines based on the distance to the camera. not functional with Lock Width enabled.
Line Silhouette Fade Sharpness	How much the drawn silhouette lines will fade away based on the size of the edge angle to the camera.

Point-Level Animation

Name	Description
Use Point-Level Animation	When enabled, PLA contained within the object file will be used to deform the mesh.
Point-Level Animation Blend Amount	How much to blend between the PLA and the meshes default position.
Point-Level Animation Speed	Modify the speed that the PLA should be run at.
Point-Level Animation Offset	Offset the beginning of the PLA,

UV Output

Name	Description

UV Scale X	Scale the object UV along the x axis.
UV Scale Y	Scale the object UV along the y axis.
UV Offset X	Move the object UV along the x axis.
UV Offset Y	Move the object UV along the y axis.

Physics Attributes

Name	Description
Friction	How much other rigid bodies will be able to slide along side this rigid body. When two rigid bodies of different frictions interact, the minimum value is used.
Bounciness	How much this rigid body will bounce off of other rigid bodies in the scene.
Density	The density of the rigid body. The density is scaled by the area of the shape to determine the mass of the body.
Spin X/Y/Z	The spin of the rigid body on the X/Y/Z axes. This scales the inertia tensor on the axes, making the body spin faster in that direction when torque is applied.
Dynamics Mode	The dynamics mode of the object • Static, A static rigid body does not move and can't be moved by physics. • Kinematic, A kinematic rigid body is not moved by physics but has a velocity that can affect dynamic bodies. • Dynamic, A dynamic rigid body has its initial position set by its transform, but transform control is taken over by physics as soon as the simulation starts. • Disabled, Physics will not be applied.
Dynamics Transform For Rendering Only (Faster)	If selected, the transform of the body is maintained on GPU only. This reduces latency and increases performance but means that parenting to the object, e.g. using it to transform lights will not work
Rigid Body Shape	The shape of the rigid body • Sphere, A sphere • Box, A box • Plane, A plane – can only be static or kinematic • 3D Object (Convex Hull), A convex hull derived from the geometry of the node • 3D Object (Use Original Geometry), The original triangle geometry of the node, if applicable.
Rigid Body Sphere Radius	The radius of the rigid body sphere shape if applicable
Rigid Body Box Size X	The size of the rigid body box shape if applicable
Rigid Body Box Size	The size of the rigid body box shape if applicable

Y	
Rigid Body Box Size Z	The size of the rigid body box shape if applicable
Rigid Body Convex Hull Mode	If the Convex Hull shape is used, determines the convex hull mode used – which will be wrapped around the node's geometry

Materials

See Materials.

Inputs

"Default Material" won't always appear under this name, as it will always take the name of the imported object's material.

Name	Description	Typical Node Input
Skeleton Root	Input the root bone of a skeleton system to deform the mesh. The object must have weight maps imported with it, or headaches will ensue.	Bone
Default Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Auto Bounding Box

Method

This node generates a bounding box based on the combined size of nodes input into the nodes Bounds Nodes input.

Inputs

Name	Description	Typical Node Input
Bounds Nodes	Input nodes from which a combined bounding box will be generated.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs a bounding box which can be input into many other nodes which require it to function.

Bone

Method

This node is used for skeletal deformation of 3D Objects. Bones/skeletons apply transformations to vertices in a 3D object. Transforms are applied hierarchically and different bones in the skeleton may affect vertices by different amounts, which allows for complex structures such as humanoids to be animated.

Skeleton / bone rigs are typically authored in other 3D packages and imported into Notch as part of an Imported 3D Scene such as an FBX or Lightwave LWS file, whereby Bone nodes are automatically generated as child nodes of the Imported 3D Scene node for each bone in the 3D scene. However Bone nodes may also be created manually. Bones must be parented directly or indirectly to a 3D Object node, and only affect the 3D Object node(s) they are parented to.

Each bone defines a Rest Pose transform. The Rest Pose is the transform of the bone in the initial default pose. This pose is usually based on the 3D object the bones are attached to – e.g. humanoid characters are typically initialised in a T pose. In the rest pose, no deformation takes place.

A bone generates a weighting per vertex which decides how much its transform is applied to that vertex. Bones are typically linked to Weight Maps – also known as Skin Weight Sets in some 3D packages. A weight map stores a value between 0 and 1 for each vertex in a 3D object which defines how much the bone should influence that vertex, and must be pre-authored in the 3D package and exported with the 3D object. The Weightmap to use for the bone is defined by the Weightmap Name property and is matched by name. Bones may also generate their weighting per vertex using a calculation based on the distance from the bone in its rest position to the vertex.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.

Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Active	Control whether the bone is active or not.
Weightmap Name	Name of the skin weight map on the parent 3D object that is used to weight the effect of the bone's deformation.
Weightmap Only	When checked, the weight map weight will be used directly; when unchecked it will be multiplied with the calculated falloff weight.
Bone Strength	Scales the falloff weight.
Rest Position X	The X component of the initial / rest position of the bone.
Rest Position Y	The Y component of the initial / rest position of the bone.
Rest Position Z	The Z component of the initial / rest position of the bone.
Rest Heading	The heading component of the initial / rest rotation of the bone.
Rest Pitch	The pitch component of the initial / rest rotation of the bone.
Rest Bank	The bank component of the initial / rest rotation of the bone.
Rest Length	The length of the bone in its rest pose.

Limits

Name	Description
Heading Limits	Limit on the rotation heading when used as part of an IK rig.
Pitch Limits	Limit on the rotation pitch when used as part of an IK rig.
Bank Limits	Limit on the rotation bank when used as part of an IK rig.

Inputs

Name	Description	Typical Node Input

World Rotation Center	Use another nodes rotation to control the bones rotation in place.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Notes

Use in conjunction with an IK Chain.

Bounding Box

Method

This node is a Null transform node that renders a unit sized (-1 to 1) box. Often used to mark areas of space, such as bounding regions for fluids or volumetric effects.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs a bounding box which can be input into many other nodes which require it to function.

Combine Geometry

Method

Combine multiple sources of geometry into one to be used or affected by other nodes.

Rendering

Name	Description
Visible	Control whether the node is visible or not to the scene.

Lines

Name	Description
Lines Visible	Control whether the node is visible or not to the scene.
Lines Alpha	Control the alpha value of the lines.
Colour	Control the colour value of the lines.
Use Vertex Colours	Colour lines based on the vertex colours of the geometry.
Blend Mode	Control how the lines blend with the rest of the scene.
Thick Lines	Use lines with thickness relative to their distance to the camera.
Hide Back Face Lines	Hides the lines around back faces of geometry.
Lock Width	Lock the line width to be consistent regardless of distance from the camera. Only functions with Thick Lines enabled.
Thick Line Width	Control the thickness of all the lines. Only functions with Thick Lines enabled.
Show Silhouette Lines	Draws lines along the edges of the object relative to the camera.
Show Normal Difference Lines	Draw a line along the edges of the mesh, depending on the angle difference between their mutual faces.
Show Unshared Lines	Draw lines along all edges of the shape.
Show Other Lines	Show all the lines for each edge of the Mesh.
Unshared Lines Weight	Greater control over the alpha of the unshared lines.
Silhouette Lines Weight	Greater control over the alpha of the silhouette lines.

Normal Difference Lines Weight	Greater control over the alpha of the normal difference lines.
Other Lines Weight	Greater control over the alpha of the other lines.
Line Normal Difference Angle	Change the threshold angle between two face normals that will generate a line along their common edge. Only functions with Show Normal Lines enabled.
Line Normal Fade Sharpness	How much the drawn normal lines will fade away the closer the edge angle is to the Line Normal Difference Angle.
Line Depth Bias	Exaggerate the width of the lines based on the distance to the camera. not functional with Lock Width enabled.
Line Silhouette Fade Sharpness	How much the drawn silhouette lines will fade away based on the size of the edge angle to the camera.

Materials

See Materials.

Inputs

Name	Description	Typical Node Input
Geometry Sources	Sources of geometry to be combined into a single object.	Shape 3D
Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Convex Hull

Method

Generates a containing mesh based on an input object. The mode can control how accurate the generated outer mesh is.

Attributes

Name	Description
Mode	Determines how convex hull mode generates the wrapped hull around the input geometry.

Rendering

Name	Description
Visible	Control whether the node is visible or not to the scene.
Seen By Rays	Enable the mesh to be seen by the raytracer.

Lines

Name	Description
Lines Visible	Control whether the node is visible or not to the scene.
Lines Alpha	Control the alpha value of the lines.
Colour	Control the colour value of the lines.
Use Vertex Colours	Colour lines based on the vertex colours of the geometry.
Blend Mode	Control how the lines blend with the rest of the scene.
Thick Lines	Use lines with thickness relative to their distance to the camera.
Hide Back Face Lines	Hides the lines around back faces of geometry.
Lock Width	Lock the line width to be consistent regardless of distance from the camera. Only functions with Thick Lines enabled.
Thick Line Width	Control the thickness of all the lines. Only functions with Thick Lines enabled.
Show Silhouette Lines	Draws lines along the edges of the object relative to the camera.
Show Normal	Draw a line along the edges of the mesh, depending on the angle difference between

Difference Lines	their mutual faces.
Show Unshared Lines	Draw lines along all edges of the shape.
Show Other Lines	Show all the lines for each edge of the Mesh.
Unshared Lines Weight	Greater control over the alpha of the unshared lines.
Silhouette Lines Weight	Greater control over the alpha of the silhouette lines.
Normal Difference Lines Weight	Greater control over the alpha of the normal difference lines.
Other Lines Weight	Greater control over the alpha of the other lines.
Line Normal Difference Angle	Change the threshold angle between two face normals that will generate a line along their common edge. Only functions with Show Normal Lines enabled.
Line Normal Fade Sharpness	How much the drawn normal lines will fade away the closer the edge angle is to the Line Normal Difference Angle.
Line Depth Bias	Exaggerate the width of the lines based on the distance to the camera. not functional with Lock Width enabled.
Line Silhouette Fade Sharpness	How much the drawn silhouette lines will fade away based on the size of the edge angle to the camera.

Materials

See Materials.

Inputs

“Default Material” won’t always appear under this name, as it will always take the name of the imported object’s material.

Name	Description	Typical Node Input
Geometry Source	Add a geometry source to generate the convex shape from.	3D Object
Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

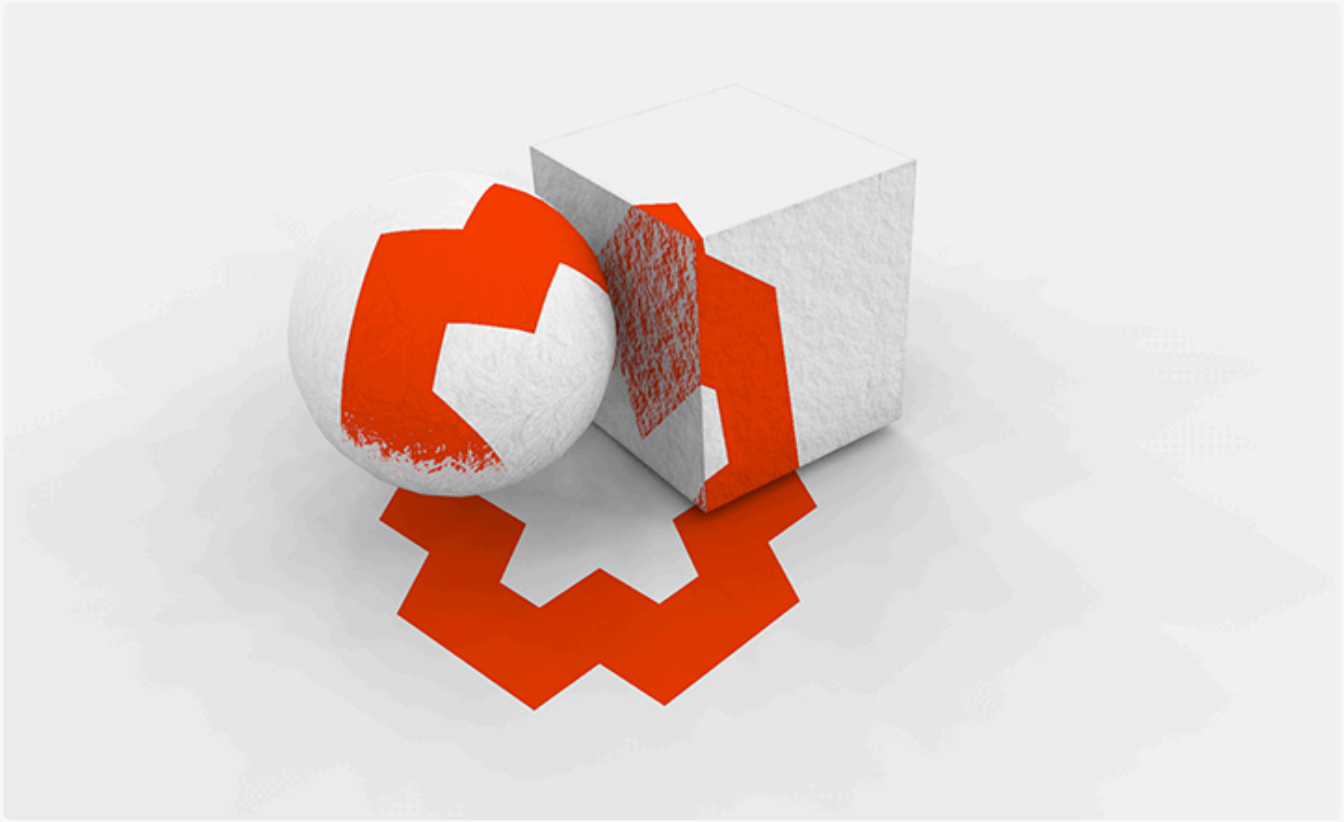
This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Decal

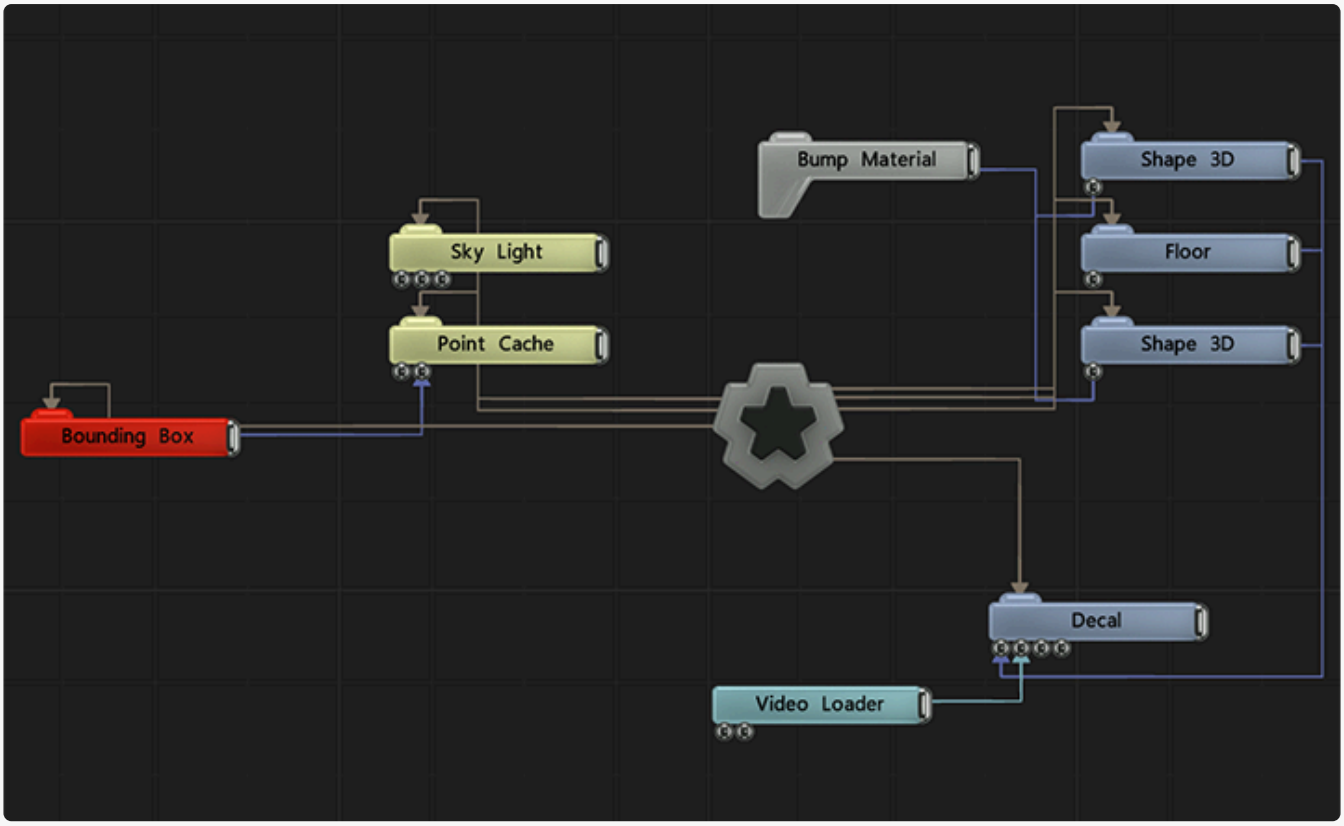
Method

Use the decal node to project a texture onto surfaces.

Notch logo decal



Decal nodegraph



Sample

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Attributes

Name	Description

Mapping type	Sets the mapping type for the decal
Original UV's	uses the shapes UVs
Colour	Adds colour to the texture
Blend Amount	Sets the blend of the texture
Normal Falloff	Sets the falloff of the texture
Texture Filter Mode	Toggles between Point, Bilinear and Anisotropic
Texture Wrap Mode U	Toggles between Repeat, clamped and Border with black
Texture Wrap Mode V	Toggles between Repeat, clamped and Border with black

UV Transform

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.

Falloff

Name	Description
Falloff Enabled	toggles off and on
Falloff Shape	Sets the shape of the falloff.
Falloff Range	Sets the range of the falloff
Falloff Inner Range	Sets the inner range of the falloff
Falloff Curve Power	Sets the power of the falloff
Invert Falloff	toggles off and on inverting the falloff
Falloff Curve	Sets the fall of curve

Inputs

Name	Description	Typical Node Input
Affected Objects	Select which objects should be affected by the decal.	3D Object
Image	Image to apply to the object.	Video Loader
Mapping	Add a mapping node to control how the mapping affects the shape.	Mapping

Falloff Node	Use an input node to control the falloff of the Decal	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

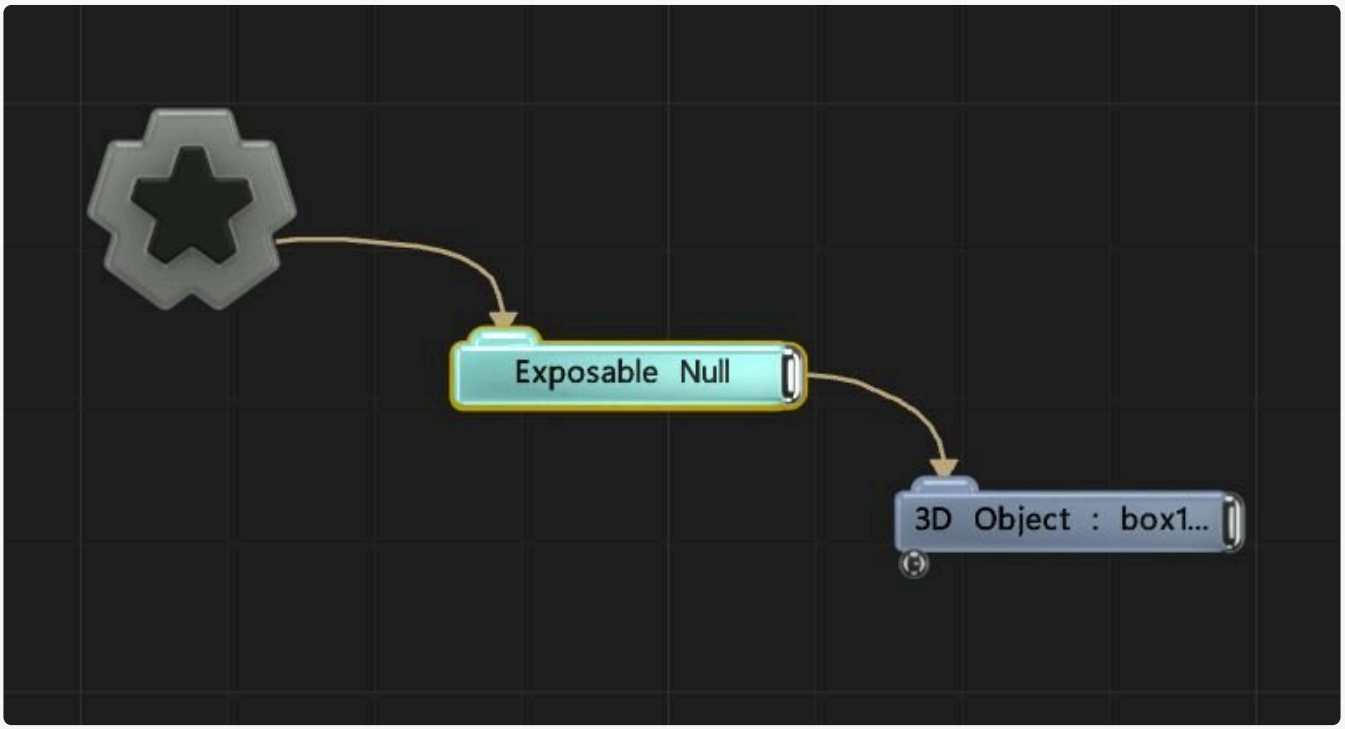
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Exposable Null

Method

This node allows supported media servers to have simplified 6DOF control of a Null. This is useful for managing objects which are tracked by stage automation or spatial tracking systems (e.g. Blacktrax, Optitrack).

When the *Exposable Position Rotation* attribute is exposed, it is recognised by the media server as a controllable Null and it provides higher level controls. Generally, you would parent objects, emitters etc to the *Exposable Null*.

Example


Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.

Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Attributes

Name	Description
Flip Z Axis	Flip the Z axis of the values passed by the media server
Exposable Position Rotation	You must expose this value for the media server to be able to control the *Exposable Null*

> ! Note: All transforms are overwritten by the host media server. If you need to transform the incoming values, use a parent/child Null with the *Exposable Null* depending on the transform order you want.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Extruded Spline

Method

This node extrudes n-gon shapes along a spline. The spline used to generate the shape must be connected via the Spline Sources input.

Attributes

Name	Description
Visible	Control whether the node is visible or not to the scene.
Seen By Rays	Enable the mesh to be seen by the raytracer.
Radius	The radius of the shape to be extruded along the spline.
Num Radial Segments	How many sides the extruded shape will have.
Num Spline Segments	How many sections the extruded shape is broken up into when following the spline.
Use Spline Colours	use the colours from the input sspline to
Max Visible Age	The maximum length the extruded geometry can get to as a function of age. Only functions with a Node Trail input.
Fade Front Duration	How long the front edge fades for as a percentage of the whole spline.
Fade Back Duration	How long the back edge fades for as a percentage of the whole spline.
Fade Alpha	Fade the alpha values of the generates spline along its length using Fade Front and Back Duration. Requires an alpha supporting blend mode.
Fade Scale	Scale the radial size of the spline using the Fade Front and Back Duration.
Draw Triangles	Toggle whether the mesh faces are drawn.

Lines

Name	Description
Lines Visible	Control whether the node is visible or not to the scene.
Lines Alpha	Control the alpha value of the lines.
Colour	Control the colour value of the lines.

Use Vertex Colours	Colour lines based on the vertex colours of the geometry.
Blend Mode	Control how the lines blend with the rest of the scene.
Thick Lines	Use lines with thickness relative to their distance to the camera.
Hide Back Face Lines	Hides the lines around back faces of geometry.
Lock Width	Lock the line width to be consistent regardless of distance from the camera. Only functions with Thick Lines enabled.
Thick Line Width	Control the thickness of all the lines. Only functions with Thick Lines enabled.
Show Silhouette Lines	Draws lines along the edges of the object relative to the camera.
Show Normal Difference Lines	Draw a line along the edges of the mesh, depending on the angle difference between their mutual faces.
Show Unshared Lines	Draw lines along all edges of the shape.
Show Other Lines	Show all the lines for each edge of the Mesh.
Unshared Lines Weight	Greater control over the alpha of the unshared lines.
Silhouette Lines Weight	Greater control over the alpha of the silhouette lines.
Normal Difference Lines Weight	Greater control over the alpha of the normal difference lines.
Other Lines Weight	Greater control over the alpha of the other lines.
Line Normal Difference Angle	Change the threshold angle between two face normals that will generate a line along their common edge. Only functions with Show Normal Lines enabled.
Line Normal Fade Sharpness	How much the drawn normal lines will fade away the closer the edge angle is to the Line Normal Difference Angle.
Line Depth Bias	Exaggerate the width of the lines based on the distance to the camera. not functional with Lock Width enabled.
Line Silhouette Fade Sharpness	How much the drawn silhouette lines will fade away based on the size of the edge angle to the camera.

Materials

See Materials.

Inputs

Name	Description	Typical Node Input
Spline Sources	Spline nodes used to draw the extrusion along.	Spline
Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Face Tracking Geometry

Method

This node generates a 2D mesh using the predefined structure of the geometry generated by the Face Tracker node: 68 vertices linked as triangles with texture coordinates. It takes as input a Face Tracker node, which is required for the node to render anything. When a Face Tracker node is linked the geometry is updated automatically each frame as long as the tracker has found and tracked a face.

The Face Tracking Geometry node allows the geometry produced by the face tracker to be rendered in different ways or multiple times easily with low overhead: the face tracking process is only done once using the Face Tracker. The Face Tracking Geometry node can also be used as input to other nodes which use geometry as part of processing, such as Particle Mesh Emitter, Clone to Mesh, Combine Geometry.

For more information on face tracking see the Face Tracker node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Rendering

Name	Description

Show Lines	Show lines across the edges of the polygons.
Show Polygons	Show the polygons of the mesh.
Line Colour	Change the colour value of the lines.
Visible	Control whether the node is visible or not to the scene.

Materials

See Materials.

Inputs

Name	Description	Typical Node Input
Face Tracker Source	Input a node with facial tracking data to drive the effect.	Face Tracker
Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Geometry Exporter

Method

The Geometry Exporter node allows sequences, or single frames, of geometry to be exported as OBJs or Alembic(ABC) files. The source object should be attached to the Geometry input of the Geometry Exporter node. All types of geometry source can be exported.
The node is analogous to a Video Exporter node: it only executes when video export is running, not during regular real-time execution. Therefore to use it either use File -> Export Video or add the layer to the Render Queue.
The frame rate of the export, if animated, is taken from the frame rate of the video export. Multiple Geometry Exporter nodes can be executed from within a single layer at once.

To export multiple pieces of geometry in a single OBJ or Alembic (ABC) file, first, combine them into one using a Combine Geometry node and then link that to the Geometry Exporter.

Attributes

Name	Description
Bake Now..	Opens a dialog enabling the bake properties to be edited.
Export Properties	Opens a dialog enabling the export properties to be edited.
Filename	The base path and filename of the OBJ/ABC sequence to be saved.
Export Animation Sequence	Exports an OBJ/ABC per frame if enabled, or a single OBJ/ABC for the first frame if disabled.

Inputs

Name	Description	Typical Node Input
Geometry	The geometry source to be exported.	3D Objects, Procedural Meshes, Kinect Meshes

Outputs

There are no outputs from this node.

Geometry Network Receiver

Method

This node is in private beta, and requires a lot of technical setup. Please get in contact with us first if you wish to use it, at support@notch.one.

Geometry Network Sender

Method

This node is in private beta, and requires a lot of technical setup. Please get in contact with us first if you wish to use it, at support@notch.one.

IK Chain

Method

This node is used to link several Bones into an inverse kinematics solver chain which rotates the bones in order to reach a given target point in world space.

The first bone in the chain – the one which is closest to the root of the skeleton – must be linked to the Chain Start input and the last bone in the chain must be linked to the Chain End input. There must be a direct path between the first and last bones in the skeleton's hierarchy.

The goal location is defined by linking a Null to the End Goal input.

Inputs

Name	Description	Typical Node Input
Chain Start	The first bone in the IK system.	Bone
Chain End	The last bone in the IK system.	Bone
End Goal	The control point for the IK system. When this point is moved, the bones will rotate to best meet that point.	Null

Outputs

The outputs section for this node is currently being worked on.

Image Plane

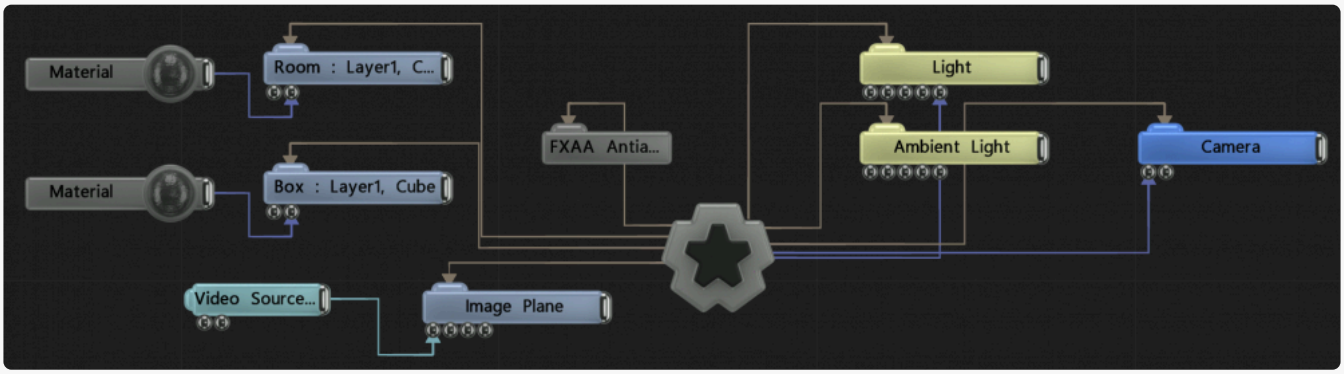
Method

This node is used to render an image or video on a plane in 3D space. The image may be set directly via the Image parameter or linked via the Video Node input.

Image Plane nodes have similar rendering options to other geometry nodes such as 3D Objects or Shape 3D nodes.

Example

Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Image	Select an image to be displayed on the image plane.
Normal Map	Select a normal map to change how light affects the image plane.
Colour	Add a colour filter over the image.
Aspect-Based Scaling Mode	Scale the plane by the aspect ratio of the selected image. • Disabled, The plane won't scale to fit the image. • Scale X, The image is scaled along the X axis to fit the image. • Scale Y, The Image is scaled along the Y axis to fit the image. • Larger, Whichever is larger of scale X or Y is chosen. • Smaller, Whichever is smaller of scale X or Y is chosen.
Blend Mode	Choose how the image blends into the scene. • Opaque, the image is solid with alpha values set to black. • Alpha To Coverage, the alpha values are used to mask out the image. • Alpha Blend, the image alpha values are blended at the edges.
Blend Function	Choose how the blend mode functions. See Blend Modes for more.
Normal Map Mode	If a normal map is input, control how it is used in the scene. • Disabled, Even if a normal map is selected in the node, it won't be used on the image plane.

	• Normal Mapping, the normal map is used to change how light affects the surface of the plane. • Parallax Mapping, the pixels of the image are given height values, which when viewed at an angle gives a 3D effect; cannot occlude itself. • Parallax Occlusion Mapping, the pixels of the image are given height values, which when viewed at an angle gives a 3D effect; can occlude itself.
Casts Shadows	Toggle whether the object can cast shadows.
Lit	Toggle whether the object can be lit by scene lights.
Frame	If the image is animated, choose which frame is displayed.
Alpha	Control the alpha value of the image.
Metallicness	Change how metallic the object looks.
Luminosity	Change the brightness of the image.
Specularity	How much specular light is reflected from the object.
Roughness	How rough the surface of the material is.
Displacement	The strength of the displacement from the normal map.
UV Offset X	Move the object UV along the x axis.
UV Offset Y	Move the object UV along the y axis.
UV Scale X	Scale the object UV along the x axis.
UV Scale Y	Scale the object UV along the y axis.
Alpha Sort Bias	Biases the alpha sort in order to make it render in front or behind other transparent objects.

Video

Name	Description
Frame Offset	Offset the start frame.
Frame Rate	Control the frame rate of the video.
Loop End Frame	Choose when the video stops looping.

Texture Animation

Name	Description
Is Texture Animation Page	Toggle whether the input image should be treated as an animation page containing multiple frames of an animation.
Num Frames X	The number of animation frames in the X axis contained in the image.
Num Frames Y	The number of animation frames in the Y axis contained in the image.

Crop

Name	Description
Crop Enabled	Enable the image to be cropped.
Crop Left	How much of the image is cropped from the left.
Crop Right	How much of the image is cropped from the right.
Crop Top	How much of the image is cropped from the bottom.
Crop Bottom	How much of the image is cropped from the top.

Inputs

Name	Description	Typical Node Input
Video Node	Add a video to be shown on the image plane.	Video Loader
Alpha Image	Use an image to control the alpha values of the image plane.	Video Loader
UV Remap Image	Use an image to remap the UV of the image plane.	Image Plane
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Depth Camera / Kinect Mesh

Method

This node generates a mesh based on Kinect camera data from a Depth Camera / Kinect Source connected via the “Colour Image Node” input. If no source is connected, this node is ineffective. The mesh is based on a subdivided plane of quads, displaced by the depth values from the Kinect and projected back from the camera. Polygons with depths that fall outside the clip planes set on the Kinect Source node are clipped out. Where neighbouring points in the depth image differ greatly in depth large quads with long edges may be created, which may be undesirable. This can be limited using the Max Edge Length parameter. The resolution of the generated mesh may be reduced using the Mesh Resolution Scale parameter.

The generated mesh may be processed by Kinect Mesh Modifier nodes or Defomer nodes. It may also be used as an input to Particle Mesh Emitters or Field 3D Object Emitters.

The mesh may be rendered as transparent or opaque polygons, lines or points – or all three.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Point Texture	Choose an image texture to be placed at the position of each tracked point.
Visible	Control whether the node is visible or not to the scene.
Max Cameras Active	Maximum number of Kinect camera's active
Mesh Resolution Scale	Scales the resolution of the generated mesh – defines the number of pixels in the source image per polygon in the mesh.
Pivot Distance	How far the mesh is generated from the pivot.
Max Edge Length	Max distance between two neighbouring points in the depth image that will be joined together into a polygon.
Vertex Randomisation	How much randomness is added to the positions of each vertex.
Alpha	Controls the alpha transparency value for rendering the polygons of the mesh. If this is set to 0, the polygons will not be rendered. If it is set to 1, the mesh will be rendered as opaque and may be lit.
Line Alpha	Controls the alpha transparency value for rendering the edges of the mesh as lines. If this is set to 0 the lines will not be rendered.
Point Alpha	Controls the alpha transparency value for rendering the vertices of the mesh as points. If this is set to 0 the points will not be rendered.
Point Size	The size of the rendered points.
Use Depth From Luminance (Fake Depth)	Depth values may be taken from an RGB image rather than depth values calculated by the Kinect.
Filter Depths	Smooths the Kinect Depths to try to remove noise – generally only suitable for Kinect v1.
Flatten Depth	Depth Values are ignored and the mesh is flattened.
Invert Mask Enabled	Inverts the clipping area.
Flat Shading	Toggle flat shading on or off.
Render To Shadows Only	Only renders shadows, and not the mesh itself.
Constant Colour	Replace the colour image with a solid colour.
Constant Colour Amount	How much the constant colour is blended over the colour image values.
Sort Key	Changes the render order of the Kinect Mesh node against other transparent objects in the scene.

Material

Most of these Attributes are shared with the Materials topic.

Name	Description
Line Colour	Changes the colour of the mesh edges.
Point Colour	Changes the colour of the point texture.

Inputs

Name	Description	Typical Node Input
Colour Image Node	Defines the Kinect source for the mesh. If a Kinect Source is used, both colour and depth data will be taken from the same node. Otherwise only colour data is taken.	Depth Camera / Kinect Source
Mask Image Node	Use a mask image to control which regions are used by the mesh, based on the luminance of the image.	Video Loader
Depth Image Node	Use an image to override the depth input from the Kinect Source node. If the connected node is a Kinect source the depth channel will be taken; otherwise the luminance of the colour channel is used as depth data.	Video Loader
Project Image Nodes	Projects images onto the Kinect mesh to colour it.	Video Loader
Material	Override the default material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Kinect1 Skeleton

Method

This node controls the Kinect Skeleton tracked from a Kinect camera sensor.

If this node is hashed out with red, this means the node isn't active for some reason. Usually :

- Kinect isn't on or hasn't been connected to Notch.
- Kinect Skeletons have not been enabled in the project settings window.
- A suitable skeleton hasn't been found yet.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Use Active Skeleton	When enabled, automatically select the currently active skeleton.
Avatar Index	Select which Skeleton to use from the avatar index. Only functional with Use Active Skeleton is disabled.
Rotate Bind Pose Joints By	Rotate the bind pose to face along the skeletons local rotations.

Facing Direction	
Input Skeleton Scale	Scale the size of the input skeleton.
Smoothing	How much smoothing is applied to the output skeletons motion.
Derive Rotations (Don't Use Kinect SDK Rotations}	Use internally calculated rotations instead of rotations from the Kinect SDK.

Inputs

Name	Description	Typical Node Input
Hierarchy Root	Connect the skeleton root node to drive the rest of the skeleton from.	Imported 3D Scene
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Also listed are the joints for the rest of the skelatal system. To drive a node based on a specific joint, connect it to its relevant input.

Outputs

The outputs section for this node is currently being worked on.

Kinect2 Skeleton

Method

This node controls the Kinect Skeleton tracked from a Kinect 2 camera sensor.

If this node is hashed out with red, this means the node isn't active for some reason. Usually :

- Kinect isn't on or hasn't been connected to Notch.
- Kinect Skeletons have not been enabled in the project settings window.
- A suitable skeleton hasn't been found yet.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Use Active Skeleton	When enabled, automatically select the currently active skeleton.
Avatar Index	Select which Skeleton to use from the avatar index. Only functional with Use Active Skeleton is disabled.
Rotate Bind Pose Joints By	Rotate the bind pose to face along the skeletons local rotations.

Facing Direction	
Input Skeleton Scale	Scale the size of the input skeleton.
Smoothing	How much smoothing is applied to the output skeletons motion.
Derive Rotations (Don't Use Kinect SDK Rotations}	Use internally calculated rotations instead of rotations from the Kinect SDK.

Inputs

Name	Description	Typical Node Input
Hierarchy Root	Connect the skeleton root node to drive the rest of the skeleton from.	Imported 3D Scene
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Also listed are the joints for the rest of the skelatal system. To drive a node based on a specific joint, connect it to its relevant input.

Outputs

The outputs section for this node is currently being worked on.

Imported 3D Scene

Method

This node instanciates a 3D scene which has been imported from one of the valid scene file formats: Lightwave LWS, FBX or Cinema4D. The scene resource must be set via the “Lightwave Scene” parameter. The scene is then rendered faithfully to the original file as far as possible.

When a valid scene resource is set, sub-nodes are created for each node imported from the original scene – such as objects, lights, cameras, bones or transform nodes – and linked together as they appear in the original scene’s hierarchy. This allows complex scenes with skins, skeletons and hierarchical animation to work properly. These sub-nodes may not be deleted, their linkages may not be changed and some of their parameters, such as transforms, can not be edited – as they are representations of elements loaded from the imported scene file. However other nodes from outside of the imported scene may be connected to them. The sub-nodes may contain animations loaded from the source file.

In Notch, animation playback is framerate-independent: there is no “frame rate”, and animations are interpolated accurately at any given time point. In some 3D packages, however, time is locked to a certain frame rate and there is no sub-frame interpolation of animations: the playback time is always quantised to a division based on the frame rate. This difference in behaviours can lead to errors in animation playback, when interpolations occur that were not intended – e.g. rotation going full circle when interpolating between values at two discrete frames. To resolve this issue the Lock to Frame Rate parameter may be used to force playback times to be quantised to divisions of a given frame rate as in the 3D package that authored the animation.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Lightwave Scene	Import a Lightwave scene.
Loop Start	The start time of the section of the scene which is played.
Loop End	The end time of the section of the scene which is played.
Playback Speed	Change the speed at which the scene is played.
Visible	Control whether the node is visible or not to the scene.
Loop Mode	Change the way in which the time loops when the end of the loop is reached. • Repeat: The time returns to that specified by the Loop Start parameter. • One Shot: The time continues indefinitely and does not loop.
Reload Materials From LWS	Reload the material used from the original 3D object file.
Lock to Frame Rate	Quantise the times used in scene playback to exact divisions of the specified Locked Frame Rate.
Locked Frame Rate	The frame rate at which the playback rate is quantised to.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

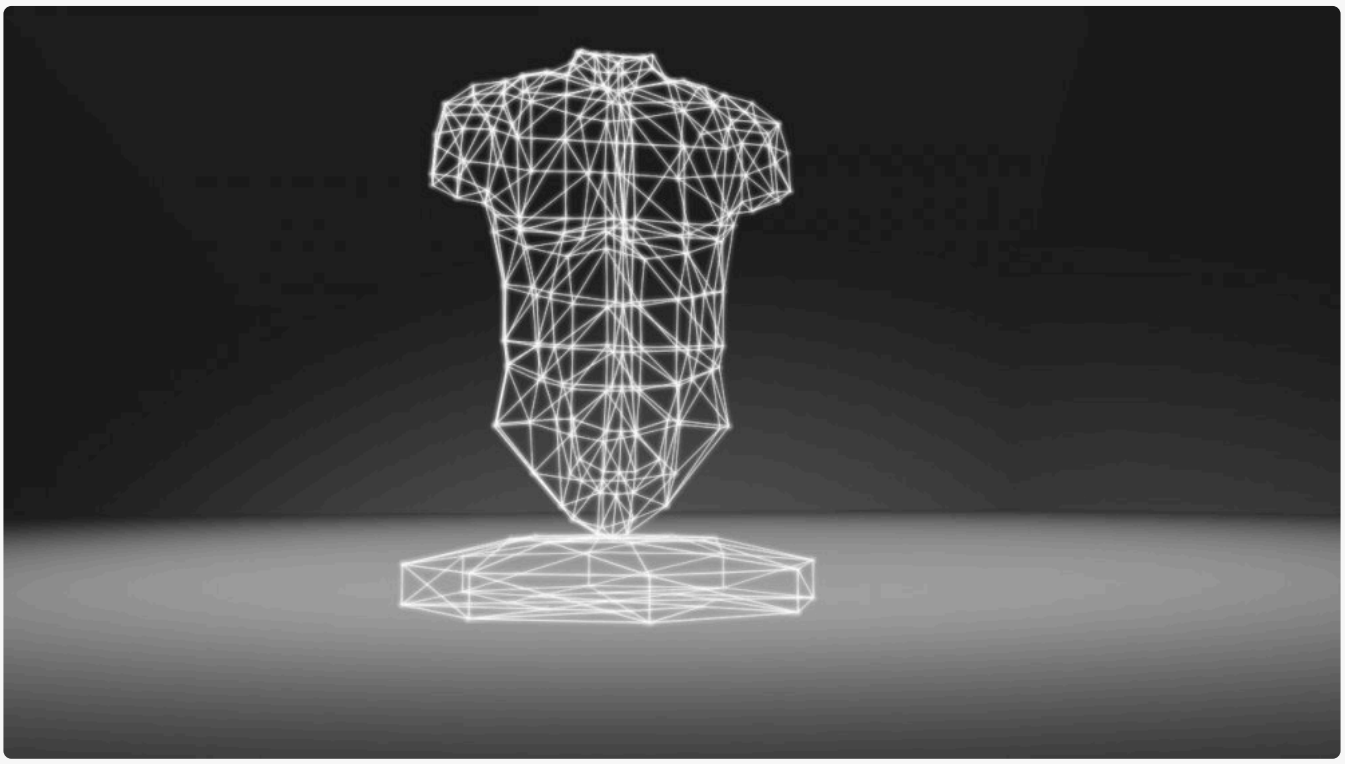
Line Renderer

Method

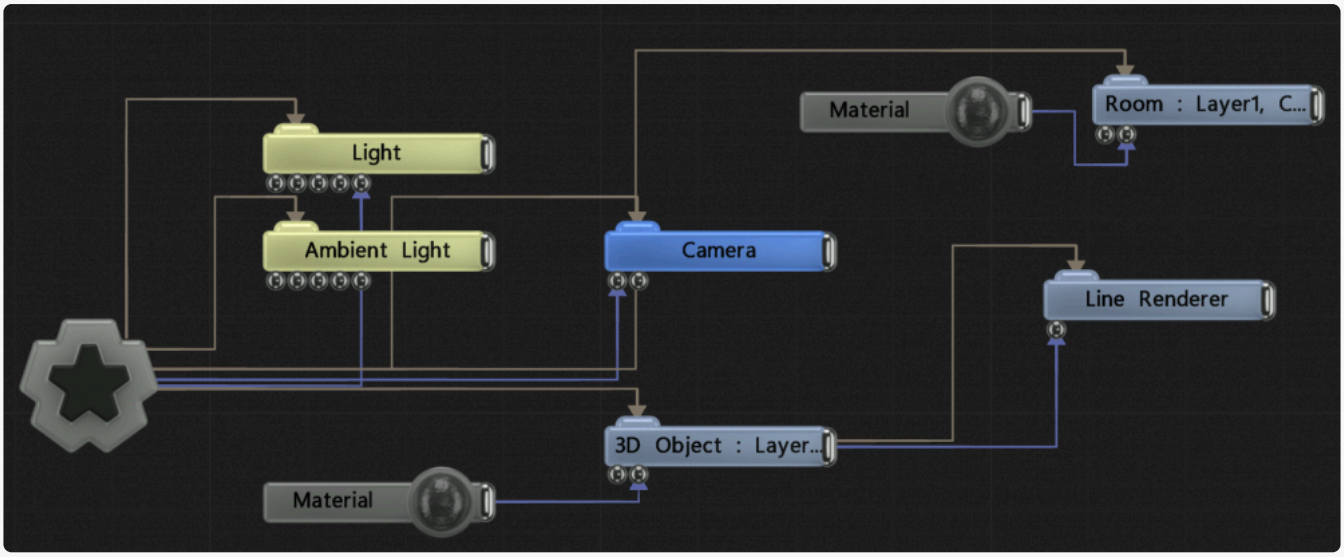
This node is used to render lines with thickness and antialiasing. Lines may be taken from wireframes of 3D objects connected via the Line Source Node input.

Lines are rendered as thickened quads with soft edges. Optionally smoke/laser-like effects can be achieved by applying some 3D fractal noise to modulate the transparency of the lines, using the Smoke Enabled attribute.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	Change the colour value of the lines.
Alpha	Change the alpha value of the lines.
Brightness	Control the brightness of the lines.

Visible	Control whether the node is visible or not to the scene.
Sort Bias	Biases the render order.
Depth Bias	Biases the depth values generated by rendering the geometry, to make them less likely to be occluded by nearby 3D objects.
Thickness	Control the thickness of the lines.
Falloff Power	Control the rate of falloff of the line's transparency from the centre of the line outwards.
Blend Mode	Control how the lines are blended into the scene.
Thick Lines	Toggle whether the lines have 3D thickness.
Reflections	Determine whether lines should be rendered in reflection passes.
Reflection Brightness	Scales the brightness of the lines in reflection passes.

Smoke Attributes

Name	Description
Smoke Enabled	Enables smoke-like effects on line rendering, by modulating line transparency with 3D fractal noise.
Smoke Alpha	The amount the smoke effect affects line transparency values.
Smoke Scale	The Scale of the 3D fractal noise used to affect the lines.

Inputs

Name	Description	Typical Node Input
Line Source Node	Source for the line rendering to be generated from.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Lines

Method

This node draws lines between the positions of its input nodes, from source points to destination points.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Rendering

Name	Description
Subdivisions	Subdivide the lines so that deformations use smaller segments, giving greater detail to the deformations.

Rendering

Name	Description
Visible	Control whether the node is visible or not to the scene.

Materials

See Materials.

Inputs

Name	Description	Typical Node Input
Line Source Nodes	Points from which lines are drawn.	Null
Line Destination	Points to which lines are drawn.	Null
Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Mocap Stream

Method

This node allows a pre-recorded motion capture data stream to be used as a proxy / replacement for live motion capture data on the Perception Neuron Mocap Skeleton node. When this node is connected to the Perception Neuron Mocap Skeleton's "Mocap Stream" input, it overrides live data.

The node requires a motion capture data stream to be set via the "Mocap Stream" parameter. This stream should either be a BVH file loaded as a "BVH Animation" resource, or data recorded from Perception Neuron loaded as a "Perception Neuron Mocap Stream" resource.

Attributes

Name	Description
Mocap Stream	The mocap stream resource.
Active	Determines whether the node is active and its data should be used.
Time Mode	Change how the stream is sampled with respect to the scene's playback time. • Use Deltas (Continuous/Looping), The time runs based on the frame delta, loops when the play head loops, and the Playback Rate parameter may be animated.
Time Offset	The time offset for the animation.
Playback Rate	The playback rate of the animation.
Interpolation	The interpolation mode for the animation's keyframes. • Stepped, Jump from between gaps in Mocap data. • Linear, Use linearly interpolate between gaps in Mocap data. • Cubic, Use cubic interpolation between gaps in Mocap data.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

Outputs MOCAP data for the Perception Nueron Mocap Skeleton node.

Node Trail

Method

This node creates a spline that follows the position of a node in the scene. At each frame update, a new point is added to the spline.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Update Time Mode	How the generated spline updates with relation to the time code. • Locked To Timecode, The deformer deformations are locked to the time code and the same time will always yield the same deformations. • Running / Looping, The deformer deformations are disconnected from the time code and will loop seamlessly at the end of the layer.

Visualisation

Name	Description

Show Spline	Show the new spline in the scene.

Materials

See Materials.

Inputs

Name	Description	Typical Node Input
Spline Sources	Spline nodes used to draw the extrusion along.	Spline
Material	Override the default material with another material.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs a spline which can be used to as an input into other nodes which use splines to generate new effects.

Null

Method

A generic transform node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Transform Modifier Apply Mode	Select how this node applied its own transformation changes to other nodes when connected to their transformation modifiers input. • Replace, The transformation values of the newly connected node are replaced with the current values from the null. • Add to Local, The transformation values are added to the current transformation values of the node in local space. • Add to World, The transformation values are added to the current transformation values of the node in world space.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Notes

A Null is a really useful object to use as a controller for other objects, such as a camera's target position.

Optitrack Mocap Skeleton

Method

This node reads bone data from a Optitrack motion capture suit and applies it to Bone nodes, either via direct input links or by a connection to the root of the target hierarchy.
A network connection must be made to the Optitrack software which provides a stream of bone data from the suit. This is done via the Devices menu – use the “Motive” connection options.

The input skeleton the node is applied to must have been designed to receive motion capture data: the bones must be named, oriented and arranged appropriately. Mixamo rigs are a good reference.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Avatar Index	Select the mocap actor to drive the skeleton.
Rotate Bind Pose Joints By Facing Direction	Determines whether the input skeleton has been rigged so that the bones in their bind pose are rotated to point in the direction of the next bone, or whether they are unrotated in their bind pose.

Input Skeleton Scale	uniformly scale the size of the input mobcap skeleton.
Mirrored	Mirror the movements of the incoming mobcap data along the x axis.

Inputs

Name	Description	Typical Node Input
Hierarchy Root	The root of the input skeleton to be driven by motion capture.	You'll need to connect the skeleton root within an Imported 3D Scene.
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Perception Neuron Mocap Skeleton

Method

This node reads bone data from a Perception Neuron motion capture suit and applies it to Bone nodes, either via direct input links or by a connection to the root of the target hierarchy.
A network connection must be made to the Axis Neuron software which provides a stream of bone data from the suit. The server address and port must be entered to match the output address and port in Axis Neuron. If there is no connection the node will be hatched out in red.

The input skeleton the node is applied to must have been designed to receive motion capture data: the bones must be named, oriented and arranged appropriately. Mixamo rigs are a good reference.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Axis Neuron Server Address	The address / IP of the Axis Neuron server providing the skeleton stream.
Axis Neuron Server Port	The port of the Axis Neuron server providing the skeleton stream.

Avatar Index	Select the mocap actor to drive the skeleton.
Rotate Bind Pose Joints By Facing Direction	Determines whether the input skeleton has been rigged so that the bones in their bind pose are rotated to point in the direction of the next bone, or whether they are unrotated in their bind pose.
Input Skeleton Scale	uniformly scale the size of the input mobcap skeleton.
Mirrored	Mirror the movements of the incoming mobcap data along the x axis.

Inputs

Name	Description	Typical Node Input
Mocap Stream	Input a pre-recorded mocap stream to run instead of any live data.	Mocap Stream
Hierarchy Root	The root of the input skeleton to be driven by motion capture.	You'll need to connect the skeleton root within an Imported 3D Scene.
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Shape 3D

Method

This node renders a 3D primitive mesh that has been generated according to various attributes. The Shape Type parameter defines the primitive shape used. The Subdivisions X/Y parameters determine how many subdivisions the primitive has, and the Axis defines which axis it is created in where appropriate. The Size and Radius parameters may be used to control the size of the primitive.

As well as being rendered directly, Shape 3D nodes may also be used as an input for various other nodes, including Particle Mesh Emitters, Field 3D Object Emitters, Clone To Mesh, Clone To Volume, Collision Affectors and numerous others.

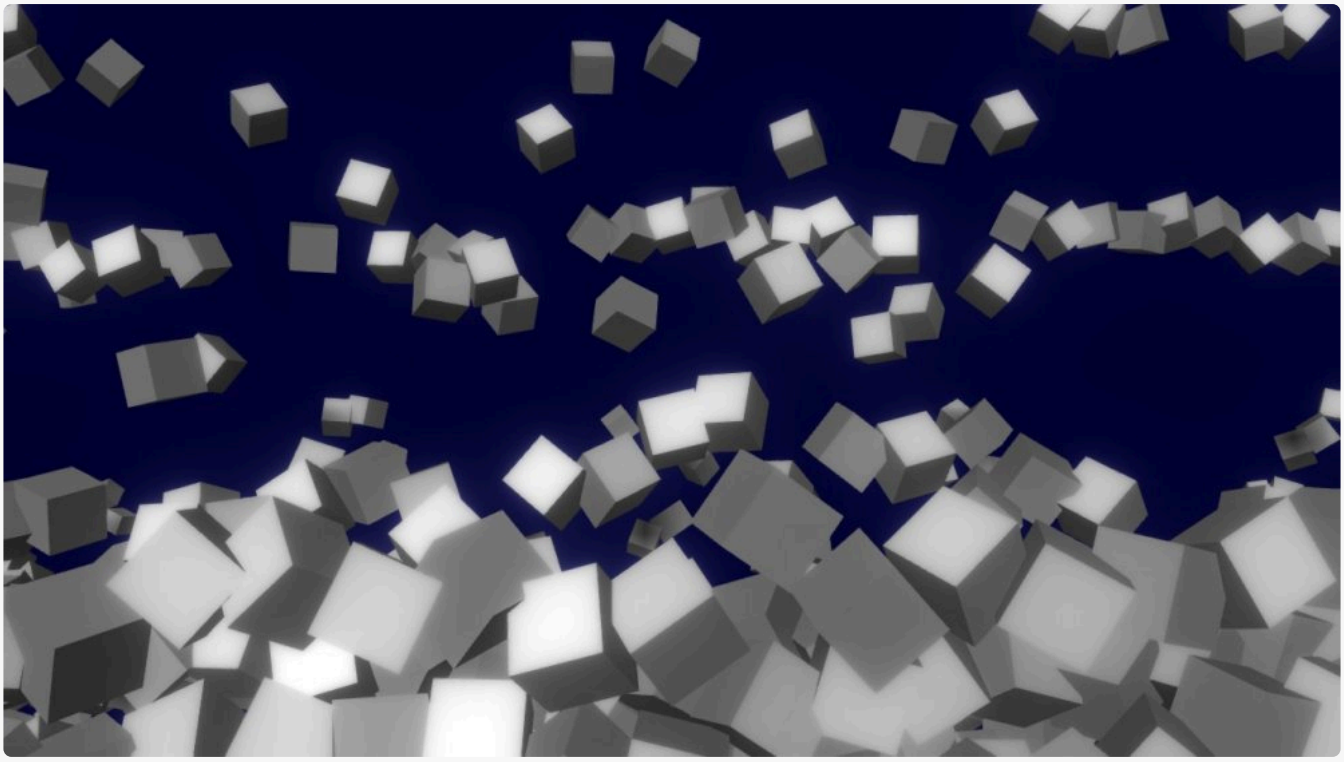
There is a set of material parameters under the Material property group which controls how the shape is rendered. The material also has a corresponding input which allows Material nodes to be connected to it. See Materials for more information about material properties.

Deformers may be parented to the node, causing the mesh to be deformed.

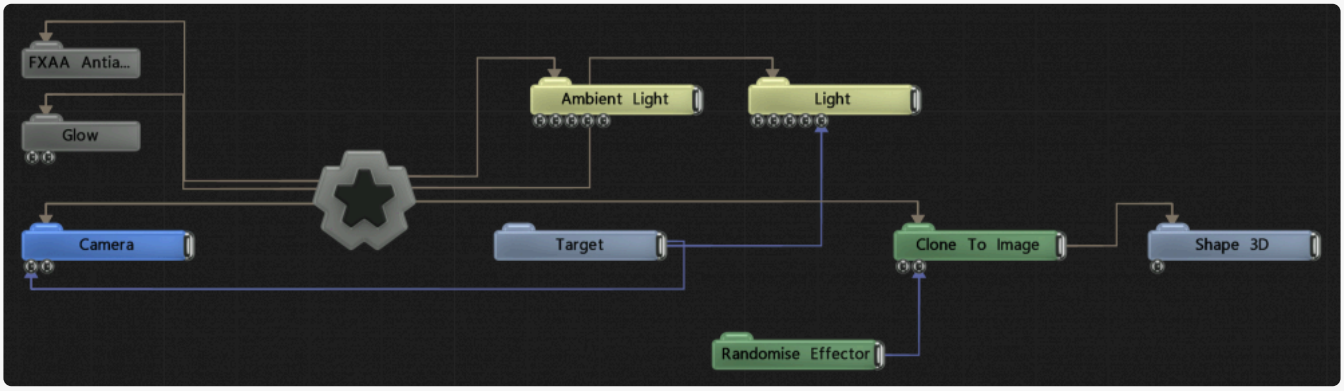
GPU hardware tessellation is supported via the Tessellation Enabled parameter. This causes the mesh to be subdivided at render time using the GPU hardware which does not incur a memory overhead and is also processed efficiently. Tessellation is adaptive based on distance from the camera, where the falloff is controlled via the Subdivision Distance parameter. This allows the mesh to become denser when close to the viewer. Tessellation is often useful in conjunction with displacement mapping, enabled by setting a displacement map on a material.

The Shape 3D node may be used as a rigid body in a physics system via the Physics Attributes properties. It must be parented under a Rigid Body Root node for physics to be applied.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Shape Type	Choose which 3D shape is rendered.
Radius	The radius of the primitive, where appropriate.
Size X	The size of the primitive in the X axis, where appropriate.
Size Y	The size of the primitive in the Y axis, where appropriate.
Size Z	The size of the primitive in the Z axis, where appropriate.
Subdivisions X	How many subdivisions along the objects X axis.
Subdivisions Y	How many subdivisions along the objects Y axis.
Axis	Select which axis you want the shape to aligned to upon creation.
Line Thickness	Thickness of lines, if “Line” or “Line Array” is selected in the “Shape Type” attribute.

Rendering

Name	Description
Visible	Control whether the node is visible or not to the scene.
Solid	Toggle the shaped is solid or not.
Tessellation Enabled	Enables hardware tessellation, which subdivides the mesh efficiently at render time on the GPU. Tessellation does not consume memory resources and is more efficient than subdivision.
Max Tesselation Factor	The maximum tessellation factor for hardware tessellation. Controls the maximum number of polygons generated from each source polygon in the mesh.
Subdivision Near Distance	The near distance from the camera at which tessellation remains the tessellated mesh.
Subdivision Distance	The distance from the camera at which tessellation falls off to the original mesh polygons.

UV Output

Name	Description
UV Scale X	Scale the object UV along the x axis.
UV Scale Y	Scale the object UV along the y axis.
UV Offset X	Move the object UV along the x axis.
UV Offset Y	Move the object UV along the y axis.

Physics Attributes

Name	Description
Friction	The friction of the rigid body.
Bounciness	The bounciness of the rigid body.
Density	The density of the rigid body. The density is scaled by the area of the shape to determine the mass of the body.
Spin X	The spin of the rigid body in the X axis. This scales the inertia tensor on the X axis, making the body spin faster in that direction when torque is applied.
Spin Y	The spin of the rigid body in the Y axis. This scales the inertia tensor on the Y axis, making the body spin faster in that direction when torque is applied.
Spin Z	The spin of the rigid body in the Z axis. This scales the inertia tensor on the Z axis, making the body spin faster in that direction when torque is applied.
Dynamics Mode	The dynamics mode of the object • Static, A static rigid body does not move and can't be moved by physics. • Kinematic, A kinematic rigid body is not moved by physics but has a velocity that can affect dynamic bodies. • Dynamic, A dynamic rigid body has its initial position set by its transform, but transform control is taken over by physics as soon as the simulation starts. • Disabled, Physics will not be applied.
Dynamics Transform For Rendering Only (Faster)	If selected, the transform of the body is maintained on GPU only. This reduces latency and increases performance but means that parenting to the object, e.g. using it to transform lights or emitters, will not work.
Rigid Body Shape	The shape of the rigid body • Sphere, A sphere • Box, A box • Plane, A plane – can only be static or kinematic • 3D Object (Convex Hull), A convex hull derived from the geometry of the Shape3D node

	• 3D Object (Use Original Geometry), The original triangle geometry of the Shape 3D node, if applicable
Rigid Body Sphere Radius	The radius of the rigid body sphere shape if applicable
Rigid Body Box Size X	The size of the rigid body box shape if applicable
Rigid Body Box Size Y	The size of the rigid body box shape if applicable
Rigid Body Box Size Z	The size of the rigid body box shape if applicable
Rigid Body Convex Hull Mode	If the Convex Hull shape is used, determines the convex hull mode used – which will be wrapped around the node's geometry

Material

see Materials

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Shatter Primitive 3D

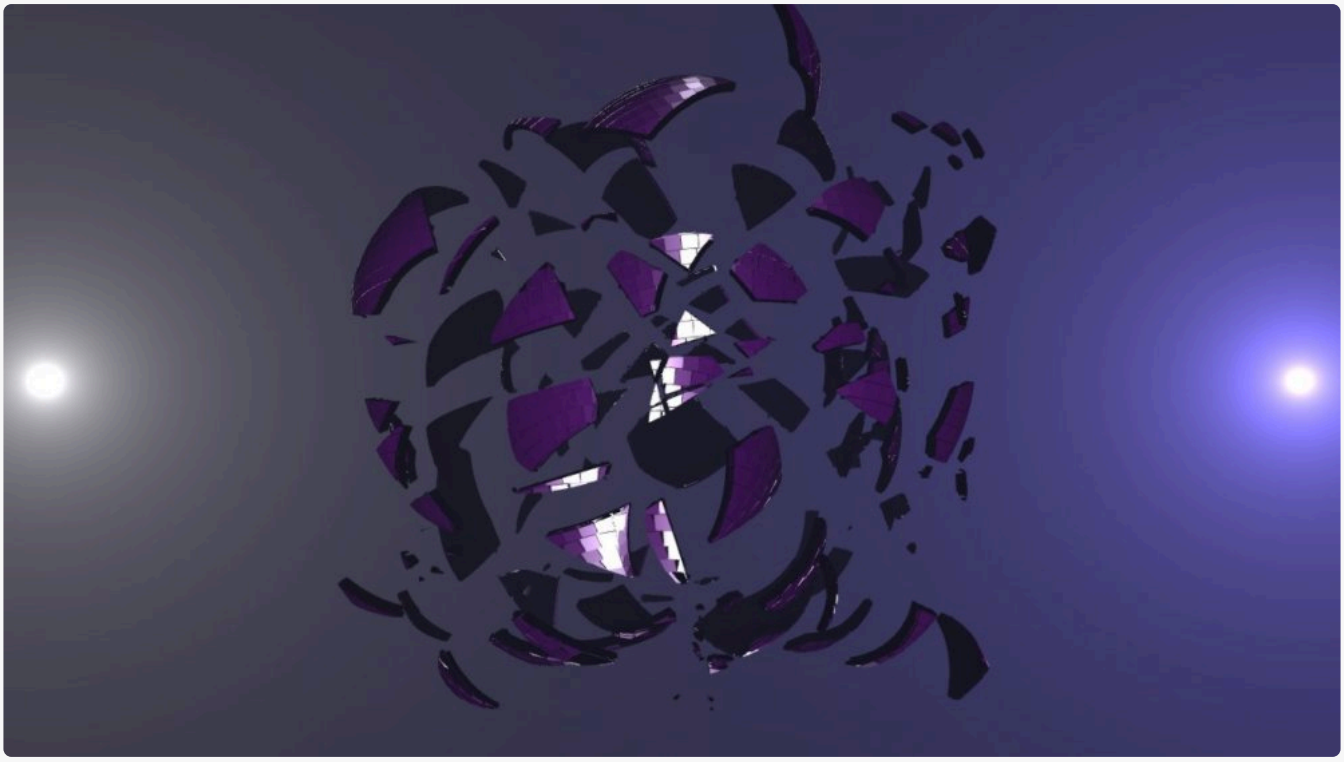
Method

This node creates a breakable copy of a 3D object using Voronoi-based splitting process. The underlying 3D object may be connected from a 3D Object node via the Object Node input, or generated as a primitive using the Shape Type parameter. The splitting process iteratively cuts the mesh and then creates multiple pieces. The Num Cuts and Num Pieces parameters control the number and size of pieces created, where larger values will cause more and smaller pieces to be created. The pieces may be grouped together via cuts or points, using the Grouping Method parameter; grouping by points produces more regular shaped pieces, where grouping by cuts creates shards. The shattering is not volumetric; instead, the shape is shattered as thin polygons which are then thickened to make 3D shards using the Thickness parameter.

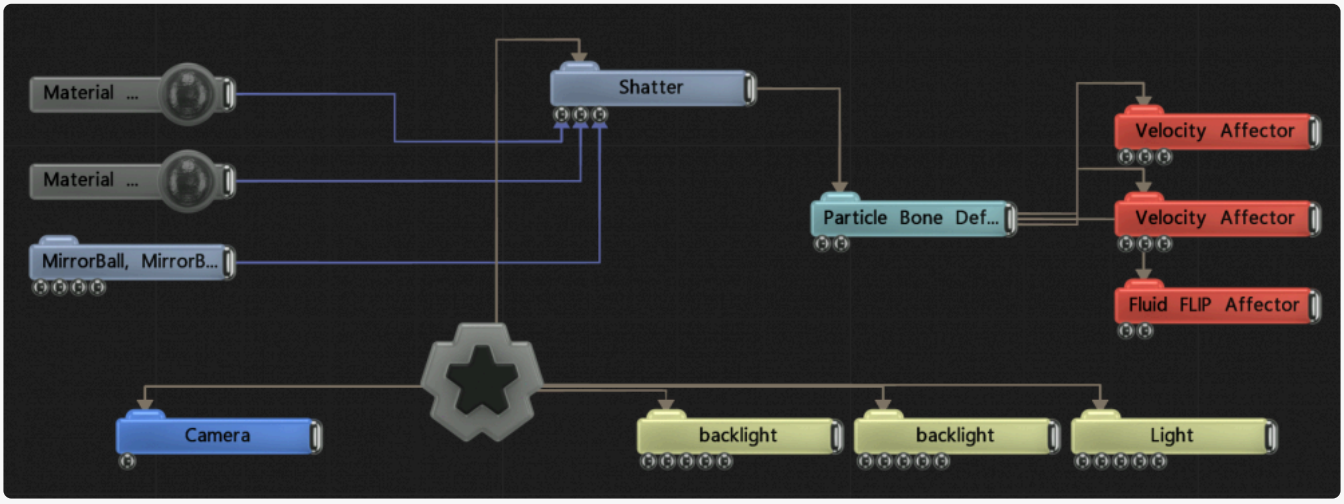
The shattered mesh remains a single object, but each generated piece is assigned a different bone, allowing the pieces to be animated using bone deformation. In order to animate the shattered pieces as particles a Particle Bone Deformer may be parented to the node. Other Defomer nodes may also be connected in order to deform the shattered mesh.

Materials may be connected via the Material and Cut Material inputs, allowing different materials to be used for the original polygons and the generated cut polygons.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.

Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Shape Type	Select a primitive or an object to be used in the shatter.
Num Cuts	Number of cuts into the object.
Num Pieces	Number of pieces the object can be shattered into.
Grouping Method	How the cut pieces of the shatter node are grouped together.
Seed	Choose the seed for the random object cutting.

Rendering

Name	Description
Visible	Control whether the node is visible or not to the scene.
Thickness	Change the thickness of the shattered object.

Materials

see Materials

Inputs

Name	Description	Typical Node Input
Material	Override the default material with another material.	Materials
Cut Material	Change the material used for the inside cut of the object.	Materials
Object Node	Select an object to be used to create a shattered copy.	3D Object.

Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

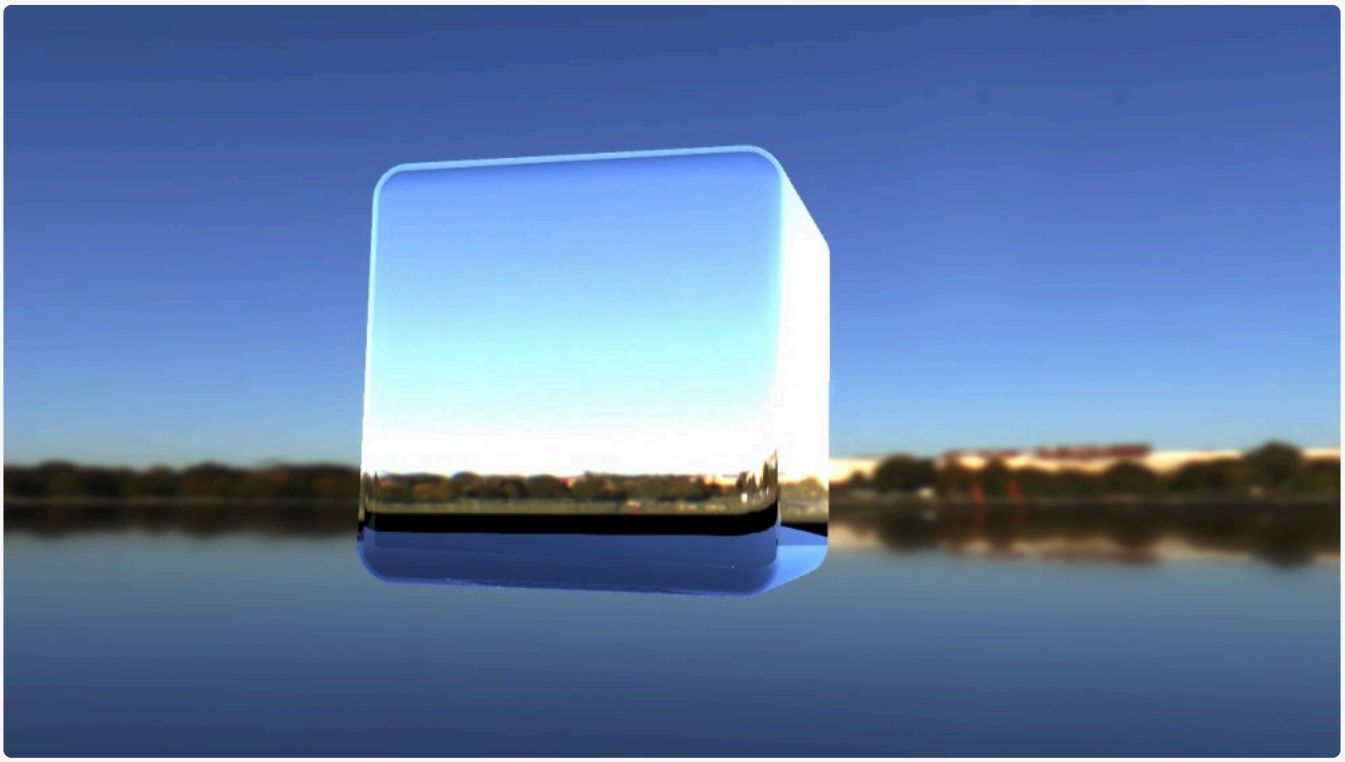
Skybox

Method

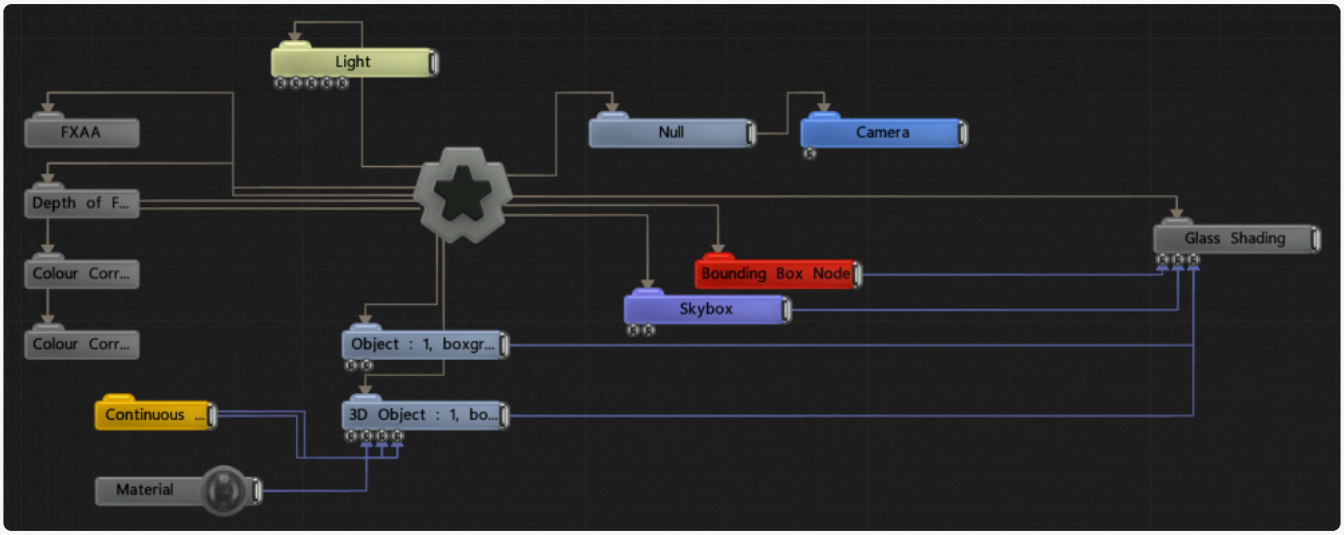
This node defines a sky box which can be used as a background for a 3D scene. Sky boxes can be created from images that are arranged in a spherical or dual paraboloid format. The image is converted into a cube map to be used as a sky box. The cube map is stored in a 16-bit HDR format so HDR images may be used for the sky box.

The cube map created for the sky box may also be used as an environment map in the same way as an Environment Map node.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Texture	Choose an image to use for the skybox.
Skybox Brightness	Control the brightness of the skybox.
Dual Paraboloid Brightness	Change the brightness of the skybox, and all nodes that reflect the skybox.

Size	Control the size of the skybox.
Blur Amount	Control the amount of blur that is applied to the skybox.
Dual Paraboloid Blur Amount	Control the amount of blur that is applied to the skybox when in dual paraboloid mode.
Render Skybox	Toggle whether the skybox is rendered or not.
Apply As Environment Map	Toggle whether the skybox is applied as an environment map for reflections.
Skybox Resolution	Control the resolution of the skybox
Dynamic	Toggle whether the skybox is dynamic.
Image Source Mapping	Select which type of mapping should be used for the supplied image.
Stereoscopic	Enables stereoscopic 360 videos/images to be used within a stereoscopic setup. Requires a stereoscopic image to function properly.

Inputs

Name	Description	Typical Node Input
Envmapped Nodes	Nodes to be affected by the environment map.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

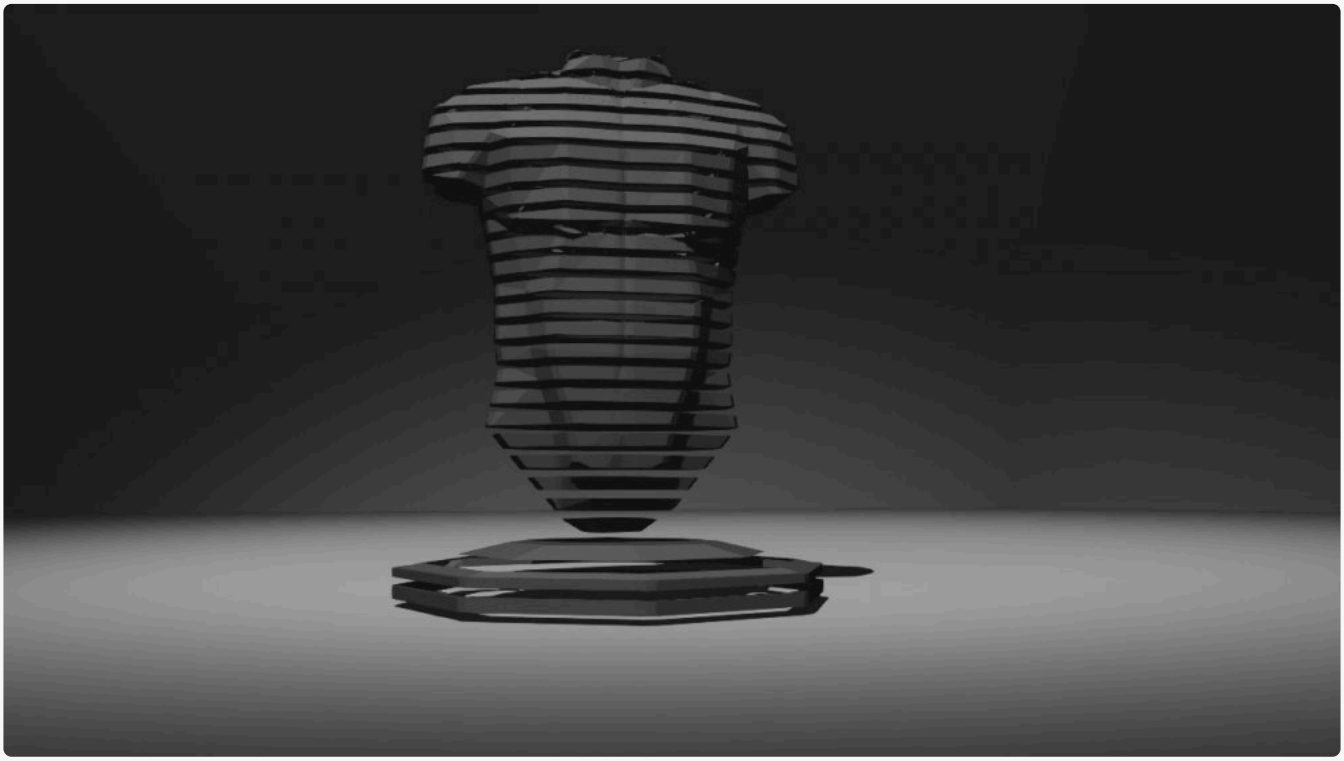
This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Slice Geometry

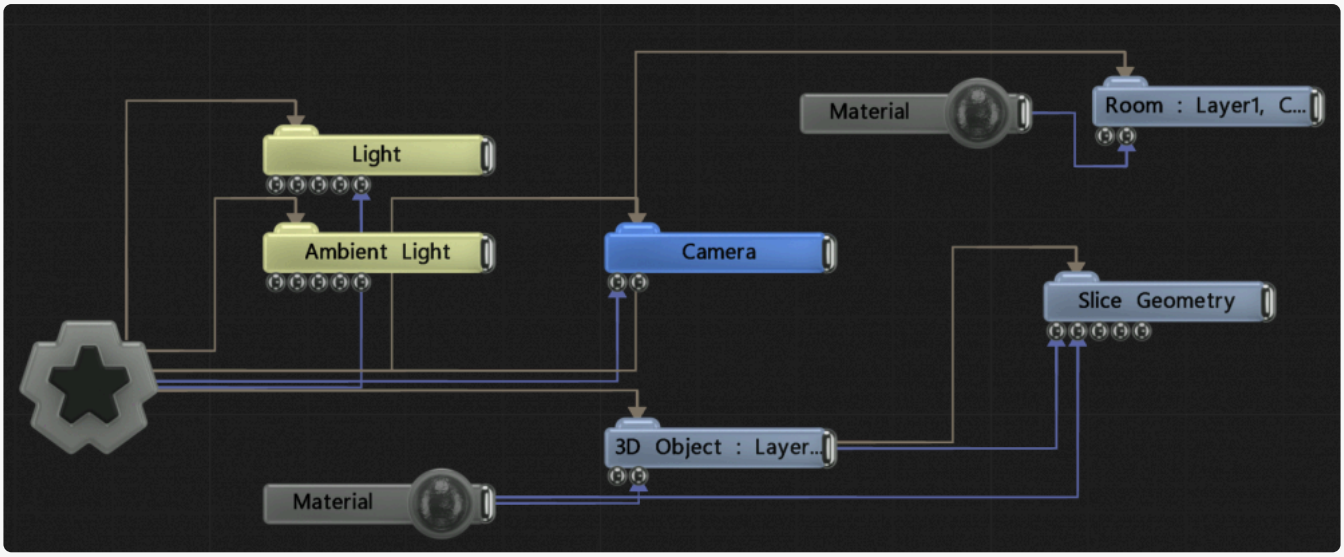
Method

This node creates a new mesh by slicing polygons from the original input mesh into a series of cuts. The source mesh must be connected to the Object Node input. The polygons of the mesh are sliced along a planar axis which may be transformed by a Null connected to the Slice Transform input.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Rendering

Name	Description
Visible	Control whether the node is visible or not to the scene.

Displacement

Name	Description
Displacement Shader	Ability to over-ride internal shader. See writing custom shaders.
Extrude Amount	Control how much the face of a mesh is extruded away from the object.
Slice Thickness	How thick each slice in the displacement is.
Slice Scale	Number of slices in the displacement.
Cuts Visible	Toggle whether the cuts in the geometry are visible.

Materials

see Materials

Inputs

Name	Description	Typical Node Input
Object Node	The object used as the source of the slice geometry.	3D Object
Material	Override the material in the node with an material input.	Materials
Slice Transform	Transform the slices that cut into the geometry.	Null
Displacement Image	Use an image to displace parts of the displacement.	Video Loader
Mapping	Controls the mapping transform used to determine the location of the slices.	Mapping
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Spline

Method

This node defines a spline in 3D space from a number of control points. Control points are specified by linking Null nodes to the Spline Nodes input. The position of each Null is used as the position of the control point; the rotation of the Null is used to control the tangent direction of the spline at the control point. The ordering of the control points is defined by the vertical ordering of the nodes.

Splines may also be imported from 3D packages as part of Imported 3D Scenes.

Splines may be used in conjunction with Spline Followers to allow geometry or transforms to follow the path of a spline. Splines may also be used with Particle Spline Emitters to emit particles from splines, Spline Deformers to deform 3D objects using splines, and numerous other uses.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Spline Time Mode	Controls how the spline is evaluated by spline followers. • Knots, followers take the same amount of time to move between each control point

	on the spline. • Length, the time followers take to move between each control point is normalised by the distance along the spline, so the follower will appear to move at a constant rate.
Normalise Spline Times	Normalises the spline times between 0 and 1.
Looping	Control whether the spline animation loops.

Visualisation

Name	Description
Show Spline	Toggle whether the spline is shown.

Inputs

Name	Description	Typical Node Input
Spline Nodes	The control point nodes for the spline.	Null
Colour Source	Use a ramp node to generate colours along the spline.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs a spline which can be used to as an input into other nodes which use splines to generate new effects.

Text

Method

This node generates and renders a 3D mesh from the text that has been generated according to various attributes using a supplied font. The font must be in TrueType or OpenType format and loaded as a Font resource. Text must be entered via the Text String parameter. Text justification, spacing and kerning may be controlled by various attributes. Kerning may make use of the kerning table supplied with the font, if applicable; or it may be generated optically, using proximity checks between characters. The kerning mode is specified by the Kerning Mode parameter.

The generated mesh is 3D, and its depth is defined by the Extrude Amount parameter. It may also be bevelled using the Bevel Amount parameter. Write On / Write Off parameters allow the text to appear over time, one letter, word or line at a time.

Text strings may be supplied directly via the Text String parameter, or generated by a suitable node connected to the Text String Nodes parameter. Nodes capable of generating text include OSC Text String and RSS Text nodes, enabling strings to be supplied via external sources. Javascript scripts may modify the Text String parameter of a text node in order to control text from a script.

As well as being rendered directly, Text nodes may also be used as an input for various other nodes, including Particle Mesh Emitters, Field 3D Object Emitters, Clone To Mesh, Clone To Volume, Collision Affectors and numerous others.

There is a set of material parameters under the Material property group which controls how the shape is rendered. The material also has a corresponding input which allows Material nodes to be connected to it. See Materials for more information about material properties.

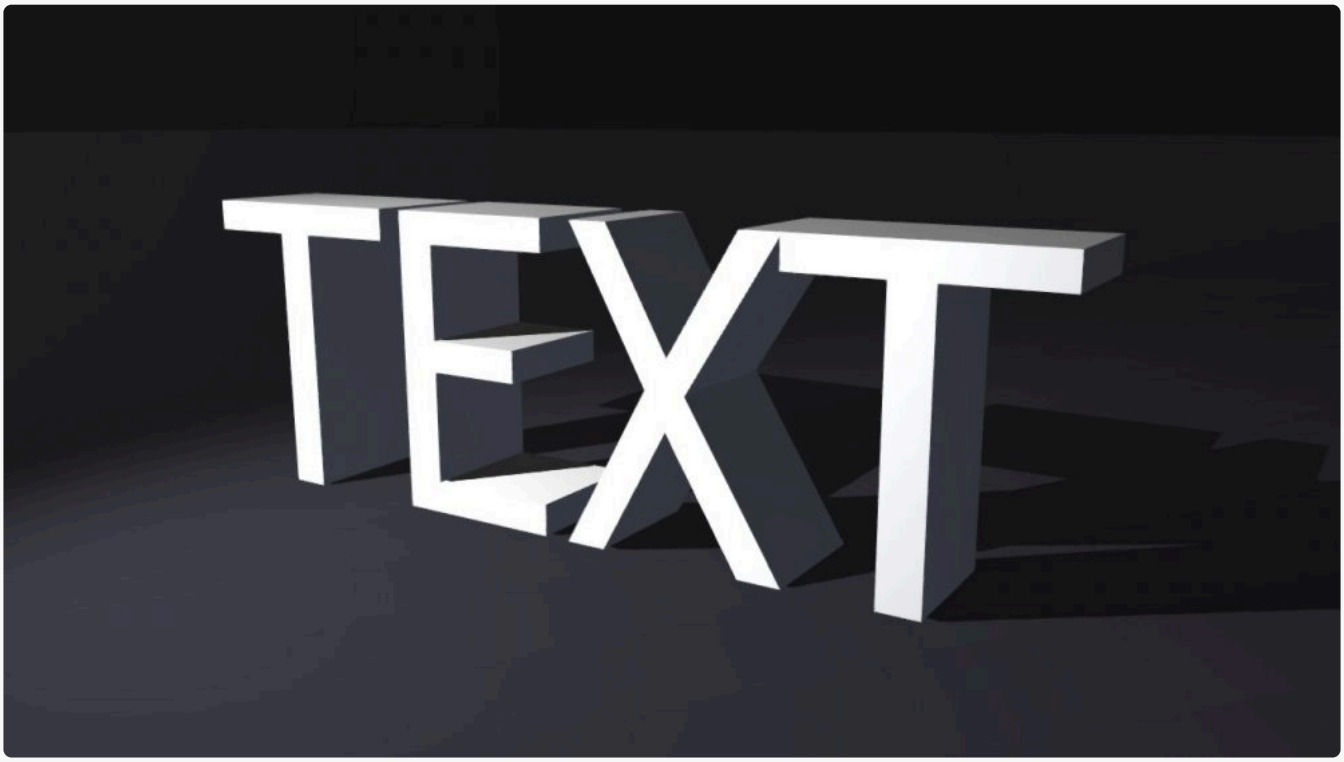
Deformers may be parented to the node, causing the generated mesh to be deformed.

If a valid font resource is not supplied or the text string is empty, this node is ineffective.

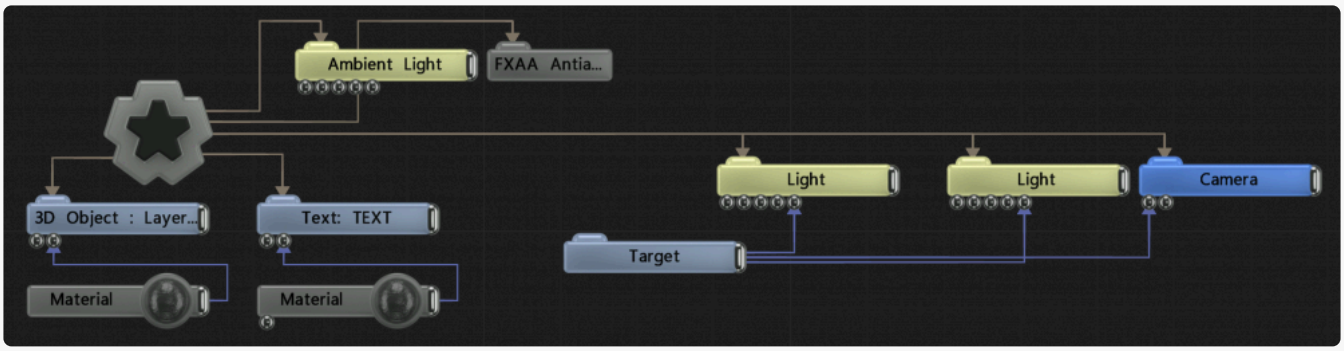
> ✻ As Point Size gets smaller, less path data is used, lowering the resolution of the of the output text. We strongly recommend using Size Scale when resizing a font, unless you need to add more or less resolution to your text.

> ✻ When using monospace fonts, ensure that Letter Space Scaling is always set to zero and scale your Word Spacing to ensure you match your space distance to the letter size.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.

Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Font	Select a font to be used.
Visible	Control whether the node is visible or not to the scene.
Text String	String of text to be displayed.
Geometry Type	How the text is generated to the screen. • Polygons, Text is generated into a 3D mesh. • Bitmaps, Text is generated into a bitmap image on a 3D plane.
Kerning	Control the kerning on the text.
Letter Spacing Scale	Scale the spacing between each letter.
Letter Gap	Scale the spacing between each letter.
Word Spacing	Control the spacing between words.
Line Spacing	Control the spacing between each new line.
Point Size	Changes the point size of the font.
Write On Off Mode	Choose how the text is animated onto the screen.
Write Off Function	Choose how the text is animated off the screen.
Write On/Off Time	Control the time it takes for the text to appear and disappear on the screen.
Write Off Time Offset	Control the time between the write on time finishing and the write off time beginning.
Write On Space Duration	How long it takes for a space character to be “written” on.
Write On/Off Fade Time	Fades the alpha of text as its written on and off. Only functions in Bitmap mode.
Justification	Choose how the text is justified in reference to the gizmo.
Kerning Mode	Choose whether kerning is done optically or through a kerning table.
Creation Plane	Choose which plane the text is generated on.
Size Scale	Scale the size of the text.

Extrude Amount	Extrude the text, so it is 3D.
Bevel Amount	Bevel the edges around the text.
Static Geometry (Generate Once)	Only generate the mesh once on creation. Updates to the text string or geometry deformation will no longer function.
Normal Smoothing Angle	The angle difference between two faces that their common edge is will be rendered as smooth.
Circular	Generates the text into a circle format
Circular Radius	The size of the circle for the text to be fixed around
Deformer Chunks Mode	How Connected Deformers in Chunks Vertex Source Mode will affect the text. • Letters, Each letter will be treated as a chunk. • Words, Each word will be treated as a chunk.

Text Box

Name	Description
Fit To Box	Enable text to be clamped to fit inside of a defined box.
Box X0 / Y0	Text boxes bottom left X / Y position.
Box X1 / Y1	Text boxes top right X / Y position.

Lines

Name	Description
Lines Visible	Control whether the node is visible or not to the scene.
Lines Alpha	Control the alpha value of the lines.
Colour	Control the colour value of the lines.
Use Vertex Colours	Colour lines based on the vertex colours of the geometry.
Blend Mode	Control how the lines blend with the rest of the scene.
Thick Lines	Use lines with thickness relative to their distance to camera.
Hide Back Face Lines	Hides the lines around back faces of geometry.
Lock Width	Lock the line width to be consistent regardless of distance from camera. Only functions with Thick Lines enabled.
Thick Line Width	Control the thickness of all the lines. Only functions with Thick Lines enabled.
Show Silhouette Lines	Draws lines along the edges of the object relative to the camera.
Show Normal	Draw a line along the edges of the mesh, depending on the angle difference between

Difference Lines	their mutual faces.
Show Unshared Lines	Draw lines along all edges of the shape.
Show Other Lines	Show all the lines for each edge of the Mesh.
Unshared Lines Weight	Greater control over the alpha of the unshared lines.
Silhouette Lines Weight	Greater control over the alpha of the silhouette lines.
Normal Difference Lines Weight	Greater control over the alpha of the normal difference lines.
Other Lines Weight	Greater control over the alpha of the other lines.
Line Normal Difference Angle	Change the threshold angle between two face normals that will generate a line along their common edge. Only functions with Show Normal Lines enabled.
Line Normal Fade Sharpness	How much the drawn normal lines will fade away the closer the edge angle is to the Line Normal Difference Angle.
Line Depth Bias	Exaggerate the width of the lines based on the distance to the camera. not functional with Lock Width enabled.
Line Silhouette Fade Sharpness	How much the drawn silhouette lines will fade away based on the size of the edge angle to the camera.

Materials

see Materials

Inputs

Name	Description	Typical Node Input
Effectors	Use Cloner Effectors to transform the words or letters.	Plain Effector
Text String Nodes	Override the text string from in the node.	OSC Text String
Material	Override the default material with another material.	Materials
Extruded Material	Select the Material to be applied to the extruded section of the mesh.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs the normal transformation and translation values, but it also outputs geometry which can be Deformed or used as a mesh source by other nodes.

Transform Array

Method

This node stores an array of transforms from a given source – such as a blob tracker. This array is used to instance the child subtree of the node – so the subtree / children are re-rendered for every transform in the array. The number of elements in the array may vary per frame, up to the defined maximum. The source of the transforms is typically a GPU buffer, so there is some latency in accessing them.

This is typically used to allow objects or image planes to be attached to transform sources where the number of sources is unknown or varies – e.g. blob trackers.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Max Element Count	The maximum number of elements allowed in the transform array.
Low Latency Mode	Reduces the number of frames of latency by which elements are updated in the transform array.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

Outputs

This node outputs a transform array – which may be used as the source data for Clone To Transform Array.

Transform Array Extractor

Method

This node extracts data from CSV/Table transform array node.

Attributes

Name	Description
Point Index	Index of data extracted.

Inputs

Name	Description	Typical Input
Point Array	The Point Array is a user-controlled array of points.	Transform Array, CSV/Table Transform
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Tweening Null

Method

This node changes its transformation values and smoothing changes between them depending on the Input Transforms (Nulls) and the Select Null Index.

Position, Rotation, and Scale are all inherited by the child nodes.

Attributes

Name	Description
Select Null Index	Which of the input transforms to move to.
Adaption Rate	How quickly the null adapts to the new positions input.
Smoothing Mode	Select how the mode moves between input transforms. • None, Jumps between positions with no smoothing applied. • Smooth, changes between transforms using the adaption rate.
Shortest Rotation Arc	Use the path with the shortest distance to the next input transform.

Inputs

Name	Description	Typical Node Input
Nulls	Transforms used to change between.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

XSens Mocap Skeleton

Method

This node reads bone data from a XSens motion capture suit and applies it to Bone nodes, either via direct input links or by a connection to the root of the target hierarchy.
A network connection must be made to the XSens software which provides a stream of bone data from the suit. The server address and port must be entered to match the output address and port in XSens. If there is no connection the node will be hatched out in red.

The input skeleton the node is applied to must have been designed to receive motion capture data: the bones must be named, oriented and arranged appropriately. Mixamo rigs are a good reference.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
XSens Server Address	The address / IP of the XSens server providing the skeleton stream.
XSens Server Port	The port of the XSens server providing the skeleton stream.

Avatar Index	Select the mocap actor to drive the skeleton.
Rotate Bind Pose Joints By Facing Direction	Determines whether the input skeleton has been rigged so that the bones in their bind pose are rotated to point in the direction of the next bone, or whether they are unrotated in their bind pose.
Input Skeleton Scale	uniformly scale the size of the input mobcap skeleton.
Mirrored	Mirror the movements of the incoming mobcap data along the x axis.

Inputs

Name	Description	Typical Node Input
Mocap Stream	Input a pre-recorded mocap stream to run instead of any live data.	Mocap Stream
Hierarchy Root	The root of the input skeleton to be driven by motion capture.	You'll need to connect the skeleton root within an Imported 3D Scene.
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Interactive

Method

Interactive nodes give outputs based on various kinds of live inputs. Most work with numerical values, although the RSS Feed Node and RSS Text Selector output a text string, and the Mouse Picker outputs translation data.

Interactive nodes can be applied to almost any attribute of a node, simply double-click a node in the nodegraph to see its drop down attribute list, and connect to the square next to the attribute. If an attribute isn't in the drop down list, it cannot be modified with an interactive node.

- Artnet Recording Playback
- Clock Time Modifier
- CSV/Table Transform Array
- Hot Zone
- Keyboard Modifier
- Mouse Picker
- RSS Feed Node
- RSS Text Selector
- TUIO Transform Array
- VR Controller
- VR Look-At Trigger

Artnet Recording Playback

Method

The Artnet Recording Playback node allows the playback of Artnet data that has been recorded using Notch Builder's built-in Artnet recorder, which has a .artnet extension. This allows Artnet data to be captured in a rehearsal or live environment and then taken offline as a recording to use in testing and when developing Notch scenes that require the data.

To record Artnet inside Builder use the Devices -> Capture Artnet Data menu option. A stream will be recorded until the option is selected again to stop recording. The Artnet recording can then be imported as a resource via the Interactive -> Artnet Recording resource option. The entire Artnet stream is recorded, including all the universes Notch is receiving – not just the channels which have been bound to parameters in Notch.

Once added to the scene and enabled, the Artnet Recording Playback node replaces the live incoming Artnet stream with the data recorded in the file. The Artnet Recording Playback node can be placed on the timeline to define where it is effective and to offset playback. Once the node is removed or disabled or is not in scope, data receiving will resume from the live incoming Artnet feed.

Attributes

Name	Description
Artnet Recording File	The recorded Artnet data

Inputs

There are no inputs for this node.

Blacktrax Tracked Body

Method

Takes a single Blacktrax *Trackable* and provides it as a tracked point (a bit like Null). You can track either the rigid body position and rotation of a given trackable or just individual tracked LEDs. To use, parent other objects to this node to have the positions and rotations inherited.

> To enable listening to the Blacktrax data, you need to configure the Blacktrax options in menu: *Devices->Mocap/Camera/Streaming Device Settings*

> A *trackable* is a Blacktrax name for a tracked object. It can either be a point, or rigid body.

Attributes

Name	Description
Select Trackable	When receiving Blacktrax data, this enables you to select a provided trackable.
Trackable Name	The name of the trackable (as defined by Blacktrax)
Trackable Type	Choose whether to take the centroid of all the LEDs or take the position of a single LED
LED Index	If Trackable Type is *LED Points* then, choose the index of the LED to track.
Flip Z Axis	Flip positions in the Z axis
Flip Z Rotation	Flip rotations in the Z axis

Outputs

Nodes parented to this node will follow the standard parent-child relationship for transformation (Position, Rotation).

Blacktrax Transform Array

Method

Takes multiple Blacktrax *Trackables* and instantiates the child nodes at the tracked points. You can track either the rigid body positions and rotation (Centroids) of given trackables or every LED of the *trackable*.

If you only wish to instantiate a subset of the *trackables* that Blacktrax is sending you can use the *Trackable Filter* attribute to set a prefix filter that all *trackable* ids must start with.

> To enable listening to the Blacktrax data, you need to configure the Blacktrax options in menu: *Devices->Mocap/Camera/Streaming Device Settings*

> A *trackable* is a Blacktrax name for a tracked object. It can either be a point, or rigid body.

Attributes

Name	Description
Trackable Type	Choose whether to take the centroid of all the LEDs or instantiate an array item for each LED
Flip Z Axis	Flip positions in the Z axis
Trackable Filter	A prefix filter for the trackable names

Outputs

Nodes parented to this node will be instantiated for every Blacktrax *trackable* and follow the standard parent-child relationship for transformation (Position, Rotation).

Clock Time Modifier

Method

Uses the system time as a modifier.

Attributes

Name	Description
Time Mode	Choose which time is used for the modifier. • System Clock Time, time based on the system clock of the PC used. • User Set Time, a time set by the user. • Looping Set User Time, the same as Set User Time, but is looped back to User Time once the layer ends.
Value Mode	Choose how the value of the time is output. • Seconds As Rotation, seconds are output as radian values. • Minutes As Rotation, minutes are output as radian values. • Hours As 12-Hour Rotation, hours are output as radian values, following a 12 hour clock. • Hours As 24-Hour Rotation, hours are output as radian values, following a 24 hour clock. • Hours+Minutes As 12-Hour Rotation, hours and minutes are output as radian values, following a 12 hour clock. • Hours+Minutes As 24-Hour Rotation, hours and minutes are output as radian values, following a 24 hour clock. • Seconds As Value, seconds are output as their numerical value. • Milliseconds As Value, milliseconds are output as their numerical value.
Scale	Scale the output modifier.
Operation	What operation is done to the modified attribute. • Add, adds the current value to where its input. • Subtract, subtracts the current value to where its input. • Multiply, multiplies the current value to where its input. • Replace, replace the value where its input by the current value.
User Time	Choose when the user time starts.
User End Time	Choose when the user time ends.
User Date	Change the date for the User Time.

Inputs

There are no inputs for this node.

Outputs

The outputs section for this node is currently being worked on.

CSV/Table Transform Array

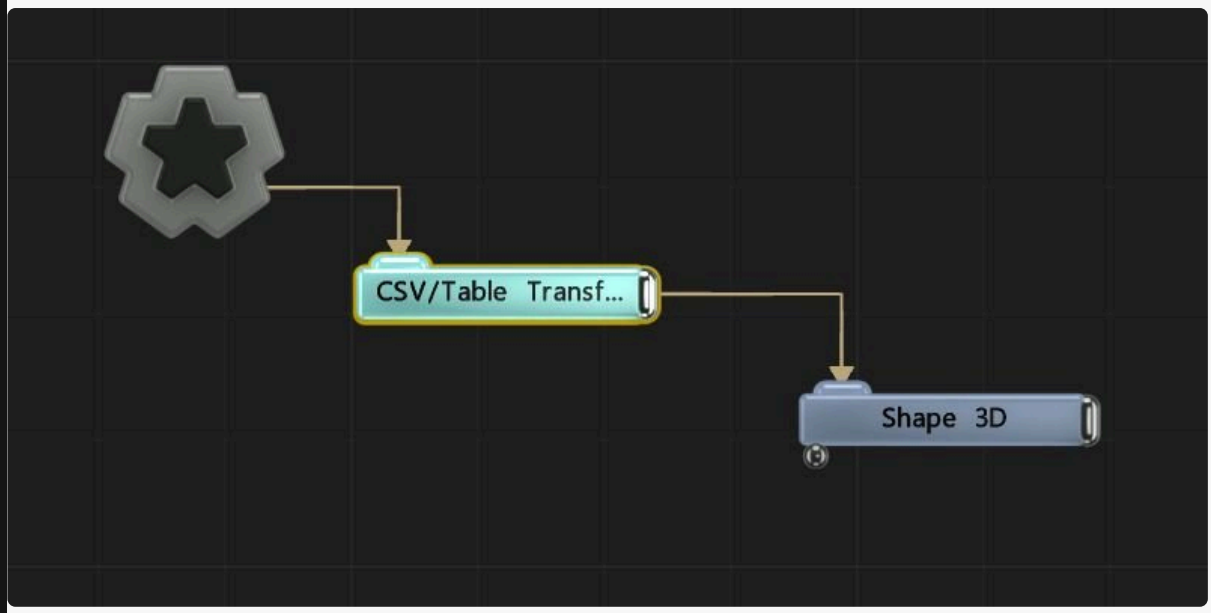
Method

This reads an array of transforms from a table resource. The array is used to instance the child subtree of the node – so the subtree / children are re-rendered for every transform in the array. The number of elements in the array will match the number of rows (Table) or items (Flat list) in the table.

Each transform channel (position, rotation, scale) can be:

- attached to a column of the table (in Table mode)
- step offset for each item
- be kept constant

Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.

Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
CSV File	The table resource.
Table Layout	• Flat List: A row of separated values. • Table – Row per point: The more traditional 2D table layout
CSV Entries Per Transform	Used for 1D/Flat List setups, where you need to specify the number of CSV instances per transform instance

Channel Data

Name	Description
Channel Source – Position/Rotation/ Scale X/Y/Z	• CSV Data : Read the value from the table • Constant: Set all the values for this attribute as a single constant value • Stepped: Step the position by the Channel Offset for each entry
CSV Index – Position X/Y/Z	Behavior depends on Table Layout: • Table: The column that holds the data (First column = 0) • Flat List: The index of the item in the separated values (First item = 0)
Channel Offset – Position X/Y/Z	Offsets by the given amount (regardless of CSV Data, Constant, Stepped)
Channel Scale – Position X/Y/Z	Behavior depends on Channel Source: • CSV Data: Scales the table value by this amount • Constant: No effect • Stepped: Step increases the value for every instance by this value

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Notes

! maybe requires something.

Hot Zone

Method

This node detects if the centre point of an object moves into a region. Generally used in conjunction with an Extractor node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Current Hit Zone	Outputs a different value for each possible hit zone.
Any Hit Zone	Outputs a value if any zone is hit.
Shape	Select a shape to check overlap with.

Inputs

Name	Description	Typical Node Input
Test Points	Points to test the position of.	Null

Zones	Zones within which to check for the Test Points..	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

When connected to an extractor, “Current Hit Zone” and “Any Hit Zone” can output their value and control other nodes.

Keyboard Modifier

Method

Detects keyboard key press and generates an output.

> ! Keyboard modifier only works in Builder (when the Keyboard Modifier Node is selected) and in Standalone executables. It does not function in media servers, as media servers capture all keyboard functions.

Attributes

Name	Description
Key	Which key to detect.
Scale	The scale/range of the modifier
Attack	How quickly the output reaches its peak.
Decay	How slowly the output moves back to its resting position.
Operation	What operation is done to the modified attribute. • Add, adds the current value to where its input. • Subtract, subtracts the current value to where its input. • Multiply, multiplies the current value to where its input. • Replace, replace the value where its input by the current value.
Behaviour	Choose whether the key needs to be held down, or is toggle-able.

Inputs

Name	Description	Typical Node Input
Blend Amount	How much the output value should affect the original value.	Envelope Modifier

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Mouse Picker

Method

Detects a mouse pressed event and outputs the position of the mouse in either world space or local space.

> ! Mouse picker only works in Builder and in Standalone executables. It does not function in media servers, as media servers capture all mouse functions.

Attributes

Name	Description
Active – Responding To Mouse	Toggle whether mouse clicks will be registered or ignored.
Position Plane	Which plane the mouse position is calculated for. • Local X / Y / Z Plane, Chooses the plane along either the X, Y or Z axis, local to the mouse picker. • Camera View Plane, Camera Relative to the X and Y coordinates of the cameras view plane.
Plane Offset	Plane offset from the selected Position Plane.
Direction Smoothing	How much smoothing is done to changes in the output rotation.
Use Movement Direction As Rotation	Toggle whether the movement of the mouse is output as a rotation.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node outputs an X, Y and Z position as well as rotations if Use Movement Direction As Rotation is

enabled. These can be used through parenting a child to the mouse picker, or as inputs into any nodes X, Y, and Z positions.

RSS Feed Node

Method

The RSS Feed node combs data from an RSS feed from the Internet. Requires an Internet connection to function properly.
The elements of the RSS feed may be accessed using the RSS Text Selector, displayed using Text nodes or Image Plane nodes. Additional processing may be done using Javascript.

Attributes

Name	Description
URL	URL used to find the RSS feed.
Cache Directory	The directory used to cache image data from the RSS feed.
Backup Data	Text containing RSS feed XML data which will be used instead of live data if there is no connection possible to the live feed.
Text Change Rate	How often a new line of text is added to the feed.
Update Feed Rate (Minutes)	How often the RSS feed is checked for new entries.
Display Mode	What data from the RSS feed will be output. • Titles, only the RSS feed titles are displayed. • Titles And Times, both the title and the time it was updated. • Descriptions, the description from the RSS feed is output. • Times, the time the RSS Feed is sent is output. • Titles And Description, the title is displayed above the description. • Titles, Times And Description, all the RSS feed data is displayed.
Choose Entry Mode	What order new entries from the RSS Feed are output in. • Sequential, new entries are added in the order they appear on the feed. • Random, new entries are added randomly from the feed. • Coming Next In Time, the new entry is only displayed once it has been received. • Random – Bias To Most Recent, same as random but with a bias towards the most recent updates from the feed.

Inputs

Name	Description	Typical Input
Time Source	Input a time code from which to decide the time to draw the RSS	Clock Time

Node	feed from.	Modifier

Outputs

The outputs section for this node is currently being worked on.

RSS Text Selector

Method

Extracts a text field from an RSS feed which has been provided as an input and is required for this node to function.
This node can be used as an input to a Text node in order to render the text.

Attributes

Name	Description
Text Change Rate	How often a new line of text is added to the feed.
Display Mode	What data from the RSS feed will be output. • Titles, only the RSS Feed titles are displayed. • Titles And Times, both the title and the time it was updated. • Descriptions, the description from the RSS feed is output. • Times, the time the RSS feed is sent is output. • Titles And Description, the title is displayed above the description. • Titles, Times And Description, all the RSS feed data is displayed.
Choose Entry Mode	What order new entries from the RSS Feed are output in. • Sequential, new entries are added in the order they appear on the feed. • Random, new entries are added randomly from the feed. • Coming Next In Time, the new entry is only displayed once it has been received. • Random – Bias To Most Recent, same as random but with a bias towards the most recent updates from the feed.

Inputs

Name	Description	Typical Input
Time Source Node	Input a time code from which to decide the time to draw the RSS feed from.	Clock Time Modifier
RSS Feed	Input an RSS Feed to for the mesh source..	RSS Feed

Outputs

The outputs section for this node is currently being worked on.

TUIO Transform Array

Method

This node generates a transform array from TUIO data sent from a suitable external application that supports the TUIO protocol, via a network connection.

For TUIO to function, you'll need a supporting application such as TUIOpad. This will be used as a source for the incoming TUIO Data. You will then need to make sure the host address and port number are the same as the target machines IP address and port number.

You can then use TUIO in much the same way as a standard Transform Array.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Attributes

Name	Description
Axis	Which axes for the generated shapes to generate on.
TUIO Cursors	Allow the TUIO node to receive Cursor data.
TUIO Objects	Allow the TUIO node to receive Object data.
TUIO Blobs	Allow the TUIO node to receive Blob data.
Use TUIO Rotations	Use rotations from the incoming TUIO source.
Use TUIO Scales	Use scales from the incoming TUIO source.

Use TUIO ID's For Transform Indexing	Use the TUIO ID's to index each point generated. This will attempt to keep cloned shapes consistent, but can lose points.
Flip Y Axis	Flip the Y axis of the incoming TUIO data.

Inputs

Name	Description	Typical Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

VR Controller

Method

This node is an object with full position and rotation data. It is generally used as a parent to other objects to provide them with position/rotations.

However, it can be used in tandem to an Extractor Node to extract button presses. The output of the VR Touch Controller node is fed into the *Source* input of the Extractor node.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Controller ID	Select which VR Controller is to be tracked.

Inputs

Name	Description	Typical Node Input

Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

these attributes will be visible when connected through an Extractor Node.

Name	Description
Position X	Position of the Controller in X
Position Y	Position of the Controller in Y
Position Z	Position of the Controller in Z
Rotation Heading	Rotation of the Controller in Y
Rotation Pitch	Rotation of the Controller in Z
Rotation Bank	Rotation of the Controller in X
Button A	1.0 if pressed
Button B	1.0 if pressed
Index Trigger	1.0 if pressed
Hand Trigger	1.0 if pressed
Thumb Stick X	X position of the joystick / pad
Thumb Stick Y	Y position of the joystick / pad

VR Look-At Trigger

Method

This node allows you to create effects based on what the VR user is looking at. The target is a cuboid region specified by the scale and position.

When the user looks at the defined space, the *Current Value* parameter will increase (at a rate defined by Required Hit Duration).

Use an Extractor modifier to use the *Current Value* to effect other parts of your scene.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Current Value	Value moves from 0.0 to 1.0 as the VR user looks at the target. Speed is set by Required Hit Duration.
Current Value With Button	Value moves from 0.0 to 1.0 as the VR user looks at the target, but increases greatly when a button is pressed. Speed is set by Required Hit Duration With Button.
Required Hit	The time it takes for the current value to move from 0.0 to 1.0, while the user is looking

Duration	at the target.
Required Hit Duration With Button	The time it takes for the current value with button to move from 0.0 to 1.0, while the user is looking at the target.
Lookat Speed Multiplier	Modify how quickly the Lookat Speed increases on the Current Value With Button.
Check VR Controllers	Enable / Disable the Vr Controllers to be checked if pointing to target.

Rendering

Name	Description
Show Hit Points	Enable/Disable Hit Point images.
Hit Point Size	Size of the Hit Point image.
Hit Point Alpha	Alpha of the Hit Point image.
Hit Point Colour	Tint the colour of the Hit Point image.
Hit Point Image	Select an image to be shown when the nodes is activated. Will be overwritten by input nodes.

Inputs

Name	Description	Typical Node Input
Hit Point Image	Add an image to appear when the node is triggered.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain. When connected to an extractor node you can collect the Current Value / Current Value With Button, to activate and control other nodes and effects.

Lighting

Method

Lighting nodes are nodes that control lighting in a scene. Most emit light from different shapes or objects, but some control how light is emitted or scattered in the scene.

Lighting nodes are generally hooked into the Root node, although they can be applied to any node – they will still appear in the scene as long as there is a path to a Root node.

- Ambient Light
- Area Light
- Area Lights From Polygons
- Bake Lighting
- Bake Lighting To Object
- Directional Light
- Environment Map
- Fog Scattering
- Light
- Planar Environment Map
- Planar Reflection
- Point Cache
- Point Lights From Vertices
- Probe Lighting
- Project Image
- Screen Space Ambient Occlusion
- Screen Space Reflections
- Shadow Volume
- Sky Light
- Volumetric Lighting
- Voxel Cone Lighting

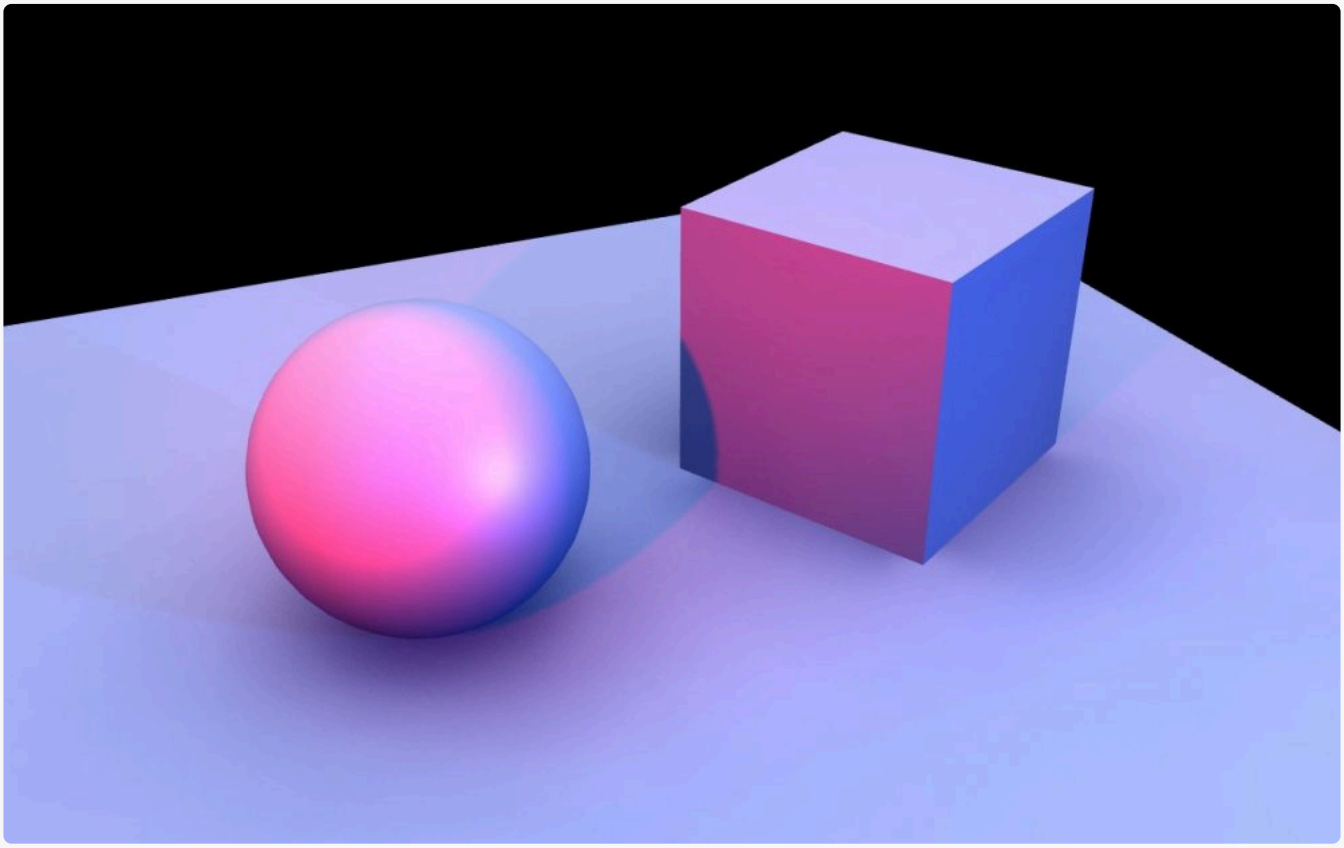
Ambient Light

Method

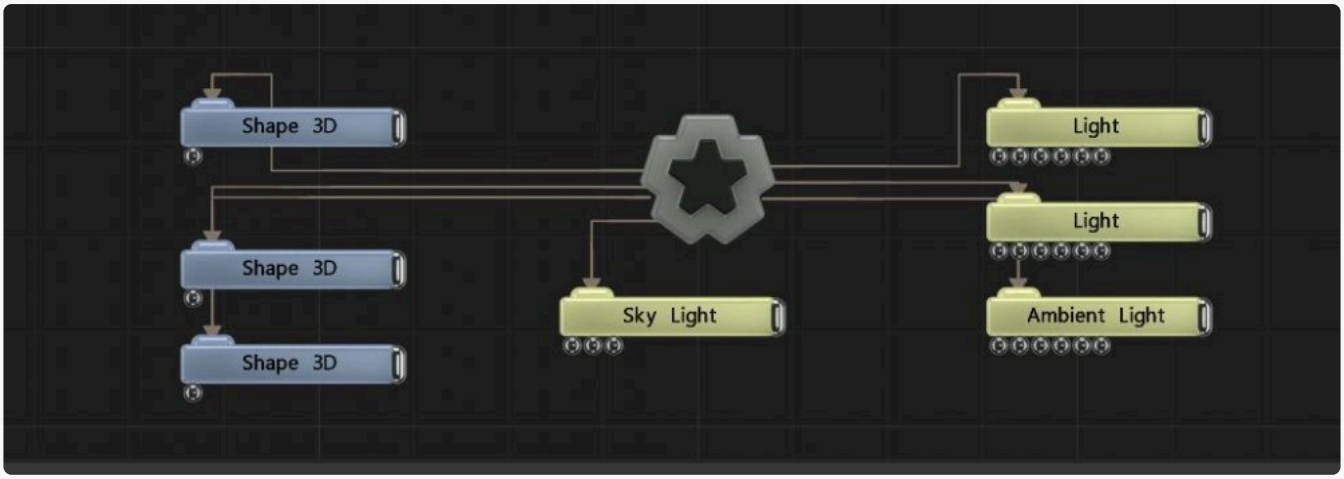
Add a light that affects all surfaces in the scene with a base ambient light level.

This is a great tool for adding light to dark and shadowed areas.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	The colour of the light.
Brightness	How bright the light is.
Scattering Intensity	How much the light is scattered in the scene, creating a bright area around the light.
Falloff Mode	Change how the light falloff is calculated. • Inner / Outer Radius (Legacy), light falloff is calculated between the inner

	and outer radii. • Inv-Squared Distance (Physical), the light falloff is calculated based on a physically accurate system.
Inner Attenuation Distance	Inner distance within which the light remains at full strength
Attenuation Distance	Maximum distance the light reaches.
Falloff Power	Change how strong the falloff for the light is between the Inner Attenuation Distance and the Attenuation Distance.
Show Light Cone	Show a cone in the scene to represent the lights current position and rotation.

Inputs

Name	Description	Typical Node Input
Projection Image	Add in an image to be projected by the light.	Video Loader
Affected Nodes	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Texture Projection Node	Connect a node from which to project the image from. Only functions if an image is being projected from the light.	Null
Multi-Source Controller	Depreciated feature.	
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

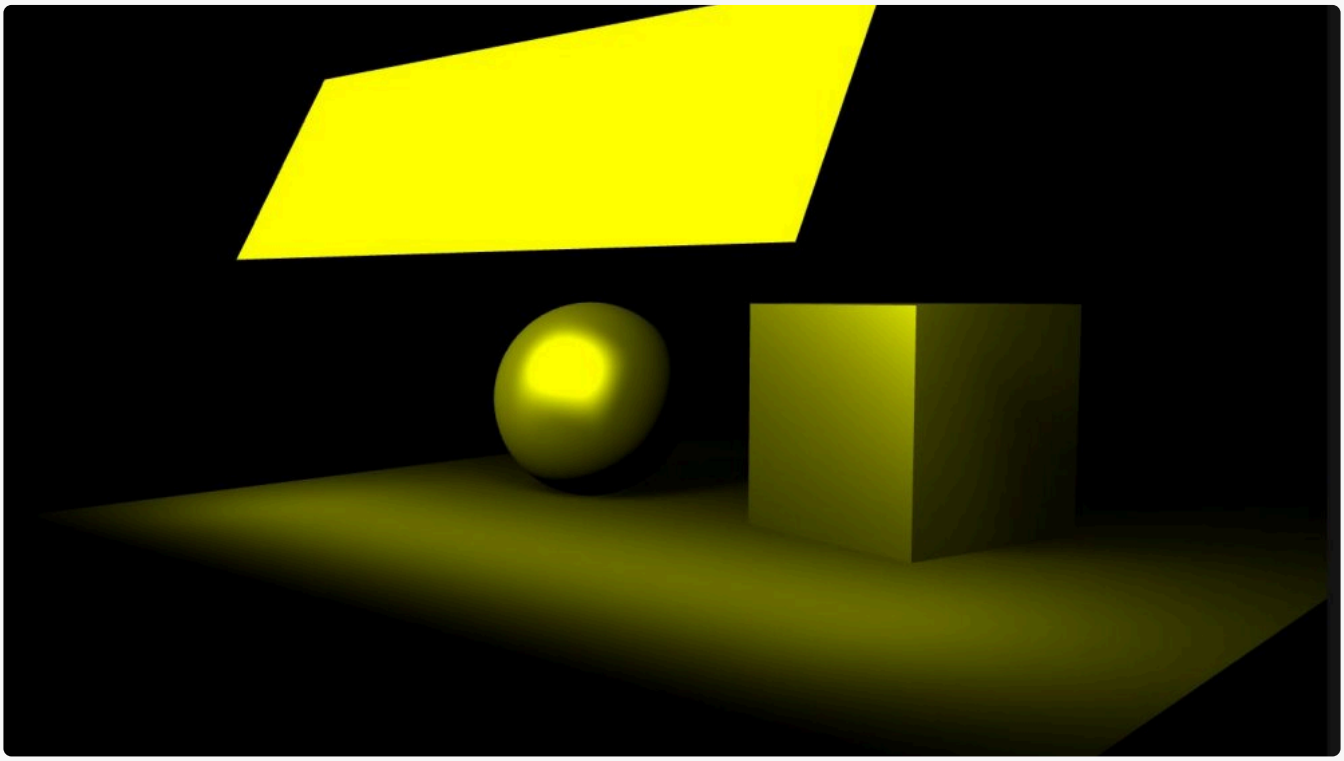
Area Light

Method

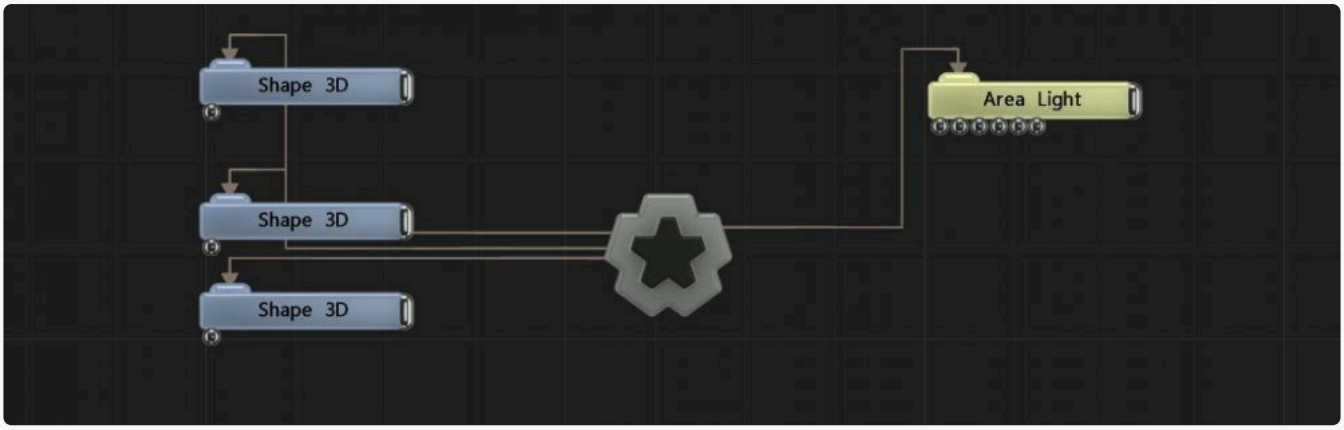
Emit light from a rectangular area, giving a soft light across a scene. An image texture can be input to emit light from the image based on a texture.

This light is great for producing a long flat light source.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	The colour of the light.
Brightness	How bright the light is.
Scattering Intensity	How much the light is scattered in the scene, creating a bright area around the light.
Double Sided	Toggle whether light is emitted from both sides of the area light.
Visible Surface	Toggle whether the Area Light Surface is visible to the light.

Raytraced	This will enable raytracing for the area light, allowing soft shadows to be cast. Only works with Raytracing enabled in the Root node
Falloff Mode	Change how the light falloff is calculated. • Inner / Outer Radius (Legacy), light falloff is calculated between the inner and outer radii. • Inv-Squared Distance (Physical), the light falloff is calculated based on a physically accurate system.
Inner Attenuation Distance	Inner distance within which the light remains at full strength
Attenuation Distance	Maximum distance the light reaches.
Falloff Power	Change how strong the falloff for the light is between the Inner Attenuation Distance and the Attenuation Distance.
Apply Specular	Control whether this light applies specular light onto objects.
Apply Diffuse	Control whether this light applies diffuse light onto objects.
Show Light Cone	Show a cone in the scene to represent the lights current position and rotation.

Shadows

Name	Description
Raytraced Shadow Samples	How many samples will be taken per frame for raytracing. Best used with continuous refinement enabled and the Denoiser Node
Z Bias	Increasing Z bias will improve the accuracy of grounding objects to their shadows.
Post Filter	Apply a filter to the light map which blurs the output result, smoothing it out.

Inputs

Name	Description	Typical Node Input
Projection Image	Add in an image to be projected by the light.	Video Loader
Affected Nodes	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Texture Projection Node	Connect a node from which to project the image from. Only functions if an image is being projected from the light.	Null
Multi-Source Controller	Depreciated feature.	
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

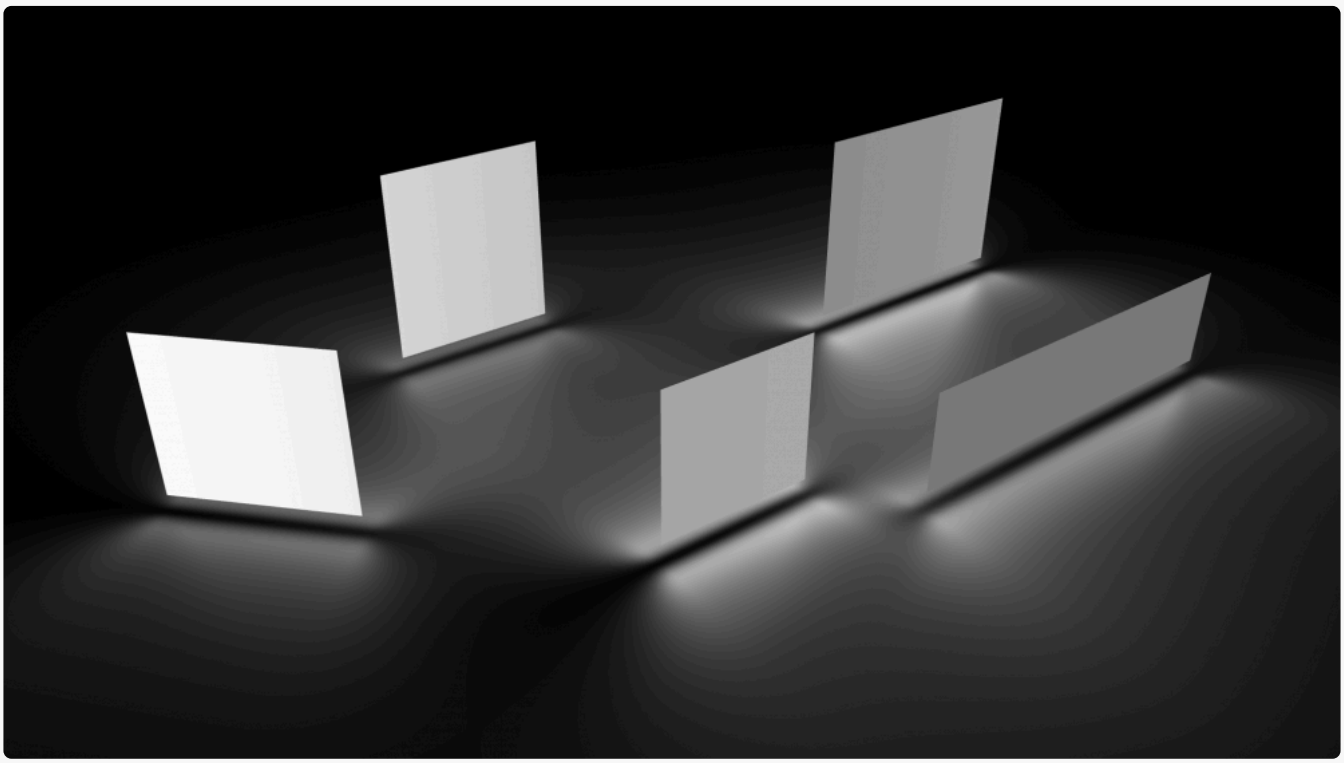
Area Lights From Polygons

Method

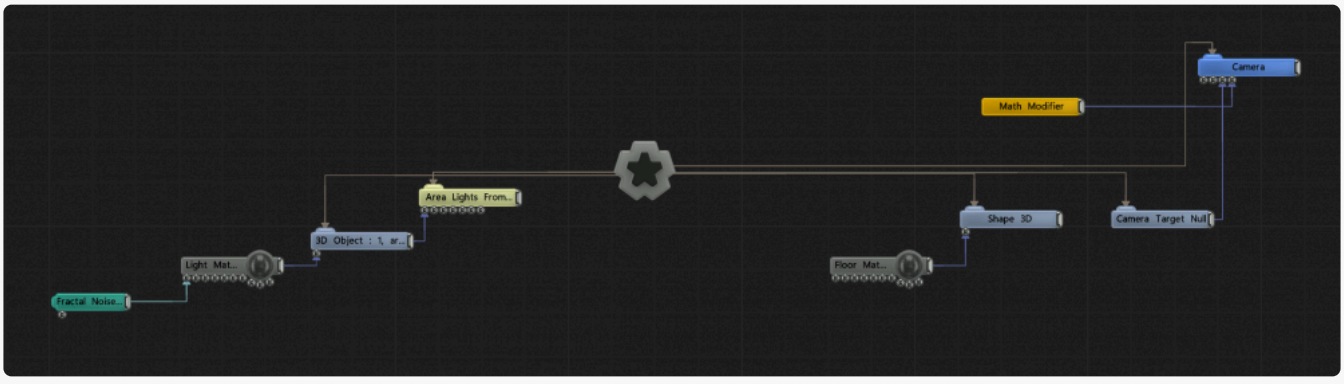
This node emits light from a polygonal mesh. All polys must be rectangular. The light is emitted based on quads, so tri-gons or n-gons will not calculate properly. A maximum of 128 polys is allowed.

Lights are generated per poly, so if you tessellate to tris you get 2x lights per quad.

Example



Example Nodegraph



Attributes

Name	Description
Colour	The colour of the light.
Brightness	How bright the light is.
Scattering Intensity	How much the light is scattered in the scene, creating a bright area around the light.
Falloff Mode	Change how the light falloff is calculated. • Inner / Outer Radius (Legacy), light falloff is calculated between the inner and outer radii. • Inv-Squared Distance (Physical), the light falloff is calculated based on a physically accurate system.
Inner Attenuation Distance	Inner distance within which the light remains at full strength
Attenuation Distance	Maximum distance the light reaches.
Falloff Power	Change how strong the falloff for the light is between the Inner Attenuation Distance and the Attenuation Distance.
Double Sided	Toggle whether light is emitted from both sides of the area light.
IES Profiile	This feature is deprecated.
Show Light Cone	Show a cone in the scene to represent the lights current position and rotation.

Inputs

Name	Description	Typical Node Input
Object Node	Input an object from which the light will be emitted.	3D Object
Projection Image	Add in an image to be projected by the light.	Video Loader
Affected Nodes	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Texture Projection Node	Connect a node from which to project the image from. Only functions if an image is being projected from the light.	Null
Multi-Source Controller	This feature is deprecated.	
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Bake Lighting

! This node is being deprecated. Please use the “Bake Lighting to Object” node instead.

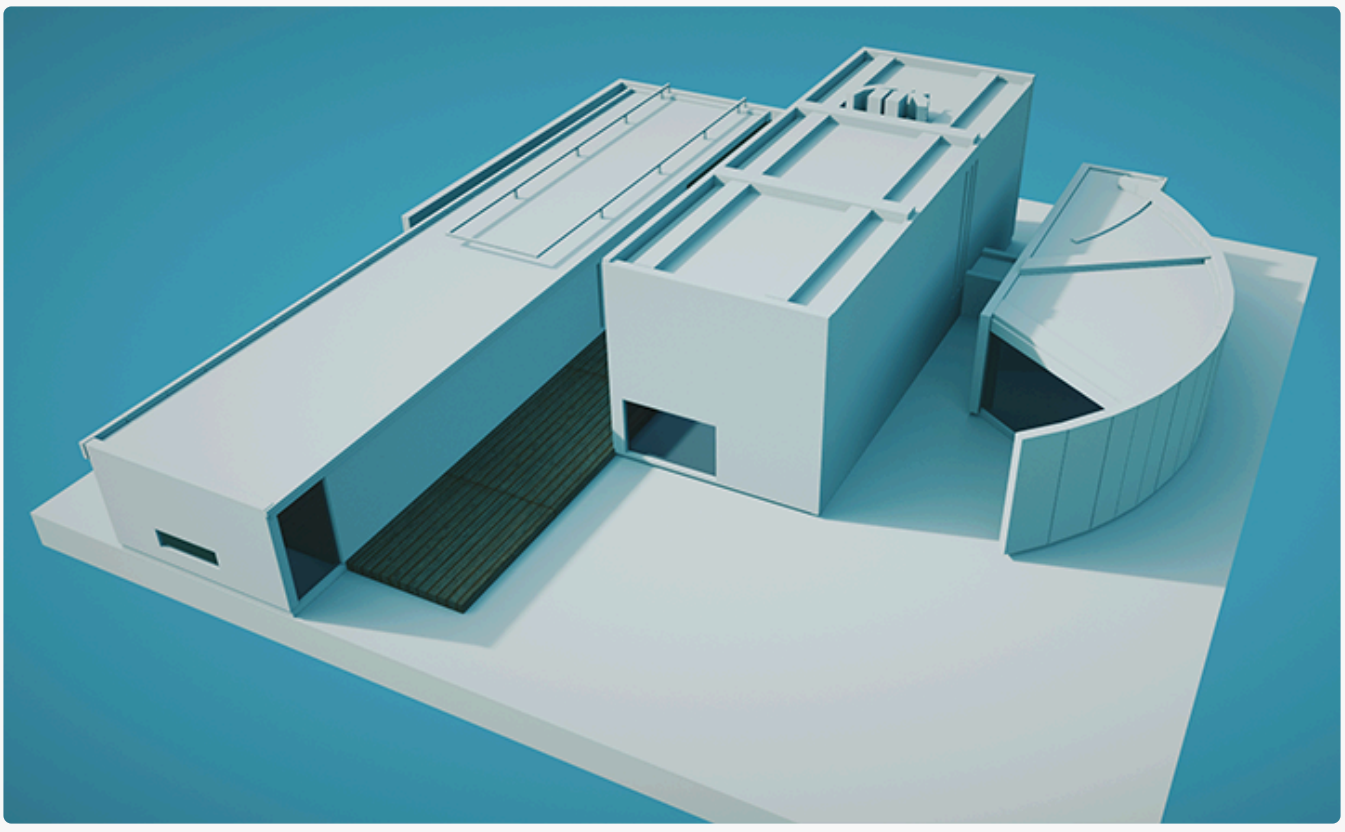
Bake Lighting To Object

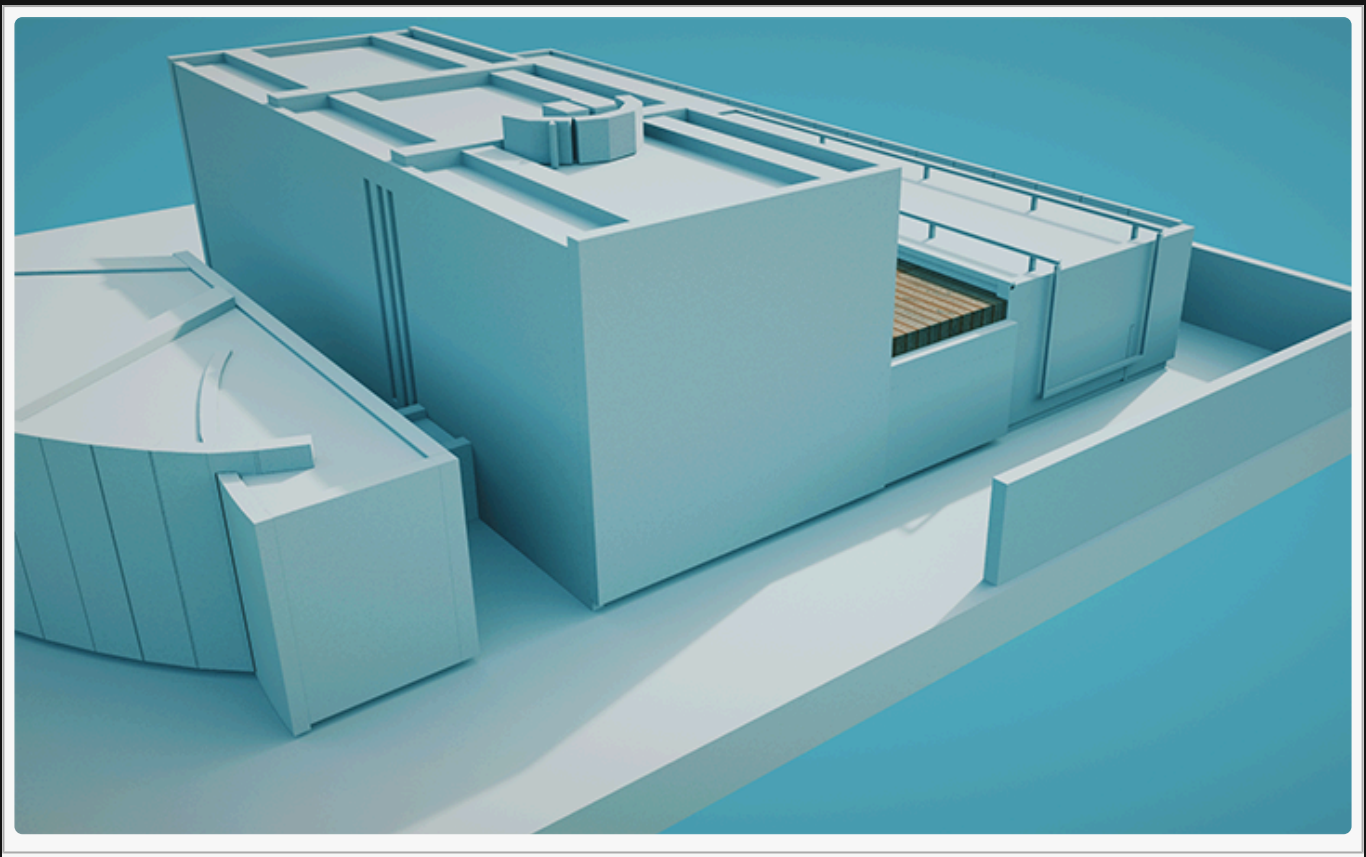
Method

The Bake Lighting To Object node bakes static lighting information for objects in the scene into lightmap textures, which are then applied back on to the objects to replace dynamic lighting.

Baking the static lighting of the scene will drastically improve the performance of a Notch scene that uses processing-intensive lights such as skylights, raytraced lighting and shadowed lights. By baking in the static lighting information, those baked light nodes will have no performance cost. These lights can be turned off/hidden (Ctrl 1) once the scene has been baked.

> ! Baking is only applicable for static 3D objects with suitable UVs. Objects generated in Notch – e.g. text, primitives or splines, or cloned geometry – are not suitable for baking.





Setting up the scene

Building a Notch scene for light baking is no different from setting up any other Notch scene. The only additional task that is required is to create a secondary UV channel with non-overlapping unique UVs for any meshes that you want to statically bake.

> Baking lightmaps will only work if either the original UV layout has non-overlapping unique UVs or a 2nd UV set has been set up with non-overlapping unique UVs.

> Non-overlapping unique UVs are where every polygon has a unique UV space that doesn't overlap any other polygon in the UV layout. Overlapped UV's will cause lighting errors on the lightmap textures because they will share lighting and shadow information which will be baked onto both polys that share that UV space. If one poly surface is in shadow and another poly surface is lit, by sharing the same UV space both polys will be shadowed.

To set up the baked lighting scene, firstly add a Bake Lighting To Object node to the node graph and connect the 3D mesh that you want to bake into the top of this node. A Bake Lighting To Object node will be required for each object to be baked.

There is an input tab on the bottom of the Bake Lighting To Object node, this is used to attach the lights

that you want to bake in the scene. If any real-time animated lights are required in the scene, these lights should not be connected to the Bake Lighting To Object node.

Once you have connected the Bake Lighting To Object nodes to the objects you can start the baking process.

Please use this example test scene for the following steps Basic_Lightbake.dfx

Step 1

Select the Bake Lighting To Object node, set the width and the height of the lightmap that you want to produce.
Smaller objects should have lower resolution lightmaps and larger objects higher resolution lightmaps.

Step 2

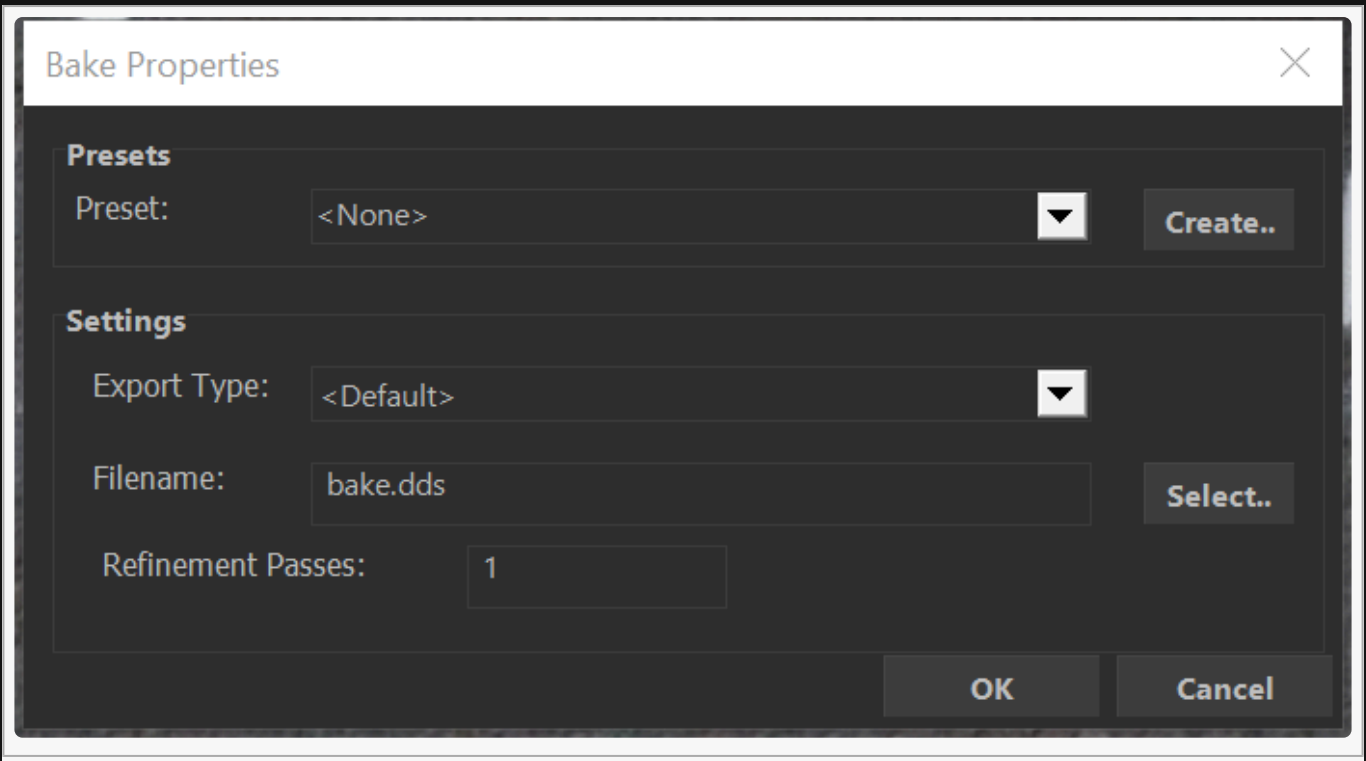
To remove the noise from the lightmap there is a “Post Filter Lightmap” checkbox, this will add a smart blur to the lightmaps making them less noisy. Turn this on before baking the lightmaps.

Select the UV channel that you have set up your unique UV set on. Traditionally Colour UVs are your original UV setup and they are your primary UV layout. It is always best to set up a secondary UV set “Diffuse UV (Lightmap) set on the 2nd UV channel, in this way you can setup up a unique UV’s set on your 3D model without impacting the original UV set.

The UV channel on the 3D mesh will also need to be set. In the properties for the 3D object – UV Sets – Diffuse Texture UV Set – needs to be set to the UV channel you want the lightmap to use.

Step 3

Hit the Bake Now.. button, this will open the bake properties dialogue box.
Set the number of refinement passes that you want on the lightmap the more set the higher the build time and the more refined the lightmap texture. 10 refinements is a good way to preview the lightmap, 500 refinements will take longer but the lightmap will be better quality.

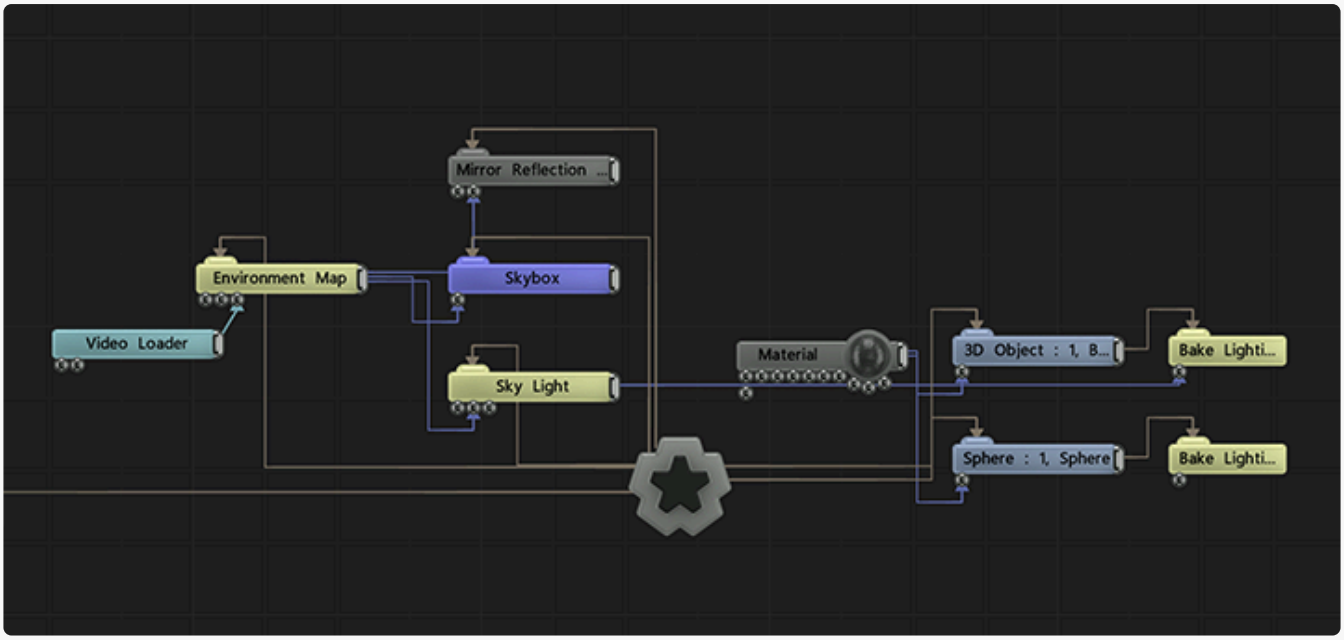


Step 4

Turn off any baked lights, drastically improving performance as they no longer need to be calculated in real-time.
Turn back on any animated lights that you want to keep real-time.

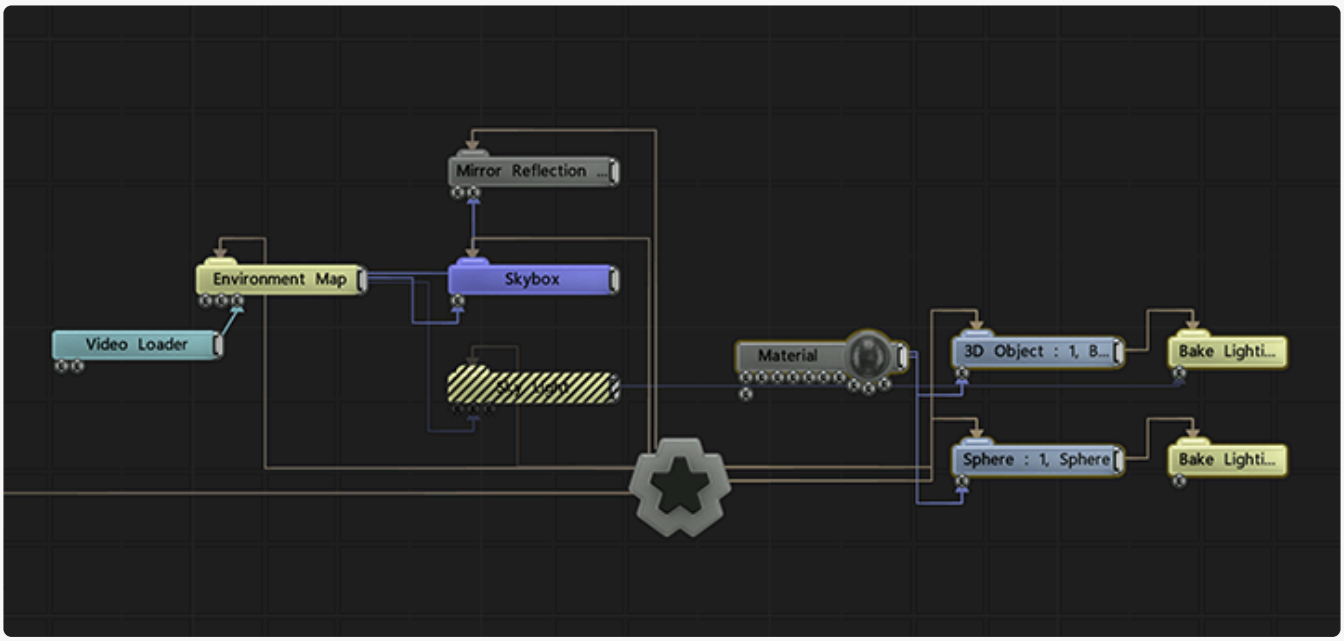
Turn off any reflection nodes to aid builder performance whilst baking the lights.

Example Nodegraph before bake



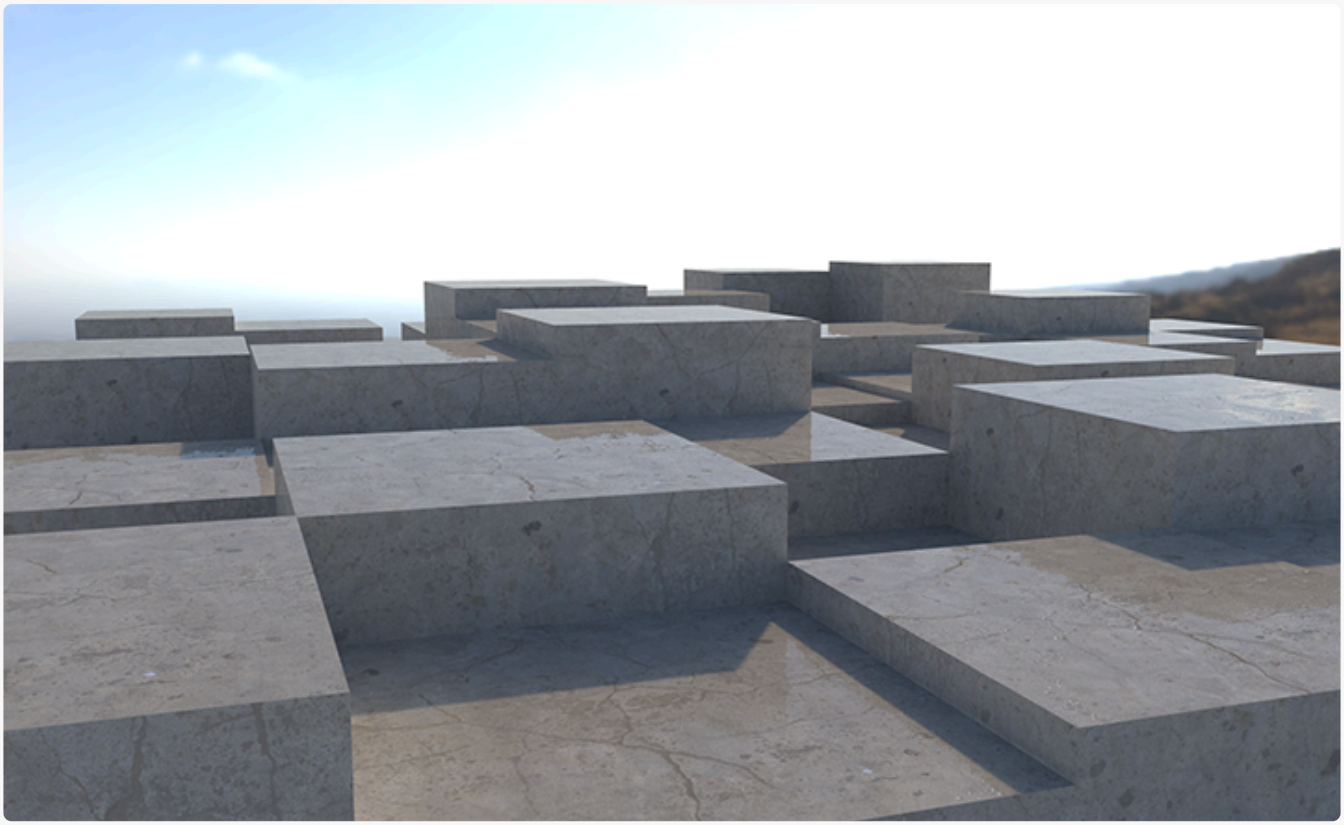
Once the lighting has been baked you can turn off the baked lights.

Example Nodegraph after bake



Baked raytraced sky lighting in an exterior location.

Baked Skylight Exterior



Baked spotlights and raytraced skylight as well as a real-time spotlight.

Baked Spotlights

Bake Lighting To Object

Name	Description
Bake Now	Opens the “Bake Properties” dialogue box.
Show Rendered Texture	Displays the rendered lightmap texture in the viewport.
Width	Sets the width of the lightmap texture.
Height	Sets the height of the lightmap texture.
Bit Depth	Sets the bit depth of the texture, 16bit is HDR.
Post Filter Lightmap	Toggles on and off a smart blur on the lightmap. In order to work, this has to be ticked on before the bake is set off.
Disable Baking (Pass Through)	Hides the lightmap on an object so the lighting is visible.
UV Channel	Sets the UV channel that the lightmap texture uses.
Colour	Default UV channel
Diffuse (Lightmap)	UV channel 2
Colour – Original UV’s	UV channel 1
Baked Lightmap	Automatic name of the baked lightmap

Bake Properties

Name	Description
Preset	Use custom preset values to generate lightmap.
Export Type	This is set to a default texture type.
Filename	Sets filename and location of the lightmap texture.
Refinement passes	This sets the number of refinement passes on each texture, the higher the number of passes the better the fidelity of the lightmap texture (set between 10 Quick pass – 500 high quality)

Outputs

There are no outputs from this node.

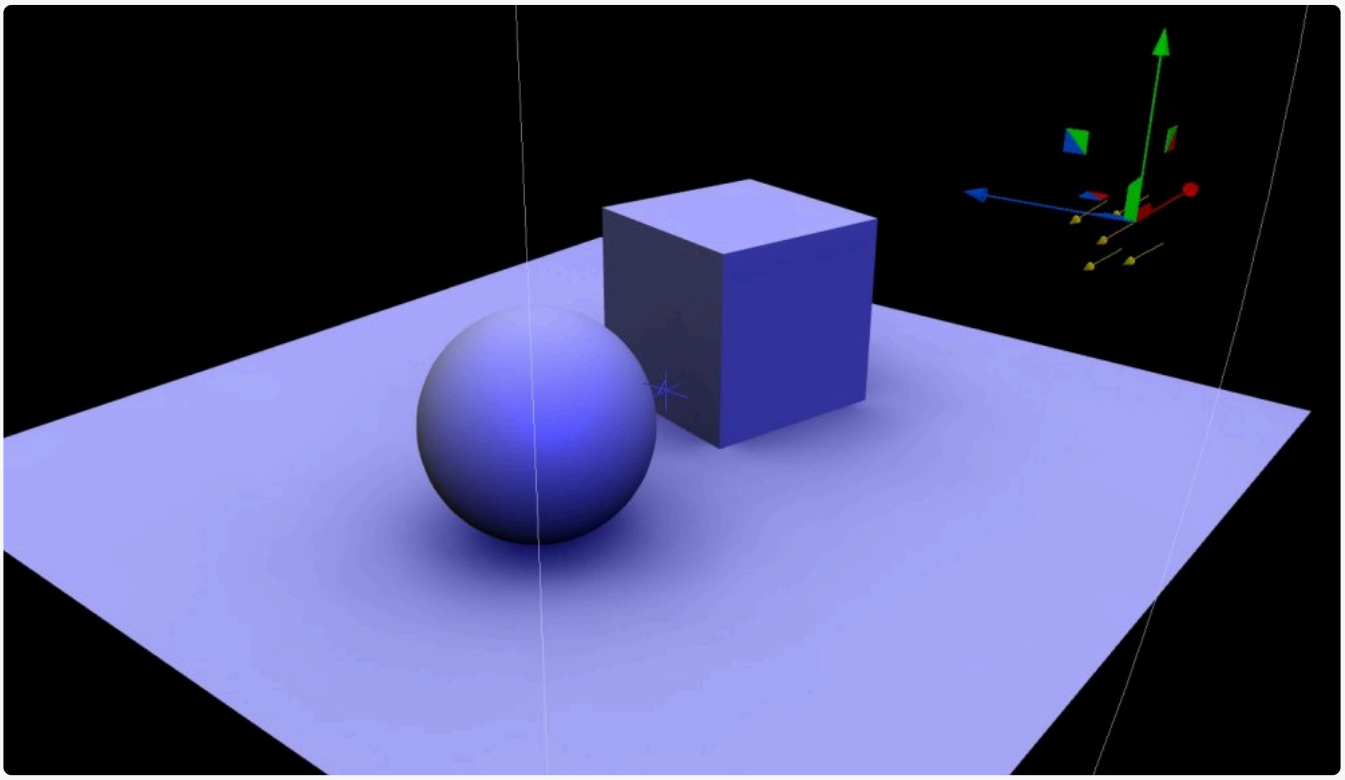
Directional Light

Method

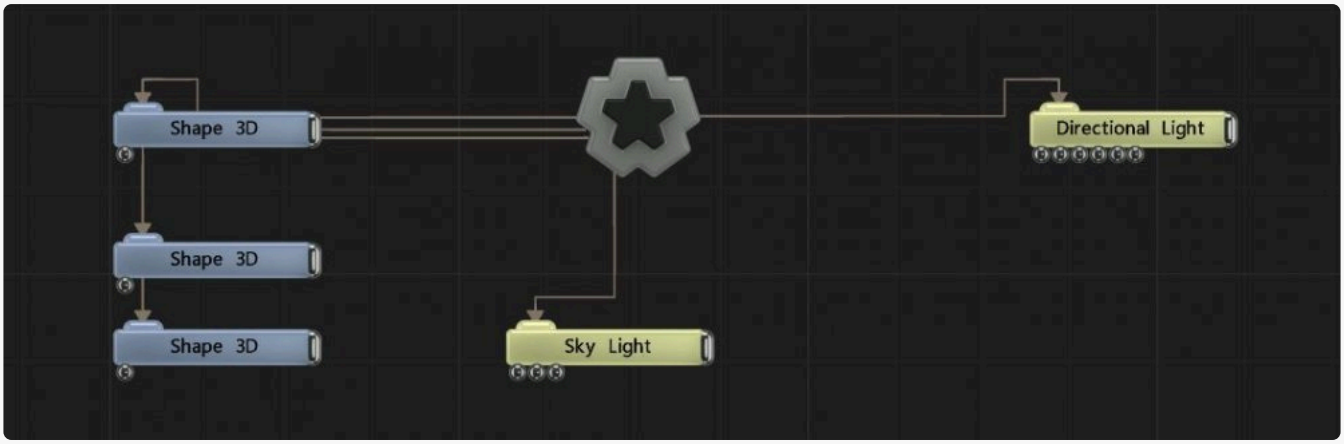
Add a directional light node to a scene to produce ambient directional lighting throughout.
Light is emitted in a parallel direction at the normal to an infinite plane.

Directional lights do not cast shadows.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	The colour of the light.
Brightness	How bright the light is.
Show Light Cone	Show a cone in the scene to represent the lights current position and rotation.

Shadows

Name	Description
Raytraced	This will enable raytracing in the skylight. Only works with raytracing enabled in the Root node
Raytraced Shadow Samples	How many samples will be taken per frame for raytracing. Best used with continuous refinement enabled and the Denoiser Node
Shadow Softness	Change how much softness is applied to the shadow edges.
Z Bias	Increasing Z bias will improve the accuracy of grounding objects to their shadows.
Post Filter	Apply a filter to the light map which blurs the output result, smoothing it out.

Inputs

Name	Description	Typical Node Input
Projection Image	Connect a node from which to project the image from. Only functions if an image is being projected from the light.	Video Loader
Point Cache	Use a point cache node to calculate the surrounding lighting calculations.	Point Cache
Affected Nodes	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Texture Projection Node	Connect a node from which to project the image from. Only functions if an image is being projected from the light.	Null
Multi-Source Controller	Deprecated feature.	
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Environment Map

Method

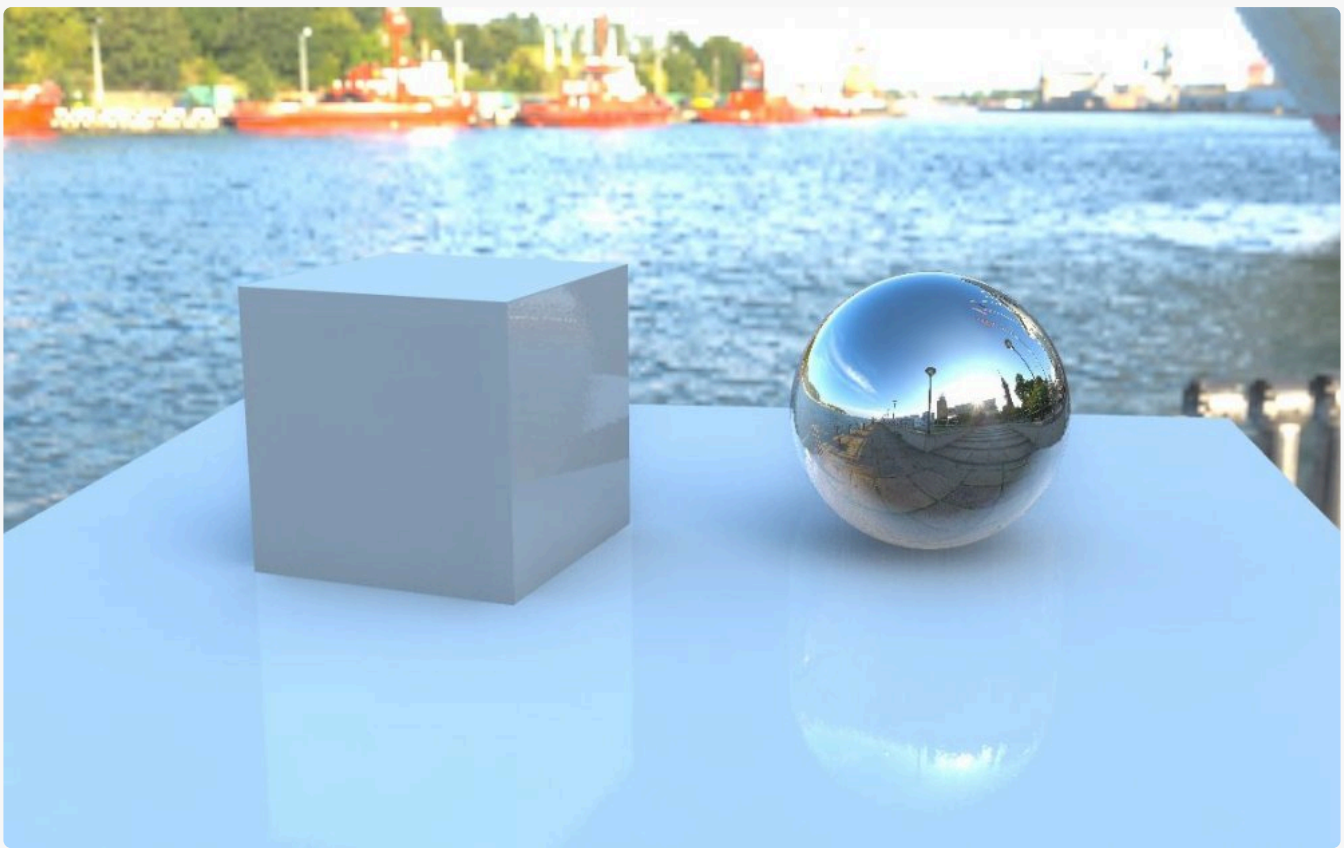
Add an environment map node to a scene, add an image to the nodegraph and plug it into the environment map node. You should Ideally use .exr of .hdr images – HDRI Haven is a great resource for these images.

The environment map output can be plugged into both skylights and skyboxes for an even better visual response.

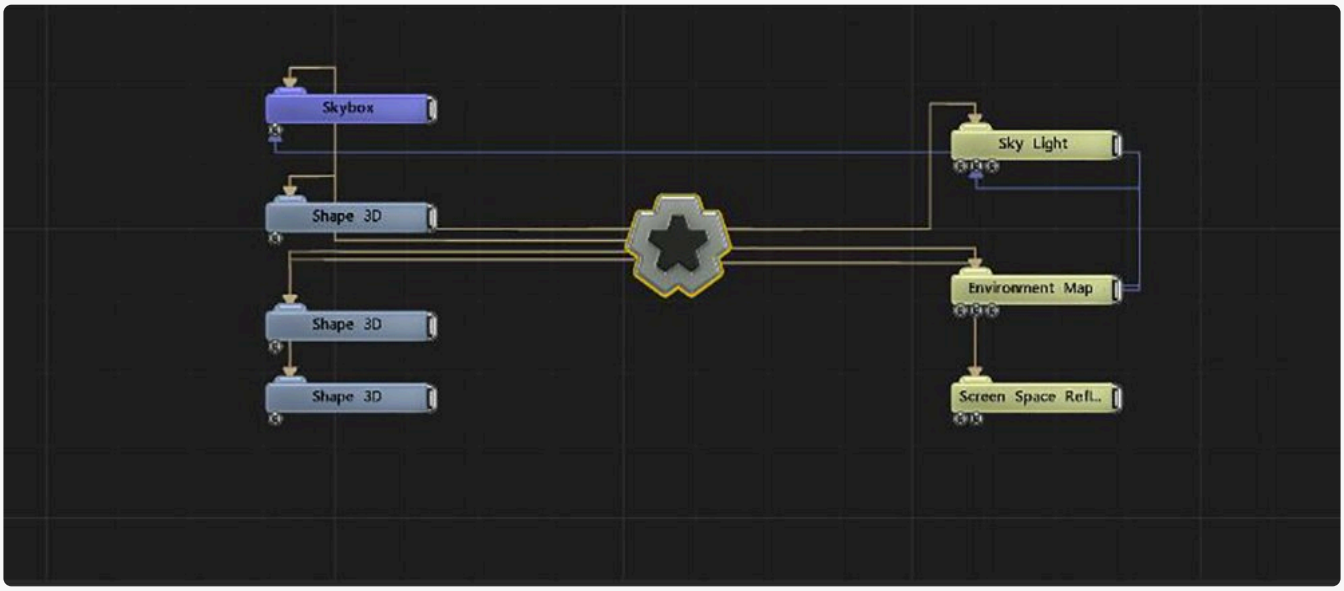
> ✻ Make sure to enabled environment maps in both the root node and on the material of any objects that you want to see it on.

> ✻ Projects will load much faster when you use .exr as opposed to .hdr files for environment maps.

Example



Nodegraph Example



Attributes

Name	Description
Envmap Image	Image used for the environment map.
Brightness	How bright the output environment map is.
Specular Amount	How much the environment map is added to the specular of objects
Diffuse Amount	How much the environment map is added to the diffuse of objects
Image Source Mapping	Select which mapping type was used in the image.
Apply Mode	How the Environment Map is applied to the mesh. • Reflection, The image is applied as a reflection on the surface of the object. • Refraction, The image is applied as a refraction of light through the volume of the object. • Direct Mapping, The image is applied as a spherical map onto the surface of the object.
Sample Quality	The quality of the sampling done across the mesh for the mapping.
Resolution	Resolution of the generated environment map. Higher resolutions can impact performance a lot.
Refractive Surface Thickness	When in Refractive mode, control how refractive the objects surface is.
Max Input Brightness	Maximum brightness from a n image that will be applied. Usually useful with HDR images.

Inputs

Name	Description	Typical Node Input
Objects	Control which objects are affected.	3D Object
Envmap Controllers	Overrides environment map attributes using a null node.	Null
Envmap Image	Override the image in the attributes with an input image.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

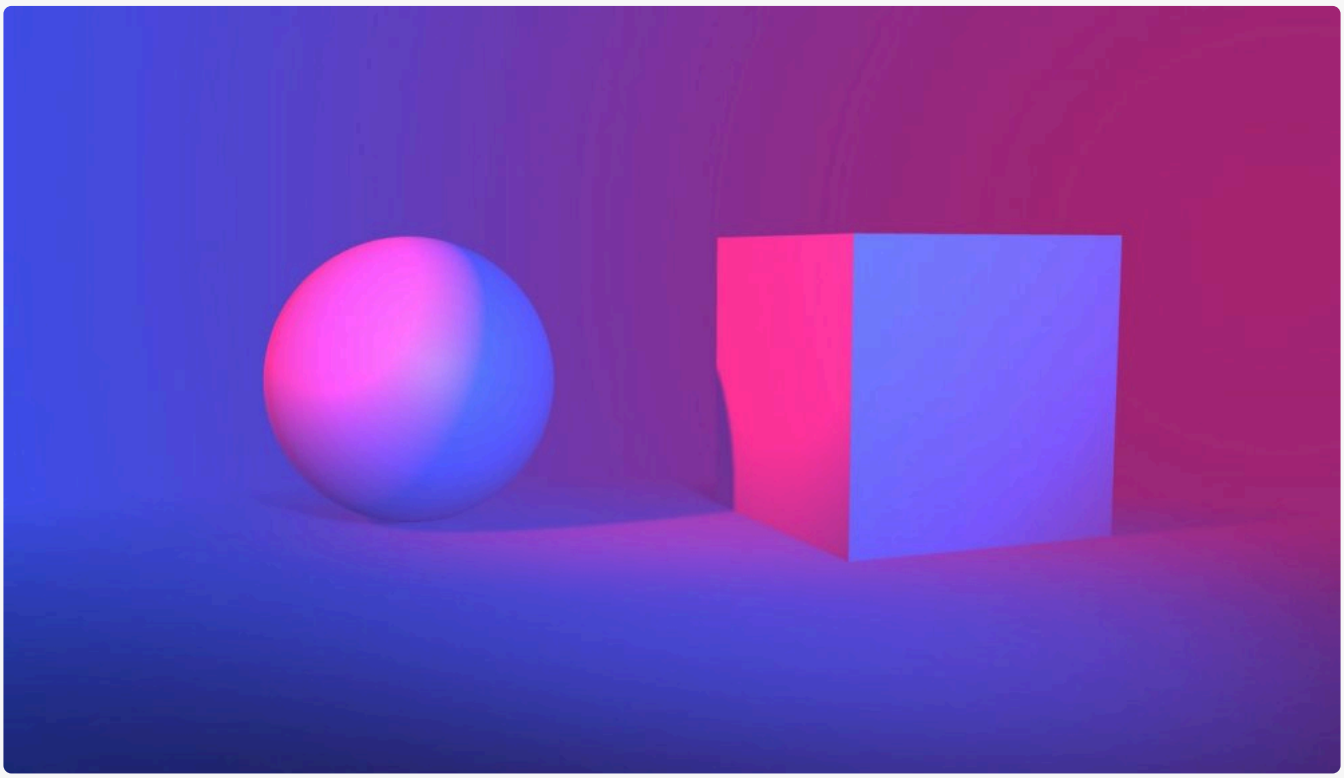
Fog Scattering

Method

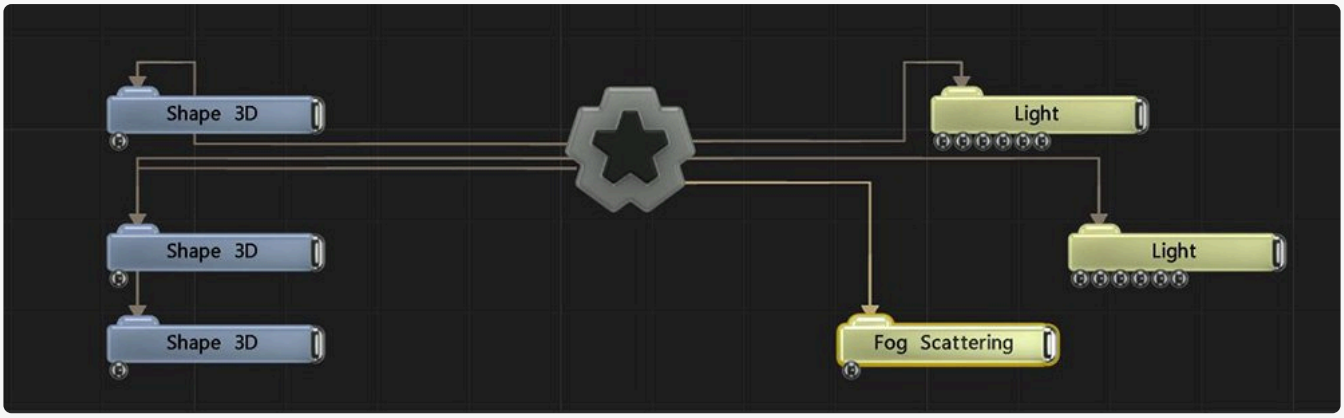
Add fog scattered light to the scene.

Fog scattering is great for creating an atmospheric background to your scene.

Example



Nodegraph Example



Attributes

Name	Description
Fog Colour	Change the colour of the fog generated.
Sun Colour	Change the colour of the light passing through the fog.
Fog Density	Density of the fog generated.
Blend Amount	Blends the density of the fog throughout the scene.
Sun Intensity	How intense the sun colour is in the generated scene.
Sun Falloff	How harshly the sun colour falls off into the fog colour.
Fog Height Offset	Offset the height at which the fog appears.
Max Distance	Maximum distance from the camera the fog will remain effective.
Max Fog Intensity	Maximum intensity the fog can have.
Sun Heading/Pitch	Rotational heading/pitch of the sun in relation to the scenes.

Inputs

Name	Description	Typical Node Input
Light Node	Connect a light to control the position of the sun.	Light
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Light

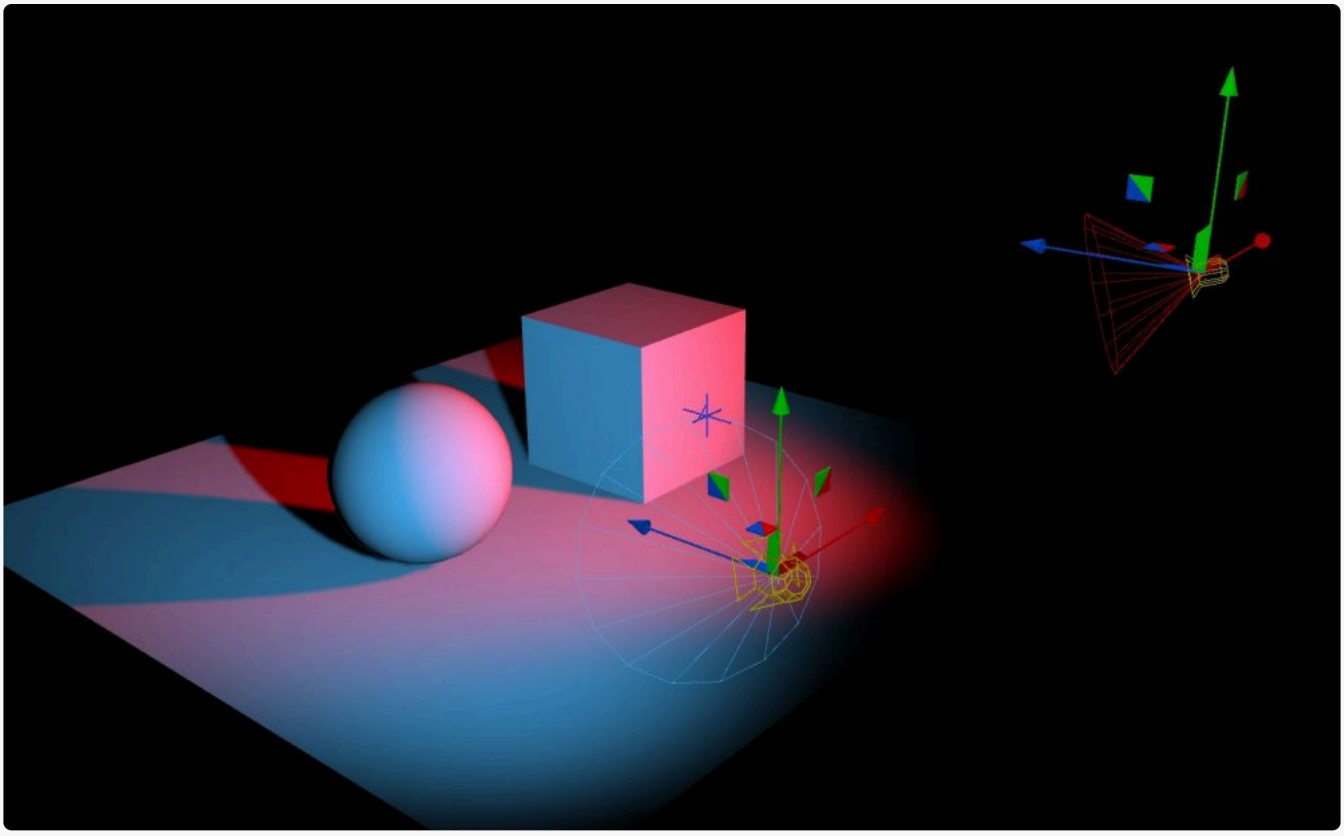
Method

Add a Light node into the scene.

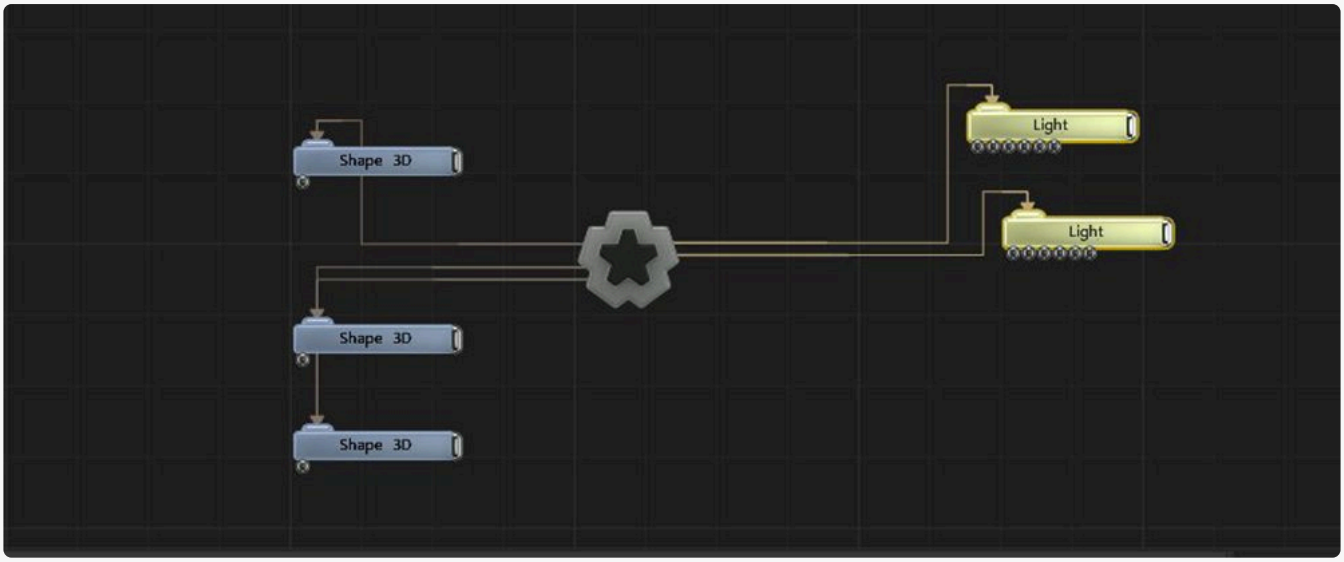
Attach the *Target Node* input to any object, to have the light track that object.

The default light node is a spotlight, in the node properties use the *Light Type* drop-down menu to toggle between Spot, Omni, Directional, Area and Omni_Ambient.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Light Type	Choose which type of light is used in the scene. • Spot, light is emitted from a point within a restricted cone. • Omni, light is emitted in all directions from a point.
Lighting	Sets light to physically based or legacy

Model	
Colour	The colour of the light.
Light Cone Angle	Change the size of the area the light covers. Only usable with the spotlight selected in the “Light Type” attribute.
Light Inner Cone Angle	Change the inner angle of the lights focus.
Brightness	How bright the light is.
Scattering Intensity	How much the light is scattered in the scene, creating a bright area around the light.
Falloff Mode	Change how the light falloff is calculated. • Inner / Outer Radius (Legacy), light falloff is calculated between the inner and outer radii. • Inv-Squared Distance (Physical), the light falloff is calculated based on a physically accurate system.
Inner Attenuation Distance	Inner distance within which the light remains at full strength
Attenuation Distance	Maximum distance the light reaches.
Falloff Power	Change how strong the falloff for the light is between the Inner Attenuation Distance and the Attenuation Distance.
Penumbra Falloff Power	How quickly the edges of the spotlight falloff.
Disable Cone Attenuation	When enabled, the cone attenuation for the spotlight is disabled.
Project Image	Select an image to be projected from the light.
Projection Map Amount	How much the image affects the projection.
IES Profile	IES light profiles are published lighting profiles from manufacturers that show the lighting energy and patterns produced by their lighting systems. Notch is able to use these profiles to accurately replicate real-world lighting in its environments. A good resource site for these profiles is Lithonia lighting which can be found here: Lithonia Lighting
Show Light Cone	Show a cone in the scene to represent the lights current position and rotation.

Shadows

Name	Description

Casts Shadows	Toggle whether baked shadows are applied to the objects lit by the light node.
Shadow Map Type	Change how the shadow maps are calculated. • PCF (Standard), Generates harsher edged shadows. • Variance (Soft), Generates smooth, soft shadows. • Sharp Shadow Map, Generates hard, sharp shadows using a hybrid raytracing / shadow map technique.
Shadow Map Size	Change the resolution of the shadow map.
Penumbra Softness Mode	How the softness of the shadow penumbra is generated. • Constant, shadows have a constant penumbra, regardless of distance from the light. • Varying, the shadow penumbra is greater the further away it is from the light source.
Shadow Softness	Change how much softness is applied to the shadow edges.
Invert Shadows	Toggles on and off inverting the cast shadows.
Z Bias	Increasing Z bias will improve the accuracy of grounding objects to their shadows.
Post filter	Toggles on and off post filter.
Raytraced Shadow Samples	Sets the number of samples used to calculate raytraced shadows.

Inputs

Name	Description	Typical Node Input
Projection Image	Add in an image to be projected by the light.	Video Loader
Affected Nodes	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Texture Projection Node	Connect a node from which to project the image from. Only functions if an image is being projected from the light.	Null
Multi-Source Controller	Depreciated feature.	
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

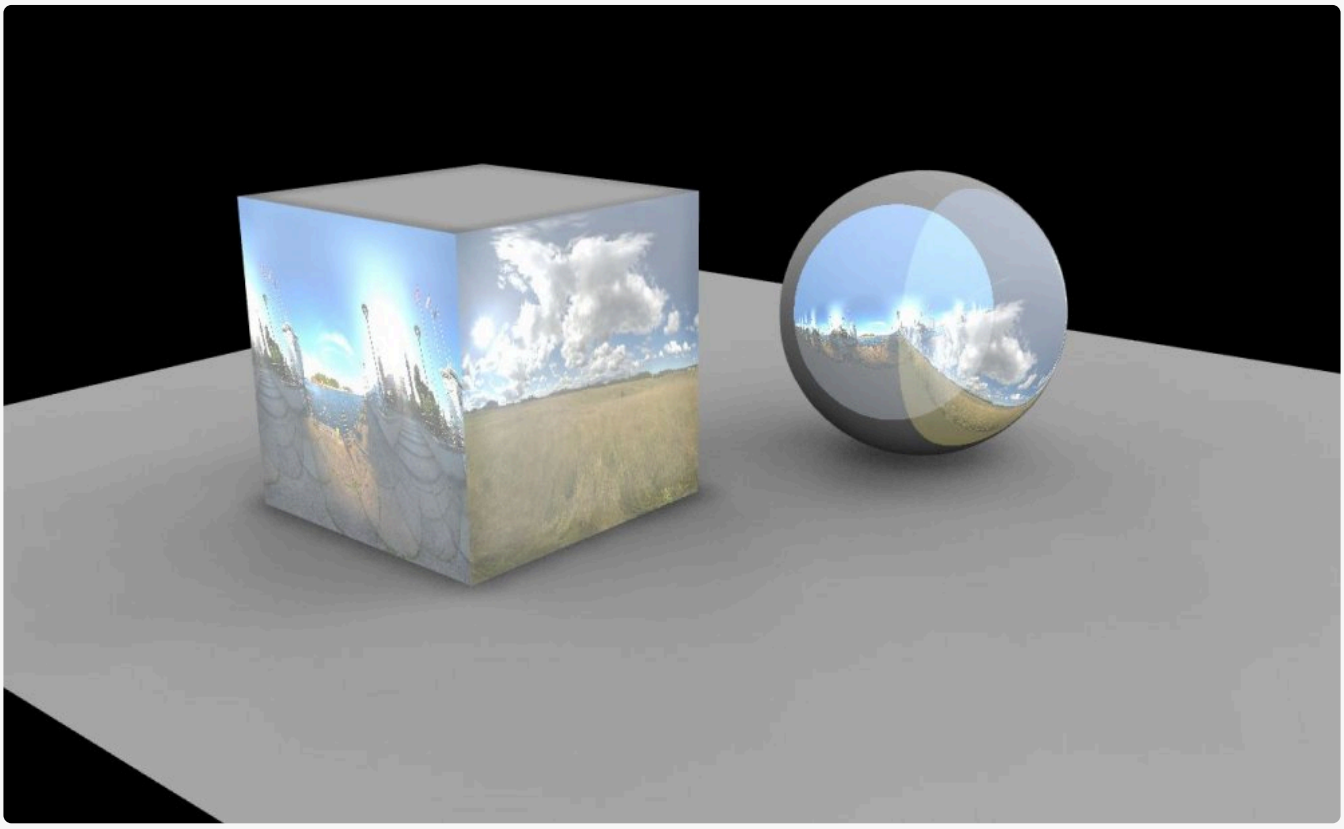
Planar Environment Map

Method

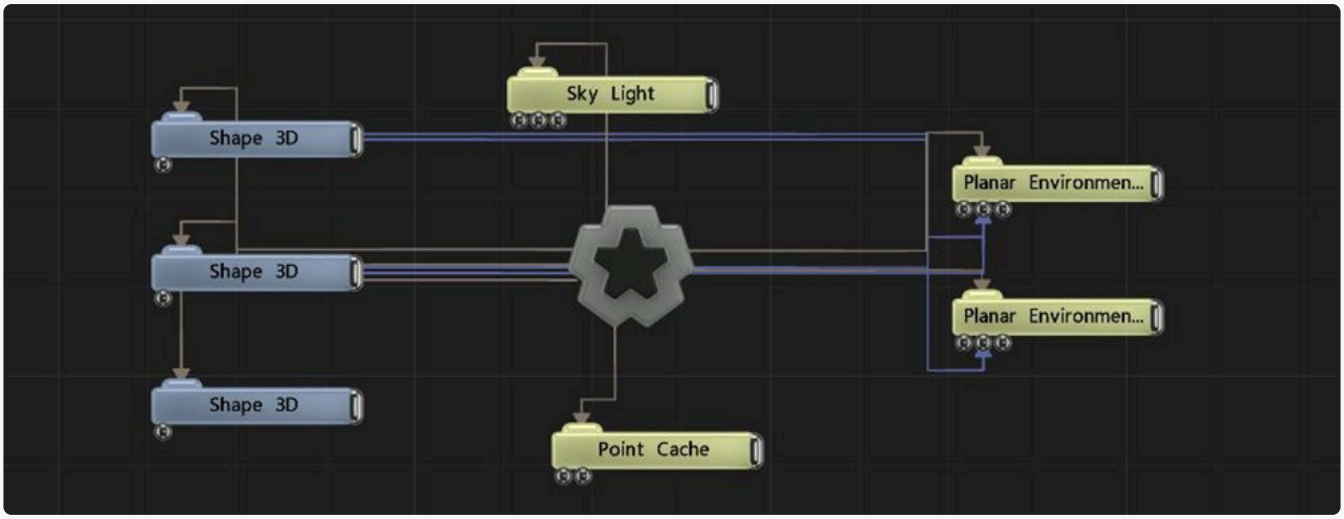
Add planar environment map node to the scene, this will display a 2D environment map to surfaces facing it.

> Multiple planar environment maps can be added to a scene to reflect different maps in different directions.

Example



Nodegraph Example



Attributes

Name	Description
Envmap Image	Image used for the environment map.
Brightness	How bright the light is.
Wrap Mode U / V	How the image wraps along the U / V axis. • Repeat, Repeat the same image to infinity. • Clamp, The end pixels of the image are stretched to infinity. • Border With Black, Replace the edges of the image with infinity.

Inputs

Name	Description	Typical Node Input
Objects	Control which objects are affected.	3D Object
Envmap Controllers	Overrides environment map attributes using a null node.	Null
Envmap Image	Override the image in the attributes with an input image.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

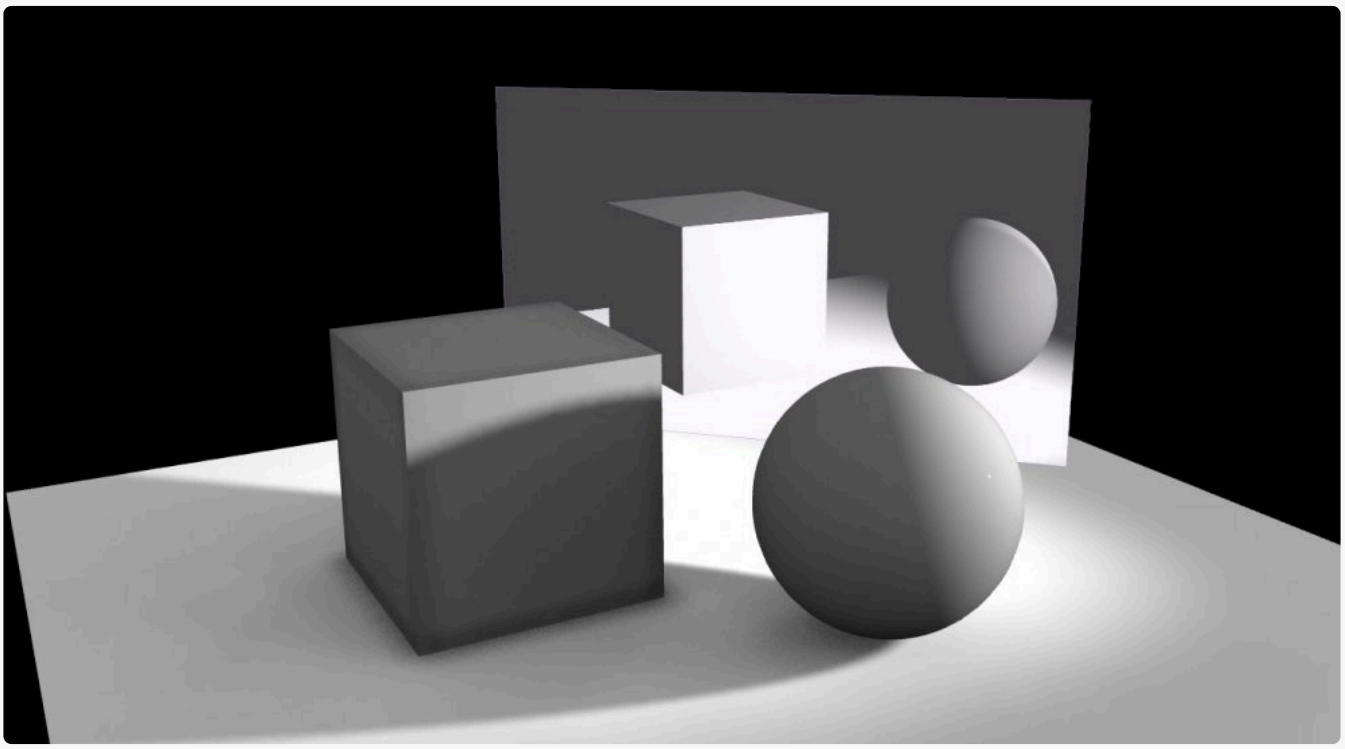
Planar Reflection

Method

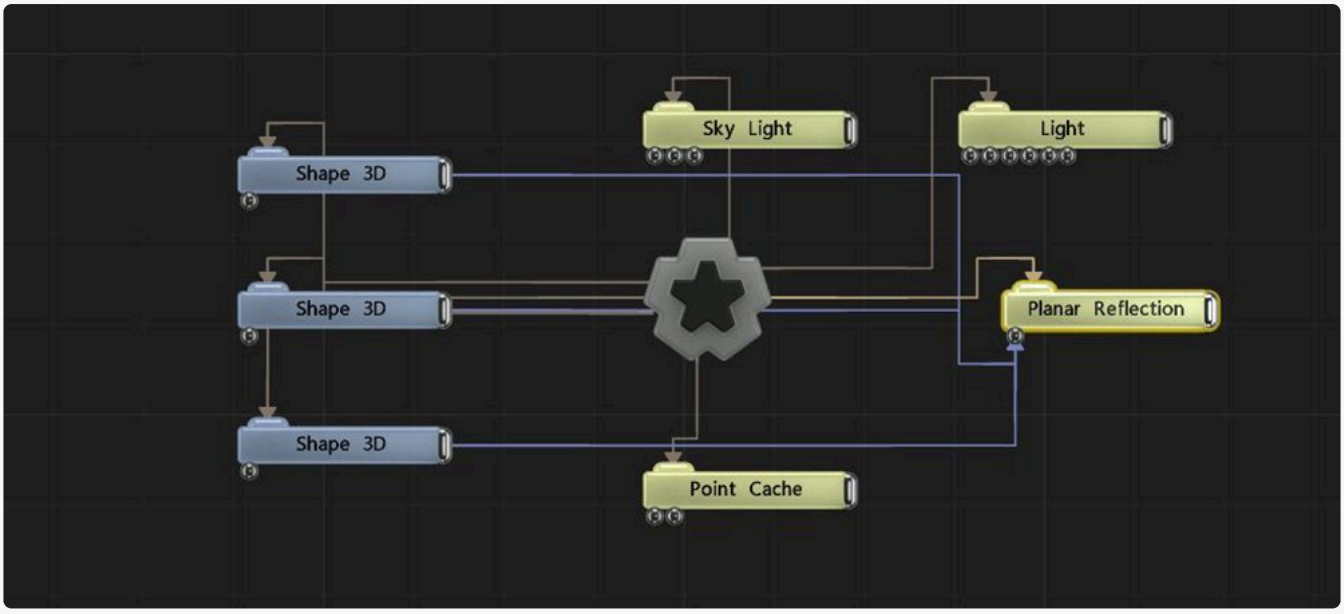
Add a planar reflection node to reflect objects in a scene.

> Only renders in forward rendering, so many details will be missed, for example, it does not reflect shadows.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	Select a colour to tint the reflected image with.
Reflection Blend Amount	How much the planar reflection of the scene is blended with the planar reflection colour.

Width/Height	The pixel resolution along the reflection.

Inputs

Name	Description	Typical Node Input
Reflected Nodes	Which nodes or objects are to be included in the reflected plane.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Point Cache

Method

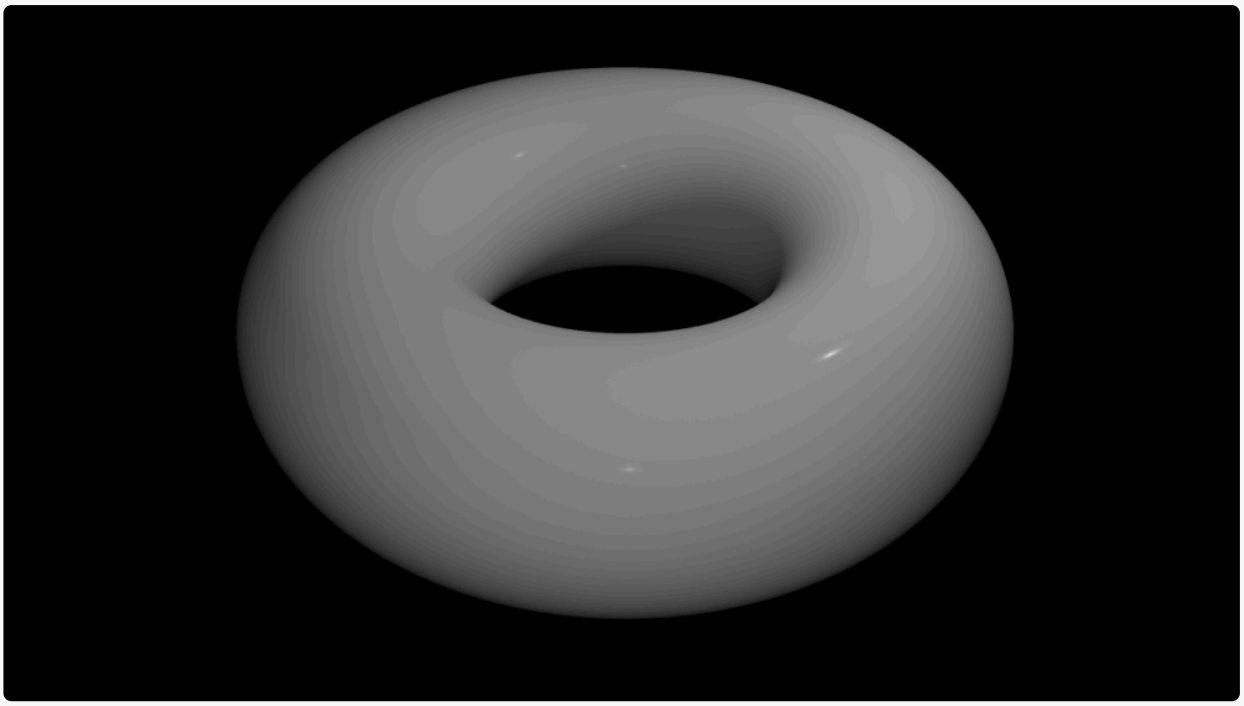
Generates a set of points over the surface of an object or set of objects, within a given bounding box.

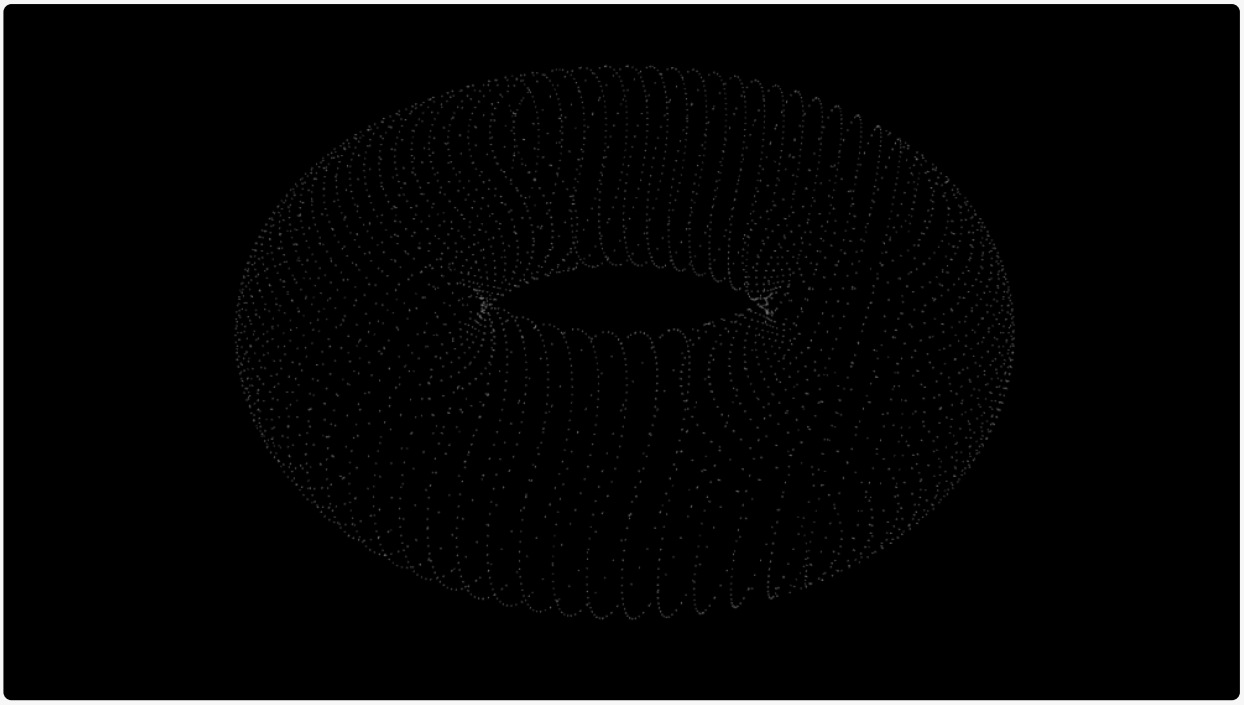
The generated set of points is intended to be used in conjunction with other nodes. For example it can be used for lighting, particle emission, and cloning. The advantage of using a point cache for these purposes is that the points are only generated once and are then re-used for all specialised nodes rather than each node generating it's own pointset. Furthermore, lighting calculations can be cached for each point so for some purposes the results of those calculations can be re-used.

The cache also groups the points into a voxel hierarchy for the purposes of lighting, when Apply Lighting. Keep this option disabled whenever possible, as Apply Lighting costs performance.

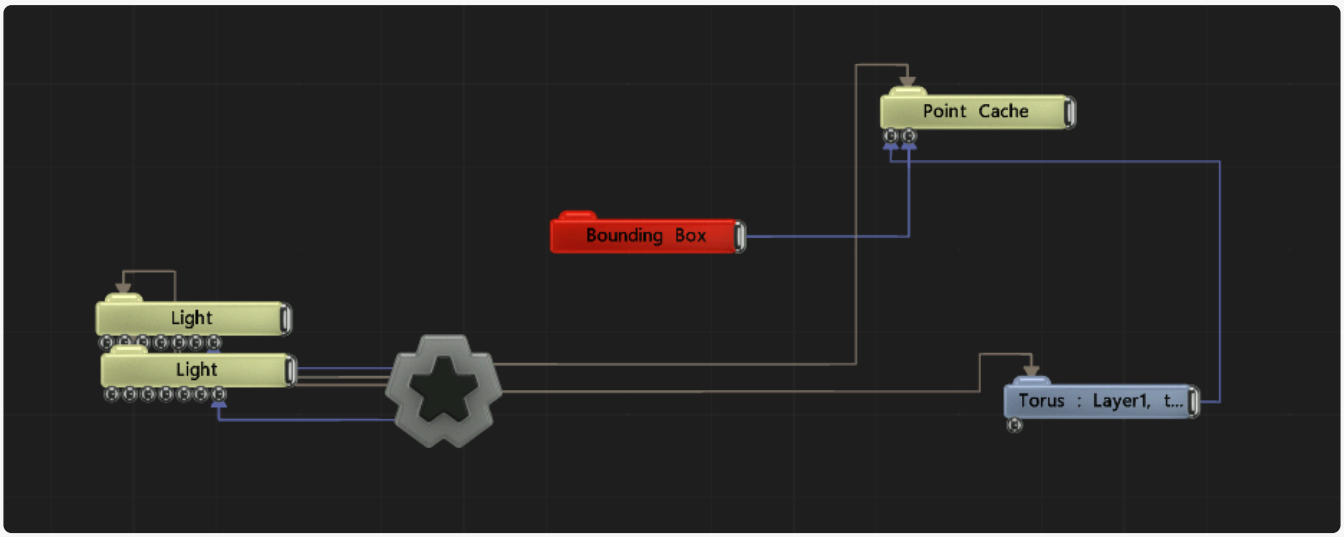
When there are no objects plugged in to the Objects input then Point Cache will use all of the objects in the scene by default.

Example





Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.

Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Debug Render Level	The voxel hierarchy level to display for debugging
Show Points	Draw the points directly in-frame.
Apply Lighting	Apply lighting operations to the points.
Point Density	Controls the amount of points to generate on the surface.
Max Num Points (Millions)	The maximum number of points to create. If the points are not completely covering the surface then try increasing this number.
Dynamic	The Point Cache be dynamic or static. When it is dynamic it re-generates the point set on every frame. When it is static it retains the last-generated set of points. When static, Point Cache uses less computational resources.

Inputs

Name	Description	Typical Node Input
Objects	The objects for which points will be generated over all surfaes.	3D Object
Bounding Box	The region to which point generation will be restricted.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Outputs a point cache that can be used as n input for other nodes, such as the Light the Clone To Point Cache nodes.

Notes

> ! Max Num Points is not only a limit. It also determines how much memory the cache uses, even if the generated number of points is nowhere near this value. This is because the allocation on GPU must be static. To avoid wasting memory, try to keep this parameter as low as possible.

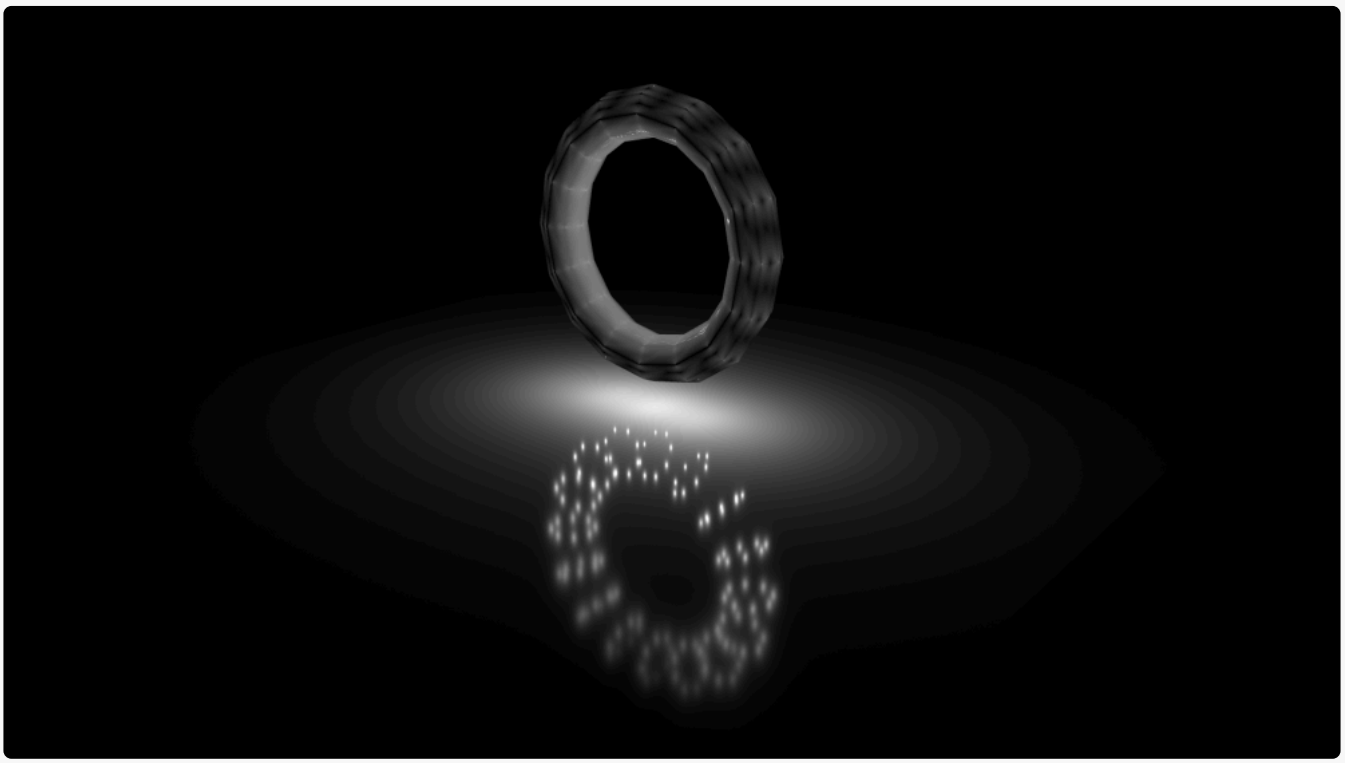
Point Lights From Vertices

Method

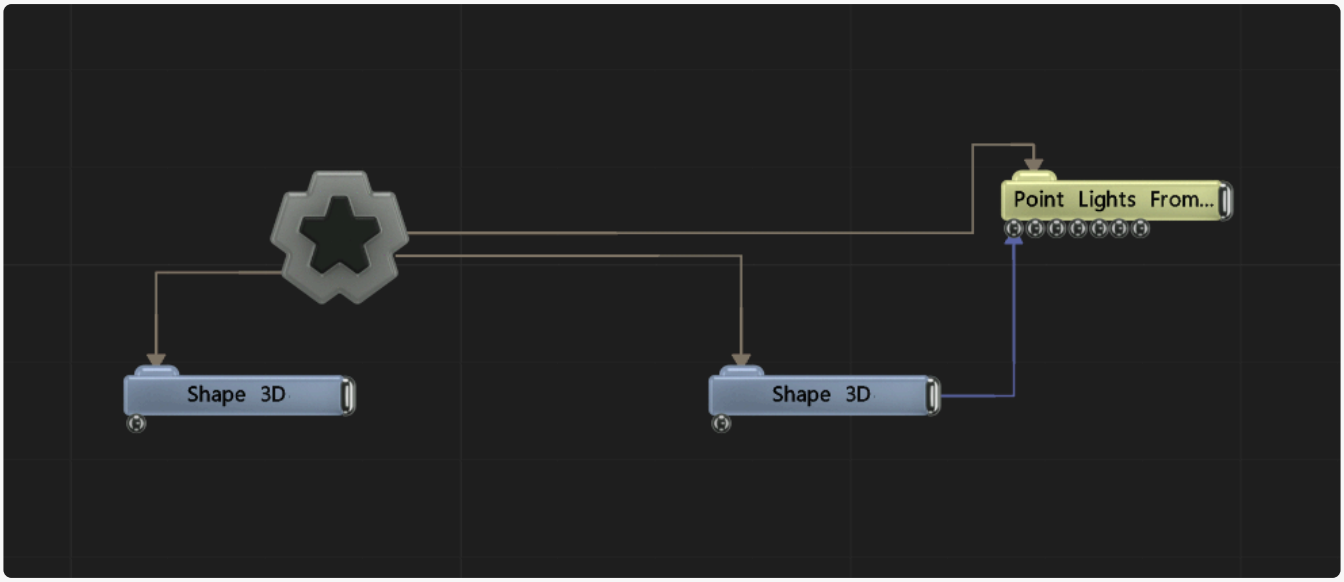
Add Lights into the scene at the vertices of a mesh.

> ! This node has a maximum point input of 128, so any more particles and the lights will Begin to flash as the pick different vertices on each re-render.

Example



Example Nodegraph



Attributes

Name	Description
Colour	The colour of the light.
Brightness	How bright the light is.
Scattering Intensity	How much the light is scattered in the scene, creating a bright area around the light.
Falloff Mode	Change how the light falloff is calculated. • Inner / Outer Radius (Legacy), light falloff is calculated between the inner and outer radii. • Inv-Squared Distance (Physical), the light falloff is calculated based on a physically accurate system.
Inner Attenuation Distance	Inner distance within which the light remains at full strength
Attenuation Distance	Maximum distance the light reaches.
Falloff Power	Change how strong the falloff for the light is between the Inner Attenuation Distance and the Attenuation Distance.
IES Profile	This feature is deprecated.
Show Light Cone	Show a cone in the scene to represent the lights current position and rotation.

Inputs

Name	Description	Typical Node Input
Source Node	Node from which to create lights from.	Particle

		Root
Projection Image	Add in an image to be projected by the light.	Video Loader
Affected Nodes	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Texture Projection Node	Connect a node from which to project the image from. Only functions if an image is being projected from the light.	Null
Multi-Source Controller	This feature is deprecated.	
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Probe Lighting

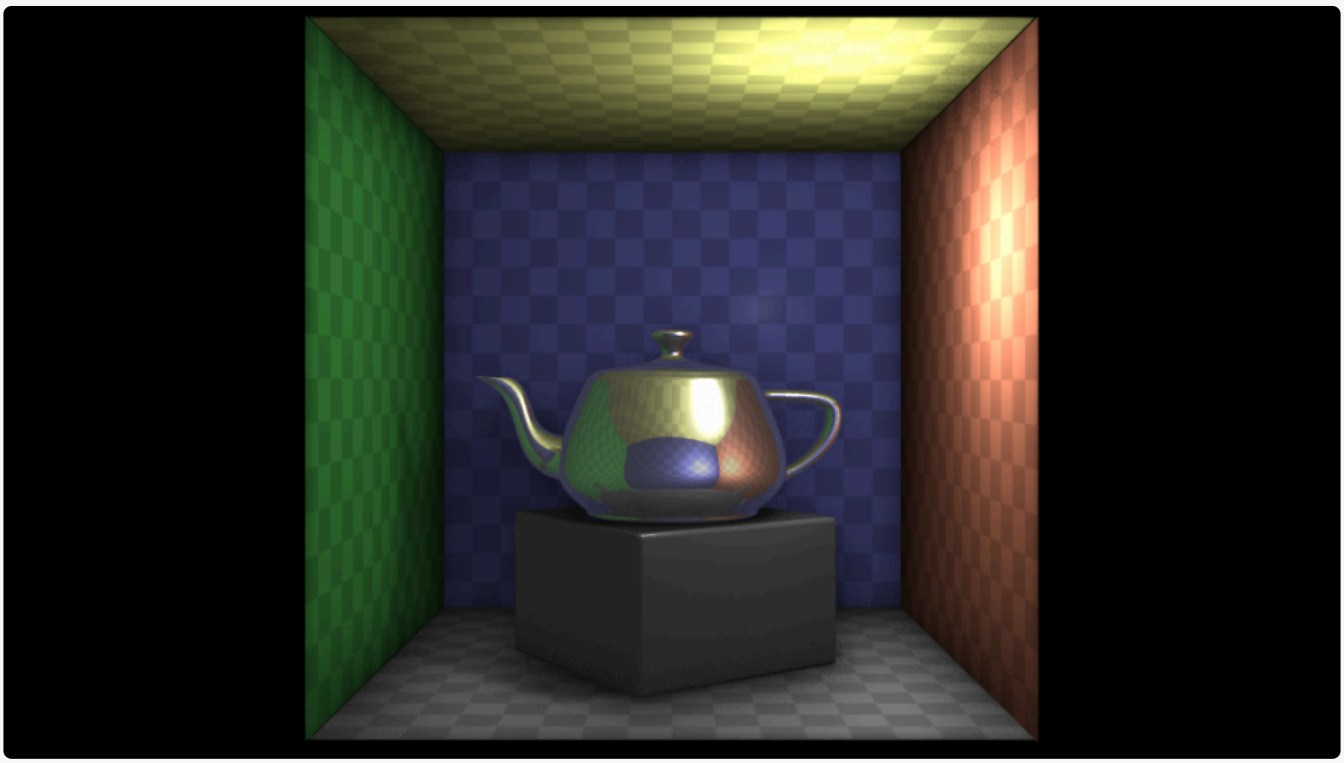
Method

Creates dynamic reflections of other objects in the scene, by rendering them from specific points within the scene.

A Point Cache may optionally be used to allow the reflection images to be generated more efficiently when there are a large number of probes to process.

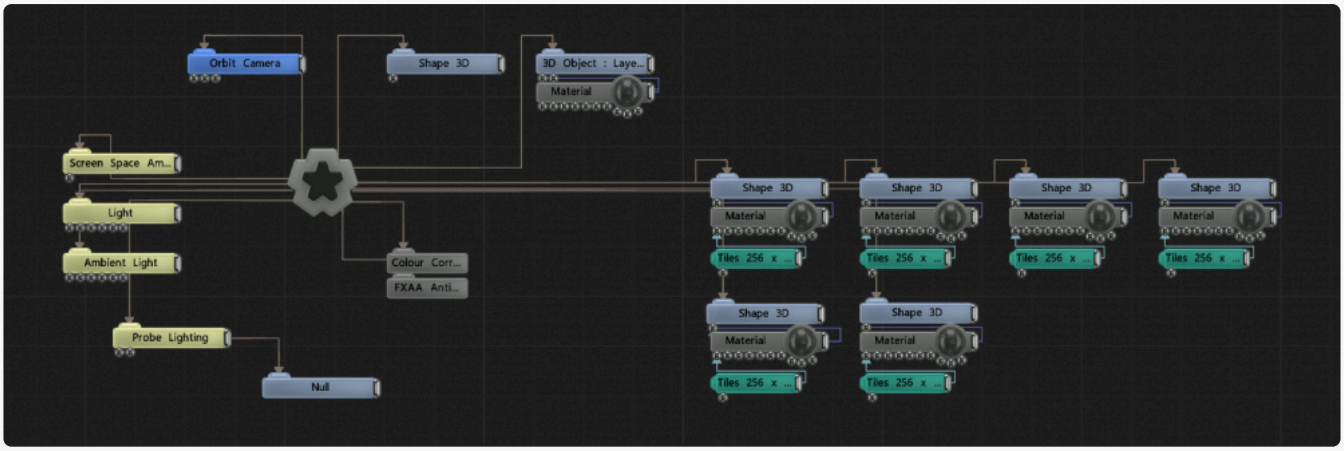
Note that the materials that should show the reflection need to have its Reflections property enabled.

Example



Here the teapot is reflecting the coloured and textured walls via the Probe Lighting node.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Brightness	The brightness of the reflections.
Map Size	The size of the generated probe reflection image in pixels, for each probe.
Num Renders Per Frame	The number of probes to process each frame, allowing a full update to be spread across multiple frames so that each individual frame can render in less time.
Dynamic	When this is set on, the probes are continuously re-generated. When it is set off then the last-generated probe set is used. Setting this off can improve performance.

Show Probes	Show the probe images that have been generated as textured spheres. • None, no probes are shown • Diffuse, diffuse reflection images are shown • Specular, specular reflection images are shown
Probe Display Radius	When probes are being shown, this property can be used to set their radius.

Inputs

Name	Description	Typical Node Input
Affected Objects	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Point Cache	An optional point cache to use when generating the probe images.	Point Cache

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

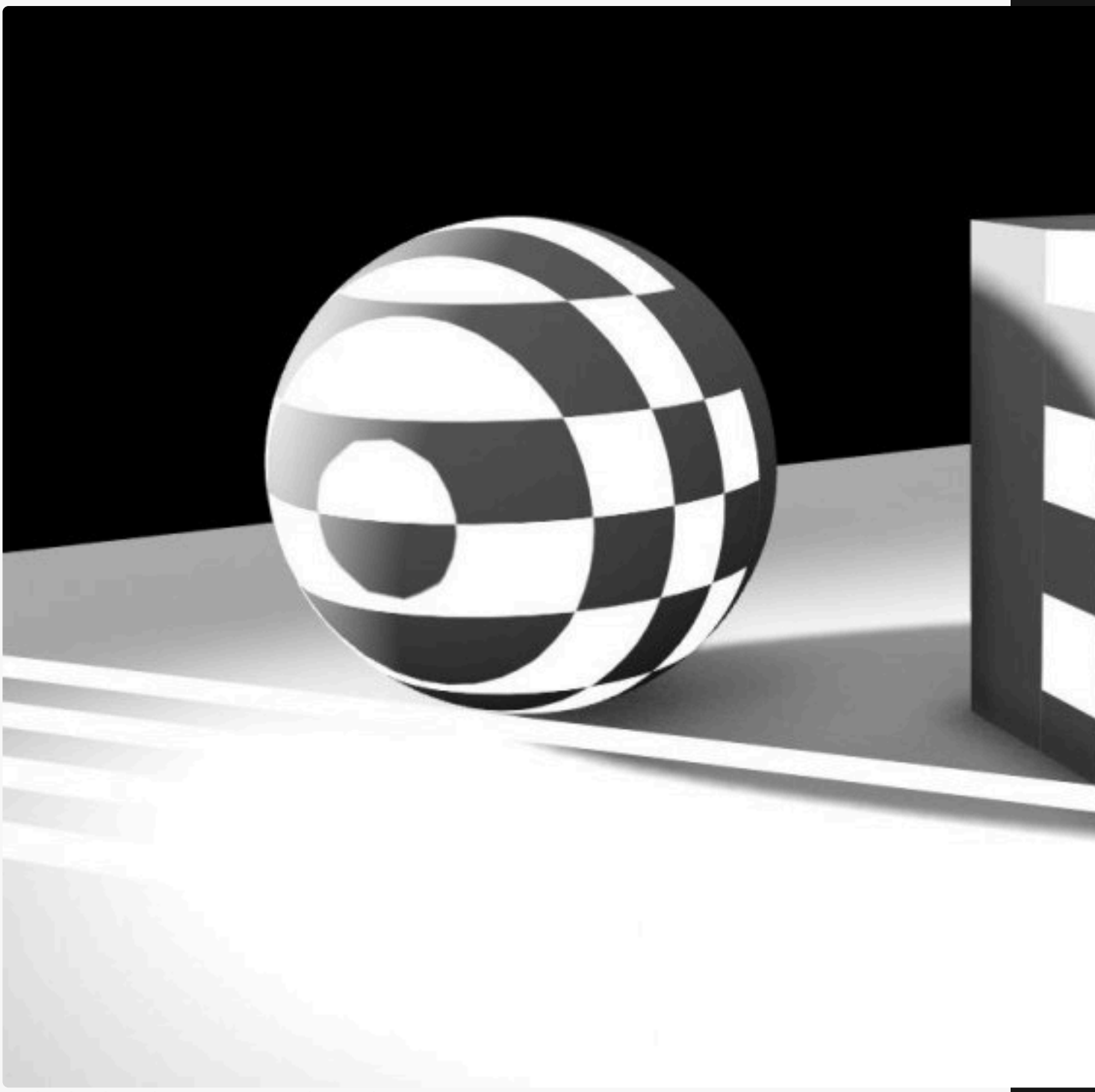
Project Image

Method

Add a projection image node to a scene, link an image and project it onto the scene.

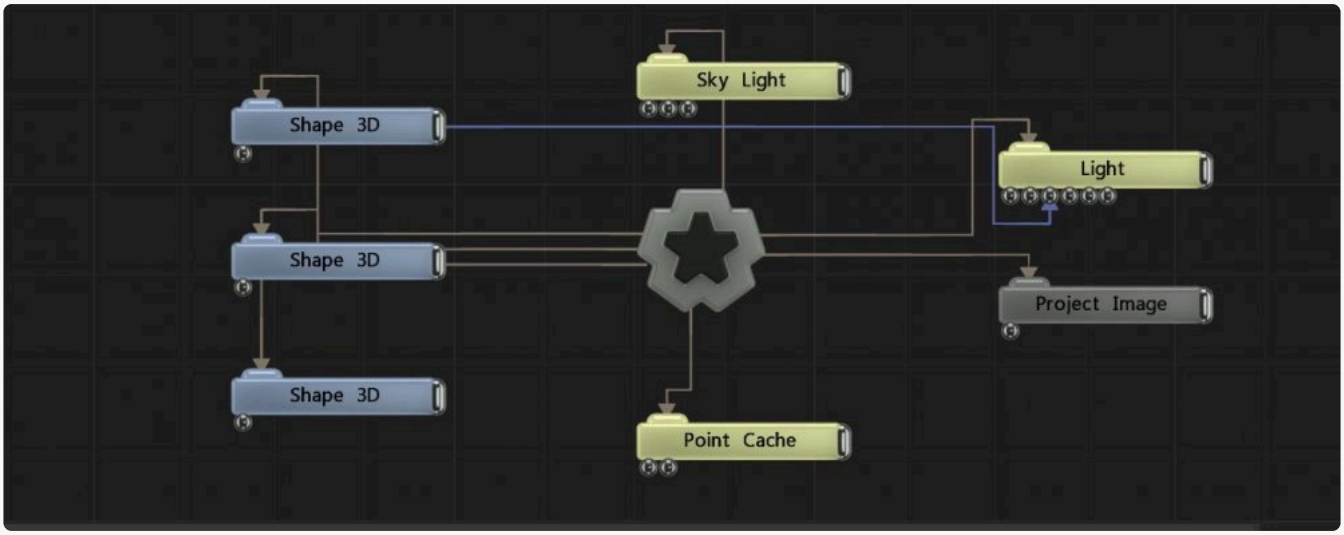
Use the blend function to blend the image into the shadows and reflections in the scene.

Example



A checker-board image projected onto the scene.

Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Image	Select an image to be projected into the scene. Adding a video node input will override this image.
Colour	Add a colour filter over the image.
Blend Function	How the projected image blends with obstructing geometry. for more, see Blend Modes.

Flip Image	Toggle whether the projected image is flipped vertically.
Alpha	Alpha of the projected image.
UV Offset X	Move the object UV along the x axis.
UV Offset Y	Move the object UV along the y axis.
UV Scale X	Scale the object UV along the x axis.
UV Scale Y	Scale the object UV along the y axis.
Wrap Mode U/V	Change how the image wraps around the x/y axis for areas outside the projection plane. • Clamp – the edges of the image are extended to fill the space outside the projection plane. • Wrap – the image is repeated until if fills the space outside the projection plane.
UV Crop Enabled	The image is clipped and the space left outside the projection plane is blank.

Inputs

Name	Description	Typical Node Input
Video Node	Video to be projected.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

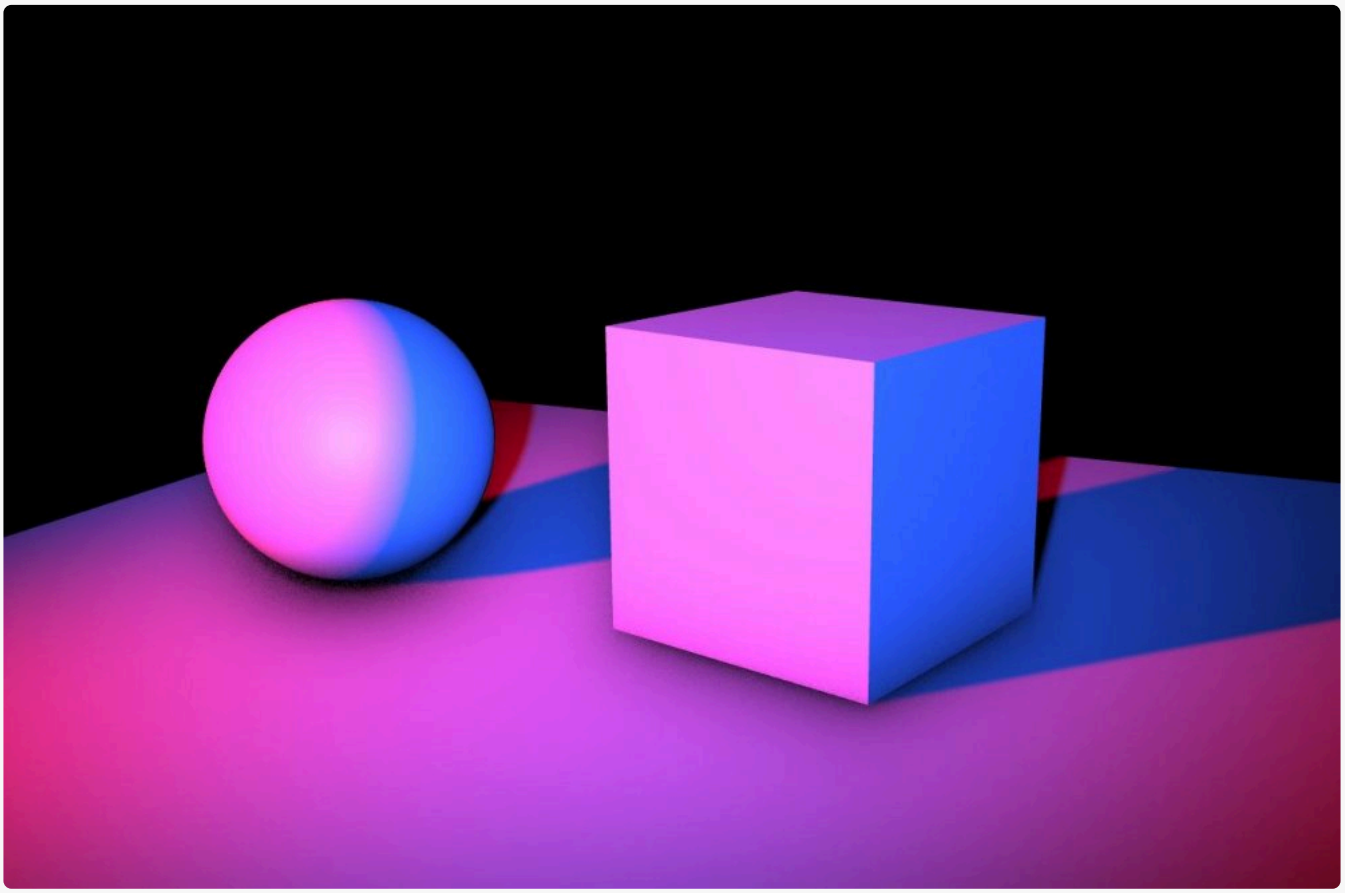
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Screen Space Ambient Occlusion

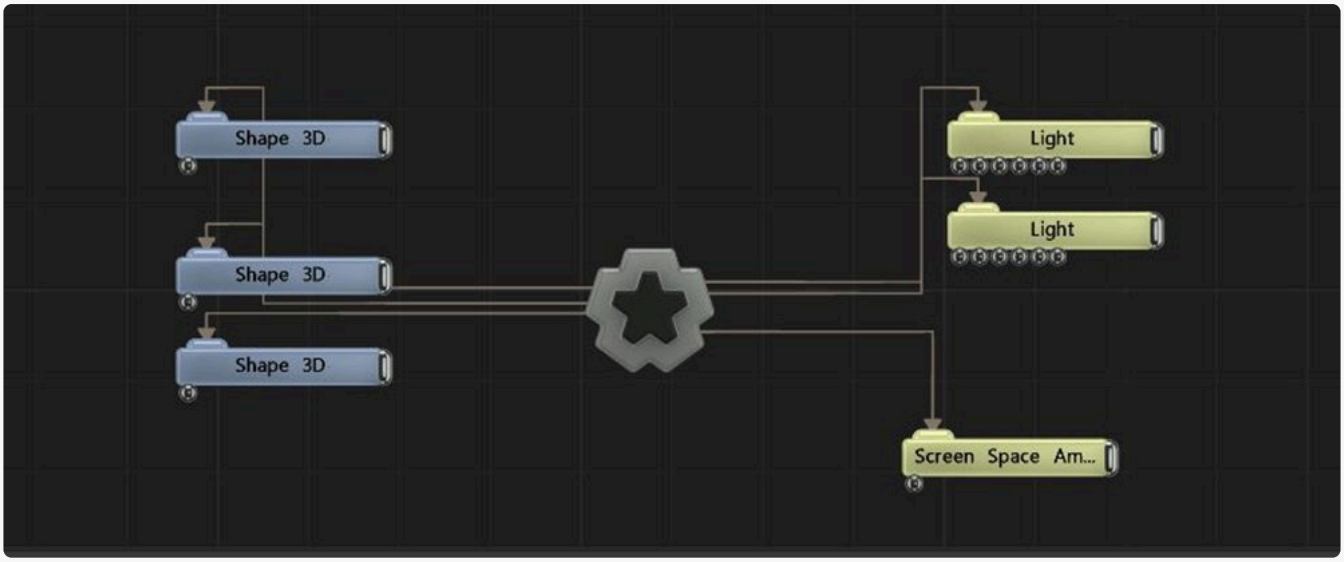
Method

Add a screen space ambient occlusion (SSAO) node to the scene, this will produce subtle ambient occlusion shadows, to ground objects to surfaces and to add depth to geometry details.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Shader	Ability to over-ride internal shader. See writing custom shaders.
Blur Size	Size of the blur from the ambient occlusion.
Max Ray Distance	The maximum distance between surfaces that SSAO will be visible.

Z Bias	Increasing Z bias will improve the accuracy of grounding objects to other surfaces
Blend Amount	Decreasing blend amount will
Apply Mode	How the Ambient Occlusion is applied to the scene. • Lighting * Ambient, Multiply the ambient occlusion lighting values by the colour values of the scene. • Ambient Only, Multiply the ambient occlusion lighting values by the ambient occlusion in the scene. • Lighting Only, Multiply the ambient occlusion lighting values by the lighting of the scene.
Samples	The number of samples to produce the SSAO.
Animate Noise	A simple noise animation on the SSAO

Inputs

Name	Description	Typical Node Input
Objects	Add objects that are affected by the ambient occlusion.	3D Object.

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Screen Space Reflections

Method

Generate screen space reflections (SSR) for objects in the scene. To see this function, “Reflections” must be enabled in the objects material node or section.

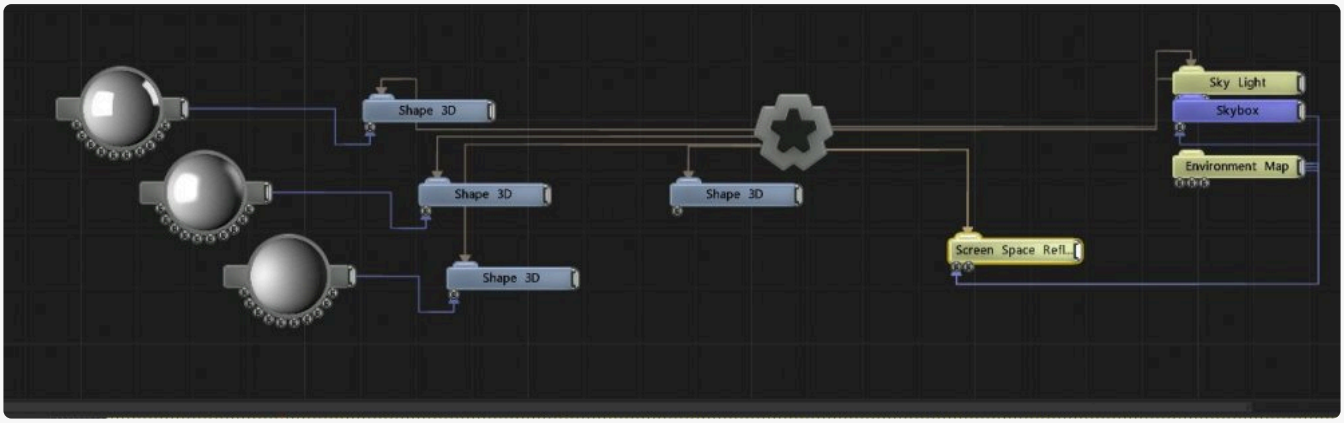
! The material nodes Roughness attribute defines the clarity of the reflections, with larger values being both more blurry and less efficient to process.

Link an environment map into the SSR to control it in the reflections.

Example

The spheres shown from a low to a high roughness.

Nodegraph Example



Attributes

Name	Description
Minimum View Angle	Reduces the angle of reflection on objects in the scene.
Step Size	Distance refection are sampled at.
Envmap Brightness	How bright the output environment map is.
Blur Samples	Number of samples taken to improve SSR accuracy.
Use Normals For Restriction	Add normal information to the SSR.
Animate Noise	Add animated noise to the SSR.

Inputs

Name	Description	Typical Node Input
Environment Map	Environment map can be controlled using SSR	Environment Map
Affected Objects	Select which nodes will be affected by the reflections.	3D Object
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Shadow Volume

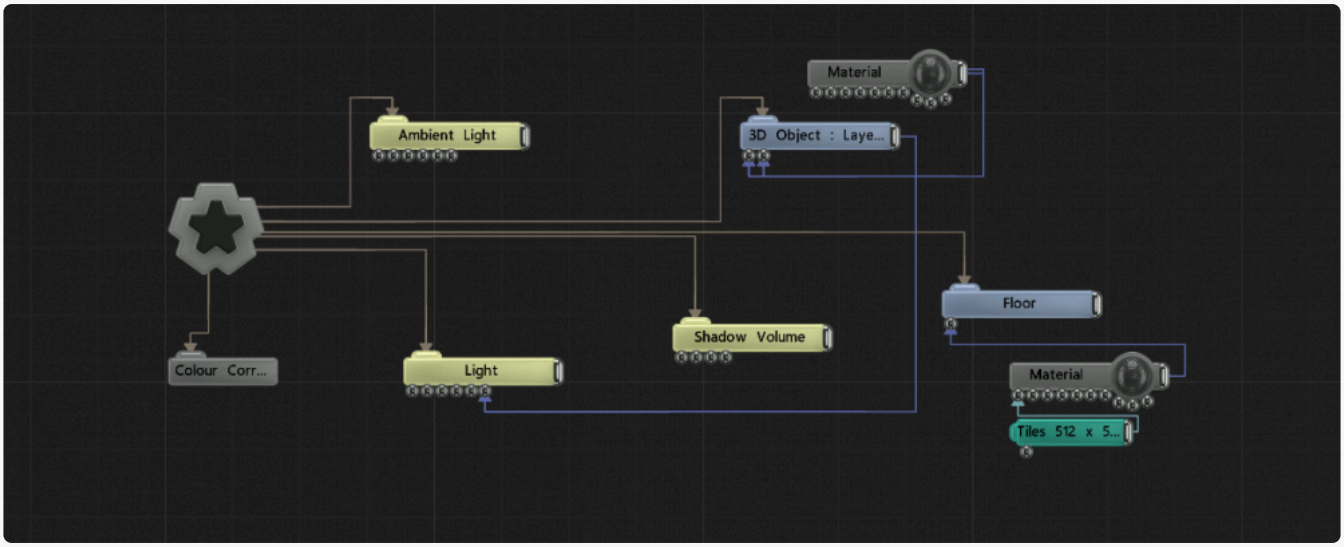
Method

Darkens a region of the scene, effectively as if it were a negative lightsource.

Example

Here a Shadow Volume is being used to add a soft shadow beneath the teapot.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	The colour of the light.
Strength	The strength of the shadow, i.e. how dark it is.
Inner Attenuation Distance	Inner distance within which the light remains at full strength

Attenuation Distance	Maximum distance the light reaches.
Falloff Power	Change how strong the falloff for the light is between the Inner Attenuation Distance and the Attenuation Distance.

Inputs

Name	Description	Typical Node Input
Affected Nodes	Choose which nodes are affected by the light node. by default, all are affected.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

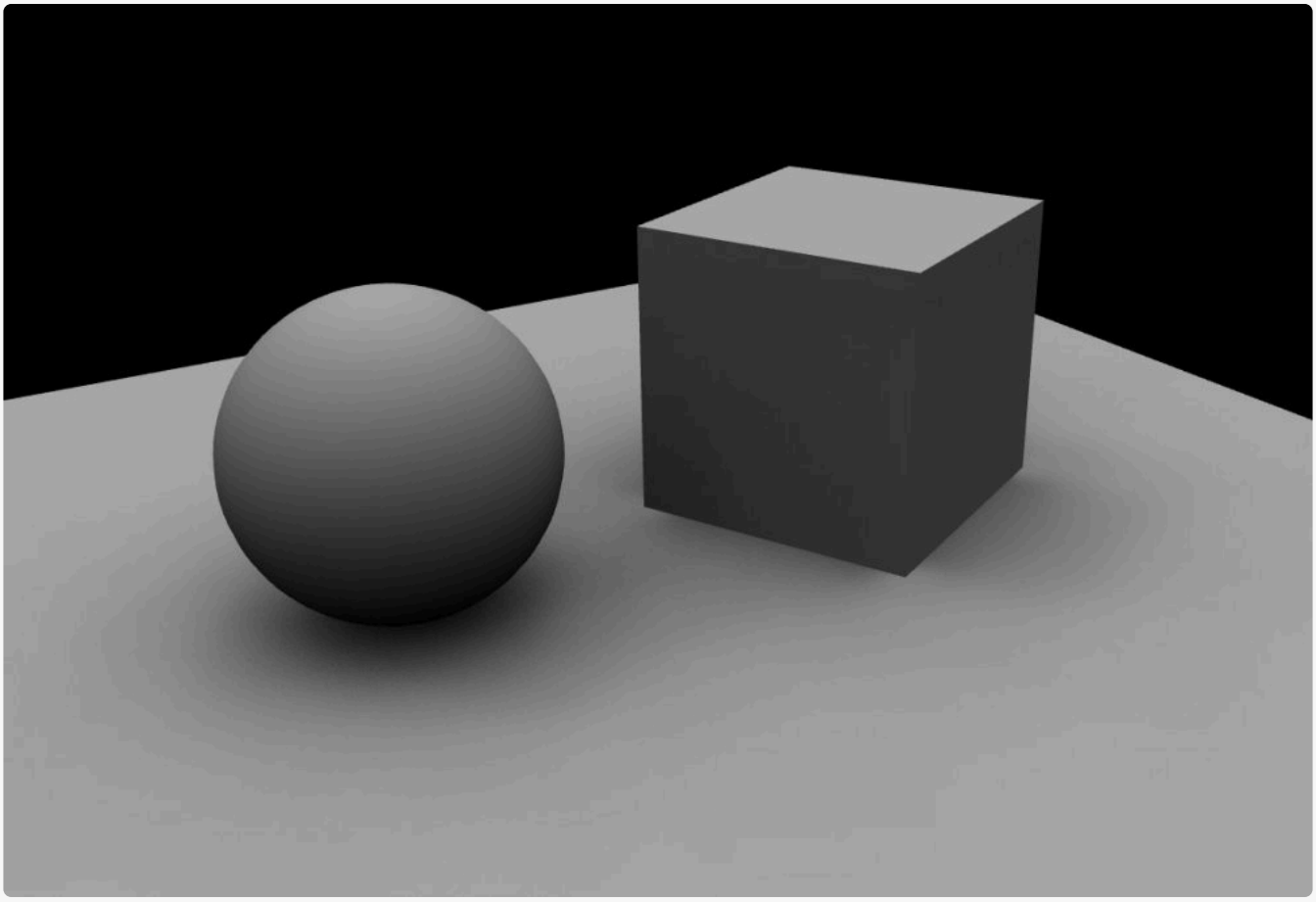
Sky Light

Method

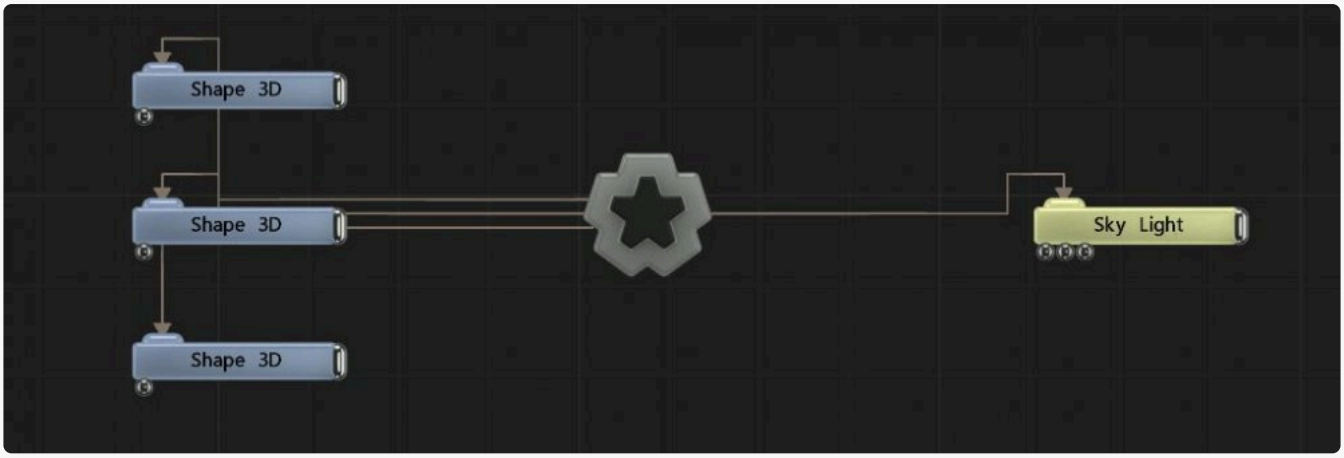
This node simulates a skylight/dome light by surrounding the scene with a large number of shadow-casting spotlights positioned on the dome pointing inwards. This allows the skylight to be rendered efficiently, although it may still be too slow for real-time use in many scenes.
To increase efficiency the spotlight shadow maps can be cached and only a subset updated per frame. This reduces render time significantly but reduces responsiveness to animation.

Turn on deferred rendering on the root node to enable the skylight.

Example



Nodegraph Example



Attributes

Name	Description
Omnidirectional	When enabled, light emits from all directions inward. When disabled, light only emits from above.
Brightness	Brightness of the skylight.
SkyDome Radius	Radius of the skylight.
Dome Vertical Weight	Balances the weighting of the sides and the top of the dome – to blend between a true dome effect and a more ambient-occlusion-like look.
Num Sample Directions	Number of directions sampled for the skylight.
Shadow Map Size	Size of the shadow map for each direction sampled.
Num Sample Direction Renders Per Frame	How many directions are sampled per frame. Lower values increase efficiency, but changes in the scene may not be reflected immediately.
Dynamic	Toggles off dynamic sampling which aids performance.
Raytrace	This will enable raytracing in the skylight. Only works with raytracing enabled in the Root node.
Raytraced Samples	How many samples will be taken per frame for raytracing. Best used with continuous refinement enabled and the Denoiser Node.

Inputs

Name	Description	Typical Node Input
Objects	Select which objects should be affected by the skylight.	3D Object
Environment Map	Add an environment map to control the colour of the skylight.	Environment Map
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

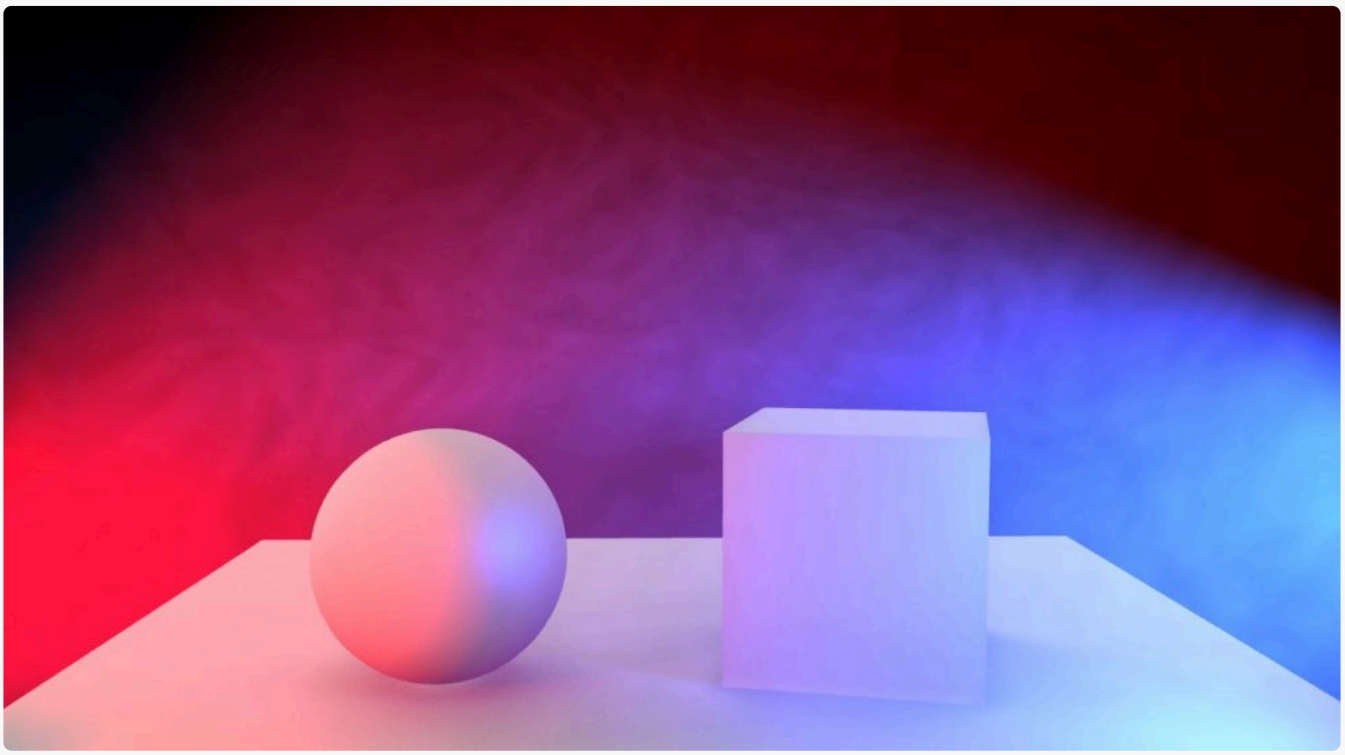
Volumetric Lighting

Method

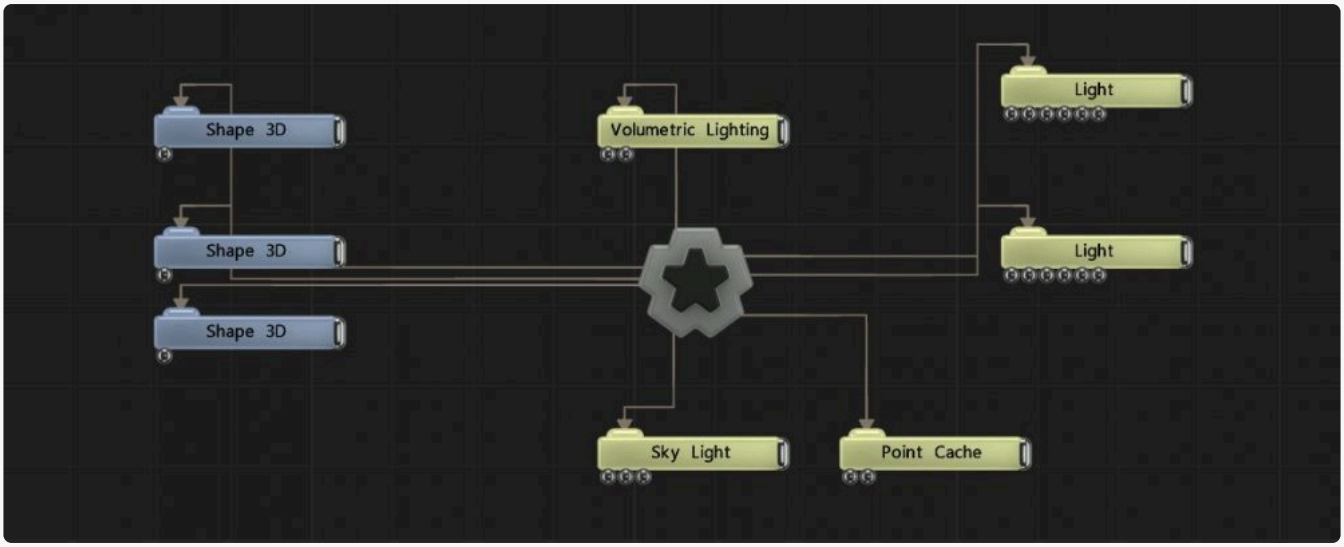
Adds volumetric lighting into the scene.

A great way of adding atmospheric fog to your scene.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Sample Density	the quantity of volumetric lighting in the scene.
Max Depth Range	Maximum distance the volumetric lighting will be scattered.
Uniform Scattering	How strong the light scattering is from lights in the scene.
Shadow Noise	How much noise is breaking the shadow.

Smokiness	the opacity of smoke withing the lights
Smoke Scale	The range of the smoke texture within the lights.
Num Depth Slices	How many slices of the light field is shown. This is internally limited to 512.

Inputs

Name	Description	Typical Node Input
Affecting Lights	Select which lights are to be used by the volumetric system. With nothing connected, they will all be used.	Light
Excluded Lights	Select which lights are to be ignored by the volumetric system.	Light

Outputs

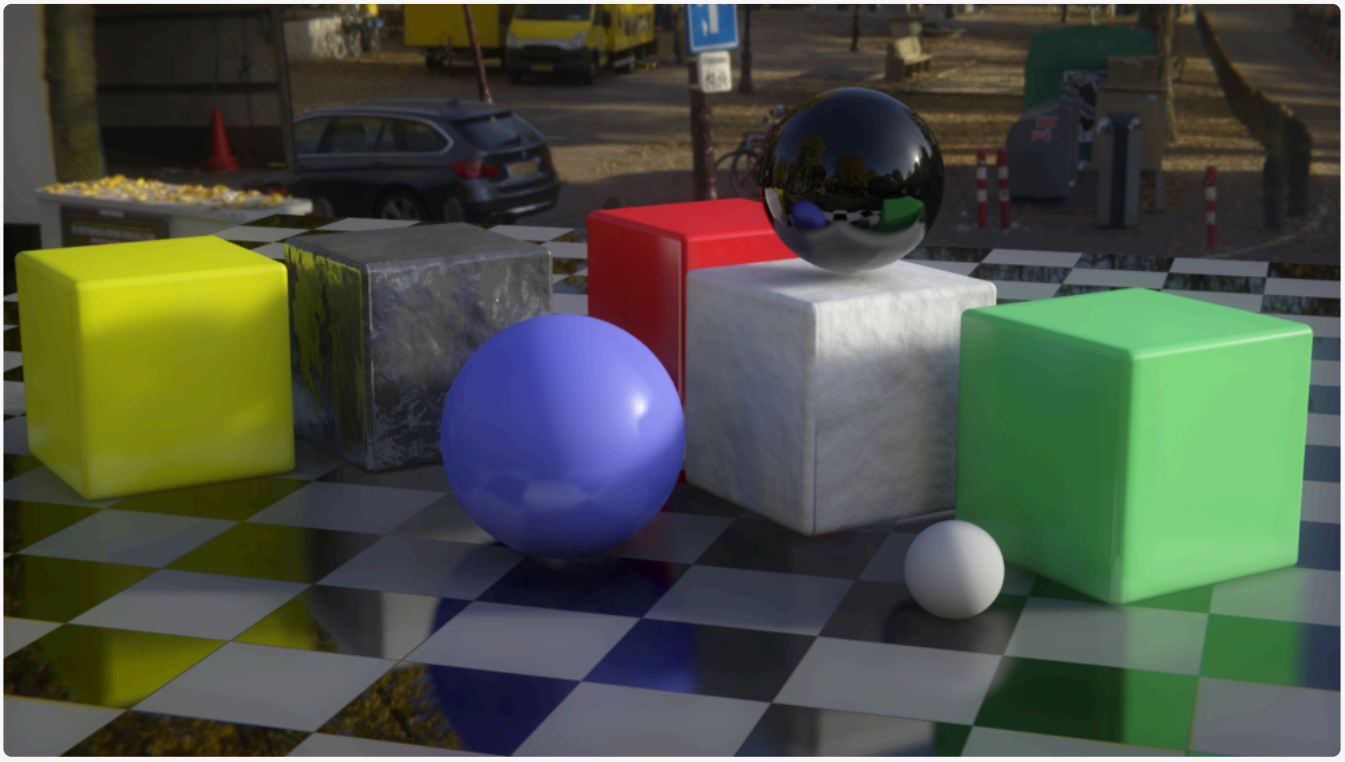
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Voxel Cone Lighting

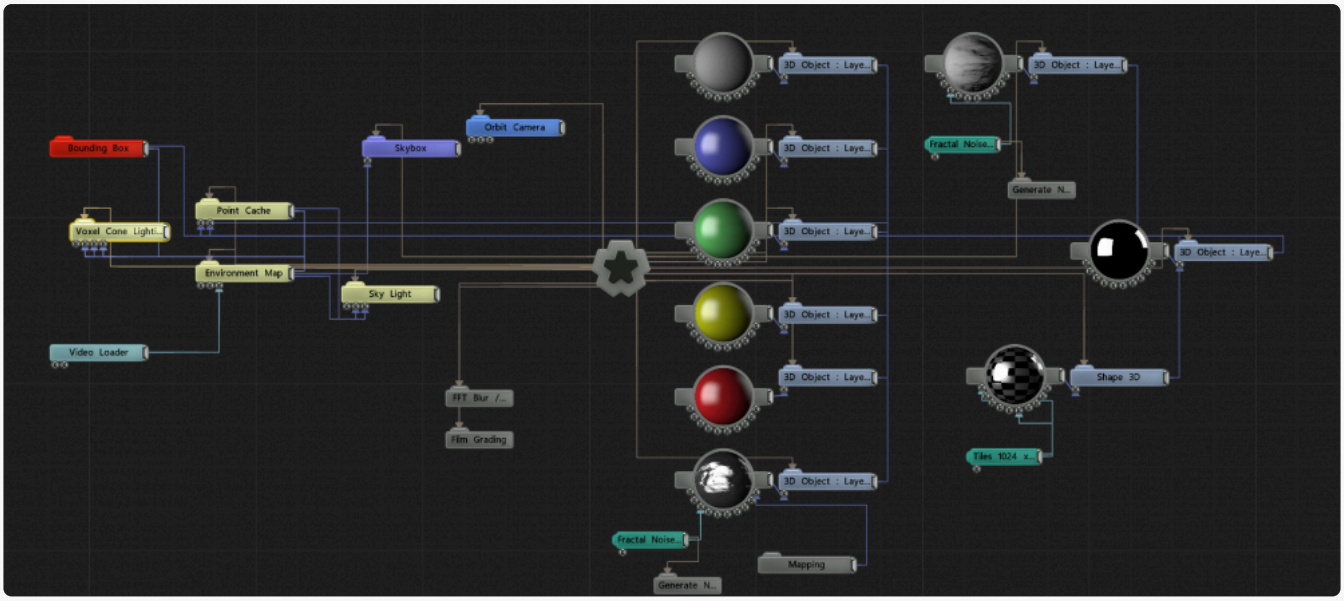
Method

Performs global illumination using a filtered voxel representation of the scene. It voxelises objects by using GPU rasterisation. The voxels are filtered at different resolutions. Coarser resolutions are used for high roughnesses, finer resolutions are used for low roughnesses. Lighting is calculated by the method of raymarching. If a Point Cache is available then points from this cache will be inserted directly in to the voxel hierarchy.

Example



Example Nodegraph



Attributes

Name	Description
Mode	The shading mode. • Ambient Occlusion, • Ambient Occlusion * Colour, • Diffuse Bounce, • Diffuse And Reflection,
Brightness	Overall brightness of the illumination.
Point Brightness	In development.
Diffuse Brightness	The amount of diffuse light.
Reflection Brightness	The amount of reflected or glossily-reflected light.
Envmap Brightness	The brightness of the fallback environment mapping.
Cone Radius	The maximum cone radius. This effectively controls the maximum surface roughness.
Max Ray Distance	The maximum distance to raymarch.
Ray Start Offset	A distance from the surface at which to start marching rays. Raising this value helps to avoid self-intersection problems.
Distance Intensity Boost	How much to raise the brightness of distant samples by.

Min Roughness	
Max Roughness	
Reflection Max Steps	The maximum steps to perform in raymarching.
Voxel Resolution	The resolution of the voxel grid.
Voxel Format	The voxel colour format. 8-bit has lower precision than 16-bit but uses less memory and may have better performance.
Dynamic	When enabled the node will re-generated the voxel hierarchy on every frame. When disabled the node will cache and re-use the last-generated voxel hierarchy.
Antialias Point Cache	If the voxel grid is fed by a point cache, then the points can be anti-aliased.
View Voxels	Displays the generated voxels to help with debugging.
Show Mip Level	Selects the hierarchy level of the display voxels when View Voxels is enabled.
Show Axis	Selects the projection axis of the display voxels when View Voxels is enabled.

Inputs

Name	Description	Typical Node Input
Objects	Control which objects are affected.	3D Object
Bounding Box		Bounding Box
Environment Map		Environment Map
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Logic

Method

The Logic nodes are used to create a meta logic system within Notch.

Time

These nodes interact with the Notch projects playhead.

- Jump to Time
- Loop Time

Selecting Nodes

These nodes control the active or inactive state of the nodes below them.

- Execute Child Nodes
- Select Child Node

State Machines.

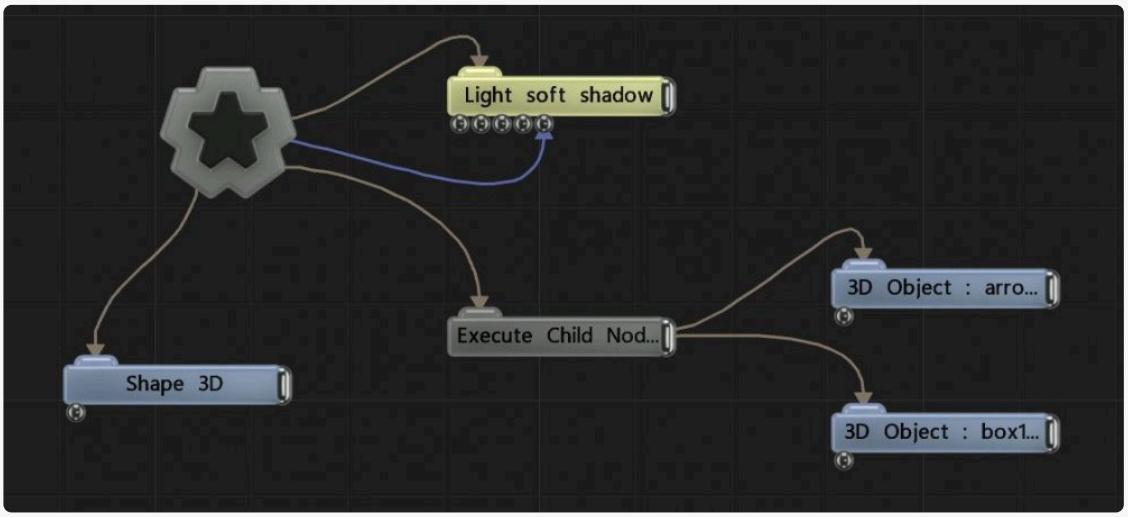
These nodes can be combined together to create simple finite state machines.

- State Machine
- State Machine Event
- State Machine State

Execute Child Nodes

Method

Allows you to enable or disable the execution of connected child nodes at runtime. This is useful for menu systems or general logic.

Example Nodegraph


Attributes

Name	Description
Execute Children Nodes	Executes children when >= 1.0

Inputs

There are no inputs for this node.

Jump to Time

Method

When activated (by the playhead crossing into the node on the timeline and Active being set to 1.0), this node jumps either the layer or global playhead to a particular timecode.

This node is often used for:

- Progressing the playhead out of a Loop Time area on the basis of an event
- Progressing to a different area of a layers timeline when a section has completed

To understand how jumping to time works in Notch, you need to understand the different playheads in Notch:

Playhead	Description
Incoming Global Playhead	This is the time that the mediaserver or host application is passing to Notch. Generally this will be simply advancing forward every frame (however media servers can jump to specific times as well).
Global Playhead	This is the master time in the project. It is advanced by the Incoming Global Playhead and can be jumped to a time by setting the *Mode* property to *Global*.
Layer Playheads	Each layer has it's own playhead. They are advanced by the Global Playhead but can be jumped to a time independently by setting the *Mode* property to *Local to layer*

The *Layer* mode is used when you are running your project layers in compositing mode (i.e. Have not set *Layers as Separate Effects* in *Project->Settings*).

Attributes

Name	Description
Destination Time	The time to jump to in MM:SS:FF
Active	Choose whether the jump should be active
Mode	Choose which play head should jump; the layers or the global (see above)

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

Loop Time

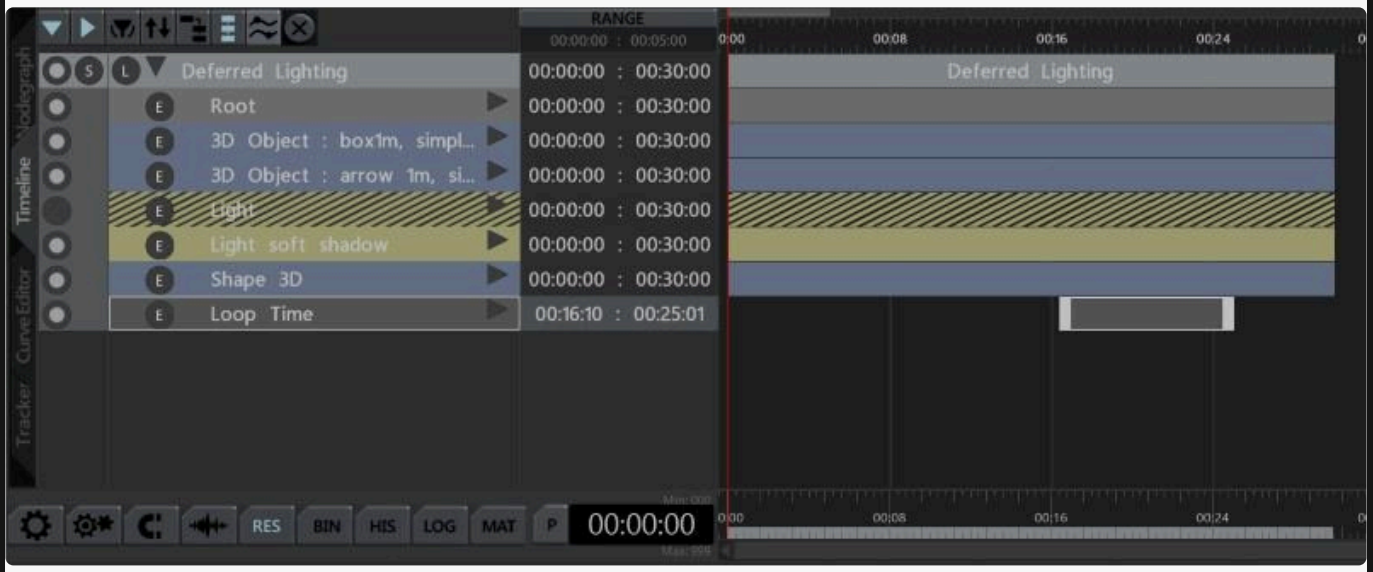
Method

This node allows you to set loop sections in either your current layer or globally. A loop section is an area of the timeline that you wish to repeat. Setting the Loop Time nodes start and end time, will define the loop section.

To understand how loops work in Notch, you need to understand the different playheads in Notch:

Playhead	Description
Incoming Global Playhead	This is the time that the mediaserver or host application is passing to Notch. Generally this will be simply advancing forward every frame (however media servers can jump to specific times as well).
Global Playhead	This is the master time in the project. It is advanced by the Incoming Global Playhead and can be looped by setting the *Mode* property to *Global*.
Layer Playheads	Each layer has it's own playhead. They are advanced by the Global Playhead but can be looped independently by setting the *Mode* property to *Local to layer*

The *Layer* mode is used when you are running your project layers in compositing mode (i.e. Have not set *Layers as Separate Effects* in *Project->Settings*).



Attributes

Name	Description
Active	Choose whether the loop should be in force

Mode	Choose which play head should be looped; the layers or the global (see above)

Inputs

Name	Description	Typical Node Input
Current Time	Override the nodes current time.	Envelope Modifier

Outputs

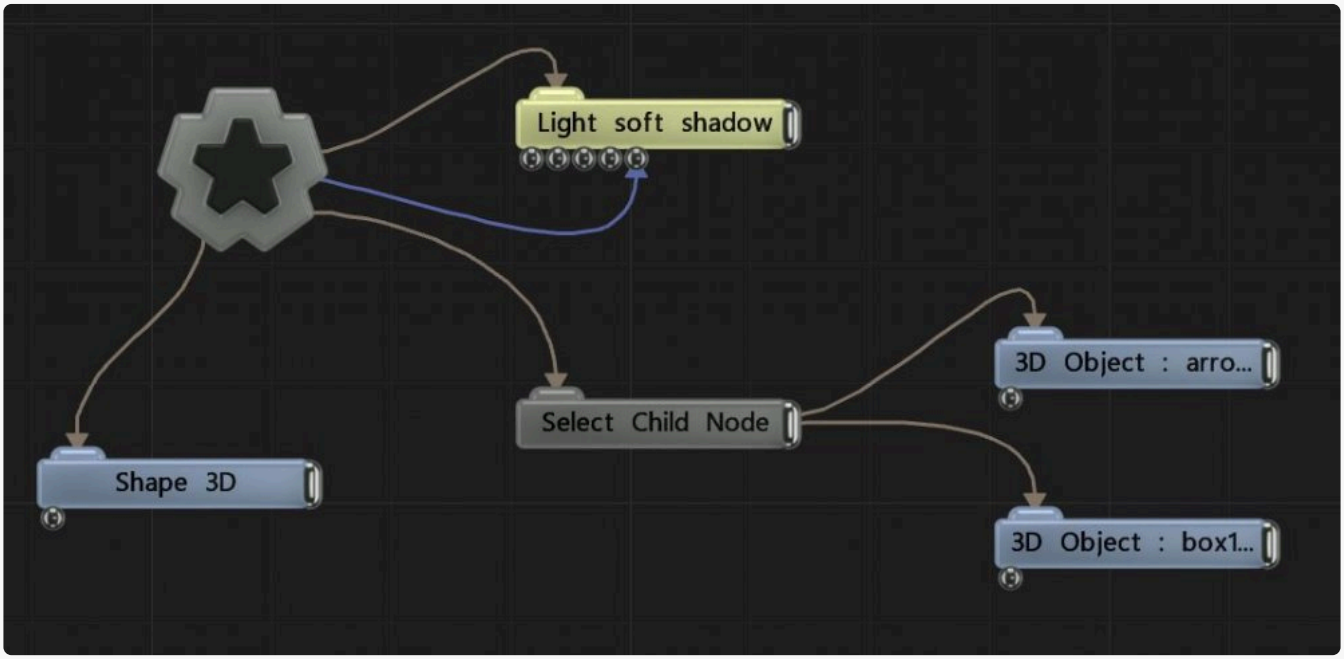
There are no outputs from this node.

Select Child Node

Method

Allows you to selectively enable or disable the execution of connected child nodes at runtime based on an index. Only one child node can be active at a time, but when used in conjunction with Null or Execute Child Nodes, you can add a tree of child nodes. This is useful for menu systems or general logic.

The index is based on the vertical order of the child nodes in the nodegraph. i.e. Index 0.0 will be the top most node. Index 1.0 the next down.

Example Nodegraph


Attributes

Name	Description
Child Node Index	Executes the child with this index (indexes start at 0.0)

State Machine

Method

The definition of a state machine is: *a logic device which can be in one of a set number of stable conditions depending on its previous condition and on the present values of its inputs*

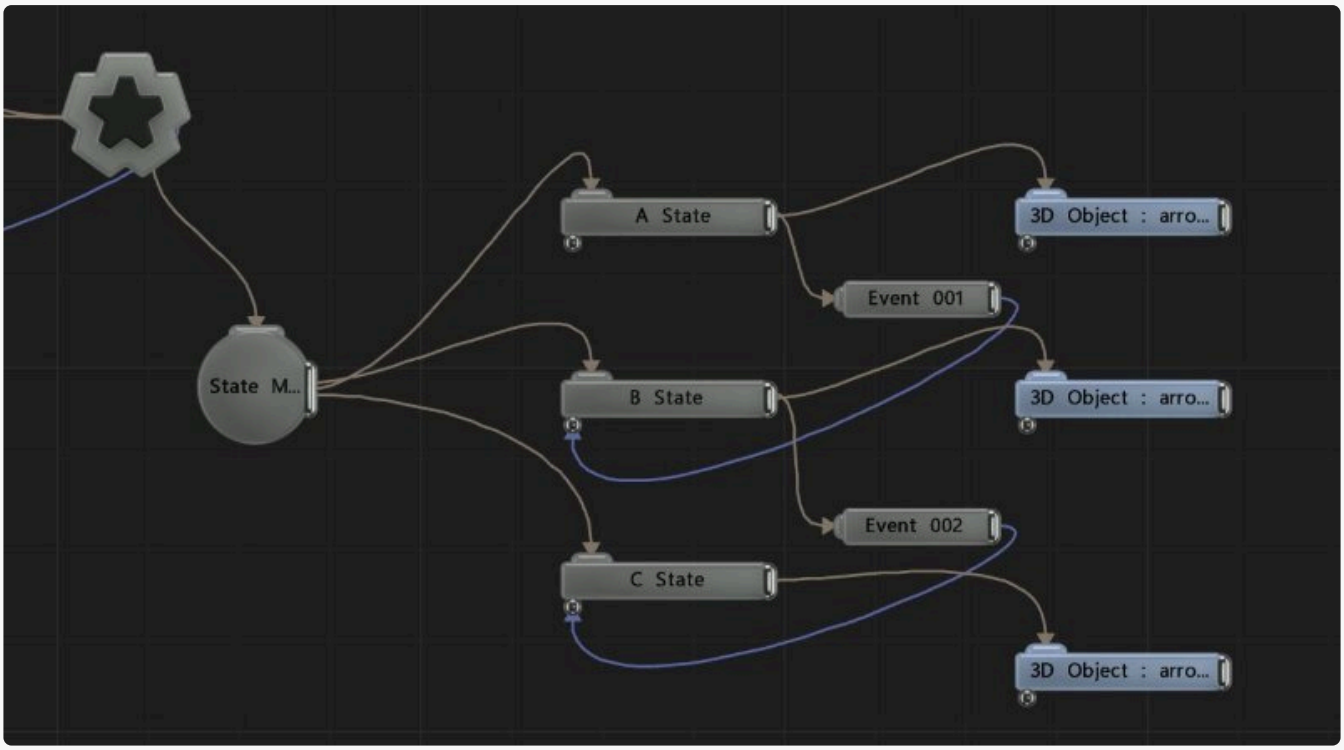
The Notch State Machine system allows certain nodes to become active on certain *states*. Only one *state* can be active at a single time and the transition from one state to another *state* is triggered by an *event*.

As such, we have two associated nodes:

- State Machine State
- State Machine Event

The State Machine node acts as mini-root node that is the parent to State Machine State nodes. The first vertically ordered *state* will be the initial state of the state machine.

Example Nodegraph



Attributes

Name	Description
Current State	Reports the name of the current State Machine State node that is active.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

State Machine Event

Method

The State Machine Event is a trigger mechanism for progressing from one state to another.

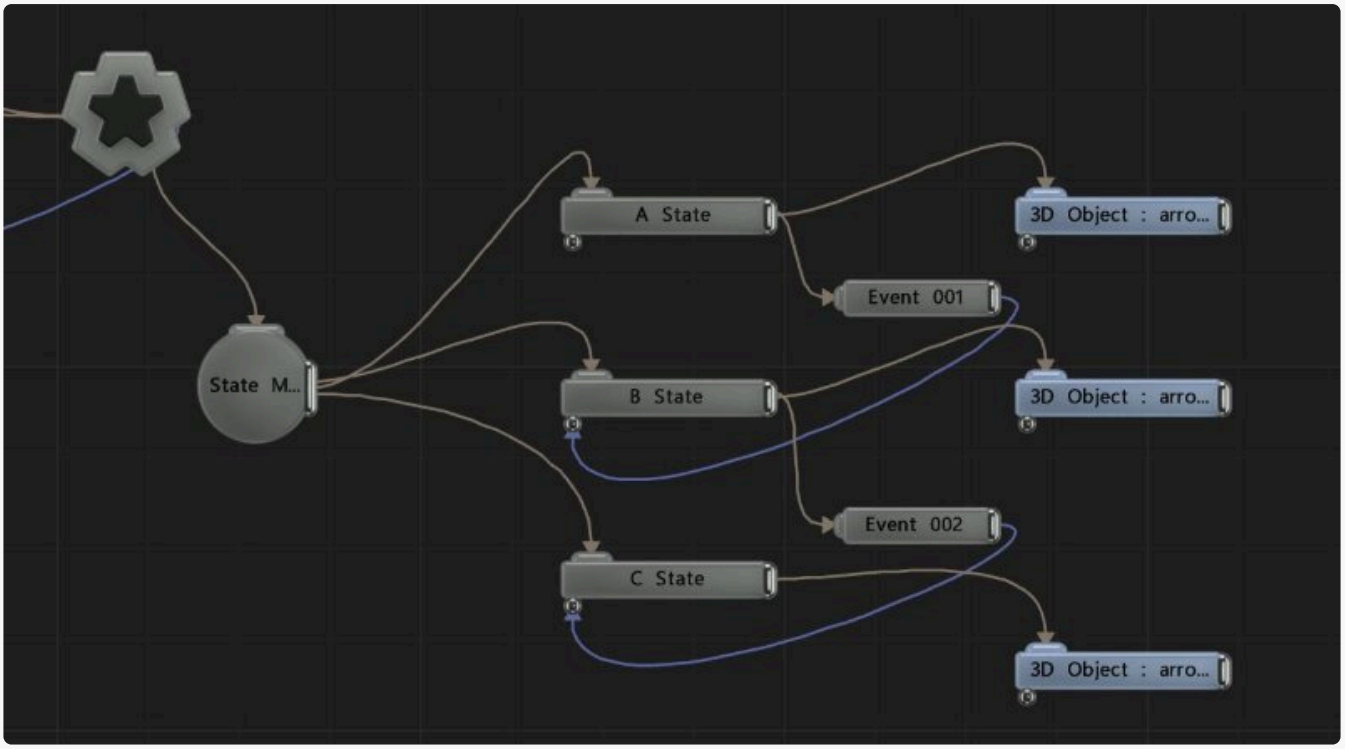
The Event input (left side) is connected to the State Machine States from which it should trigger transitions **FROM**.

The Event output (right side) is connected to the Incoming Events input of the State Machine State to which it should trigger transitions **TO**.

The *Activate* property should be used as a trigger and only moved to >= 1.0 momentarily.

> State Machine Events can be connected to **multiple FROM states** but **only one TO state**.

Example Nodegraph



Attributes

Name	Description

Activate	Control whether the event has been activated or not. Should be triggered momentarily to 1.0

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

State Machine State

Method

The *State Machine State* acts as a parent to a set of child nodes. When the state is active, the child nodes will be executed / rendered.

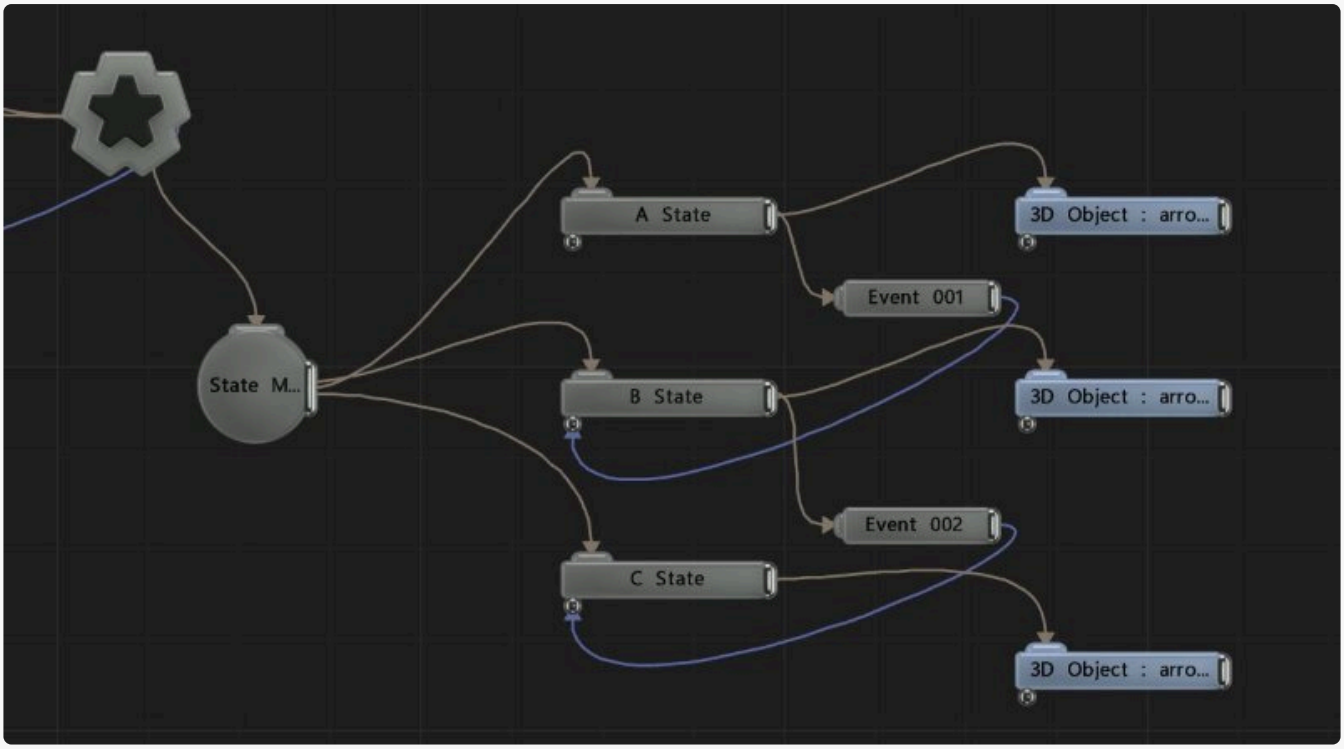
This node should be parented to a State Machine node.

The *state* can have one or multiple State Machine Events connected to it's *Incoming Events* input that will trigger transitions **INTO this *state***.

The *state* can have one or multiple State Machine Events connected to it's output that will trigger transitions **OUT OF this *state***.

See State Machine node for more details.

Example Nodegraph



Attributes

There are no attributes for this node.

Inputs

Name	Description	Typical Node Input
Incoming Events	These are the events (triggers) that will allow the transition from the previous state into this state.	State Machine Event

Outputs

The output of this node is to be a parent for child nodes that will only be executed / rendered when this *state* is active. The output is also connected to State Machine Events that are responsible for triggering transitions OUT OF this *state*.

Materials

Method

Material nodes control how light interacts with the surfaces of objects.

These nodes will accept a material input as a material.

- 3D Object
- Slice Geometry
- Shape 3D
- Shatter Primitive 3D
- Text
- Multi Material (Used to create new materials from other materials)

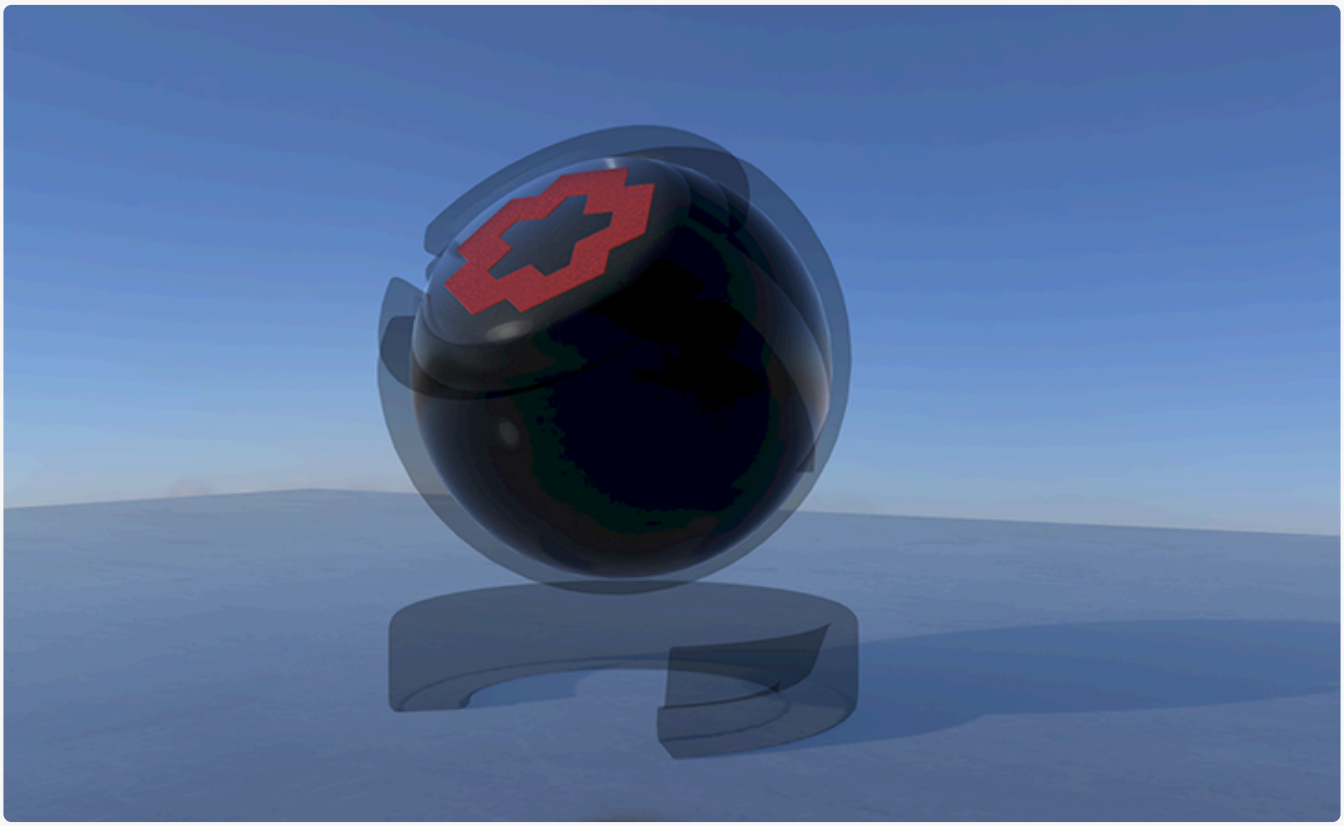
Gallery

- Alpha Blend (Transparent) Material
- Diffuse Material
- Emissive Material
- Global Material List
- Metallic Material
- Multi Material
- Shadow Catcher Material
- Material

Alpha Blend (Transparent) Material

Method

This is a basic transparent material using an alpha blend. This material can be applied to particles, 3D meshes and other objects in a 3D scene.

Alpha Blend Transparent Material


BRDF

Name	Description
Colour	The colour of the material.
Brightness	How much light the object absorbs and doesn't reflect back into the scene.
Specular Colour	The colour of specular light reflected from the material.
Specular Intensity	Intensity of the specular reflections
Specularity	How much specular light is reflected from the object.
Specular Anisotrophy	Change the shape of the specular highlight.

Emissiveness	How much of a glow is emitted around the object. Requires “high dynamic range” to be turned on in the root.
Metallicness	Change how metallic the object looks.
Roughness	How rough the surface of the material is.
Baked Diffuse Intensity	Intensity of the texture supplied via the Diffuse channel – typically used for baked light maps.
Use Baked Diffuse Map As Ambient Occlusion	Sets Diffuse Map to become an ambient occlusion map
Fresnel Diffuse Amount	The brightness of the fresnel on the diffuse surface

Alpha / Transparency

Name	Description
Alpha	Change the alpha value of the material.
Alpha Mode	Change how the alpha image affects the material. • Opaque, The material is rendered solid, completely occluding any pixels behind it in the view. • Alpha To Coverage, The material is rendered solid, but alpha values are converted into a dither pattern to allow textured alphas to shape the output. • Alpha Blend, The material is rendered transparent and the Blend Mode is used to control blending.
Blend Mode	Change how the material once added to an object blends with the scene. Only functions with “Alpha Mode” set to “ Alpha Blend”. See Blend Modes for details.
Alpha Sort Bias	Biases the alpha sorting of the objects using this material, if they are transparent, so they are drawn earlier or later in the sorting order.

Rim Lighting

Name	Description
Rim Lighting Enabled	Simulates Rim Lighting on the material with respect to the camera.
Rim Lighting Use Material Colour	Use the Materials Colour instead of the Rim Lighting Colour.
Rim Lighting Colour	Select a colour to use for Rim Lighting. Overwritten by Material Colour with Use Material Colour Enabled.
Rim Lighting Intensity	How strong the Rim Lighting is.
Rim Lighting Falloff	How far the falloff for the Rim Lighting reaches.

Settings

Name	Description
Lit	Toggle whether the material can be lit by lights in the scene.
Casts Shadows	Toggle whether the objects the material is applied to casts shadows.
Environment Mapping	Toggle whether Environment Map reflections will be applied to this material.
Back Face Cull Mode	Changes which directions the face will be visible in. • Double Sided, Both sides of the material will be rendered to the surface. • Show Front Faces, Only the front side aligned with the normal will be rendered. • Show Back Faces, Only the back side opposite to the normal will be rendered.
Flip Polygons	Toggles whether the polygons are flipped on the material
Wireframe	Toggles whether the polygons are wireframe on the material
Flat Shade Colours	Toggles whether the material colours are flat shaded

Displacement / Normals

Name	Description
Normal Smoothness	Change how much smoothing is done to the edges of the object.
Smoothing Angle	Sets the smoothing angle of the mesh faces. The higher the smoother the result.
Normal Map Strength	Change how strong the normal map effect is. Only functions if a normal map is selected in the “normal map” attribute, and the normal map mode is set to “normal mapping”.
Normal Map Mode	Change how the normal map affects the material.
Normal Map – Invert Normal X	Invert the normal map along the X axis.
Normal Map – Invert Normal Y	Invert the normal map along the Y axis.
Normal Map – Invert Normal Z	Invert the normal map along the Z axis.
Displacement	How Much the displacement map affects the object.
Displacement Offset	Offset displacement amount for the displacement maps.
Parallax Amount	Enables Parallax Occlusion Mapping, and sets how much the material is displaced by it.
Displacement –	Uses the Polygon UV’s to fix seams where the UV Map can wrap.

Use Polygons UVs	
Displacement – Fix Tessellation Seams	Can fix tessellation seams where displacement maps are sampled per vertex, and can wrap across polygons.

Texture

Name	Description
Colour Texture	Select a source image to add a colour texture to the material.
Normal Map	Select a source image to add a normal map to the material.
Specular Map	Select a source image to add a specula map to the material.
Diffuse Map	Select a source image to add a diffuse map to the material.
Displacement Map	Select an image to displace the mesh based on the luminescence values of the image. Can be used with the “Subdivision Levels” attribute in the 3D Object node.
Roughness Map	Select an image to control how rough different areas of the material are, based on luminance.
Metallicness Map	Select an image to control how metallic different areas of the material are.
Alpha Map	Select an image to control the alpha values of different areas of the material, based on luminance.
Emissiveness Map	Select a source image to control how emissive an object is, based on luminance.

UVs

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Diffuse UV Scale X	Scale the Diffuse UV texture along the X axis.
Diffuse UV Scale Y	Scale the Diffuse UV texture along the Y axis.
Diffuse UV Offset X	Offset the Diffuse UV texture along the X axis.
Diffuse UV Offset Y	Offset the Diffuse UV texture along the Y axis.
Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.

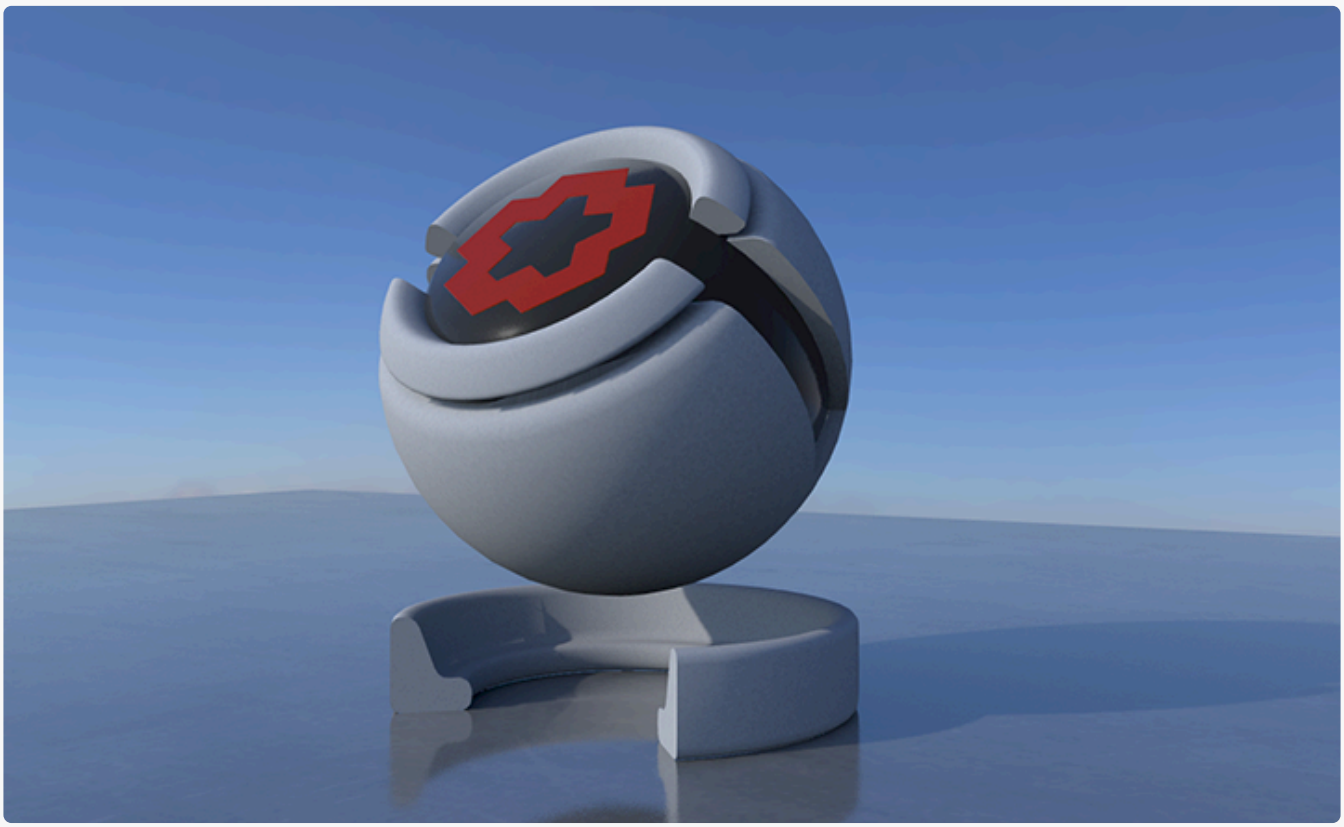
Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
Diffuse Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Diffuse Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Diffuse Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
UV Remap Filtering	Enables filtering for remapping UV's. Only functions with eligible textures.
Texture Mip Bias	Bias the distance at which Mip Maps are swapped for original textures.

Diffuse UV set will set only update the UV's for the diffuse or ambient occlusion textures rather than for all UVs for textures as above.

Diffuse Material

Method

A basic diffuse material, similar to the default material node but without any specular settings.

Diffuse materials


BRDF

Name	Description
Colour	The colour of the material.
Brightness	How much light the object absorbs and doesn't reflect back into the scene.
Baked Diffuse Intensity	Intensity of the texture supplied via the Diffuse channel – typically used for baked light maps.
Fresnel Diffuse Amount	The brightness of the fresnel on the diffuse surface.
Use Baked Diffuse Map As Ambient Occlusion	Sets Diffuse Map to become an ambient occlusion map.

Rim Lighting

Name	Description
Rim Lighting Enabled	Simulates Rim Lighting on the material with respect to the camera.
Rim Lighting Use Material Colour	Use the Materials Colour instead of the Rim Lighting Colour.
Rim Lighting Colour	Select a colour to use for Rim Lighting. Overwritten by Material Colour with Use Material Colour Enabled.
Rim Lighting Intensity	How strong the Rim Lighting is.
Rim Lighting Falloff	How far the falloff for the Rim Lighting reaches.

Settings

Name	Description
Casts Shadows	Toggle whether the objects the material is applied to casts shadows.
Back Face Cull Mode	Changes which directions the face will be visible in. • Double Sided, Both sides of the material will be rendered to the surface. • Show Front Faces, Only the front side aligned with the normal will be rendered. • Show Back Faces, Only the back side opposite to the normal will be rendered.
Flip Polygons	Toggles whether the polygons are flipped on the material.
Wireframe	Toggles whether the polygons are wireframe on the material.
Flat Shade Colours	Toggles whether the material colours are flat shaded.

Displacement / Normals

Name	Description
Normal Smoothness	Change how much smoothing is done to the edges of the object.
Smoothing Angle	Sets the smoothing angle of the mesh faces. The higher the smoother the result.
Normal Map Strength	Change how strong the normal map effect is. Only functions if a normal map is selected in the “normal map” attribute, and the normal map mode is set to “normal mapping”.
Normal Map Mode	Change how the normal map affects the material.
Normal Map – Invert Normal X	Invert the normal map along the X axis.
Normal Map –	Invert the normal map along the Y axis.

Invert Normal Y	
Normal Map – Invert Normal Z	Invert the normal map along the Z axis.
Displacement	How Much the displacement map affects the object.
Displacement Offset	Offset displacement amount for the displacement maps.
Parallax Amount	Enables Parallax Occlusion Mapping, and sets how much the material is displaced by it.
Displacement – Use Polygons UVs	Uses the Polygon UV's to fix seams where the UV Map can wrap.
Displacement – Fix Tessellation Seams	Can fix tessellation seams where displacement maps are sampled per vertex, and can wrap across polygons.

Texture

Name	Description
Colour Texture	Select a source image to add a colour texture to the material.
Normal Map	Select a source image to add a normal map to the material.
Diffuse Map	Select a source image to add a diffuse map to the material.
Displacement Map	Select an image to displace the mesh based on the luminescence values of the image. Can be used with the "Subdivision Levels" attribute in the 3D Object node.
Roughness Map	Select an image to control how rough different areas of the material are, based on luminance.

UVs

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Diffuse UV Scale X	Scale the Diffuse UV texture along the X axis.
Diffuse UV Scale Y	Scale the Diffuse UV texture along the Y axis.
Diffuse UV Offset X	Offset the Diffuse UV texture along the X axis.
Diffuse UV Offset Y	Offset the Diffuse UV texture along the Y axis.
Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling,

	linear filtering or anisotropic filtering.
Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
Diffuse Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Diffuse Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Diffuse Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
UV Remap Filtering	Enables filtering for remapping UV's. Only functions with eligible textures.
Texture Mip Bias	Bias the distance at which Mip Maps are swapped for original textures.

Diffuse UV set will set only update the UV's for the diffuse or ambient occlusion textures rather than for all UVs for textures as above.

Misc

Name	Description
Motion Blur Velocity Scale	Scale how much motion blur is affected by the object's movement.
Glow Amount	Control how much the object glows.
Density	How dense the material is. Used in sub-surface scattering, and glass shading.

Ray Depth

Name	Description
Use Global Settings	When enabled, the internal settings will be ignored and the global settings for bounces will be used.
Max Diffuse Depth	Sets the max diffuse bounces for the material.
Max Glossy Depth	Sets the max glossy bounces for the material.

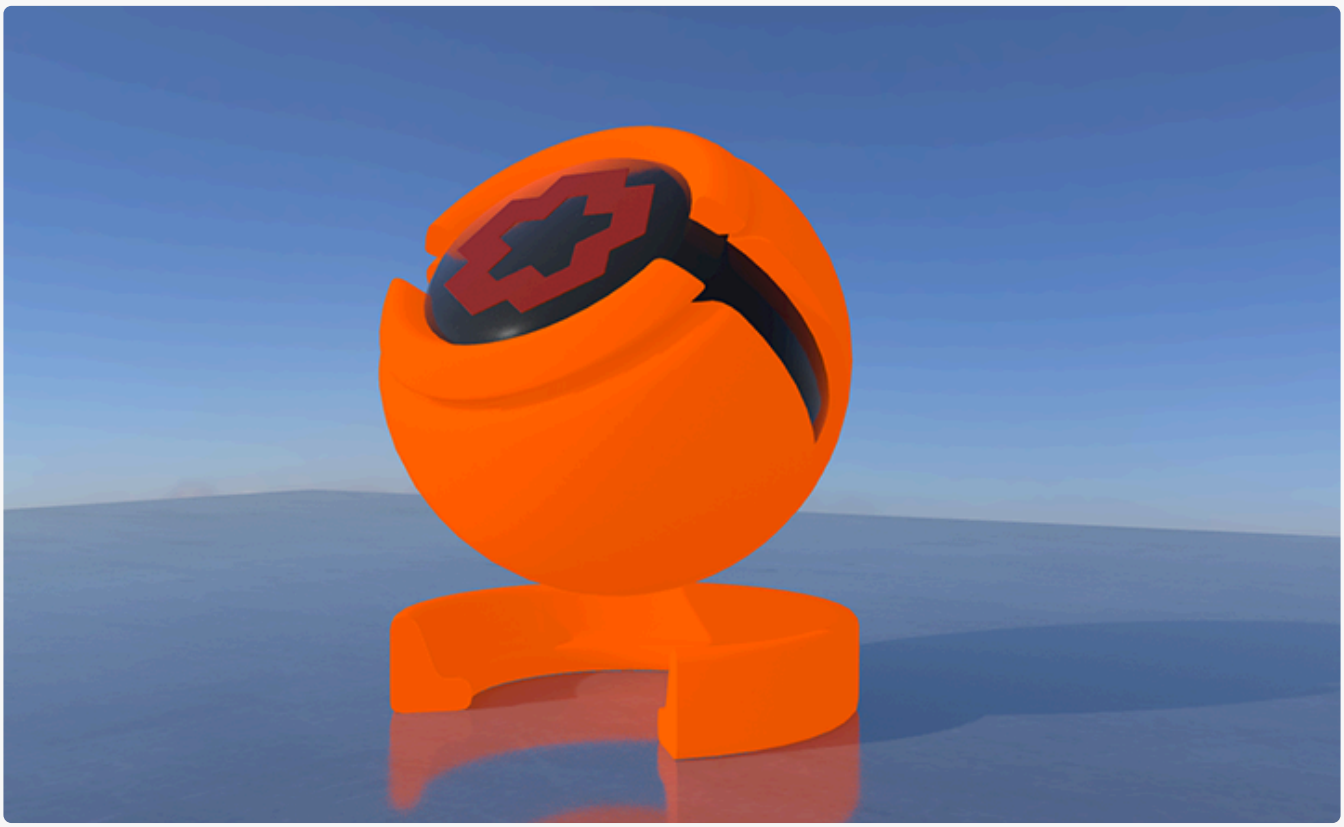
Outputs

Output a material that can be used by any node with a material input.

Emissive Material

Method

A basic emissive material, similar to the default material node but without any specular settings.

Emissive Material


BRDF

Name	Description
Colour	The colour of the material.
Brightness	How much light the object absorbs and doesn't reflect back into the scene.
Emissiveness	How much of a glow is emitted around the object. Requires "high dynamic range" to be turned on in the root.
Baked Diffuse Intensity	Intensity of the texture supplied via the Diffuse channel – typically used for baked light maps.
Use Baked Diffuse Map As Ambient Occlusion	Sets Diffuse Map to become an ambient occlusion map.

Settings

Name	Description
Lit	Toggle whether the material can be lit by lights in the scene.
Casts Shadows	Toggle whether the objects the material is applied to casts shadows.
Back Face Cull Mode	Changes which directions the face will be visible in. • Double Sided, Both sides of the material will be rendered to the surface. • Show Front Faces, Only the front side aligned with the normal will be rendered. • Show Back Faces, Only the back side opposite to the normal will be rendered.
Flip Polygons	Toggles whether the polygons are flipped on the material.
Wireframe	Toggles whether the polygons are wireframe on the material.
Flat Shade Colours	Toggles whether the material colours are flat shaded.

Displacement / Normals

Name	Description
Normal Smoothness	Change how much smoothing is done to the edges of the object.
Smoothing Angle	Sets the smoothing angle of the mesh faces. The higher the smoother the result.
Normal Map Strength	Change how strong the normal map effect is. Only functions if a normal map is selected in the “normal map” attribute, and the normal map mode is set to “normal mapping”.
Normal Map Mode	Change how the normal map affects the material.
Normal Map – Invert Normal X	Invert the normal map along the X axis.
Normal Map – Invert Normal Y	Invert the normal map along the Y axis.
Normal Map – Invert Normal Z	Invert the normal map along the Z axis.
Displacement	How Much the displacement map affects the object.
Displacement Offset	Offset displacement amount for the displacement maps.
Parallax Amount	Enables Parallax Occlusion Mapping, and sets how much the material is displaced by it.
Displacement – Use Polygons UVs	Uses the Polygon UV’s to fix seams where the UV Map can wrap.
Displacement –	Can fix tessellation seams where displacement maps are sampled per vertex, and can

Fix Tessellation Seams	wrap across polygons.

Texture

Name	Description
Colour Texture	Select a source image to add a colour texture to the material.
Diffuse Map	Select a source image to add a diffuse map to the material.
Displacement Map	Select an image to displace the mesh based on the luminescence values of the image. Can be used with the “Subdivision Levels” attribute in the 3D Object node.
Emissiveness Map	Select a source image to control how emissive an object is, based on luminance.

UVs

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Diffuse UV Scale X	Scale the Diffuse UV texture along the X axis.
Diffuse UV Scale Y	Scale the Diffuse UV texture along the Y axis.
Diffuse UV Offset X	Offset the Diffuse UV texture along the X axis.
Diffuse UV Offset Y	Offset the Diffuse UV texture along the Y axis.
Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
Diffuse Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Diffuse Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Diffuse Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
UV Remap Filtering	Enables filtering for remapping UV’s. Only functions with eligible textures.

Texture Mip Bias	Bias the distance at which Mip Maps are swapped for original textures.

Diffuse UV set will set only update the UV's for the diffuse or ambient occlusion textures rather than for all UVs for textures as above.

Misc

Name	Description
Motion Blur Velocity Scale	Scale how much motion blur is affected by the objects movement.
Glow Amount	Control how much the object glows.
Density	How dense the material is. Used in sub-surface scattering, and glass shading.

Ray Depth

Name	Description
Use Global Settings	When enabled, the internal settings will be ignored and the global settings for bounces will be used.
Max Diffuse Depth	Sets the max diffuse bounces for the material.
Max Glossy Depth	Sets the max glossy bounces for the material.

Outputs

Output a material that can be used by any node with a material input.

Global Material List

Method

Generates a list of all the materials in the scene from outside sources i.e 3D Objects, Imported 3D Scene, etc.

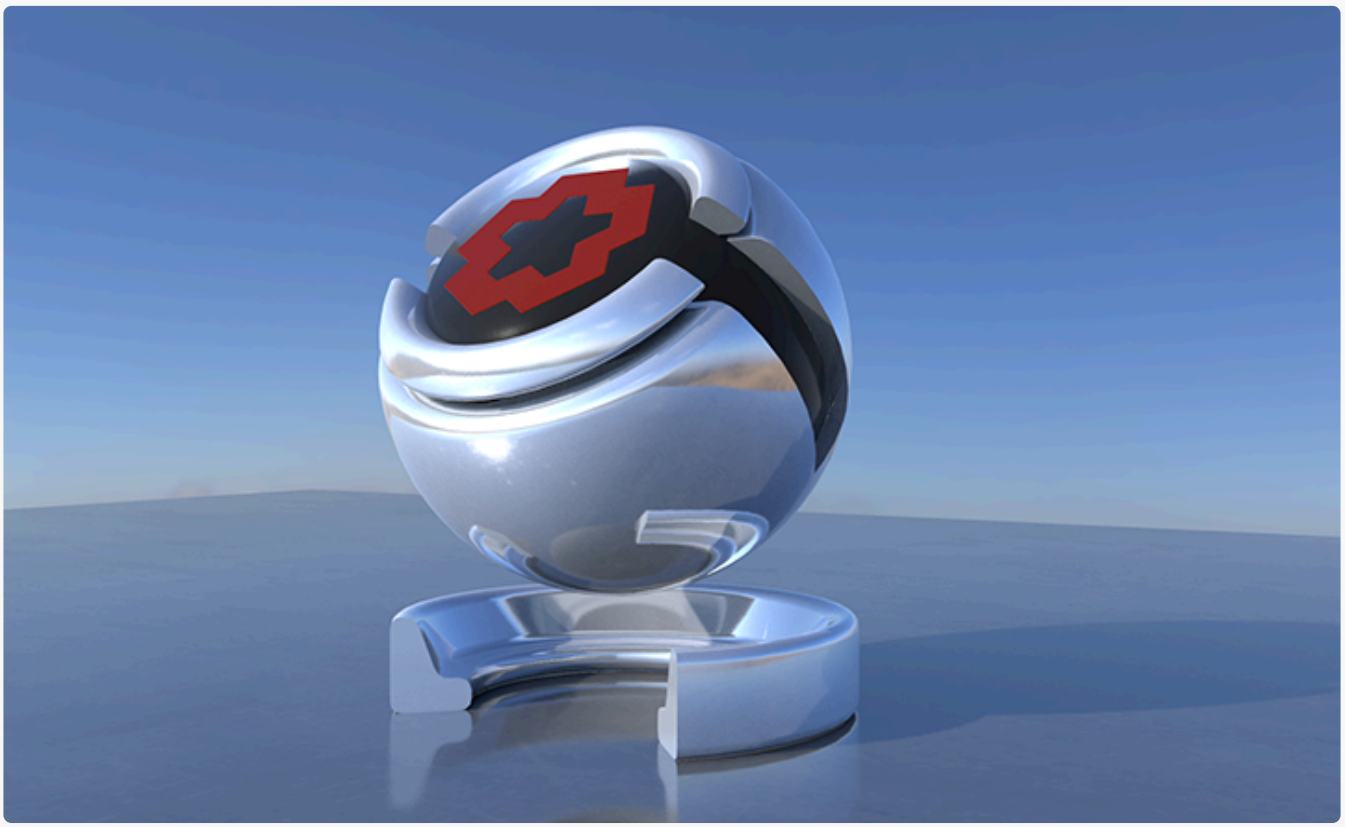
Outputs

Output a material that can be used by any node with a material input.

Metallic Material

Method

A basic metallic material, similar to the default material node but default metallic settings.

Metallic material


BRDF

Name	Description
Specular Colour	The colour of specular light reflected from the material.
Specular Intensity	Intensity of the specular reflections
Specular Anisotropy	Change the shape of the specular highlight.
Roughness	How rough the surface of the material is.
Use Colour Map as Specular	Use the input colour map as a specular map.

Rim Lighting

Name	Description
Rim Lighting Enabled	Simulates Rim Lighting on the material with respect to the camera.
Rim Lighting Use Material Colour	Use the Materials Colour instead of the Rim Lighting Colour.
Rim Lighting Colour	Select a colour to use for Rim Lighting. Overwritten by Material Colour with Use Material Colour Enabled.
Rim Lighting Intensity	How strong the Rim Lighting is.
Rim Lighting Falloff	How far the falloff for the Rim Lighting reaches.

Settings

Name	Description
Casts Shadows	Toggle whether the objects the material is applied to casts shadows.
Reflections	Change what types of reflections will be reflected by the material. • Raytraced, Toggle whether Raytraced reflections will be applied to this material. • Voxel Cone, Toggle whether Voxel Cone lighting will be applied to this material. • Screen Space, Toggle whether Screen Space reflections will be applied to this material. • Probes, Toggle whether Probe reflections will be applied to this material. • Environment Mapping, Toggle whether Environment Map reflections will be applied to this material.
Back Face Cull Mode	Changes which directions the face will be visible in. • Double Sided, Both sides of the material will be rendered to the surface. • Show Front Faces, Only the front side aligned with the normal will be rendered. • Show Back Faces, Only the back side opposite to the normal will be rendered.
Flip Polygons	Toggles whether the polygons are flipped on the material.
Wireframe	Toggles whether the polygons are wireframe on the material.
Flat Shade Colours	Toggles whether the material colours are flat shaded.

Displacement / Normals

Name	Description
Normal Smoothness	Change how much smoothing is done to the edges of the object.

Smoothing Angle	Sets the smoothing angle of the mesh faces. The higher the smoother the result.
Normal Map Strength	Change how strong the normal map effect is. Only functions if a normal map is selected in the “normal map” attribute, and the normal map mode is set to “normal mapping”.
Normal Map Mode	Change how the normal map affects the material.
Normal Map – Invert Normal X	Invert the normal map along the X axis.
Normal Map – Invert Normal Y	Invert the normal map along the Y axis.
Normal Map – Invert Normal Z	Invert the normal map along the Z axis.
Displacement	How Much the displacement map affects the object.
Displacement Offset	Offset displacement amount for the displacement maps.
Parallax Amount	Enables Parallax Occlusion Mapping, and sets how much the material is displaced by it.
Displacement – Use Polygons UVs	Uses the Polygon UV’s to fix seams where the UV Map can wrap.
Displacement – Fix Tessellation Seams	Can fix tessellation seams where displacement maps are sampled per vertex, and can wrap across polygons.

Texture

Name	Description
Colour Texture	Select a source image to add a colour texture to the material.
Normal Map	Select a source image to add a normal map to the material.
Specular Map	Select a source image to add a specula map to the material.
Displacement Map	Select an image to displace the mesh based on the luminescence values of the image. Can be used with the “Subdivision Levels” attribute in the 3D Object node.
Roughness Map	Select an image to control how rough different areas of the material are, based on luminance.

UVs

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.

UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Diffuse UV Scale X	Scale the Diffuse UV texture along the X axis.
Diffuse UV Scale Y	Scale the Diffuse UV texture along the Y axis.
Diffuse UV Offset X	Offset the Diffuse UV texture along the X axis.
Diffuse UV Offset Y	Offset the Diffuse UV texture along the Y axis.
Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
Diffuse Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Diffuse Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Diffuse Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
UV Remap Filtering	Enables filtering for remapping UV's. Only functions with eligible textures.
Texture Mip Bias	Bias the distance at which Mip Maps are swapped for original textures.

Diffuse UV set will set only update the UV's for the diffuse or ambient occlusion textures rather than for all UVs for textures as above.

Misc

Name	Description
Motion Blur Velocity Scale	Scale how much motion blur is affected by the objects movement.
Glow Amount	Control how much the object glows.
Density	How dense the material is. Used in sub-surface scattering, and glass shading.

Ray Depth

Name	Description
Use Global Settings	When enabled, the internal settings will be ignored and the global settings for bounces will be used.
Max Diffuse	Sets the max diffuse bounces for the material.

Depth	
Max Glossy Depth	Sets the max glossy bounces for the material.

Outputs

Output a material that can be used by any node with a material input.

Multi Material

Method

Generates a material based on an input of two materials.

Attributes

Name	Description
Select Image	Image used to control how the materials are combined.
Select Threshold	The threshold used to decide at what area one material is replaced by another.

Inputs

Name	Description	Typical Node Input
Materials	Materials to be combined.	Material
Select Texture	select a texture to be used to blend the materials together.	Image Plane

Outputs

Output a material that can be used by any node with a material input.

Shadow Catcher Material

Method

The shadow catcher node captures shadow information from lights cast on to the surface of an object that has the shadow catcher material applied to it.

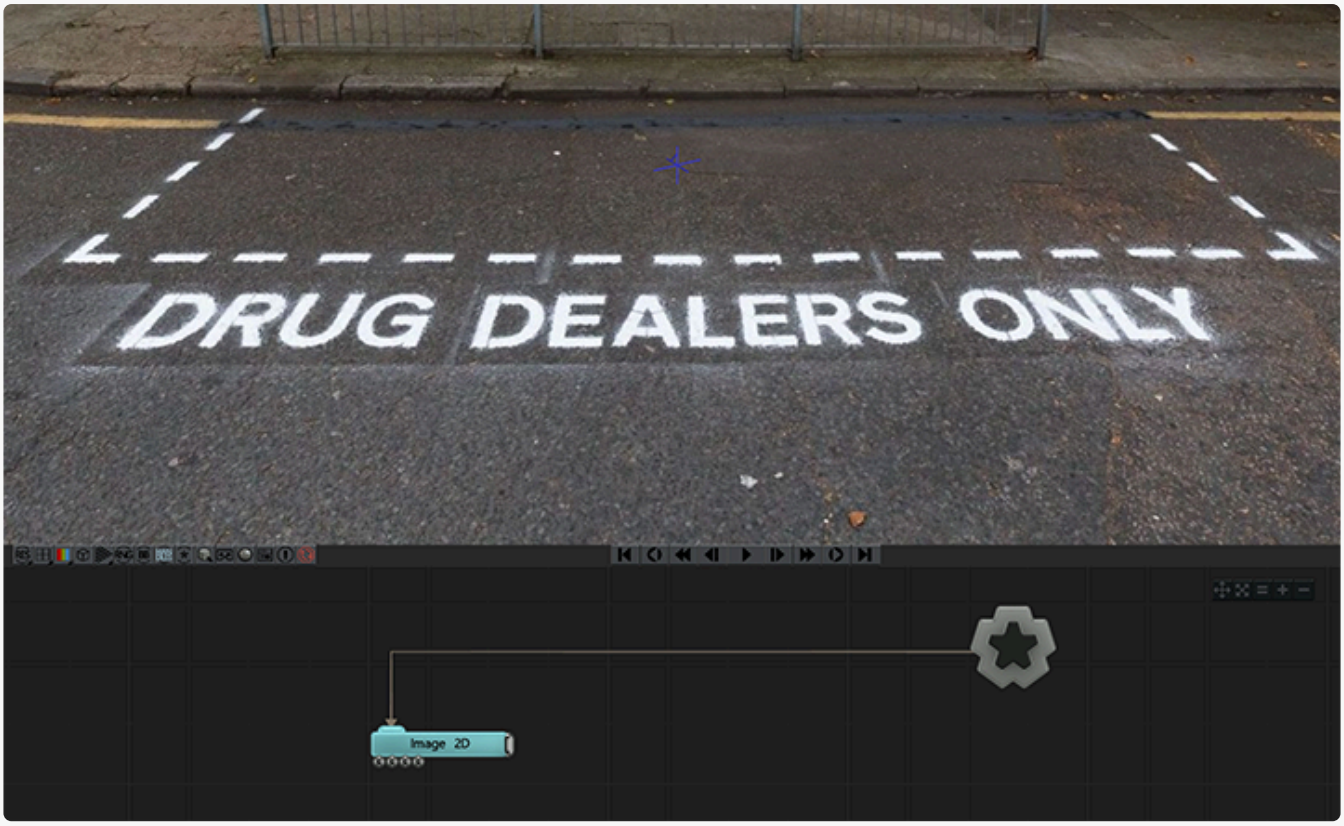
The captured shadow information can then be rendered separately onto surfaces of a scene using the layers composite blend modes alpha channels.
This will give you the ability to render shadows onto objects not in the scene – for instance on real-world objects or floors in AR projects.

> The shadow catcher node is great for faking shadows onto surfaces for AR projects.

An example shadow catcher project can be found below.

ShadowCatcher.dfx

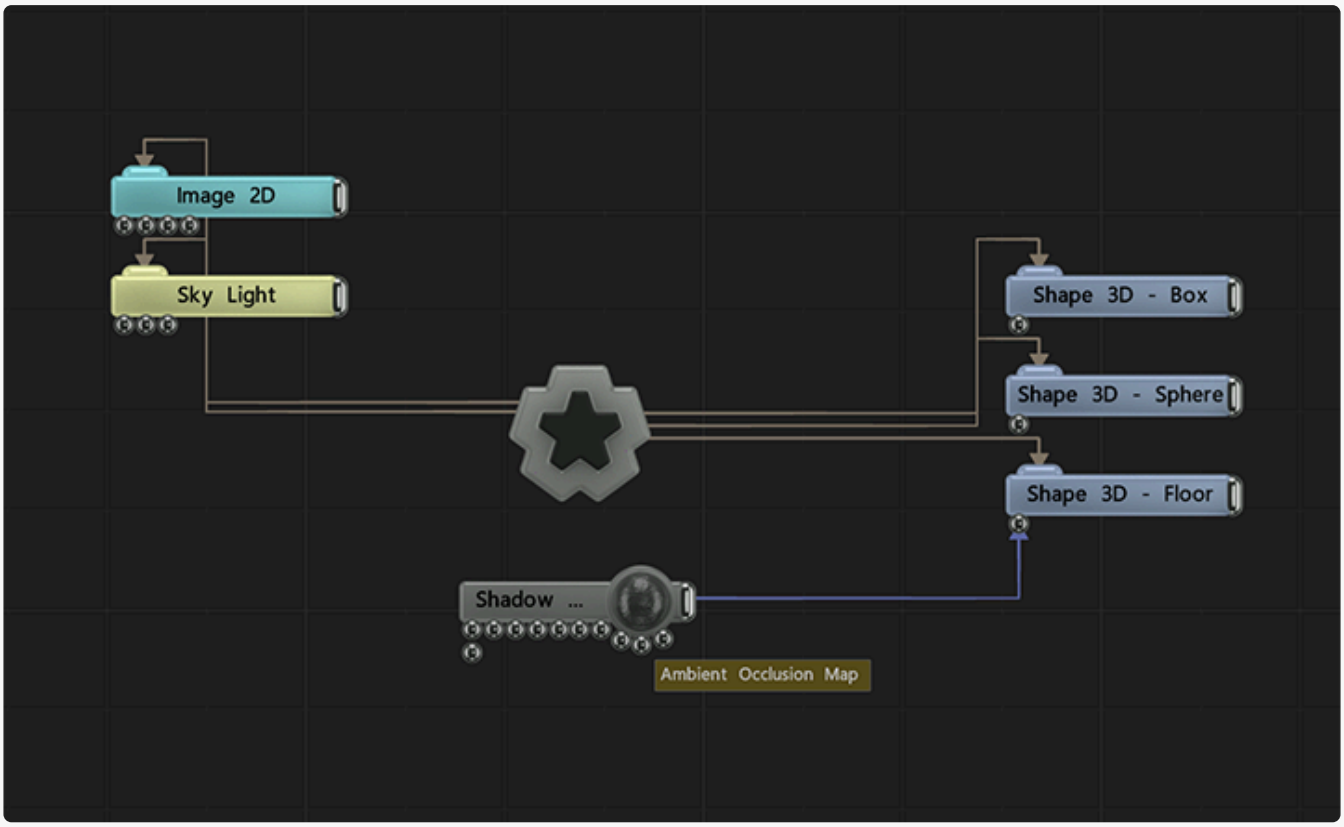
This example uses layers to show the shadow catcher node working.
Layer 1 is the background layer containing a background image the shadow catcher will project on.



Layer 2: Shadow Catcher skylight layer shows a scene with the shadow catcher setup with a skylight.

Shadow Catcher using a skylight

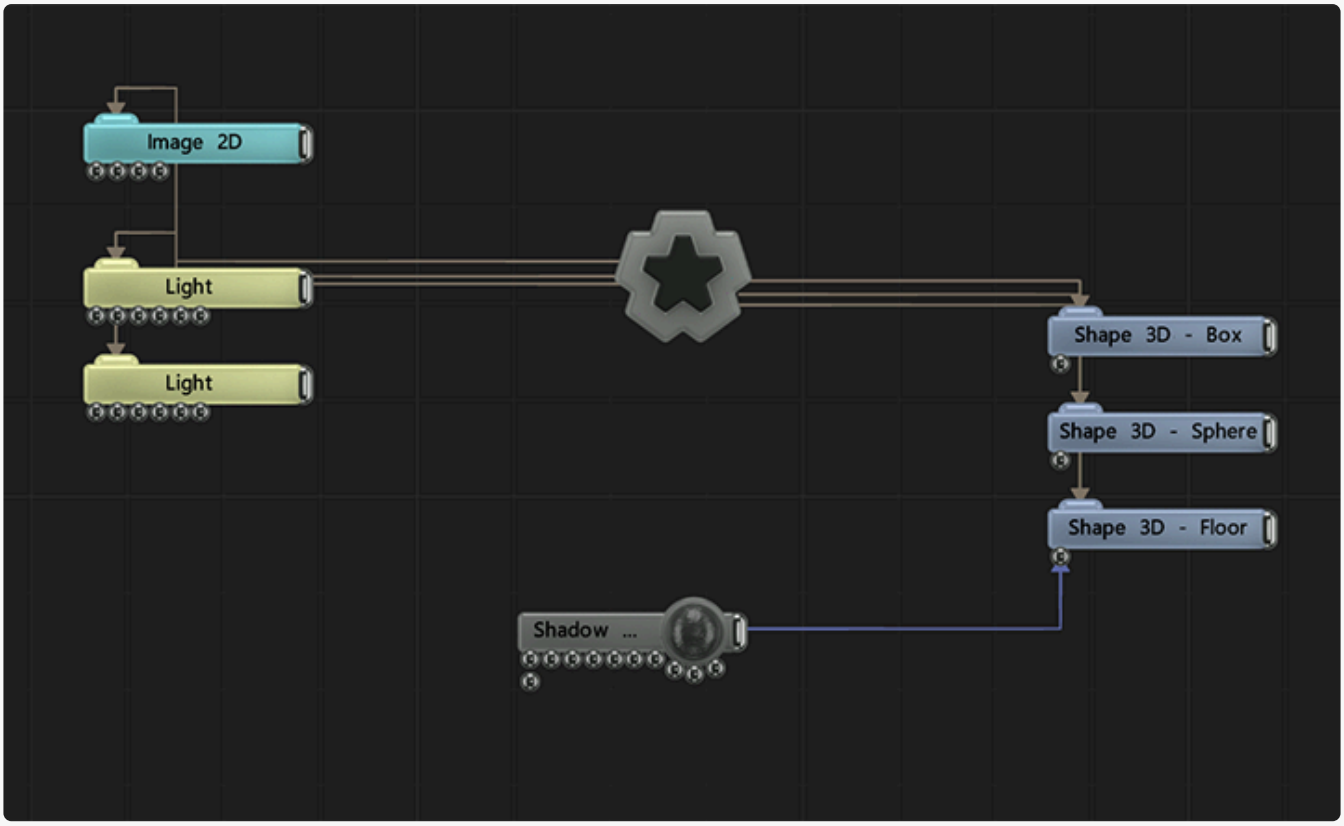
Shadow Catcher skylight Nodegraph



Layer 3: Shadow Catcher Spotlights layer shows a scene with the shadow catcher node setup using spotlights.

Shadow Catcher using Spotlights

Shadow Catcher Spotlights Nodegraph



BRDF

Name	Description
Shadow Catcher Colour	The colour of the shadows.
Baked Diffuse Intensity	The intensity of the diffuse texture.
Use Baked Diffuse Map As Ambient Occlusion	Sets the diffuse map as an ambient occlusion map.

Settings

Name	Description
Lit	Toggle whether the material can be lit by lights in the scene.
Casts Shadows	Toggle whether the objects the material is applied to casts shadows.
Unseen By Camera	Toggle whether can be seen by the camera.
Back Face Cull Mode	Changes which directions the face will be visible in. • Double Sided, Both sides of the material will be rendered to the surface. • Show Front Faces, Only the front side aligned with the normal will be rendered. • Show Back Faces, Only the back side opposite to the normal will be rendered.

Flip Polygons	Toggles whether the polygons are flipped on the material.
Wireframe	Toggles whether the polygons are wireframe on the material.

Displacement / Normals

Name	Description
Normal Smoothness	Change how much smoothing is done to the edges of the object.
Smoothing Angle	Sets the smoothing angle of the mesh faces. The higher the smoother the result.
Normal Map Strength	Change how strong the normal map effect is. Only functions if a normal map is selected in the “normal map” attribute, and the normal map mode is set to “normal mapping”.
Normal Map Mode	Change how the normal map affects the material.
Normal Map – Invert Normal X	Invert the normal map along the X axis.
Normal Map – Invert Normal Y	Invert the normal map along the Y axis.
Normal Map – Invert Normal Z	Invert the normal map along the Z axis.
Displacement	How Much the displacement map affects the object.
Displacement Offset	Offset displacement amount for the displacement maps.
Parallax Amount	Enables Parallax Occlusion Mapping, and sets how much the material is displaced by it.
Displacement – Use Polygons UVs	Uses the Polygon UV’s to fix seams where the UV Map can wrap.
Displacement – Fix Tessellation Seams	Can fix tessellation seams where displacement maps are sampled per vertex, and can wrap across polygons.

Texture

Name	_.Description
Diffuse Map	Select a source image to add a diffuse map to the material.
Displacement Map	Select an image to displace the mesh based on the luminescence values of the image. Can be used with the “Subdivision Levels” attribute in the 3D Object node.
Alpha Map	Select an image to control the alpha values of different areas of the material, based on luminance.

UVs

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Diffuse UV Scale X	Scale the Diffuse UV texture along the X axis.
Diffuse UV Scale Y	Scale the Diffuse UV texture along the Y axis.
Diffuse UV Offset X	Offset the Diffuse UV texture along the X axis.
Diffuse UV Offset Y	Offset the Diffuse UV texture along the Y axis.
Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
Diffuse Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Diffuse Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Diffuse Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
UV Remap Filtering	Enables filtering for remapping UV's. Only functions with eligible textures.
Texture Mip Bias	Bias the distance at which Mip Maps are swapped for original textures.

Diffuse UV set will set only update the UV's for the diffuse or ambient occlusion textures rather than for all UVs for textures as above.

Misc

Name	Description
Motion Blur Velocity Scale	Scale how much motion blur is affected by the objects movement.
Glow Amount	Control how much the object glows.
Density	How dense the material is. Used in sub-surface scattering, and glass shading.

Ray Depth

Name	Description
Use Global Settings	When enabled, the internal settings will be ignored and the global settings for bounces will be used.
Max Diffuse Depth	Sets the max diffuse bounces for the material.
Max Glossy Depth	Sets the max glossy bounces for the material.

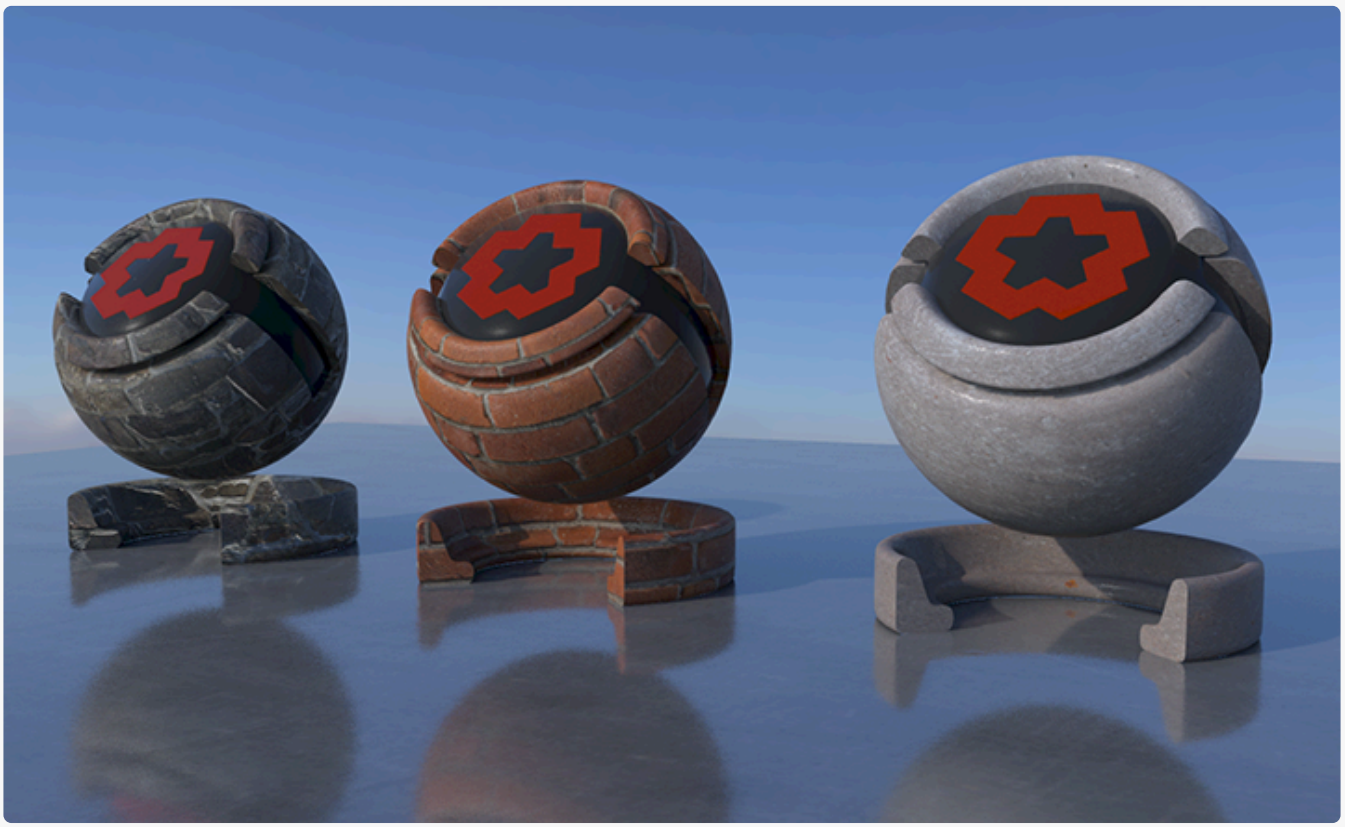
Outputs

Output a material that can be used by any node with a material input.

Material

Method

Create a PBR material that can be applied to particles, 3D meshes and other objects in a 3D scene.

Rock and brick PBR materials


BRDF

Name	Description
Colour	The colour of the material.
Brightness	How much light the object absorbs and doesn't reflect back into the scene.
Specular Colour	The colour of specular light reflected from the material.
Specular Intensity	Intensity of the specular reflections.
Specularity	How much specular light is reflected from the object.
Specular Anisotropy	Change the shape of the specular highlight.
Emissiveness	How much of a glow is emitted around the object. Requires "high dynamic

	range" to be turned on in the root.
Metallicness	Change how metallic the object looks.
Roughness	How rough the surface of the material is.
Baked Diffuse Intensity	Intensity of the texture supplied via the Diffuse channel – typically used for baked light maps.
Use Baked Diffuse Map As Ambient Occlusion	Sets Diffuse Map to become an ambient occlusion map.
Fresnel Diffuse Amount	The brightness of the fresnel on the diffuse surface.
Shadow Catcher Colour	Colour of the shadow catcher colour.

Alpha / Transparency

Name	Description
Alpha	Change the alpha value of the material.
Alpha Mode	Change how the alpha image affects the material. • Opaque, The material is rendered solid, completely occluding any pixels behind it in the view. • Alpha To Coverage, The material is rendered solid, but alpha values are converted into a dither pattern to allow textured alphas to shape the output. • Alpha Blend, The material is rendered transparent and the Blend Mode is used to control blending.
Blend Mode	Change how the material once added to an object blends with the scene. Only functions with "Alpha Mode" set to " Alpha Blend". See Blend Modes for details.
Alpha Sort Bias	Biases the alpha sorting of the objects using this material, if they are transparent, so they are drawn earlier or later in the sorting order.
Refraction IOR	Activates when raytracing is enabled on the root. How much the light is bent through a transparent surface.
Absorption	Activates when raytracing is enabled on the root. This is how much light is absorbed on a transparent surface.
Absorption Colour	Activates when raytracing is enabled on the root. The colour of the absorbed light on a transparent surface.
Transparent Diffuse	Activates when raytracing is enabled on the root. The transparency of the diffuse material.

Rim Lighting

Name	Description
Rim Lighting Enabled	Simulates Rim Lighting on the material with respect to the camera.
Rim Lighting Use	Use the Materials Colour instead of the Rim Lighting Colour.

Material Colour	
Rim Lighting Colour	Select a colour to use for Rim Lighting. Overwritten by Material Colour with Use Material Colour Enabled.
Rim Lighting Intensity	How strong the Rim Lighting is.
Rim Lighting Falloff	How far the falloff for the Rim Lighting reaches.

Settings

Name	Description
Lit	Toggle whether the material can be lit by lights in the scene.
Casts Shadows	Toggle whether the objects the material is applied to casts shadows.
Subsurface Scattering	Toggle whether the objects the material is applied to has screen space subsurface scattering applied.
Reflections	Change what types of reflections will be reflected by the material. • Raytraced, Toggle whether Raytraced reflections will be applied to this material. • Voxel Cone, Toggle whether Voxel Cone lighting will be applied to this material. • Screen Space, Toggle whether Screen Space reflections will be applied to this material. • Probes, Toggle whether Probe reflections will be applied to this material. • Environment Mapping, Toggle whether Environment Map reflections will be applied to this material.
Refractions	Toggle whether light can be refracted Inside the objects the material is applied to.
Shadow Catcher	Toggles converting the material into a shadow catcher material
Unseen By Camera	Toggle whether can be seen by the camera.
Back Face Cull Mode	Changes which directions the face will be visible in. • Double Sided, Both sides of the material will be rendered to the surface. • Show Front Faces, Only the front side aligned with the normal will be rendered. • Show Back Faces, Only the back side opposite to the normal will be rendered.
Flip Polygons	Toggles whether the polygons are flipped on the material.
Wireframe	Toggles whether the polygons are wireframe on the material.
Flat Shade Colours	Toggles whether the material colours are flat shaded.

Displacement / Normals

Name	Description
Normal Smoothness	Change how much smoothing is done to the edges of the object.
Smoothing Angle	Sets the smoothing angle of the mesh faces. The higher the smoother the result.
Normal Map Strength	Change how strong the normal map effect is. Only functions if a normal map is selected in the “normal map” attribute, and the normal map mode is set to “normal mapping”.
Normal Map Mode	Change how the normal map affects the material.
Normal Map – Invert Normal X	Invert the normal map along the X axis.
Normal Map – Invert Normal Y	Invert the normal map along the Y axis.
Normal Map – Invert Normal Z	Invert the normal map along the Z axis.
Displacement	How Much the displacement map affects the object.
Displacement Offset	Offset displacement amount for the displacement maps.
Parallax Amount	Enables Parallax Occlusion Mapping, and sets how much the material is displaced by it.
Displacement – Use Polygons UVs	Uses the Polygon UV’s to fix seams where the UV Map can wrap.
Displacement – Fix Tessellation Seams	Can fix tessellation seams where displacement maps are sampled per vertex, and can wrap across polygons.

Texture

Name	Description
Colour Texture	Select a source image to add a colour texture to the material.
Normal Map	Select a source image to add a normal map to the material.
Specular Map	Select a source image to add a specula map to the material.
Diffuse Map	Select a source image to add a diffuse map to the material.
Displacement Map	Select an image to displace the mesh based on the luminescence values of the image. Can be used with the “Subdivision Levels” attribute in the 3D Object node.
Roughness Map	Select an image to control how rough different areas of the material are, based on luminance.

Alpha Map	Select an image to control the alpha values of different areas of the material, based on luminance.
Emissiveness Map	Select a source image to control how emissive an object is, based on luminance.

UVs

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Diffuse UV Scale X	Scale the Diffuse UV texture along the X axis.
Diffuse UV Scale Y	Scale the Diffuse UV texture along the Y axis.
Diffuse UV Offset X	Offset the Diffuse UV texture along the X axis.
Diffuse UV Offset Y	Offset the Diffuse UV texture along the Y axis.
Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
Diffuse Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Diffuse Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Diffuse Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
UV Remap Filtering	Enables filtering for remapping UV's. Only functions with eligible textures.
Texture Mip Bias	Bias the distance at which Mip Maps are swapped for original textures.

✻ Diffuse UV set will set only update the UV's for the diffuse or ambient occlusion textures rather than for all UVs for textures as above.

Misc

Name	Description

Motion Blur Velocity Scale	Scale how much motion blur is affected by the objects movement.
Glow Amount	Control how much the object glows.
Density	How dense the material is. Used in sub-surface scattering, and glass shading.

Ray Depth

Name	Description
Use Global Settings	When enabled, the internal settings will be ignored and the global settings for bounces will be used.
Max Diffuse Depth	Sets the max diffuse bounces for the material.
Max Glossy Depth	Sets the max glossy bounces for the material.

Outputs

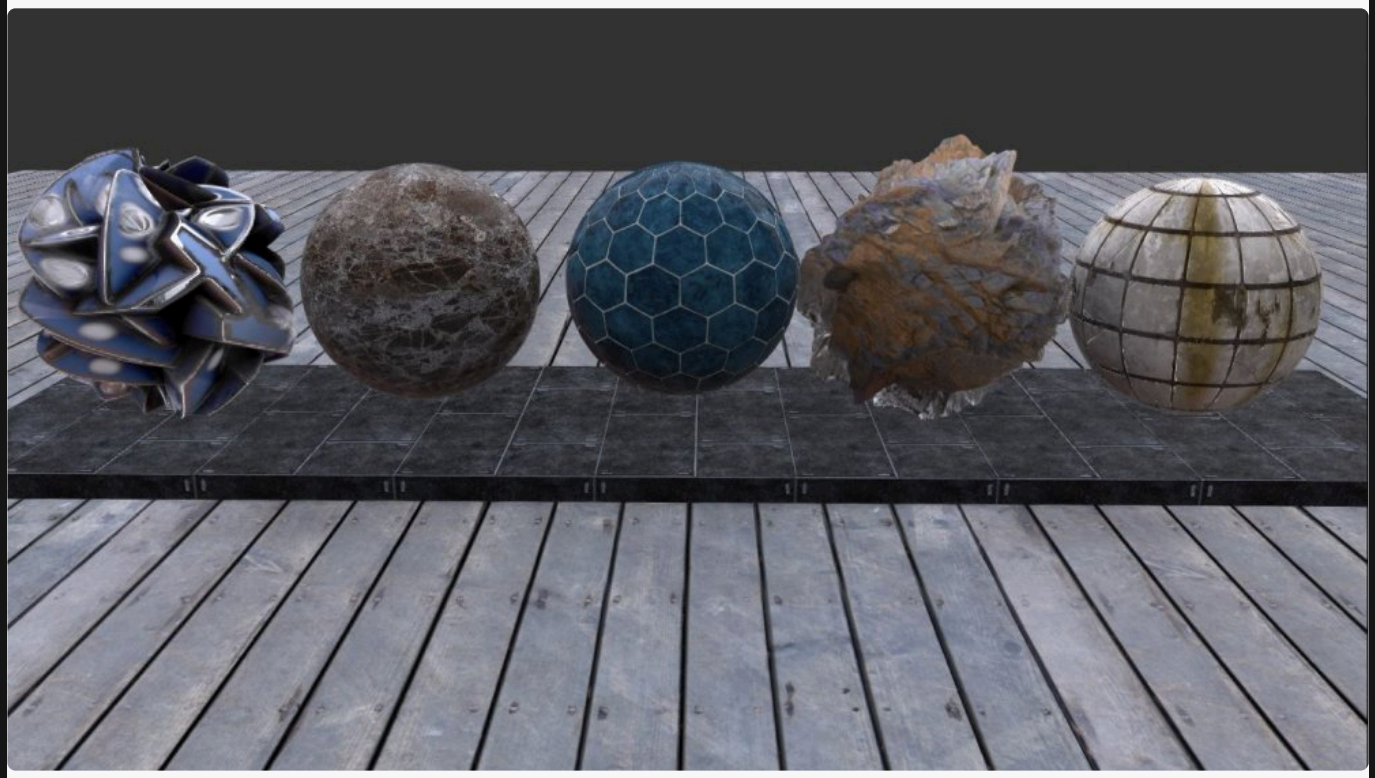
Output a material that can be used by any node with a material input.

Substance Material

Method

Notch allows the use of materials made with Substance Designer from Allegorithmic.
The *Substance Designer Material* once assigned to an object will behave like a standard Notch material.
All options are identical, but with the ability to modify the texture on the fly according to your parameters.
You can also apply *Substance Material* on a Procedural Mesh.

For more information about Substance Designer:
Substance designer web site.



Substance

Name	Description
Substance SBS	Selected .sbsar material
Output Width	Pixel resolution of the texture horizontally.
Output Height	Pixel resolution of the texture vertically.

You can only generate square textures.
Resolutions are : 16 ,32 64, 128,256,512,1024,2048,4096,8192.

Substance Parameters

If your material contains modifiable parameters, all modifiable parameters will be present here

BRDF

Name	Description
Colour	The colour of the material.
Brightness	How much light the object absorbs and doesn't reflect back into the scene.
Specular Colour	The colour of specular light reflected from the material.
Specular Intensity	Intensity of the specular reflections
Specularity	How much specular light is reflected from the object.
Specular Anisotropy	Change the shape of the specular highlight.
Emissiveness	How much of a glow is emitted around the object. Requires "high dynamic range" to be turned on in the root.
Baked Diffuse Intensity	Intensity of the texture supplied via the Diffuse channel – typically used for baked light maps.
Use Baked Diffuse Map As Ambient Occlusion	Sets Diffuse Map to become an ambient occlusion map
Fresnel Diffuse Amount	The brightness of the fresnel on the diffuse surface
Shadow Catcher Colour	Colour of the shadow catcher colour

Alpha / Transparency

Name	Description
Alpha	Change the alpha value of the material.
Alpha Mode	Change how the alpha image affects the material. • Opaque, The material is rendered solid, completely occluding any pixels behind it in the view. • Alpha To Coverage, The material is rendered solid, but alpha values are converted into a dither pattern to allow textured alphas to shape the output. • Alpha Blend, The material is rendered transparent and the Blend Mode is used to control blending.
Blend Mode	Change how the material once added to an object blends with the scene. Only functions with "Alpha Mode" set to " Alpha Blend". See Blend Modes for details.
Alpha Sort Bias	Biases the alpha sorting of the objects using this material, if they are transparent, so they are drawn earlier or later in the sorting order.

Refraction IOR	Activates when raytracing is enabled on the root. How much the light is bent through a transparent surface.
Absorption	Activates when raytracing is enabled on the root. This is how much light is absorbed on a transparent surface.
Absorption Colour	Activates when raytracing is enabled on the root. The colour of the absorbed light on a transparent surface.
Transparent Diffuse	Activates when raytracing is enabled on the root. The transparency of the diffuse material.

Rim Lighting

Name	Description
Rim Lighting Enabled	Simulates Rim Lighting on the material with respect to the camera.
Rim Lighting Use Material Colour	Use the Materials Colour instead of the Rim Lighting Colour.
Rim Lighting Colour	Select a colour to use for Rim Lighting. Overwritten by Material Colour with Use Material Colour Enabled.
Rim Lighting Intensity	How strong the Rim Lighting is.
Rim Lighting Falloff	How far the falloff for the Rim Lighting reaches.

Settings

Name	Description
Lit	Toggle whether the material can be lit by lights in the scene.
Casts Shadows	Toggle whether the objects the material is applied to casts shadows.
Subsurface Scattering	Toggle whether the objects the material is applied to has screen space subsurface scattering applied.
Reflections	
Refractions	Toggle whether light can be refracted Inside the objects the material is applied to.
Shadow Catcher	Toggles converting the material into a shadow catcher material
Unseen By Camera	Toggle whether can be seen by the camera.
Back Face Cull Mode	
Double sided	Sets the material to double Sided.
Show Front Faces	Sets the material to show front faces.
Show Back Faces	Sets the material to show back faces.
Flip Polygons	Toggles whether the polygons are flipped on the material

Wireframe	Toggles whether the polygons are wireframe on the material
Flat Shade Colours	Toggles whether the material colours are flat shaded

Displacement / Normals

Name	Description
Normal Smoothness	Change how much smoothing is done to the edges of the object.
Smoothing Angle	Sets the smoothing angle of the mesh faces. The higher the smoother the result.
Normal Map Strength	Change how strong the normal map effect is. Only functions if a normal map is selected in the “normal map” attribute, and the normal map mode is set to “normal mapping”.
Normal Map Mode	Change how the normal map affects the material.
Normal Map – Invert Normal X	Invert the normal map along the X axis.
Normal Map – Invert Normal Y	Invert the normal map along the Y axis.
Normal Map – Invert Normal Z	Invert the normal map along the Z axis.
Displacement	How Much the displacement map affects the object.
Displacement Offset	Offset amount for the displacement maps
Parallax Amount	How much parallax in the displacement
Displacement – Use Polygons UVs	Toggles on and off
Displacement – Fix Tessellation Seams	Toggles on and off

Texture

Name	Description
Colour Texture	Select a source image to add a colour texture to the material.
Normal Map	Select a source image to add a normal map to the material.
Specular Map	Select a source image to add a specula map to the material.
Diffuse Map	Select a source image to add a diffuse map to the material.

Displacement Map	Select an image to displace the mesh based on the luminescence values of the image. Can be used with the “Subdivision Levels” attribute in the 3D Object node.
Roughness Map	Select an image to control how rough different areas of the material are, based on luminance.
Alpha Map	Select an image to control the alpha values of different areas of the material, based on luminance.
Emissiveness Map	Select a source image to control how emissive an object is, based on luminance.

UVs

Name	Description
UV Scale X	Scale the UV texture along the X axis.
UV Scale Y	Scale the UV texture along the Y axis.
UV Offset X	Offset the UV texture along the X axis.
UV Offset Y	Offset the UV texture along the Y axis.
Diffuse UV Scale X	Scale the Diffuse UV texture along the X axis.
Diffuse UV Scale Y	Scale the Diffuse UV texture along the Y axis.
Diffuse UV Offset X	Offset the Diffuse UV texture along the X axis.
Diffuse UV Offset Y	Offset the Diffuse UV texture along the Y axis.
Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
Diffuse Texture Filter Mode	Controls how textures used by the material are filtered – through point sampling, linear filtering or anisotropic filtering.
Diffuse Texture Wrap Mode U	Controls how textures used by the material are wrapped when the U value range exceeds 0 to 1.
Diffuse Texture Wrap Mode V	Controls how textures used by the material are wrapped when the V value range exceeds 0 to 1.
UV Remap Filtering	Toggles on and off
Texture Mip Bias	Sets the bias of the mip maps

Diffuse UV set will set only update the UV’s for the diffuse or ambient occlusion textures rather than for all UVs for textures as above.

Misc

Name	Description
Motion Blur Velocity Scale	Scale how much motion blur is affected by the objects movement.
Glow Amount	Control how much the object glows.
Density	How dense the material is. Used in sub-surface scattering, and glass shading.

Ray Depth

Name	Description
Use Global Settings	toggles off and on
Max Diffuse Depth	sets the max diffuse depth
Max Glossy Depth	Sets the max gloss depth

Outputs

Output a material that can be used by any node with a material input.

Using Substance Painter exports

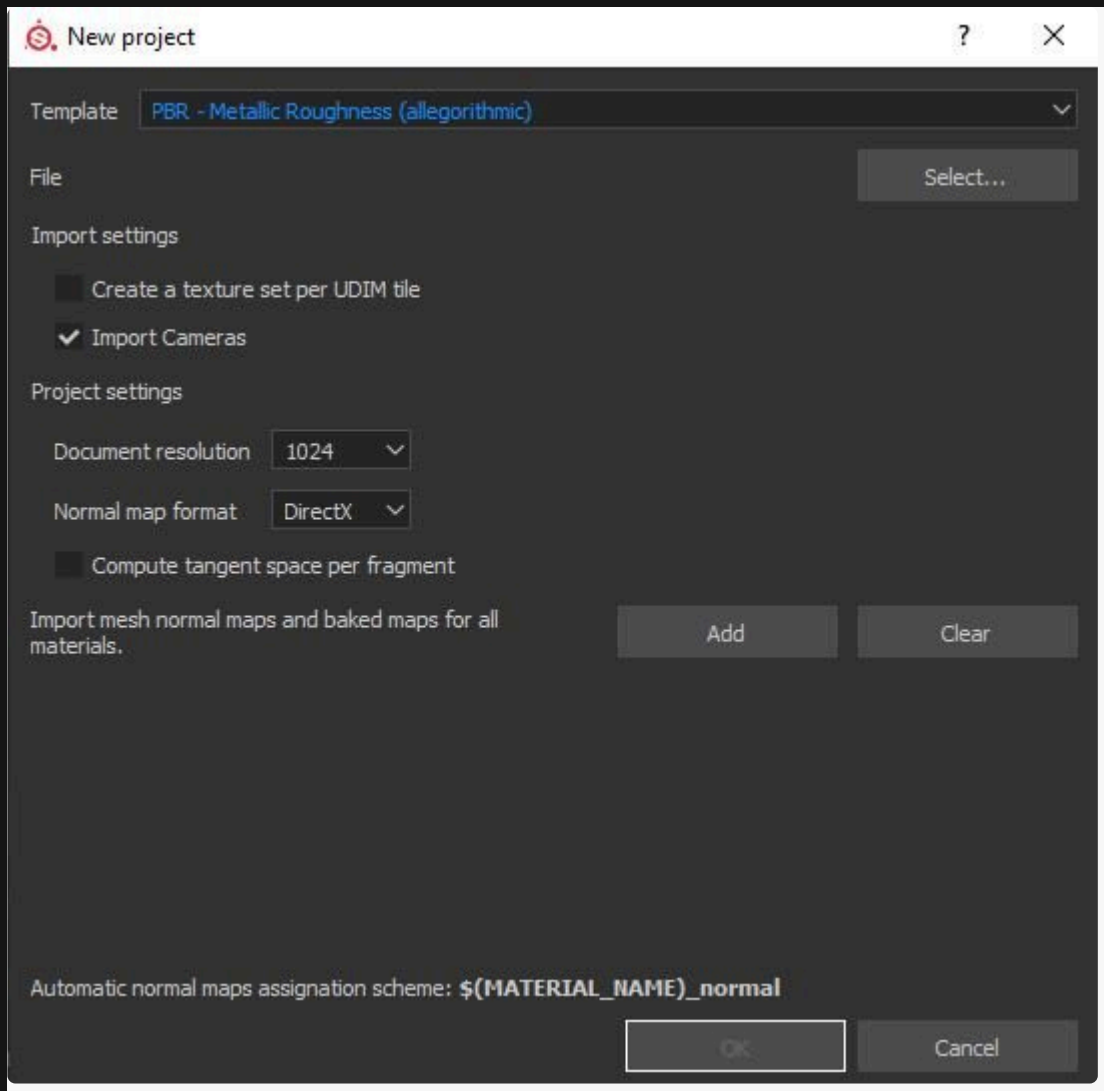
Method

Unlike a material made with Substance Designer, it is not possible to use the Substance Painter file directly. You must export the textures from Substance Painter to use them in Notch.
Your Painter project must also be created with the right presets.

Meshs textured with painter and rendered in Notch

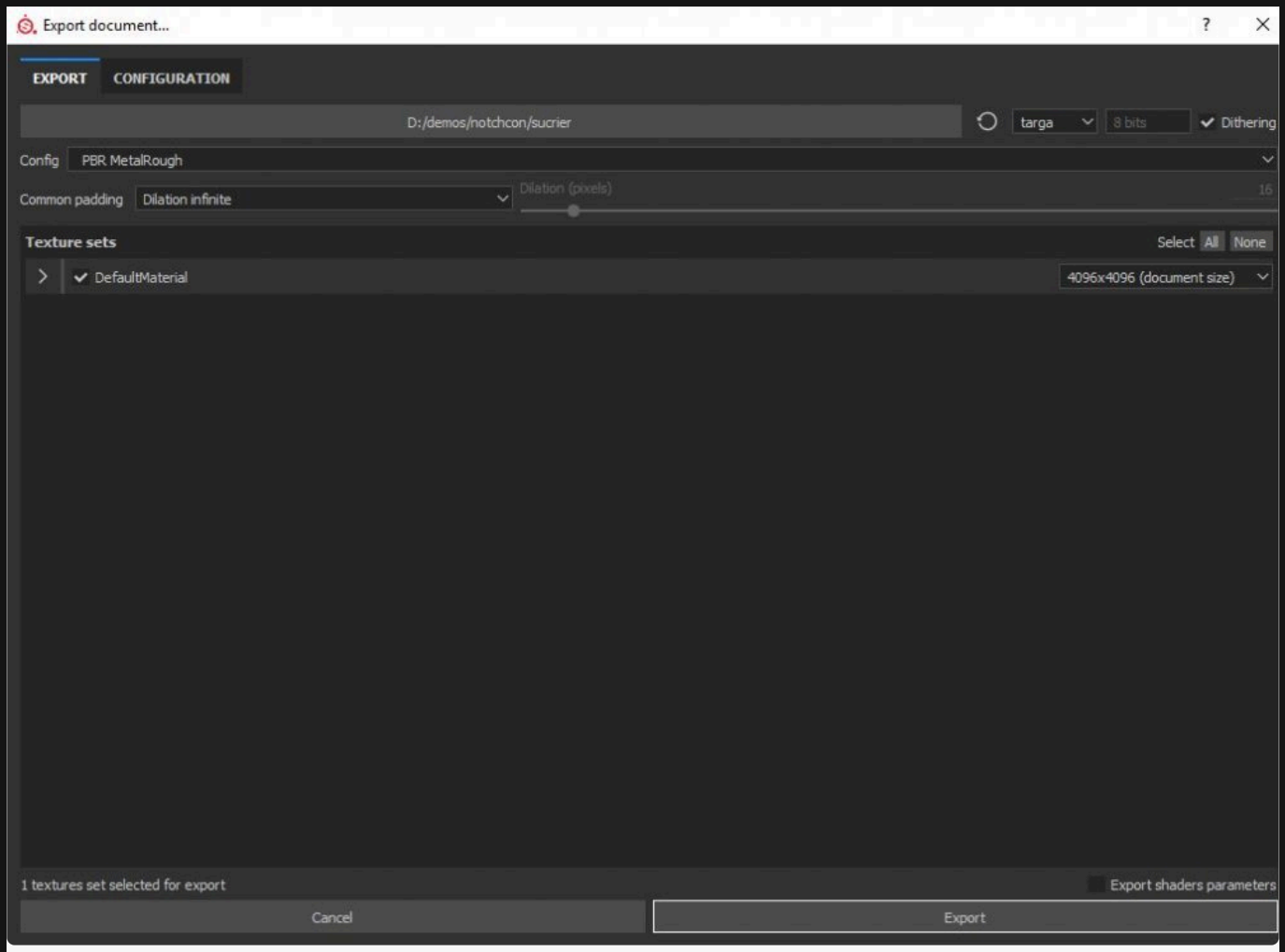
Material setup with Substance Painter

You need to choose the template “PBR – Metallic Roughness (Allegorithmic)”

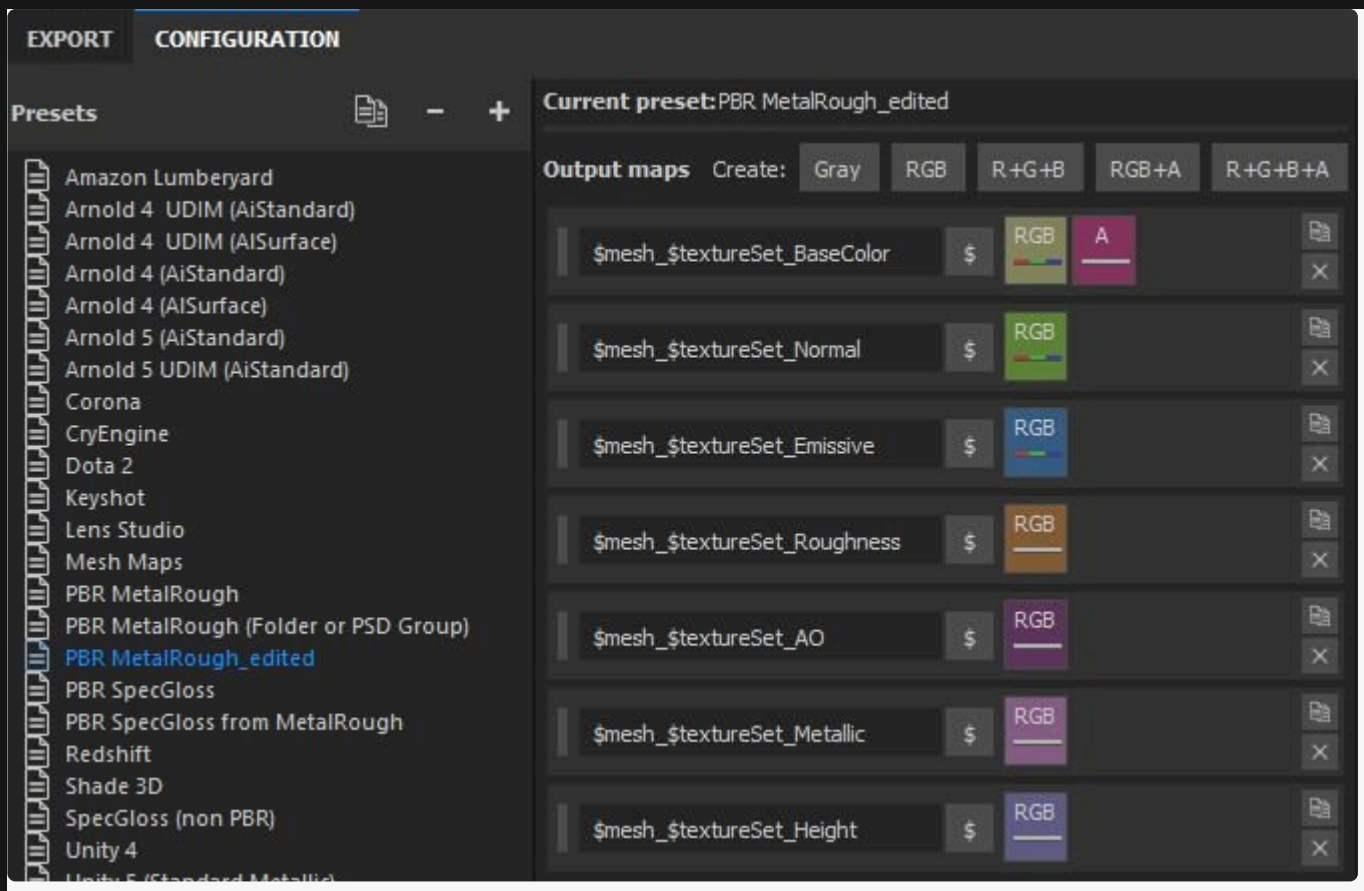


Exporting Textures

In the Export panel option you need to choose the config “PBR MetalRough”, It is preferable to choose the TGA image format.

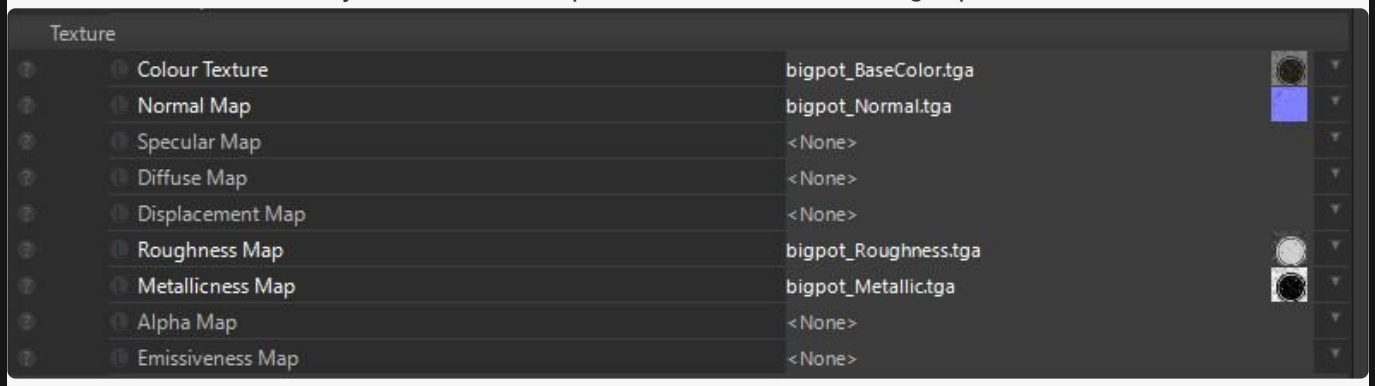


By default, the textures of Metallic and Roughness are in grey level.
Notch uses RGB textures, you can change the export to RGB in the configuration menu.

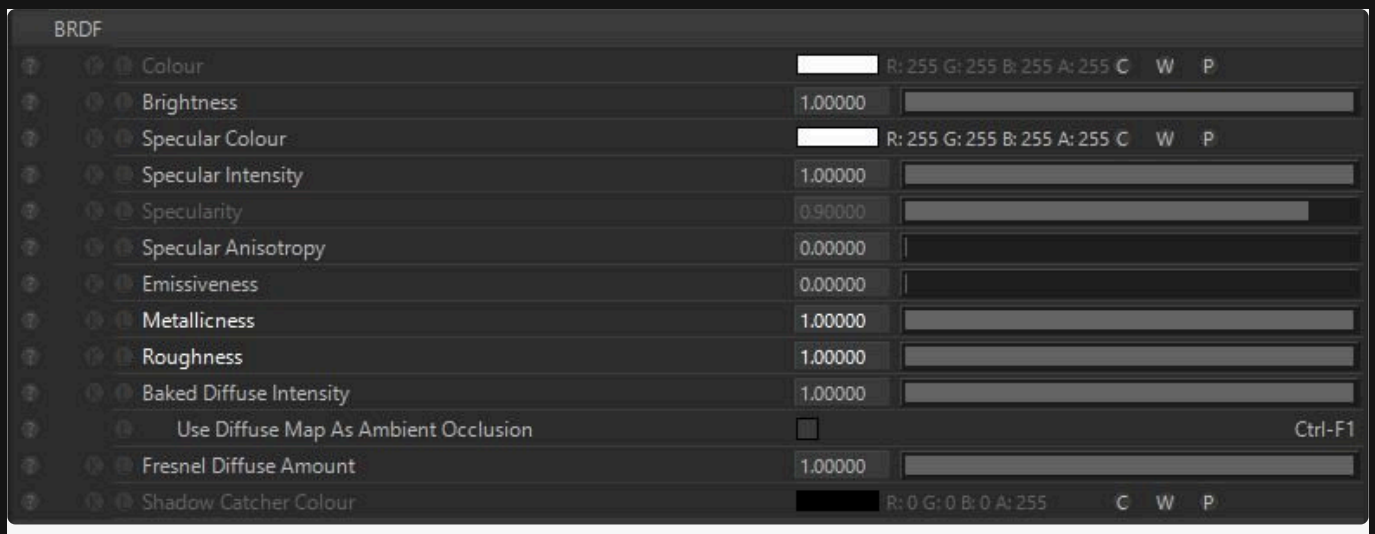


Material setup in Notch

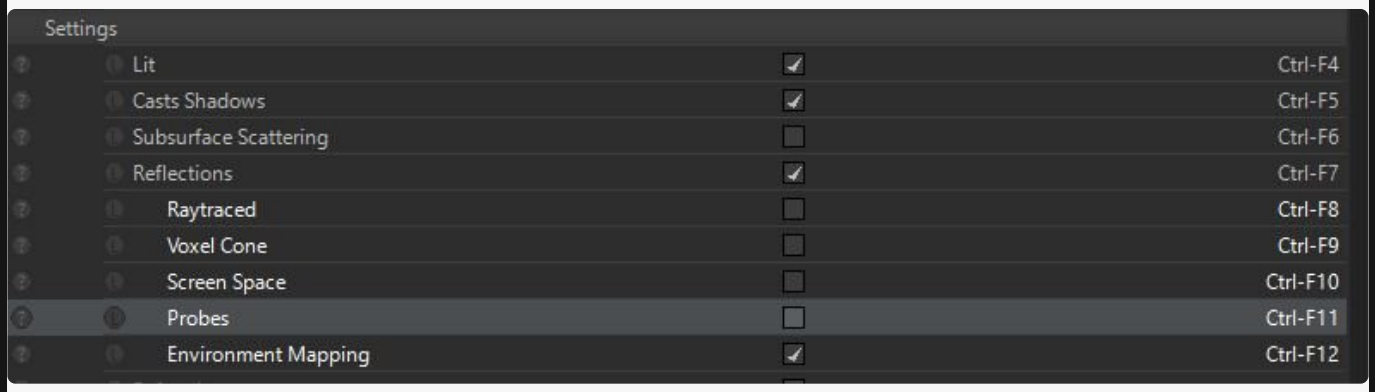
In the Uber Material node you have to must place the textures in the right place.



Change metallic and roughness to 1.

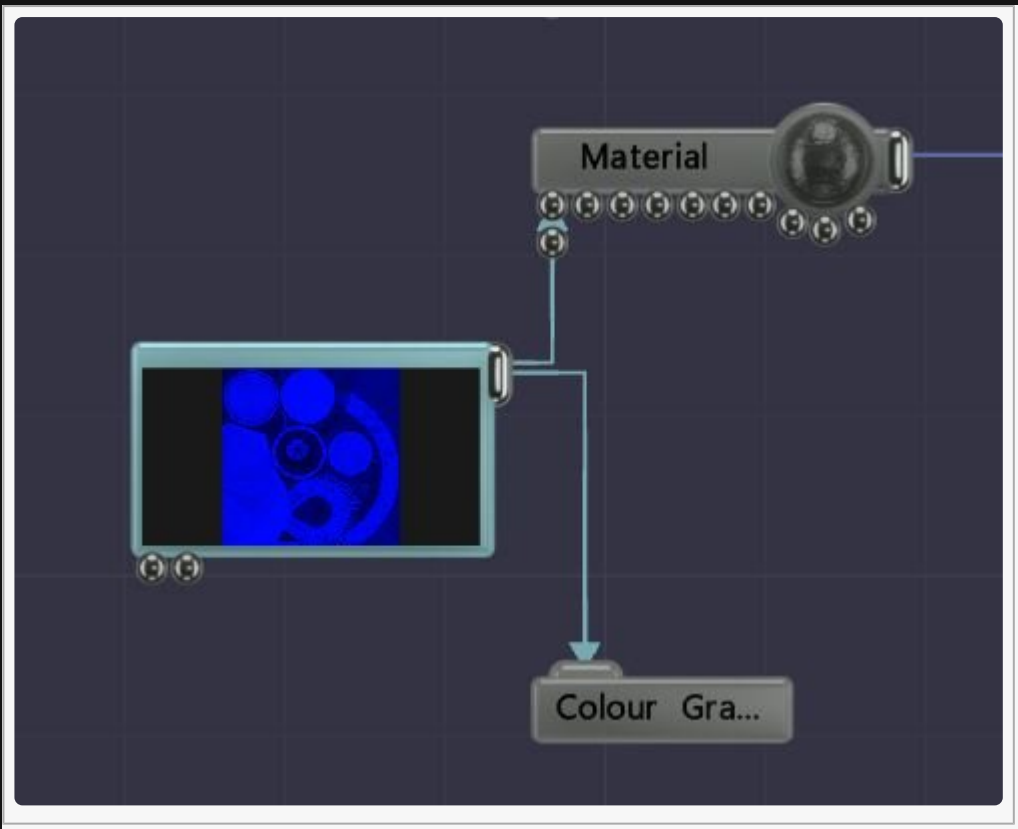


The PBR materials need reflection to be complete. The easiest way is to use an Environment Map. Other reflection modes also work.



You can also link texture to the *Uber Material* node using the *Video Loader* node, and apply post fx to your textures.

Post FX on Texture

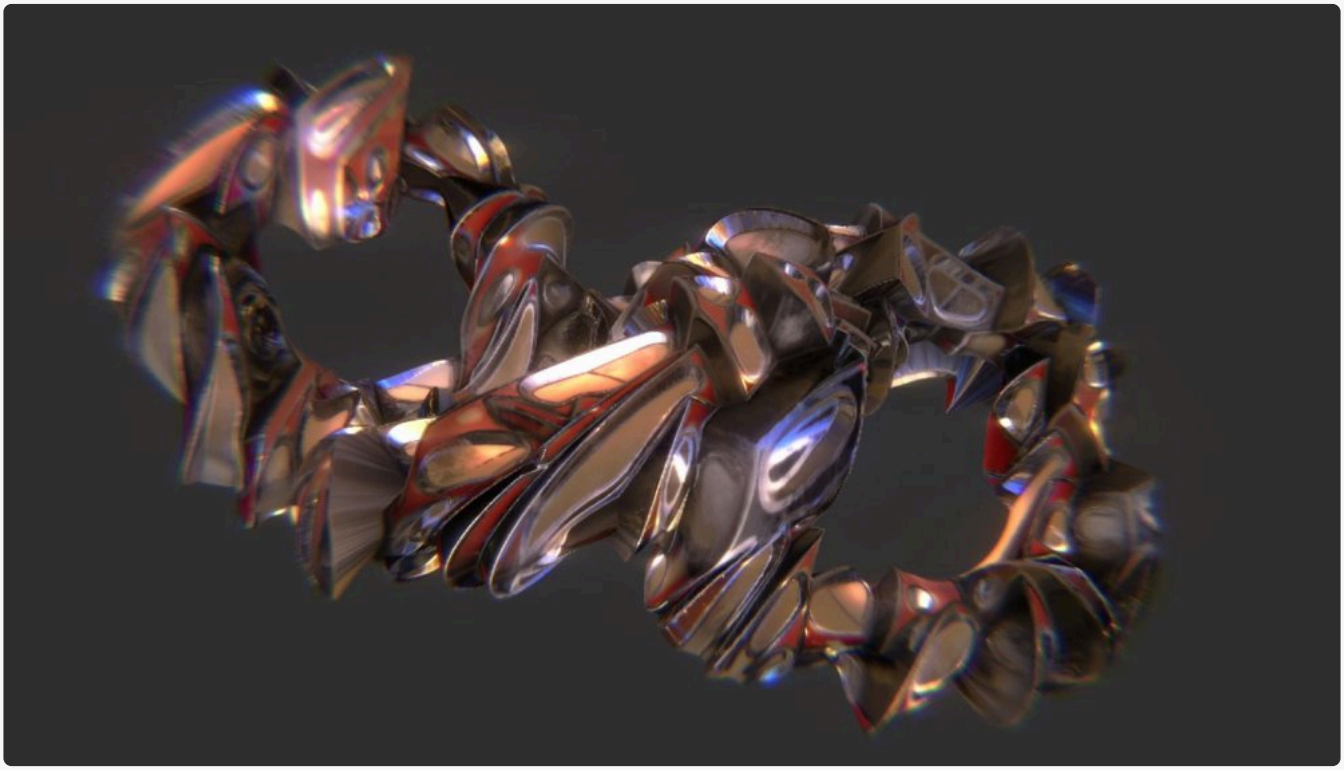

Material
Colour Gra...

Using Substance Designer Materials with Procedurals

Using *Substance Material* with Procedurals Meshes.

You can use Substance Designer Materials with Procedurals Meshes.
It works the same way as with standard material. Unlike a classic object, you simply need to add a node *Mapping*:#nodes-nodes-mapping node to assign UVs to the Procedural Mesh.

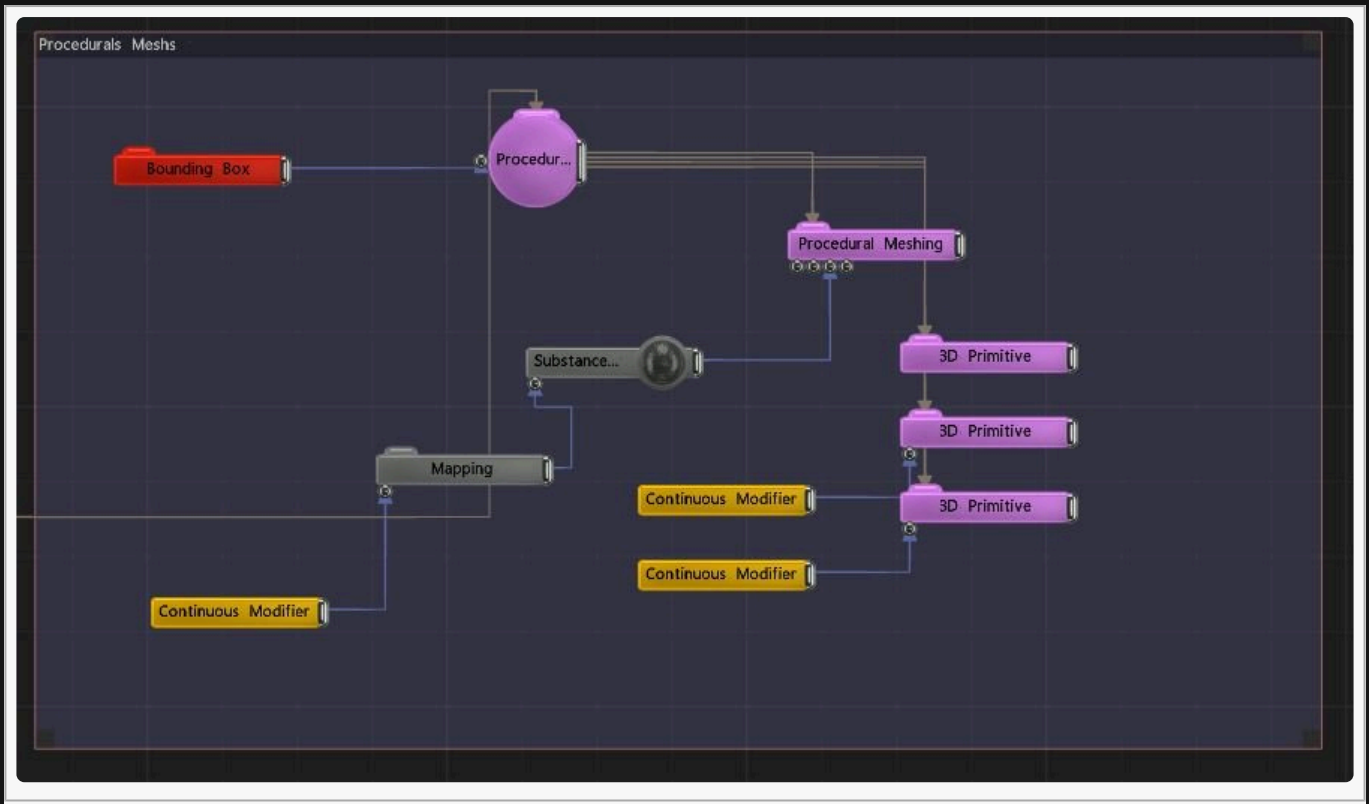
Substance Material with Procedural Mesh



Sample Project

By default the *Displacement* value is at 0. If the material uses a heightmap it is necessary to increase the *Displacement* value.

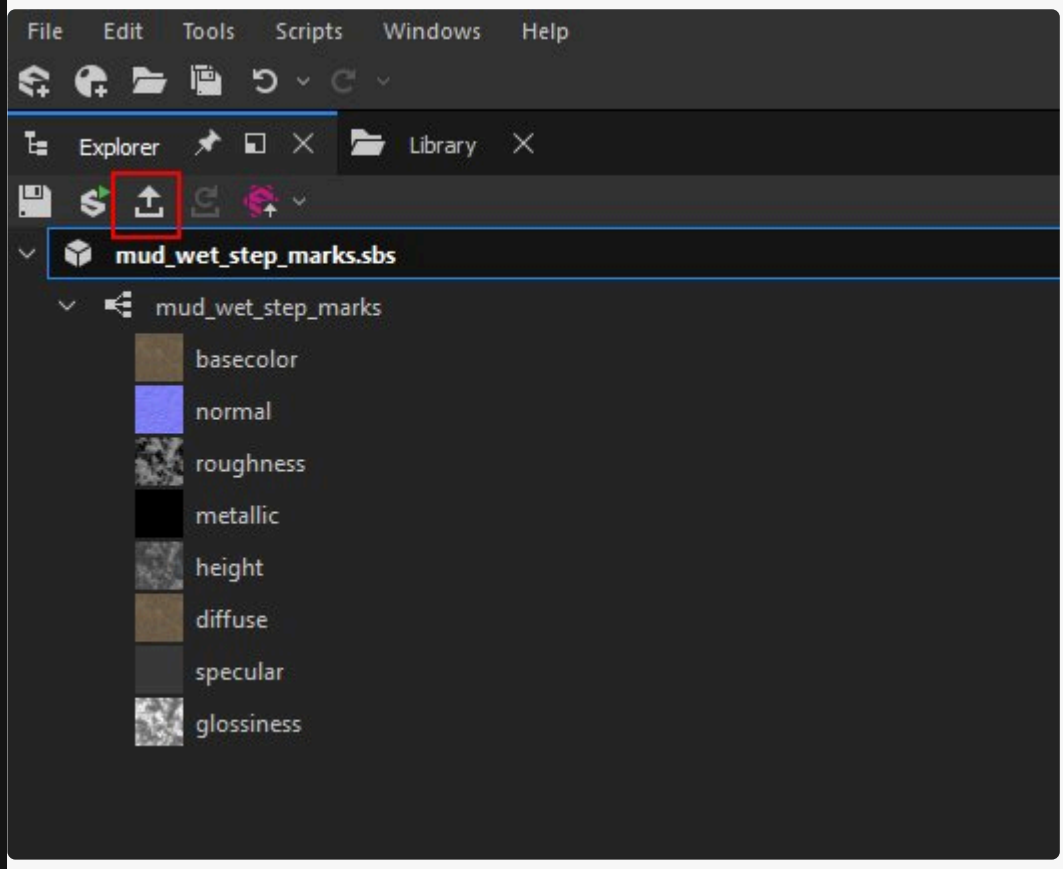
Example Nodegraph


Procedurals Meshs
Bounding Box
Procedur...
Procedural Meshing
Substance...
3D Primitive
3D Primitive
Mapping
Continuous Modifier
3D Primitive
Continuous Modifier
Continuous Modifier

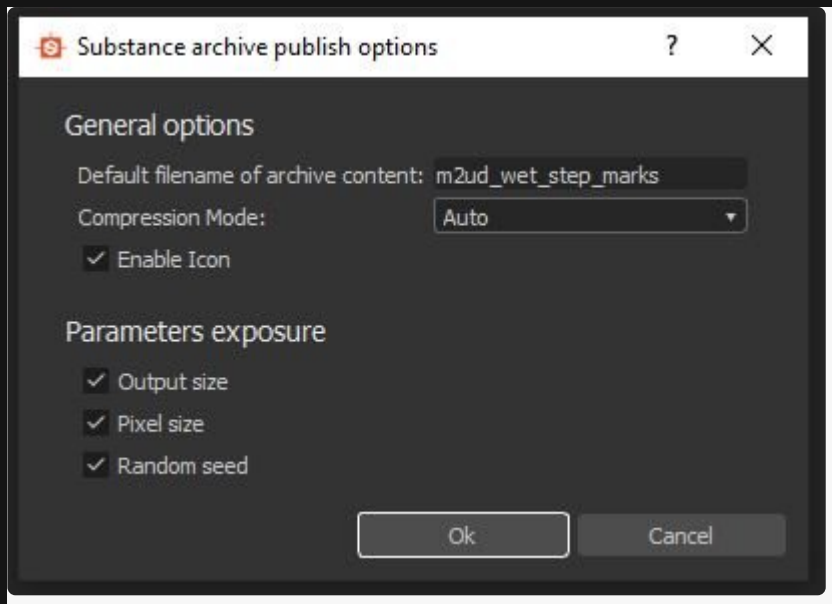
Import and Using a Substance Designer materials

Exporting .sbsar Materials from Substance Designer.

To export a material, click on the icon with the arrow. “Publish selected Element(s)”

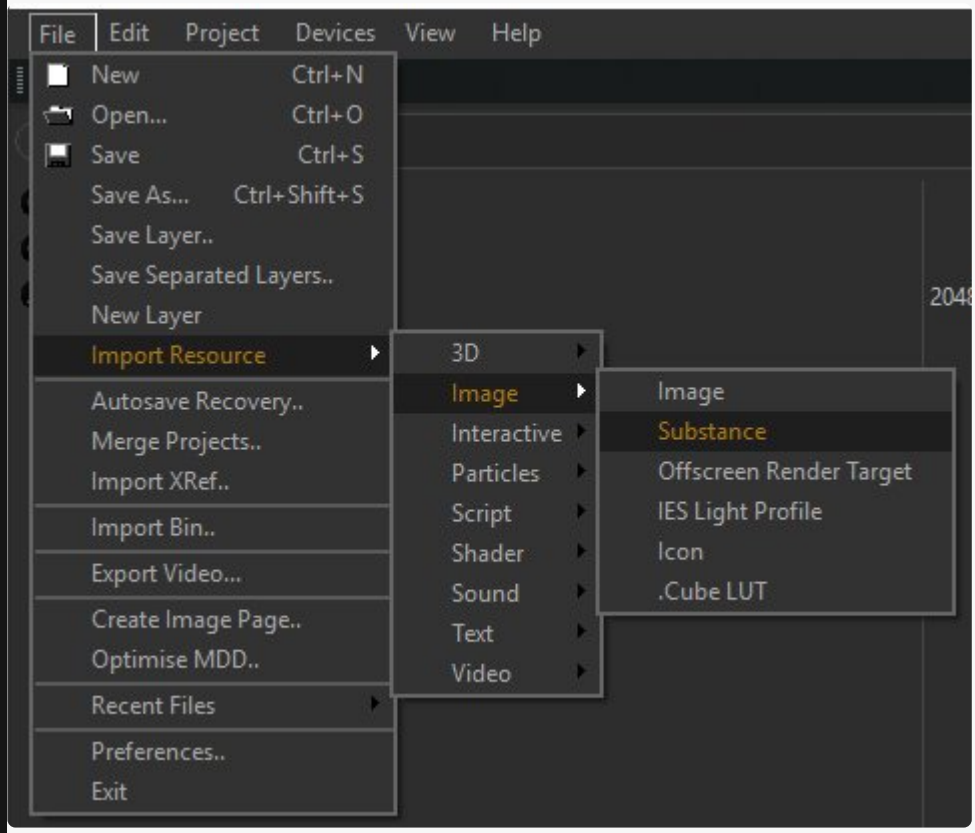


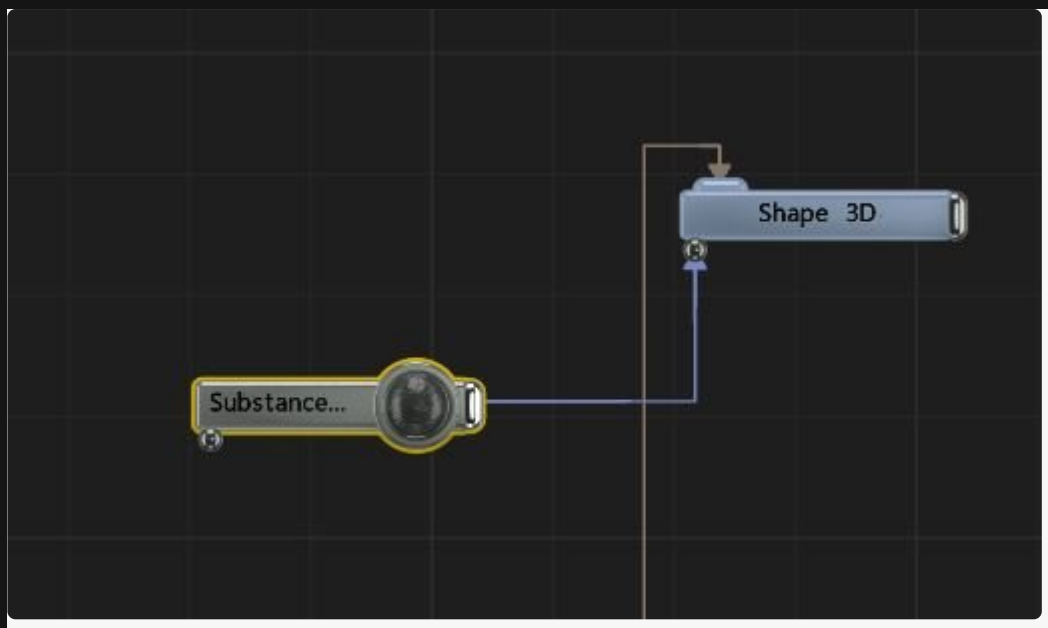
Leave the default settings, click OK. Your substance material is now exported. The extension for substance designer file is “.sbsar”



Importing .sbsar materials into Notch.

There are two ways to import a.sbasar file into notch :
You can drop your file in the Resource panel.
Or using the menu : File/Import Resource / Image /Substance



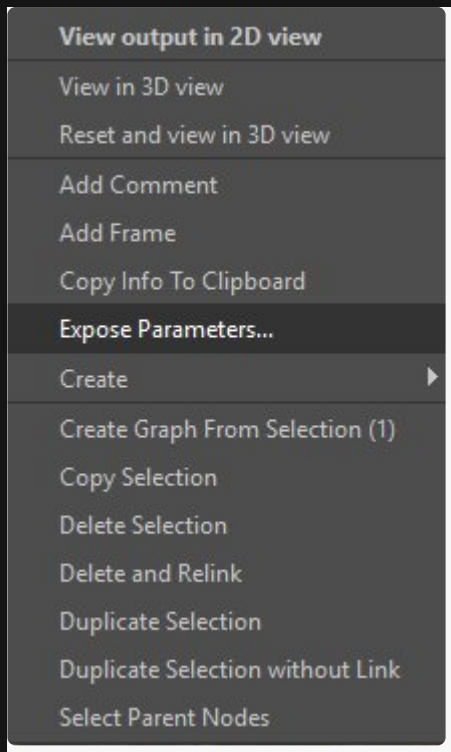


! Importing too many Substance materials at the same time or duplicating a layer with too many Substance Materials can cause a freeze.

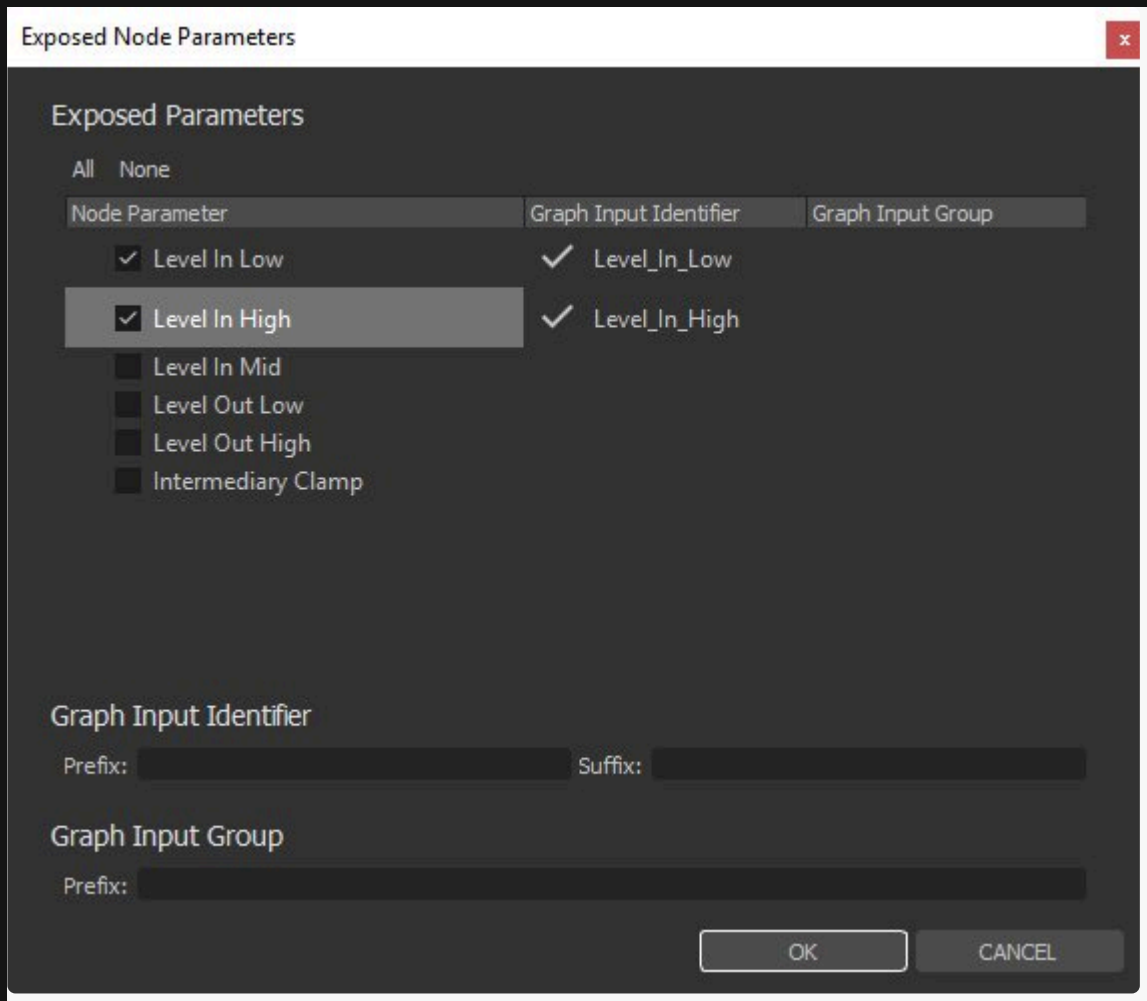
Creating exposed parameters in Substance Designer.

To modify a texture directly in Notch it is necessary to expose the parameters you want to modify. You can expose any parameter, colour, value, text, etc

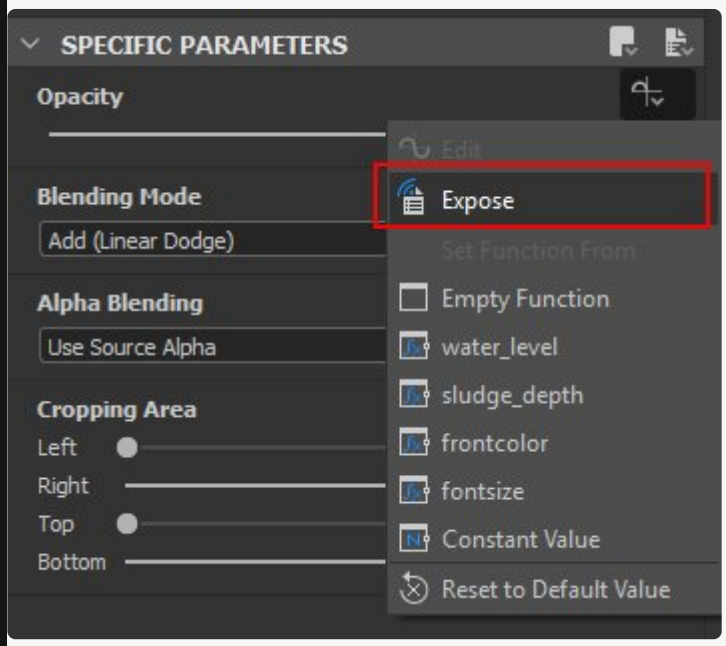
In Substance Designer, right click on the selected node and “Expose parameters” :



Choose which parameter you want to expose :



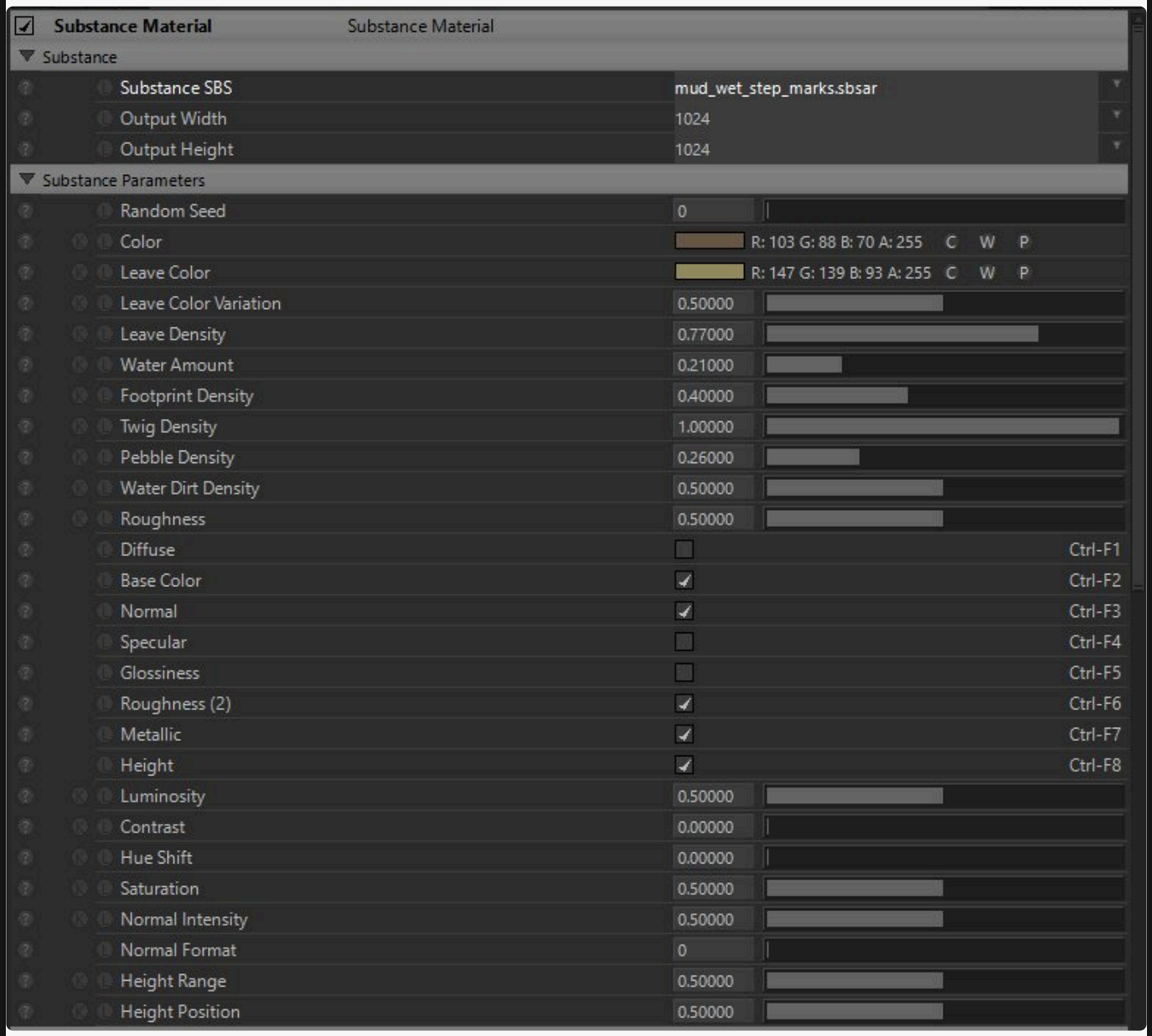
You can also click on this icon of the selected node :



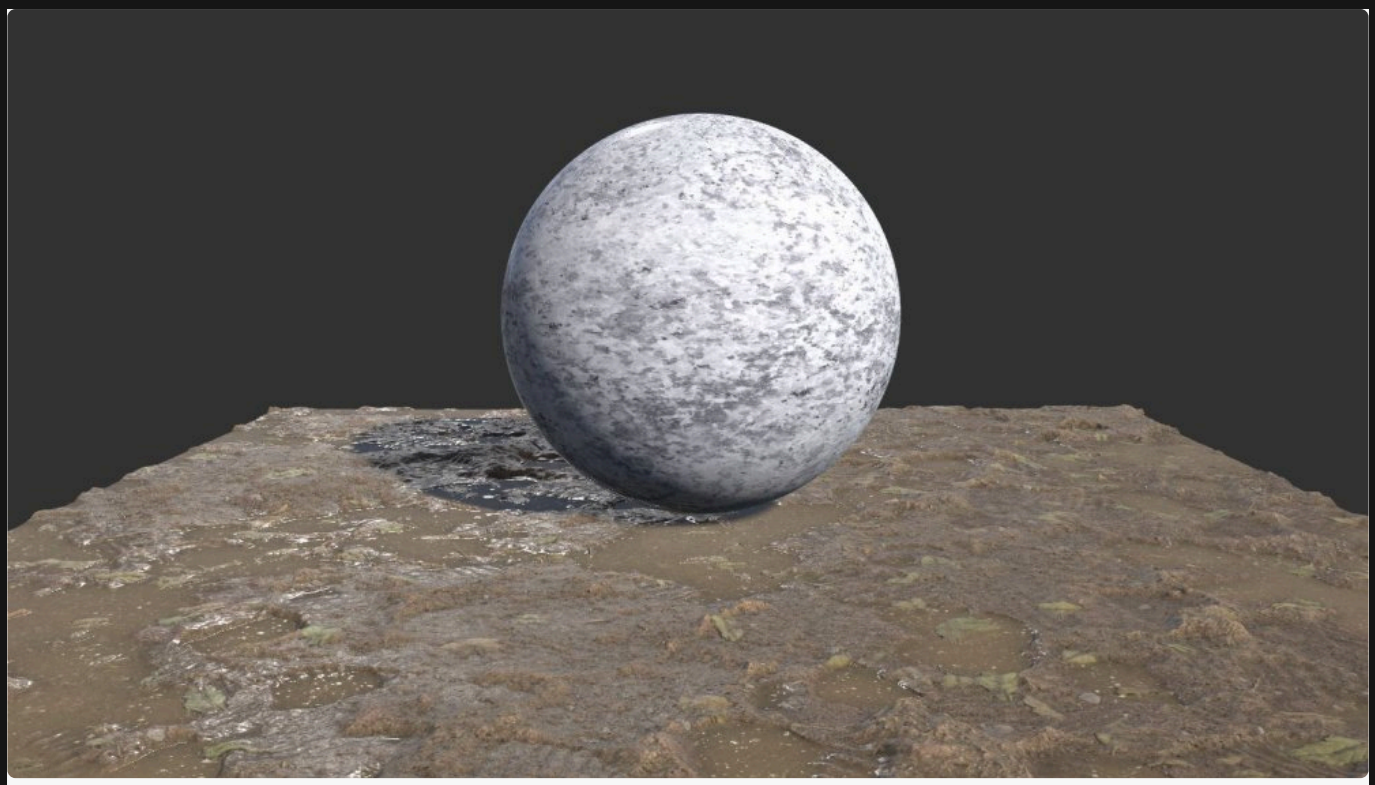
Using exposed parameters in Notch

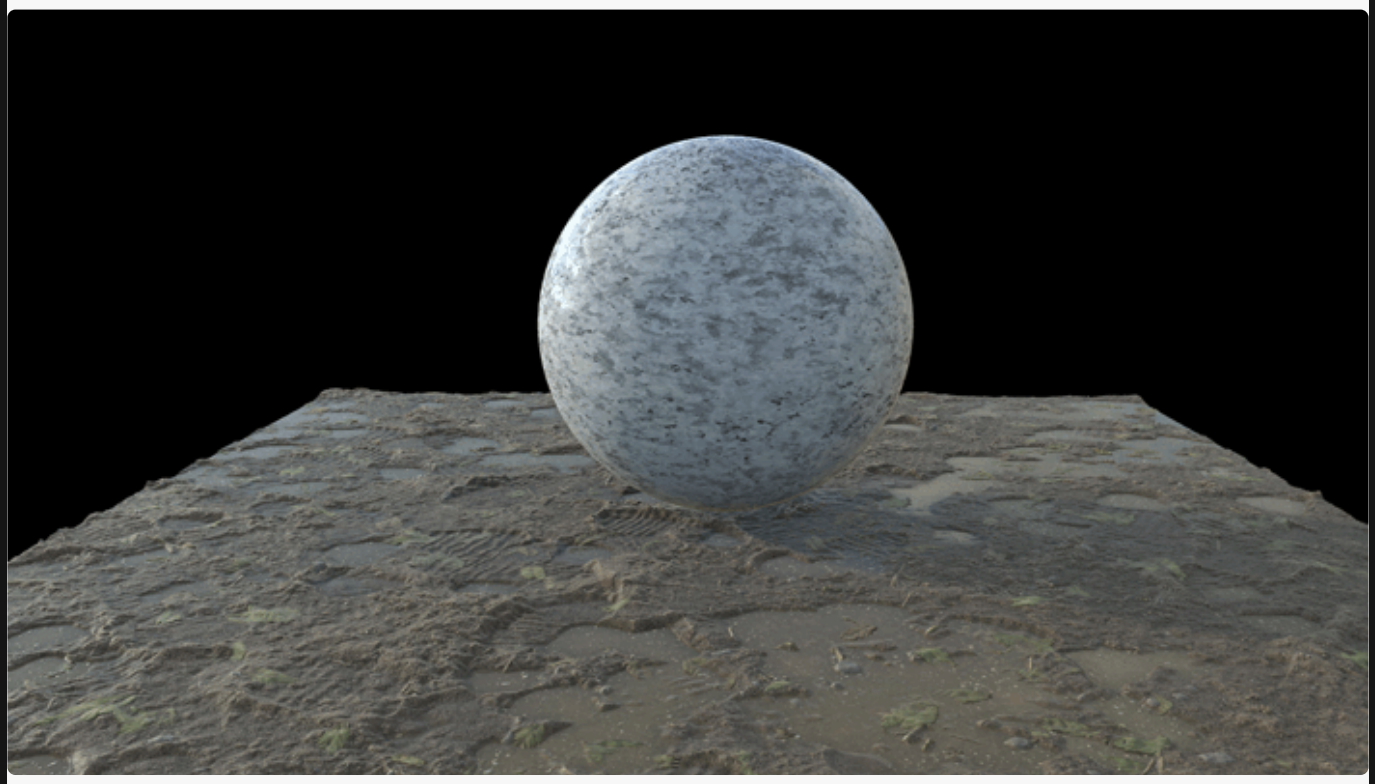
If your Substance material contains exposed parameters they will automatically be visible in the Substance Material node's parameters.

The texture will be regenerated as soon as a exposed parameter is modified. The more complex the material is, the longer the computation/regeneration time can be.
If the material is complex you can reduce the resolution of the texture to improve calculation time. Once you've found the settings that suit you, you can increase the resolution again.



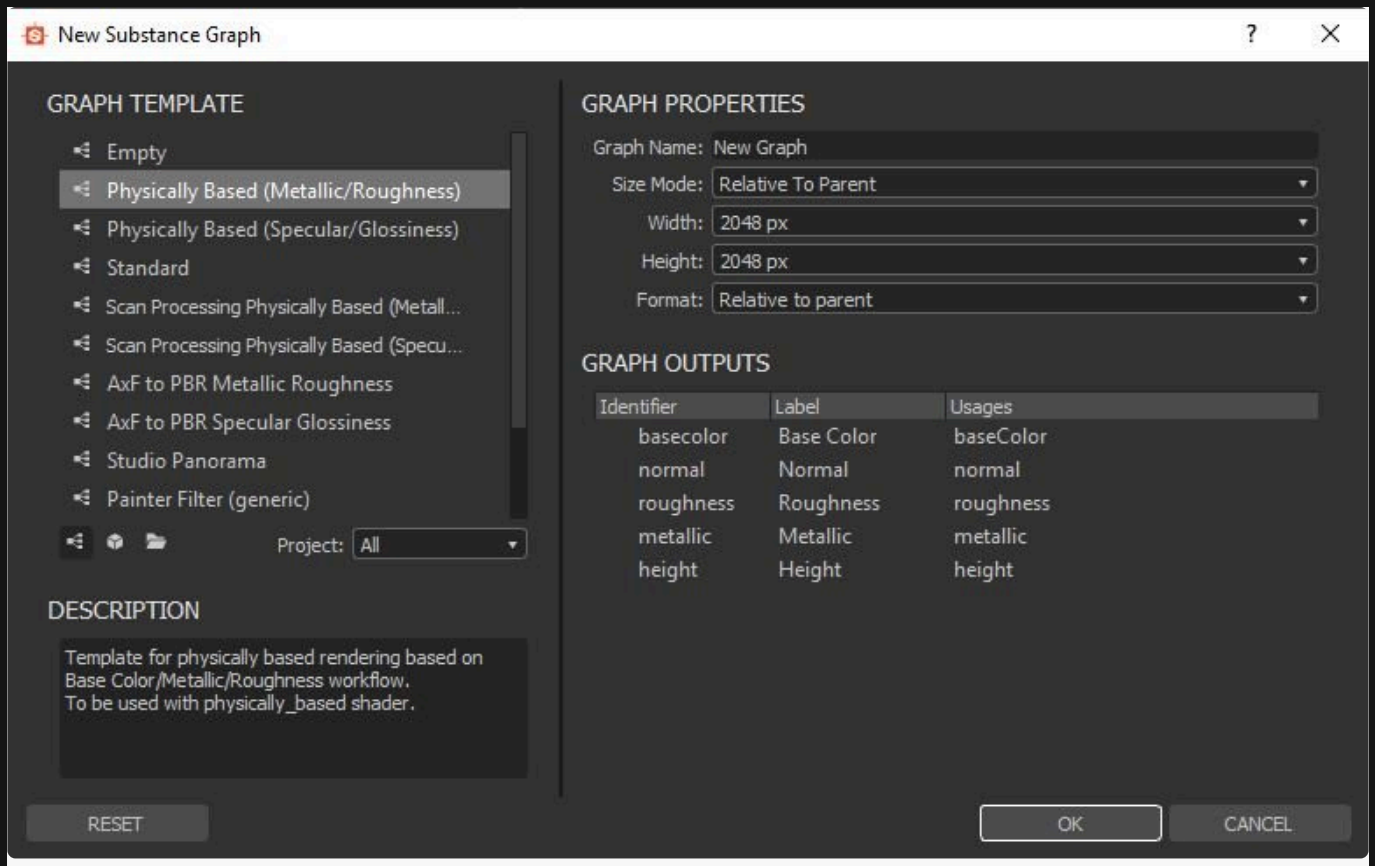
With a single material you can generate many variations of the same texture :





Creating materials in Substance Designer for Notch.

When you start a new Substance Designer material use this template :



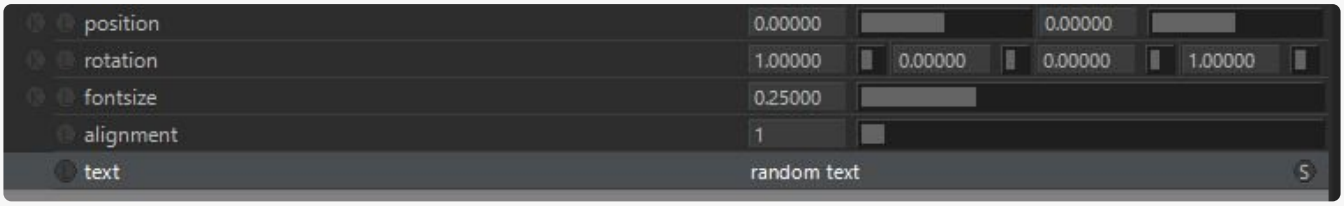
Substance Material Exposed Text.

You have the possibility to use text in your textures with substance designer. By exposing the text you can modify it in Notch.

Same material with different text

the options of the text will depend on the parameters that are exposed

Text option in material



Substance Material and Blocks / Standalone.

When exporting your project to *Standalone* or a *Block*, all textures will be generated and cached. They will no longer be editable so you cannot expose any parameters from a substance material in Notch. The textures being cached will logically increase the size of your Standalone or Block export. The higher the resolution of the textures the larger the size.

Substance Material and Height map.

A lot of Substance Designer materials utilise a height map.
A height map deforms the mesh by changing the position of the vertices.
When using a heightmap material in Notch, it is necessary to modify the “Displacement” value. It is also important that the object has enough faces (appropriate use of Subdivisions and Tessellation is advised)

Height map on high poly mesh vs low poly mesh

Modifiers

Method

Modifier nodes modify the attributes in other nodes.

Modifiers can be applied to almost any attribute of a node, simply double click a node in the nodegraph to see its attribute list, and connect a valid modifier to the square next to the attribute. If an attribute isn't in the list, it cannot be modified with a modifier.

- Accumulator
- Beat Pulse Modifier
- Combiner
- Condition Modifier
- Continuous Modifier
- CSV/Table Read Modifier
- Delay Value
- Direction-Weighted Motion Modifier
- Envelope Modifier
- Expression
- Extractor
- FPS Counter Value
- Gradient Remap Modifier
- Input Selector Modifier
- Limiter Modifier
- MIDI Modifier
- Math Modifier
- OSC Modifier
- Proximity Modifier
- Quantise Modifier
- Range Remap
- Smooth Envelope Modifier
- Sound Modifier
- Speed Tracking Modifier
- Triggerable Envelope Modifier
- Video Sampler Modifier

Accumulator

Method

This node accumulates input values.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Accumulator Mode	How the accumulator should accumulate values. • Value, The whole values is added on each update. • Value Delta, The difference between the previous value and the new value is added.
Wrap Mode	How the accumulator wraps when it meets its max value.
Attack	Controls the initial time between the current value to the peak.
Change Threshold	Threshold below which new values will not be added to the accumulator.
Scale	The scale/range of the modifier
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Max Value	Maximum value the accumulator can reach. Only used with “Clamp To Max” or “Wrap” in the Accumulator node.

Inputs

There are no inputs for this node.

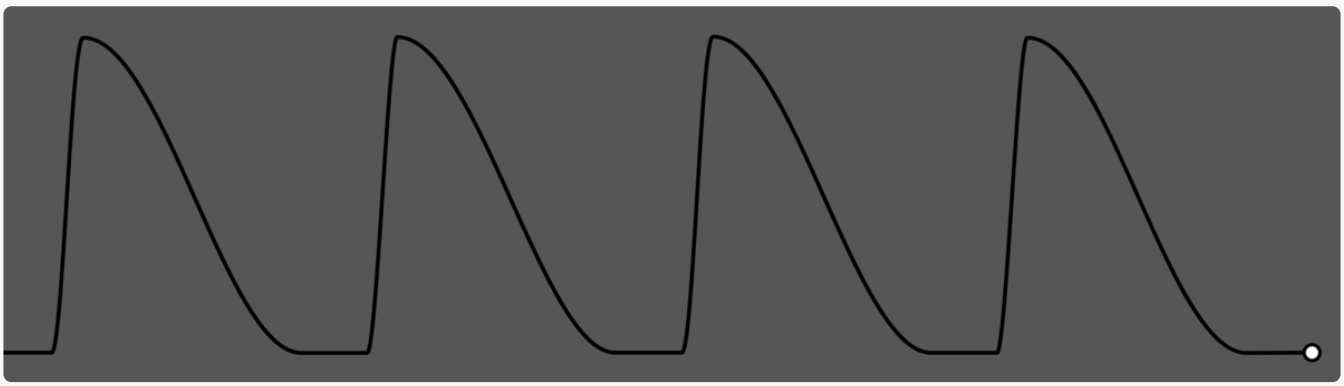
Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Beat Pulse Modifier

Method

This node outputs a value based on a consistent BPM.



Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Input Time	Which time the modifier uses to time the beats.
Time Mode	How the modifier updates with relation to the time code. • Locked To Timecode, The modifier values are locked to the time code and the same time will always yield the same numerical value. • Running / Looping, The modifier values are disconnected from the time code and will loop seamlessly at the end of the layer. This also means that animated speed values will change smoothly.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
BPM	Beats per minute, or how many times the modifier will reach its peak per minute.
Num Beats	Number of beats per BPM.
Num Beats	Offset the beat timing of the Num beats.

Offset	
Time Offset	Offsets the time the value is modified from the time the waveform is played.
Attack	Controls the initial time between the current value to the peak.
Decay	Controls the time between the peak to the sustain level.
Scale	The scale/range of the modifier
Pulse Sharpness	How sharply the pulse eases into its peak value.

Inputs

There are no inputs for this node.

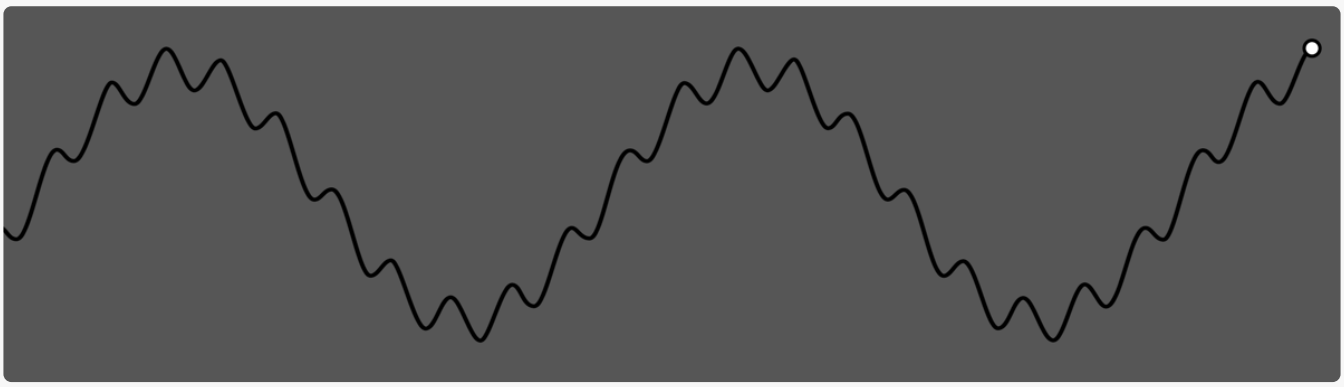
Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

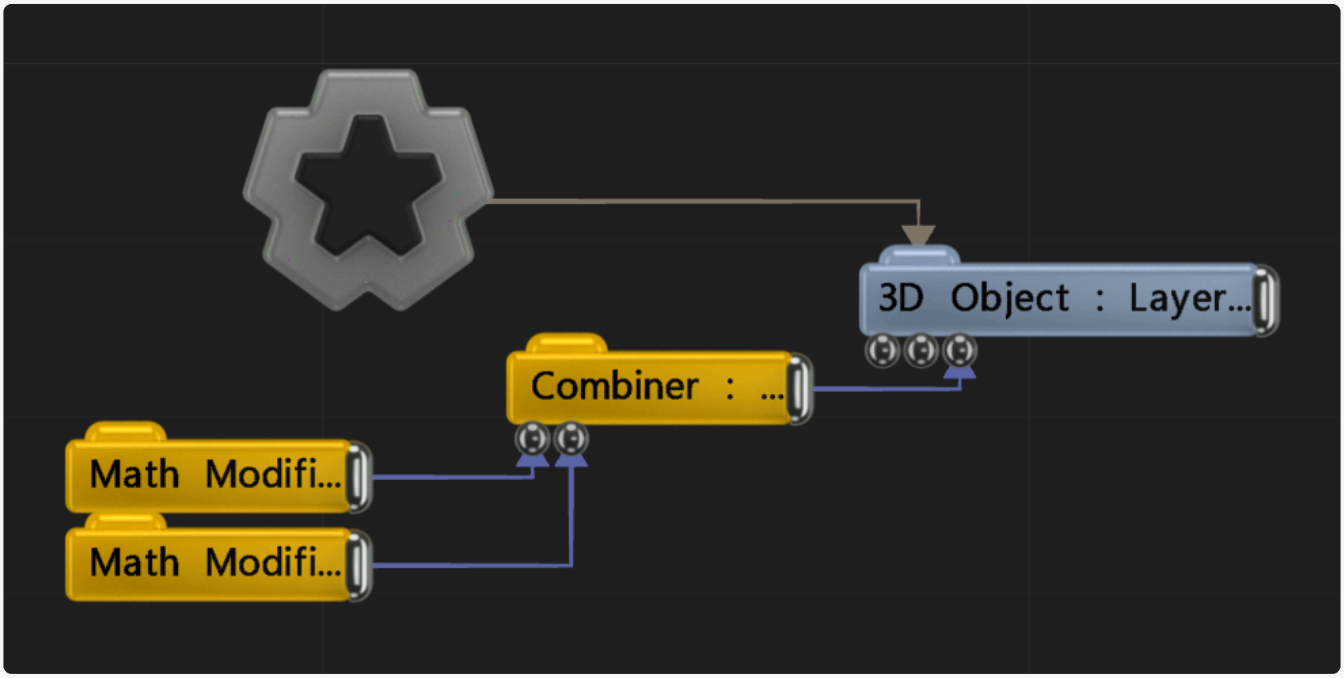
Combiner

Method

This node combines two numeric input values into one numeric output.



Example Nodegraph



Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value 1	The first input value

Value 2	The second input value
Combiner Operation	How the two inputs are to be combined: • Add, Add value 1 to value 2. • Add Saturated, Add value 1 and value 2, but clamp the output between 0 and 1. • Subtract, Subtract value 2 from value 1. • Subtract Saturated, Subtract value 2 from value 1, but clamp the output between 0 and 1. • Multiply, Multiply value 1 and value 2. • Min, Compare value 1 and value 2, and select the minimum value. • Max, Compare value 1 and value 2, and select the maximum value.
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

Name	Description	Typical Node Input
Value 1	The first input value	Other Modifiers
Value 2	The second input value	Other Modifiers

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Condition Modifier

Method

Outputs a set value once an input value meets a certain trigger condition.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Threshold	Changes the threshold for what counts toward the modifier.
Trigger Mode	How the value is modified, once the trigger condition is reached. • Constant, As long as the trigger condition is met, the value is output. • On Change, Every time the condition changes, the value is triggered once. • On Change To True, Once the condition changes to true, the value is triggered once. • On Change To False, Once the condition changes to false, the value is triggered once.
Trigger Condition	What conditions need to be met for the modifier to be triggered. • Greater Than Threshold, The incoming value must be greater than the threshold value. • Less Than Threshold, The incoming value must be less than the threshold value. • Equal To Threshold, The incoming value must be equal to the threshold value.
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

Name	Description	Typical Node Input
Value	Input a numerical value to be modified.	Math Modifier

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Continuous Modifier

Method

This modifier continually increments or decrements the targeted parameter value at a constant rate.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Speed	The speed at which the modifier increases (per second)
Scale	The scale/range of the modifier
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Time Mode	How the modifier updates in relation to the time code. • Locked To Timecode, The modifier values are locked to the time code and the same time will always yield the same numerical value. • Running / Looping, The modifier values are disconnected from the time code and will loop seamlessly at the end of the layer. This also means that animated speed values will change smoothly.

The rate of change is equivalent to:
Change Per Second = Speed * Scale

Inputs

There are no inputs for this node.

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

CSV/Table Read Modifier

Method

Reads a numeric value from a table cell.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
CSV File	The table resource.
Read Index	In a 2D table, this is the column to be picked from. In a 1D list this is the index to pick.
Row Index	In a 2D table, this is the row to be picked from.
Selection Mode	• 1D – Index : A row of separated values. • 2D – Column + Row : The more traditional table layout
Scale	The scale/range of the modifier
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

There are no inputs for this node.

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Notes

You can add tables in the Resource Panel via *Interactive-> CSV/Text File*

Delay Value

Method

This modifier delays the output of an input node by a time frame set by the Delay Time.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Delay Time	Time in seconds the output value should be delayed by. Above 10, it will run out of space in its buffer and will no longer delay input values.
Scale	The scale/range of the modifier
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

There are no inputs for this node.

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Direction-Weighted Motion Modifier

Method

This node detects how much an input object moves in a particular direction, and outputs a value based on it.

Attributes

Name	Description
Cone Angle	Movement cone angle for which movement within the cones direction will count toward the modifier.
Scale	The scale/range of the modifier
Smoothing	The amount of smoothing to applied to the output value.
Decay	Controls the time between the peak to the sustain level.
Max Speed	Set a maximum speed the modifier can read for a value.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

Name	Description	Typical Node Input
Tracked Node	Node whose values will be tracked.	3D Object
Direction Controller	The input nodes local axes are used for determining the traced direction.	Null

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Envelope Modifier

Method

This modifier evaluates an incoming value before outputting it. It can be used as:

- A straight multiplier (Operation: None)
- A threshold condition gate (Operation: Above/Below Threshold)
- An invertor : 1-x (Operation: Invert)

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Scale	The scale/range of the modifier
Threshold	Changes the threshold for what counts toward the modifier.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Incoming Operation	What operation is done to the incoming value. • None, The incoming value is only manipulated by the *Scale*. • Invert, subtract the current value from 1. • Above Threshold, Above *Threshold* value is 1.0 multiplied by the *Scale*, else 0.0. • Below Threshold, Above *Threshold* value is 1.0 multiplied by the *Scale*, else 0.0.

Inputs

Name	Description	Typical Node Input
Value	Input a numerical value to be modified.	Math Modifier

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Expression

Method

This node evaluates an expression and outputs its value. The node can have up to four input values.

Available operators

Symbol	Description
+	Add
–	Subtract
*	Multiply
/	Divide
^	Power
()	Bracket

Example expressions

```
value0 * value1
```

```
(value0 + value1) / value2
```

```
(value0 / value1) ^ 2
```

Attributes

Name	Description
Current Value	Shows the resulting value of the expression. Cannot be directly changed.
Expression	The text expression (see Example expressions above)
Value0-3	Values to be used in expression
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

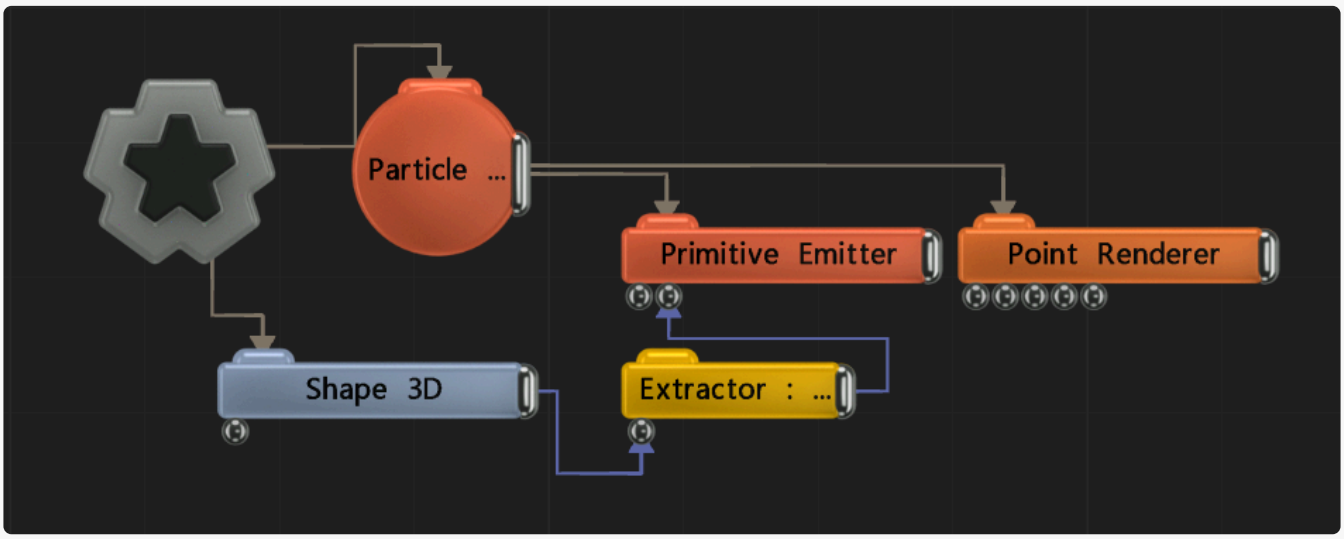
Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Extractor

Method

This modifier extracts the current value of a single numerical parameter from another node.

Example Nodegraph


Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Source Envelope	Which parameter is to be extracted from the *Source Node* input.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Scale	The scale/range of the modifier
Offset	Applies an offset (post scale) to the calculated value

Inputs

Name	Description	Typical Node Input
Source Node	Source node from which the parameter is sourced.	Any node with numeric parameters

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

FPS Counter Value

Method

This node generates the current frame rate of the scene as a numerical value.

Attributes

Name	Desription
Counter Mode	Which performance values are output. • FPS, The frames per second the scene is running at. • CPU / GPU Milliseconds, The current delay per frame in milliseconds it takes the scene to be processed on the CPU / GPU.

Inputs

There are no inputs for this node.

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Gradient Remap Modifier

Method

This node remaps incoming values based on a user created gradient. Values outside of 0 and 1 are clamped.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Gradient	Gradient used to remap values. Double click on the visual gradient to create a new node at that position. Click and drag on a node vertically to change the value at that position. Click and drag on a node horizontally to change the position at that value.
Modifier Operation	What operation is done to the modified attribute. • Add, adds the current value to where its input. Subtract, subtracts the current value to where its input. • Multiply, multiplies the current value to where its input. • Replace, replace the value where its input by the current value.

Inputs

Name	Description	Typical Input
Value	Input a numerical value to be modified.	Math Modifier

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Input Selector Modifier

Method

This node takes multiple input values and uses an index to select which to output.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Selected Index	Select which of the outputs will be used.
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

Name	Description	Typical Node Input
Inputs	The nodes with outputs which will be selected between.	Math Modifier

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Limiter Modifier

Method

Clamps the incoming values to the given lower and upper limits.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Lower Limit	Lower threshold beyond which the incoming value is limited to.
Upper Limit	Upper threshold beyond which the incoming value is limited to.

Inputs

Name	Description	Typical Node Input
Value	Input a numerical value to be modified.	Math Modifier

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

MIDI Modifier

Method

This node reads CC values from channels of a MIDI device so they can be used to control values on other nodes.

The MIDI channel can be selected manually, or use “Listen For Channel/CC” and make a change on the device and the channel will be picked up automatically.

> ! You must first add the MIDI device in the Notch Midi Mapper. Go to *Devices -> Audio Devices*.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Channel	Choose which MIDI channel to use for the modifier.
CC	Select which control change to modify the channel.
Use Recorded Value	Uses the recorded MIDI files, instead of the live input from a MIDI device.
Listen For Channel/CC	Listen for the incoming MIDI device.
Recording..	Start recording changes in the current value, to save to as a sequence of keys on a newly created attribute.
Scale	The scale/range of the modifier
Offset	Offset the current value of the incoming
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Recorded Value	The currently recorded value being used.

Recording History

Name	Description
Recorded Value #	A keyed series of inputs matching the input from the the midi controller that can be reused.

Inputs

There are no inputs for this node.

Outputs

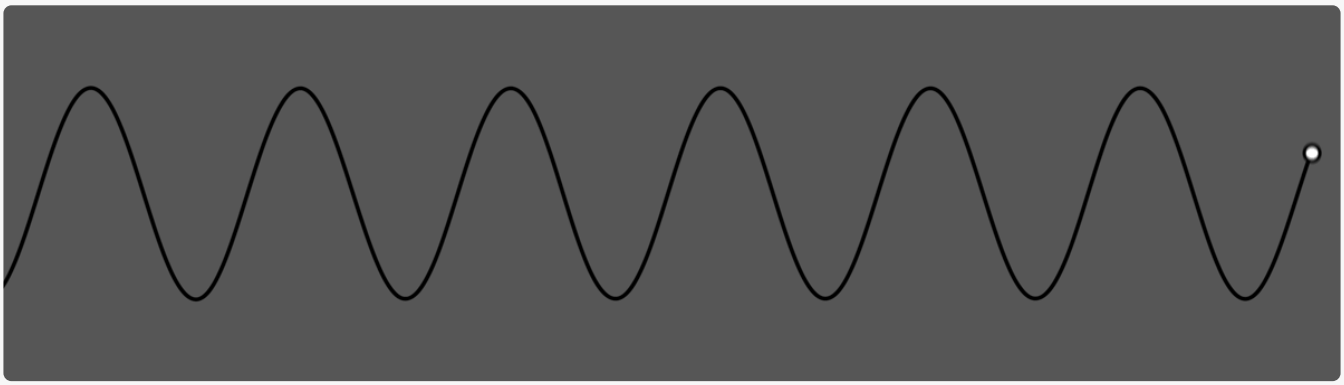
The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Math Modifier

Method

This node generates numeric values on the basis of mathematical pattern functions, from smooth sine waves to noise.

The node provides a preview of the pattern value that will be generated with a tracer line showing the place of the play head.



Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Math Function	The mathematical function to be used by the modifier. • Sine, a simple sine wave. • Cosine, a simple cosine wave. • Interpolated Noise, random noise is generated with values and smoothly interpolated. • Square, Jumps between 0 and 1 at a constant pace. • Square – Inverted, Jumps between 0 and 1 at a constant pace, at opposite timing to square. • Random Noise, Random values are generated at regular intervals with no interpolation between values. • Perlin Noise, Noise is generated based on a gradient function, leading to smoother looking noise. • Saw, Value Rises consistently, before sharply decreasing. • Triangle, Value rises then decreases at the same consistent rate.
Blend	Control how much the modifier affects the values its input into.

Amount	
Scale	The scale/range of the modifier
Offset	Applies an offset (post scale) to the calculated value
Speed	The speed at which the value moves through the generated pattern.
Time Offset	Offsets the time the value is modified from the time the waveform is played.
Time Mode	How the modifier updates with relation to the time code. • Locked To Timecode, The modifier values are locked to the time code and the same time will always yield the same numerical value. • Running / Looping, The modifier values are disconnected from the time code and will loop seamlessly at the end of the layer. This also means that animated speed values will change smoothly.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Restore Values	Toggle whether the values restore to 0. If unchecked, generated values incrementally add to the modifier value.
Use Absolute Value (Ignore Sign)	Ignore negative signs.
Perlin Noise Octaves	The granularity of the noise.

Inputs

There are no inputs for this node.

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

OSC Modifier

Method

Receives a numeric *float* OSC value over the network, manipulates it then applies it to a destination value.

> ! The incoming OSC values will only be processed when the play head is playing

See OSC Topic for more details.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
OSC Channel Name	The address of the OSC value being received e.g. /myvalue/x
OSC Channel Value Index	Select a specfic value from an array of input OSC Values.
Scale	The scale/range of the modifier
Offset	Applies an offset (post scale) to the calculated value
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

There are no inputs for this node.

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Proximity Modifier

Method

This node outputs a value if an input node is within range of a point. It only calculates distance based on the origin of the input node, so objects with large bounding boxes should be tested with this in mind.

Attributes

|_. Name |_. Description | | Current Value | Shows the current value of the effect. Cannot be directly changed. | | Blend Amount | The amount to blend the modifier's value with its target parameter. | | Scale | The scale/range of the modifier | | Operation | The operation to be performed on the targeted parameter.

- Add, adds to the parameter value.
- Subtract, subtracts from the parameter value.
- Multiply, multiplies the parameter value.
- Replace, replaces the parameter value. | | Inner Distance | Inner range, where the maximum value is applied. | | Outer Distance | Outer range, within which values will be generated linearly to the inner distance. | | Use X / Y / Z | Select which axis are used when calculating proximity distance.

Transform

Name	Description
Position X / Y / Z	Set the position for which you want to test if any target nodes are in range of.

Inputs

Name	Description	Typical Node Input
Target Node	The node which will be tracked.	Null

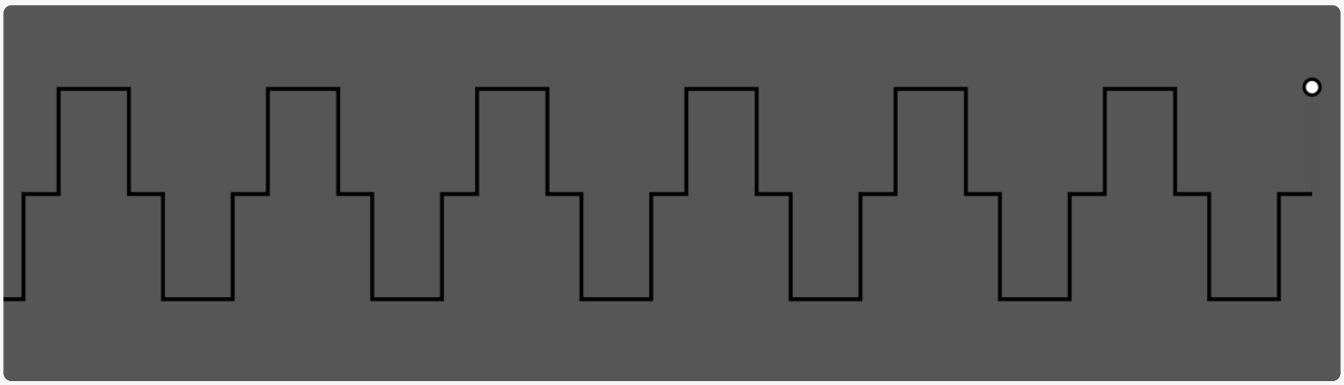
Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Quantise Modifier

Method

This node restricts a value to be multiples of the Quantise Scale value. For example, a Quantise Scale value of 1.0 will restrict the input value to integers – 0, 1, 2, etc.



Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Shows the current value of the effect. Cannot be directly changed.
Quantise Scale	The current value will be rounded to the nearest multiple of this value.
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

Name	Description	Typical Node Input
Value	Input a numerical value to be modified.	Math Modifier

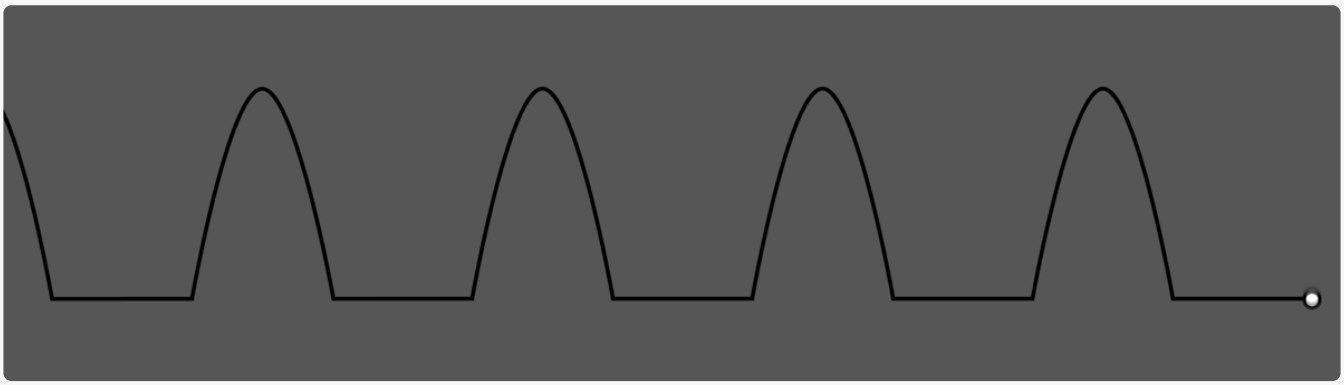
Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Range Remap

Method

This node limits the range of values that can be output and remaps incoming values to fit within the output ranges.



Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Modifier Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

In

Name	Description
In Lower	Lowest value in that will be remapped into range.
In Upper	Highest value in that will be remapped into range.

Out

Name	Description

Out Lower	Lowest value that can be output.
Out Upper	Highest value that can be output.

Inputs

Name	Description	Typical Node Input
Value	Input a numerical value to be modified.	Math Modifier

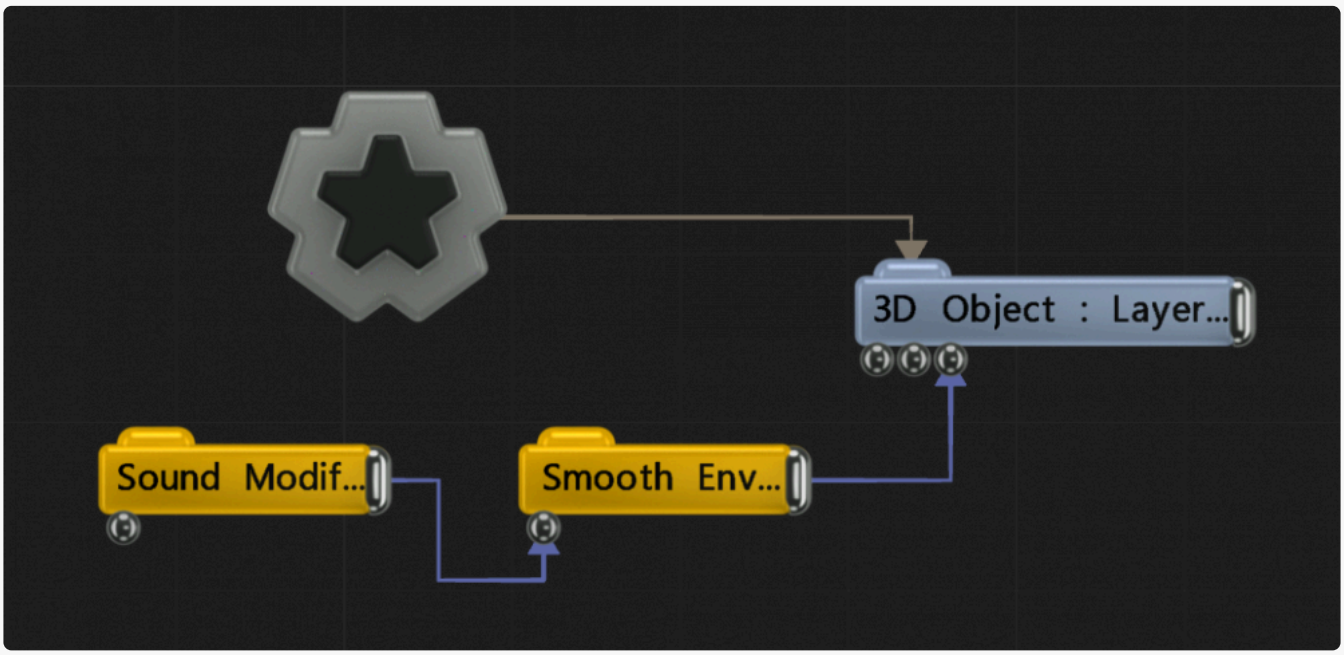
Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Smooth Envelope Modifier

Method

This modifier smooths incoming values to create a smooth output.

Example Nodegraph


Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Scale	The scale/range of the modifier
Attack	Controls the initial time between the current value to the peak.
Decay	Controls the time between the peak to the sustain level.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Restore Values	Attempt to move back to the current value to the input value more quickly.

Inputs

Name	Description	Typical Node Input
Value	Input a numerical value to be modified.	Math Modifier

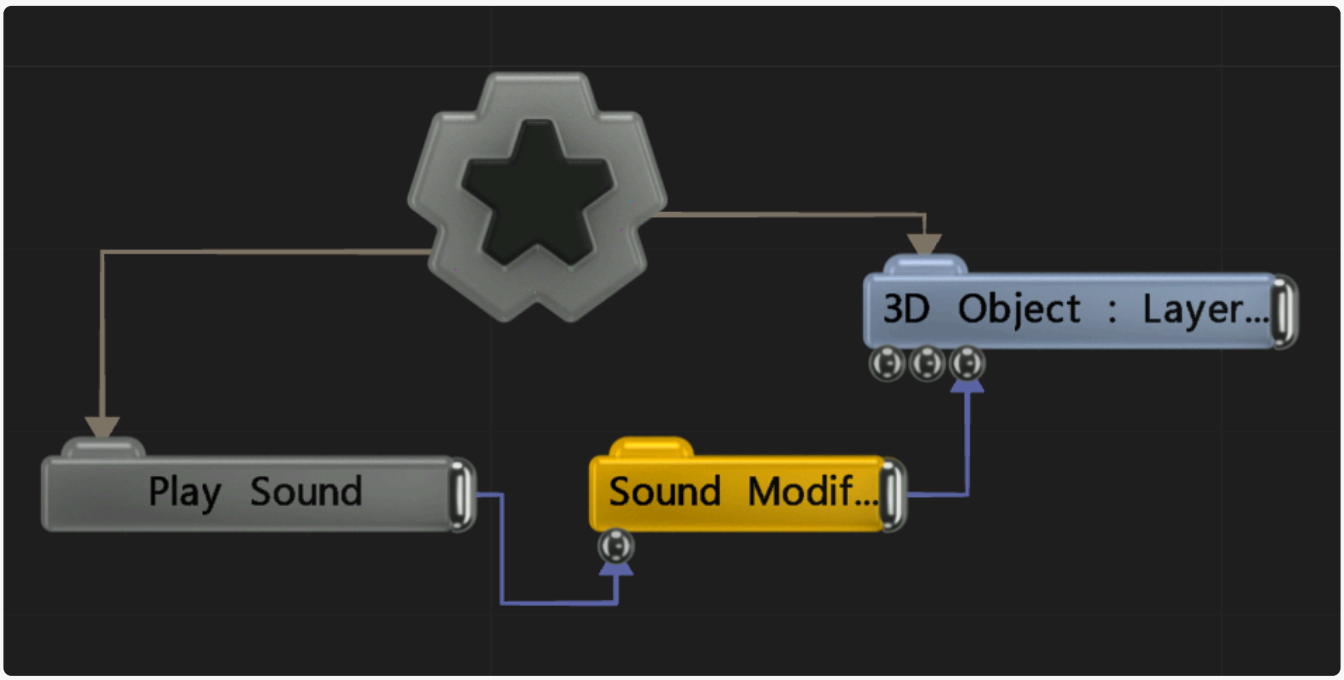
Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Sound Modifier

Method

This node outputs a value based on the waveform of an audio file or a live captured audio input.

Example Nodegraph


Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Blend Amount	The amount to blend the modifier's value with its target parameter.
Sound	Sound file used for the modifier.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Restore Values	Toggle whether the values restore to 0. If unchecked, generated values incrementally add to the modifier value.
Frequency	Sets the Band EQ to one of the given presets.

Band	
Band EQ	Selects and weights the frequency bands to be used from the sound file.
Time Offset	Offsets the time the value is modified from the time the waveform is played.
Change Threshold	Changes the threshold for what counts toward the modifier.
Attack	Controls the initial time between the current value to the peak.
Decay	Controls the time between the peak to the sustain level.
Min Value	Acts as a minimum threshold for extracting a range of values from the audio feed.
Max Value	Acts as a maximum threshold for extracting a range of values from the audio feed.
Max Clamp	Clamps the result.
Spikiness	Accentuates peaks in the waveform so they are sharper.
Scale	The scale/range of the modifier
Offset	Offset the waveform.
Smoothness	The amount of smoothing to applied to the output value.
Waveform	A visual representation of the output of the node.

Inputs

Name	Description	Typical Node Input
Sound	Use the waveform from a given Play Sound or Capture Sound node.	Play Sound

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Speed Tracking Modifier

Method

This node calculates the rate of movement of the source node, connected via the “Tracked Node” input, and outputs it as a value.

Attributes

Name	Description
Scale	The scale/range of the modifier
Smoothing	The amount of smoothing to applied to the output value.
Decay	Controls the time between the peak to the sustain level.
Max Speed	Set a maximum speed the modifier can read for a value.
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Inputs

There are no inputs for this node.

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Triggerable Envelope Modifier

Method

This node is used for triggerable animations. It begins playback of the keyframed animation of the Value parameter when used through the Trigger parameter.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
Value	Base value to modify the output value with.
Scale	The scale/range of the modifier
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.

Trigger Attributes

Name	Description
Trigger	Triggers the animation set on the Value parameter. When this value is > 0.5, the animation is triggered.
Instant Retrigger	Toggle whether the value can be re-activated immediately after its finished playing.

Inputs

Name	Description	Typical Node Input
Value	Input a numerical value to be modified.	Math Modifier
Trigger	Use an incoming value to reset the trigger.	Envelope Modifier

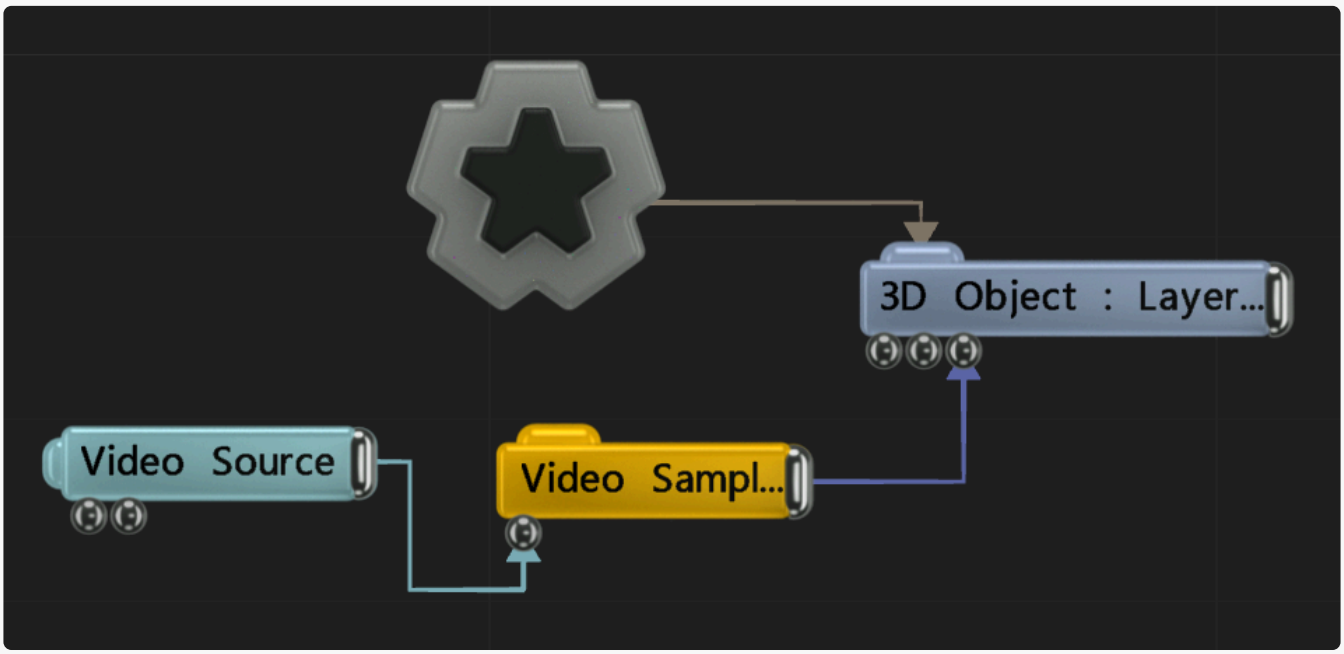
Outputs

There are no outputs from this node.

Video Sampler Modifier

Method

This node outputs a value based the luminescence values of specific pixels from a video input.

Example Nodegraph


Attributes

Name	Description
Sample Location U	Point along the U axis that is sampled.
Sample Location V	Point along the V axis that is sampled.
Smoothing	The amount of smoothing to applied to the output value.
Scale	The scale/range of the modifier
Operation	The operation to be performed on the targeted parameter. • Add, adds to the parameter value. • Subtract, subtracts from the parameter value. • Multiply, multiplies the parameter value. • Replace, replaces the parameter value.
Latency	How the video is sampled with respect to performance.

Mode	• Performance, The video is sampled with some latency, to avoid stalling the GPU and giving higher performance. • Low Latency (Slower), The video value is sampled immediately, stalling the GPU but giving the lowest possible latency.
Location In Pixels	The sample location describes the location in pixels, not a percentage along width and length.

Inputs

Name	Description	Typical Node Input
Video Node	The video node from which values will be generated.	Video Loader

Outputs

The output is a numeric value that acts upon a connected parameter input of another node, using the operation method selected.

Nodes

Method

This section contains a group of mostly miscellaneous nodes.

- Colour
- Colour Ramp
- Comment
- CSV/Table Entry As Text
- Debug Log
- Image 2D
- Image File Loader
- Layer Precomp
- Mapping
- Motion Direction Follower
- Motion Predictor
- OSC Output
- OSC Text String
- Parent To Vertex
- Render Layer
- Render To Texture
- Root
- Screen Projection
- Spline Follower
- Time Counter As Text
- Time Stretch
- Timecode As Text
- Triangle Octree Node
- Value As Text

Colour

Method

Generates a colour which can be input into various nodes.

Attributes

Name	Description
Colour	Control the colour to be output.
Brightness	The intensity of the colour.

Inputs

Name	Description	Typical Node Input
Colour R/G/B/A	Adjust the colour values for the various colour channels.	Envelope Modifier

Outputs

Outputs a colour which can be input into various colour inputs.

Colour Ramp

Method

This node outputs colours or gradients, based on the colours selected.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Num Control Points	Number of control colours.
Selection Mode	How the colours are selected and output. • Individual Colours, outputs unchanged colours from the control colours. • Gradient, colours selected on a gradient between the control colours. • Single Colour Selection, selects individual colours based on the single colour index. Only works as an input to Particle Emitter nodes.
Single Colour Index	Selects an individual colour to be output. Only functions with single colour selection selected in the selection mode attribute.

Colours

Depending on how high the number of control points set in the attributes, will change how many control colours will appear in this window.

Name	Description
Invert Order	Invert the order of the colours.
Colour #	Edit the colour of a control point.

Inputs

There are no inputs for this node.

Outputs

The outputs section for this node is currently being worked on.

Comment

Method

This node allows you to add a comment to the nodegraph. The comment is applied directly to the nodegraph as a text string, and can be moved to wherever it is needed.

Attributes

Name	Description
Comment	A string comment that will be shown in the nodegraph.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

CSV/Table Entry As Text

Method

Reads a text string value from a table. Typically this is used to read values from a table and pass them into a Text node for rendering on screen.

Attributes

Name	Description
Current Value	Shows the current value of the effect. Cannot be directly changed.
CSV File	The table resource.
Read Index	In a 2D table, this is the column to be picked from. In a 1D list this is the index to pick.
Row Index	In a 2D table, this is the row to be picked from.
Selection Mode	• 1D – Index : A row of separated values. • 2D – Column + Row : The more traditional table layout

Inputs

Name	Description	Typical Node Input
Read Index	In a 2D table, this is the column to be picked from. In a 1D list this is the index to pick.	A numeric input, e.g. Envelope Modifier
Row Index	In a 2D table, this is the row to be picked from.	A numeric input, e.g. Envelope Modifier

Outputs

The output is a string value that acts upon a connected parameter input of another node (typically a Text node)

Notes

You can add tables in the Resource Panel via *Interactive-> CSV/Text File*

Debug Log

Method

This node displays the debug log onto the rendered image.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Log Mode	Control which log outputs are shown for debugging. • Log (History Of Important Messages), Uses the data from the debug log window. The list of messages grows continuously. • Debug (Per-Frame Messages), Uses the data from the debug log window. The list of messages is cleared and reset every frame. • Device Info, Uses the debug information for connected devices.

Inputs

Name	Description	Typical Node	Typical Node

		Input	Input
Transform Modifier	Links all transform properties to the input node.	Null	
Target Node	Always faces the x-axis towards the inputs anchor point.	Null	

Outputs

The outputs section for this node is currently being worked on.

Image 2D

Method

This node displays an image in 2D space on top of the rendered scene, with no respect paid to the 3D camera, viewport or objects within it. This is useful for displaying full screen images, overlays and so on.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Image	Select an image to be displayed on the image plane.
Alpha Image	Use an image to control the alpha values.
UV Remap Image	Use an image to remap the UVs for the image.
Colour	Add a colour filter over the image.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.
Frame	If the image is animated, choose which frame is displayed.
Alpha	Control the alpha value of the image.
Alpha Sort Bias	Biases the alpha sort in order to make it render in front or behind other transparent objects.
Aspect Based Scaling Mode	Scale the image to retain its original aspect ratio. • Disabled, Does not function.

	• Scale X, The x scale is changed until it matches the original files aspect ratio. • Scale Y, The y scale is changed until it matches the original files aspect ratio. • Larger, Chooses the larger scale mode. • Smaller, Chooses the smaller scale mode.
UV Remap Filtering	Remap the colour image to the Image 2D based on a UV map.
No Image Behaviour	Select what colour should appear in the absence of an image input.

UV Transform

Name	Description
UV Offset X	Move the object UV along the x axis, local to the screen.
UV Offset Y	Move the object UV along the y axis, local to the screen.
UV Scale X	Scale the object UV along the x axis, local to the screen.
UV Scale Y	Scale the object UV along the y axis, local to the screen.

Video

Name	Description
Frame Offset	Offset the start frame.
Frame Rate	Control the frame rate of the video.
Loop End Frame	Choose when the video stops looping.

Texture Animation

Name	Description
Is Texture Animation Page	Toggle whether the input image should be treated as an animation page containing multiple frames of an animation.
Num Frames X	The number of animation frames in the X axis contained in the image.
Num Frames Y	The number of animation frames in the Y axis contained in the image.

Crop

Name	Description
Crop Left	How much of the image is cropped from the left.
Crop Right	How much of the image is cropped from the right.

Crop Top	How much of the image is cropped from the bottom.
Crop Bottom	How much of the image is cropped from the top.

Inputs

Name	Description	Typical Node Input
Video Node	Add an image to be displayed on the Image2D node.	Video Loader
Alpha Image	Add an image to override the alpha channel of the Image 2D node.	Fractal Noise
UV Image Remap	Add an image to use as a UV remap on the Image 2D node.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Image 2D Equirectangular

Method

This node warps a cube map – supplied as six individual images/videos, one per face – into an equirectangular image in 2D space on top of the rendered scene, with no respect paid to the 3D camera, viewport or objects within it.
This is useful for taking separate perspective renders of a 3D scene and compositing them into an equirectangular output feed.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.

Attributes

Name	Description
Mode	Sets the mode to either 360 or fisheye.
Cube Face Resolution	Sets the resolution of the cube map used to composite the equirectangular image.
Invert X	Inverts image on the X axis.
Invert Y	Inverts image on the Y axis.
Fish Eye Angle	Sets the angle of the fisheye and defaults at 180.
Colour	Sets the colour of the image.
Blend Mode	Toggles the mode of the alpha channel between – Solid, Blend, Additive, Subtractive, Multiply, Max, Min, Screen, Light and Pre Mul Blend.
Alpha	Strength of the alpha channel 1 – 0.
Alpha Sort Bias	Sets the value of the alpha sorting.

Set as background	Toggles on and off showing the image in the viewport.

Inputs

Name	Description	Typical Node Input
Cube Negative X Image	The image/video used for the negative X axis of the cube map.	Video Loader.
Cube Positive X Image	The image/video used for the positive X axis of the cube map.	Video Loader.
Cube Negative Y Image	The image/video used for the negative Y axis of the cube map.	Video Loader.
Cube Positive Y Image	The image/video used for the positive Y axis of the cube map.	Video Loader.
Cube Negative Z Image	The image/video used for the negative Z axis of the cube map.	Video Loader.
Cube Positive Z Image	The image/video used for the positive Z axis of the cube map.	Video Loader.

Image File Loader

Method

This node loads an image from disk based on a specified filename. The image is loaded when the filename changes. This node is typically controlled via Javascript, external input or an RSS feed. The image file is loaded in line with other processing so may result in a pause in execution.
Note that it is the user's responsibility to ensure the image exists and is valid. If the load fails the Image File Loader will contain an empty image.

Attributes

Name	Description
Filename	Type the filename to be loaded.

Inputs

Name	Description	Typical Node Input
Filename Source Node	Use a string input to find the image file.	RSS Feed Node

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Layer Precomp

Method

This node pre-composites a layer so it can be rendered inside another layer. Any exposed values from inside that layer will also be carried over into the new layer.

> Multiple nodes in one scene will rerender that original layer, so make sure to use as few layer precomp nodes as possible and branch out with Video Nulls.

Attributes

Name	Description
Source Layer	Select a layer to precomposite.
Render Width / Height	Change the width and height of the rendered layer. When set to 0, render width and height are set to scene resolution.
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Time Mode	Change relative time in which the precomped layer is running. • Node Relative, Time will be relative to the start and end time of the node. • Layer Relative, Time will be relative to the start and end time of the layer. • Global, Time will be relative to the start and end time of the project. • Use Deltas (Looping), Time will use its own time and run continuously.
Time Offset	Offset the start time of the layer.
Playback Speed	Speed at which the layer is played at.
Looping	Enable or disable the layer from looping at the end.
Loop Start Time	Offset the start time of the layer after each loop.
Update Active	Enable or disable the layer from re-rendering to the current scene. When disabled, a static image will be output.
Optimise	This will dynamically remove memory data if the node isn't active. This can optimise

Memory On Idle	memory usage, but can cause issues loading a precomp if it is sufficiently large.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Mapping

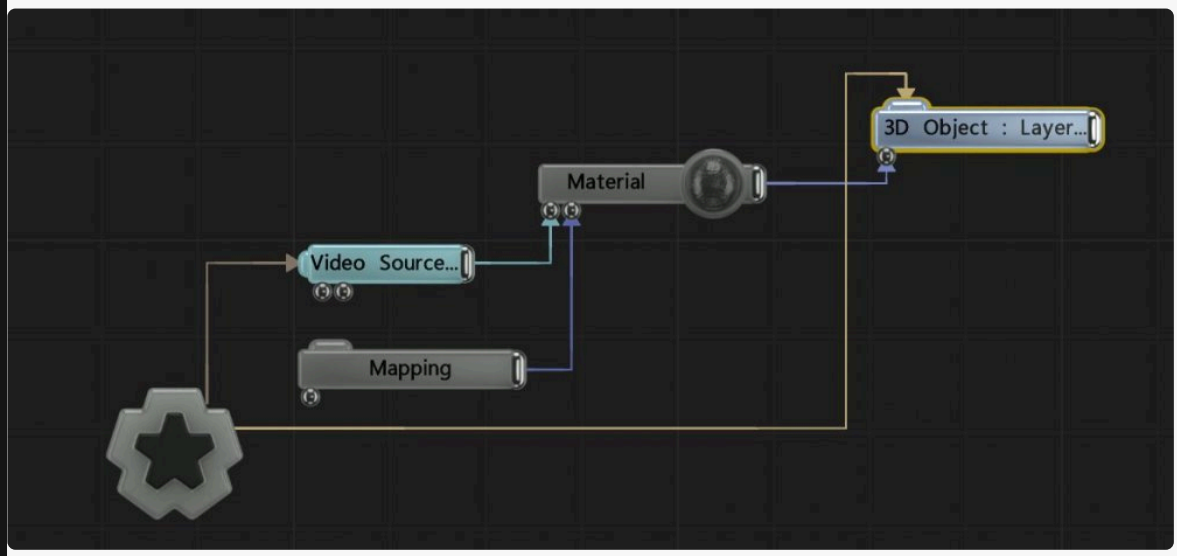
Method

This node controls how texture coordinates (UVs) are generated for a given material or piece of 3D geometry. This allows UVs to be created procedurally, e.g. via planar, spherical or camera perspective mappings.

The *Mapping node* acts on a *Material node's Mapping input.* It does not need parenting.

To map a texture to an object using the Mapping node:

1. Add the 3D Object you wish to map on to
2. Add a Material node and link it's output to the *3D Object*'s : *Default Material*
3. Add a Video Source node and link it's output to the *Material*'s : *Colour Texture* input
4. Add a Mapping node and link it's output to the *Material*'s : *Mapping* input.
5. In the Mapping node:
    a. Select the Mapping Type you wish to use
    b. If using a geomterical applied mapping (Perspectice, Spherical, Planar etc.) then:
        i. Set the transform properties of the mapping
        ii. OR Inherit the transforms from a camera by linking your camera to the *Inherit Transforms* input.



Mapping nodes can be used in combination with Screen Resources to pipe content from one layer and apply it another via a mapping.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mapping Type	What kind of mapping is to be applied. • Original UV's, The source values are output directly. • Planar, The map is generated based on the planar view of the XY plane. • Cubic, the map is generated based on the planar views of the x, y and z planes.. • Spherical, the map is a 360 spherical mapping back out into space. • Normal Face-Map, the map is generated based on the normal. • Perspective, the map is generated based on the position and rotation of the mapping node. Generally used with a Camera connected to the Transform Modifiers input. • Equirectanglur, the map is generated based on a cubic map, but smoothed to the shape of a sphere.
Source Channel	The linked 3D Objects source data that the mapping should use in it's application. • Local Position, the local position of the vertices before transformation. • World Position, the world position of the objects vertices (most commonly used with Spherical, Planar, Perspective mappings) • UV, the UV coordinates of the vertices • Local Normal, the local normals before transformation. • World Normal, the world normals after transformations are applied. • Index, the vertex index is used as an input.

Dimension	How many dimensions the map affects.
Generate Per Pixel	Determines whether UVs are generated per vertex or per pixel.
Show Guides	Show a visual guide for the mapping from this node in the viewport.

UV Transform

Name	Description
UV Offset X	Move the object UV along the x axis.
UV Offset Y	Move the object UV along the y axis.
UV Scale X	Scale the object UV along the x axis.
UV Scale Y	Scale the object UV along the y axis.

Inputs

Name	Description	Typical Node Input
Transform Modifiers	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Motion Direction Follower

Method

This node generates its rotation angles using the motion of the node it is following. This allows it to be used to point an object in the direction of motion of the following node.

Inputs

Name	Description	Typical Node Input
Following Node	Input a node to use its transformation values.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Motion Predictor

Method

This node predicts the motion of a node it is following – causing it to be positioned ahead of the current location of that node.

Attributes

Name	Description
Prediction Type	How much the predicted position affects the current position.
Smoothing	How much smoothing between points is done for the predicted position.
Max Step Size	Maximum size between each predicted next step.

Inputs

Name	Description	Typical Node Input
Following Node	Input a node to use its transformation values.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

OSC Output

Method

Sends an OSC message with a single *float* value every frame, to the target IP and Port number set in Project Settings.

> ! OSC messages will only be sent when the play head is playing.

See OSC Topic for more details.

Attributes

Name	Description
Value	The numeric value to be sent. Often a linked value.
Send Active	Control whether OSC messages are being sent.
OSC Channel Name	The OSC address for the message. e.g. /myoutput/x

Inputs

Name	Description	Typical Node Input
Value	The value to be sent via OSC.	Any numeric field

Outputs

There are no outputs from this node.

OSC Text String

Method

Receives a *string* OSC value over the network then applies it to a destination value.

> ! Please note that the OSC message must only contain a single *string* value.

> ! The incoming OSC values will only be processed when the play head is playing

See OSC Topic for more details.

Attributes

Name	Description
Current Value	Current Text String being reciieved via OSC.
OSC Channel Name	The address of the OSC value being received e.g. /myvalue/x

Inputs

There are no inputs for this node.

Outputs

Output is a string value that can be linked to any string value in the node graph. (e.g. Text Node – Text String)

Parent To Vertex

Method

This node parents a child node to follow the transformation values of the selected vertex, particle or point – allowing nodes to be attached to the motion & transform of particles, points or blobs.

This node can be applied directly to these nodes.

- 3D Object
- Particle Root
- Blob Tracker

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Vertex Index	Choose which point or vertex to follow.

Inputs

Name	Description	Typical Node Input
Source	Select which node to use as a source for the points.	Particle Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

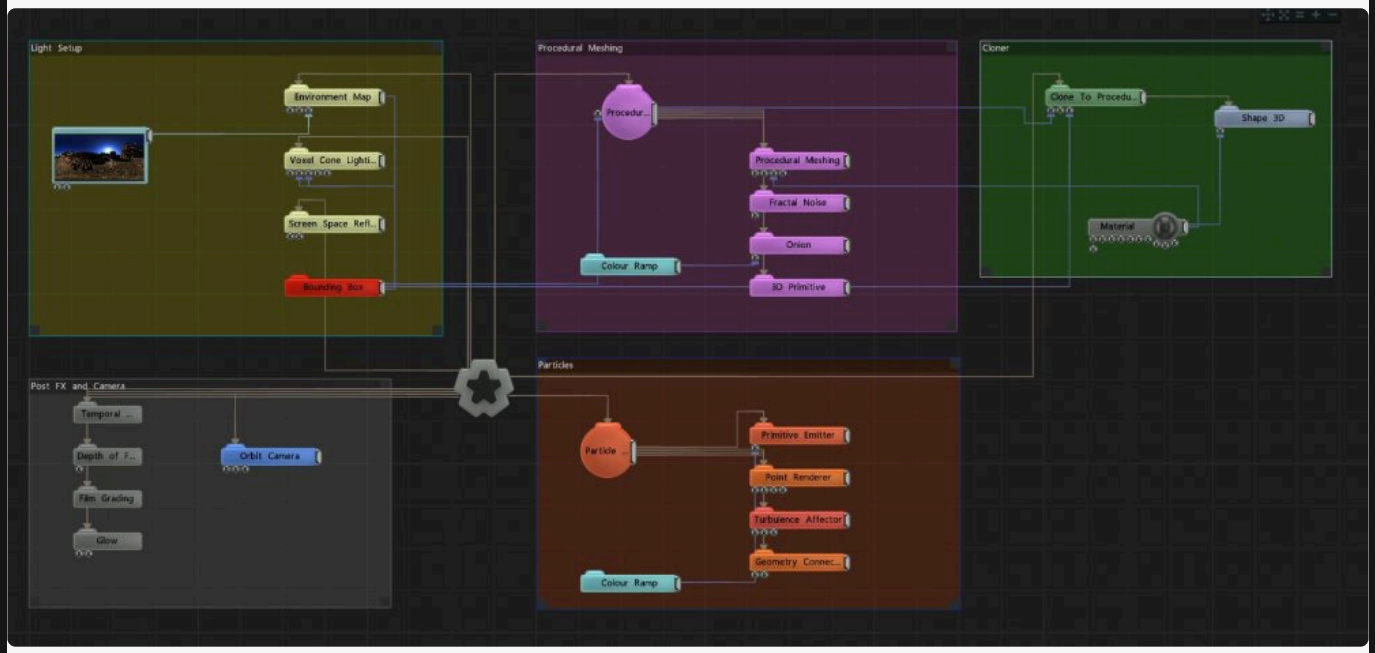
Connected nodes will be parented to the selected vertex.

Region

Method

This node allows you to create a coloured region directly on the nodegraph.

You can also use Shift+Drag to move around the contents of a region node.



Attributes

Name	Description
Comment	Text that will appear in the region.
Colour	Set a colour for the Region node.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

Render Layer

Method

This node renders all its child nodes and their sub-trees to a separate composition layer within the scene.
Composition layers share the same camera view and may share the same depth space but have different render targets, allowing them to have their own post processing chain separate to the main render and other composition layers. The Affecting Lights input may be used to specify which lights are allowed to affect the objects in this layer. Render Layers, when used with lighting, add significant additional processing time and memory overhead so should be used sparingly.

This node is commonly used to render 3D elements with different post processing effects applied than those on the rest of the scene.

Attributes

Name	Description
Layer Alpha	Control the alpha values for the layers.
Composition Order	Prioritise this layer to be rendered on top of others in the scene. If this value is the same as others, the nodegraph position decides render order. For more on this, visit the Node Hierarchies page.
Own Depth Buffer	Give the composition layer its own depth buffer – so objects are not occluded by those in other layers.
Deferred Lighting Enabled	Enable deferred rendering for connected nodes.

Inputs

Name	Description	Typical Node Input
Affecting Lights	Add which lights will affect the objects in the rendered layer. By default, all will affect the layer.	Light
Excluding Lights	Add which lights won't affect the objects in the rendered layer. By default, all will affect the layer.	Light

Outputs

Nodes connected to this layers outputs will be included in the Render Layers scene.

Render To Surfaces

Method

This node renders connected objects and lights onto the surface of chosen objects.

Attributes

Name	Description
Width	Width of rendered texture.
Height	Width of rendered texture.
Background Colour	Change the background colour of the rendered texture.
Disable Render To Texture (Pass Through)	When enabled, the texture rendering will be ignored and the child nodes will be passed through into the main scene.
Use 360 Degree Camera	Render onto surfaces using a 360 degree camera mapping.

Inputs

Name	Description	Typical Node Input
Affecting Lights	Select which lights will be rendered and used on the affected surface. by default, all are used.	Light
Target Surfaces	Select which surfaces will have the rendered image applied to them.	3D Object
Rendered Nodes	Add nodes which will be included in the rendered scene.	3D Object
Excluded Lights	Add lights which will be excluded from being rendered.	Light

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Render To Texture

Method

This node renders all its child nodes and their sub-trees to a separate off-screen texture / precomposition. This texture may then be applied anywhere that takes an image or video node as input: materials, video nodes, Image2D nodes, Image Planes and so on.

Render To Texture nodes may use a different camera to the main scene, if that camera node is parented to the Render To Texture. Similarly it may also have its own lights. Post Processing nodes parented to the Render To Texture node will be applied to the texture after the 3D objects have been rendered to post process the result.

Deferred Rendering may be enabled on the Render To Texture to use the deferred rendering path. This is only effective if Deferred Rendering is also enabled in the Root node.

Attributes

Name	Description
Show Rendered Texture	Toggle whether the rendered texture is previewed in the viewport.
Show Rendered Texture Alpha	Toggle whether the rendered textures alpha values are previewed in the viewport.
Disable Render To Texture (Pass Through)	When enabled, the texture rendering will be ignored and the child nodes will be passed through into the main scene.
Width	Width of rendered texture.
Height	Height of rendered texture.
Background Colour	Change the background colour of the rendered texture.
Use Main Output Aspect Ratio	Use the aspect ratio created from the Width and Height attributes.
Rendering Enabled	Controls whether the connected scene is re-rendered to the texture.
Deferred Lighting Enabled	Enable deferred rendering for connected nodes.
Use Main Output Eye Position	Use the main scene's eye position for lighting calculations, regardless of where the Render To Texture's camera is.
Early Evaluation	Evaluate the render to texture node earlier in the render pass. This can prevent a blank

	output appearing for the first frame, but can also cause issues for some nodes which need to be evaluated later.

Inputs

Name	Description	Typical Node Input
Affecting Lights	Choose which lights will affect connected connected objects.	Light
Excluding Lights	Choose which lights don't affect connected connected objects.	Light

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Root

Method

The Root node for the scene, controlling the basic menu and other important scene attributes.

Attributes

Name	Description
Background Colour	Change the background colour.
Backdrop Glow	Defines the “glow” amount for the material used for the background, when deferred rendering is active.
Clear Screen Enabled	Controls whether the screen is cleared to the background colour.
Current Camera	Select which camera is currently being used by the root.
Deferred Rendering	Enables Deferred Rendering, where the final shading pass is delayed until after multiple passes of the scene. When disabled, Forward Rendering is used.
High Dynamic Range	The layer is rendered to 16 bit floating point targets instead of 8 bit targets. This allows rendering and post processing to use more colour precision, and for lighting to be able to write a greater range of intensities.
Dither High Dynamic Range	Dithers the Final image, breaking up any visible banding in the scene..
Antialiasing	Toggle multi-sample anti-aliasing for the scene.
Linear-Space Lighting	Switches the lighting model from gamma space to linear space.
VR Optimisations	Optimises your scene for use in VR.
Composite Blend Mode	Change how this layer will blend with other layers in the project. See Blend Modes for details.
Output Premultiplied Alpha	The final RGB colour values are multiplied against the Alpha value before being output.
Layer Alpha	Control the layer alpha value.
View Layer Alpha	Visualise the rendered layers alpha values.
Offscreen	A Screen resource to which the contents of the layer’s final render will be copied to after

Render Target	rendering, for use as a texture in future layers.

Information

Name	Description
Creators	Contains the name of the original creator of the scene.

Raytracing

Name	Description
Enabled	Enable Ray Tracing support.
Dynamic	Enable Ray Tracing support for dynamic scenes.

Outputs

Almost all nodes must be connected to a root node either directly or indirectly, in order to function.

Screen Projection

Method

This node reprojects the main render onto a quad in 3D space, then outputs the result into the UV space of that quad. This allows content to be rendered from the point of view of a camera and reprojected onto a quad that represents an LED screen, then producing a result that can be rendered out on that LED screen. The Output rectangle properties allow the result to be positioned in 2D so that multiple Screen Projection nodes can be used at once and mapped to different areas of the screen.

This is typically used in live reprojection workflows such as in-camera LED screens with camera tracking.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Outut Enabled	Determines whether the reprojected output should be rendered.
Show Geometry	Determines whether the wireframe quad should be displayed in the viewport.
Border Size	Defines the size of the border around the projected result which will be filled with black.

Output

Name	Description
Output X0	Defines the output rectangle in screen space.
Output Y0	Defines the output rectangle in screen space.
Output X1	Defines the output rectangle in screen space.
Output Y1	Defines the output rectangle in screen space.
Output Rotation	Rotate the output screen projection.

Inputs

Name	Description	Typical Node Input
Camera	The camera used for the reprojection view.	Camera
Outside Area Image	Defines an image to use for pixels outside of the reprojection and border area	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Spline Follower

Method

This node translates a child object along an input spline. The child may also optionally be rotated to point along the direction of the spline.

Attributes

Name	Description
Spline Time	The percentage along the spline the child nodes will have moved along, in relation to the “Spline Time Mode” dictated in the input spline. If set to “Knot”, the spline will move up by 1 per control point.
Rotation Follows Direction	Toggle whether the rotation of the objects on the spline follows the direction.
Rotation Look Ahead Time	How far ahead along the spline the child nodes should rotate towards.
Follower Rotation – Heading / Pitch / Bank	Control which axis of rotation are used in the rotation.
Use Matrix Rotations	Generate the rotations via transform matrices. This may be more accurate as unlike the euler angle method it does not suffer from gimbal lock – but it is less controllable, as the rotation channels cannot be accessed or controlled separately in this mode.
Fix Heading Rotations	Try to solve flips in the heading direction as the object moves around the spline.

Inputs

Name	Description	Typical Node Input
Spline Nodes	Source spline along which child objects will move along.	Spline
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be input into any node which uses spline nodes as an input. Otherwise, child nodes are treated as if in the usual parent child relationship.

Time Counter As Text

Method

Creates a clock time as a string value which may be rendered via a Text node.
To make the timer count up or down, the Time Offset Seconds parameter may be keyframed or driven by a Continuous Modifier.

Attributes

Name	Description
Display Mode	Change how the time code is output as a string.
Initial Time (Hours Minutes Seconds)	Initial time the time counter starts at.
Time Offset Seconds	Offset the initial time from the current time in seconds. Useful for counting up, or counting down.
Separator	Change which ASCII Character is used to separate the different time codes.
Clamp To Zero	Clamps the value at 0 so you cannot move into negative time.
Sub Second Frame Rate	When showing sub-second time codes, how many time intervals should be shown.

Inputs

There are no inputs for this node.

Outputs

This node outputs a string that can be used by any node which takes a string input.

Time Stretch

Method

This node stretches and adjusts the time being passed to all of its children and their respective subtrees that will be used for animation, keyframes and so on. It does not affect visibility as controlled by timeline bars.

Attributes

Name	Description
Time Modification Mode	Change how the time in the child node is affected. • Speed, the speed that the affected node is played at is modified. • Absolute Time, control the absoolute time that the affected node is currently at.
Affects LWS Only	Toggles whether the time stretch only affects Light Wave Scenes.
Time	Change the time that the affected node is currently at, in seconds. Only functions with “absolute time” selected in the time modification mode attribute.
Speed	Change the speed that the affected node is played at. Only functions with “Speed” selected in the time modification mode attribute.
Time Offset	Offset the affected nodes time.
Time Stretch Enabled	Enable or disable the time stretch node.

Inputs

Name	Description	Typical Node Input
Blend Amount	How much the newly output time will affect the child nodes.	Envelope Modifier

Outputs

The outputs section for this node is currently being worked on.

Timecode As Text

Method

Outputs the current timecode value – the current play time of the project timeline – as a string. This is useful for debugging and video annotations.

Attributes

There are no attributes for this node.

inputs

There are no inputs for this node.

Outputs

This node outputs a string that can be used by any node which takes a string input.

Triangle Octree Node

Method

This node is being deprecated, and replaced

Value As Text

Method

This node converts any numerical value to a string, which can be input into other nodes – typically the Text node.

Attributes

Name	Description
Value	Numerical value to be converted to a string.
Num Decimal Places	Number of decimal places the converted float should be limited to.

Inputs

Name	Description	Typical Node Input
Value	Override the value attribute with any numerical output.	Extractor

Outputs

This node outputs a string that can be used by any node which takes a string input.

Particles

Method

Particle nodes are nodes used in a particles system. This system starts with a Particle Root Node, and is built out with Emitter, Affector and Shader nodes, before finally being rendered to the camera with a Renderer node.

The Particle Root Node contains the particles themselves: their positions, velocities, colours and so on, in a pool waiting to be used. The number of particles in the pool is set by the Max Particle Count attribute on the root node. Particle Emitters take particles from the pool and bring them to life. Particle Affectors make them move; Particle Rendering Nodes control how particles are rendered to screen. When particles die they are returned to the pool until they are emitted again. It is possible that not all the particles in the pool are alive at any time. Even particles that are not currently alive in the pool carry some performance and memory overhead, so it is recommended that the maximum number of particles on the Particle Root node is limited to the amount actually needed by the emitters.

Multiple Particle Emitters may exist under one Particle Root node. Particle Affectors and Rendering nodes may be connected to the Particle Root directly, making them work on every particle under the root node; or they may be connected to individual Emitters, making them only affect the particles emitted by that Emitter.

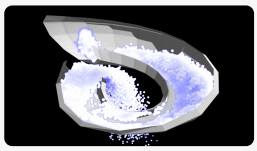
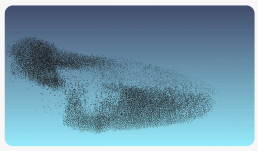
Particles are generally hooked into the Root node, although they can be applied to any node – they will still appear in the scene as long as there is a path to a Root node.

Aside from the Particle Bounding Box, Particle Event and Particle Root, these nodes are split into 4 groups:

- Affectors, these affect the movement of the particles once they are emitted.
- Emitters, these emit particles based on different shapes or models.
- Rendering, render particles as different shapes or objects.
- Shading, change the colours of the particles based on various parameters.

Gallery

Affectors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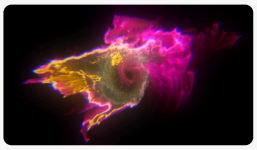
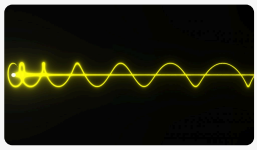
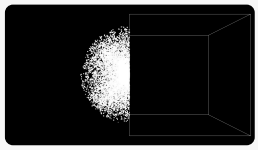
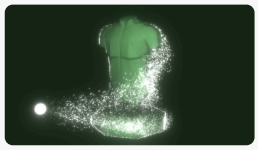
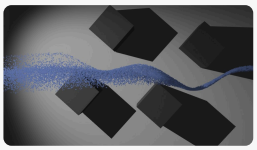
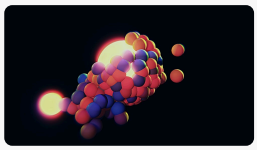
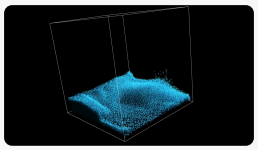
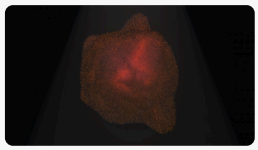
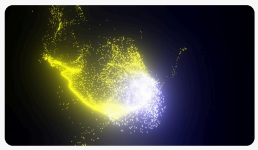
				
Fluid FLIP Affector	Force Affector	Image Affector	Kill Box Affector	Mesh Attractor
				
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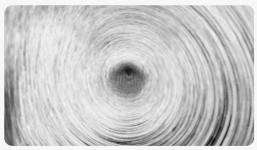
				
Velocity Affector	Vortex Affector			

- Field Affector
- Spline Attractor

Emitters

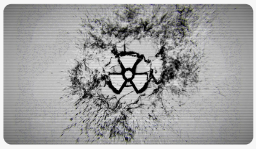
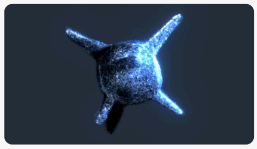
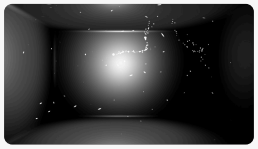
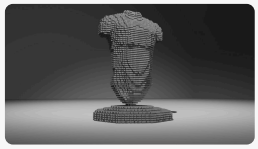
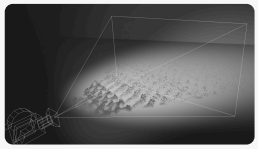
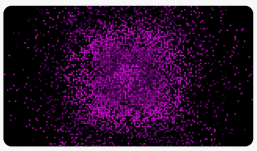
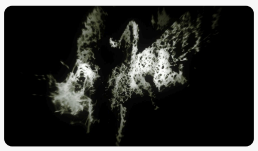
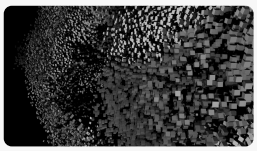
				

Image Emitter	Mesh Emitter	Primitive Emitter	SDF Emitter	Screen Emitter
Trail Emitter	Video Feature			

	Emitter			

- Spline Emitter

Rendering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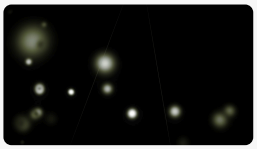
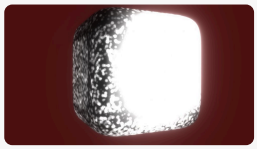
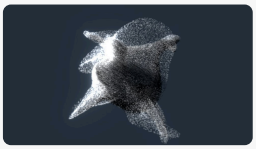
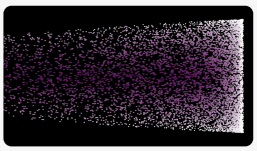
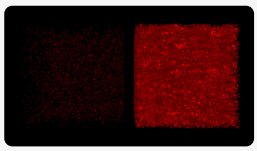
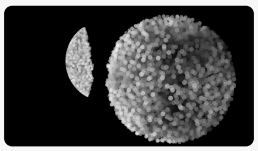
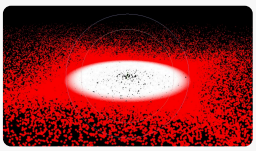
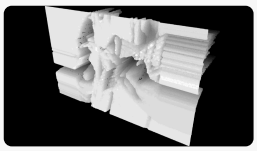
				
Point Renderer	Render Particles To Surfaces	Trail Renderer	Volume Renderer	

- Gradient 2D Renderer

Shading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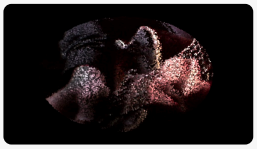	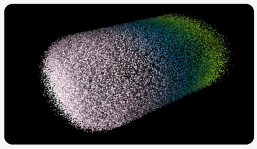	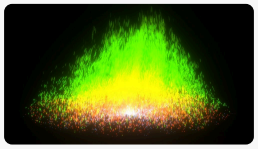		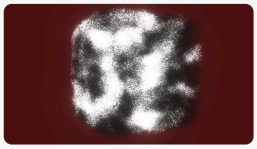
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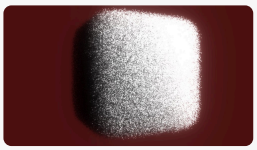
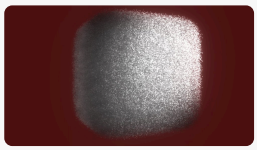
				
Volume Shadow Shading	Voxel Cone Shading			

Particle Bounding Box

Method

This node generates a bounding box around the positions of the particles in the connected Particle Root Node. This is typically used for nodes which work on a limited bounding region such as Field Nodes which need to track a particle simulation that has an unknown location and bounds, e.g. as the result of following tracking data.

As the bounds of a particle simulation often varies greatly from frame to frame as particles move or are spawned and die, the Smoothing Amount attribute may be used to control the smoothing of the size and location of the generated bounding box over multiple frames.

There is a latency of several frames in the bounding box generation in order to pipeline the processing and not impact on performance.

Attributes

Name	Description
Smoothing Amount	Controls how much the bounding box transformations are smoothed across multiple frames.

Inputs

Name	Description	Typical Node Input
Particle Node	Source particle root for generating the box.	Particle Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

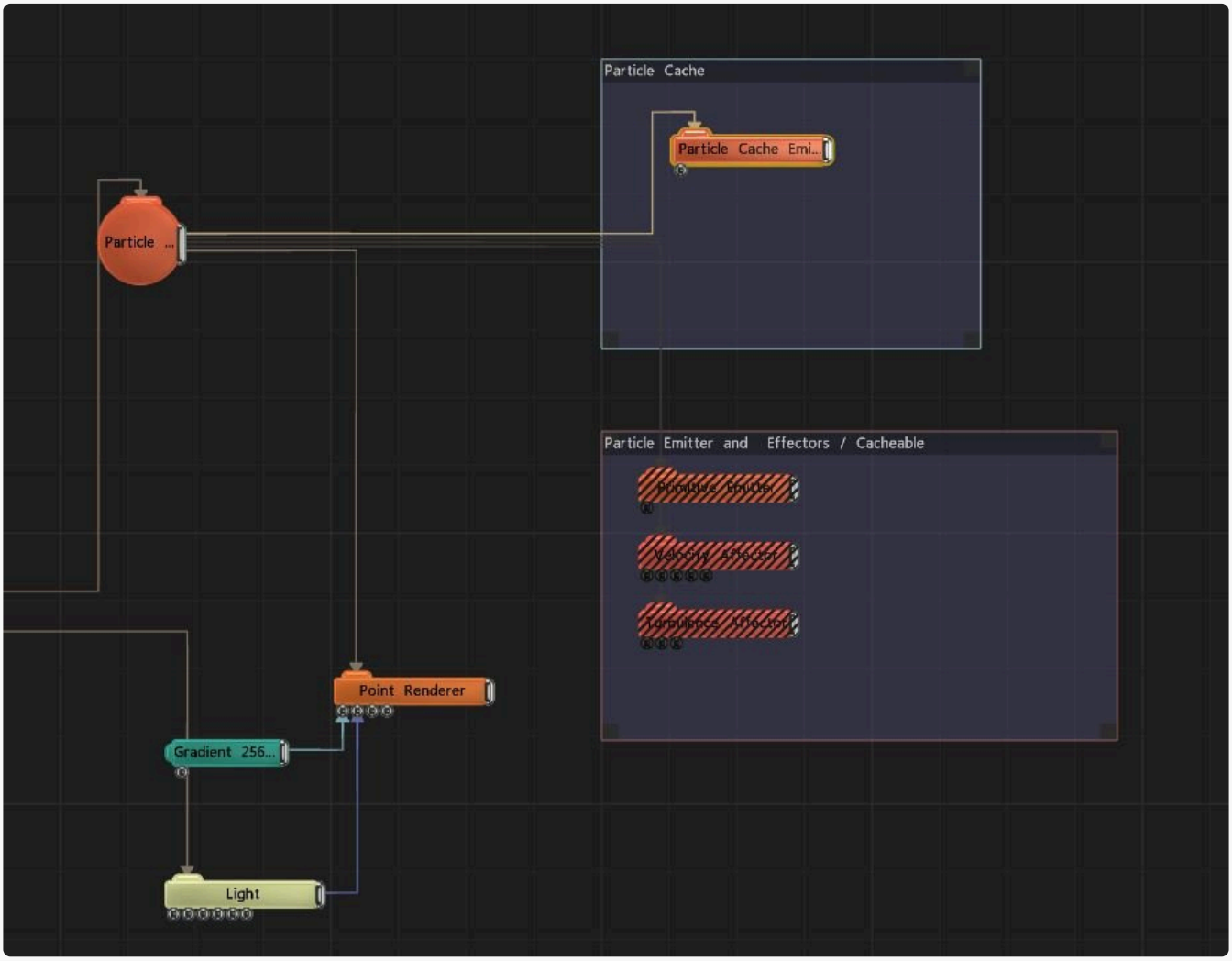
The outputs section for this node is currently being worked on.

Particle Cache

Method

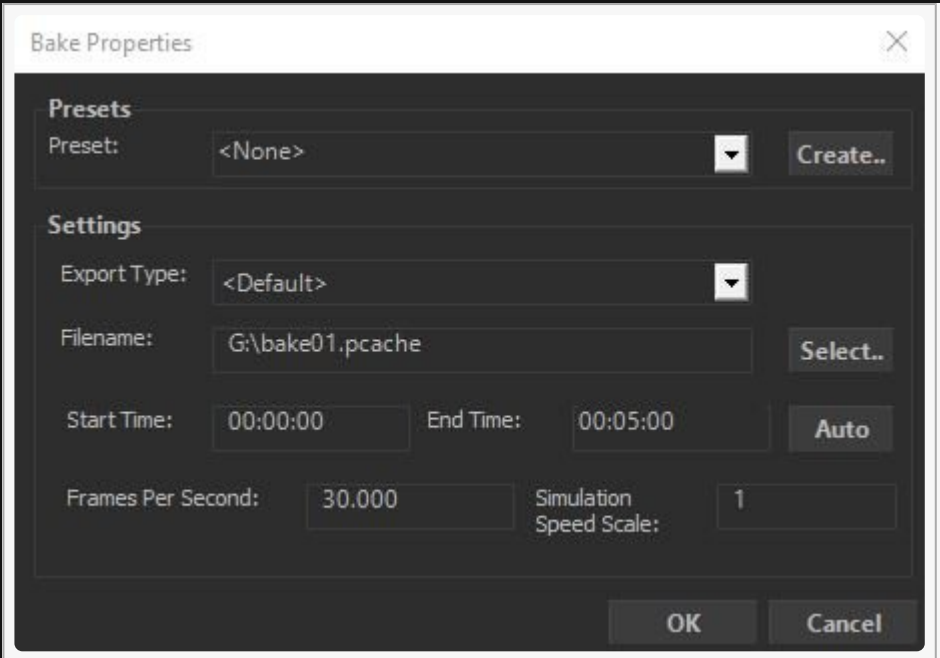
The particle cache node allows you to store the animation of particles to disk. This allows them to be scrubbed in time and played deterministically rather than simulated during playback.
Particle cache files may be very large on disk.

Example Nodegraph



When the baking is finished you may disable the effectors.

Baking Panel



The file extension for particle cache is *.pcache.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Bake Now..	Open baking panel and begin bake

Particle Cache	Cached file
Realflow Animation	Load *.bin realflow file
Playback Rate	Playback speed
Playback Time Offset	Offset the playback Time
Looping	Enable loop playback
Use Node Material	Use the particle material on this node, instead of the material baked into the cache

Colour Control

To enable, add an input into this node.

Name	Description
Colour Selection Mode	Choose how the input colour affects the particles. • Input Colour, the first colour input is the only colour output. • Selected Single Colour, Uses the Colour selection parameter to decide which colour to use from the input ramp. • Emission Time, colour is selected based on time at which the particle is emitted. • Random Colour, the colour is selected randomly at the particles creation.
Colour Selection Parameters	A number used to select the colour output.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.

Fade Out Time	What percentage through the particles life span the particle fades out.
Fade Falloff Coefficient	Change the weighting of the fade falloff to either speed up or slow down over time.

Inputs

Name	Description	Typical Node Input
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Notes

Particle caching can generate very large files if a large number of particles is used. The frames per second will also influence the size of the cached file.

Particle Event

Method

Particle Events are used to affect change in a particle system when something happens to an individual particle: for example, when a collision occurs between the particle and a collision surface, new particles may be emitted at that point; or when a particle reaches a certain age, it may change size and colour. Events are specified as a cause, set via the Cause Type parameter, and effect, set by the Event Type parameter. Particles are monitored for occurrence of the cause; when it occurs, the event is executed.

The Particle Use Amount parameter may be used to restrict the set of the particles so that not every particle for whom the cause occurs will trigger the event. For events which emit new particles or change particle materials there must be a Particle Emitter connected to the Target Emitter input.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Cause Type	What kind of event triggers the node. • Collision, a collision occured between the particle and a collision surface such as

	an Collision Affector. • Particle Life, the particle reached a certain remaining life time. • Particle Time, the particle reached a certain time since birth. • Event Node Time, the event node reached a certain point on the timeline. • Layer Time, the layer reached a certain point on the timeline. • Velocity, the particle's velocity reached a certain magnitude.
Event Type	What kind of event is triggered. • None, no event is triggered • Change Emitter Material, the particle's emitter is changed, causing it to take on a new material – which can be used to change size or colour • Emit New Particles, new particles are emitted at the particle's location • Emit New Particles And Kill, new particles are emitted at the particle's location and the particle itself is killed.
Particle Use Amount	Percentage of particles that can be used by the node.
Time Value	The time value used for cause types Particle Time, Event Node Time and Layer Time.
Particle Life Amount	The life value used for cause type Particle Life.
Num New Particles	How many new particles are generated with cause types Emit New Particles and Emit New Particles And Kill.
Trigger Value	Value needed to trigger the particle event.

Inputs

Name	Description	Typical Node Input
Target Emitter	The new emitter to use, for cause types Change Emitter Material, Emit New Particles and Emit New Particles And Kill.	Primitive Emitter
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The child of this node is the emitter which will be used to emit new particles from.

Particle Root

Method

This node is the root and container for every particle system. Particle Emitters, Particle Affectors and Particle Rendering Nodes must be parented to this node directly or indirectly in order to be operational. The node contains a number of controls that are globally effective across the system.

The Pre-Roll Time parameter is used to cause the particle update process to run for a given number of seconds before the first frame is rendered. This allows systems to be “warmed up” so particles are already emitted and moving in space before the first rendered frame, at the cost of some performance overhead – making it not recommended for real-time projects.

The simulation of particle systems has some inherent randomness and variation, in part because of random seed values used to vary behaviour over time, and in part because of operational orders of processing on the PC hardware. This means that a simulation run multiple times or on multiple PCs at once may result in slightly different positions as a result. While this is often acceptable, in some cases it is desirable for simulations to be deterministic when played by multiple servers simultaneously – for example when the same particle system is output to multiple overlapping projectors by multiple servers. The “Deterministic” parameter is used to force particle simulations to behave in a deterministic manner by locking random seeds and reordering processing so it occurs in the same order every time, at the cost of some performance overhead. In order to achieve a deterministic result it is also necessary to ensure the simulation is updated at an identical frame rate and time on every server.

In general simulations are intended to be frame rate independent. The same simulation run multiple times at differing frame rates should result in particles that are at approximately the same positions in space; the results should be visually similar. However some simulations are inherently highly dependent on update rate, e.g. where fluid solvers such as SPH are used. Where deterministic behaviour for such a system is necessary so that exactly the same results are achieved every time, the Fixed Update parameters may be used to lock or restrict the frame rate at which the system is updated. This is typically desirable for projects that are to be rendered to video.

Attributes

Name	Description
Num Particles	Number of particles generated in the particle system.
Pre-roll Time	Pre-generate the particle system with a time delay in seconds.
Emission Update Active	Controls whether any emitters in the system are allowed to emit new particles.

Physics Velocity Dampening	Dampens the velocities created by physics based effectors such as Force Affector or SPH across multiple frames.
Fixed Update Rate Enabled	Force the particle system to update at a constant rate.
Fixed Update Framerate	The frame rate the particle system is forced to play at.
Fixed Update Mode	Controls how the fixed update rate is used, if the actual frame update rate is faster than the fixed particle update rate. • Lock Update Delta, steps particles between fixed update frames • Interpolate, interpolates particles between fixed update frames.
Shading Smoothing	Smooths the colours generated by Particle Shading nodes across multiple frames.
Motion Smoothing	Smooths the directions of motion of particles in the system across multiple frames.
Terminal Velocity	The maximum velocity allowed for particles.
Master Size Scale	Scales the size of all the particles in the system.
Master Alpha Scale	Scales the alpha value of all the particles in the system.
Master Brightness Scale	Scales the brightness of all the particles in the system.
Deterministic	Make simulations deterministic as long as other conditions are met.
Show Metrics	Displays metrics, describing the particle count max, the particle count active, and the average particle count.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

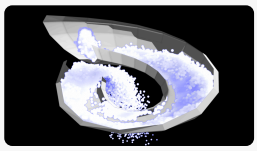
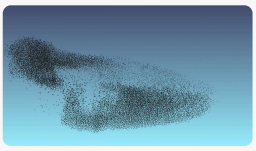
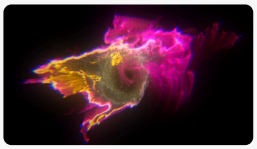
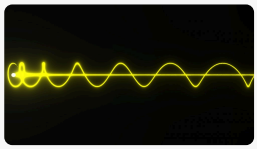
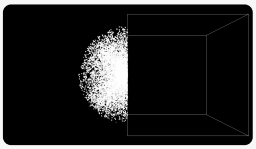
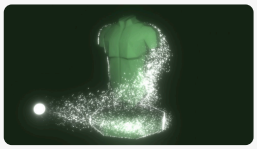
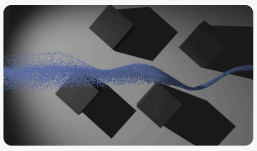
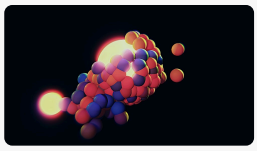
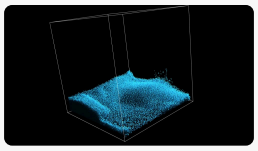
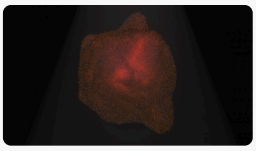
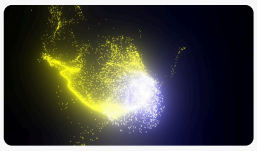
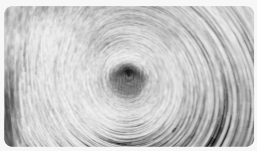
The outputs section for this node is currently being worked on.

Affectors

Method

Particle Affector nodes modify particle motion. Affectors can be connected to a Particle Root node or a Particle Mesh Deformer, which makes them effect every particle in the system. Alternatively they can be connected to a Emitter Node, whereby they only affect particles spawned from that emitter. The exception to this is the Cloth Affector, Which can only be connected to the Particle Mesh Deformer.

Gallery

				
Cloth Affector	Collision Affector	Curl Noise Fluid Affector	Explode Affector	Flocking Affector
				
Fluid FLIP Affector	Force Affector	Image Affector	Kill Box Affector	Mesh Attractor
				
Object Distance Field Affector	Primitive Affector	SPH Affector	Spring Affector	Turbulence Affector
				
Velocity Affector	Vortex Affector			

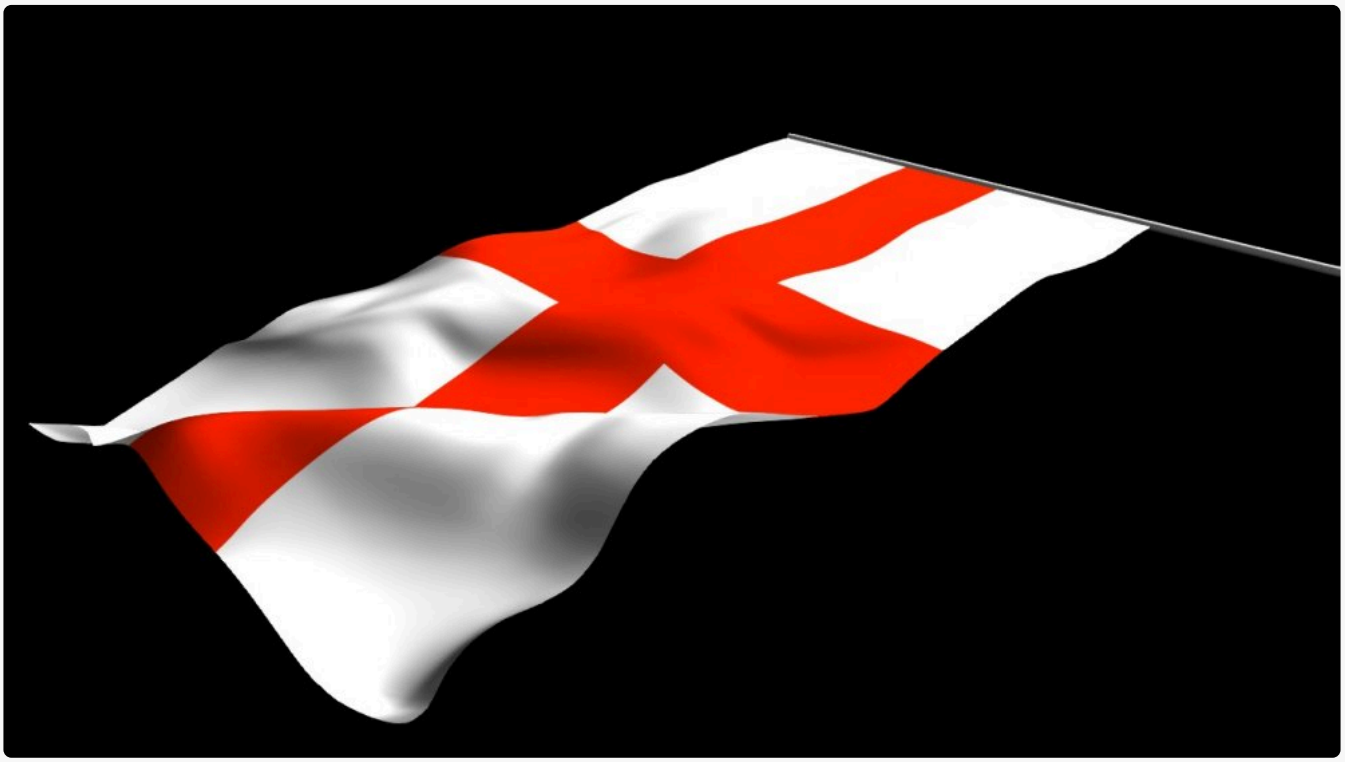
- Field Affector
- Spline Attractor

Cloth Affector

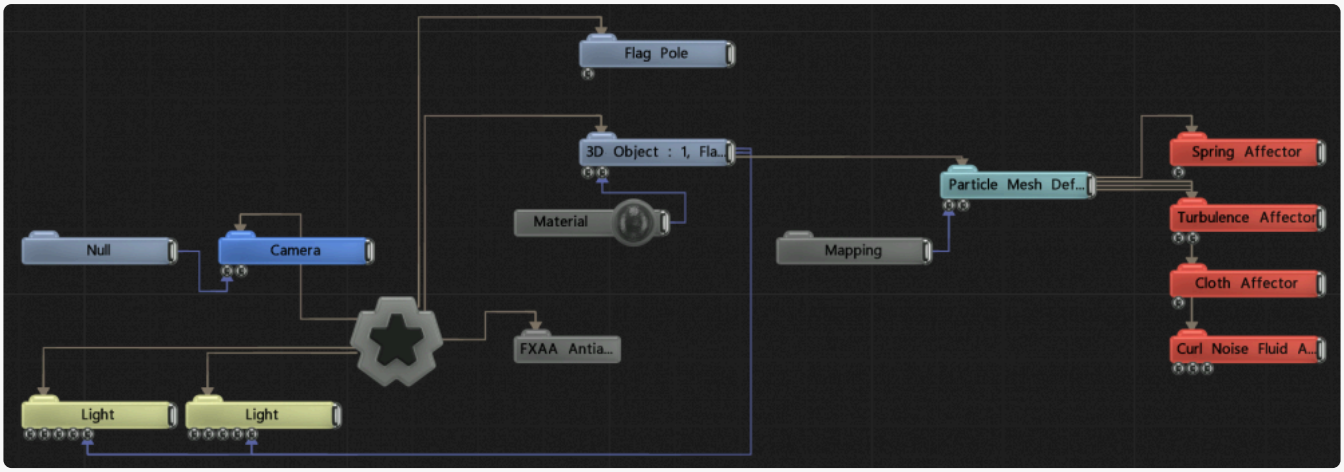
Method

This node applies a cloth simulation to particles that were spawned from a Particle Mesh Deformer. Only particles created from a Particle Mesh Deformer will work with the cloth simulation because it requires information about connections between particles to create constraints. These are generated from the polygons and edges in the mesh parented to the Particle Mesh Deformer.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Stiffness	How much the particles are resistant to deformation.
Dampening	How fast the particles slow down after movement.

Inputs

Name	Description	Typical Node

		Input
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

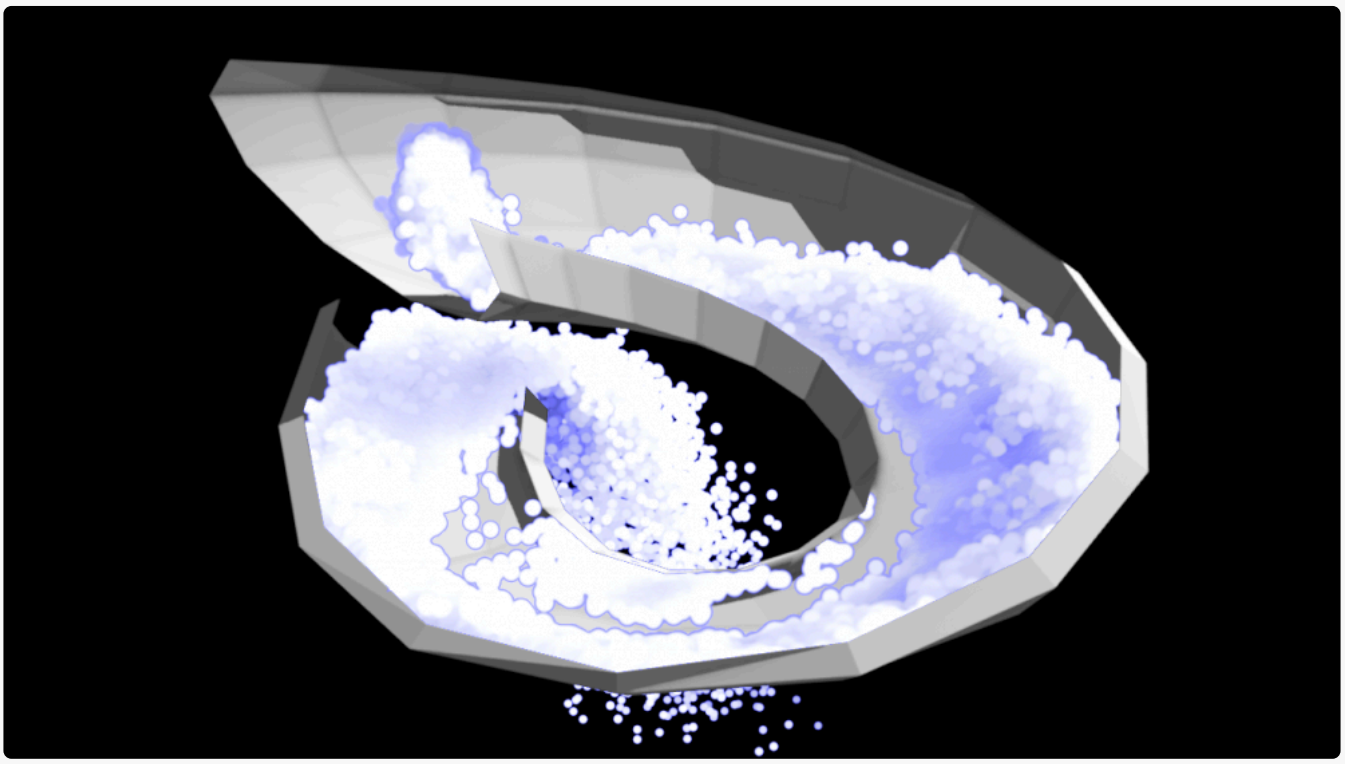
Collision Affector

Method

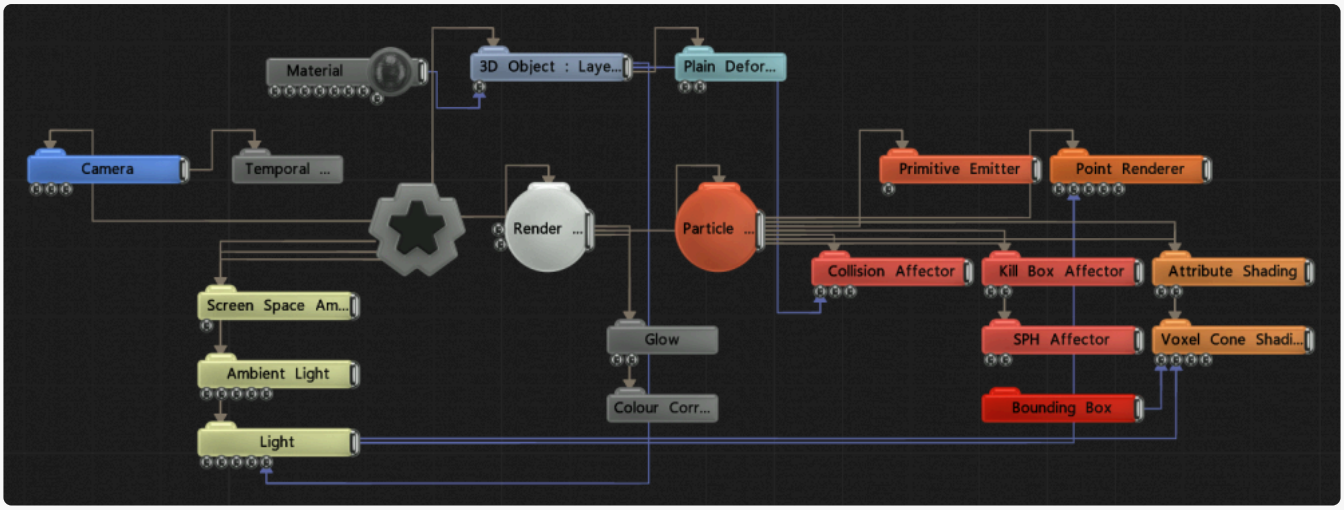
This node simulates collisions between particles and a 3D object. It uses ray traced intersections with triangles contained in a bounding volume hierarchy structure. This allows for fast, accurate collisions with 3D objects, but animating, generated or deforming objects are not supported. They may move in 3D space but must be rigid.

At least one 3D Object Node must be connected via the Object Nodes input for this node to be effective.

Example



Example Nodegraph



Attributes

Name	Description
Collision Velocity Scale	Scales the velocity of the particle after a collision so they can be made to slow down.
Point Collision Radius	Radius around a particle in which it will calculate colliding.
Mode	Chang how the calculations against mesh edges are calculated. • Thin Mesh, The mesh faces are treated as a thin edge, and calculations are calculated against the face. Fast, but occasionally inaccurate. • Extruded Mesh, The mesh faces are extruded along an axis, and the collisions are calculated against the volume. Slow, but more accurate.
Flip Normals	Flip the normals of the input object, so collisions are calculate for other side of the face normals.
Double Sided	Calculate collisions for both sides of the objects normals.
Dynamic Collision Objects	Recalculate collisions each frame for an animating mesh.
Extrude Axis	Which axis the mesh has been extruded along.

Inputs

Name	Description	Typical Node Input
Object Node	Object with which the particles collide.	3D Object
Collision Event Nodes	Particle events to be triggered when collisions occur.	Particle Event
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter

Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Curl Noise Fluid Affector

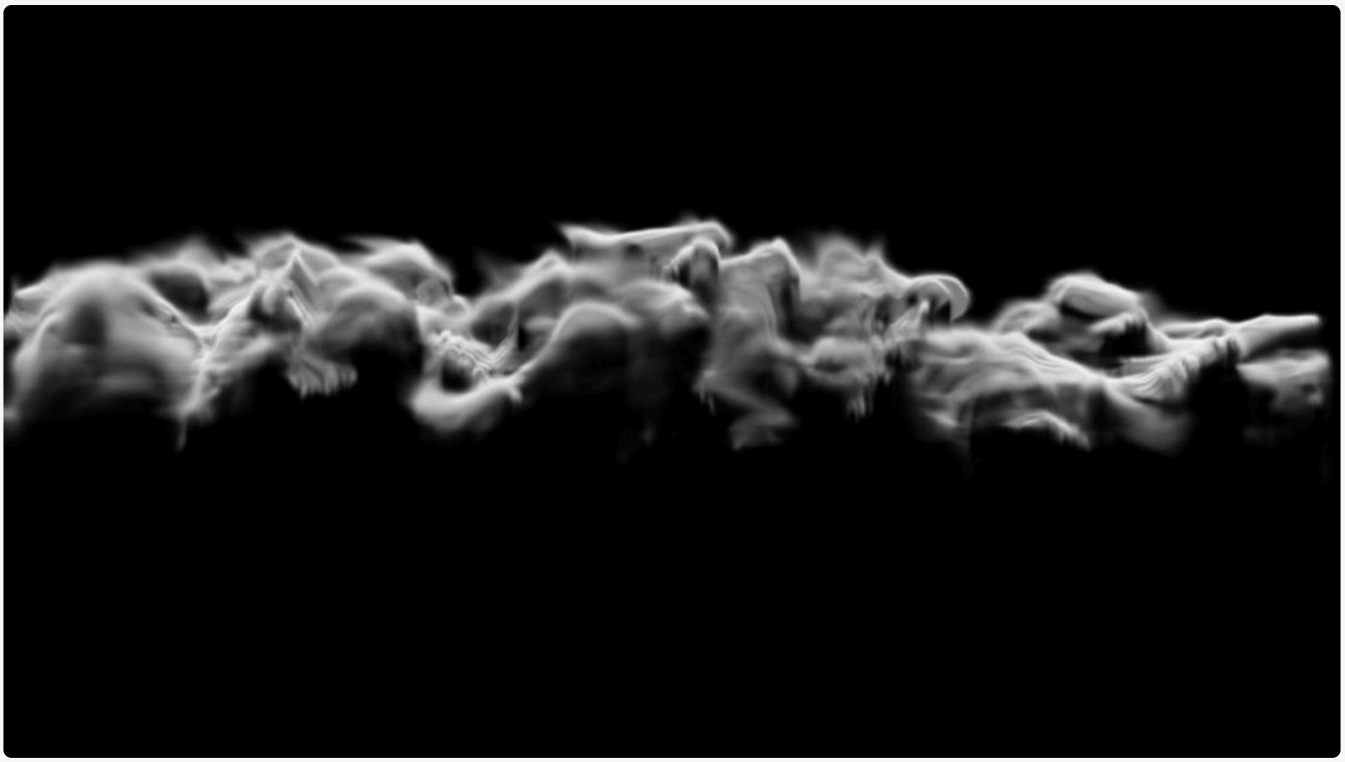
Method

This node gives the affected particles a fluid-like motion. This is typically used to make particles move in a turbulent but spatially coherent manner with local eddies like smoke or liquid. The motion is generated procedurally using Curl Noise rather than simulated so it doesn't incur the performance overhead of a fluid solver.

The Curl Noise Amount attribute modulates the magnitude of the effect. The Noise Size attribute controls the tightness of the eddies.

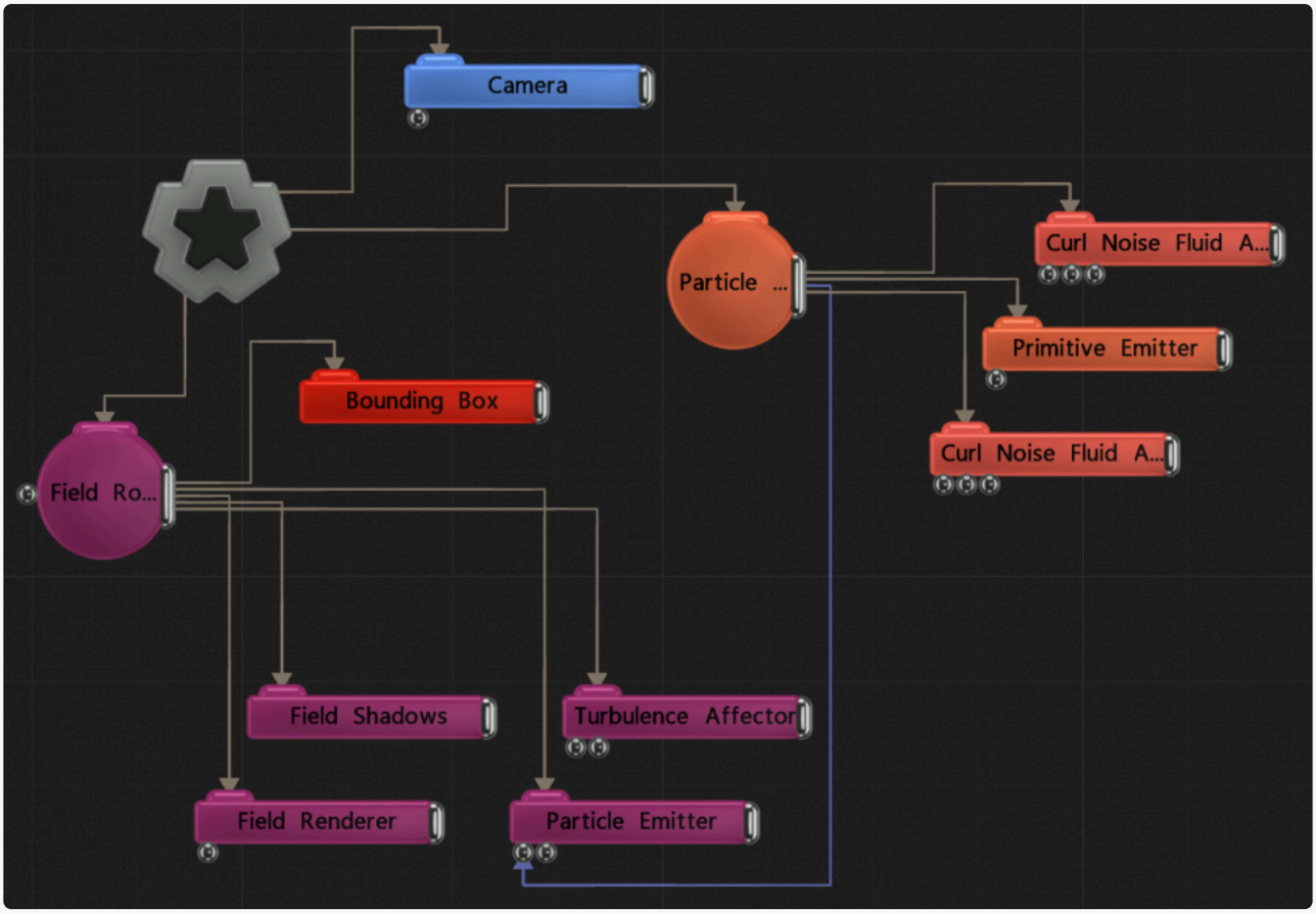
The effect is weighted by a falloff calculated using the distance from the node to the particle, ramping from 100% at distance zero down to 0% at the distance specified by the Radius attribute.

Example



This image is taken from the "smokebox002.dfx" sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Fluid Simulation Speed	Speed at which the fluid simulation updates.
Curl Noise Amount	Controls the magnitude of the motion applied to the particles.
Noise Size	Controls the size of the noise curls.
Normalise Noise Parameters	Automatically balance the curl noise amount when the noise size changes.
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	How much randomness is added in the particles movement.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Velocity Transform	Can be used to apply an additional transform to the velocities generated by the node.	Null
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

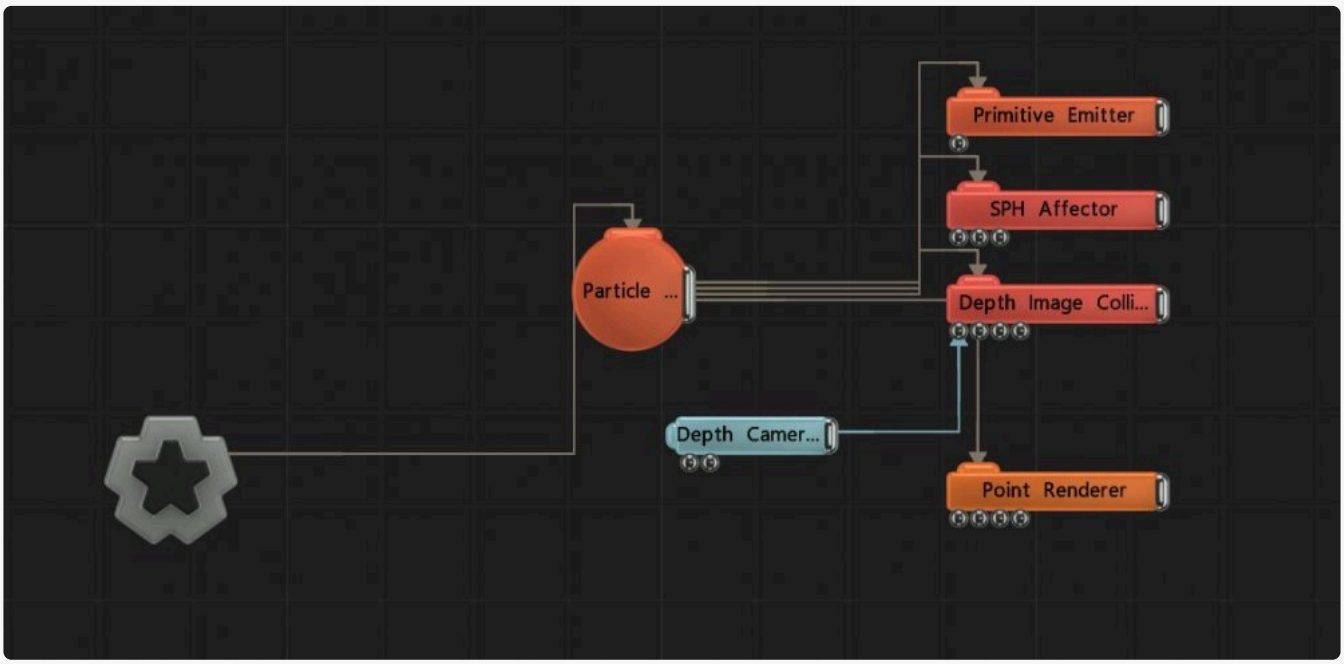
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Depth Image Collision Affector

Method

This node simulates collisions between particles and a Kinect depth.

Example graph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Flip Image	Flip the Image in the Y axis.
Collision Velocity Scale	Scales the velocity of the particle after a collision so they can be made to slow down.

Inputs

Name	Description	Typical Node Input
Depth Image	Add a depth image to drive the collision inputs,	
Collision Event Nodes	Particle events to be triggered when collisions occur.	Particle Event
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Explode Affector

Method

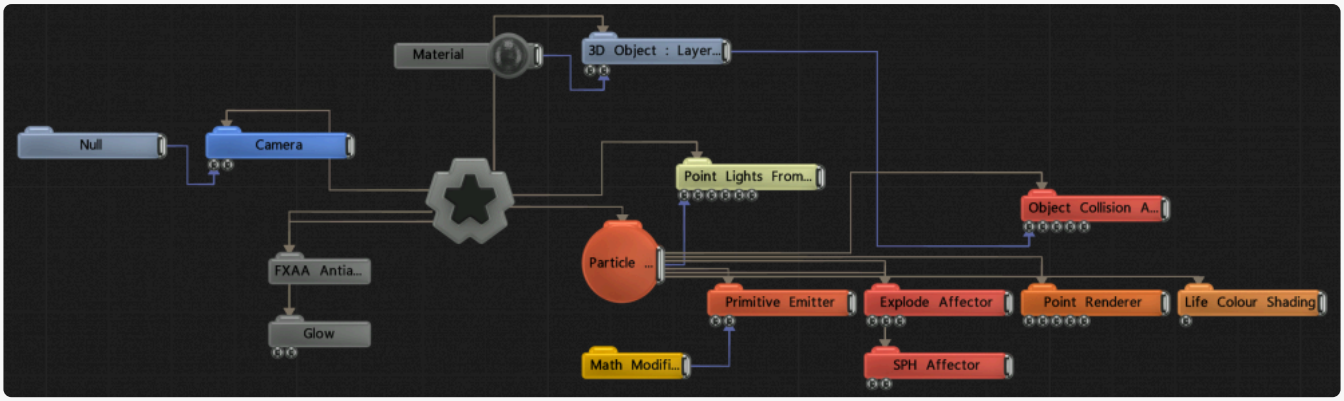
This node applies a velocity to the affected particles at the birth of the particle. This is typically used to create explosion-like effects.

The Explode Mode attribute is used to determine if the particle should be pushed outwards from the affector's position, or if it should be random for every particle. The magnitude of the velocity is controlled by the Velocity Scale attribute and modulated by a random value which is constant per particle and weighted by the Randomness attribute. The Affected Particle Amount parameter can be used to apply the effect only to a limited random subset of particles, where a value of 1 will cause every particle to be affected and 0 will affect no particles.

The velocity effect is weighted by a falloff calculated using the distance from the node to the particle. The effect ramps down from 100% to 0% at the distance specified by the Affected Radius attribute.

Example

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Spread Angle	Change the angle of spread for the particles.
Randomness	How much randomness is added in the particles movement.
Affected Radius	The radius within which particles will be affected.
Explode Mode	Where the explosion expands from. • From Emission Position, explodes from the position of the explode node.

	• From Null Position, Explodes from a null input into the node. • Eurovision Splines (dont ask), self explanatory.
Explode Shape	Choose a shape the explosion spreads out in.
Affected Particle Amount	What percentage of the particles are affected by the affector.

Inputs

Name	Description	Typical Node Input
Explode Node	Override the explode transform.	Null
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Field Affector

Method

This node samples velocities from a Field node and applies them to particles. This can be used to apply motions generated on a field, e.g. via a fluid solver, and apply them to a particle system so the particles move with the field. The magnitude of the velocity is controlled by the Velocity Scale attribute and modulated by a random value which is constant per particle and weighted by the Randomness attribute.

This node can also accept Optical Flow, to drive particles based on a video.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Randomness	How much randomness is added in the particles movement.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Apply Mode	Select whether the field force are applied as simple velocities or continuous forces.

Inputs

Name	Description	Typical Node Input
Field Node	The field root node to use	Field Node
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Flocking Affector

Method

This node simulates a flocking behavior on a particle system. This is typically used to make particles behave like a flock of birds or a shoal of fish.

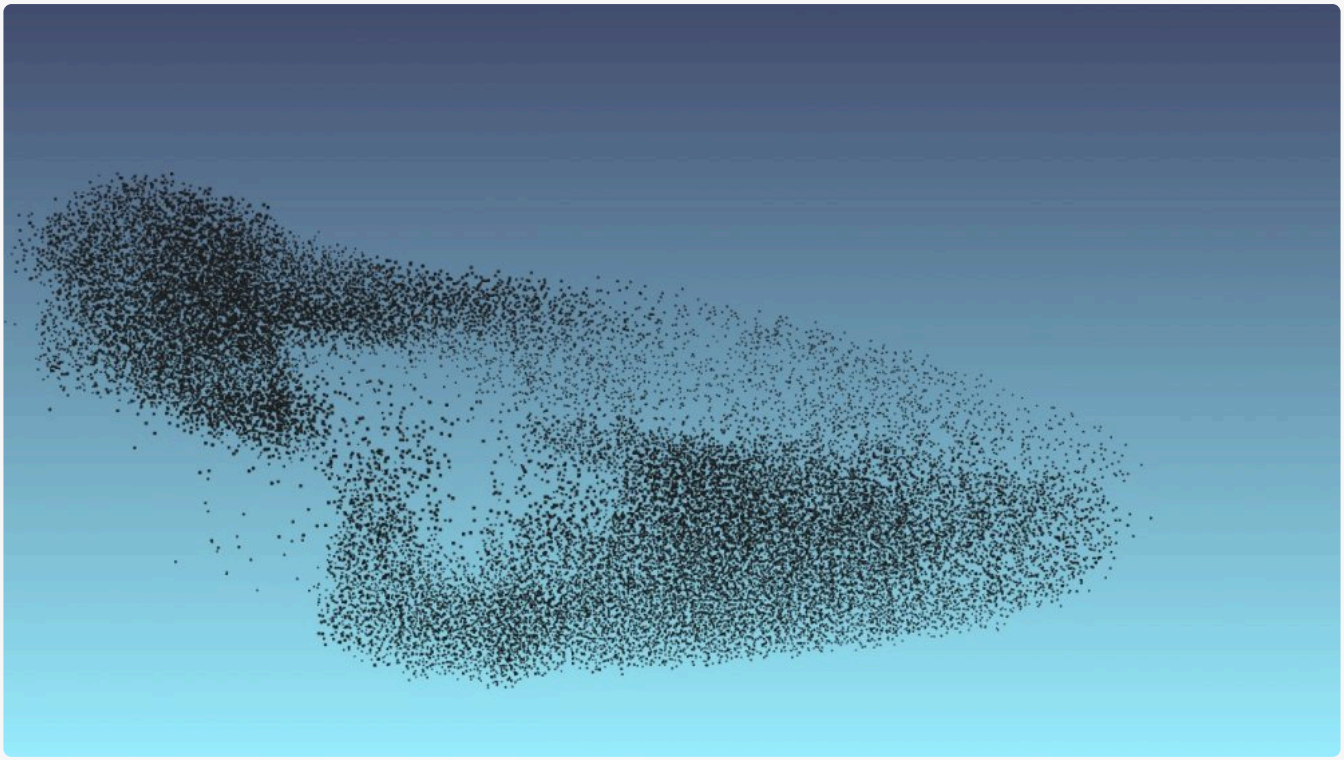
The simulation solves several different behaviour goals: making particles move towards their goal position (goal seeking); making particles avoid others nearby (avoidance); making particles stay close to their neighbours (cohesion); and making particles move in the same direction as their neighbours (alignment). The results of these conflicting goals are weighted together to produce a new velocity for the particle. The weights for the different behaviour goals are summed together and normalised, so a large weighting on one behaviour reduces the effect of the others.

The goal positions are determined by connecting nodes to the Flock Goal Nodes input. Where 3D objects are used, vertex positions are used as goals. Otherwise the transform position of the node is used. Where there are multiple goals particles are each assigned a goal either randomly or based on their emitter.

The range in which particles can see their neighbours is determined by radii – Cohesion Radius and Avoidance Radius. The neighbourhood search is achieved internally by placing particles into a grid, and the location, cell size and resolution of this grid may be controlled in order to optimise the performance requirements of the node. Larger search areas, and search areas containing more particles, increase demands on performance. Larger grid resolutions may be desirable when dealing with large areas of space.

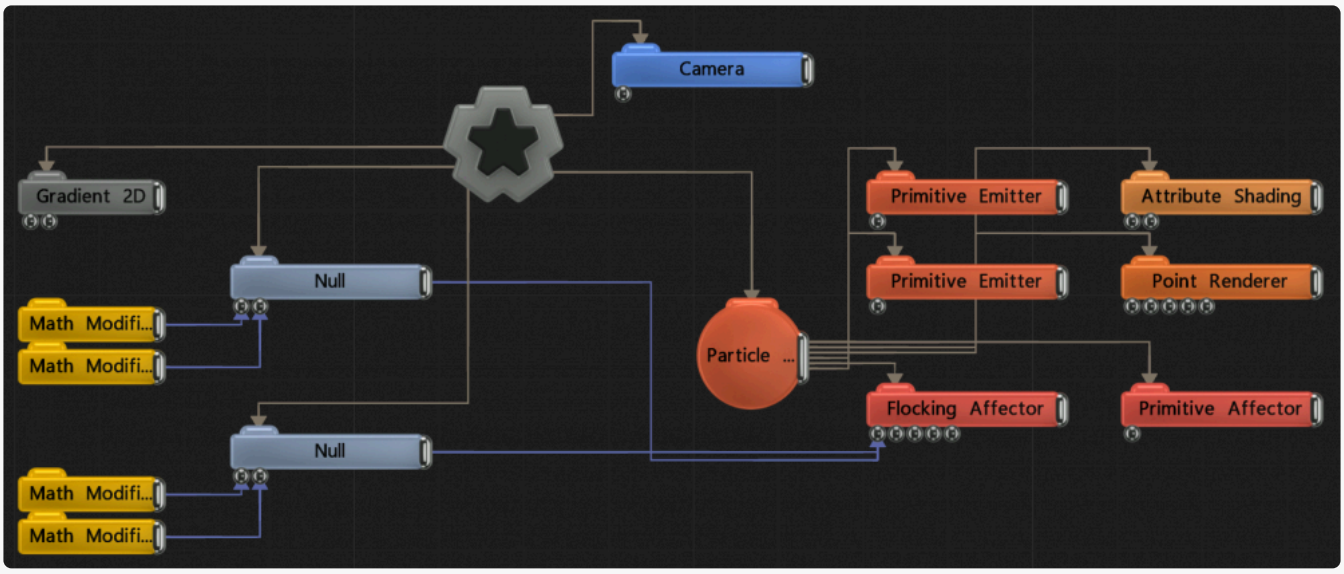
The sample project “flocking_birds.dfx” included in the Notch installer provides an example of the flocking affector in action.

Example



This image is taken from the “flocking_birds.dfx” sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.

Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Cell Size	The area around each particle that resists other particles from getting within a certain distance.
Weight	How strong an effect has on the particles.
Goal Seeking	How much particles will want to move towards the goal input.
Min Goal Seek Threshold	The minimum weighting that will be applied to the goal seeking behaviour.
Max Goal Seek Threshold	The maximum weighting that will be applied to the goal seeking behaviour.
Avoidance	How much particles attempt to avoid each other.
Cohesion	How much the particles try to stay close to each other.
Alignment	How much the particles try to move in the same direction.
Cohesion Radius	Distance at which the particles can see others when determining cohesion.
Avoidance Radius	Distance at which the particles can see others when determining avoidance.
Visibility Angle	The field of view angle at which particles can see others.
Rotation Limit	The maximum rate at which particles can change direction.
Max Speed	Maximum speed the particles can move at.
Min Speed	Minimum speed the particles can move at.

Slowdown At Goal Distance	Distance from the goal that particles begin to slow down.
Goal Movement Weight	How much the goal movement affects the flock movement.
Kinect Motion Threshold	Threshold for which movement from the Kinect will be followed.
Mesh Goal Seeking	The weighting for the mesh goals.
Null Goal Seeking	The weighting for the transform goals.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.
Grid Resolution	The resolution of the underlying neighbour search grid.
Limit to 2D	Limits the affectors functionality to only its x and y plane.
Particle Goal Allocation Mode	Choose how a particle decides which goal to move towards. • Random, the particles are randomly assigned which goal to move towards. • Per Emitter, the particles are assigned goals by emitter – so every particle from one emitter has the same goal.

Inputs

Name	Description	Typical Node Input
Flock Goal Nodes	Nodes input will be used as the goals for the flock effect.	Null
Grid Transform	Used to control the size of the underlying grid used for neighbourhood searches.	Bounding Box
Obstacle Nodes	These nodes will be avoided by the flock effect	3D Object
Kinect Skeleton	A skeleton generated from a kinect.	Kinect2 Skeleton
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

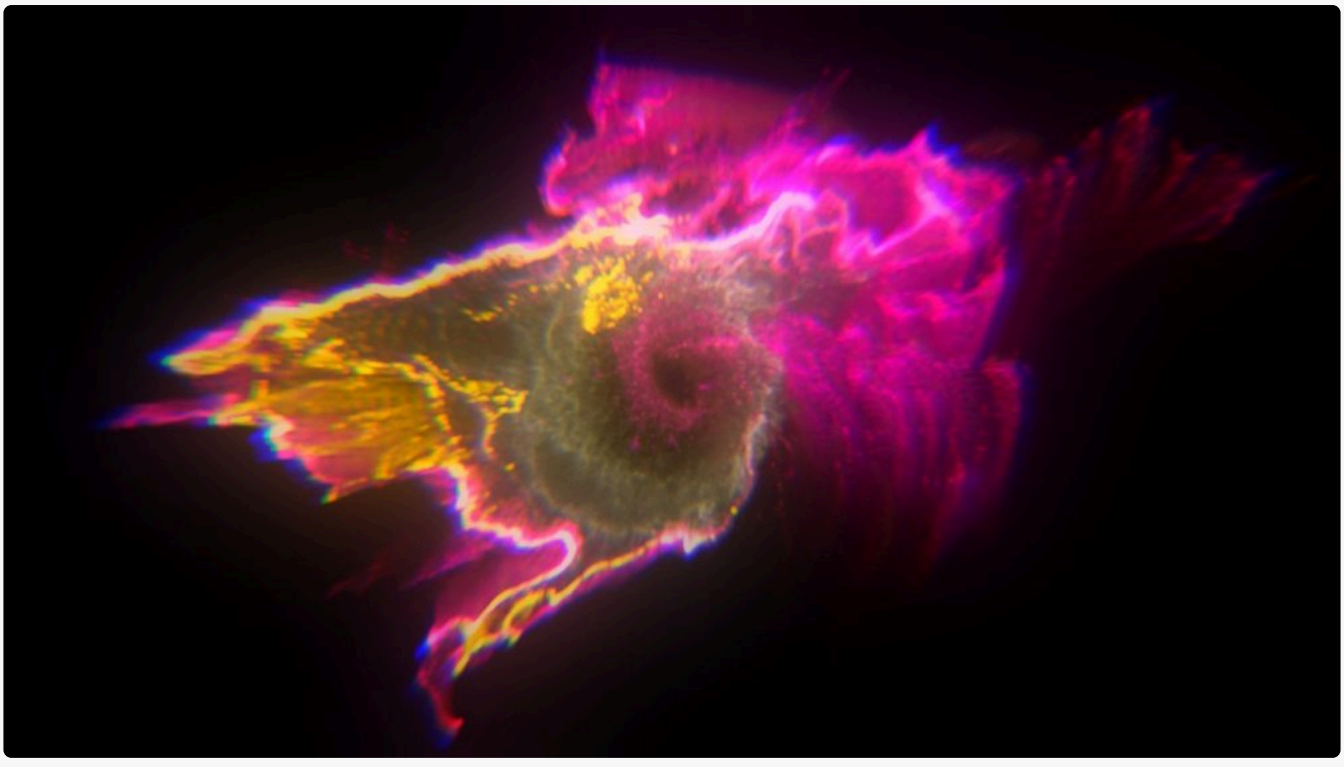
Fluid FLIP Affector

Method

This node simulates fluid dynamics on a particle system using the FLIP (FLuid In Particle) or PIC (Particle In Cell) simulation methods. This is typically used to simulate smoke, gas and other fluid effects. This works by transferring particle forces to a grid, solving pressure forces on the grid and then transferring the resultant forces back to the particle system. This allows particles to affect each other and to move in a locally coherent manner. The simulation is stable, detailed and efficient.

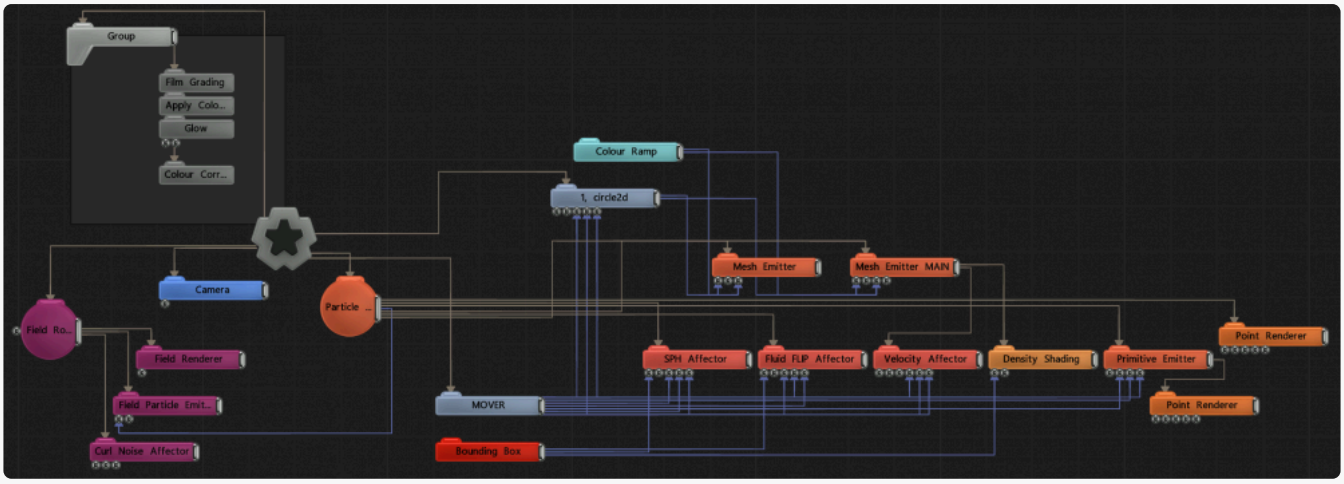
The grid resolution and size used for the pressure solver is key to the detail and performance of the resultant simulation. A higher resolution grid over a smaller area will give a more detailed simulation, but higher resolution grids are slower to process. The simulation may be switched from 3D to 2D, in which case one axis is dropped from the simulation.

Example



This image is taken from the “sunburstt.dfx” sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Solver Mode	Choose how the solver is calculated. • PIC, Particle In Cell. A detailed but more noisy and explosive simulation. • FLIP, A less detailed but more stable simulation.
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Incoming Velocity Scale	Scales the velocity of the particles before they go into the pressure solver.

Radius	Alter the outer radius at which the affector is no longer effective.
Simulation Speed	Speed at which the simulation is played.
Depth Spread	For 2D simuations – control the range at which the solver affects particles in the depth axis.
Surface Tension	Control the amount of surface tension in the fluid solver.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.
Grid Width	The width of the grid in cells.
Grid Height	The height of the grid in cells.
Grid Depth	The depth of the grid in cells.
Use 3D Solver	Toggle whether to use a 3D solver in calculating the fluid dynamics.
2D Axis	If 3D solver is turned off, the selected 2D axis is used.
Visualise Solver	Visualise the fluid dynamics solver.
Fixed Solver Update Framerate	Toggle whether to use the fixed solver, or the legacy mode.
Blend Weight	Control how much the affector has an effect on the particles.

Updates

Name	Description
Time Step Mode	Choose how the simulation update rate is calculated. FLIP simulations are sensitive to the update rate: different update rates change the simulation results, so it may be desirable to control it in order to achieve a deterministic simulation. • Running (Normal) – use the same time delta as the main render, which may vary frame by frame. Perform a single simulation update per frame. • Fixed – use a fixed update frame rate as specified by the Update Frame Rate property. Perform a single simulation update per frame. • Adaptive – use a fixed update frame rate as specified by the Update Frame Rate property. If the render time step is greater than the fixed update rate, perform multiple simulation steps in a frame to keep in sync with it – at the cost of slower processing.
Update Frame Rate	The frame rate used for simulation updates in Fixed or Adaptive time step mode.
Num Update Steps	The number of simulation steps to take per frame. This allows the simulation to be performed with multiple small time steps rather than single large steps, which may give better quality.

Inputs

Name	Description	Typical Node Input
Bounds Transform	Controls the area of space covered by the FLIP simulation.	Bounding Box
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Force Affector

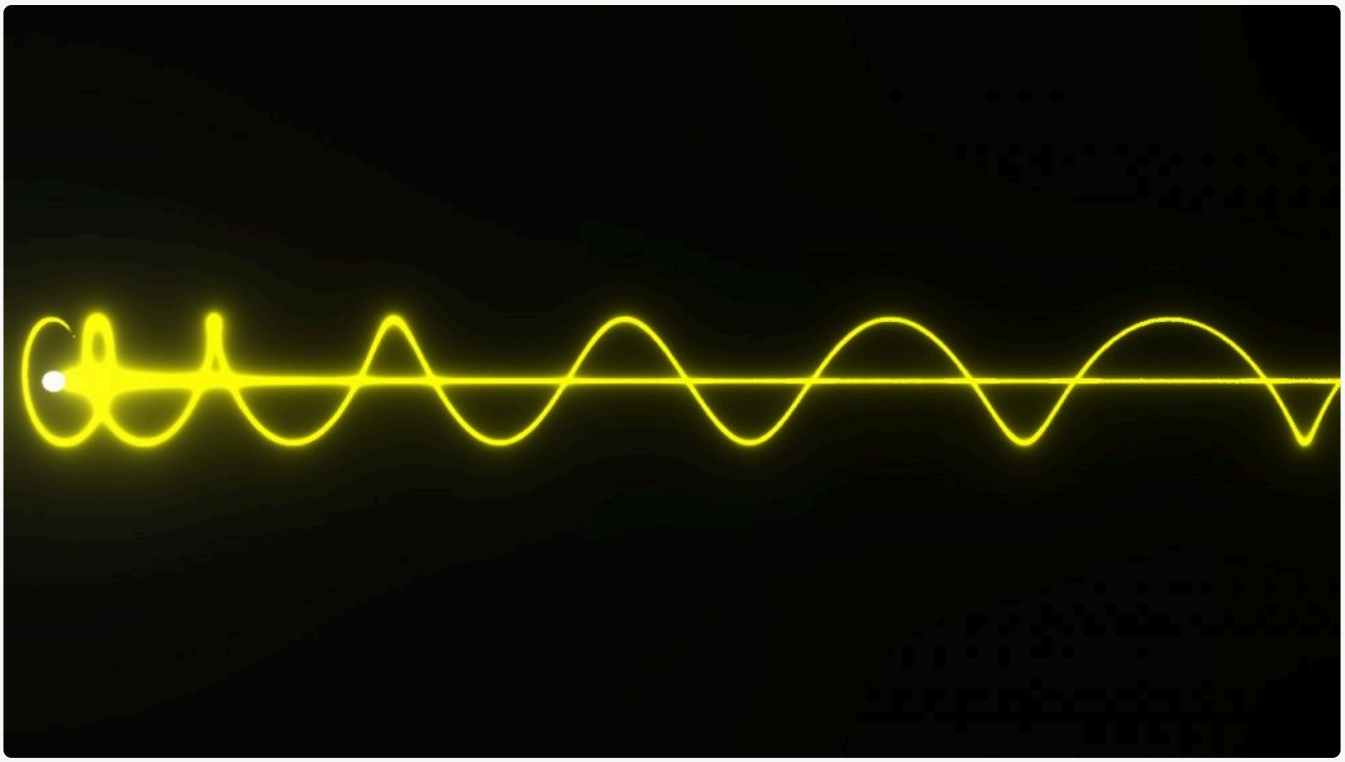
Method

This node applies a force to the affected particles. This is typically used to give particles a constant acceleration to simulate e.g. gravity.

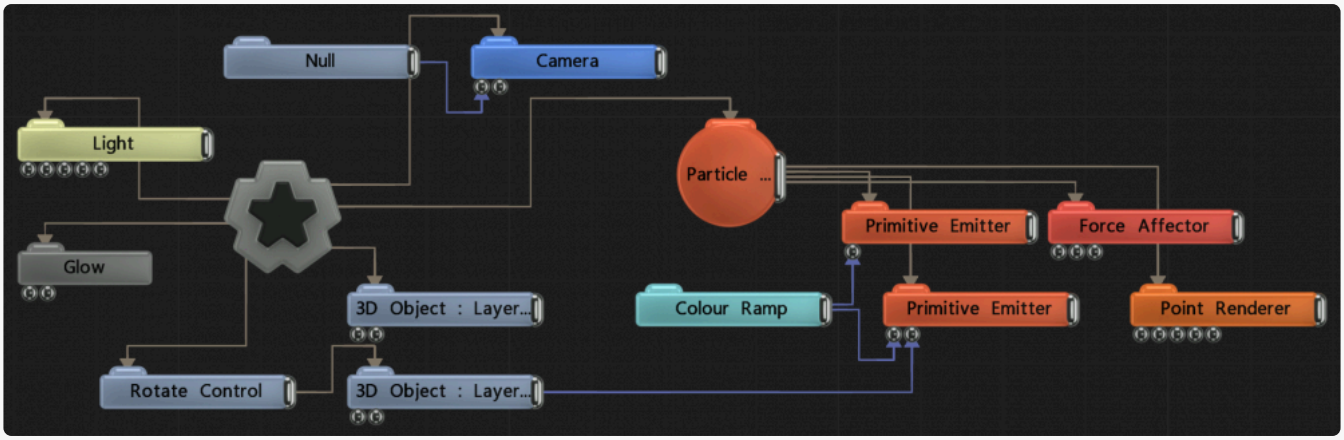
The Mode attribute is used to determine if the force is directional with a random spread determined by the Spread Angle attribute, or if it is an attracting or repelling force generated from the effector's position. The magnitude of the force is controlled by the Amount attribute and modulated by a random value which is constant per particle and weighted by the Randomness attribute.

The resultant force is weighted by a falloff calculated using the distance from the node to the particle. The effect ramps down to 0% at the distance specified by the Radius attribute.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Amount	How strong an effect the force has on the particles.
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	How much randomness is added in the particles movement.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Mode	Change which kind of force is applied. • Directional Force, The force is applied in a particular direction, along the z axis. • Repel, the particles move away from the node. • Attract, the particles move towards the node.

Inputs

Name	Description	Typical Node Input
Transform Nodes	Override the objects transform attributes with an input objects transform attributes.	Null
Force Transformer	Transforms the force direction.	Null
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Image Affector

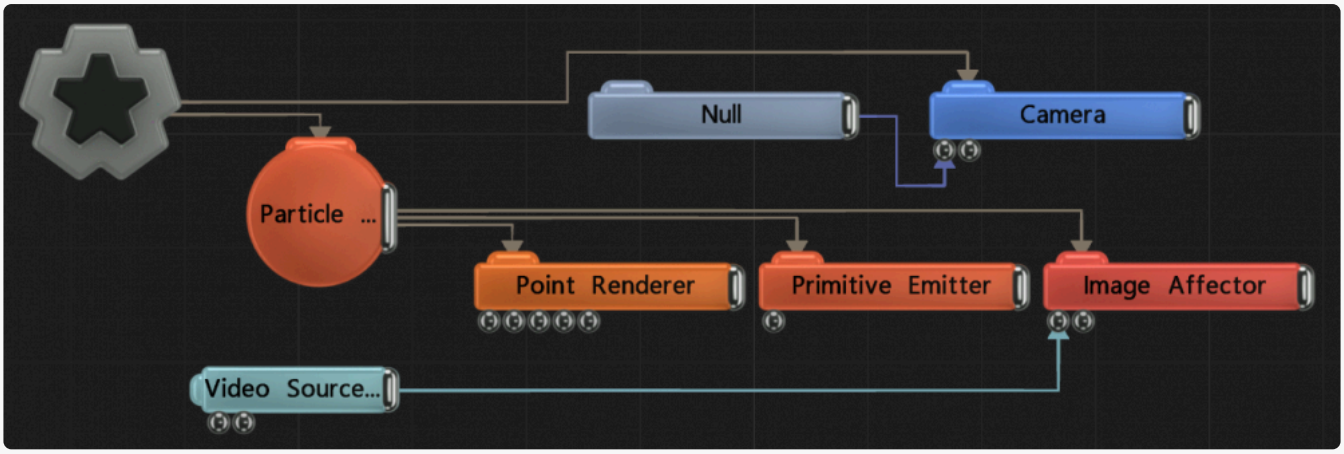
Method

This node is used to attract or repel particles from pixels in an image. This is typically used to make particles form into a given image. The image can be set directly using the Image attribute or connected from a video node via the Video Nodes input.

The image is pre-processed to determine which pixels should be used to attract or repel from by thresholding either the alpha value or luminance value.

Example

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Image	Override the input image with an image selected from the drop down menu.
Flip Image	How much the particle colours adapt to the image colours.
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Spread Angle	Change the angle of spread for the particles.

Radius	Alter the outer radius at which the affector is no longer effective.
Inner Radius	The radius up until which the affector is fully effective.
Mode	Choose how the image affector affects the particles. • Repel, Particles move away from the node. • Attract, Particles are moved toward the image affector, and generate an image by colliding with the image plane. • Collision, Particles collide with image pixels.
Image Search Mode	Choose how the particles find a place in the image. • Pixels, the particles spread to the positions of individual pixels in the image. • Closest, all the particles move toward the closest pixel in the image.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.
Randomness	How much randomness is added in the particles movement.
Use Thickness	Toggle whether to emit the particles on a 2d plane, or in three dimensions.
Thickness	Change the thickness of the three dimensional area the particles can spawn in. Only functions if “Use Thickness” is on.
Pixel Cull/ Thickness Mode	Change how the depth of the particle generation is calculated and which pixels are used by the affector. • Alpha Channel, higher alpha values will have greater depth. • Luminescence, brighter parts of the image will have greater depth.
Alpha Threshold	Manage the threshold on where the particles will emit based on the alpha or luminance.
Image Colour Adaption	How much the particle colours adapt to the image colours.
Avi FPS	Change the frames per second the video is played at.
Time Offset	Offset the time the effect is running.
Luminance Offset Scale	Offsets the points on the image in the depth axis by their luminance.

Blending

Name	Description
Blend Mode	Choose how the particle colours blend to the source colours
Blend Weight	Controls how much the result of the affector is blended with results from preceding affectors.

Inputs

Name	Description	Typical Node Input
Video Nodes	The image node	Null
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

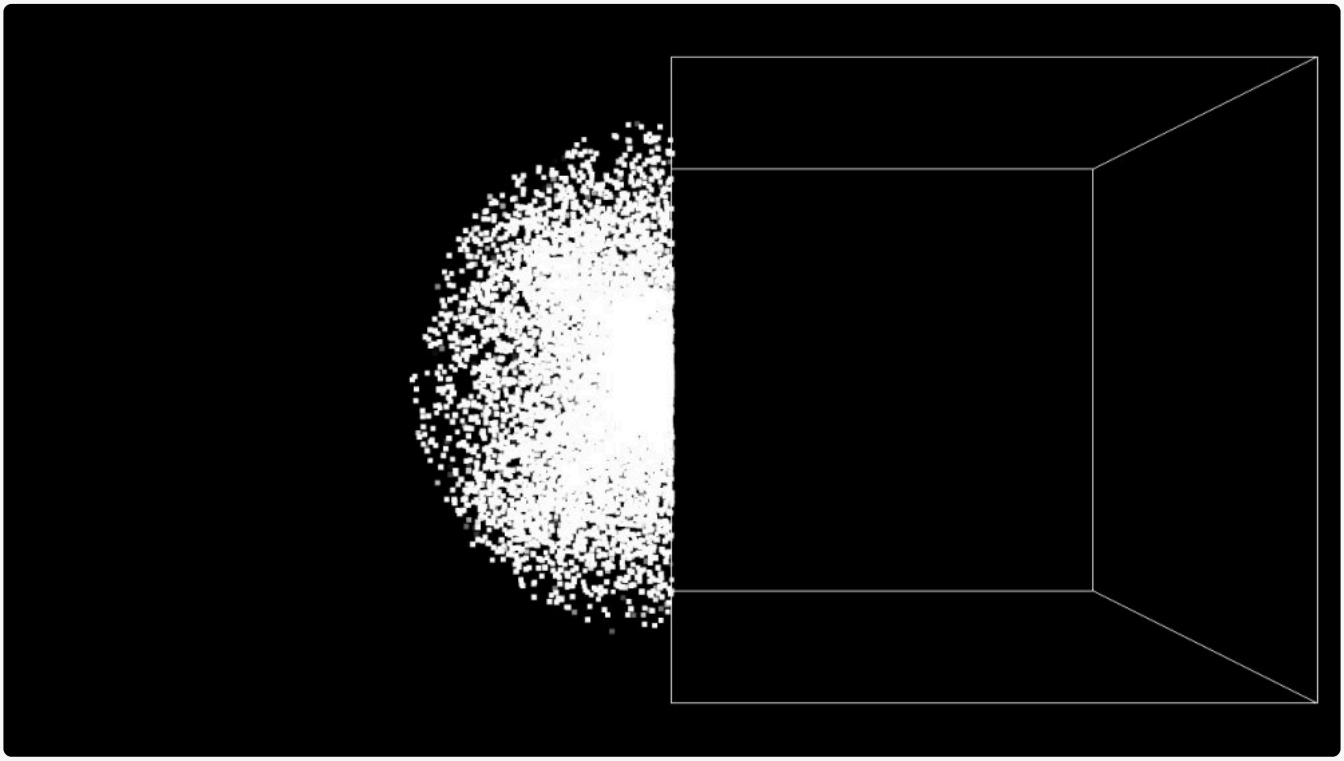
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Kill Box Affector

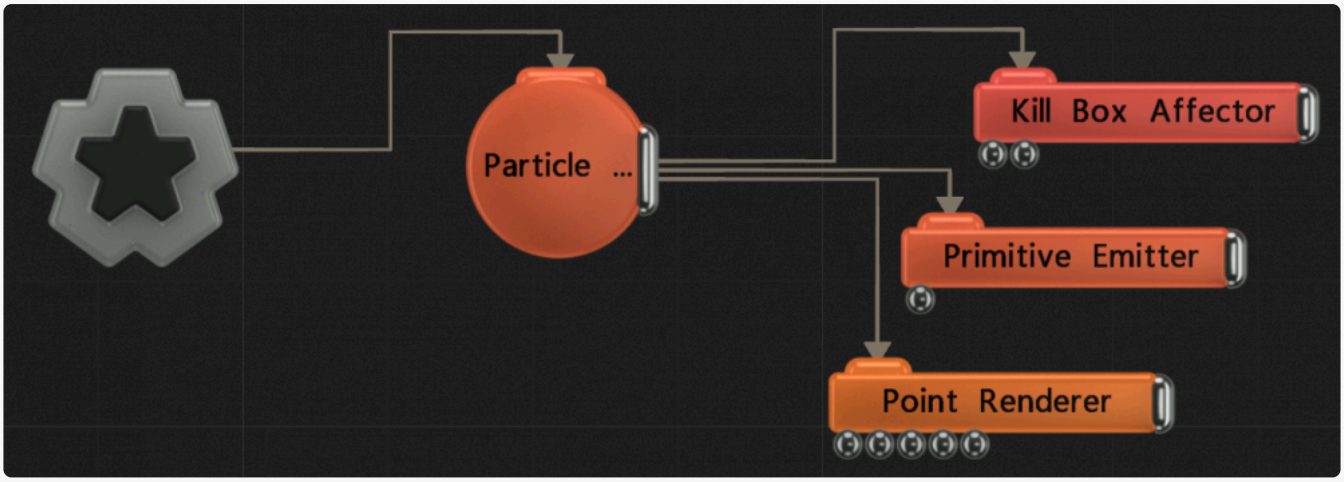
Method

This node kills particles that are either inside or outside of a bounding box, dependent on the Kill Mode attribute. Particles can be killed immediately or decayed over a period of time depending on the Kill Operation.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Kill Mode	Toggle whether particles are killed inside or outside the area.
Kill Operation	Choose how the particles are killed, instantly or slowly.
Particle Kill Amount	What percentage of the particles should be killed.

Inputs

Name	Description	Typical Node Input
Box Node	Specifies a bounding box node to be used for the kill box.	Bounding Box
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

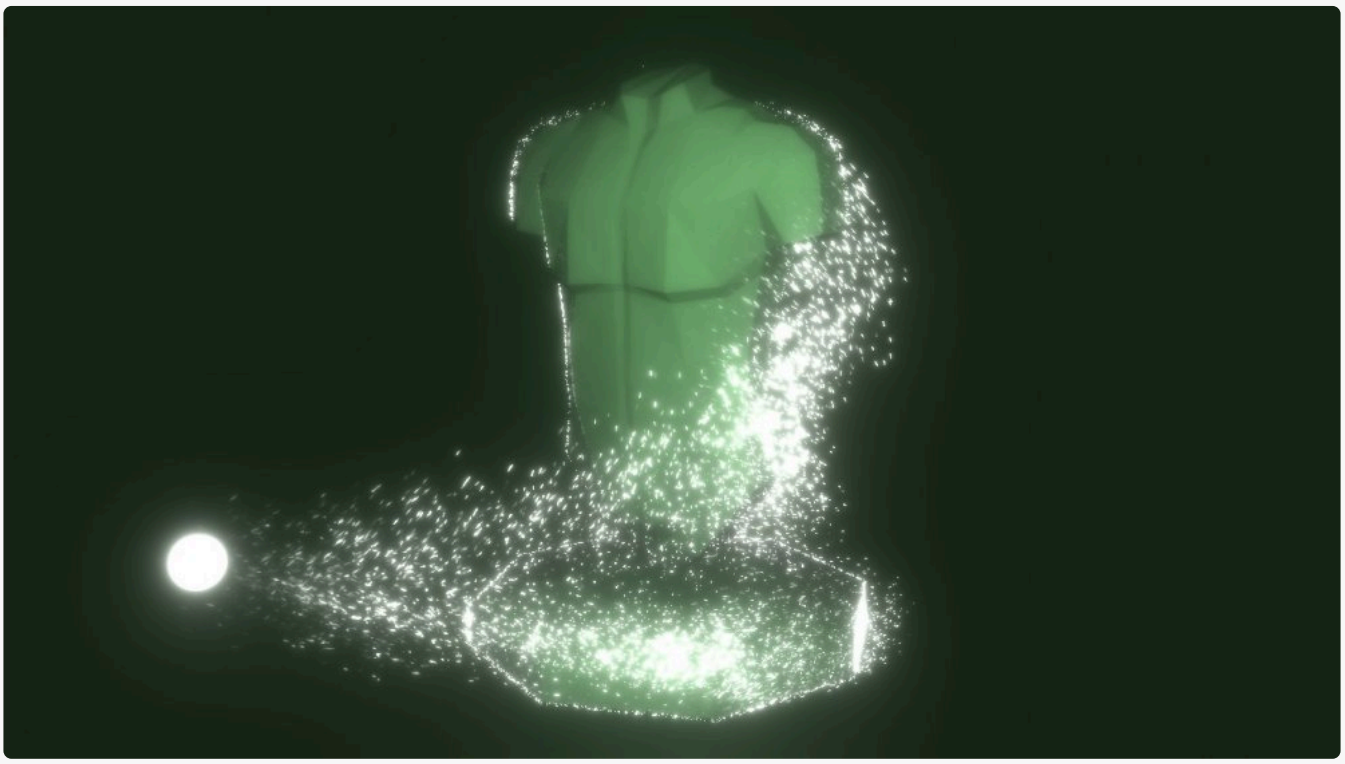
Mesh Attractor

Method

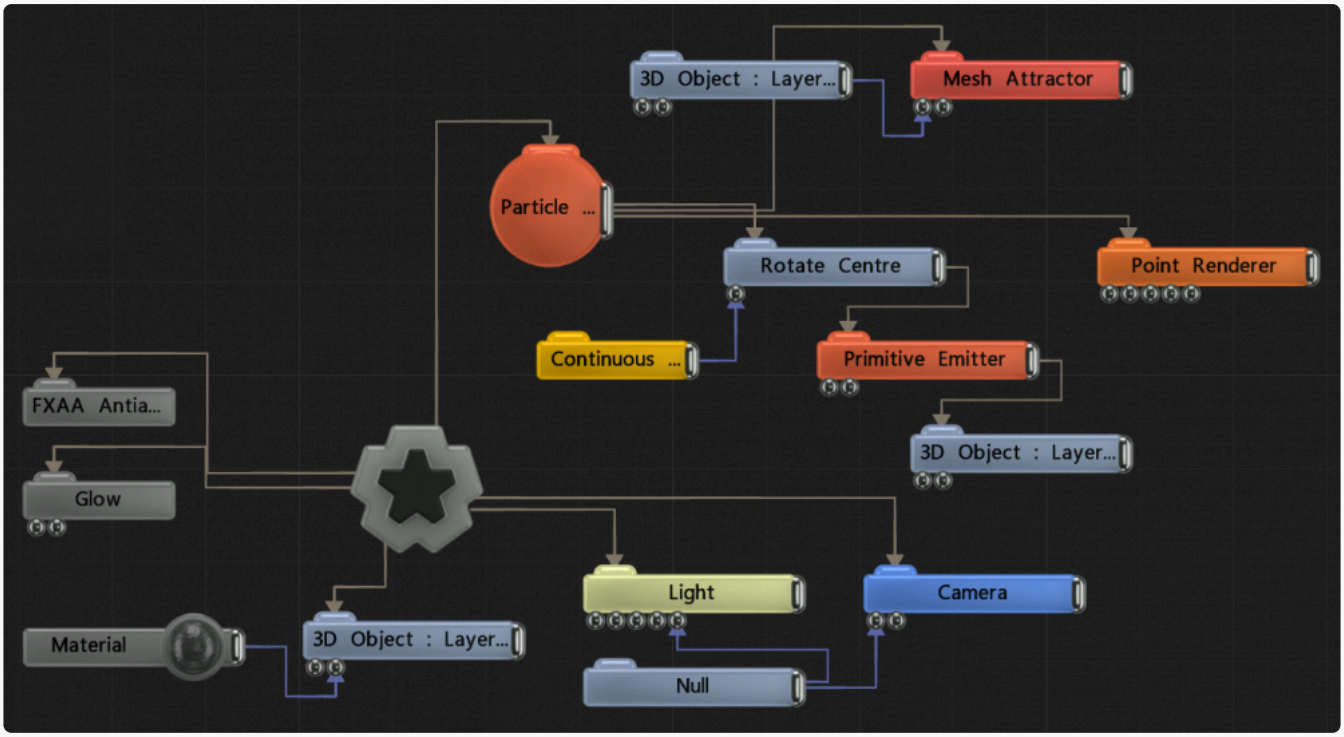
This node is used to attract or repel particles from the surface of a given 3D object. This is typically used to make particles form into a given shape. Particles will use the closest point on the object's surface to move towards or away from; this may be offset randomly using the Randomness attribute to create a noisier shape.

This node requires a 3D object to be connected via the Object Nodes input.

Example



Example Nodegraph



Attributes

Name	Description
Spawn Mode	Choose where particles move to, mesh polygons or mesh vertices.
Use Colours	Toggle whether particles use the same colours as the input object.
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	How much randomness is added in the particles movement.
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Weight	How strong an effect has on the particles.
Colour Weight	The amount in which the colour of the particles blends towards the target object's colours.
Stickiness	Controls how much the particle sticks to the surface of the shape once it reaches it.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Blending

Name	Description
Blend Mode	Choose how the particle colours blend to the source colours

Inputs

Name	Description	Typical Node Input
Object Nodes	The source meshes for the particles ot be attracted to.	3D Object
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Object Distance Field Affector

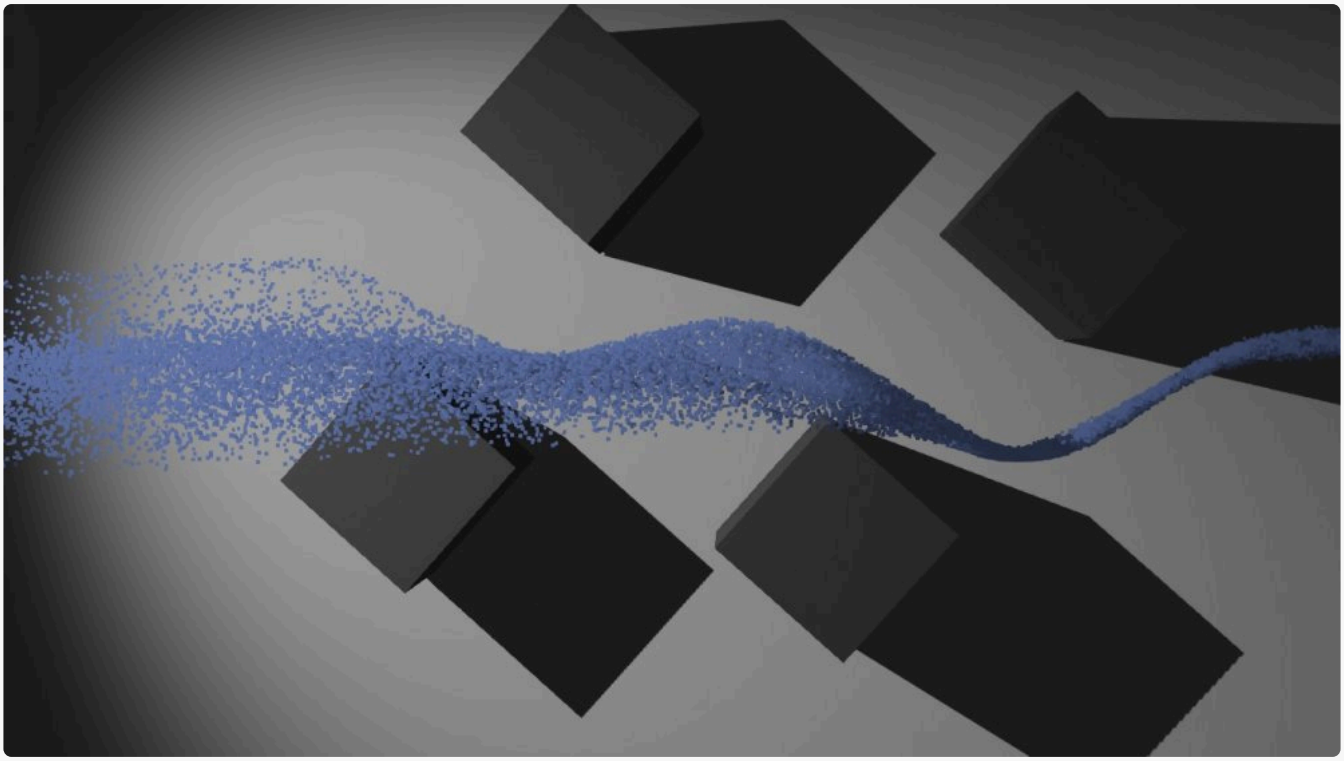
Method

This node simulates collisions between particles and a 3D object. It uses signed distance fields to calculate collisions which enables some other effects to be achieved, such as attraction and repulsion from object surfaces or making particles flow around the particle surface, as selected by the Mode parameter.

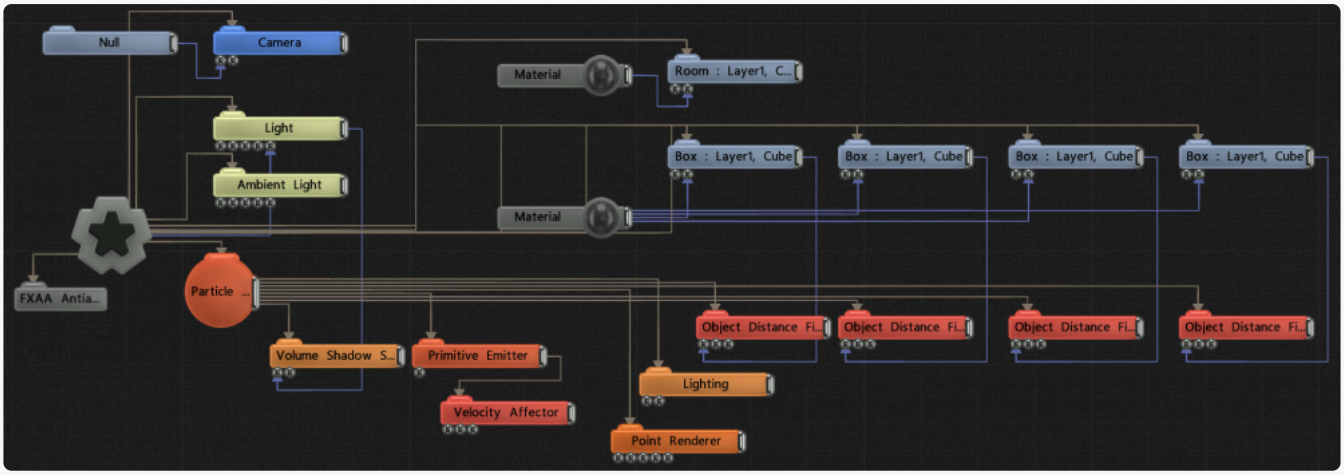
At least one 3D Object Node must be connected via the Object Nodes input for this node to be effective. If static objects are connected the signed distance field is only built once. If animating or deforming objects are connected the signed distance field has to be built every frame, so it has a considerably higher performance overhead.

Particle Events may be triggered when collisions occur. This allows effects such as particles changing colour, size or material on collision, or emitting new particles at the point of collision.

Example



Example Nodegraph



Attributes

Name	Description
Mode	Choose how the node interacts with the input object. • Attractor, moves the particles towards the mesh. • Repel, moves the particles away from the mesh. • Collision, particles collide with the object and bounce off. • Follow Contours, particles flow around the surface of the object.
Radius	Limit the radius at which particles can be affected by the affector.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.
Colour Weight	Controls how much the colour value generated by the affector is blended with the particle's current colour.
Collision Velocity Scale	Scales the velocity of the particle after a collision so they can be made to slow down.
Is Inside Threshold	Distance inside or outside the object at which collisions are considered to have occured.
Surface Distance Target	The radius of the particle when determining collisions.
On Surface Velocity Scale	Scales the velocity of the particle when it is on the surface of the object.
Collision Event Likeliness	Controls for what fraction of collisions a collision event should be triggered.
Use Colours	Toggle whether to use the colours input by the mesh.

Invert Space	Invert the object so areas inside the mesh are considered hollow and areas outside are filled.
Allow Animation	Toggle whether to allow animation in the mesh to be accounted for with the affector.
SDF Width	The depth in pixels of the signed distance field 3D voxel texture.
SDF Height	The height in pixels of the signed distance field 3D voxel texture.
SDF Depth	The width in pixels of the signed distance field 3D voxel texture.

Inputs

Name	Description	Typical Node Input
Object Nodes	The source meshes for the particles to be affected by.	3D Object
Animated SDF Bounding Box	Bounding box to specify the size of the input object if it is animating or deforming.	Bounding Box
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Points Affector

Method

This node affects particles by positional vortex forces created around points from another particle system, or vertices of a 3D Object. This can be used to make one particle system “move through” another and appear to affect it.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Point Falloff Distance	The radius of falloff of effect from each point.
Point Falloff Power	The sharpness of the falloff from each point.
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	How much randomness is added in the particles movement.

Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Point Source	The source of the point data.	Particle Root Node
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

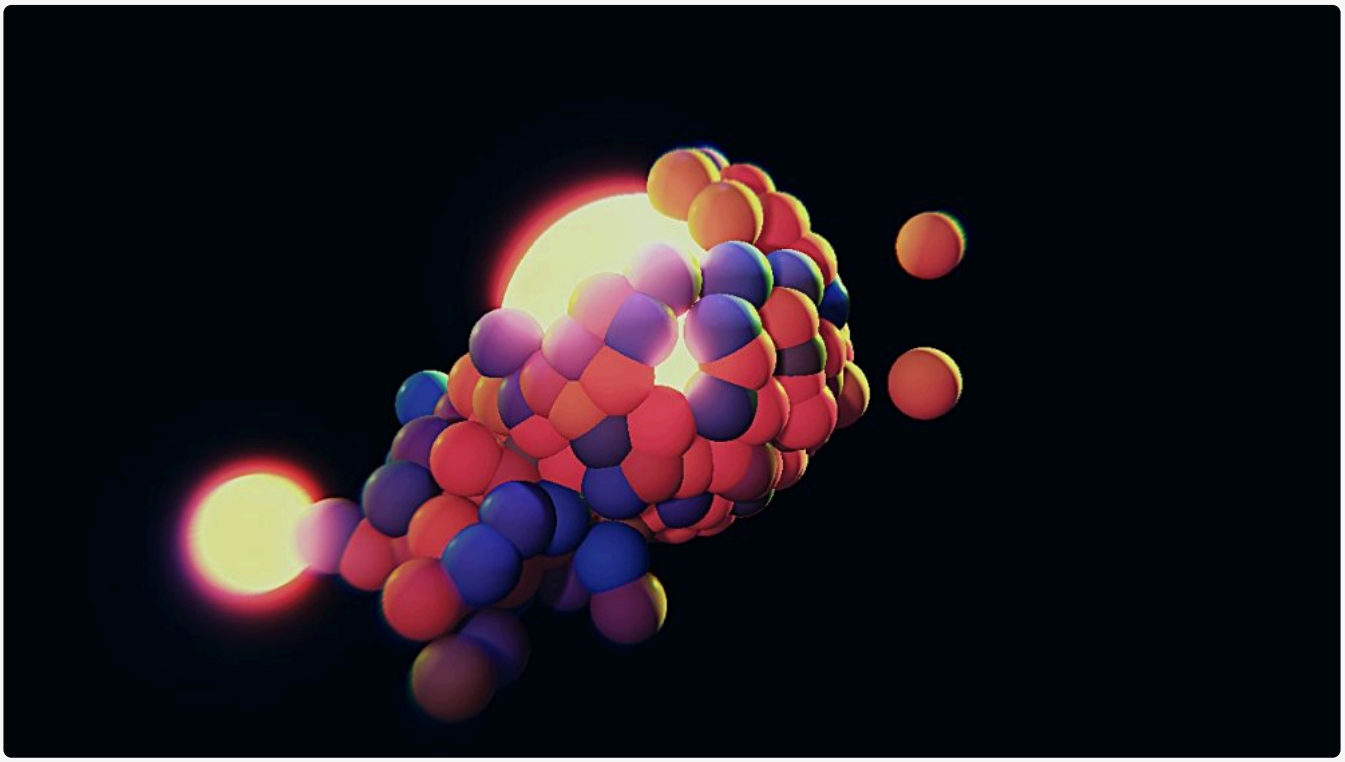
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Primitive Affector

Method

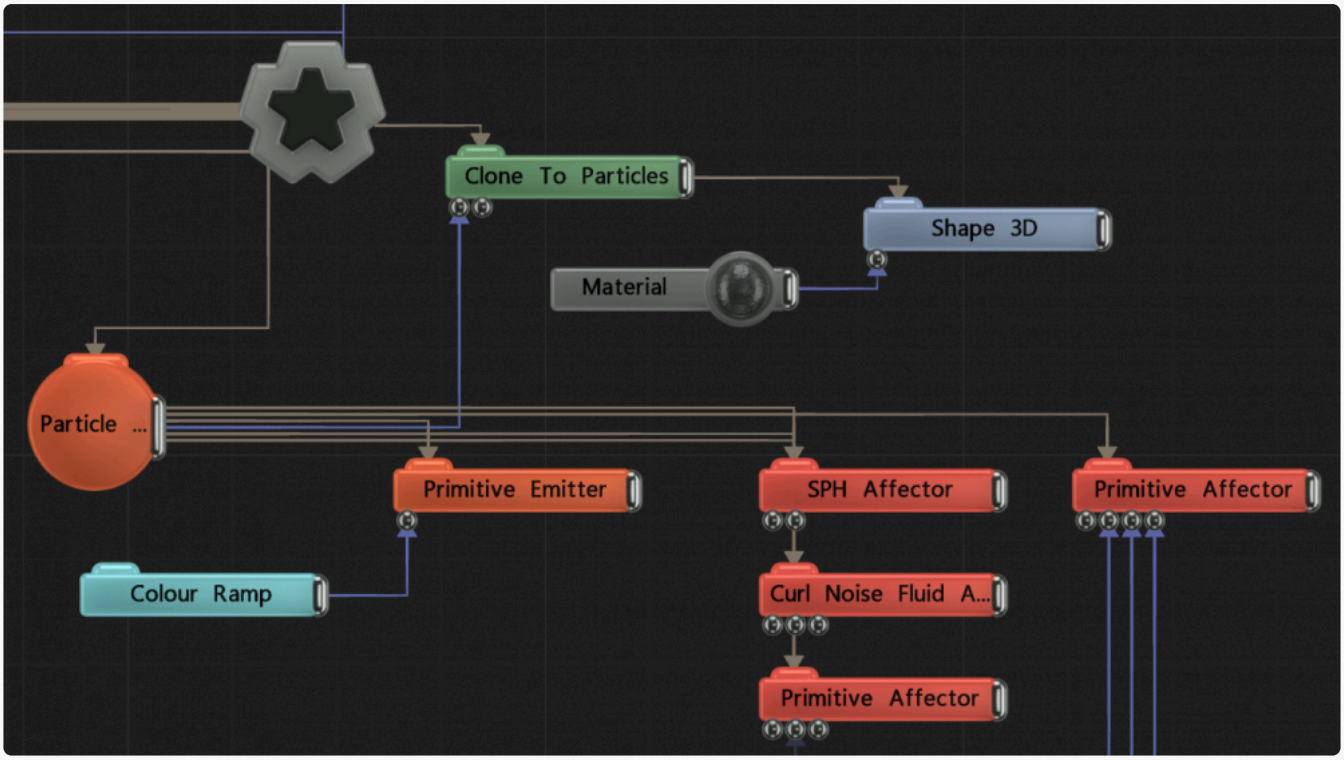
This node is used to attract or repel particles from the surface of the selected primitive type. This is typically used to make particles form into a given shape. Particles will use the closest point on the primitive's surface to move towards or away from; this may be offset randomly using the Randomness attribute to create a noisier shape.

Example



This image is taken from the "cloner_spheres-b.dfx" sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Primitive Type	Choose which primitive shape to use. • Sphere, Affect from a sphere. • Box, Affect from a box. • Cylinder, Affect from a cylinder, • Plane, Affect from a plane. • 2D Grid, Affect from a 2D grid. • 3D Grid, Affect from a 3D grid. • 2D Noise, Affect from random 2D noise. • Wireframe Sphere. Affect from the wireframe of a sphere.
Velocity Mode	Control whether the particles should be attracted or repelled by the primitive.
Use Colours	Toggle whether to use the colours input by the mesh.
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	Applies a random offset to the position the particles move towards or away from.
Velocity Randomness	Amount by which the resultant velocity is randomised.
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Weight	How strong an effect has on the particles.
Colour Weight	Controls how much the colour value generated by the affector is blended with the particle's current colour.
Stickiness	Controls how much the particle sticks to the surface of the shape once it reaches it.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Blending

Name	Description
Blend Mode	Change how the particle affector changes with the particles current changes.

Inputs

Name	Description	Typical Node Input
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter

Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

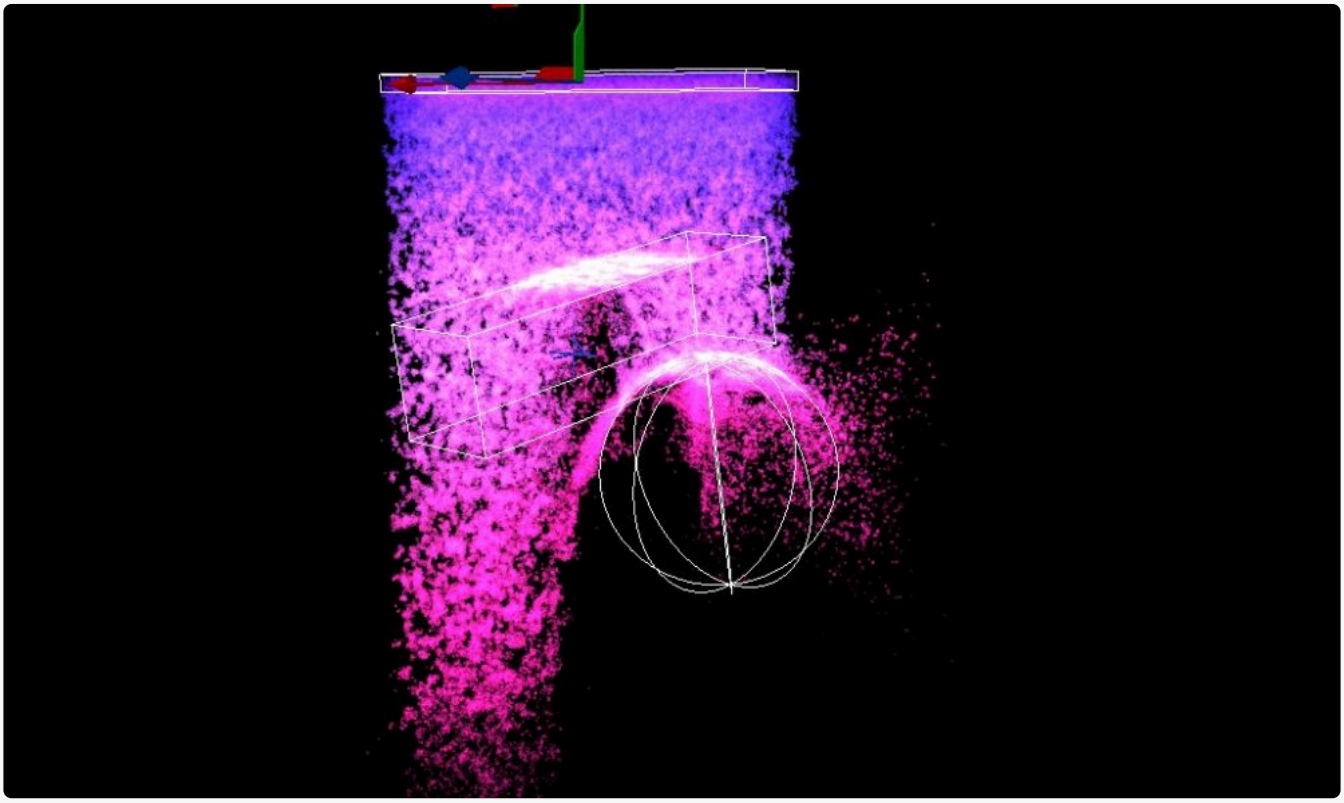
Primitive Collision Affector

Method

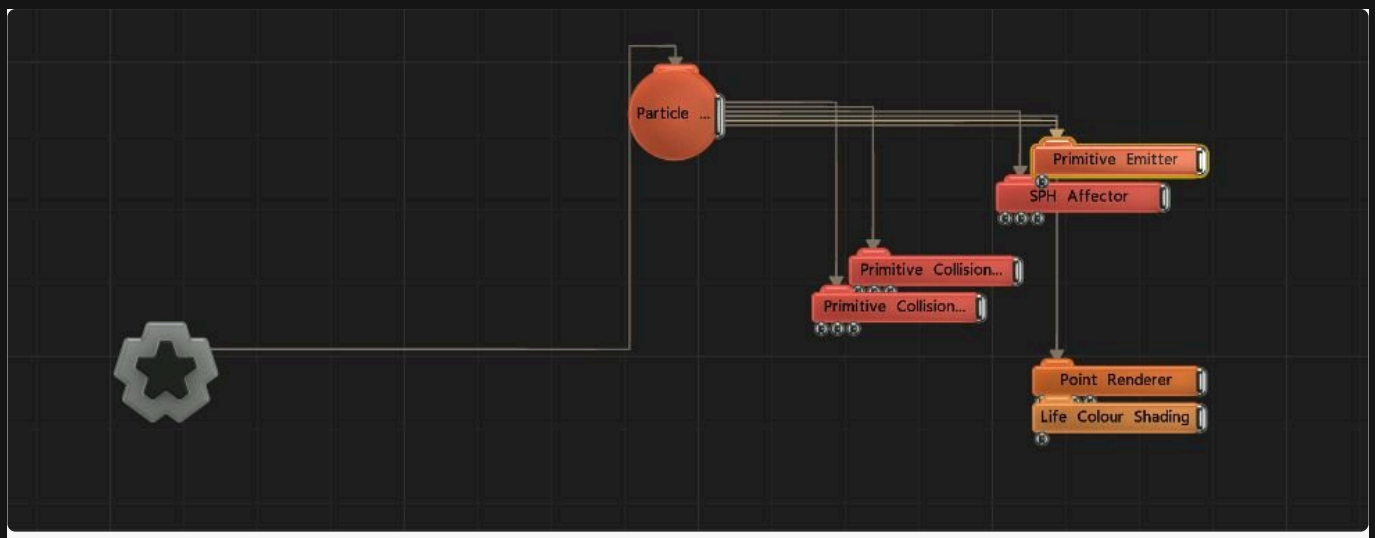
This node simulates collisions between particles and a 3D primitive. It uses ray traced intersections with triangles contained in a bounding volume hierarchy structure. This allows for fast, accurate collisions with 3D primitive, but animating.

Particle Events may be triggered when collisions occur. This allows effects such as particles changing colour, size or material on collision, or emitting new particles at the point of collision.

Example



|_. Example Nodegraph |



Attributes

Name	Description
Collision Velocity Scale	Scales the velocity of the particle after a collision so they can be made to slow down.
Particle Collision Radius	Radius around a particle in which it will calculate colliding.
Primitive Type	The shape in which the particles are affected. • Sphere, Particles spawn within a 3D sphere. • Box, Particles spawn within a 3D Cube. • Cylinder, Particles spawn within a Cylinder. • Plane, Particles spawn on a flat, 2D Plane.
Inverted	Invert the object so areas inside the mesh are considered hollow and areas outside are filled.

Inputs

Name	Description	Typical Node Input
Collision Event Nodes	Particle events to be triggered when collisions occur.	Particle Event
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

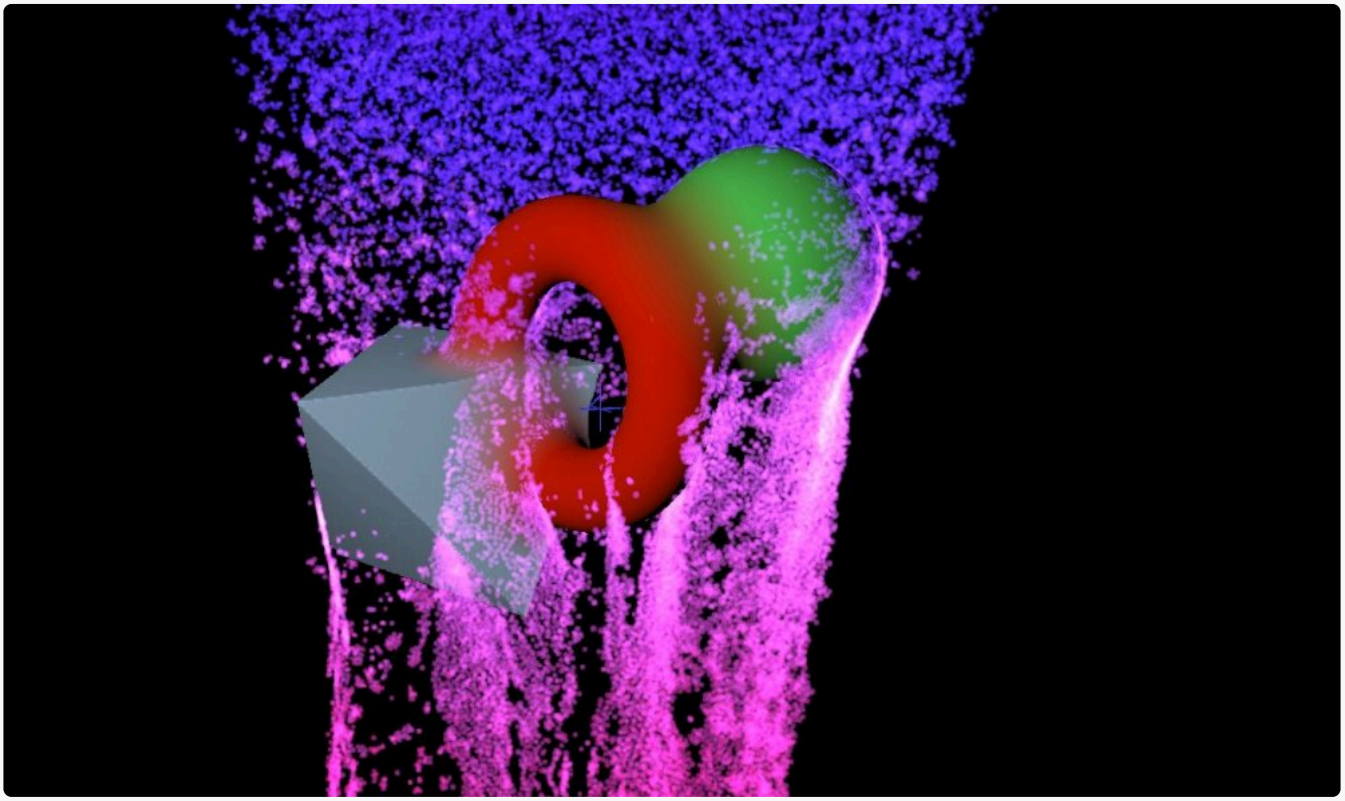
Procedural Affector

Method

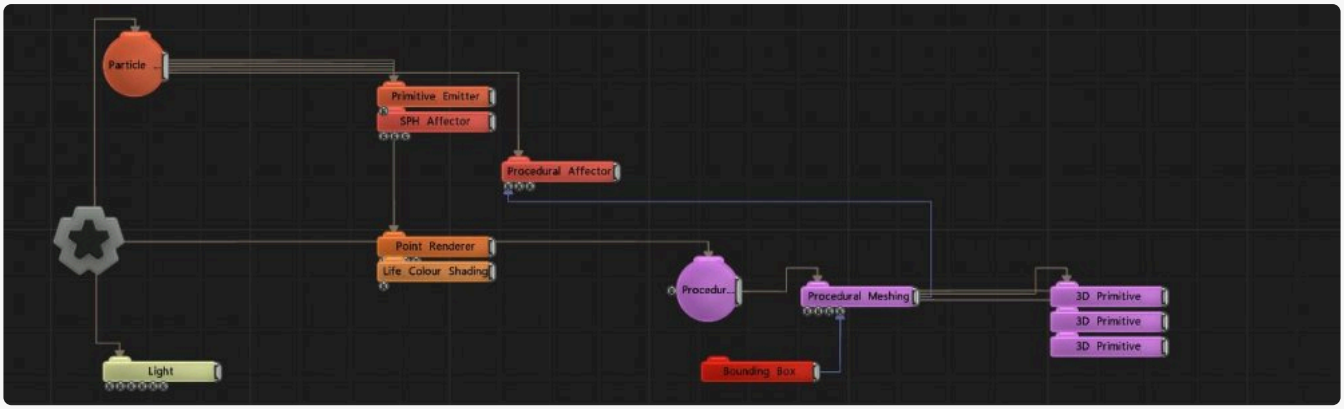
This node simulates collisions between particles and Procedural meshing object. Different effects can be achieved, such as attraction and repulsion from object surfaces or making particles flow around the particle surface, as selected by the Mode parameter.

At least one Procedural Object Node must be connected via the Procedural Nodes input for this node to be effective.

Example



Example Nodegraph



Attributes

Name	Description
Mode	Choose how the node interacts with the input object. • Attractor, moves the particles towards the mesh. • Repel, moves the particles away from the mesh. • Collision, particles collide with the object and bounce off. • Follow Contours, particles flow around the surface of the object.
Radius	Limit the radius at which particles can be affected by the affector.
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.
Colour Weight	Controls how much the colour value generated by the affector is blended with the particle's current colour.
Collision Velocity Scale	Scales the velocity of the particle after a collision so they can be made to slow down.
Is Inside Threshold	Distance inside or outside the object at which collisions are considered to have occured.
Surface Distance Target	The radius of the particle when determining collisions.
On Surface Velocity Scale	Scales the velocity of the particle when it is on the surface of the object.
Collision Event Likeliness	Controls for what fraction of collisions a collision event should be triggered.
Use Colours	Toggle whether to use the colours input by the mesh.

Invert Space	Invert the object so areas inside the mesh are considered hollow and areas outside are filled.

Inputs

Name	Description	Typical Node Input
Procedural Node	The source Procedural mesh for the particles to be affected by.	Procedural Meshing
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Rigid Body Collision Affector

Method

This node simulates collisions between particles and a Rigid Body Systems.

Attributes

Name	Description
Collision Velocity Scale	Scales the velocity of the particle after a collision so they can be made to slow down.
Point Collision Radius	Radius around a particle in which it will calculate colliding.

Inputs

Name	Description	Typical Node Input
Rigid Body Nodes	The rigid bodies to collide with.	Rigid Body
Collision Event Nodes	Particle events to be triggered when collisions occur.	Particle Event
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Shockwave Affector

Method

This node applies a pulsing spatial shockwave through particles.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Wave Size	The strength of the wave.
Wave Delay	The rate at which new shockwaves are created.
Travel Speed	The speed at which the wave moves.
Wave Offset	The time offset of the first wave.
Radius	The radius of effect of the affector.
Life	How much the particles are affected by the affector at different stages of the particles life cycle.

Effect Coeffs	Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

SPH Affector

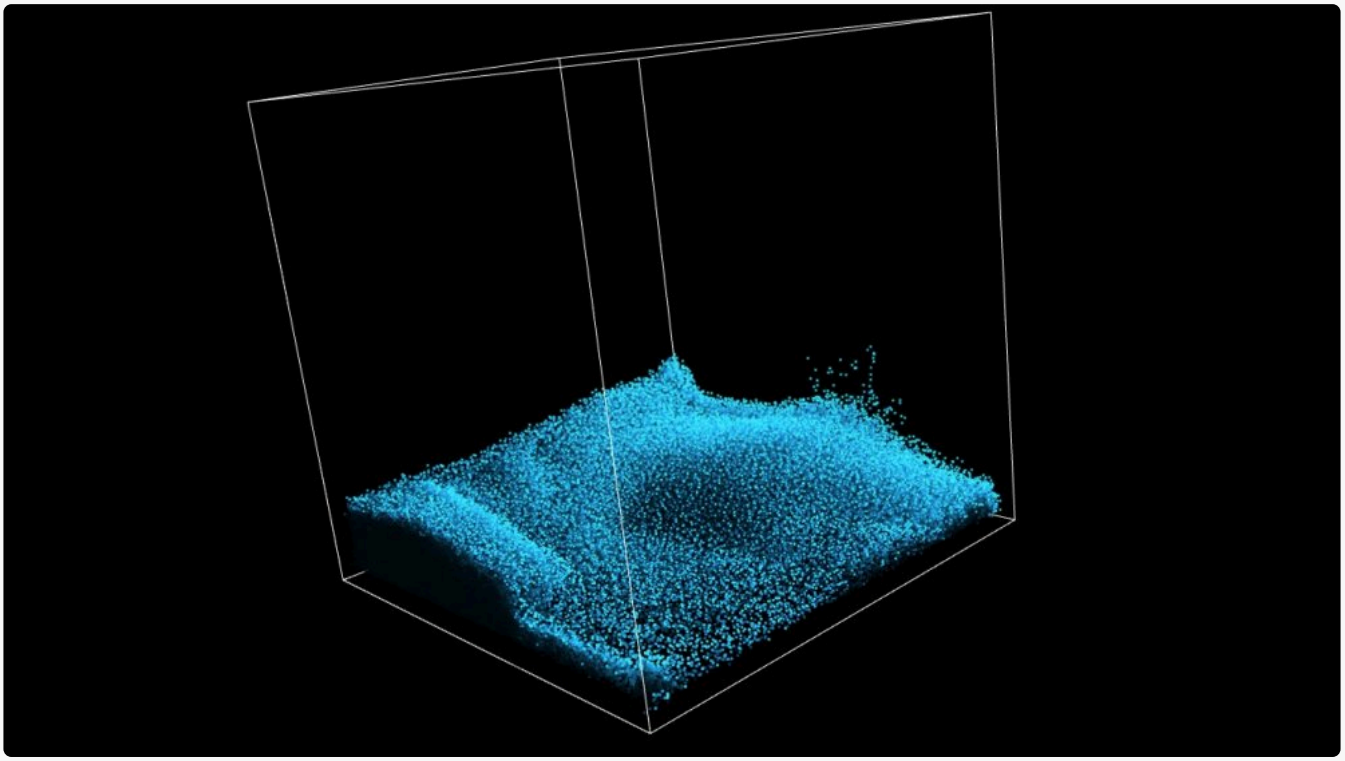
Method

This node simulates fluid dynamics on a particle system using the SPH (Smoothed Particle Hydrodynamics) simulation method. This is typically used to simulate liquid effects. It solves a fluid simulation by locally solving pressure forces between a particle and others nearby. This allows particles to affect each other and to move in a locally coherent manner. SPH works well for liquid effects like water.

The solver takes into account both the position and velocity of particles and their neighbours. The Viscosity attribute is used to make the simulation behave as a thicker liquid. Surface Tension is used to keep particles together like droplets of water. The radius around each particle in which they interact with their neighbours is controlled using the Cell Size attribute. Larger cell sizes may result in a smoother simulation that increases performance demands. The simulation may be switched from 3D to 2D, in which case one axis is dropped from the simulation.

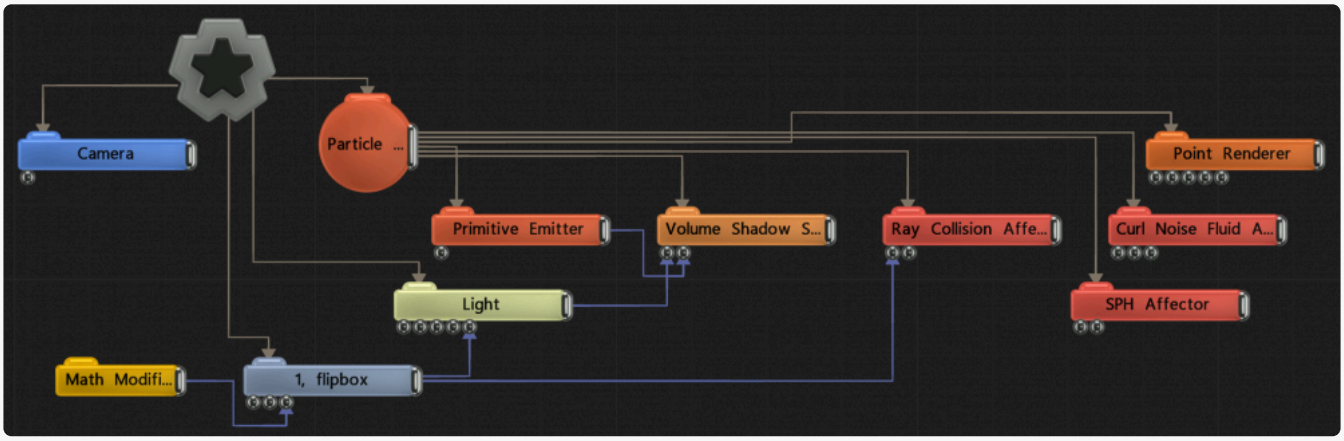
The grid resolution and size used for the pressure solver is key to the detail and performance of the resultant simulation. A higher resolution grid over a smaller area will give a more detailed simulation, but higher resolution grids are slower to process.

Example



This image is taken from the “sph_box_example.dfx” sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Weight	How strong an effect has on the particles.
Cell Size	The area around each particle that resists other particles from getting within a certain distance.

Viscosity	The viscosity of the fluid, where smaller values make it more gas-like and larger values make it thicker – more like treacle.
Gravity	How strong gravity is on the particles.
Pressure Scale	Scales the amount by which particles push apart from each other.
Rest Density	Controls the base density of the fluid.
Surface Tension	How much the particles want to stay together at their surface.
Max Force	The limit on the force applied to the particles as a result of the simulation.
Dampening	The amount particle forces are damped – so they decay over time, rather than moving constantly.
Area Scale	Scales the area of space the simulation is processing.
Mode	Choose how the fluid simulation is calculated. • SPH, use smoothed-particle hydrodynamics to generate the fluid dynamics. • Position Based, uses position based fluids, faster but less realistic. • Inter-Particle Force, simply pushes particles away from their neighbours.
Dimension	Choose whether the effect is 2D or 3D.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.
Grid Resolution	The resolution of the underlying grid used in neighbourhood searches.

Inputs

Name	Description	Typical Node Input
Grid Transform Nodes	Controls the transform of the bounding box of the affector.	Bounding Box
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any

transformation changes along the chain.

Spline Attractor

Method

This node attracts particles towards a spline shape. The particles will flow along the spline towards a goal point which moves from the beginning to the end of the spline at a rate determined by the Spline Rate parameter. The splines used by this node are extracted from a 3D object which must be connected for this node to have an effect. If The object that is connected contains no spline data this node will have no effect.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Scale	Scale the strength of the affectors velocity on the particles.
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	How much randomness is added in the particles movement.
Spline Rate	The rate at which the goal point moves from the start to the end of the spline.
Spline Time	The minimum point on the spline at which particles will be affected.

Min	
Spline Time Max	The maximum point on the spline at which particles will be affected.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Object Nodes	The source object for the splines.	3D Object
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

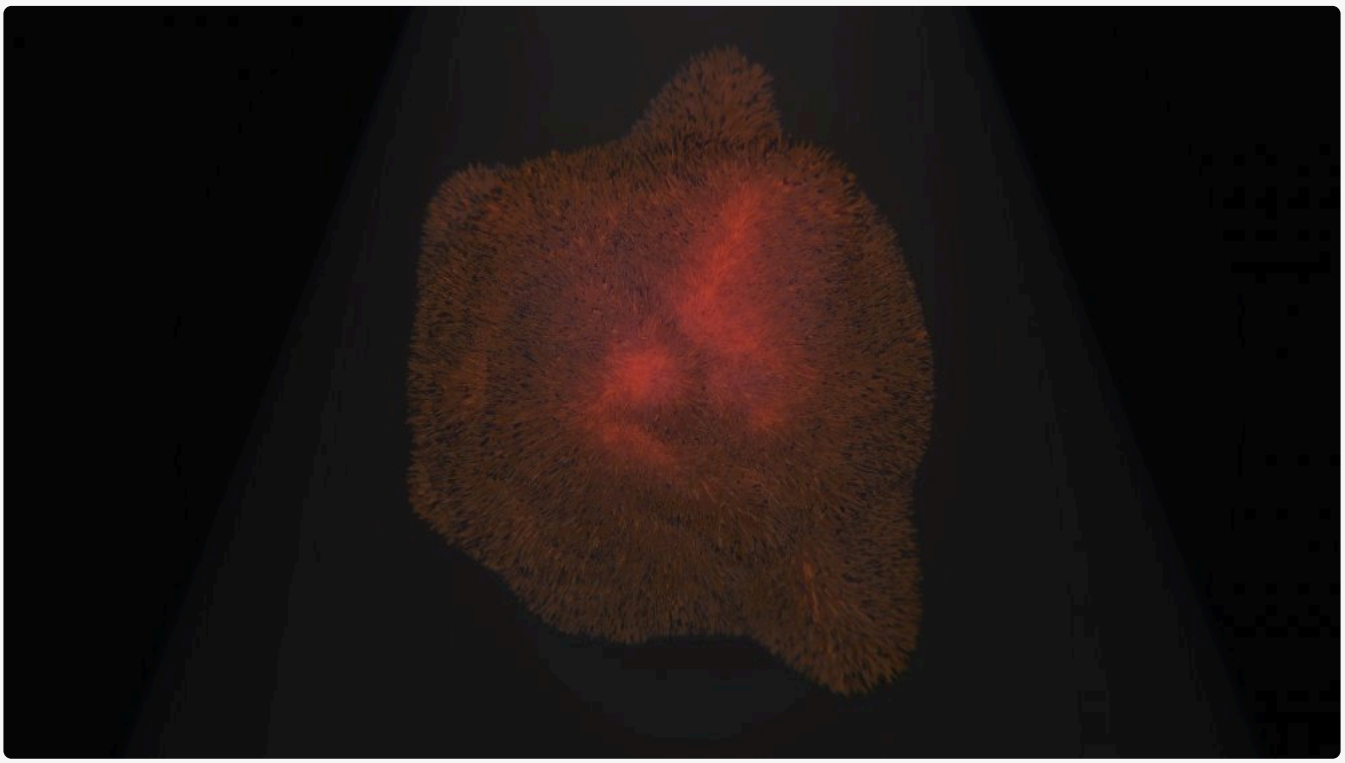
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Spring Affector

Method

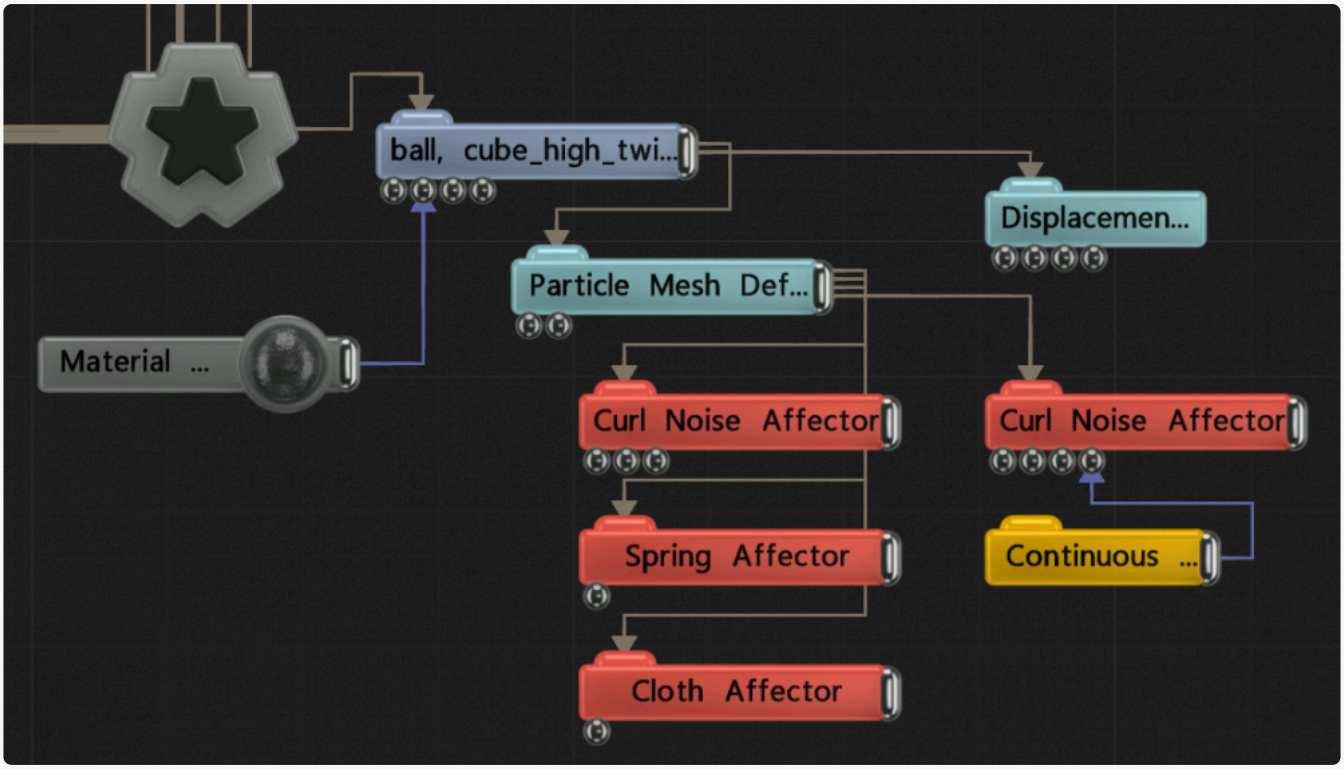
This node simulates a spring-like effect between a particle's current position and its original emission position, making it spring back towards the point it was emitted from over a period of time. This can be used to restore particles to their original emitted form, or as part of cloth simulations.

Example



This image is taken from the "furball.dfx" sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Spring Length	The scaling applied to the rest length of the generated springs.
Spring Strength	The strength of the spring effect. Larger values will make spring forces greater and particles will move more quickly.
Spring Dampening	The dampening applied to the spring forces.

Inputs

Name	Description	Typical Node Input
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

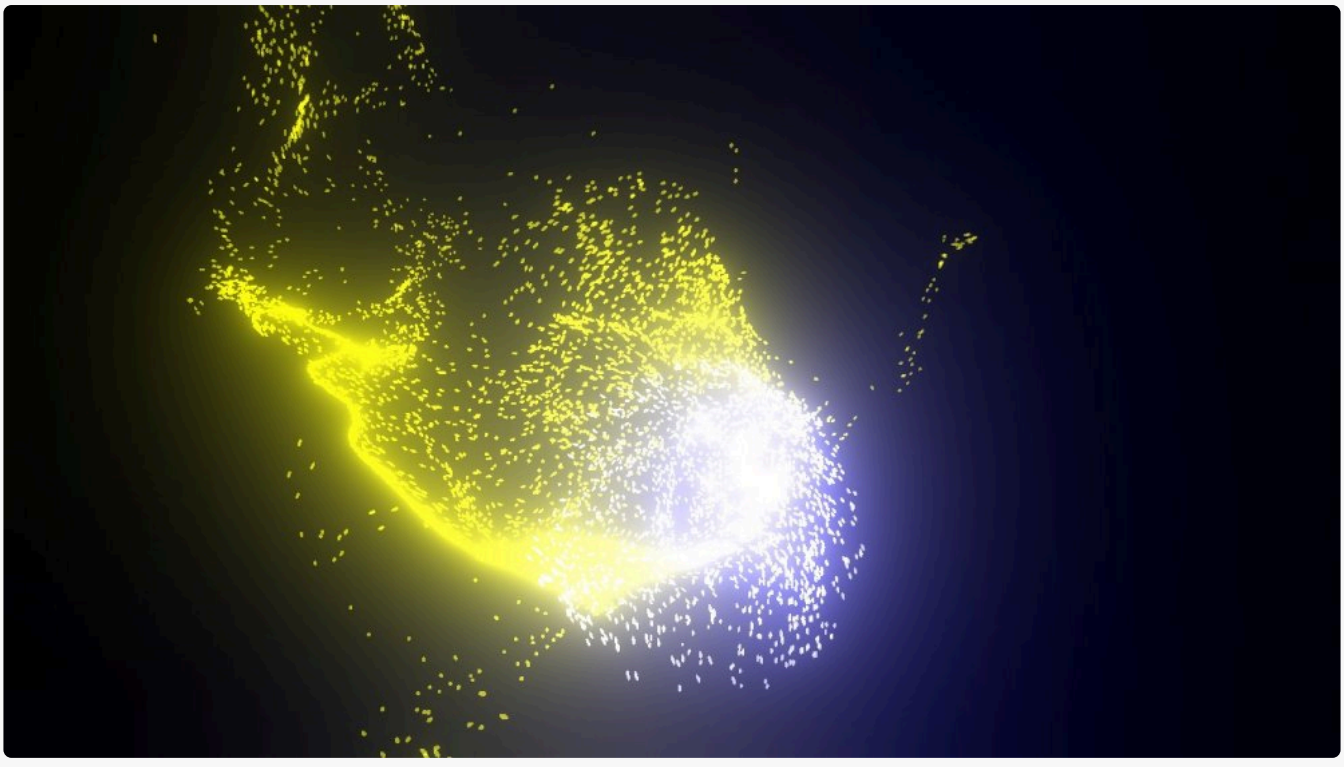
Turbulence Affector

Method

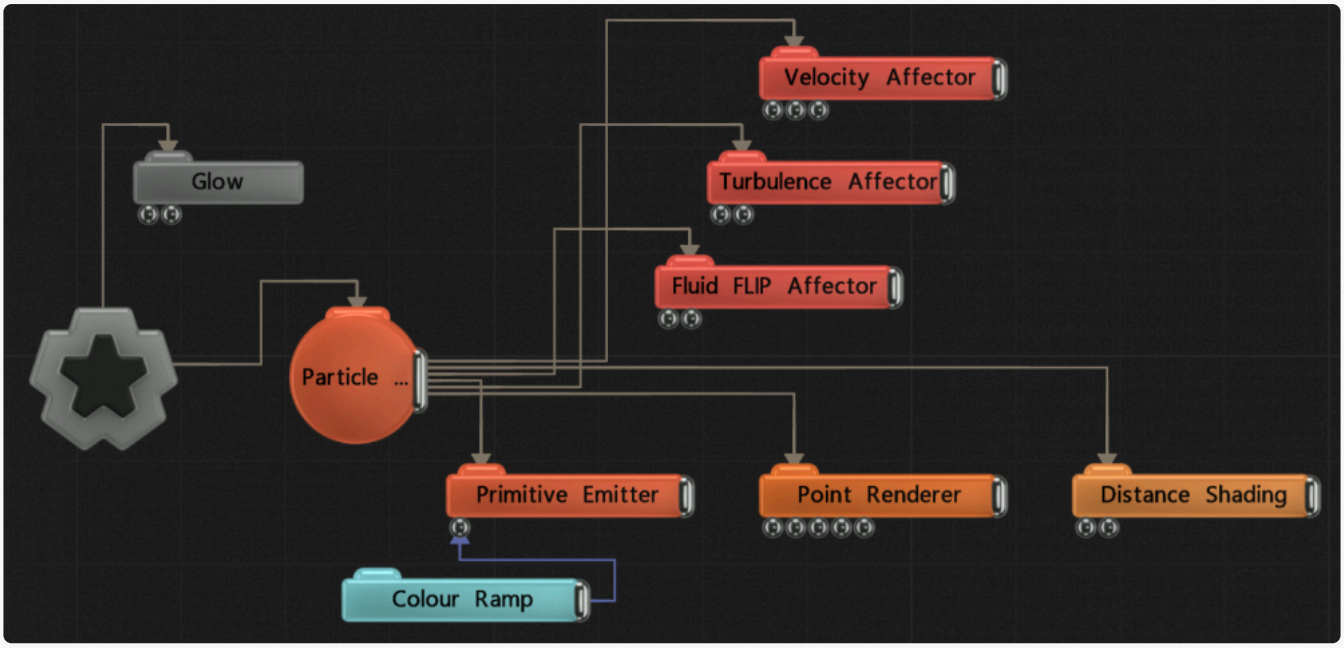
This node applies turbulence to the particle motion. This is typically used to apply local variations to particle movement and simulate small gusts of wind. The motion is generated by using a smoothed noise field for both the direction and the magnitude of the applied velocity. The noise field is scaled by the Noise Scale attribute and thresholded by the Noise Threshold attribute, so that areas of the noise field that are below the threshold contribute no motion. The overall amount of motion applied is scaled by the Velocity Scale attribute.

The effect is weighted by a falloff calculated using the distance from the node to the particle, ramping from 100% at the distance defined by the Inner Radius attribute down to 0% at the distance specified by the Radius attribute.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Scale	Scale the strength of the affectors velocity on the particles.

Spread Angle	Change the angle of spread for the particles.
Radius	Alter the outer radius at which the affector is no longer effective.
Inner Radius	Alter the inner radius up to which the affector is fully effective.
Randomness	How much randomness is added in the particles movement.
Noise Scale	The scale of the noise field.
Noise Threshold	The threshold applied to the noise field.
Mode	Change which kind of turbulence is applied. • Directional Force, The force is applied in a direction defined by the rotation of the node. • Repel, The particles move away from the node. • Attract The particles move towards the node. • Turbulence, The particles are given turbulent motion.
Falloff Shape	The affect becomes weaker the further away from a chosen shape.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Velocity Node	Overrides the velocity direction.	Null
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Velocity Affector

Method

This node applies a constant velocity to the affected particles. This is typically used to make particles move in a regular, linear fashion, e.g. wind effects or repulsions.

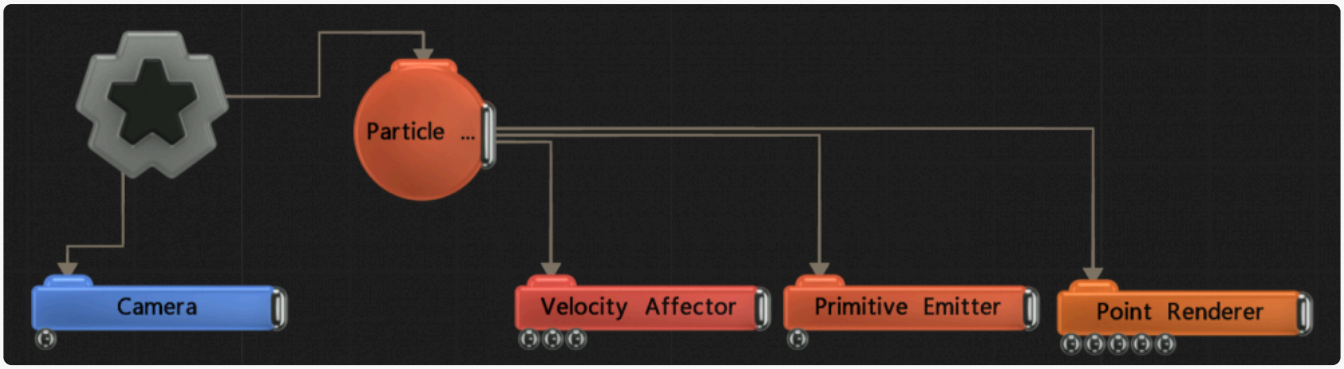
The Mode attribute is used to determine if the velocity is directional with a random spread determined by the Spread Angle attribute, or if it is an attracting or repelling velocity generated from the effector's position. The magnitude of the velocity is controlled by the Velocity Scale attribute and modulated by a random value which is constant per particle and weighted by the Randomness attribute.

The velocity effect is weighted by a falloff calculated using the distance from the node to the particle. The effect is at 100% up to the distance specified by the Inner Radius attribute, then ramps down to 0% at the distance specified by the Radius attribute.

Example

This image is taken from the "simple_rain.dfx" sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Amount	Scale the strength of the affectors velocity on the particles.
Spread Angle	Change the angle of spread for the particles.
Radius	Alter the outer radius at which the affector is no longer effective.
Inner Radius	Alter the inner radius up to which the affector is fully effective.
Randomness	How much randomness is added in the particles movement.
Mode	Choose what kind of velocity affects the particles.

Falloff Shape	The primitive shape used to calculate the falloff weight for the affector. • Point, uses the distance from the centre position of the node • Line, uses the distance from an infinite line in the X axis centred at the position of the node • Plane, uses the distance from an infinite plane in the XY axis centred at the position of the node.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Velocity Node	A transform node that overrides the velocity direction and source position.	Null
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

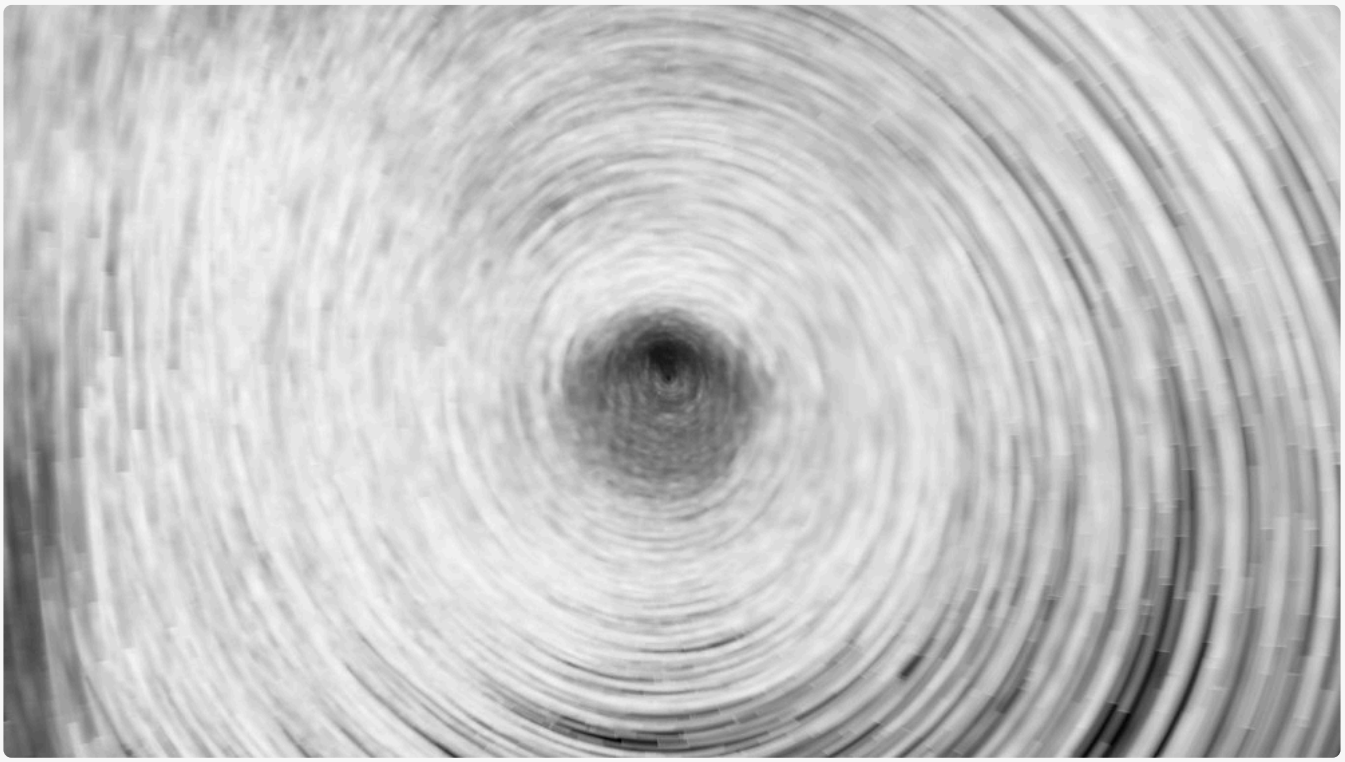
Vortex Affector

Method

This node makes particles move in a rotational manner. This is typically used to create rotational vortex effects, e.g. tornados.

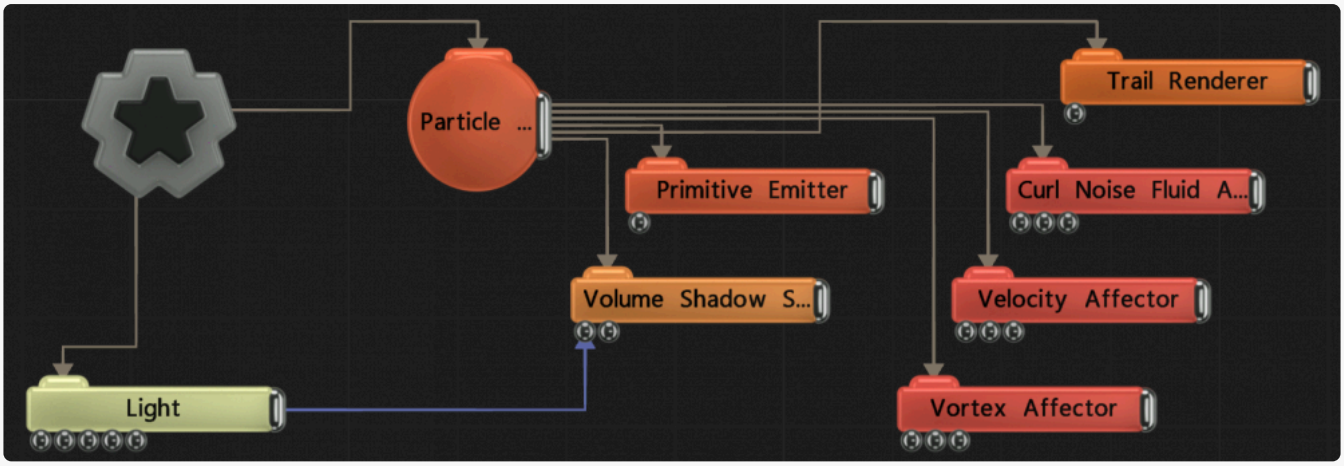
The effect is weighted by a falloff calculated using the distance from the node to the particle, ramping from 100% at distance zero down to 0% at the distance specified by the Radius attribute.

Example



This image is taken from the “tornado.dfx” sample project.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Velocity Amount	Scale the strength of the affectors velocity on the particles.
Spread Angle	Change the angle of spread for the particles.
Vortex Angle Scale	Controls the effect of the angular velocity by radius, making particles further away from the centre of the vortex move faster.
Outward	Controls the amount particles are pushed outwards.

Velocity Amount / Blend	
Radius	Alter the outer radius at which the affector is no longer effective.
Randomness	How much randomness is added in the particles movement.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Vortex Position Node	Overrides the vortex transform.	Null
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Scale Affector

Method

This node scales particles to have larger and smaller

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Scale Amount	How much to scale all particles by.
Radius	Alter the outer radius at which the affector is no longer effective.
Inner Radius	Alter the inner radius up to which the affector is fully effective.
Randomness	How much randomness is added in the particles movement.
Blend Mode	How the changes to the Scale Amount will affect the particles. • Blend, Multiplies the Scale Amount and the current particle scale. • Add, The Scale Amount will be added to the current value. • Subtract, The Scale Amount will be subtracted from the current value. • Max, The larger value between the Scale Amount and the current particle size is

	chosen. • Min, The smaller value between the Scale Amount and the current particle size is chosen.
Falloff Shape	Select which shape to calculate the falloff from.
Life Effect Coeffs	How much the particles are affected by the affector at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.

Inputs

Name	Description	Typical Node Input
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Procedural Falloff	Use the SDF values from a procedural system to dictate the falloff.	Procedural Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Emitters

Method

Emitter nodes spawn particles that can be manipulated in a particles system. Any Emitters need to be connected to a Particle Root node, and they will only spawn particles within that particle system unless modified appropriately.

Every emitter has a “Max Particle Count” attribute which, depending on the value of the Respawn Enabled parameter, defines either: the maximum number of particles from that emitter that may be alive at any one time if Respawn Enabled is ticked; or the total number of particles that may be emitted from this emitter if Respawn Enabled is not ticked. However the total number of particles in the system is defined by the Particle Root Node and there may be multiple emitters competing for those particles, so it may be impossible to fully satisfy the value set by “Max Particle Count”. Emission occurs per frame in node order and depends on the Emission Rate attribute, so it is possible for an emitter that is evaluated first to consume all of the particles in the system and leave none left for the other emitters.

Emission

Every emitter has a set of common properties defining the rate at which particles are emitted and their life time.

Name	Description
Emitter Active	Change whether the emitter is on or off.
Randomness	How much randomness is added in the particles movement.
Life	Control how low long each particle exists for.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.
Shader	Ability to over-ride internal shader. See writing custom shaders.

Colour Control

Emitters have an input named “Colour Control Nodes” that allows a Colour Ramp node to be connected which can control the colour of emitted particles via a gradient or colour palette. The Colour Selection Mode attribute determines the way in which colours are selected by the emitter from the palette.

Name	Description
Colour Selection Mode	Choose how the input colour affects the particles. • Input Colour, the first colour input is the only colour output. • Selected Single Colour, A single colour is selected using the “Colour Selection Parameter” attribute. • Emission Time, colour is selected based on time at which the particle is emitted. • Random Colour, the colour is selected randomly at the particles creation.
Colour Selection Parameters	A number used to select the colour output.

Material

Every emitter node has a set of properties that define its material. The material allows some control over how particles are rendered on a per emitter basis such as their size and colour.

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle’s colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The temperature, for thermal dynamics simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Emitters

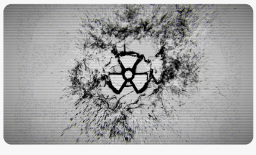
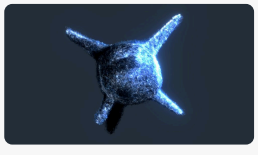
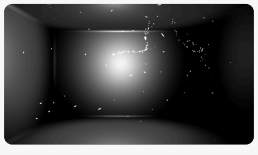
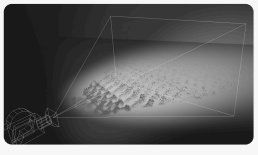
				

Image Emitter	Mesh Emitter	Primitive Emitter	SDF Emitter	Screen Emitter

Trail Emitter	Video Feature Emitter

- Spline Emitter

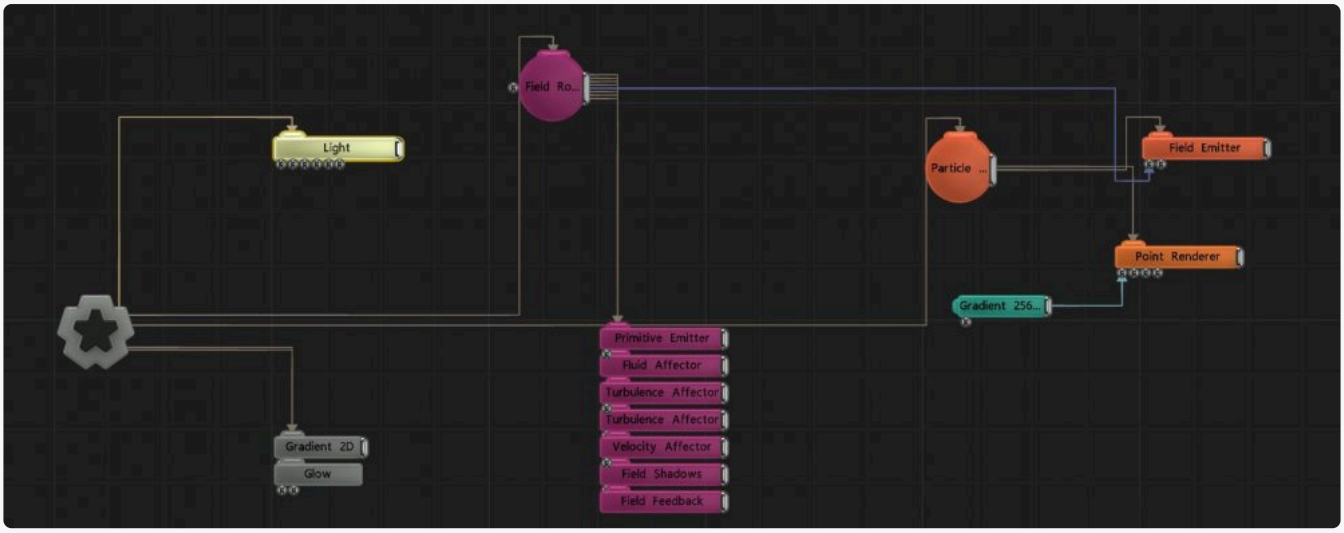
Field Emitter

Method

This node emits particles from a Field. It can also use Colours, Density, or Temperatures from Density Field Modes.

Example

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Randomness	How much randomness is added in the particles movement.
Life	Control how low long each particle exists for.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.

Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Colour Control

To enable, add an input into this node.

Name	Description
Colour Selection Mode	Choose how the input colour affects the particles.
Colour Selection Parameters	A number used to select the colour output.

Inputs

Name	Description	Typical Node Input
Field Source	Field used as a basis for the particle system.	Field Root
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Image Emitter

Method

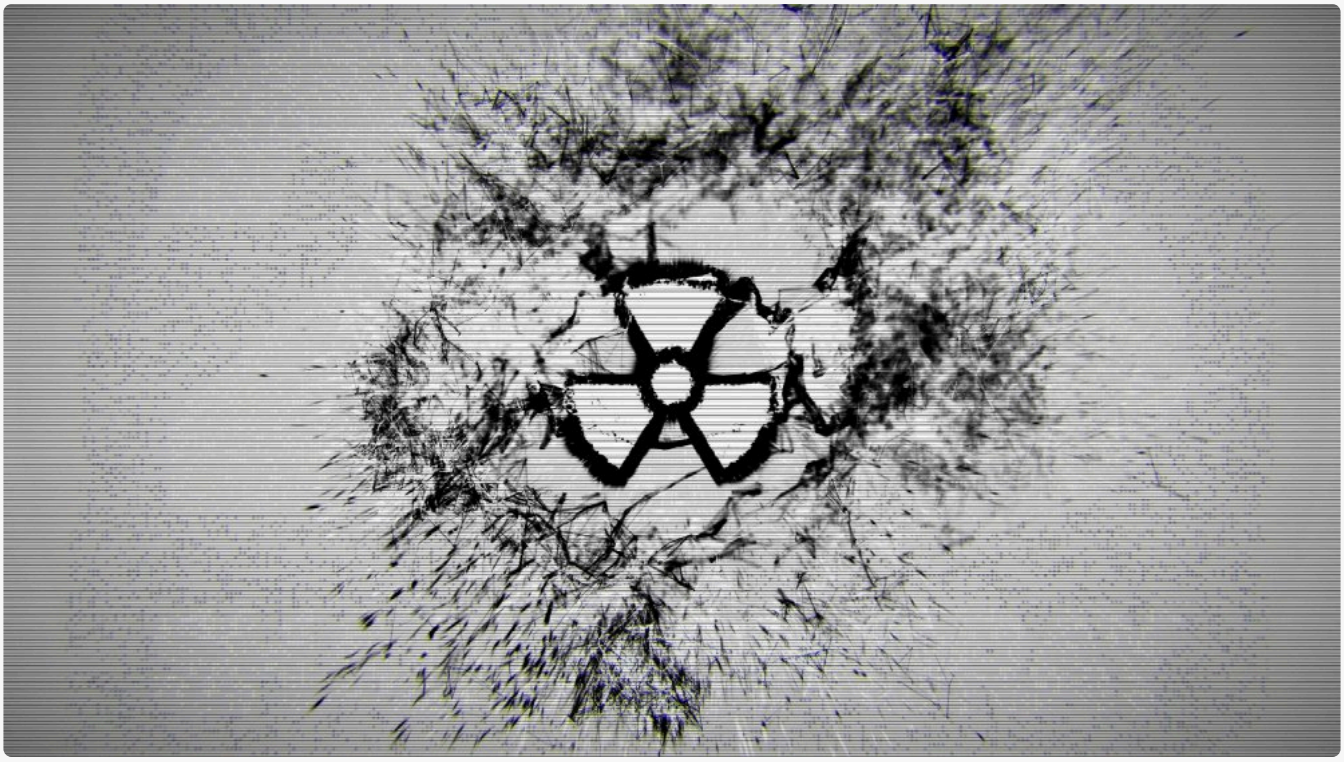
This node emits particles from an image or video. It can make use of motion vectors to make particles track the motion of a video once emitted. The image or video may be set directly using the Image attribute, or taken from a node connected via the Video Node attribute.
A threshold is applied to the image on either the luminance or alpha channel values as determined by the Pixel Cull/Thickness Mode attribute. Only pixels which pass the threshold are used for emission. If the Use Thickness option is ticked multiple particles may be emitted from each pixel and spread out in depth based on the luminance or alpha value of the pixel, creating volume from the emission. Otherwise, particles may be biased in depth by their luminance using the Luminance Offset Scale parameter, so brighter pixels are pushed forward in 3D space.

The location of emitted particles depends on the way the image is supplied to the emitter. If an image is supplied via the Image attribute or linked from a Video node it will be emitted from a unit plane in the XY axis, combined with the transform from the emitter itself. If an Image Plane node is linked to the emitter's Video Node input the transform from the Image Plane is used, so the particles will emit at the same location in 3D space as the pixels in the Image Plane, assuming the emitter's own transform doesn't offset it. If an Image 2D node is connected, particles use the current camera plane to emit particles such that, after transformation by the camera, they map to the Image 2D node's pixels in the final render.

Once emitted particles may read the image each frame, sample the colour at their current location and blend towards it by an amount specified by the Image Colour Adaption parameter.

To make particles track video motion a video of motion vectors must be set via the Motion Vector Video parameter; or a node containing motion vectors such as a Video Optical Flow node must be connected to the Motion Video Node input. Input motion vectors are scaled by the Motion Vector Effect attribute.

Example



This image is taken from the “particles_logos_explode.dfx” sample project.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Image	Override the input image with an image selected from the drop down menu.
Flip Image	Flip the image input vertically.
Luminance Offset Scale	Bias the particles in depth by the luminance of the source pixel.
Use Thickness	Toggle whether to emit the particles on a 2d plane, or in three dimensions.
Thickness	Change the thickness of the three dimensional area the particles can spawn in. Only functions if “Use Thickness” is on.
Pixel Cull/ Thickness Mode	Change how the depth of the particle generation is calculated. • Alpha Channel, lower alpha values will have greater depth. • Luminescence, darker parts of the image will have greater depth. • Luminance * Alpha Channel, luminance values are multiplied by alpha values and lower values after which are given greater depth.
Alpha Threshold	Limit where the particles will spawn based on their source alpha.
Image Colour Adaption	How much the particle colours adapt to the image colours.
Particle Use Image Alpha	Toggle whether particles use the image alpha.
Limit Emissions Per Pixel	Toggle whether the number of particles that can be emitted per pixel can be limited..
Max Emissions Per Pixel	The maximum number of particles that can emit per pixels. Only functions if “Limit Emissions Per Pixel” is true.
Emission Area Min	Control the minimum area that the particles will be emitted.
Emission Area Max	Control the maximum area that the particles will be emitted.

Emission

Name	Description
Emitter Active	Change whether the emitter is on or off.
Randomness	How much randomness is added in the particles movement.
Life	Control how low long each particle exists for.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.

Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.

Colour Control

To enable, add an input into this node.

Name	Description
Colour Selection Mode	Choose how the input colour affects the particles. • Input Colour, The first colour input is the only colour output. • Selected Single Colour, Uses the colour selection parameter to decide which colour to use. • Emission Time, Colour is selected based on time at which the particle is emitted. • Random Colour, the colour is selected randomly at the particles creation.
Colour Selection Parameters	A number used to select the colour output.

Video

Name	Description
Depth Video	Modifies the z position of the particles, based on the input video.
Motion Vector Video	Select a motion vector video to apply to the object.
Motion Vector Effect	Scales effect of motion vectors on the motion of the particles.
Motion Vector Scale X	Scale particle movement along the x axis.
Motion Vector Scale Y	Scale particle movement along the y axis.
Motion Vector Max	Maximum movement allowed for the particle.
Motion Vector Bias	Control whether there is a bias towards either axis from the motion vector video.
Avi FPS	Change the frames per second the video is played at.
Motion Vector FPS	Control the frames per second of the input motion video.
Time Offset	Offset the time the effect is running.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.

Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Inputs

Name	Description	Typical Node Input
Video Node	Video used as a basis for the particle system.	Video Loader
Motion Video Node	Video used to calculate motion for the particles.	Optical Flow
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Notes

! Requires an image to be supplied via the Image property or the Video Node input to function.

Mesh Emitter

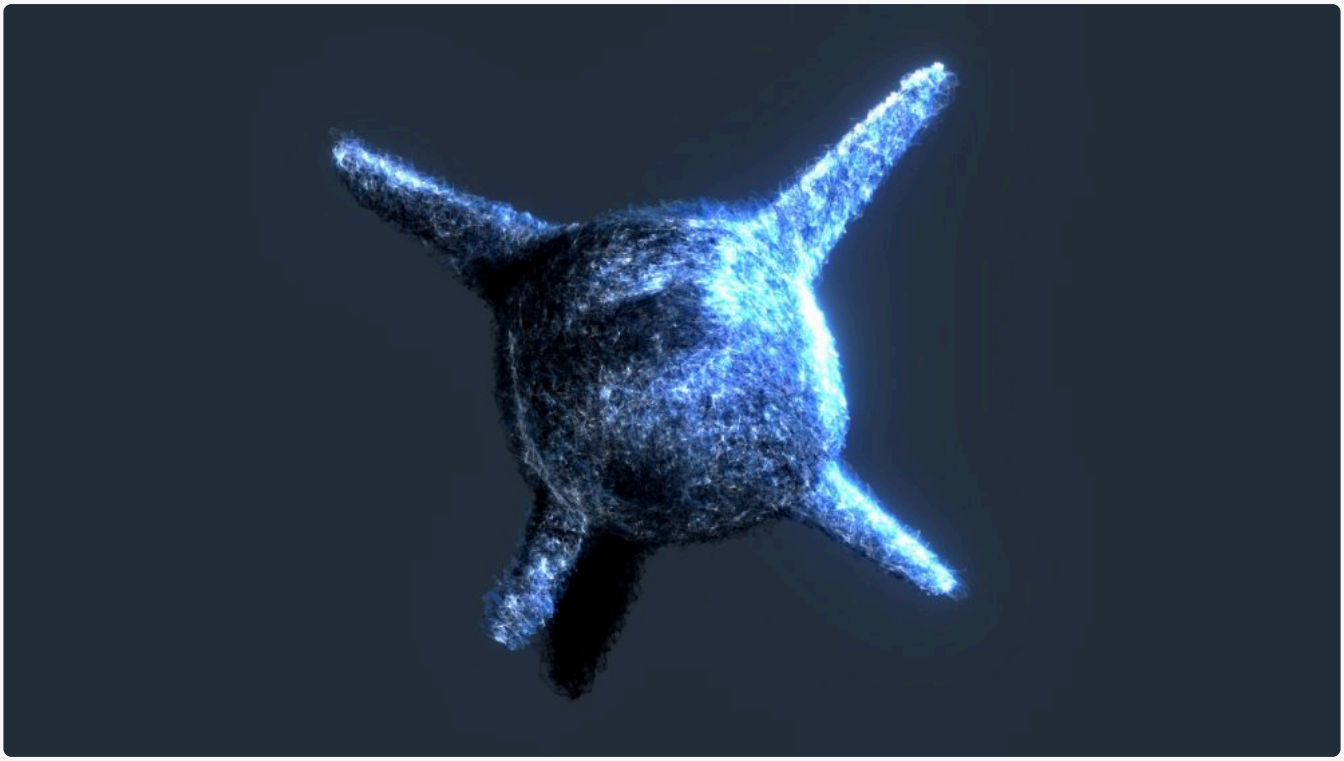
Method

This node emits particles from a 3D mesh. The mesh must be connected via the “Object Nodes” input, and can be a 3D Object node, a Shape 3D node, a Text node or a Depth Camera / Kinect Mesh. If no suitable node is connected then no emission will occur. Deforming and animating objects are supported.

The node chooses locations on the mesh to emit from in one of several ways depending on the Spawn Mode attribute. The vertices of the mesh can be used directly, or random points spread evenly across the polygon surface or the edges of the mesh can be used. Particles can be emitted at a position offset from the surface using the Emit Distance From Surface parameter. The Incidence Angle control can be used to make particles only emit from polygons facing towards, or at an angle incident to the camera. The Randomise Order attribute is used to decide if emitted particles may be spread evenly across the available positions or emit in polygon / vertex order so the mesh appears to form in a regular fashion. The particles may optionally take on the colour of the underlying mesh using the “Use Mesh Colours” attribute.

Where an animated or deforming object is connected, emitted particles may track the motion of the object so they appear to stick to or follow the moving object. The Parent Transform Weight parameter scales this effect. Particles may also make use of motion to set an initial emission velocity.

Example



This image is taken from the “volume_shadow_particles.dfx” sample project.

Attributes

Name	Description
Spawn Mode	Control how the particles spawn, either on vertices or on polygons.
Incidence Angle Emission Coeffs	The angle at which particles are emitted from the 3d object.
Parent Transform Weight	How much the transform of the parent affects the transform of the particles.
Parent Transform Weight Life Coeffs	How much the particles are affected by the parent nodes transforms at different stages of the particles life cycle. Values 2 and 3 are control points, and are used to control the curve between values
Parent Transform Randomness	Controls the randomness of the parent transform weight.
Emission Velocity	Speed at which the particles move after emission, in the direction of the movement of the point on the mesh they were emitted from.
Emission Normal Velocity	Speed at which particles after emission, along the angle of the normal.
Use Mesh	Toggle whether particles are given colours based on the colour of the mesh.

Colours	
Bake Texture Colours	Toggle whether textures on the materials of the mesh should be applied to particle colours.
Randomise Order	Toggle whether particle generation should be done randomly, or in an ordered list through the mesh.
Polys To Emit From Amount	Controls how many of the polygons on the mesh will emit particles.
Emit Distance From Surface	Distance from the surface that the particles emit from.
Max Particles Per Vertex	When using the *Spawn Mode* of *Vertices* or *Vertices Follow Edges*, this attribute sets the max number of particles emitted from a vertex that can be in flight at any time

Emission

Name	Description
Emitter Active	Change whether the emitter is on or off.
Life	Control how low long each particle exists for.
Randomness	How much randomness is added in the particles movement.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.
Emitter Sort Key	Controls the processing order of the emitter.

Colour Control

To enable, add an input into this node.

Name	Description
Colour Selection Mode	Choose how the input colour affects the particles. • Input Colour, The first colour input is the only colour output. • Selected Single Colour, Uses the colour selection parameter to decide which colour to use. • Emission Time, Colour is selected based on time at which the particle is emitted. • Random Colour, the colour is selected randomly at the particles creation.
Colour Selection Parameters	A number used to select the colour output.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Inputs

Name	Description	Typical Node Input
Object Nodes	Mesh used for the particle system.	3D Object
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Notes

Requires a 3D object input to function.

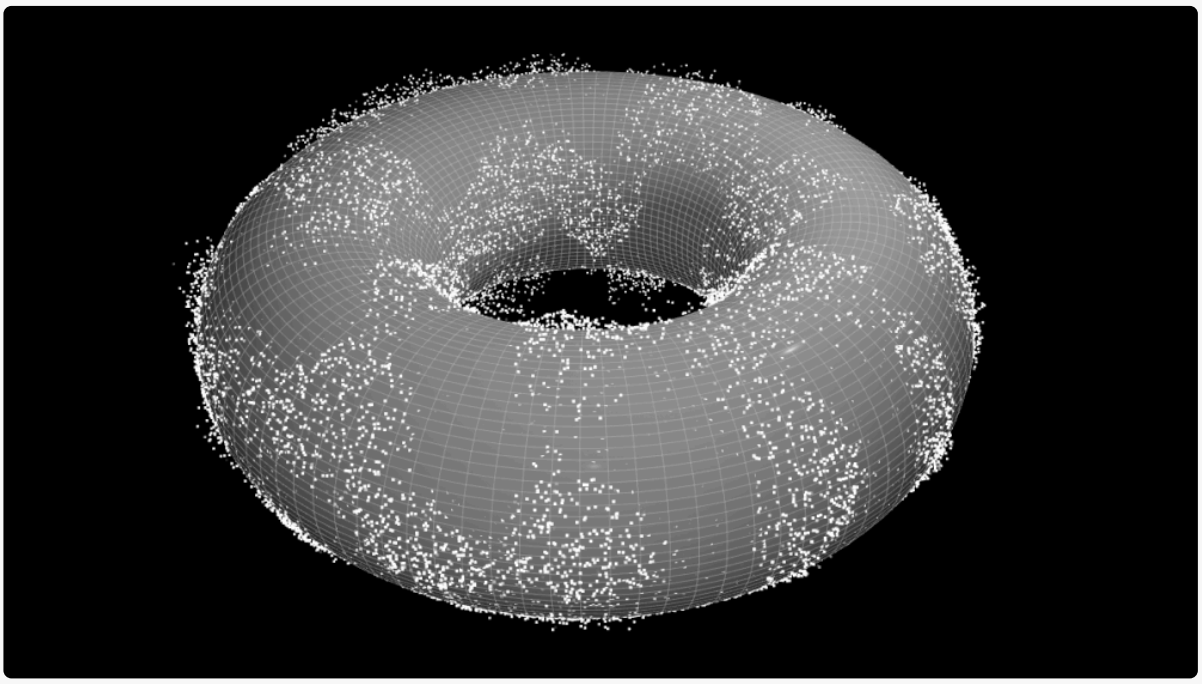
Point Cache Emitter

Method

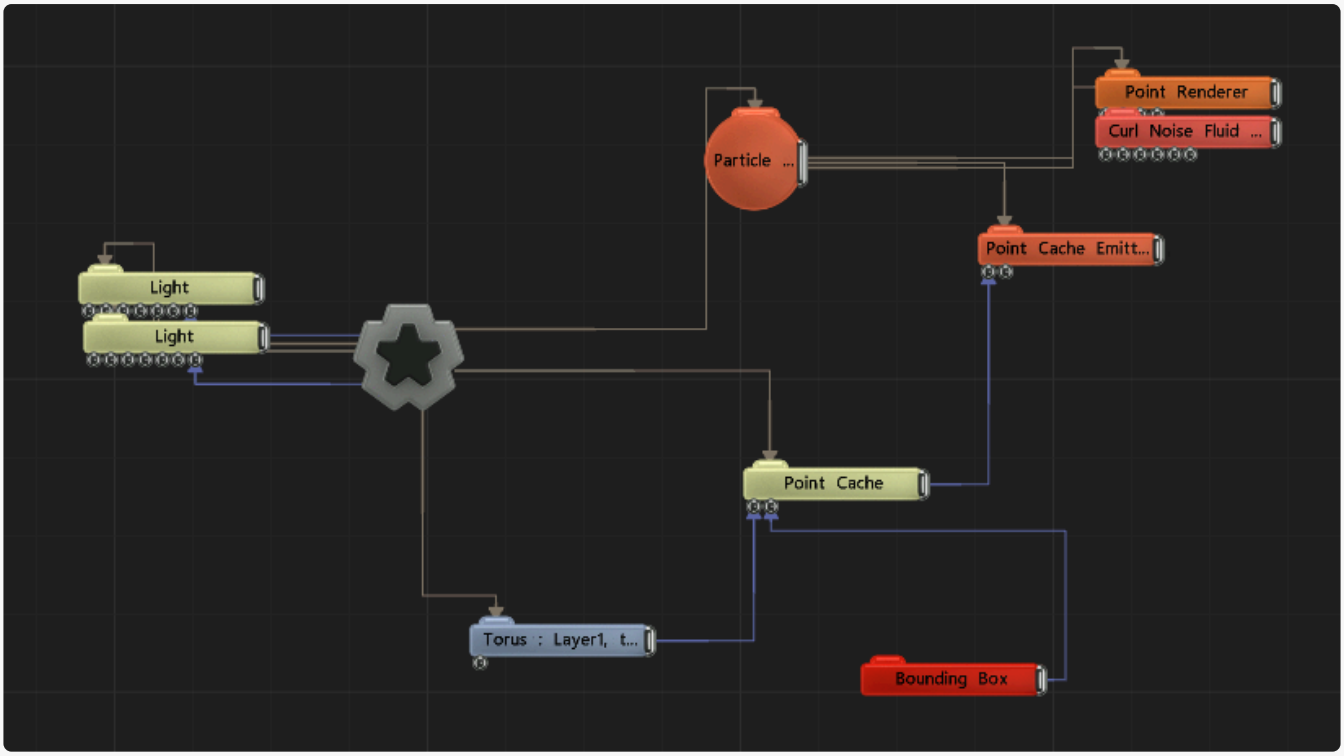
Emits particles from the points in a Point Cache.

This is useful for saving on mesh processing cost by re-using a single point cache for multiple emitters as well as other features such as lighting and cloning.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Life	Control the randomness for the life of each particle.
Randomness	How much randomness is added in the particles movement.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.
Fade Falloff Coefficient	Change the weighting of the fade falloff to either speed up or slow down over time.

Inputs

Name	Description	Typical Node Input
Point Cache	The points source.	Point Cache
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

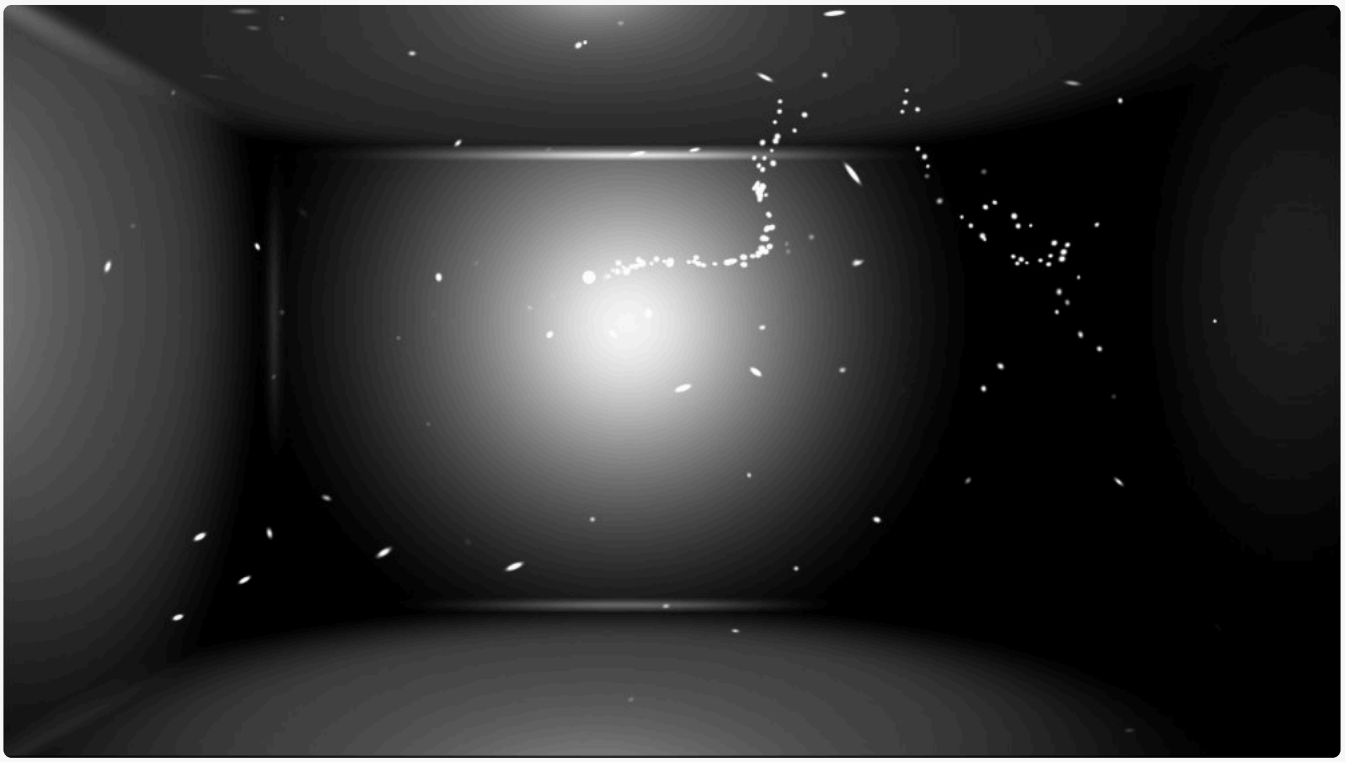
The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Primitive Emitter

Method

This node emits particles in the form of a 3D primitive shape. The Emitter Type parameter defines which shape is used. Particles can be emitted on the surface of the shape or inside the volume of the shape, depending on the Emit On Surface parameter.

If the emitter has an animated transform, emitted particles may track the motion of the primitive so they appear to stick to or follow the moving primitive. The Parent Transform Weight parameter scales this effect.

Example

This image is taken from the “particle_collisions+parenting.dfx” sample project.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.

Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Emitter Type	The shape in which the particles are emitted. • Sphere, Particles spawn within a 3D sphere. • Box, Particles spawn within a 3D Cube. • Cylinder, Particles spawn within a Cylinder. • Plane, Particles spawn on a flat, 2D Plane. • 2D Grid, Particles spawn along the edges of a 2D grid. • 3D Grid, Particles spawn along the edges of a 3D grid. • Point, all particles spawn at the same point in 3D space.
Repeating Random	Toggle whether the random number generation repeats, and particles are emitted with repeated transform properties.
Seed	Choose a seed for the random number generation.
Uniform Distribution	Make sure the particle generation is evenly distributed throughout the object.
Emit On Surface	Toggle whether particles emit on the surface of the emitter object.
Normal Direction	Controls the way particle normals are generated. • Emitter Shape, use the underlying primitive shape. • Emitter Motion, normals point in the direction of motion of the emitter. • Emitter Facing, normals point in the facing direction of the emitter.
Parent Transform Weight	How much the transform of the parent affects the transform of the particles.
Parent Transform Weight Life Coeffs	How much the particles are affected by the parent nodes transforms at different stages of the particles life cycle. Values 2 and 3 are control points, and are used to control the curve between values

Emission

Name	Description
Emitter Active	Control how low long each particle exists for.
Life	Control how low long each particle exists for.
Randomness	How much randomness is added in the particles movement.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.

Colour Control

To enable, add an input into this node.

Name	Description
Colour Selection Mode	Choose how the input colour affects the particles. • Input Colour, the first colour input is the only colour output. • Selected Single Colour, Uses the Colour selection parameter to decide which colour to use from the input ramp. • Emission Time, colour is selected based on time at which the particle is emitted. • Random Colour, the colour is selected randomly at the particles creation.
Colour Selection Parameters	A number used to select the colour output.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.

Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.
Fade Falloff Coefficient	Change the weighting of the fade falloff to either speed up or slow down over time.

Inputs

Name	Description	Typical Node Input
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

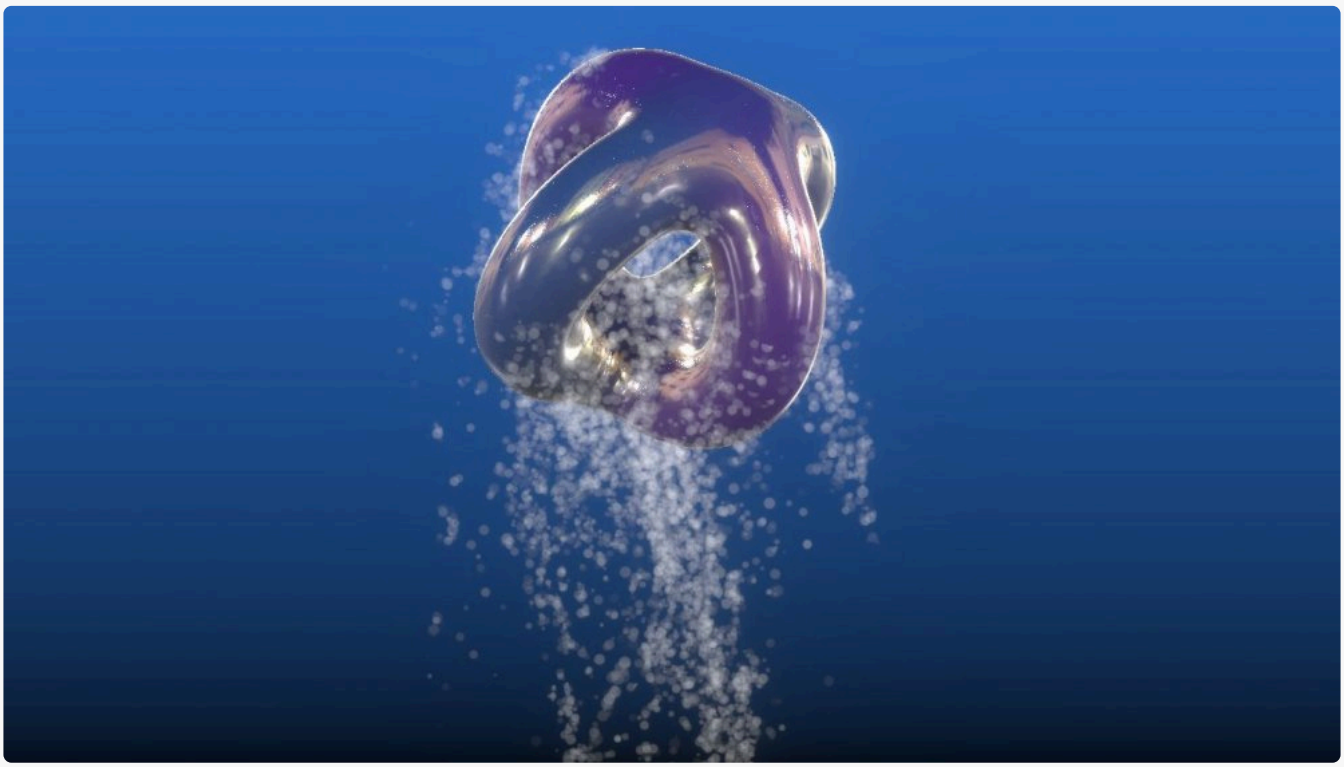
The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Procedural Emitter

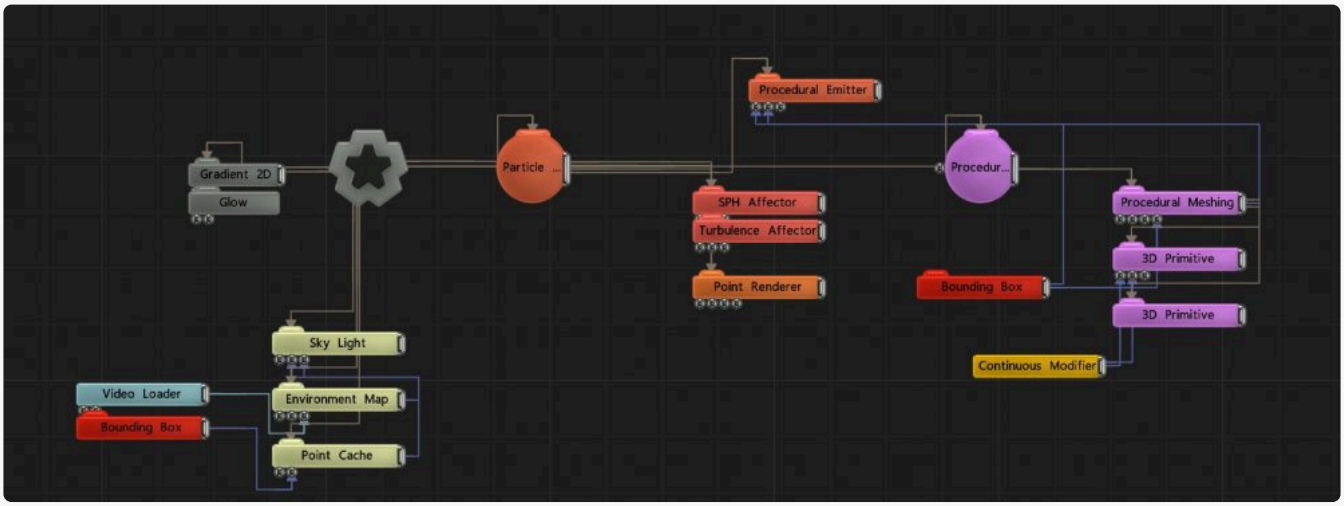
Method

This node is used to emit particles from a generative form created using Procedural nodes.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Randomness	How much randomness is added in the particles movement.
Life	Control the randomness for the life of each particle.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.

Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Inputs

Name	Description	Typical Node Input
Procedural Root	Connect a source procedural node.	Procedural Root
Bounding Box	Limits the area that the procedural emitter will use.	Bounding Box
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

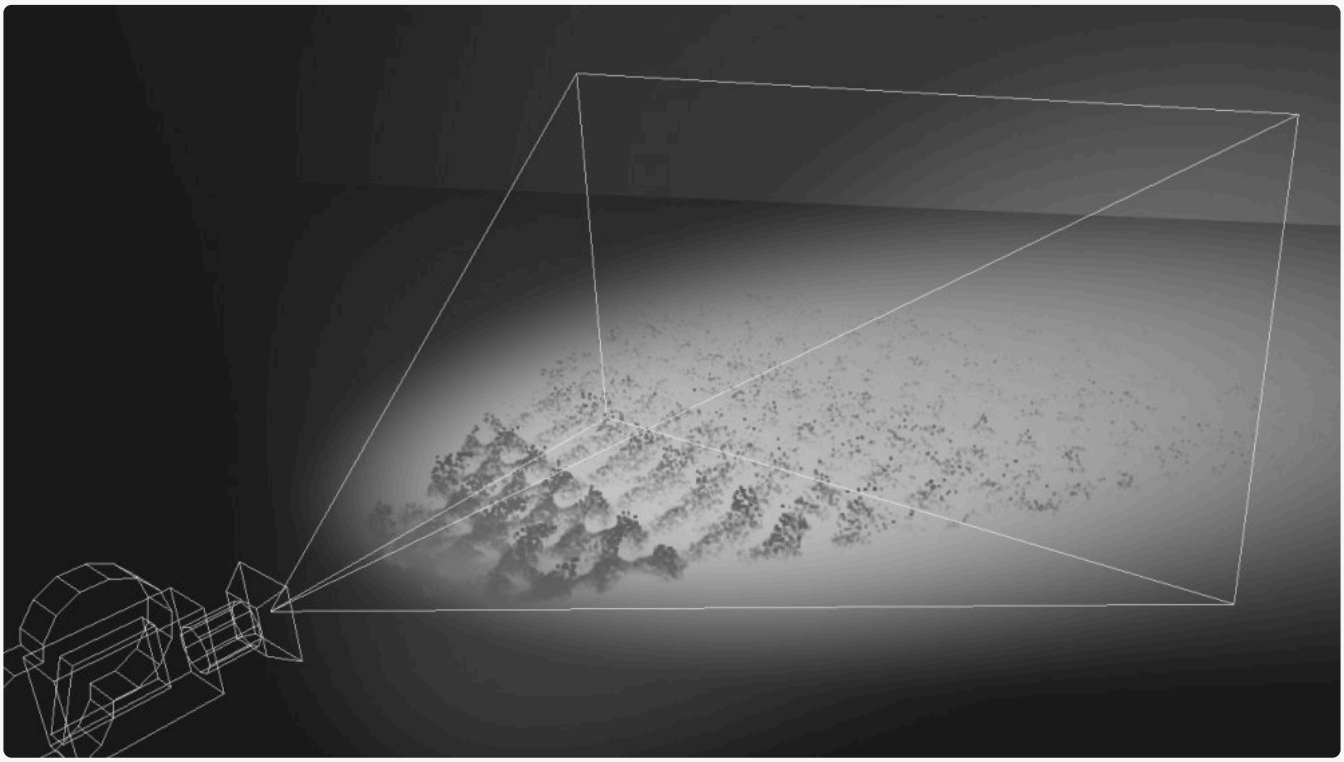
Outputs

The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Screen Emitter

Method

This Emitter emits particles only from objects within the cameras view. Particles can be emitted from other layers by adding a Render Layer node as an input to this node.

Example


Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.

Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Flip Image	Flip the image input vertically.
Luminance Offset Scale	Bias the particles in depth by the luminance of the source pixel.
Use Thickness	Toggle whether emit the particles on a 2d plane, or in three dimensions.
Thickness	Change the thickness of the three dimensional area the particles can spawn in. Only functions if “Use Thickness” is on.
Pixel Cull/Thickness Mode	Change how the depth of the particle generation is calculated. • Alpha Channel, lower alpha values will have greater depth. • Luminescence, darker parts of the image will have greater depth. • Luminance * Alpha Channel, luminance values are multiplied by alpha values and lower values after which are given greater depth.
Alpha Threshold	Limit where the particles will spawn based on their source alpha.
Image Colour Adaption	How much the particle colours adapt to the image colours.
Particle Use Image Alpha	Toggle whether particles use the image alpha.
Emission Velocity Normal Direction	How great a velocity the particles are given in the normal direction of the object when spawned.
Limit Emissions Per Pixel	Toggle whether the number of particles that can be emitted per pixel can be limited..
Max Emissions Per Pixel	The maximum number of particles that can emit per pixels. Only functions if “Limit Emissions Per Pixel” is true.
Emission Area Min	Control the minimum area that the particles will be emitted.
Emission Area Max	Control the maximum area that the particles will be emitted.

Emission

Name	Description

Emitter Active	Change whether the emitter is on or off.
Randomness	How much randomness is added in the particles movement.
Life	Control how low long each particle exists for.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.

Colour Control

To enable, add an input into this node.

Name	Description
Colour Selection Mode	Choose how the input colour affects the particles. • Input Colour, The first colour input is the only colour output. • Selected Single Colour, Uses the colour selection parameter to decide which colour to use. • Emission Time, Colour is selected based on time at which the particle is emitted. • Random Colour, the colour is selected randomly at the particles creation.
Colour Selection Parameters	A number used to select the colour output.

Video

Name	Description
Motion Vector Effect	Scales effect of motion vectors on the motion of the particles.
Time Offset	Offset the time the effect is running.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.

Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Inputs

Name	Description	Typical Node Input
Render Layer	Layer to render the particles from.	Render Layer
Colour Control	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Spline Emitter

Method

This node emits particles from a spline shape. The splines used by this node are extracted from a 3D object which must be connected to the Object Nodes input for this node to have an effect. If The object that is connected contains no spline data this node will have no effect.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Radius	The radius around the spline at which the particles will be emitted.
Radius Randomness	The randomness of the radius around the spline at which the particles will be emitted.
Spline Time Min	The minimum point on the spline at which particles will be emitted.
Spline Time Max	The maximum point on the spline at which particles will be emitted.
Initial Spline Direction	The magnitude of the initial velocity assigned to particles in the tangential direction of the point on the spline at which they are emitted.

Velocity	
Initial Spline Normal Velocity	The magnitude of the initial velocity assigned to particles outwards from the point on the spline at which they are emitted.
Follow Spline Amount	The velocity along the spline applied to particles after emission towards the particle's goal point on the spline, which starts at the point they are emitted from.
Follow Spline Rate	The rate at which the particle's goal point moves along the spline.

Emission

Name	Description
Emitter Active	Change whether the emitter is on or off.
Randomness	How much randomness is added in the particles movement.
Life	Control how low long each particle exists for.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Inputs

Name	Description	Typical Node Input
Spline Node	The spline to emit from.	Spline
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Notes

> ! Requires a Spline input to function.

Trail Emitter

Method

This node emits particles from the positions of other currently active particles from other emitters. This is used to create trails of particles.

This node is typically connected as a child of another emitter node. When connected in this way it only emits particles at the locations of those emitted from the parent emitter. Alternatively this node can be connected to a Particle Root node and emitters can be connected to the Source Particle Nodes input. If no emitters are connected this node is ineffective.

The Initial Velocity Amount parameter causes the particles to be emitted with velocity taken from the source particle. The Initial Velocity Tangent Amount parameter causes the particles to be emitted with a velocity tangential to the source particle, which is used to make them appear to move sideways from the parent particle.

The Parent Transform Weight controls may be used to make the particle follow the parent particle's motion.

Example

Attributes

Name	Description
Max Particles Per Source Particle	The maximum number of particles per particle.
Use Parent Particle Count	Use the particle count of the source emitter to scale the number of particles emitted by this trail emitter.
Initial Velocity Amount	Control the velocity particles spawn with in the direction of the source particle.
Initial Velocity Tangent Amount	Control the velocity particles spawn with in the direction tangential to the source particle.
Parent Transform Weight	How much the transform of the parent affects the transform of the particles.
Parent Transform Weight Life Coeffs	How much the particles are affected by the parent nodes transforms at different stages of the particles life cycle. Values 2 and 3 are control points, and are used to control the curve between values
Parent Transform Randomness	How much randomness to apply to the parents transform values.

Emission

Name	Description
Emitter Active	Change whether the emitter is on or off.
Life	Control how low long each particle exists for.
Randomness	How much randomness is added in the particles movement.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.
Max Particle Count	Set a maximum particle count for the emitter.
Respawn Enabled	Toggle whether a particle can respawn.
Emitter Sort Key	Controls the processing order of the emitter.

Material

Name	Description
Colour	RGB colour of particles.

Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Inputs

Name	Description	Typical Node Input
Source Particle Nodes	The emitter(s) from which particles are used as sources for the trail emitter.	Particle Emitters
Mask Node	Mask out areas that particles cannot spawn.	Image Plane
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

Video Feature Emitter

Method

This node emits particles from an image or video by extracting feature points from the image or video frame. The image or video may be set directly using the Image attribute, or taken from a node connected via the Video Node attribute. Features are extracted by looking for corners or areas of interest in the video frame that make good tracking points.

If the source is a video the feature points are then tracked through the motion of the video. Tracking can make use of motion vectors if a Video Optical Flow node is connected to the Optical Flow Node input.

The location of emitted particles depends on the way the image is supplied to the emitter. If an image is supplied via the Image attribute or linked from a Video node it will be emitted from a unit plane in the XY axis, combined with the transform from the emitter itself. If an Image Plane node is linked to the emitter's Video Node input the transform from the Image Plane is used, so the particles will emit at the same location in 3D space as the pixels in the Image Plane, assuming the emitter's own transform doesn't offset it. If an Image 2D node is connected, particles use the current camera plane to emit particles such that, after transformation by the camera, they map to the Image 2D node's pixels in the final render.

Example

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Image	Override the input image with an image selected from the drop down menu.
Randomness	How much randomness is added in the particles movement.
Life	Control how low long each particle exists for.
Life Randomness	Control the randomness for the life of each particle.
Emission Rate	What percentage of the particles are emitted from the emitter per second.
Max Particle Count	Set a maximum particle count for the emitter.
Use Thickness	Change the thickness of the three dimensional area the particles can spawn in. Only functions if “Use Thickness” is on.
Depth Video	Modifies the z position of the particles, based on the input video.
Motion Vector Video	Select a motion vector video to apply to the object.
Motion Vector Effect	Scales the magnitude of motion vectors when applied to the particles.
Motion Vector Bias	Control whether there is a bias towards either axis from the motion vector video.

Avi FPS	Change the frames per second the video is played at.
Motion Vector FPS	Control the frames per second of the input motion video.
Time Offset	Offset the time the effect is running.
Feature Offset	Limits which parts of the video emit particles.
Feature Minimum Distance	The minimum allowed distance between generated feature points – prevents too many feature points from being spawned in one place.
Track Edge Features Only	Toggle whether to track edges, or track the whole image.
Edge Detect Threshold	Control the threshold at which the edge can be detected.
Limit Emissions Per Point	Toggle whether the number of particles that can be emitted per pixel can be limited.
Emissions Area Min	Control the minimum area that the particles will be emitted.
Emissions Area Max	Control the maximum area that the particles will be emitted.

Material

Name	Description
Colour	RGB colour of particles.
Diffuse	Control how much the light is scattered from the surface of the object.
Emissiveness	Control how much light is emitted by the particle.
Life Colour Affecter Weight	Controls how much the result of any Life Colour Shading nodes are blended with the particle's colour.
Particle Scale	Scale the size of the particle.
Dof Amount	How much depth of field effects the particles material.
Density	The density, for use in some simulations.
Temperature	The density, for use in some simulations.
Cooling Rate	The cooling rate, for thermal dynamics simulations.
Density Decay	Control the rate of decay in the density.
Fade In Time	What percentage through the particles life span the particle fades in.
Fade Out Time	What percentage through the particles life span the particle fades out.

Inputs

Name	Description	Typical Node Input
Video Node	Video used as a basis for the particle system.	Video Loader
Optical Flow Node	Video used to calculate motion for the particles.	Optical Flow
Video Feature Node	The input video feature node.	Video Find Features
Colour Control Nodes	Control the colours of the particles.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The transformation values of thi node will be inherited by its children. Furthermore, Affectors, Shading And Rendering nodes will only be effective to the particles emit by this emitter.

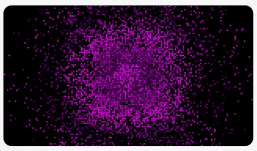
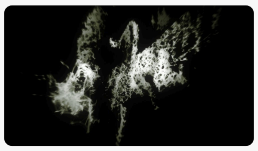
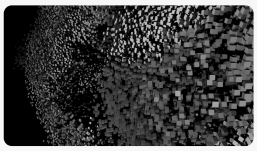
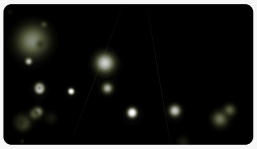
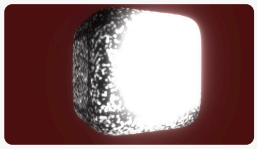
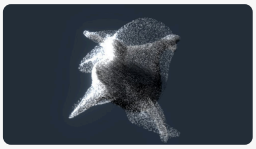
Rendering

Method

Rendering nodes visualise the particles by spawning images, meshes or trails. Multiple rendering nodes may be connected to the same particle system, allowing the same particles to be rendered in multiple different ways at once.

Any Rendering nodes need to be connected to a Particle Root node directly or indirectly, and they will only render particles within that particle system. If a Rendering node is connected to a Particle Emitter it will render only the particles spawned from that emitter.

Gallery

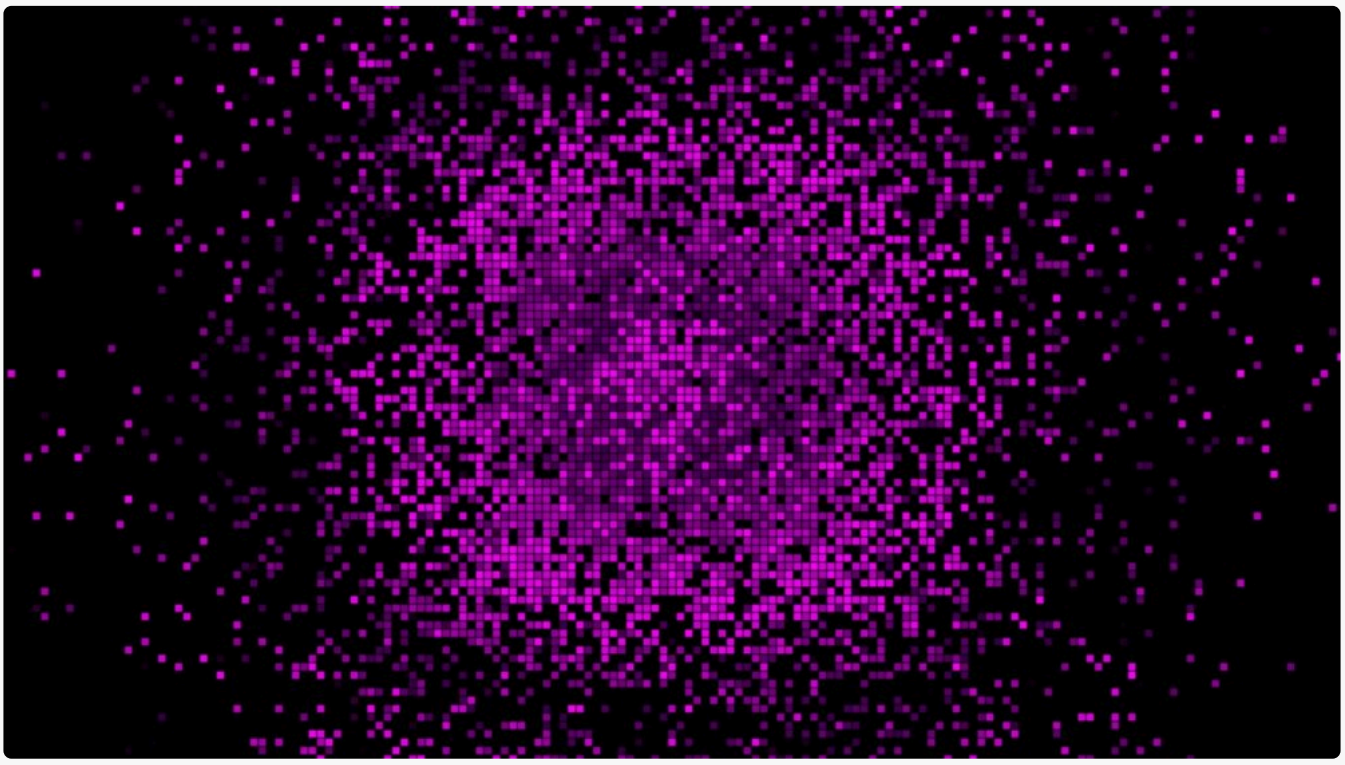
				
Dot Matrix Renderer	Geometry Connections Renderer	Line Connection Renderer	Line Renderer	Mesh Renderer
				
Point Renderer	Render Particles To Surfaces	Trail Renderer	Volume Renderer	

- Gradient 2D Renderer

Dot Matrix Renderer

Method

This node renders particles in a dot-matrix like effect that aligns them to grid cells on the screen.

Example


Attributes

Name	Description
Texture	Select a texture to be rendered at each particles position.
Particle Size	Edit the size of the particles once they are rendered.
Particle Alpha	Change the alpha value for the particles.
Visible	Control whether the node is visible or not to the scene.
Dot Grid Size	The size of the grid in cells in pixels.
Sort Key Value	Biases the depth-based render order, to force the particle system to be drawn before or after other objects in the scene.
Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the

	point at which they intersect with the rest of the scene.
Use Texture Animation	Edit whether the texture animation is shown with the rendering.
Texture Animation Rate	Change the speed the texture animation is played at.
Num Frames X	Change how many tiles the sprite image will be spread across the x axis.
Num Frames Y	Change how many tiles the sprite image will be spread across the y axis.
Randomise Start Frame	Randomises the beginning frame the texture animation is played from.
Sort Particles	Toggle whether the particles are sorted by depth from camera from back to front before rendering, enabling transparent particles to be rendered correctly.
Blend Mode	Choose how the texture blends onto the particles.

Inputs

Name	Description	Typical Node Input
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Geometry Connection Renderer

Method

This node generates faces and lines based on the position of particles in the scene. Particles are joined with lines by proximity, and where lines form a triangle one is created.

Example
From the “No Thanks” sample.

Attributes

Name	Description
Min Distance Threshold	Minimum distance between two particles to draw a line between.
Distance Threshold	Maximum distance a line can be drawn at.
Connection Lifetime	How long a line drawn between two particles should last after the connection is initially made.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.

Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the point at which they intersect with the rest of the scene.
Particle Use Amount	Percentage of particles that can be used by the node.
Draw Triangles	Draw triangle geometry from the particles.
Use Particle Colours	recolour the triangles to blend between the colour of the particles they were spawned from.

Lines

Name	Description
Visible	Control whether the lines are visible or not.
Alpha	Change the alpha value for the particles.
Colour	Colour of lines when they are drawn.
Use Vertex Colours	Rendered lines will use the colours from source particle.
Blend Mode	How the lines blend with the rest of the scene. see Blend Modes for details.
Thick Lines	Toggle whether the lines have 3D thickness, or not.
Hide Back Face Lines	Hide lines drawn from the back faces of generated the triangles.
Scale Thickness With Distance	Scale the thickness of the lines by their distance to the camera.
Thick Line Width	Edit the thickness of the line rendered. Only functions if Use Thick Lines is turned on.
Show Silhouette Lines	Determines whether lines along the silhouette of the shape should be rendered. The silhouette is determined as lines connected to two polygons, where one faces towards the camera and the other faces away.
Show Normal Difference Lines	Determines whether lines along creases between connected polygons facing in different directions should be rendered.
Show Unshared Lines	Determines whether lines along unshared edges should be rendered.
Show Other Lines	Determines whether lines not covered by the other cases should be rendered.
Unshared Line Weight	The intensity of the unshared lines.
Silhouette	The intensity of the silhouette lines.

Line Weight	
Normal Difference Line Weight	The intensity of the normal difference lines.
Other Lines Weight	The intensity of the other lines.
Line Normal Difference Angle	The threshold angle between polygons that qualifies as creating a normal difference edge.
Line Normal Fade Sharpness	The sharpness of the falloff for the angle between polygons creating a normal difference edge – allowing the line to fade out as polygons flatten.
Line Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the point at which they intersect with the rest of the scene.

Materials

See Materials.

Inputs

Name	Description	Typical Node Input
Material	Add a material to override the internal material and affect the generated geometry.	Material
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

This node generates geometry which can be Deformed or used as an input source for other effects.

Gradient 2D Renderer

Method

This node generates a 2D Gradient based on the positions and colours of active particles.

Attributes

Name	Description
Visible	Control whether the node is visible or not to the scene.
Alpha	How much the rendered gradient blends with the scene.
Blend Mode	How the gradient blends with the scene. See Blend Modes for details.
Falloff Scale	Scale the size of the falloff.
Falloff Power	How strong the falloff is.
Sort Key Value	Biases the depth-based render order, to force the particle system to be drawn before or after other objects in the scene.

Inputs

Name	Description	Typical Node Input
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Line Connection Renderer

Method

This node renders lines between pairs of nearby particles, giving the impression of a mesh-like structure.

The connection pairs are determined by locating particles that are near to each other using a spatial grid. This grid may be scaled by connecting a node to the Bounding Box input. A particle may be connected to multiple others; the amount is controlled by the Max Lines Per Particle parameter. The Min Distance and Distance Threshold parameters are used to limit the distance between particles that are allowed to be connected, and the Max X/Y/Z Difference parameters control the limits on separations in each dimension of space. Additionally a position and radius may be used to limit the area of space where lines can be generated, specified by the Affected Radius parameter and the Affected Centre Position input.

Once connected, particles remain joined for a period of time specified by the Line Connection Lifetime parameter unless one of the particles dies.

Particles can be sorted in back to front rendering order if Sort Particles is enabled, allowing transparent particles to render and blend together correctly. The Blend Mode parameter is used to control the blend mode between individual particles and also between the particles and the rest of the scene. The Particle Alpha parameter can be used to control the transparency of individual particles, scaling the alpha value already on the particle's colour channel. Lines may be rendered as thin single pixel lines, or thickened and rendered as quads with softened edges, determined by the Use Thick Lines parameter. When rendered as thick lines the line thickness may be controlled by the Line Thickness parameter.

Example

This image is taken from the “imag_samples.dfx” sample project.

Attributes

Name	Description
Particle Alpha	Change the alpha value for the particles.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.
Sort Key Value	Biases the depth-based render order, to force the particle system to be drawn before or after other objects in the scene.
Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the point at which they intersect with the rest of the scene.
Distance Threshold	Maximum distance a line can be drawn at.
Min Distance	Maximum distance a line can be drawn at.
Particle Use Amount	Percentage of particles that can be used by the node.
Line Thickness	Edit the thickness of the line rendered. Only functions if “Use Thick Lines” is enabled.
Depth Of Field Amount	How much depth of field effects the particles.
Line Connection	Length of time a line between two points can exist.

Lifetime	
Affected Radius	The radius of the area of space within which connections may be generated.
Max X Difference	The maximum separation of particles in the X axis that can be connected.
Max Y Difference	The maximum separation of particles in the Y axis that can be connected.
Max Z Difference	The maximum separation of particles in the Z axis that can be connected.
Cast Shadows	Control whether shadows are cast.
Sort Particles	Toggle whether the particles are sorted by depth from camera from back to front before rendering, enabling transparent particles to be rendered correctly.
Blend Mode	Edit the blend mode used for the particles. See Blend Modes for details.
Use Thick Lines	Toggle whether the lines have 3D thickness, or not.
Max Lines Per Particle	Maximum number of lines that can be drawn from each particle.

Inputs

Name	Description	Typical Node Input
Bounding Box	Limit the area for which shadow casting will be calculated.	Bounding Box
Affected Centre Position	Controls the centre position of a radial area of space where the connections may be generated.	Null
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Line Renderer

Method

This node renders lines between pairs of particles that neighbour each other in emission order. This is typically used in conjunction with emitters that spawn particles in an ordered fashion so that lines are coherent; otherwise the lines that are created may appear random.

Particles can be sorted in back to front rendering order if Sort Particles is enabled, allowing transparent particles to render and blend together correctly. The Blend Mode parameter is used to control the blend mode between individual particles and also between the particles and the rest of the scene. The Particle Alpha parameter can be used to control the transparency of individual particles, scaling the alpha value already on the particle's colour channel. Lines may be rendered as thin single pixel lines, or thickened and rendered as quads with softened edges, determined by the Use Thick Lines parameter. When rendered as thick lines the line thickness may be controlled by the Line Thickness parameter.

Example

This image is taken from the "imag_samples.dfx" sample project.

Attributes

Name	Description
Texture	Select a texture to be rendered at each particles position.
Line Thickness	Edit the thickness of the line rendered. Only functions if Use Thick Lines is turned on.
Particle Alpha	Change the alpha value for the particles.
Depth Of Field Amount	How much depth of field effects the particles.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.
Screen Size Limits	The minimum and maximum size of the rendered particle in normalised screen coordiates.
Sort Key Value	Biases the depth-based render order, to force the particle system to be drawn before or after other objects in the scene.
Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the point at which they intersect with the rest of the scene.
Lit	Control whether the particles are lit.
Cast Shadows	Control whether shadows are cast.
Sort Particles	Toggle whether the particles are sorted by depth from camera from back to front before rendering, enabling transparent particles to be rendered correctly.
Blend Mode	Edit the blend mode used for the particles. See Blend Modes for details.
Use Thick Lines	Toggle whether the lines have 3D thickness, or not.

Inputs

Name	Description	Typical Node Input
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

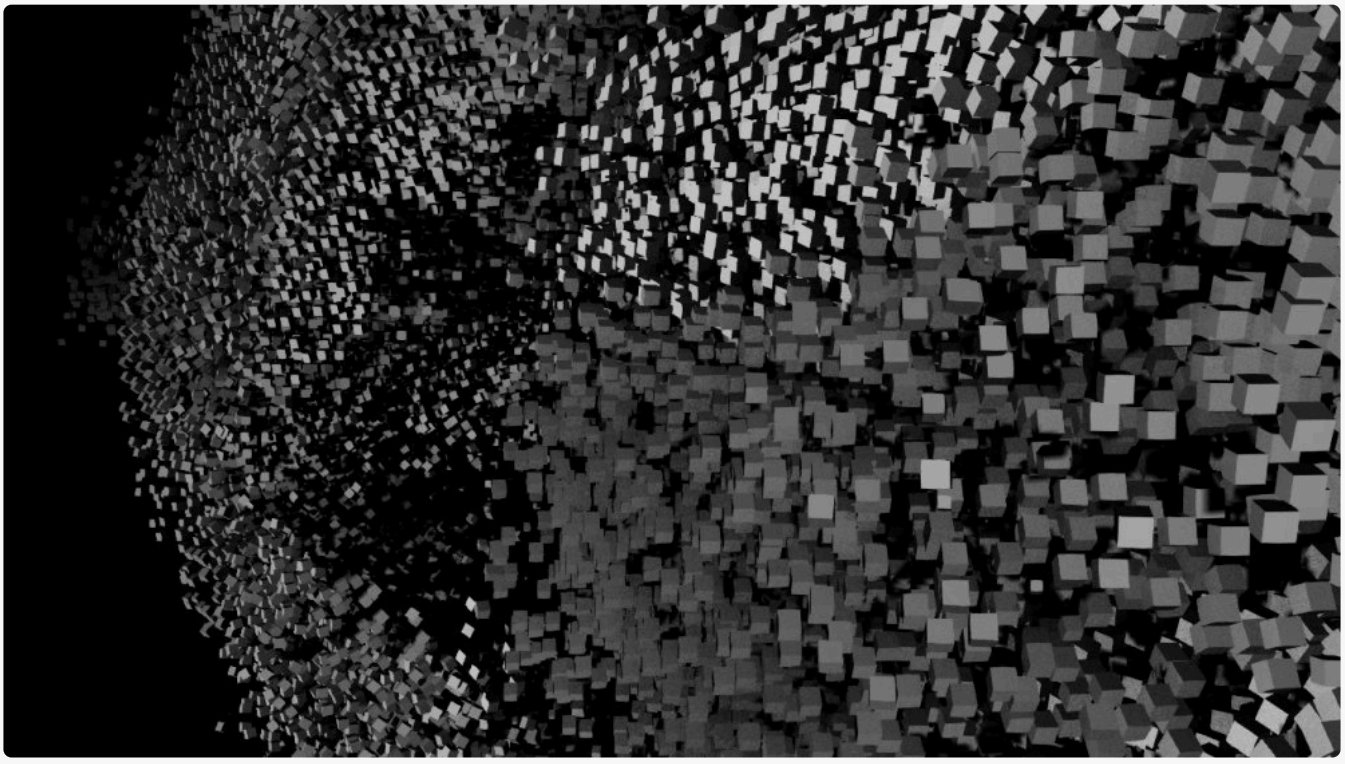
Mesh Renderer

Method

> ! Mesh Renderer is being deprecated and replaced by Clone to Particles which handles a wider range of meshes, including Shape 3D and Text nodes.

This node renders an instance of a mesh at the location of every active particle. A 3D Object must be connected to the Object Nodes input, or parented to the Mesh Renderer node, for it to be effective.

If the particle system contains a lot of active particles or the connected 3D object is complex or has a high polygon count it will impact heavily on performance.

Example

This image is taken from the “meshparticle_renderer.dfx” sample project.

Attributes

Name	Description
Particle Size	Edit the size of the particles once they are rendered.

Particle Scale Coeffs	How much the particle scales are affected by the node at different stages of the particles life cycle. Values 1 and 2 are control points, and are used to control the curve between values 0 and 3.
Size Randomisation Coeffs	How much the rendereed meshes sizes change randomly at different stages of the particles life cycle. Values 1 and 2 are control points used to control a bezier curve between values 0 and 3.
Rotation Randomness	Give the meshes a randomised rotation.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.
Size Randomness	Control the randomness in size of the particles.
Animation Speed	Control the speed that mesh animations are played at.
Velocity Rotation Speed	Control the speed at which the mesh particles rotate.
Cast Shadows	Control whether shadows are cast.
Rotation Mode	Control the rotation of particles as they are emitted. • None, the meshes move around and face the same direction regardless of movement. • Motion Direction, the mesh is rotated to face the direction it is rotating. • Normal, the mesh is rotated to face the particles normal.

Inputs

Name	Description	Typical Node Input
Object Nodes	Choose the objects that will be used in the particle rendering.	3D Object
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Point Renderer

Method

This node renders a point sprite for every particle. A point sprite is a quad which is positioned in 3D space, is rotated to face the camera and may be textured. This is the most commonly used rendering node for particle effects.

Particles can be sorted in back to front rendering order if Sort Particles is enabled, allowing transparent particles to render and blend together correctly. The Blend Mode parameter is used to control the blend mode between individual particles and also between the particles and the rest of the scene. The Particle Alpha parameter can be used to control the transparency of individual particles, scaling the alpha value already on the particle's colour channel.

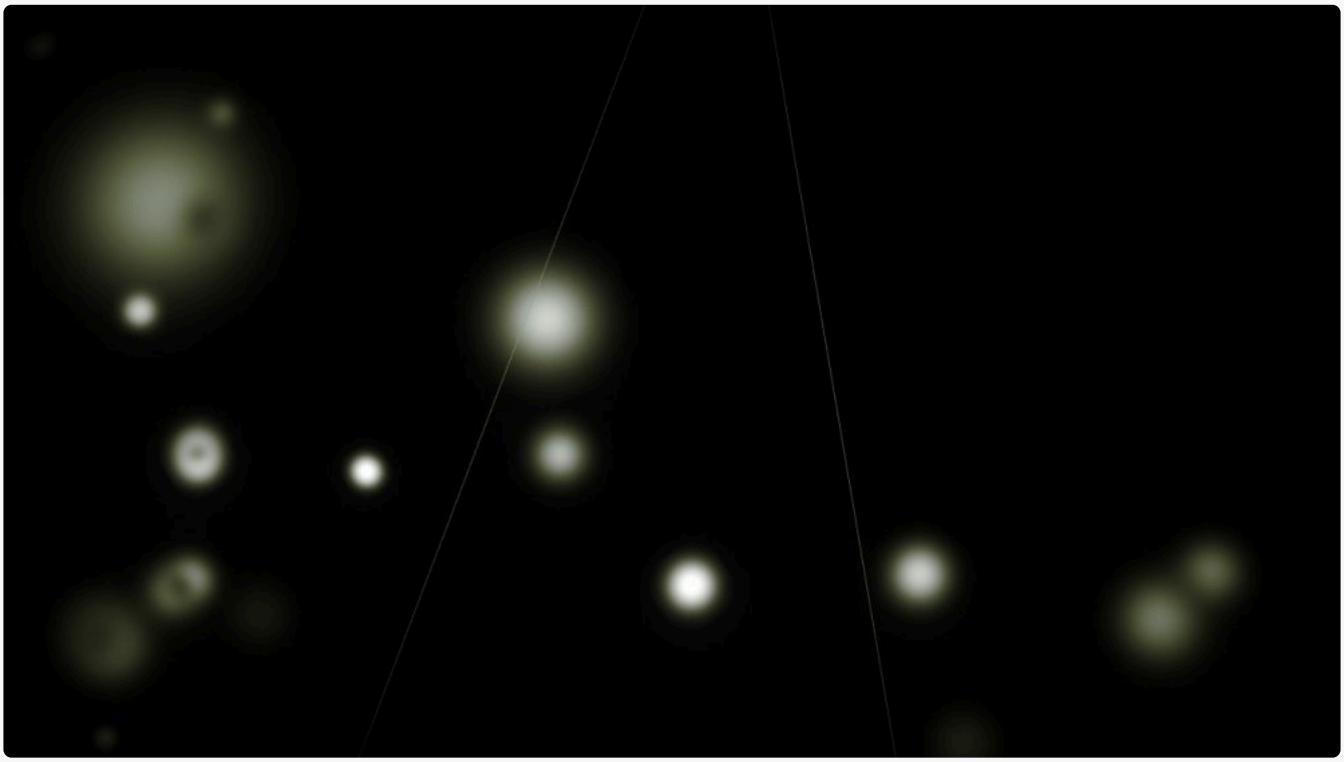
The particle size may be controlled by the Particle Size and Particle X and Y Scale parameters, which are multiplied with the scale on the particle's emitter material. The scale can be randomised using the Size Randomness parameter. The Scale Over Time control can be used to make the particle grow or shrink over its life time. The Scale / Alpha Mode control can be used to additionally scale particles by the alpha value of their colour channel, allowing Shading nodes to have an effect on the scale of particles by modifying the alpha. Particles are usually camera-aligned so sprites are always oriented to the view direction but the Alignment parameter may be used to orient them along the particle's normal direction instead. The 2D rotation of sprites may be controlled by the Rotation and Rotation Randomness parameters.

Particles, like other 3D objects, are rendered to normalised viewport coordinates with sub-pixel accuracy. For some forms of output target such as low resolution LED screens it may be desirable to make particles fit exactly to pixels. The Pixel-Align Output control can be used to snap them to pixel boundaries and the size limits may optionally be specified in pixels.

An image may be used on the particle. It can be set via the Texture parameter, or via a Video Node connected to the Image Node input. If an image is not used the sprites will render as plain rectangles. The alpha channel of the image is used to affect particle transparency. So that animations can be played on each particle or so that each particle can use a different image, it is possible to treat the image as multiple frames laid out within the texture. The Texture Animation parameters control this. If Use Texture Animation is enabled, the image is considered to be a series of frames laid out in a regular grid of cells defined by Num Frames X and Num Frames Y. Each particle then plays the animation frames sequentially at a rate defined by Texture Animation Rate, with loop points set by Texture Animation End Frame and Texture Animation Loop Frame. The Texture Start Frame Mode parameter is used to determine how the start frame of the animation is chosen per particle: from the start, from a random frame, or using the particle's emission sequence or emitter. If the Texture Animation Rate is set to 0 and a random start

frame is used, each particle will use a different static frame of the texture but no animation will occur.

Motion blur effects may be simulated on particles in an efficient way using the Motion Blur Amount parameter, which causes sprites to be stretched along their direction of motion. Depth of field may be simulated by blurring and enlarging the sprites further away from the camera focus plane.

Example

This image is taken from the “imag_samples.dfx” sample project.

Attributes

Name	Description
Texture	Select a texture to be rendered at each particles position.
Visible	Control whether the node is visible or not to the scene.
Particle Alpha	Control the alpha value for each particle.
Blend Mode	Edit the blend mode used for the particles. See Blend Modes for details.
Particle Size	Edit the size of the particles once they are rendered.
Particle X Scale	Control the x-scale of the sprites emitted.
Particle Y Scale	Control the y-scale of the sprites emitted.

Particle Use Amount	Percentage of particles that can be used by the node.
Pixel-Align Output	Align the rendered points exactly to screen pixels, with no sub-pixel interpolation.
Particle Scale Coeffs	How much the particle scales are affected by the node at different stages of the particles life cycle. Values 1 and 2 are control points, and are used to control the curve between values 0 and 3.
Screen Size Limits	The minimum and maximum size of the rendered particle in normalised screen coordiates.
Specify Size Limits In Pixels	Indicates whether particle size limits are specified in normalised viewport coordinates which are consistent across different render resolutions, or in pixels.
Size Randomness	Control the randomness in size of the particles.
Scale Over Time	Change the scale of the sprites over time.
Scale Over Time Mode	How the particle is scaled over time. • Particle Time, Individual particles scale over their life time; particles that live longer will end up scaling more. • Normalised Emitter Time, Individual particles scale over the time of the emitter. • Normalised Particle Time, Individual particles scale over their life time; the time is normalised so all particles reach the same scale at death.
Scale / Alpha Mode	Control how the scale and alpha modes relate to each other.
Rotation	Control the rotation of the sprites.
Rotation Randomness	Give the meshes a randomised rotation.
Rotation Follows Direction	Toggle whether the rotation of the particles follows the direction the particle is moving in.
Alignment	Control what the orientation of the sprites aligns too once spawned.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.
Render Geometry Type	Choose whether the particles spawn as single pixel points or spawn as a sprite texture.
Blur Mip Levels	The number of MIP levels in the image that may be used for blurring effects.
Sort Key Value	Biases the depth-based render order, to force the particle system to be drawn before or after other objects in the scene.
Sort Particles	Toggle whether the particles are sorted by depth from camera from back to front before rendering, enabling transparent particles to be rendered correctly.

Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the point at which they intersect with the rest of the scene.
Motion Blur Amount	Control the amount of motion blur.
Mipmap Enabled	Toggle whether mipmaps are enabled.
Depth Of Field Amount	How much depth of field effects the particles.
Randomise DOF Amount	Randomises the position of particles based on their distance from the focus plane.
Depth Of Field Texture Size	The size of the texture used when depth of field is enabled.

Texture Animation

Name	Description
Use Texture Animation	Edit whether the texture animation is shown with the rendering.
Texture Animation Rate	Edit whether the texture animation is shown with the rendering.
Texture Animation Loop Frame	The index of the frame that will be jumped to after a loop.
Texture Animation End Frame	The index of the last frame in the texture, which causes a loop when reached.
Num Frames X	Change how many tiles the sprite image will be spread across the x axis.
Num Frames Y	Change how many tiles the sprite image will be spread across the y axis.
Texture Start Frame Mode	The method by which the start frame of the texture animation is chosen. • Frame 0, the animation always starts at frame 0 for every particle. • Random, a random frame is chosen as the start frame. • Particle Index, the particle's emission sequence index is used to choose the start frame. • Emitter Index, the particle's emitter is used to choose the start frame, so all particles from one emitter start on the same frame.
Choose Frame By Best Fit To Colour	Choose the texture animation frame by analysing which frame best fits the colour of the particle.

Lighting

Name	Description

Lit	Control whether the particles are lit.
Volumetric Shadows	Enable volumetric shadows.
Volumetric Shadows Alpha	The transparency of the volumetric shadows.
Cast Shadows	Cast shadows from particles onto the scene.
Shadow Particle Size	The size of the particles when rendered into the shadow map.
Shadow Particle Alpha	The transparency of the particles when rendered into the shadow map.
Local Lighting Enabled	Toggles per-pixel lighting on particles.
Curvature	The curvature of the particle when used for lighting.

Inputs

Name	Description	Typical Node Input
Image Node	Used to provide a texture for sprite rendering.	Video Node
Lights	Control which light nodes affect the node.	Light
Bounding Box	Limit the area for which shadow casting will be calculated.	Bounding Box
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Render Particles To Surfaces

Method

This node renders particles onto nearby 3D surfaces. This means that instead of rendering particles directly into space, they instead appear as splats on 3D geometry, only being visible when they are close enough to 3D geometry. This is particularly useful when attempting to render particles in a scene rendered by a UV Camera.

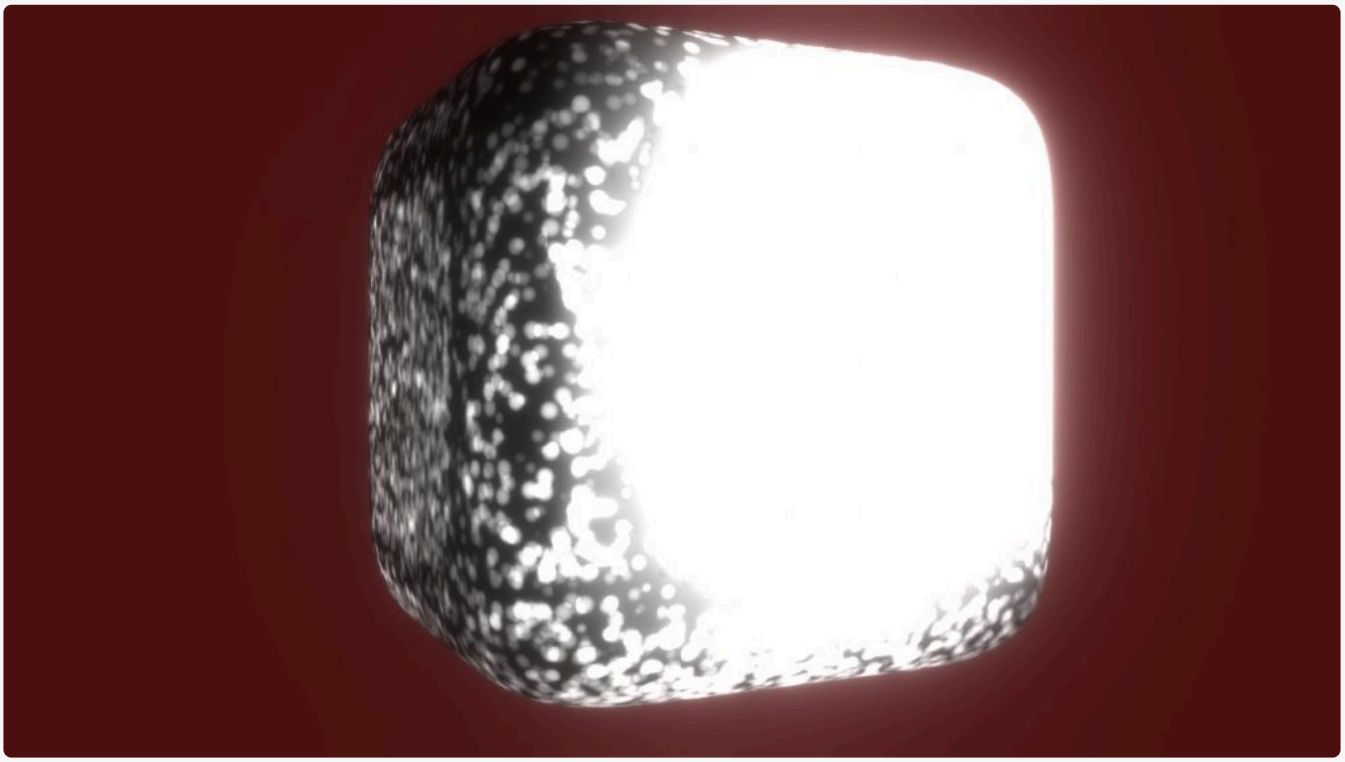
For this node to be effective, Deferred Rendering must be enabled in the Root Node. There must be visible opaque 3D geometry in the scene, and the particles must be close enough to geometry to intersect with it in order to be rendered.

The Blend Mode parameter is used to control the blend mode between individual particles and also between the particles and the rest of the scene. The Particle Alpha parameter can be used to control the transparency of individual particles, scaling the alpha value already on the particle's colour channel.

The particle size may be controlled by the Particle Size and Particle X and Y Scale parameters, which are multiplied with the scale on the particle's emitter material. The scale can be randomised using the Size Randomness parameter. The Scale Over Time control can be used to make the particle grow or shrink over its life time. The Scale / Alpha Mode control can be used to additionally scale particles by the alpha value of their colour channel, allowing Shading nodes to have an effect on the scale of particles by modifying the alpha. Particles are usually camera-aligned so sprites are always oriented to the view direction but the Alignment parameter may be used to orient them along the particle's normal direction instead. The 2D rotation of sprites may be controlled by the Rotation and Rotation Randomness parameters.

An image may be used on the particle. It can be set via the Texture parameter, or via a Video Node connected to the Image Node input. If an image is not used the sprites will render as plain rectangles. The alpha channel of the image is used to affect particle transparency. So that animations can be played on each particle or so that each particle can use a different image, it is possible to treat the image as multiple frames laid out within the texture. The Texture Animation parameters control this. If Use Texture Animation is enabled, the image is considered to be a series of frames laid out in a regular grid of cells defined by Num Frames X and Num Frames Y. Each particle then plays the animation frames sequentially at a rate defined by Texture Animation Rate, with loop points set by Texture Animation End Frame and Texture Animation Loop Frame. The Texture Start Frame Mode parameter is used to determine how the start frame of the animation is chosen per particle: from the start, from a random frame, or using the particle's emission sequence or emitter. If the Texture Animation Rate is set to 0 and a random start frame is used, each particle will use a different static frame of the texture but no animation will occur.

Motion blur effects may be simulated on particles in an efficient way using the Motion Blur Amount parameter, which causes sprites to be stretched along their direction of motion. Depth of field may be simulated by blurring and enlarging the sprites further away from the camera focus plane.

Example


Attributes

Name	Description
Texture	Select a texture to be rendered at each particles position.
Particle Size	Edit the size of the particles once they are rendered.
Particle X Scale	Control the x-scale of the sprites emitted.
Particle Y Scale	Control the x-scale of the sprites emitted.
Pixel Align Output	Align the rendered points exactly to screen pixels, with no sub-pixel interpolation.
Particle Scale Coeffs	How much the particle scales are affected by the node at different stages of the particles life cycle. Values 1 and 2 are control points, and are used to control the curve between values 0 and 3.
Particle Alpha	Change the alpha value for the particles.
Visible	Control whether the node is visible or not to the scene.

Size Randomness	Control the randomness in size of the particles.
Rotation Randomness	Give the meshes a randomised rotation.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.
Screen Size Limits	The minimum and maximum size of the rendered particle in normalised screen coordiates.
Specify Size Limits In Pixels	Indicates whether particle size limits are specified in normalised viewport coordinates which are consistent across different render resolutions, or in pixels.
Sort Key Value	Biases the depth-based render order, to force the particle system to be drawn before or after other objects in the scene.
Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the point at which they intersect with the rest of the scene.
Motion Blur Amount	Control the amount of motion blur.
Use Texture Animation	Edit whether the texture animation is shown with the rendering.
Texture Animation Rate	Edit whether the texture animation is shown with the rendering.
Num Frames X	Change how many tiles the sprite image will be spread across the x axis.
Num Frames Y	Change how many tiles the sprite image will be spread across the y axis.
Randomise Start Frame	Randomises the beginning frame the texture animation is played from.
Blend Mode	Choose how the particle colours blend to the source colours
Rotation Follows Direction	Toggle whether the rotation of the particles follows the direction the particle is moving in.
Output Target	Determines which channel the effect is rendered to. • Composite, Render particles to the final composite colour channel. • Baked Shadow, Render particles to the shadow channel, so they appear as shadows that darken the effect of lights on geometry. • Albedo, Render particles to the albedo colour channel so they appear as decals, with lighting applied on top.

Inputs

Name	Description	Typical Node Input
Bounds Node	The bounding box within which particles are rendered.	Bounding Box
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Trail Renderer

Method

This node generates trails of lines or points along the path of individual particles to create trail-like effects. This is done by sampling the particle position at regular time intervals and storing the samples as control points in a path buffer. The size of the path buffer is finite so only a limited number of control points per particle may be stored, which in turn limits the visual length of the generated trail. The rate at which samples are taken is controlled by the Control Point Time Spacing parameter. There is also a threshold applied to the distance in 3D space between samples which is controlled using the Distance Threshold parameter. By increasing these thresholds new control points are added less regularly, allowing the trail to become longer. Control points slowly die over time, fading out the end of the trail. This is controlled by the Trail Decay parameter. The Particle Use Amount parameter is used to limit the number of particles that generate trails.

Particles can be sorted in back to front rendering order if Sort Particles is enabled, allowing transparent particles to render and blend together correctly. The Blend Mode parameter is used to control the blend mode between individual particles and also between the particles and the rest of the scene. The Particle Alpha parameter can be used to control the transparency of individual particles, scaling the alpha value already on the particle's colour channel. Lines may be rendered as thin single pixel lines, or thickened and rendered as quads with softened edges, or the trail may be rendered as individual control points, determined by the Primitive Types parameter. When rendered as thick lines the line thickness may be controlled by the Line Thickness parameter.

Example

This image is taken from the “tornado.dfx” sample project.

Attributes

Name	Description
Particle Alpha	Change the alpha value for the particles.
Blend Mode	Edit the blend mode used for the particles. See Blend Modes for details.
Primitive Types	Change the shape that trails behind the particle. • Lines, single pixel lines trail the particles. • Thick Lines, particles with variable thickness follow the particles. • Thick Lines (Simplified), Uses simplified thick lines to generate to particle lines. • Extruded Geometry, Extrudes a geometric shape along the particle lines.
Line Thickness	Edit the thickness of the line rendered. Only functions if Use Thick Lines is turned on.
Line Softness	Change the thickness of the gradient along the edge of the line.
Luminance	How bright the drawn trail is.
Luminance Randomness	How much rnadomness there is in the brightness of the drawn trail.
Sort Key Value	Biases the depth-based render order, to force the particle system to be drawn before or after other objects in the scene.
Depth Bias	Offsets particles in depth so they are closer or further away from the camera, changing the point at which they intersect with the rest of the scene.

Cast Shadows	Control whether shadows are cast.
Sort Particles	Toggle whether the particles are sorted by depth from camera from back to front before rendering, enabling transparent particles to be rendered correctly.

Trail Properties

Name	Description
Control Point Time Spacing	The minimum time allowed between control point samples.
Trail Fade Mode	Select how the trail fading is calculated. • Time, Trail fades based on the timeline. • Length, Trail fades on the length of the trail. • Age, Trail fades based on the age of each particle.
Trail Decay	The rate of decay for control point samples. Only functions with Time set in Trail Fade Mode.
Trail Fade Length	Set the length at which the particles fade off at. Only functions with Length set in Trail Fade Mode.
Trail Fade Age	Set the age at which the particles fade at. Only functions with Age set in Trail Fade Mode.
Trail Fade Range	How aggressively the particles fade away.
Num Trail Vertices	Change the number of vertices generated to form the trail.
Particle Use Amount	Percentage of particles that can be used by the node.
Num Radial Segments	Change the number of sides to the extruded geometry. Extruded Geometry must be selected in the Primitive Types attribute.

Inputs

Name	Description	Typical Node Input
Material	Input a material to be used by the trail when in Extruded Geometry mode.	Materials
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform	Override the transformation values of the node, relative to its parent.	Null

Override		

Outputs

In general, this node does not create usable outputs, but in Extruded Geometry mode this node generates geometry which can be Deformed or used as an input source for other effects.

Volume Renderer

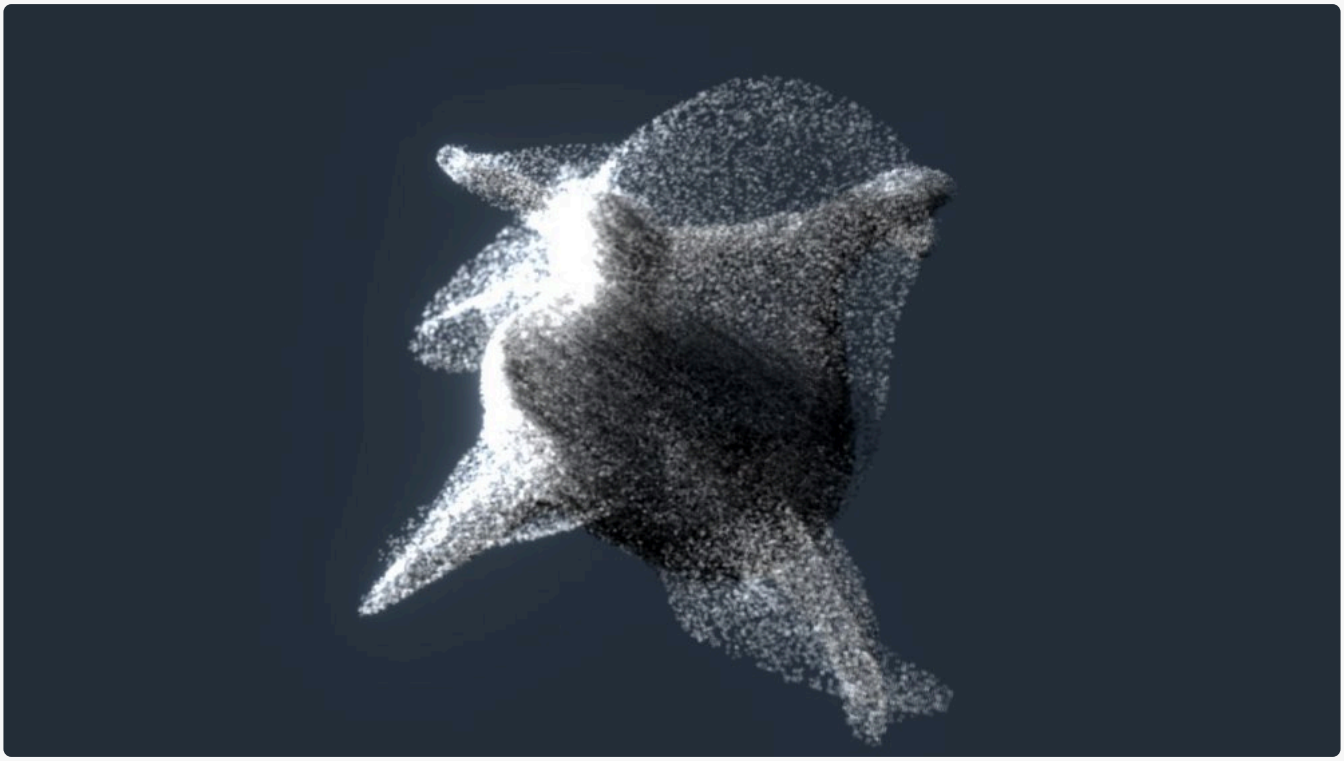
Method

This node renders particles using a volume renderer. This causes space to be split into a 3D grid of cells and particles within each cell are accumulated together, before the cells are rendered to screen in depth order. This can give the appearance of a more continuous, solid, smooth result than would be achieved by rendering particles as points. One of the advantages of volume rendering is that lighting and shadow effects can be rendered realistically, with light cast through the grid being absorbed and tinted by filled cells to create transparent shadow effects.

The Resolution parameter controls the resolution of the 3D grid, where higher resolution will give more detail but impact more heavily on performance. The area of space covered by the grid can be controlled by connecting a Bounding Box to the Bounding Box input.

This effect is computationally demanding and may not be suitable for some real-time use cases and hardware targets.

Example



This image is taken from the “volume_shadow_particles.dfx” sample project.

Attributes

Name	Description
Resolution	The resolution of the 3D grid used for volume rendering.
Colour	The tint colour applied to the results of the volume render.
Particle Size	Edit the size of the particles once they are rendered.
Particle Alpha	Change the alpha value for the particles.
Shadow Alpha	Change the alpha of the shadow that is cast by the particles.
Absorption Colour	The tint applied to light as it passes through cells and is absorbed.
Rotation Randomness	Give the meshes a randomised rotation.
Luminance Randomness	Control how much randomness is in the luminance of the rendered particles.
Motion Blur Amount	Control the amount of motion blur.
Voxel Size	Control the size of the voxels.
Cast Shadows	Control whether shadows are cast.
Fog Near Distance	The distance at which the fog effect begins to be applied.
Fog Range	The distance at which the fog effect reaches full intensity.
Fog Colour	The colour of the fog effect.

Inputs

Name	Description	Typical Node Input
Bounding Box	The region of space included in the volume renderer.	Bounding Box
Light Node	Lights which affect the volume renderer.	Light
Rendered Emitters	Specify which emitters are rendered using this renderer. By default, all emitters connected to the same particle root as the renderer are rendered.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

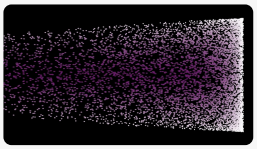
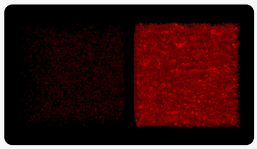
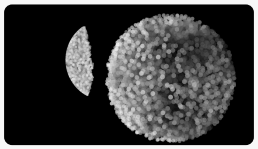
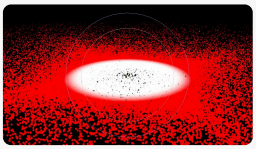
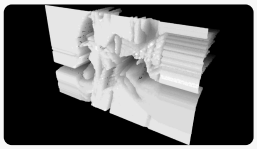
Shading

Method

Shading nodes change the colour or position of the particles in various ways. Some shading nodes are used to tint particles based on their own individual attributes such as their life or velocity; others consider them as a system and shade them by density of particles in a given area; and others use properties from the scene in order to generate lighting and shadow effects. Some other shading nodes generate displacements which are used to offset particle positions at render time.

The generated colour or position is only used at render time and is recalculated every frame, so its state is not stored. Multiple Shading nodes may be used on one set of particles and blended together. They are evaluated in node order. Any Shading nodes need to be connected directly or indirectly to a Particle Root node, and they will only apply to particles within that particle system. If Shading nodes are parented to a particular Particle Emitter they will only apply to particles spawned from that emitter.

Gallery

				
Attribute Shading	Density Shading	Displace To Shape	Distance Shading	Image Displacement

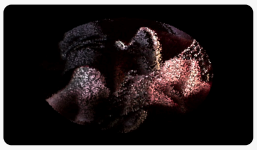
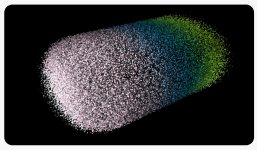
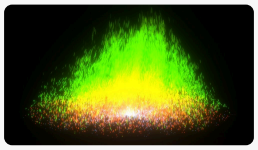
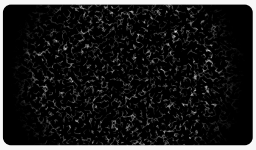
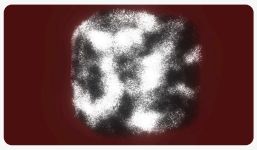
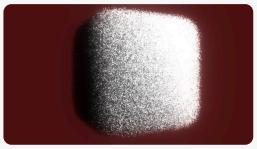
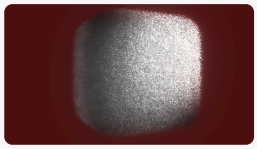

				

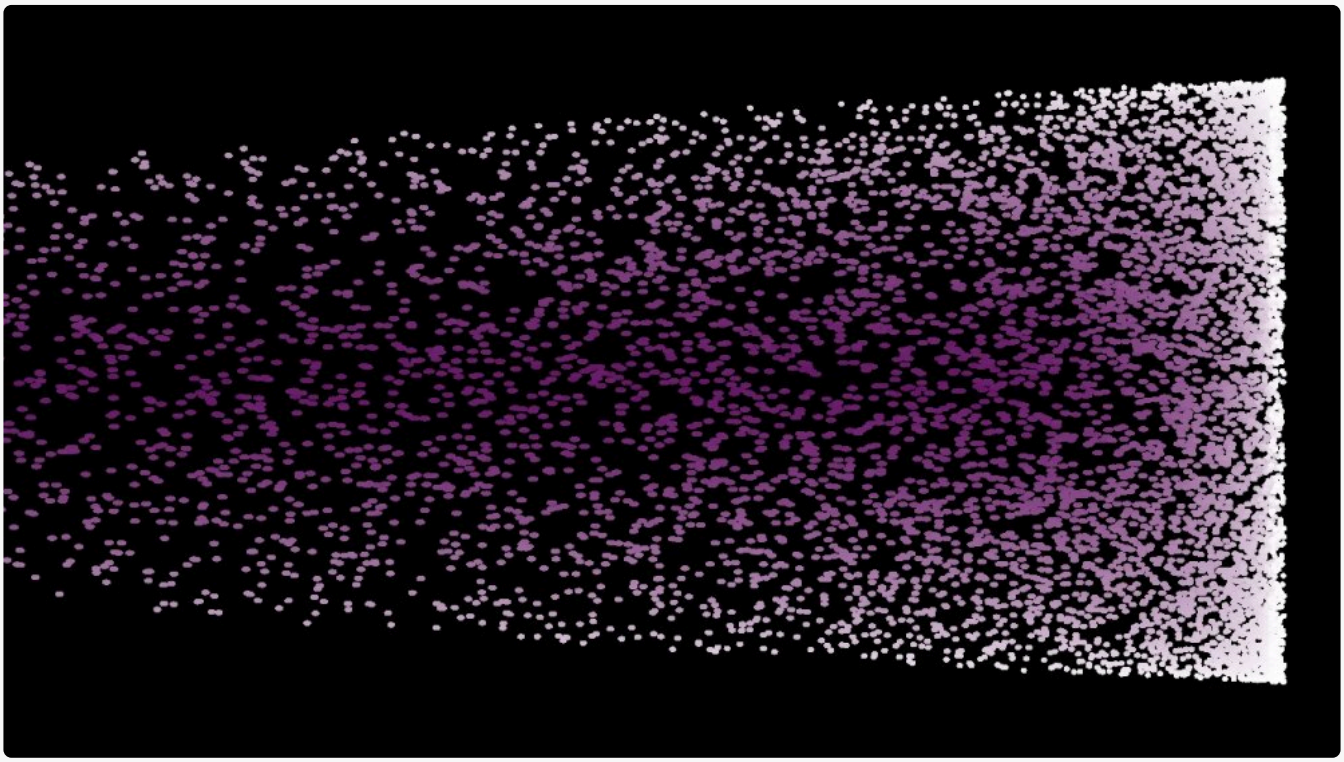
Image Shading	Keyed Colour	Life Colour Shading	Lighting	Noise Shading
				
Volume Shadow Shading	Voxel Cone Shading			

Attribute Shading

Method

This node colours particles based on an attribute per particle. This is used to shade particles by their own properties, e.g. tint a particle red as it gets faster, or fade it out as it faces towards the camera.

A Colour Ramp node may be connected to the Colour Ramp input, which is used as a gradient and sampled by the attribute value to generate the outgoing colour.

Example


Transform

Name	Description
Position X	Position x in local space
Position Y	Position y in local space
Position Z	Position z in local space
Rotation Heading	Rotation around y axis in local space
Rotation Pitch	Rotation around x axis in local space

Rotation Bank	Rotation around z axis in local space
Scale X	Scale along the x axis in local space
Scale Y	Scale along the y axis in local space
Scale Z	Scale along the z axis in local space

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour	Change the colour of the particles as they spawn.
Input Channel	Choose which attribute will be used to control the shader. • Velocity X / Y / Z, Shades the particle based on its velocity along a particular axis. • Velocity Magnitude, Shades the particle based on the particles absolute velocity. • Velocity Along Direction, Shades the particle based on how much its velocity points along the orientation of the shading node. • Facing Along Direction, Shades the particle based on how much its facing direction is aligned to the orientation of the shading node. • Life, Shades the particle based on the remaining life of the particle. • Time, Shades the particle based on the time since birth of the particle. • Normalised Life, Shades the particle based on the remaining life of the particle, scaled into 0 to 1 range by the life at birth of the particle.
Attribute Scale	Scales the incoming attribute value before using it to generate a colour.
Attribute Bias	Offsets the incoming attribute value before using it to generate a colour.
Use Absolute Value (Ignore Sign)	Toggle whether to use the absolute value of the incoming value – ignoring the whether the input channel is negative.
Blend Mode	Choose how the particle colours blend to the source colours
Blend Amount	Control how much the shader affects the particles.

Falloff

Name	Description
Radius	Outer radius for which the particles will no longer be coloured.

Inner Radius	Inner radius for which the particles will be coloured at their max.
Falloff Power	How quickly the gradient changes from the inner radius to the outer radius.

Inputs

Name	Description	Typical Node Input
Colour Ramp	An optional colour ramp node to be sampled by the attribute value.	Colour Ramp
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

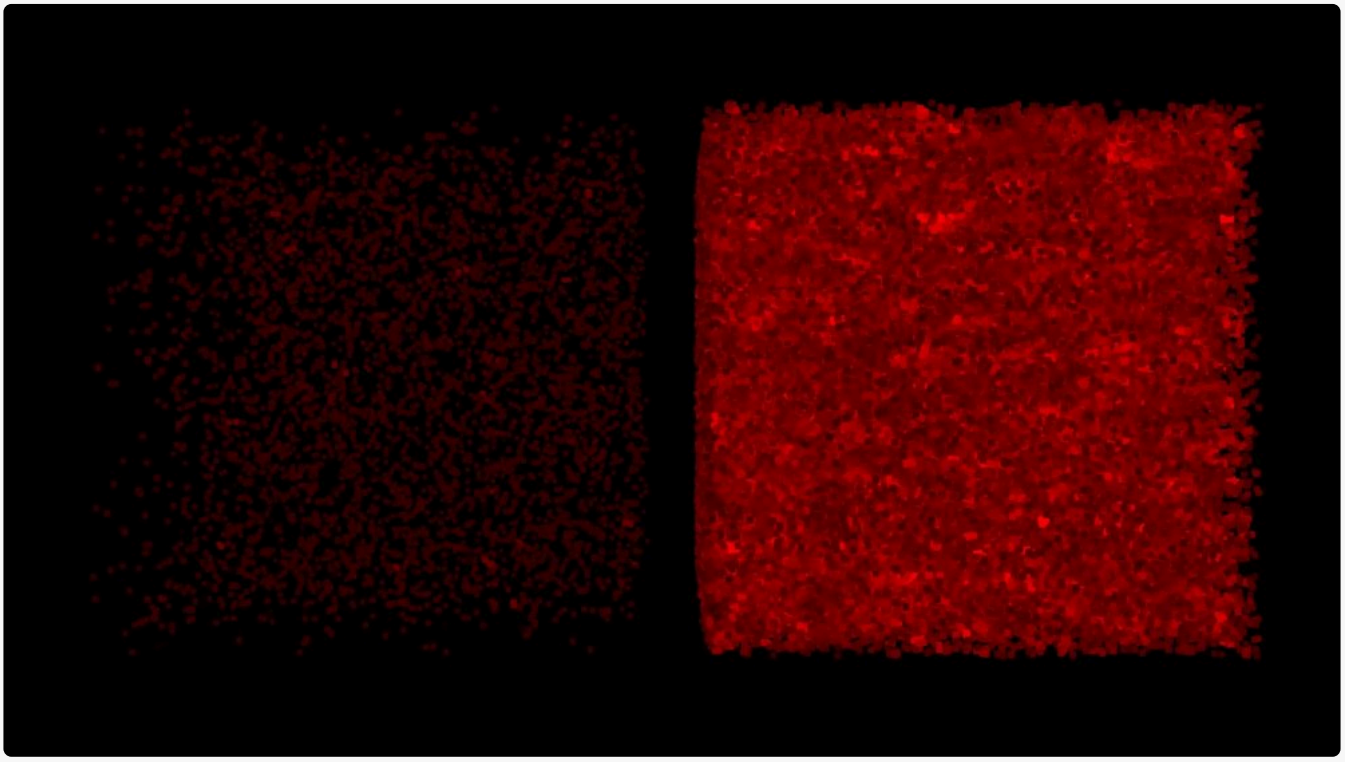
Outputs

The outputs section for this node is currently being worked on.

Density Shading

Method

This node shades particles by the density of particles in a given area of space. More particles close together results in a brighter shading result. The node uses a bounding box connected to the Bounds Node input to define the area of space that it considers. The area of space sampled per particle to determine density depends on this bounding box: it is segmented discretely, so a larger bounding box will cause a larger area per particle to be tested.

Example


Attributes

Name	Description
Density Scale	Scales the density result before using it to calculate a shading value.

Inputs

Name	Description	Typical Node Input

Bounds Node	The bounding box of the space considered by the node.	Bounding Box
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

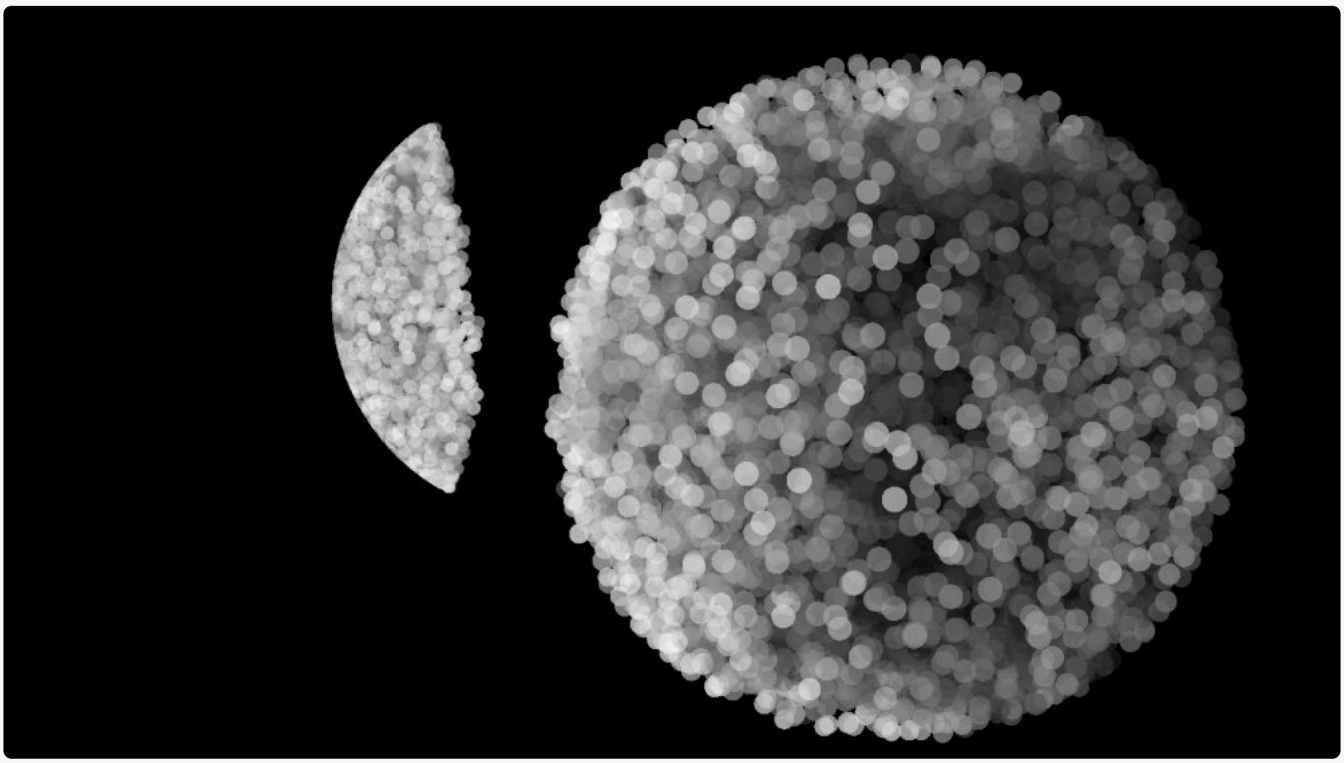
Outputs

The outputs section for this node is currently being worked on.

Displace To Shape

Method

This node displaces a particle so that it is positioned onto the surface of a 3D primitive shape.

Example


Transform

Name	Description
Position X	Position x in local space
Position Y	Position y in local space
Position Z	Position z in local space
Rotation Heading	Rotation around y axis in local space
Rotation Pitch	Rotation around x axis in local space
Rotation Bank	Rotation around z axis in local space
Scale X	Scale along the x axis in local space
Scale Y	Scale along the y axis in local space

Scale Z	Scale along the z axis in local space

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mapping Shape	The shape the particles are displaced to.
Mapping Scale X	The scale of the shape mapping in the X axis.
Mapping Scale Y	The scale of the shape mapping in the Y axis.
Blend Amount	Control how much the shader affects the particles.

Inputs

Name	Description	Typical Node Input
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

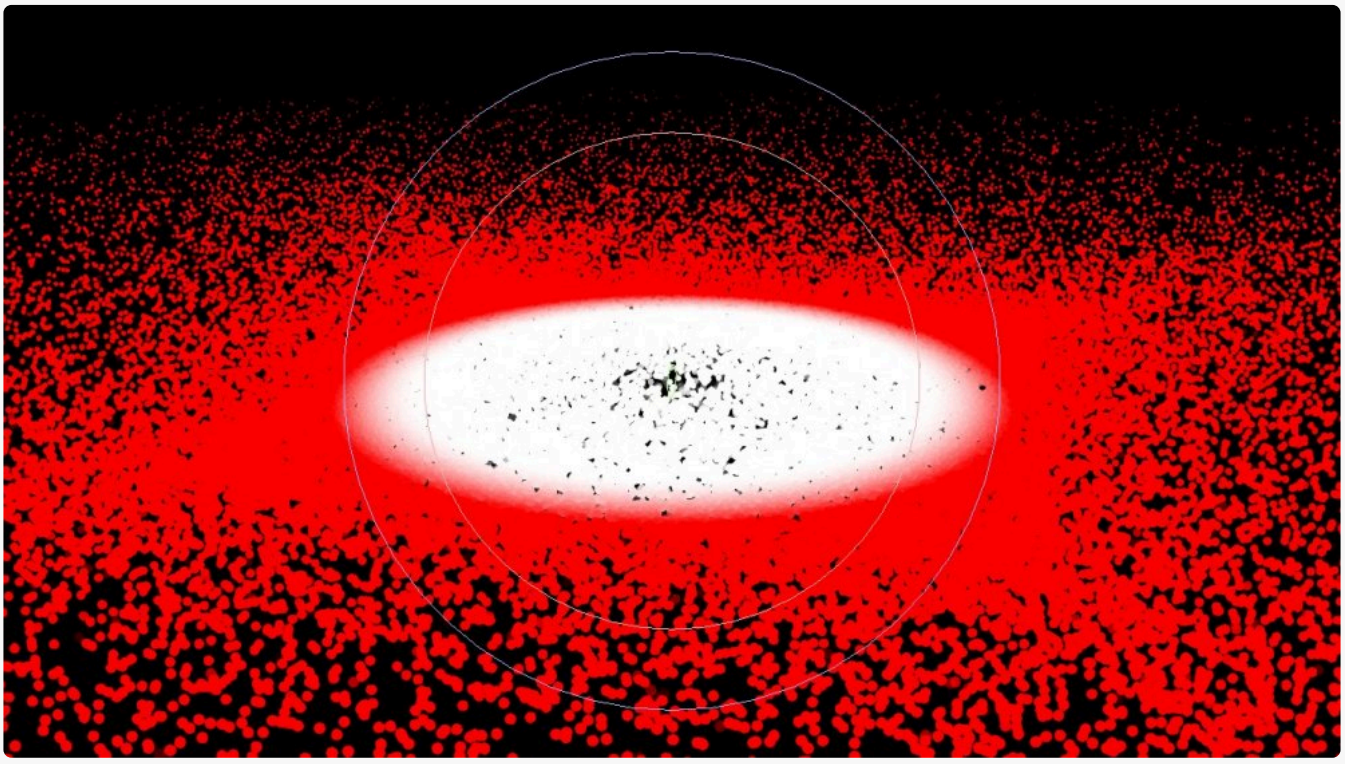
Outputs

The outputs section for this node is currently being worked on.

Distance Shading

Method

This node shades particles based on their distance from a shape. The shape type is chosen using the Distance Mode parameter. Distance from the chosen shape is then calculated and a falloff function is used to produce a value that is used for shading. The distance calculation may be inverted so that the shading result is greater when further away from the shape.

Example


Transform

Name	Description
Position X	Position x in local space
Position Y	Position y in local space
Position Z	Position z in local space
Rotation Heading	Rotation around y axis in local space
Rotation Pitch	Rotation around x axis in local space
Rotation Bank	Rotation around z axis in local space

Scale X	Scale along the x axis in local space
Scale Y	Scale along the y axis in local space
Scale Z	Scale along the z axis in local space

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Distance Mode	Choose what shape the particles are calculated to be a distance from. • Point, a point is used. • Line, a line is used. • Plane, a plane is used.
Radius	Outer radius for which the particles will no longer be coloured.
Inner Radius	Inner radius for which the particles will be coloured at their max.
Falloff Power	How quickly the gradient changes from the inner radius to the outer radius.
Colour	Change the colour of the particles as they spawn.
Invert Distance	toggle whether the calculation is done for inside or outside the inner radius.
Blend Mode	Choose how the particle colours blend to the source colours
Blend Amount	Control how much the shader affects the particles.

Inputs

Name	Description	Typical Node Input
Position Node	Overrides the transform of the shape used to calculate the distance.	Null
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

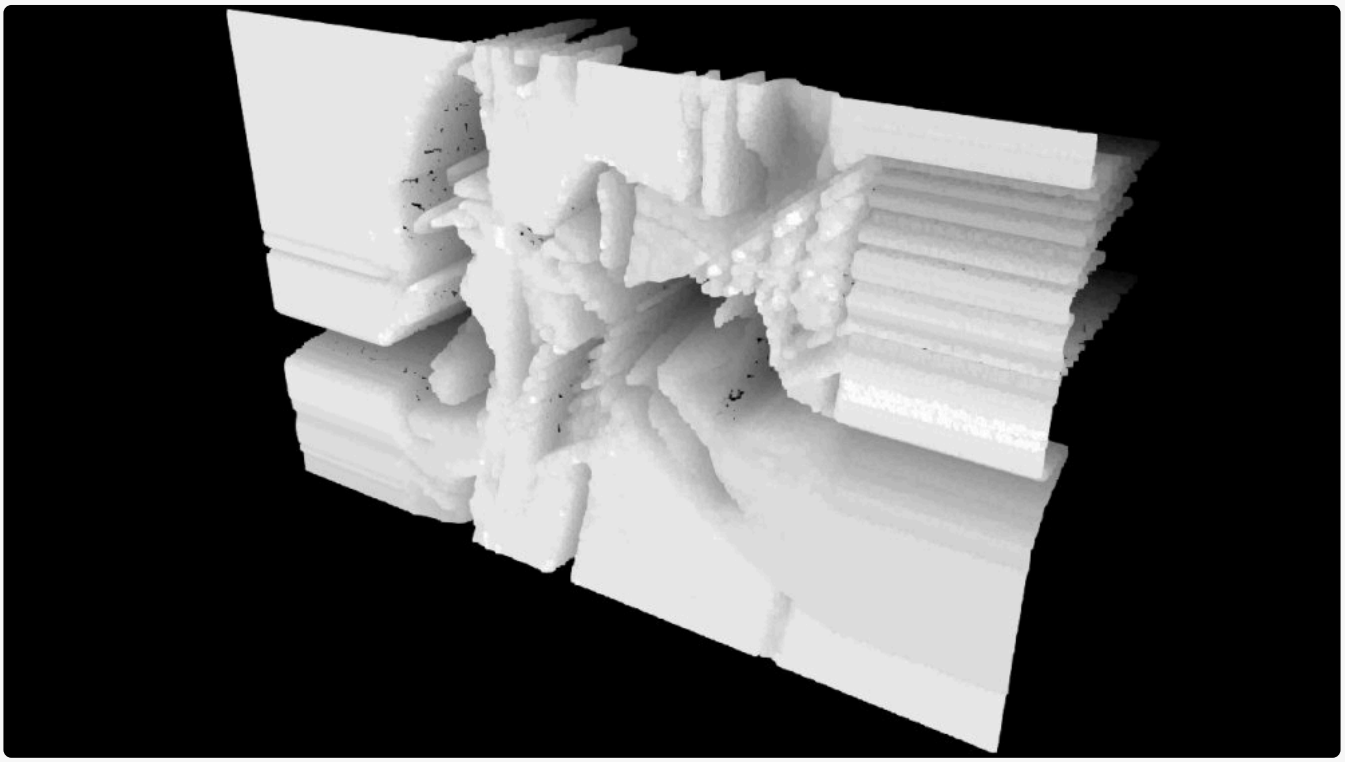
The outputs section for this node is currently being worked on.

Image Displacement

Method

This node displaces the position of a particle based on an image or input video source. This is very similar in operation to the Displacement Map Deformer node for 3D objects.

For this node to operate an image must be supplied either via the Image attribute or connected via the Image Node input. When an Image Plane node is connected to the Image Node input the transform from the image plane will be used, so the sampled pixels in the displacement map deformer correspond with the pixels on the image plane in 3D space.

Example


Attributes

Name	Description
Image	How much the particle colours adapt to the image colours.
Displacement Mode	Determines how the displacement direction is calculated. • Directional, displace the particles along the orientation direction of the displacement node.

	• Radial, displace the particles along the direction outwards from the position of the displacement node.
Displacement Colour Mode	Changes how the colour of the video input displaces the particles position. • Luminance, displacement is based on luminance of the pixels in the image. • RGB, displacement is based on RGB, and the colour channels effect the direction components individually: red affects X, green affects Y, blue affects Z. • Alpha. displacement is based on the alpha values of the image. • RGB Biased, As RGB, but the incoming value is scaled and biased so mid grey is considered 0. • Bump XY, displacement is based on the image processed as a bump map.
Blend Mode	How the particle shading blends.
Blend Amount	Control how much the shader affects the particles.

Inputs

Name	Description	Typical Node Input
Image Node	The image source node.	Video Node, Image Plane Node
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

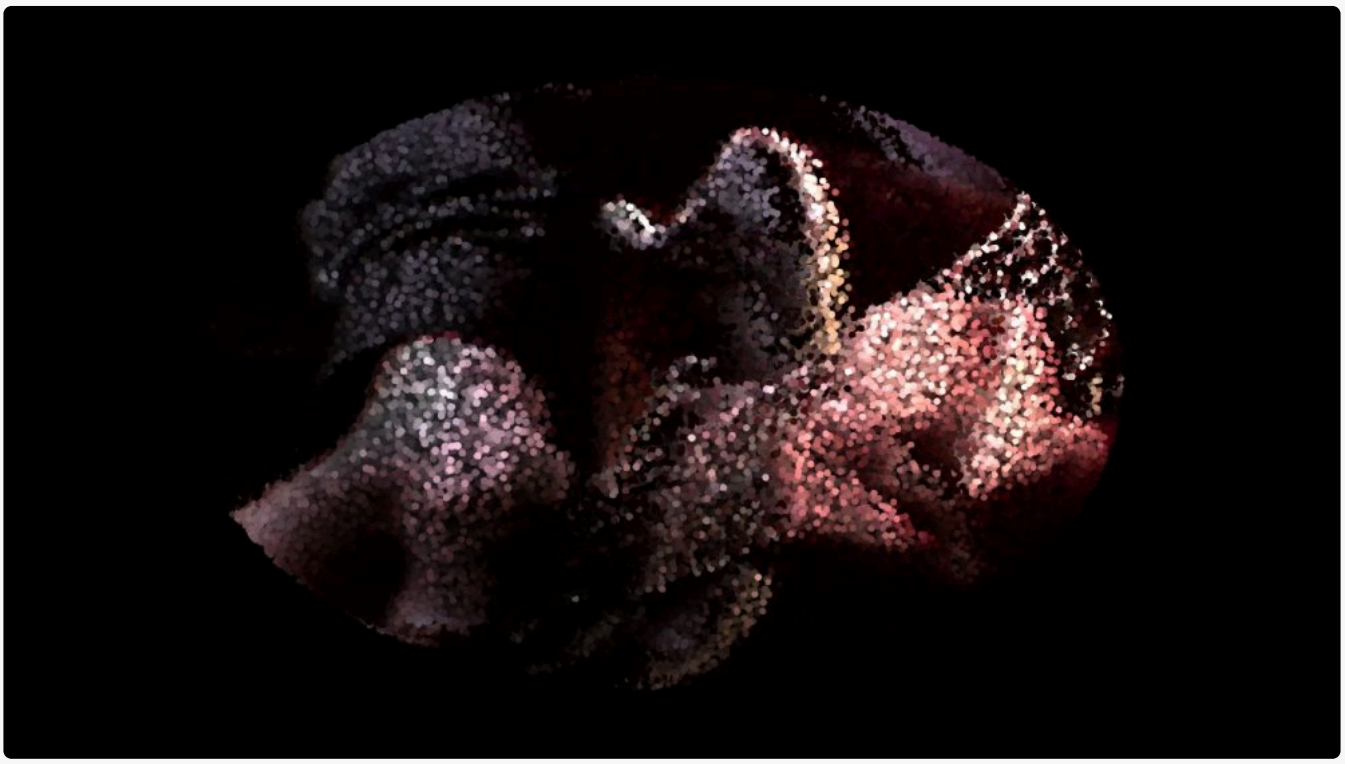
The outputs section for this node is currently being worked on.

Image Shading

Method

This node shades particles based on pixels sampled from an image or input video source.

For this node to operate an image must be supplied either via the Image attribute or connected via the Image Node input. When an Image Plane node is connected to the Image Node input the transform from the image plane will be used, so the sampled pixels in the displacement map deformer correspond with the pixels on the image plane in 3D space.

Example


Attributes

Name	Description
Image	Override the input image with an image selected from the drop down menu.
Warp X Mode	Changes what happens at the edge of the particle image along the x axis. • Clamp, the colours of the image on the left and right of the image are stretched to fill space. • Repeat, the whole image is repeated to the left and right of the image to fill space.

	• Mirror, the image is mirrored repeatedly until the space is filled. • Border, the image is clipped and filled with black. • Clip, the image is clipped, and filled with white.
Warp Y Mode	Changes what happens at the edge of the particle image along the y axis. • Clamp, the colours of the image above and below the image are stretched to fill empty space. • Repeat, the whole image is repeated above and below the image to fill empty space. • Mirror, the image is mirrored repeatedly until the space is filled. • Border, the image is clipped and empty space is filled with black. • Clip, the image is clipped, and empty space is filled with white.
Blend Mode	Choose how the particle colours blend to the source colours
Blend Amount	Control how much the shader affects the particles.

Inputs

Name	Description	Typical Node Input
Image Node	The image source node. If an Image Plane is used, its transformation values are used too.	Video Node
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

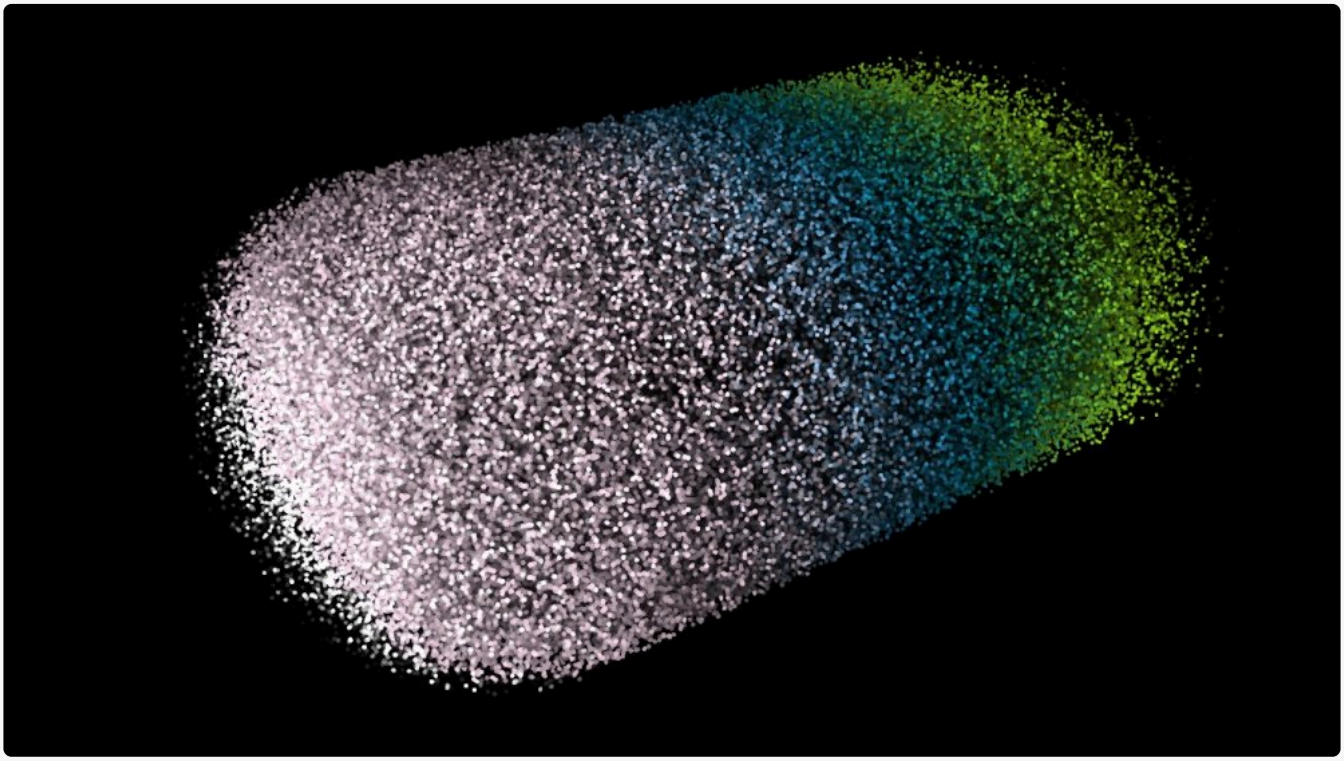
Outputs

The outputs section for this node is currently being worked on.

Keyed Colour

Method

This node applies a key frame animated colour to individual particles. Any animated keys of the Colour attribute are offset by the start time of each particle and then evaluated. This allows an arbitrary animation to be used to control the colour of particles.

Example


Attributes

Name	Description
Colour	Change the colour of the particles as they spawn.
Mode	The way in which the time is generated when evaluating the Colour attribute's animation. • Particle Time, the time since birth of the particle is used. • Particle Life, the remaining life of the particle is used.
Blend Mode	Choose how the particle colours blend to the source colours

Inputs

Name	Description	Typical Node Input
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

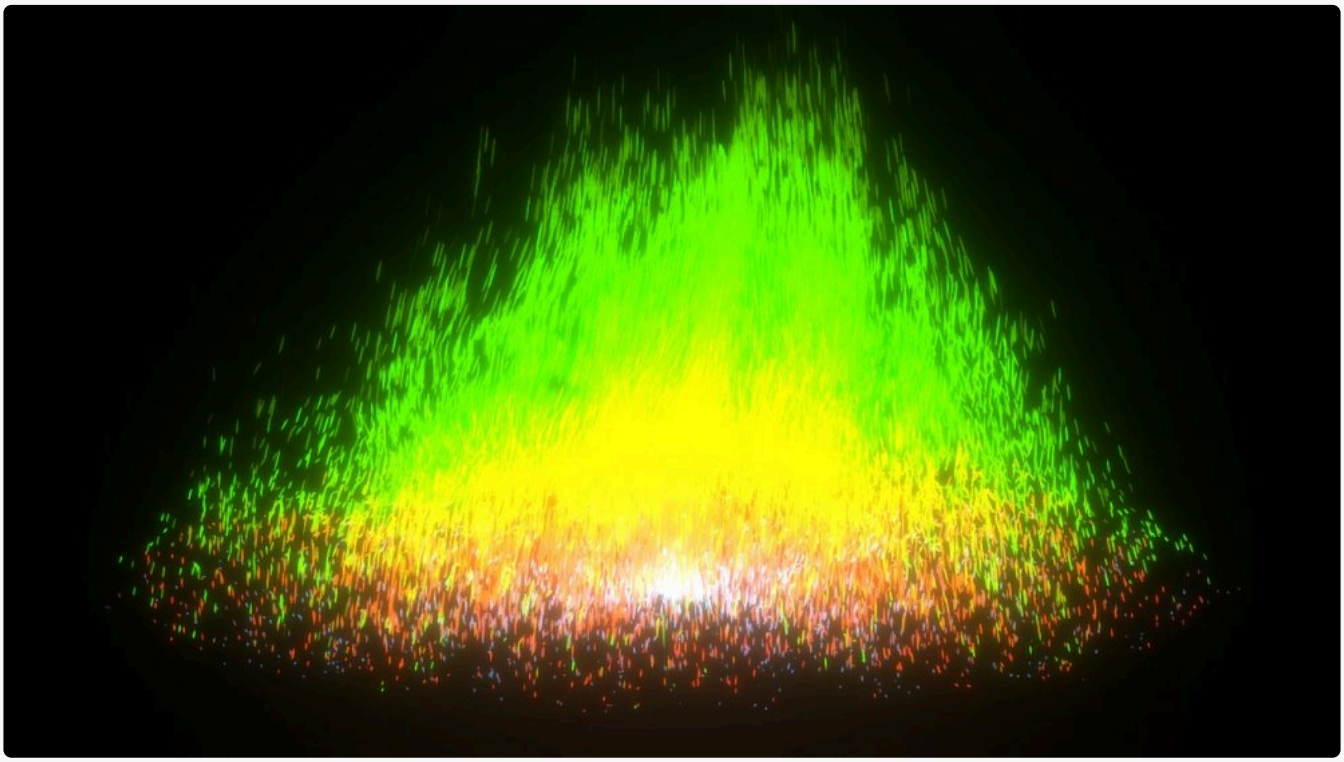
Outputs

The outputs section for this node is currently being worked on.

Life Colour Shading

Method

This node colours particles based on their life using a gradient generated by interpolating between four colour values.

Example


Attributes

Name	Description
Life Colour 0	The first colour the particles are given.
Life Colour 1	The second colour the particles are given.
Life Colour 2	The third colour the particles are given.
Life Colour 3	You can probably guess the pattern.
Weights	How much time is spent on each colour for all particles after spawn.
Scales	Scale the time spent on each weight.
Weight	How much the colour shading affects the colour of the particles.

Inputs

Name	Description	Typical Node Input
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

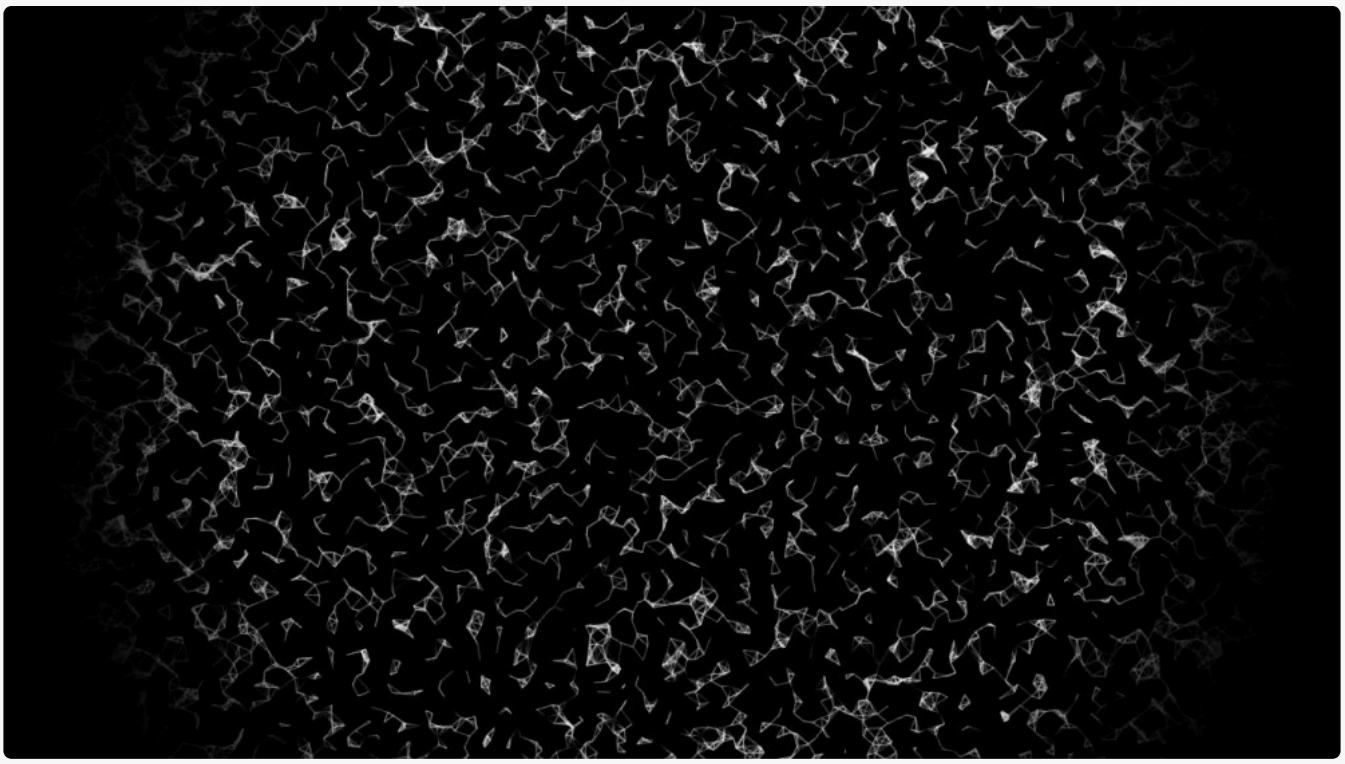
The outputs section for this node is currently being worked on.

Lighting

Method

This node shades particles based on scene lighting. The lighting calculation is an approximation based on the particle's distance to the light and its facing direction, which is determined by either the particle's normal if available or the orientation of the camera, giving a specular-like result. The Facing Direction Amount parameter controls the weighting of the facing direction effect so it can be blended out, leaving only the attenuation distance to generate the lighting effect.

Shadows cast between particles are not calculated by this node. To calculate shadows from particles use either the Volume Shadow Shading or Voxel Cone Shading nodes.

Example


Transform

Name	Description
Position X	Position x in local space
Position Y	Position y in local space
Position Z	Position z in local space

Rotation Heading	Rotation around y axis in local space
Rotation Pitch	Rotation around x axis in local space
Rotation Bank	Rotation around z axis in local space
Scale X	Scale along the x axis in local space
Scale Y	Scale along the y axis in local space
Scale Z	Scale along the z axis in local space

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Facing Direction Amount	Weighting of the facing direction calculation as part of the lighting effect.
Facing Angle Range	The angle range of the facing direction calculation: larger values produce a softer result.
Blend Mode	Choose how the particle colours blend to the source colours
Blend Amount	Control how much the shader affects the particles.

Inputs

Name	Description	Typical Node Input
Affecting Lights	The light nodes used to calculate lighting on the particles.	Light
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

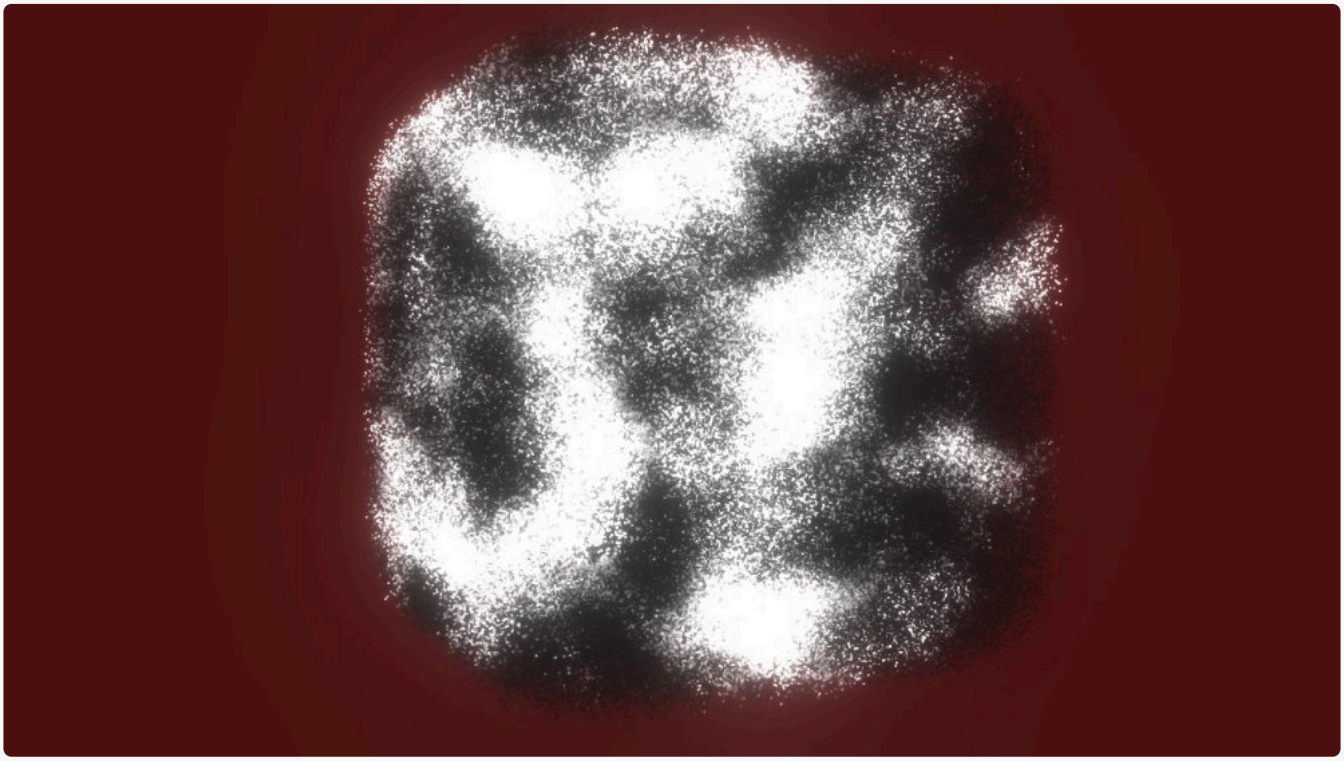
Outputs

The outputs section for this node is currently being worked on.

Noise Shading

Method

This node shades particles using values generated by a fractal noise function, similar to the Fractal Noise Generator node but in 3D. The noise function may be sampled by the position of the particle in 3D, or the life of the particle.

Example


Transform

Name	Description
Position X	Position x in local space
Position Y	Position y in local space
Position Z	Position z in local space
Rotation Heading	Rotation around y axis in local space
Rotation Pitch	Rotation around x axis in local space
Rotation Bank	Rotation around z axis in local space
Scale X	Scale along the x axis in local space

Scale Y	Scale along the y axis in local space
Scale Z	Scale along the z axis in local space

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Num Octaves	How many time the noise generation is iterated.
Noise Scale	Scale the size of any noise generated.
Animaton Rate	The speed at which the noise is animated.
Lacunarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Intensity Scale	Scales the intensity of the resulting noise values.
Input Channel	Choose how the noise affects the particles. • Position, 3D noise is generated and applied to particles based on their position in the scene. • Life, noise is generated based on the particles life. • Life With Random Offset, noise is generated based on the particle life, but is offset based on the particles position.
Radius	Outer radius for which the particles will no longer be coloured.
Inner Radius	Inner radius for which the particles will be coloured at their max.
Falloff Power	How quickly the gradient changes from the inner radius to the outer radius.
Colour	Change the colour of the particles as they spawn.
Blend Mode	Choose how the particle colours blend to the source colours
Blend Amount	Control how much the shader affects the particles.

Inputs

Name	Description	Typical Node Input
Position Node	Control the position of the shader.	Null
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

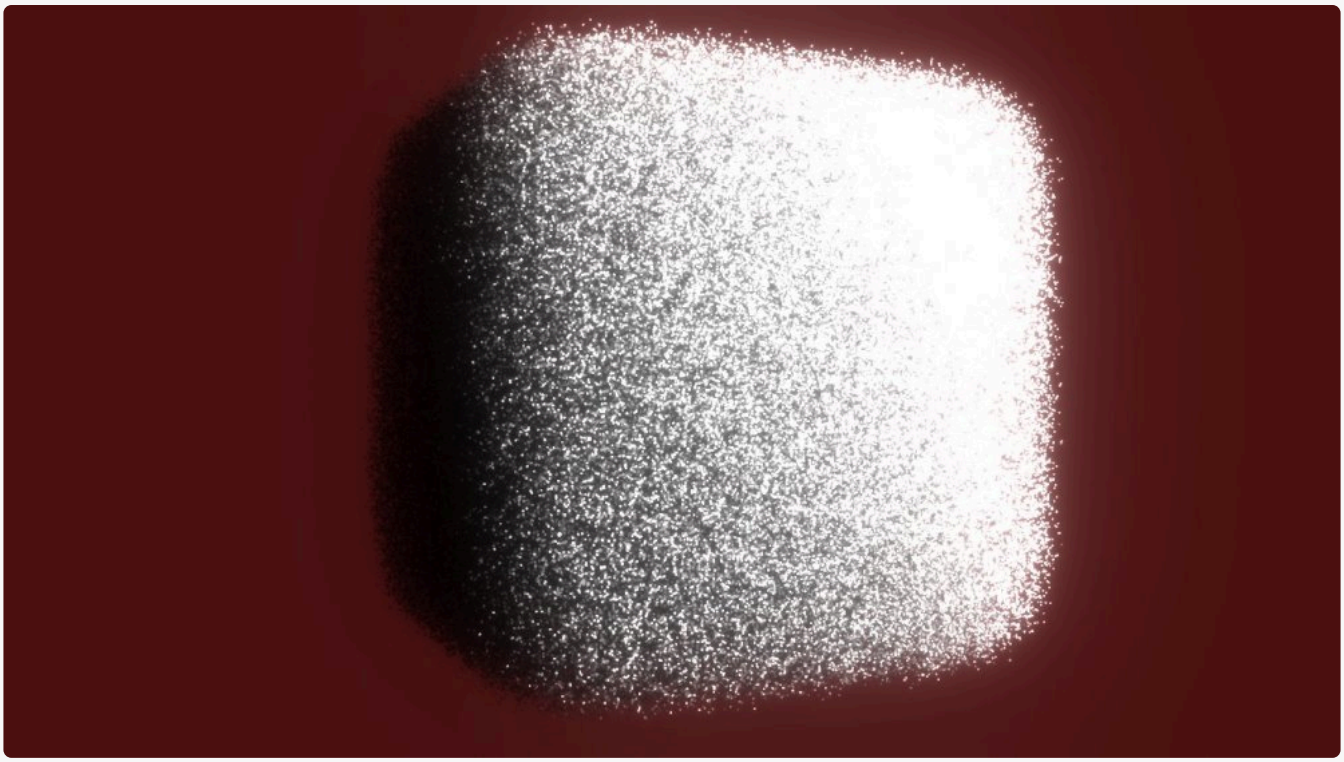
The outputs section for this node is currently being worked on.

Volume Shadow Shading

Method

This node shades particles using a shadowing function from the point of view of a Light Node connected to the Light Node input. The shadow effect takes into account transparency of particles, so light will appear to be partially absorbed by particles rather than completely blocked by them. The Particle Alpha parameter is used to scale the transparency of the particles when calculating the shadow effect. The Particle Use Amount parameter is used to reduce the number of particles used for generating the shadow, which may also increase performance.

This node is only effective if a light is connected to the Light Node input. The light node must be a spot light.

Example


Attributes

Name	Description
Particle Size	Edit the size of the particles once they are rendered.
Particle Alpha	Control the alpha value for each particle.

Particle Use Amount	Percentage of particles that can be used by the node.

Inputs

Name	Description	Typical Node Input
Light Node	Control which light nodes affect the node.	Light
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

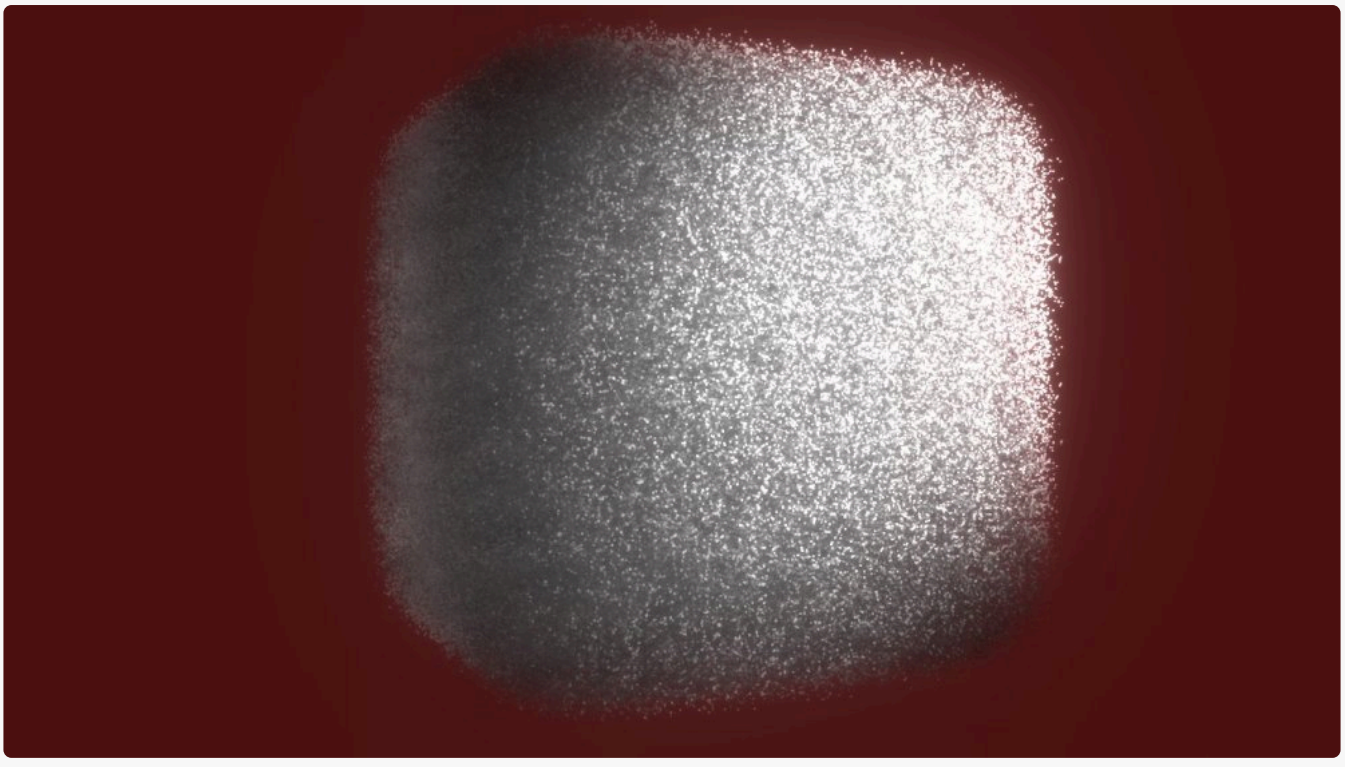
The outputs section for this node is currently being worked on.

Voxel Cone Shading

Method

This node calculates lighting on particles using Voxel Cone Shading. This allows for soft shadows to be calculated that also take into account particle transparency. This effect must first voxelise the particles, which requires a limited spatial area denoted by a bounding box that can be connected via the Bounds Node. Only particles within that area of space are included in the effect. The size of the spatial area also effects its resolution and visual result: large areas of space will reduce the precision of the effect.

At least one Light Node must be connected to the Light Node input in order for this effect to operate. Multiple lights can be connected and they will be evaluated sequentially to generate the shading result. It is more efficient in terms of performance to use a single Voxel Cone Shading node with multiple light nodes connected, than multiple Voxel Cone Shading nodes each with one light node connected.

Example


Attributes

Name	Description
Density Scale	Scale how much light is absorbed per voxel.

Inputs

Name	Description	Typical Node Input
Bounds Node	Adds an area in which the shading can apply.	Bounding Box
Light Node	Control which light nodes affect the node. A light node is required for the shading to run.	Light
Affected Emitters	Choose which emitters can be affected by the affector.	Primitive Emitter
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Physics

Method

The nodes in this section allow you to create simple physics systems and dynamic movements for objects in your scene.

Generally you create a physics system by hooking up 3D Objects and Shape 3D's to a Rigid Body Root, and adjusting their internal Physics attributes, but for using large numbers of similar objects you can use the Rigid Body Effector on a Clones System.

- Rigid Body
- Rigid Body Collision Mesh
- Rigid Body Force Affector
- Rigid Body Procedural
- Rigid Body Root

Physics / Rigid Body Root

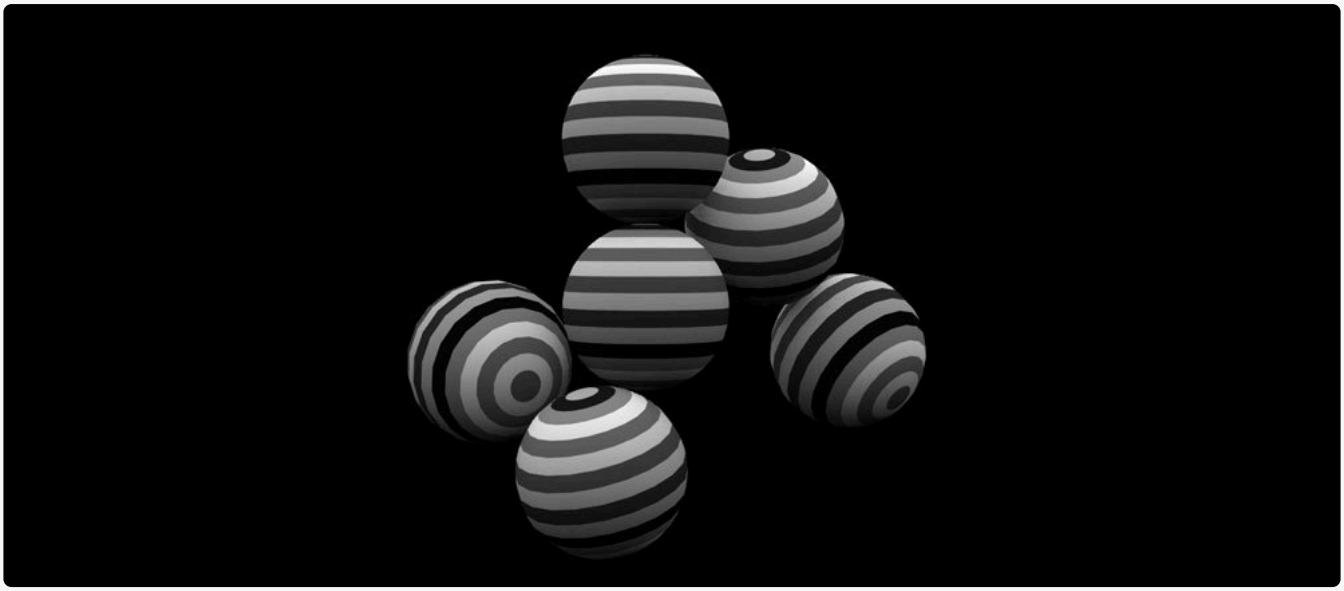
Method

The Rigid Body Root node is the root node of a rigid body physics system. Every node using physics that is parented directly or indirectly to a Rigid Body Root node is part of the same physics system and will interact with each other.
3D Objects, Primitives, cloners with Rigid Body Effectors, and Rigid Body nodes may be part of physics systems and may interact with each other.

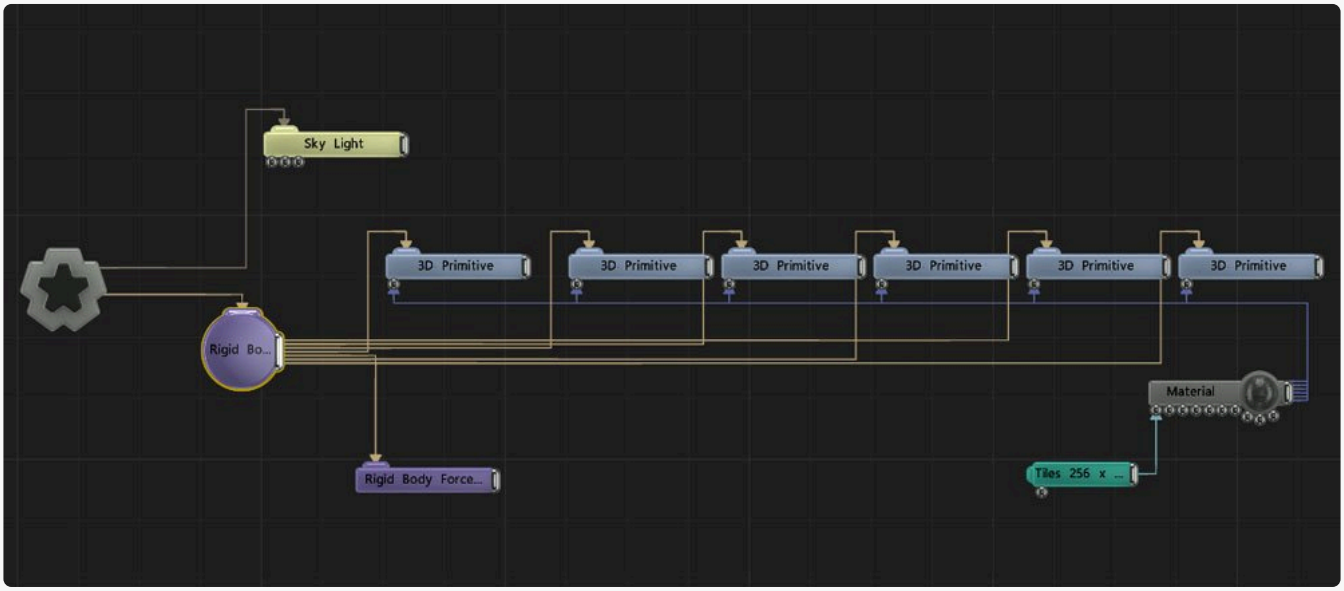
The Rigid Body Root node defines the global properties for the simulation, such as gravity, dampening and smoothing. It also defines the physics frame rate. Physics simulations are stepped – objects move by a small amount at each time step and collisions are tested for their current position at each step. This means that if an object was moving very fast and colliding with a very thin object, it may be able to pass through it – which would be undesirable. As such is common for physics to be updated at a higher frame rate from rendering to improve accuracy. It is also desirable to maintain a constant update rate for physics. The Update Frame Rate parameter defines the desired update rate of the physics system in FPS, which is used to determine the number of update steps for the physics system in each frame. For example, given a render FPS of 30 and an Update Frame Rate of 300, this would require 10 physics update steps for one render frame. The Min and Max Update Steps parameters further clamp the number of steps per frame. Once the number of steps for the frame has been determined, the physics time delta is derived from the render frame's time delta and the number of physics update steps.

Each physics update step takes a certain amount of time to complete and puts a load on the system. In a real-time system a large number of physics steps may put enough load on the system to slow down its render frame rate. This can create a feedback loop: a lower render FPS results in more physics steps required to meet the physics FPS, which in turn adds load on the system and reduces the render FPS. As such it is important to balance the number of physics steps with the performance of the system and reduce it accordingly to maintain performance. When rendering to video this is not a concern.

Example



Example Nodegraph



Attributes

Name	Description
Gravity	Gravity strength. Defaults to 9.8 but should be adjusted to reflect the scale of the scene.
Floor Collision Enabled	Generates a default floor plane to collide all rigid bodies with.
Floor Height	The height of the default floor plane.
Max Velocity	The maximum velocity any rigid body in this system can reach.
Max Angular	The maximum angular velocity any rigid body in this system can reach.

Velocity	
Dampening	Reduces the velocity and angular velocity of bodies over time, per frame.
Smoothing	Smooths motion of bodies over frames to remove the visual appearance of jitters in the physics system.
Update Frame Rate	The frame rate step of the physics system. For example, at update frame rate 240 in a project running at 60 fps, 4 physics steps will be executed per frame.
Min Update Steps	The minimum number of physics steps per frame.
Max Update Steps	The maximum number of physics steps per frame.

Inputs

There are no inputs for this node.

Outputs

The children of this node will be included in the physics system.

Rigid Body

Method

The Rigid Body node defines a static or dynamic rigid body collision object. This is a 3D body that moves under physics and collides with other objects in the same physics system – under the same Rigid Body Root. It must be parented to a Rigid Body Root for physics to work.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mode	The mode of the rigid body. • Static, A static rigid body does not move and can't be moved by physics. • Kinematic, A kinematic rigid body is not moved by physics, but has a velocity that can affect dynamic bodies. • Dynamic, A dynamic rigid body has its initial position set by its transform, but transform control is taken over by physics as soon as the simulation starts.
Shape	The shape of the rigid body. • Sphere, A sphere.

	• Box, A box. • Plane, A plane – can only be static or kinematic. • 3D Object (Convex Hull), A Mesh defined by the 3D Object Node input.
Radius	The radius of the sphere shape, if applicable.
Size X/Y/Z	The size of the box shape, if applicable.
Show Rigid Body	Displays a debug view of the actual rigid body shapes being used to calculate collisions.
Transform For Rendering Only (Faster)	If selected, the transform of the body is maintained on GPU only. This reduces latency and increases performance but means that parenting to the object, e.g. using it to transform lights will not work

Physics Attributes

Name	Description
Friction	How much other rigid bodies will be able to slide along side this rigid body. When two rigid bodies of different frictions interact, the minimum value is used.
Bounciness	How much this rigid body will bounce off of other rigid bodies in the scene.
Density	The density of the rigid body. The density is scaled by the area of the shape to determine the mass of the body.
Spin X/Y/Z	The spin of the rigid body on the X/Y/Z axes. This scales the inertia tensor on the axes, making the body spin faster in that direction when torque is applied.

Inputs

Name	Description	Typical Node Input
Object Node	Allows a 3D Object node to be connected to define the shape of the body.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Rigid Body Collision Mesh

Method

The Rigid Body Collision Mesh node is used to allow rigid bodies to collide with a static, complex mesh – such as a displaced floor.
Collisions with a Collision Mesh node use tests against polygons treated as thin planes. This is less robust than collisions with convex hulls as used when 3D Object or Primitive nodes are set up as static colliders. A high frame rate on the Rigid Body Root is recommended to reduce the chance of bodies falling through. Where ever possible, a 3D Object or Primitive node as a static rigid body should be used instead.

Physics Attributes

Name	Description
Friction	How much other rigid bodies will be able to slide along side this rigid body. When two rigid bodies of different frictions interact, the minimum value is used.

Inputs

Name	Description	Typical Node Input
Objects	The 3D objects used for the collision mesh.	3D Object nodes
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

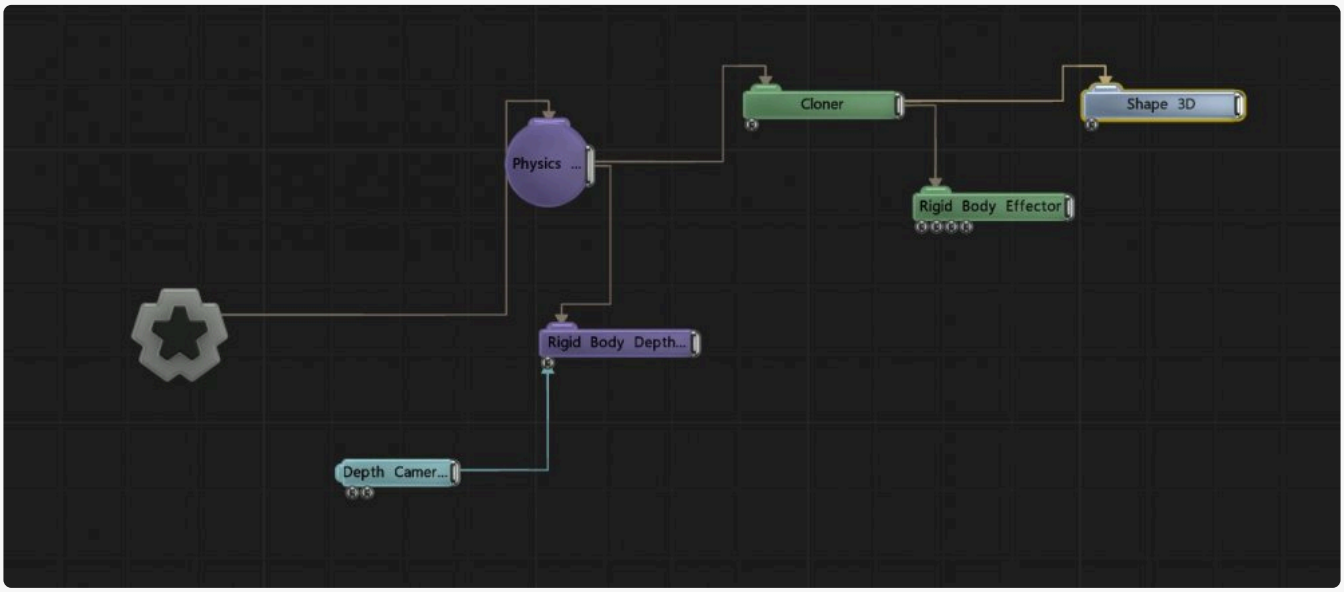
Outputs

There are no outputs from this node.

Rigid Body Depth Image

Method

The Rigid Body Collision Depth Image node is used to allow Kinect depth to collide with mesh in the rigid body simulation.

Example graph


Attributes

Name	Description
Flip Image	Flip the Image in the Y axis.

Inputs

Name	Description
Depth Image	Add a depth image to drive the collision inputs,

Physics Attributes

Name	Description
Friction	How much other rigid bodies will be able to slide along side this rigid body. When two rigid bodies of different frictions interact, the minimum value is used.

Bounciness	How much this rigid body will bounce off of other rigid bodies in the scene.
Density	The density of the rigid body. The density is scaled by the area of the shape to determine the mass of the body.
Spin X/Y/Z	The spin of the rigid body on the X/Y/Z axes. This scales the inertia tensor on the axes, making the body spin faster in that direction when torque is applied.

Outputs

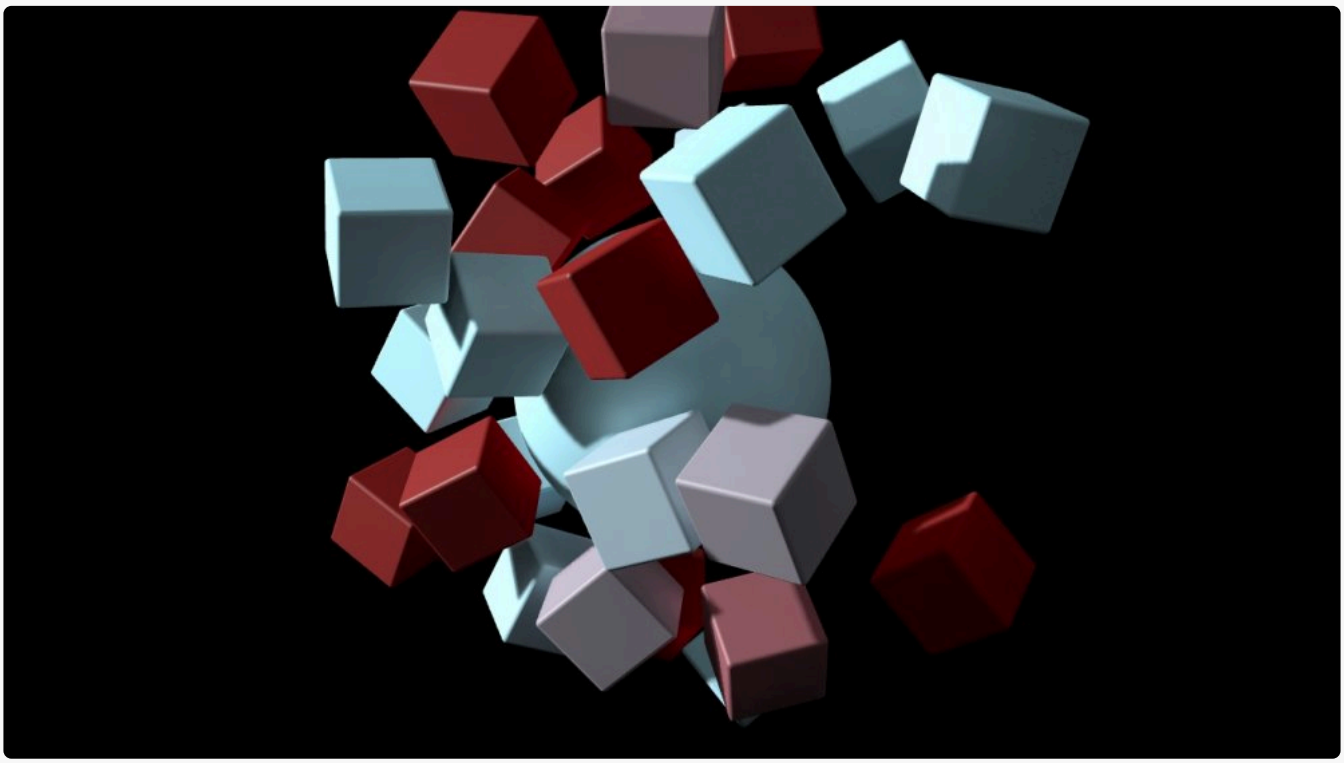
All nodes connected to this node are treated as if flowing to the parent node, and inherits any transformation changes along the chain.

Rigid Body Force Affector

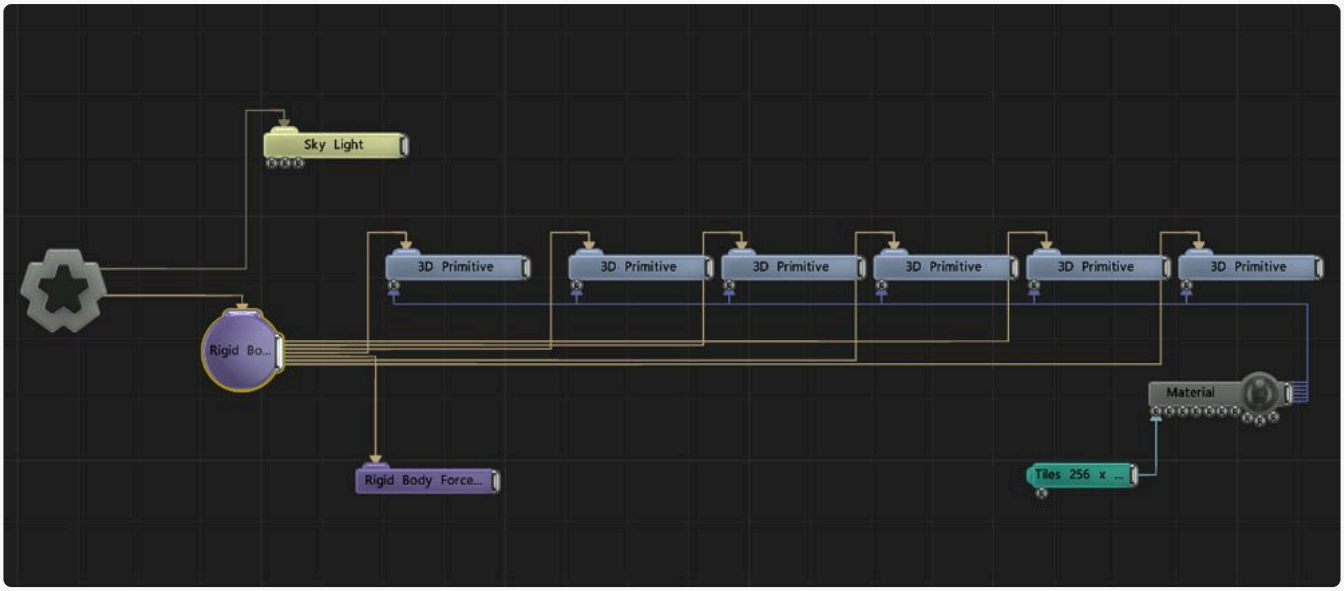
Method

The Rigid Body Force Affector node allows forces to be applied to a rigid body system.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Amount	The amount of force applied.
Mode	The mode of the affector • Directional Force, Apply force in a constant single direction

	• Repel, Repel from the centre point • Attract, Attract to the centre point
Falloff Mode	The falloff mode of the affector • Infinite, No falloff is applied • Spherical, A spherical falloff is applied
Inner Radius	The inner radius of the falloff if spherical mode is used
Outer Radius	The outer radius of the falloff if spherical mode is used
Randomness	The randomness of the amount of force applied

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Rigid Body Procedural

Method

The Rigid Body Procedural node allows a procedural system to be used as a static collider for rigid bodies. It must be parented to a Rigid Body Root.

Inputs

Name	Description	Typical Node Input
Procedural Root	The root node of the procedural system to use	Procedural Root Node
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Post-FX

Method

Post-FX nodes are mostly effects added onto an image, after the scene is rendered. These can vary from Colour Correction to FXAA antialiasing, and are generally used to enhance an image. The order of operations are decided based on the Y value of the node in the nodegraph, or the X values if the Y values are the same. Nodes with larger X or Y values will be calculated first.
Unlike the Video Processing Nodes (many of which are shared with these nodes), these nodes only affect the parent, and do not contain a copy of the image.

Post-FX can be applied directly to these nodes, however if applied to other nodes it will affect the whole scene, not just the parent node.

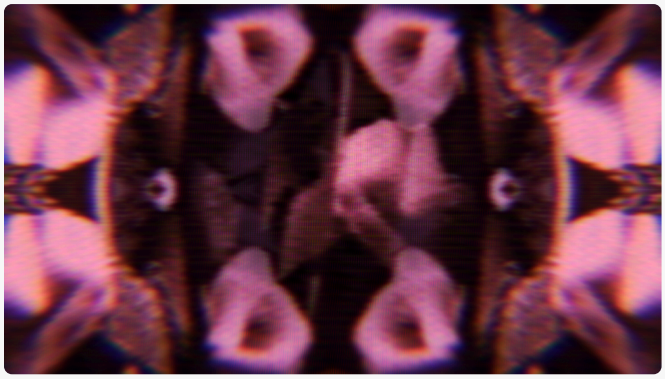
- Cameras (Will only come into affect when viewed through the camera)
- Field Root and Image Emitter
- Generators
- Render To Texture
- Root (This will affect the whole layer)
- All Video Processing Nodes (although you will mostly use Video Loader and Video Null)

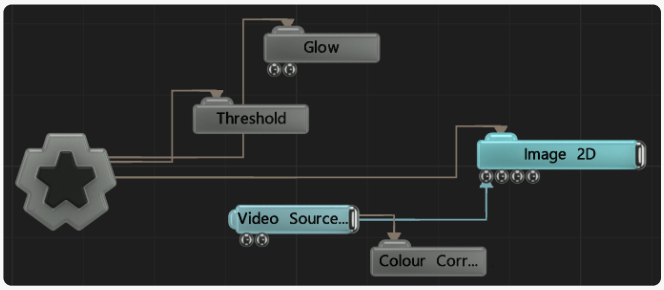
Post-FX have been seperated into 9 groups:

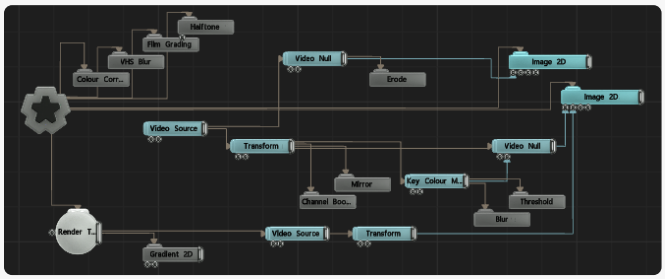
- Antialiasing, for nodes that generate better antialiasing.
- Blur, for blurring an image.
- Colour Processing, for changing the colours in an image.
- Distortion, for modifying the shape of an image.
- Generators, use mathematical patterns to affect an image.
- Image Compression, for compressing or decompressing images.
- Image Processing, for general video effects.
- Stylisation, for more intense image modifications.
- Warping, for stretching and squashing images.

In Action

Example 1	Example 2

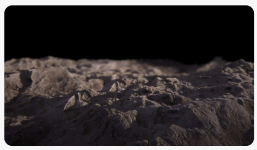
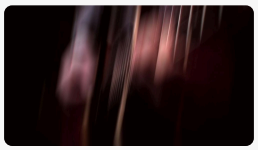
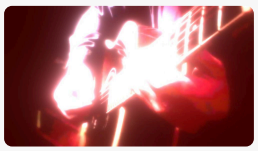
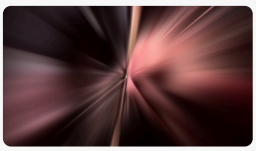






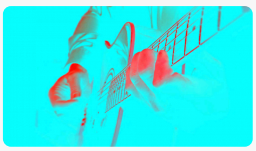
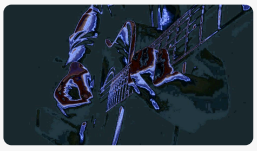
Gallery

Blur

				
Blur	Depth Of Field	Directional Blur	Edge-Aware Blur	Feedback Blur
				
FFT Blur / Glow	Frame Feedback	Glow	Radial Blur	Tilt Shift
VHS Blur				

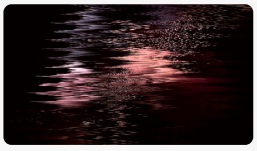
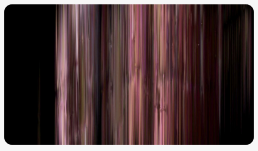
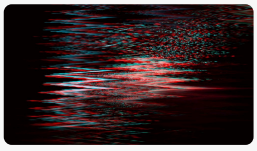
- Motion Blur

Colour Processing

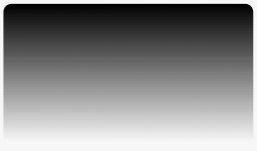
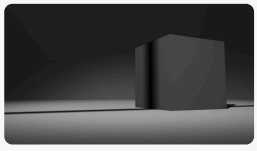
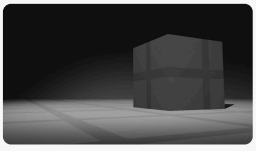
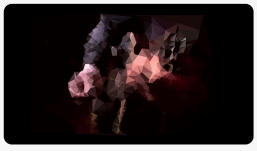
				
Apply Colour LUT	Colour Grading	Colour Limiter	Invert	Local Contrast
				
Recolour	Strobe	Tint	Tone Map	

- Colour Correction
- Colour Channel Mixer
- Combine Colour Grades

Distortion

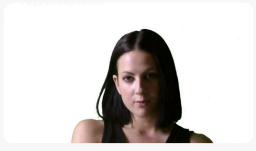
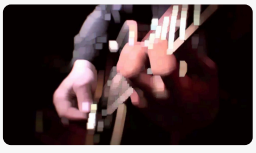
				
Distortion	Dither	Line Distortion	Noise	RGB Distortion

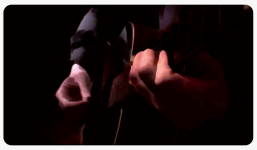
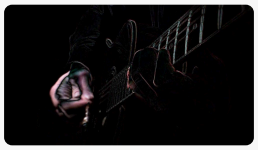
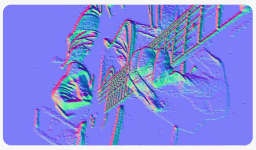
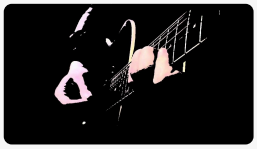
Generators

				
Gradient 2D	Gradient 3D	Gradient Patch	Grid	Voronoi 2D

- Composite Image
- Light Scattering Beam

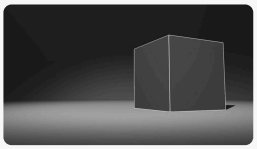
Image Processing

				
Auto Key Colour	Bit Crush	Channel Boolean	Dilate	Edge Detect

Mask				
				
Erode	Frame Buffer	Frame Difference	Generate Normal Map	Histogram Normalise
				
Key Colour Mask	Median Filter	Range Remap	Replace Colour	Threshold

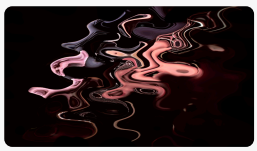
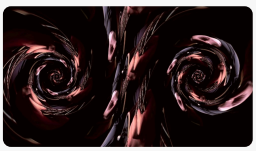
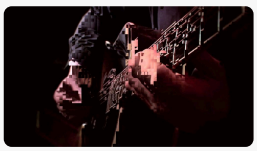
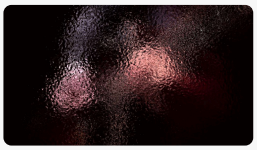
- Capture Image File
- Frame Delay
- Frame Loop
- Video Exporter

Stylisation

				
3D Object Outline	Cross Hatch	Digital Block Glitch	Digital Chroma Glitch	Dot Matrix
Film Grading	Halftone	Motion Datamosh	Pixellate	Pixel Sorting Glitches
Sharpen	Slit Scan	Streaks	Vector Blur	VHS Scanlines
Voronoi Post				

Process

Warping

Barrel Distortion	Bezier Warp	Bump Map Warp	Curl Noise Warp	Droste Warp
				
Field Position-Based Warp	Field Warp	Mirror	Moebius Warp	Randomise Tiles
Ripple	Screen Warp	Sine Warp	Stretch	Turbulence
				
Water Ripples				

Antialiasing

Method

These nodes calculate better antialiasing than the default.

Antialiasing nodes don't apply to the same nodes as the rest of the Post-Fx nodes, and instead, function on these nodes,

- Cameras (will only be applied when the scene is viewed through a camera)
- Root (This will affect the whole layer, and is generally where you'll connect it)

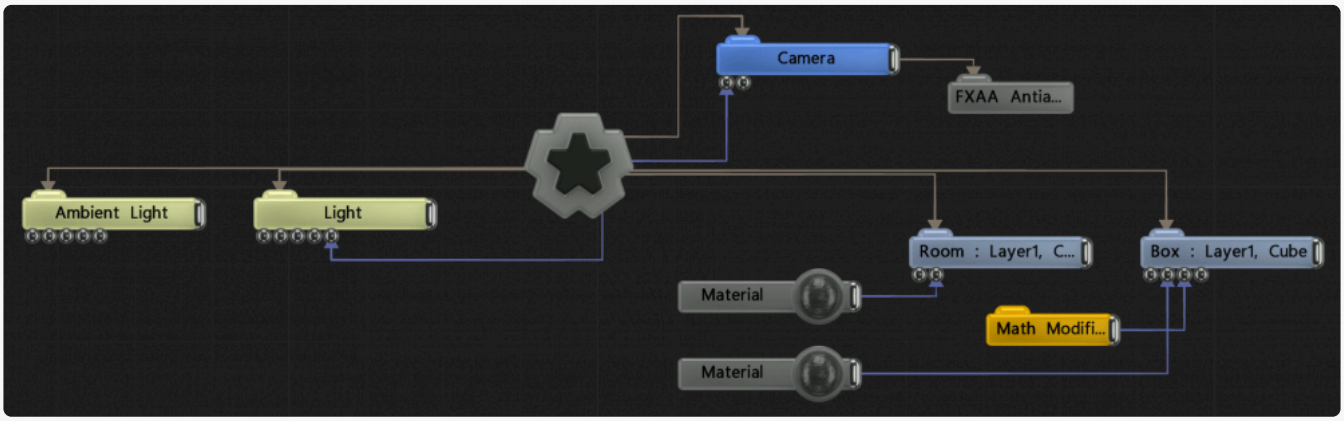
These are the Antialiasing nodes available in Notch:

- FXAA Antialiasing
- Temporal Antialiasing

FXAA Antialiasing

Method

This node antialiases the incoming image using the Fast Approximate Anti-Aliasing technique. This attempts to find jagged edges in the image and smooths them out.

Nodegraph Example


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

Temporal Antialiasing

Method

This node anti-aliases the incoming image using the Temporal Anti-Aliasing technique. This compares the previous frame with the current frame to smooth the differences between the two and eliminate jittery movement in the scene, at the expense of a more blurry output.

Attributes

Name	Description
Shader	Ability to over-ride internal shader. See writing custom shaders.
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Softness	Change how much the Temporal Antialiasing blurs the image.
Use Motion Vectors	Recalculate the Temporal Antialiasing to use motion vectors.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

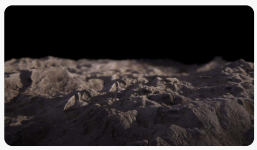
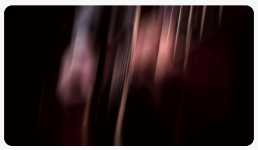
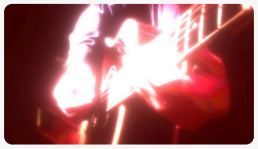
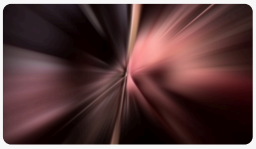
Blur

Method

Blur nodes defocus images, making them appears less clear. These are useful in many scenarios, from cleaning up the harsh edges on a key mask to creating depth of field for the image. They follow the same order of operations as all the other post-fx nodes.

Blur Nodes can be applied to all the same nodes as the rest of the post-fx nodes.

Gallery

				
Blur	Depth Of Field	Directional Blur	Edge-Aware Blur	Feedback Blur
				
FFT Blur / Glow	Frame Feedback	Glow	Radial Blur	Tilt Shift
VHS Blur				

- Motion Blur

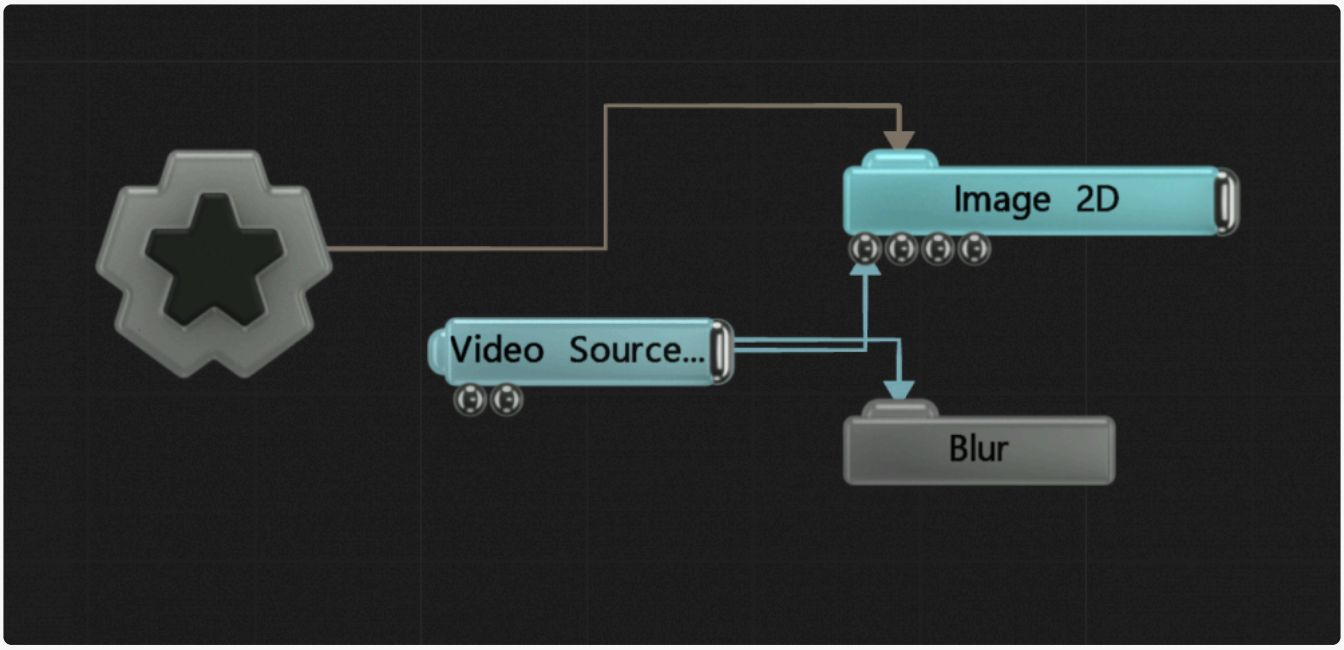
Blur

Method

This node generates a simple blur effect.

Raw texture	Processed texture	Modified texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.

Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Iterations (Effect Size)	How many iterations of the blur function are run.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Depth Of Field

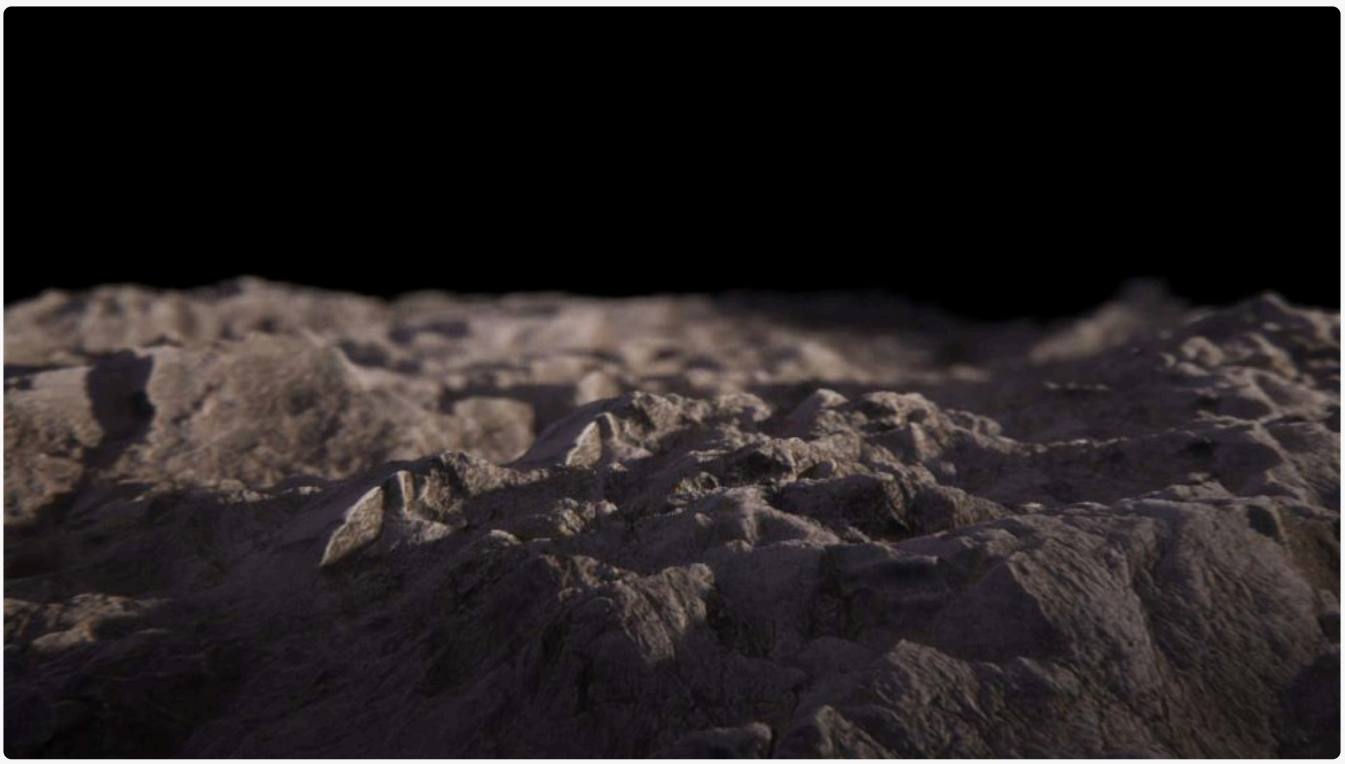
Method

This node renders a depth of field blur effect on the 3D scene based on the distance of each pixel from the camera. This attempts to simulate the behaviour of the focus effects of a real camera lens, whereby there is a point of focus and then areas in front and behind this point are out of focus.

The depth of field effect is controlled by parameters in the Camera node. Focal Plane Distance controls the distance of the in-focus plane from the camera. Focal Range controls the size of the in-focus area in depth. Focal Bluriness scales the bluriness of the result.

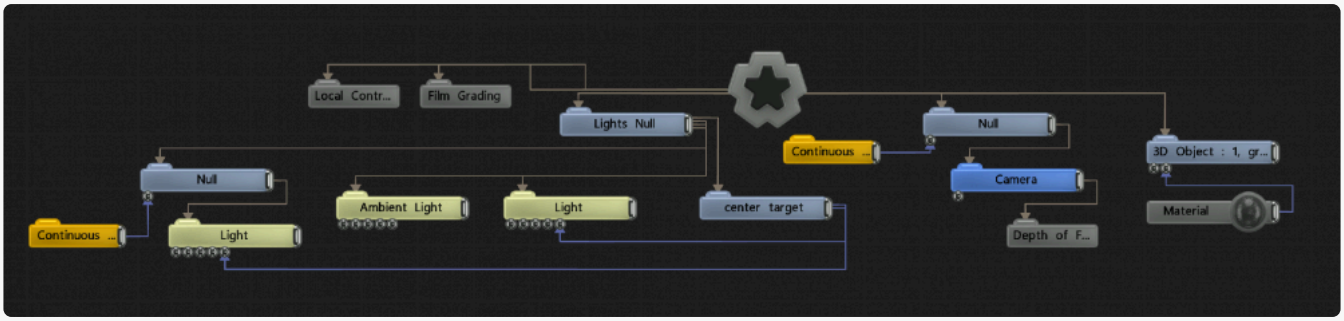
This node does not work when connected to video processing nodes – it only works on the full 3D scene.

> ! This node will flatten all Alpha Values to 1 when functioning.



This is an image taken from the sample file “Rocks_displacement-3”

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Max Blur Size	The size of the blur.
Sampling Quality	Number of samples taken to generate the depth of field.
Sample Shape	Select a shape used to draw the depth of field from.
Sample Shape Rotation	Change the rotation of the sample shape.
Sample Shape Image	Select an image to be used as the sample shape. It should be noted that high resolution textures can cause significant drops in efficiency for complex scenes.
Apply To Opaque Objects Only	Toggle whether the effect only applies to opaque objects.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

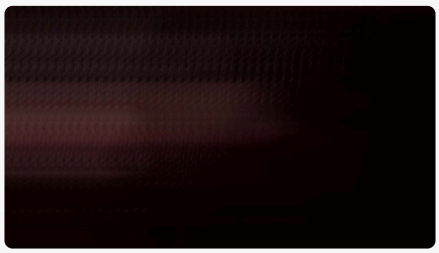
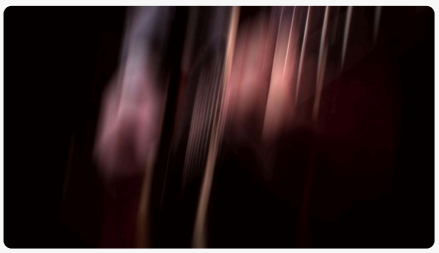
Outputs

There are no outputs from this node.

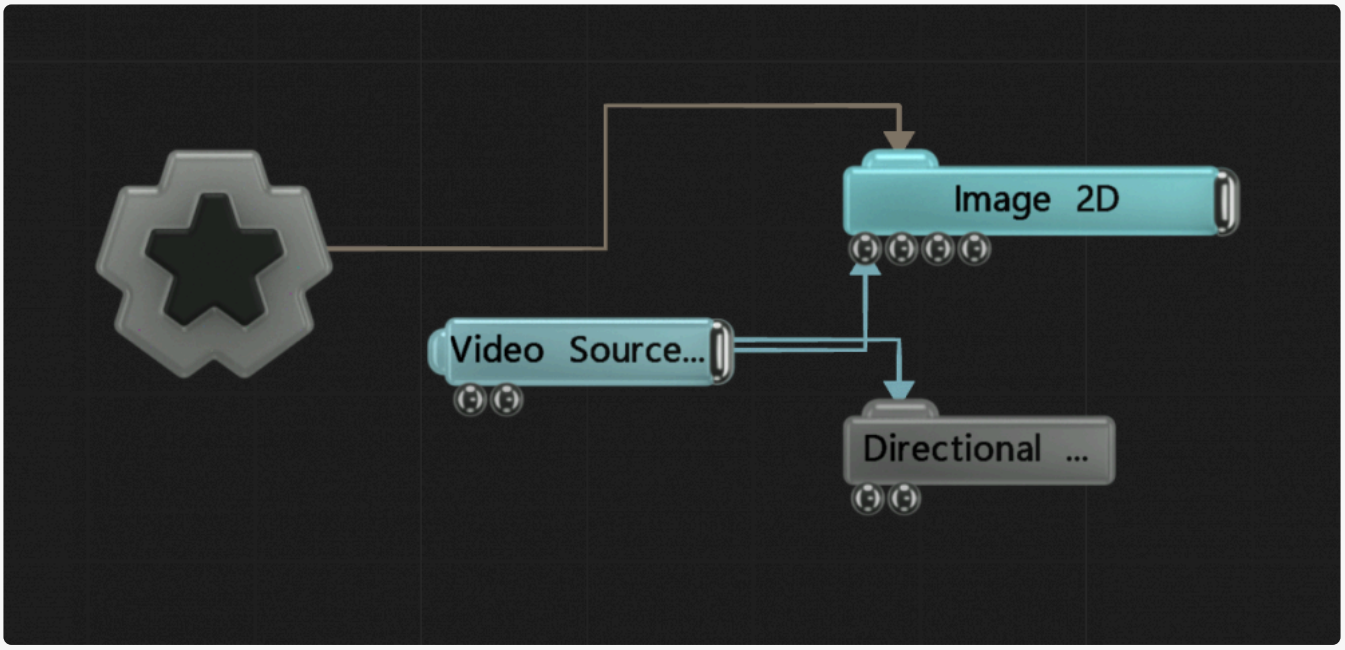
Directional Blur

Method

This node blurs the image in a direction.

Raw texture	Processed texture	Modified texture
		

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.

Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Blur Length	How far the image is blurred.
Angle	Edit the rotation of the effect.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Blur Length Image	Use an image to control the length of the blur. Darker parts of the image are affected more by the blur.	Image Plane
Angle Image	Use an image to control the angle the image is blurred in.	Image Plane

Outputs

There are no outputs from this node.

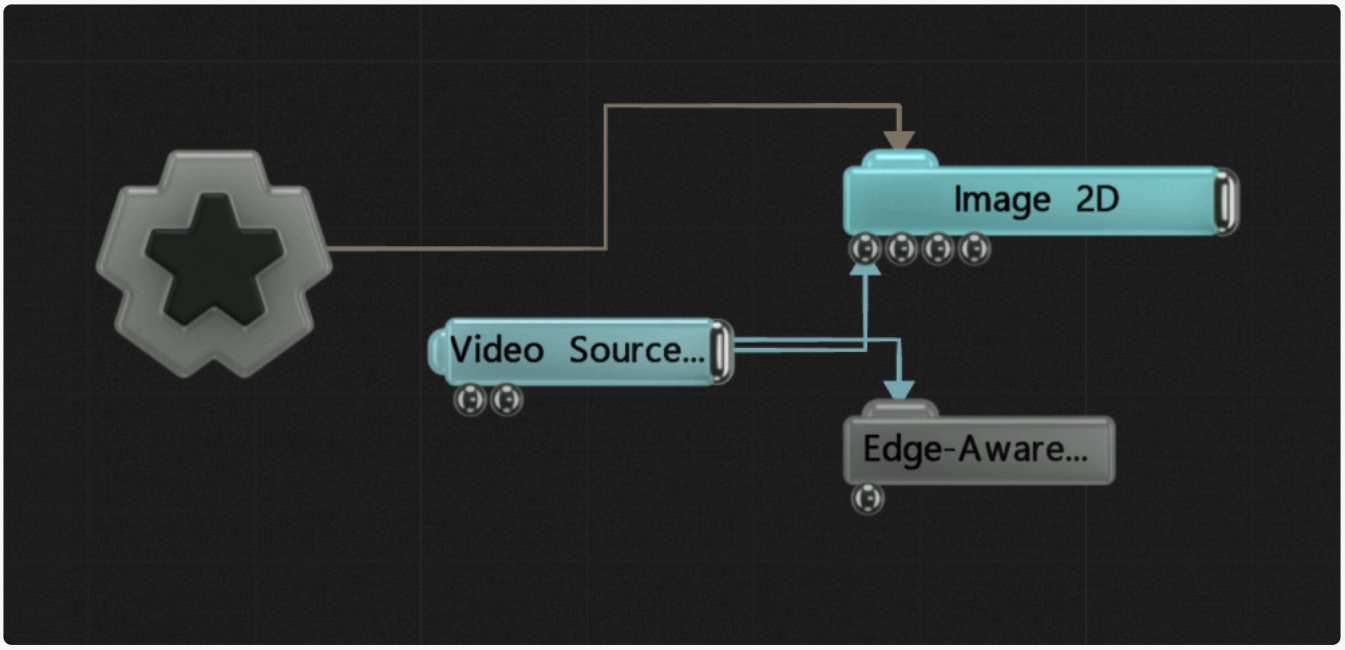
Edge-Aware Blur

Method

This node blurs the image, but preserves harsh edges.

Raw texture	Processed texture	Modified Texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.

Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Iterations (Effect Size)	How many iterations of the blur function are run.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

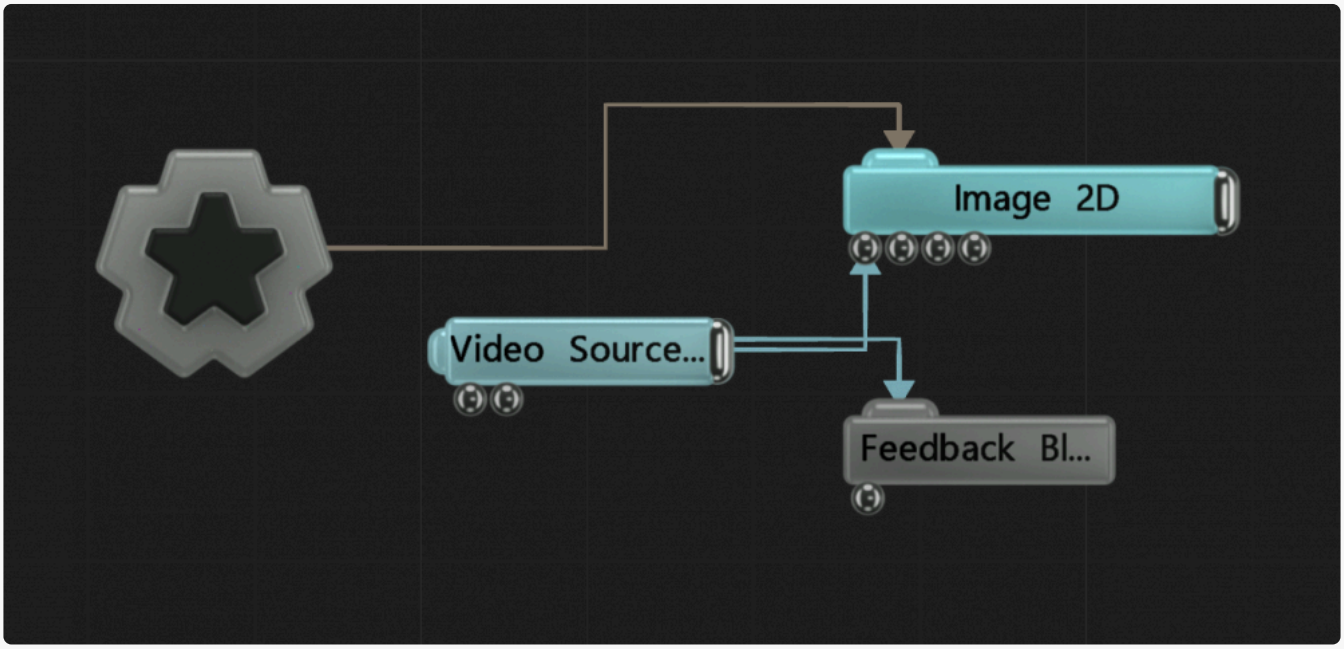
Feedback Blur

Method

This node creates a trailing blur from a line across the image.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Previous Frame Feedback	How much the previous frame effects the current frame.
Rotation	Edit the rotation of the effect.
Stretch Position	Change the position of the stretch.
Stretch Falloff	Change the falloff length of the stretch.
Blur Scale	How far the blur should push out. This is multiplied by the distance of the pixel from the center of the image.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Applies a colour ramp to the feedback blur.	Colour Ramp
Amount	Change how strong the efffect is on the input image.	Envelope Modifier
Intensity	The intensity of the effect that is applied.	Envelope Modifier

Outputs

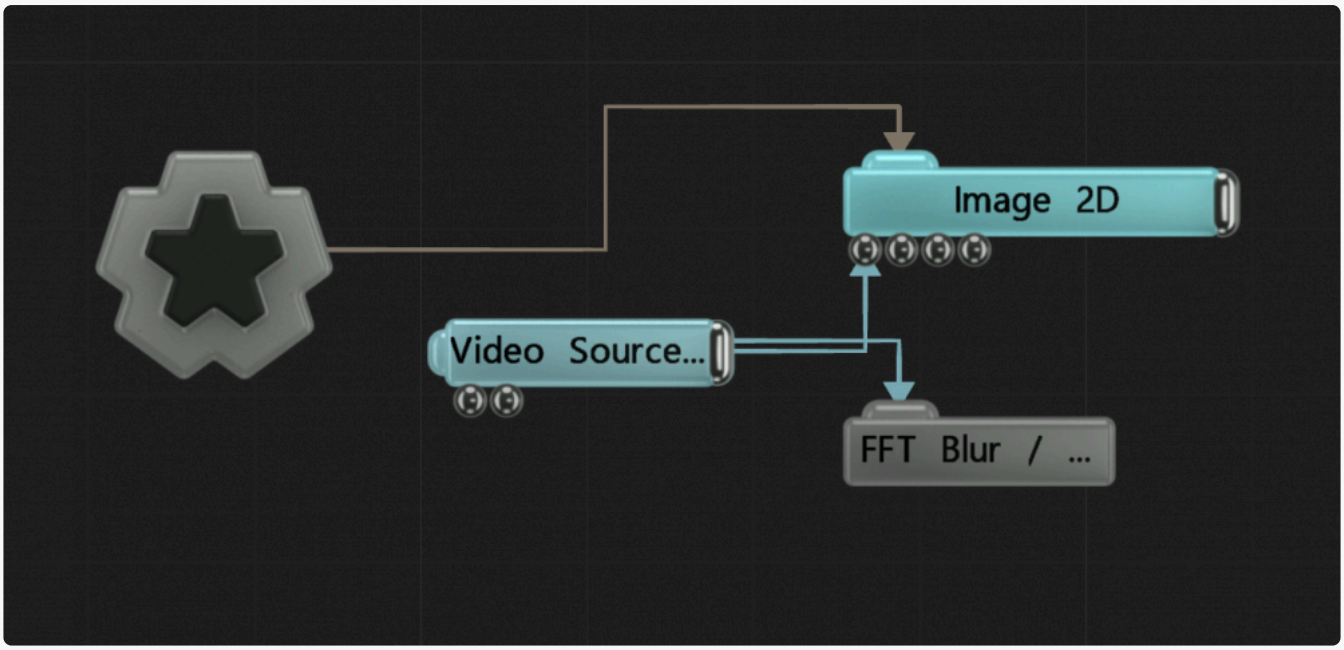
There are no outputs from this node.

FFT Blur / Glow

Method

This node performs a blur operation in frequency space using a Fast Fourier Ttransform (FFT). This allows any size of blur to take the same amount of processing time – even for huge blur kernels – at the cost of the conversion of the image into frequency space and back, which is constant for a given size of image. This makes this process useful for performing very large blurs much more efficiently than using an iterative blur with the Blur node.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Blur Shape Texture	Shape the blur based on a texture.
Downsample Iterations	Number of times the image is downsampled
Blur Size	The size of the blur.
Threshold	The luminance threshold at which a pixel will contribute to the effect.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

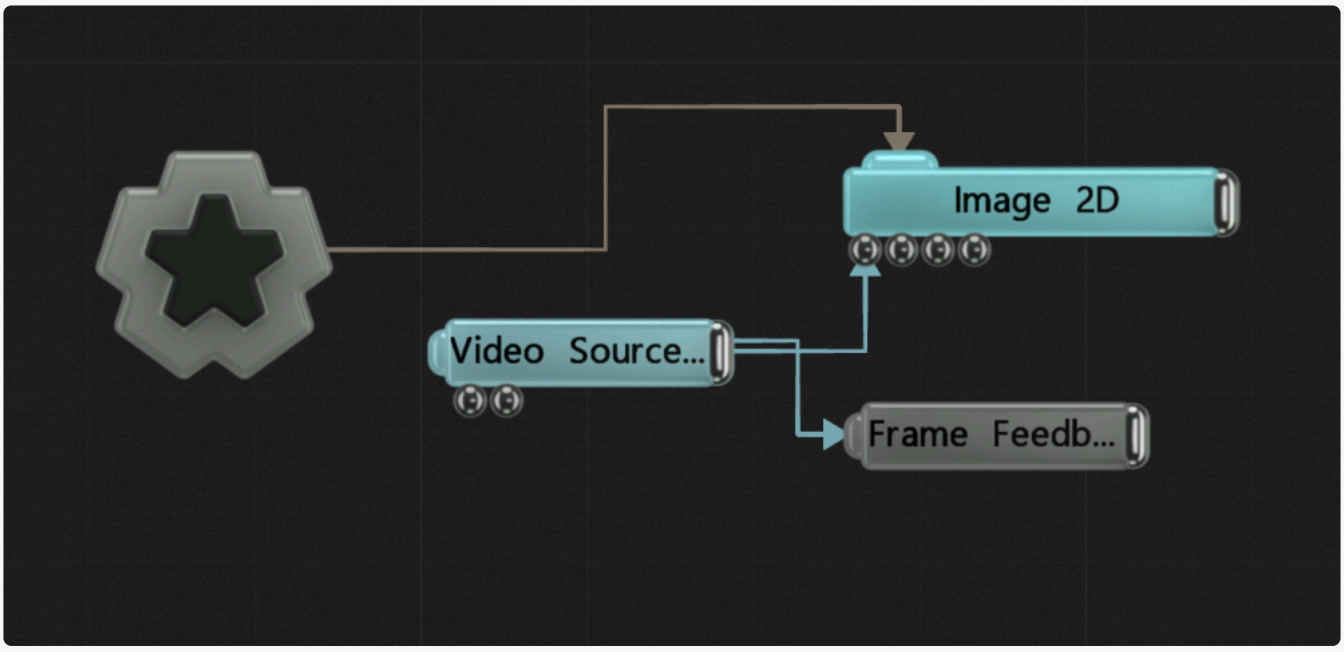
Frame Feedback

Method

This node overlays the previous frame over the current frame. To further manipulate the feedback frame, add more post-fx nodes to the output.

Raw texture	Processed texture	Modified texture

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Previous Frame Feedback	How much the previous frame effects the current frame.
Max Frame Rate	Maximum accepted frame rate.

Previous Frame Blend Mode	Change the blend mode of the effect

Ghosting

Name	Description
Ghost Alpha	Alpha value of the ghost image
Num Ghosts	Number of ghost images
Ghost Feedback	Controls the amount of feedback applied to the ghosts.
Ghost Frame Rate	Frame rate of the ghost image.
Ghost Offset X	Offset ghost along x-axis
Ghost Offset Y	Offset ghost along y-axis

Feedback

Name	Description
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Offset X	Offset from the original image on the X axis.
Offset Y	Offset from the original image on the Y axis.
Rotation	Edit the rotation of the effect.
Blend Amount	Changes the opacity of the new effect over the original image.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier
Frame Rate	Change the frame rate with a simple numerical input.	Envelope Modifier

Outputs

This node outputs a video image of the feedback frame. Further Post-FX can be applied to this feedback image by connecting to this output.

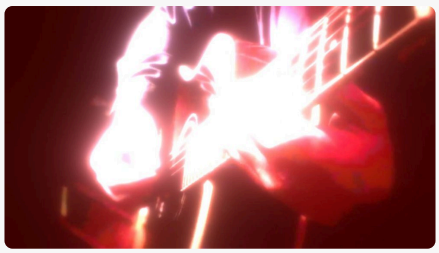
Glow

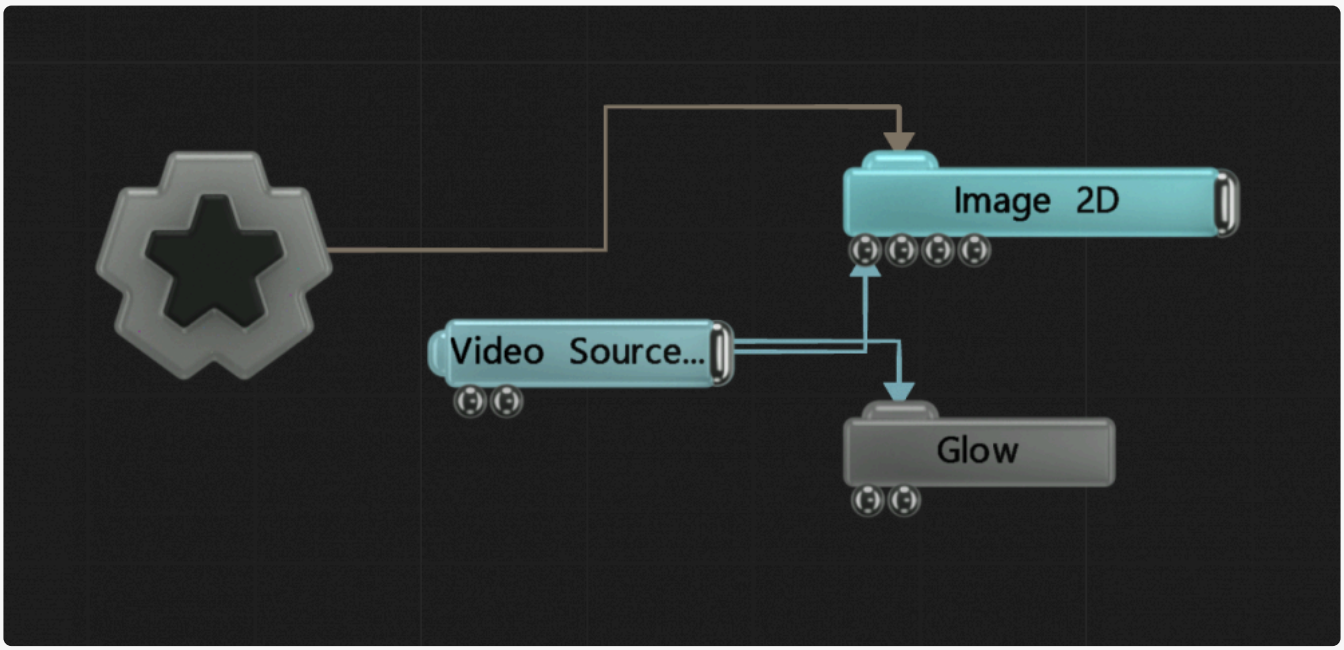
Method

This effect blurs the bright parts of the image over the darker parts of the image. The pixels of the incoming image that are brighter than the threshold are isolated and blurred, then added to the incoming image. This has the effect of blowing out the highlights of the image. This effect can be used to simulate overexposure of brightly lit objects.

The Glow Mask input can be used to supply a mask image to modulate the amount of glow per pixel.

> ! This node is resolution dependent.

Raw texture	Processed texture	Modified texture
		

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Intensity	The intensity of the effect that is applied.
Blur Scale	How far the blur should push out. This is multiplied by the distance of the pixel from the center of the image.
Softness	Controls the size of the blur highlight.
Threshold	The luminance threshold at which a pixel will contribute to the effect.
Threshold Mode	Select how the Threshold is calculated. • RGB, The glow effect is done on the RGB values individually. • Luminance, The glow effect is done on the Luminance values for all objects in the scene.
Apply to Opaque Objects Only	Toggle whether the effect only applies to opaque objects.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Blur Shaping

Name	Description
Blur Shaping X	How much the glow will affect the X axis.
Blur Shaping Y	How much the glow will affect the Y axis.

Chromatic Shift

Name	Description
Chromatic Shift Red	Controls how much of the glow is shifted towards red.
Chromatic Shift Green	Controls how much of the glow is shifted towards green.
Chromatic Shift Blue	Controls how much of the glow is shifted towards blue.

Inputs

Name	Description	Typical Node Input
Glow Mask Image	Use a mask image to control where the output is most or least affected by the effect, based on the mask images luminance.	Image Plane
Affected Objects	Change which objects are affects by the effect. by default, all objects are affected.	3D Object
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

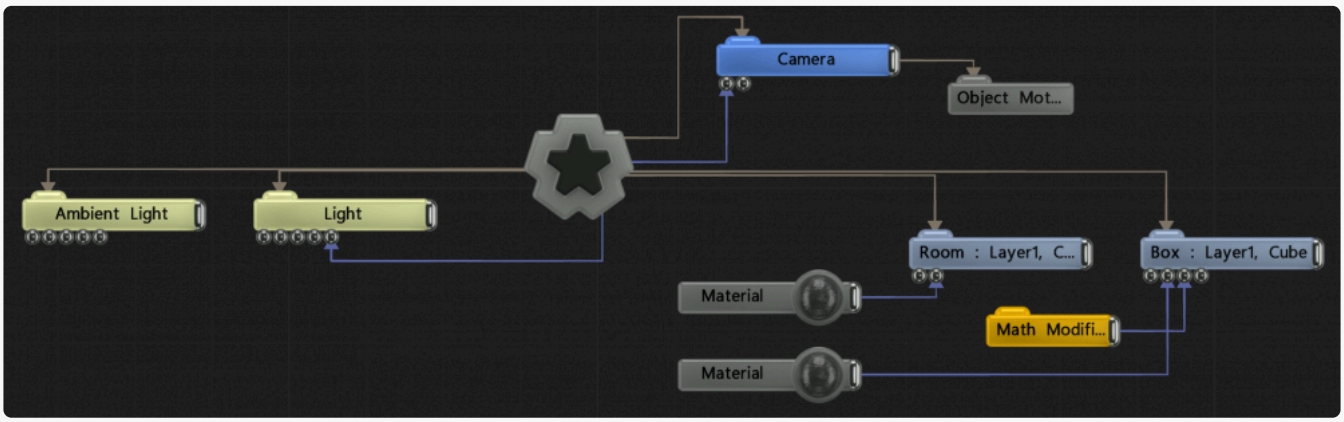
Outputs

There are no outputs from this node.

Motion Blur

Method

This node adds motion blur to objects in the scene.

Example Nodegraph


Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blur Scale	Size of the motion blur applied.
Direction Mode	Select which direction the motion blur is applied. • Backwards, Motion blur is generated in the direction of its previous position. • Forwards And Backwards, Motion Blur is generated in both the direction the object came from and the direction the object is moving in.
Lock Frame Rate	Lock the frame rate of the selected objects.
Locked Frame Rate	Frame rate to lock the motion blur calculations.
Limit Blur Length	Limit the distance the motion blurs can reach.
Max Blur Length	Set the limit to which the motion blur can be blurred. Limit Blur Length must be enabled.
Line Trace	Select how the motion blurs are calculated.

Mode	
Line Step Size	Number of substeps for each frame. Stepped Samples must be enabled.
Apply To Opaque Objects	Toggle whether the effect only applies to opaque objects.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

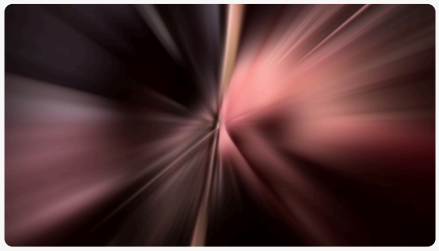
There are no outputs from this node.

Radial Blur

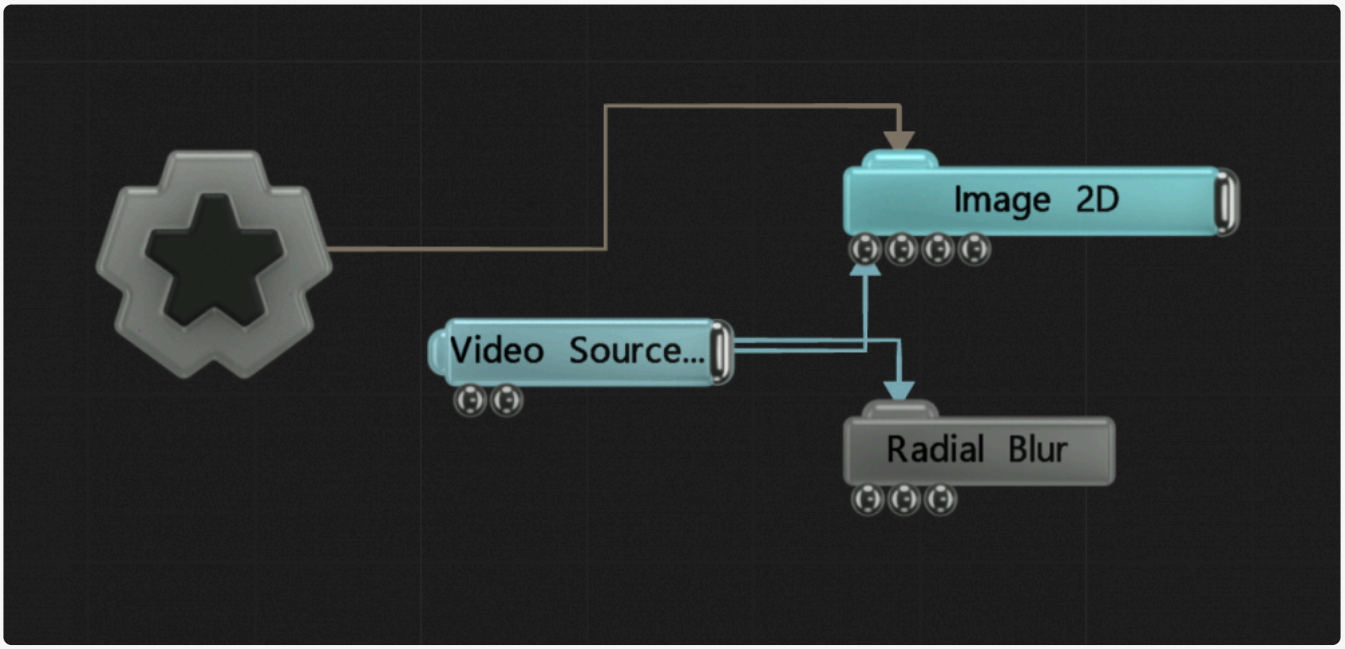
Method

This effect blurs a texture in a radial directional fashion from an origin point on the image, usually the center of the image unless a Transform Controller input is used. The further a source pixel is from the origin point the more it will be blurred.

This is typically used with small blur lengths to bring focus to the centre of the image, or with large blur lengths and an additive blend mode to achieve light ray beam effects.

Raw texture	Processed texture	Modified texture
		

Example Nodegraph



Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Intensity	The intensity of the effect that is applied.
Blur Scale	How far the blur should push out. This is multiplied by the distance of the pixel from the center of the image.
Threshold	The luminance threshold at which a pixel will contribute to the effect..

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Glow Mask Image	Use a mask image to control where the output is most or least affected by the effect, based on the mask images luminance.	Image Plane
Affected Objects	Change which objects are affects by the effect. by default, all objects are affected.	3D Object
Transform Controller	Set the origin/center point of the radial blur.	Null
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Notes

Animating your origin using the Blur Transform Controller can produce stunning effects.

! Animating your origin can cause psychosis.

Tilt Shift

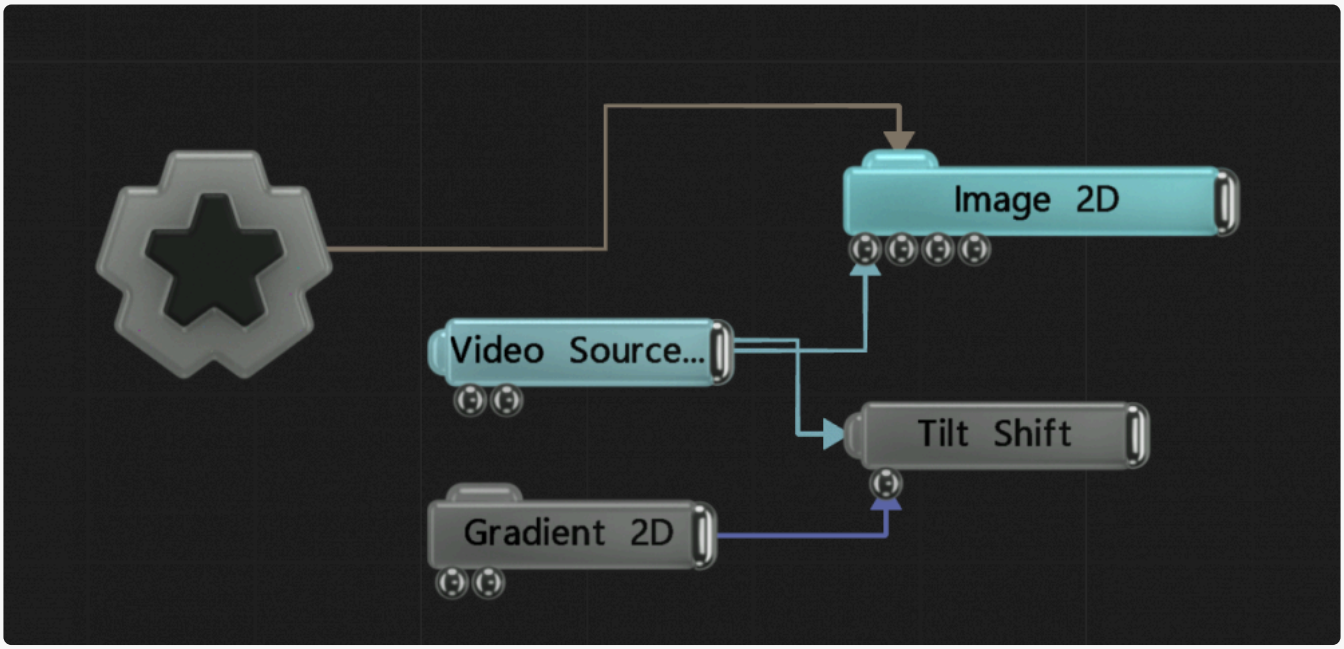
Method

This node applies a tilt shift effect to the image by blurring the top and bottom parts of the image, while keeping the center plane in focus.

Requires a Gradient 2D input to run.

Raw texture	Processed texture	Modified texture

Example Nodegraph



Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Mode	How the tilt shift blurs the image. • Blur, the image is simply blurred. • Sprites, the image is blurred, and points are blurred with a sprite. • Show Gradients Only, shows the gradient input.
Blur Size	The size of the blur.
Max Sprite Size	Limit the maximum size the blurring sprite will go to.
Colour Difference Threshold	Limits where tilt shift will be applied based on differences on differences in colour value.
Sprite Texture	Input an image texture to be blur the parent.
Apply To Opaque Objects Only	Apply only to objects with alpha values of 1.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Gradient Node	Controls the gradient of the tilt shift effect.	Gradient 2D
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

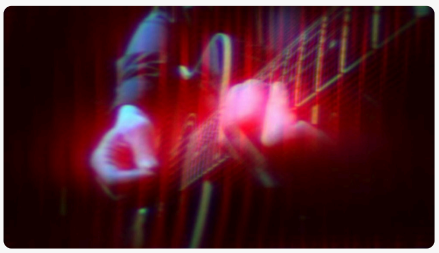
Outputs

Connected nodes will be forced to generate after the tilt shift is applied.

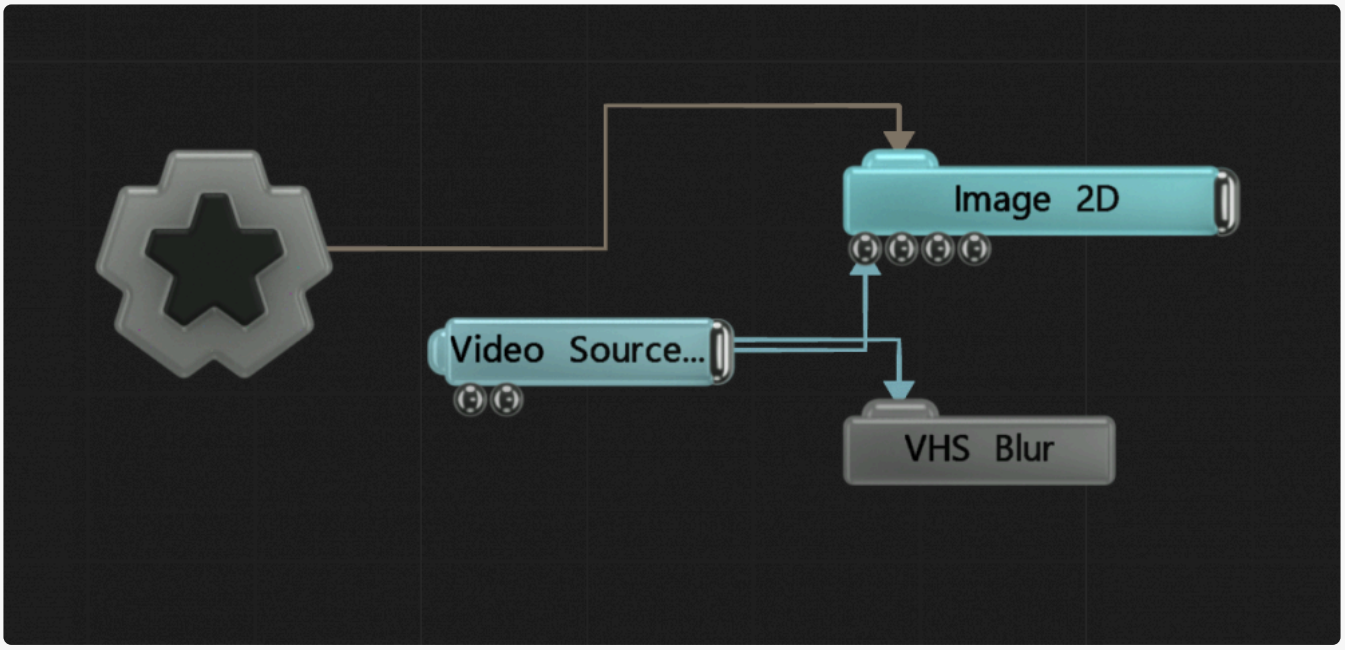
VHS Blur

Method

This node creates a damaged VHS effect.

Raw texture	Processed texture	Modified texture
		

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.

Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Blur Scale	How far the blur should push out. This is multiplied by the distance of the pixel from the center of the image.
Chromatic Blur Scale	Scale the effect of the chromatic blur.
Chromatic Intensity Scale	Scale the intensity of the effect.
Noise Amount	How much noise is applied to the image.
Chromatic Bias R	How much the chromatic blur is shifted towards red.
Chromatic Bias G	How much the chromatic blur is shifted towards green.
Chromatic Bias B	How much the chromatic blur is shifted towards blue.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

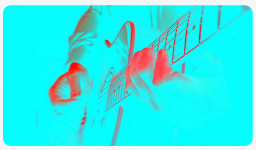
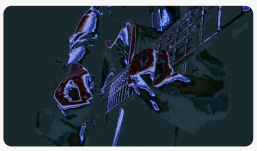
There are no outputs from this node.

Colour Processing

Method

Colour Processing nodes are used to modify the colours in an image.
Colour Processing nodes can be applied directly to all the same nodes as the rest of the post-fx nodes.

Gallery

				
Apply Colour LUT	Colour Grading	Colour Limiter	Invert	Local Contrast
				
Recolour	Strobe	Tint	Tone Map	

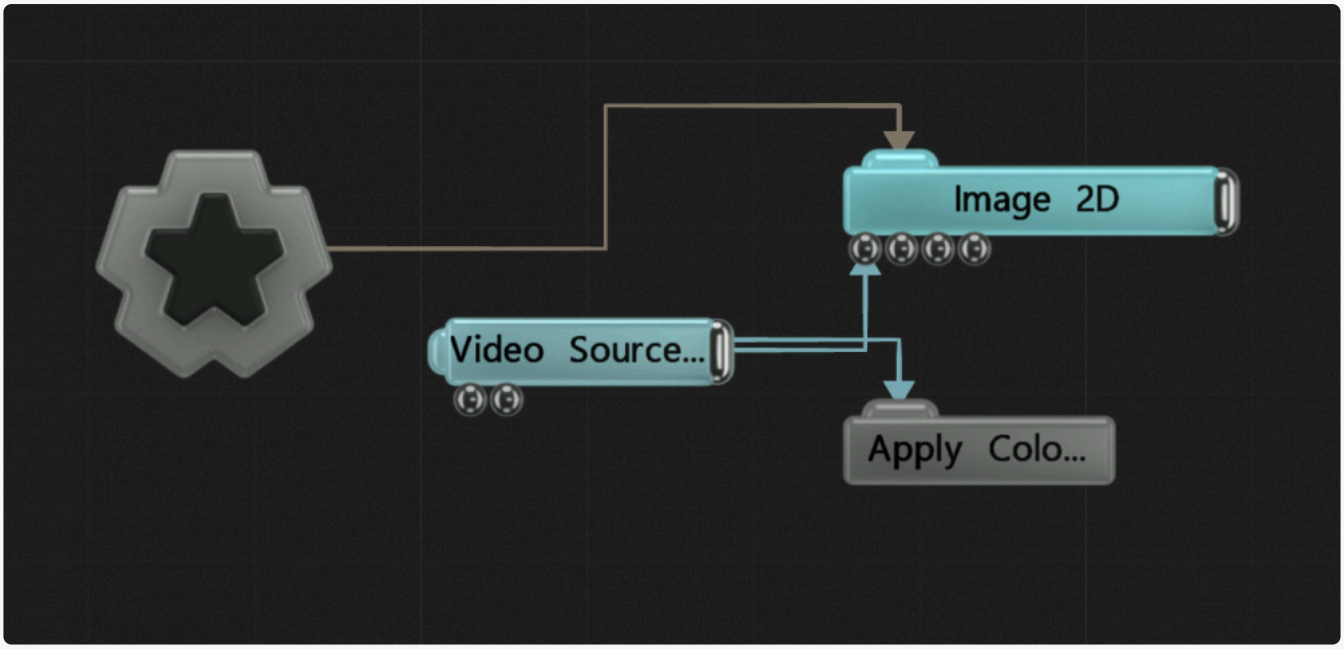
- Colour Correction
- Colour Channel Mixer
- Combine Colour Grades

Apply Colour LUT

Method

This Node applies a Colour Look Up Table to the Image.
Colour Look Up Tables (LUTs) are a method of transforming the colours of an image. They are used extensively in colour grading in post production. Notch supports the standard 3D LUT format of .cube, exported by the vast majority of colour grading packages.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Cube LUT	The imported .cube resource.
LUT Working Colour Space	The colour space in which to apply the LUT. This should be matched to the space in which the LUT was authored. • Gamma 2.2 – convert the input colours to gamma 2.2 space before applying the LUT. • Linear – convert the input colours to linear space before applying the LUT.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

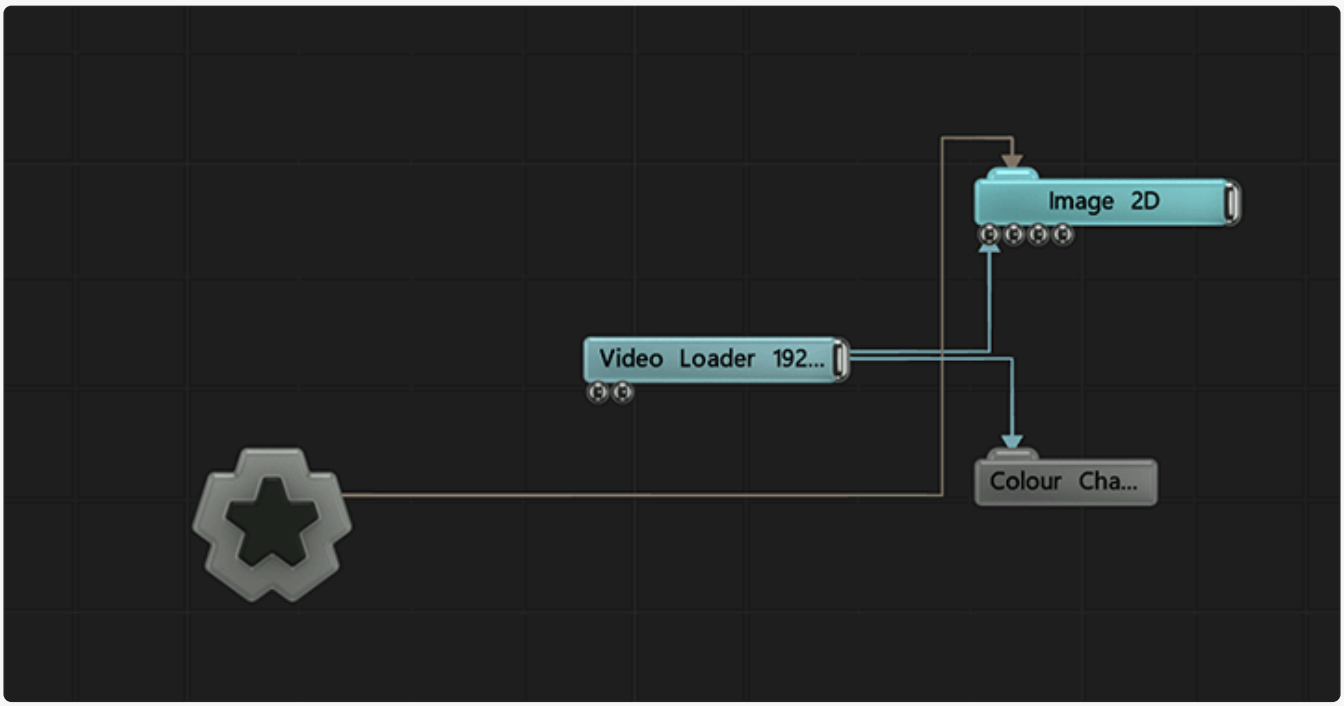
There are no outputs from this node.

Colour Channel Mixer

Method

This node allows you to use the colour values from the different colour channels and blend them together, similar to the Channel Boolean but with much greater control.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
R/G/B/A Channel – R/G/B/A Amount	How much of each RGBA channel is used in a different channel.
R/G/B/A Blend Mode	How the RGBA Values Blend with the other RGBA channels. See Blend Modes for more.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Colour Correction

Method

This node modifies the current colour correction of an image.

Example Nodegraph

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Apply To Solid Geometry Only	Toggle whether the effect should only apply to solid geometry, or the whole of the scene.
Clamp Source Colour	Clamp the incoming colours to be between 0-1.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Levels

Name	Description
In Black	Darken the dark parts of the image.
In White	Brighten the light parts of the image.
Out Black	Darkens the dark parts of the image.
Out White	Brighten the light parts of the image.
Gamma	Changes the gamma value of the image.
Brightness	Control the brightness of the image.
Contrast	Control the contrast of the image.
Saturation	Control the saturation of the image.
Hue	Control the hue of the image.

Colours

Name	Description
Red	Change the amount of red used in the whole image.
Green	Change the amount of green used in the whole image.
Blue	Change the amount of blue used in the whole image.

Colours – Hilights

Name	Description
Red Hi	Change the amount of red used in the bright parts of the image.
Green Hi	Change the amount of green used in the bright parts of the image.
Blue Hi	Change the amount of blue used in the bright parts of the image.

Colours – Midtones

Name	Description
Red Mid	Change the amount of red used in the midtones of the image.
Green Mid	Change the amount of green used in the midtones of the image.

Blue Mid	Change the amount of blue used in the midtones of the image.

Colours – Shadows

Name	Description
Red Low	Change the amount of red used in the dark parts of the image.
Green Low	Change the amount of green used in the dark parts of the image.
Blue Low	Change the amount of blue used in the dark parts of the image.

Inputs

There are no inputs for this node.

Outputs

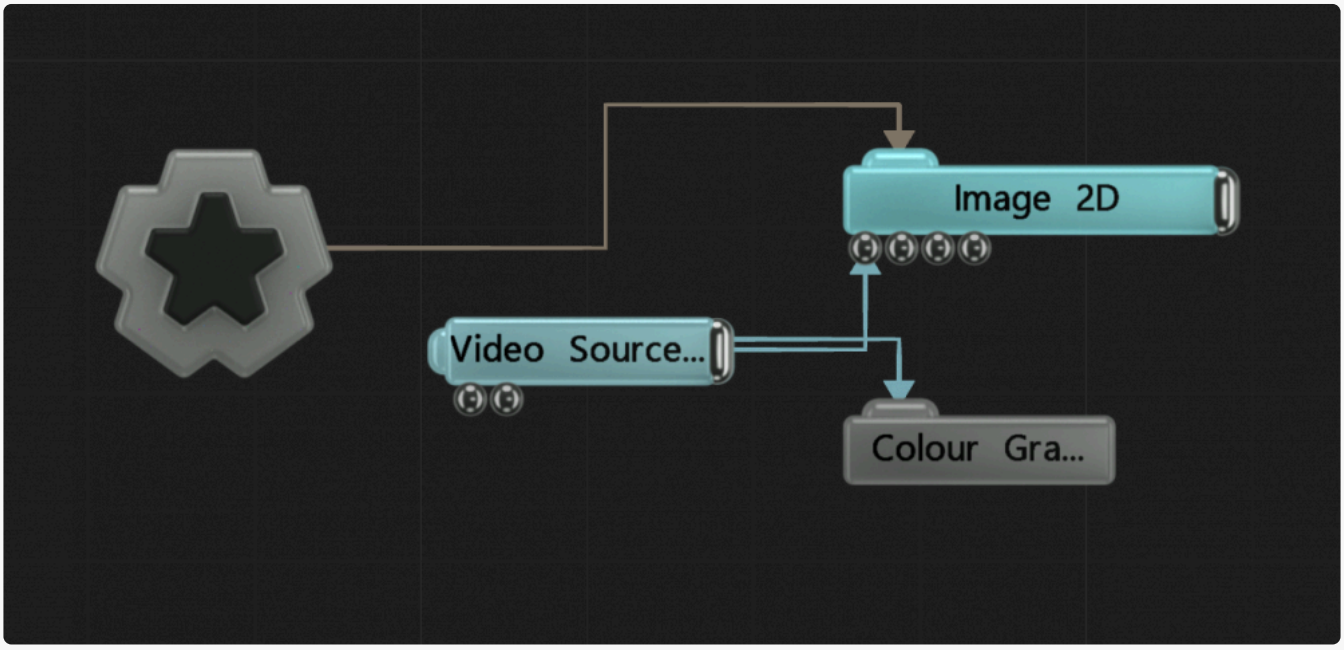
There are no outputs from this node.

Colour Grading

Method

This node alters the distribution of colour in the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Apply To Solid Geometry Only	Toggle whether the effect should only apply to solid geometry, or the whole of the scene.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Global

Name	Description
Global Tint	Tint of colour in image
Global Offset	Offset of colour in image

Shadows

Name	Description
Shadow Tint	Tint the darker sections of the image
Shadow Offset	Offset the darker sections of the image
Shadow Falloff	Control the falloff of the darker sections of the image

Midtones

Name	Description
Midtone Tint	Tint of shadows in image
Midtone Offset	Offset of shadow colour in image
Midtone Falloff	Control the falloff of the shadow effect to the image
Midtone Centre Point	Control the midpoint between shadows and highlights

Highlights

Name	Description
Highlight Tint	Tint the brighter sections of the image
Highlight Offset	Offset the brighter sections of the image

Highlight Falloff	Control the falloff of the brighter sections of the image

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

Notes

> ! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

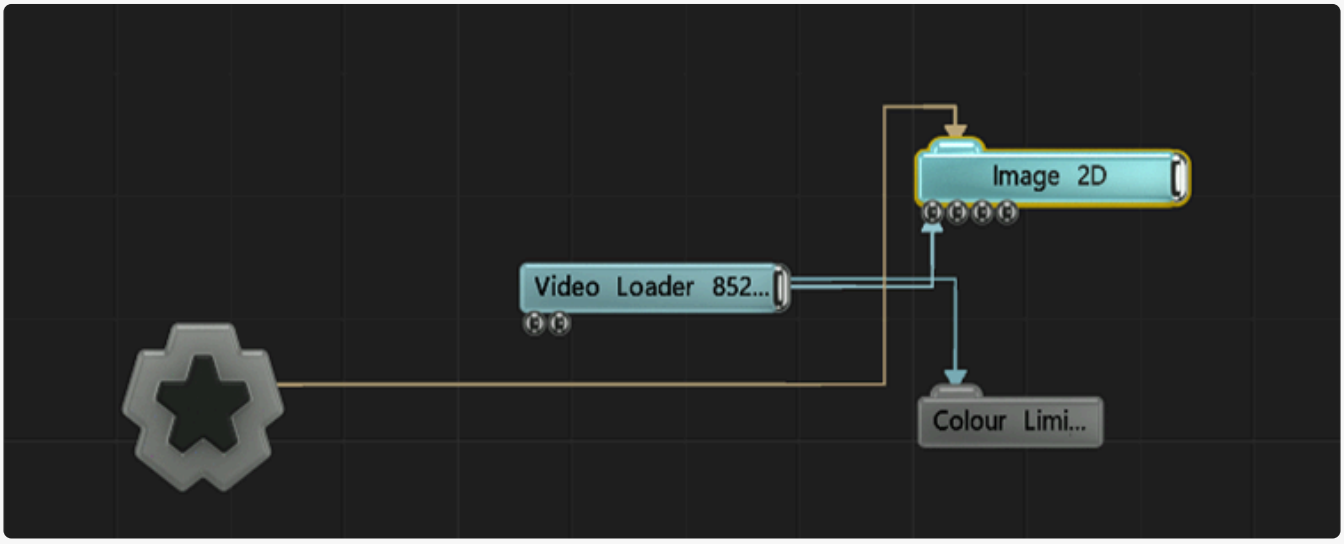
Colour Limiter

Method

This node limits the colour palette to between two selected colours.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode	Change how the generated effect blends with the parent image RGB.

(RGB)	
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Min Colour	Choose the minimum colour value of the parent image is.
Max Colour	Choose the maximum colour value of the parent image is.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Combine Colour Grades

Method

Combine multiple Colour Grading nodes together before use on the parent image or scene.

Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Max Range	Set a maximum range between colour grades that will be combined.
HDR	Change the precision the attached Colour Grading nodes are calculated in.
Greyscale	Greyscale the image before it is used by the colour grades.

Inputs

There are no inputs for this node.

Outputs

Connected colour grades will be combined together.

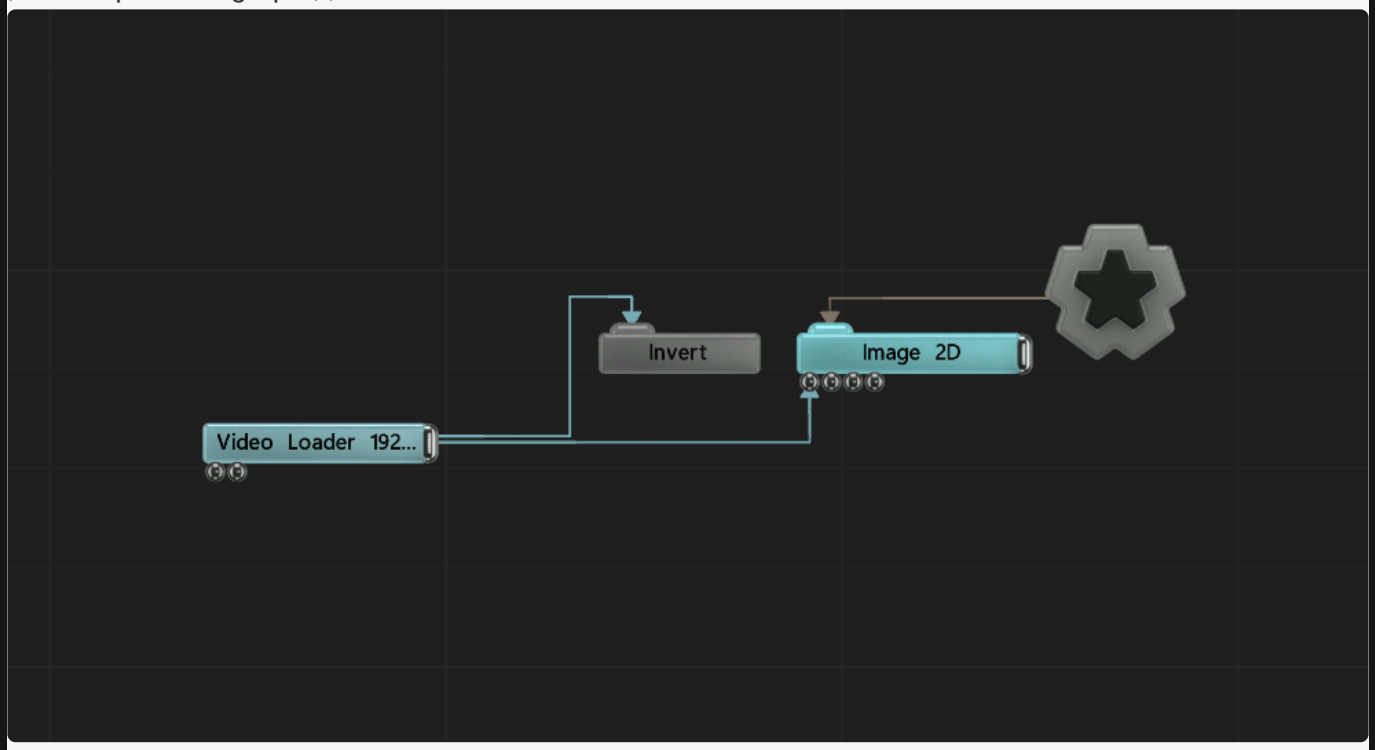
Invert

Method

This node inverts the colouring to the opposite colours within in the image.

Raw texture	Processed texture

|_. Example Nodegraph | |



|\

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

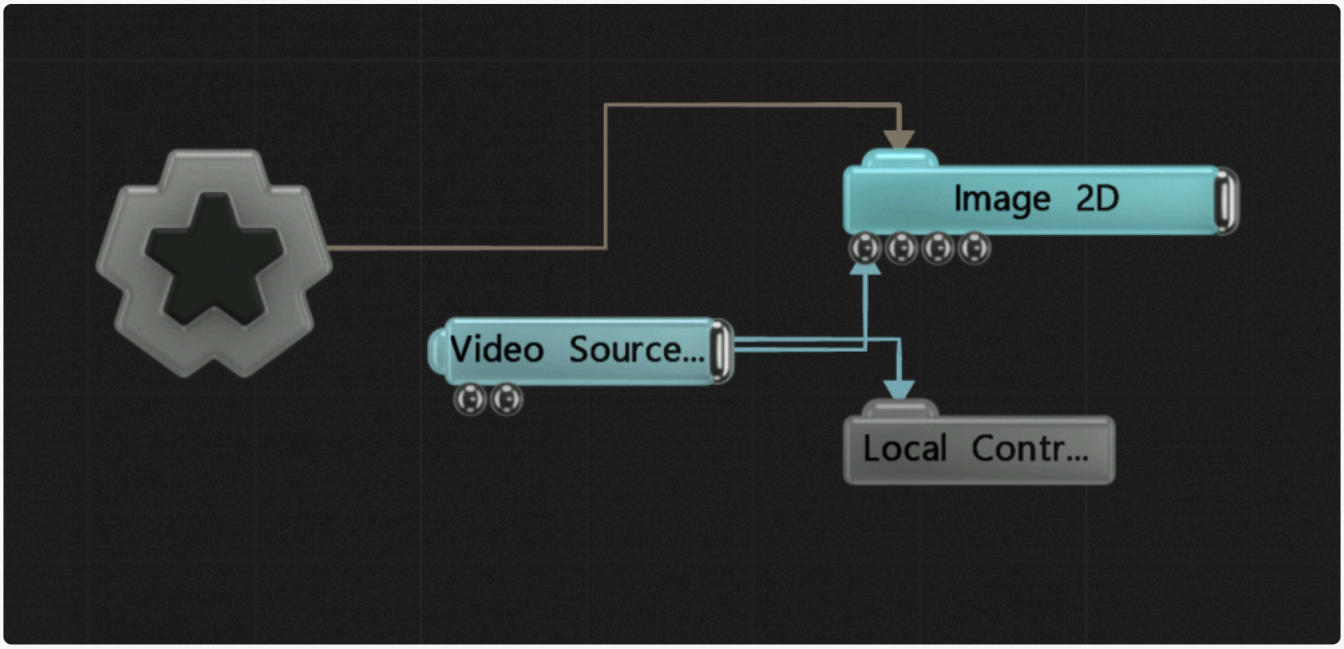
There are no outputs from this node.

Local Contrast

Method

This Node increases the appearance of small scale edges.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Apply To Solid Geometry Only	Toggle whether the effect should only apply to solid geometry, or the whole of the scene.
Brightness	Increase the brightness of the contrast.
Contrast	Increase the contrast in the image.
Local Area Size	Increase the harshness of the edges.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

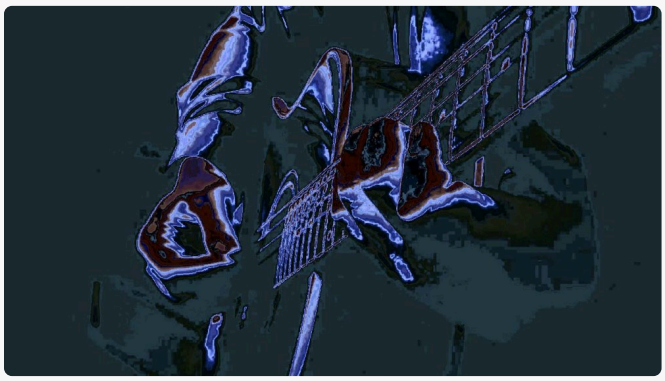
Notes

! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

Recolour

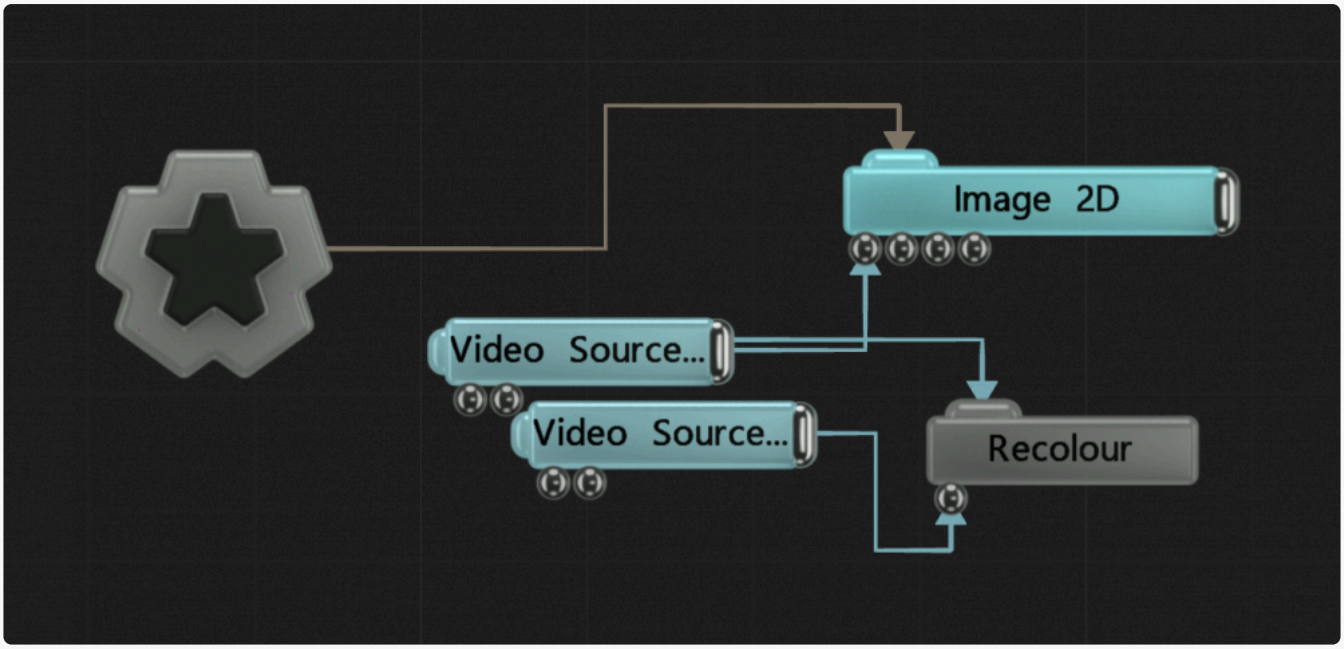
Method

This node recolours an image based on the luminance of another input image.

Raw texture	Processed texture
	

Input Image

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Colour Image	Override the input image.
Input Scale	Scale the depth of the input mages colour resolution.
Input Offset	Offset the colours used for the recolour.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Source Image	Image used to recolour the original image.	Video Loader

Outputs

There are no outputs from this node.

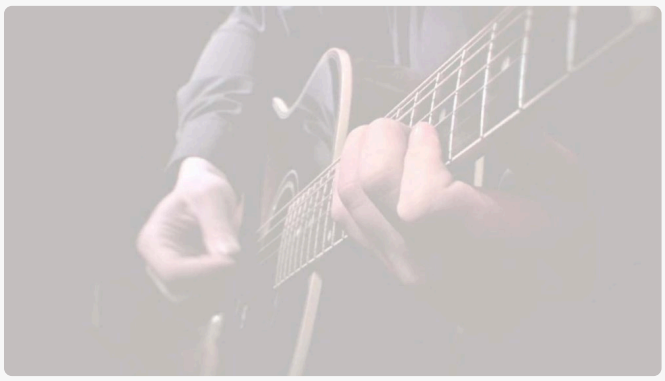
Notes

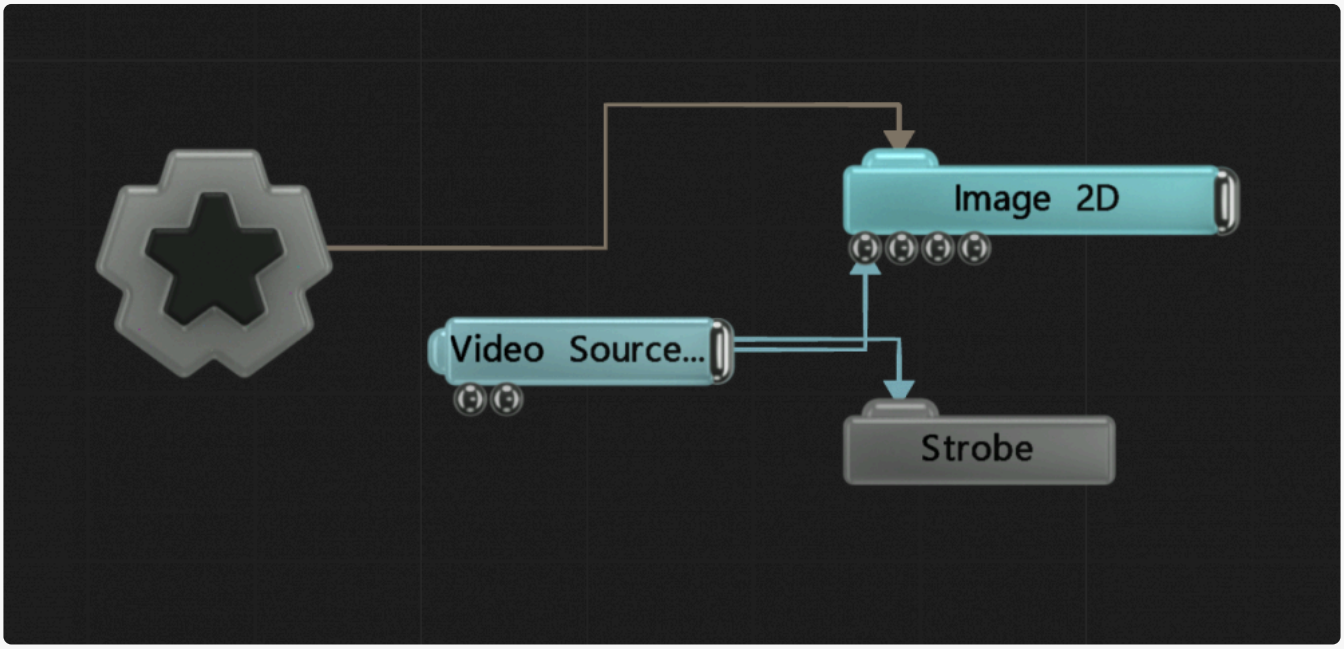
> ! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you add a source image as an input.

Strobe

Method

This node adds a flashing strobe to the images.

Raw texture	Processed texture
	

Example Nodegraph


Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Colour	Edit the colour of the strobe.
Rate	Control the rate at which the strobe flashes.
Blend Mode	Choose to strobe with a constant color or an invert of the image.
Blend Amount	Changes the opacity of the new effect over the original image.
Time Mode	Change how the strobe calculates its rate of change.

Outputs

There are no outputs from this node.

Inputs

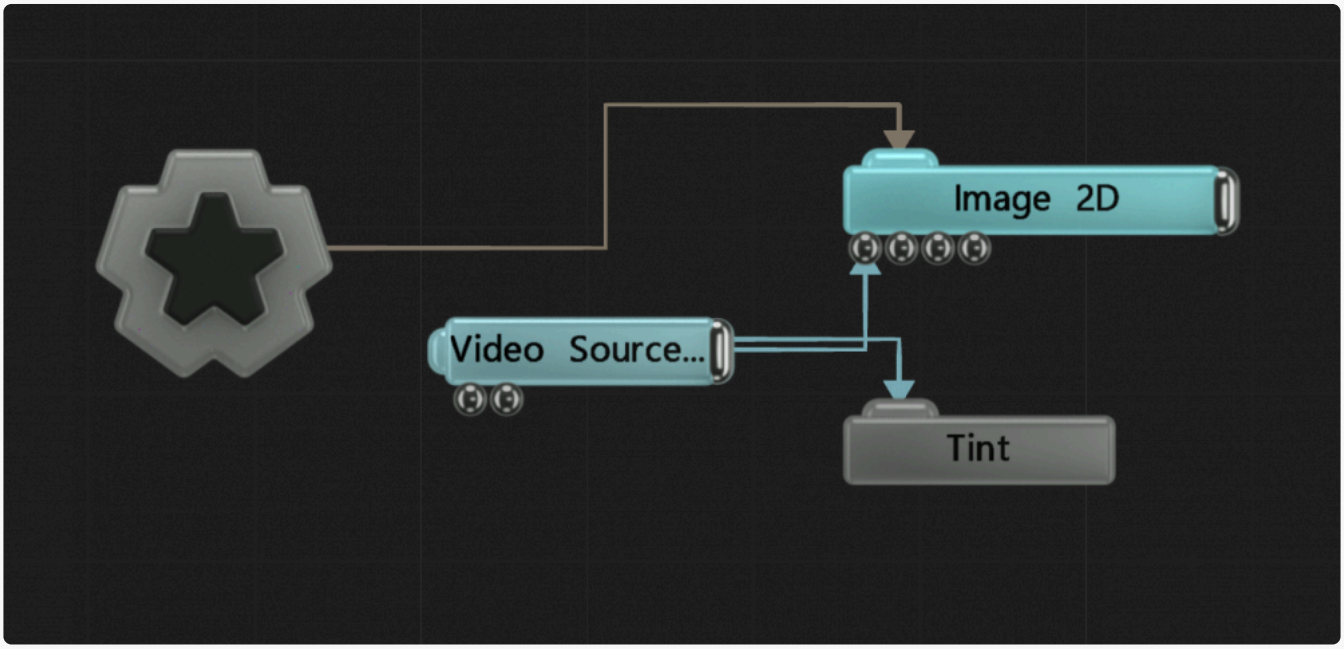
There are no inputs for this node.

Tint

Method

This node tints the overall colour in the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Colour	Edit the colour of the tint.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

Notes

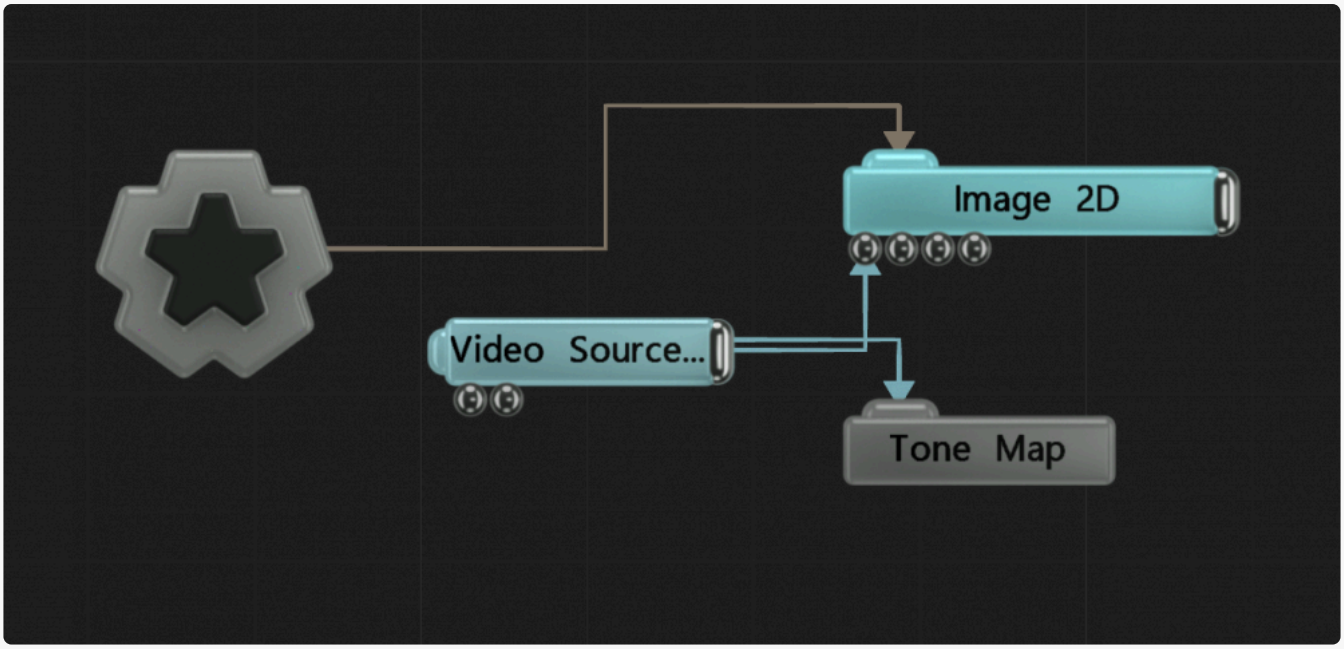
! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

Tone Map

Method

This node applies a tone mapping process to an image. This is often used to convert high dynamic range images to a colour space suitable for output; to convert linear space images to gamma 2.2 for output; or to balance brightness levels across an image and adapt them over time, to mimic the behavior of camera lenses and eyes. A number of standard tone mapping operators are supported.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Tone Map Mode	The method used for tone mapping. • Direct (Pass Throguh Linear), Leave the images unchanged. • Linear To Gamma, Convert from linear colour space to gamma 2.2. • Reinhard, Perform tonemapping with the Reinhard operator. • Filmic, Perform tonemapping with the Filmic operator. • Max White, Tone map the image by scaling down brightness by the brightest pixel value. • Linear-Camera, Perform tone mapping from linear space using a camera exposure model using the parameter controls. • AutoLinear-Camera, Perform tone mapping from linear space using a camera exposure model which automatically determines the parameters based on the input image and exposure setting. • Preserve Contrast, Perform tone mapping using an operator that attempts to preserve contrast in the image.
Adaption Rate	The rate of adaption when moving from bright to dark areas and vice versa, used to mimic real eye and camera behaviours. When moving from a dark to a light area eyes take time to adapt, so at first the light area appears excessively bright.
Exposure	The exposure, for camera-based operators.
ISO (Sensitivity)	The ISO, for camera-based operators.
F/stop	The F/stop, for camera-based operators.
Gamma	The desired gamma of the target output image – usually 2.2.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Notes

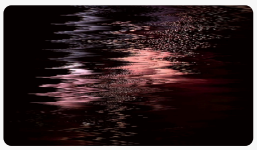
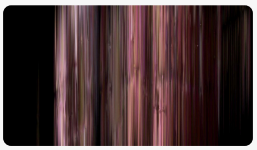
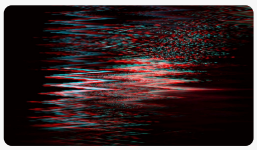
> ! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

Distortion

Method

Changes the shape of the image in different ways.
Distortion nodes can be applied directly to all the same nodes as the rest of the post-fx nodes.

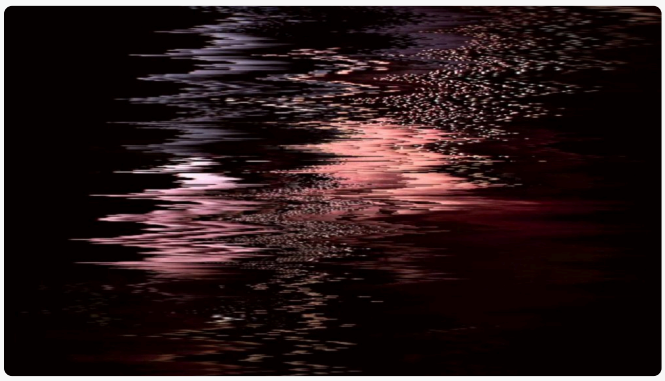
Gallery

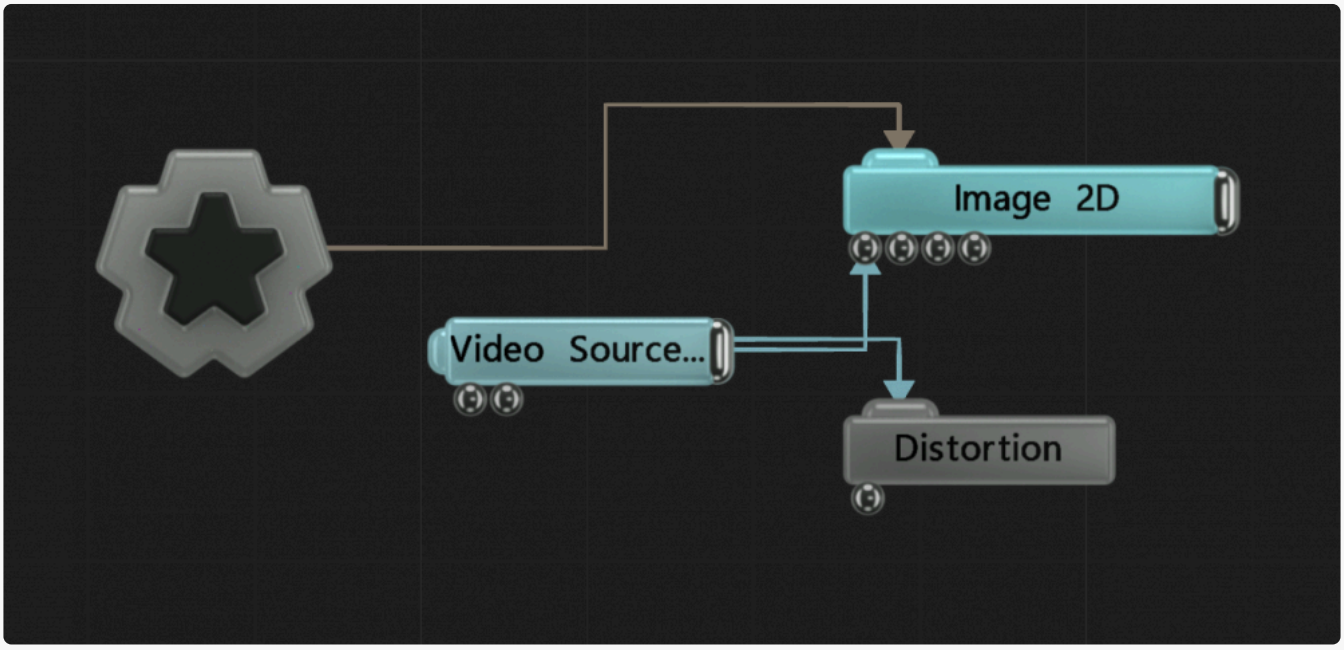
				
Distortion	Dither	Line Distortion	Noise	RGB Distortion

Distortion

Method

This node applies digital distortion to the image.

Raw texture	Processed texture
	

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Amount	How strong an effect will be applied to the image.
Pixel X Noise	How much noise is along the x-axis
Pixel Y Noise	How much noise is along the y-axis
Pixel Noise Scale X	Scale of noise along x-axis
Pixel Noise Scale Y	Scale of noise along y-axis
Distort Y Scale	How much distortion is along the y-axis
Sine Scale	Scale of sine curve on the image
Noise Scale	General scale of noise
Speed	How fast the effect moves.
Blockiness	The blockiness of the distortion.
Frame Time Difference	The time offset between glitch frames when time glitching is active.
Distortion Amount	How much the the image distorts and moves horizontally.
Frame Glitch Amount	Controls the amount of full-frame offset glitching.
Time Glitch Amount	Controls the amount of temporal glitching, where previous frames may be selected and held randomly.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Mask Image	Use a mask image to control where the output is most or least affected by the effect, based on the mask images luminance.	Image Plane

Outputs

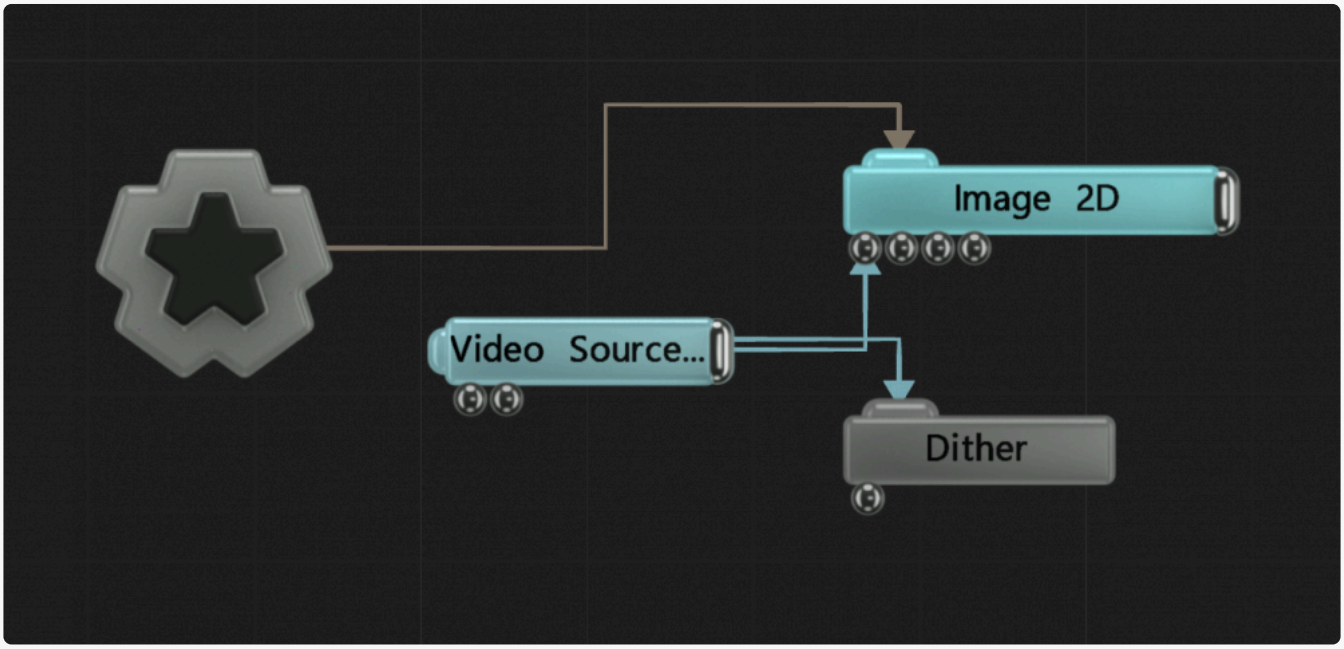
There are no outputs from this node.

Dither

Method

This node applies a dithering effect to the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Mode	Which method of dithering should be used.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Colour Source	Affect the colour of the dither.	Colour Ramp

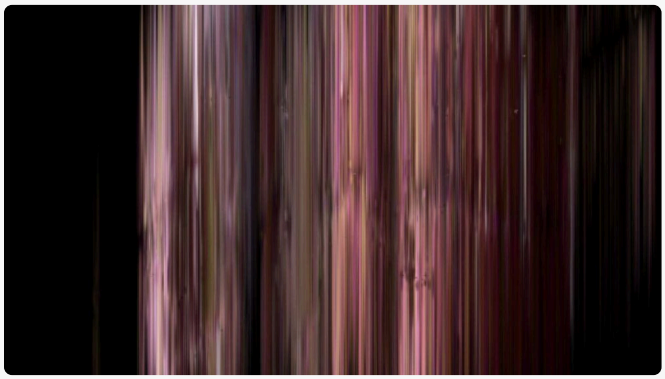
Outputs

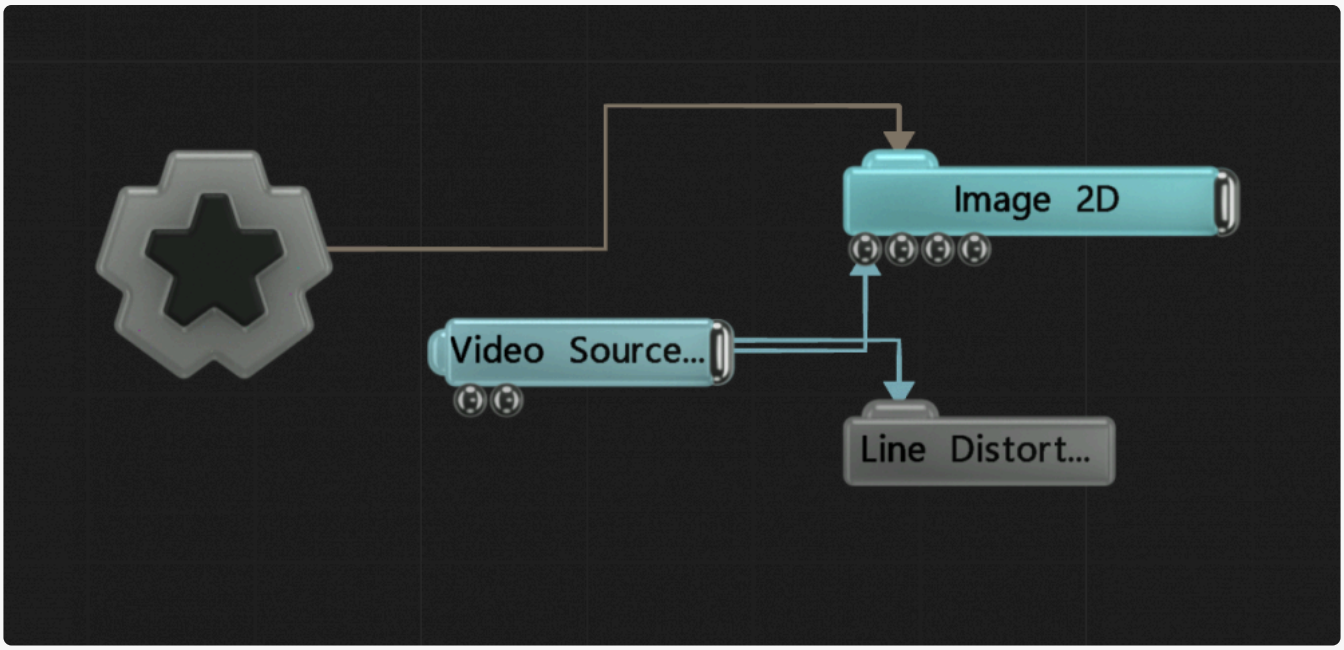
There are no outputs from this node.

Line Distortion

Method

This node distorts to an image by generating lines from each pixel, rotating them and varying their lengths.

Raw texture	Processed texture
	

Example Nodegraph


Attributes

Name	Description
Amount	How strong an effect will be applied to the image.

Rotation	Edit the rotation of the effect.
Sparseness	How close together all the lines are in the effect.
Threshold	The luminance threshold at which a pixel will contribute to the effect.
Line Wave Amount	How much the distorted lines lengthen and shorten in a vertical wave.
Line Width	Width of the lines used in the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

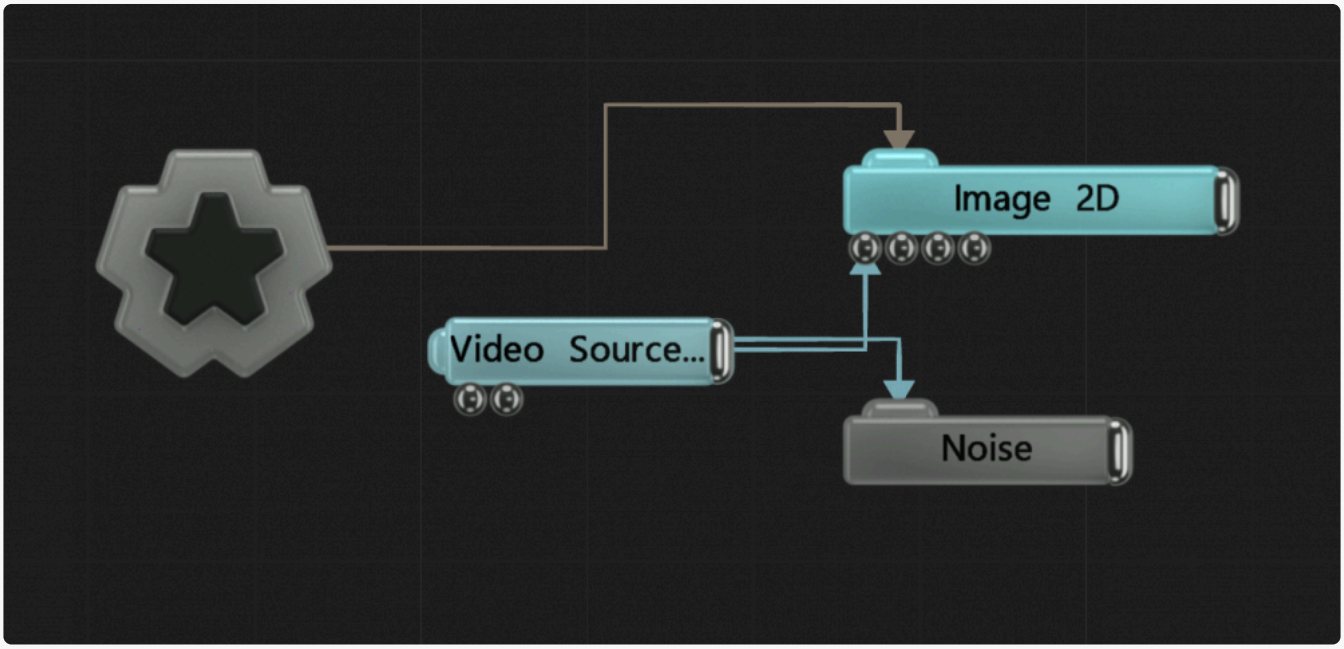
There are no outputs from this node.

Noise

Method

This node overlays random noise on to the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Intensity	The intensity of the effect that is applied.
Amount	How strong an effect will be applied to the image.
Scale	Scale the size of any noise generated.
Animation Rate	The speed at which the noise is animated.
Attack	How quickly a random point reaches its peak.
Decay	How quickly a random point decays.
RGB Noise	Toggle whether the noise is randomised colour, or randomised black and white..
Mode	Choose different kinds of noise. • Point, the noise generates random points of differing brightness for each frame. • Lines, the noise generates parallel lines of differing brightness. • Time Filtered Points, the noise is generated through random points at random times, allowing for the noise to be animated smoothly.
Interpolation	Toggle whether noise is interpolated between frames.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

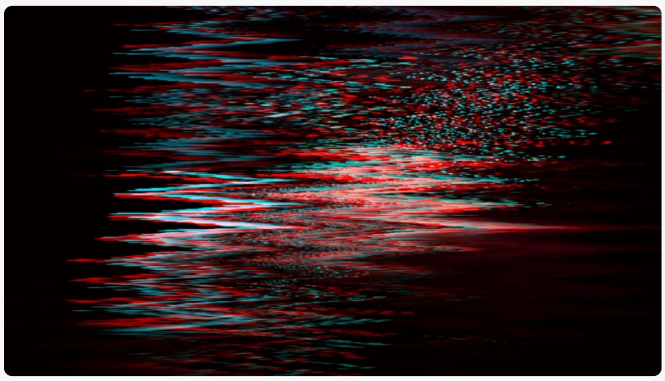
Outputs

The outputs section for this node is currently being worked on.

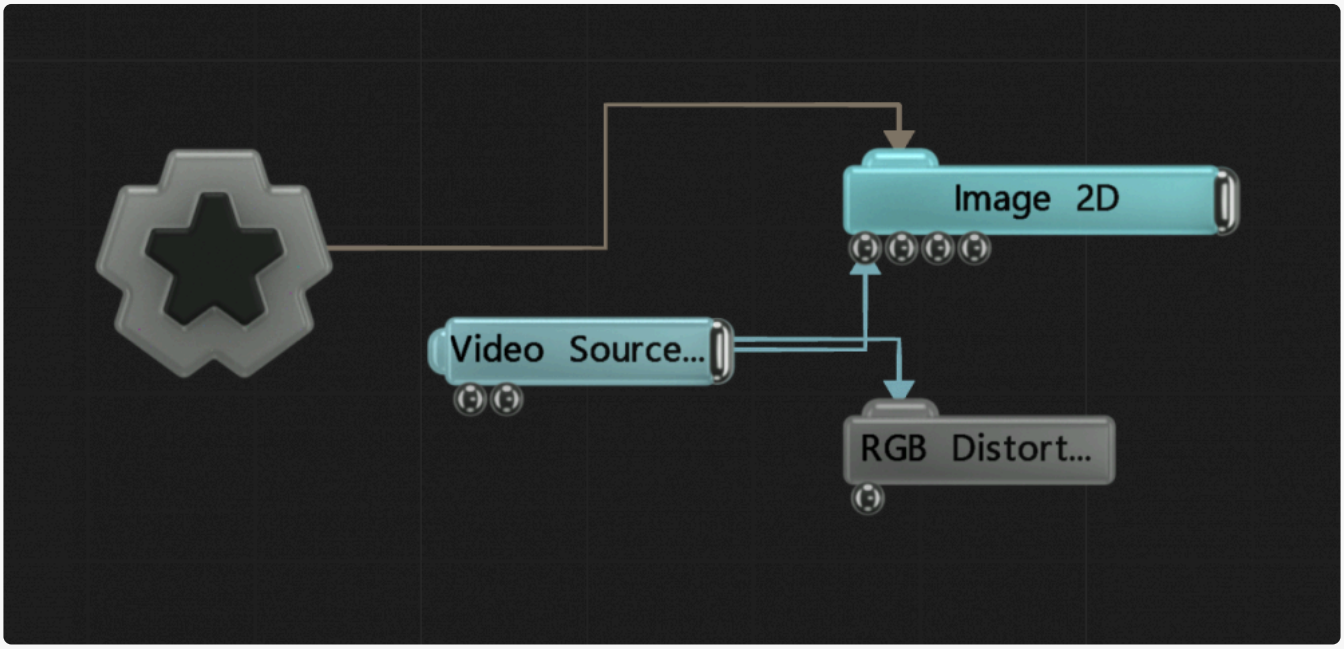
RGB Distortion

Method

This node applies digital RGB distortion to the image.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Amount	How strong an effect will be applied to the image.
Red Distribution	Distribution of red distortion.
Green Distribution	Distribution of green distortion.
Blue Distribution	Distribution of blue distortion.
Distort Y	Distortion on the y-axis.
Sine Scale	Scale of the sine wave.
Noise Scale	Scale of the noise.
Speed	Speed at which the distortion is animated.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Mask Image	Use a mask image to control where the output is most or least affected by the effect, based on the mask images luminance.	Image Plane
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Generators

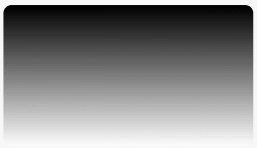
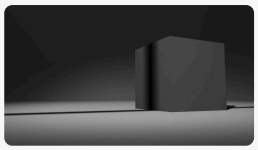
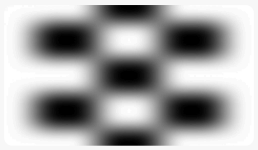
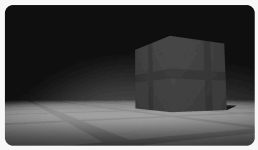
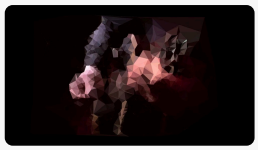
Method

These nodes effect the input image by compositing mathematically generated patterns onto them.

Generators nodes don't affect all the same nodes as the rest of the post-fx nodes, as each node functions differently.

- The Gradient 2D node and Gradient Patch node can be linked into a Render To Texture node, and then applied to the scene in different ways.
- The Gradient 3D node and Grid node can be applied to a Root node, and any objects in the scene will affected by their .
- The Voronoi 2D node can be applied to a Root node, and will generate a mesh based on particles.

Generators

				
Gradient 2D	Gradient 3D	Gradient Patch	Grid	Voronoi 2D

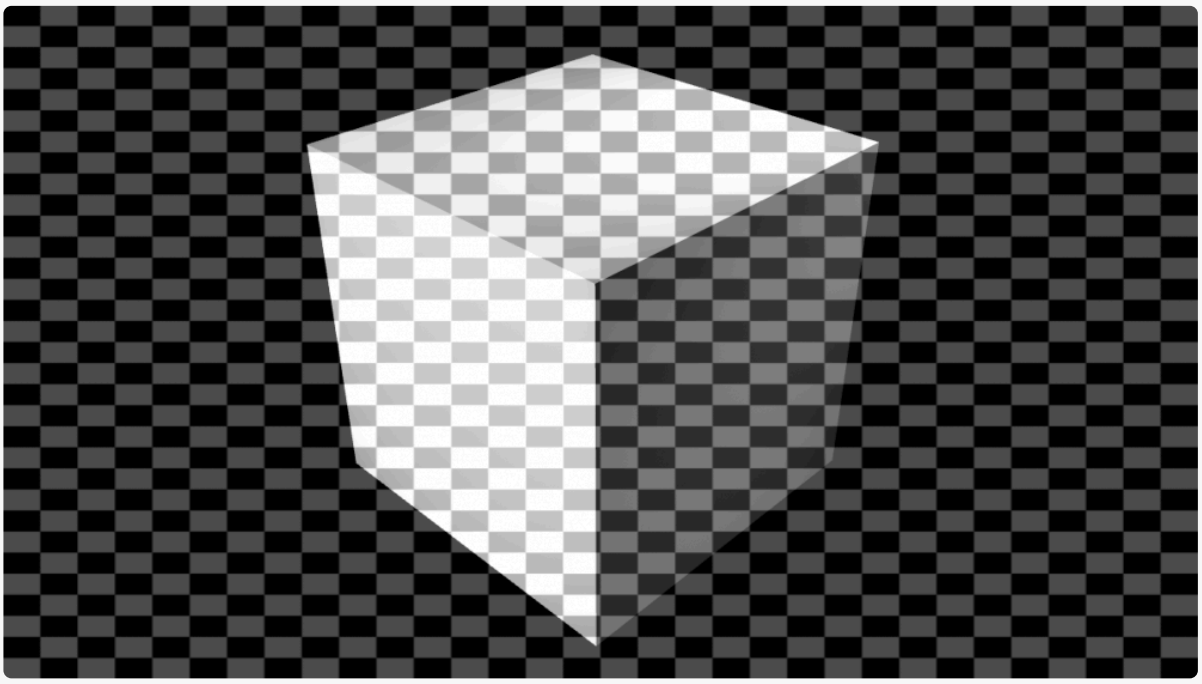
- Composite Image
- Light Scattering Beam

Composite Image

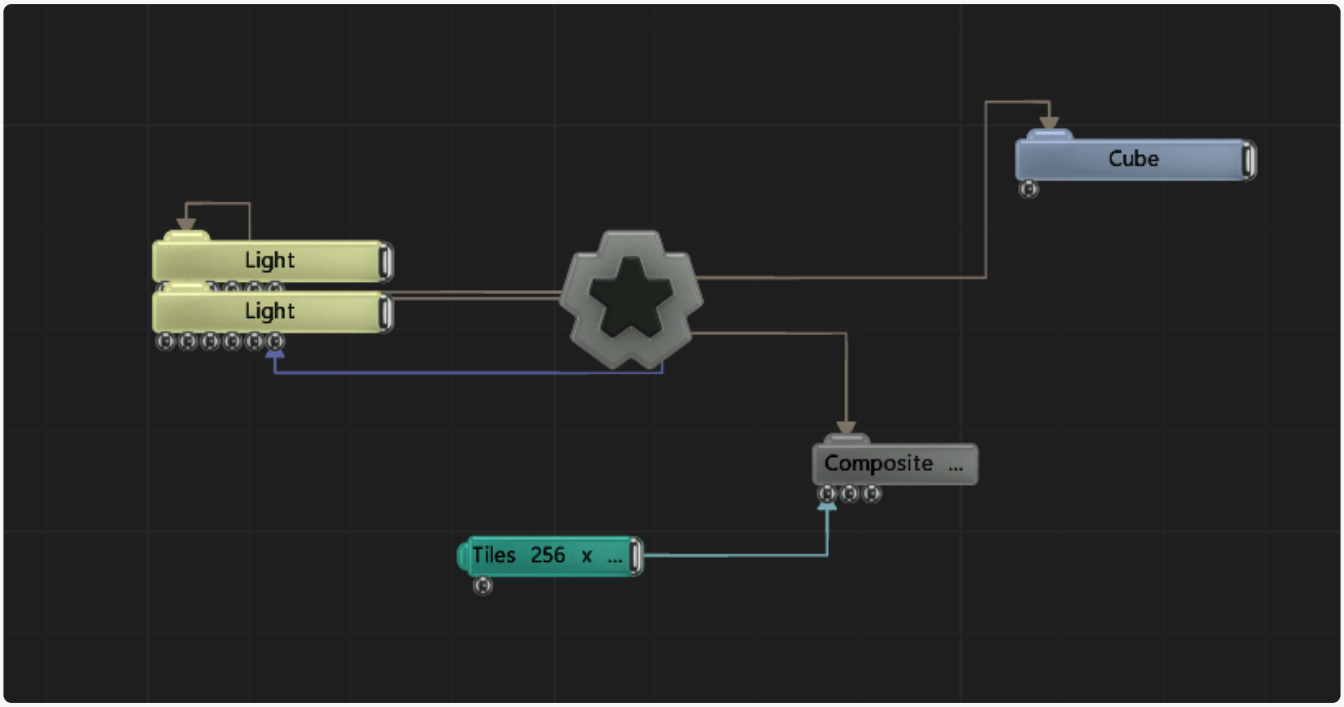
Method

Inserts an image directly into a Post-FX chain.

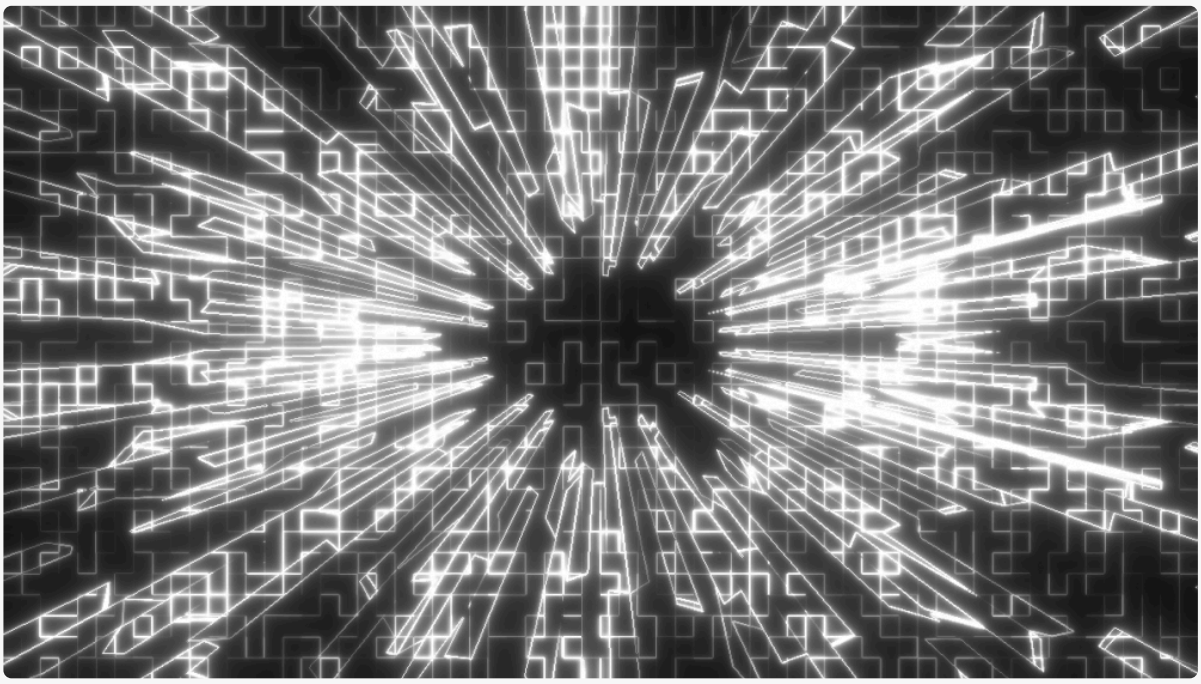
Example 1



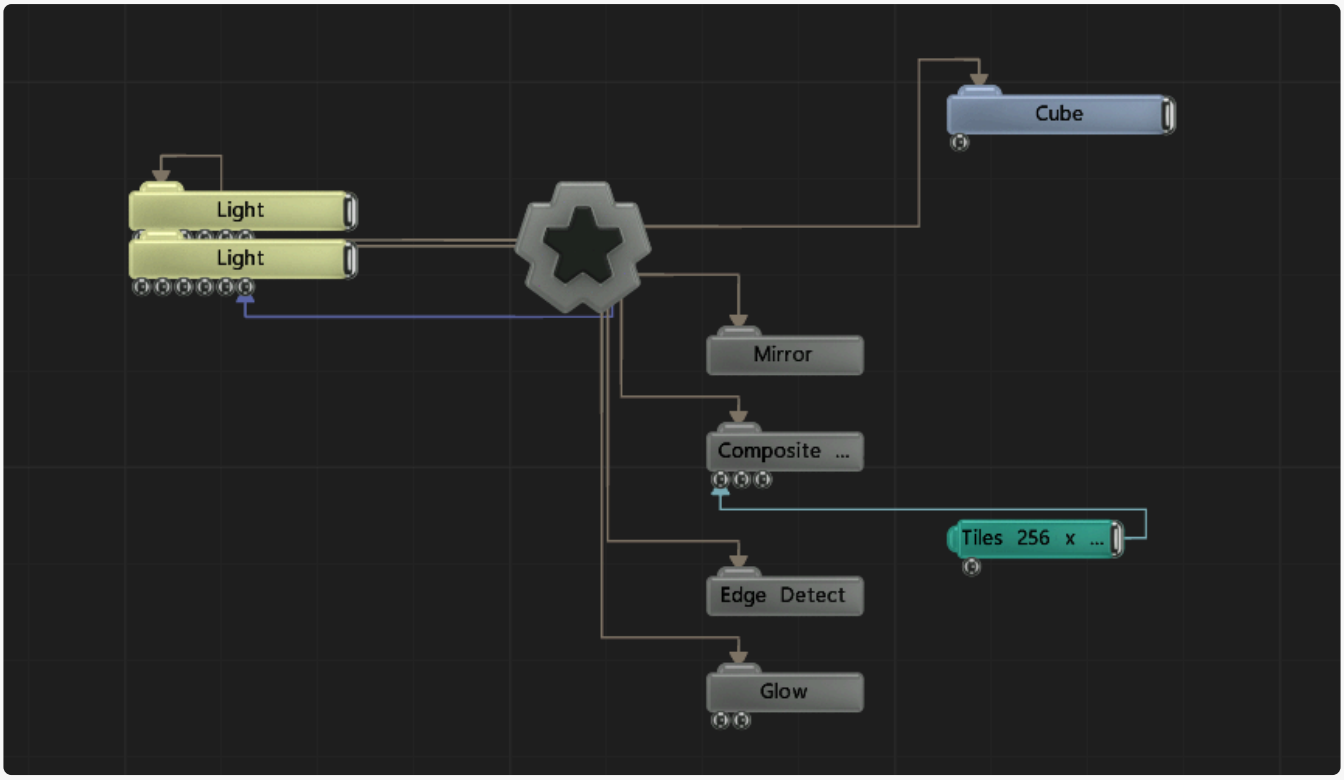
Nodegraph Example 1



Example 2



Nodegraph Example 2



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Image	Select an image to be displayed on the image plane.
Alpha Image	Use an image to control the alpha values.
UV Remap Image	Use an image to remap the UVs for the image.
Colour	Add a colour filter over the image.
Frame	If the image is animated, choose which frame is displayed.
Alpha	Control the alpha value of the image.
Alpha Sort Bias	Biases the alpha sort in order to make it render in front or behind other transparent objects.
Aspect Based Scaling Mode	Scale the image to retain its original aspect ratio. • Disabled, Does not function. • Scale X, The x scale is changed until it matches the original files aspect ratio.

	• Scale Y, The y scale is changed until it matches the original files aspect ratio. • Larger, Chooses the larger scale mode. • Smaller, Chooses the smaller scale mode.
Apply Aspect Before Rotation	Apply aspect correction before applying the rotation transform.
UV Remap Filtering	Remap the colour image to the Image 2D based on a UV map.
No Image Behaviour	Select what colour should appear in the absence of an image input.
Texture Filter Mode	
Texture Wrap Move U/V	Change how the image wraps around both the X and Y axis if the UV transform moves the image off of the output plane. • Clamp – the edges of the image are extended to fill the space left by the transform. • Repeat – the image is repeated until if fills the space left by the transform. • Border With Black- the image is clipped and the space left by the transform is blank.
Use Image Alpha	If enabled, the node will use the alpha channel of the input image when blending.

Affected Channels

Toggle which of the RGBA channels are affected by the effect.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.

UV Transform

Name	Description
UV Offset X	Move the object UV along the x axis, local to the screen.
UV Offset Y	Move the object UV along the y axis, local to the screen.

UV Scale X	Scale the object UV along the x axis, local to the screen.
UV Scale Y	Scale the object UV along the y axis, local to the screen.

Video

Name	Description
Frame Offset	Offset the start frame.
Frame Rate	Control the frame rate of the video.
Loop End Frame	Choose when the video stops looping.

Texture Animation

Name	Description
Is Texture Animation Page	Toggle whether the input image should be treated as an animation page containing multiple frames of an animation.
Num Frames X	The number of animation frames in the X axis contained in the image.
Num Frames Y	The number of animation frames in the Y axis contained in the image.

Crop

Name	Description
Crop Left	How much of the image is cropped from the left.
Crop Right	How much of the image is cropped from the right.
Crop Top	How much of the image is cropped from the bottom.
Crop Bottom	How much of the image is cropped from the top.

Inputs

Name	Description	Typical Node Input
Image	The image to render in to the Post-FX chain	Video Loader
Alpha Image	Add an image to override the alpha channel of the Image 2D node.	Fractal Noise
UV Image Remap	Add an image to use as a UV remap on the Image 2D node.	Video Loader

Outputs

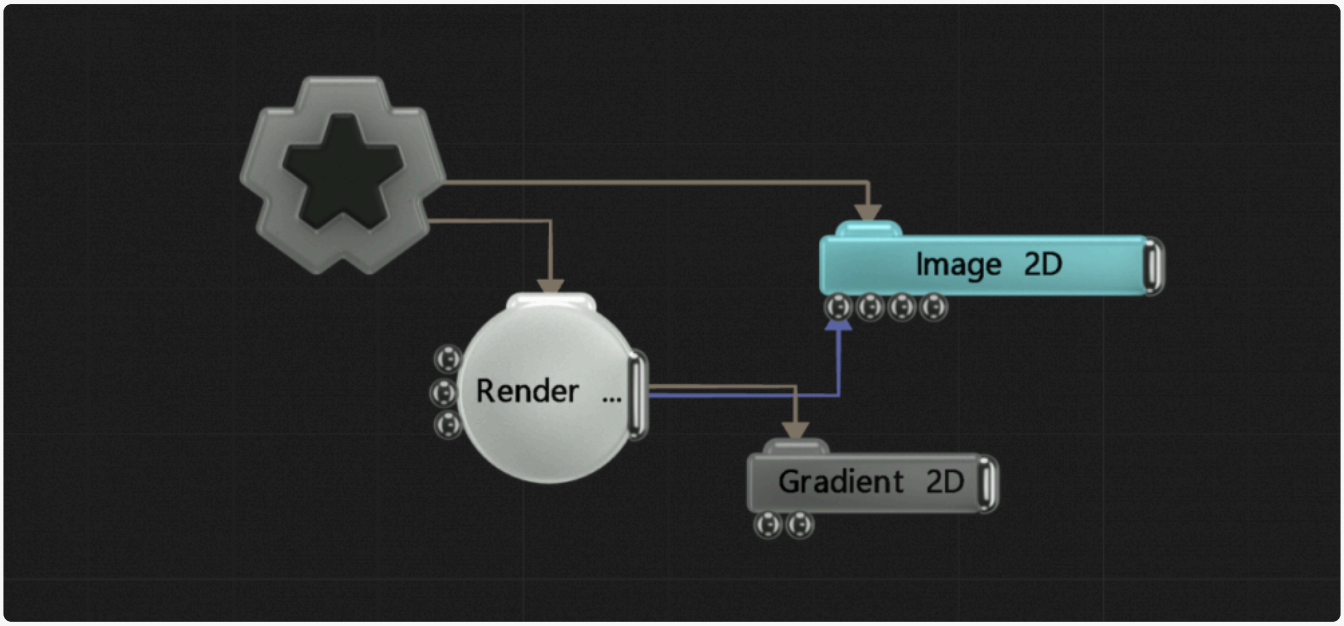
There are no outputs from this node.

Gradient 2D

Method

This node generates a 2D gradient. It is usually used as an input into other nodes, such as the Tilt Shift and Voronoi 2D nodes.

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mode	Control how the gradient effect is built.
Apply Mode	Control how the gradient effect is applied to the scene.

	• Background, the gradient is applied behind the image. • 3D Quad, the gradient is applied as a 2D plane in the scene. • Object Shading, the gradient is generated per pixel based on the depths / positions of rendered 3D objects – making the gradient appear to be mapped to 3D objects. • None, the gradient isn't applied.
Visible	Control whether the node is visible or not to the scene.
Transition Mode	The method by which colours are transitioned. • Timeline – Switch, switch colours by their key positions on the timeline. • Timed Fade, fade between colours at a set rate.
Transition Time	The fade time between colours.
Alpha	Control the alpha value of the image.
Inner Range	The inner distance for which colour 0 fills the space.
Outer Range	The outer distance for which colour 1 fills the rest of the space..
Falloff Power	Change how far the gradient reaches.
Colour 0	Colour to transition from.
Colour 1	Colour to transition to.

Distortion

Name	Description
Distortion Amount	How much the the image distorts and moves horizontally.
Distortion Scale	Scale the distortion along the x axis.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Use a colour ramp for the gradient.	Colour Ramp
Affected Objects	Change which objects are affects by the effect. by default, all objects are affected.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

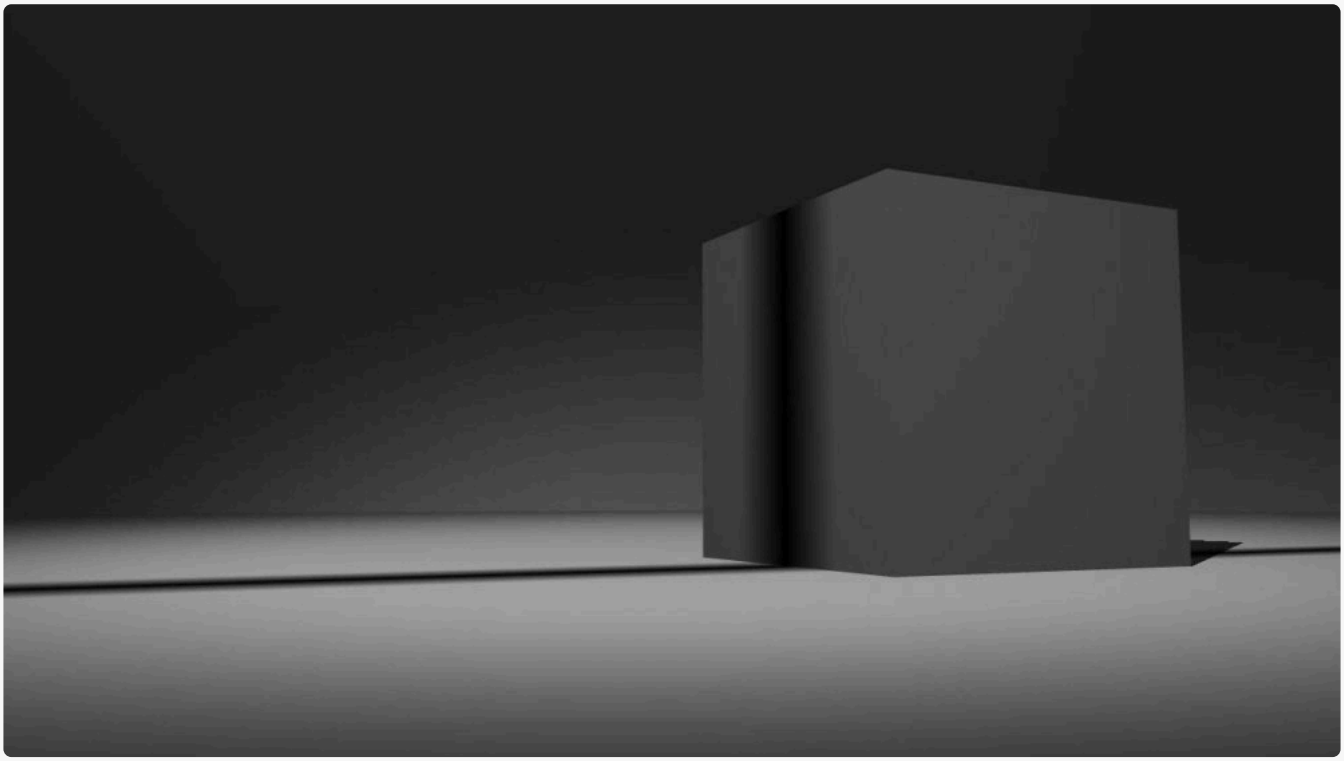
Outputs

The outputs section for this node is currently being worked on.

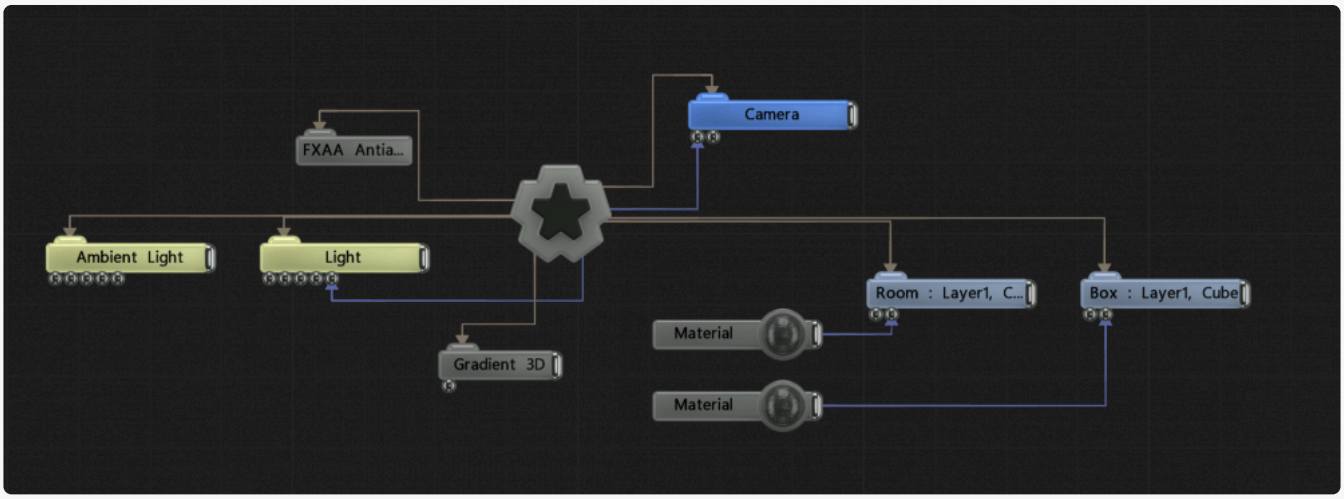
Gradient 3D

Method

This node generates a 3D gradient that appears on all objects in the scene.



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mode	Control how the gradient effect is built.
Apply Mode	Control how the gradient effect is applied to the scene. • Diffuse Colour, the gradient is applied to the diffues colour of the objects in the scene. • Post Lighting Colour, the gradient is applied to the scene after the lighting is calculated.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.
Camera Relative	Control if the gradient is relative to the camera or not.
Inner Range	The inner distance for which colour 0 fills the space.
Outer Range	The outer distance for which colour 1 fills the rest of the space..
Falloff Power	Change how far the gradient reaches.
Blend Amount	Changes the opacity of the new effect over the original image.
Colour 0	Colour to transition from.
Colour 1	Colour to transition to.

Inputs

Name	Description	Typical Node Input
Affected Objects	Change which objects are affects by the effect. by default, all objects are affected.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

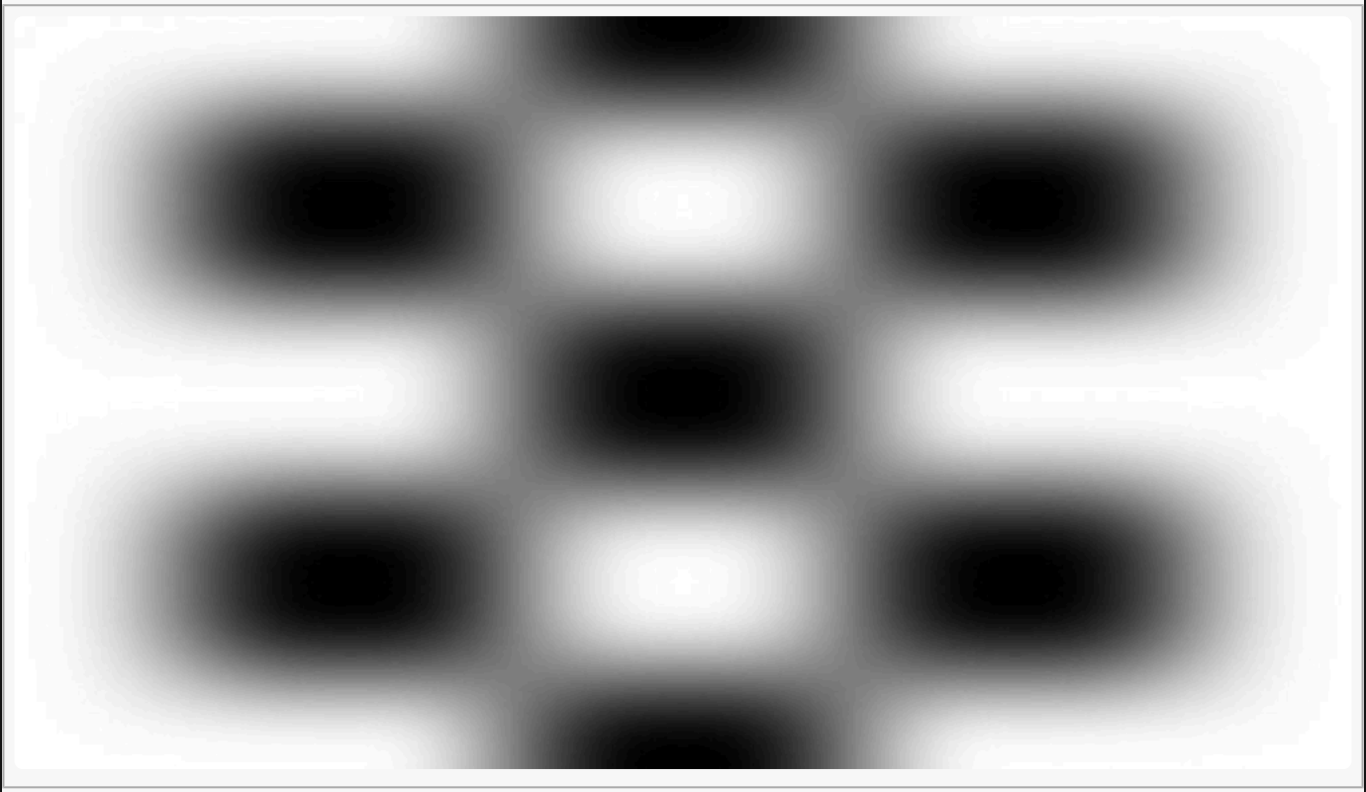
Outputs

The outputs section for this node is currently being worked on.

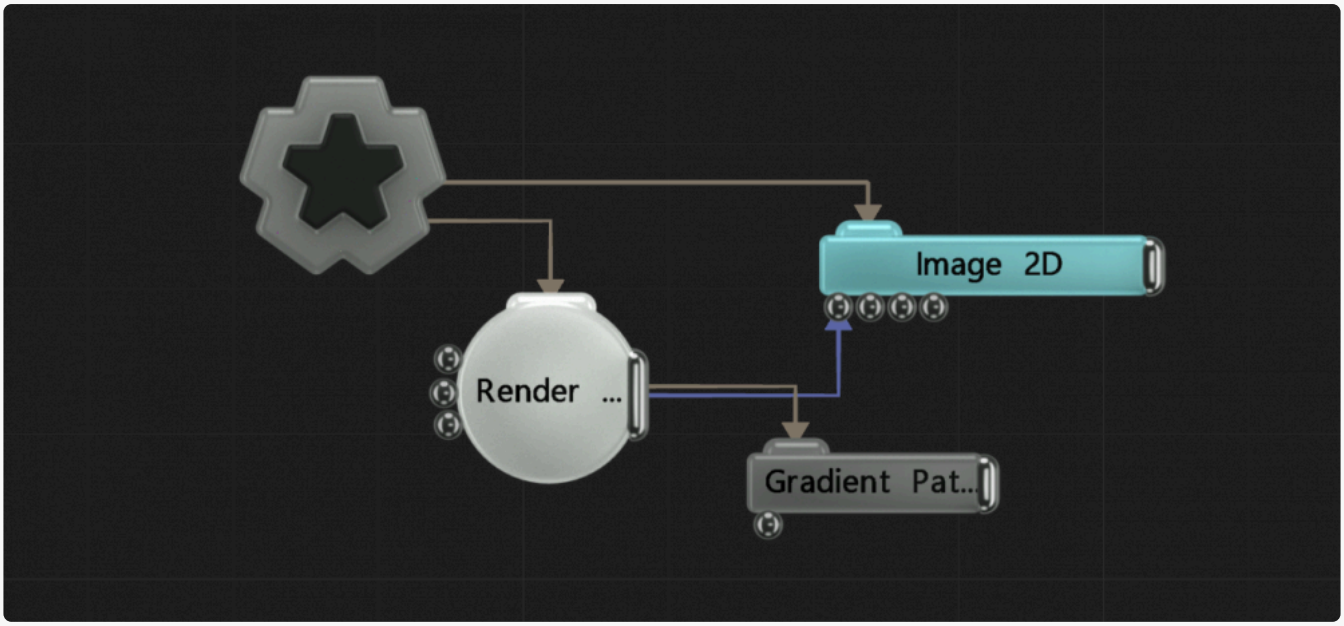
Gradient Patch

Method

This node generates a 2D Array of colours, with gradients blending between them.



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Apply Mode	Control how the gradient effect is applied to the scene.
Num Control Points X	Number of colours along the x axis.

Num Control Points Y	Number of colours along the y axis.
Alpha	Control the alpha of the gradient.

Colours

The colours will appear with the number of colours.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Use a colour ramp for the gradient.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

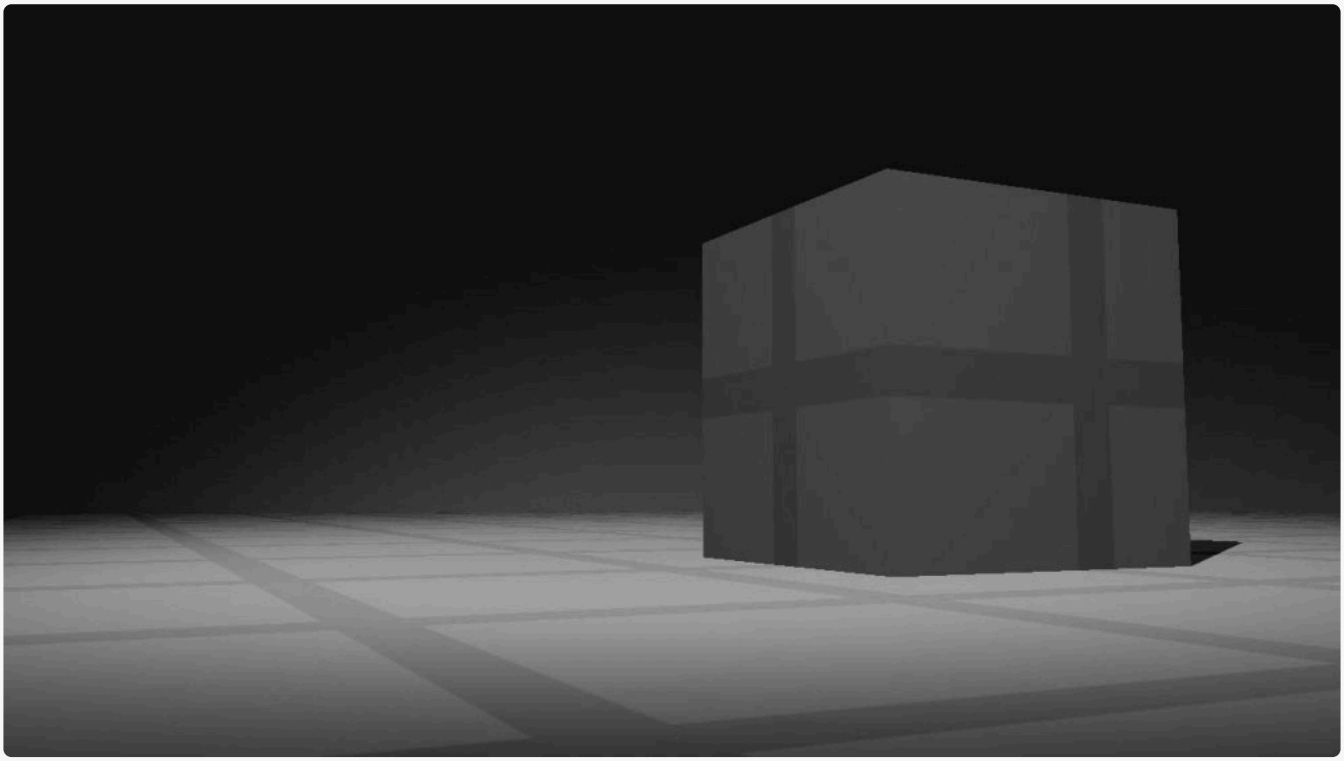
Outputs

{message-outputs-in-development

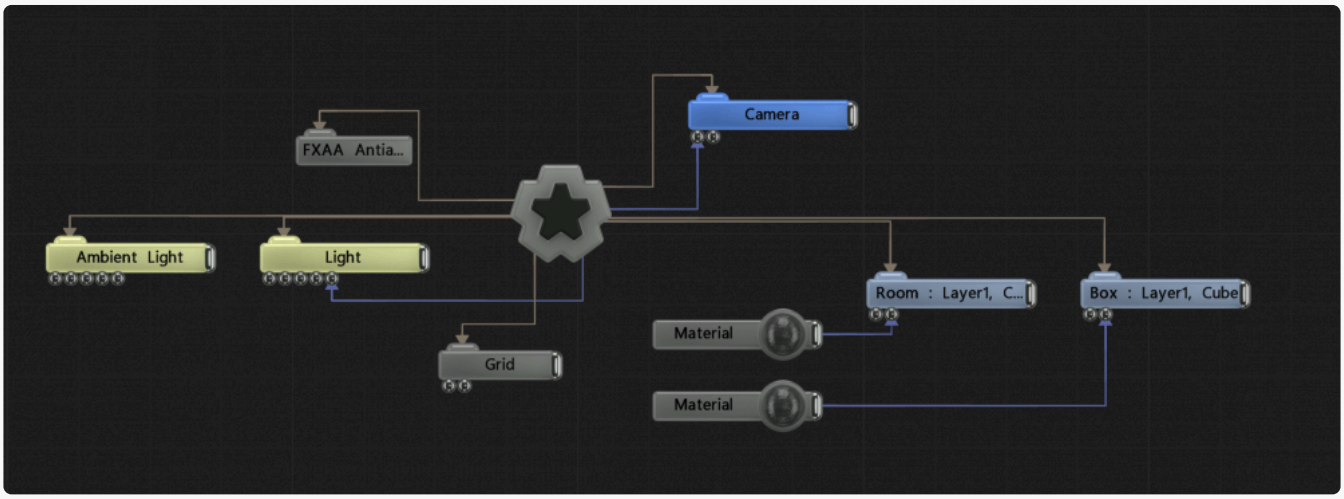
Grid

Method

This node generates a 3D grid that appears on all objects in the scene.



Example Nodegraph



Attributes

Name	Description
Line Width	Control the width of the grid lines.
Contrast	Increase the darkness of the grid lines.

Inputs

Name	Description	Typical Node Input
Affected Objects	(input-node-postfx-affected-objects-description)	(input-node-postfx-affected-objects-typical-input)
Grid Transform	Use an input to control the position of the grid.	Null

Outputs

{message-outputs-in-development

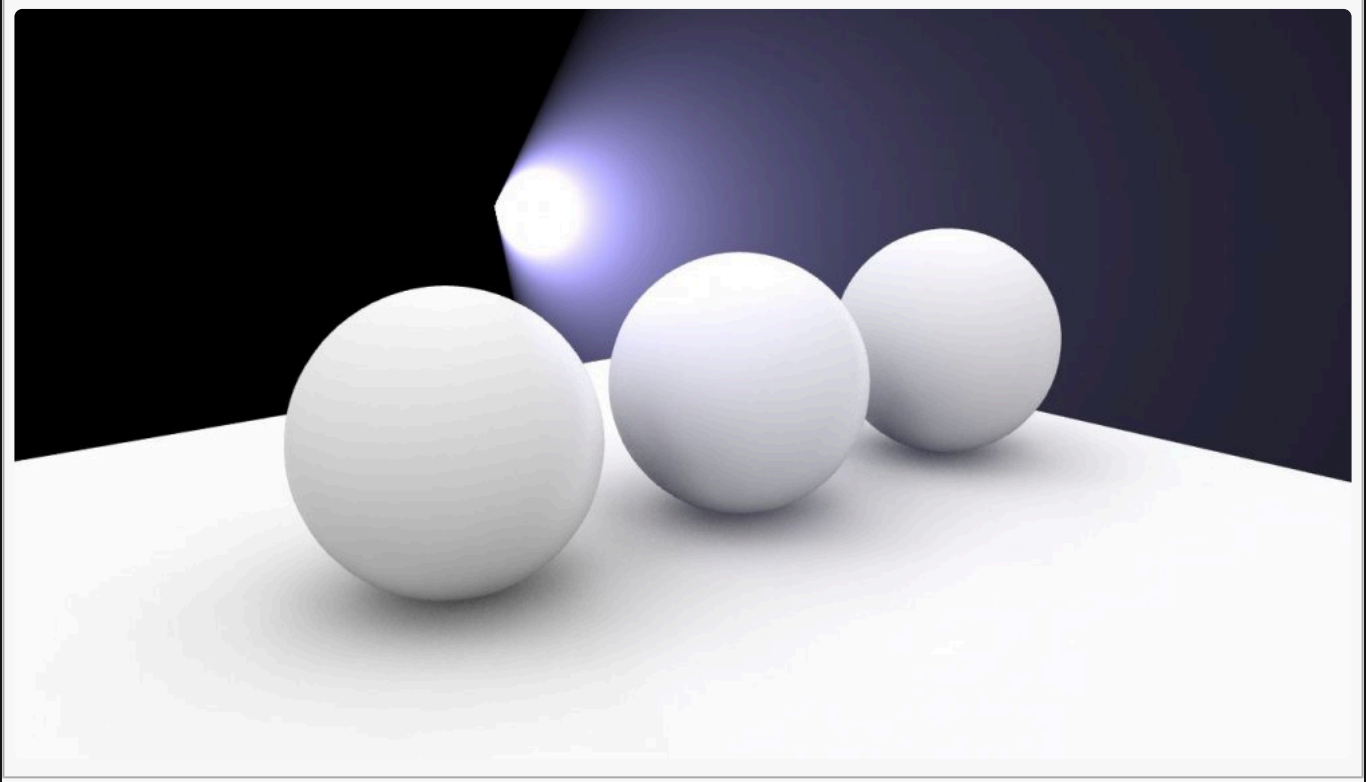
Light Scattering Beam

Method

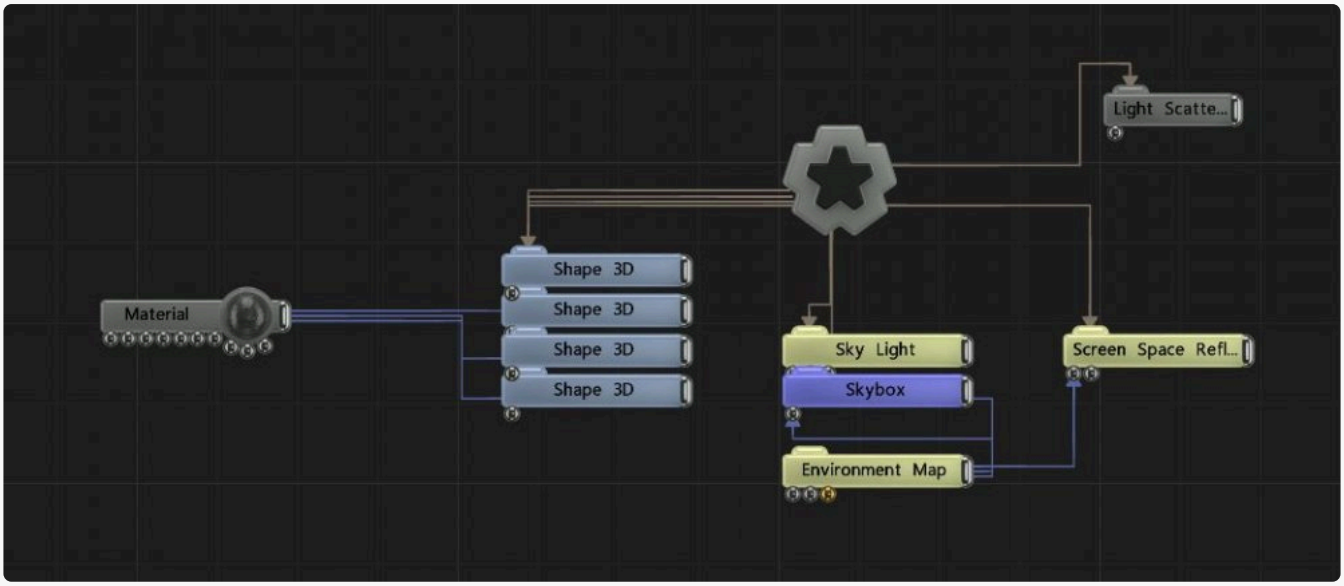
This node generates a light beam, visually similar to what is achieved when Scattering Intensity is used on a Light node, but without needing to add a light to the scene or enable Deferred Rendering.

This does not emit light, will not affect surfaces adjacent to it or cast shadows.

Example



Nodegraph Example



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mode	Change the shape of the light. • Sphere, Light is emitted from a sphere. • Cone, Light is emitted from a cone.

Brightness	How bright the light is.
Max Brightness	Maximum brightness the light can reach.
Colour	Change the colour of the light.
Cone Angle	Change the angular area of light emitted from the light. Only functions with “Cone” selected in the Mode attribute.
Sort Bias	Biases the draw order of the beam against other transparent items in the scene.
Depth Test Enabled	The scattered light is depth tested against objects in the scene.
Use Geometric Bounds	
Dither Enabled	

Inputs

“Default Material” won’t always appear under this name, as it will always take the name of the imported objects material.

Name	Description	Typical Node Input
Colour Ramp	Allows a Colour Ramp to be connected to define the colour of the beam.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

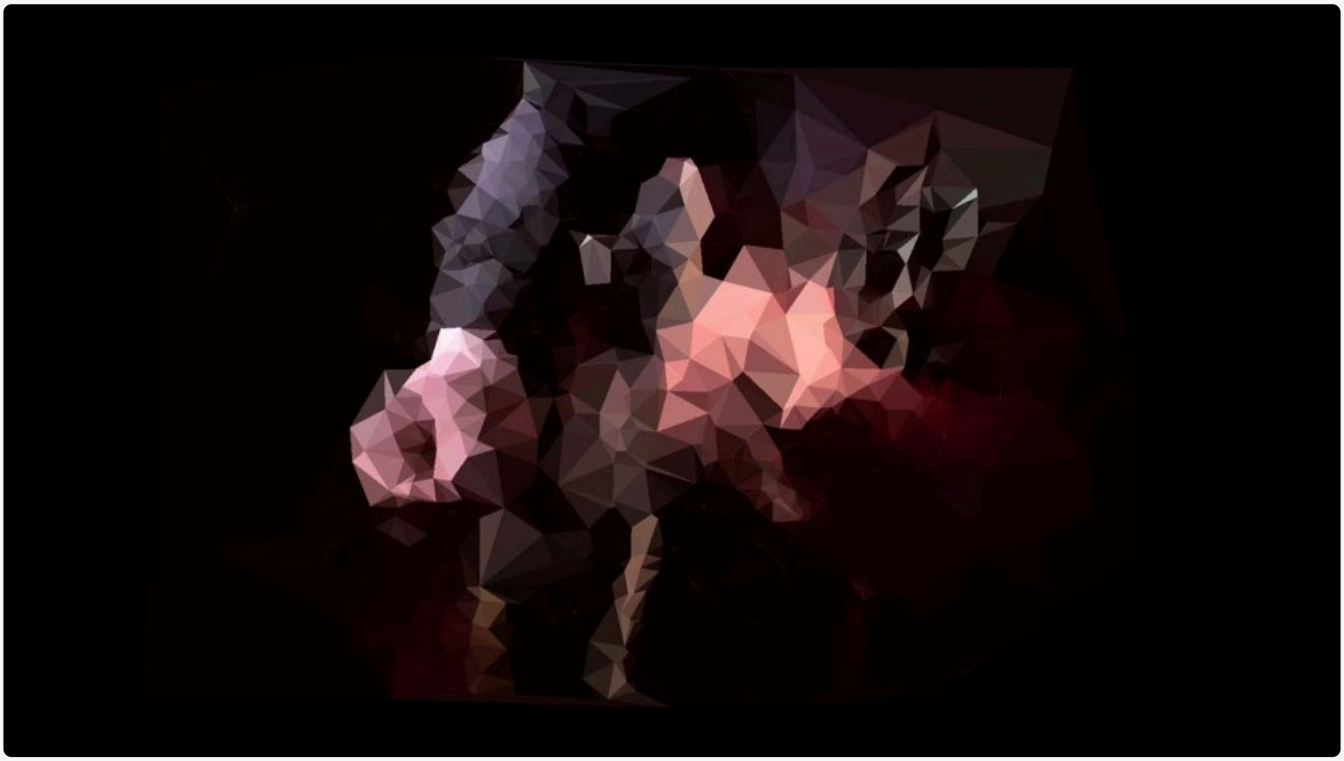
Outputs

The outputs section for this node is currently being worked on.

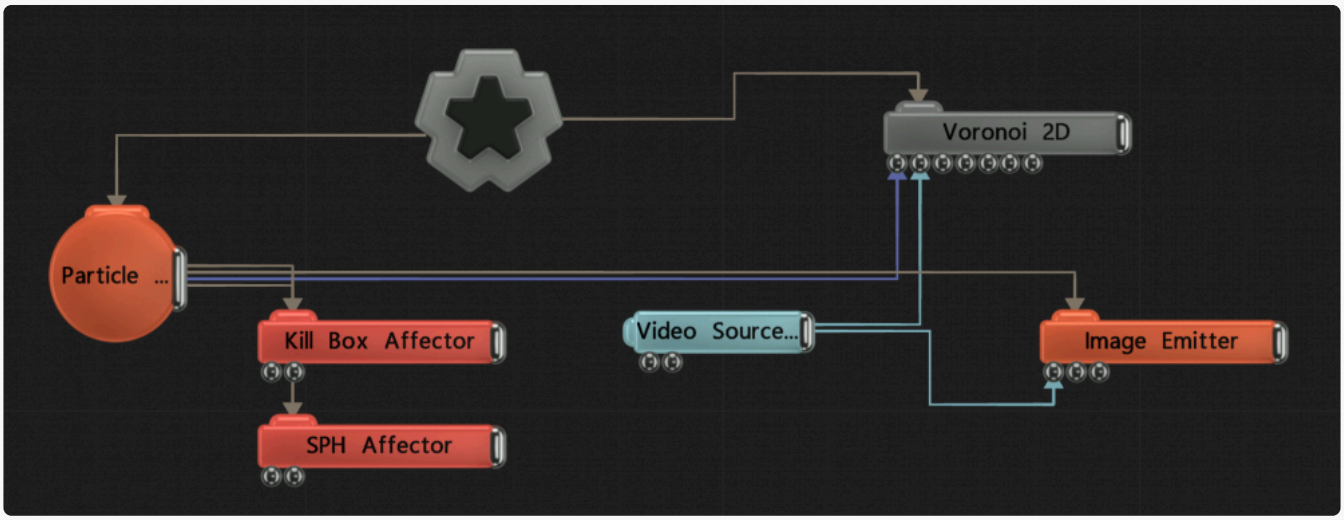
Voronoi 2D

Method

Generate delaunay triangulation based on a particle system. This process is computationally expensive.



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Edge Length Threshold	Edit the maximum distance a line can be drawn between points from.
Update Tessellation Time	The rate at which the voronoi tessellation is regenerated.
Subdivision Amount	How much output mesh is subdivided.
Alpha Threshold	Limits the particles used based on their alpha values.
Line Alpha	Alpha value for the lines between points.
Constant Colour Blend	How much of a constant colour is blended into the scene.
Depth Displace Amount	Displace the voronoi effect from the particle system.
Optical Flow Amount	How much the optical flow affects the image.
Particles To Skip	How many particles are skipped
Colour Source	Colour source for the image.
Cull Triangles By Alpha	Choose whether triangles are culled by their alpha value.

Inputs

Name	Description	Typical Node Input

Particle Node	Used for the points of the generated voronoi diagram.	Particle Root
Video Node	Can be used to control the colour or the voronoi and the z movement.	Video Loader
Gradient Node	Used to scale the tessellation amount via a gradient.	Gradient 2D
Optical Flow	Controls Movement of the points of the voronoi diagram.	Optical Flow
Bounding Box	Limit the area for which shadow casting will be calculated.	Bounding Box
Depth Video Node	The input depth video node, which offsets the positions of the points by luminance.	Video Loader
Material	Tint the colour of the effect.	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

The outputs section for this node is currently being worked on.

Image Compression

Method

Compress or decompress images with different kinds of compression.
Image Compression nodes can be applied directly to all the same nodes as the rest of the post-fx nodes.

- Compress UV Animation
- Decompress UV Animation

Compress UV Animation

Method

This node is used to compress a two channel floating point image – for example a UV remap image loaded in a floating point HDR format – into a 3-channel RGB or 4-channel RGBA 8 bit per channel output, which may make it suitable for storing in a number of standard image or video codecs.

Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Mode	Select how the UV animation is compressed – whether the result should use only the RGB channels of the output, or the alpha as well. Using RGBA provides higher quality but alpha may not be supported by all codecs and players.
Flip V	Flip the V axis of the animation when compressing.
Quantisation	The amount of quantisation applied to the incoming values. A higher level of quantisation may make the resultant image easier to compress and therefore smaller, at the cost of a loss of precision.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Decompress UV Animation

Method

This node decompresses and therefore reverses the result of a Compress UV Animation node.

Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Mode	Select how the UV animation is compressed – whether the result should use only the RGB channels of the output, or the alpha as well. This parameter must match the setting used on the Compress UV Animation node that created the source image.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

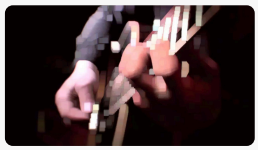
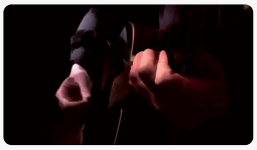
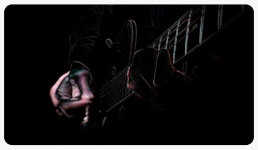
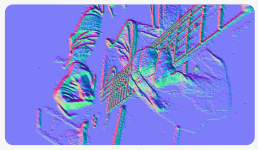
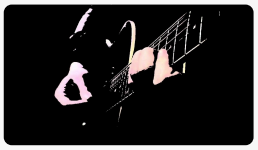
There are no outputs from this node.

Image Processing

Method

These nodes analyse and modify the image with different effects.
Image Processing nodes can be applied directly to all the same nodes as the rest of the post-fx nodes.

Gallery

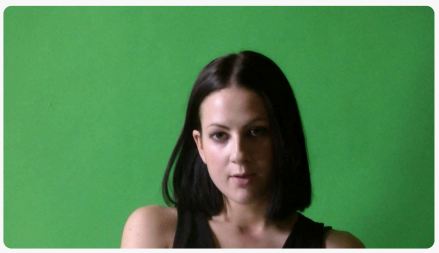
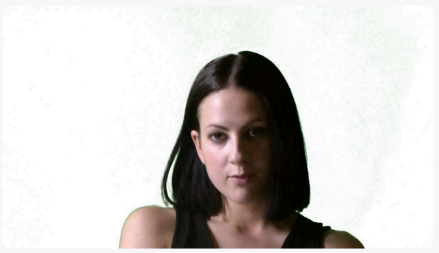
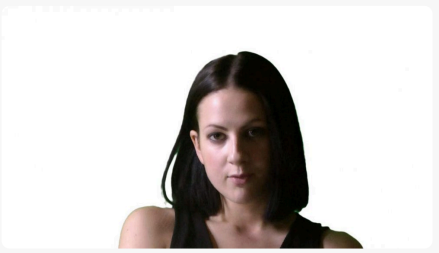
				
Auto Key Colour Mask	Bit Crush	Channel Boolean	Dilate	Edge Detect
				
Erode	Frame Buffer	Frame Difference	Generate Normal Map	Histogram Normalise
				
Key Colour Mask	Median Filter	Range Remap	Replace Colour	Threshold

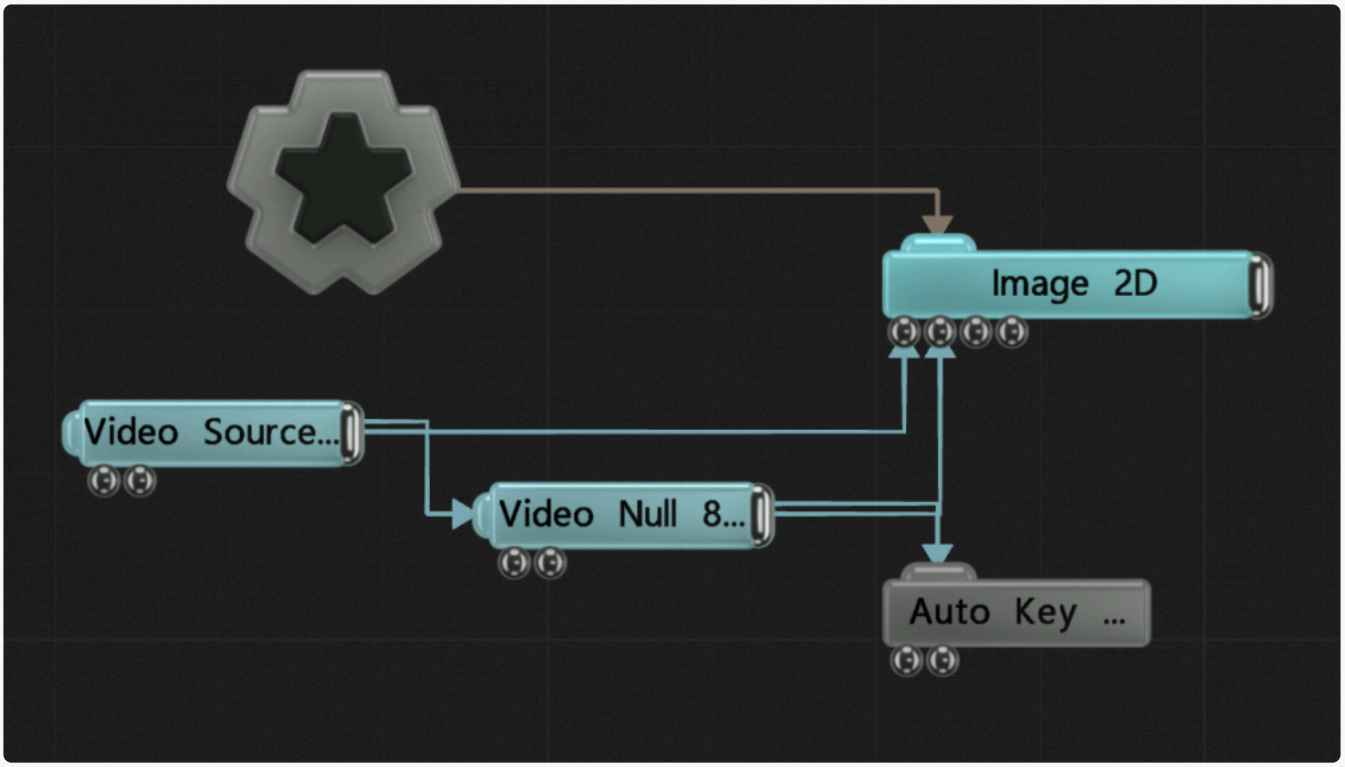
- Crop
- Capture Image File
- Custom Shader Post Effect
- Frame Delay
- Frame Loop
- NDI Output
- Output Gbuffer
- Video Exporter

Auto Key Colour Mask

Method

This node automatically creates a keyed mask for a video.

Raw texture	Processed texture	Retouched texture
		

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Output Mask Only	Toggle whether to only output the greyscale mask.
Invert Mask	Invert the greyscale output mask.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.
Process HSV	Toggles whether processing is done in HSV colour space.
Show Colours	Visualise the colours that were extracted from the input image and used for auto-keying.
Hardness	Change the Hardness at the edges of the mask
Vignette Width	Controls the width of the centre vignette, inside which the weight of likeliness of colours being used as key colours is reduced.
Colour Difference	The threshold of tolerance of difference between key and source pixel colours, inside which the pixel is considered visible / part of the mask.
Hue Difference	Toggles whether processing is done in HSV colour space.
Saturation Difference	Control the difference in saturation.
Luminance Diffrerence	Control the difference in luminance.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Input
Key Colour Source Image	The image colour you want to key out.	Video Source
Vignette Mask Image	Image gradually fades into the background.	Video Source

Outputs

There are no outputs from this node.

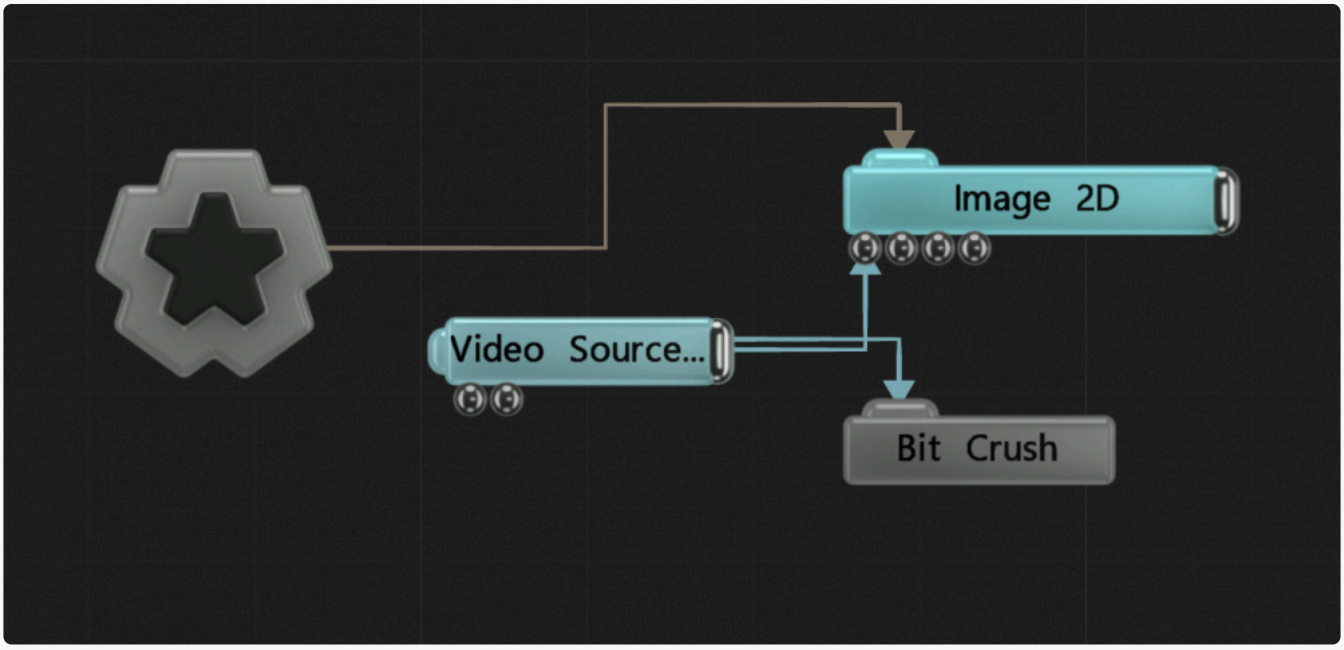
Bit Crush

Method

This node reduces the colour resolution.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.

Level Count	Levels of colour resolution in the image.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

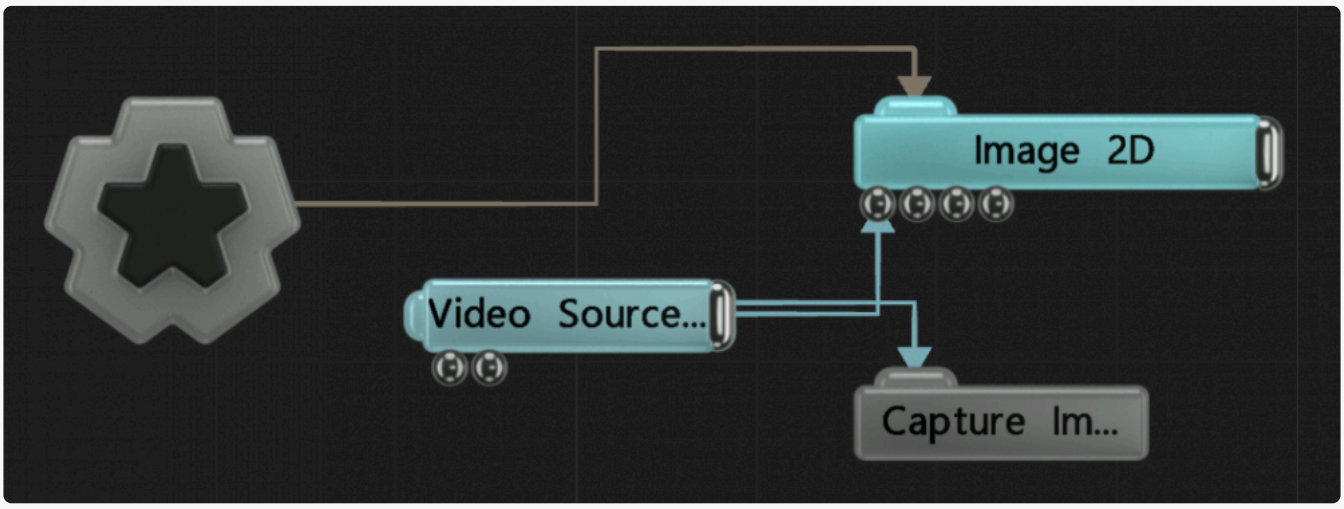
Outputs

There are no outputs from this node.

Capture Image File

Method

This node captures the viewport and exports the images to a chosen directory.

Example Nodegraph


Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Filename	Set the filename for the captured Image Sequence.
Directory	The file directory saved images will be saved to.
Capture Enabled	Toggle whether the image capturing capabilities function.
Capture Rate	How many frames per second are captured.
Generate Incremental Filenames	Filenames generated will include incremental numbers to differentiate them.
Overwrite File	Overwrites files with the same name and file type. If disabled, new files will only be written once.
Write Alpha Channel	Enable or disable alpha values in the saved images.

Inputs

There are no inputs for this node.

Outputs

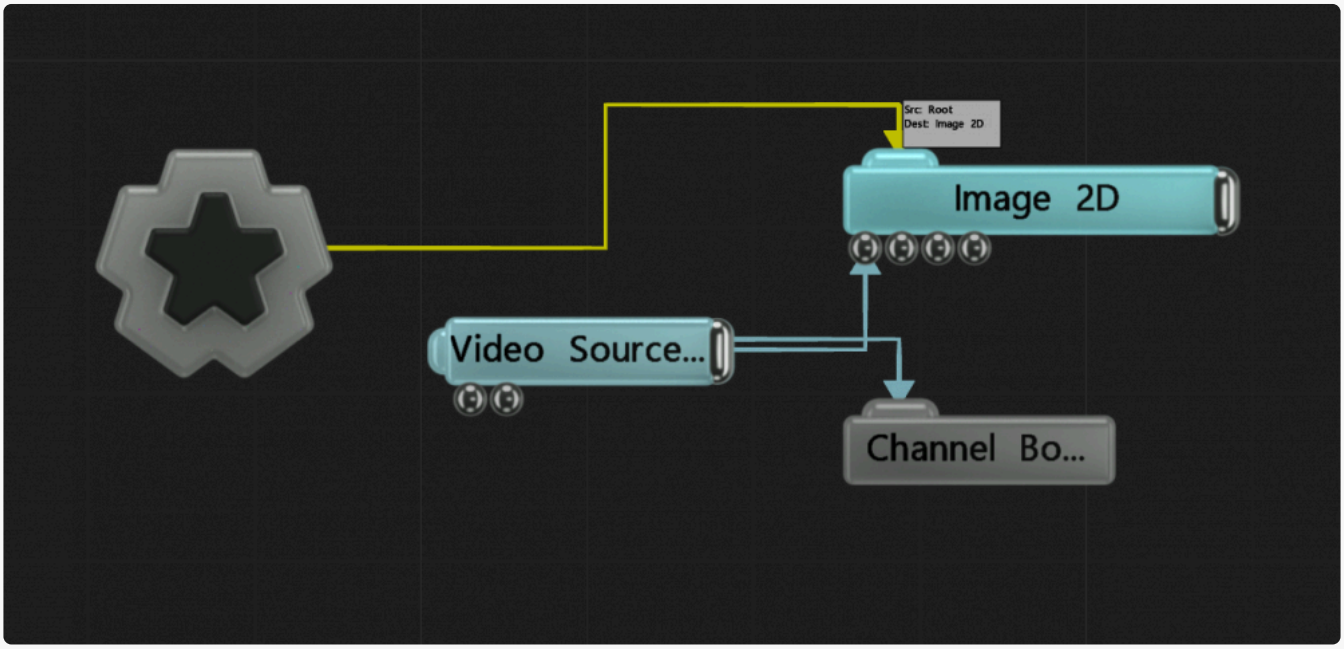
There are no outputs from this node.

Channel Boolean

Method

This node swaps RGBA channels.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.

Swizzle Channels

Name	Description
Red Source	Choose which channel to replace red.
Green Source	Choose which channel to replace green.
Blue Source	Choose which channel to replace blue.
Alpha Source	Choose which channel to replace alpha.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

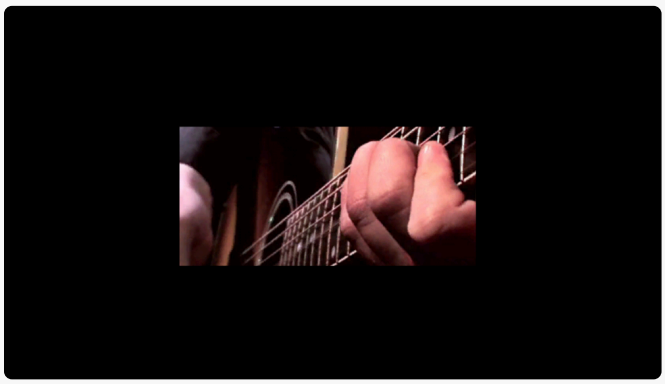
Notes

> ! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

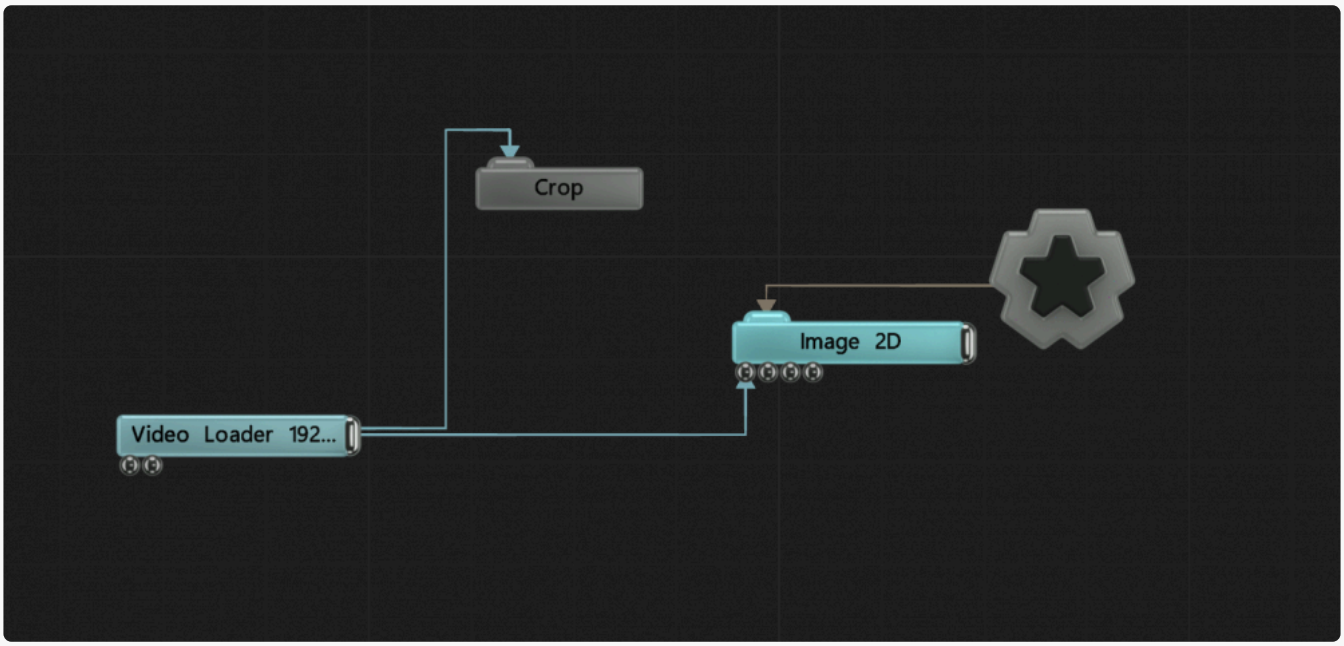
Crop

Method

This is node crops out a portion of a full image to strengthen the composition.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Crop

Name	Description
Crop Left	Crops image from the left.
Crop Right	Crops image from the right.
Crop Top	Crops image from the top.
Crop Bottom	Crops image from the bottom.

Inputs

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Outputs

There are no outputs from this node.

Notes

> ! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

Custom Shader Post Effect

Method

This node allows you to write your own custom shaders for use as a Post FX within the Notch nodegraph. Notch shaders are written in HLSL and use the D3DX Effect framework which allows for multiple techniques and passes and access to all of the pipeline stages. For Post FX the Pixel Shader is most commonly used for processing and effecting images.

> ! Use of custom shaders is at your own risk. 10bit does not provide support for custom shader code. If you experience an issue with a project/block you will need to demonstrate your issue without your custom shader in the nodegraph, to be able to receive support from the 10bit team.

Shaders are resources with a `.fx` suffix. The most effective workflow for authoring shaders is to import your shader resource and turn on Reflect Resource Changes (right click resource to set this). Now every time you save your shader in your text editor, the shader will be reloaded in Notch.

Any compilation errors will be reflected in the log (View -> Log Window)

The Notch engine provides a number of standard semantics for the shader:

- `CURRENTTIME` : The nodes current time
- `BLENDAMOUNT` : The blend amount

Global single float variables are exposed as properties in the node attributes, allowing you to link/animate them.

An example of a Post-FX shader is below:

```
Texture2D <float4> InputBuffer : INPUTBUFFER;                          // The in
put texture

float CurrentTime : CURRENTTIM
E;                                                  // The current time
float BlendAmount : BLENDAMOUN
T;                                                  // The blend amount param

float MyCustomParamete
r;                                                                 // A custom
parameter
```

```
sampler LinearClampSampler
{
        Filter = Min_Mag_Linear_Mip_Point;
    AddressU = Clamp;
    AddressV = Clamp;
    AddressW = Clamp;
};

struct VS_OUTPUT
{
    float4 Position  : SV_POSITION;
        float2 Uv : TEXCOORD0;
};

VS_OUTPUT VS_Fullscreen(float4 Position : POSITION)
{
         VS_OUTPUT Out = (VS_OUTPUT)0;
         Out.Position = float4(Position.xy,0,1);
        Out.Uv = Position.xy * 0.5f + 0.5f;

        return Out;
}

float4 PS_ApplyPostProcess(VS_OUTPUT In) : SV_TARGET0
{
        float4 sourceValue = InputBuffer.Load(uint3(In.Position.xy,0));

        float4 rslt = float4(sourceValue.xyz * abs(sin((In.Uv.y+CurrentTim
e*0.2f)*30.0f * (1.0f+MyCustomParameter))),sourceValue.w);
        rslt = lerp(sourceValue, rslt, BlendAmount);

        return rslt;
}


BlendState NoBlend {
  AlphaToCoverageEnable = FALSE;
  BlendEnable[0] = FALSE;
  BlendEnable[1] = FALSE;
  BlendEnable[2] = FALSE;
  BlendEnable[3] = FALSE;
};
DepthStencilState NoDepthState {
  DepthEnable = FALSE;
  DepthWriteMask = All;
  DepthFunc = Less;
  StencilEnable = FALSE;
};
RasterizerState DefaultRasterState
{
        CullMode = None;
        FillMode = Solid;
        DepthBias = 0;
        ScissorEnable = false;
```

```
};
technique11 ApplyPostProcess
{
        pass p0
        {
                SetVertexShader( CompileShader( vs_4_0, VS_Fullscreen() ) );
                SetPixelShader( CompileShader( ps_4_0, PS_ApplyPostProcess()
) );

                SetBlendState( NoBlend, float4( 0.0f, 0.0f, 0.0f, 0.0f ), 0xFF
FFFFFF );
                SetDepthStencilState( NoDepthState, 0);
                SetRasterizerState( DefaultRasterState );
        }
}
```

Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Shader	The selected shader from that has been imported as a resource

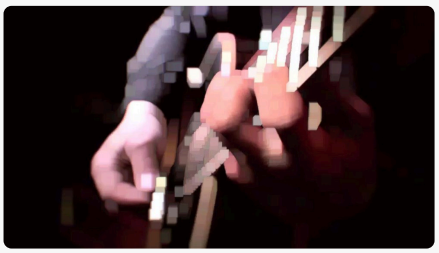
Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

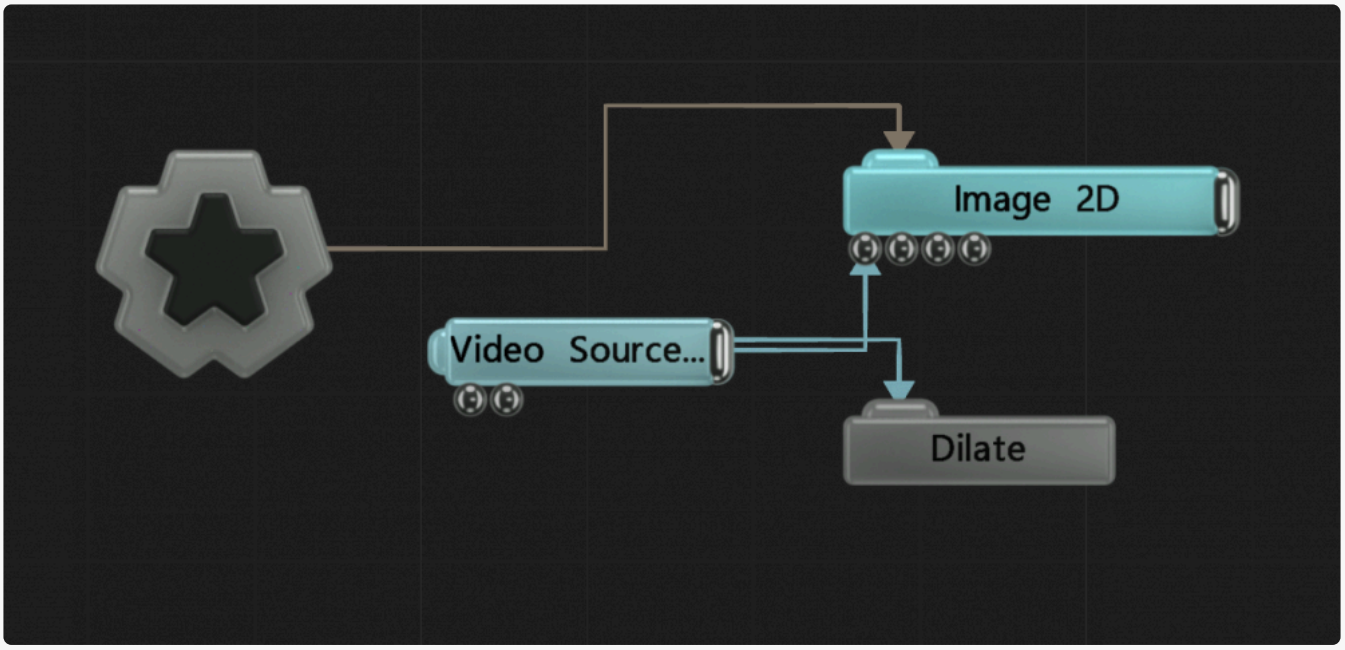
Dilate

Method

This node expands bright pixels outwards over darker neighbors.

Raw texture	Processed texture	Modified Texture
		

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Iterations (Effect Size)	How many times the dilate function is run.
Mode	Which directions the image is dilated in. • Horizontal + Vertical, Both horizontal and vertical are dilated.

	• Horizontal, Only horizontal is dilated. • Vertical, Only vertical is dilated. • Cross, Both diagonals are dilated.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

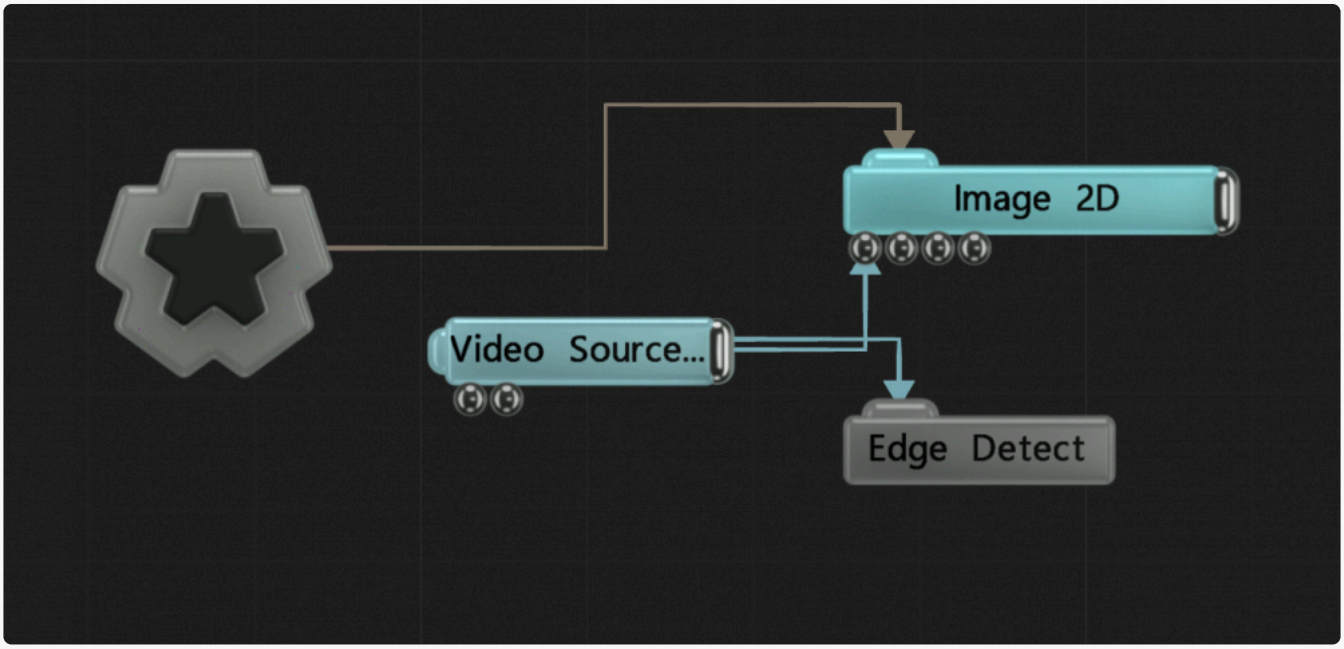
There are no outputs from this node.

Edge Detect

Method

This node leaves bright lines in place of edges in the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Mode	Change which edge detection method is used.
Colour	Edit the colour of the edge
Threshold	Change the threshold for the edge detection.
Scale	Scale the brightness for the effect.
Width	Change the width of the output lines detected.
Pixel Width	When Sobel mode is chosen Pixel Width defines the width of the edge

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

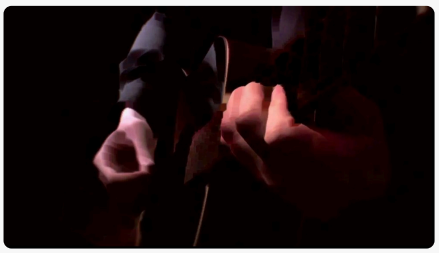
Outputs

There are no outputs from this node.

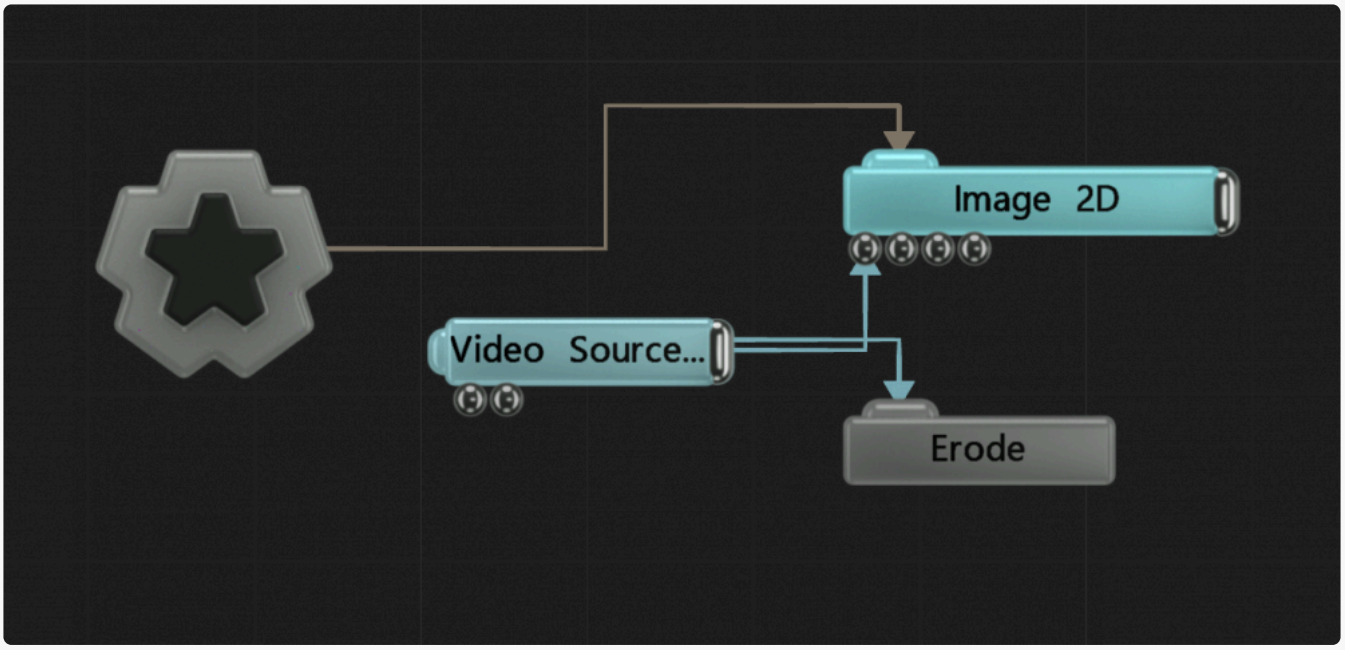
Erode

Method

This node expands dark pixels over brighter neighbors.

Raw texture	Processed texture	Modified texture
		

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Iterations (Effect Size)	How many times the erode function is run.
Mode	Which directions the image is eroded in. • Horizontal + Vertical, Both horizontal and vertical are eroded.

	• Horizontal, Only horizontal is eroded. • Vertical, Only vertical is eroded. • Cross, Both diagonals are eroded.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

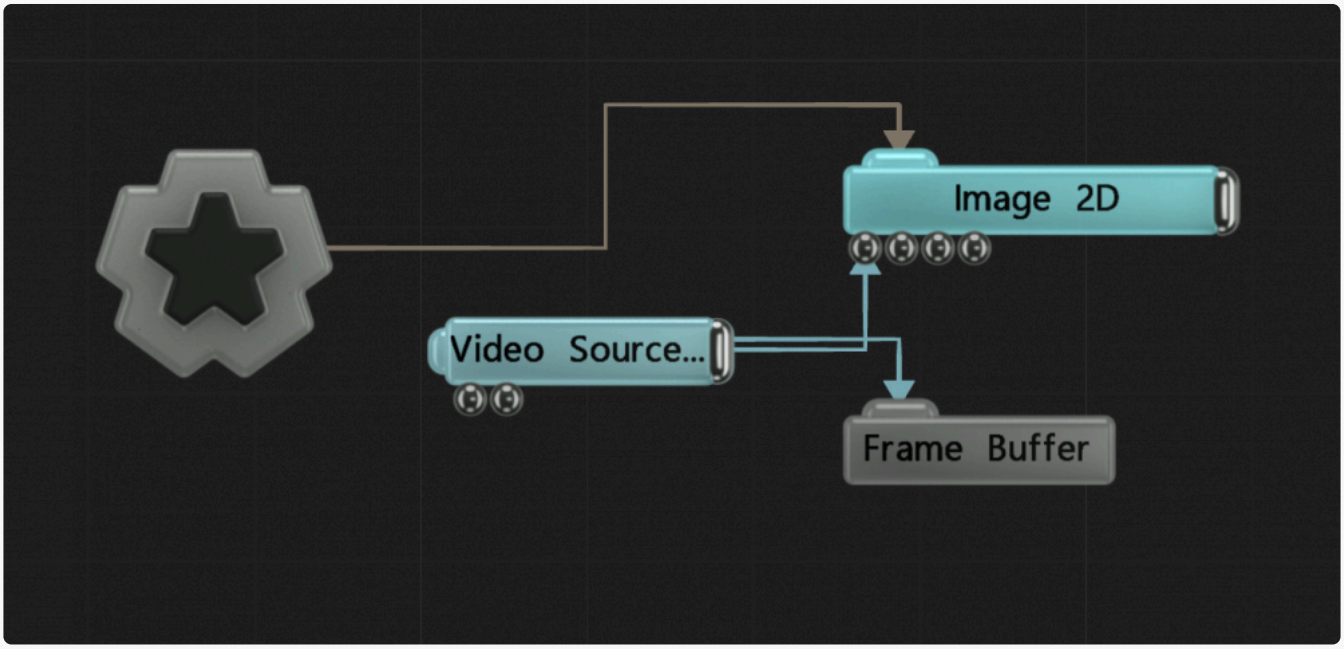
Frame Buffer

Method

This node buffers a frame for a period of time, before updating based on the “Frame Grab Rate”.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.

Frame Grab Active	Toggle whether a new frame can be grabbed.
Frame Grab Rate	How many frames ahead the new frame is buffered.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

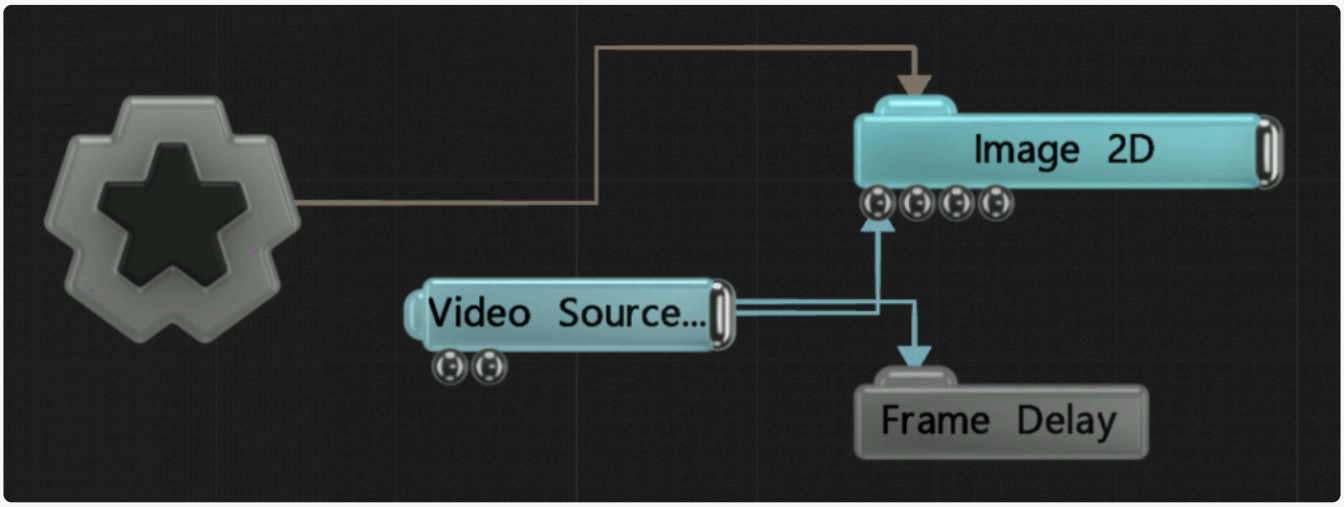
Outputs

There are no outputs from this node.

Frame Delay

Method

This node delays the image played by a specified frame amount. It is also used as a generalised buffer for the Frame Delay Frame (which picks specific frames from the buffer).

Example Nodegraph


Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Num Delay Frame	Number of frames the image will be delayed by. Max 600.
Buffer Format	Select which format the buffered frames are kept in. • RGBA, The RGBA values are all saved. • Greyscale, The image is saved in greyscale. • DXT1 Compressed RGB, The image is compressed using the DXT1 format – ignores alpha values.

Inputs

There are no inputs for this node.

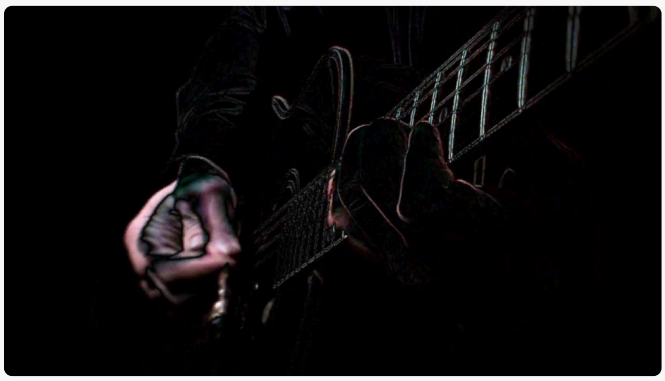
Outputs

There are no outputs from this node.

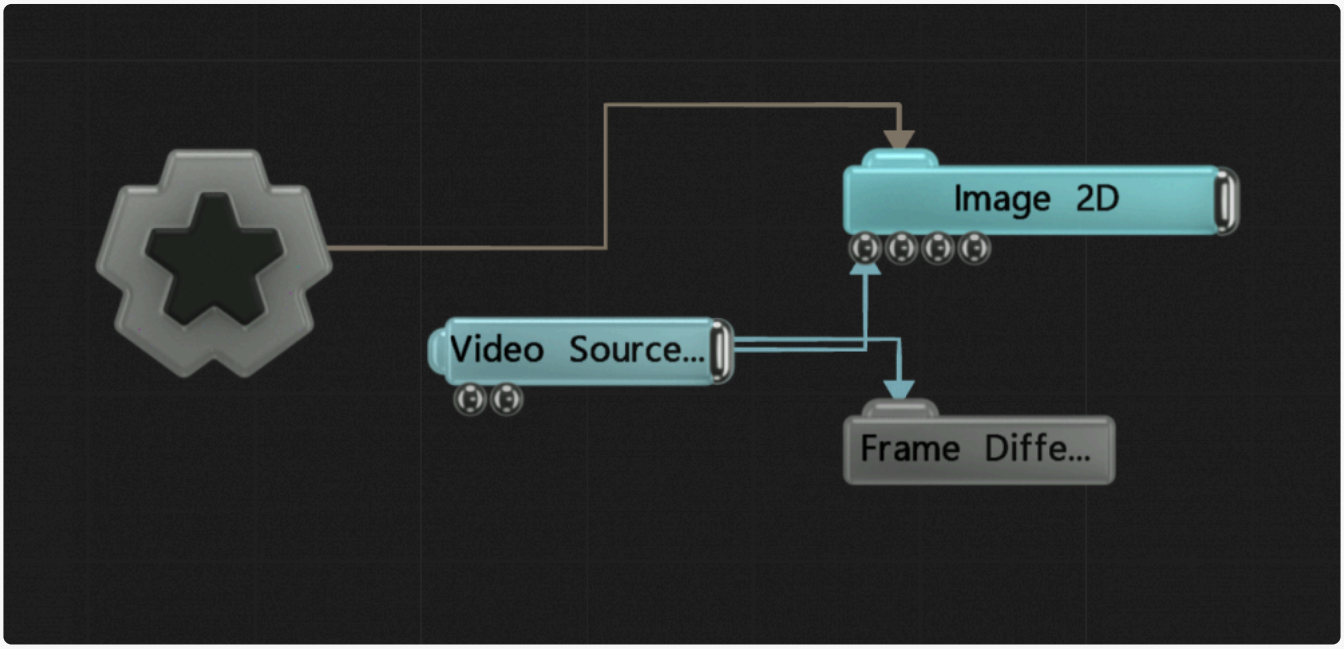
Frame Difference

Method

This node difference blends the image with the previous frame of the image.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Intensity Scale	The intensity of the effect that is applied.
Num Frames	Number of frames other than the original frame included in the difference calculation.
Use Absolute Difference	Toggles whether magnitudes of differences between pixels should be used, or whether differences only occur when the new pixel is brighter than the old.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

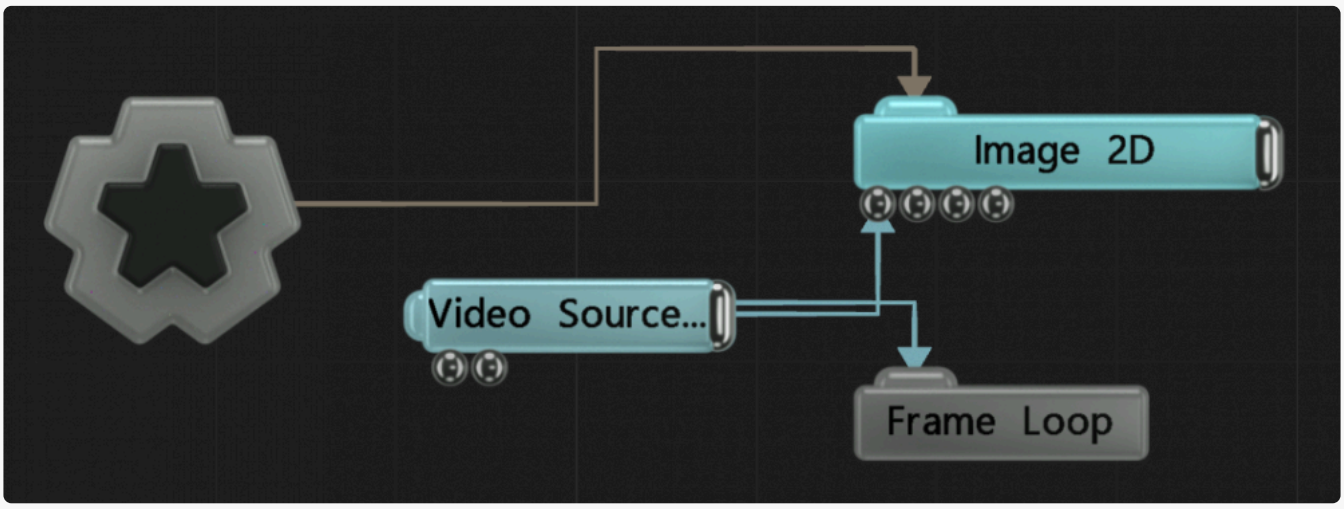
Outputs

There are no outputs from this node.

Frame Loop

Method

This node loops a group of frames specified after “capturing enabled” is turned off.

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Capturing Enabled	Once a value < 0.5 is set, frames will being to loop.
Frame Buffer Size	Number of frames that will be buffered and looped through.
Loop Mode	Change how the looped frame is selected. • Mirror, the frames progress through the buffered frames in sequence, then reverse back through the buffer before starting again.. • Loop, the frames progress through the buffered frames in sequence, then jump

	back to the beginning of the buffer.
Capture Frame Skip	Determines how many frames should be ignored between each frame captured: every nth frame is captured.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

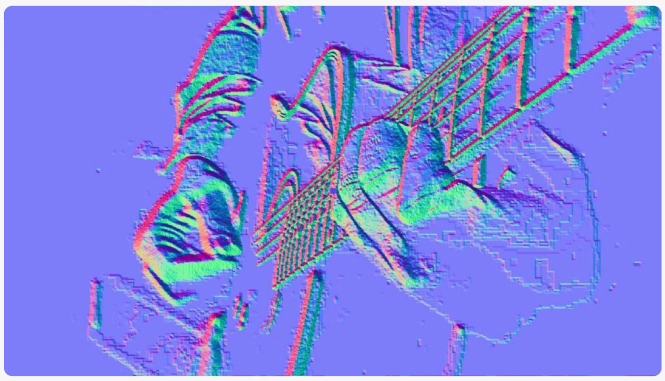
Outputs

There are no outputs from this node.

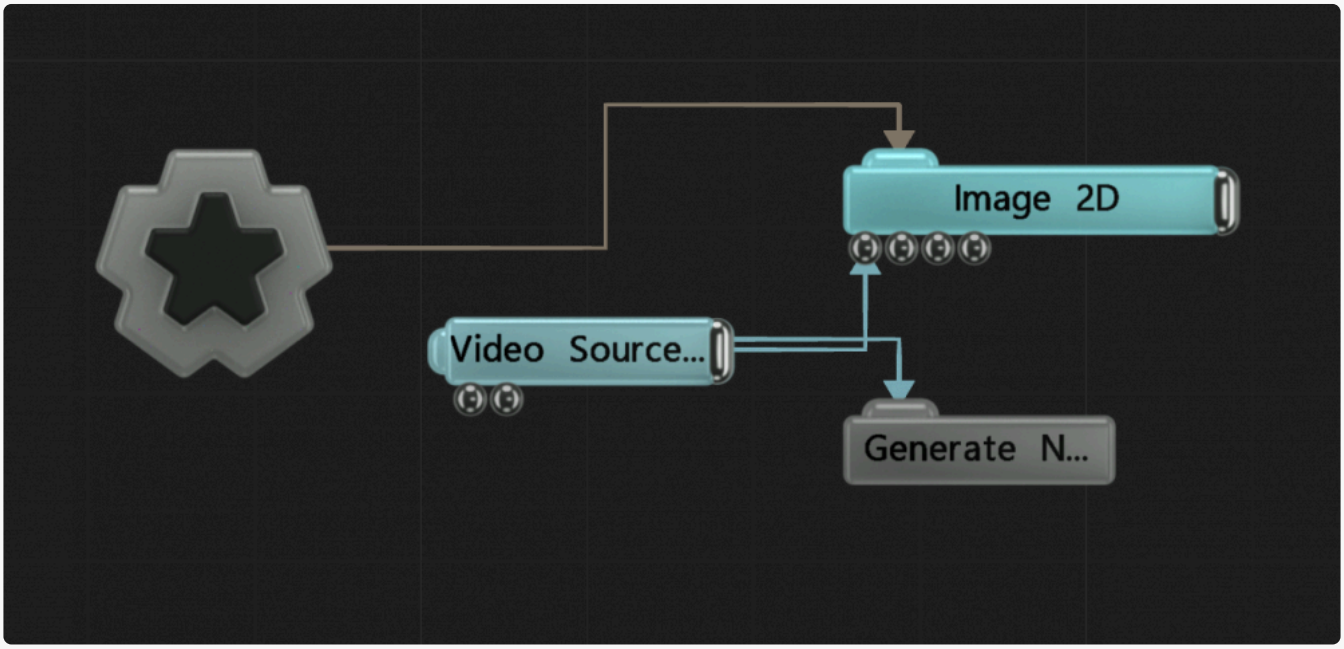
Generate Normal Map

Method

This node generates a normal map based off the luminance values from an image.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.

Depth Scale	Control the scale of the depth in the Normal Map.
Invert Normal X/Y/Z	Invert the direction for the normals generated along each axis.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

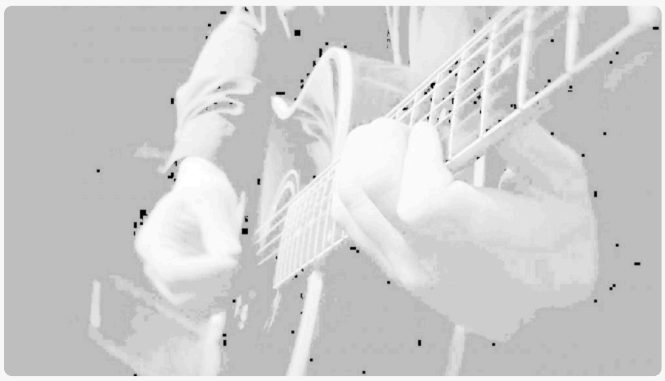
Outputs

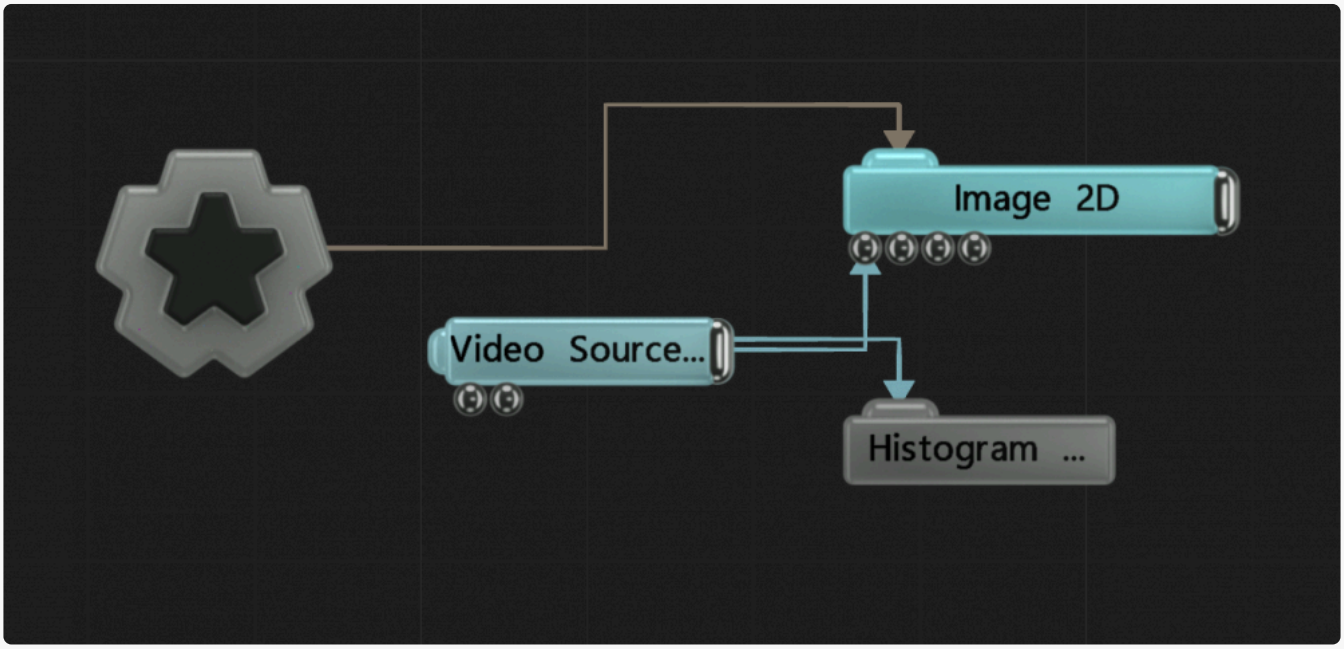
There are no outputs from this node.

Histogram Normalise

Method

This node uses a histogram to normalise the colours.

Raw texture	Processed texture
	

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Min Level	Change the Minimum level for brightness
Max Level	Change the Maximum level for brightness

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

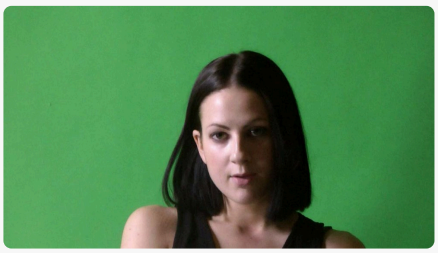
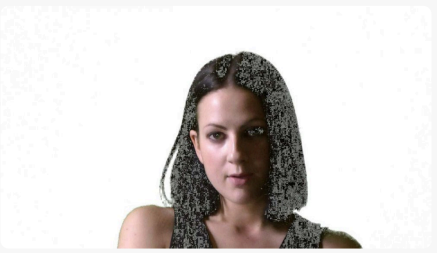
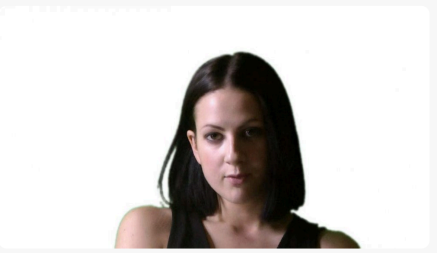
Outputs

There are no outputs from this node.

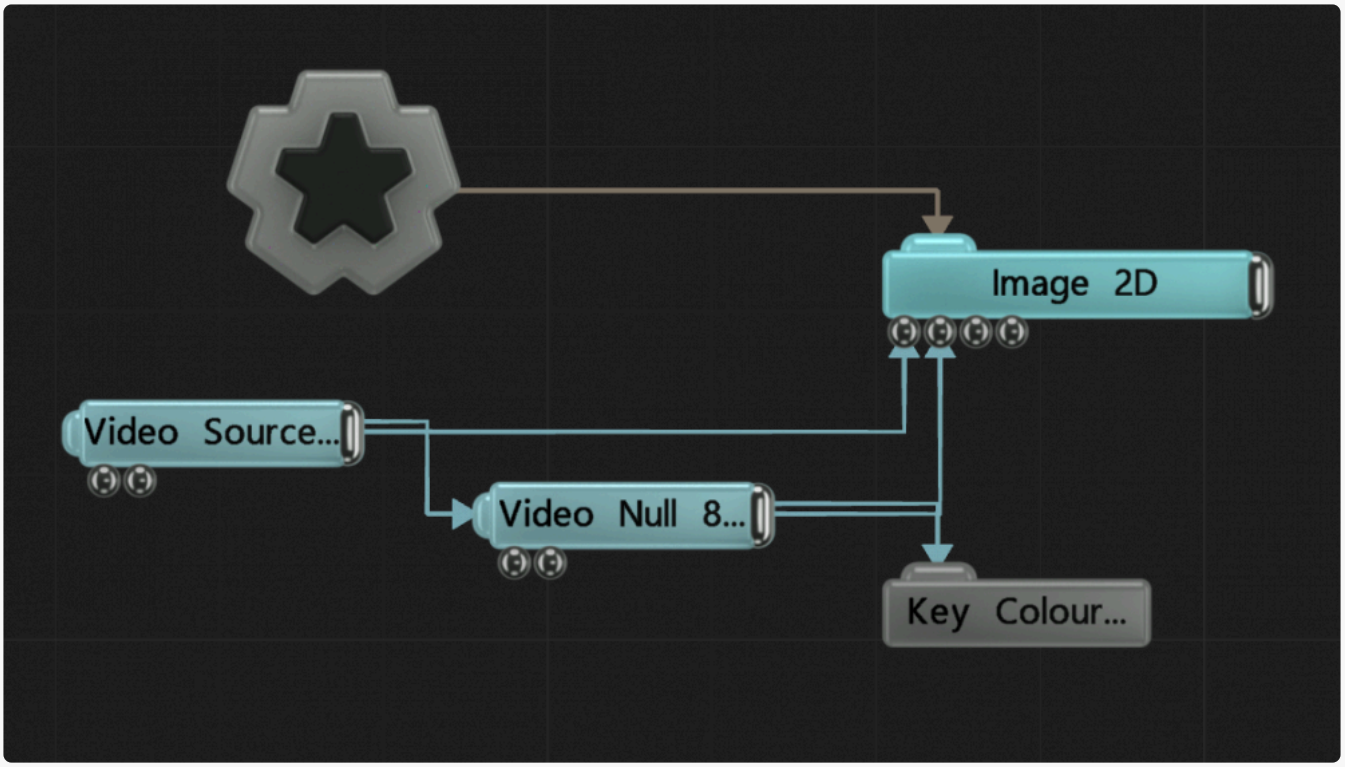
Key Colour Mask

Method

This node masks out a colour.

Raw texture	Processed texture	Retouched texture
		

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Key Colour	Choose the colour to be keyed out of the image.
Output Mask Only	Toggle whether to only output the greyscale mask.
Invert Mask	Invert the greyscale output mask.
Blend Mode	Choose how the image blends with the scene. See Blend Modes for details.
Process HSV	Toggles whether processing is done in HSV colour space.
Colour Difference	The threshold of tolerance of difference between key and source pixel colours, inside which the pixel is considered visible / part of the mask.
Hue Difference	Control the difference in hue.
Saturation Difference	Control the difference in saturation.
Luminance Difference	Control the difference in luminance.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

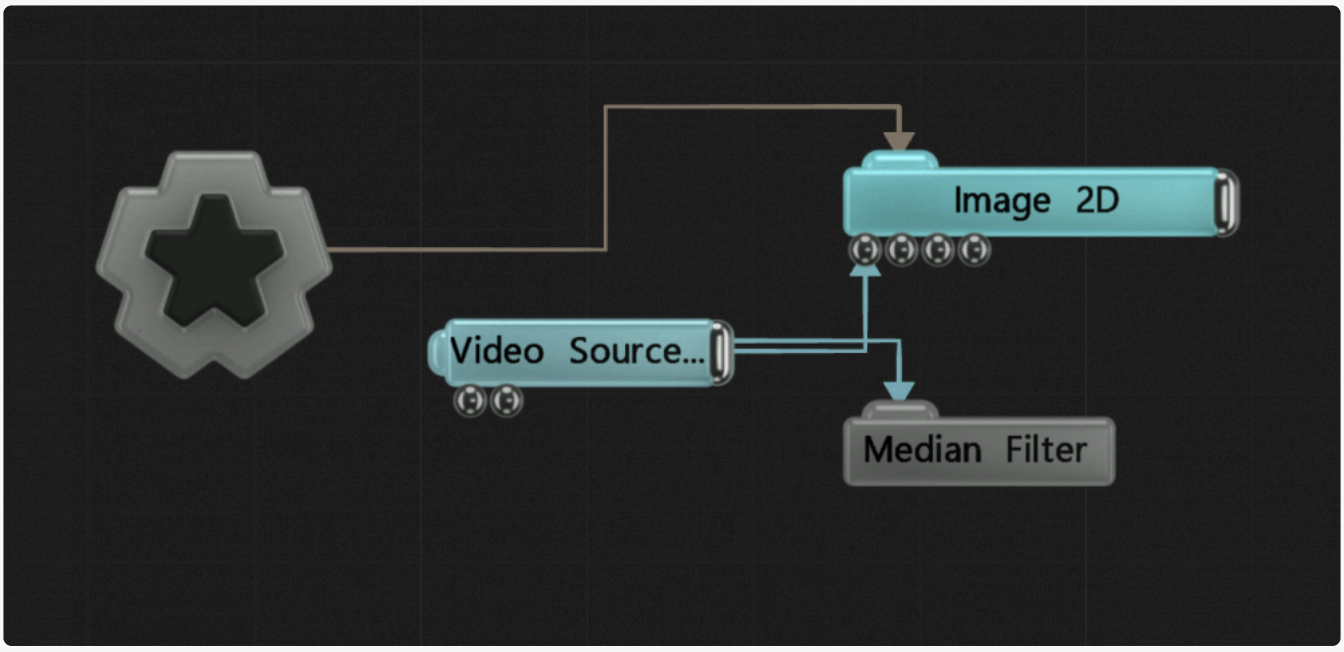
Median Filter

Method

This node performs a filter kernel operation where the median colour in the region of pixels is taken as a result. This is often used as a de-noising kernel.

Raw texture	Processeed texture	Modified texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.

Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Iterations (Effect Size)	How many times the effect is run.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

NDI Output

Method

This node sends the video or scene render it is attached to out via NDI.

Multiple NDI outputs may be sent simultaneously from a single Notch layer.

NDI page

> ! NDI signal will only be sent when the play head is playing.

Attributes

Name	Description
Active	Control whether NDI stream is being sent.
NDI Sender Name	The NDI stream name

Affected Channels

Toggle which of the RGBA channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

Output GBuffer

Method

This node outputs various GBuffers to the screen. GBuffers are geometry buffers – rendered images that contain geometric information rendered from the objects in the current view, such as normals, material IDs, positions etc. These may be useful when rendered and loaded into other software.

> ! Deferred Rendering must be enabled in the layer Root node for this to work.

Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Channel	Select which GBuffer channel to output. • Normal – World Place, Surfaces are coloured based on a normal map generated in world space. • Normal – Camera Space, Surfaces are coloured based on a normal map generated in camera space. • Colour, Surfaces are only coloured based on their colour values. • Specular Colour, Surfaces are only coloured by their specular colours. • Depth – Camera Space, Surfaces are coloured based on their distance from the camera. • World Position, Objects are coloured based on their position in the scene in world space. • Object Mask, Objects in the scene are combined in screen space and a mask is output. • Object ID, Objects are colour based on their object ID. • Material ID, Objects are colour based on their Materials.

Inputs

Name	Description	Typical Node Input
Render Layer	Select a specific render layer to output the GBuffer for.	Render Layer
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred	Envelope

	rendering must be on.	Modifier

Outputs

There are no outputs from this node.

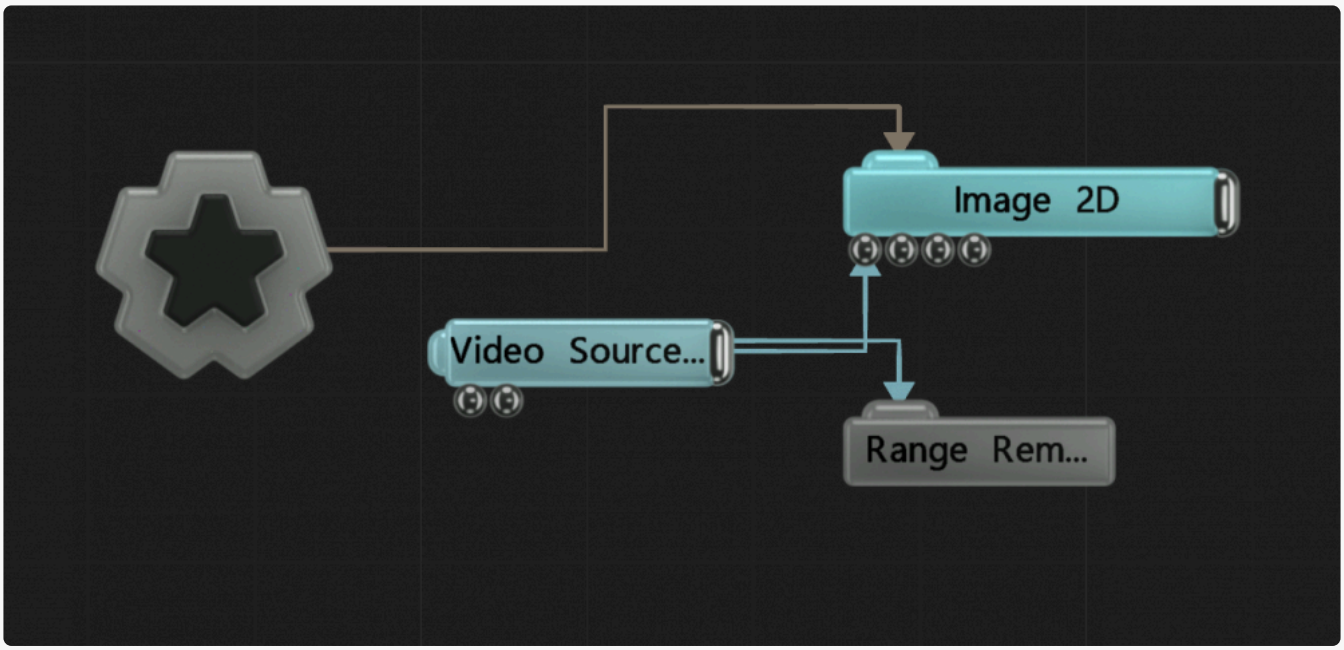
Range Remap

Method

This node remaps the colours of an image from the range specified by In Min and In Max to the range specified by Out Min and Out Max.

Raw texture	Processed Texture	Modified texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.

Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
In Min	The minimum channel value of the incoming range.
In Max	The maximum channel value of the incoming range.
Out Min	The minimum channel value of the outgoing range.
Out Max	The maximum channel value of the outgoing range.
Clamp Range	Toggles whether colours that fall outside the In Min and In Max range should be clamped to it, or whether the remap range should continue outwards beyond the range specified.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

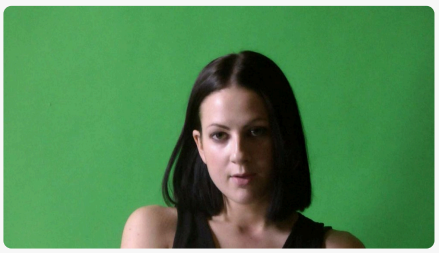
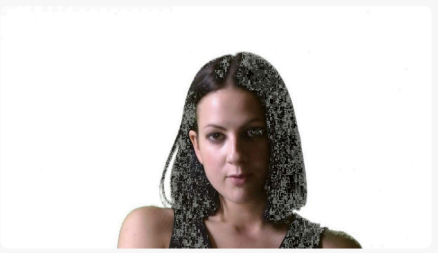
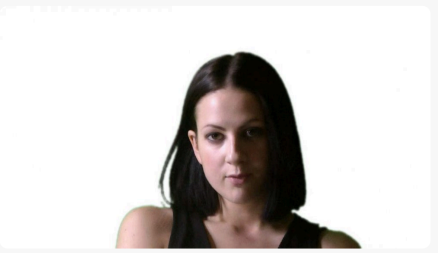
Outputs

There are no outputs from this node.

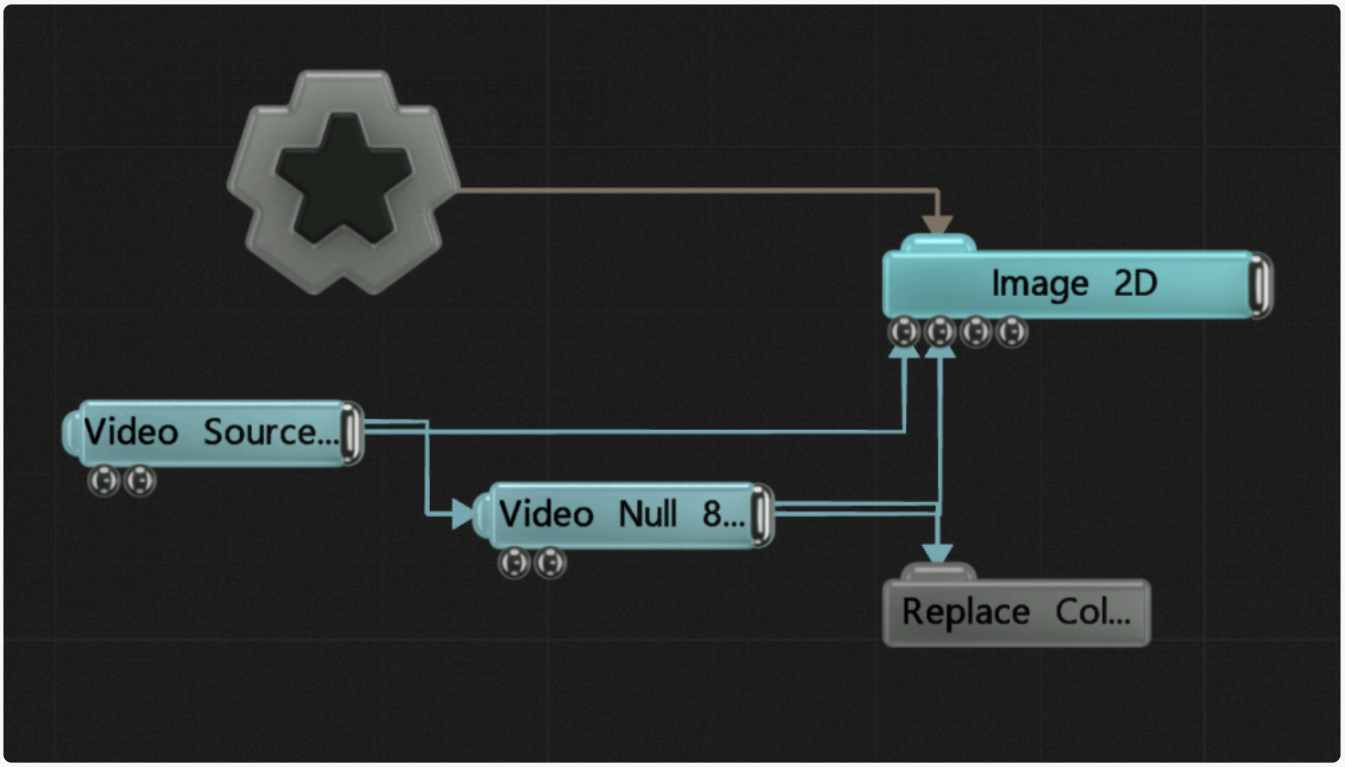
Replace Colour

Method

This node mask out a colour, and replace it with a difference colour.

Raw texture	Processed texture	Retouched texture
		

Example Nodegraph



Attributes

Name	Description
Blend Amount	Changes the opacity of the new effect over the original image.
Colour	Choose the colour to be keyed out of the image.

Replace Colour	Choose the colour to be placed into the image.
Threshold	Threshold for the colour key.
Falloff	Falloff around the map.
Output Mask Only	Toggle whether to only output the greyscale mask.
Process HSV	Toggles whether processing is done in HSV colour space.
Hue Difference	Control the difference in hue.
Saturation Difference	Control the difference in saturation.
Luminance Difference	Control the difference in luminance.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

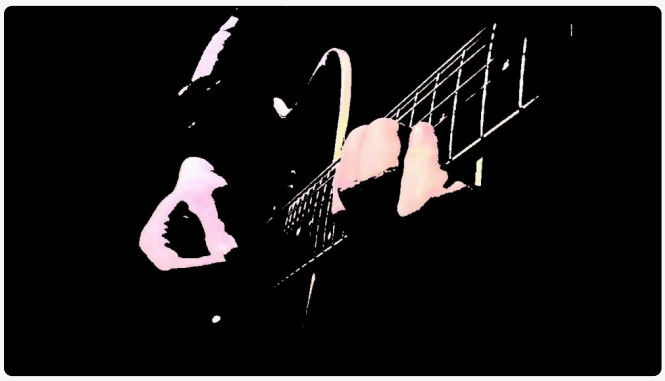
Outputs

There are no outputs from this node.

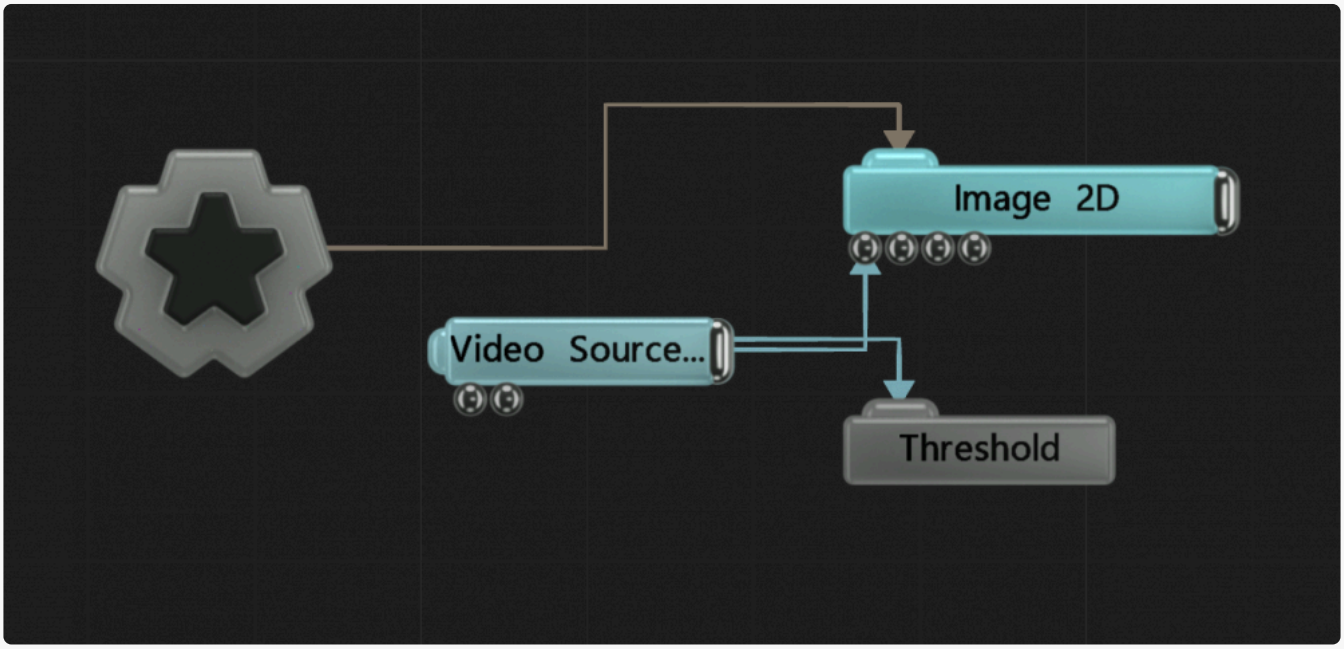
Threshold

Method

This node limits the luminance values in the image.

Raw texture	Output Mask
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Threshold	Change the luminance threshold for the effect to apply.
Falloff Range	Control the falloff of the threshold edge.
Falloff Power	Control the strength of the falloff.
Mode	Change how the threshold functions. • Above, anything below the threshold is omitted. • Below, anything above the threshold is omitted. • Band, anything outside the middle values are omitted, within the range specified by the threshold.
Output Mode	Change how the cut image outputs. • Colour, Colour is output along with the image. • Mask, A mask is generated based on the regions inside the threshold.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Video Exporter

Method

This node captures the video from the view port and exports to a chosen directory. It is important to note that even if this node is attached to multiple Camera's, it will only run if that Camera is being used in the scene. To render multiple camera's in a scene, you should use multiple Render To Texture nodes.

Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Export Properties	Open the Export Video Settings Window.
Filename	The filename and path location of the saved video.
Width	The width of the exported video.
Height	The height of the exported video.
Export Type	How the Video will be exported.
Codec	Which Video Codec will be used in to export.
Quality	The Overall quality of the exported Video. Greater quality means greater time export times.
FPS	The Frames Per Second the video will be export at.
Write Alpha Channel	Include an alpha channel in the video export. This is not compatible with some export types.
Write Audio	Include audio in th exported video file.
Audio Offset (Frames	Offset the exported audio from the video.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

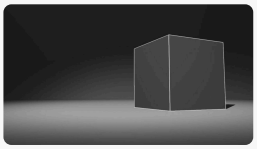
Stylisation

Method

These nodes modify the image.

Stylisation nodes can be applied directly to all the same nodes as the rest of the post-fx nodes.

Gallery

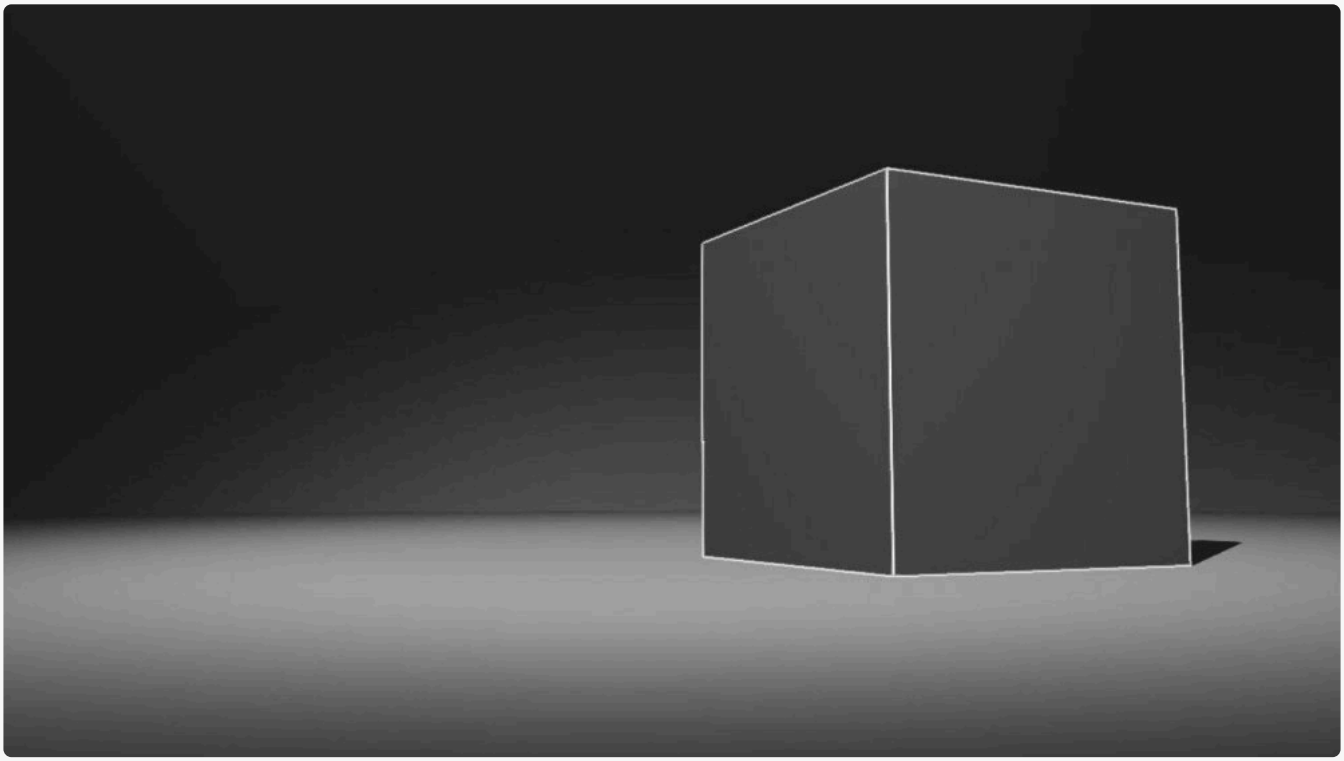
				
3D Object Outline	Cross Hatch	Digital Block Glitch	Digital Chroma Glitch	Dot Matrix
Film Grading	Halftone	Motion Datamosh	Pixellate	Pixel Sorting Glitches
Sharpen	Slit Scan	Streaks	Vector Blur	VHS Scanlines
Voronoi Post Process				

3D Object Outline

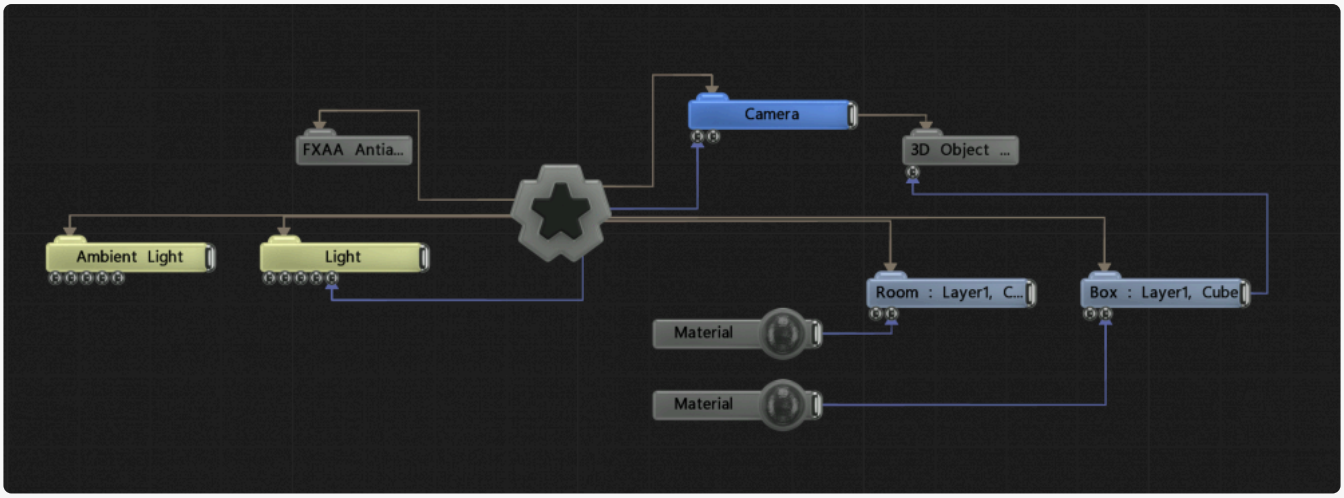
Method

This node draws an outline around the visible edges of the 3D objects.

> This node uses the scene depth buffer to render, so when used with a Render Layer all objects inside and out will be outlined. This can be avoided by using the Affected Objects input on this node, or enabling Use Own Depth Buffer in the Render Layer.



Example Nodegraph



Attributes

Name	Description
Apply To Sold Geometry	Toggle whether the effect should only apply to solid geometry, or the whole of the scene.
Colour	The colour of the lines around each object.
Line Width	Width of the lines around the objects
Material Weight	The strength of the outline across boundaries of materials.
Material Line Width	The width of the line caused by boundaries of materials.
Object Weight	The strength of the outline across boundaries of objects.
Object Line Width	The width of the line caused by boundaries of objects.
Normal Weight	The weight of the line that is generated at the normal to the objects surface.
Normal Line Width	the width of the line generated at the normal to the objects surface.
Depth Weight	The strength of the outline caused by differing depths.
Depth Line Width	The width of the line caused by differing depths.
Normal Threshold	Set the threshold for lines rendered based on the normal.
Depth Threshold	Set the threshold for lines rendered based on the depth.

Inputs

Name	Description	Typical Node Input
Affected Objects	Change which objects are affects by the effect. by default, all objects are affected.	3D Object
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred	Envelope

	rendering must be on.	Modifier

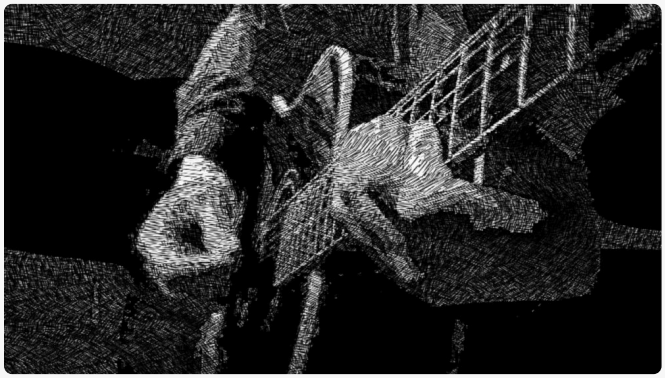
Outputs

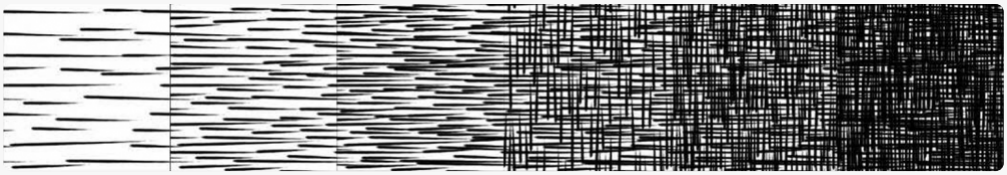
There are no outputs from this node.

Cross Hatch

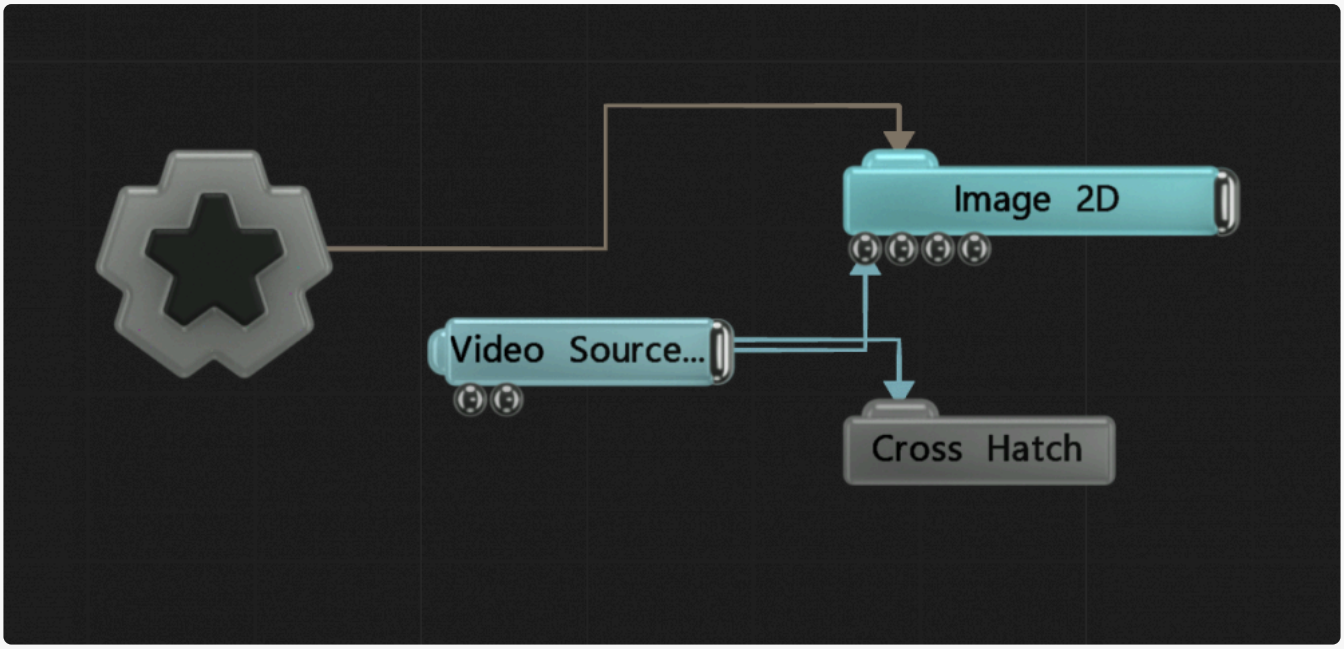
Method

This node adds a crosshatch effect. The image is broken up by brightness, and hatch texture is sectioned and overlaid onto the image. The brightness of the section in the original image determines which part of the hatch texture will be overlaid into that section.

Raw texture	Processed texture
	

Input Image


Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Hatch Texture	The texture used as a hatch pattern.
Intensity	The intensity of the effect that is applied.
Amount	Change how strong the efffect is on the input image.
Hatch Texture Scale	Change the scale of the cross hatching on the image.
Animation Rate	The speed at which the cross hatching is animated.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

Notes

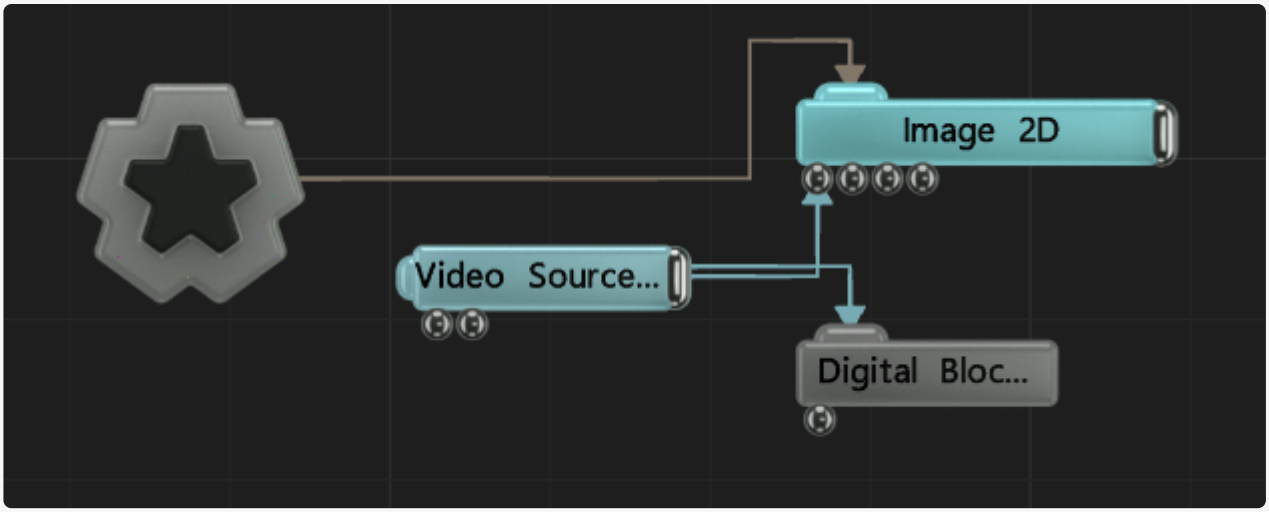
> ! The processed texture above has had a hatch texture applied, the effect doesn't work without a hatch texture selected and by default, none is applied.

Digital Block Glitch

Method

This node generated an effect of digital blocks periodically displacing the image and altering their colours.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.

Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Block Size	Pixel size of the blocks the image will be broken into.
Breakup Amount	How much the blocks are broken up.
Breakup Frame Amount	How far apart the blocks are moved when breaking up.
Breakup Size	How large each block is.
Displace Amount	How much to displace the image when broken up.
Glitch Rate	How often the glitch frames appear.
Glitch Duration	How long the glitch frames last.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

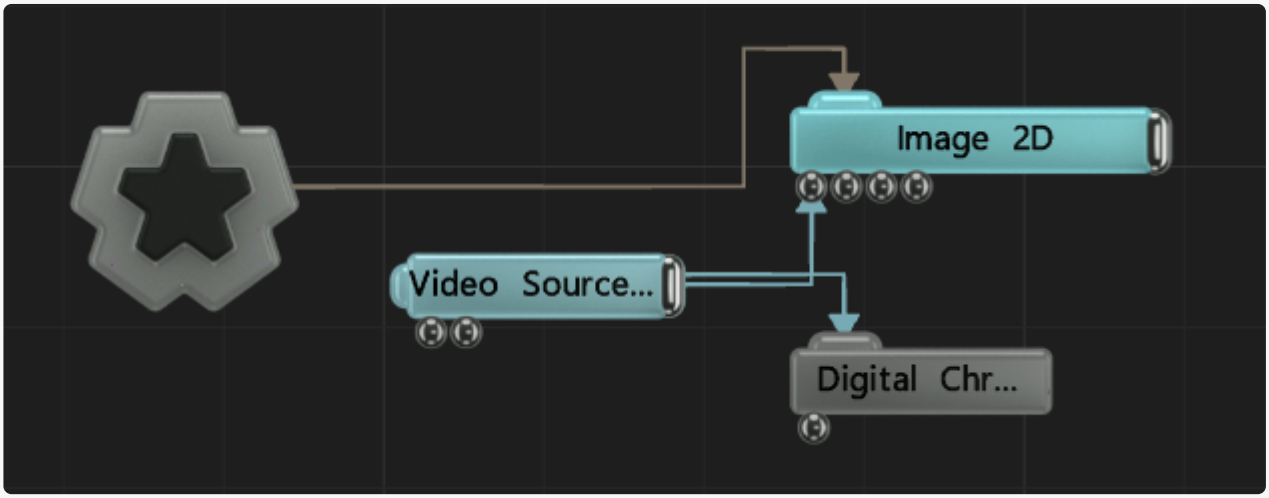
There are no outputs from this node.

Digital Chroma Glitch

Method

This node generates a striped glitches which displace the image and alters its colours.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.

Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Block Size	Pixel size of the blocks the image will be broken into.
Breakup Amount	How much the blocks are broken up.
Breakup Frame Amount	How far apart the blocks are moved when breaking up.
Breakup Size	How large each block is.
Displace Amount	How much to displace the image when broken up.
Glitch Rate	How often the glitch frames appear.
Glitch Duration	How long the glitch frames last.
Hold Glitch Frames	How long the Glitch frames should be held for.
Colour Channel Mode	How the Glitched frames should break up based on colour. • Red / Green + Blue, Red is split away from green and blue. • Luminance Dark / Light, Dark and Light luminance values are split. • No Split, Colour channels are not split when the image glitches.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

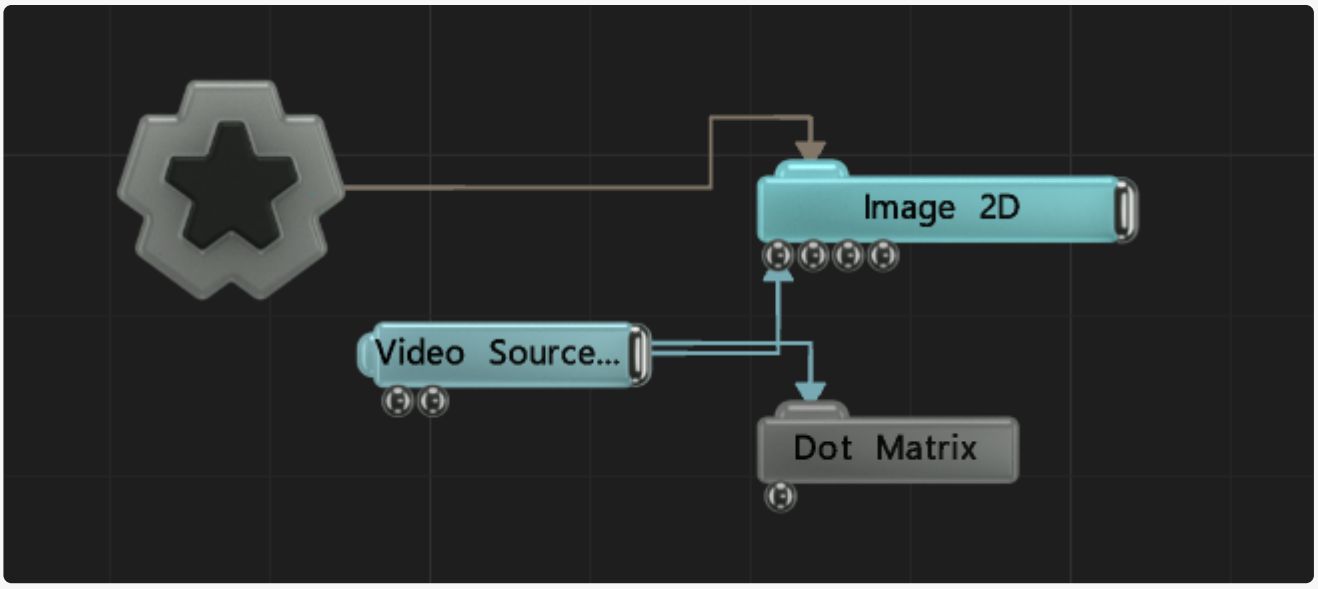
There are no outputs from this node.

Dot Matrix

Method

This node Breaks up the image in a matrix of dots, and colours or scales them based on the colours below.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Resolution	Resolution of the grid, specifically controlling the number of cubes along the Y axis.
Image	Select an image be tiled across the image.
Mode	Change how the Tiles are affected by the Image. • Flat, No effect. • Colour, Each tile is recoloured based on the colour beneath it. • Scale, Each tile is scaled based on the luminance of the colour beneath it. • Colour And Scale, Each tile is coloured and scaled based on the colour beneath it.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Tile Sheet

Name	Description
Use Tile Sheet	Enable use of an input Tile sheet.
Num Tiles X	Number of tiles along the X axis.
Num Tiles Y	Number of tiles along the Y axis.
Tile Layout	How the tiles are laid out and arranged onto the grid. Random, Each tile is randomly placed around the grid. By Colour, Each tile is placed based its average luminance and the luminance of the colour below. Like Sheet, Each tile is arranged in a sequence matching that of the tilesheet.

Inputs

Name	Description	Typical Node Input
Tile Source	Add a tile sheet to control each dots Alpha Map.	Tile Sheet

Outputs

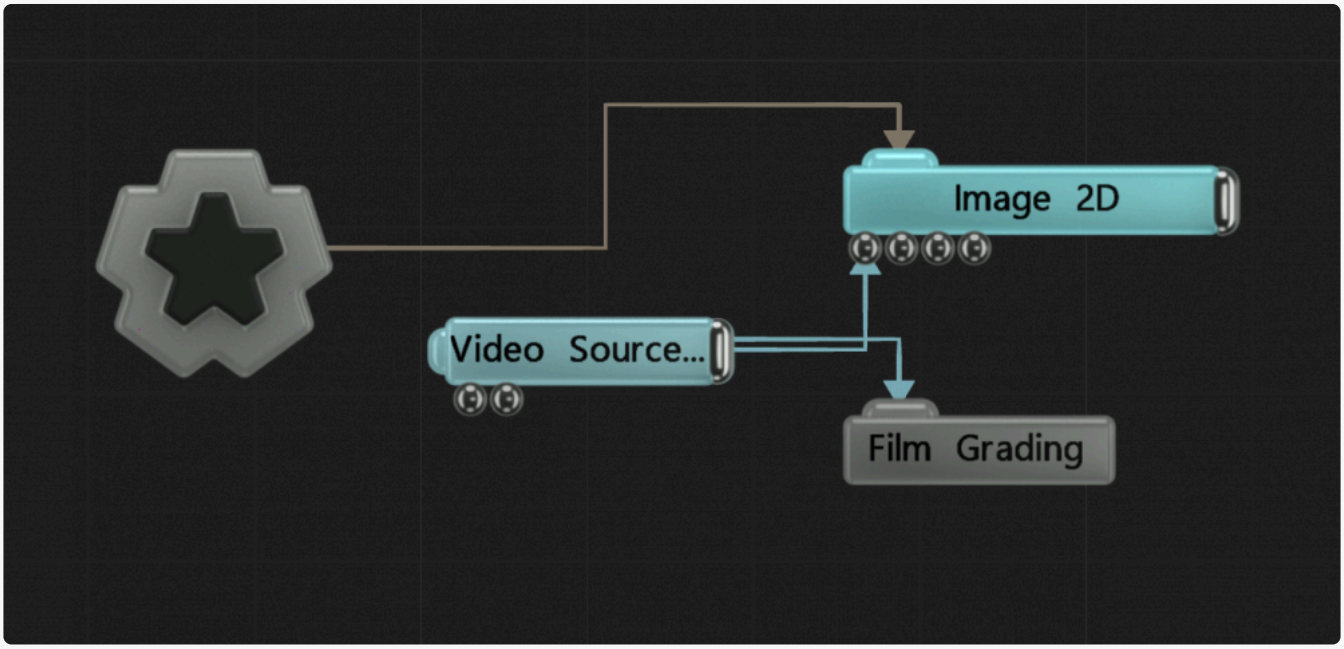
There are no outputs from this node.

Film Grading

Method

This node applies a film grading effect to the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Chromatic Amount	Amount of chromatic aberration in the effect.
Vignette Width	Control the size of the vignette
Tone Map Gamma	Control the brightness of the effect
Noise Amount	Amount of noise in the image
Centre X	Change the X axis centre point along from which the chromatic aberration is drawn.
Centre Y	Change the Y axis centre point along from which the chromatic aberration is drawn.
Normalise Blur Steps	Normalises the blur steps, so that they remain more accurate when at larger extremes.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

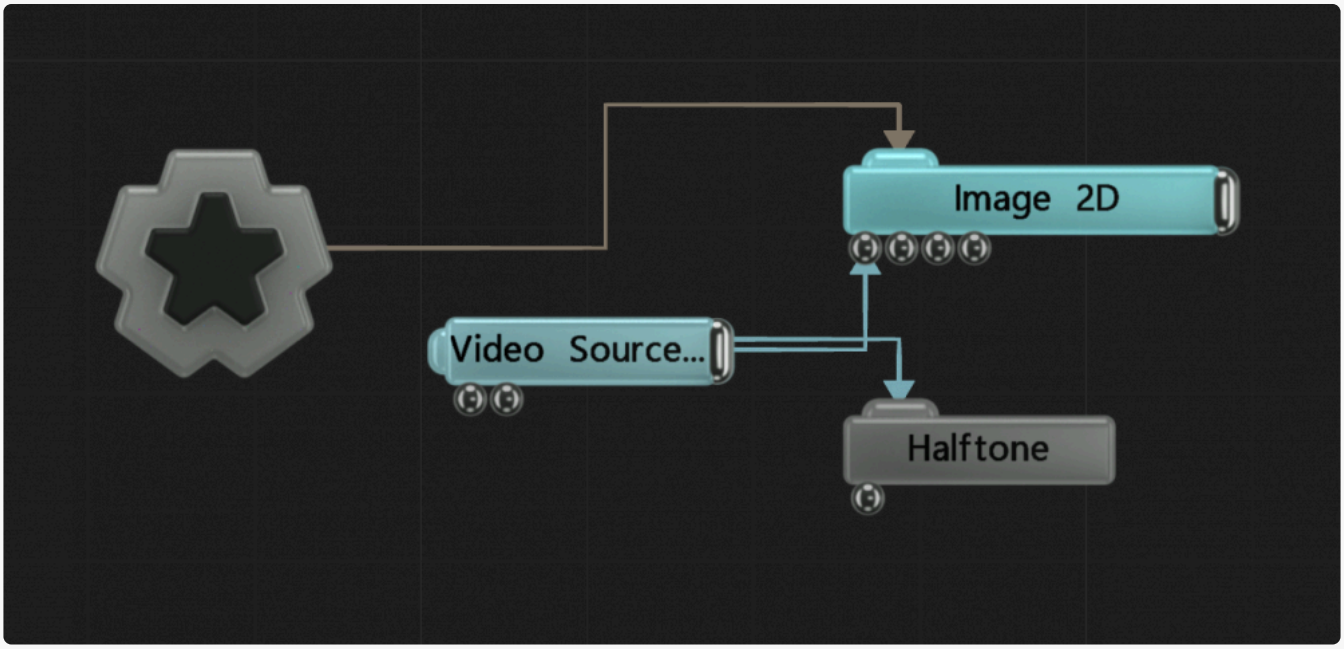
There are no outputs from this node.

Halftone

Method

This node applies a Halftone effect, where the image is separated into small circles and resized depending on the brightness in that area.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering

	must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Tint Colour	Edit the colour of the tint.
Background Colour	Change the background colour.
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Max Point Size	Size of largest points in the effect.
Point Scale	Scale size of all points.
Rotation Randomness	How random the rotation of each point is.
Invert Colour	Toggle inverted colour on or off.
Greyscale	Toggle greyscale on or off.
Halftone Texture	Override default halftone texture.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Colour Controller	Control the colours in the effect	Colour Ramp

Outputs

There are no outputs from this node.

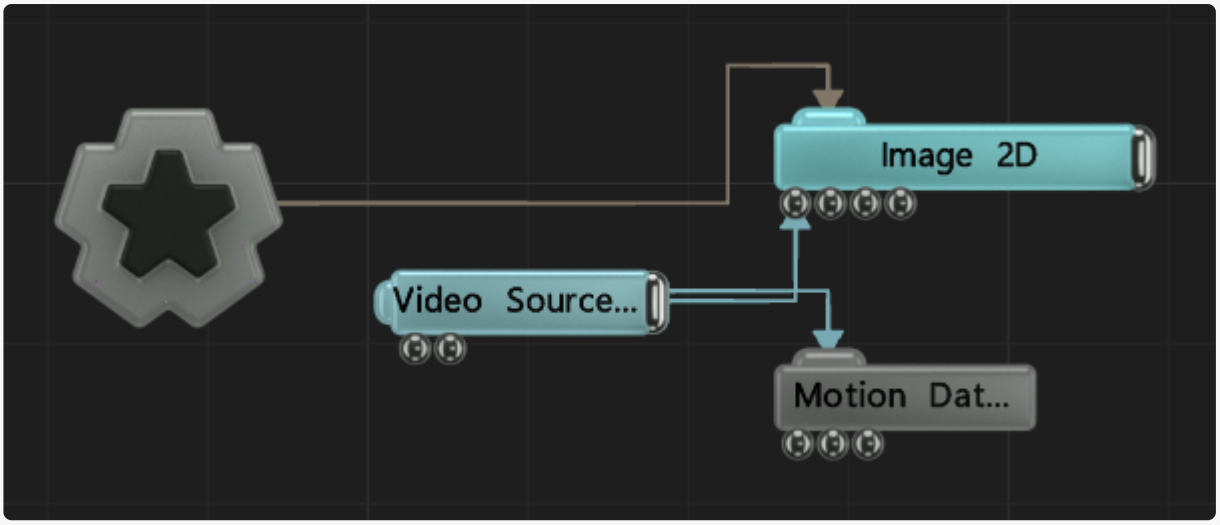
Motion Datamosh

Method

Generates Datamoshing using the movement vectors of the image, or an input velocity image.

> ! This node is framerate dependent.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering

	must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Velocity Amount	How much the velocity data affects the image.
Hold Time	How long the image will be held before getting a new frame.
Velocity Update Rate	How many times per second the motion data will update with the image.
Use Scene Motion Vectors	Use the motion vectors from within the scene.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Velocity Image	Use an input image to decide how the datamoshing should be applied.	Optical Flow
Hold Time Image	Use an image to decided how different parts of the image hold their datamosh-ed state.	Video Loader
Velocity Mask Image	Use an image to mask out areas where the datatmoshing wont be applied.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

Outputs

There are no outputs from this node.

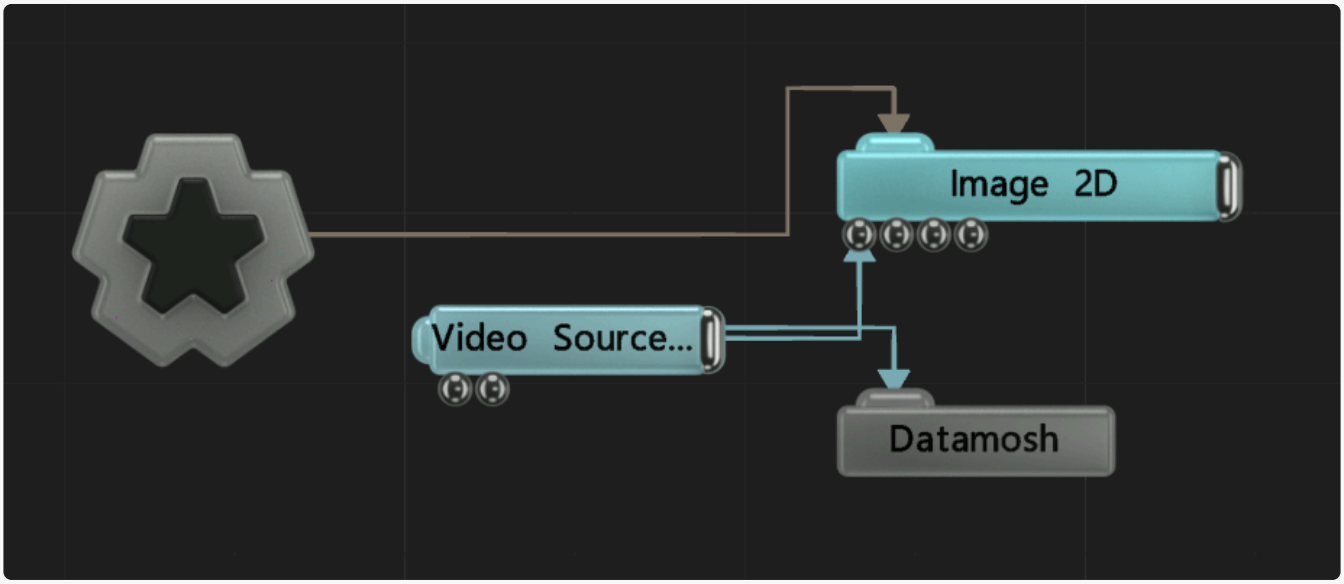
Pixel Sorting Glitches

Method

This node applies a simple pixels sorting algorithm to the image.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.

Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Brightness Threshold	Threshold below which values will be blended into the data mosh.
Direction	Select which direction the pixels are sorted in.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

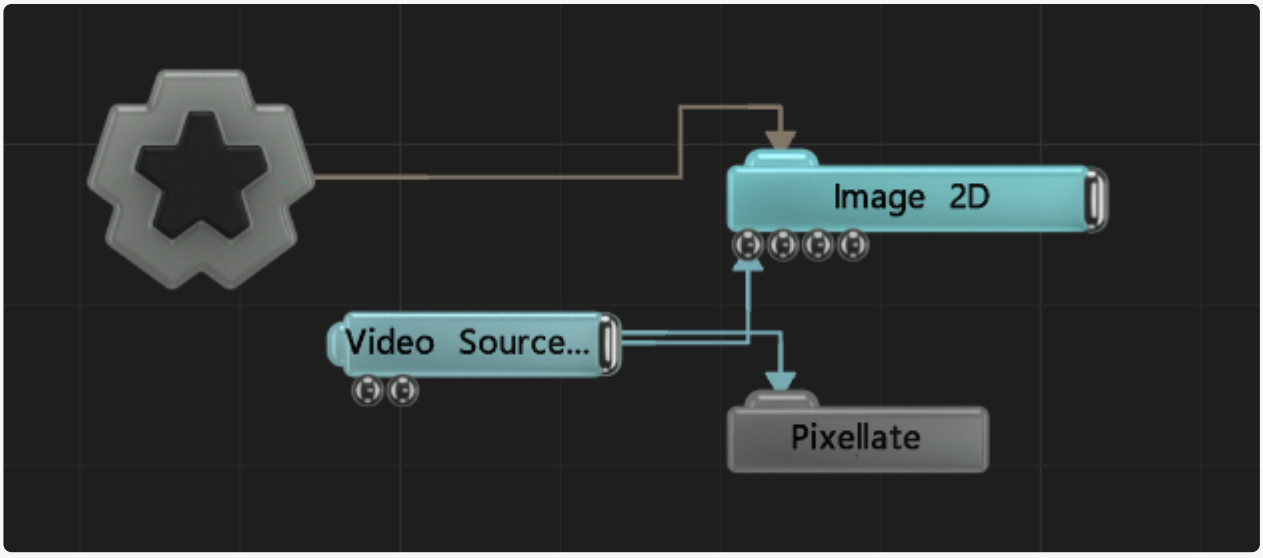
Pixellate

Method

This node pixellates an image, giving it a lower resolution.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.

Blend Mode (RGB)	Choose how the image blends with the scene. See Blend Modes for details.
Blend Mode (Alpha)	How the image alpha blends with the scene. See Blend Modes for details.
Resolution	Resolution of the grid, specifically controlling the number of squares along the Y axis.
Colour Quantisation	Select the image is quantised. • None, The colour values are not quantised. • Step, The colours are quantised to this amount. • Step + Dither, The colours are quantised and dithered for a smoother output.
Colour Quantisation Steps	Control the number of quantisation steps.
CRT Emulation	Enables a simple CRT emulation, in which the grid is broken up into RGB pixels.

Affected Channels

Toggle which of the RGBA channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

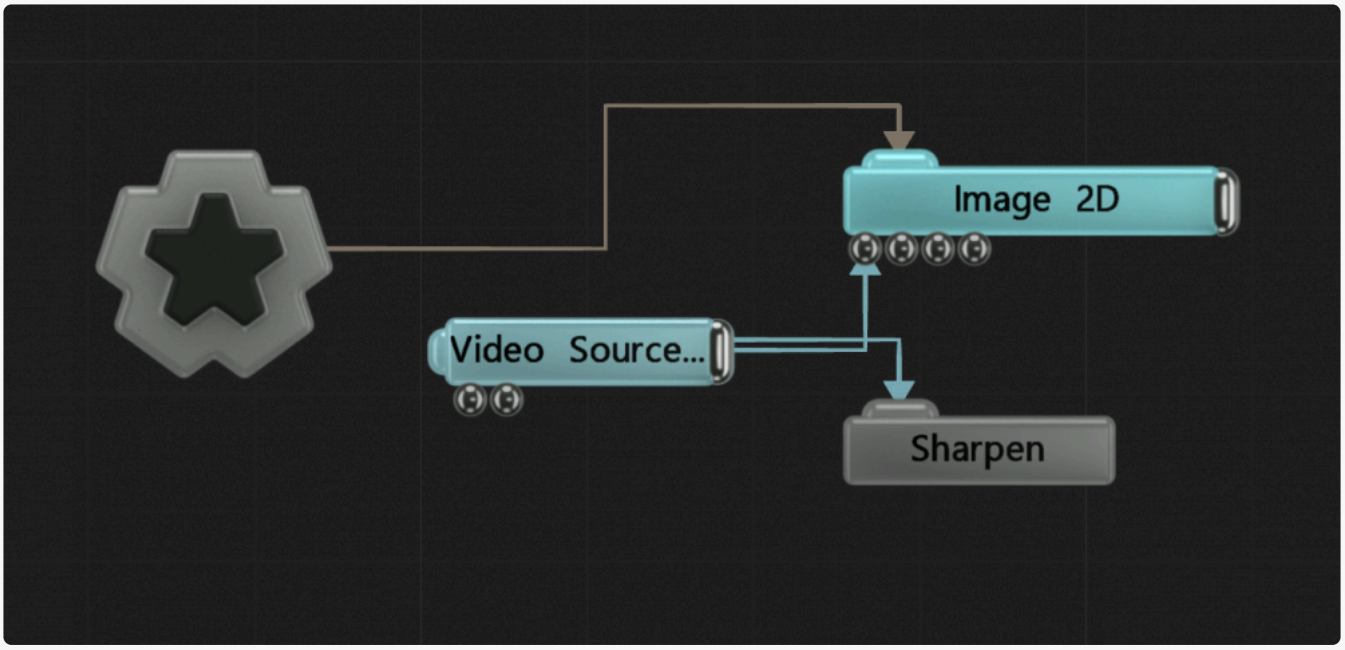
Sharpen

Method

This node applies a sharpen effect to the image.

Raw texture	Processed texture	Modified texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode	Change how the generated effect blends with the parent image RGB.

(RGB)	
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Amount	Change how strong the efffect is on the input image.
Radius	Increase the radius of the sharpen effect

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Slit Scan

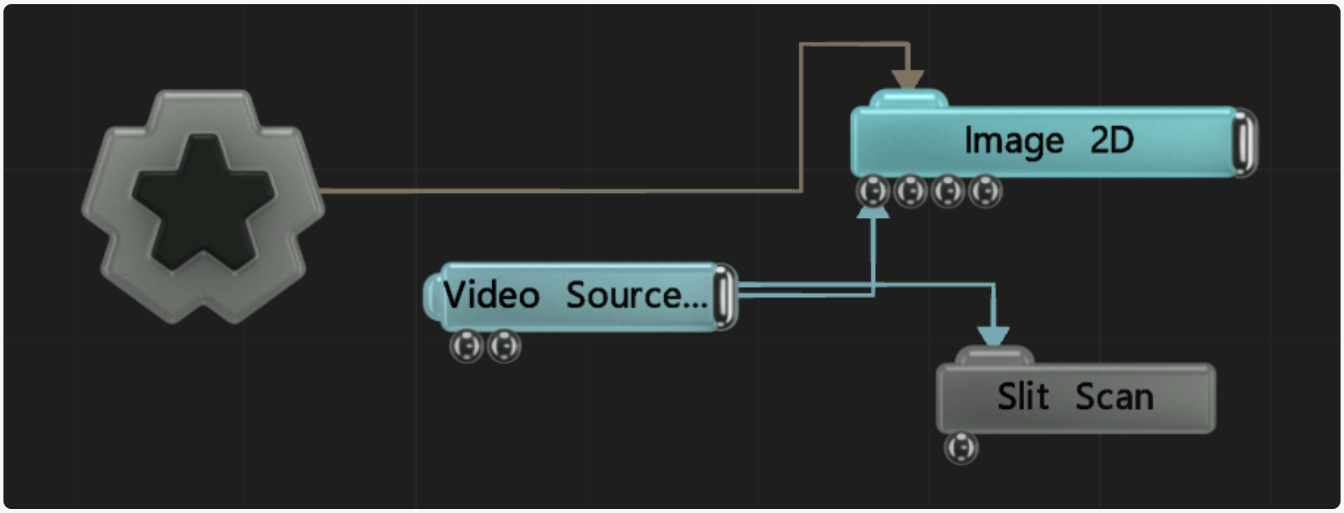
Method

This nodes generates a slitscan effect, where previous frames are stacked from left to right across the frame.

> ! When you use the Frame delay with the Slit scan, the Slit Scan will use the Frame Delays image buffer instead of its own.
> This means that if the Slit Scan is run before the Frame Delay, the empty image from the Frame Delay will passed into the Slit Scan, which will then be picked up by the Frame Delay when it runs. To avoid this:
> - Make sure the Slit Scan is placed below the Frame Delay in the Nodegraph, so it runs after.
> - Make sure the Slit Scan uses a different image source to the Frame Delay.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Gap Width	Width between the different slit sections.
Delay Range	Number of slits the image is broken up into..
Direction	The direction the slits appear across and the direction the slit delay travels along.

Inputs

Name	Description	Typical Node Input
Frame Delay Node	Input a video source with previous frames to draw from.	Frame Delay

Outputs

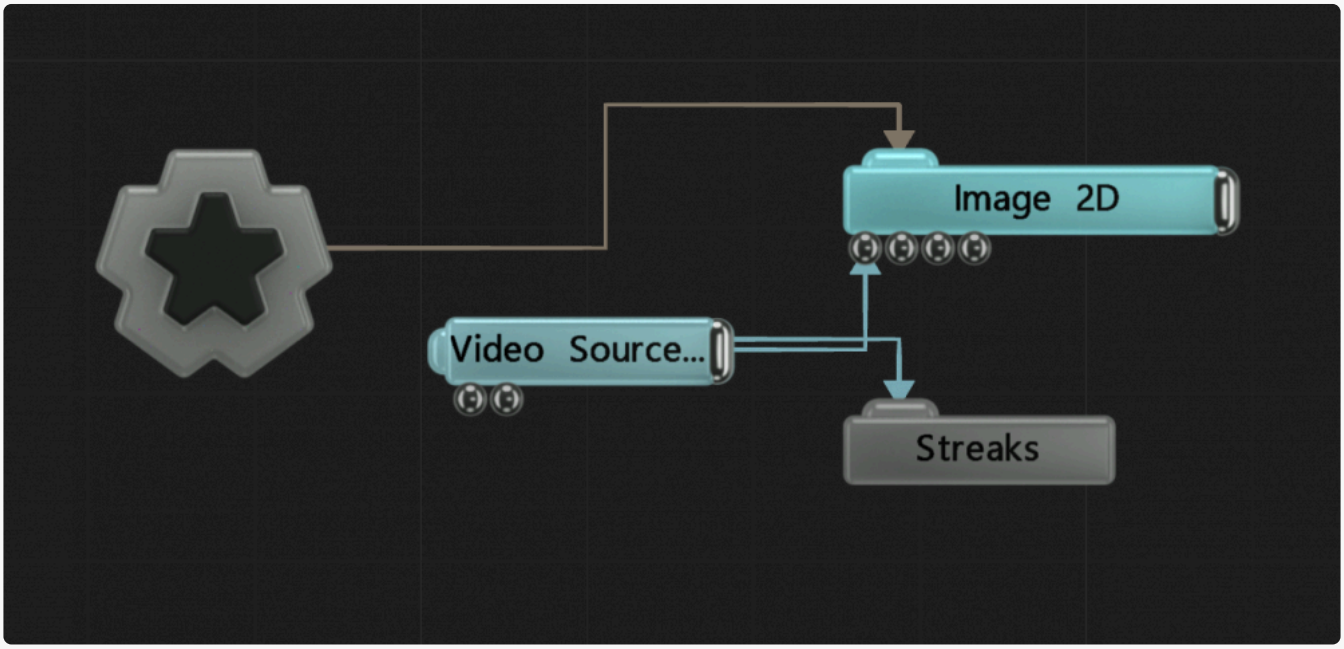
There are no outputs from this node.

Streaks

Method

This node applies a streak effect to the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Streak Length	Length of the streaks used in the image.
Intensity	The intensity of the effect that is applied.
Num Streak Angles	Number of streaks shown.
Angle Offset	Angle of the effect.
Angle Step	Difference in angle for each offset streak.
Threshold	The luminance threshold at which a pixel will contribute to the effect.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

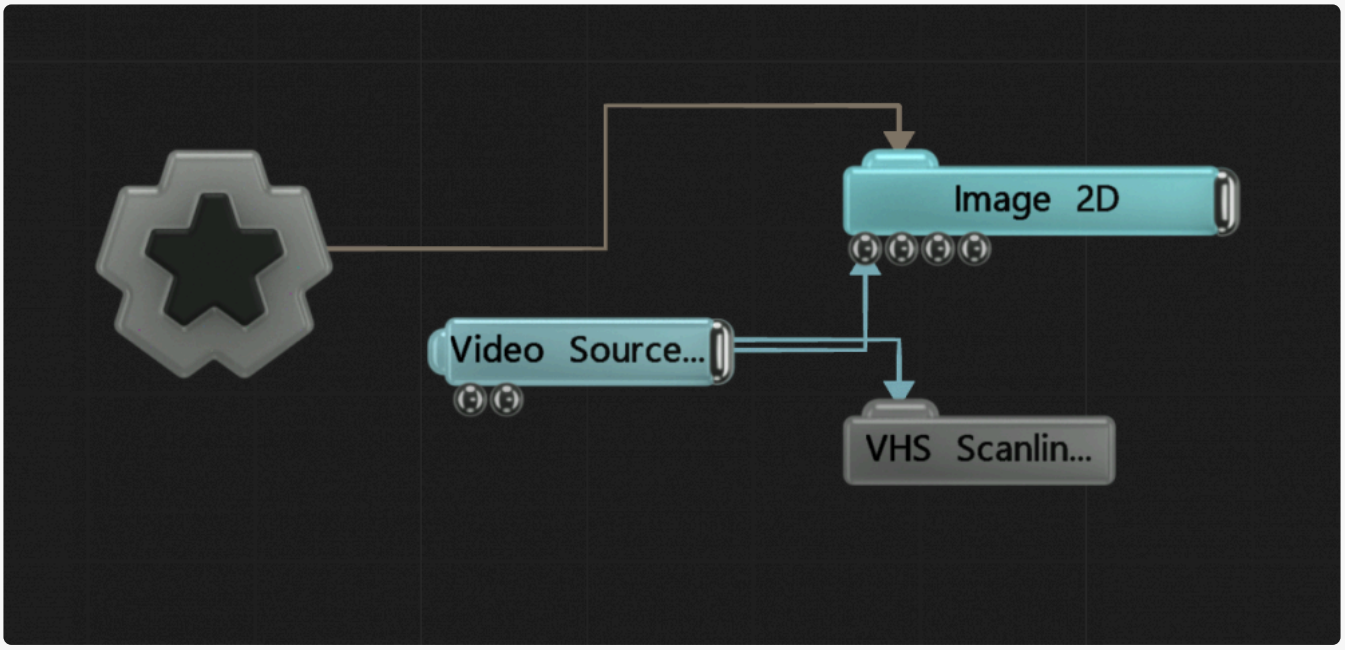
VHS Scanlines

Method

This node generates damaged VHS scanlines.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode	Change how the generated effect blends with the parent image RGB.

(RGB)	
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Intensity	The intensity of the effect that is applied.
Amount	Change how strong the efffect is on the input image.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

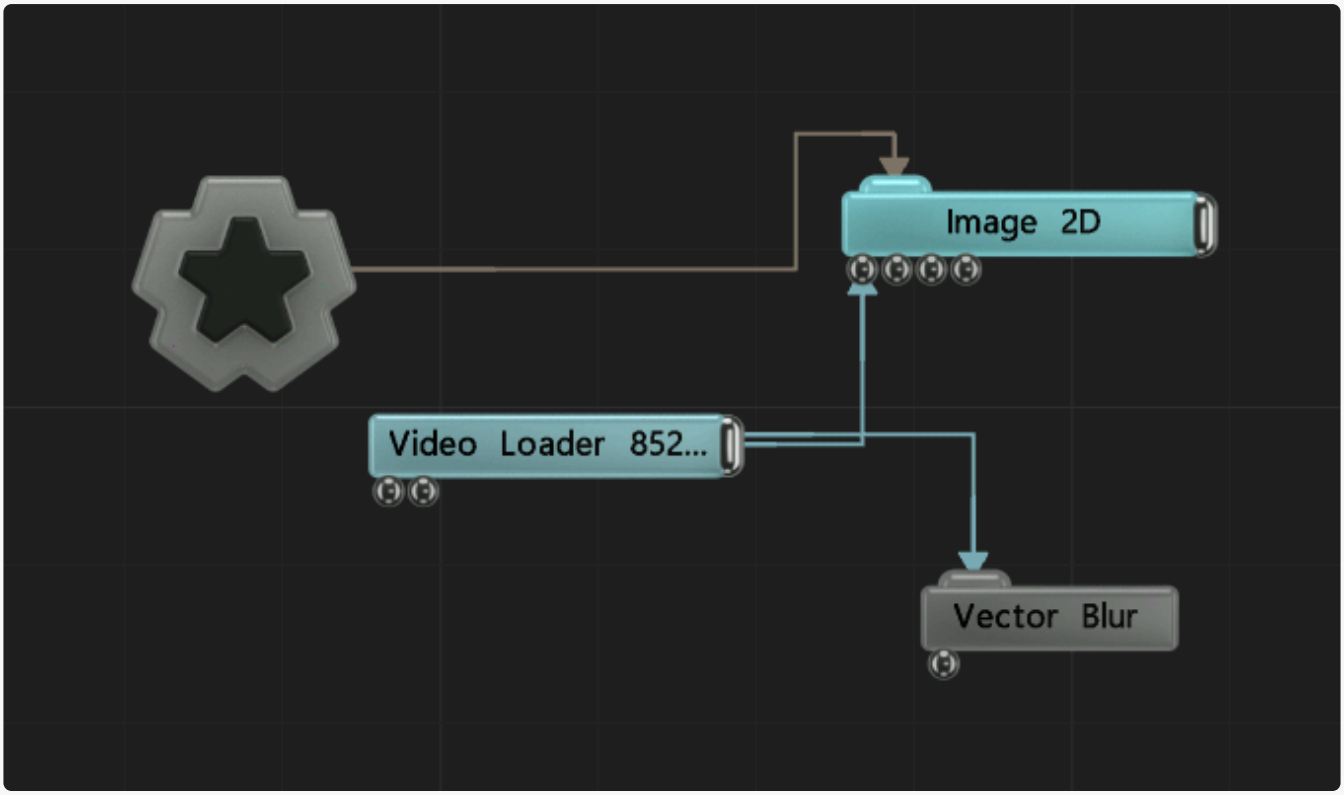
Vector Blur

Method

Performs a blur operation on an image, but instead of blurring around each pixel uniformly the blur follows a path through the image. The path is determined by vectors extracted from the image itself. They point in the direction of gradients in the image, for example in the direction of a downward slope in image luminance. The result is a blur that conforms to details in the original image and produces a look similar to a traditional painting.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Steps	The number of steps that will be taken along the path for a single pixel.
Gradient Blur Iterations	The number of pre-blurring operations to perform on the extracted gradient vectors. This helps reduce artifacts in the end result.
Orientation	An offset applies to the rotation of the extracted gradient vectors.
Softness	Controls how much influence points further along the path have.
Step Size	Size of each step taken along each path.
Dampening	Controls how much influence the gradients have on the acceleration of the movement along the path.
Epsilon	Controls how finely the gradients are calculated. Raising this value may help reduce artifacts or precision issues.

Normalize	Normalizes the gradient vectors, so the gradient magnitude isn't used when calculating the paths.
Fixed Direction	If enabled, the effect will use only one calculated gradient for the whole path when blurring a pixel. This means the path is a straight line.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Direction Source	Add a texture whose luminance values will be used to drive the Vector blur directions instead.	Video Source

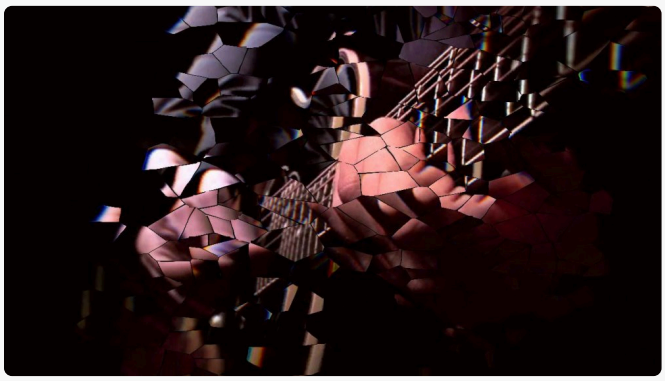
Outputs

There are no outputs from this node.

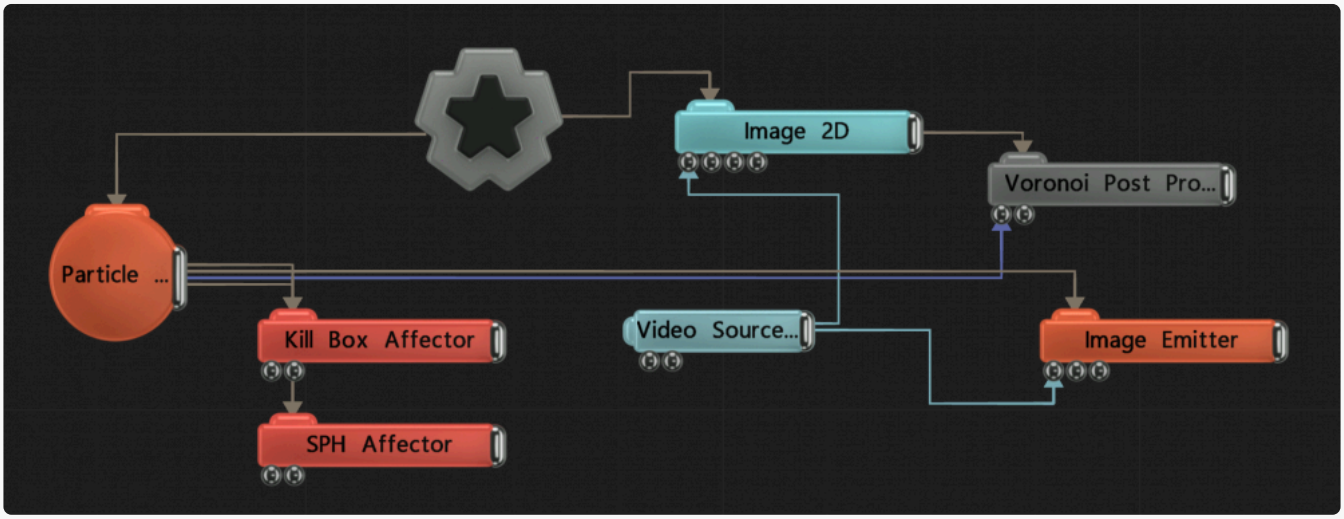
Voronoi Post Process

Method

This node generates a voronoi triangulation effect on a pixel by pixel basis.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode	Change how the generated effect blends with the parent image RGB.

(RGB)	
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Mode	Changes how the voronoi diagram affects the image. • Reflection Warping, Use the voronoi triangles to simulate a glass-like reflection of the image. • Cell Colour, Sample a colour from the image for each triangle.
Warp Amount	Changes how much the voronoi regions are displaced from the image.
Blend Amount	Changes how much the voronoi diagram affects the image.
Noise Distortion	Distorts the output with noise.
Crack Amount	How wide the cracks are between the voronoi regions.
Chromatic Aberration	How much chromatic aberration affects the image.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Particle Root	Used to gather the points for the Voronoi region generation. The regions will then be drawn based on the particle positions in screen space.	Particle Root

Outputs

The outputs section for this node is currently being worked on.

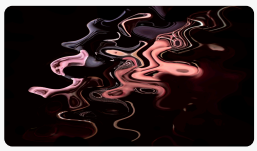
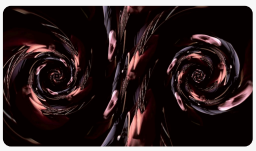
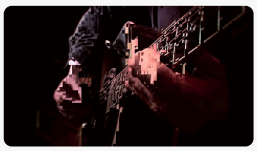
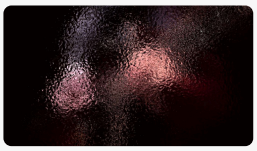
Warping

Method

These nodes take an image and stretch or squash them in different ways.

Warping nodes can be applied directly to all the same nodes as the rest of the post-fx nodes.

Gallery

Barrel Distortion	Bezier Warp	Bump Map Warp	Curl Noise Warp	Droste Warp
				
Field Position-Based Warp	Field Warp	Mirror	Moebius Warp	Randomise Tiles
Ripple	Screen Warp	Sine Warp	Stretch	Turbulence
				
Water Ripples				

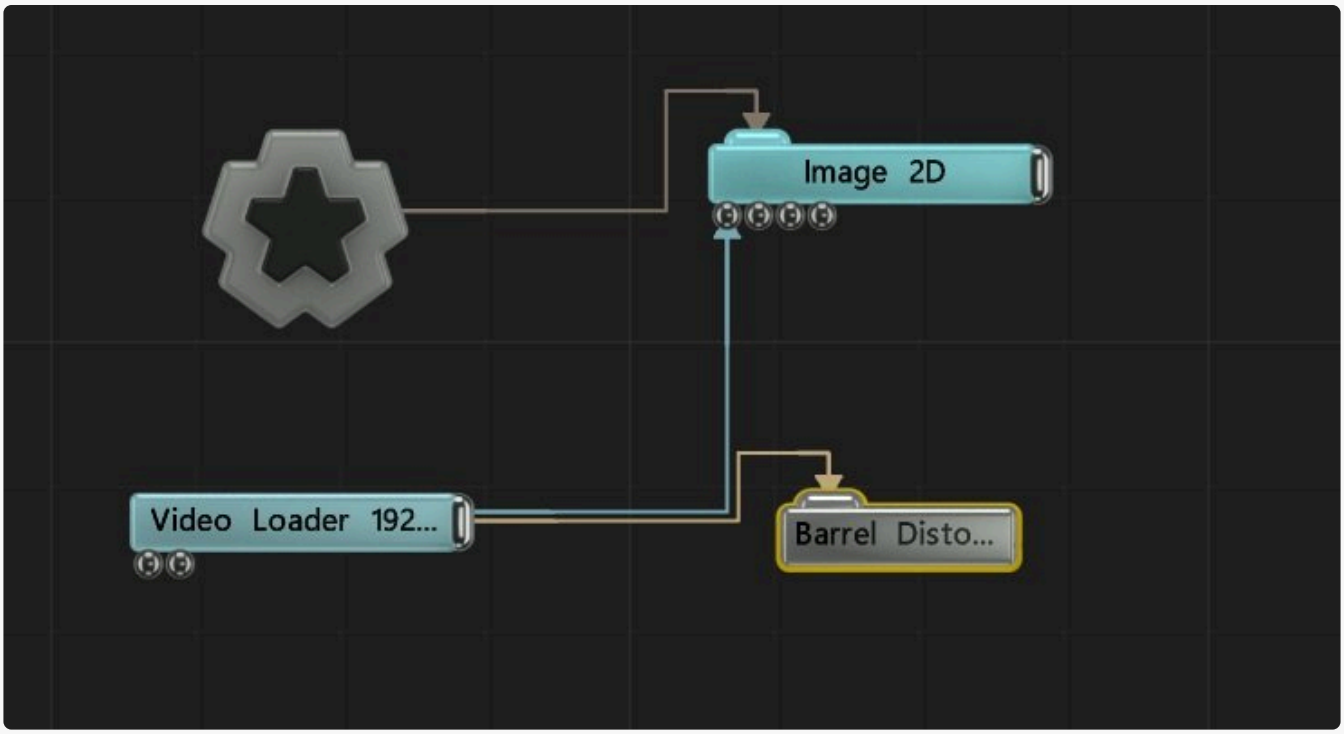
Barrel Distortion

Method

This node can be used to simulate distortions in real-world camera lenses. It creates a bulging or pinching effect from the centre of the image. See Wikipedia for more information.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
k1	First radial distortion coefficient. Barrel distortion typically will have a negative term for k1 whereas pincushion distortion will have a positive value.
k2	Second radial distortion coefficient.
k3	Third radial distortion coefficient.
Distortion Scale X	The distortion scale amount in X.
Distortion Scale Y	The distortion scale amount in Y.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

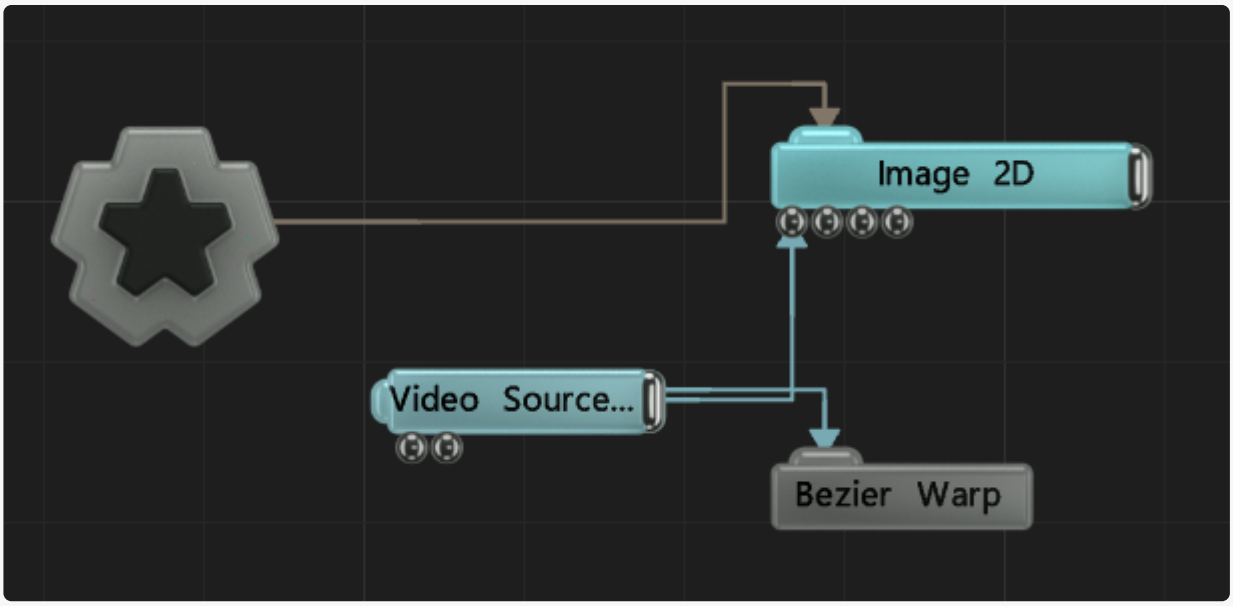
There are no outputs from this node.

Bezier Warp

Method

This node warps an image using a bezier control grid and 8 control points to affect how the image is warped.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Show Control Points	Visualise the control points being used to warp the image.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Centre Control Points

Central points used to warp the image.

Corner Control Points.

Outer points used to warp the image.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Notes

> ! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

Bump Map Warp

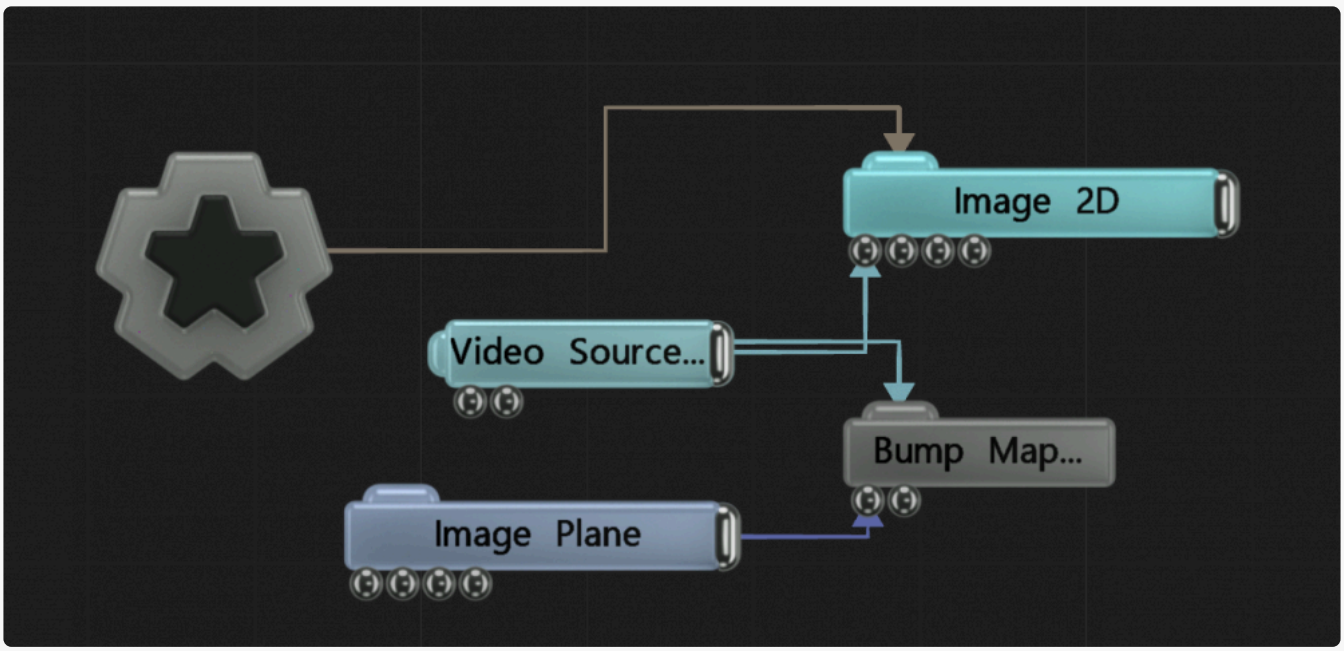
Method

This node warps and image based off of a bump map. The warp is generated by creating a copy of the image with a slight offset and multiplied.

Raw texture	Processed texture

Input Image

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Displacement Amount	How much the warp effect displaces the image.
Falloff Range	How far the falloff for the warp reaches.
Displacement Amount X	How much the images are displaces along the x axis.
Displacement Amount Y	How much the images are displaced along the y axis.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Image Node	The source bump map for the warp. Effect doesn't function without an input here.	Image Plane
Falloff Node	Add a gradient that controls how far the effect affects the image.	Gradient 2D

Outputs

There are no outputs from this node.

Notes

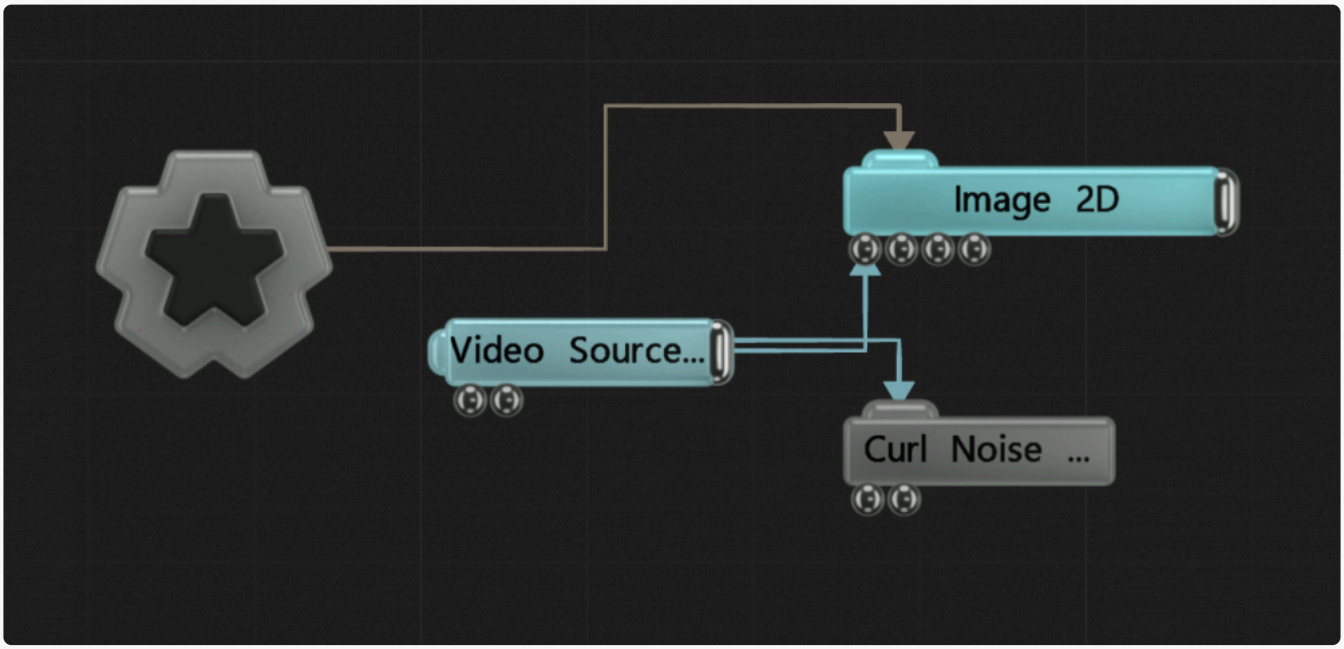
! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

Curl Noise Warp

Method

This node warps and image using a curl noise function.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Displacement Amount	How much the warp effect displaces the image.
Noise Scale	Size of the noise in the warp.
Falloff Range	How far the falloff for the warp reaches.
Simulation Speed	Control the speed at which the warp is animated.
Edge Fade Distance	how much of the edge is effected by the warp from the center.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Falloff Node	Add a gradient that controls how far the effect affects the image.	Gradient 2D
Mask Image	An area which is not affected by the warp effect.	Image Plane

Outputs

There are no outputs from this node.

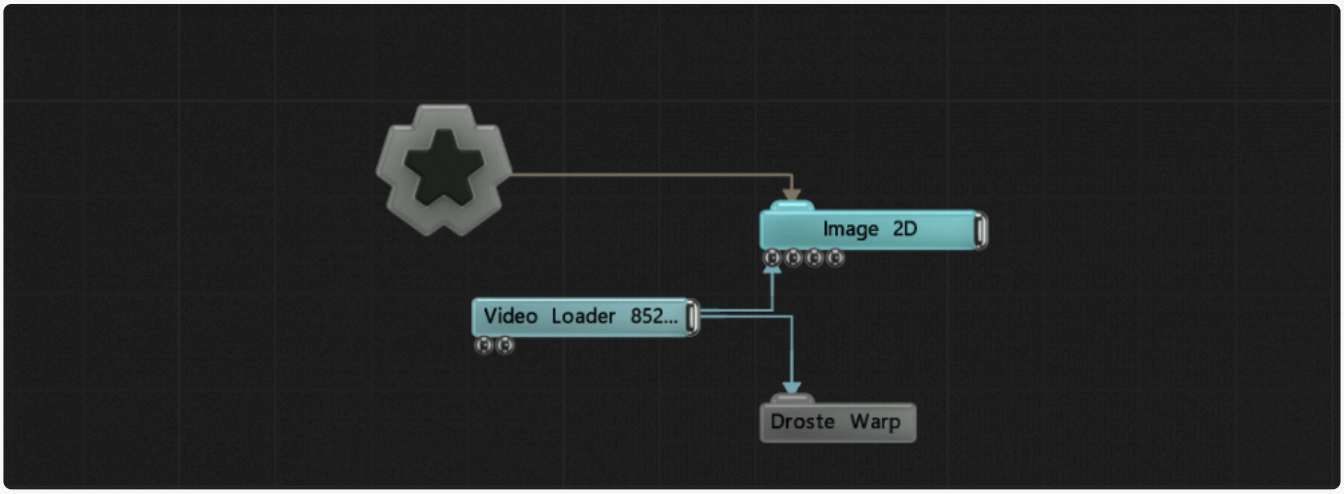
Droste Warp

Method

This node applies a Droste function to the image, creating an infinitely warping warp.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode	Change how the generated effect blends with the parent image RGB.

(RGB)	
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Animation Rate	Change the rate at which the sine wave is animated.
Focal Point Offset X/ Y	Move the centre point of the Droste effect.
Matrix Coefs X	Pinches and stretches the Image Inward.
Matrix Coefs Y	Radial twist amount.
Matrix Coefs Z	Shift the radial twist inward and outward.
Matrix Coefs W	Stretch the image around the focal point.
Spiral Multiplier	Multiply the radial twist, so it twists more
Update Time Mode	How the effect updates with relation to the time code. • Locked To Timecode, The effect is locked to the time code and the same time on the time code will always yield the same image output. • Running / Looping, The effect is disconnected from the time code and will loop seamlessly at the end of the layer. This also means that animated speed values will change smoothly.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

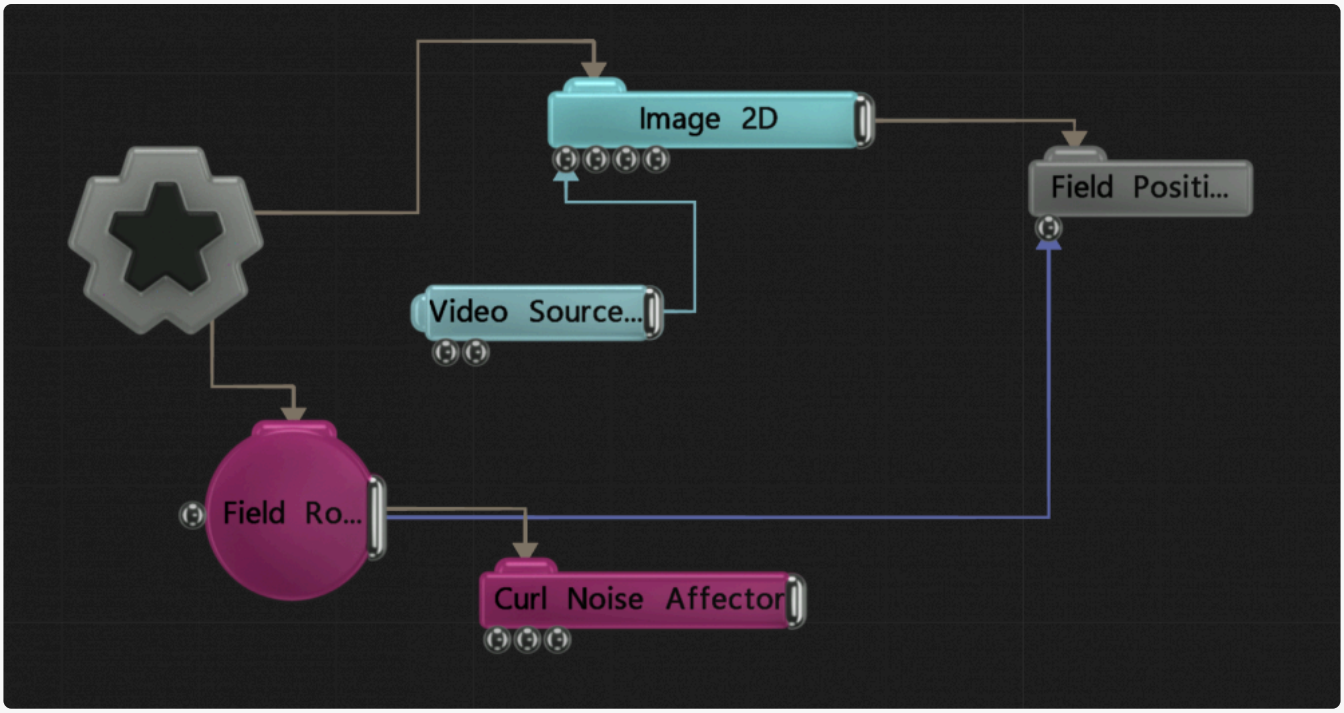
Field Position-Based Warp

Method

This node warps an image based on the movement vectors of an input field. The field movement vectors are used to deform a position lookup grid over time, which is then used to sample the image every frame. This allows animating deformations to be applied to separately animating sources.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Simulation Speed	Control the speed at which the warp is animated.
Velocity Scale	Scales the velocities of the input field.
Displacement Scale	Scale the amount the field root effects the image.
Velocity Dampening	Dampen the effect of the field root.
Brightness	Scales the brightness of the result.
Width	Controls the width of the underlying deformation grid. The greater the width of the grid, the more memory intensive the processing is but the sharper the result.
Height	Controls the height of the underlying deformation grid. The greater the height of the grid, the more memory intensive the processing is but the sharper the result.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Source Field	Input a field root node to affect the image.	Field Root
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

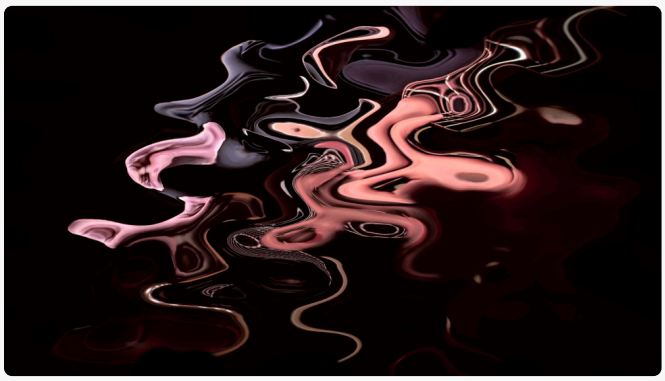
Notes

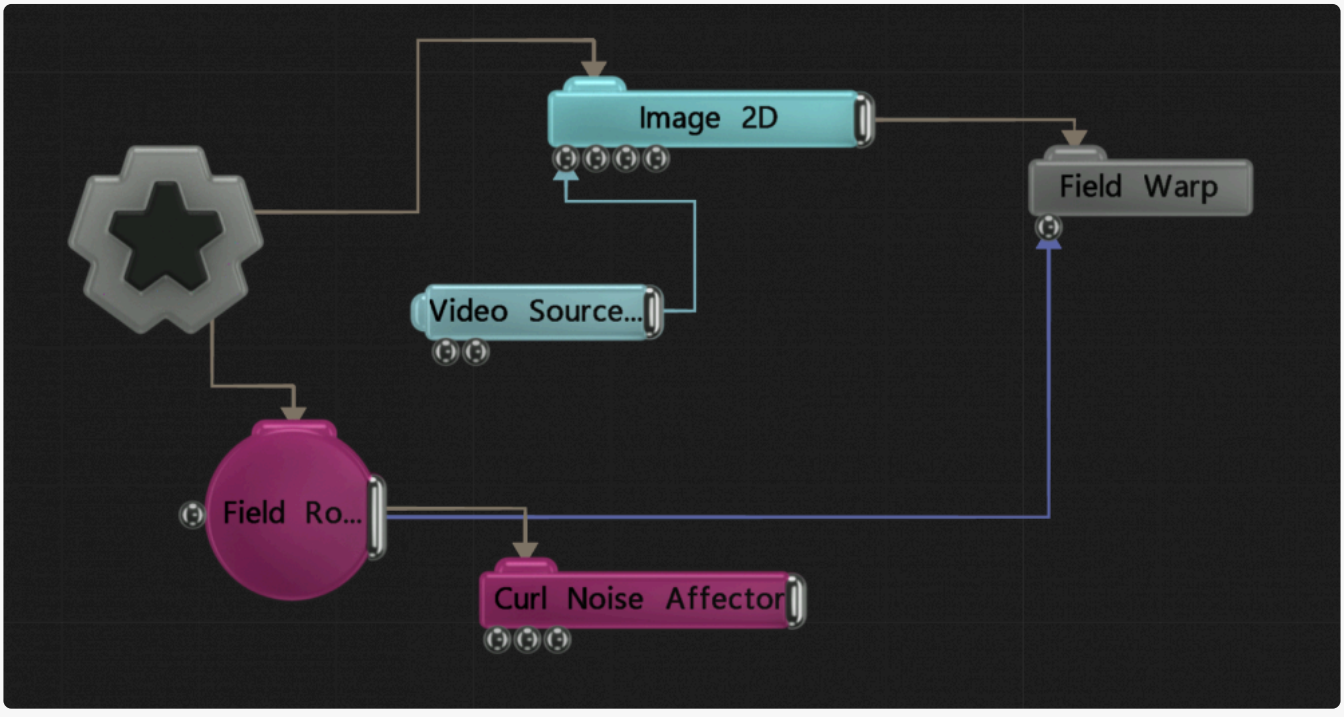
> ! The processed texture above has been altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you input a field root system.

Field Warp

Method

This node warps an image based off of a field system.

Raw texture	Processed texture
	

Example Nodegraph


Attributes

Name	Description

Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Amount	How much the field root affects the image.
Inner Radius	The inner radius of the warp.
Outer Radius	The outer radius of the warp.
Use Velocities	Toggle whether the velocities from the field node are used in the field warp.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Source Field	Input a field root node to affect the image.	Field Root
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Notes

! The processed texture above has been altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you input a field root system.

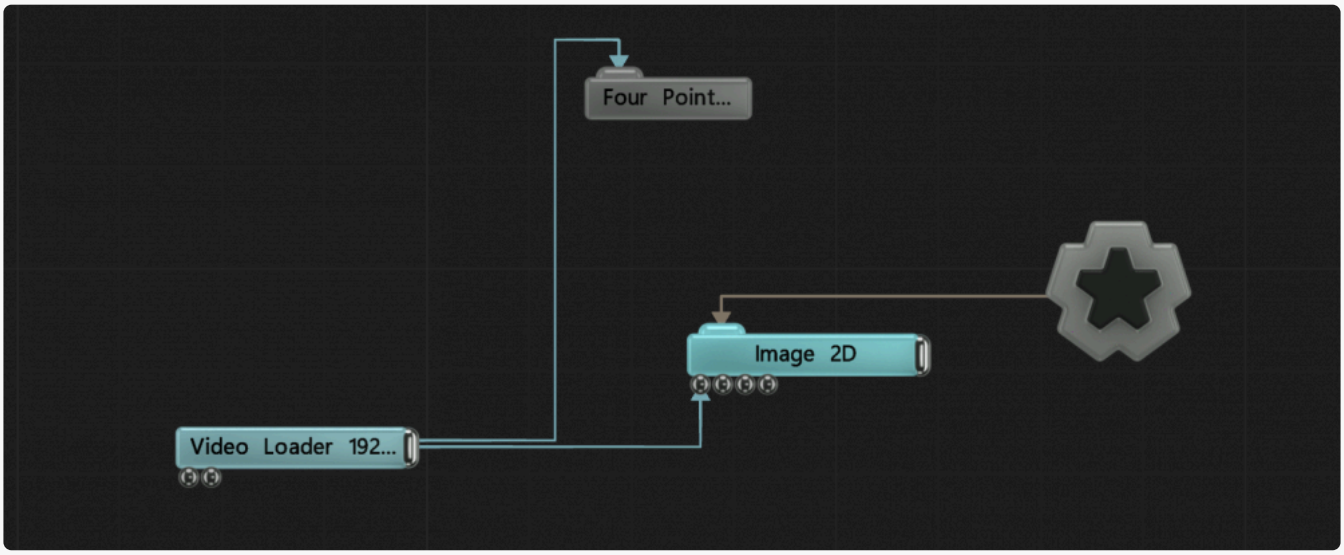
Four Point Warp

Method

This Node allows the image to be warped from 4 cornered sections of the image.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.

Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Show Control Points	Show the control points used in generating the effect.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Control Points

Modify the control points for each of the four corners of the image.

Inputs

There are no inputs for this node.

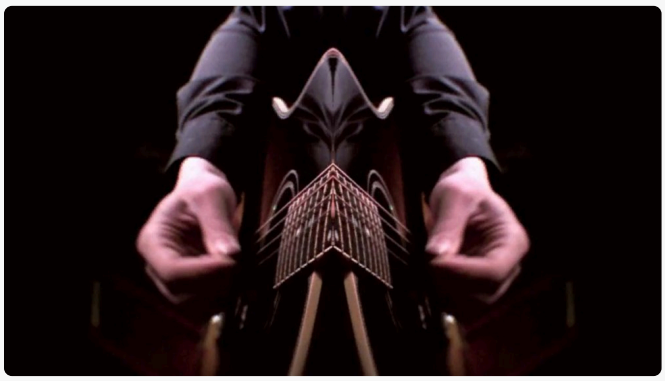
Outputs

There are no outputs from this node.

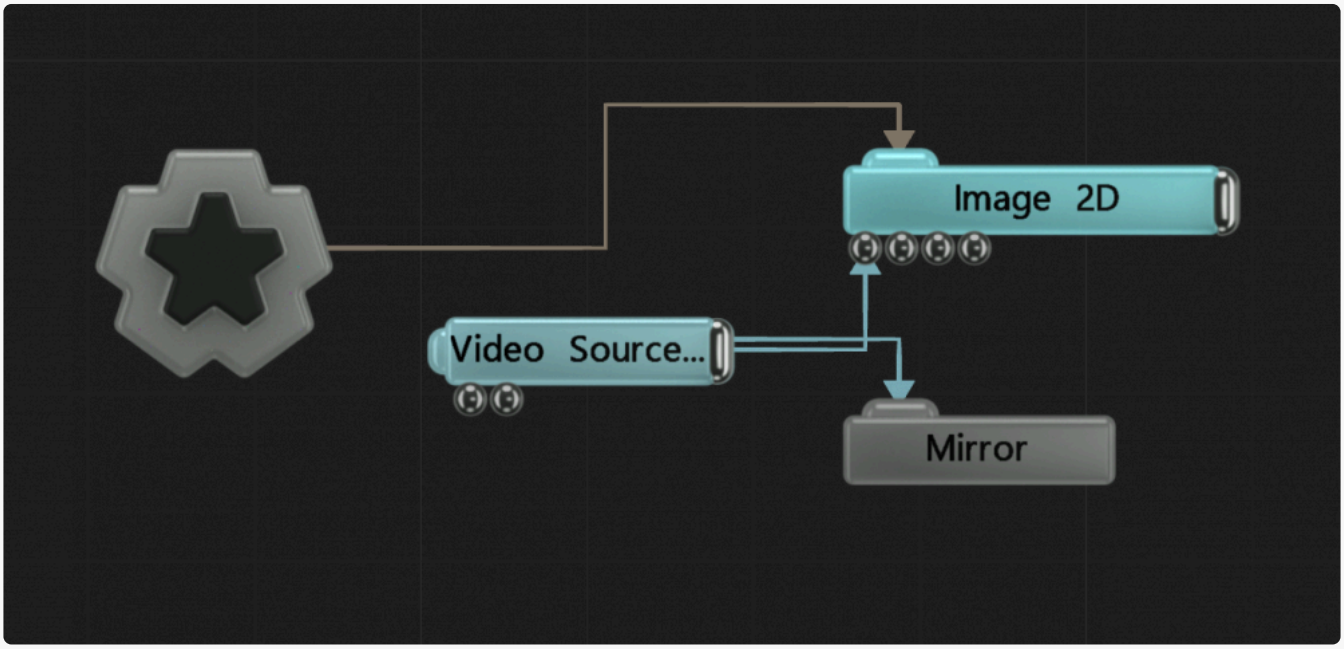
Mirror

Method

This node mirrors one side of the image onto the other side.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Rotation	Edit the rotation of the effect.
Position X	Change the x position of the mirror line.
Position Y	Change the y position of the mirror line.
Num Mirrors	Change the number of mirrors in the image.
Kaleidoscope Speed	How fast the kaleidoscope is animated.
Kaleidoscope Offset	Offset the positioning of the kaleidoscope.
Mode	Choose which kind of mirroring to be used on the image. • Mirror, The left side of the image is reflected to the right side. • Simple Kaleidoscope, the bottom right image is reflected into the other 3 corners. • Full Kaleidoscope, a more fluid and complex kaleidoscopic image is generated.
Update Time Mode	How the effect updates with relation to the time code. • Locked To Timecode, The effect is locked to the time code and the same time on the time code will always yield the same image output. • Running / Looping, The effect is disconnected from the time code and will loop seamlessly at the end of the layer. This also means that animated speed values will change smoothly.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

There are no inputs for this node.

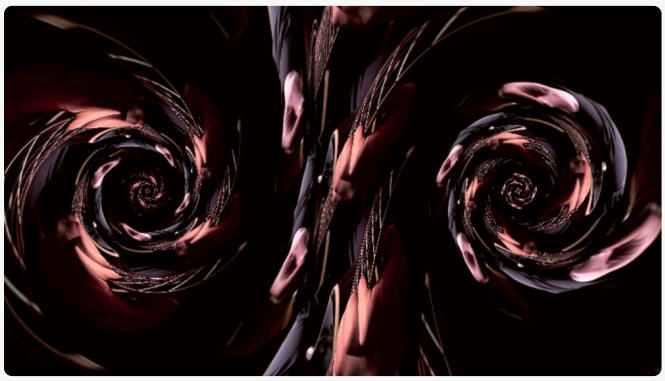
Outputs

There are no outputs from this node.

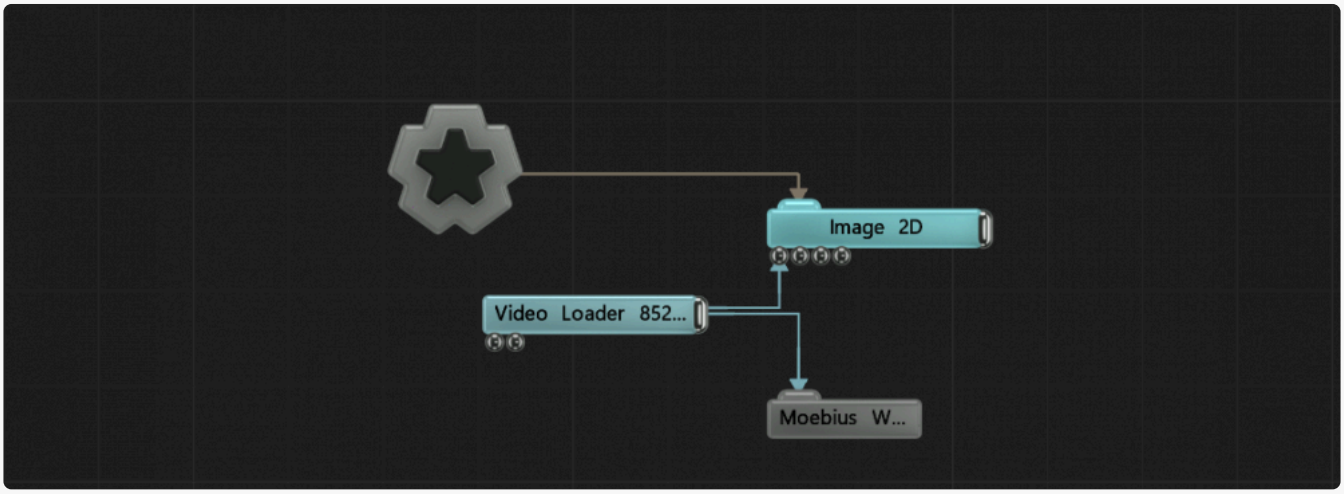
Moebius Warp

Method

This node applies a Moebius function to the image, creating an infinitely warping warp.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.

Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Zoom	How far to zoom into the Moebius warp.
Twist	How much the image is twisted between the Moebius points.
X/Y Offset	Offset the image along the warp.
X/Y Scale	Scale the image along the warp.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

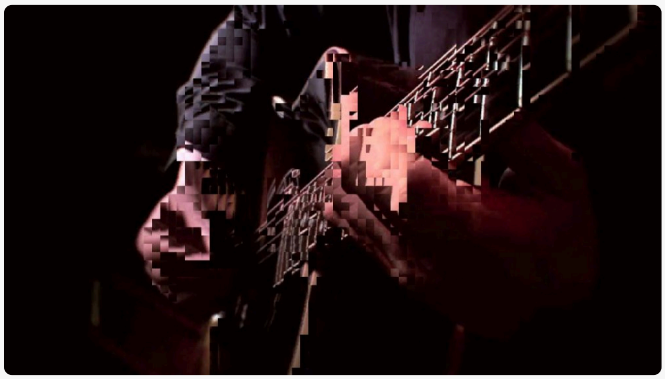
Outputs

There are no outputs from this node.

Randomise Tiles

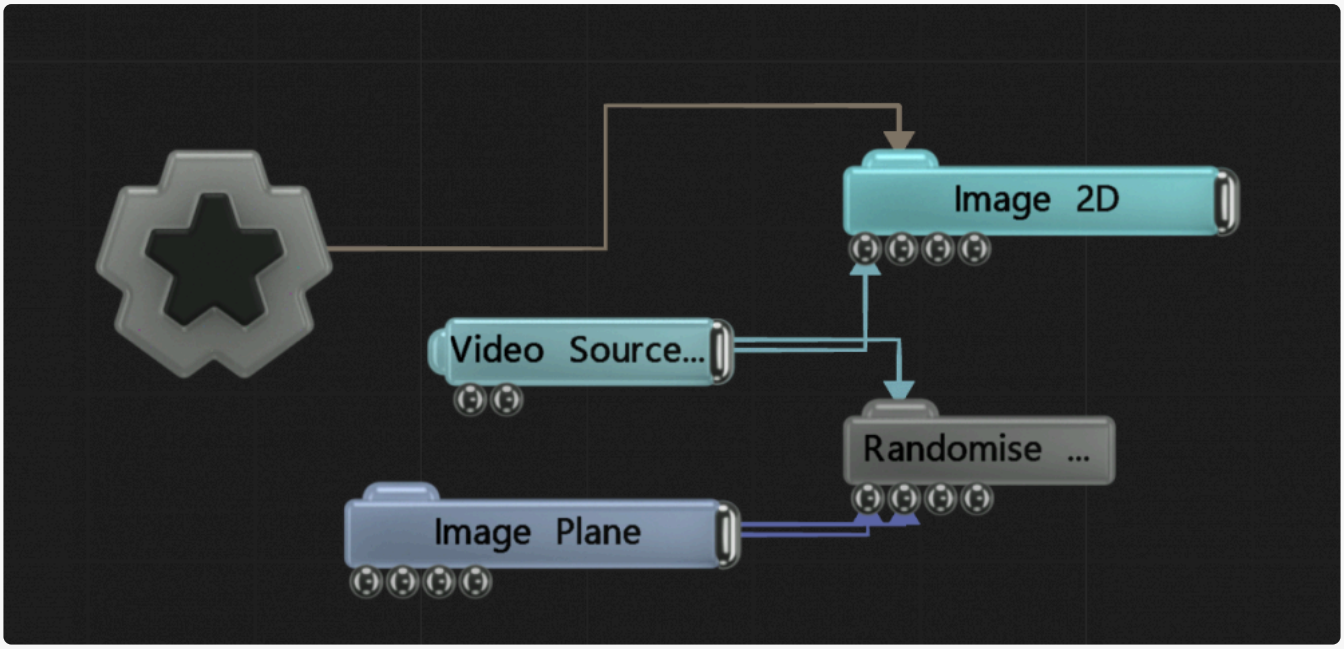
Method

This node breaks the image into a grid, and randomises the positions and frame delays of parts of the image based on an input image.

Raw texture	Processed texture
	

Input Image
This image was used for both x and y randomisation images.

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Use Num Tiles	Toggle whether the tiles are generated based on size, or based on numbers that fit into the viewport.
Tile Size X	Width of the tiles generated. Only functions with Use Num Tiles toggled off.
Tile Size Y	Height of the tiles generated. Only functions with Use Num Tiles toggled off.
Num Tile X	Number of tiles generated along the x axis. Only functions with Use Num Tiles toggled on.
Num Tile Y	Number of tiles generated along the y axis. Only functions with Use Num Tiles toggled on.
Gap Width	Width of the gap between the tiles.
Randomisation X Range	The X range at which a tile can be randomly moved to.
Randomisation Y Range	The Y range at which a tile can be randomly moved to.
Use As Absolute Positions	Use the absolute positions of the tiles in the grid, rather than relative offsets.

Show Offsets	Visualise how the image is being offset based on the tile input.

Inputs

Name	Description	Typical Node Input
Randomisation X Image	Randomise the image along the x axis based on the luminance values from an input image.	Video Loader
Randomisation Y Image	Randomise the image along the y axis based on the luminance values from an input image.	Video Loader
Delay Offset Image	Randomise the frame delay per tile based on the luminance values from an input image.	Video Loader

Outputs

There are no outputs from this node.

Notes

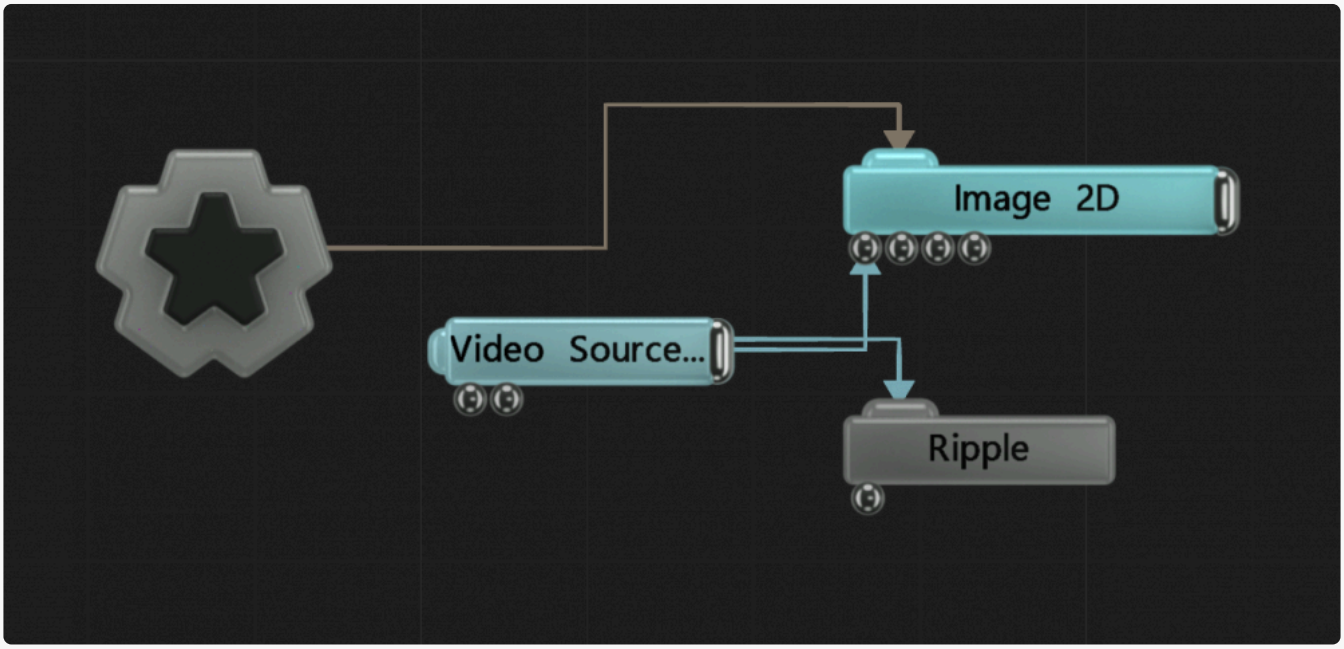
> ! The processed texture above has been altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you input an image.

Ripple

Method

This node warps an image with a ripple emanating from the center of the screen.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Displacement Amount	How much the warp effect displaces the image.
Falloff Range	How length of the blend to the displacement.
Max Displacement	Maximum height of the ripple.
Ripple Speed	Speed at which the ripple moves.
Ripple Peak Sharpness	How sharp the peaks of the ripples are.
Ripple Scale	How many ripples are generated.
Ripple Repeat Rate	How many seconds between each new ripple.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Falloff Node	Add a gradient that controls how far the effect affects the image.	Gradient 2D
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

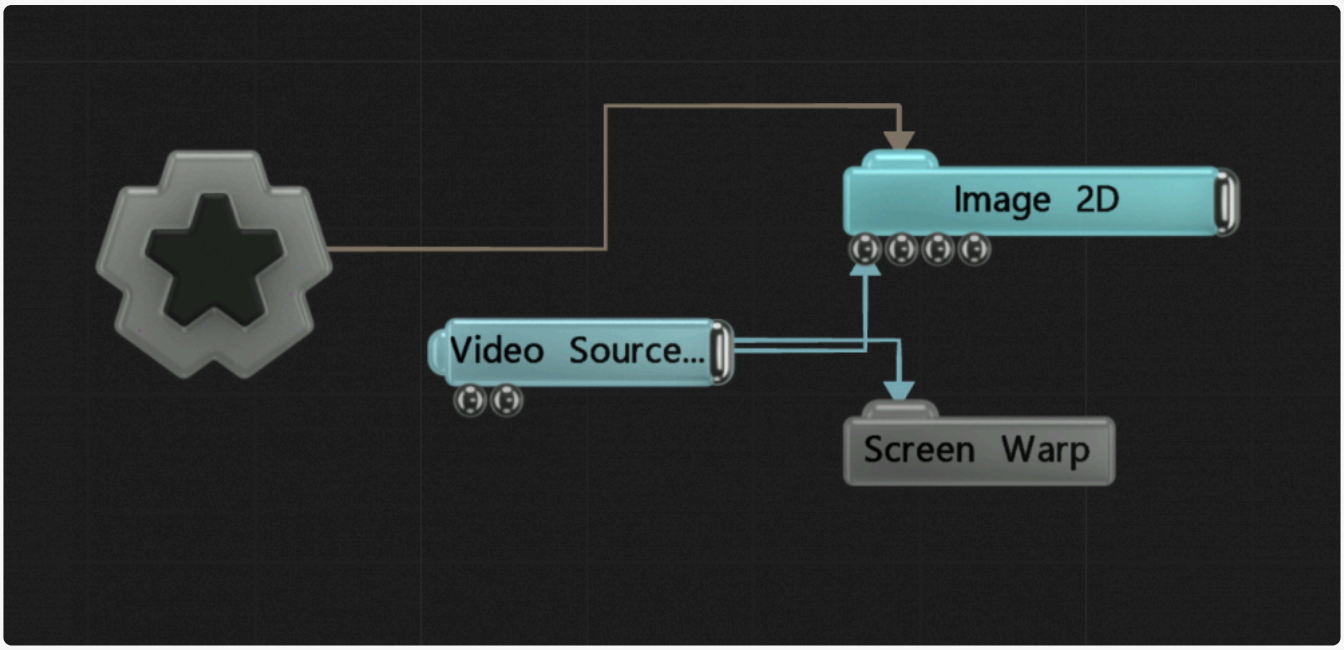
Screen Warp

Method

This node adds a bulge effect to the image, whereby a chosen point is stretched and the outer edge is squashed.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering

	must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Amount	How strong the warp is.
Inner Radius	Radius size of the focus of the warp.
Outer Radius	The outer radius of the warp.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

There are no outputs from this node.

Notes

> ! The processed texture above has been slightly altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you change some of the nodes attributes.

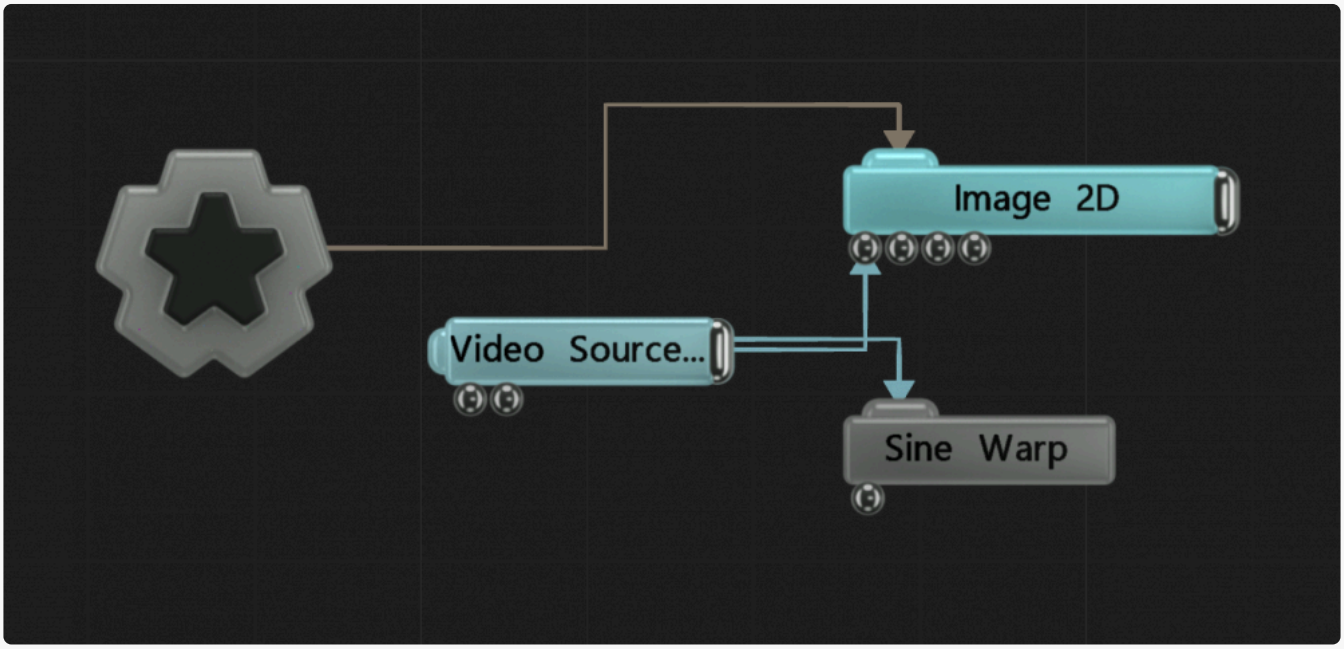
Sine Warp

Method

This node warps an image with a ripple emanating from the centre of the screen.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Sine Major Scale Axis	Change the peak value for the major axis of the sine wave.
Sine Minor Scale Axis	Change the peak value for the minor axis of the sine wave.
Displacement Amount	How much the warp effect displaces the image.
Noise Amount	how much is applied to the warp.
Falloff Range	The range at which the effect works.
Max Displacement	Maximum amount the image can be displaced.
Animation Rate	Change the rate at which the sine wave is animated.
Update Time Mode	How the effect updates with relation to the time code. • Locked To Timecode, The effect is locked to the time code and the same time on the time code will always yield the same image output. • Running / Looping, The effect is disconnected from the time code and will loop seamlessly at the end of the layer. This also means that animated speed values will change smoothly.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Falloff Node	Add a gradient that controls how far the effect affects the image.	Gradient 2D
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

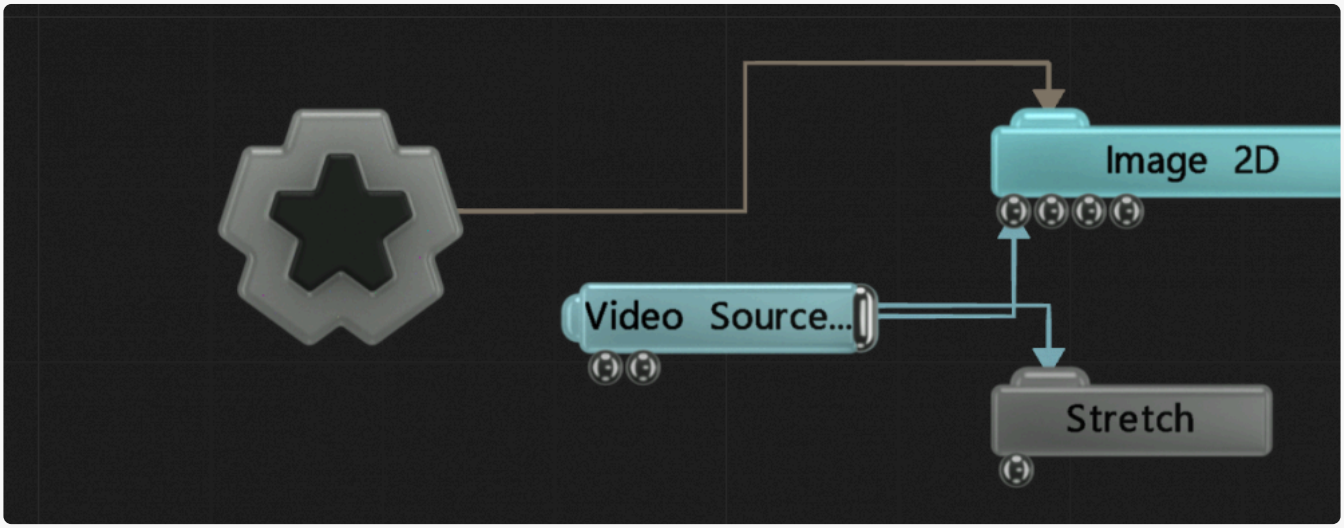
There are no outputs from this node.

Stretch

Method

Stretches a cross section of the image.

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode	Change how the generated effect blends with the parent image RGB.

(RGB)	
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Amount	How strong an effect will be applied to the image.
Position	Move the position of the stretch
Rotation	Change the rotation of the stretch

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Image Node	Used to alter the shape of the stretch	Image Plane
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

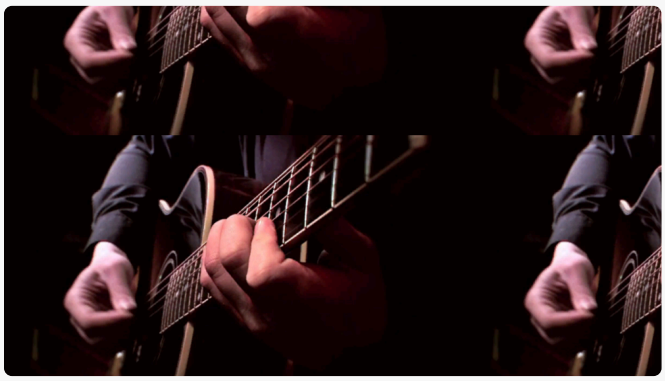
Outputs

There are no outputs from this node.

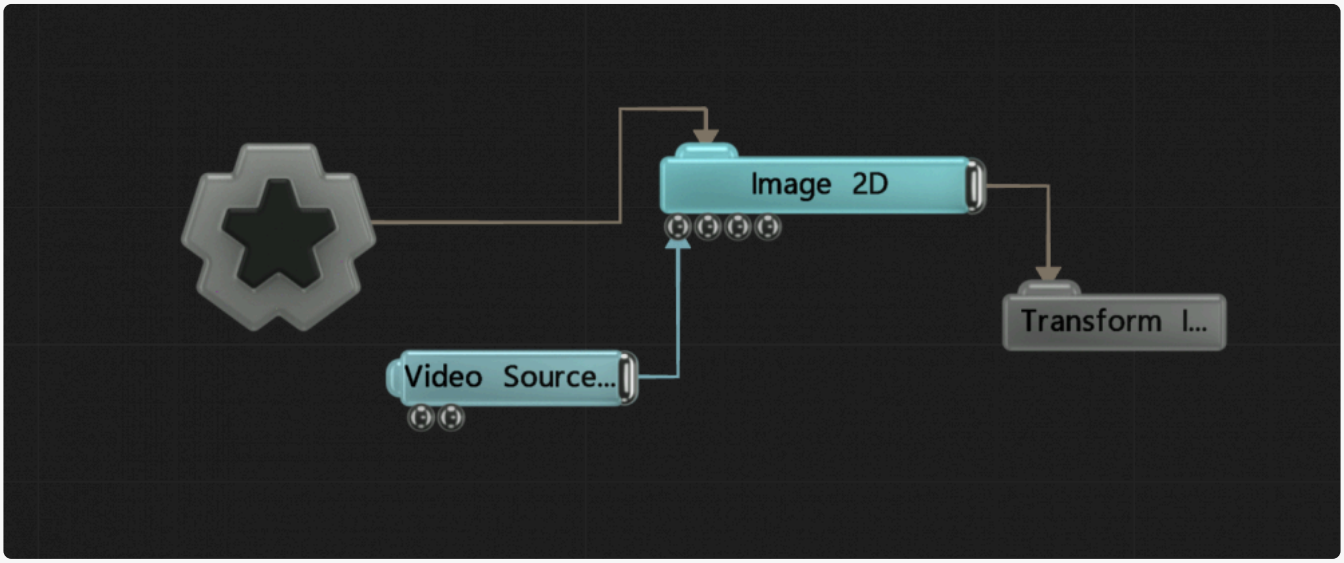
Transform Image

Method

Transform the image.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.

Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Wrap Mode X	Change how the image wraps around the x axis if the transform moves the image off of the output plane. • Clamp – the edges of the image are extended to fill the space left by the transform. • Repeat – the image is repeated until if fills the space left by the transform. • Clip – the image is clipped and the space left by the transform is blank.
Wrap Mode Y	Change how the image wraps around the y axis if the transform moves the image off of the output plane. • Clamp – the edges of the image are extended to fill the space left by the transform. • Repeat – the image is repeated until if fills the space left by the transform. • Clip – the image is clipped and the space left by the transform is blank.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Rotation	The rotation of the image.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

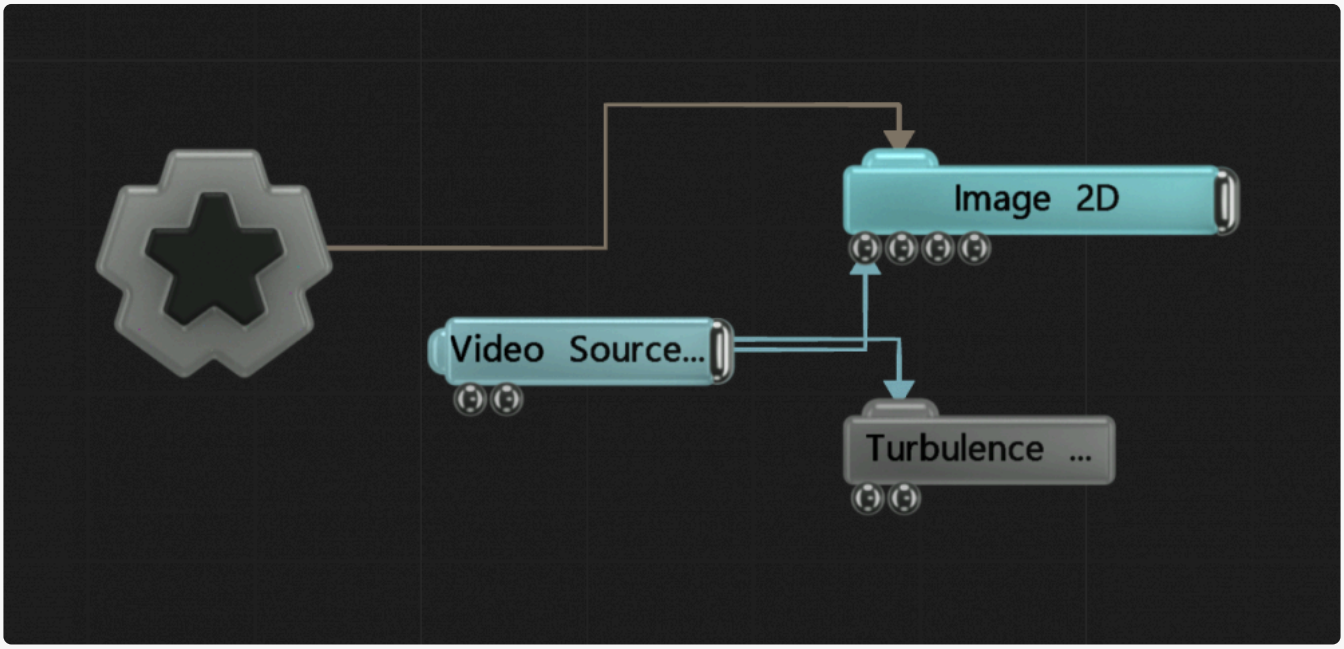
Turbulence Warp

Method

This node warps an image with a ripple emanating from the centre of the screen.

Raw texture	Processed texture

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.

Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Displacement Amount	How much the warp effect displaces the image.
Noise Scale	Scale the size of any noise generated.
Lacunarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Falloff Range	Limit the range from which the warp falls off an becomes ineffective.
Animation Rate	Control the speed at which the noise is animated.
Update Time Mode	How the effect updates with relation to the time code. • Locked To Timecode, The effect is locked to the time code and the same time on the time code will always yield the same image output. • Running / Looping, The effect is disconnected from the time code and will loop seamlessly at the end of the layer. This also means that animated speed values will change smoothly.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Falloff Node	Add a gradient that controls how far the effect affects the image.	Gradient 2D
Mask Image	An area which is not affected by the warp effect.	Image Plane
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

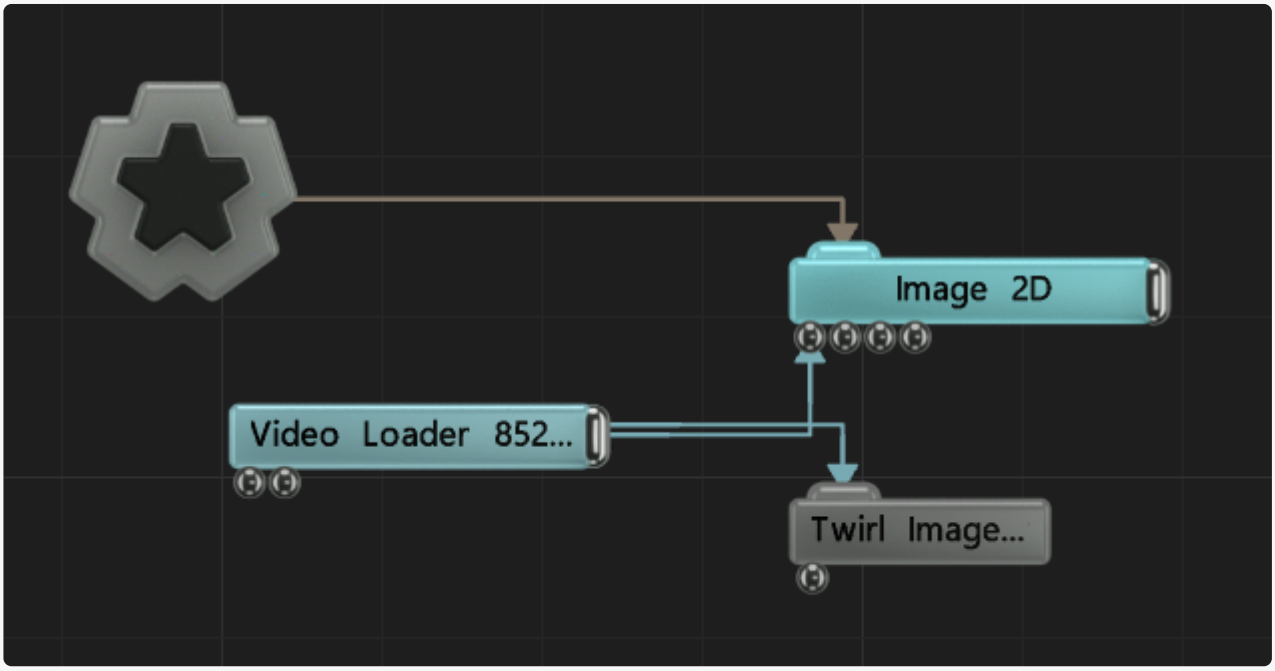
There are no outputs from this node.

Twirl Image Warp

Method

Warps the image in a twist around the images center..

Raw texture	Processed texture

Example Nodegraph


Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering

	must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Radial Scale	Change how much warping is applied to the image.
Angle Offset	Change the initial rotated angle off the image before warping is applied.
Centre X/Y	Change the centre of rotation for the image.

Affected Channels

Toggle which of the RGBA channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Mask Image	An area which is not affected by the warp effect.	Image Plane
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

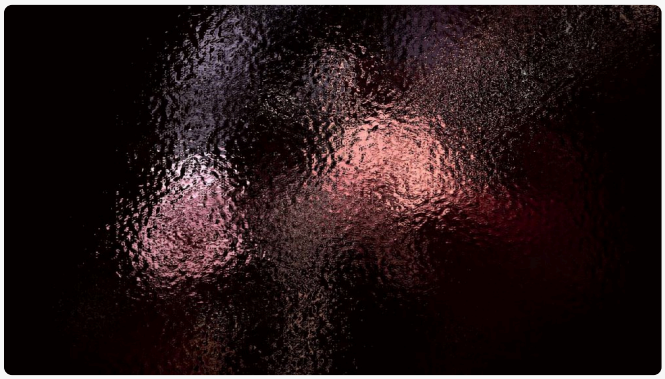
Outputs

There are no outputs from this node.

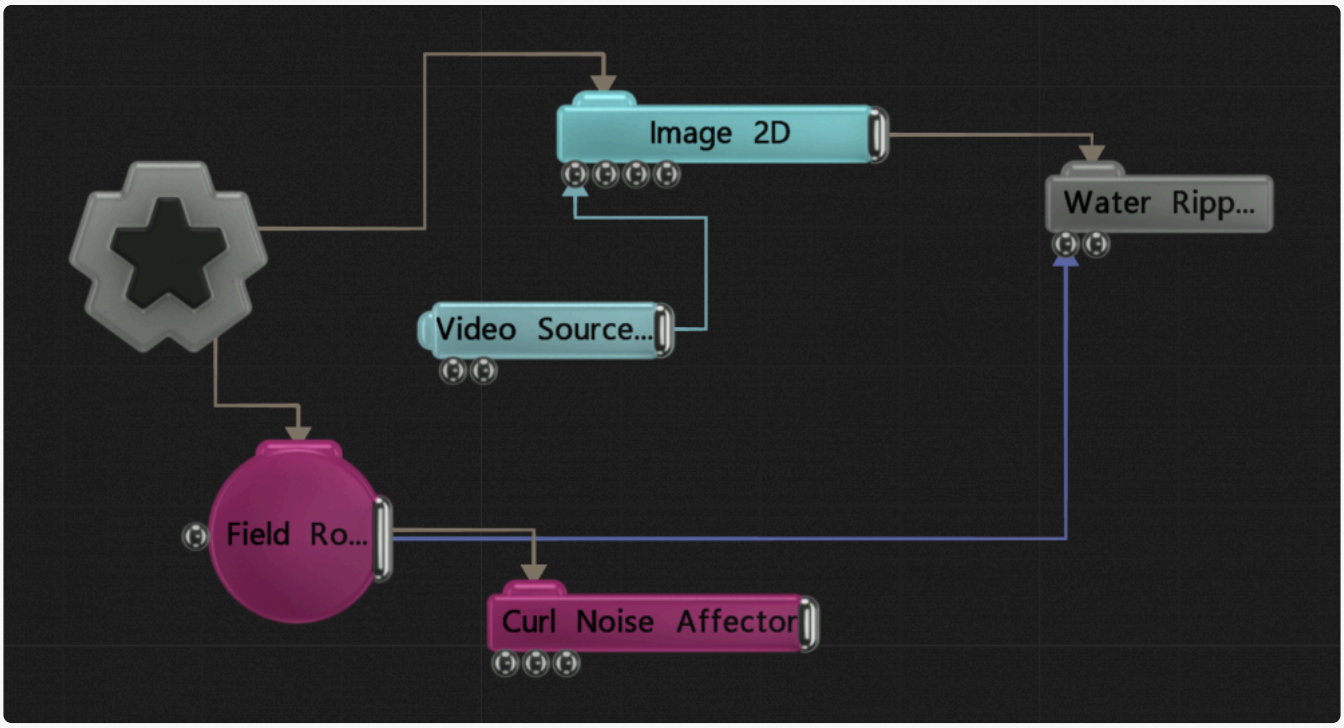
Water Ripples

Method

This node simulates water movements across an image based on an input field using a spring-based water solver.

Raw texture	Processed texture
	

Example Nodegraph



Attributes

Name	Description
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.
Blend Amount	Changes the opacity of the new effect over the original image.
Blend Mode (RGB)	Change how the generated effect blends with the parent image RGB.
Blend Mode (Alpha)	Change how the generated effect blends with the parent image alpha.
Simulation Speed	Control the speed at which the warp is animated.
Speed	The speed of the ripples as the move over the image.
Length	The distance between springs. Larger values make the ripples move faster.
Displacement Scale	Scale the displacement the water ripples simulate.
Velocity Dampening	Controls how much the velocities are dampened over time.
Brightness	Controls the brightness of the ripple displacements composited over the image so they can be seen, giving a lighting effect.
Trigger Source Channel	Choose what triggers and affects ripples.
Simulation Width	The width of the grid used for the simulation, in cells.
Simulation Height	The height of the grid used for the simulation, in cells.

Affect Channels

Select which of the RGBA colour channels are affected by the effect.

Inputs

Name	Description	Typical Node Input
Source Field	Input a field root node to affect the image.	Field Root
Collision Image	Adds further locations for the ripples to collide with.	Image Plane
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred	Envelope

	rendering must be on.	Modifier

Outputs

There are no outputs from this node.

Notes

> ! The processed texture above has been altered from default to show the kind of effect you can get with this node. By default, no change will be made to the node until you input a source.

Procedural

Method

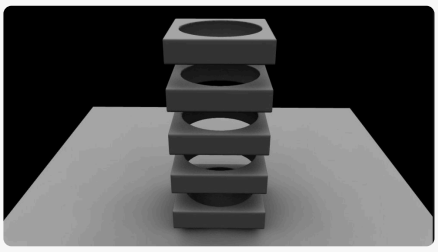
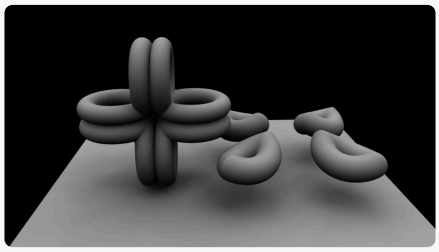
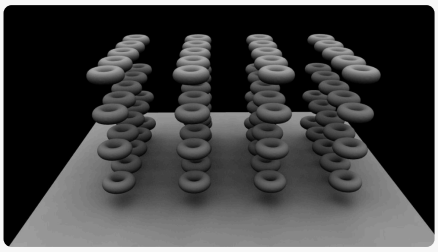
In Notch a procedural is a 3-dimensional field of signed distances. This is often known as a Signed Distance Field. An SDF alone does not represent geometry, but surfaces and volumes can be extracted from the field and rendered conventionally. Notch provides procedural rendering nodes to perform this extraction and rendering. For this extraction to work most efficiently, the SDF must be well-formed and devoid of extreme distortions. Some rendering nodes such as Procedural Meshing provide an Error Tolerance which relaxes this restriction at the cost of increased computation.

The following node categories are available for working with procedurals:

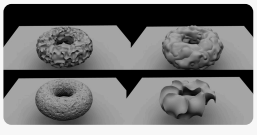
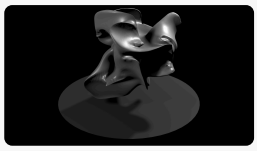
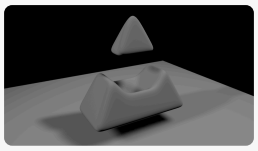
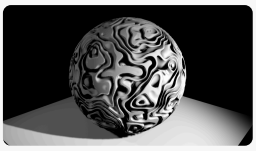
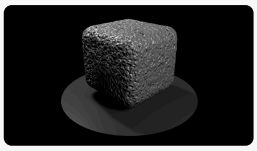
- Procedural Root, Root node from which the procedural system is linked out from.
- Cloning, Repeat their child systems in various ways.
- Displacement, Displace and modify the generated SDFs.
- Generators, Generate SDFs using Particles, Meshes, Images, Etc.
- Render Nodes, Change how the generated SDF is rendered in the scene.
- Texturing, Change how a texture is applied to the material.

Gallery

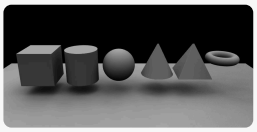
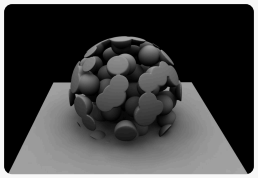
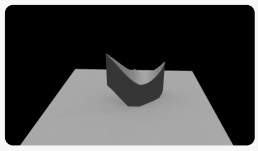
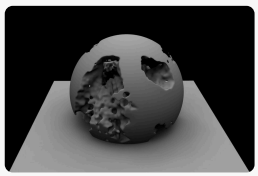
Cloning

		
Clone	Mirror	Repeat

Displacement

				
FBM Displacement	Fluid Affector	Melt	Onion	Pyroclastic Displacement

Generators

				
3D Object	3D Primitive	Cellular Noise	Editable Code	Fractal Noise

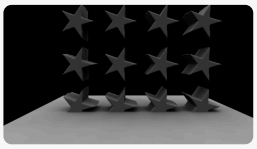
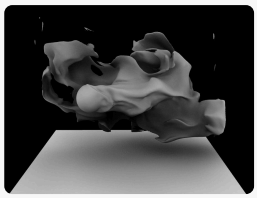
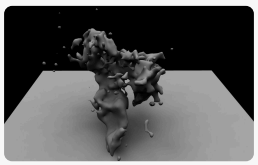
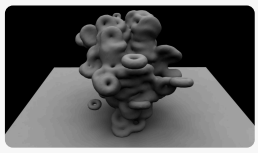
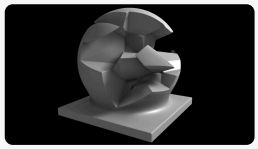
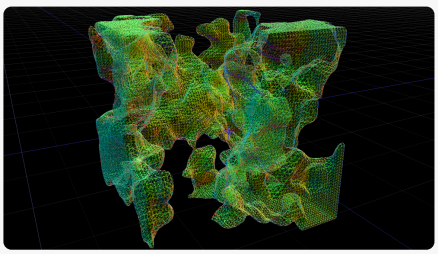
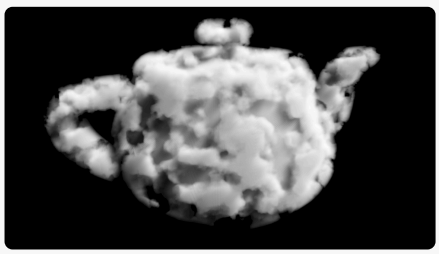

				

Image	Level Set	Particles	Particles As Primitives	Voronoi

Render Nodes

		
Procedural Meshing	Procedural Shading Node	Volume Generator

Texturing

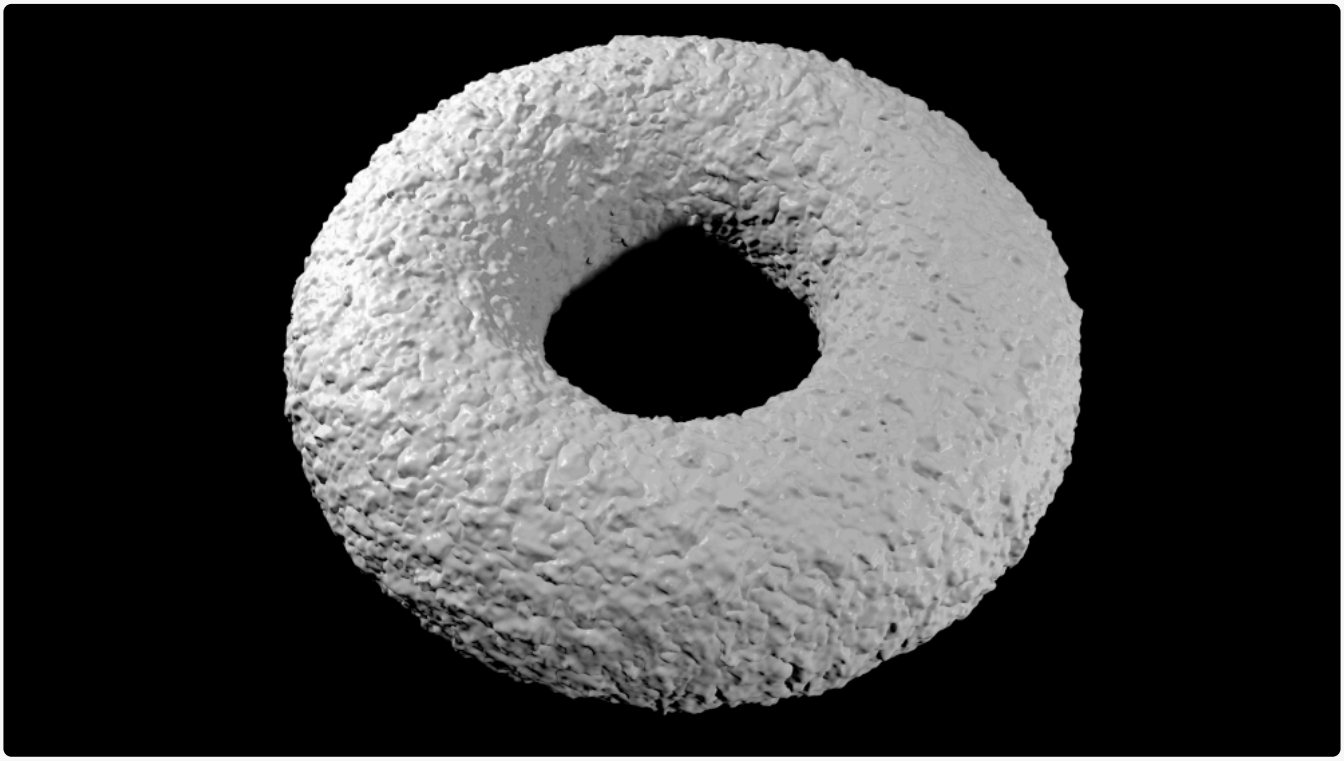
Meshing Texture Map

Procedural Root

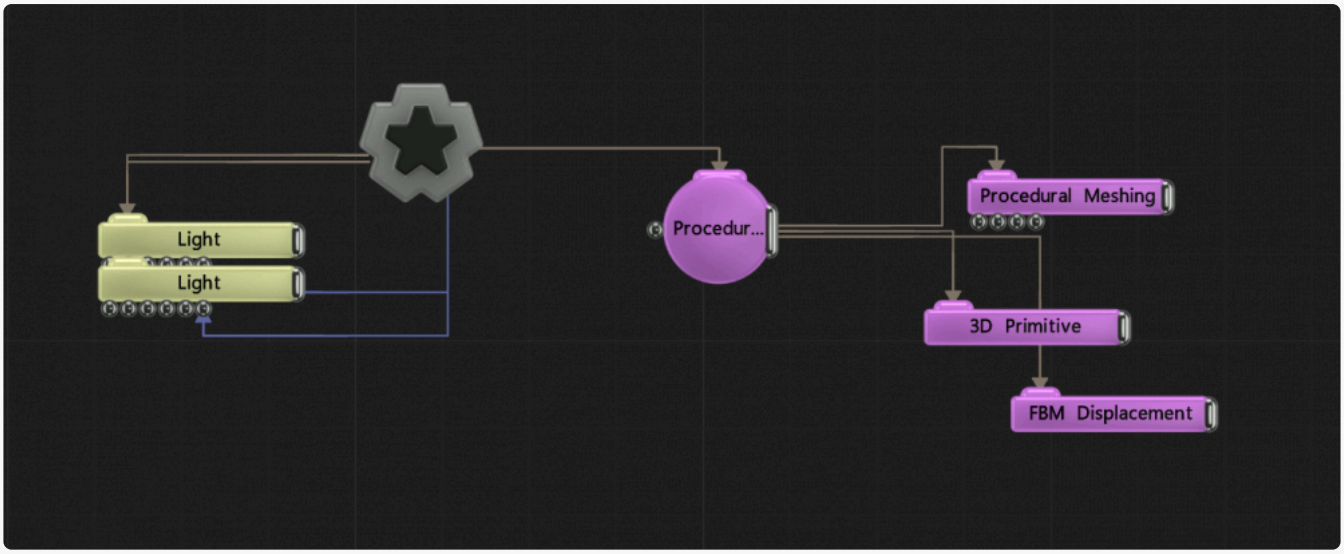
Method

This node is the root and container for every procedurals system. Procedural Generators, Procedural Cloners and Procedural Rendering nodes must be parented to this node directly or indirectly in order to be operational.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Inputs

Name	Description	Typical Node Input
Bounding Box	The region that the connected rendering nodes will fall back to when they don't have bounding boxes of their own.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null

Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

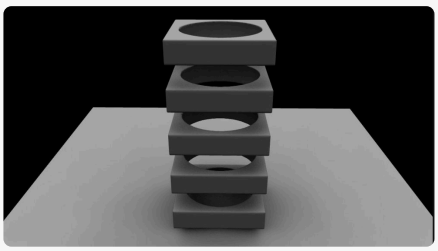
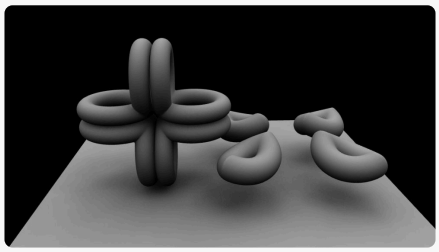
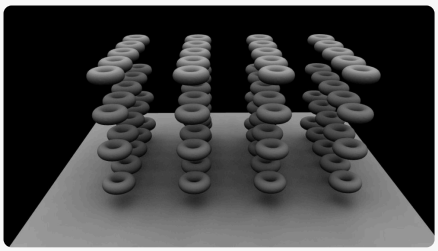
This node is the root of procedural systems, so all procedural nodes should eventually link back to this node.

Cloning

Method

These nodes clone the generators used in a procedural mesh, creating repeating patterns similar to Cloner Systems.

Gallery

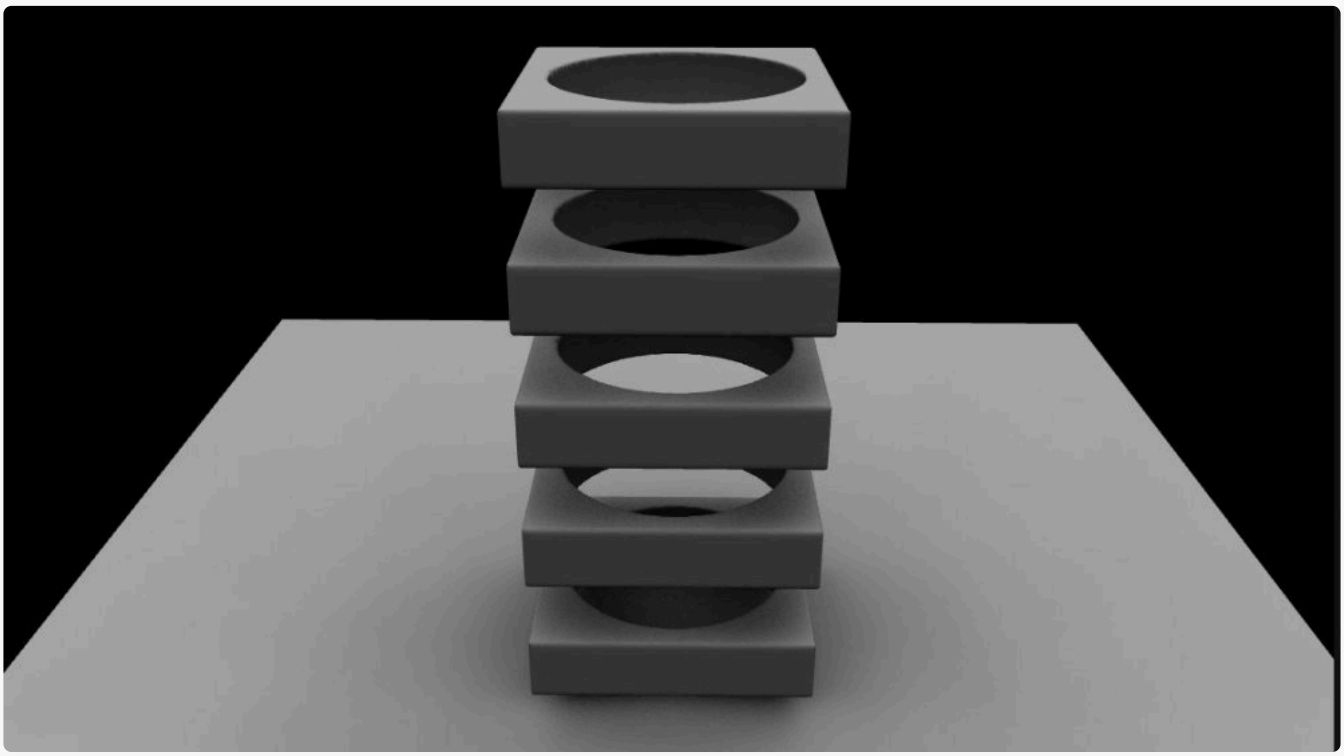
		
Clone	Mirror	Repeat

Clone

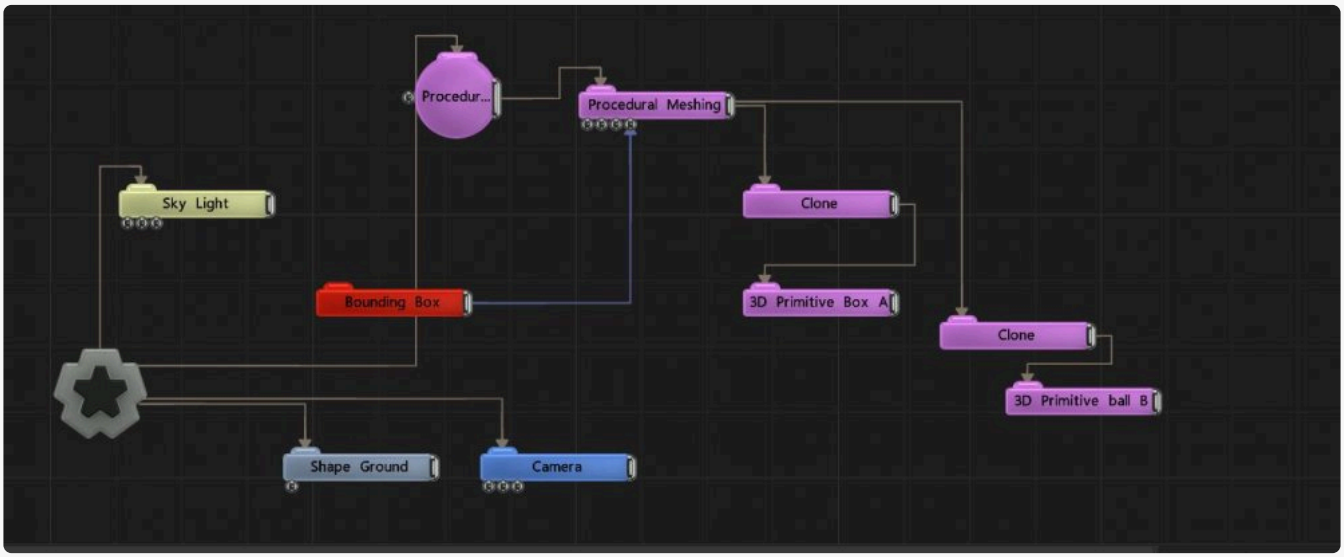
Method

Makes copies of its children.

Example



Example Nodegraph



Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Clone Count	The number of clones to produce.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.

CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled (No Time Bars)	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

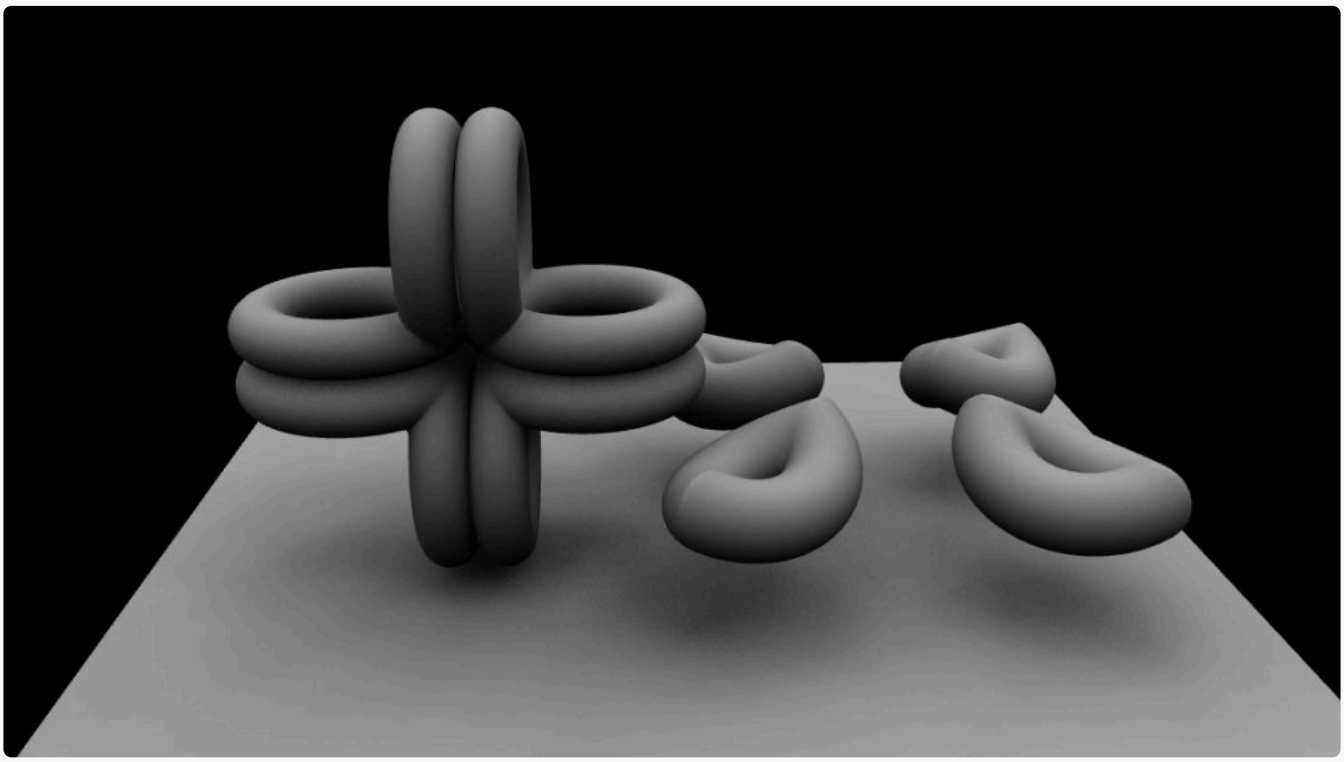
There are no outputs from this node.

Mirror

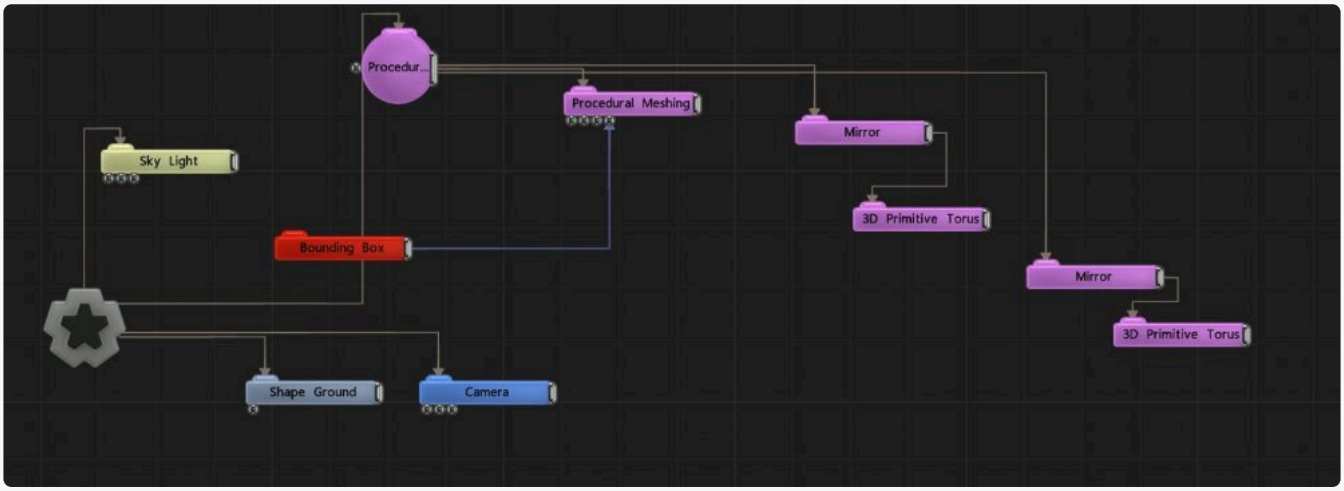
Method

Effectively folds its children on to themselves over a specific plane of reflection.

Example



Example Nodegraph



Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Mirror Mode	Select which Axis along which to mirror the Procedurals. • Octant means the procedurals will be mirrored along diagonals aswell, • Radial means the clones will be repeated a set number of times radially, defined by the Count attribute.
Mirror Offset X/Y/Z	Offsets the X/Y/Z coordinate of the mirror's position.
Count	Number of shapes to be generated when in radial mode.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight.

	• Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled (No Time Bars)	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

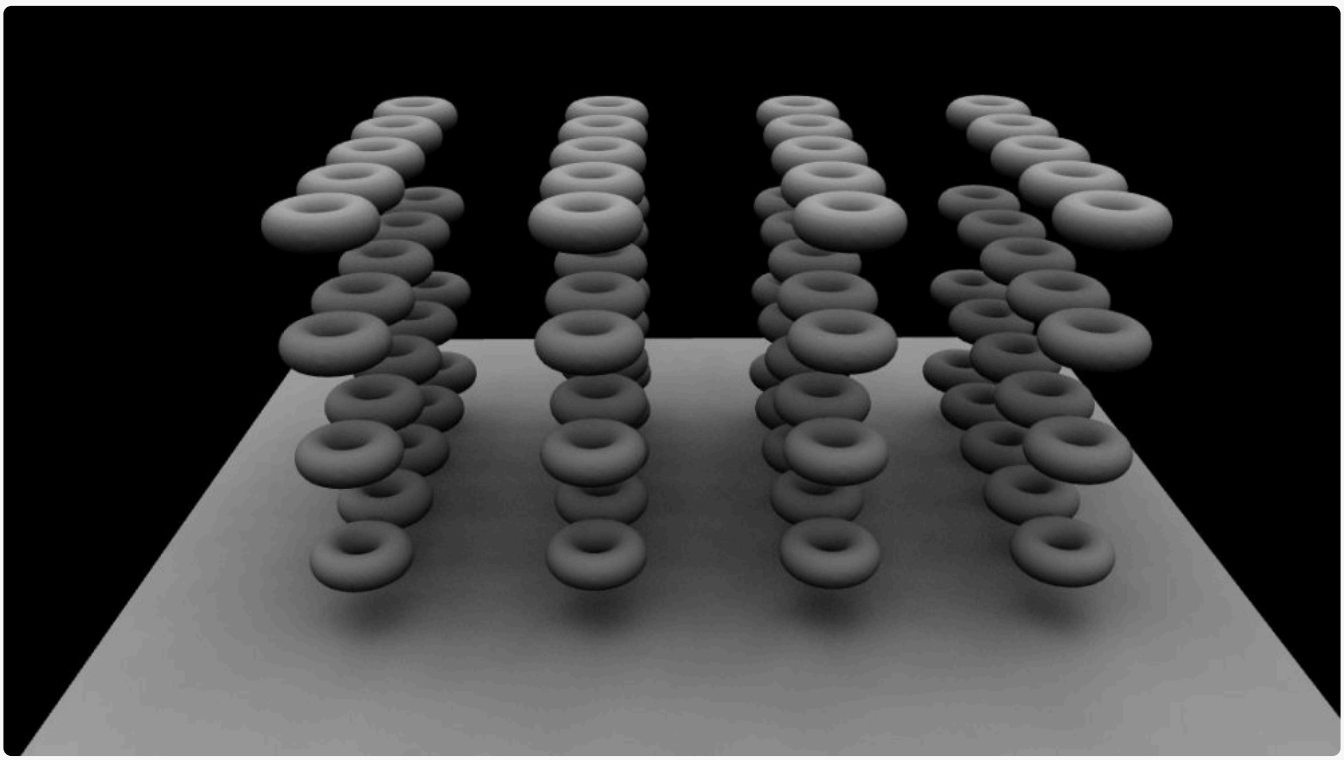
There are no outputs from this node.

Repeat

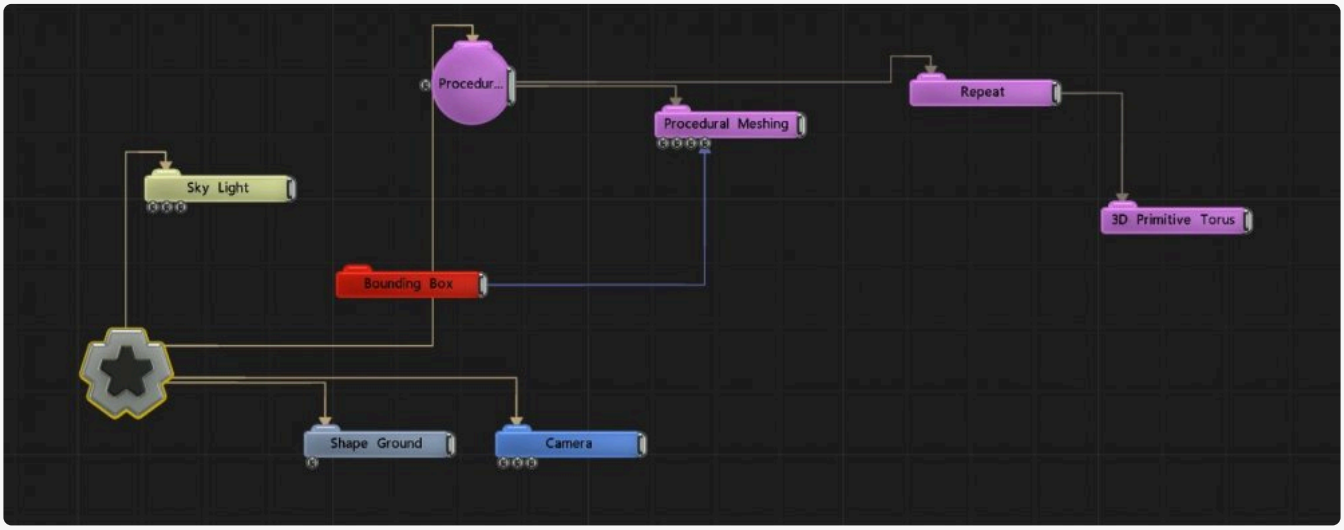
Method

Spatially replicates its children. This is a spatial operation, so the number of copies is potentially infinite.

Example



Example Nodegraph



Example Project

Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.

Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.
Repeat Mode	Selects the axis along which to repeat the procedural.
Repeat Positive Direction Only	Only repeat clones in the positive axes.
Limit Repeat Count	Uses the Repeat Count X/Y/Z to limit the child generators.
Repeat Spacing X/Y/Z	The distance each of the clones is spaced out along each axis.
Repeat Count X/Y/Z	The number of clones repeated along each axis.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

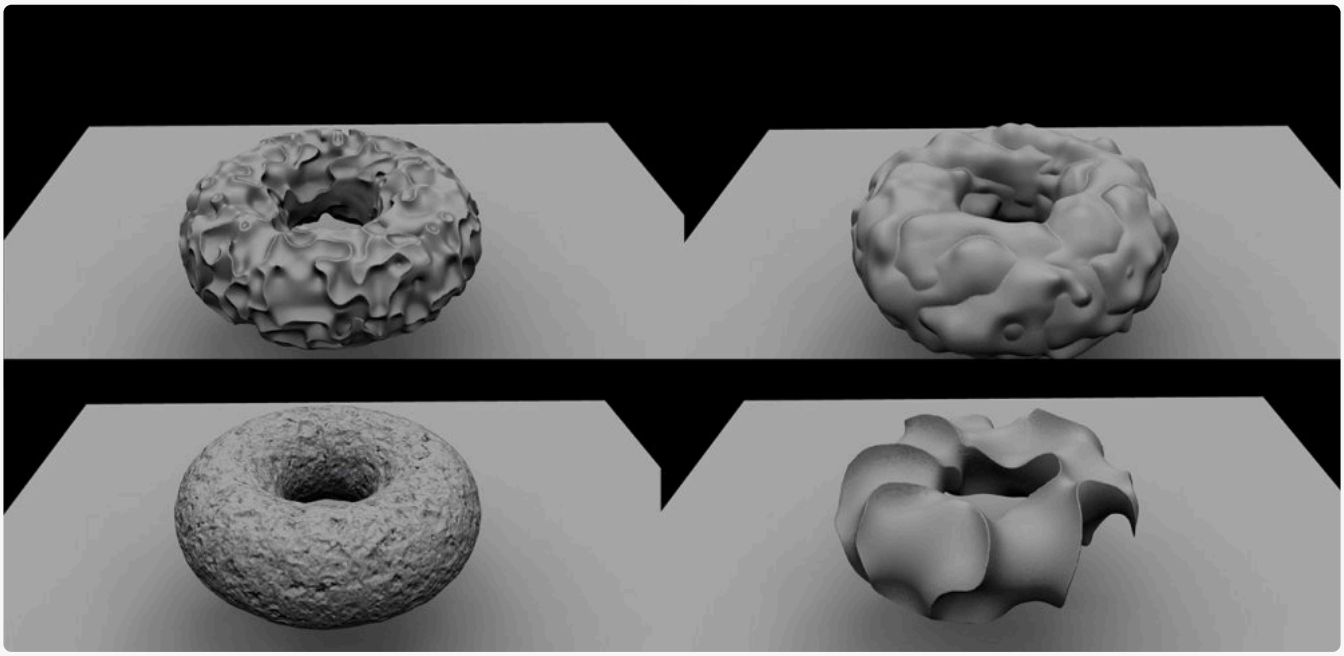
Outputs

There are no outputs from this node.

Displacement

These nodes apply spatial displacements in a procedural. In contrast to mesh deformers they deform space rather than vertices.

Gallery



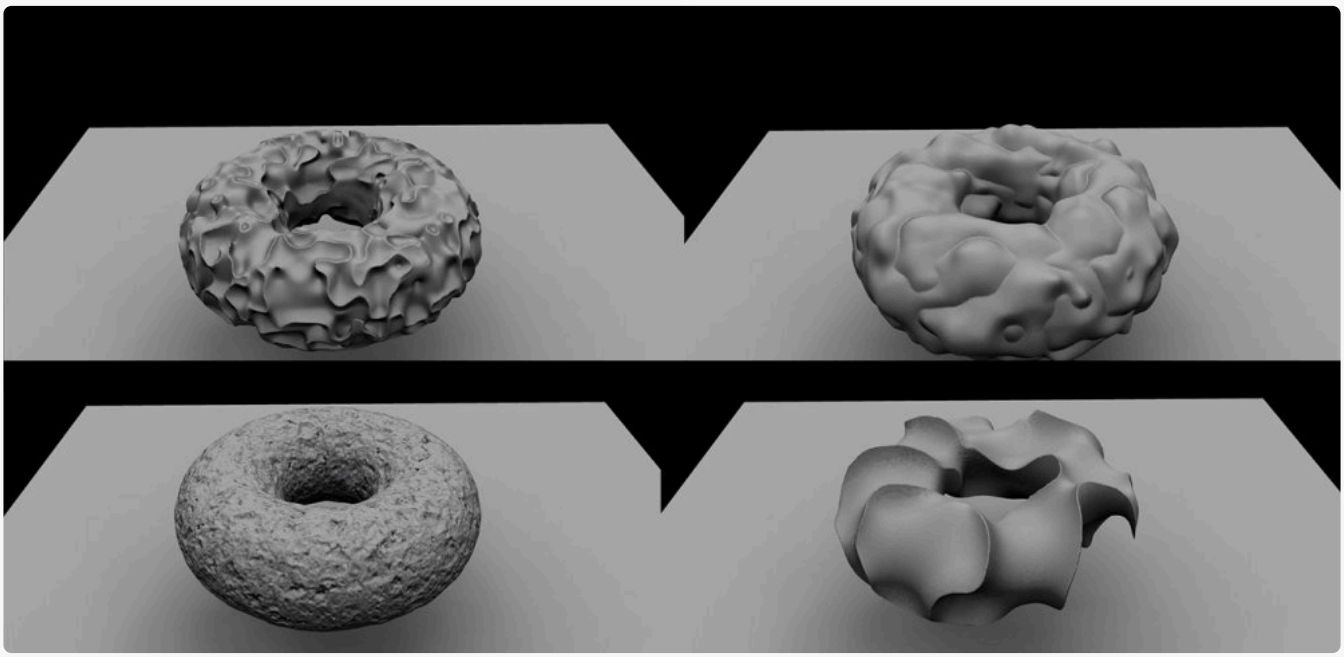
FBM Displacement

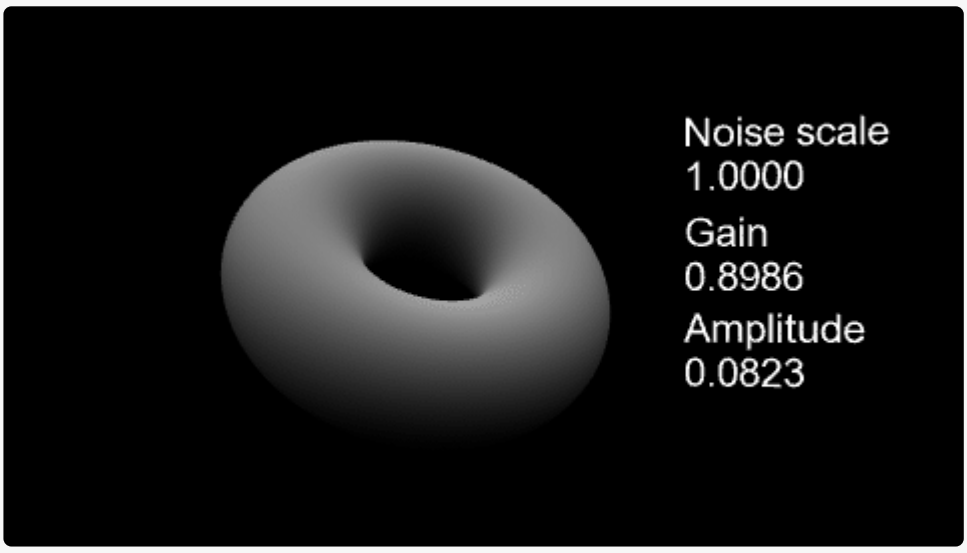
FBM Displacement

Method

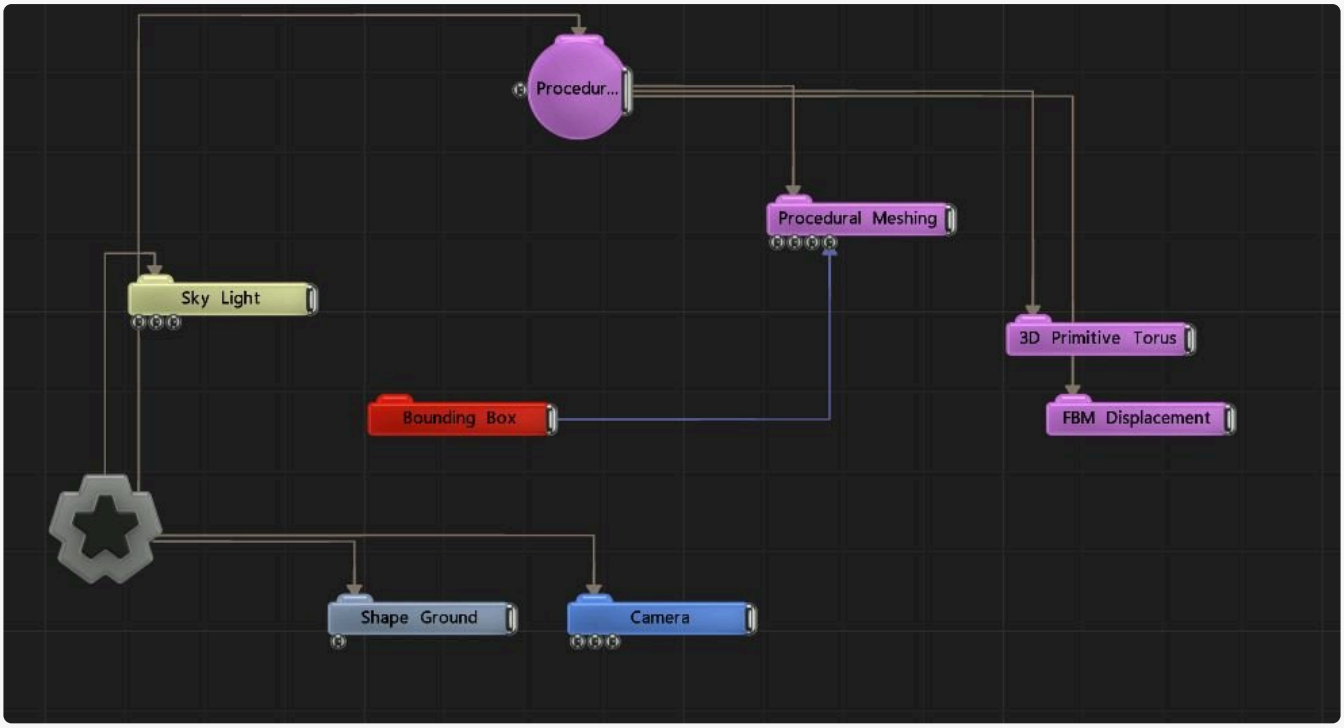
This node applies an FBM (Fractal Brownian Motion) deformation to the procedural.

Example





Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description

Num Octaves	How many time the noise generation is iterated.
Noise Scale	Scale the size of any noise generated.
Amplitude	How greatly the generated noise adds to the distance field.
Lacunarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Colour 0	If the renderer in the procedural network produces colour then this colour will be used for the displaced shape.
Colour 1	If the renderer in the procedural network produces colour then this colour will be used for the displaced shape.
Apply Mode	How the displacement will be applied to the distance field. • Add, add to the current distance field. • Subtract, subtract from the distance field. • Add Signed, only add to the distance field when the FBM displacement is positive.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

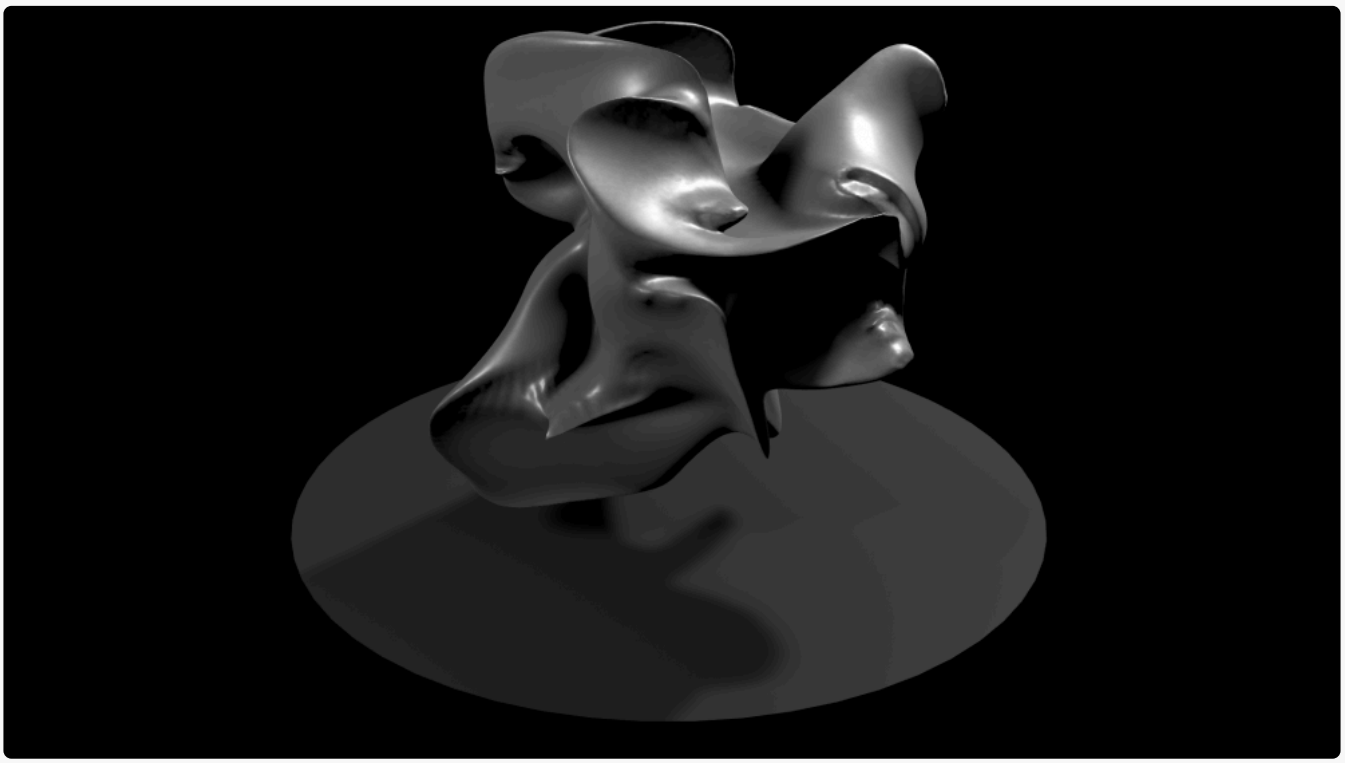
There are no outputs from this node.

Fluid Affector

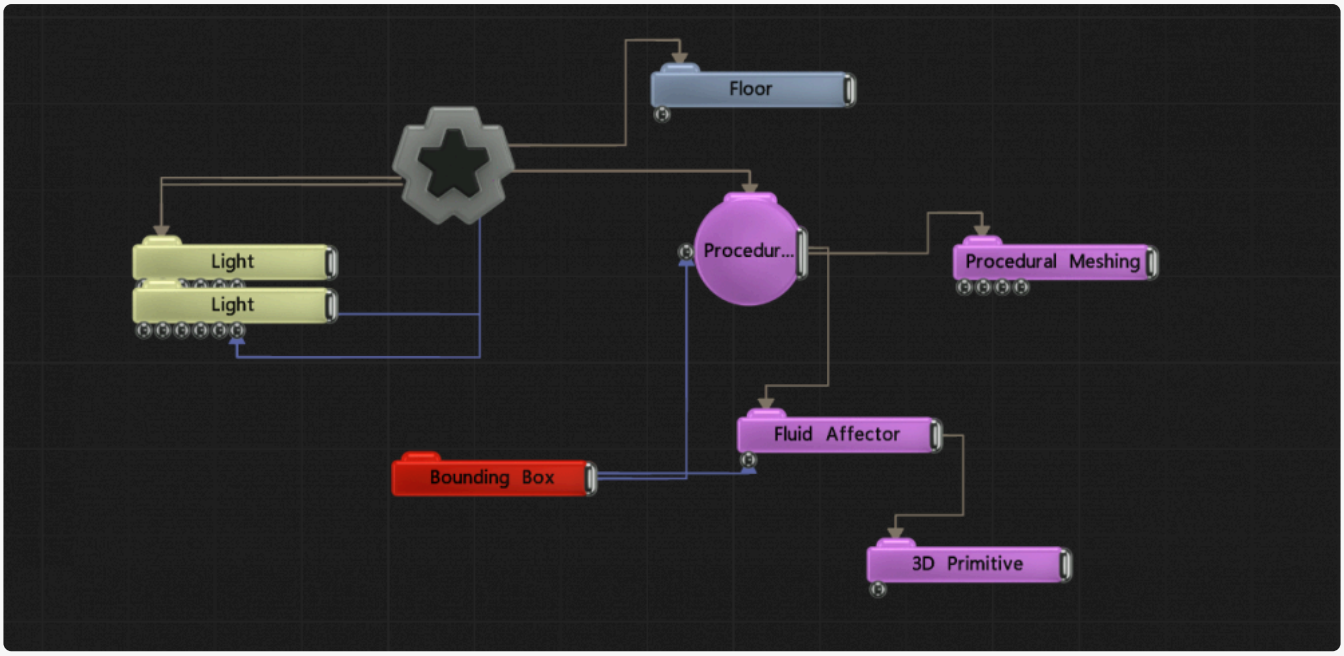
Method

Applies a fluid simulation as a deformation on a procedural.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Fluid Simulation Speed	The speed of the fluid simulation
Curl Noise Amount	The amplitude of the noise pattern when using Solver Mode is set to Curl Noise

Noise Size	The scale of the noise pattern when using Solver Mode is set to Curl Noise
Solver Mode	The type of fluid simulation to perform. • Solver, This feature is in development. • Curl Noise, Uses an internal noise pattern to drive the fluid motion.
Grid Width/Height/Depth	The resolution of the solver's simulation grid.

Inputs

Name	Description	Typical Node Input
Bounding Box	The region within which to perform the fluid simulation.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

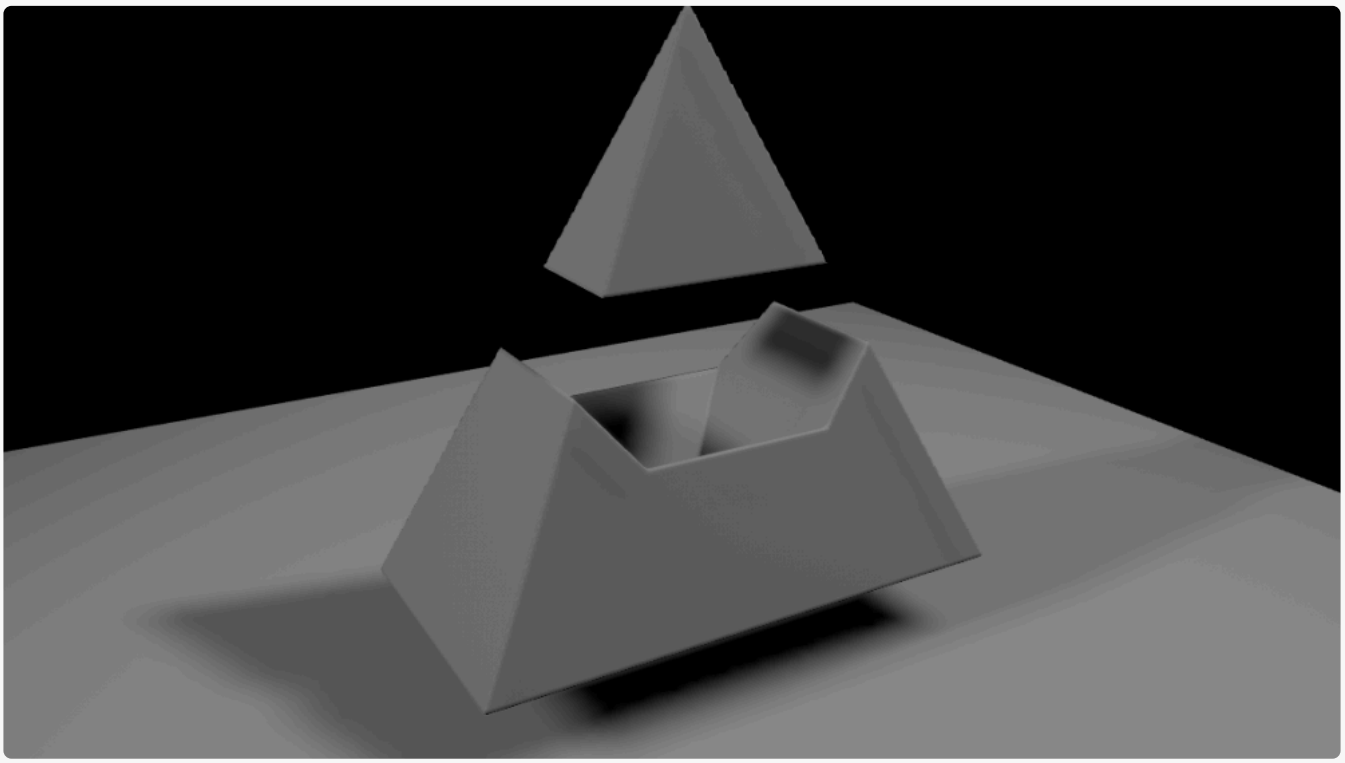
There are no outputs from this node.

Melt

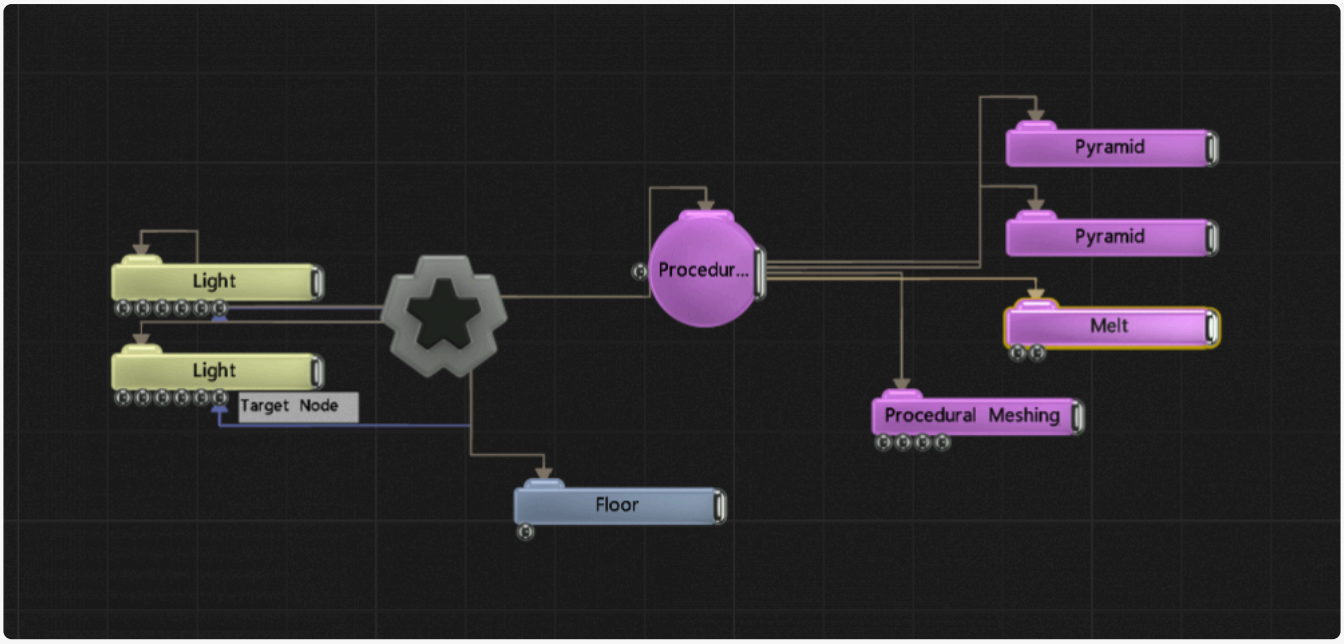
Method

Smoothens the shape a procedural in 3D space, much like how a blur smoothens an image in 2D space.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Distance Offset	Offsets the distance field values, causing the generated distance field to expand of contract.

CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
Filled Mode	Thickness of the Shell wall, when Filled Mode is set to Shell.
Shell Thickness	Thickness of the Shell wall, when Filled Mode is set to Shell.
Grid Width/ Height/ Depth	Size of the SDF Grid used for generating this effect.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.
Iterations	How many iterations of the melft function are run.
Error Tolerance	Expands the allowable values for generating the Distance Field. Higher values often get rid of jagged edges and odd rendering behaviours, but with decreased performance.
Use Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

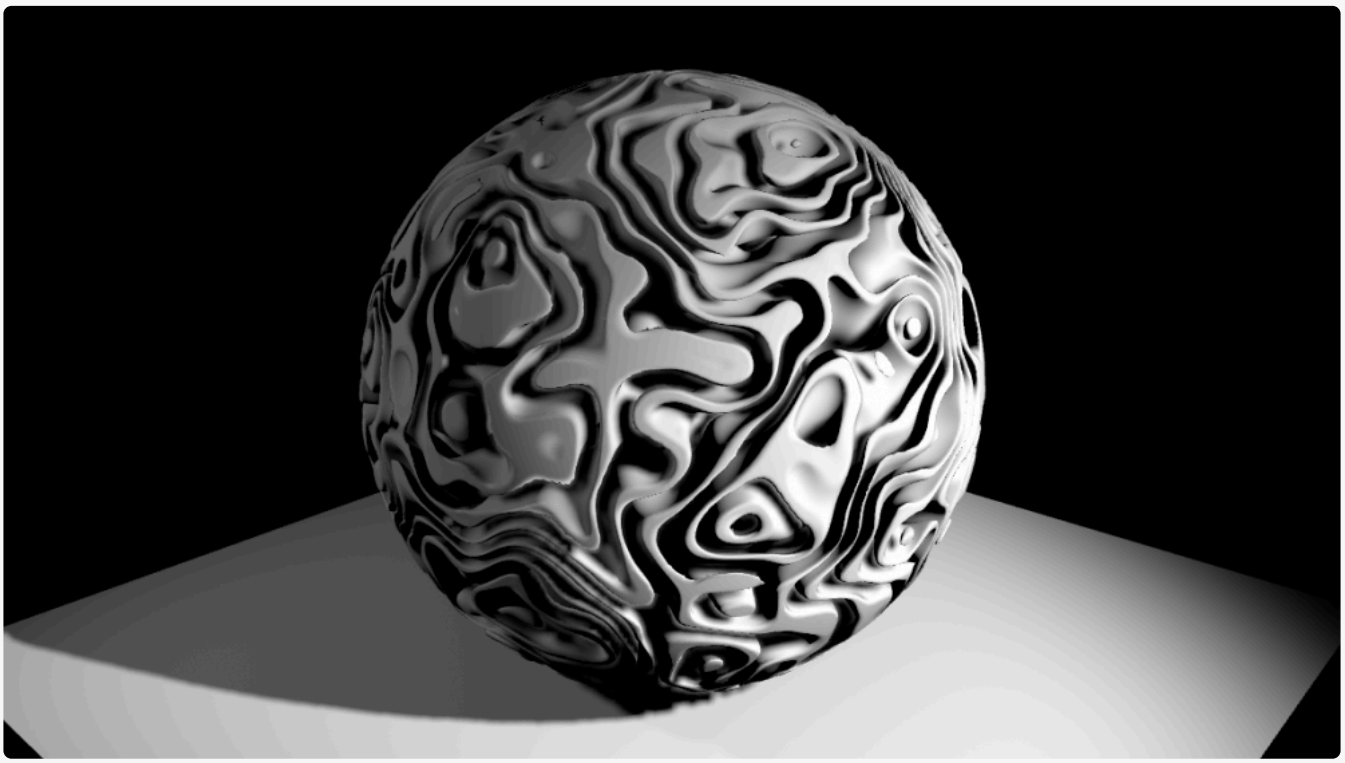
There are no outputs from this node.

Onion

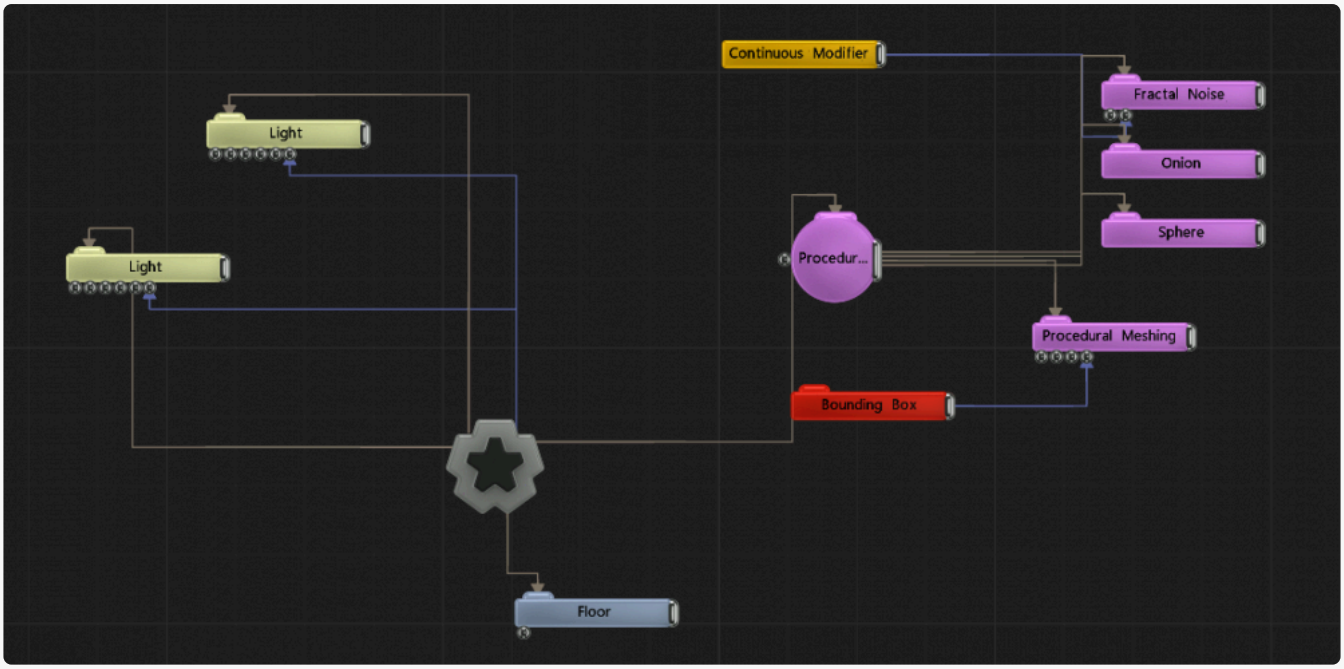
Method

Creates layers of surfaces on the inside or the outside a procedural.

Example



Example Nodegraph



Attributes

Name	Description
Scale	Controls the number of layers produced.
Mode	• Inner, Only produce layers on the inside volume of a procedural. • Inner And Outer, Produce layers on the inside and the outside volume.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

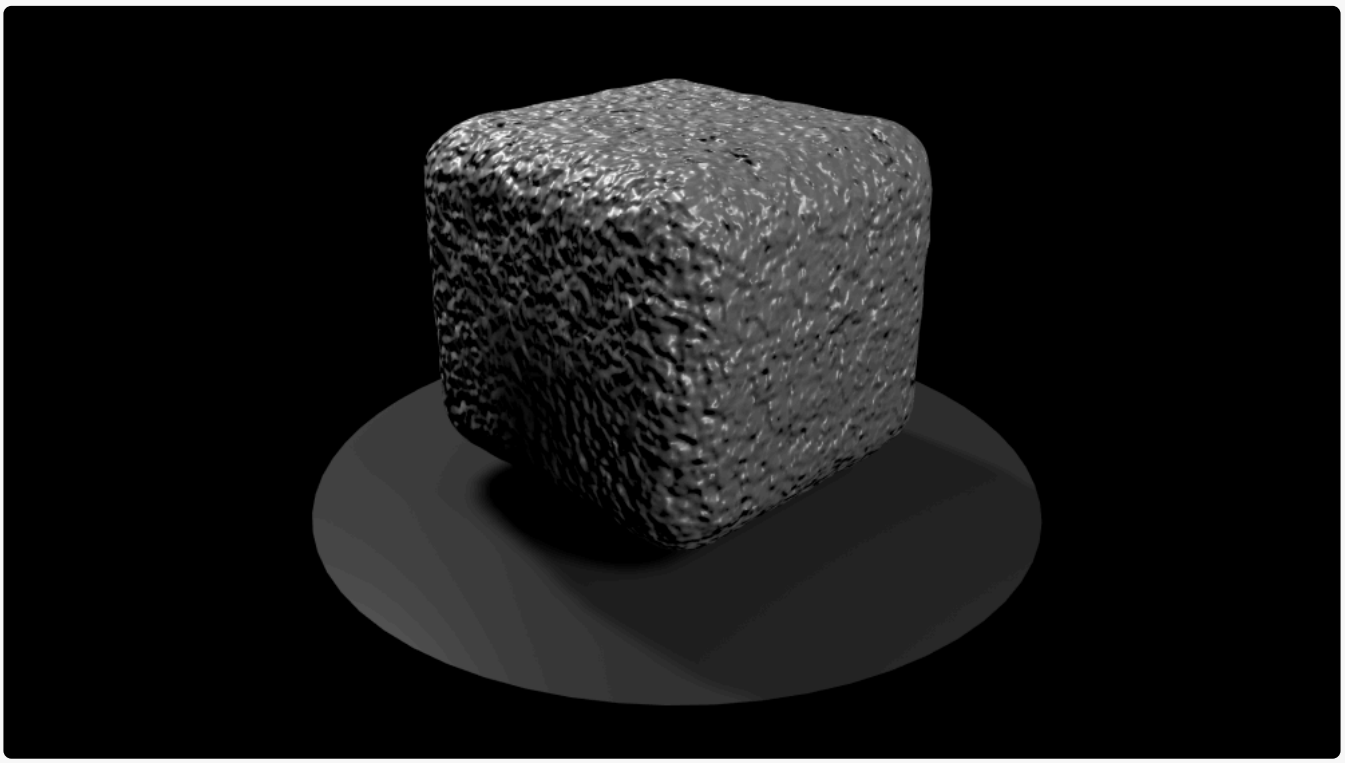
There are no outputs from this node.

Pyroclastic Displacement

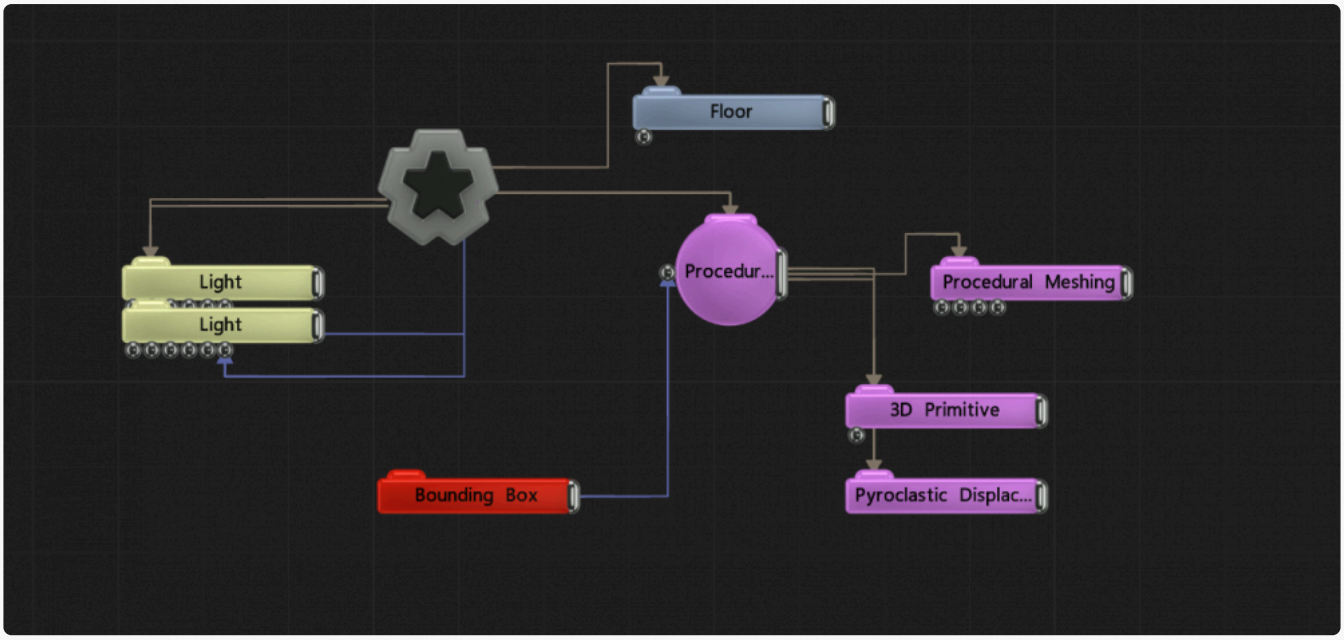
Method

Applies a noise-based deformation to a procedural. The noise is form of a dense fusion of blobs.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Num Octaves	How many octaves of noise are generated.
Noise Scale	Size of the noise generated.

Amplitude	How greatly the generated noise displaces the distance field.
Blob Size	Controls the overall ‘blobiness’ of the displacement.
Animation Rate	When not zero, this property will control how fast the noise animates.
Colour 0	If the renderer of the procedural generates colours, then this colour will be used for the deformed shape.
Colour 1	If the renderer of the procedural generates colours, then this colour will be used for the deformed shape.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

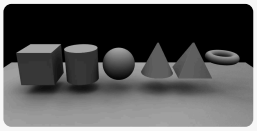
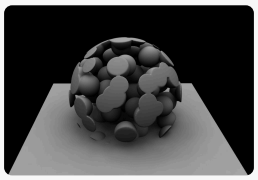
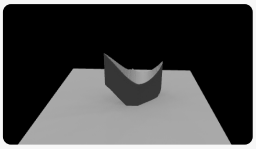
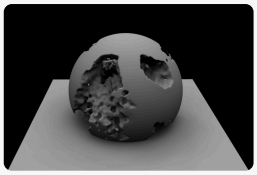
There are no outputs from this node.

Generators

Method

These nodes serve the purpose of generating a distance field for use in a procedural. Usually, the starting point in the process of creating a procedural surface or volume is to add one of these nodes.

Gallery

				
3D Object	3D Primitive	Cellular Noise	Editable Code	Fractal Noise

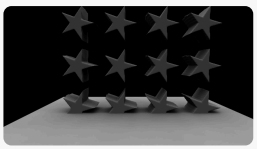
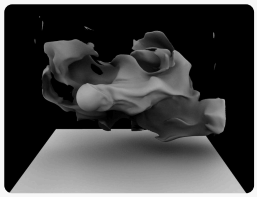
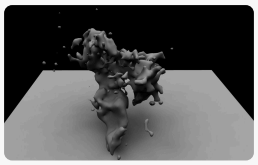
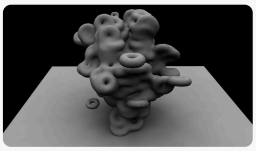
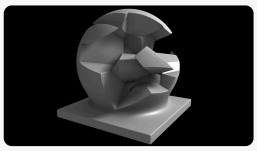

				

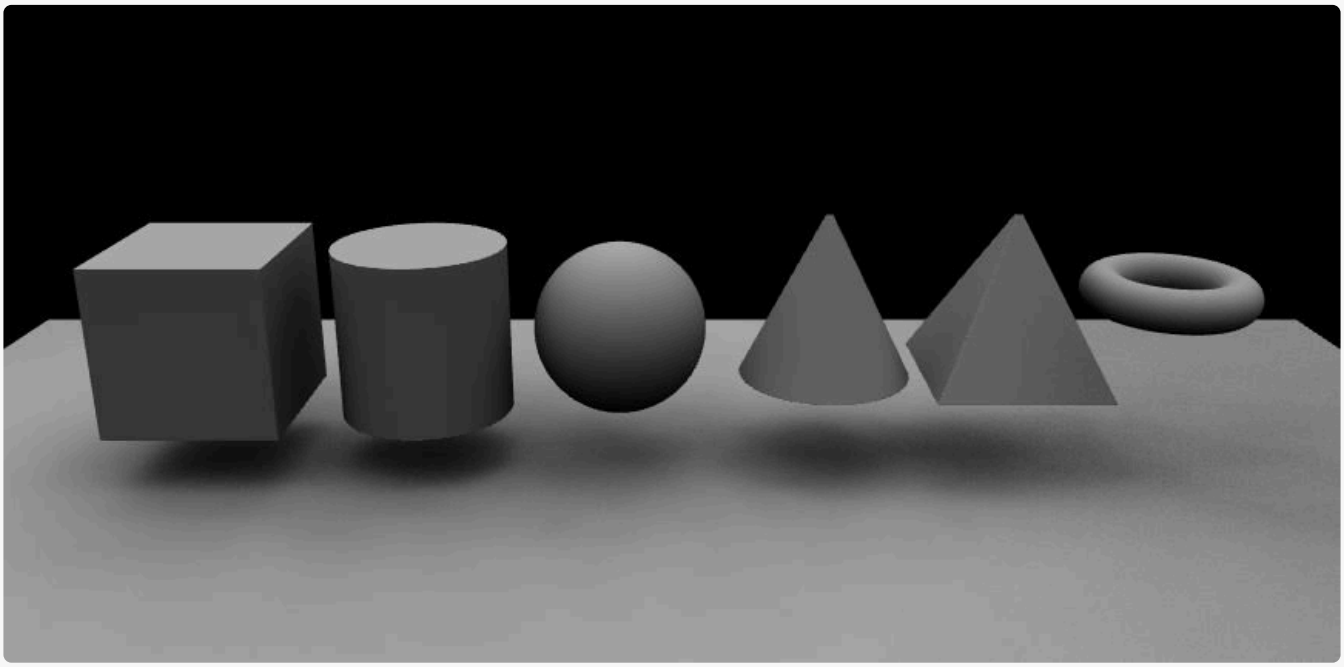
Image	Level Set	Particles	Particles As Primitives	Voronoi

3D Primitive

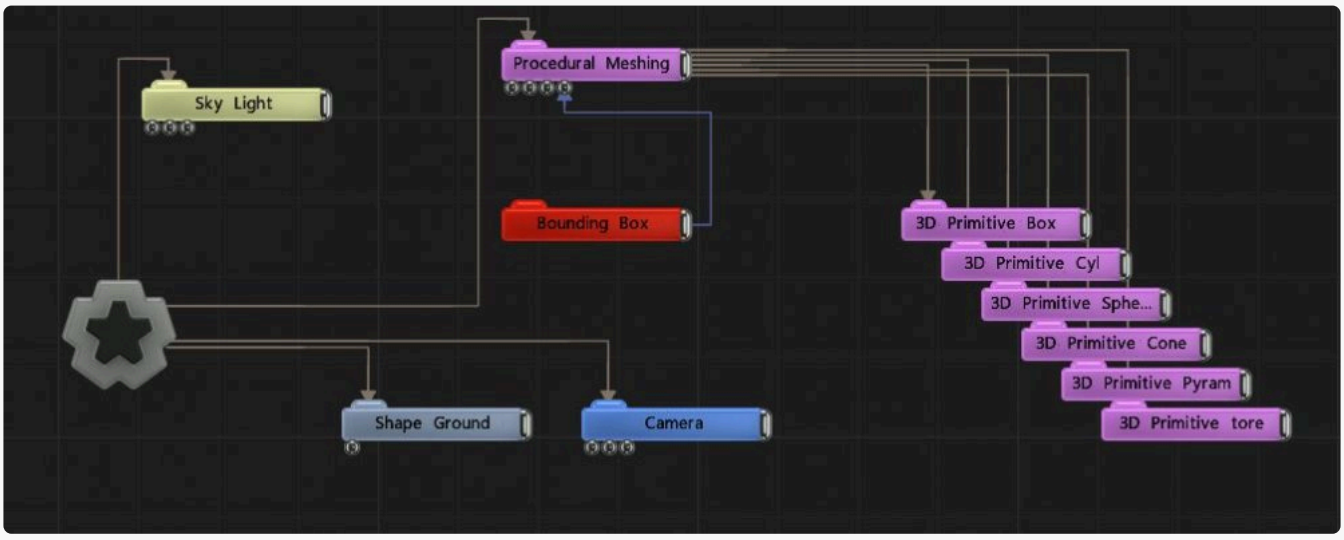
Method

This node renders a 3D primitive only usable with procedural node. The Primitive Type parameter defines the primitive shape used.

Procedural Primitives



Procedural Primitives Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Primitive Type	Select a primitive shape to be generated into the procedural system.
Filled Mode	Thickness of the Shell wall, when Filled Mode is set to Shell.
Shell Thickness	Thickness of the Shell wall, when Filled Mode is set to Shell.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another.

	• Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled (No Time Bars)	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

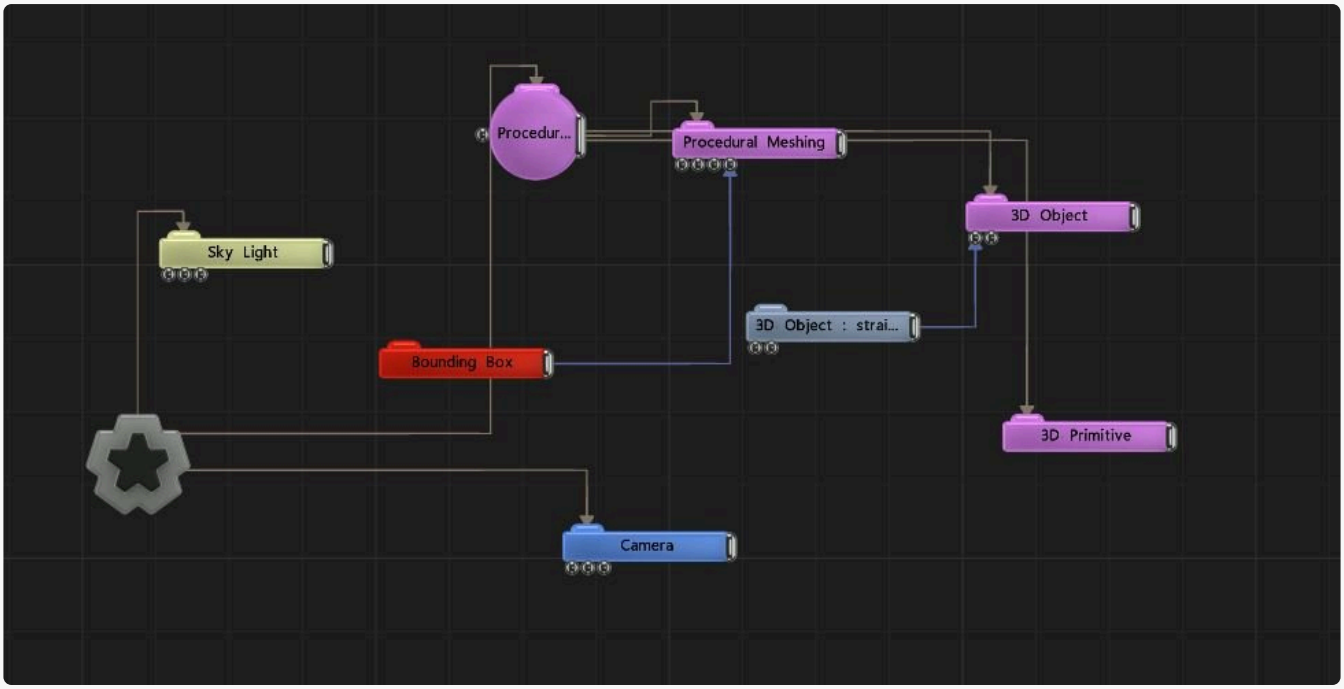
3D Object

Method

Generates a procedural shape from a mesh object.

Example

Example Nodegraph



Attributes

Name	Description
Distance Offset	Offsets the distance field values, causing the generated distance field to expand of contract.
Filled Mode	Thickness of the Shell wall, when Filled Mode is set to Shell.
Shell Thickness	Thickness of the Shell wall, when Filled Mode is set to Shell.
SDF Width/ Height / Depth	Resolution of the distance field.
Generate Colours	Colours are generated for the procedural by sampling the first texture of the material assigned to the input object. This requires Affect Colour to be enabled and for the procedural renderer to support colour generation.
Generate UVs	This feature is in development
Animate SDF	When enabled, the procedural will be re-generated on every frame. Use if the source mesh is animating.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system.

	• Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled (No Time Bars)	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Object Node	Mesh used for the generated procedural.	3D Object
Bounds Override	Usually the mesh object’s bounding box will be used for generating the procedural, but it can be over-ridden here.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

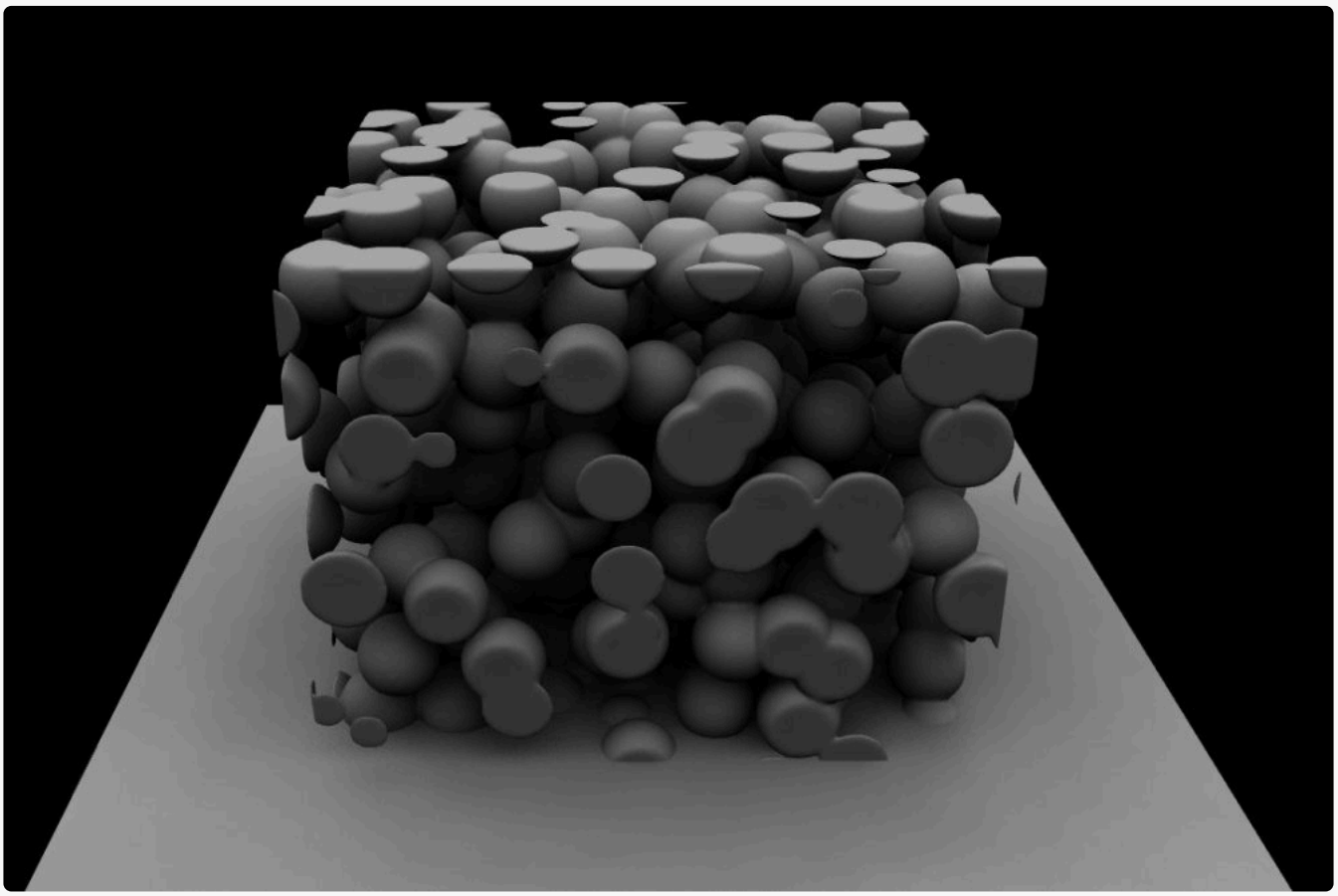
There are no outputs from this node.

Cellular Noise

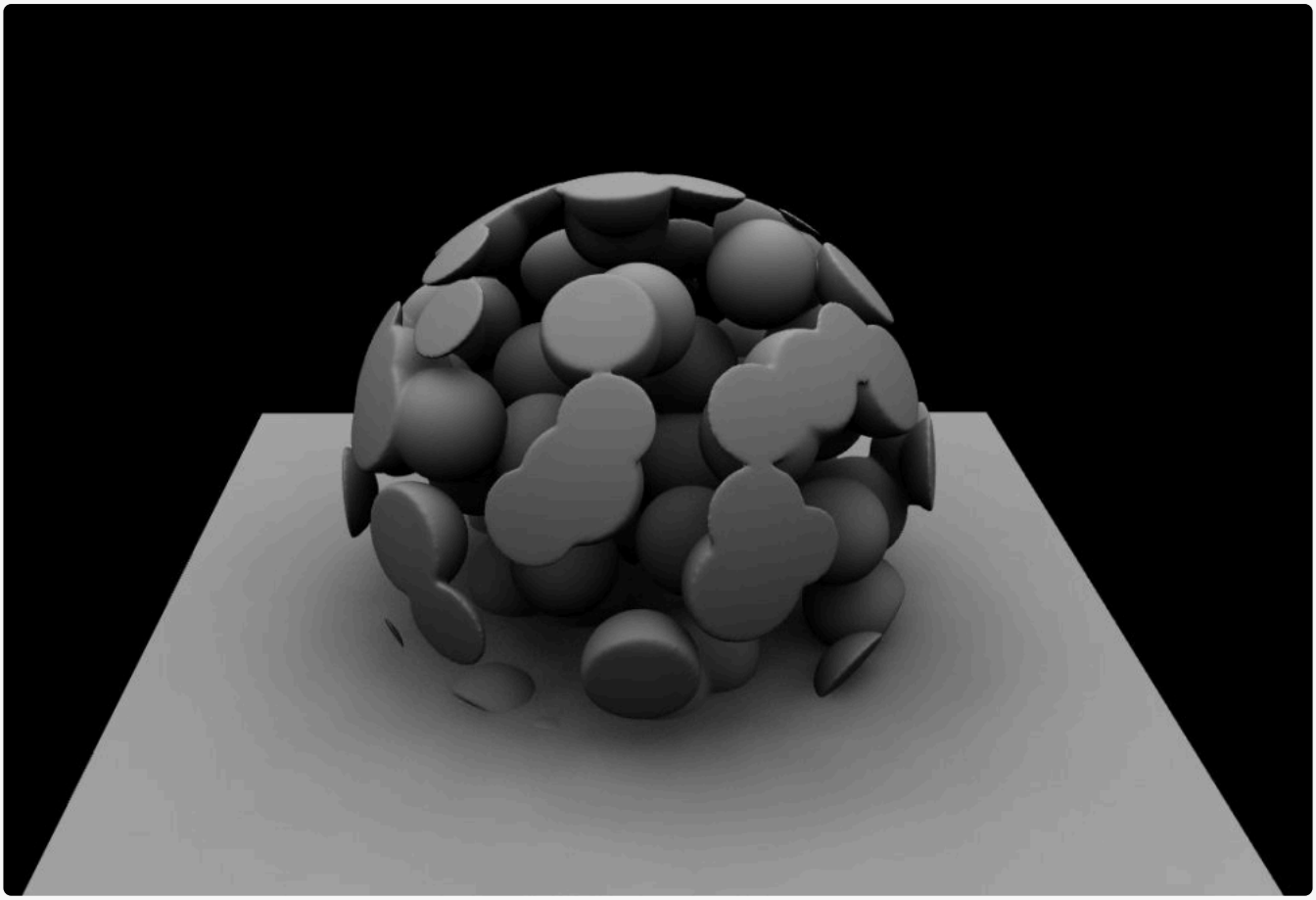
Method

This node generates a cellular noise pattern which is potentially infinite. It works by dividing the space in to cells and placing a point in each cell, which is expanded to a sphere. The placing of the points is randomised.

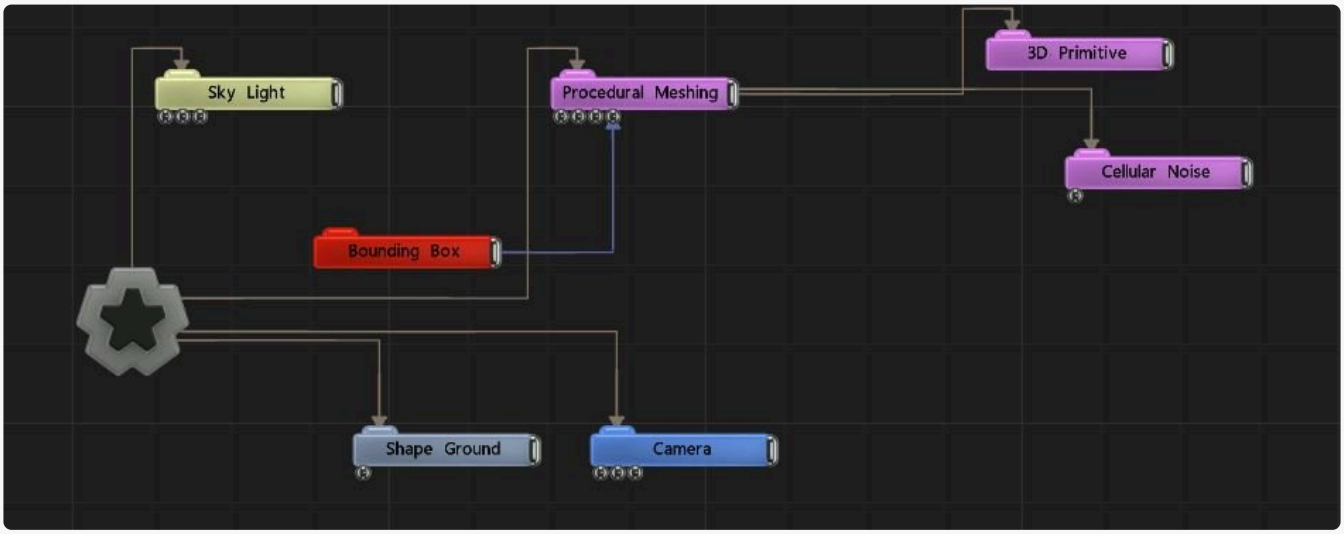
Example



Example with CSG Sphere



Example Nodegraph



Attributes

Name	Description
Distance	Offsets the distance field values, causing the generated distance field to expand of contract.

Offset	
Cell Size	Size of the generated cells.
Jitter	How much the spheres are randomly moved from their original cell positions.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

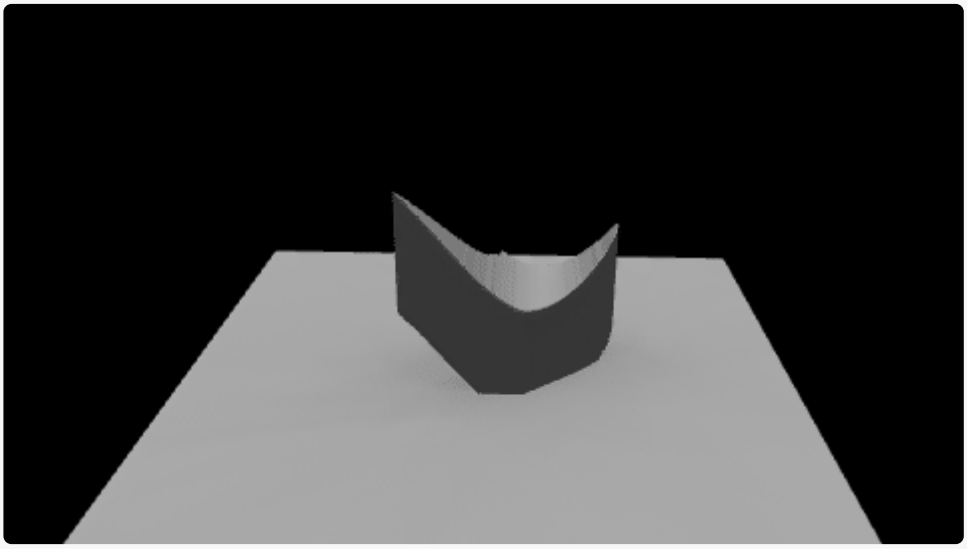
There are no outputs from this node.

Editable Code

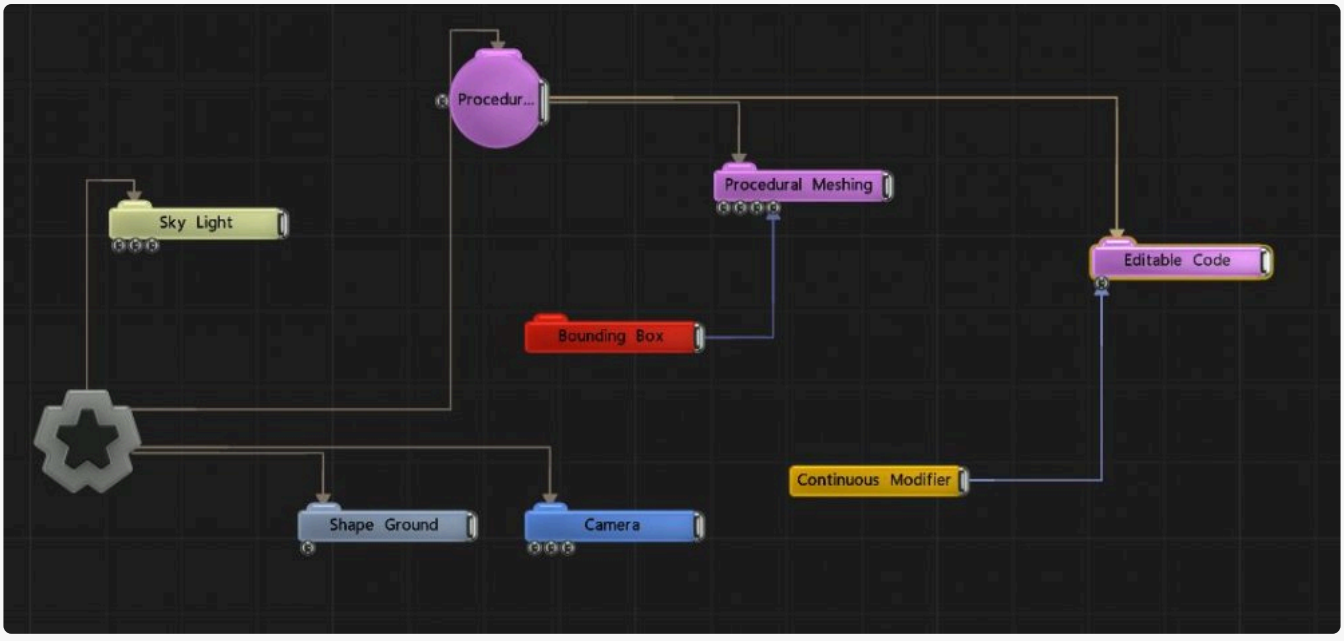
Method

Allows a custom piece of HLSL code to be written to produce a distance value from which a procedural shape will be created. For best results with this node you should have a working knowledge of the HLSL shading language, and signed distance fields.

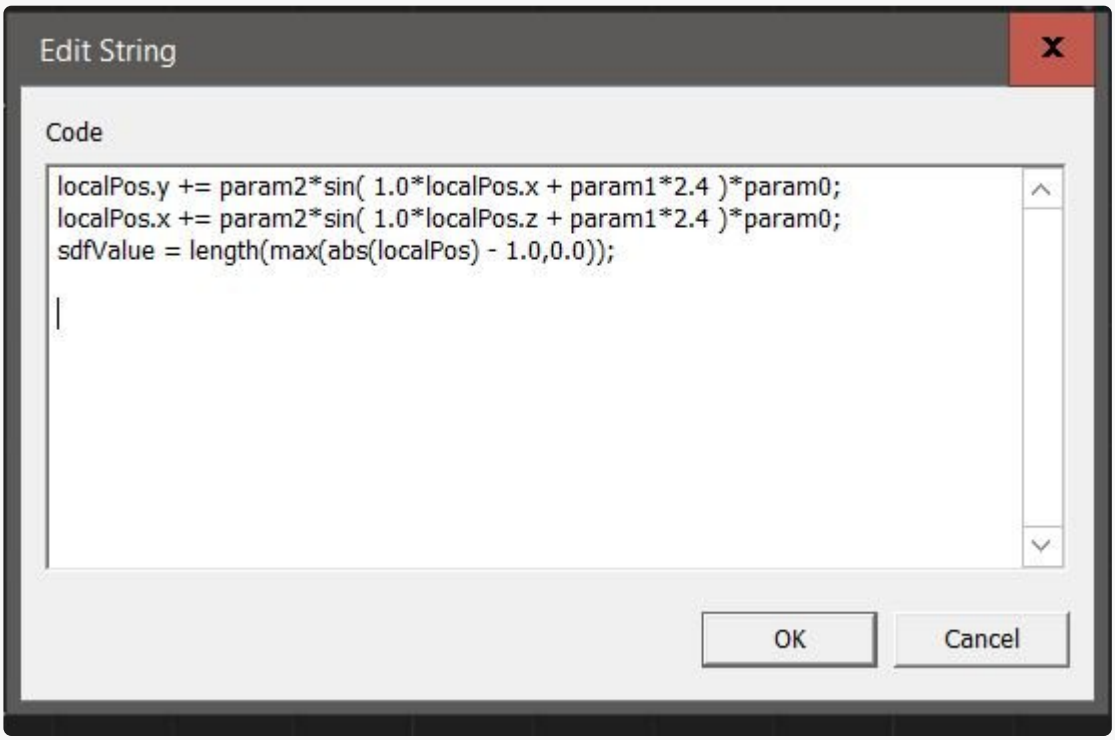
Example



Example Nodegraph



Code



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Code	Type your code here
Param 0	variable that can be used in the code
Param 1	variable that can be used in the code
Param 2	variable that can be used in the code
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null

Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

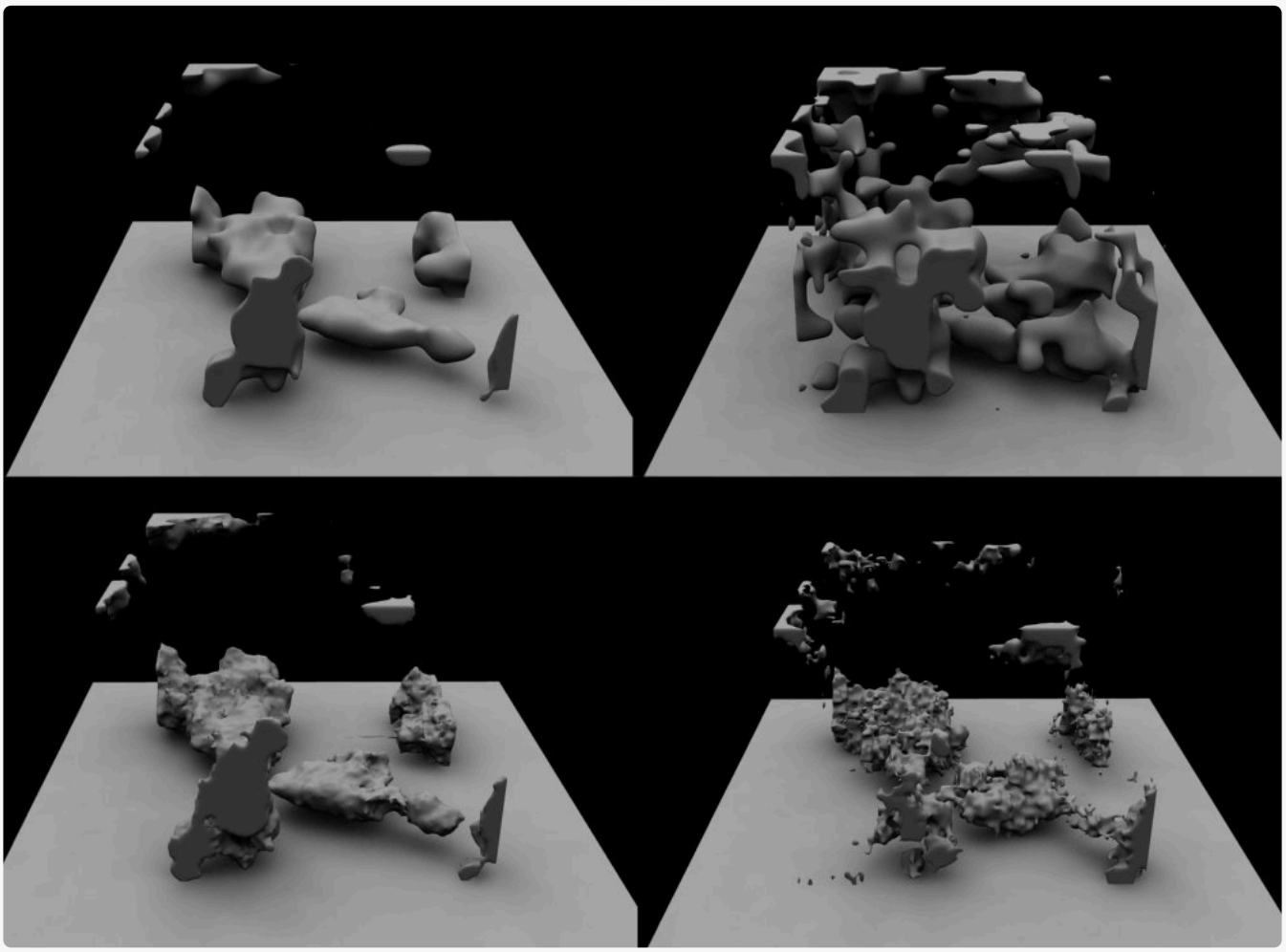
There are no outputs from this node.

Fractal Noise

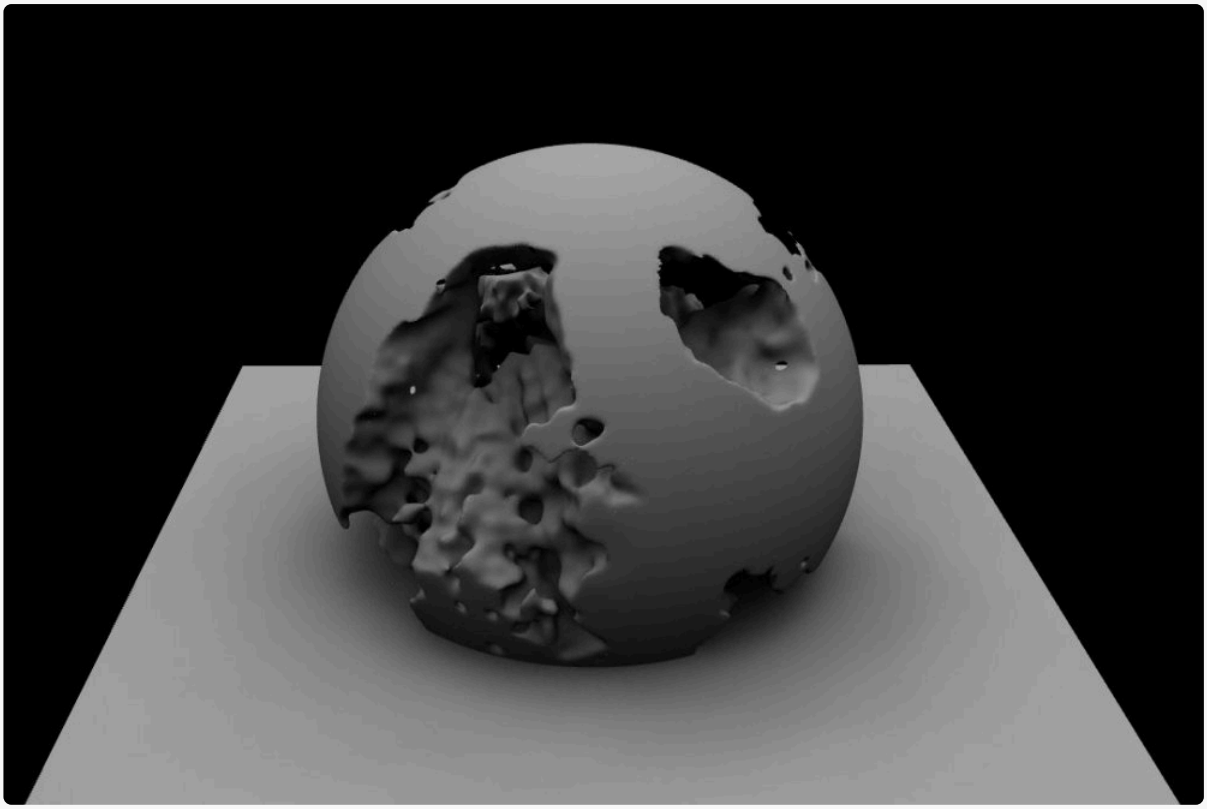
Method

Generates simple 3D fractal noise.

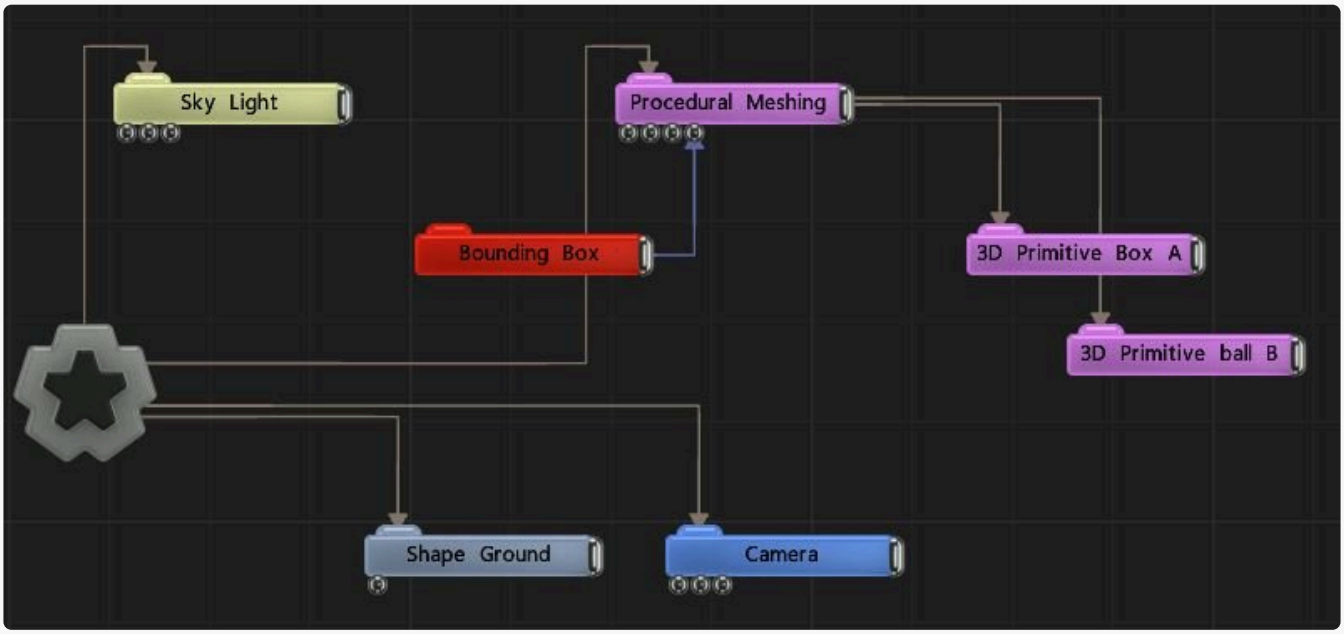
Example



Example with CSG sphere



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.

Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Num Iterations	The number of octaves of noise. A higher value will produce more detail.
Fractal Mode	Which fractal noise generation method to use. • 3D Fast Noise, A simple and fast noise generation. • 3D Noise, A more complex Noise generation method, which looks nices but is a bit slower. • 4D Noise (Time-Evolving), 3D Noise, but with an added dimension so the noise can be animated.
Distance Offset	Offsets the distance field values, causing the generated distance field to expand of contract.
Lacunarity	How large the gaps between the generated noise is.
Gain	The smoothness of the generated noise.
Animation Rate	The speed at which the noise is animated.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight.

	• Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled (No Time Bars)	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

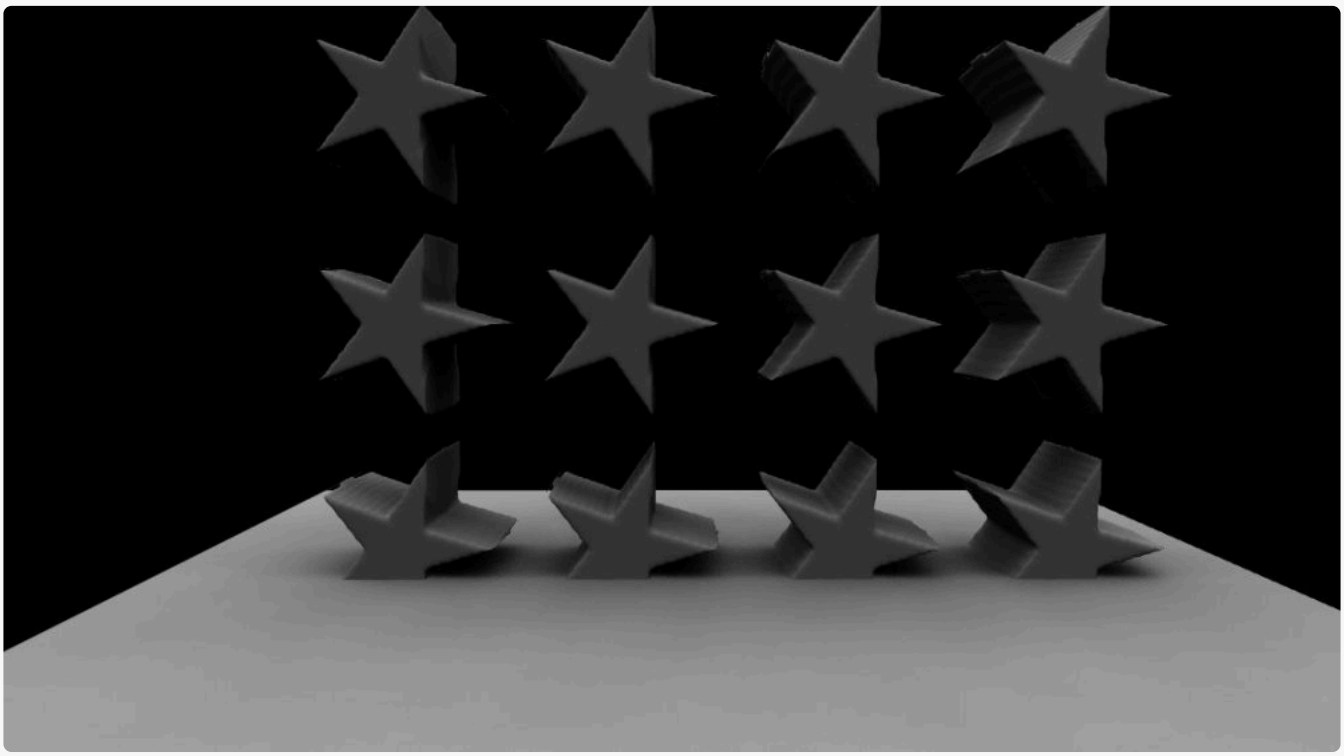
There are no outputs from this node.

Image

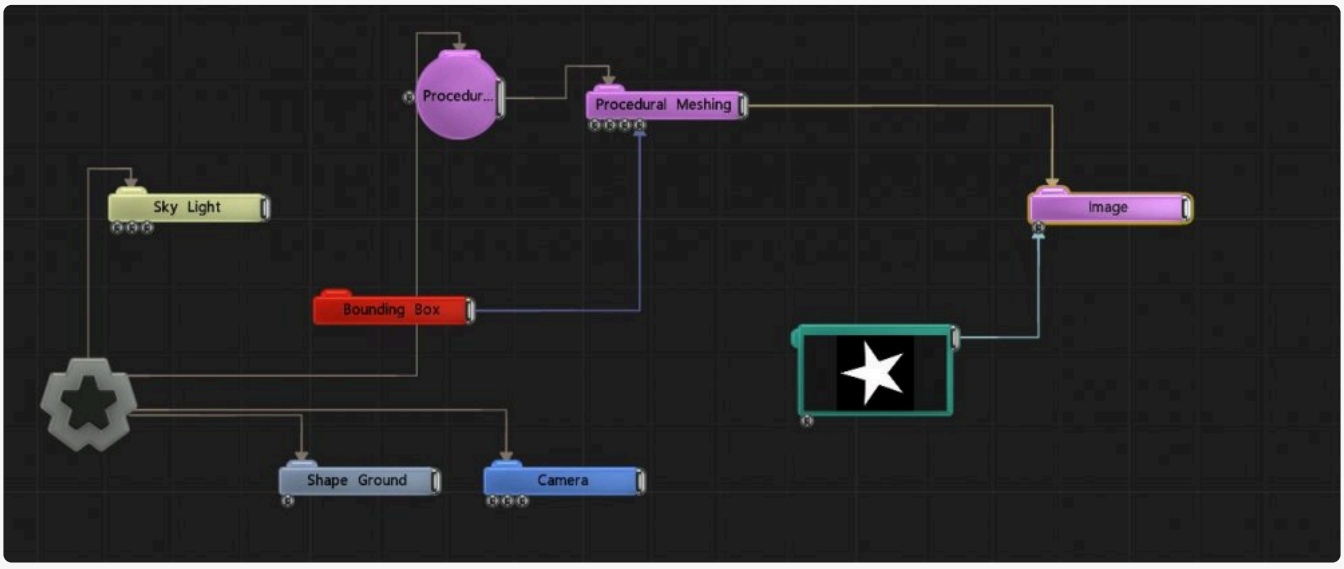
Method

Create a 3D shape by using the luminance of an input image as a mask.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Texture	The image used to generate the effect.
Colour Texture	An image from which to read and output colours values, for procedural renderers that support it. This is only visible when the alpha values of the Material Colour property is less than 1.
Height Scale	Scales the thickness of the generated shape.
Distance Offset	Offsets the distance field values, causing the generated distance field to expand of contract.
Wrap Mode U/V Mode	Change how the image wraps around the the U/V axes. • Clamp, the edges of the image are extended to fill the space left by the transform. • Repeat, the image is repeated until if fills the space left by the transform.
Power	Applies a power curve to the height value, to control steepness.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system.

	• Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled (No Time Bars)	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Image	The image used to generate the distance field.	Video Source
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

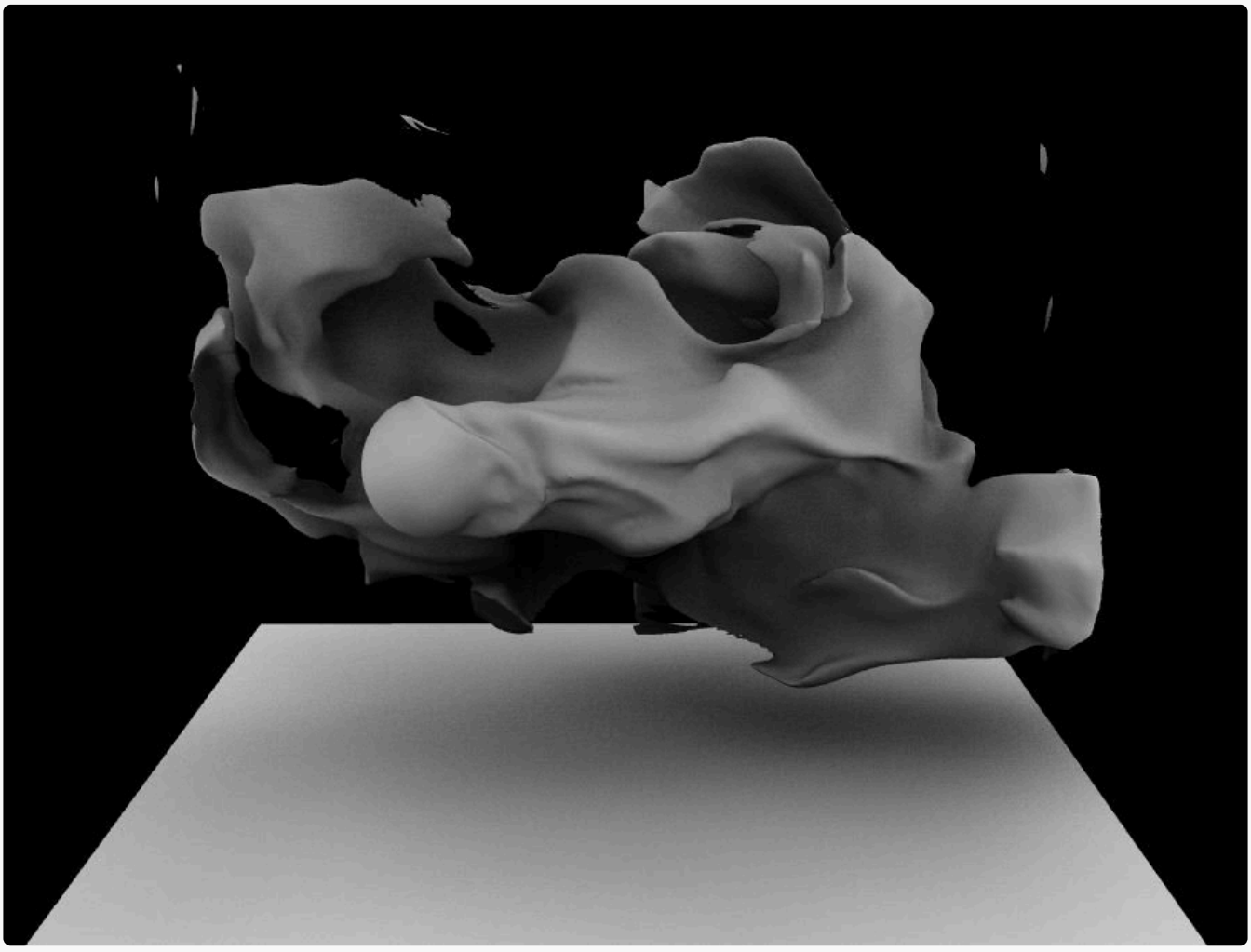
There are no outputs from this node.

Level Set (Field)

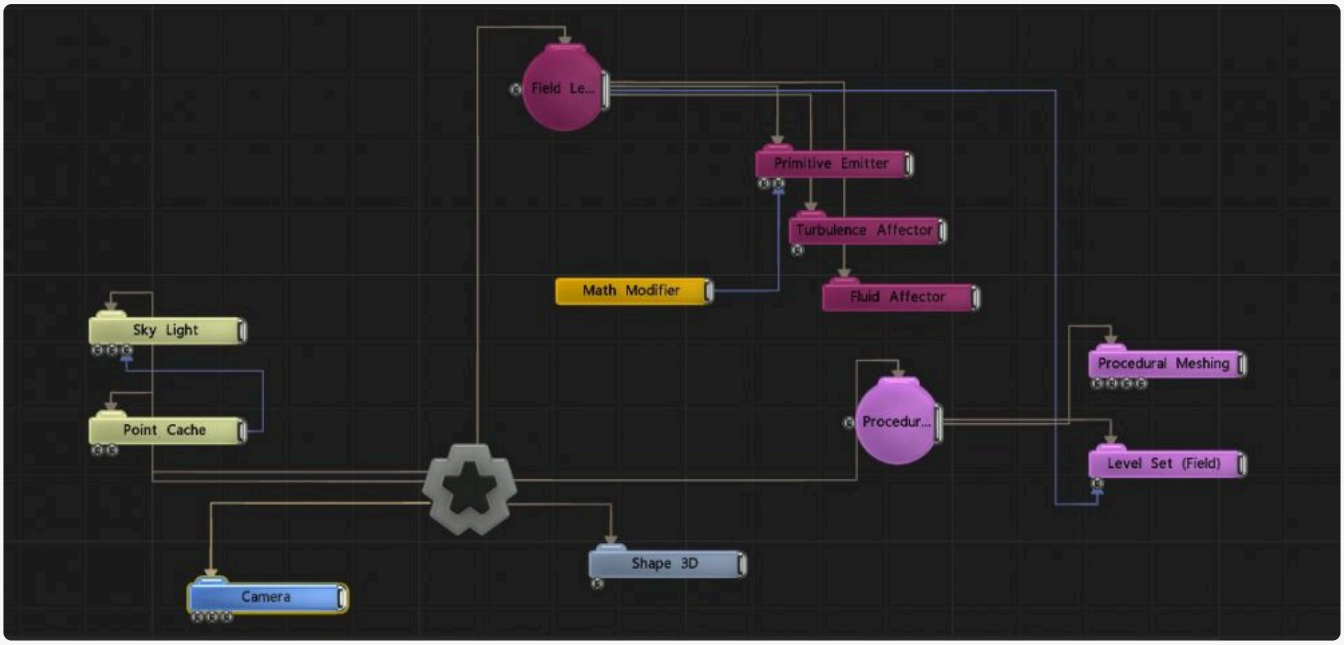
Method

This node allows a Field Level Set System to be used as a procedural generator source. This path is useful for generating fluid like meshes via the Procedural Meshing Node.

Example



Example Nodegraph



Attributes

CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Material Colour	Modify the colour for the procedural material.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Field Source	Connect a Field Level Set root to generate the procedural shape.	Field Level Set Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

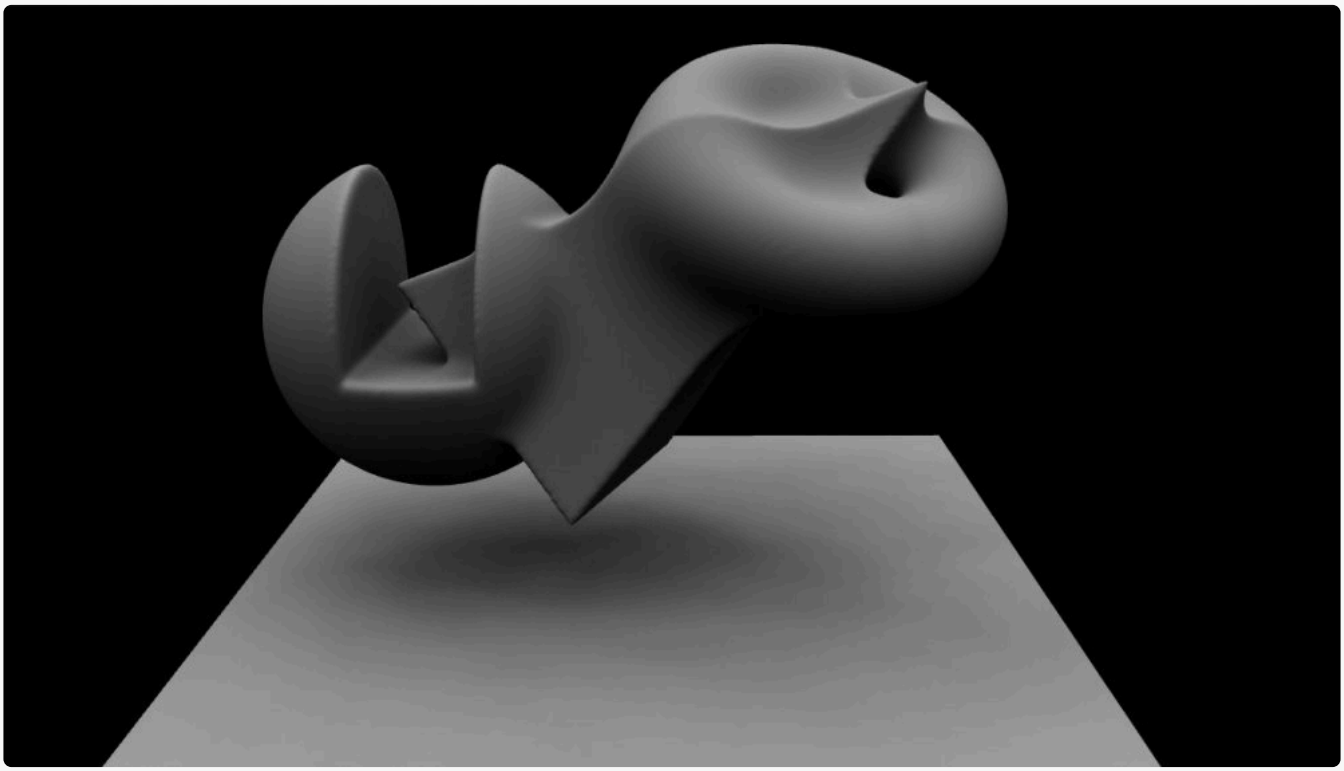
There are no outputs from this node.

Null

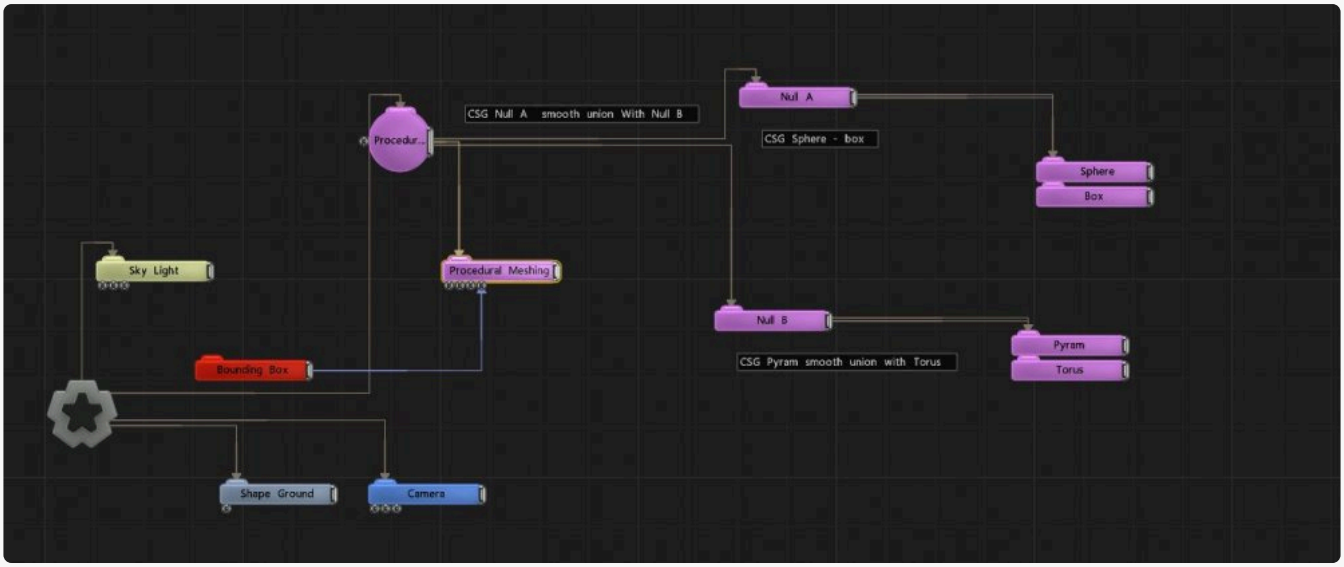
Method

This node allows you to combine multiple generators together into a shape, and then combine that shape with the rest of your procedural system.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system.

	• Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural on top of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

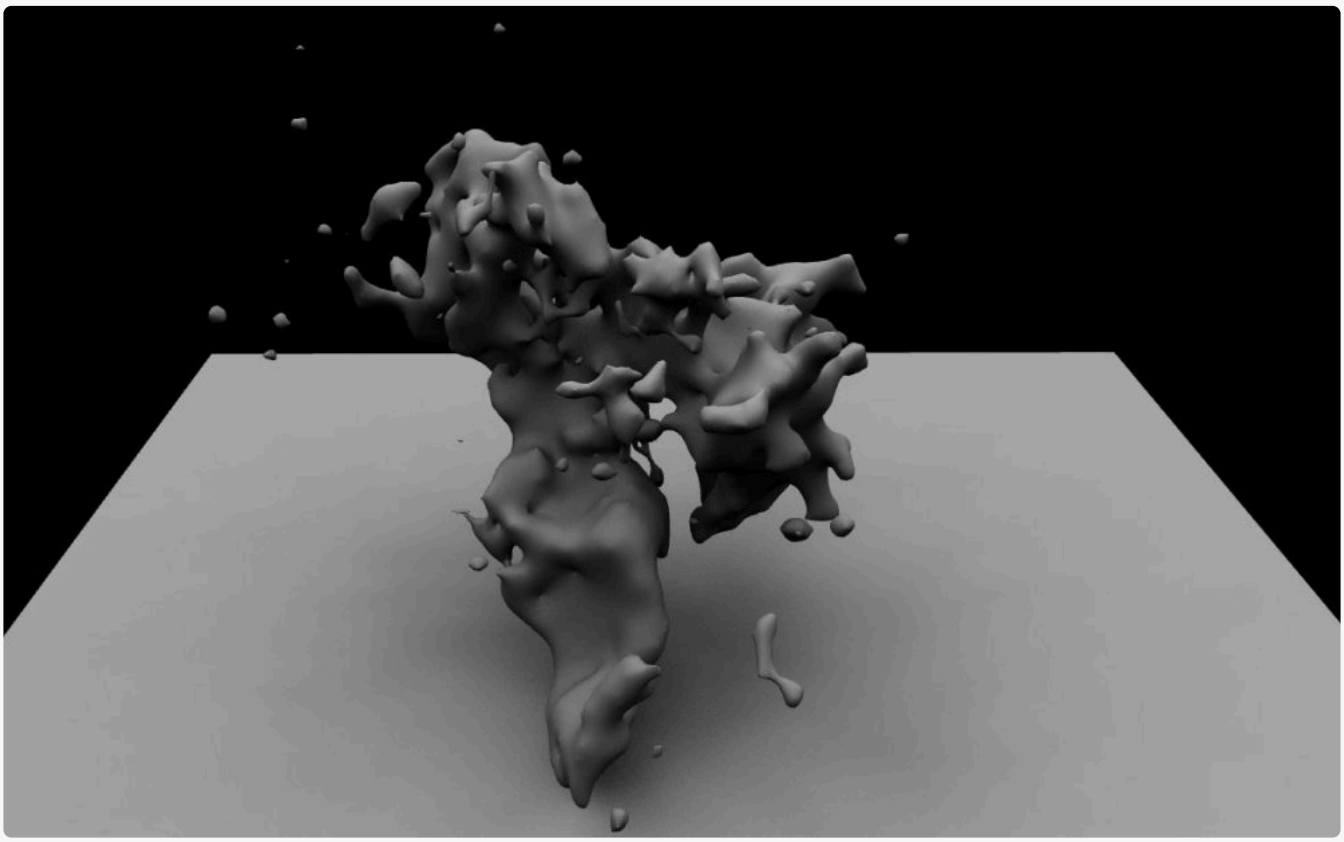
There are no outputs from this node.

Particles

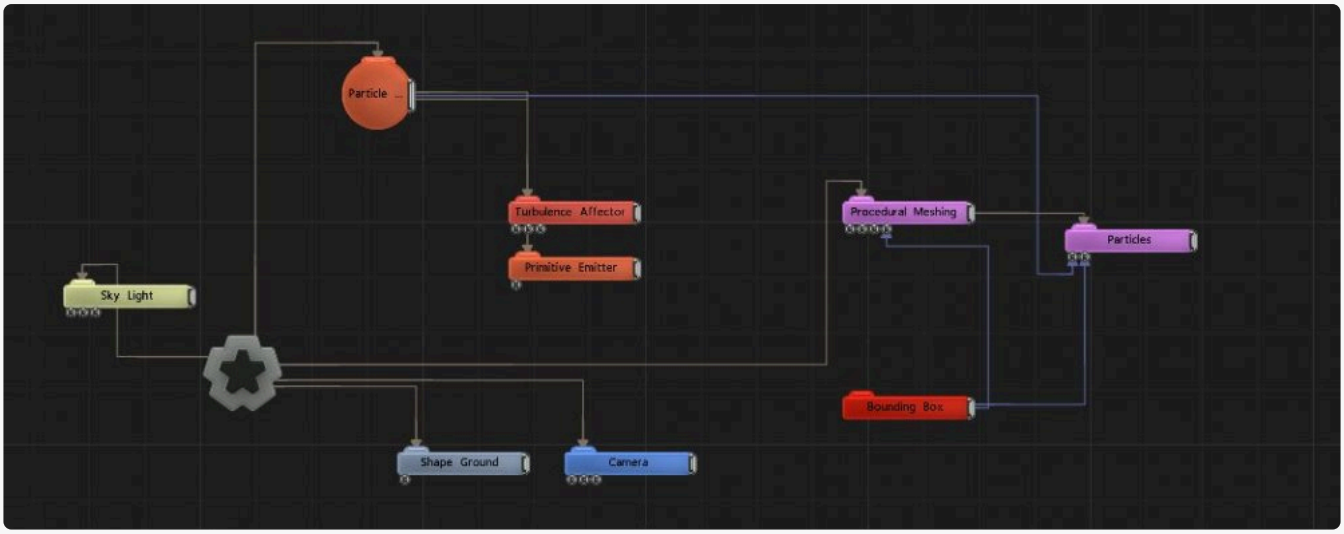
Method

Generates a shape based on the positions and movement of particles from a particle system.

Example



Example Nodegraph



Attributes

Name	Description
Particle Size	Size of the generated particle shapes.
Blob Softness	The softness of the blending between the blobs. Only functions with “Blobs” selected in Field Mode.
Size Randomness	An amount of randomness applied to the size of each particle shape.
Error Distance	Expands the allowable values for generating the Distance Field. Higher values often get rid of jagged edges and odd rendering behaviours, but with decreased performance.
Use Particle Colours	If this is enabled then the colour of each primitive will be taken from it’s particle. This only has an effect for procedural renderers that support colour generation (and which have it enabled).
Field Mode	Change how the emitted particles generate in the procedural system. • Spheres, Each particle is generated as a simple sphere. • Blobs, Each particle is generated as a blob which smoothly blends and combines with other blobs in the scene.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is

	applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Material Colour	Modify the colour for the procedural material.

Inputs

Name	Description	Typical Node Input
Particle Node	The particle system used to generate the distance field.	Particle Root
Bounding Box	The region to which mesh generation will be restricted.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

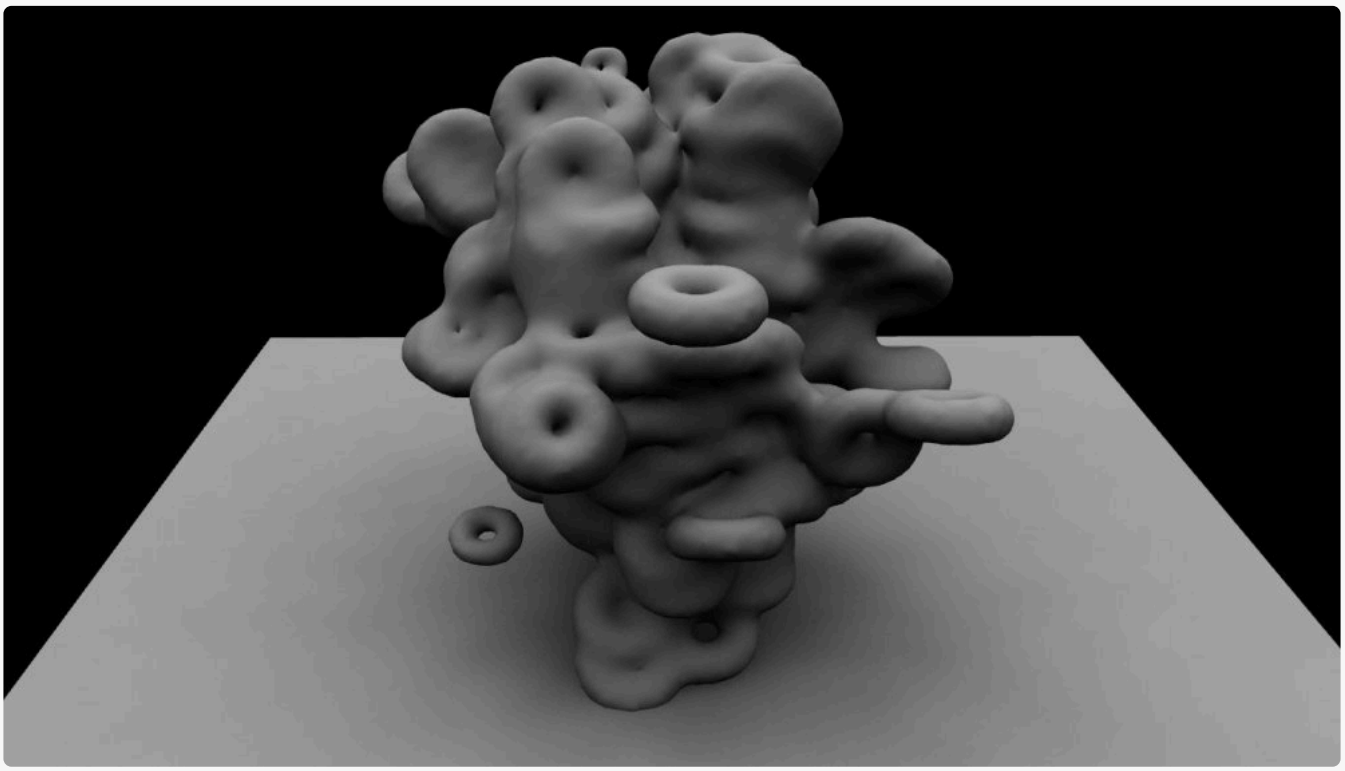
There are no outputs from this node.

Particles As Primitives

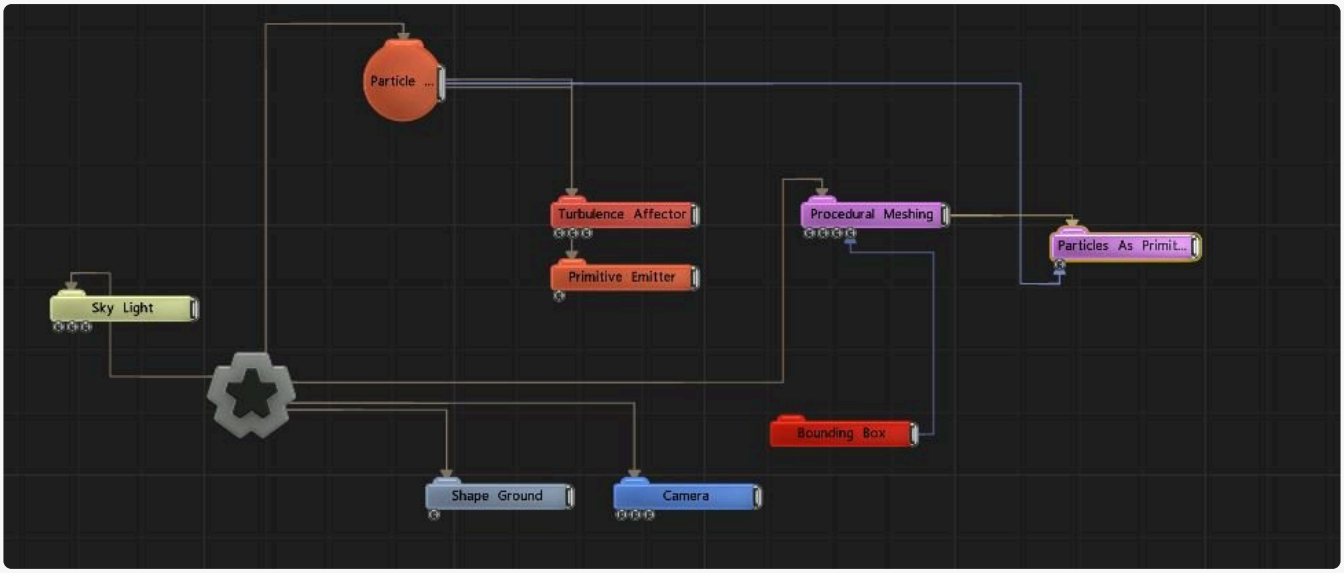
Method

Generates primitives based on the positions and movement of particles from a particle system.

Example



Example Nodegraph



Attributes

Name	Description
Particle Size	Edit the size of the particles
Potential Cutoff	Controls the blending range of every particle (how smoothly they are blended).
Use Particle Colours	If this is enabled then the colour of each primitive will be taken from it's particle. This only has an effect for procedural renderers that support colour generation (and which have it enabled).
Primitive Type	Change the shape of the generated primitives.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG	How much the new procedural blends with the old procedurals, depending on the CSG Blend

Blend Weight	Mode.
Material Colour	Modify the colour for the procedural material.

Inputs

Name	Description	Typical Node Input
Particle Node	The particle root used to generate the distance field.	Particle Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Reaction-Diffusion

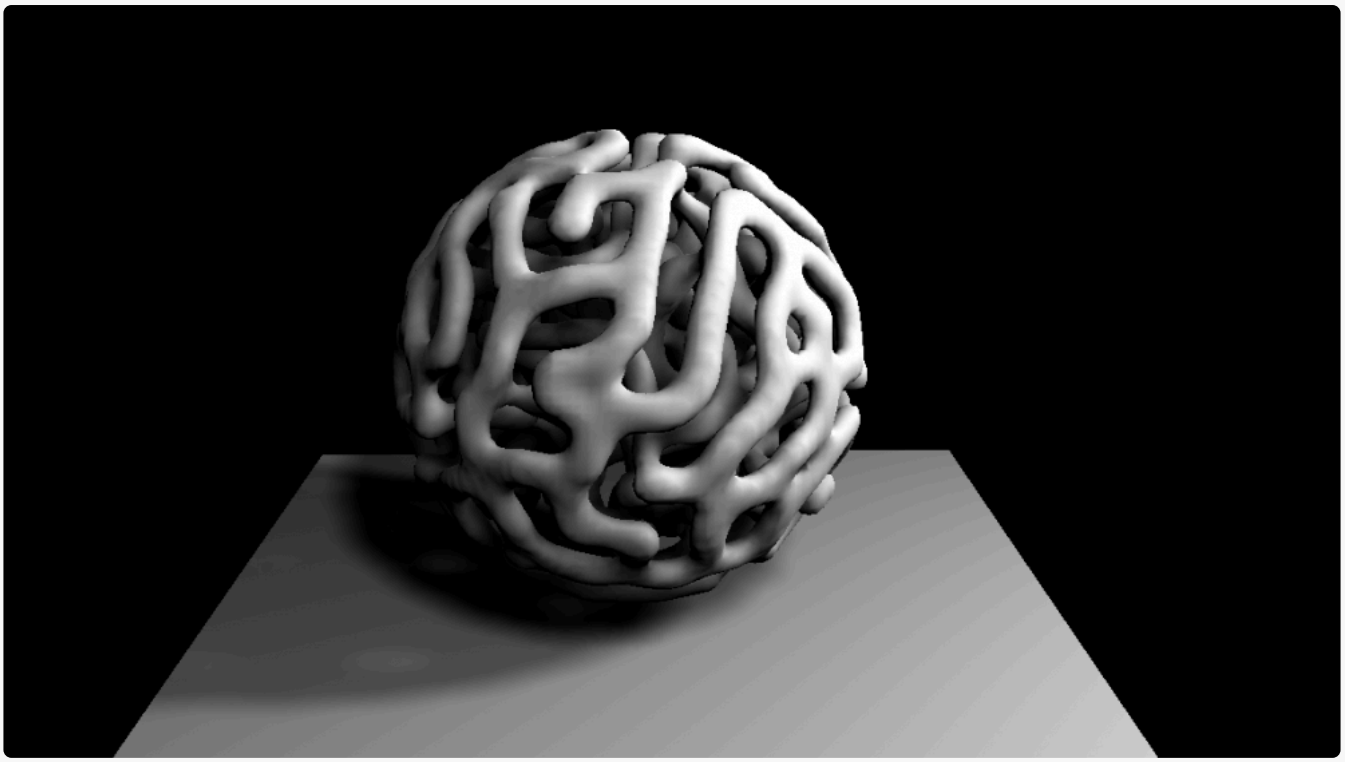
Method

Performs reaction-diffusion simulation, using a procedural input to restict the placement of seeds and another procedural input to restrict growth.

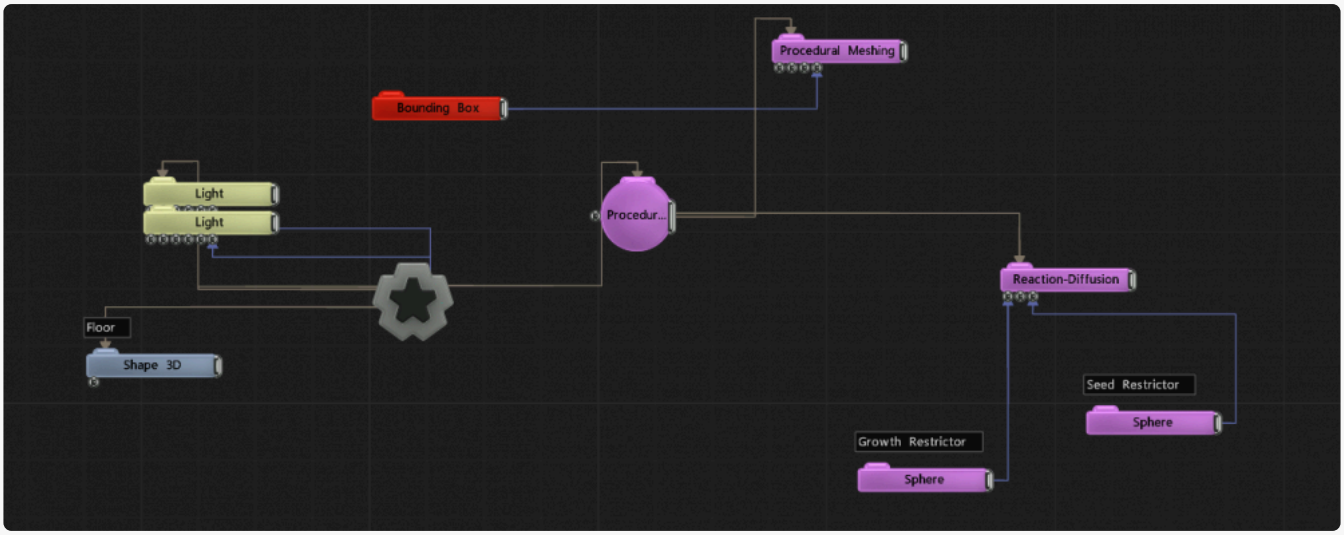
This node simulates the Gray-Scott reaction-diffusion process, which can be thought of as a kind of fluid simulation with an extra step that creates organic-like patterns which grow out from seed points. Seed points are created by random spread, and if a seed restrictor is used then seeds outside of the restrictor volume are rejected. The growth is limited by the growth restrictor volume. There are options to invert these volumes.

More information on the general topic of reaction-diffusion simulation can be found here

Example



Example Nodegraph



Attributes

Name	Description
Distance Offset	Offsets the distance field values, causing the generated distance field to expand of contract.
Filled Mode	Thickness of the Shell wall, when Filled Mode is set to Shell.
Shell Thickness	Thickness of the Shell wall, when Filled Mode is set to Shell.
Simulation Grid Width/Height/ Depth	The voxel resolution of the simulation grid used for performing the reaction-diffusion simulation
Material Colour	Modify the colour for the procedural material.
Initialisation Seed	The randomisation of the seed points can be changed by changing this seed value
Smoothen	When enabled, the surface extracted from the simulation is smoothened internally
Growth Pattern	Changes the type of growth that occurs. At 0.0 the growth will be more like a web, and at 1.0 the growth will be more like separated blobs.
Growth Rate	Controls the speed at which the growth progresses.
Invert Growth Restriction	Inverts the in/out sense of the restriction volume
Seed Density	Increase this property to make the seed points appear more densely packed together. Decrease it to spread them out more.
CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system.

	• Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.
Affect Colour	Affect the colour of the generated procedural system. only functions with “Generate Colours” enabled in some Procedural Render nodes.
Always Enabled (No Time Bars)	When enabled, this node will run regardless of time bar enable/disable. Due to how Notch handles shader generation with procedurals, with this enabled the node runs more efficiently.
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.

Inputs

Name	Description	Typical Node Input
Colour Ramp	Specifies a range of colours the generator can use.	Colour Ramp
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

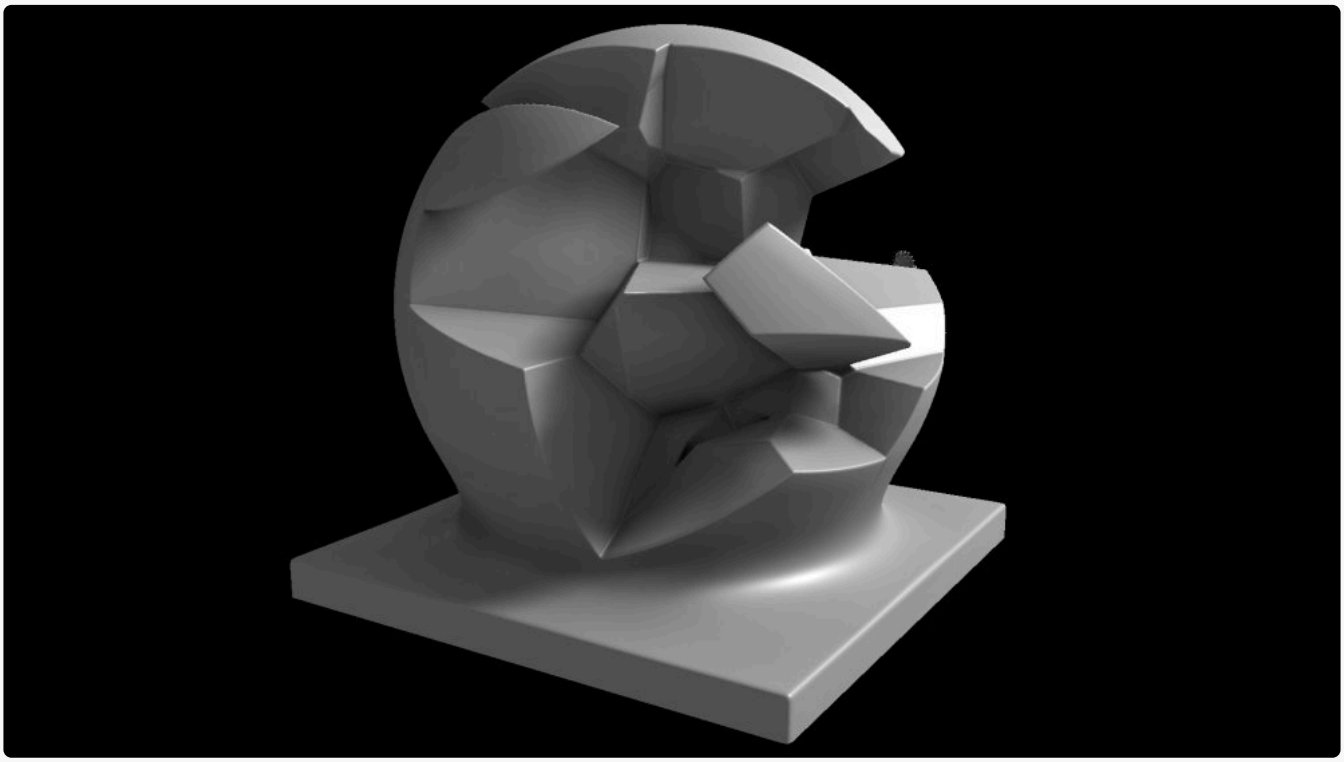
Can be connected to any node which requires an image input.

Voronoi

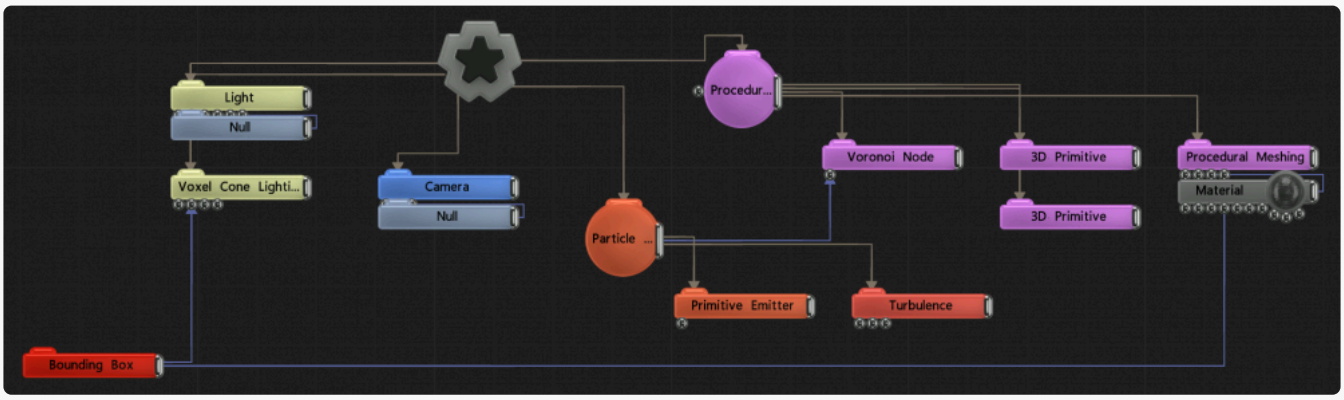
Method

Generates a 3D Voronoi pattern based on an input particle system. If no particle root is plugged in, then a default infinite pattern will be used.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description		
Num Particles	Number of particles to be used to generate the Voronoi Shape.		
Mode	Select how the Voronoi Points are Sourced. • Grid, Points of generated grid will be used. This can be scaled and moved using the transformation values. • Particles, The particles in a particle system are used for the voronoi points. This requires a Particle Root or Particle Emitter to be connected.	CSG Mode	These options change how a this node combines with the rest of the procedural system. To find out more, see CSG Operation. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of

			Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.
CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.		
Custom CSG Code	Type your Custom code here, using the HLSL language. Read more on Editable Code.		

Inputs

Name	Description	Typical Node Input
Particle Node	Connect a particle system to generate the procedural shape.	Particle Root
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

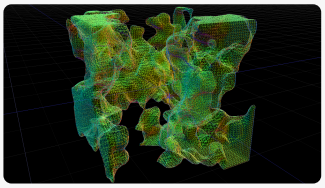
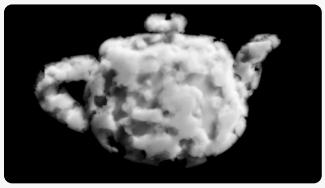
There are no outputs from this node.

Render Nodes

Method

These nodes convert the procedural distance field into rendered geometry, voxel grids, or other systems.

Gallery

			
Procedural Meshing	Procedural Shading Node	Volume Generator	Volumetric Tracer

Heightmap Generator

Method

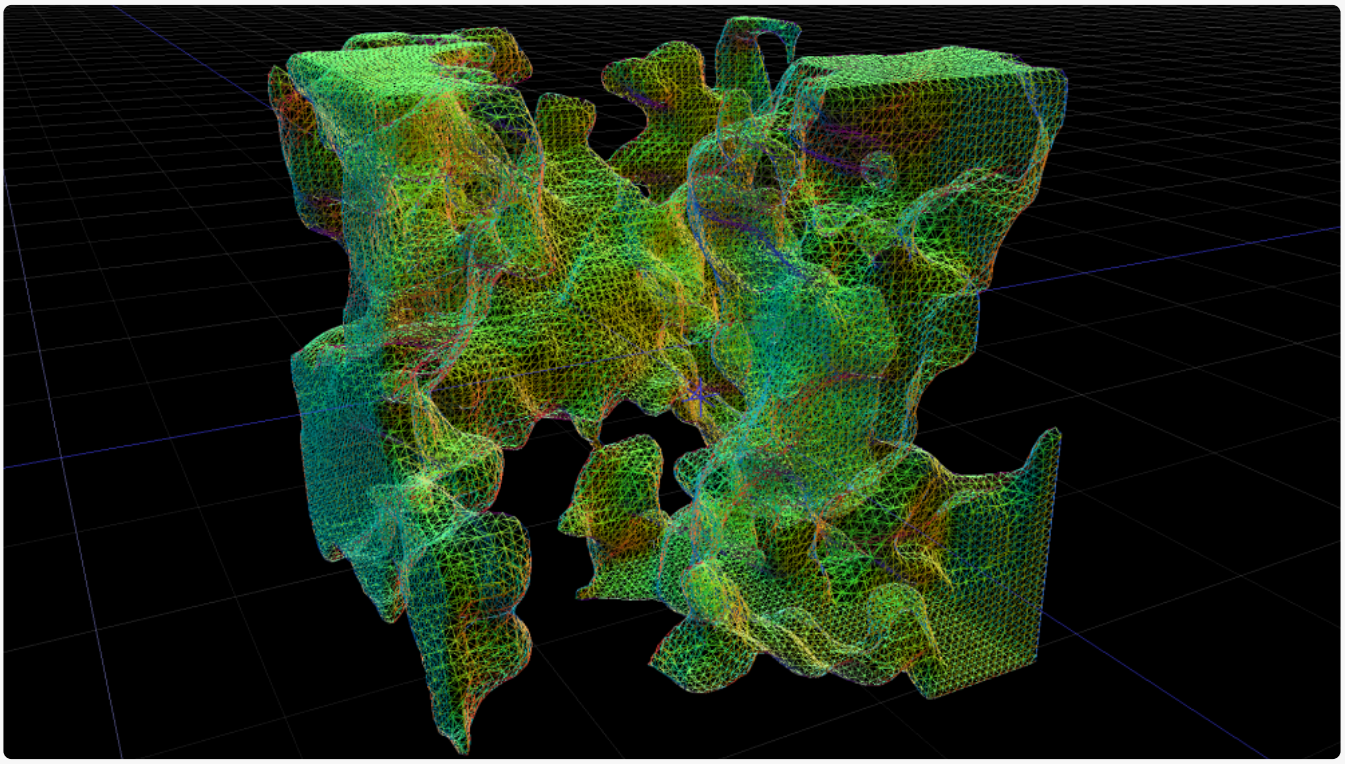
This node is currently in development.

Procedural Meshing

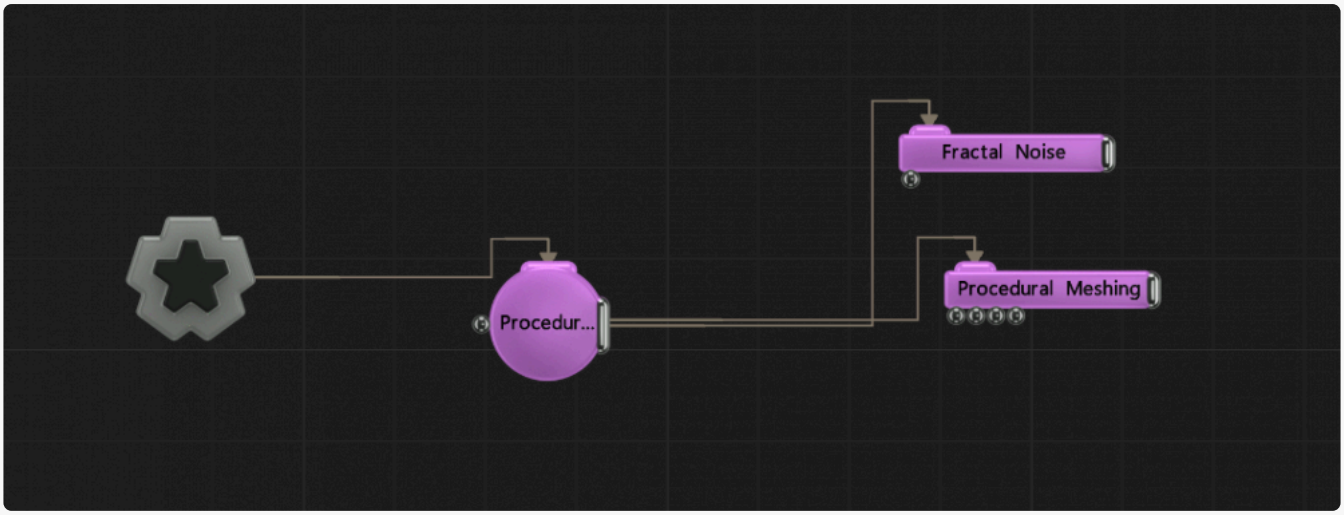
Method

Extracts a surface from a procedural by first voxelising it (but only voxelising the spatial areas which are required) and then constructing a smoothened surface over the voxels. The surface produced is a triangle mesh which can be texture and deformed, can cast shadows, and can be used as a particle emitter among other things.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Grid Width	Width of the adaptive voxel grid.
Grid Height	Height of the adaptive voxel grid.
Grid Depth	Depth of the adaptive voxel grid.
Error Tolerance	If the procedural distance field has too much distortion then it may be necessary to raise the error tolerance. A higher error tolerance may reduce performance, so this is a trade-off.

Smoothing Iterations	The number of vertex smoothening iterations to perform. This will smoothen out sharp edges.
HQ Smoothing	When enabled, vertex positions will be projected back on to the procedural surface. This preserves sharp edges without increasing the voxel grid size.
Distance Field Normals	Vertex normals will be extracted from the procedural distance field. This can be more accurate, but slower.
Seal Boundaries	When a procedural intersects the bounding box, usually a hole is created. Enabling this option will fill in the hole.
Generate Colours	Uses colours set in procedural nodes (such as 3D Primitive) to colourise the generated vertices. This can reduce performance slightly.
Generate UVs	Generate texture coordinates at the generated vertices, for use with a material. This can reduce performance slightly.
Visible	Control whether the node is visible or not to the scene.
Dynamic	When set above 1.0, the mesh will be re-generated on every frame. When set to 0.0, the last-generated mesh will be cached and re-used as a static output.
Vertex Buffer Size (100,000s)	Limits the generated vertex buffer size.
Triangle Buffer Size (100,000s)	Limits the generated triangle buffer size.
Show Metrics	Displays information about the amount of mesh geometry being generated.
Tessellation Enabled	Enables GPU-side tessellation. Note that post-tessellated geometry is processed last.
Max Tessellation Factor	The maximum level of GPU tessellation.

Material

See Materials.

Inputs

Name	Description	Typical Node Input
Procedural Root	Use a Procedural Root as an input, so the renderer is treated seperately from the roots transforms. In this case, the renderer itself would be connected to the scene Root node.	Procedural Root
Bounding Box	The region in which the surface will be voxelised and generated	Bounding Box

Render Transform	Takes the transformation of another node and applies it to the rendered mesh.	
Material	A material to apply to the rendered mesh	Materials
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

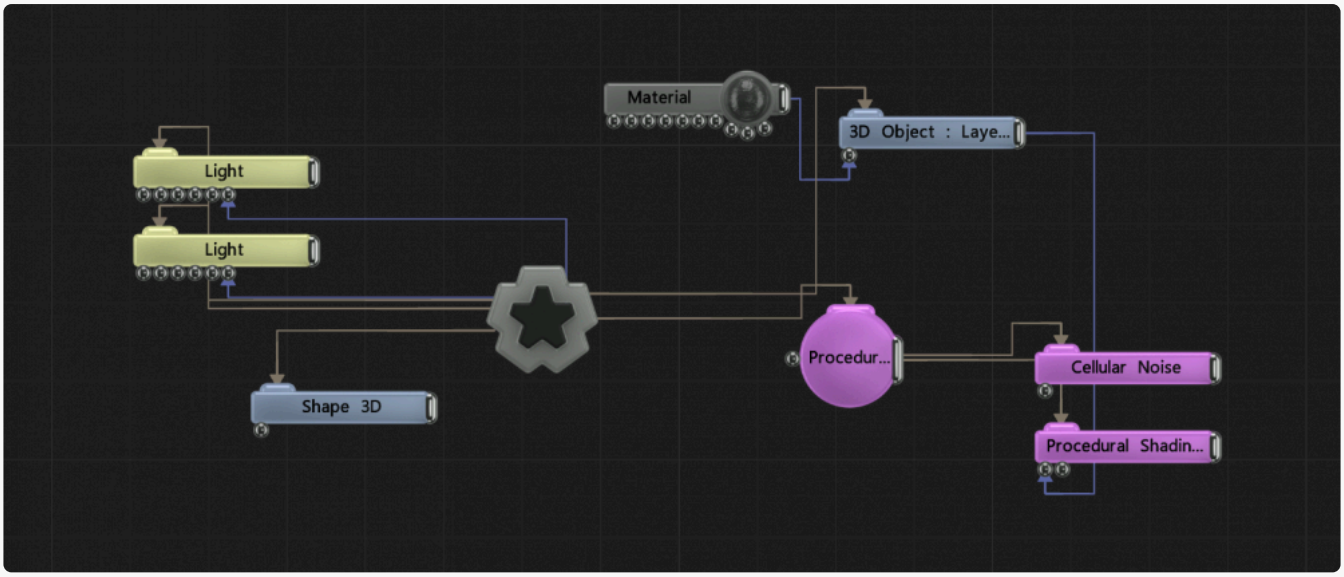
Procedural Shading Node

Method

Adjusts the shading of an object based on the shape a procedural. The procedural shape is effectively raytraced, with the ray starting at the object's surface. This can be used to create an effect similar to a boolean operation on a surface, but without the need to add that surface as a procedural node.

Example

Example Nodegraph



Attributes

Name	Description
Colour	The inner colour of the shading
Inner Fade Distance	A distance limit for parts of the procedural which are inside of the object surface.
Outer Fade Distance	A distance limit for parts of the procedural which are outside of the object surface.
Colour Affect Amount	A blending amount for the inner colour.
Normal Affect Amount	A blending amount for the surface normal.
Apply To Colour	When enabled the colour of the affected object will be affected. The colour is taken from the generated procedural.
Apply To Normal	When enabled the normal of the affected object will be affected. The normal is derived from the shape of the generated procedural.

Inputs

Name	Description	Typical Node Input
Affected Object Nodes	The objects to adjust the shading of.	3D Object
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

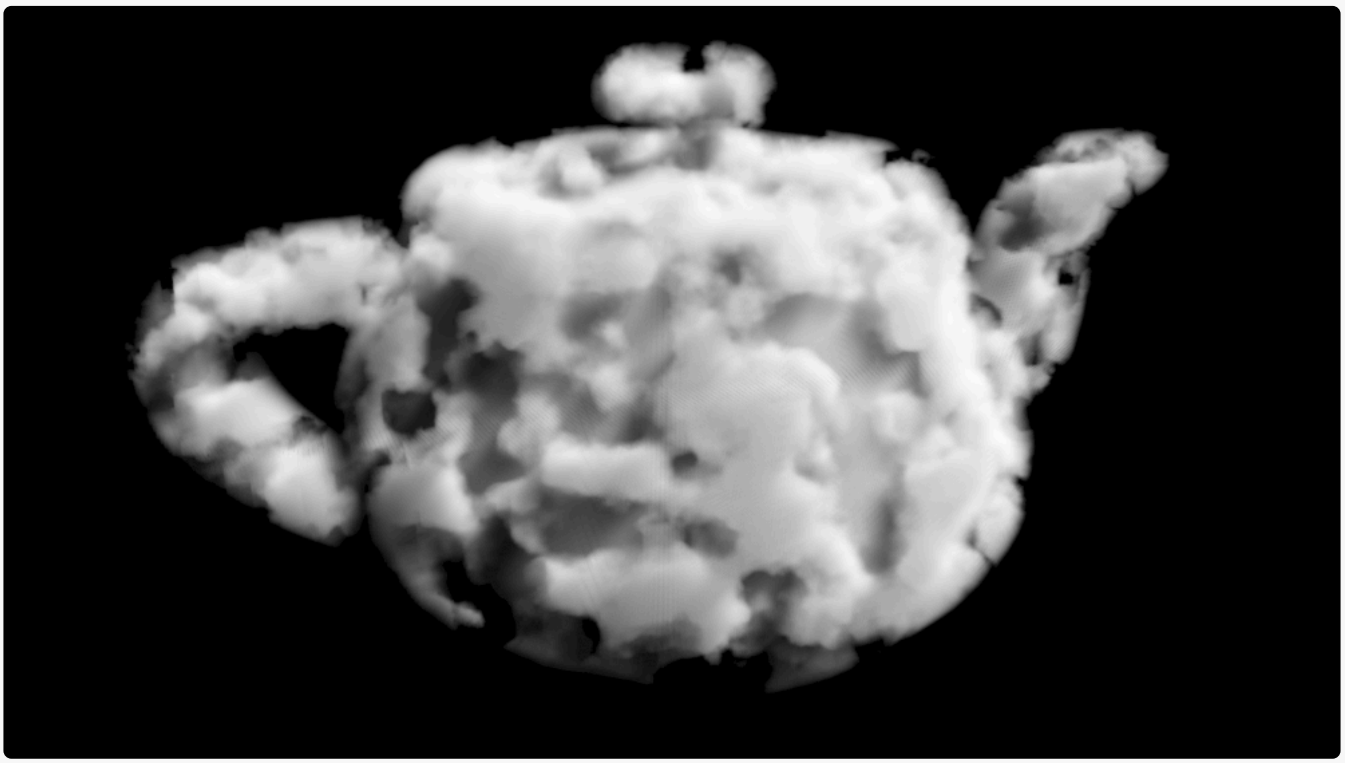
There are no outputs from this node.

Volume Generator

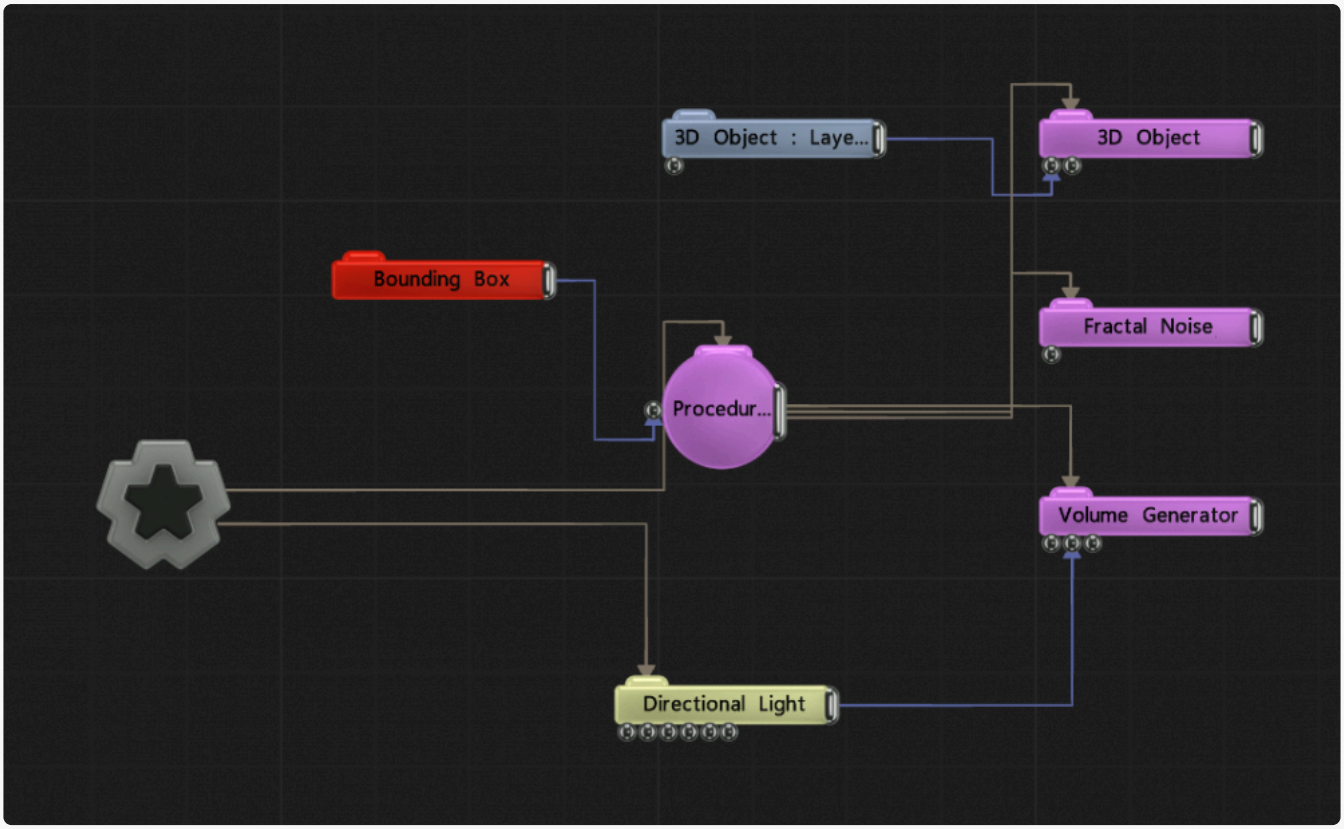
Method

Renders a procedural as a translucent volume. This node is suitable for creating cloud-like effects. It first voxelises the procedural and then renders it by raymarching. It is able to cast shadows within the volume in the direction of a lightsource.

Example



Example Nodegraph



Attributes

Name	Description
Grid Width/Hieght/Depth	Control the resolution of the voxel grid along each axis.
Visible	A keyframable toggle for controlling whether the renderer is active or not.
Colour	A colour tint applied to the whole volume.
Depth Alpha Scale	Scales the density of the volume.
Shadow Absorb	Scales the density of the volume with respect to shadow propagation.
Shadow Scatter	Controls how deeply shadows propagate through the volume.
Shadow Area Scale	Scales the rectangular area where shadow propagation will be computed.
Shadow Tint Colour	Control the colour tint for the shadows.
Generate Colours	Use the colours generated by other nodes in the procedural system.

Inputs

Name	Description	Typical Node Input
Procedural	Use a Procedural Root as an input, so the renderer is treated seperately from the	Procedural

Root	roots transforms. In this case, the renderer itself would be connected to the scene Root node.	Root
Lights	Lights to use for shadow propagation	Directional Light
Bounding Box	Bounding box within which voxels will be generated and raymarched	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Volumetric Tracer

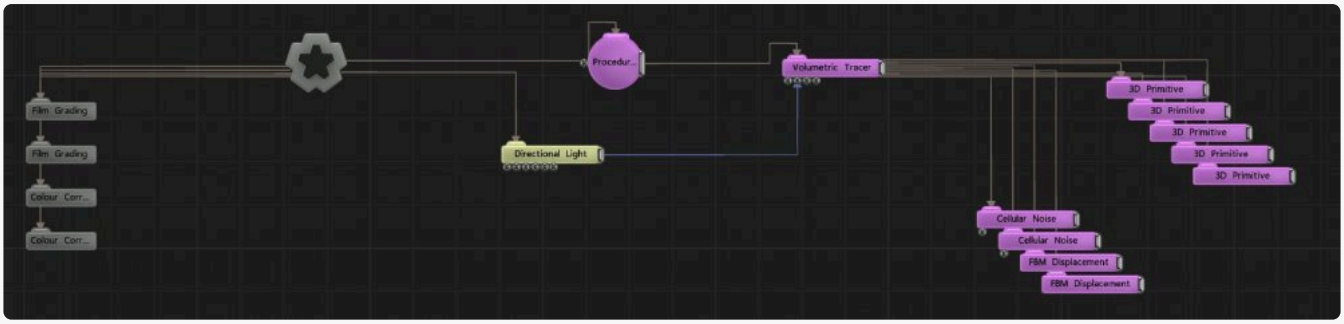
Method

Renders a procedural as a volume. Unlike the Volumetric Generator node, this volume is not restricted to a bounded region of space. This allows a free camera flight through the volume without needing to animate or switch bounding boxes.
This node is highly performance-intensive and processing time depends on resolution.

> ! Use of this node above 1920×1080 resolution is not recommended.
> This node is limited for use only with single perspective camera nodes, like the Camera and Region Camera.

Example

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Visible	Control whether the node is visible or not to the scene.
Alpha	Alpha transparency amount.
Colour	Colour of the volumetric cloud.
Depth Alpha Scale	The alpha density of the cloud.
Max Depth	The maximum depth at which raymarching should terminate.
Num Slices	Increase the number of slices to increase the precision of the tracer at the cost of memory and computation.

Error Tolerance	Increase this tolerence level to fix holes in the cloud shape, which can happen if the procedural field becomes too distorted.
Coarse Alpha Threshold	A threshold for the low-resolution first pass raymarch. A higher threshold may increase performance but introduce artefacts.
Fine Alpha Threshold	A threshold for the high-resolution first pass raymarch. A higher threshold may increase performance but introduce artefacts.
Shadow Area	Sets the size of the shadowmap casting area
Shadow Max Distance	The maximum distance that shadows will be cast to.
Direct Illumination Intensity	The intensity of the light applied directly to the cloud (before shadowing).
Shadow Absorb	The hardness or density of the cloud with respect to shadow-casting. Increasing this value makes for more contrasted shadows, decreasing it makes for softer shadows.
Shadow Scatter	The scattering effect of the direct illumination.
Shadow Tint Colour	Shadows will be tinted by this colour.
Shadow Map Size	The resolution of the shadowmap used for shadow casting.
Ambient Absorb	The hardness or density of the cloud with respect to ambient light.
Ambient Instensity	The amount of ambient light added to the cloud.
Static Shadows	While this property is enabled, shadows will not be generated. The last-generated shadowmaps will be cached and re-used.
Apply Shadows To Solid Objects	Determines whether volumetric shadows should be cast onto solid objects.
Apply Shadows From Solid Objects	Determines whether solid objects should cast shadows onto the volumetrics.

Inputs

Name	Description	Typical Node Input
Procedural Root	Use a Procedural Root as an input, so the renderer is treated seperately from the roots transforms. In this case, the renderer itself would be connected to the scene Root node.	Procedural Root
Light	Light nodes used for lighting and shadowing of the volumetrics.	Light
Mask	A 2D mask image that can be used to define areas of the screen which are raytraced.	Video Source

Bounding Box	A bounding box that may be used to contain the raytraced area in 3D space.	Bounding Box
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

There are no outputs from this node.

Texturing

Method

These nodes allow for textures to be applied to the procedural system.

Gallery

Meshing Texture Map

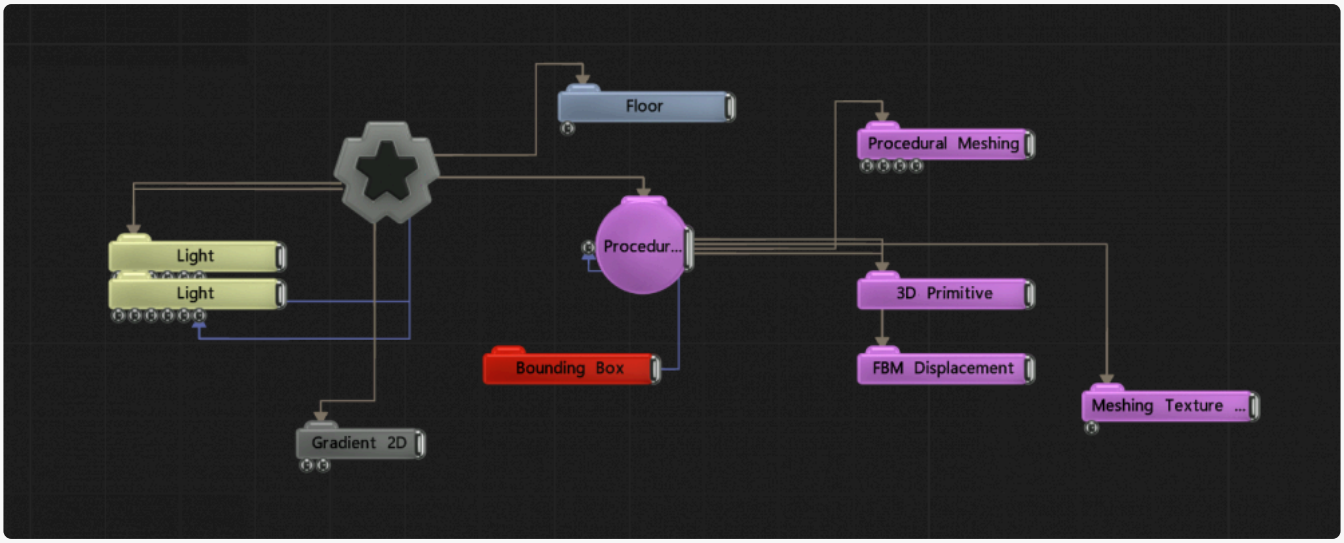
Meshing Texture Map

Method

Applies a colour texture map to a procedural. This only has an effect if the procedural renderer supports colour generation. The map has a built-in falloff allowing multiple texture maps to be blended together.

Example

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Attributes

Name	Description
Colour Texture	The image file to map over the procedural shape.
Falloff Scale	The texture map falloff size.
Power	The texture map falloff sharpness.
Blend Weight	How much the texture is blended with the current material texture.

Colour	A colour tint applied to the read texture map.

Inputs

Name	Description	Typical Node Input
UV Transform	A node from which to read a transformation, which will be applied to the texture mapping.	Null
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

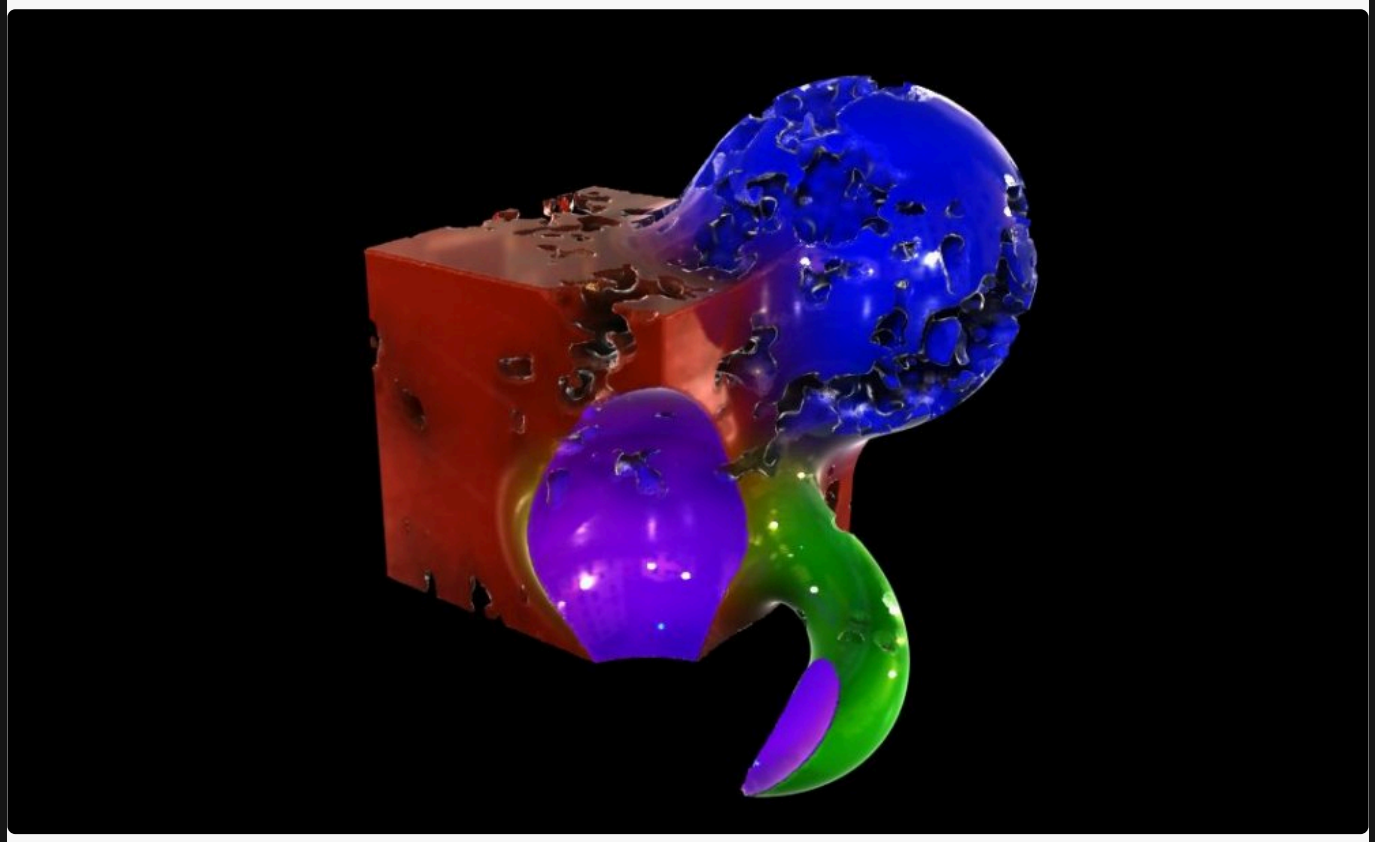
Outputs

There are no outputs from this node.

CSG Operation

Method

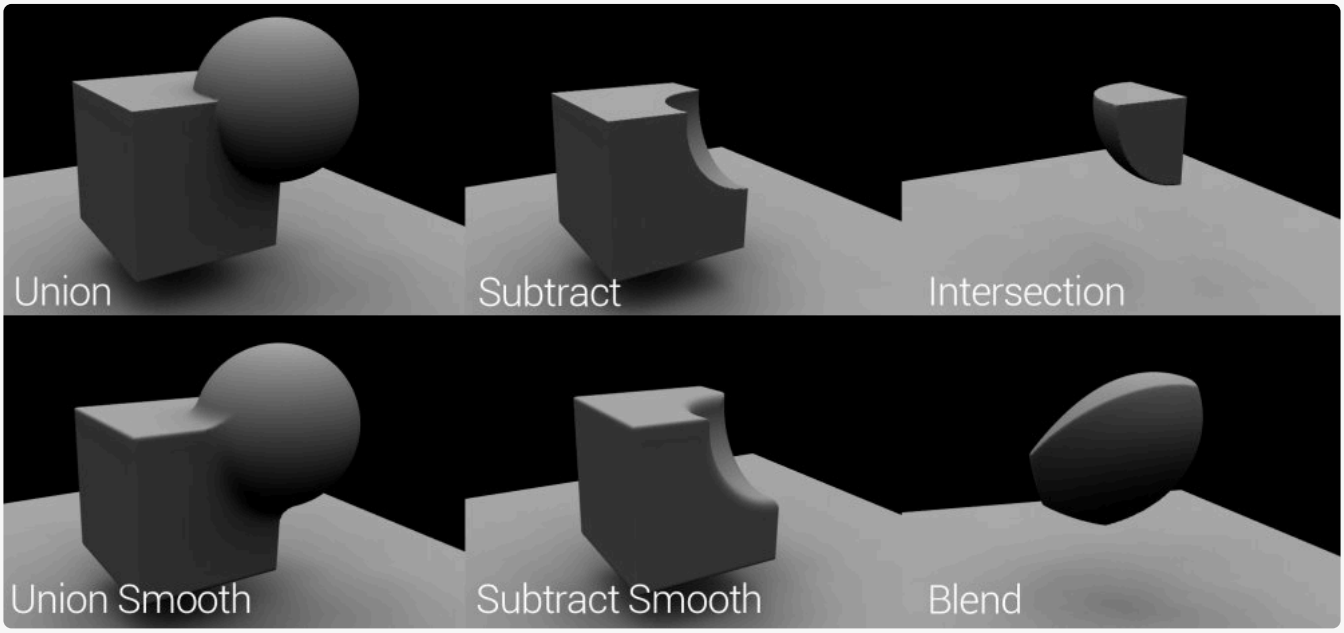
This option allows to perform Boolean operations between the different generators.



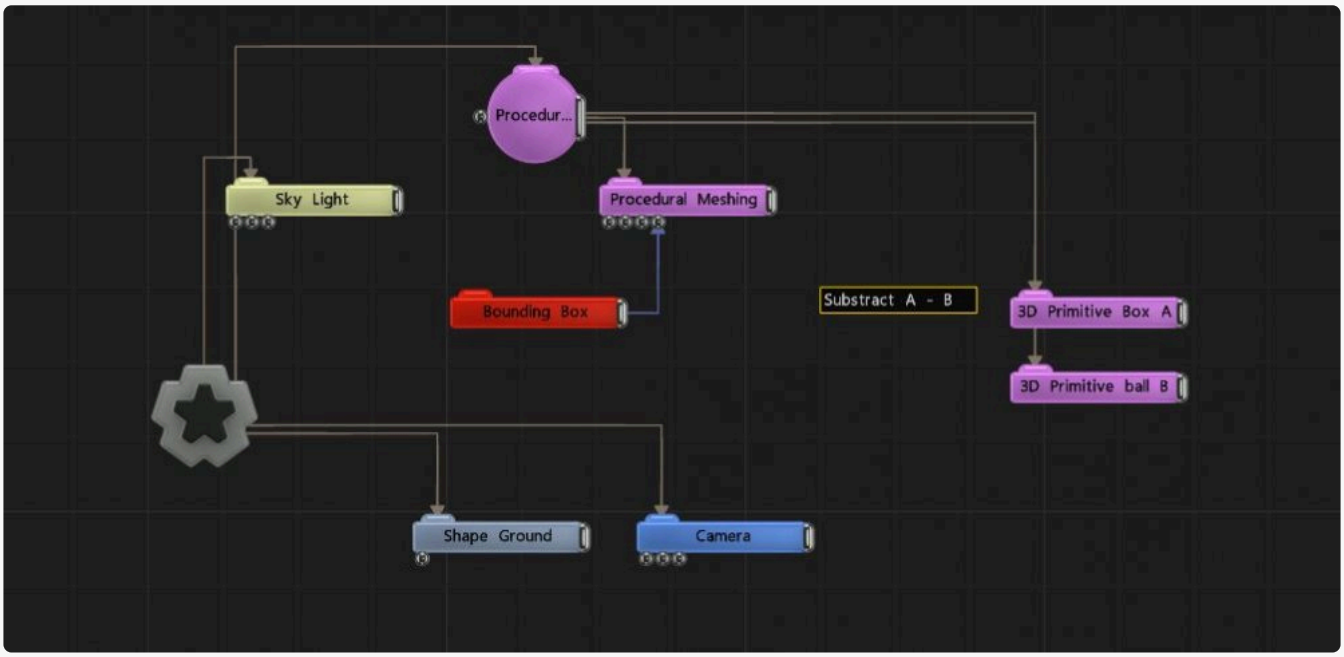
CSG Mode	These options change how a this node combines with the rest of the procedural system. • Replace, Replaces the previous procedural system. • Union, Adds the new procedural to the old procedural system. • Intersection, Interesects the new procedural with the old procedural. • Subtract, Subtracts the new procedural from the previous procedural system. • Blend, Blends between both procedurals – driven by the CSG Blend Weight. • Union Blend, A combination of Union and Blend – driven by the CSG Blend Weight. • Smooth Union, The new procedural is added to the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Smooth Subtract, The new procedural is subtracted from the old, and smoothing is applied to the outcome. Driven by the CSG Blend Weight. • Offset, Adds one procedural ontop of the other another. • Custom Code, allows you to enter your own expression code.

CSG Blend Weight	How much the new procedural blends with the old procedurals, depending on the CSG Blend Mode.

CSG OPERATION

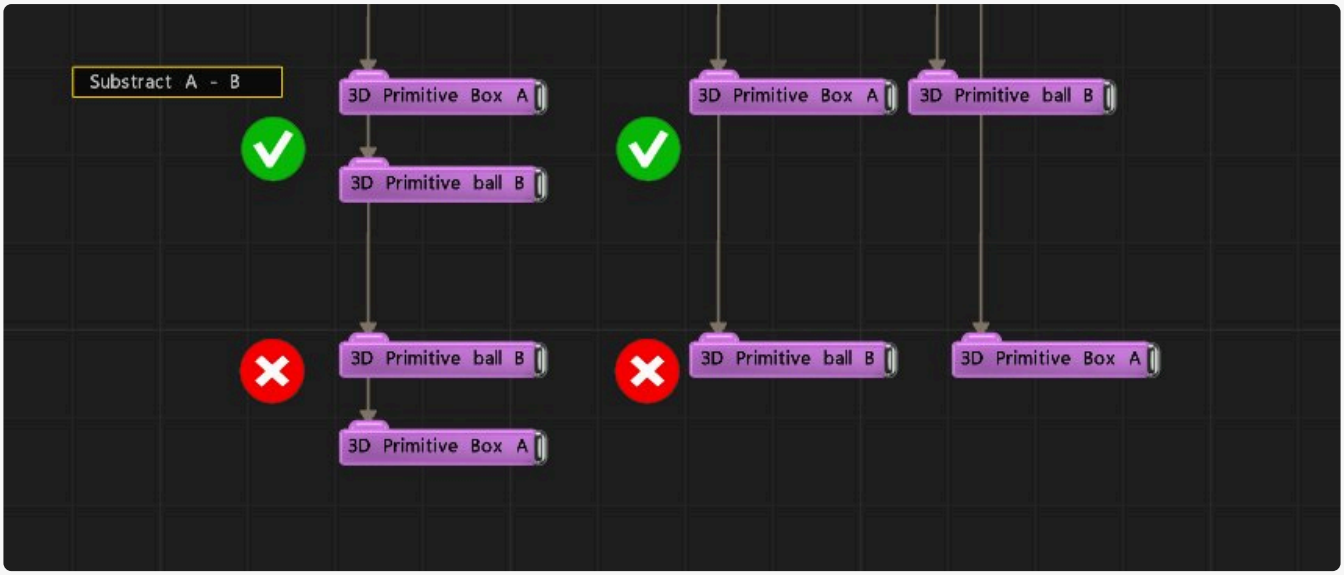


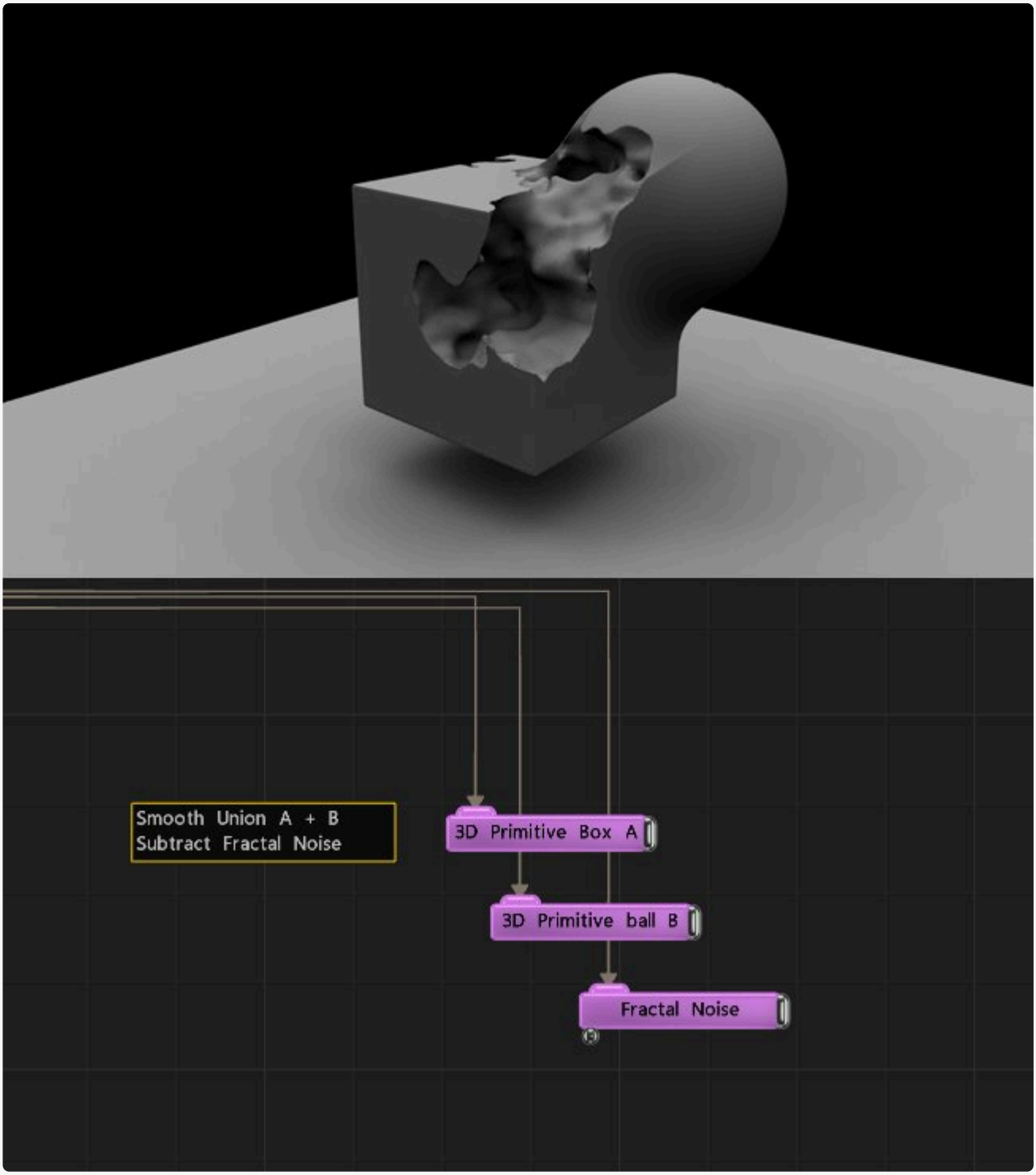
CSG OPERATION Nodegraph

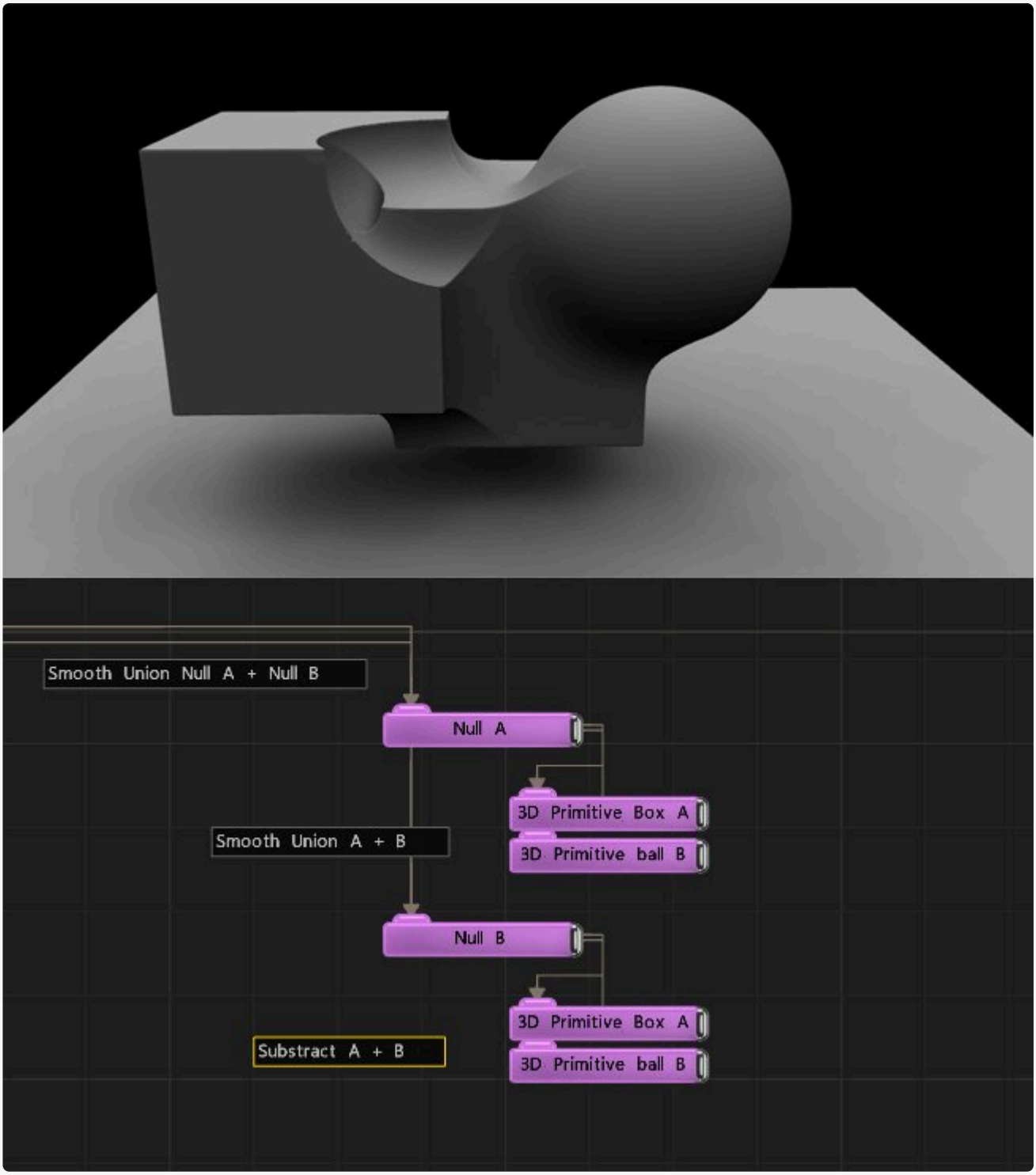


Order Of Operations

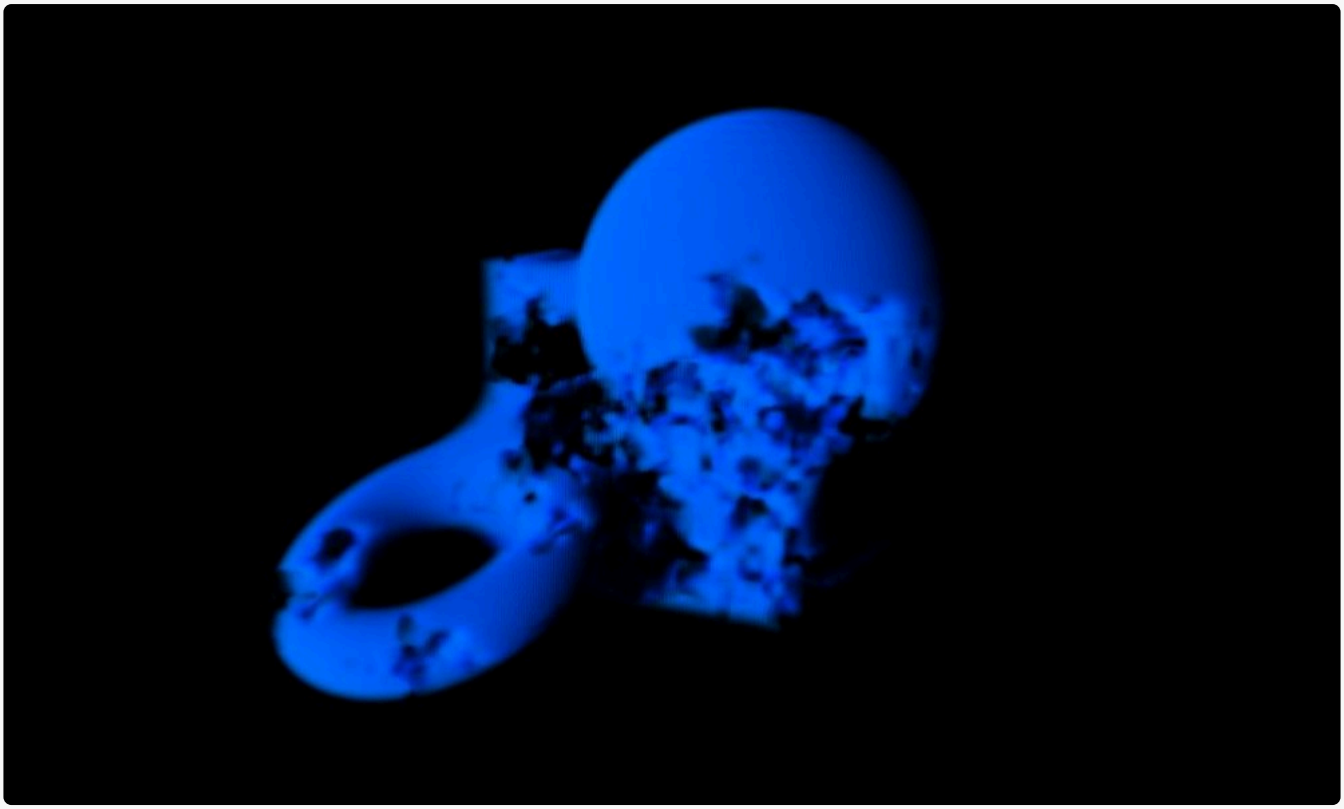
The order of operations for processing CSG operation is decided based on the Y position of the node in the nodegraph, or the X position if the Y values are the same.


Substract A - B
3D Primitive Box A
3D Primitive ball B
3D Primitive ball B
3D Primitive Box A
3D Primitive Box A
3D Primitive ball B
3D Primitive ball B
3D Primitive ball B
3D Primitive Box A

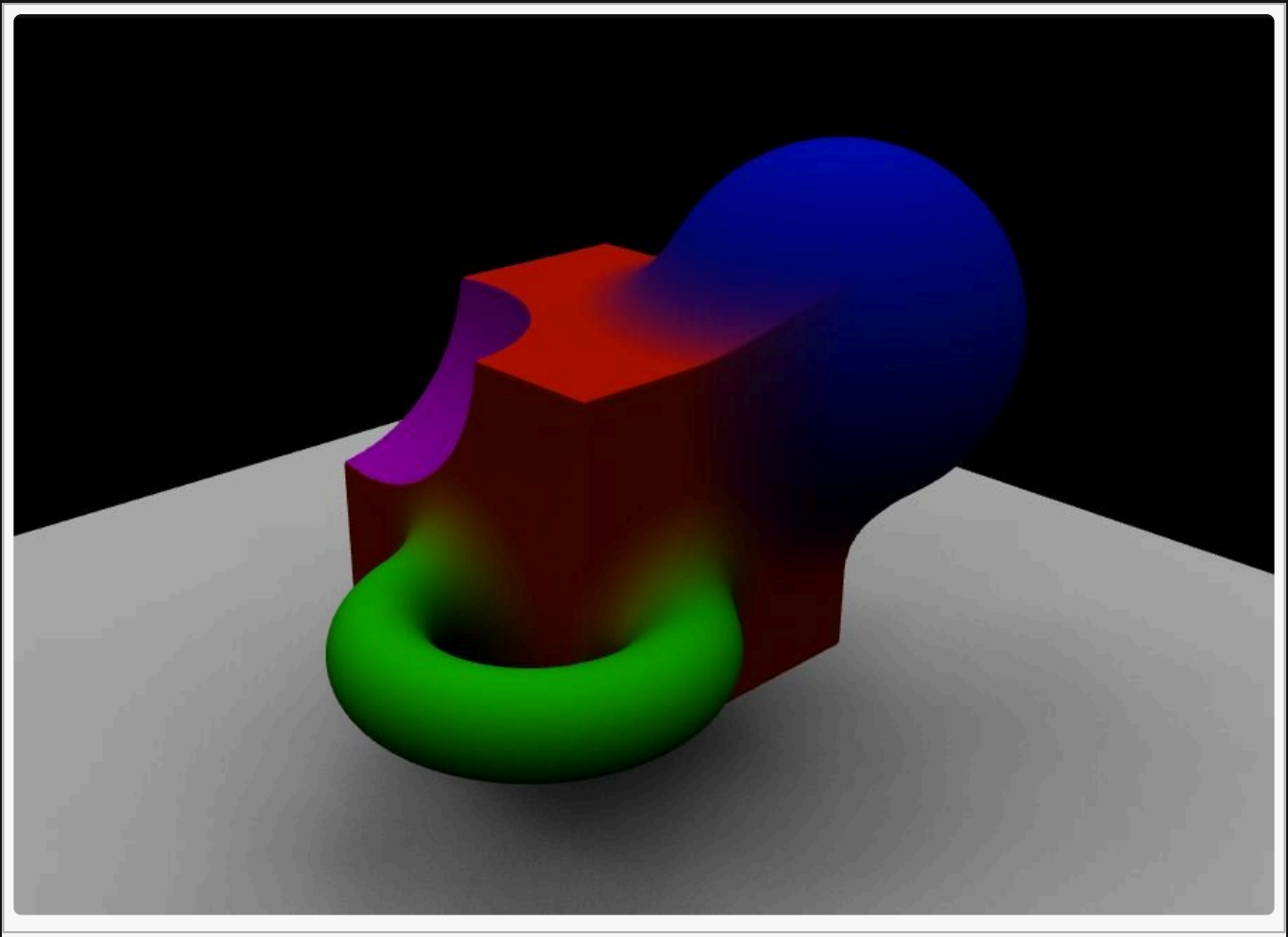

Smooth Union A + B
Subtract Fractal Noise
3D Primitive Box A
3D Primitive ball B
Fractal Noise



CSG operations works the same way for the Volume Generator .



Affect Color
This option only takes affect if the renderer node being used for this procedural supports it. For example, the Generate Colours checkbox in the Procedural Meshing node must be enabled. CSG Blend Weight is used into account for color blending



Ray Tracing

Method

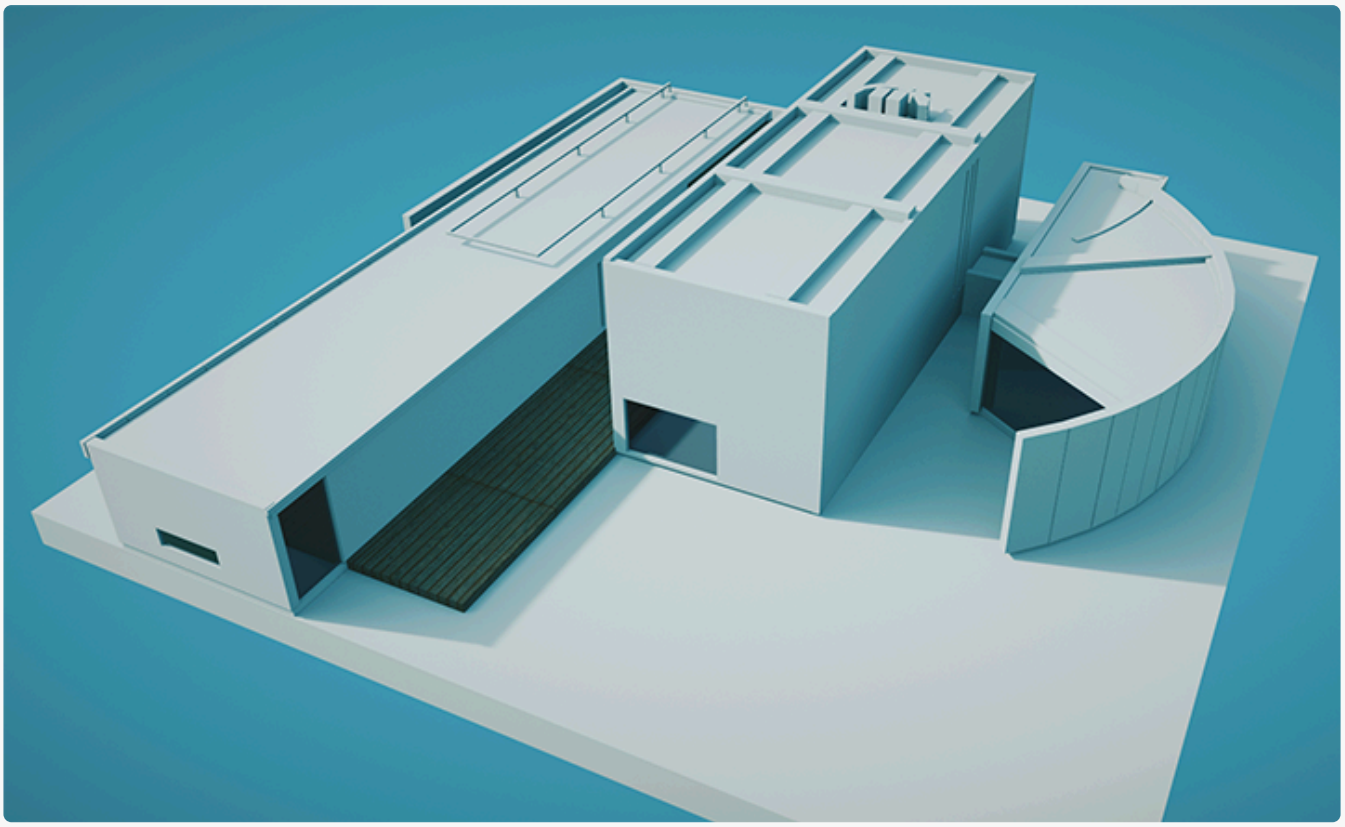
Ray tracing is a more accurate “photorealistic” rendering technique for calculating lighting, shadows and reflections in a 3D scene.

Raytracing brings to Notch a number of features not previously possible with the traditional renderer and greatly improves others. Accurate one-bounce reflections, area lights can cast shadows and spot, Omni & skylight quality is improved greatly by using raytraced shadows.

Ray tracing in Notch is modular: you can add it to existing projects and turn on select features at will. It does not completely replace the existing renderer & node set, but augments it and works with it.

In order to use ray tracing in a layer, the “Ray Tracing” checkbox must be ticked on the Root Node. There is an additional “Dynamic” option which, if unchecked, will cause the data structure to never be updated – a useful optimisation for entirely static scenes only.

Ray Traced Skylight Baked Exterior Example | Ray Trac



Ray Traced Skylight, RT Mirror reflections and RT Denoiser Example

Important

One of the main disadvantages of using raytracing is performance. Ray tracing may work in real-time for some suitable scenes but can quickly reduce performance if used incorrectly. When using ray tracing in realtime scenes it will be down to the user to set up their scene optimally. Notch has developed tools to enable users to use raytracing in real-time.

In order to take advantage of the improved render quality offered by ray tracing even in real-time targeted scenes, a new baking workflow to cache lighting to textures has been developed.

RT mirror reflection is an optimal single bounce ray trace reflection which can be used to simulate mirrors, reflections and specular on any raytraced enabled material/surface. This node is best-used for scenes that need to run more optimally at higher framerates.

RT Skylight enables you to reduce the number of bounces and the denoise has similar parameters where both the bounce and filter iterations can be reduced.

Ray Tracing nodes

Lights

“Ray Traced” options are now available on Sky Light, Area Light, basic spot/omni Light and Directional Light nodes. When this option is enabled, the light is rendered using ray tracing rather than traditional shadow maps.

Ray tracing is generally slower than using shadow maps – but in some cases may actually be faster, depending on scene complexity. Limit the attenuation of lights to improve performance.

Reflections

The RT Mirror Reflections node uses ray tracing to produce a one-bounce sharp mirror reflection on shiny surfaces. This is likely to have a significant performance hit but may be usable even in real-time projects. Rays are only cast for reflective pixels on the screen, so reducing the size of reflective surfaces may improve performance.

Mirror reflections in most cases do not require denoising or refining as they’re sharp; one ray per pixel is sufficient. The exception is when mirror reflections see bounces from lights with ray traced noisy shadows. To enable denoising/refining on the Mirror Reflections there is a checkbox on the node.

Materials

A new set of material nodes have been added which simplify the setup of common surface types, including when used in ray tracing scenes.

Refining & Denoising

Ray tracing is computationally intensive and some effects – such as soft area light shadows – rely on lots and lots of rays being cast per pixel. In order to make this viable in real-time or while editing interactively, Notch typically casts very few rays per pixel but uses denoising or refining to aggregate the results over time.

Refining

Refining simply rerenders the same view repeatedly but with different ray directions, and averages the results to create a smooth, accurate render. If the play head, the camera, or any objects move, the refining resets and the aggregated result is lost. A new button in the GUI has been added which allows you to toggle infinite refining on and off.

Turn on refining when using real-time ray tracing. Refining is not needed when using the bake lighting to object node.

The new Refine Render button in the GUI.

Denoising

Denoising attempts to handle moving objects and views using motion and spatial coherence. This is imperfect; it can lead to ghosting and bleeding artefacts. But it allows a moving scene to appear refined.

RT Denoiser

The RT Denoiser node is used to control denoising parameters throughout the scene. With no RT Denoiser present, the default behaviour is Refining.

Baking

Notch allows you to take static elements in your scene and bake various forms of view-independent diffuse lighting, shadows and ambient occlusion. By removing these calculations for these static elements you can achieve very high-quality lighting looks and even combine baked lighting with other dynamic real-time lights.

This works for any lighting in Notch – but is particularly applicable with slower, higher quality raytraced lighting setups.

The Bake Lighting To Object node allows lighting to be cached for a single 3D object.

Baking only works on static geometry and requires that your imported meshes have well-formed UV maps to bake too. Note that this renders it unsuitable for any generative meshes (Shape 3D, Text etc), cloned objects, dynamic objects or deformed objects.

Optimising Raytracing

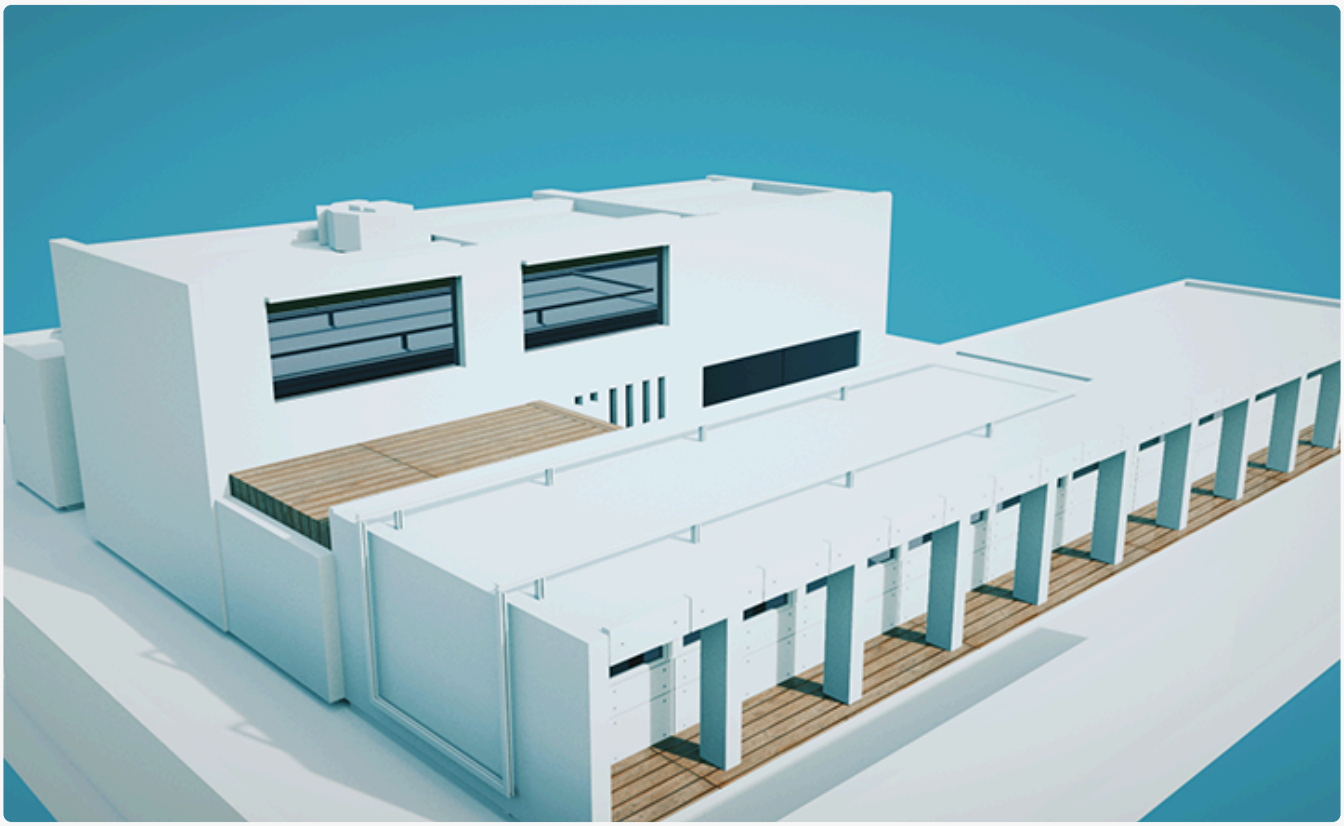
We have developed some methods to help optimised ray traced scenes. Below is an example utilising several of these techniques.
The sample comprises of two layers:

Layer 1 – RT
A simple raytraced scene that is running at 15fps (on a GeForce 1080ti)

Layer 2 – RT Optimised
The same simple scene which has been optimised and running at over 70 fps (on a GeForce 1080ti)

The first step is to bake the ray-traced lighting of the scene into lightmaps attached to the 3D meshes. In doing this we are able to turn off the skylight as well as remove the denoiser node.

Step two is to utilise the RT Mirror reflection node because it's a cheap one sample ray trace node.

Raytraced scene – This scene runs at 15 fps	Optimise
	

- Bake RT lighting in static scenes.
- Reduce the number of bounces and filter iterations on RT skylights and denoise nodes.
- Hook RT enabled meshes into the RT reflection nodes to isolate/reduce the number of meshes that are real-time raytraced.

RT Denoiser

Method

Ray tracing is computationally intensive and some effects – such as soft area light shadows – rely on lots and lots of rays being cast per pixel. In order to make this viable in real-time or while editing interactively, Notch typically casts very few rays per pixel but uses denoising or refining to aggregate the results over time. The RT Denoiser node is used to control denoising parameters throughout the scene – not to actually perform the denoising process itself.

Denoising exploits spatial and temporal coherence via filters to smooth out the noisy image. Spatial filtering involves moving and blurring the images static sections, while temporal denoising averages frames over time. Spatial filtering may make the render appear blurrier; temporal filtering may make it appear to ghost between frames as things move. The “Spatial Filter Iterations” parameters set the amount of spatial filtering. The “Temporal Filter” parameters control the amount of temporal filtering, and the “Movement Sensitivity” parameters make denoising use less previous frame data if things are moving. Max Refinement parameters control the number of frames in the history that will be used to smooth the current frame.

There are multiple sets of parameters, separated into direct and indirect, diffuse and specular. Diffuse lighting is usually less sensitive to movement of the camera as diffuse lighting is view independent – so it may be possible to reduce motion sensitivity. Diffuse lighting is also often softer so it may be possible to increase spatial filtering. Indirect diffuse lighting is often less visible but noisier, so may be able to be filtered more heavily.

With no RT Denoiser present and active in the scene, the default behavior is Refining.

Without Denoising	With Denoising

Direct Denoising

Name	Description
Direct Denoising Enabled	Enable denoising for direct light
Diffuse Spatial Filter Iterations	How many iterations of the spacial filter function are run on the diffuse light.
Diffuse Temporal Filter	How much the temporal filter applies to the direct diffuse lighting.
Diffuse Max Refinement Iterations	Maximum number of temporal filter iterations that can be used for the diffuse light.
Diffuse Movement Sensitivity	How sensitive the direct diffuse denoising is to movement in the scene.
Specular Spatial Filter Iterations	How many iterations of the spacial filter function are run on the specular light.
Specular Temporal Filter	How much the temporal filter applies to the direct specular lighting.
Specular Max Refinement Iterations	Maximum number of temporal filter iterations that can be used for the diffuse light.
Specular Movement Sensitivity	How sensitive the direct specular denoiser is to movement in the scene.

Bounce Denoising

Name	Description
Bounce Denoising Enable	Enable denoising for indirect bounce light
Bounce Diffuse Spatial Filter Iterations	How many iterations of the spacial filter function are run on the bounce diffuse light.
Bounce Diffuse Temporal Filter	How much the temporal filter applies to the bounce diffuse lighting.
Bounce Diffuse Max Refinement Iterations	Maximum number of temporal filter iterations that can be used for the bounce diffuse light.
Bounce Diffuse Movement Sensitivity	How sensitive the bounce diffuse denoising is to movement in the scene.
Bounce Specular Spatial Filter Iterations	How many iterations of the spacial filter function are run on the bounce specular light.
Bounce Specular Temporal Filter	How much the temporal filter applies to the bounce specular lighting.
Bounce Specular Max Refinement Iterations	Maximum number of temporal filter iterations that can be used for the bounce specular light.
Bounce Specular Movement Sensitivity	How sensitive the bounce specular denoiser is to movement in the scene.

Inputs

There are no inputs for this node.

Outputs

There are no outputs from this node.

RT Mirror Reflection

Method

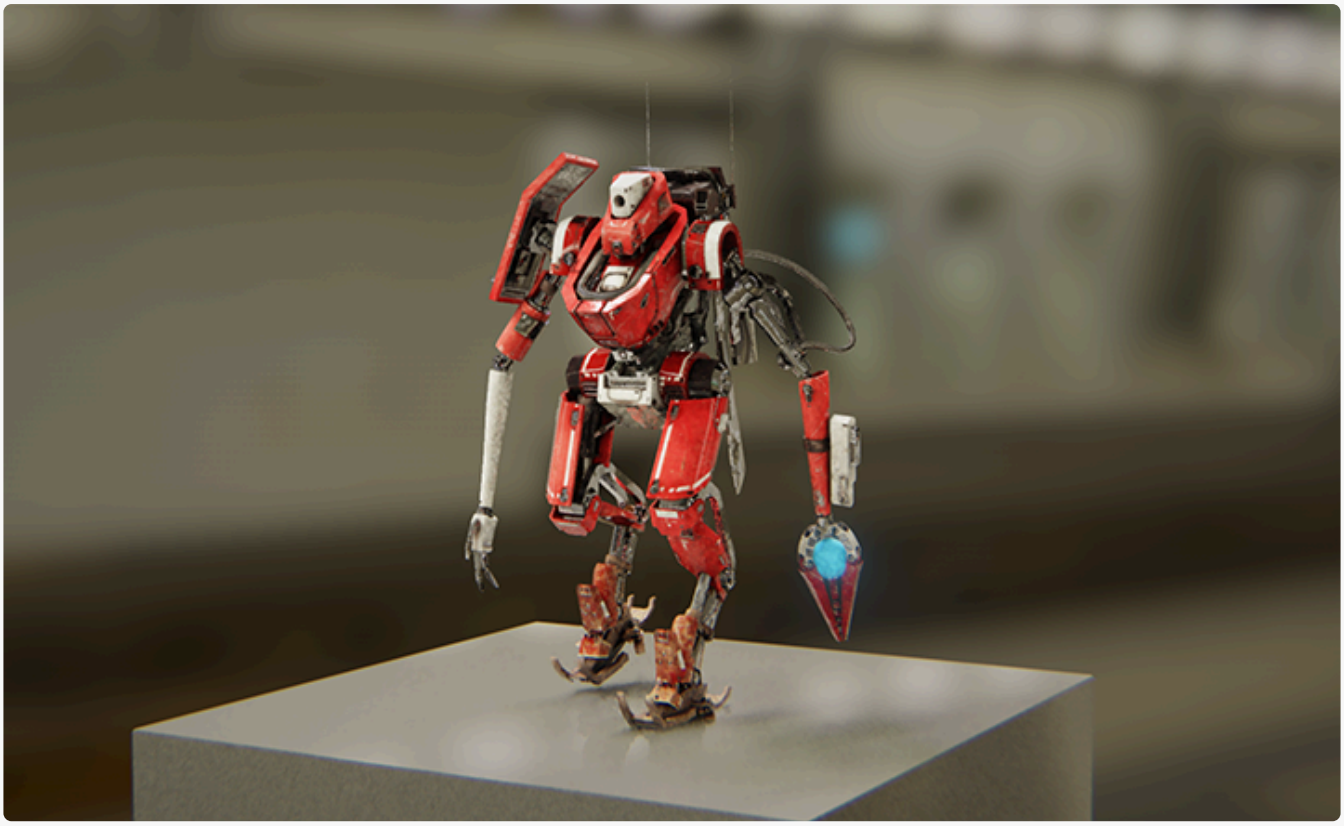
RT Mirror Reflection is the fastest raytracing reflections node with only a single, sharp ray traced bounce supported.
This can be used to simulate mirrors, reflections and specular on any raytracing enabled specular material/surface. Rough reflections are not supported by this node.

As it only uses one bounce, secondary bounces such as a mirror reflecting another mirror will not work.
This node is best-used for scenes that need to run more optimally at higher framerates.

Raytracing will need to be enabled on the root node for the RT Mirror Reflection node to work.

Raytraced reflections will need to be enabled on the material node of 3D objects that will utilise raytraced mirror reflections.

A scene using RT Mirror Reflections



A scene using RT Mirror Reflections

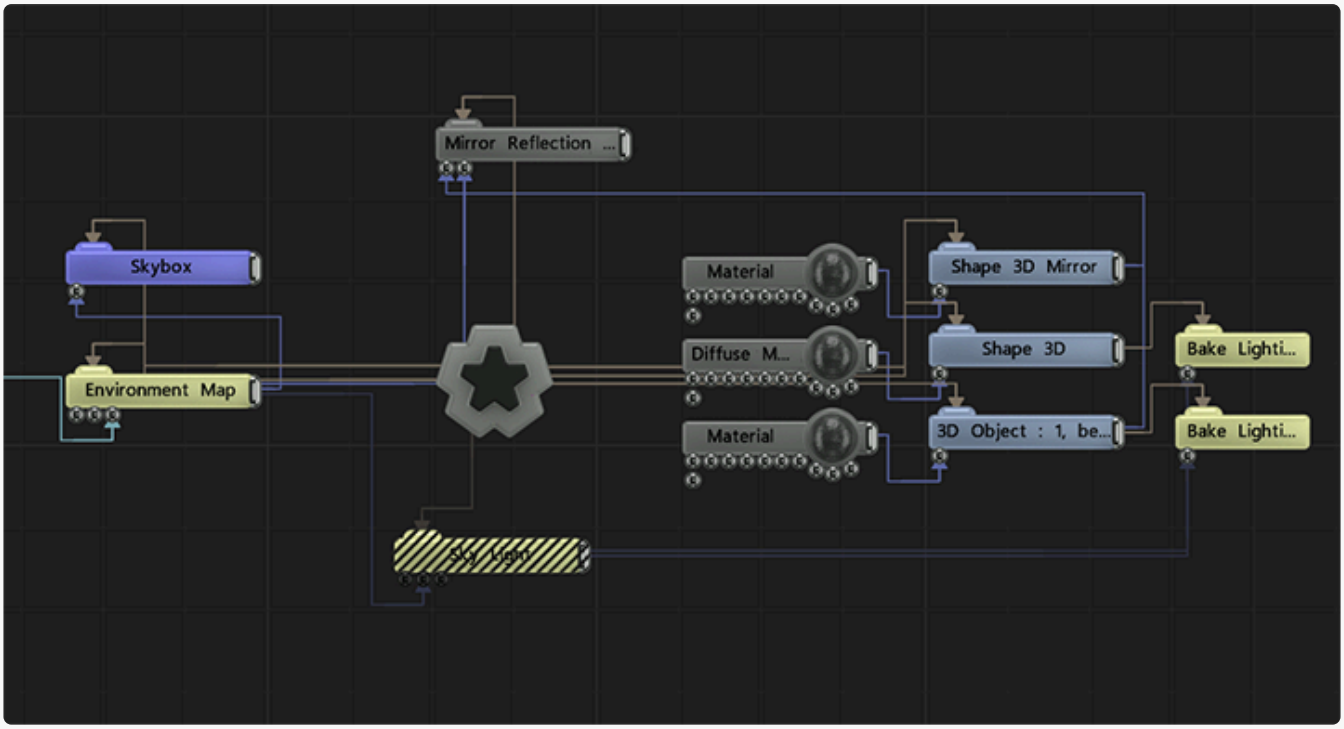
Sample

RT Mirror Reflection node

RT_MirrorReflection.dfx

This sample uses light-baked assets in the scene.

RT Mirror Reflection example nodegraph



Attributes

Name	Description
Path Tracer Shader	Import a shader source code file as a resource.
Denoising / Refinement	Toggles on and off denoising / refinement.
Ray Bias	Sets the bias of the rays.
Sample clamp	Clamps the reflectiveness of the rays.

Environment Map

Name	Description
Environment Brightness	The brightness of the environment map.
Environment Specular	Toggles on and off environment specular.
Environment Filtering	Toggles on and off environment filtering.

Inputs

Name	Description	Typical Node Input
Object Nodes	Only reflect particular objects in the scene. Great for making vampires.	3D Object

Environment Map	Add an environment map to be reflected on the object surface.	Environment Map

Outputs

There are no outputs from this node.

Scripting

Method

Scripting nodes allow for project behaviour to be scripted using Javascript.

Javascript Node

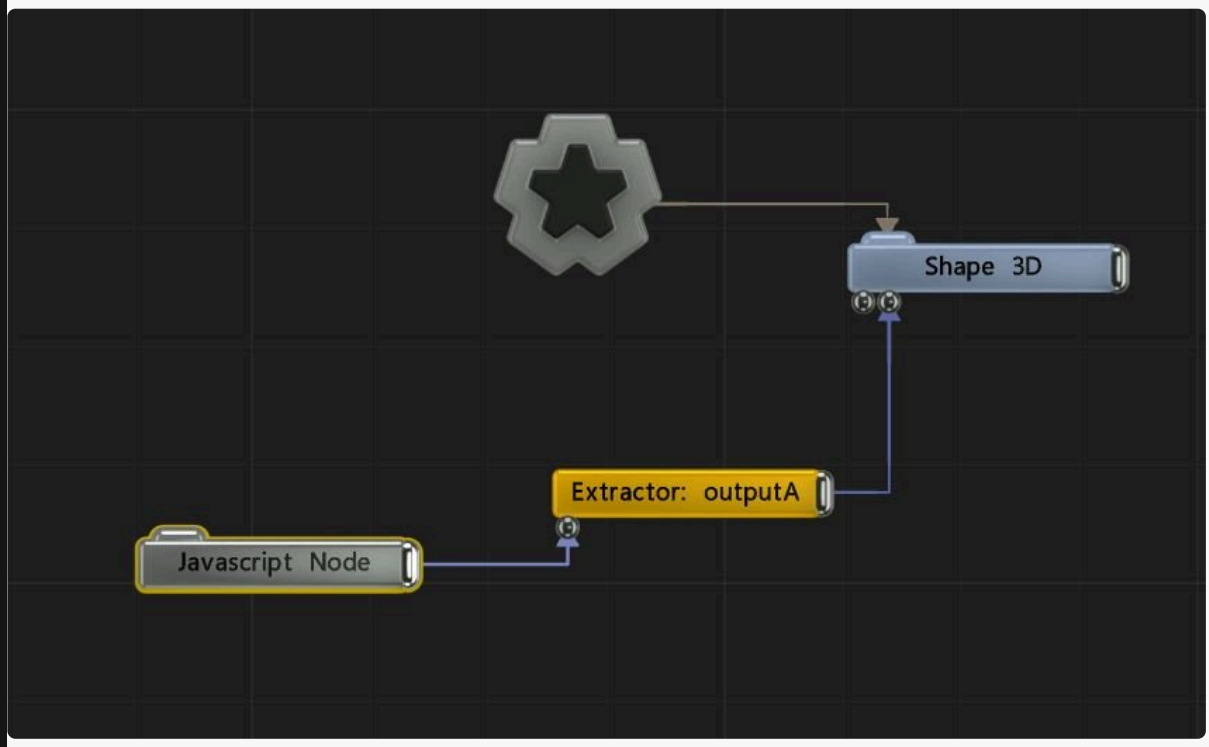
Method

This node allows a custom JS script to manipulate parameters in the scene and other functions.

For a full breakdown see the Javascript Section.

Nodegraph

Example of extracting output values from the Javascript Node.



Attributes

Name	Description
Javascript File	A script resource
Add Global Input	Add a parameter that can be sent to the JS script as global variables every frame.
Add Global	Add a parameters that can be received from the JS script as global variables every frame. You can use these values in other nodes by using the Extractor Node on the Javascript Node.

Output	

Only numeric parameters are supported at present.

Inputs

These are defined by the Input Parameters.

Outputs

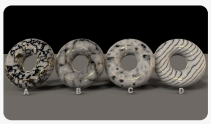
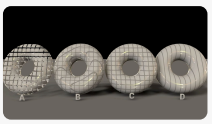
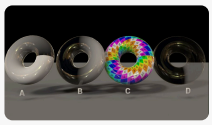
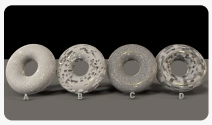
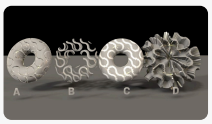
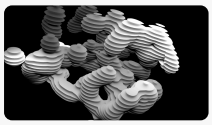
These are defined by the Output Parameters.

Shading Nodes

Method

These nodes change the ways that material nodes apply to an objects, and how their materials are shaded on the object surface.

Gallery

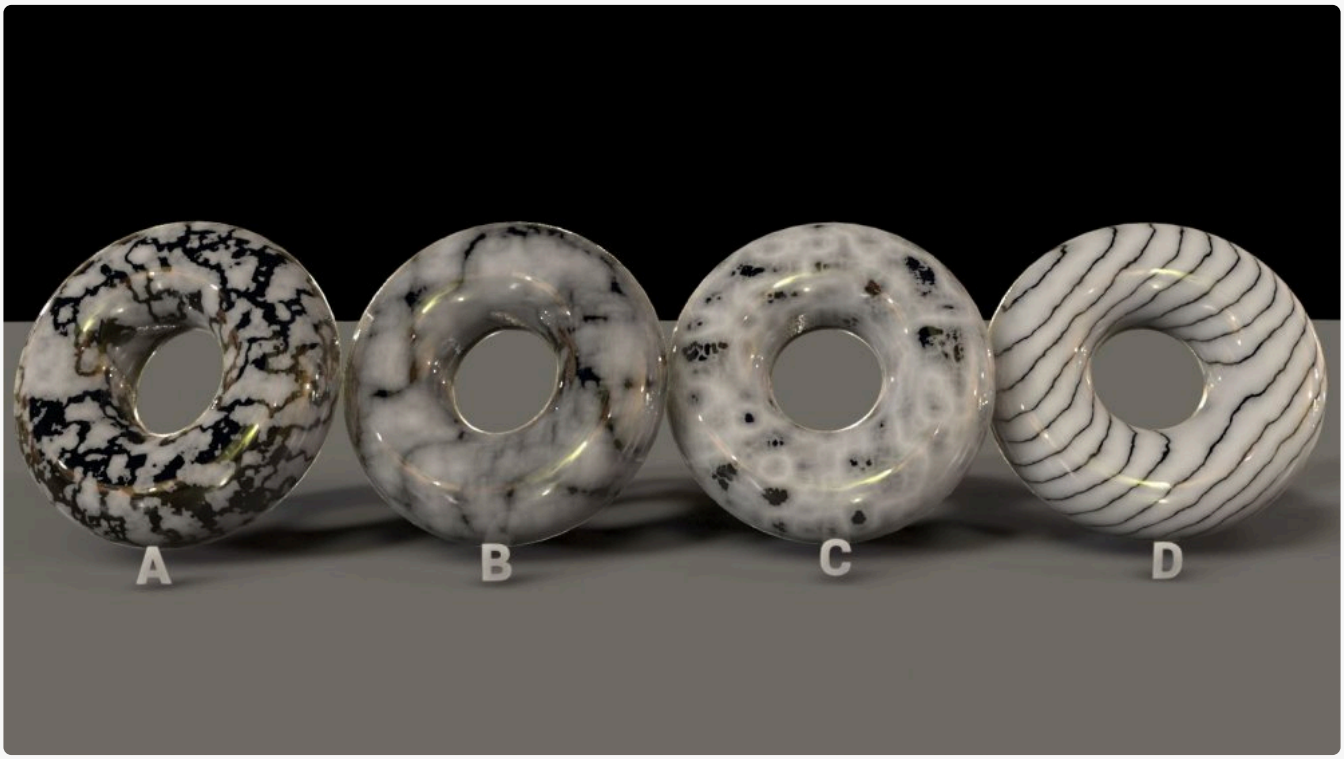
					
Noise Fractal Shading	Grid Shading Node	Gradient Shading Node	Noise Shading Node	Texture Shading Node	Procedural Shading Node

Fractal Noise Shading Node

Method

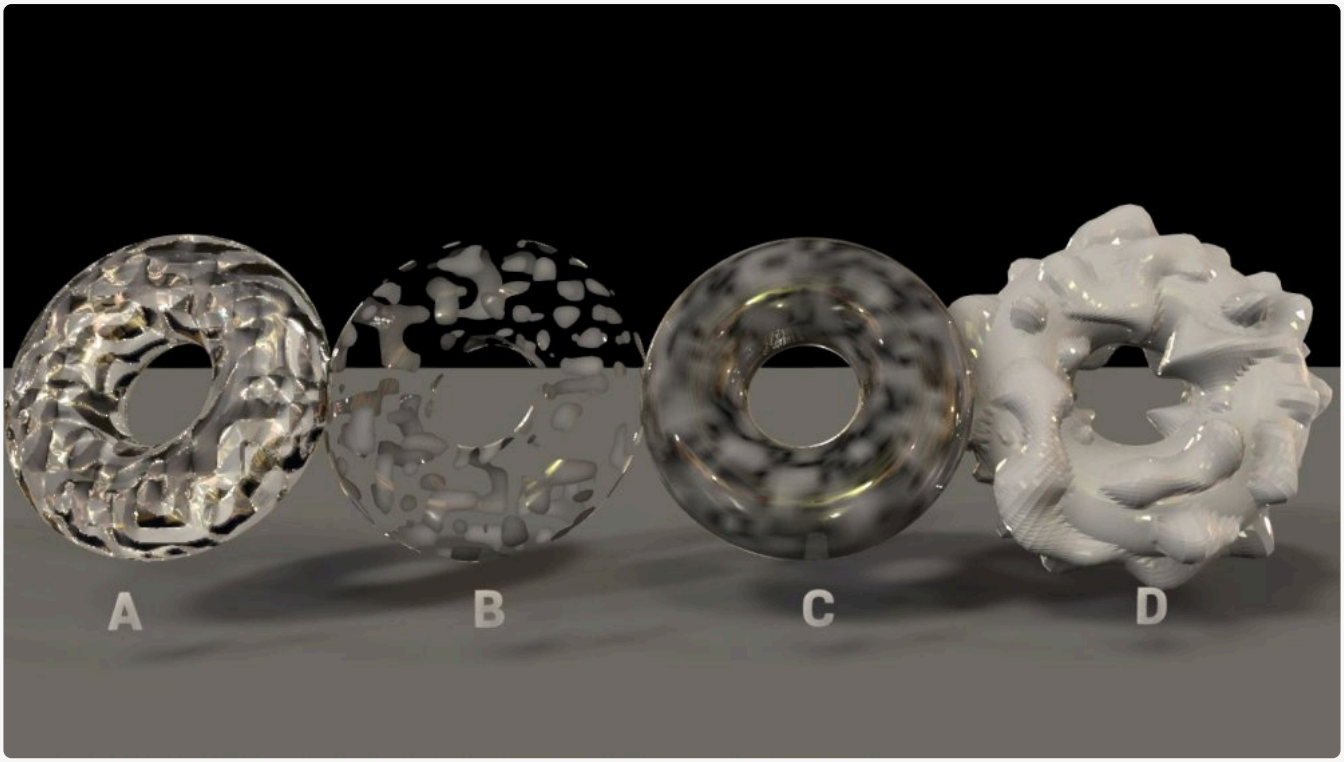
This node applies fractal noise to the shading of a material node. This can be used to deform, recolour and change the lighting on a mesh.

Fractal Type



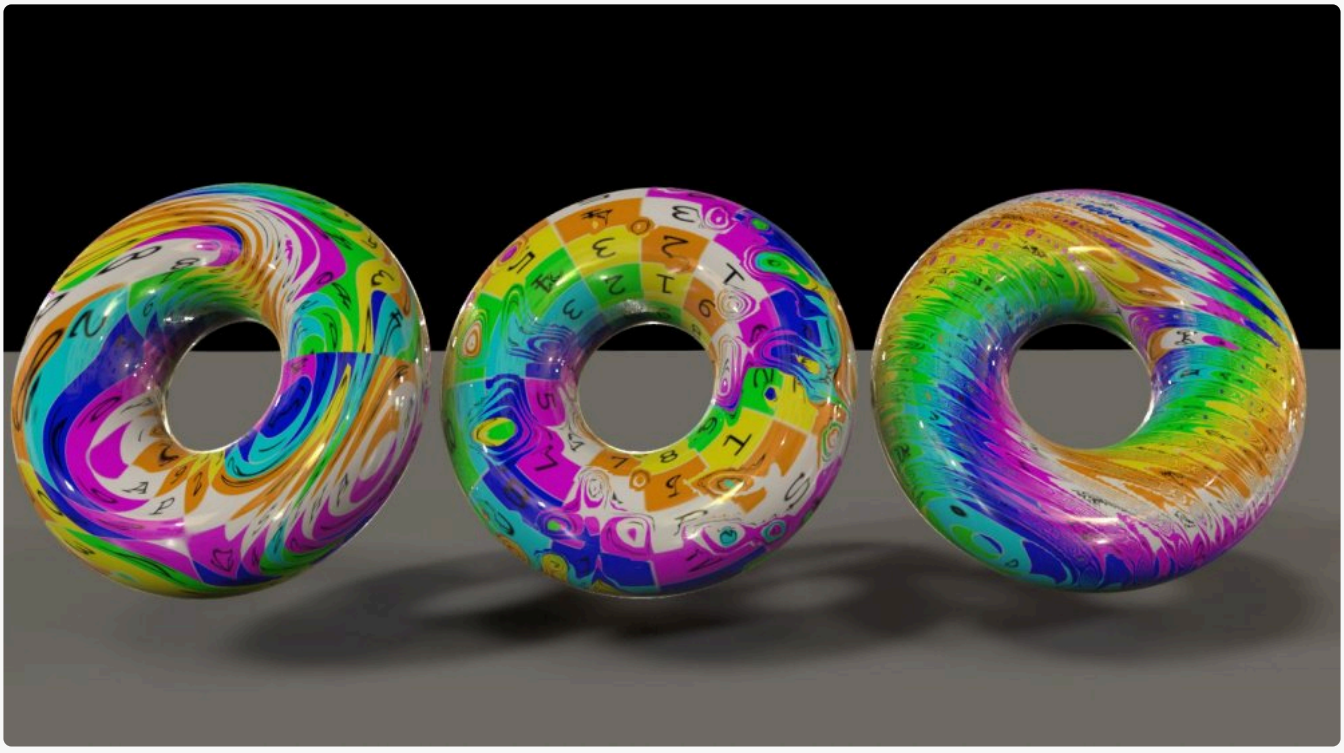
A FBM fractal – B Turbulence – C Ridged Multi Fractal – D Marble

Output



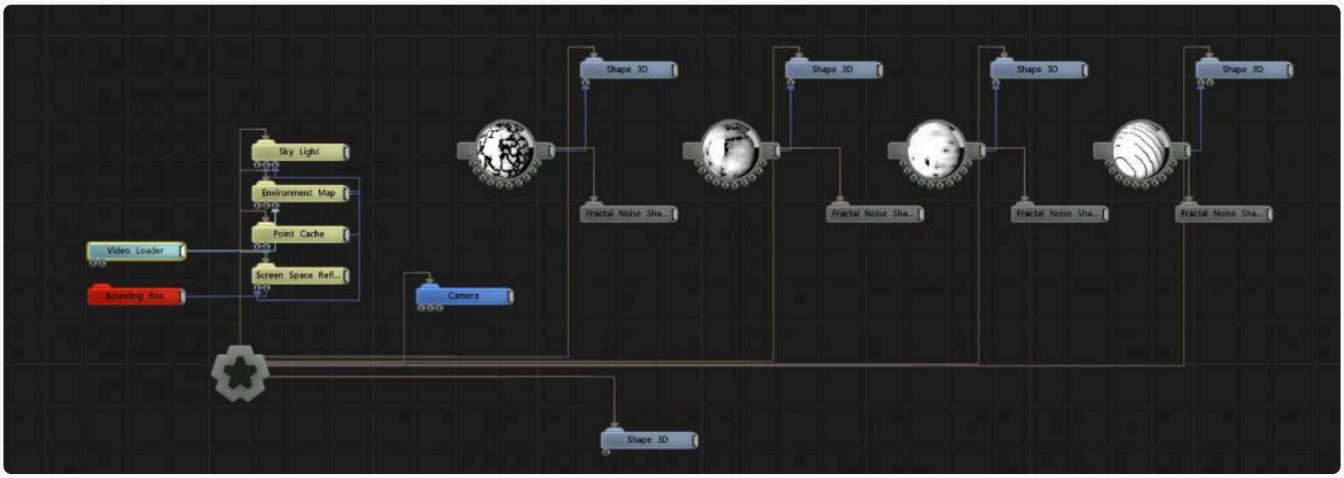
A Output channel normal – B Output channel RGBA – C Shader pass vertex – D OutPut channel position, Shader passe vertex

Texture Coordinate



OutPut channel texture coordinate, Shader pass vertex

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Shading Node Attributes

Name	Description
Mapping Type	What kind of mapping is to be applied. • World Position, the position of each vertex relative to the scene world space (most commonly used with Spherical, Planar, Perspective mappings). • Object Local Position, the position of each vertex relative to the objects local space. • View-Space Position, the position of each vertex relative to the cameras view.

	• Texture Coordinate, the position of each vertex relative to the objects texture coordinates. • World Normal, the world normals after transformations are applied.
Output Channel	Which channel will be affected by the fractal noise. • Colour RGBA • Colour RGB • Colour Alpha • Normal • Texture Coordinate • Position
Blend Mode	How the new texture or deformation will blend with the current object. See Blend Modes for more details.
Shader Pass	How the final modified shading is applied to the shape. • Vertex, The shading is only changed from vertex to vertex. • Tessellation, The shading is applied as the model is tessellated. only functions with Tessellation Enabled in connected objects. • Pixel, The shading is applied per pixel in screen space, so it will always be applied optimally.
Blend Amount	The amount the generator is blended with the output.

Fractal Noise Attributes

Name	Description
Noise Type	• FBM. • Turbulence. • Ridged Multifractal. • Marble.
Noise Threshold	Minimum value threshold for where the noise will be generated.
Ramp Power	Change how the gradient changes between the high and low values.
Scale	Scale the size of any noise generated.
Offset Amount	Offset the the minimum value.
Num Octaves	How many time the noise generation is iterated.

Inputs

Name	Description	Typical Node Input

Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

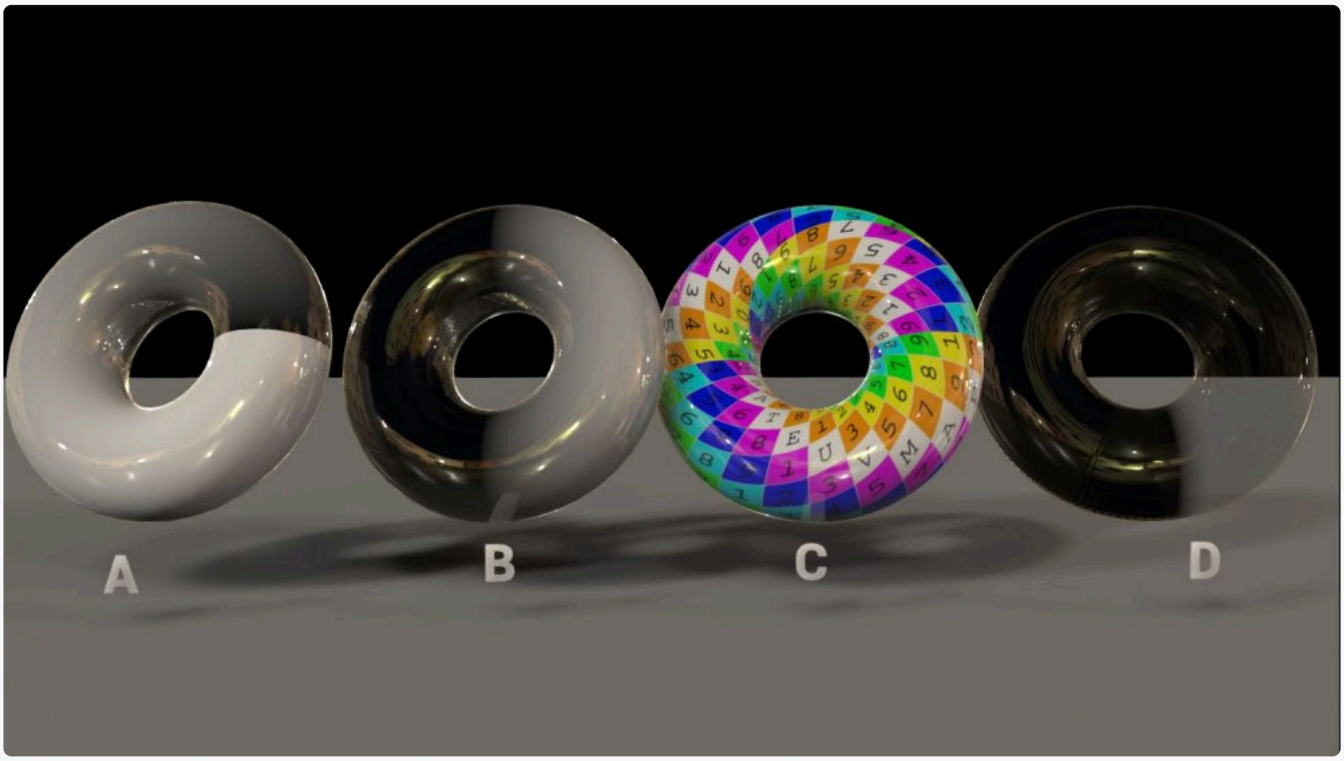
Can be chained with other Shading nodes for more complex shading systems.

Gradient Shading Node

Method

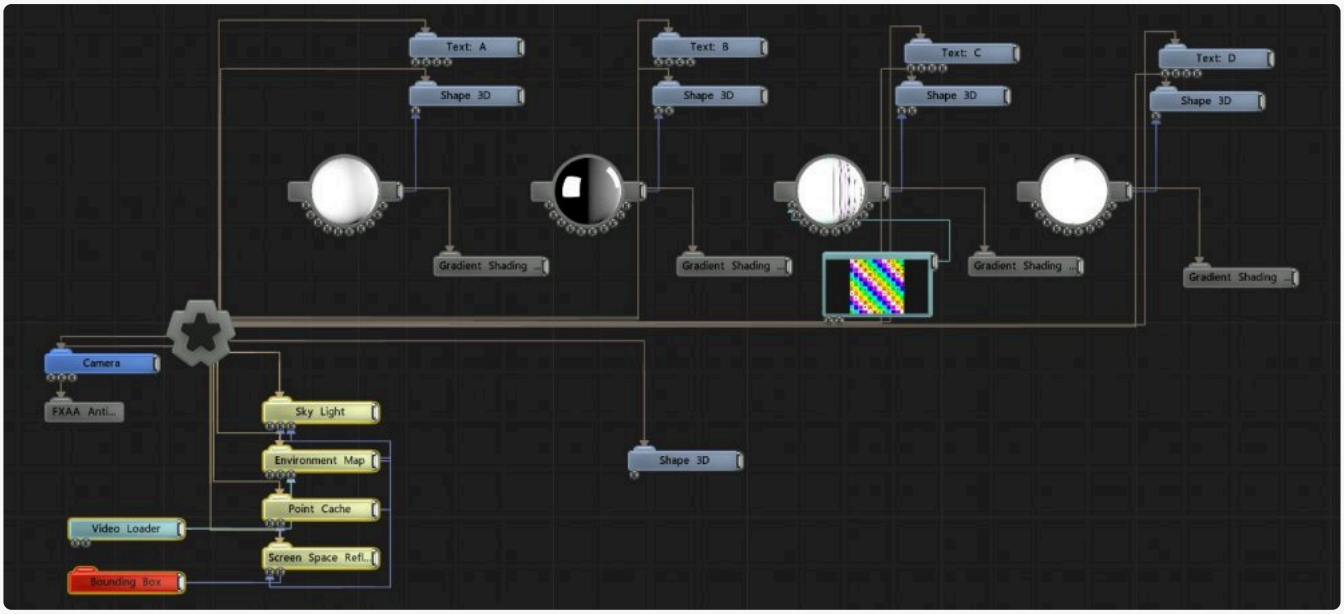
This node applies a gradient to the shading of a material node. This can be used to deform, recolour and change the lighting on a mesh.

Example



A Mapping type Object coordinate – B Mapping type Object Output channel local position – C Output channel Texture coordinate Shader pass vertex – D Output channel RGBA with alpha blended material

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Shading Node Attributes

Name	Description
Mapping Type	What kind of mapping is to be applied. • World Position, the position of each vertex relative to the scene world space (most commonly used with Spherical, Planar, Perspective mappings).

	• Object Local Position, the position of each vertex relative to the objects local space. • View-Space Position, the position of each vertex relative to the cameras view. • Texture Coordinate, the position of each vertex relative to the objects texture coordinates. • World Normal, the world normals after transformations are applied.
Output Channel	Which channel will be affected by the fractal noise. • Colour RGBA • Colour RGB • Colour Alpha • Normal • Texture Coordinate • Position
Blend Mode	How the new texture or deformation will blend with the current object. See Blend Modes for more details.
Shader Pass	How the final modified shading is applied to the shape. • Vertex, The shading is only changed from vertex to vertex. • Tessellation, The shading is applied as the model is tessellated. only functions with Tessellation Enabled in connected objects. • Pixel, The shading is applied per pixel in screen space, so it will always be applied optimally.
Blend Amount	The amount the generator is blended with the output.

Gradient Attributes

Name	Description
Min Position	Minimum gradient position.
Max Position	Maximum gradient position.
Power	Change the gradient of the falloff.
Axis	Axis the gradient applies along.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

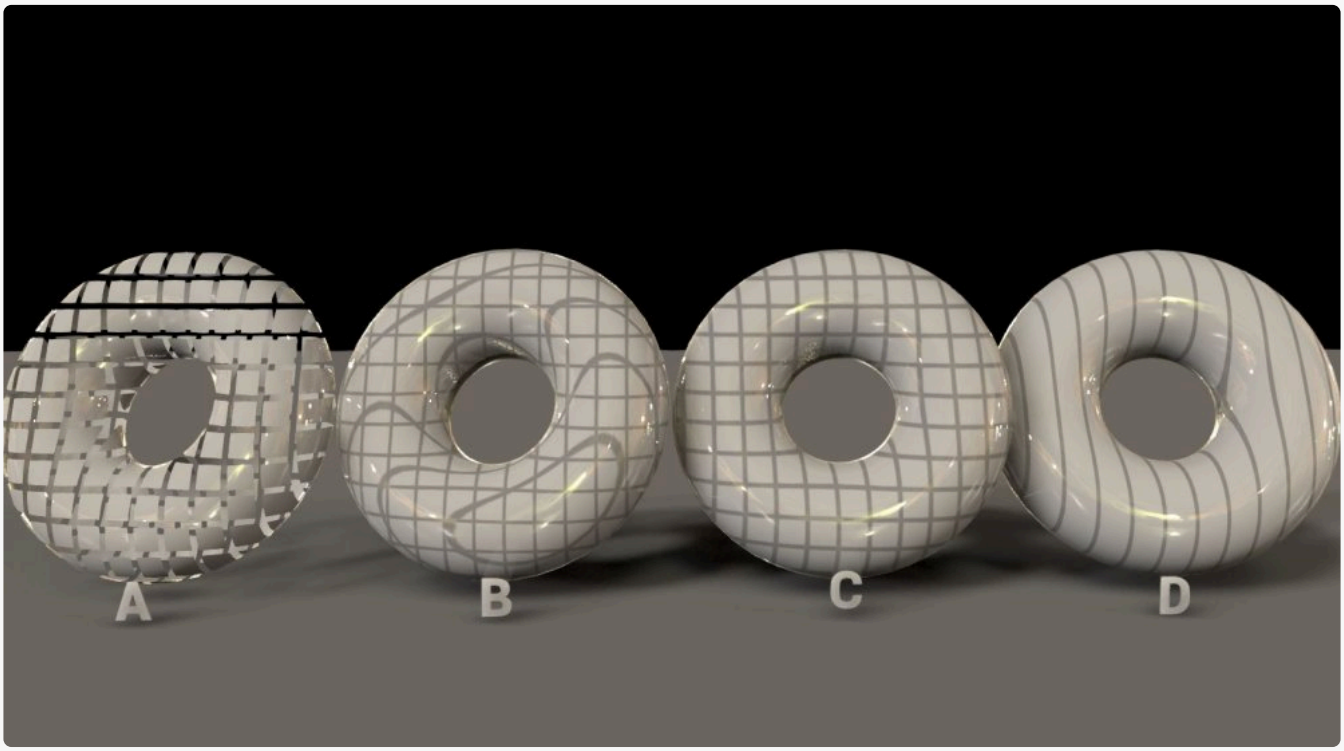
Can be chained with other Shading nodes for more complex shading systems.

Grid Shading Node

Method

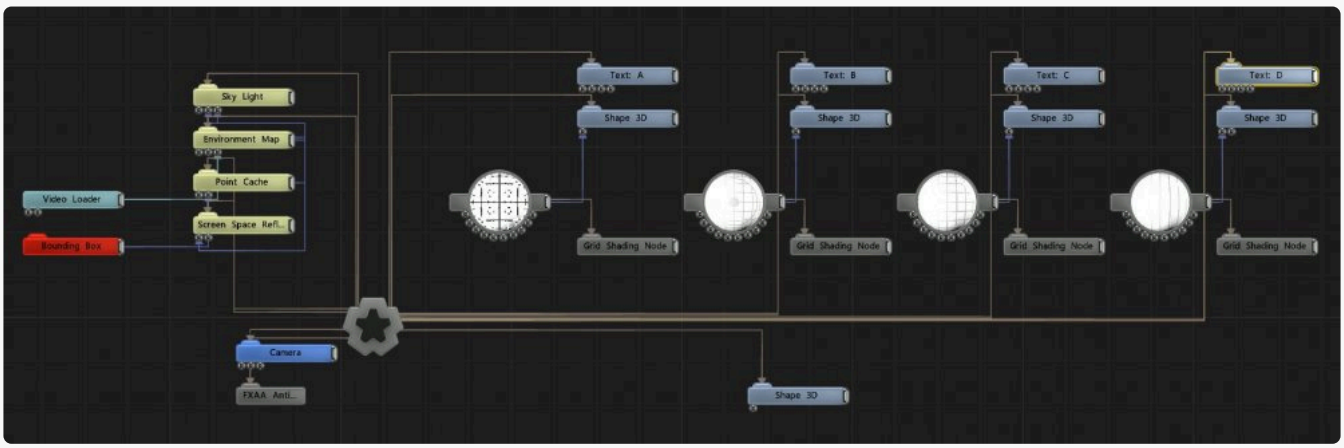
This node applies grid pattern to the shading of a material node. This can be used to deform, recolour and change the lighting on a mesh.

Example



A 2d grid with alpha blended – B 3Dgrid – C 2D grid – D 1D grid

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Shading Node Attributes

Name	Description
Mapping Type	What kind of mapping is to be applied. • World Position, the position of each vertex relative to the scene world space (most commonly used with Spherical, Planar, Perspective mappings). • Object Local Position, the position of each vertex relative to the objects local space. • View-Space Position, the position of each vertex relative to the cameras view. • Texture Coordinate, the position of each vertex relative to the objects texture coordinates. • World Normal, the world normals after transformations are applied.
Output Channel	Which channel will be affected by the fractal noise. • Colour RGBA • Colour RGB • Colour Alpha • Normal • Texture Coordinate • Position
Blend Mode	How the new texture or deformation will blend with the current object. See Blend Modes for more details.
Shader	How the final modified shading is applied to the shape.

Pass	• Vertex, The shading is only changed from vertex to vertex. • Tessellation, The shading is applied as the model is tessellated. only functions with Tessellation Enabled in connected objects. • Pixel, The shading is applied per pixel in screen space, so it will always be applied optimally.
Blend Amount	The amount the generator is blended with the output.

Grid Attributes

Name	Description
Line Width	Control the width of the grid lines.
Contrast	Increase the darkness of the grid lines.
Hardness	control the hardness of the grid lines.
Dimension	How many axes the grid applies along.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

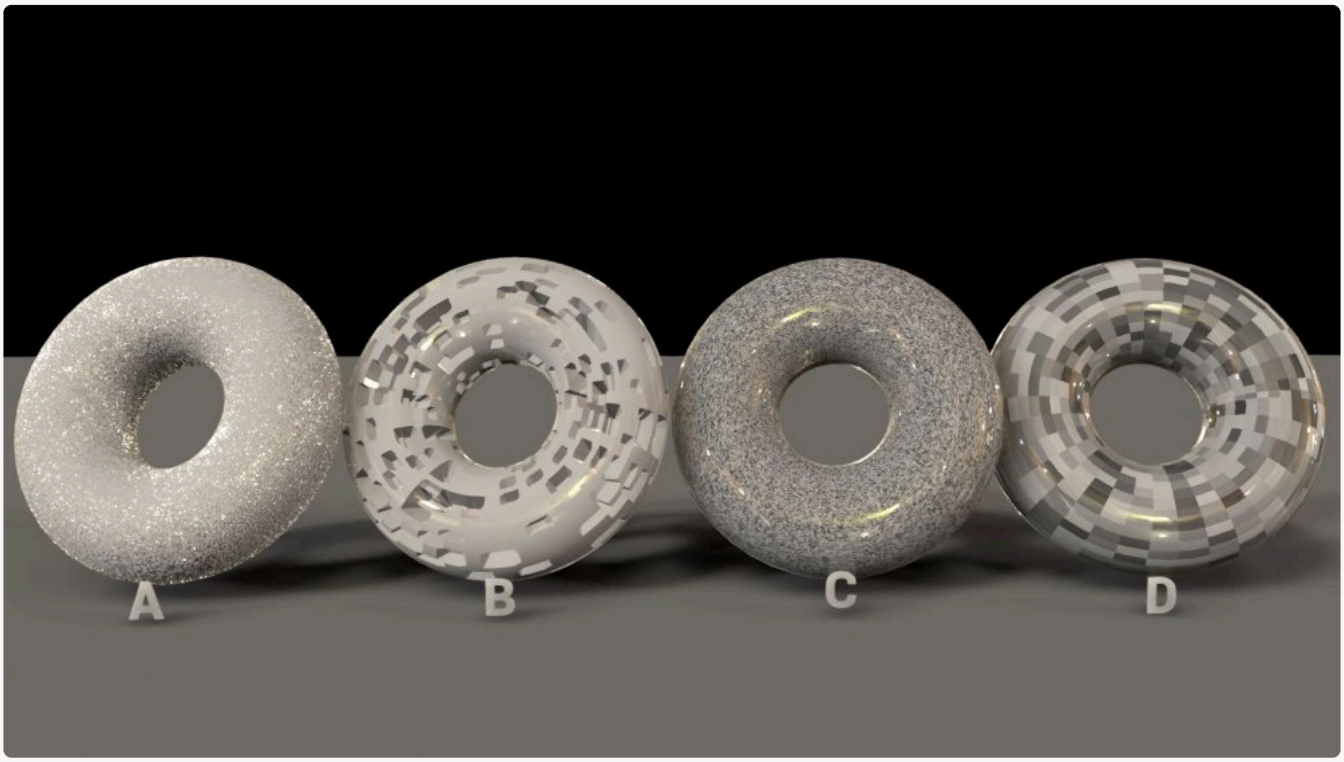
Can be chained with other Shading nodes for more complex shading systems.

Noise Shading Node

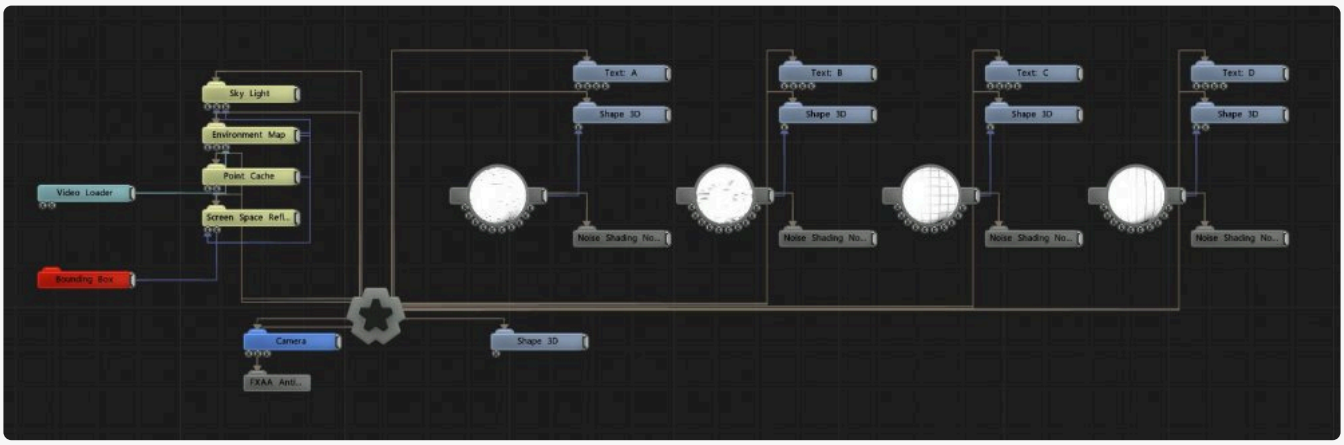
Method

This node applies simple noise to the shading of a material node. This can be used to deform, recolour and change the lighting on a mesh.

Example



Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Shading Node Attributes

Name	Description
Mapping Type	What kind of mapping is to be applied. • World Position, the position of each vertex relative to the scene world space (most commonly used with Spherical, Planar, Perspective mappings). • Object Local Position, the position of each vertex relative to the objects local space. • View-Space Position, the position of each vertex relative to the cameras view. • Texture Coordinate, the position of each vertex relative to the objects texture coordinates. • World Normal, the world normals after transformations are applied.
Output Channel	Which channel will be affected by the fractal noise. • Colour RGBA • Colour RGB • Colour Alpha • Normal • Texture Coordinate • Position
Blend Mode	How the new texture or deformation will blend with the current object. See Blend Modes for more details.
Shader	How the final modified shading is applied to the shape.

Pass	• Vertex, The shading is only changed from vertex to vertex. • Tessellation, The shading is applied as the model is tessellated. only functions with Tessellation Enabled in connected objects. • Pixel, The shading is applied per pixel in screen space, so it will always be applied optimally.
Blend Amount	The amount the generator is blended with the output.

Noise Attributes

Name	Description
Amount	How much noise is generated per pixel.
Intensity	How strongly the noise generated it.
Scale	Scale the size of any noise generated.

Inputs

Name	Description	Typical Node Input
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

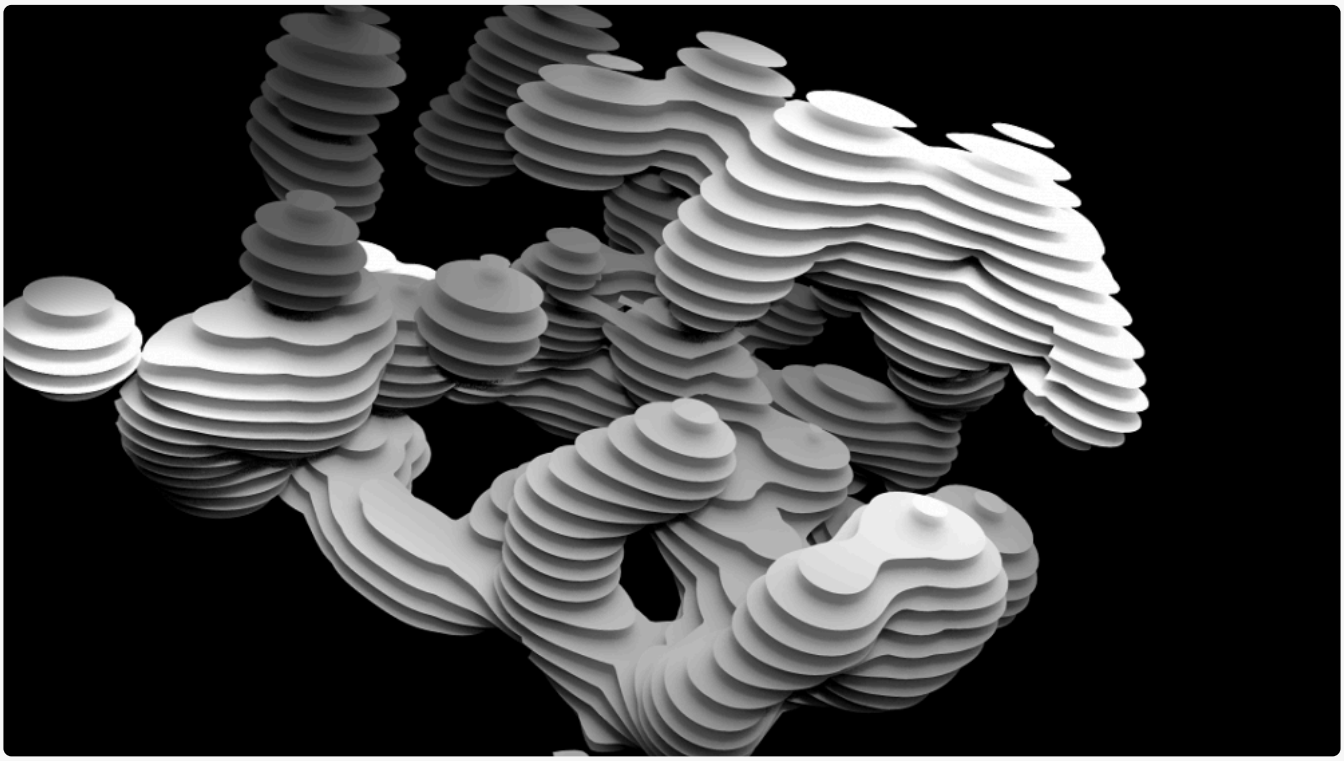
Can be chained with other Shading nodes for more complex shading systems.

Procedural Shading Node

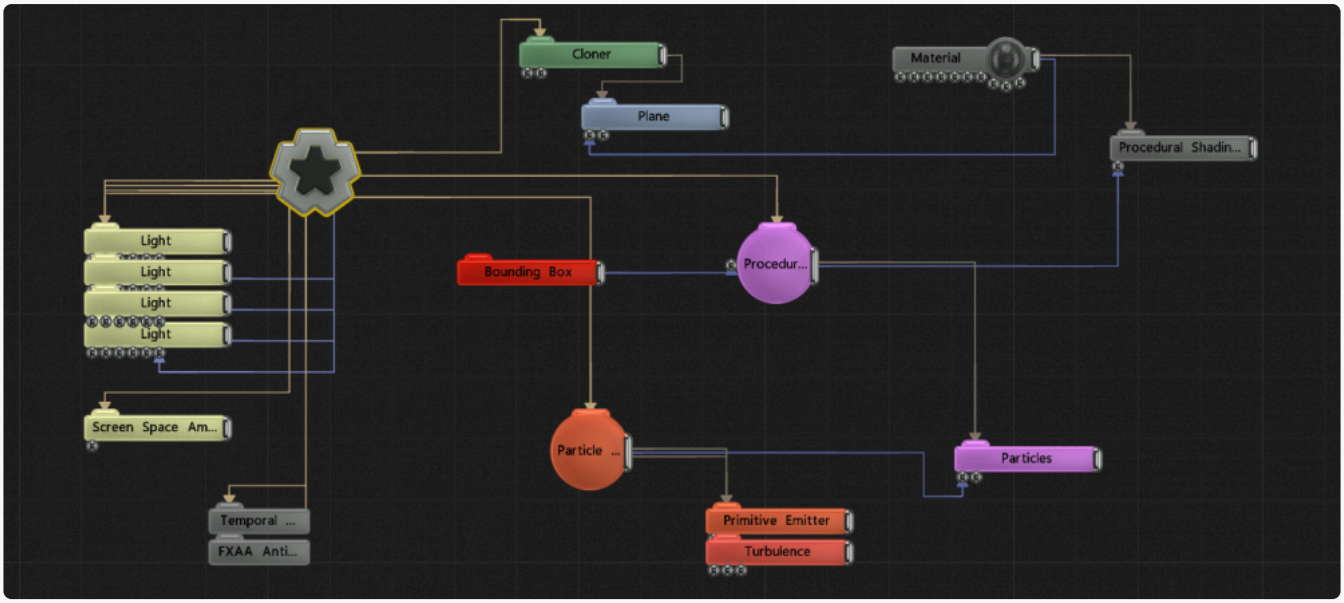
Method

Uses a procedurals network as a shading value source. The output of this shading node is the distance to the surface of the connected procedural.

Example



Example Nodegraph



Attributes

Name	Description
Mapping Type	What kind of mapping is to be applied. • World Position, the position of each vertex relative to the scene world space (most commonly used with Spherical, Planar, Perspective mappings). • Object Local Position, the position of each vertex relative to the objects local space. • View-Space Position, the position of each vertex relative to the cameras view. • Texture Coordinate, the position of each vertex relative to the objects texture coordinates. • World Normal, the world normals after transformations are applied.
Output Channel	Which channel will be affected by the fractal noise. • Colour RGBA • Colour RGB • Colour Alpha • Normal • Texture Coordinate • Position
Blend Mode	How the new texture or deformation will blend with the current object. See Blend Modes for more details.
Shader Pass	How the final modified shading is applied to the shape. • Vertex, The shading is only changed from vertex to vertex. • Tessellation, The shading is applied as the model is tessellated. only functions with Tessellation Enabled in connected objects. • Pixel, The shading is applied per pixel in screen space, so it will always be applied optimally.

Blend Amount	The amount the generator is blended with the output.

Inputs

Name	Description	Typical Node Input			
Procedural Root	The root node of the procedural network to calculate a distance from.	Procedural Root			
Transform Modifier	Links all transform properties to the input node.	Null			
Target Node	Always faces the x-axis towards the inputs anchor point.	Null	Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

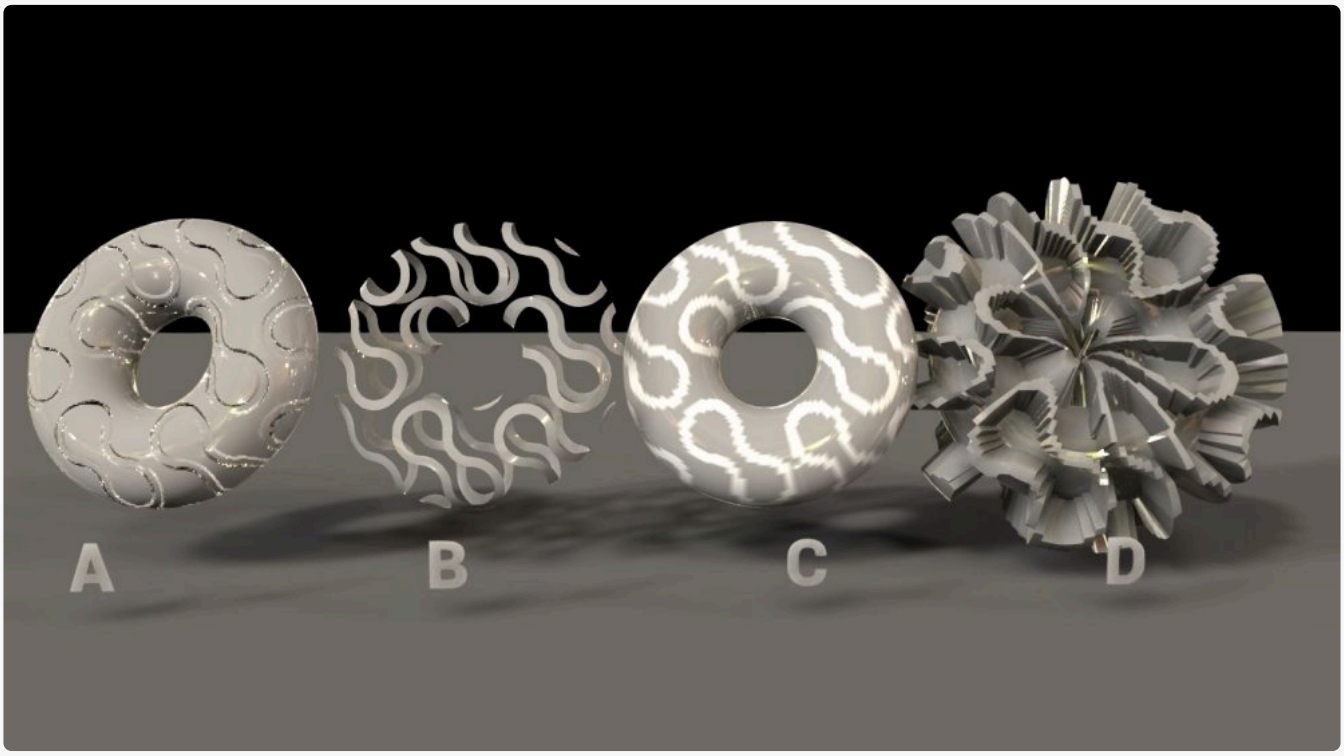
Can be chained with other Shading nodes for more complex shading systems.

Texture Shading Node

Method

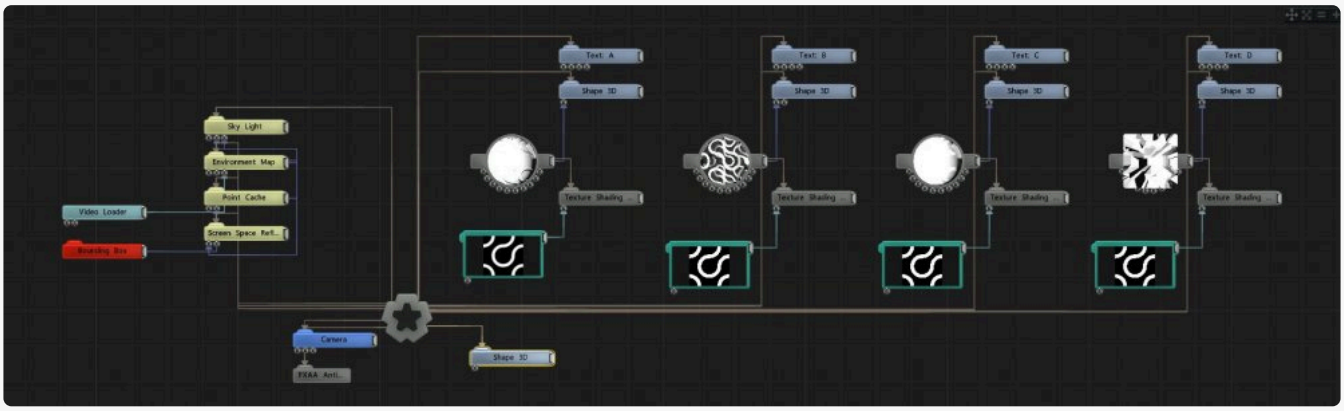
This node applies a chosen texture to the shading of a material node. This can be used to deform, recolour and change the lighting on a mesh.

Example



A Output channel normal – B Output channel TGBA with alpha blended materiel – C Shader pass vertex – D Output channel RGBA position shader pass vertex

Example Nodegraph



Transform

Name	Description
Position X	Move its position along the x-axis in local space.
Position Y	Move its position along the y-axis in local space.
Position Z	Move its position along the z-axis in local space.
Rotation Heading	Rotate the object about the x-axis.
Rotation Pitch	Rotate the object about the y-axis.
Rotation Bank	Rotate the object about the z-axis.
Scale X	Scale along the x-axis.
Scale Y	Scale along the y-axis.
Scale Z	Scale along the z-axis.

Inherit Transform Channels

Toggle which transform channels should be inherited. By default, all are on.

Shading Node Attributes

Name	Description
Mapping Type	What kind of mapping is to be applied. • World Position, the position of each vertex relative to the scene world space (most commonly used with Spherical, Planar, Perspective mappings). • Object Local Position, the position of each vertex relative to the objects local space. • View-Space Position, the position of each vertex relative to the cameras view. • Texture Coordinate, the position of each vertex relative to the objects texture coordinates. • World Normal, the world normals after transformations are applied.
Output Channel	Which channel will be affected by the fractal noise. • Colour RGBA • Colour RGB • Colour Alpha • Normal • Texture Coordinate • Position
Blend Mode	How the new texture or deformation will blend with the current object. See Blend Modes for more details.
Shader	How the final modified shading is applied to the shape.

Pass	• Vertex, The shading is only changed from vertex to vertex. • Tessellation, The shading is applied as the model is tessellated. only functions with Tessellation Enabled in connected objects. • Pixel, The shading is applied per pixel in screen space, so it will always be applied optimally.
Blend Amount	The amount the generator is blended with the output.

Texture Attributes

Name	Description
Texture	Select an Image to drive the shading.
Texture Channel	Select which channel(s) to use for the shading. • RGBA • Red • Green • Blue • Alpha • RGB • Luminance
Intensity	Intensity of the texture
UV Offset X	Move the object UV along the x axis.
UV Offset Y	Move the object UV along the y axis.
UV Scale X	Scale the object UV along the x axis.
UV Scale Y	Scale the object UV along the y axis.

Inputs

Name	Description	Typical Node Input
Texture	Input texture to drive the shading node. Overwrites the Texture property.	Video Loader
Transform Modifier	Links all transform properties to the input node.	Null
Target Node	Always faces the x-axis towards the inputs anchor point.	Null
Local Transform Override	Override the transformation values of the node, relative to its parent.	Null

Outputs

Can be chained with other Shading nodes for more complex shading systems.

Sound

Method

These nodes control sound and sound output in Notch.

They can be applied to any node in Notch and will either play sound in the scene, or record sound from an audio input device. Outputs can be used as an input to other nodes to drive effects such as the FFT Deformer and Sound Modifier.

You can change whether the sound is recorded from or played to in the Audio Devices Menu.

- Capture Sound
- Play Sound

Capture Sound

Method

This node captures sound from an incoming audio device to modify attributes in the scene. You can select which Audio Device to use using the Audio Devices Menu.

Attributes

Name	Description
Input Channel	Select which audio channel to capture audio from.
Volume	Change the volume of the captured sound.

Inputs

There are no inputs for this node.

Outputs

Outputs an audio file, that can be input to relevant nodes.

Play Sound

Method

Play sound from an imported sound file. Once added to the nodegraph, the node will function without needing to be connected to the root node; useful for multi-layered projects, where a separate audio layer maybe required.

Sound will be played through your default audio device, but you can choose others using the Audio Devices Menu.

Attributes

Name	Description
Sound	Source file for the sound that is played.
Volume	Change the volume of the played sound.
Looping	Toggle whether the sound played repeats after ending.

Inputs

There are no inputs for this node.

Outputs

Outputs an audio file, that can be input to relevant nodes.

Video Processing

Method

Video processing nodes control video post-fx in the scene.

Video Processing nodes can be parented to these nodes, and will output an effect.

- Render To Texture
- All Video Processing Nodes (although you will mostly use Video Source and Video Null)

Aside from the Video Null, Video Processing nodes have been separated into 6 groups.

- Depth Processing, process depth information.
- Feature Tracking, detect and track features a video.
- Image Processing, apply affects to an image.
- Input Output, control video sourcing and where the video is output.
- Motion Processing, process video motion.
- Segmentation, EDIT ME.

Video Null

Method

Creates a copy of the upstream video node, which can then be modified/effected without affecting the original.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

There are no outputs from this node.

Depth Processing

Method

Depth Processing nodes generate and change depth data using various techniques. Can be applied to all the same nodes as the Video Processing group.

- Luminance From Depth

Luminance From Depth

Method

Generates a greyscale luminance image from a depth source, usually a Depth Camera / Kinect Source or a Colour And Depth Source node.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Near Plane	The near clip plane. Depth values less than this are masked out.
Far Plane	The far clip plane. Depth values greater than this are masked out.
Fall Off	Control the falloff of the output image.
Output Mask	Toggle whether to only output the greyscale mask.
Invert	Invert the value output for the depth image.

Inputs

Name	Description	Typical Node Input
Depth Source	Source for the image depth.	Colour And Depth Source
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

The outputs section for this node is currently being worked on.

Feature Tracking

Method

Feature tracking nodes detect and track features in an image. These nodes are currently under development, so your mileage may vary.
Can be applied to all the same nodes as the Video Processing group.

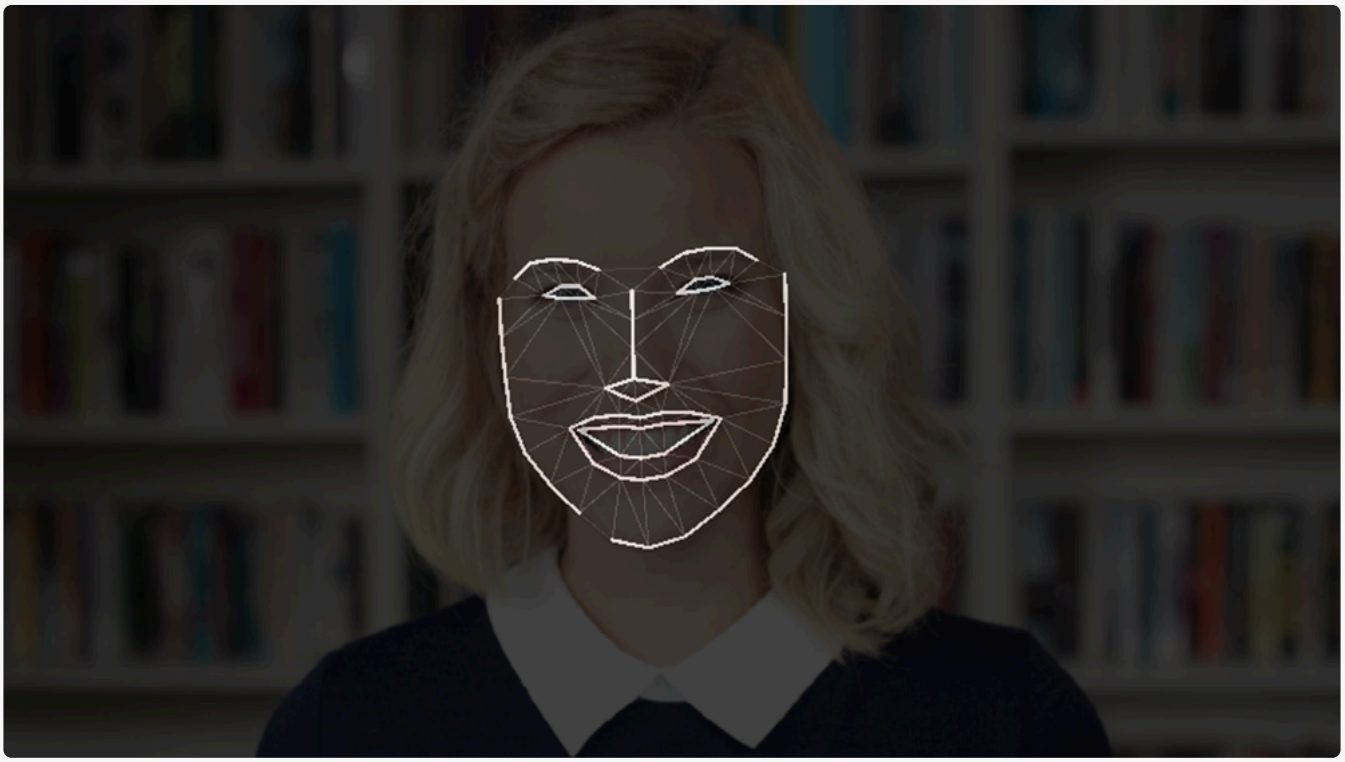
Face Tracker

Method

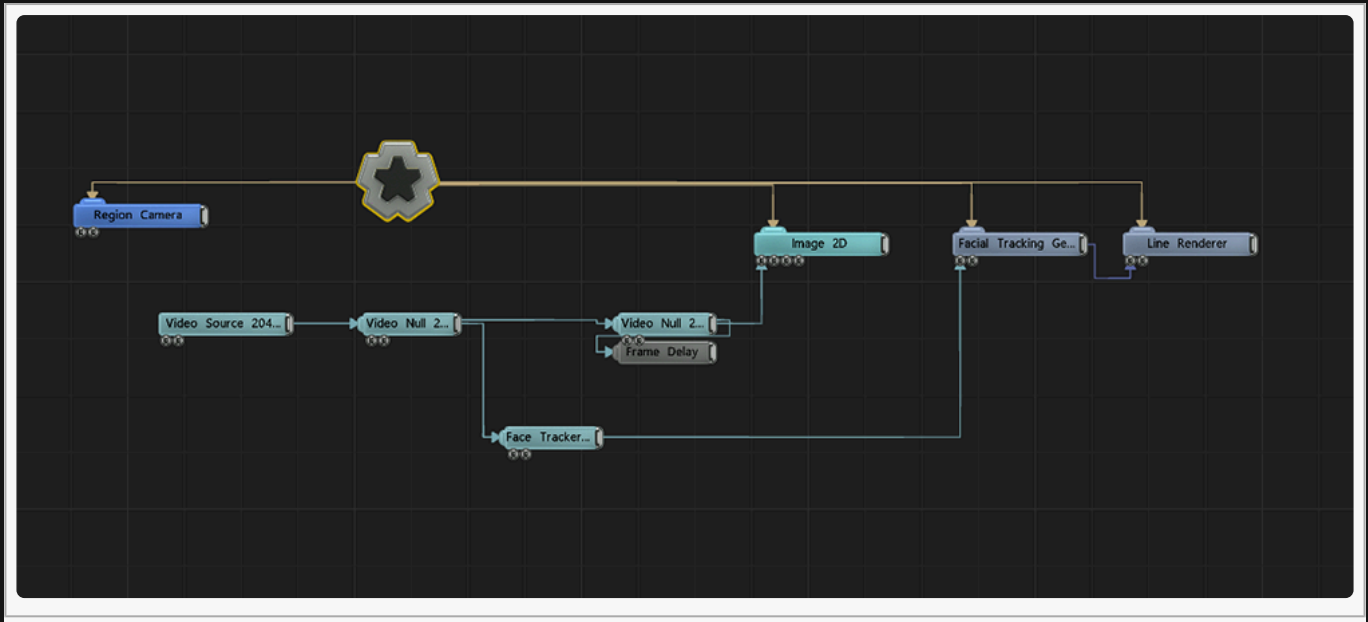
This node searches an image for faces. When a face is found a pre-defined arrangement of vertices, forming a simple 2D mesh, are searched for and tracked across multiple frames.

> **Looking for an example?** Download the free samples, which includes multiple Face Tracker example projects, as well as the required Machine Learning Database.

Example Image



Example Nodegraph



Face tracking is based on machine learning. It uses a preprocessed database generated from hundreds of different images of faces to recognise new faces in the images given to it. This database is required by the Face Tracker node; it is loaded as a “Machine Learning Database” resource and is set via the “Training Database” parameter.

> An example database is available for download here. You can also download sample project files.

When the Face Tracking node finds a face it generates a mesh which may be used as geometry by the Face Tracking Geometry node, or used to deform a matching 3D object’s vertices using the Face Tracking Deformer node. The image ouput by the Face Tracking node can either pass through the original input; or output a mask from the detected face geometry in either the RGB or Alpha channels. The Face Tracker also analyses the detected face pose to determine whether the eyes and mouth are open, the positions of several key points such as the eyes, and the overall approximate rotation and scale of the face. These values are available as envelopes that can be extracted from the node via an Extractor modifier and can for example be linked to Image2D nodes in order to attach 2D images to points on the face. The Face Found envelope is set to 0 if no face is found, or 1 if there is.

Face tracking is CPU-intensive; face recognition takes 1-2 frames on CPU. In order to keep rendering performant this is performed in parallel to the rest of the graphics processing in the frame. As such there is an inherent additional latency in the output of the node – typically two frames, but this may be reduced to one frame using the “Low Latency” option at the cost of reduced frame rate. To simplify use, the image output from the Face Tracking node is delayed so it is in sync with the geometry generated by the node: if you are using the face geometry from the detected face with a Face Tracking Geometry node, you can use the image stored on the Face Tracker node to texture it and they will be in sync.

In order to improve performance further, there is the option to downsample the input image before face detection – as this typically does not have to be processed at full resolution to find faces. Downsample Steps defines the number of downsample iterations: 1 means half width, half height and so on.

It must be noted that face tracking, while reasonably solid and robust, is not perfect. There is a degree of tolerance but care must be taken with the input feed to ensure that the algorithm is able to perform to its best. In particular:
- Face detection works best in good, balanced, even lighting, with a subject facing straight on to the camera and good image quality. The technique is not intended to work with moving cameras but is tolerant to some degree.
- Excessive facial hair, hats, novelty glasses, low frame rates and fast motion may impact the result.
- The face must be at least 300 pixels high in the source image. Smaller faces will most likely not be detected.
- The face detection algorithm can detect multiple faces in a single image, but at present only one face is tracked. To keep consistency the largest face in the image is chosen each frame.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Downsample Steps	The number of times the input image is halved in size before face detection is executed – to increase performance.
Frame Skips	The number of input frames that are skipped. A 60hz feed may be processed at 30hz to increase overall system performance.
Low Latency	Reduce the number of frames between processing and getting the result, at the cost of reduced overall performance.
Output Image Mode	Defines the image generated by the node. • Original Image, The original image is output with no modifications. • Face Mask, A white mask is generated against a black background. • Face Mask + RGB, A mask is generated and multiplied against the original image, against a black background. • Original Image with Alpha Mask, the original image is output, with the faecemask applied to the alpha.
Show Bounding Boxes	Render bounding boxes of detected faces on screen.
Training	The Machine Learning Database resource – required for face tracking to work.

Database	

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

There are no outputs from this node.

If you want a technical explanation of how the Face Tracking node detects faces, check out the article here

Image Processing

Method

These nodes analyse and modify the image with different effects.
Can be applied to all the same nodes as the Video Processing group.
Unlike Post-FX nodes (many of which are shared with these nodes), these do not affect the parent with the effect and instead contain an altered copy of the image, so these nodes need to be linked to an input for the desired effect to be seen.

Composite Sources

Method

Composite two image sources to one image.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Blend Amount	Changes the opacity of the new effect over the original image.
Use Alpha Channel	Toggle if the alpha channel is used in the composite.
Copy To Alpha	Toggle if alpha values are copied to the output.
Blend Mode	Choose how the images are composited together. More information on blend modes can be found on the Blend Modes page,
Colour 0	Tint the colour of the parent image.
Colour 1	Tint the colour of the composite source.

Inputs

Name	Description	Typical Node Input
Composite Source	Source image to be composited with.	Video Node
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader
Image Width/Height	Change the resolution width and height of the image.	Envelope Modifier

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Downsample

Method

Downsample the resolution of the input image.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Iterations	how many levels of down sampling are generated.
Mode	Choose how the downsample output is filtered. • Filtered, Checks the surrounding 3×3 pixels to downsample based on their average. • Point Sampled, Only one point is sampled. • Min Of Sampled, The minimum value of the points sampled is used. • Max Of Sampled, The maximum value of the points is used. • Bilinear Filtered, Linear blend is applied between pixels.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader
Active	Turn the effect on or off. Values < 0.1 will turn the effect off, and deferred rendering must be on.	Envelope Modifier

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Frame Buffer

This node is being phased out and replaced by a node in the post-fx menu.
p. Click here to go the frame buffer post-fx node.

Frame Delay Frame

Method

This node delays the image played by a specified frame amount, based on an input frame delay node. Requires a Frame Delay input to function, with a “num frame delay” larger than this nodes frame index value.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Frame Index	How many frames to delay by.

Inputs

Name	Description	Typical Node Input
Frame Delay	Source Frame Delay node from which the buffered frames are pulled from.	Frame Delay
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Mirror

This node is being phased out and replaced by a node in the post-fx menu.
p. Click here to go the mirror post-fx node.

Resize

Method

This node resizes an Image.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.

Source

Name	Description
Use Source Image Dimensions	Use the dimensions of the source image.
Source X	The x position in local space of the source image.
Source Y	The y position in local space of the source image.
Source Width	The width of the source image.
Source Height	The height of the source image.

Destination

Name	Description
Destination Width	Width of the output image.
Destination Height	Height of the output image.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Upsample

Method

This node upscale the resolution of the image.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Iterations	How many iterations of the upscale are generated.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

The outputs section for this node is currently being worked on.

Input Output

Method

These nodes control where video is imported from, and where video is output to.
Can be applied to all the same nodes as the Video Processing group.

Colour and Depth Source

Method

This node is similar to the Depth Camera / Kinect Source node, but instead combines two input images and generates a depth camera source from them. This can then be used with some of the other Depth Camera / Kinect nodes, such as the Depth Camera / Kinect Mesh.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Near Clip Plane	The closest distance that will be rendered. NB: Reducing this value too low can reduce the accuracy of aspects of the render.
Far Clip Plane	The furthest distance that will be rendered by this camera. NB: Increasing this value too high, without increasing the Near Clip, can reduce the accuracy of aspects of the render.
Depth Clip Hardness	EDIT ME
Colour Image Offset X/Y	EDIT ME
Output Depth	Toggle whether only the depth image is output.

Inputs

Name	Description	Typical Node Input
Colour Source	Source colour image to be used.	Video Loader
Depth Source	Source depth image to be used.	Video Loader
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

There are no outputs from this node.

GBuffer To Image

Method

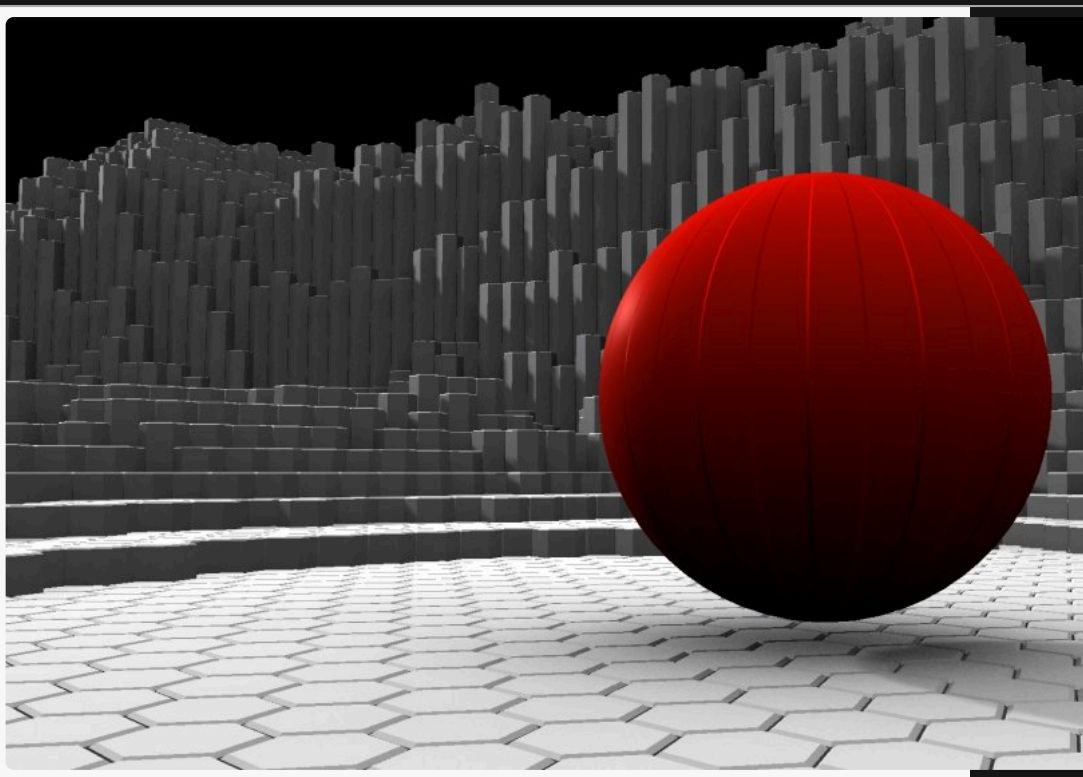
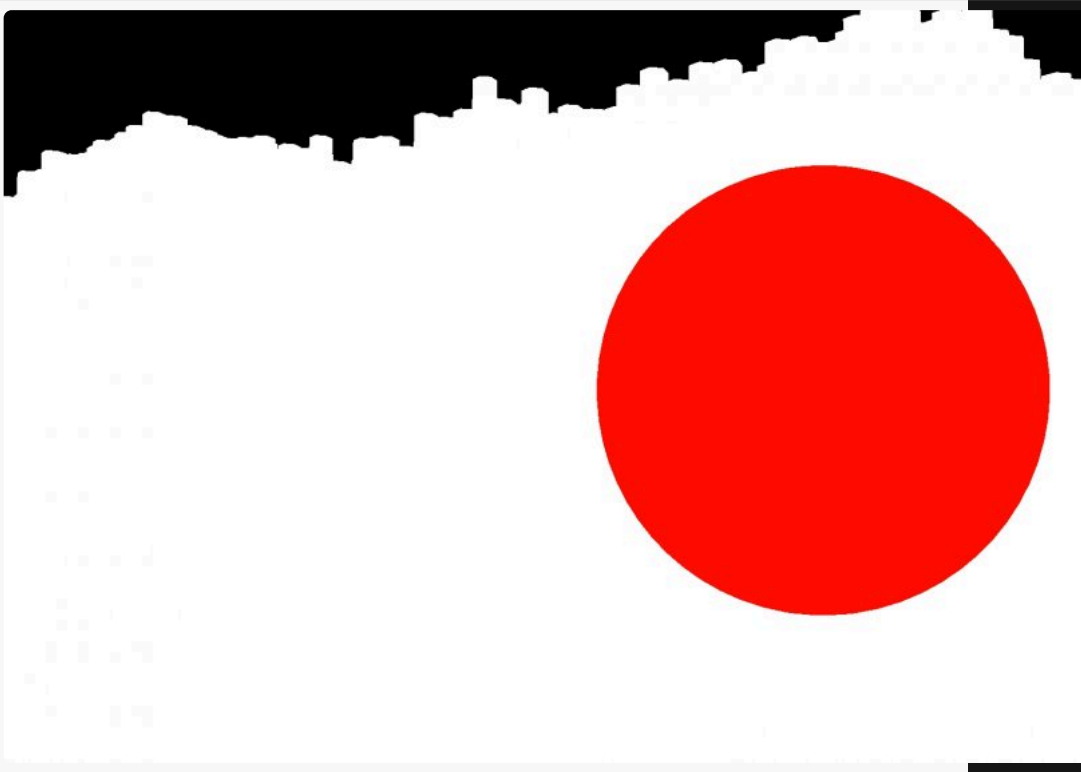
This node allows GBuffer channels from a rendered scene to be used as video nodes for compositing or export purposes. By default the base render layer is used as the GBuffer source, but a Render Layer may be supplied via appropriate input.
For most channels to be accessible, Deferred Rendering must be enabled in the root node.

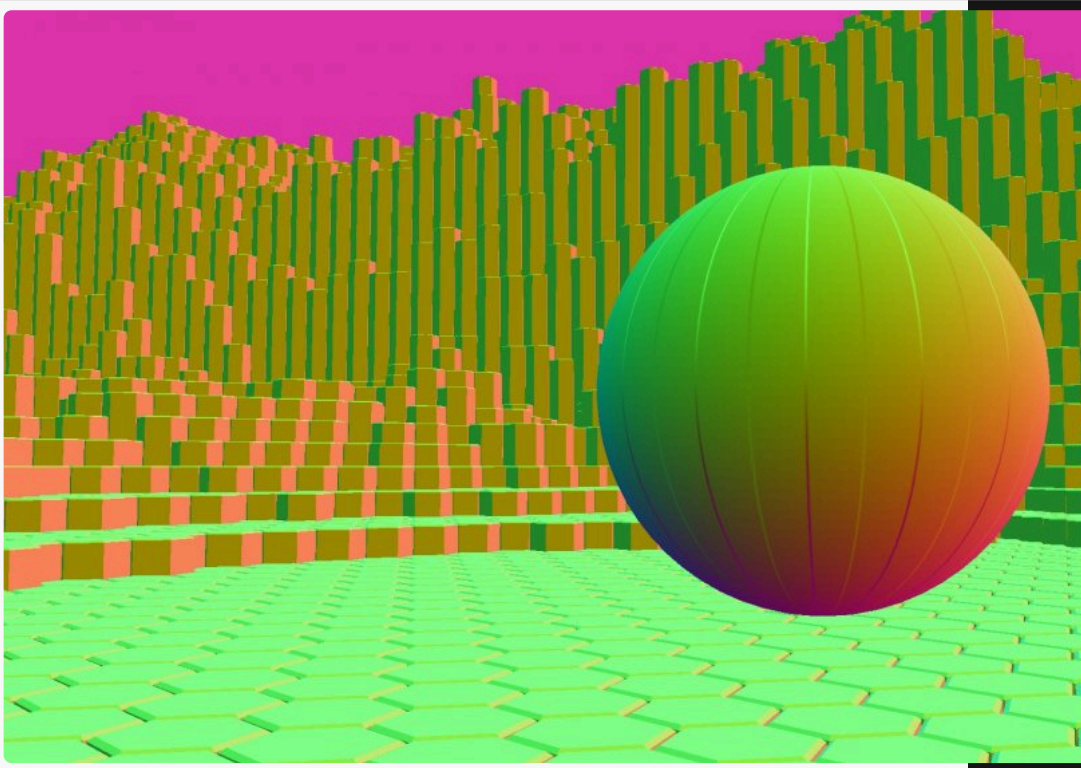
> Use a Video Exporter node to export the contents of the GBuffer To Image node to video. Multiple channels may be exported separately and simultaneously.

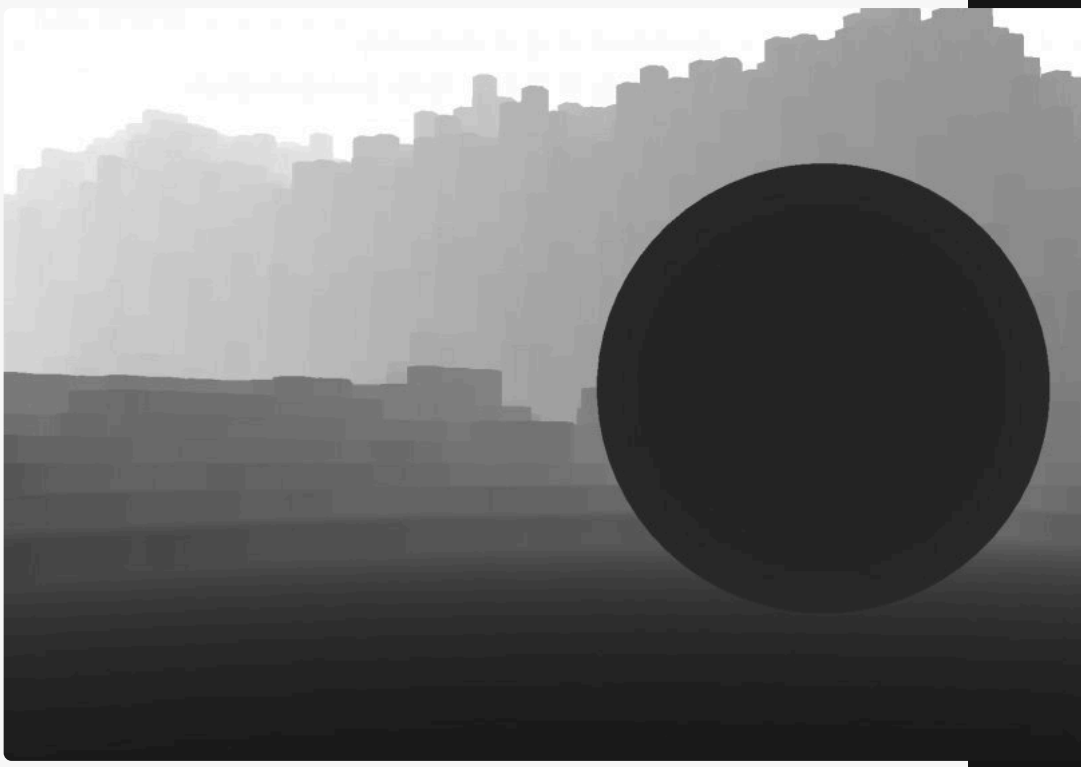
Attributes

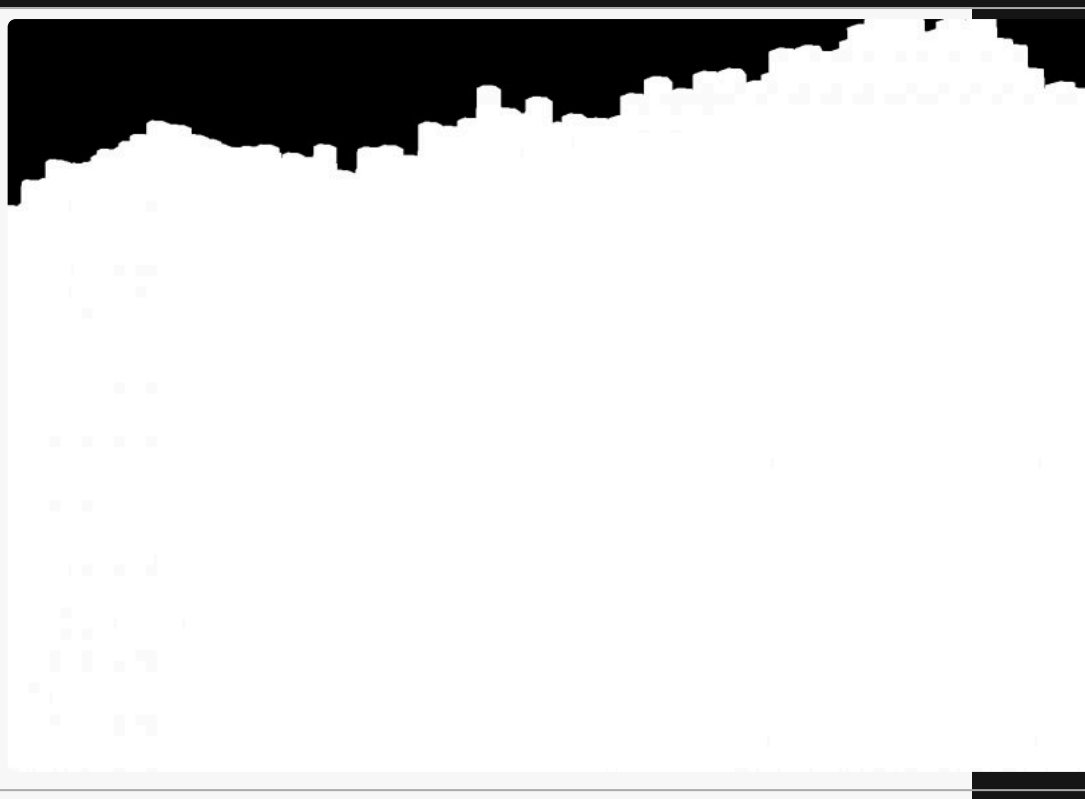
Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Source Channel	This selects which channel from the Gbuffer to generate as an image.

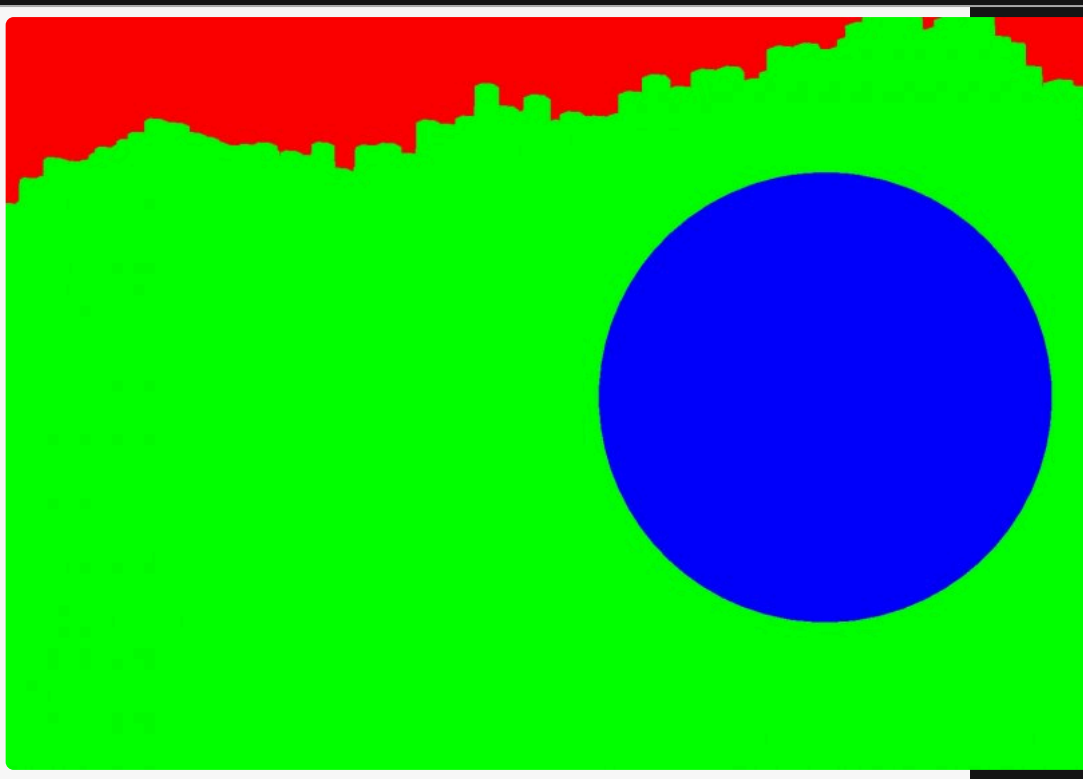
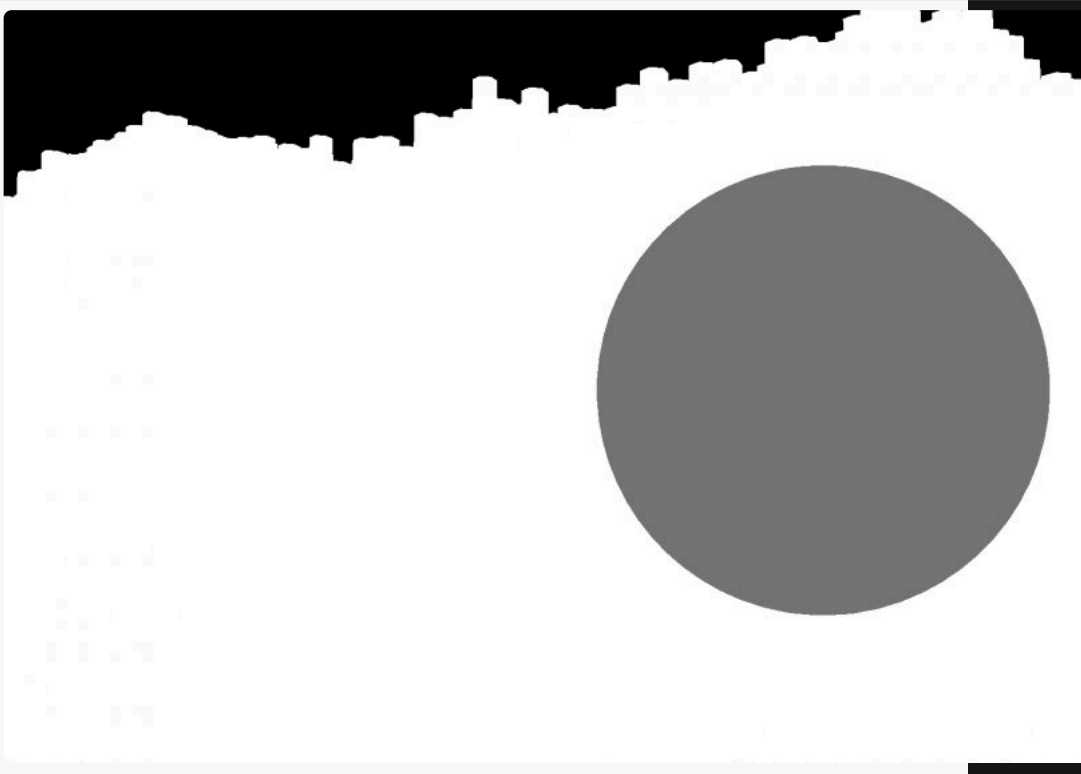
Channel	Description	Reference image

Composite Colour	The composited output from the viewport.	
Colour	The unshaded colour of all objects in the scene.	

Alpha	The Alpha channel of the scene. As its a Gbuffer output, only alpha from geometry will be accepted (e.g Shadow Catcher), not the full layer alpha.	
Normal – World Space	The normals of all surfaces in the scene, relative to the world.	
Normal – Local Space	The normals of all surfaces in the scene, relative to the camera.	
Specular Colour	The colour of specular	

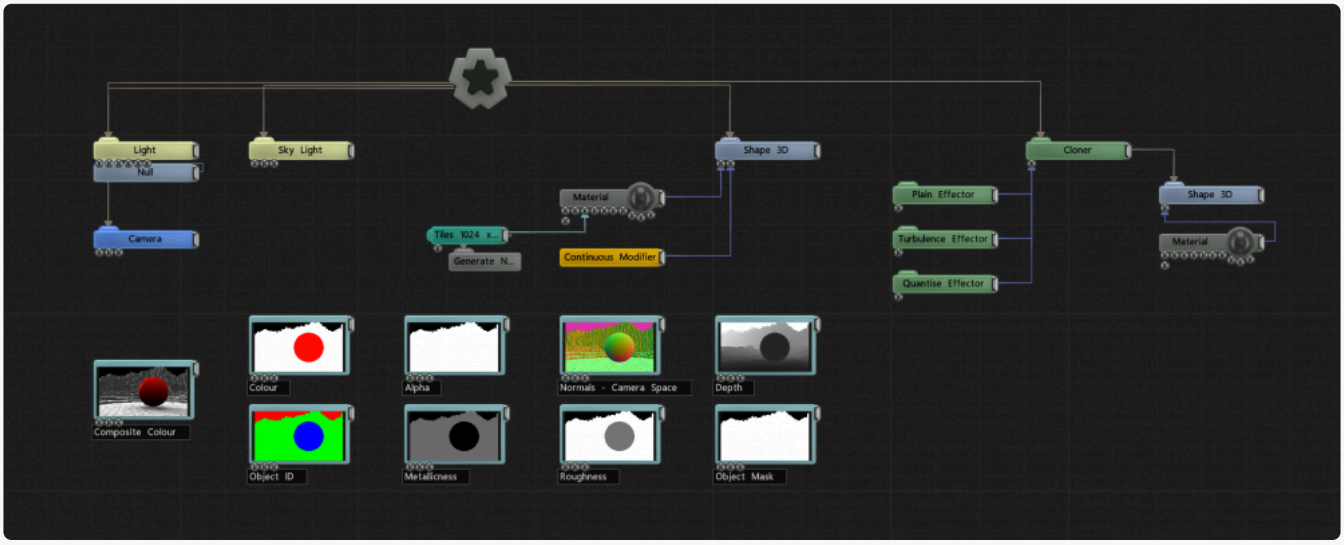
	lighting on all surfaces in the scene.	
Depth – Camera Space	The depth of all surfaces in the scene away from the camera, without compensating for the camera far plane.	
Depth – Camera Space (Normalised)	The depth of all surfaces in the scene away from the camera, compensating for the camera far plane.	
World Position	The position of each point in the scene in world space.	

Object mask	Uses geometry to mask all surfaces in the scene.	
Object ID	Colours objects using their internal Object ID's.	
Material ID	Colours objects using their internal Material ID's.	
Object ID (False Colours)	Colours objects using their internal Object ID's – but with false colours to make differences more obvious.	

Material ID (False Colours)	Colours objects using their internal Material ID's – but with false colours to make differences more obvious.	
Roughness	Colours Objects using the different values of roughness on object surfaces.	

Metallicness	Colours Objects using the different values of metallicness on object surfaces.	

Nodegraph



Inputs

Name	Description	Typical Node Input
Render Layer	Use the gbuffer of a specific render layer.	Render Layer
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Multiplex Sources

Method

This node takes multiple video inputs and outputs a single video based on the Source Index attribute. All connected video nodes are treated as active, even if they are not currently being used.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Source Index	Select the source video to use from the input source.

Inputs

Name	Description	Typical Node Input
Sources	Add sources to select from.	Video Source
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Rendered Video Source

Method

Output the rendered image from a Render Layer node for other nodes to use.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Source Type	What kind of input the source is.

Inputs

Name	Description	Typical Node Input
Render Layer	Source render layer to render from.	Render Layer
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Video In Source

Method

Use input from a video capture source (DirectShow / Media Foundation).

See Video Capture for further details.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Video Loader

Method

This node is the source for an imported video or image source from the resources window. Images or videos brought into the scene will by default use this node.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Video	Select a video from the resources window to be used as the source.
Frame Rate	Control the frame rate of the video.
Frame Rate Offset	Offset the frame rate of the video.
Update Time Mode	How the video is played in relation to the time code. • Locked To Timecode, The video is locked to the time code and the same time will always yield the same video frame. • Running / Looping, The video is disconnected from the time code and will loop seamlessly at the end of the layer.
Looping	Enable the video to loop back to the beginning once it reaches the Loop End Frame. If disabled, nothing will be output.
Loop Start Frame	With looping enabled, sets the beggining frame to start the loop from.
Loop End Frame	With looping enabled, sets the final frame to end the loop on.
Static image (Process Only Once)	Only process the image once, making a more efficient scene. Animated Post-FX nodes will not function with this enabled.
Format Conversion	Convert the Image to a different format. Useful for dealing with banding issues.
Allow Frame Drops	When a frame is dropped, the previous frame is held until a new frame is ready to take its place.
Flip Image Y	Flip the image along the y axis.
Retrigger	Only Functions with Running/Loopable selected in the Update Time Mode attribute.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Video NDI Source

Method

Use input from an NDI IP video stream.

See NDI topic for step by step instructions on how to use NDI in Notch.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
NDI Source Name	The NDI source name as presented by the NDI protocol. e.g. 'MYNOTCHPC (Test Pattern)'
NDI Source IP	The NDI source IP address. e.g. '192.168.1.25'

You can view the *NDI Source Name* and *NDI Source IP* in the Video In dialog: Devices->VideoIN/Camera/Kinect

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

Outputs an image or video that can be connected to any relevant video input, most commonly an Image 2D node.

Motion Processing

Method

These nodes analyse a video for movement, and give outputs based on that movement.
Can be applied to all the same nodes as the Video Processing group.

Temporal Filter

Method

This node combines multiple frames together and filters out overlapping values.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Mode	How the next frame is generated based on the frames before it. • Min, The minimum value override the current value. • Max, The maximum value override the current value. • Average, The average of the values overrides the current value.
Num Frames	The number of frames previous to the current frame used in the filter.

Inputs

Name	Description	Typical Node Input
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

The outputs section for this node is currently being worked on.

Video Motion Blur

Method

This node applies a motion blur using motion vectors generated from an input Optical Flow node.

Attributes

Name	Description
Preview In Viewport	Preview the effect blended with alpha in the viewport.
Preview RGB In Viewport	Preview the RGB values in the viewport.
Preview Alpha In Viewport	Preview the alpha values in the viewport.
Motion Blur Amount	The amount of motion blur that the effect shows.

Inputs

Name	Description	Typical Node Input
Optical Flow Node	Node used to generate the motion blur.	Optical Flow
Effect Mask	Mask out areas the effect wont affect the image.	Image Plane
Alpha Image	Add an image to control the alpha values of the image.	Video Loader

Outputs

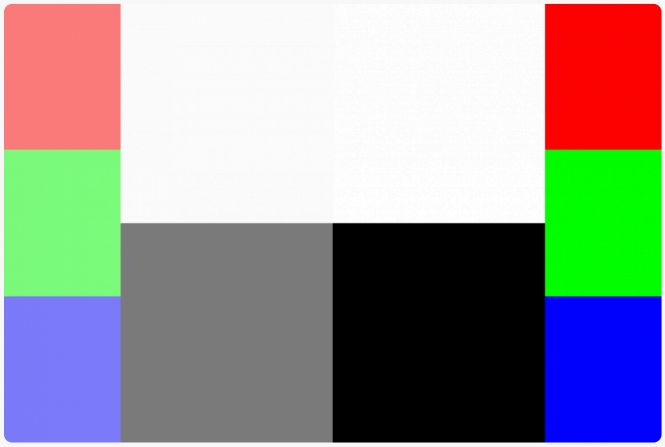
The outputs section for this node is currently being worked on.

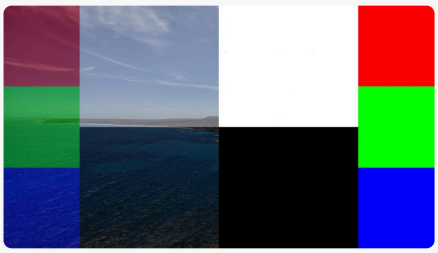
Blend Modes

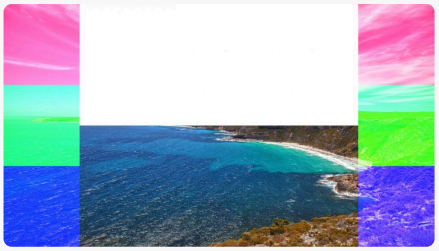
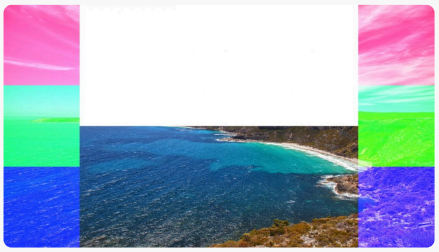
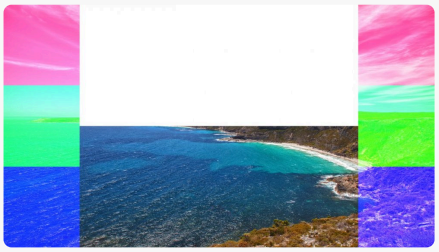
Method

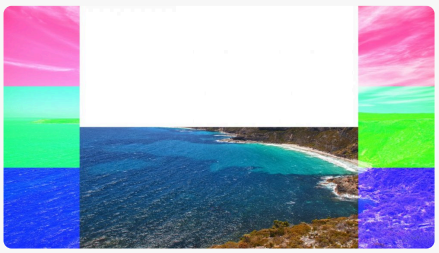
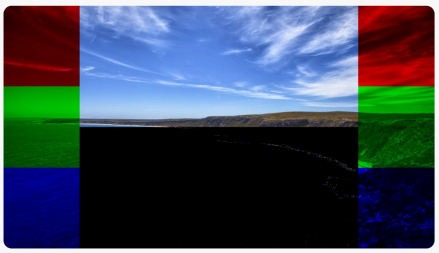
Blend Modes control how images are blended together and overlayed.

These two images are the two images used for the composited examples below.

Image Input A	Image Input B
	
This is the original image.	This is the image being applied. Note that the left side is a mirror of the right, but with 50% opacity.

Blend Mode	Description	Example Image
Composite	Image B is placed over Image A. Only available within the Composite Sources node.	
Multiply	Multiplies the values of image A and B together to produce a darker image.	

Add	Adds the values of image A and B together to produce a brighter image.	
Subtract	Subtracts the values of image B from image A to produce a new image.	
Linear	Image B is placed over Image A – however the alpha values are ignored.	
Max	Image A and B are compared, and the maximum values are used.	
Min	Image A and B are compared, and the minimum values are used.	
Screen	Image A and B are inverted, multiplied together and inverted again, producing a brighter image.	

Light	Image A is multiplied by Image B, and then Image A is added again, resulting in a brighter image.	
Difference	Image B is subtracted from Image A, and the absolute value is used to produce an image that highlights the differences between Image A and Image B. Only available within the Composite Sources node.	
Exclusion	Image A and Image B are multiplied together and then by 2, then subtracted from Image A added to Image B. The result is very similar to Difference, but with lower contrast. Only available within the Composite Sources node.	
Dodge	Image A is divided by the inverse of image B, producing an image that lightens Image A based on Image B. Only available within the Composite Sources node.	
Burn	Image A is inverted, divided by image B and the result is inverted, producing an image that darkens Image A based on Image B. Only available within the Composite Sources node.	
Negate	Image B is subtracted from image A, subtracted from 1, and the absolute value is subtracted from 1. This is the inverse of the difference blend mode. Only available within the Composite Sources node.	

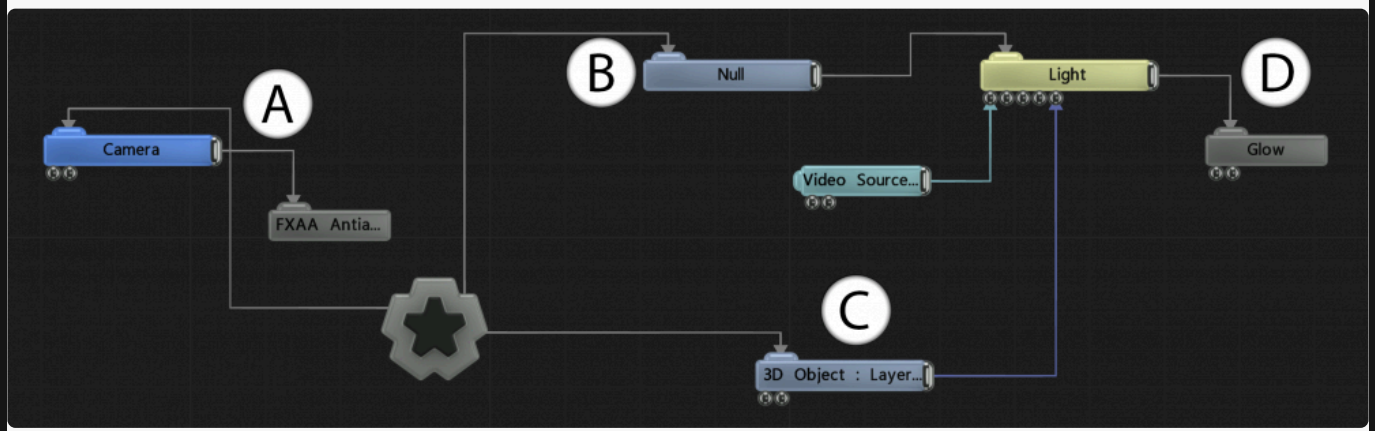
Node Hierarchies

Data Flow

Nodes are connected in a parent / child hierarchy. This is first and foremost a transform hierarchy: parent transformations are applied to the child, composited with the child's own transformation – so the parent moves the child with itself. The parent child relationship is used to flow other data along the hierarchy, such as image data between a chain of video nodes. It's also used to represent collection relationships / modifier relationships: for example a Particle Root node represents a collection of particles, and emitters and affectors that work on the collection are linked as children of the Particle Root node; or in another example, a 3D Object node is the parent and there are Deformer nodes attached as children that modify the parent 3D Object's mesh. Similarly, a Post FX node parented to a Video Processing node modifies the image that is contained in the Video Processing node.

The Root node is the entry point for the scene. Everything that is rendered in the scene must be connected via the root node, directly or via a parent hierarchy. Post FX that are attached to the root node or camera nodes effect the rendered scene.

Nodes can also be connected across the branches of the transform hierarchy via input connectors. This is used to pass the data owned by one node into another's processing; for example, a 3D Object node may be connected to an input of a Particle Mesh Emitter node in order to define the mesh used for emission. Inputs are weakly typed: when a node is connected as an input to another node, the relevant information from the connected node is automatically chosen, if applicable. There are hints when connecting inputs about which nodes make for valid connections, and invalid ones may be rejected if a connection is attempted. Some inputs take only one node at a time and some take multiple nodes. Input connectors are also created for all numeric properties on a node, allowing them to be driven by other nodes – e.g. modifiers.

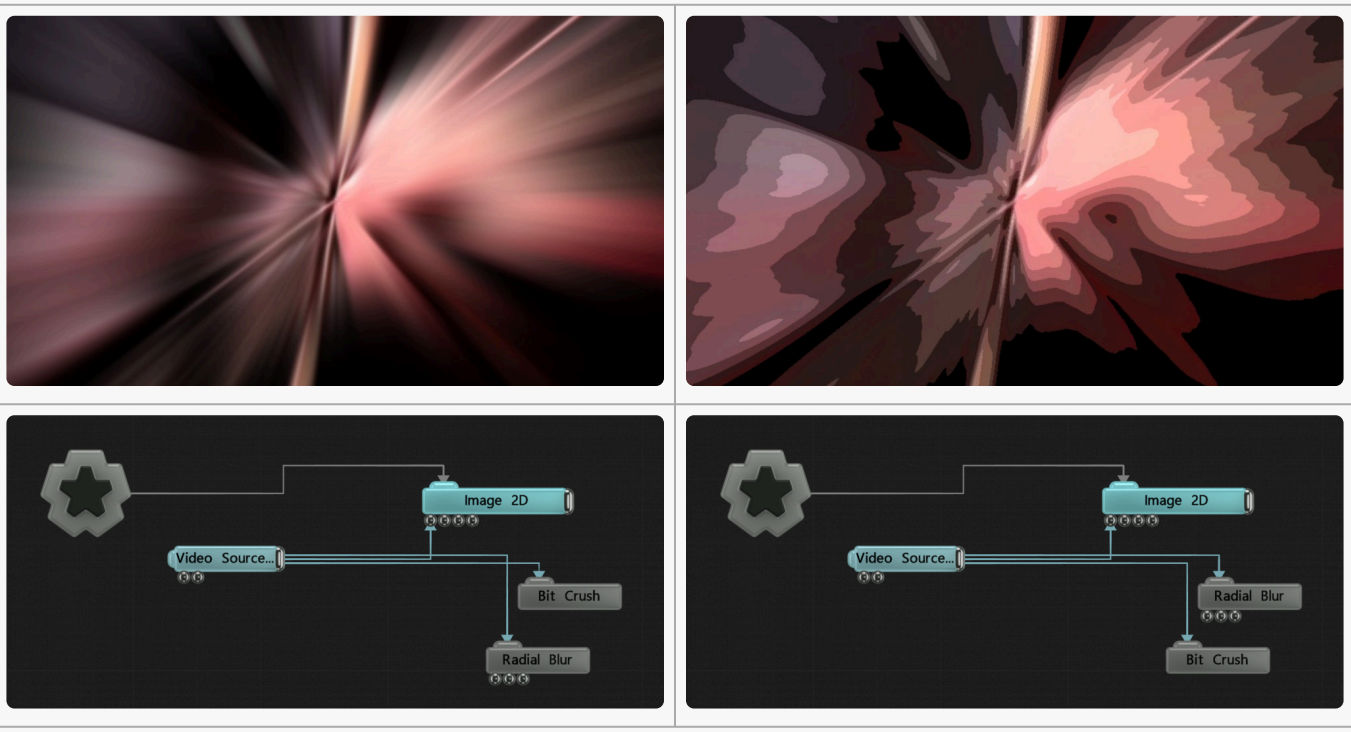


- A – The FXAA node (as with other Post-FX nodes) is parented to the Camera node, and will only be applied when the scene is viewed through that Camera.

- B – This Null node is the parent of the Light. Transforming the Null will also transform the Light.
- C – This 3D Object is connected to the Target Node input of the Light Node, meaning that the 3D Object's position will be used as the target for the rotation of the light. The Video Source node is connected to the Projection Image of the Light, causing the image stored in the Video Source to be used as the light's projection / gobo image.
- D – This Glow node is connected to the Light node, however light nodes do not contain images so this does not form a valid parent/modification relationship. As such, the glow is considered to be connected to the Root via the hierarchy and is applied to the whole scene. This does mean that if the Light is disconnected from its parent, the Glow no longer has a connected path through the hierarchy to the Root node, so the glow will also no longer be applied to the scene.

Order Of Operations

For nodes sharing the same parent, the order of operations for processing the nodes is decided based on the Y position of the node in the nodegraph, or the X position if the Y values are the same. Nodes with larger X or Y values are calculated first, meaning that if Effect A needs to be run after Effect B, Effect A should be placed lower in the nodegraph than Effect B.



The images on the left shows the radial blur being done after the bit crush, with the reverse being shown on the image on the right. This is decided by the position of both the radial blur and the bit crush in the nodegraph.

Javascript

Welcome to Notch Scripting which aims to give you what you need to get started in your scripting journey.

Notch employs a Javascript engine to allow you to programmatically manipulate the nodes in your scene.

It is useful for building logic into your scene or triggering changes from external sources. The Javascript engine runs with Builder, in Exported media server blocks or Exported standalone executables.

Anatomy of a Notch JS Script	What does a Notch JS script look like?
Adding a JS script to your scene	Getting your code in there and keeping it fresh
Manipulating the scene with JS	Getting real work done

Anatomy of a Notch JS Script

A typical Notch JS script can have these types of components:

Global variables	These can be used for passing values in and out of the Javascript node. You define the input and output global variables you want to hook in the Javascript Node. You can have non hooked global variables as well.
Init() function	called by Notch on initialisation of the script.
Update() function	called by Notch every frame.
OnKeyPress() function	called by Notch when a key is pressed.

All these elements are optional and not required in a script.

Notch will run the script when it loads, so you can initialize elements when you first start.

```
var inputA, inputB, outputA, outputB;

function Init()
{
    Log("My Script v0.1");
    // Initialize any *internal* variables here.
}

function Update()
{
    // Put your active code in here.
}

function OnKeyPress(key)
{
    // Respond to keypresses here
}
```

However, your javascript might be as light as:

```
var inputA, inputB, outputA;

function Update()
{
    outputA = inputA + inputB;
}
```

Adding a JS script to your scene

Adding the script

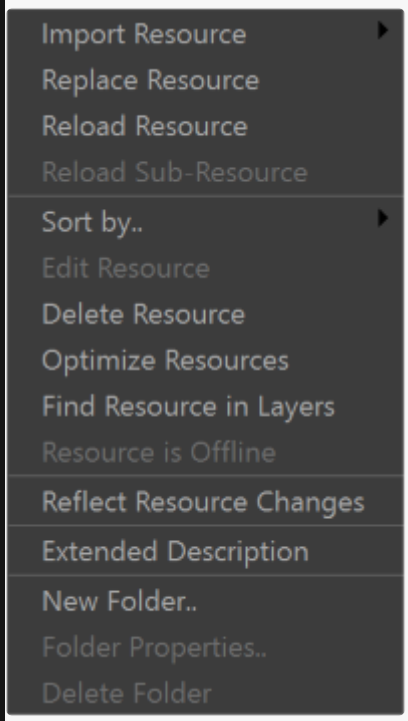
JS scripts are resources and so need to be imported into the scene after which they can be applied to a Javascript node.

1. In the Resources panel, right click then: Import Resource -> Script -> Javascript and browse to your .js file.
2. Create a Javascript Node and then select the JS Resource in it's properties.

Keeping the script up-to-date

The JS script becomes embedded in your project when you import it. To refresh from the source .js file, right click the resource and click *Reload Resource*.

Notch can watch the .js file for changes and reload when it sees updates. To enable this right click the resource and click *Reflect Resource Changes*.



Manipulating the scene with JS

Three methods for manipulating the scene

There are three methods by which you can manipulate nodes of a given scene:

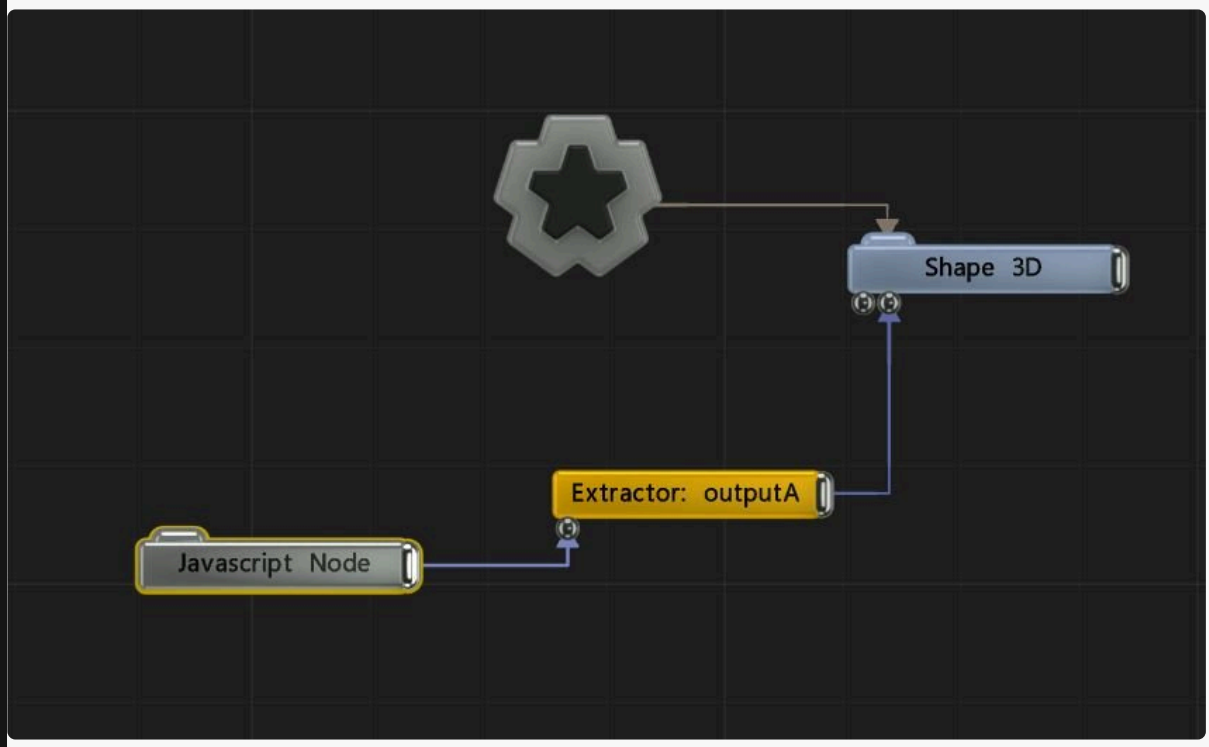
- Pass values out of a Javascript node using global variables, and then use these values in your Nodegraph
- Manipulate the *exposed properties* of a scene with SetExposedPropertyValue.
- Manipulate individual properties of a specified node with SetInt, SetFloat or SetString.
- Manipulate individual properties of nodes via it's envelope (which is subtly different) with SetEnvelopeValue.

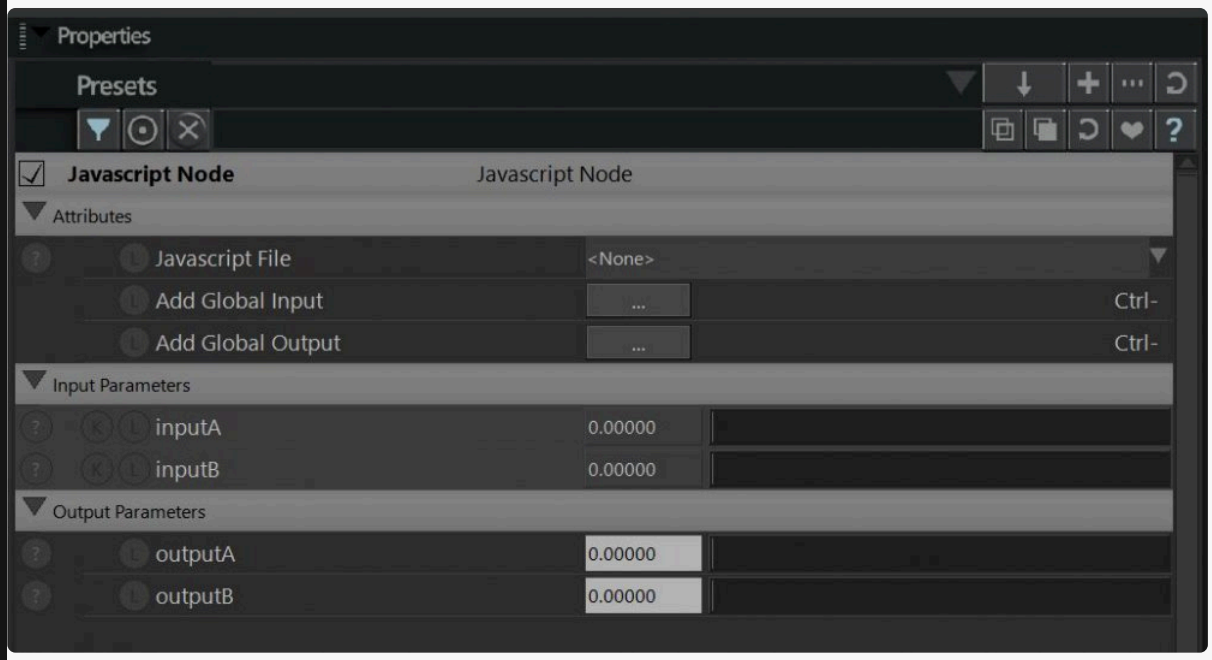
Method 1. Passing parameters in and out through Global Variables

> Please note that global variables are not available in the Initialize() function.

In the Javascript node you can hook input and output global variables for use within your scripts `Update()` function. Prior to your script being run, Notch will read the inputs from the nodegraph and set the global variables in Javascript. You can then use these global variables and write out to a set output global variables. These output global variables are then pushed into the Javascript node and can be read using the Extractor Node.

Full Example



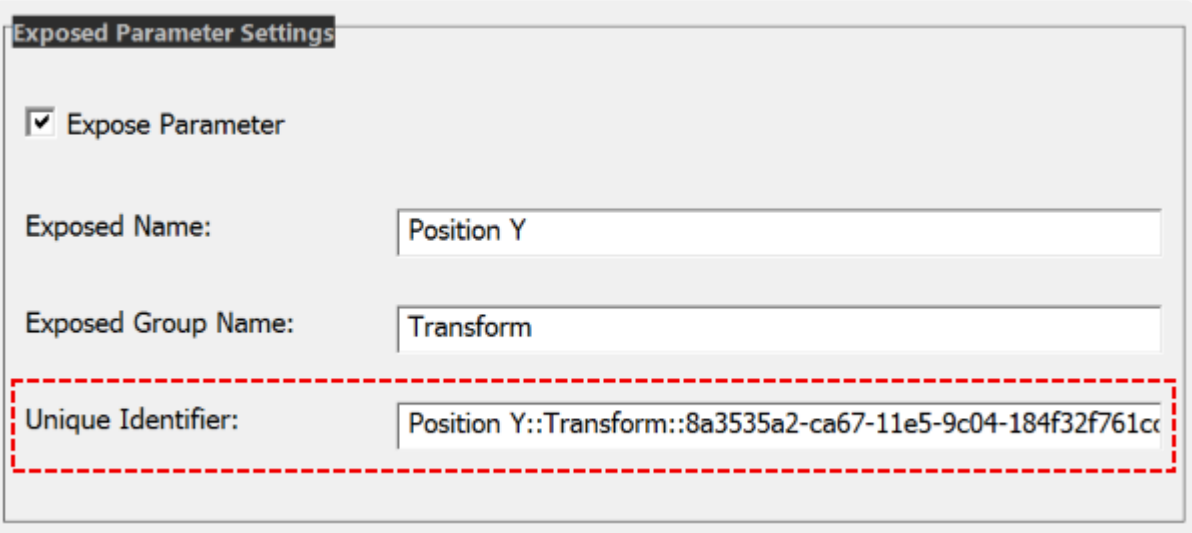



```
var inputA, inputB, outputA;

function Update()
{
    outputA = inputA + inputB;
}
```

Method 2. Exposed Parameters

Exposed properties are parameters that you have specifically exposed (usually to a media server). Each exposed property has a unique identifier that you use to reference in your JS. This unique identifier is editable and can be set to a more friendly name.



To set the exposed property use SetExposedPropertyValue

e.g. `Document.SetExposedPropertyValue("Position Y::Transform::8a3535a2-ca67-11e5-9c04-184f32f761cc", 3.2);`

Full Example

```
function Initialize()
{
    Log("Change Exposed Values v0.1");
}

function Update()
{
    Document.SetExposedPropertyValue("Position Y::Transform::8a3535a2-ca67-11e5-9c04-184f32f761cc", 3.2);
}

Initialize();

p.
```

Method 3. Set individual properties

The node graph is stored within a Document object. The Document holds *Layers*, which in turn hold

Nodes. By iterating across this structure, individual properties within nodes can be modified.

First we must acquire a handle to the Layer object of interest by utilising FindLayer():

```
var layer = Document.FindLayer("My Layer");
```

If the Layer is not found it will return with an object with type *undefined*.

With the layer, we can now search for the required node.

```
var node = layer.FindNode("Image Plane");
```

Again, if the node is not found the function will return with an object with type *undefined*.

Once we have the node, we can now set it's properties with either SetInt, SetFloat or SetString, depending on the property.

```
node.SetFloat("Transform.Position X", 1.3);
```

Note that the fully qualified property name is in the format GroupName.PropertyName.

Full Example

```
function Initialize()
{
    Log("Change Property Values v0.1");
}

function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    node.SetFloat("Transform.Position X", 1.3);
}

Initialize();
```

When you alter the scene via this method, you will be changing the original value in Builder. i.e. it persists.

Method 4. Envelope Values

Envelope value changes are subtly different to Method 2, in that they only effect the value at run-time /

calculation-time and do not over-write the underlying editor value.

Just like in Method 2, we'll be iterating across this scene structure to get to the node we are seeking.

First we must acquire a handle to the Layer object of interest by utilising FindLayer():

```
var layer = Document.FindLayer("My Layer");
var node = layer.FindNode("Image Plane");
```

Once we have the node, we can now set envelope values utilising SetEnvelopeValue.

```
node.SetEnvelopeValue("Position X", 1.3);
```

Note that envelopes do not require the property group prefix as required in SetFloat/SetInt/SetString. It just needs the property name.

Full Example

```
function Initialize()
{
    Log("Change Envelope Values v0.1");
}

function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    node.SetEnvelopeValue("Position X", 1.3);
}

Initialize();
```

Envelope changes do not persist – they only work at run/calculate time.

API Reference

Inbuilt Functions

GetGPUName()

Purpose

Returns the name of the GPU currently being used by Notch's render engine.

Syntax

string GetGPUName()

Example

```
function Init() {
    Log("GPU: " + GetGPUName());
}
```

GetViewportSize()

Purpose

Returns the size of the render viewport as an array of two numbers: width, height.

Syntax

Array GetViewportSize()

Example

```
function Init() {
    Log("Width: " + GetViewportSize()[0]);
    Log("Height: " + GetViewportSize()[1]);
}
```

JumpGlobalTime()

Purpose

Jump the timeline to time specified in seconds.

Syntax

void JumpGlobalTime(float *time*)

- *time* : Time to jump to expressed in seconds (float)

Example

```
var frame = 0;

function Update() {
    if (frame % 100 == 0) {
        JumpGlobalTime(5.0);
    }
    frame = frame + 1;
}
```

Log()

Purpose

Writes a message to Notch's log window.

Per-frame log output should be used sparingly as it can severely impact framerate.

Syntax

void Log(String *content*);

- *content*: The string to be written to the log.

Example

```
function Update() {
    Log("Hello world");
}
```

Use View->Log Window to see the log file.

SetPausePlayback()

Purpose

Pauses and unpauses the playhead when running in Standalone. The definition of *paused* is that the play head does not advance (time stays constant, frame delta time is zero), but rendering still occurs.

> ! This function only works in Standalone. It has no effect in Builder.

Syntax

void SetPausePlayback(bool *pause*);

- *pause* : Set's whether the play head is paused or not.

Example

```
var frame = 0;
var flip = true;

function Update() {
    Log("Frame: " + frame);
    frame = frame + 1;

    if (frame % 100 == 0) {
        SetPausePlayback(flip);
        if (flip == true) {
            flip = false;
        }
        else {
            flip = true;
        }
    }
}
```

Timer()

Purpose

Creates a timer that calls a function at the interval specified.

Per-frame log output should be used sparingly as it can severely impact framerate.

Syntax

void Timer(float *interval*, func *function*, string *name*, bool *repeat*);

- *interval*: The time interval in seconds between calls
- *function* : The function that should be called when timer reaches interval
- *name* : A string name you can refer to the timer with, mainly to be able to use cancelTimer(). [Optional]
- *repeat* : When true (default), the timer will repeat, when false, the time will be a one shot. [Optional]

Example

```
function Init() {
    Timer(1.0, myTimerFunction, name='secondTimer', true);
}

function myTimerFunction() {
    Log("ping");
}
```

Use View->Log Window to see the log file.

You cannot call Timer in the global scope. Easiest to initiate from code initiated by either Init or Update.

CancelTimer()

Purpose

Cancels a timer.

Syntax

void CancelTimer(string *name*);

- *name* : The string name identifier that you specified in Timer().

Example

```
function Init() {
    Timer(1.0, myTimerFunction, name='secondTimer', true);
    CancelTimer('secondTimer');
}

function myTimerFunction() {
    Log("never gets called");
}
```

Use View->Log Window to see the log file.

You cannot call CancelTimer in the global scope. Easiest to initiate from code initiated by either Init or Update.

Document Object

FindLayer()

Purpose

Finds the layer object with the given name. If the layer is not found, it returns an object of type *undefined*.

Syntax

object FindLayer(String *LayerName*);

- *LayerName* : The name of the layer as set in Notch Builder.

returns Layer Object if found or, if not found, object of type *undefined*.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    value = node.GetFloat("Transform.Position X");
}
```

GetExposedPropertyValue()

Purpose

Returns the float value of an exposed property.

Syntax

float GetExposedPropertyValue(String *ExposedUniqueIdentifier*);

- *ExposedUniqueIdentifier* : The unique identifier as set in the Exposed Parameter Settings.

returns the float value of the exposed property or *undefined* if unable to find the parameter.

Example

```
function Update()
{
    var x = Document.GetExposedPropertyValue("Position Y::Transform::8a3535a
2-ca67-11e5-9c04-184f32f761cc");
}
```

GetLayer()

Purpose

Retrieves the layer object with the given index. If the layer is not found, it returns an object of type *undefined*.

Syntax

object FindLayer(int *LayerIndex*);

- *LayerIndex*: The array index of the layer.

returns Layer Object if found or, if not found, object of type *undefined*.

Example

```
function Update()  {
    layer = Document.GetLayer(0);
    node = layer.FindNode("Frame Buffer");
    value = node.GetFloat("Transform.Position X");
}
```

GetNumLayers()

Purpose

Returns the number of layers in the project.

Syntax

int GetNumLayers();

returns an integer of the number of layers in the project.

Example

```
function Update()
{
    var x = Document.GetNumLayers();
}
```

SetExposedPropertyValue()

Purpose

Sets the value of an exposed property.

Syntax

void SetExposedPropertyValue(String *ExposedUniqueIdentifier*, float *value*);

- *ExposedUniqueIdentifier* : The unique identifier as set in the Exposed Parameter Settings.
- *value*: the float value to set to.

Example

```
function Update()
{
    Document.SetExposedPropertyValue("Position Y::Transform::8a3535a2-ca67-11e5-9c04-184f32f761cc", 3.2);
}
```

See *Using JS to manipulate the scene* for further details.

Layer Object

FindNode()

GetEndTime()

Purpose

Provides the end time of the layer (as per Notch timeline) in hundredths of a second.

Syntax

int GetEndTime();

returns time in hundredths of a second as an integer.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    var timeStart = layer.GetEndTime();
}
```

GetName()

Purpose

Returns the name of the layer.

Syntax

string GetName();

returns the name of the object.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    var name = layer.GetName();
}
```

GetNode()

Purpose

Retrieves the node object with the given index within a layer. If the node is not found, it returns an object of type *undefined*.

Syntax

object GetNode(int *NodeIndex*);

- *NodeIndex*: The array index of the layer.

returns Node Object if found or, if not found, object of type *undefined*.

Example

```
function Update()  {
    layer = Document.GetLayer(0);
    node = layer.GetNode(0);
}
```

GetNumNodes()

Purpose

Returns the number of nodes in the layer.

Syntax

int GetNumNodes();

returns an integer of the number of nodes in the layer.

Example

```
function Update()
{
    layer = Document.FindLayer("My Layer");
    var x = layer.GetNumNodes();
}
```

GetStartTime()

Purpose

Provides the start time of the layer (as per Notch timeline) in hundredths of a second.

Syntax

int GetStartTime();

returns time in hundredths of a second.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    var timeStart = layer.GetStartTime();
}
```

GetVisible()

Purpose

Retrieves the visible state of the layer.

> ! This only works when your project is NOT set to use Layers as Separate Effects: *Project Settings->General->Layers As Separate Effects*

Syntax

bool GetVisible();

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    visible = layer.GetVisible();
}
```

SetVisible()

Purpose

Sets whether the layer is visible.

> ! This only works when your project is NOT set to use Layers as Separate Effects: *Project Settings->General->Layers As Separate Effects*

Syntax

void SetVisible(Bool *visible*);

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    layer.SetVisible(True);
}
```

GetNodes()

Purpose

Retrieves a list of node objects within a layer.

Syntax

object GetNodes();

returns Node Object list.

Example

```
function Update()  {
    layer = Document.GetLayer(0);
    nodeList = layer.GetNodes();
    for(i = 0; i < nodeList.length; ++i)
    {
        var node = nodeList[i];
    }
}
```

Node Object

AsRSSFeedNode()

Purpose

Returns the node as a RSSFeedNode object, if this is the correct node type.

Syntax

RSSFeedNode AsRSSFeedNode();

returns the node as an RSSFeedNode.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    rssNode = layer.FindNode("RSSFeed").AsRSSFeedNode();
}
```

GetEndTime()

Purpose

Provides the end time of the node (as per Notch timeline) in hundredths of a second.

Syntax

int GetEndTime();

returns time in hundredths of a second as an integer.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Image 2D");
    var timeEnd = node.GetEndTime();
}
```

GetEnvelopeValue()

Purpose

Retrieves the calculated value (post modifiers and keyframes) of a float property in a node.

> ! The retrieved value is from the last frame.

Syntax

float GetEnvelopeValue(String *FieldName*, float *value*);

- *FieldName* : the field name (NB: Does not require the group name)

returns a float of the resulting calculated value from the last frame.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    value = node.GetEnvelopeValue("Position X");
}
```

GetFloat()

Purpose

Retrieves the value of a float property in a node.

Syntax

float GetFloat(String *PropertyName*);

- *PropertyName* : the property within the node. Starts with `GroupName.Property` e.g. `Transform.Position X`

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    value = node.GetFloat("Transform.Position X");
}
```

GetInt()

Purpose

Retrieves the value of an integer property of a node.

Syntax

int GetInt(String *PropertyName*);

- *PropertyName* : the property within the node. Starts with `GroupName.Property` e.g. `Transform.Position X`

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    value = node.GetInt("Attributes.Frame Grab Active");
}
```

Checkboxes are integer properties.

GetName()

Purpose

Returns the name of the node.

Syntax

string GetName();

returns the name of the object.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Image 2D");
    var name = node.GetName();
}
```

GetNodeGraphPosition()

Purpose

Retrieves the location (X and Y position) of a node within the nodegraph.

Syntax

Array GetNodeGraphPosition();

returns The X and Y position of the node in the nodegraph.

Example

```
function SortNodesByPosition(a, b) {
    var nodeAGraphXY = a.GetNodeGraphPosition();
    var nodeBGraphXY = b.GetNodeGraphPosition();
    if (nodeAGraphXY[1] > nodeBGraphXY[1])
        return 1;
    else if (nodeAGraphXY[1] == nodeBGraphXY[1] && nodeAGraphXY[0] > nodeBGrap
hXY[0])
        return -1;
    return 0;
}
function Update() {
    layer = Document.GetLayer(0);
    nodeList = layer.GetNodes();
    nodeList.sort(SortNodesByPosition);
}
```

GetNumChildren()

Purpose

Returns the number of child nodes.

Syntax

int GetNumChildren();

returns an integer of the number of child nodes.

Example

```
function Update()
{
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    n = node.GetNumChildren();
}
```

GetStartTime()

Purpose

Provides the start time of the node (as per Notch timeline) in hundredths of a second.

Syntax

int GetStartTime();

returns time in hundredths of a second.

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Image 2D");
    var timeStart = node.GetStartTime();
}
```

GetString()

Purpose

Retrieves the value of a string property within a node.

Syntax

String GetString(String *PropertyName*);

- *PropertyName* : the property within the node. Starts with `GroupName.Property` e.g. `Transform.Position X`

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("MyTextNode");
    value = node.GetString("Attributes.Text String");
}
```

RSSTextSelectorChangeText()

SetEnvelopeValue()

Purpose

Sets the value of a float property in a node but only for run/calculation time.

Syntax

void SetEnvelopeValue(String *FieldName*, float *value*);

- *FieldName* : the field name (NB: Does not require the group name)
- *value*: the float value the property is to be set to

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    node.SetEnvelopeValue("Position X", 1.3);
}
```

Using SetEnvelopeValue only has an effect at run-time / calculation-time. i.e. it does not change the value in the Editor/Document. SetEnvelopeValue also responds to keyframes and modifiers. This is subtly different to SetFloat which alters the underlying editor value and hence persists.

SetFloat()

Purpose

Sets the value of a float property in a node.

Syntax

void SetFloat(String *PropertyName*, float *value*);

- *PropertyName* : the property within the node. Starts with `GroupName.Property` e.g. `Transform.Position X`
- *value*: the float value the property is to be set to

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    node.SetFloat("Transform.Position X", 1.3);
}
```

Using SetFloat alters the value of the property in the Editor/Document. This is subtly different to SetEnvelopeValue which responds to modifiers and keyframes.

SetInt()

Purpose

Sets the value of an integer property in a node.

Syntax

void SetInt(String *PropertyName*, int *value*);

- *PropertyName* : the property within the node. Starts with `GroupName.Property` e.g. `Transform.Position X`
- *value*: the integer value the property is to be set to

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("Frame Buffer");
    node.SetInt("Attributes.Frame Grab Active", 1);
}
```

Checkboxes are integer properties.

SetString()

Purpose

Sets the value of an string property in a node.

Syntax

void SetString(String *PropertyName*, String *value*);

- *PropertyName* : the property within the node. Starts with `GroupName.Property` e.g. `Transform.Position X`
- *value*: the string value the property is to be set to

Example

```
function Update()  {
    layer = Document.FindLayer("My Layer");
    node = layer.FindNode("MyTextNode");
    node.SetString("Attributes.Text String", "Dormant");
}
```

RSSFeedNode

GetEntryImageFilename()

GetEntryImageFilename(entryIndex, 1);

Purpose

Retrieves the file path of the image for a given RSS entry from an RSS Node.

Syntax

string GetEntryImageFilename(int entryIndex, int imageIndex);

- entryIndex : The index of the entry, where 0 is the top of the list.
- imageIndex : The index of the image to retrieve. RSS entries can have multiple images.

Example

```
function Update()  {
    t = UpdateContext.LocalTime;
    numLayers = Document.GetNumLayers();
    layer = Document.GetLayer(0);
    layerEndTime = layer.GetEndTime();

    rssNode = layer.FindNode("RSSFeed").AsRSSFeedNode();
    textNode = layer.FindNode("MainText");
    imageLoaderNode = layer.FindNode("MainImageLoader");

    numRssEntries = rssNode.GetNumEntries();
    entryIndex = 0;

    entryImageFilename = rssNode.GetEntryImageFilename(entryIndex, 0);
    entryText =  rssNode.GetEntryTitle(entryIndex);

    imageLoaderNode.SetString("Attributes.Filename", entryImageFilename);
    textNode.SetText(entryText);
}
```

GetEntryTitle()

Purpose

Retrieves the title of a given RSS entry from an RSS Node.

Syntax

string GetEntryTitle(int entryIndex);

- entryIndex : The integer index of the entry, where 0 is the top of the list.

Example

```
function Update()  {
    numLayers = Document.GetNumLayers();
    layer = Document.GetLayer(0);
    layerEndTime = layer.GetEndTime();

    rssNode = layer.FindNode("RSSFeed").AsRSSFeedNode();
    textNode = layer.FindNode("MainText");

    numRssEntries = rssNode.GetNumEntries();
    entryIndex = 0;
    if (numRssEntries > 0) {
        entryText = rssNode.GetEntryTitle(entryIndex);
    }
    else {
        entryText = "No entries";
    }
    textNode.SetText(entryText);
}
```

GetNumEntries()

Purpose

Retrieves the current number of entries retrieved in a RSS Node.

Syntax

int GetNumEntries();

returns the number of entries as an integer.

Example

```
function Update()  {
    numLayers = Document.GetNumLayers();
    layer = Document.GetLayer(0);
    layerEndTime = layer.GetEndTime();

    rssNode = layer.FindNode("RSSFeed").AsRSSFeedNode();
    textNode = layer.FindNode("MainText");

    numRssEntries = rssNode.GetNumEntries();
    entryIndex = 0;
    if (numRssEntries > 0) {
        entryText = rssNode.GetEntryTitle(entryIndex);
    }
    else {
        entryText = "No entries";
    }
    textNode.SetText(entryText);
}
```

UpdateContext Object

GlobalTime

Purpose

Gets or sets the time on the Notch timeline in hundredths of a second.

Syntax

float GlobalTime;

Example : Getting

```
function Update()  {
   currentTime = UpdateContext.GlobalTime;
}
```

Example : Setting

```
function Update()  {
   UpdateContext.GlobalTime = 5.0;
}
```

Please note this is a member variable of UpdateContext, not a function.

Layer

Purpose

Provides the current layer object.

Syntax

object Layer;

Example

```
function Update()  {
    layer = UpdateContext.Layer;
    node = layer.FindNode("Frame Buffer");
    node.SetInt("Attributes.Frame Grab Active", 1);
}
```

Please note this is a member variable of UpdateContext, not a function.

LocalTime

Purpose

Provides the time local to the current layer.

Syntax

float LocalTime;

Example

```
function Update()  {
   time = UpdateContext.LocalTime;
}
```

Please note this is a member variable of UpdateContext, not a function.

TimeDelta

Purpose

Provides the time between the last frame and the current one in seconds.

Syntax

float TimeDelta;

Example

```
function Update()  {
   delta = UpdateContext.TimeDelta;
}
```

Please note this is a member variable of UpdateContext, not a function.

HTTP Functions

HTTPGet

Purpose

Calls a URL and returns the payload of the HTTP response as a string.

> ! This is a synchronous call and hence will block rendering until it completes (which could take hundreds of milliseconds). As such it is usually used at the start of a scene in the first frame.

> ! Only HTTP is supported at this time. (No HTTPS).

Syntax

string HTTPGet();

returns the payload of the HTTP response as a string.

Example

This example pulls JSON from an example HTTP endpoint. The JSON is an array of objects, with an element named 'title'.

```
function OnKeyPress(key)
{
    Log('Got keypress: ' + key);
    if (key == 'P') {
        Log("Getting items from API");
        var data = HTTPGet("http://jsonplaceholder.typicode.com/posts");
        items = JSON.parse(data);
        for (i in items) {
            Log(items[i].title);
        }
    }
}
```

HTTPGetFile

Purpose

Calls a URL and then saves the payload of the HTTP response to a file.

> ! This is a synchronous call and hence will block rendering until it completes (which could take hundreds of milliseconds). As such it is usually used at the start of a scene in the first frame.

> ! Only HTTP is supported at this time. (No HTTPS).

Syntax

HTTPGetFile(,);

Example

This example pulls a file (a Notch image) from a URL and stores it in your Desktop.

```
function OnKeyPress(key)
function OnKeyPress(key)
{
    Log('Got keypress: ' + key);
    if (key == 'P') {
        Log("Getting file");
        HTTPGetFile("http://www.notch.one/wp-content/uploads/2017/12/notchlog
o-retina_new.png", "C:\\Users\\My Name\\Documents\\Notch_Download.png");
    }
}
```

NFetch

Purpose

Function to make asynchronous HTTP requests and then invoke a callback function with the result. It is inspired by the `Fetch` Javascript function as implemented in most browsers.

✻ The callback is done on the next frame update loop – it is not run in a parallel thread.

! In most cases this supersedes HTTPGet function.

Syntax

NFetch function

```
function NFetch(url, request, callBack);
```

Parameter	Description	Example
url	The URL to be called	`"https://exampleapi.notch.one/tests/getText"`
request	Request object describing how the request should be made	`{ method: 'GET', 'saveToPath': "C:\\Temp\\mycsv.csv" }`
callBack	Reference to a function that should be called on success/failure of the async NFetch call	`myFunc`

! You cannot call NFetch in the global scope. Easiest to initiate from code initiated by either Init or Update.

Request Object

The Request object has numerous properties to enable configuration of the HTTP request.

Property	Description	Example
method	One of the following: `GET` | `POST` | `PUT` | `DELETE`	`"GET"`
headers	A list of key/value pairs for HTTP Header items.	`{ 'Content-Type': 'appli`

		`cation/json' }`
body	Payload when using POST or PUT	`body: JSON.stringify(myPayload)`
redirect	Decide whether redirects should be followed: `"follow"` or `"error"` or `"manual"`.	`"follow"`
saveToPath	If a file path is provided, the payload of the HTTP response will be saved to the path specified.	`"C:\\Temp\\testimage.png"`
referrer	Elther the URL of referring site or `"no-referrer"` or `"client"`	`"no-referrer"`

> **method** is a mandatory property in the Request object, all others are optional.

Callback functions

On completion/failure of a NFetch async request, the callback function will be called on the next available render loop. The callback function must accept a single parameter: `response` which is the Response Object.

```
function handleMyResponse(response) {
    if (response.ok && response.status === 200) {
        Log(response.text());
    }
}
```

Response Object

The Response object is populated by the NFetch handler and provided to the defined callback function (see above).

Property	Description	Example
ok	Did the HTTP request succeed	`true`
headers	A list of key/value pairs returned from the server.	`{ 'Content-Type': 'text/html; charset=utf-8' }`
status	Returned HTTP status code	`200`
saveSuccess	If a save to path was requested, then returns whether the file was succesfully written.	`true`
url	Gets the final response URL	`"http://foo.com/bar"`
curlErrorCode	For debugging : The resulting number from the underlying CURL call.	`0`

curlErrorText	For debugging : The resulting error text from the underlying CURL call.	"r"

Usage

You can copy, paste & test all of the below examples, against our test web API server. (https://exampleapi.notch.one/tests/)

GET Plain Text

```
req = { method: 'GET' };
NFetch("https://exampleapi.notch.one/tests/getText", req, testTextResponse);

function testTextResponse(response) {
    if (response.ok && response.status === 200) {
        Log(response.text());
    }
}
```

Save to File

```
req = { method: 'GET', 'saveToPath': "C:\\Temp\\mycsv.csv" };
NFetch("https://exampleapi.notch.one/tests/getCSV", req, testCSVResponse);

function testCSVResponse(response) {
    if (response.ok && response.status === 200) {
        Log('Saved csv to disk');
    }
}
```

Save PNG to File

```
req = { method: 'GET', 'saveToPath': "C:\\Temp\\testimage.png" };
NFetch("https://exampleapi.notch.one/tests/getPNG", req, testPNGResponse);

function testPNGResponse(response) {
    if (response.ok && response.status === 200) {
        Log('Saved png to disk');
    }
}
```

Get and parse JSON

```
req = { method: 'GET' };
NFetch("https://exampleapi.notch.one/tests/getJSON", req, testJSONResponse);
```

```
function testJSONResponse(response) {
    if (response.ok && response.status === 200) {
        json = response.json();
        Log(json);
        Log(json['elementExamples']['ex_unicodeStr']);
        Log(json['elementExamples']['ex_string']);
        Log(json['elementExamples']['ex_integer']);
        Log(json['elementExamples']['ex_float']);
    }
}
```

Make request with headers

```
req = { method: 'GET', headers: { 'mySpecialToken': 'Blah', 'customHeader': 'm
eow' };
NFetch("https://exampleapi.notch.one/tests/headers", req, testHeaders);

function testHeaders(response) {
    if (response.ok && response.status === 200) {
        Log(response.text());
    }
}
```

POST JSON data

```
payload = {
        "mydata": "is awesome",
        "myNumber": 42
}

req = { method: 'POST', body: JSON.stringify(payload), headers: { 'Content-Typ
e': 'application/json' } };
NFetch("https://exampleapi.notch.one/tests/postJSON", req, testPostJSONRespons
e);

function testPostJSONResponse(response) {
    if (response.ok && response.status === 200) {
        Log('POST JSON success');
    }
}
```

POST Form Data

```
payload = 'fieldA=Hello%20A&fieldB=Hello%20B';

req = { method: 'POST', body: JSON.stringify(payload), headers: { 'Content-Typ
e': 'application/x-www-form-urlencoded' } };
NFetch("https://exampleapi.notch.one/tests/postJSON", req, testPostFormRespons
```

```
e);

function testPostFormResponse(response) {
    if (response.ok && response.status === 200) {
        Log('POST form success');
    }
```

Devices & Protocols

Method

This section contains some information on the various protocols and external devices that can be used with notch.

- ArtNet
- Audio Devices
- Kinect Setup
- NDI
- OSC
- Video Capture
- Web / HTTP API

ArtNet

ArtNet in Notch

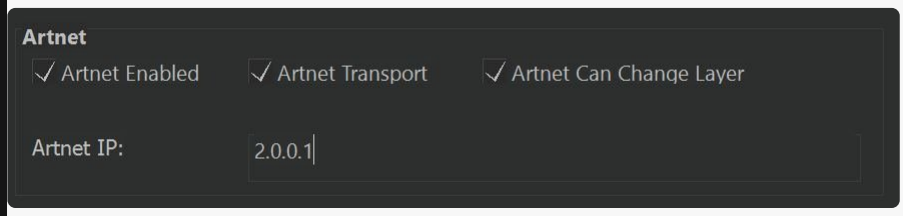
When running in **Builder** or **Standalone**, you can expose any numerical parameter and basic transport controls to ArtNet (DMX over network) and hence control it via a lighting desk.

> ! ArtNet does not operate when a Notch block is running in a media server. Media servers provide their own mechanisms for using ArtNet to control Notch parameters.

Setting up your ArtNet connection

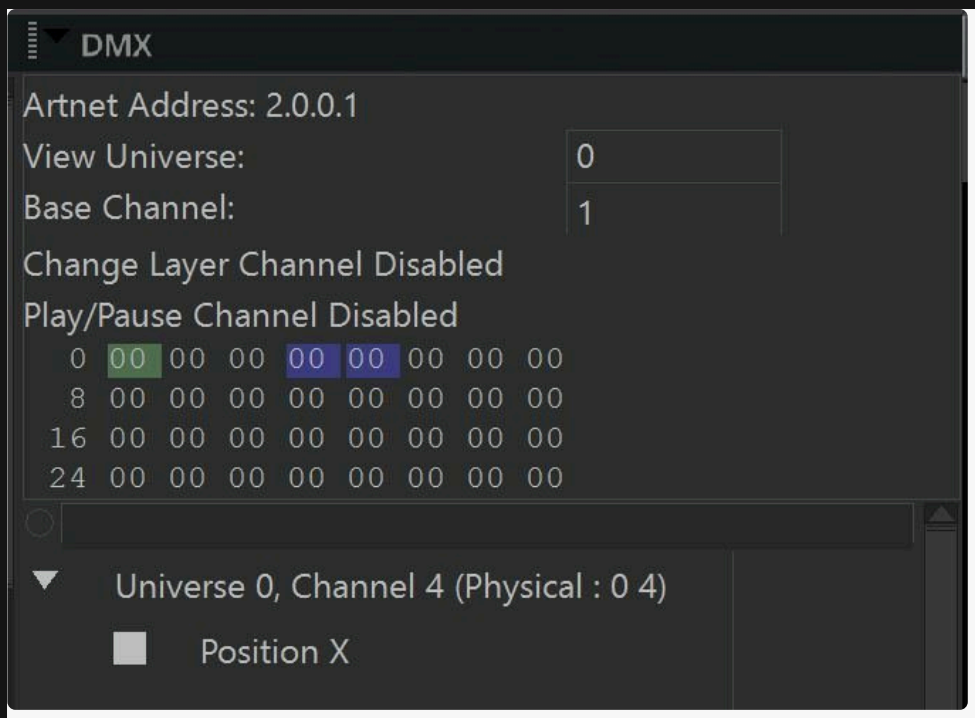
To enable ArtNet in your project:

1. Open *Project* -> *Settings*
2. In the ArtNet section:
    a. Check ArtNet Enabled
    b. Enter the IP address of your PCs local network adapter into the ArtNet IP field (ensure it is the network adapter on the ArtNet network).
    c. If you wish to control layers via ArtNet then enable: *ArtNet Transport* and *ArtNet Can Change Layer*



Configuring and Monitoring the DMX channel layout:

1. Enable the ArtNet monitor: *View* -> *ArtNet Monitor*
2. The DMX pane will appear
    a. The ‘Base’ universe/channel can be selected here and is the first universe/channel that will be used as part of your patch. This allows you to offset the entire DMX channel patch if required.
    b. You can see the exposed parameter mappings below, both on the visual channel list (assigned channels are in blue) and in the tree list.



If you need to check that you are receiving ArtNet data packets you can use the *Connection Monitor Panel*.

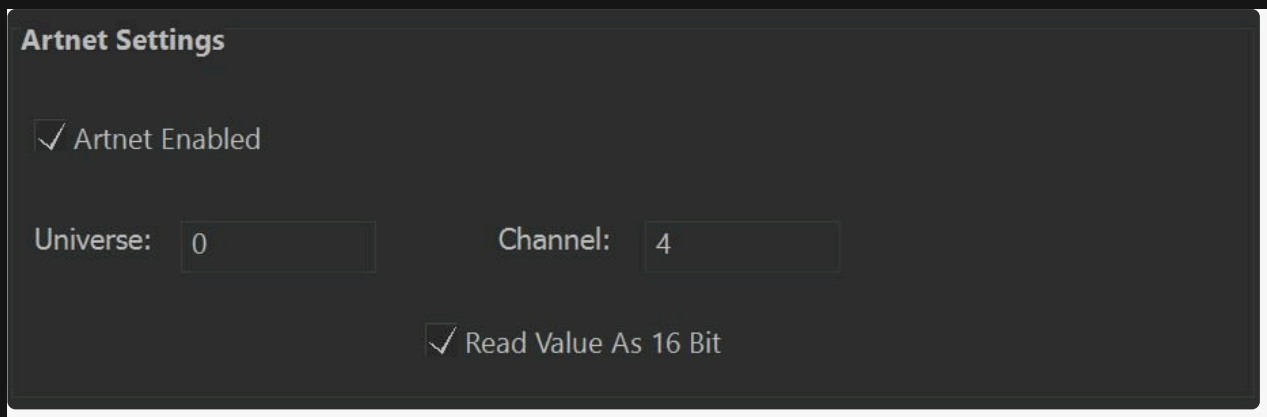
The channel table view has the following colour key:

- Green – Transport Control Channel
- Blue – Assigned to Exposed Parameter
- Red – Error: Channel Conflict (overlapping channel assignment)

Expose Parameter to ArtNet

To expose a parameter for control via ArtNet:

1. Click the ? symbol next to the parameter to open the *Parameter Property* window.
2. In the *ArtNet Settings* section:
    a. Check *ArtNet Enabled*.
    b. Choose the Universe and Channel for the parameter you are exposing. (NB: The universe/channel will be offset, if you have set a different *Base Universe/Channel* in your setup – see above)
    c. If you would like to use two channels to achieve 16bit granularity, then select *Read Value As 16bit*.
3. You can now see the exposed value visually in the ArtNet Monitor.



! The first 3 channels should be left free for Notch ArtNet transport controls. These are channels are identified visually in green. If you have an overlap, it will show in red.

* When using 16bit values, the channel order is Coarse then Fine (as per DMX conventions).

ArtNet Transport Control

To use ArtNet Transport controls, you must enable them in Project Settings.

There are three channels of transport control:

Control	Channel	Values
Layer Selection	Base	0 = 1st Layer, 1 = 2nd, 2 = 3rd ...
Play Head Control	Base + 1	0 = Paused, 1 = Playing
Rewind to Zero	Base + 2	0 = No Action, 1 = Trigger

You only need to issue the Rewind to Zero command momentarily.

! ArtNet Transport Controls only operate when the Notch block is running as a Standalone. They do **not** operate when running in Builder. Best Practice is to set up a Standalone and then Remote Network Edit from another machine.
Furthermore, if you enable ArtNet transport controls in standalone, it will start paused until you tell it to play.

Audio Devices

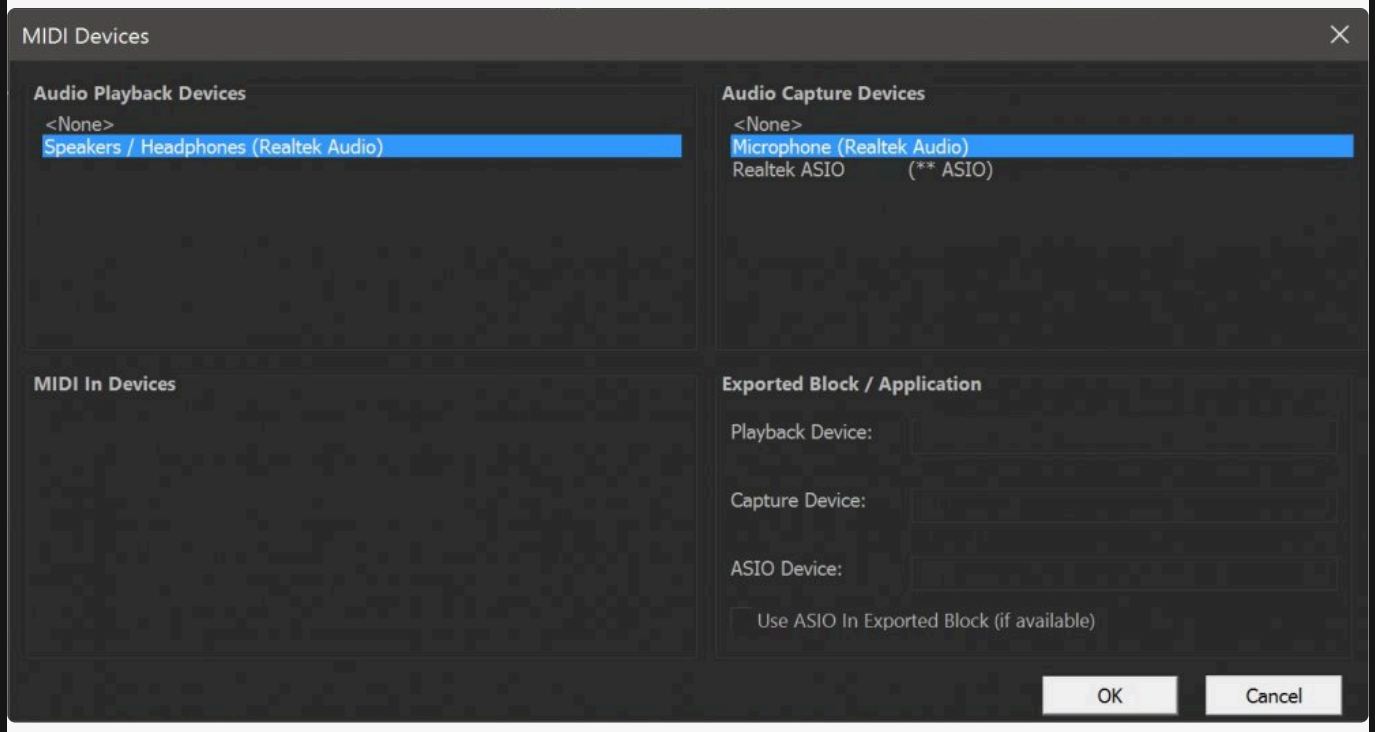
At present Notch interfaces directly with audio devices either via the standard Windows audio device interface or via ASIO.

Once setup, you can use audio with the following nodes:

- Play Sound
- Capture Sound

Audio Devices Panel

The Audio Devices panel can be accessed from the menu: *Devices -> Audio Devices…*



Setting up audio devices for use in Notch Builder

To set up the audio devices to be used in Notch Builder:

1. Go to menu *Devices -> Audio Devices…*
2. In the *Audio Playback Devices* panel choose the playback device you wish to use (single click).
3. In the *Audio Capture Devices* panel choose the recording device you wish to use (single click).

Setting up audio devices for use in Blocks and Standalone Executable

Notch uses search strings to find matching devices when running in Blocks or Standalone. This allows you to choose the audio device to use on the target machine without having an identical setup on the Builder machine.

To set the audio devices to use when running as a block or standalone:

1. Go to menu *Devices -> Audio Devices…*
2. In the *Exported Block / Application* panel you can type all or part of the name of the device to be used for Playback (WDM) / Capture (WDM) or ASIO.
3. If you are using planning on using ASIO devices, select *Use ASIO In Exported Block (if available)*

If no audio devices are set in this panel, the Block/Standalone will use the default Windows audio devices for playback and capture.

> You can double click devices from the top panes to have their text copied into the text boxes

> You do not need to enter the whole device name. Notch will use ‘fuzzy logic’ to find the closest match.

Using ASIO

ASIO offers a number of distinct advantages over Windows Audio Devices:

1. Much lower latency capture, which is important in audio reactive applications
2. Multi-channel audio support, useful for taking stems from audio desks.

However, there can be limitations to ASIO audio:

1. ASIO driver quality varies from device to device. Pro audio devices (such as RME) generally have excellent driver support, but your ‘on-board audio’ ASIO driver may not be as robust.
2. Not all ASIO drivers are multi-client, meaning that only one block/program can access the audio device at one time.

Intel Realsense 2.0 Camera Setup

Introduction

Just like the Kinect, the Intel RealSense can be used to with Notch in a number of ways, such as generating meshes, emitting particles, generating fields, and using the depth and color images in video processing chains.

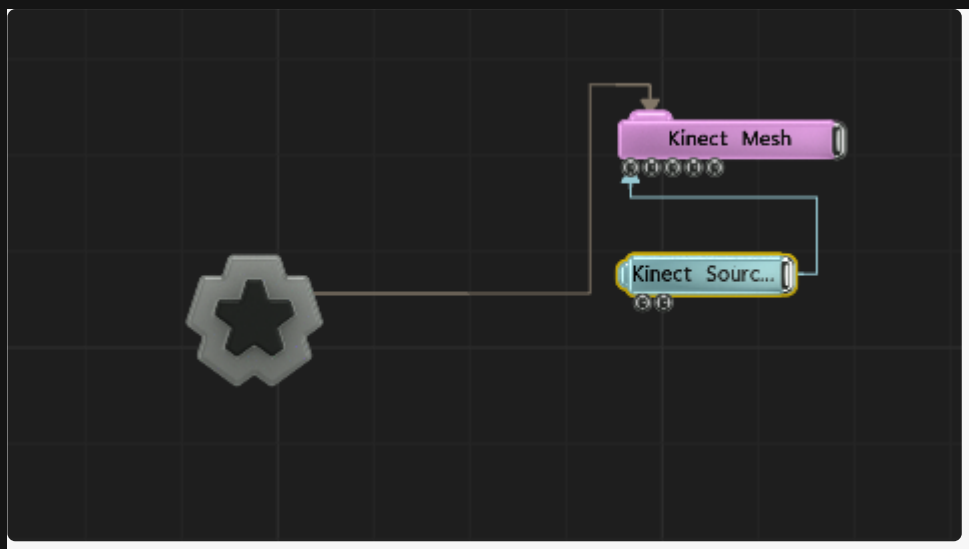
> ! The suitability of RealSense for production environments is entirely at your own risk. Internal and external user testing has highlighted significant issues in aligning operating system, driver and firmware versions. Driver management is extremely difficult with the device due to two paths of driver delivery (packaged in Windows 10 OS updates and separate driver downloads). We advise significant caution when considering this device for any production environment.

Setup

Firstly, you will need an Intel RealSense depth camera. Notch Uses the official SDKs to integrate with the RealSense camera. Please note that you should download the SDKs first before downloading any other softwares or using the camera. The Intel Realsense SDK's support cameras SR300 and D400- Series. (SDK V2.0)

Connect your RealSense camera to your PC and open Notch Builder. Go to menu Devices > VideoIn/ Camera/Kinect Settings to find the Video In settings. In the Subheading of Intel Realsense tick "Realsense Enabled" and press OK.

To see if the camera is working you will need to connect the Kinect Mesh node to the root, then link the Kinect Source node to the Kinect mesh Colour Image Input as shown in the example below. Press play and the camera should be working.



Adding Realsense sources to your scene

Add a Video Kinect Source Node to the Nodegraph (Video Processing > Input Output). This is the source node for any Realsense related outputs. This node provides both the RGB and depth image from the Realsense camera, and by default, it generates an alpha channel which is clipped using the depth image and the near and far planes set on the node. You may also output depth from this node as luminance in the RGB channel. Connecting it to a Kinect Mesh node will allow you to visualize what the Realsense camera can see in 3D space. You need one Video Kinect Source for each physical Realsense camera in use.

Nodes that use Intel RealSense source

Video nodes can use Kinect RGB or Depth images as source as inputs. However, the following nodes are specifically made for use with the RealSense camera:

- Depth Camera / Kinect Colour Key
- Depth Camera / Kinect Mesh, Generates a mesh from a RealSense source.
- Depth Camera / Kinect Source, source node for any effect using Kinect.

Using multiple Realsense cameras with Notch

While Notch supports multiple Realsense cameras (up to 4), the PC hardware / USB buses have limitations on the number of Realsense cameras, It depends on what machine you are working with. This has not been tested however, a user has managed to get up to 4 working.

Use of a Realsense Camera is mutually exclusive to any other depth camera (e.g. Kinect) – it is not possible to mix the RealSense cameras, Kinect1 and Kinect2 in one project.

Skeletal Data

There is no Skeletal data with the Realsense camera.

Recording Realsense Data

Notch does not currently support recording Realsense data.

Considerations for the use of the Realsense camera in performance environments

Working with a Realsense Camera can take some persistence. The cameras were not designed specifically for performance environments and the driver/firmware provided by the vendor is sometimes in flux. If you do not have any experience with the use of these cameras we highly recommend engaging with an experience interaction/integration specialist. Specific considerations:

- IR Interference: Incandescent light sources (including the sun, and some models of strobe) significantly degrade the real sense depth image, making it unusable.
- Signal Extension – as the camera is fairly new we do not know the achievability of the camera's extension.
- Field of View : Both versions of the realsense cameras have very particular field of views and both versions depth and RGB fov's differ.

Troubleshooting

My Realsense camera does not show up in Notch. What should I do?

- Does the camera work outside of Notch? There are two tool softwares that come with the SDK such as Intel Depth Quality Tool and Intel RealSense Viewer.
- Close all other software that may be accessing the camera (including Intel's own tools).
- Replugging the Realsense camera while using Notch will not work. Please restart Notch.
- Check you are using a USB 3.0 port and cable.
- Please turn off all anit-virus software. We have seen some issues with popular anit-virus softwares which can interfear with the camera.

The frame rate of the RGB camera appears poor, even though Notch's frame rate is fine..

- Please be aware that the Intel Realsense Cameras frame rate is limited speed by your USB Bus. Having multiple cameras on one PC will also affect this, try disconnecting a few cameras.
- If your scene only requires the depth camera try disabling the colour channel in the Video In/ Kinect settings dialog. This will reduce the amount of bandwidth used.

- There is a known issue with the RGB camera not working smoothly on the Disguise GX range.

If you are still struggling to use your Realsense camera with Notch please get in contact with us at support@notch.one.

Kinect Setup

Introduction

Notch can read both RGB and Depth data from both the Kinect v1 or v2. You can use this data in a whole variety of ways, from generating meshes, emitting particles, generating fields, and using the depth and colour images in video processing chains.

Setup

You'll need either a Kinect 1.0 or a Kinect 2.0 with a Kinect for Windows Adapter. Notch uses the official Microsoft SDKs to integrate with the Kinect cameras, so you may also need to download the relevant drivers from Microsoft (Kinect 1 Drivers v1.8 and Kinect 1 SDK v1.8, Kinect 2 Drivers).

Connect your Kinect to your PC and open Notch Builder. Go to menu Devices > VideoIn/Camera/Kinect Settings to find the Video In settings. Depending on which Kinect sensor you have, tick "Kinect Enabled" underneath the corresponding device, hit apply, and you should notice your Kinect light up. It is possible to read only the colour or depth channel from the Kinect camera if the other channels are not required in order to improve performance.

Adding Kinect sources to your scene

Add a Depth Camera / Kinect Source Node to the Nodegraph (Video Processing > Input Output). This is the source node for any Kinect related outputs. This node contains both the RGB and depth image from the Kinect, and by default it generates an alpha channel which is clipped using the depth image and the near and far planes set on the node. You may also output depth from this node as luminance in the RGB channel. Connecting it to a Kinect Mesh node will allow you to visualize what the Kinect sensor can see in 3D space. You need one Video Kinect Source for each physical Kinect camera in use.

Nodes that use Kinect source

Video nodes can use Kinect RGB or Depth images as source as a inputs. However the following nodes are specifically made for use with the Kinect:

- Depth Camera / Kinect Mesh, Generates a mesh from a Kinect source.
- Kinect1 Skeleton, Generates skeletal data from a Kinect 1 camera, which can be used to drive a character animation live.
- Kinect2 Skeleton, Generates skeletal data from a Kinect 2 camera, which can be used to drive a character animation live.

- Depth Camera / Kinect Colour Key,
- Depth Camera / Kinect Source, Loads the Kinect 1 and Kinect 2 Colour and Depth Data.

Using multiple Kinects with Notch

While Notch supports multiple Kinect v1.0s (up to 4), the PC hardware / USB buses have limitations on the number of Kinects that they support simultaneously. Users have successfully used up to 4 Kinect v1.0s on a single machine but this is dependent on the PC hardware itself. Only one Kinect v1.0 camera may be used per USB bus lane; on a typical PC, multiple USB ports share a single lane, so it is usually necessary to add additional USB add-on cards to make 4 Kinects work.

Only one Kinect v2.0 is supported per PC. This is a driver restriction not a Notch restriction.

Use of Kinect v1 and Kinect v2 is mutually exclusive – only one or other's drivers may be installed on the PC at any one time and only one or other may be used in Notch at once, so it is not possible to mix Kinect1 and Kinect2 in one project.

Skeletal data

Notch supports the Microsoft Skeletal data from Kinect 1 and 2. However, we have not found it to be suitable in production environments. The conditions required for Microsoft's skeletal data don't lend themselves to the stage or public spaces. Specifically, it requires a control pose at the beginning and the user to stay in a control space in view.

Recording Kinect data

Notch is able to record a stream of Kinect data for playback when there is no camera connected. In order to do this, use the "Capture Kinect1/2 Data" option in the Devices menu (Builder Pro only). Recording begins immediately and continues until the option is used again to switch it off. The resulting file may be loaded into Notch as a "Kinect Stream" resource. The Video Kinect Source node has a parameter which takes a pre-recorded stream which will then be used as a substitute for the live Kinect camera feed.

Considerations for the use of Kinect in performance environments

Using Kinect cameras takes care and planning. It was designed as a gaming controller, not for performance work. If you are inexperienced with their use, we strongly recommend you engage with an experienced interaction/integration specialist. Specific considerations:

- IR Interference : Incandescent light sources (including the sun, and some models of strobe) significantly degrade the Kinect depth image, making it unusable.

- Signal extension : Extension of Kinect v1.0 USB cabling is known to be achievable. Certain models of powered USB over ethernet extenders have been found to work to extend the range over 50 metres. However users still report significant technical challenges in extending Kinect v2.0.
- Field of View : Both versions of the Kinect have very particular field of views and both version's depth and RGB fov's differ.

Troubleshooting

My Kinect camera doesn't show up in Notch. What do I do?

- Does the camera work outside of Notch? The Kinect SDKs come with a number of example programs that test the cameras. "Kinect Studio" for Kinect v1 is worth trying.
- The status of the Kinect cameras are visible in Device Manager. They may be missing drivers, or the problem may be due to the USB connection or lack of power.
- Kinect v2 requires USB3.0, a compatible USB bus and a suitable software USB stack, which is available only in Windows 8 and up. Windows 7 is not able to support the Kinect v2. Older PCs may also be unable to support the device.

The frame rate of the camera appears poor, even though Notch's frame rate is fine..

- The Kinect v1 and v2 are both capable of 30hz input. Kinect v1 is only capable of 30hz at 640×480 and below.
- The frame rate of the Kinect is limited by the speed of your USB bus. Multiple cameras and slow/busy buses will affect this. If you have multiple cameras connected and low frame rate, try disconnecting some cameras.
- If your scene only requires depth data from the Kinect, try disabling the colour channel in the Video In / Kinect Settings dialog. This will reduce the amount of bandwidth used.
- If multiple programs try and use the Kinect camera at once the frame rate of the camera seen in each program will be reduced. This is particularly relevant if running Kinects in Notch standalone at the same time as Builder, or running instances of the Notch plugin inside media servers. Only one active plugin may use the Kinect at any time to achieve full frame rate.

NDI

What is NDI?

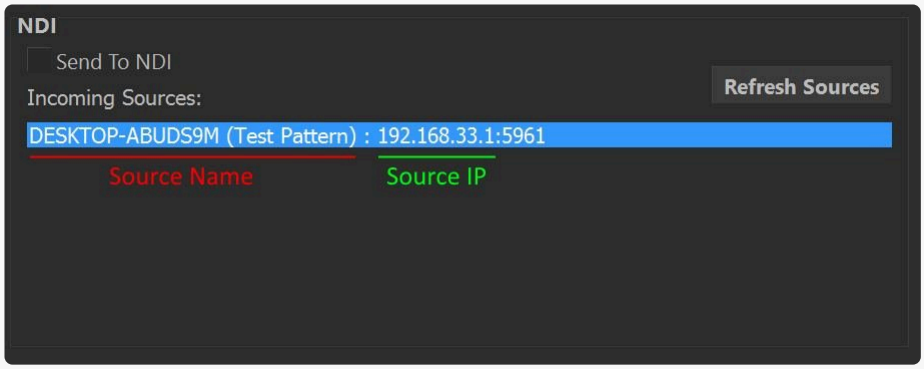
NDI is an IP video streaming protocol developed by NewTek.

Notch accepts NDI sources into the nodegraph via the Video NDI Source node.

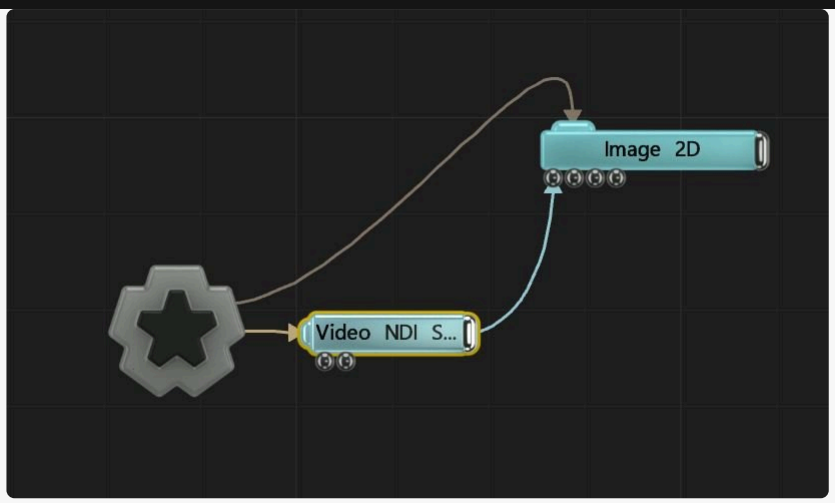
Receiving an NDI stream

> To test/experiment with NDI we recommend utilising the Newtek NDI Tools pack to test your NDI configuration.

1. Create an NDI source on the network. (You can use 'NewTek NDI Test Patterns' tool to create a test source).
2. In Notch, browse the current NDI sources by going to:
    a. Devices -> VideoIN/Camera/Kinect…
    b. Go to the NDI panel and click 'Refresh Sources' and you will now see your video sources.



3. Add an Video NDI Source node to your scene.
    a. Select the NDI Source (dropdown) property or set it manually with the *NDI Source Name* & *NDI Source IP* properties.
4. Connect your Video NDI Source node to it's destination, e.g. Image 2D.



5. Play the scene and you will see the incoming video.

To refresh the NDI Source list in the Video NDI Source node, open the Video IN/Camera/Kinect… dialog and click 'Refresh Sources' in the NDI panel.

Please note, NDI audio is not currently supported.

Using NDI in Standalone applications

When using NDI input/output with a standalone application, you may need to copy the following files (dlls's) to the same directory as your exported .exe file:

```
C:\Program Files (x86)\Notch\Processing.NDI.Lib.x86.dll
C:\Program Files (x86)\Notch\Processing.NDI.Lib.x64.dll
```

OSC

Introduction

Notch allows you to send and receive simple OSC data over the network for interacting with your project. When running as standalone, you can also control the play head remotely.

Receiving OSC

Setting up your project to receive OSC.

1. Open the Project Settings via menu *Project -> Settings*
2. In the OSC pane
    a. Check the box: OSC Enabled
    b. Enter the network UDP port number that the OSC data is to be received on
3. Click OK

Notch will listen to network traffic on all network adapters, using the specified port number.

To check you are receiving data with this network configuration:

1. Open the Connection Monitor pane with *View -> Connection Monitor*
2. The pane will show you how many packets of data have been received on the listening OSC port in realtime

> ! Only one process/Block can use a specific port number at a time. Either consolidate your effects into a single Block OR use different port numbers for each Block.

Using received OSC data

You can manipulate numeric and text string values in the nodegraph by utilising two nodes:

1. OSC Modifier for numeric values
2. OSC Text String for text string values

If you wish to use OSC values in your Javascript scripts, then setup a receiving node (as above) and read the value from the node using GetFloat()

> ! The incoming OSC values will only be processed when the play head is playing

Sending OSC

Setting up your project to send OSC

1. Open the Project Settings via menu *Project -> Settings*
2. In the OSC pane
    a. Check the box: OSC Enabled
    b. Enter the network UDP port number that the OSC data should be transmitted on
    c. Enter the Target IP address that OSC data should be transmitted to
3. Click OK

> ! The receiving and transmitting OSC port is the same

Sending OSC data from Notch

You can send numeric values (as floats) over the network using the OSC Output node.

> ! The outgoing OSC values will only be sent when the play head is playing

OSC Transport Control

When running as standalone you can remotely control the play head via OSC.

Setting up your project to receive OSC Transport Commands

1. Open the Project Settings via menu *Project -> Settings*
2. In the OSC pane
    a. Check the box: *OSC Enabled*
    b. Check the box: *Transport Enabled*
    c. Enter the network UDP port number that the OSC data is to be received on
3. Click OK

To check you are receiving data with this network configuration:

1. Open the Connection Monitor pane with *View -> Connection Monitor*
2. The pane will show you how many packets of data have been received on the listening OSC port in

realtime

> ! OSC Transport commands have no effect in Builder. They only work in an exported Standalone.

OSC Transport Commands

```
/notch/transport/play
/notch/transport/pause
/notch/transport/reset   <-- Returns to time zero
/notch/transport/time <float>    <-- Goes to time t in seconds
/notch/transport/layer <int>     <-- select layer by index, from 0
```

Video Capture

Capture Methods

There are multiple ways to bring video capture data into Notch, depending on your scenario.

- **Notch Builder / Playback:** Using DirectShow / MediaFoundation compatible capture cards.
- **Embedded in Media Server:** The MediaServer provides routing from their capture methods into the Notch Block

Capturing via DirectShow / MediaFoundation compatible cards / cameras

To configure your Notch Builder project to use a local capture device (for use in Builder or Standalone):

1. Go to menu *Devices -> VideoIn/Camera/Kinect Settings…*
2. Under the *Video* In pane, check the *Video In Enabled* box.
3. If using a device that supports Media Foundation, ensure this box is also checked.
4. You can now manually select the DirectShow / Media Foundation devices and available modes below in tow ways:
    a. by manually selecting the device and specific mode
    b. or, you can enter target resolutions and FPS rates and Notch will attempt to select the capture mode that is closest to that target configuration.#
5. Click OK
6. Add a *Video In Source* node to the nodegraph. This node delivers a texture that can be piped into an Image 2D or other node that accepts textures.

Capturing from Media Server sources

To configure your Notch project to receive video from a media servers capture source:

1. Add a *Video Loader* node to the nodegraph. This node delivers a texture that can be piped into an Image 2D or other node that accepts textures.
2. Expose the Video parameter of the node by:
3. Click the ? icon next to the Video parameter and in the Parameter window:
    a. Check the Expose Parameter box
    b. You can change the labels/groups that are presented to the media server
4. Click OK

When your project is exported to a media server, it will now present a hook for the inbound video. For working and previewing in Notch Builder, you can use an imported video in the Video Loader node and the video will be over-ridden at runtime in the media server.

Single / Multiple streams

When running in Builder / Standalone Notch supports a single video capture device/stream. If you need to input multiple sources, you will need to either:

- Utilise Notch embedded in a media server
- Or, Use an upstream decimator or compositor.

Notes for specific capture cards

Datapath

> When installing the Datapath drivers, make sure you set the mode to : *Kernel Streaming Mode* to enable DirectShow usage.

Cards reported as working:

- VisionSDI2
- VisionRGB-ES2

Troubleshooting

Notch doesn't show my capture device in the Video In panel.

Check that you can see the device is showing in other DirectShow/Media Foundation application such as Skype. If the device does not appear in these apps speak to the capture device manufacturer about DirectShow / MediaFoundation compatibility.

The image capture is just static in Builder.

The play head needs to be playing for capture to refresh.

Web / HTTP API

Introduction

Notch Blocks and Standalone Executables provide a webserver that allows exposed properties to be controlled via HTTP GET requests. This functionality primarily drives the Web GUI, but can also be used by 3rd party applications & web services.

How to enable the Web API in your project

To enable the Web API follow the instructions for enabling the Web GUI.

API Description

All calls listed below should be made via:

- HTTP GET
- Utilising the HTTP port specified in the Project Settings

e.g. `http://127.0.0.1:8910/control`

Retrieving a manifest of exposed parameters

Calling `/control` will return a JSON manifest of the exposed properties. An example below:


```
{
	"controls": [
		{
			"enums": [
				"Deferred Lighting"
			],
			"groupName": "",
			"name": "Notch Layer",
			"type": "Enum",
			"uniqueId": "layerlayerlayer",
			"value": ""
		},
		{
			"groupName": "3D Object",
			"max": 1.964810013771057,
			"min": 0,
			"name": "Position X",
			"type": "Float",
```

```
                        "uniqueId": "Position X::Transform::ee54699e-8bc2-11e
6-895a-002590e7589b",
                        "value": "1.964810"
                }
        ],
        "protocolVersion": "100"
}
```

The Layer attribute will always be shown in the manifest.

Setting an Exposed Properties value

To set an Exposed Properties value call: `/control?uid=<your_uniqueid>&value=<your_value>`

- URL: `/control`
- Parameters:
  - `uid`: The uniqueId (URL escaped) as provided by the JSON manifest (above) and viewable in the Notch Builder when you exposed the property.
  - `value`: The value you wish to set. If setting text strings, then URL escape the string.

Examples:

Text: `http://127.0.0.1:8910/control?uid=Text+String%3A%3AAttributes%3A%3A7f9b7203-30d8-11e7-b0fa-b88a60f6d91a&value=Hello%20World`

Float: `http://127.0.0.1:8910/control?uid=Position+X%3A%3ATransform%3A%3Aee54699e-8bc2-11e6-895a-002590e7589b&value=0.6955427448749542`

Colour (RGBA): `http://127.0.0.1:8910/control?uid=Colour%3A%3AMaterial%3A%3Afb679e90-8bc2-11e6-895a-002590e7589b&value=0.1881285057810822%2C1%2C0.30517378671806084%2C1.000000`

Standalone

From Notch Builder Pro you can export directly to standalone executable files. Standalone executables are commonly used in fixed installs/kiosks etc. where the features of a media server are not required.

License Requirements

To run a Standalone without a watermark, you need to have exported from Notch Builder Pro and have a Notch Playback license on the playback machine.

When you should use a media server

Standalone is not a media server replacement. You should definitely consider embedding Notch Blocks in a media server when:

- Outputting to multiple heads
- Playing back videos (Standalone has very limited video playback capabilities)
- Capturing multiple streams of video
- Projection Mapping
- Complex integrations with stage automation
- Feed mapping
- Chasing timecode or other sophisticated timeline control

Features of Standalone

- Receive remote edits from Notch Builder
- Web GUI / API
- ArtNet / OSC / Midi input
- ArtNet / OSC Transport control (limited)
- Video capture via DirectShow or Media Foundation (single input only)
- Kinect support
- Keyboard controls for switching layers [Optional]

Command Line Parameters

Standalones accept a number of parameters on the command line.

```
+debug 1                                    - shows HUD with statistics
+document "c:\projects\myproject.dfx"       - overrides document
```

```
+logfile x                                  - set logfile to x
+windowed 1                                 - windowed mode
+nosetup 1                                  - force no setup dialog
+deleteSource 1                             - deletes document source when cl
ient terminates
+scene n                                    - start specific scene (by inde
x, 0 is the first scene)
+artnetoffset 3600                          - set artnet offset to x
+width x , +height x                        - set the output width and heigh
t (if windowed)
+password x                                 - set password for zip
+nopassword                                 - no zip password
```

> ! While running through command line with no setup dialog, notch will launch using it's default settings. This means certain settings may need to be specified when launching from the command line, such as full screen and output resolution.

Keyboard commands

The following keyboard commands exist for standalone:

- `ESC` : Exit the standalone program
- `Arrow Up / Arrow Down` : Switch the active layer. (Must be enabled in: Project > Settings > Exported App > Keyboard Transport Controls)

Using Standalone in Production Environments

As stated, Notch is not a media server replacement and as such, the onus is on the user to prepare a good environment for Notch Standalones to run in. Prepping machines for production environments is a skill set on it's own and if you are unfamiliar with the process, we recommend that you talk to an experienced AV production company.

There are number of common gotchas that users hit when setting up their machines for use with Standalones which we have listed below.

Set Local Security Policy for Unidentified Networks

When you set up a static IP network which doesn't have a gateway/router (for ArtNet for example), Windows will mark it as an Unidentified Network and not allow Firewall Rules to be applied, meaning no traffic can get in. You therefore need to configure Windows to mark Unidentified networks as Private to have the Private Firewall Rules applied.

To do this:

- Cmd + R
- Enter *secpol.msc* and run
- For both *Network Managers List -> Unidentified Networks* AND *Identifying Networks*
    - Set – Location Type : Private.
    - Set – User Permissions : User can change location

> ! Changing the network location policy behaviour has security implications. If you are not familiar with network security, we recommend you get advice.

Firewall Rules

The Windows Firewall attaches rules to specific executables or globally. Given that the executables are created regularly as part of the Notch workflow, we recommend that you create the following **global** firewall rules:

Rule	Protocol	Port Number	Note
Notch Network Editing	TCP	3776-3904	
ArtNet	UDP	6454	
OSC	UDP	**port**	The OSC port you have set in your Notch Project Settings

> ! Creating inbound firewall rules has security implications. If you are not familiar with network security, we recommend you get advice.

Start Up

If you intend to run the Standalone after booting, we recommend that you put a delay in a batch file before starting. Various workstation graphics drivers take time to complete their initialisation and you need to start the standalone after these procedures.

Disable background activities

To avoid unintended activities kicking off in the background or on machine restart:

- Disable Windows Indexing
- Disable Automatic Windows Update

Known good GPU driver

GPU drivers from NVidia and AMD both occasionally have bugs, therefore it's not always a good idea to

take the latest driver update as soon as it comes out. Find a known good version and stick with it.

Misc

- Disable any power saving functions

Standalone – Multi-head Output

The exported Notch Standalone executable allows you to use up to two heads/outputs.

Notch provides a rudimentary feed/window selection mechanism to allow content arrangement on multiple heads.

> ! Notch's multi-head management is very basic and is not being further developed. You should use a media server for most multi-head setups.

> ! All monitor outputs must be the same resolution and Windows is responsible for the display head order

Method

1. Set the project to Multi-Monitor
    a. Project -> Settings -> Exported App
    b. Enable *Allow Multi-Monitor*
2. Set your project rendering to Crop.
    a. Project -> Settings -> Rendering
    b. Set Output Resizing to: *Crop / Border Output to Window*
3. Setup your Output Feeds
    a. Project -> Edit Output Feed Configuration
    b. Add your Displays
        i. Click + next to Add Display (one for each display)
        ii. Set the geometry for each display. Please note, at this time, every display must have the same resolution.
    c. Add Feed Regions
        i. Click + next to Feed, one for each feed.
        ii. Set the Target Display, Source and Destination coordinates.
        iii. You can see a preview of the source region in the viewport as you edit.
    d. Export your standalone executable.
    e. When running your standalone executable:
        i. Ensure you select 'Fullscreen'.

> ✻ When previewing the source feed regions, your Viewport Pixel Scale needs to be set to: 1×1 Pixels.

Media Servers

Native Notch playback is supported in numerous industry media servers. Other media servers are adding Notch integration, so if your preferred media server is not listed, it may be worth getting in contact with them. SPOUT (an inter-application texture sharing technology) can also be used with media servers that support it.

Media servers with native Notch integrations:

- 7thSense Delta
- Avolites Ai
- disguise
- Hippotizer
- RealMotion
- Pixera
- TouchDesigner

We strongly recommend that you read Managing Performance in Media Servers.

Managing Performance in Media Servers

Introduction

Unless your media server has a ‘side-car’ GPU dedicated to Notch rendering, your Notch effects will be sharing the same GPU processor as the media server software. Successful shows require an understanding of GPU resources.

When rendering at 60 frames a second, the GPU has 16.6 milliseconds to do all the work required to render and present it’s content to the connected output devices (monitors, projectors etc.). During this 16ms, the GPU has to perform activities for the media server software (uploading video frames, warping for projectors) as well as render any Notch content you are playing at that particular moment.

Therefore: GPU load = Media Server Time + Notch Render Time

The times available at different frame rates are:

- 60fps = 16.6ms
- 50fps = 20.0ms
- 30fps = 33.3ms
- 25fps = 40.0ms

Notch Builder is an ‘open’ tool. It allows you to run as light or as heavy effects as you wish (meaning: you can drive it off a cliff if you’re not careful) but also gives you the tools to manage this.

How to measure your Notch project’s load

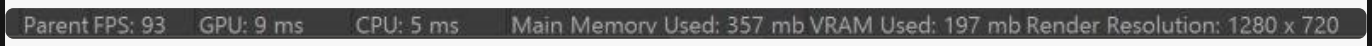
You need to measure your project’s GPU load on the target machine as GPU power differs from card to card. You can also use the Performance Panel to estimate GPU load on a target machine.

Please refer to your media server vendor for details on viewing the GPU time of the media server.

Please note: Some media servers allow you to measure the time a Notch block is taking to render within the media server. However, if that feature is not available in your media server, you can do it manually:

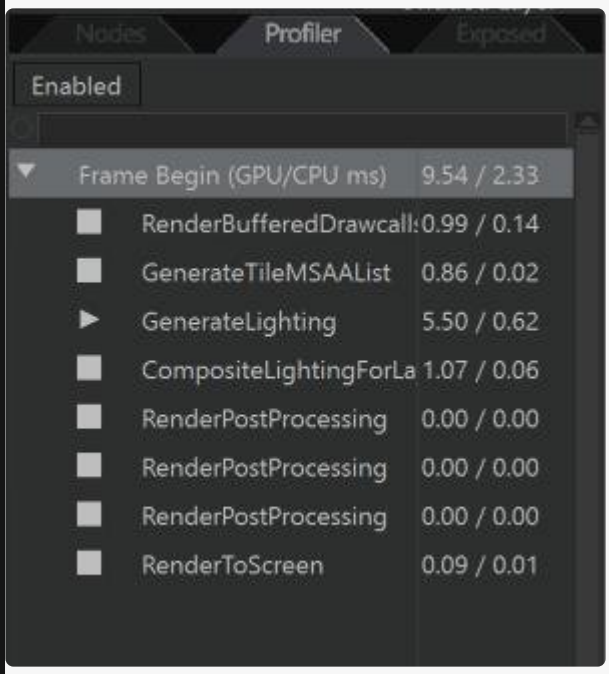
1. Install Notch Builder on the target machine
2. Load your Notch project
3. In project settings
    a. Set the Output Width and Height to the size of your target canvas in the media server.
    b. Set the Output Resizing to *Scale/Filter Output To Window*

c. Click OK
4. Set your Resolution sizing to 100% (RES button)
5. Play your project
6. Observe the GPU statistic on the Status Bar



If you would like more details on what aspects of the scene are taking the GPU time you can use the Notch Profiler

1. In the Nodes/Profiler/Exposed panel (usually bottom right), select Profiler
   a. Click Enabled (turns white)
2. Play your project
3. Observe the Profiler pane. The *Frame Begin* represents the total frame time — The left value is the GPU, right is CPU.



The profiler also allows you to see what aspects of the Notch render pipeline are taking time, to allow you to make some educated decisions.

With this information, plus an understanding of the GPU time taken by the Media Server, you have a total picture of GPU usage.

How to measure your Media Server's GPU time

Media Server's measure their GPU time in different ways. Most measure the total time including the time taken by all Notch content that is currently rendering. Therefore to calculate the media server time you

must either:

- Baseline the server without Notch content running
- Calculate the following: Media Server GPU Time = Total GPU time – Notch GPU time

Common Performance Issues

Cross fades double the load

Most media servers support cross fades between cues or timeline points. It's important to bear in mind, that in the middle of your cross fade, you might have two sets of Notch content running in parallel.

Frequently Asked Questions

Is there a limit to the number of 'layers' of Notch content that can be played on a machine?

Notch Playback does not impose any restrictions on the number of layers allowed to play in parallel. But your media server might, so check with the vendor.

How powerful is XYZ GPU for Notch rendering?

Take a look at the Notchmarks to compare the relative performance of various GPUs and media servers.

Using Notch in 7thSense Delta

7th Sense Delta servers have **native** Notch playback support from version 4.2 (patch required)

Features supported

- Pass textures/video from Delta to Notch (e.g. SDI capture)
- Pass textures/video out of Notch into Delta (the resulting output)
- Control parameters exposed in the Notch project

To preview or play content in Delta you will need either :

- Watermarked license (either separate or bundled in Builder Learning)
- Full Playback license

Instructions

- Please contact info@7thsense.co.uk for instructions on usage.

Using Notch in Ai

Avolites Ai supports the **native** playback of Notch Blocks from v9.1 in both it's software and hardware versions.

Features supported

- Pass textures/video from Ai to Notch (e.g. SDI capture)
- Pass textures/video out of Notch into Ai (the resulting output)
- Control properties exposed in the Notch project

> ! Ai have recently updated their Notch integration in their forthcoming beta. Please get in touch with Ai to receive the latest beta.

> ! Users currently advise that you need to run Ai on a Windows 7 ×64 machine for Notch compatibility.

Instructions:

Please ensure you have installed the Codemeter licensing runtimes on your Ai system. These are needed by the Notch dongles.

Instructions on the use of Notch blocks within Ai are available in the document: Using Notch in Ai

Using Notch in disguise (formerly d3)

disguise has had **native** Notch playback support from r14.1.

Features supported

- Pass textures/video from disguise to Notch (e.g. SDI capture)
- Pass textures/video out of Notch into disguise (the resulting output)
- Control properties exposed in the Notch project
- Render Notch content at frame intervals (i.e. surface rate of 60fps, Notch rate at 30fps)

> disguise ships with a set of ~13 in-built Notch effects which work with all disguise products out of the box. If you wish to playback Notch content outside of these disguise in-built effects (i.e. custom blocks or Notch created blocks), you will require a full Notch Playback License.

Instructions

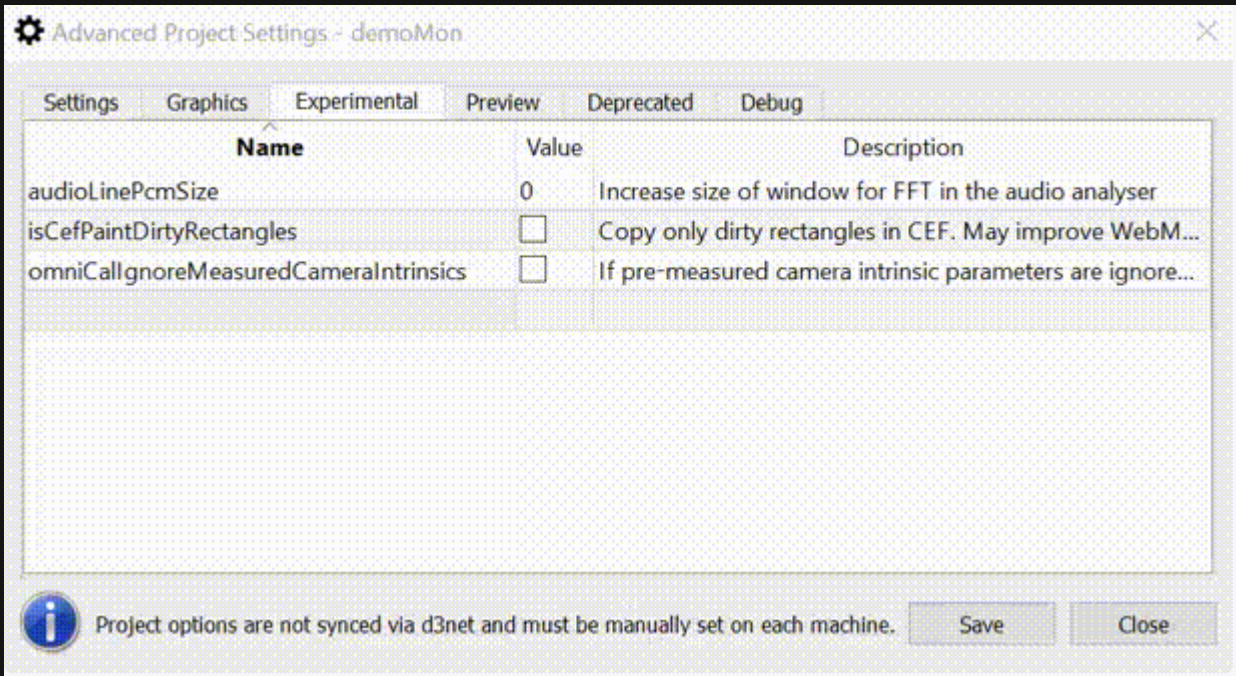
- disguise Manual – Notch Layer

Interleaved rendering

In disguise you can render Notch content at a fraction of the surface rate. For example you can run a 60Hz/50Hz surface refresh rate, while rendering Notch content at 30fps/25fps. *For heavier content this can bring you a lot more GPU headroom to work with.*

To use this feature, you need to set `notchRenderInterval` in the options and set the interval level.

For example:
`notchRenderInterval 2` — is half rate – Notch renders every second surface frame
`notchRenderInterval 3` — is third rate – Notch renders every third surface frame


Advanced Project Settings - demoMon
Settings
Graphics
Experimental
Preview
Deprecated
Debug
Name
Value
Description
audioLinePcmSize
0
Increase size of window for FFT in the audio analyser
isCefPaintDirtyRectangles
Copy only dirty rectangles in CEF. May improve WebM...
omniCalIgnoreMeasuredCameraIntrinsics
If pre-measured camera intrinsic parameters are ignore...
Project options are not synced via d3net and must be manually set on each machine.
Save
Close

Using Notch in Hippotizer

Green Hippo have **native** Notch playback support from version 4.2 (patch required)

Features supported

- Pass textures/video from Hippo to Notch (e.g. SDI capture)
- Pass textures/video out of Notch into Hippo (the resulting output)
- Control parameters exposed in the Notch project

To preview or play content in Hippotizer you will need either :

- Watermarked license (either separate or bundled in Builder Learning)
- Full Playback license

> Hippotizer ships with a set of 10 in-built Notch effects which work with all Hippotizer+ products out of the box. If you wish to playback Notch content outside of these Hippotizer in-built effects (i.e. custom blocks or Notch created blocks), you will require a full Notch Playback License.

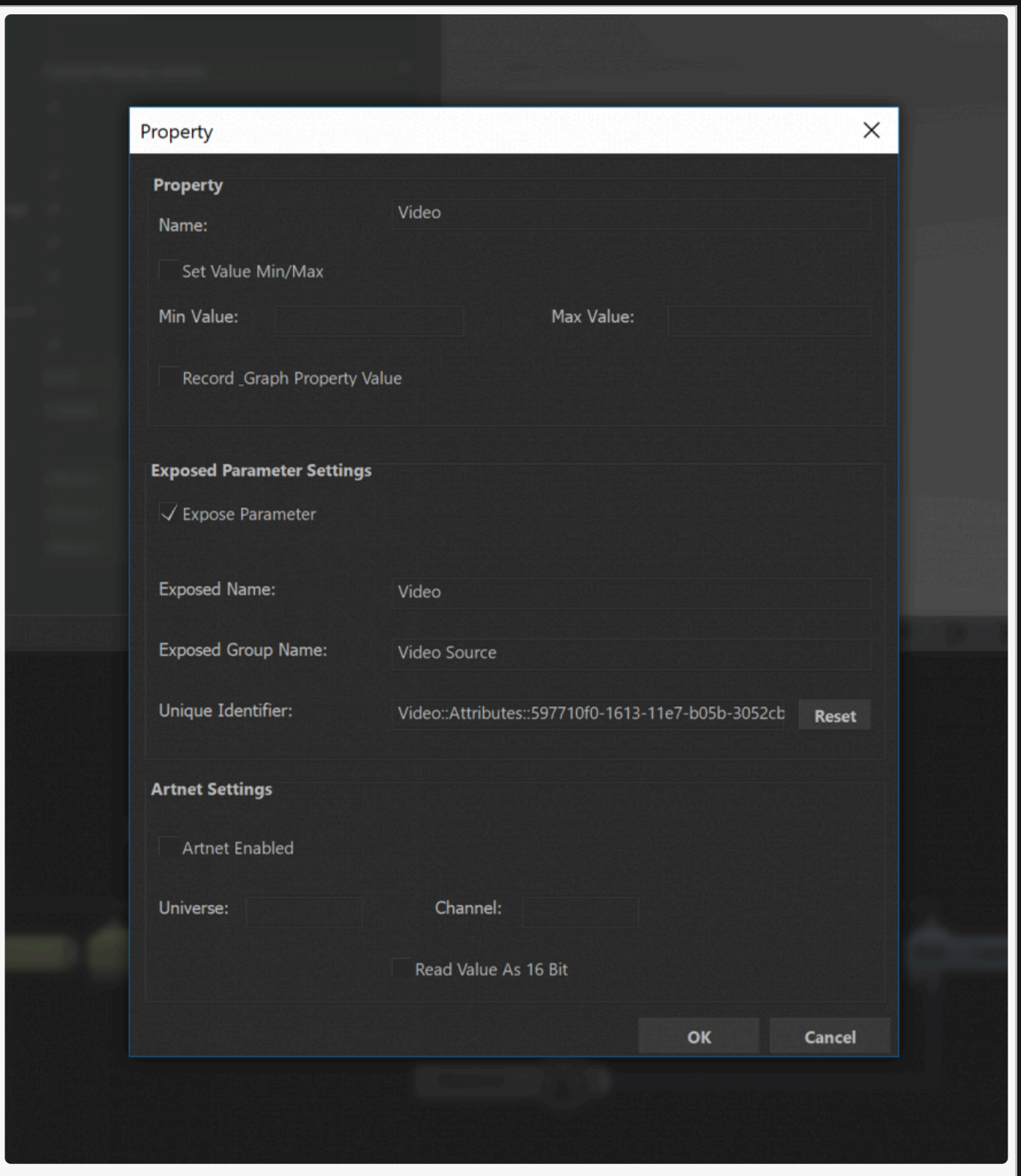
Instructions

- Hippo Manual – Notch Integration

Exposing Attributes

Method

Exposing properties allows other applications (e.g. media servers or via WebAPI) to control your scene in Notch, creating more dynamic and reactive effects.



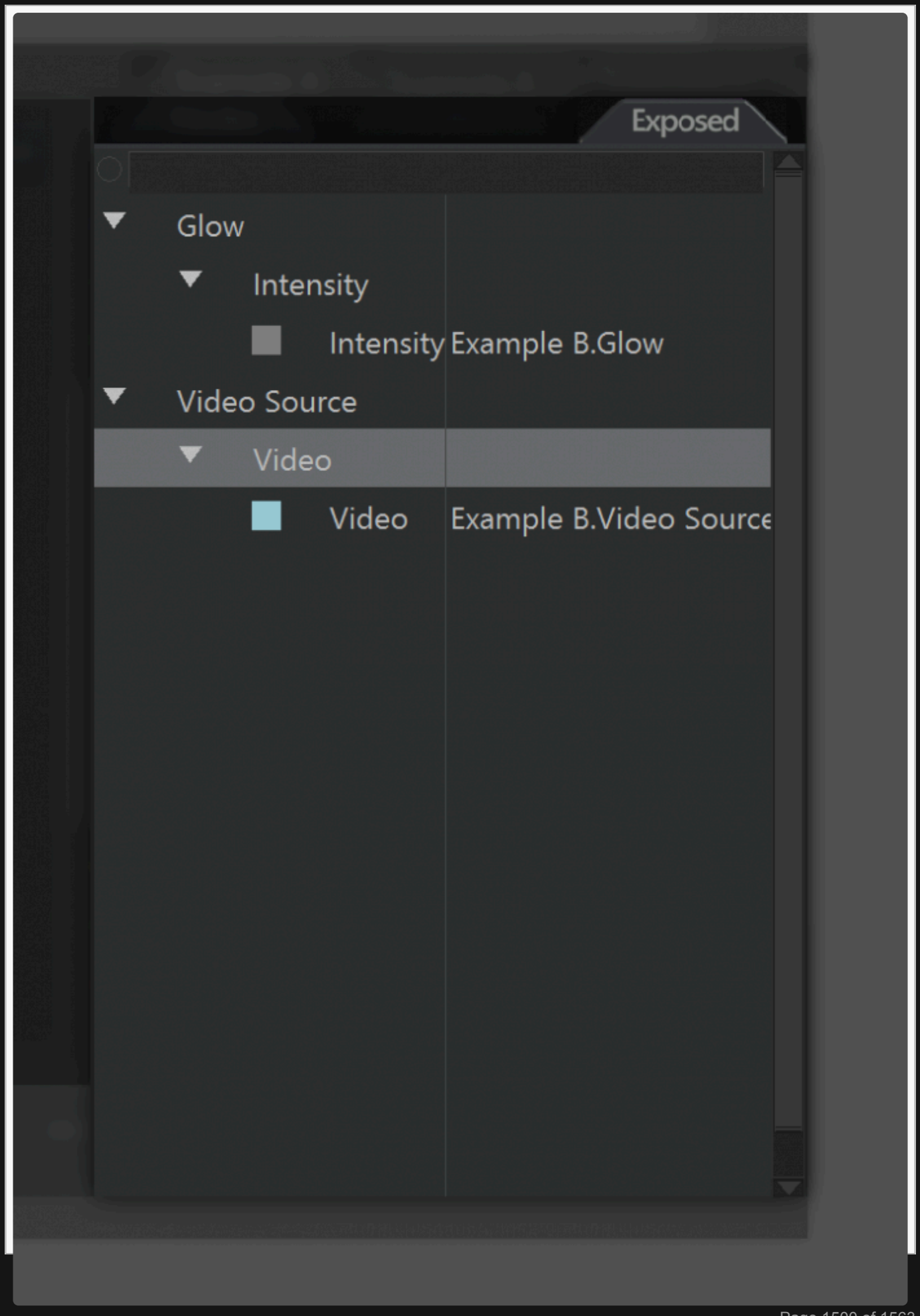
To expose a property, select the property settings button (?) next to the property you want to expose. A new window will appear, with various controls and settings for properties.

From here, enable “Expose Property” in the “Exposed Property Settings” frame. You should see “Exposed Name”, “Exposed Group Name” and “Unique Identifier” which are auto-populated with some simple generated values, which can be changed. Nodes with the same Group Name will be grouped together,

and nodes with the same Unique Identifier will be combined when exposed to host applications/media servers. With the Unique Identifiers combined, the name of the first item in the group will be used.

It is generally advised you also set reasonable Min and Max Values, because some media servers require this to be enabled for a Notch block to run. This also gives you greater control over what can be done with your block while it is being used in the show environment.

If an attribute is exposed, the (?) icon will light up.


Exposed
Glow
Intensity
Intensity Example B.Glow
Video Source
Video
Video Example B.Video Source

You can keep track of all the exposed attributes in a project through the Exposed tab to the right of the Nodegraph panel. Here, you can see exposed properties grouped by their group name, and their Unique Identifier. You can change the name of groups or exposed properties through right click > “Rename.. “. You can also merge the Unique Identifier of exposed properties by dragging them together.

We often recommend exposing the *Value* field of an Envelope Modifier node that is then connected to the attribute of the node you wish to manipulate, rather than expose the attribute itself.
Not only does this make the nodegraph easier to understand, but making changes to the exposed nodes becomes a simple task of reconnecting already exposed values.

Proxy Block

Method

Proxy blocks allow you to set up the Notch Block on the master machine and distribute it to the machine network

Features supported

- Pass textures/video from media server to Notch (e.g. SDI capture)
- Pass textures/video out of Notch into Media server (the resulting output)
- Control properties exposed in the Notch project
- Render Notch content at frame intervals (i.e. surface rate of 60fps, Notch rate at 30fps)

Instructions

- Go to Project > Compile Proxy Block
- Export the block to the relevant Media Server file location
- Import inside the Media Server as any regular Notch Block

Codemeter Licensing

Why does Notch use Codemeter licensing?

Notch have selected Codemeter because it gives you more options:

- Licenses aren't tied to machines – your Codemeter USB license dongle goes in any machine. Portable and flexible.
- Licences can be deployed immediately once you have your Codemeter dongle
- Licences can be deployed onto ANY Codemeter dongle, so if you already have one you won't need another. We're saving the earth one dongle at a time.
- It's highly secure, your licence, your competitive advantage

How to apply your Notch license to your Codemeter USB key – Online method

You will have received a URL link to your license in your Order Confirmation Email. Now to apply it to your dongle:

1. Make sure your Codemeter USB key is not inserted into your PC
2. The Codemeter USB key needs drivers. These are bundled with Notch or Disguise installers or you can download specifically. Download & install one of the following:
    a. Notch Installer
    b. Codemeter Runtime Drivers
3. Insert your Codemeter USB key
4. Go to the license URL provided by us
5. Click 'Activate Selected Licenses Now'
6. You will see the license starting to apply and then receive confirmation.

How to apply your Notch license to your Codemeter USB key – Offline method

On your target machine i.e. the machine you wish to install the license on to:

> ! NB: Please note the differences between .WibuCmRaC and .WibuCmRaU suffixes.

1. Start CodeMeter Control Center.

2. Click the ‘License’ Update button.
3. Select ‘Create license request’ then Next.
4. Select ‘Add license of new producer’ then Next.
5. Enter the FirmCode ‘102820’ then Next.
6. Save the xxxx.WibuCmRaC to a USB drive/pen.

On an internet connected PC:

1. Make sure you have Codemeter installed. If not, download and install it from here.
2. Connect the USB drive/pen used to save the xxx.WibuCmRaC file previously from the target machine.
3. Go to the license URL provided to you by us.
4. Click ‘Offline license transfer’ in the bottom right-hand corner.
5. Click ‘Choose file’ and select the xxx.WibuCmRaC
6. Click ‘Upload Request And Continue Now’
7. Click ‘Download License Update File Now’. This will download a xxx.WibuCmRaU license file to your PC.
8. Click ‘Next’
9. Copy the xxx.WibuCmRaU file to your USB drive/pen.

On your target machine:

1. Connect the USB drive/pen just used to save the xxx.WibuCmRaU file previously.
2. Double click the xxx.WibuCmRaU
3. You will be prompted to confirm the license transfer. Click ‘Yes’.
4. You will be provided with a confirmation of license transfer.
5. Your license is now applied!

It is helpful if you can provide a delivery receipt via the instructions below.

How to provide a delivery receipt after offline activation

There may be occasions where we ask you to provide a transfer receipt.

On the target machine i.e. the machine you applied the license to:

1. Start CodeMeter Control Center.

1. Click the ‘License’ Update button.
2. Select ‘Create receipt’ then Next.
3. Select ‘10bit FX Limited (102820)’ and deselect all others. Then Next.
4. Save the xxxx.WibuCmRaC to a USB drive/pen.

On an internet connected PC:

1. Connect the USB drive/pen used to save the xxx.WibuCmRaC file previously from the target machine.
2. Go to the license URL provided to you by us.
3. Click ‘Continue License Transfer’.
4. Click ‘Choose file’ and select the xxx.WibuCmRaC
5. Click ‘Upload Receipt Now’
6. The receipt send is now confirmed!

Academic License Server

Introduction

Academic License server provides network wide access to Notch Builder Learning, without the requirement for physical dongles in workstations.

Requirements

License Server:

- **OS:** Windows 7 / 8 / 9 / 10 or Windows Server 2012 or later.
- **Connectivity:** One free USB port for the licensing dongle
- **Network:** TCP access from Notch Workstations on port 22350

Notch Workstations

- **OS:** Windows 7 / 8 / 9 / 10
- **GPU Minimum:**
  - AMD Radeon 7000 series or later
  - AMD FirePro W8000 series or later
  - NVIDIA Geforce 600 series or later
  - NVIDIA Quadro K2000 or later
- **GPU Recommended:**
  - AMD Radeon 290X or higher
  - NVIDIA Titan-X or higher
  - NVIDIA Geforce 1080 or higher
  - NVIDIA Quadro M6000 or later

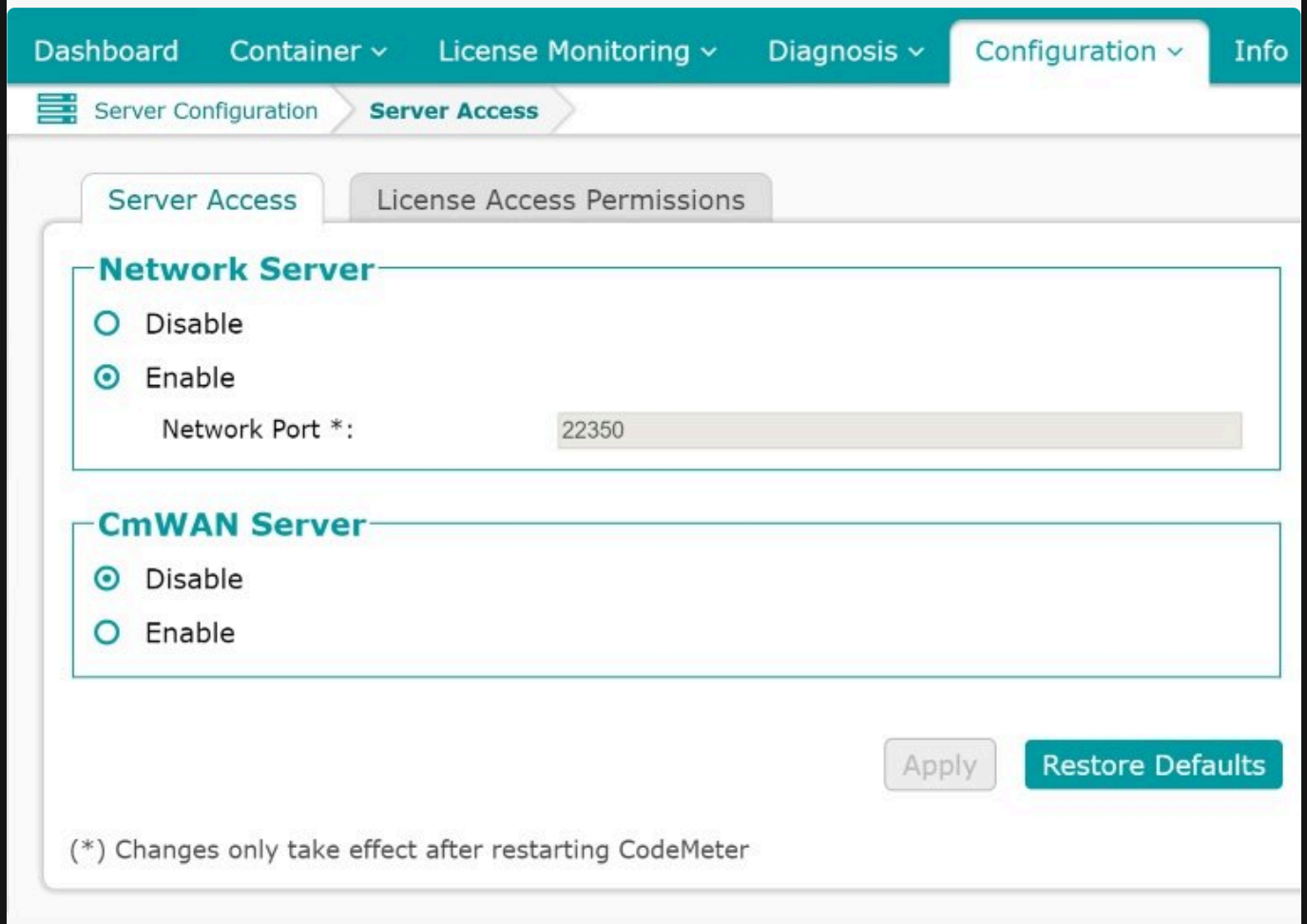
License Server Installation

To setup the license server, first ensure you have activated your licensing dongle as per email instructions.

On the server:

1. Download and install *Codemeter Runtime* from: https://www.wibu.com/uk/downloads-user-software/file/download/4437.html
2. Open 'CodeMeter Control Center'
   a. Go to: *File->WebAdmin*

b. In the Web Interface go to the menu: *Configuration -> Server -> Server Access*
c. Enable 'Network Server' and keep the default port *22350*
d. Click Apply

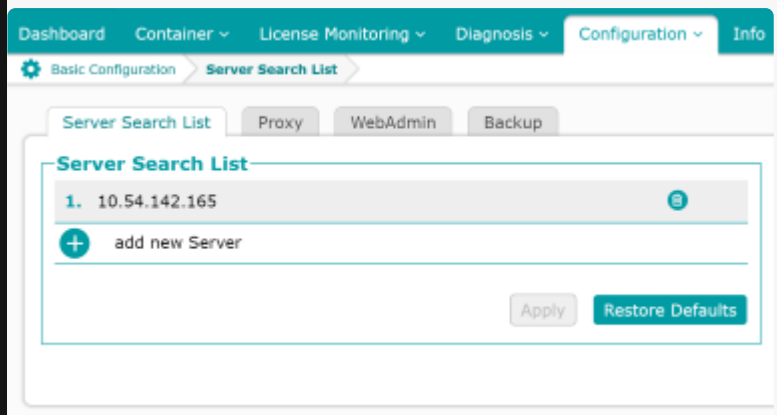


Please note this will enable LAN connections (TCP connections to *22350*). Please ensure that your firewall is allowing TCP access to this port on the License Server.

Workstation Installation

1. Download and Install the latest version of Notch Builder PLE from: https://www.notch.one/support/downloads_area/
2. Open 'CodeMeter Control Center'
   a. Go to: *File->Preferences*
   b. In the Web Interface go to the menu: Click *Add new server*
   c. Enter the IP address of the License Server
   d. Click *Add*
   e. Click *Apply*
   f. Unplug any dongles from your workstation and run Notch Builder. You should see Notch

Builder PLE start.



Alternatively you can also automate the CodeMeter server search list steps by adding a *Server.ini* file to the following location:

```
%Program Files%\CodeMeter\Runtime\bin
```

With the content of *Server.ini* being:

```
[ServerSearchList]

[ServerSearchList\Server1]
Address=<YourLicenseServerIP>
```

VR

VR Introduction

Notch offers an incredibly simple yet powerful workflow for Virtual Reality. Adding a single node enables VR or VR / 360 video in your scene.

Virtual Reality is divided into two output types:

- Headset VR (Oculus / HTC Vive)
- VR / 360 Video (YouTube 360 etc.)

Notch utilises the same workflow for in both – vastly reducing the required effort to target both formats.

Using Headset VR

Introduction

Adding VR headset support to your project is tremendously easy. Notch simply treats the headset as a camera, rendering the perspective of each eye every frame.

All the details of interocular and convergence distances are managed by the SDK and Notch, so you don't have to worry about them. Just add the VR Headset Camera node in, place it at the location you wish to situate the user and you are set.

Additionally, Notch features:

- Controller data (buttons, positions, rotations)
- Look-at triggers
- Basic in headset UI for making tweaks to your scene with your headset on.
- VR 360 previewing

Supported Equipment

Headsets

1. Oculus Rift Consumer Edition (via Oculus SDK and OpenVR)
2. HTC Vive (via OpenVR)

Controllers

1. Oculus Touch
2. HTC Vive Controller

Oculus setup

You must enable *Unknown sources* in the Oculus Application to allow Notch to access the Oculus headset:

1. Open the Oculus Application
2. Click the Cog (top right) and select *Settings*
3. Go to the *General Tab* and enable *Unknown sources* (top item)

You only have to do this process once as the setting persists.

Adding VR to the scene

Add the Headset

The process is very simple. In Builder:

1. Add the VR Headset Camera to your scene
2. On the Root Node select the VR Headset Camera as your current camera.
3. Move and rotate the camera to the vantage point you wish the user to see from.
4. Select Devices, then choose the headset you'd like to use
5. Put on your headset and press play (Space Bar)

Add VR Controllers (optional)

Both the Oculus Touch and HTC Controllers can be accessed using a combination of the VR Controller node and the (to pull the data from the VR Controller). Notch interprets the position, rotation, button and joystick movements of the controllers.

Add a Look-At-Trigger (optional)

If you wish to generate events or drawing possible from your headsets orientation, you can use the VR Look-at Trigger node in combination with an Extractor modifier node.

VR Monitor

The VR monitor provides quick access to controls needed while editing for VR.

STEP IN / OUT : Enables you to quickly turn on and off output to the VR Headset
SHOW UI IN VR : Shows the Properties and Nodegraph panes in the VR environment for in headset editing.
SHOW VR360 PREVIEW : This enables you to see the preview of a VR 360 camera, in a headset.
Prefer OpenVR Driver : When using Oculus, this will force the use of OpenVR drivers instead of Oculus Native SDK.
Windowed Display Mode: Set how you want to see the VR output in the main viewport of Builder.

Exporting to a VR Standalone

! By default, VR Standalone executables require either a *Notch Playback* or *Notch Builder Pro* license to view without a watermark. However, alternative licensing models are available for VR projects. Please get in touch to discuss directly.

The VR Standalone will be publishable to the Oculus and Steam stores shortly. If you have a project that requires store release, then please contact us directly.

VR Applications support the features of standard Standalones, including (but not limited to):

- Remote live editing
- ArtNet / OSC commands
- Live Video Capture
- Kinect

To export to a VR Application:

1. Open *Project -> Settings -> VR*
2. Enable the headset(s) you wish to target
3. Open *Project -> Compile VR Application*
4. Choose the target and the version (32bit / 64bit)
5. Click *OK*
6. Close Builder and run the executable

If both or neither of the headset manufacturers are chosen in Project Settings -> VR, then the VR standalone will search for an Oculus headset first, then a HTC Vive.

Creating VR / 360 Videos

Introduction

Notch is able to treat, animate, augment and export VR / 360 videos all in one tool with completely real-time editing and in-headset preview – an offering not available in any other package. Key to creating VR / 360 content is the ability to create your content using a VR headset, before rendering out to VR / 360 video.

There are various terms marketing terms that exist for VR / 360 Videos, but the two most common are:

360 Videos : Monoscopic videos that allow the user to look around, either in a desktop browser, Google Cardboard or a headset.
VR Videos : Stereoscopic videos, where a 360 view is rendered for each eye and composited (top & bottom) into a single video. These are much more immersive experiences on Cardboard or VR headsets.

The Notch workflow for both 360 and VR videos is the same. The only difference is that for stereoscopic rendering is enabled for VR Videos.

VR / 360 is enabled by a single additional node – the VR 360 Camera node. This camera can be placed anywhere in the scene, where it looks in all directions simultaneously with a spherical wrap.

> ! Not all Post-FX nodes are currently compatible with the VR 360 Camera. Development is continuing to bring compatibility for all relevant effects. If your immediate project needs a specific effect supported, please contact us directly.

How the VR 360 Camera works

It's not necessary to know how the background process works, but for the curious…

The *VR 360 Camera* utilises cuboid multi-view rendering. For each eye, Notch renders the scene six times in the six directions of a cuboid view. The renders are then applied to a surrounding cube which seamlessly stitches the view back together, before being output to the 360 spherical map texture.

Workflow

The creation of content for VR / 360 videos is best achieved by creating your content using the *VR Headset Camera* and then using the VR 360 Camera to export to video.

Step 1 – Creating in VR Headset

See Using Headset VR for details on how to create using a headset.

Step 2 – Setup the VR / 360 Camera

1. Add the *VR 360 Camera* to your scene
2. On the *Root Node* select the *VR 360 Camera* as your current camera.
3. In *VR 360 Camera*:
    a. Move and rotate the camera to the vantage point you wish the user to see from (most likely to be the position of the VR Headset Camera you have used in creation)
    b. Set the Cube Face Resolution – which sets the resolution of the multiview render. For <= 4K output videos a value of 1024 will suffice.
    c. If you require stereoscopic (VR Video), check '*Stereoscopic*' and tune the *Interocular & Convergence Distances*.
        i. **Interocular distance** : the distance between the left and right eye (in metres).
        ii. **Convergence distance** : the point in the distance where the the direction/beam of the two eyes meet (in metres).

Tuning the interocular and convergence distance is critical to ensuring a comfortable and compelling 3D experience in VR Videos. You can read further about it in Understanding Comfortable Stereography – Affonso Beato

Step 3 – Previewing the VR / 360 video the headset (Optional)

It is possible to preview the output of the VR / 360 video in the headset before exporting. This is useful for checking resolution selection and *Interocular & Convergence Distances*.

1. Set the resolution / aspect of the project, so your view is representative
    a. Go to *Project -> Settings -> Rendering* (tab)
    b. Set the *Output Width and Height* to your target resolution (3840×2160 is the lowest recommended resolution)
    c. Set the *Output Resizing* to *Scale / Filter Output to Window*
2. Connect either your Oculus Rift or HTC Vive
3. Select Devices, then choose the headset you'd like to use
4. Click *View -> Preview 360 on VR Headset*
5. Put on your headset and press play (Space Bar)

Step 4 – Export your VR / 360 video

Video specifications for 360 players are fairly strict and you need to research your target. YouTube 360 Specifications

To export to a VR 360 video:

1. Ensure the *Root Node*'s current camera is your *VR 360 Camera*.
2. *File -> Export Video*
3. Select the filename, formats and **resolution** of the video in line with the required specifications and click *OK*.

Other uses of VR 360 Camera

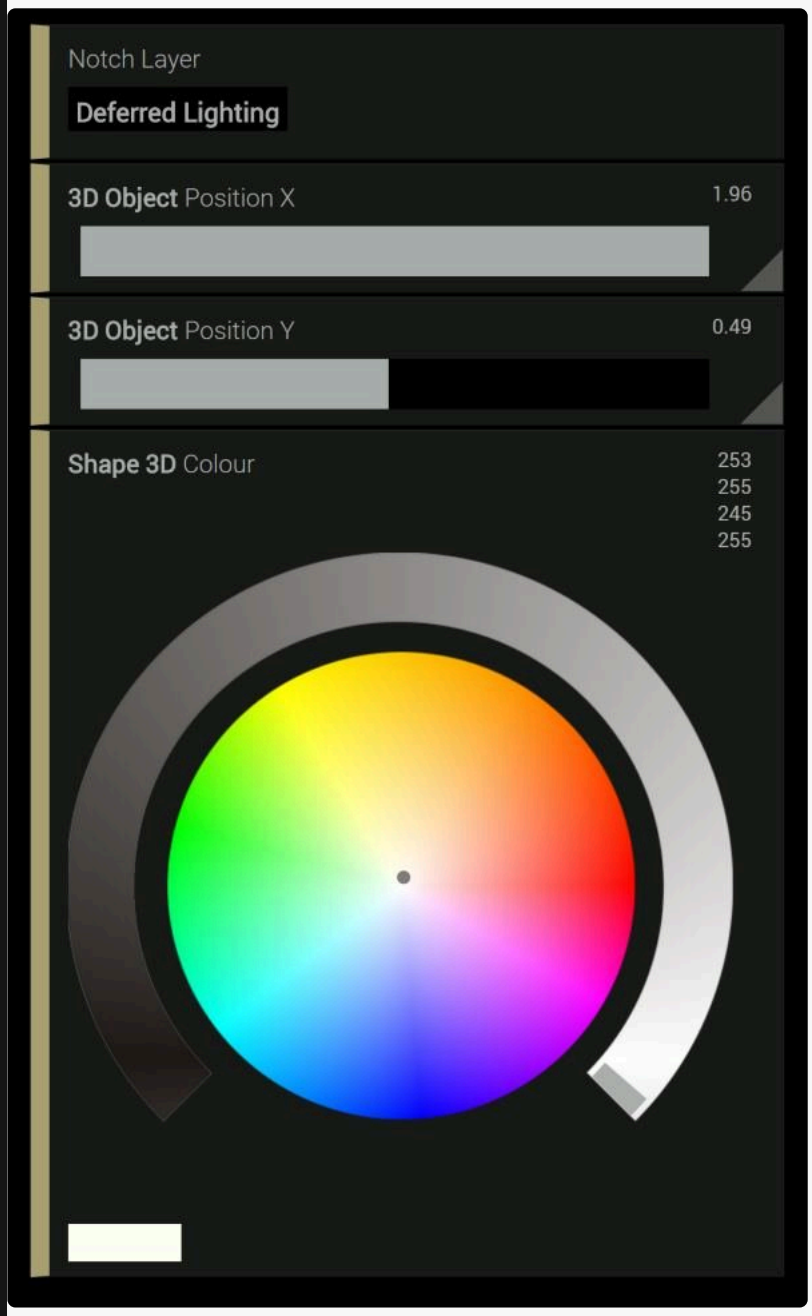
The *VR 360 Camera* can be used as a source for POV mappings, either internally in Notch or with media servers that support spherical maps.

Web GUI

Introduction

Using the Web GUI it is possible to control your projects Exposed Properties and Layer selection via a web browser. The GUI is optimised for touch surfaces (tablets, phones etc).

You can also develop your own web GUI interfaces or control from remote web apps using the Web API on which the Web GUI is based.



Accessing the Web GUI

When enabled, exported Standalone Executables start a web server on port 8910.

To enable and access the Web GUI:

1. Enable Web GUI in the project settings
    a. Project -> Settings
    b. In the General tab check 'Web GUI Enabled'
2. Export the project to a Standalone Executable
    a. Project -> Compile Standalone Executable
    b. Run the executable
3. Access the GUI from a web browser
    a. Open a web browser
    b. Go to: `http://127.0.0.1:8910`
    c. The exposed properties will be displayed

You can access the Web GUI from any other computer via `http://<ip_address>:8910`

The GUI allows you to control exposed properties when the project is running as a Standalone Executable.

Currently text fields cannot be edited from the Web GUI.

Any remote machine that has access to the Web GUI port can control the project. IP security is left in the users hands.

Topic not found

We’re working hard to expand the manual, but it looks like the topic you were looking for isn’t yet complete.

FAQ

- Apple macOS/OSX Support
- Extending GPU Timeout Detection
- Frame Rate, Resolution and YOU!
- Issues starting Notch
- Multi-GPU
- Optimising 3D Scenes for Notch
- Project Upgrade Guide
- Supported Video Codecs

Apple macOS Support

Are there plans for macOS support for Notch?

There are no future plans for a Mac version. Notch utilises the DirectCompute framework for GPU compute functions which is Windows specific, but hardware agnostic. Therefore we won’t be offering macOS support anytime soon.

Issues when installing or starting Notch

“Error 1317” during installation

On certain Windows systems, you might get the following error when attempting to install Notch:

Error 1317 An error occurred while attempting to create the directory Drive Name:\Folder Name

This is a Windows error that indicates that you are attempting to install Notch in a directory for which you do not have the correct permissions. This can be because your logged in user is not an Administrator, or that the directory you’re trying to write to is locked in some other way.

Anti-Virus

A handful of Anti-Virus programs incorrectly block Notch from running.

Most commonly we see issues with Bit Defender. You can whitelist the NotchApp.exe file in BitDefender to allow it to run. Follow the instructions on the bottom half of this BitDefender manual page to add a process to the Advanced Threat Defense exclusions list. Ensure that you select the *NotchApp.exe* file when whitelisting the process.

Nahimic (often bundled with MSI Laptops and Motherboards)

Nahimic is a 3D spatial audio program that is often packaged with MSI laptops, desktops, or components. The Nahimic application / service prevents Notch from starting. Nahimic runs in the background as a service and you may not be aware that it is actually running.

To identify if Nahimic is running.

1. Open Task Manager
2. Ensure you are opened to the ‘More Details’ view
3. Under *Background Processes* find any processes that start with *nahimic*.

Terminating these processes or uninstalling Nahimic allows Notch to start.

Error: No DirectX11 capable render device available.

If Notch is unable to access your GPU on startup, it will display this error. The cause is usually that Notch is being run on a computer that doesn’t have a DirectX11 capable GPU (in which case the solution is to run Notch on a different computer, or upgrade your GPU), or that something is blocking Notch from

accessing it.

Duet Display (https://www.duetdisplay.com/) devices are known to cause such conflicts. The solution is to uninstall the Duet Display driver and unplug the unit(s) from your computer.

Windows ‘N’ Editions

Windows ‘N’ and ‘KN’ editions miss some key media player features required by Notch. To run Notch, you need to add the Windows feature called: Media Feature Pack for N versions of Windows 10

Extending GPU Timeout Detection

Windows is constantly monitoring the GPU and it's drivers to ascertain if it is in a 'good state'. This mechanism is called Timeout Detection & Recovery (TDR). Part of TDR is making sure that render requests come back in a timely fashion. However, the timeout detection can sometimes be a bit too aggressive when you are rendering huge scenes.

In these cases you may need to extend the Timeout Detection Delay, by adding/updating the `TdrDelay` registry setting.

```
KeyPath   : HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\GraphicsDriver
s
KeyValue  : TdrDelay
ValueType : REG_DWORD
ValueData : Number of seconds to delay. 2 seconds is the default value.
```

We recommend extending the TdrDelay to 5 or 8 seconds, if you are experiencing issues.

How to add/change the TDR Delay

1. Run `regedit`, the Windows Registry Editor
2. Navigate to: `HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\GraphicsDrivers`
3. If the `TdrDelay` key exists, double-click on it and change it's value to 5 or 8.
4. If the `TdrDelay` key does not exist, add the key by:
    a. Edit -> New -> DWORD (32bit Value)
    b. Name the key `TdrDelay`
    c. Double-click the key and set it's value to 5 or 8.
5. **Reboot** your system.
6. The changes will now be in effect.

Multi-GPU

Is Notch Multi-GPU compatible like …insert raytracing renderer… ?

The short answer: Notch currently only supports rendering a frame on a single GPU as multi-GPU gains are fractional.

To understand why this is the case it's important to understand the difference between raytracing and raster rendering (which Notch uses). In raytracing, a light ray path is calculated from the camera through each pixel of the screen, to the geometry it hits and to the places that the ray bounces. Raytracing is very computationally heavy. And while Notch does support various raytracing features, it is not the default rendering method for performance reasons.

In a raster based world, the scene is 'assembled'; fluid / particle / cloner simulations are run, lights and shadow maps calculated and then the viewport is drawn on the basis of this 'assembled' environment. You can see raster rendering as a set of batch jobs that assemble the scene. This method is incredibly fast and as software advancements have been made it has enabled high end realtime rendering to occur.

When it comes to multiple GPU raytracing, while slow, does lend itself to multiple GPU processing as each 'ray' can be processed by a different GPU. However, there are large penalties in setting up each GPU for the raytrace every frame which make it unsuitable for realitme. The process goes a little like this:

1. Software uploads the full scene (geometry, materials and simulations) to each GPU (not very efficient)
2. Each GPU renders a segment of the viewport
3. Each GPU copies their rendered segment to the primary GPU (a very slow process despite technologies like SLI, as all GPUs have to stop and sync)
4. The primary GPU pieces together the segments and displays the final image.

The inefficiencies above are not noticeable in a frame that takes 2 minutes to render, but are unsustainable when you are rendering within 16ms (realtime).

In raster rendering it is possible to gain some performance advantages by running on multiple GPUs, but only in the region of 0-20%. In the multi-gpu raster rendering scenario the 'batch jobs' (cloner / particle / fluid simulations or light and shadow calculations) would be scheduled on different GPUs. However, the act of copying this data between GPUs reduces a lot of the performance benefits you achieve with the distribution of work.

At present, the work that is done to optimise Notch on a single GPU and the pace of GPU hardware

development, far out strips the advantages of multi-gpu raster rendering. Once the pace of innovation slows in single GPU rendering, our attention will turn to multiple GPU.

Can my media server use an extra GPU to render Notch graphics?

Notch does allow media servers to render Notch frames on additional GPUs, however there are some reasons why most media servers have opted not to do this.

In a media server input to output latency is often a top priority. If Notch is run on a separate GPU all live camera feeds have to be copied from the primary GPU to the generative GPU to be processed and then the treated content needs to be transferred back again. These copies are slow and sometimes outweigh the advantages of the additional GPU when live camera effects are used.

When running two GPUs that require multiple copies/sync per frame there are complexities in timings and render-sync between the GPUs (further complicated by genlock and multi-machine setups).

Again, this choice is media server vendor specific and may change over time. You may wish to talk further with your vendor.

Can you select which GPU Notch Builder is running on?

Yes (from 0.9.19). Go to File->Preferences->GPU

Optimising 3D Scenes for Notch

Working in real-time allows for great speed, flexibility and experimentation vs offline rendering / video. But projects designed to run in real-time have one key consideration that video doesn't: performance.

Performance of most real-time 3D scenes is limited by a number of factors: the size of the canvas; the complexity of lighting, materials and shading; post processing; visual effects (particles+fields etc) in the scene; and the 3D assets themselves. The scene is always limited by the slowest thing in it – it's no good optimising the assets but not the particles, for example.

Preparing 3D Assets for Real-time

Firstly, and obviously, the fastest thing to render is the thing that isn't rendered. Graphics hardware still processes polygons through the pipeline even if they aren't visible on screen. Notch culls meshes that lie outside the planes of the rendering camera, but can only do this on a per-mesh basis: if an object crosses the edge of the camera, it will be rendered in entirety. Therefore in some cases, e.g. flying down a tunnel, it may be worth cutting up the mesh into chunks if some chunks can be completely outside of the camera view at some points and therefore not processed. This also applies to polygons that face away from the camera or are hidden behind other meshes. A mesh that exists in the scene but is entirely hidden behind other objects will still be rendered completely and still cost time to process: it should be removed manually by the artist.

A 3D object is often rendered in multiple passes by the engine – for example, each shadow map rendered requires re-rendering the object. Often large parts of the scene have no real effect on the shadow map or can even adversely affect it, and it pays to turn "Cast Shadows" off on those. The floor is a particularly common example: if you have a flat floor in your scene, always disable cast shadows for it. It'll improve the quality of the shadow map too.

What makes a 3D asset perform badly? The major reasons are, in order:
- Number of batches
- Material and texture complexity
- Deformation, animation, skins
- Polygon and vertex counts

The number of batches is by far the biggest factor in many scenes. A "batch" is a piece of a mesh that can be rendered in one go by the graphics hardware. Each separate object node, each separate mesh inside each object node, and each block of polys using a different material inside a mesh, all result in a new batch. Graphics hardware likes to deal with a small number of large batches, and hates to deal with lots of small batches. In fact, with less than around 2000 vertices in a batch the graphics hardware doesn't even properly spin up – it wastes time doing any less. That's right – if you have a batch of less

than 2000 vertices, you could probably add more vertices and it would take the same amount of time to render!
Worse than that, each batch that has to be processed adds a lot of overhead on CPU and GPU. There's a limit of the number of batches you can actually process in a frame before it impacts the frame rate heavily: more than a few hundred in total is an issue. Considering that a scene is often rendered multiple times – each shadow map rendered requires a full rendering pass of the scene – then batch counts quickly add up. A badly optimised 3D file can easily destroy the frame rate.

How can you minimise batch counts? Firstly, 3D packages often favour creation of lots of small separate meshes – so an innocent-looking scene made of 100 cubes may contain 100 separate meshes, leading to a very slow real-time render. Notch does not merge meshes on load because the user often intends to keep objects separate in order to modify & animate them separately in Notch. Therefore, the first step to be taken is to merge as much of the scene as possible into one single mesh (even one with lots of materials). So important is this step that it's often worth sacrificing other "optimisations" in order to achieve it: for example it can often be more efficient to take a scene made of lots of rigidly, independently animating meshes, merge them all and bake all the animation to a huge vertex cache animation – or a skin + bone animation – than it is to run the original scene. This also goes against the previous statement about splitting meshes into chunks for culling, and neatly demonstrates that there are few hard rules in 3D scene optimisation.

The next process is to merge materials. Take for example a cube where each face has a separate texture applied. This will be rendered as 6 batches of 2 quads each – incredibly inefficient and slow. It would probably be faster to render a single 10,000 poly mesh with one texture than to render the cube with six different ones. To reduce this cost textures can be merged into a single atlas per mesh using functionality in the 3D software. One material per mesh is ideal.

The next issue is material and texture complexity. Large textures are often considered to be a cause of poor performance but this is not entirely true: what matters is actually texture density. A large texture squeezed on to a small polygon (small in output render size) may be costly. However, Notch auto-creates mipmaps from textures which mitigate this issue, but it's still worth – for quality of rendering and reduction of aliasing, not just performance – to ensure that your texture map density is in good relation to the size of the thing on screen: a 1:1 ratio is the goal. A 5 pixel sized object on screen does not need a 512×512 texture. In olden days texture sizes had to be power of 2 (512, 1024, 2048 etc). This is no longer necessary but it aids mipmap generation if abided by.
Texture formats also matter: a 16bit per channel texture is twice as slow to render as an 8 bit per channel texture. Optimising textures to DXT formats where possible reduces their memory footprint but also greatly improves their cost to render. In a PBR workflow, albedo (colour) maps can typically be compressed to DXT1 (RGB) without much noticeable difference; roughness and specular maps can be compressed to greyscale BC4. Normal maps generally should not be compressed below 8 bits per channel.

However, material complexity is the much greater enemy than textures alone. A material is capable of

using a number of textures at once: e.g. normal maps, roughness maps, displacement maps etc. Each of those elements carries a cost: in simple terms, a material using 4 textures is 4 times as heavy to render as material that uses one. But some of these stages – such as normal mapping – take additional processing beyond just reading the texture. Consider whether each texture channel really has an impact on the render. Simple materials and materials without textures are faster to process. The cost of material evaluation also heavily impacts lighting. Lighting is often the most demanding part of the overall rendering pipeline, and options in the material such as reflections are costly. Those will be discussed later.

This brings us to polygon and vertex counts. The biggest fallacy in 3D optimisation is the assumption that reducing the polygon count makes everything go faster; it should now be clear why this is not the case after the discussion of batches. GPUs are tremendously powerful nowadays and if the mesh is properly set up and dispatched millions of polygons can be rendered comfortably. However, ultimately and at extremes, polygon counts do matter – particularly when meshes are additionally processed with deformers, or in particular if the object is cloned multiple times! As with everything else, polygon counts should be kept reasonable for the way the object will be seen on screen.

Lighting

Lighting is usually the most GPU-intensive part of 3D scene rendering. Notch has two lighting modes: forward and deferred, and it is deferred rendering that will usually be used for “high quality” 3D scene rendering with shadows etc. Deferred lighting works by first rendering the 3D scene to a number of separate images (called “GBuffers”) at once, containing information like normals, albedo, roughness, depth and so on. Once these buffers are generated the lighting is all calculated as a post-process on the images. This has some great benefits: each pixel may be rendered by overlapping polys multiple times, but it will only be lit once; and the geometry only has to be rendered once. This means that overdraw, hidden polygons, texture sizes, batch counts and polygon and vertex counts are not a concern when thinking about lighting calculations. What does affect lighting calculations is the size of the canvas / output render; doubling the number of (lit) pixels on screen doubles the time taken for lighting. Lighting complexity is likely to be the limiting factor when 3D scenes are rendered in high resolutions – the size of the required render must be a key consideration when determining which lighting techniques to use.

Basic lights – spot, point, directional and area lights – are calculated analytically, making them fast to process even in large numbers unless shadows are enabled. Enabling shadows on a light massively increases its computational complexity. Shadows are generated as shadow maps, which require the entire scene to be rendered again to texture, once (for spot lights), six times (for point lights) or many times (for area lights); the resulting texture must then be sampled by each lit pixel on screen – typically many times per pixel – to calculate the shadow result. Softening shadows requires more samples, making it slower and slower to calculate. Notch optimises the shadow sampling process to try and avoid processing the light and reading the shadow map in areas of the screen which are outside the attenuation area of the light. There are two different modes for shadow map sampling: PCF shadow maps require lots of samples to make soft shadows smooth; Variance shadow maps optimise some of

this process into a pre-calculation, making them faster for very soft shadows. Shadow softness may be constant or varying, based on the occlusion of the object; varying softness requires even more calculations to generate, so takes longer. To optimise basic lights first disable shadows where ever possible, reduce the shadow softness otherwise, use constant softness not varying where possible, try variance shadow maps, and then make your shadowing lights as small as possible.

For reflections, environment maps are cheap approximation and can be calculated quickly. The environment map itself can take time to process, so static environment maps should be used where ever possible: video or other animation applied to video nodes linked to the environment map source causes the environment map to be dynamic and will make it much slower. Advanced lighting options such as screen space reflections, sky lights and voxel cone shading are very heavy processes requiring a considerable amount of preprocessing and lots of samples. Screen space ambient occlusion may be a cheaper alternative to sky lights.

Volumetric lighting is available in two forms in Notch. The simple scattering available by setting Scattering Intensity on light nodes is fast but does not allow shadow maps, projected textures or more complex effects as it is calculated analytically, just based on the light cone and the per-pixel depths. The Volumetric Lighting node allows access to these but – as could be expected – has a great impact on performance: the volumetric effect now has to be ray casted per pixel through multiple scattering sources, with shadows evaluated at each step along the ray. Where possible, only use full volumetric lighting where lights really need it: e.g. where the shadow map or projected texture are visually key. The Volumetric Lighting node has “Affected Lights” and “Excluded Lights” inputs which may be used to restrict the set of lights in the scene which use full volumetric lighting.

In many scenes it may be possible to bake some or all of the lighting to textures, massively reducing the computational cost per frame. This is the most effective way to optimise lighting while maintaining a good visual result. Specular lighting and reflections will always change when either the camera, the lights or the objects in the scene move; it is therefore usually impossible to bake. Diffuse illumination, bounce lighting and ambient occlusion on the other hand only change when the objects move; bounces and ambient occlusion are also the slowest things to calculate. As such it is common to bake the bounce / ambient occlusion passes plus some of the light sources into textures (light maps), then use a small number of real-time key lights to provide specular, and shadow cues from a few moving objects. Baked lightmaps can be generated offline in other 3D tools and loaded into the material’s Diffuse Illumination channel.

Antialiasing

A beautifully modelled, lit and textured 3D scene can often be let down be aliasing artefacts. Real-time renderers do not have the massive oversampling options available in offline renderers so it becomes much more of a problem – but antialiasing techniques allow things to be improved. There are a number of methods available in Notch but first we must consider where aliasing actually comes from. There are three major types: – polygon edge (geometric) aliasing, material / texture aliasing, and lighting / shading

aliasing.

Geometric aliasing is often easily visible on straight edges of 3D objects at angles – they look jagged. Removing this requires use of one of the antialiasing methods in Notch: MSAA, FXAA or Temporal AA. MSAA specifically treats pixels that lie on the edges of polygons as multiple samples which are later averaged; this costs processing time because each pixel may be processed and lit multiple times rather than once. FXAA is effectively a post-blurring technique that looks for edges, and is cheap but tends to lose sharpness. Temporal AA uses multiple frames and generated motion vectors to smooth pixels over multiple frames, which is reasonably cheap and looks good but breaks down in some scenarios. It's important to understand that polygon edges don't always result from the silhouette of an object; cracks in polygons are a common cause. A crack occurs where the edges of two neighbouring polygons do not perfectly match up: e.g. small differences in unwelded vertex positions that can be solved by welding them; or one edge butting up against two. This must be fixed in the artwork: clean meshes are essential for a good render.

Texture aliasing is visible on the interior of a textured 3D object. This occurs when textures – including specular, roughness and normal maps – have hard lines and/or are too large for the number of pixels on screen. The best solution to this is to fix the artwork: smooth it out, get the resolutions right vs the density of the texture on screen. The UV coordinates on the mesh can be a big contributor: uneven UVs or hard joins. Normal map and roughness map aliasing are particularly important because they directly cause the last type: shading aliasing.

Shading aliasing occurs when processing lighting and shading. A sharp change in normal direction may result in a huge change in e.g. specular light result from one pixel to the next – which results in aliasing. This is the most challenging type to remove and must be done by careful work by the artist. Notch has a number of views to help: you can view normals, texture coordinates etc. to try and diagnose the issue.

Shadow aliasing forms a part of shading aliasing but one to consider separately. It shows as jagged edges along the lines of hard shadows, and is caused when shadow maps are too low resolution for the area they are asked to cover. In practice this is a difficult problem to resolve because depends not just on the cone of the light, but the area on to which the shadow map is sampled: it may be fine with a zoomed out camera and a low screen resolution, but zoomed in on a small area of the scene and rendered at high resolution the problem may become more evident. The only options are to reduce the area covered by the light, increase shadow map resolution, or soften shadows to hide the problem.

0.9.22 Project Upgrade Guide

Summary

There are often reams of small (and large) bug fixes between one release and the next. Sometimes a bug fix changes behaviour that improves things going forward, but makes old projects look different when loaded in the latest version. This guide presents a list of changes between version 0.9.21 and 0.9.22 and advises what you might need to do bring your scene back to it's original intent.

Sky Light brightness is brighter

The Sky Light brightness has been adjusted to make it more accurate and balanced with ray traced lighting. You may find your Sky Light lit scenes are brighter by default.

Materials : Smoothing Angles now work

While the materials did have a Smoothing Angle attribute, it previously had no effect. This is now fixed and you will need to set a smoothing angle that is appropriate for your material. Diffuse lighting may look broken without setting this.

Environment Map & Screen-Space Reflections orientation

We've corrected the orientation of Environment Maps and Screen-Space Reflections to match Skybox, Sky Light and the new raytracer. You may need to go back and change the orientation in these two nodes.

Post FX : Warping : Stretch – Rotation is now in degrees

The Rotation value previously was in radians and is now in degrees. You may need to update your values accordingly.

Fixed OSC command: /notch/transport/time

Previously, when setting playhead time via OSC you had to set it in hundredths of a second. Now the command accepts seconds. If you are using this command you will need to update your source sender.

Particle Emitters: Max Emitters Per Vertex

If your Spawn Mode is Vertices or Vertices – Follow Edges, then this new attribute caps the number of particles emitted from a single vertex that can be in flight at any given time. By default, it is set to 10,000. If you are emitting an awful lot of particles, you may need to increase this number.

Small tweak to how Roughness Textures are handled

Previously we treated material roughness textures as having Gamma 2.2. We now treat them as being linear. If you are using a roughness texture, you may notice a small difference.

Supported Video Codecs

Notch supports a wide range of codecs. Some are handled natively and can be played back without modification. Others will be automatically transcoded to NotchLC on import.

The list of video codecs with **native** support:

- NotchLC
- DXV2
- HAP
- HAPQ
- PhotoJPEG
- Animation

Codecs that can be automatically transcoded on import:

- H.263
- H.264 / AVC / MPEG-4 AVC / MPEG-4 part 10
- HEVC
- MagicYUV
- DNxHD
- MPEG1/2/4
- VP8 / VP9

Auto-transcoding is available from Notch Builder 0.9.22.

Remote Network Editing

Notch Builder Pro is able to remotely edit Notch projects running as Standalone or Blocks on local or remote machines. Changes made in Builder will instantly be reflected on the remote standalone/block for the duration the standalone/block is running.

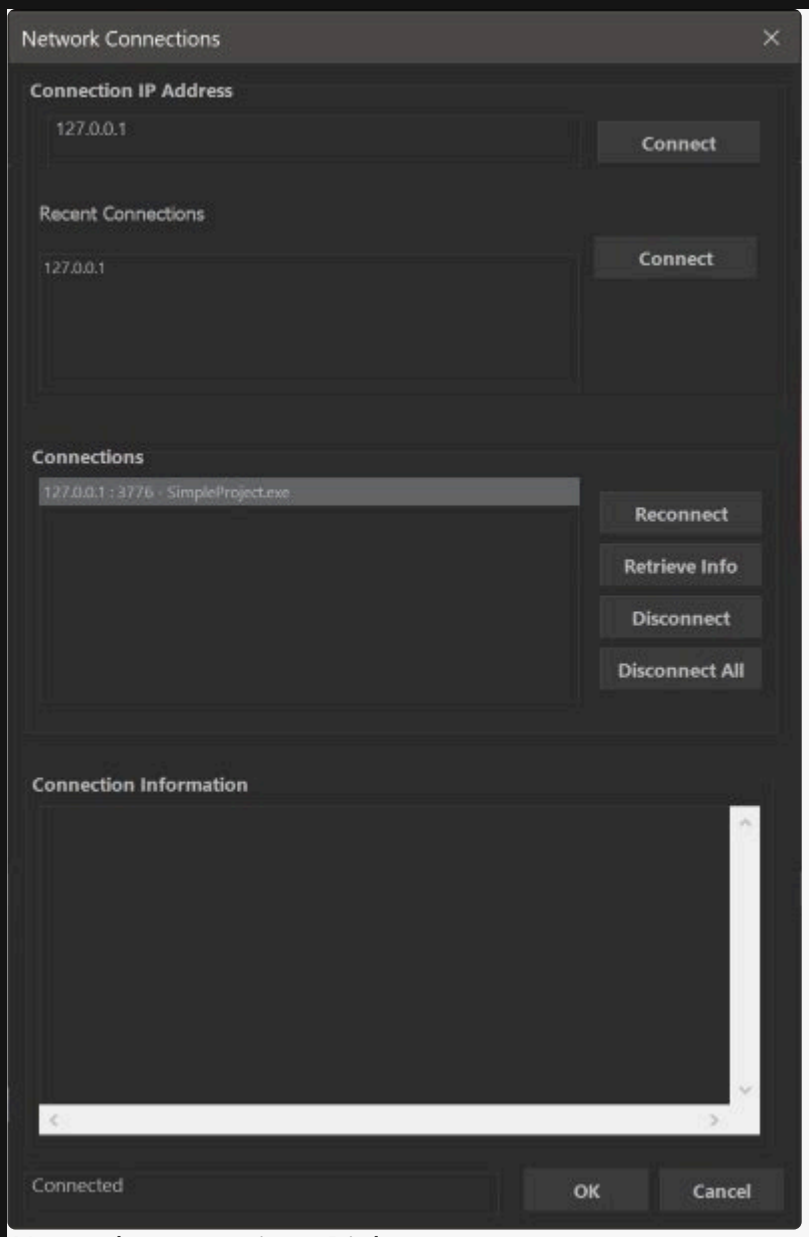
> ! Changes that are made via remote editing do not persist after the standalone / block is closed. You must re-export your standalone/block to have your changes persist.

> ! Remote network editing is only available from Notch Builder **Pro**.

How to set up a remote editing session

1. In Builder Pro, load the Notch project that matches the one running remotely.
2. Go to: *Devices -> Network Connections*
3. Enter the IP address or resolvable hostname for the machine running the standalone/block in the *Connection IP Address* field.
4. Clic *Connect*
5. You will be met with the *Select Connection* dialog box which shows all the standalone processes or blocks running on the remote machine.
6. Select the process or block and click *OK*
7. You will now see at the bottom of the *Network Connections* dialog the status of 'Connected'.
8. All changes that you make in Builder are now reflected on the remote standalone/block.

> ✻ You can edit the same block running on multiple machines, by entering multiple IP addresses in the *Connection IP Address* field, separated by commas.



Network Connections Dialog

How to end remote editing session

1. Go to: *Devices -> Network Connections*
2. In the *Connections* panel select the active connection you wish to disconnect
3. Click ‘Disconnect’

Useful things to know

- Remote connections work over TCP/IP, with each block/standalone listening on an auto-selected port.
- You can use remote editing over solid wifi connections as well as wired
- New or refreshed resources are not distributed over the editing session

- The playhead and current layer are intentionally not reflected on the target standalone/block. Use the media server, WebGUI, OSC or ArtNet to control the playhead/layer selection.

Release Notes

Version:

- 0.9.22: Notch 0.9.22 Release Notes.

Notch 0.9.22 Release Notes

0.9.22.061 (3rd patch release, 3rd September 2019):

Changes

- Upgraded to NewTek NDI SDK v3.8.
- Upgraded to Spout v2.006.
- Updated the Motion Datamosh node by changing the hold time targets to 32 bit, so they have a longer possible duration.
- Updated VR export to copy all the required DLLs and not just the OpenVR DLL.

Bug fixes

- Updated the NDI Output node to always send RGBA8 data as NDI does not support 16 bit.
- Fixed the Preview In Viewport options in the Video NDI Source node so that they are mutually exclusive.
- Fixed a bug with the Refresh Sources button in the VideoIn/Camera/Kinect Settings dialog.
- Worked around an issue on the AMD WX9100 where shadows would not appear in some scenes.
- Fixed a bug where VR applications would always choose to use the Oculus headset.

0.9.22.059 (2nd patch release, 29th July 2019):

Bug fixes

- Fixed a licensing issue in Notch.exe which meant that expired subscriptions would not fall back to the Learning license if available.
- Fixed a bug in the Particle Point Renderer node which would cause animated sprites to jitter.
- Fixed a crash when using the Render To Surfaces node.
- Fixed a crash when clicking on the Remove button in the Feed Configuration dialog.

0.9.22.053 (1st patch release, 26th June 2019):

Added Nodes

- None.

Added Shortcuts

- Added Ctrl+Shift+M shortcut for opening the video export dialog.
- Added Shift+R shortcut for toggling Refine Render.
- Added Ctrl+U shortcut for Copy To Clipboard.
- Added Ctrl+I shortcut for Paste From Clipboard.
- Added Ctrl+Shift+N shortcut for New Layer.

Added Features

- Added an option to change the Depth Range in the Luminance From Depth node. Options include Kinect v1, Kinect v2 and Raw Depth.
- Added unicode string support to enable updating exposed text strings via WebGUI.
- Added a Refine steps count to the Status Bar.
- Added a Radial Rotation Offset parameter to the Extruded Spline node.
- Added a UV Mode parameter to the Extruded Spline node. Added a Spline Time mode that locks the UV to the spline point time.
- Added node presets for the RT Denoiser node.
- Added a Calculate Distance bin, which calculates the distance between two nodes and outputs the value.
- Added a Calculate Midpoint bin, which calculates the midpoint between two nodes and outputs a position you can child other nodes to so they follow that midpoint.
- Added the ShadowCatcher.dfx project that was previously in the additional Samples pack into the Notch installer.
- Added support for sending a layer bin to a specific folder in the Bins Window.

- Added a texture input pin to the Halftone Post FX node.

Changes

- Deprecated the Bake Lighting node. Please see the Bake Lighting To Object node for baking lighting in your scenes.
- Updated the Region node so that Shift+Drag only moves child nodes that are fully within the region.
- Updated the Fractal Noise Shading Node to disable the Offset Amount parameter when using the FBM or Turbulence Noise Type.
- Updated the Downsample Iterations parameter on the FFT Blur / Glow node to set the min and max slider range to 2 to 16.
- Updated standalone applications to generate mipmaps for image resources. This now matches the behaviour in Notch Builder.
- Render refinement is now only enabled if ray tracing is turned on for an active layer in the current time scope.
- Removed the ability to disable Region and Comment nodes. You couldn't disable them anyway and attempting to do so was confusing the GUI.
- Updated the Procedural Shading Node so that it connects to the closest Procedural Root node when the pressing Ctrl+R shortcut.
- Removed unused Shift+F11 shortcut.
- Updated the Tweening Null node so that it now works with Cloner nodes.
- Updated the export video progress dialog window so that it is now moveable.
- Updated the image file loader to correctly classify image formats in the Resource Browser window.
- Updated the Paste From Clipboard functionality to paste the nodes to the position of the mouse cursor if in the nodegraph, otherwise to the centre of the nodegraph.
- Disabled the ability to copy the Root node when using the Copy To Clipboard feature.
- Updated the DFX project loader to ensure that node GUIDs are unique across all layers. Duplicate GUIDs can cause issues with the undo stack.
- Removed the RT AO bin. This will be resurrected for the Notch 0.9.23 release.
- Updated the Skylight node so the Raytraced Samples parameter is set to 1 by default.
- Updated Material bins to ensure that the 3D Objects are positioned at the origin.
- Deprecated the Clip Box node. This has been replaced by the Cull Deformer node.
- Updated the Skylight node so the Lock To Camera parameter is enabled by default.
- Updated the Expression node to support calculating floating point remainders. Previously, value0%value1 would round down the resulting value.

Bug fixes

- Fixed a crash when instantiating bins containing textures, then closing Notch Builder or opening/creating a new project.
- Fixed a bug in the Region node, which meant the outline of the region in the Nodegraph would be

rendered using the wrong colour.
- Fixed a bug in NFetch that meant the saveToPath request would not create the destination directory if it did not exist.
- Fixed the formatting of some error messages written to the log file.
- Fixed a bug when loading and importing files from unicode paths.
- Fixed a bug in the Water Ripples Post-FX node which caused rendering artifacts when the Length parameter was very close to zero.
- Fixed a bug in the Luminance From Depth node's texture preview scaling.
- Fixed a bug in the Skylight node, which was incorrectly applying a ray bias in the reflection pass.
- Fixed a bug in the Timeline window when rendering curves for nodes inside layers with multiple time segments. Sections of the curve were displayed multiple times.
- Fixed a bug in the Curve Editor window when rendering curves for nodes inside layers with multiple time segments. Sections of the curve were displayed multiple times.
- Fixed some menu item typos relating to shortcut key commands.
- Fixed the Frame Feedback node so that Ghost Offset X and Y parameter can now be set by dragging a connection to the Property window.
- Fixed a camera movement bug, which meant that pressing and scrolling the mouse wheel at the same time would cause objects to move position arbitrarily.
- Fixed a bug relating to 3D Objects, which would cause line rendering to flicker when the Subdivision Levels parameter was changed.
- Fixed a bug in the Colour Ramp node, which meant that the preview in viewport checkbox would not be disabled if you previewed a different node, such as Video Loader.
- Fixed a bug where resource load times were not being calculated when reloading or importing a resource (only when loading a DFX from scratch).
- Fixed issues with node links when copying and pasting via the clipboard feature.
- Fixed a bug in the Merge Resources By Filename option in the Resource Browser. It was incorrectly deleting unused resources even if they had a unique name.
- Fixed a bug which meant the viewport was not updating after deleting a resource.
- Fixed a bug in Spout output, which could cause the spout receiver to receive black frames until the viewport is resized.
- Fixed a crash when switching projects when the Refine Render option is enabled.
- Fixed a bug when using non-ascii characters in the folder paths specified in File->Preferences.
- Fixed a bug where the nodegraph button tooltips would appear when hovering over nodes and connections, which was very annoying.
- Fixed a bug in the Skybox node, which meant the Blur Amount parameter did not behave as expected.
- Fixed a bug in the Skybox node, which meant that it did not show on the first frame of a render when the image was supplied from the Environment Map node.
- Fixed a bug in the Quicktime GPU compressor, which was causing some rendering artifacts and reduced quality compared to Quicktime for Windows exports.
- Fixed a bug in the Expression node when using the % operator which would result in a crash.

0.9.22.043 (official release, 6th June 2019):

Added Nodes

- Cloning
  - Clone Cache | Allows baking of cloner animations to disk, and playback of baked cloner animations.
- Deformers
  - Cull Deformer | Cuts away the polygons of the affected object using a plane, box or sphere.
  - Generate UVs | Allows you to generate UV coordinates for the deformed object using a mapping.
  - Mirror Deformer | This can be used to mirror geometry from one side to another and combine the output into a single mesh.
- Fields
  - Deformers->Fbm Deformer | Deforms a field based on the Fractional Brownian Motion algorithm.
  - Field Cache | Allows you to store the animation of a field to disk for scrubbale, deterministic playback.
- Generators
  - Truchet | Generates a texture of a Truchet pattern.
  - Voronoi | Generates a texture of a Voronoi pattern.
- Geometry
  - Decal | Use this node to project a texture onto a surface.
  - Optitrack Mocap Skeleton | This node reads bone data from a Optitrack motion capture suit and applies it to Bone nodes.
  - Transform Array Extractor | Extracts data from CSV/Table transform array node.
  - Tweening Null | Allows for a smooth transition between a number of transformation values.
- Interactive
  - Blacktrax Tracked Body | Takes a single Blacktrax Trackable and provides it as a tracked point (a bit like Null).
  - Blacktrax Transform Array | Takes multiple Blacktrax Trackables and instantiates the child nodes at the tracked points.
  - TUIO Transform Array: Generates a transform array from TUIO data sent from an external app supporting the TUIO protocol.
- Lighting
  - Bake Lighting To Object | This node bakes static lighting information for objects into lightmap textures.
- Materials
  - Alpha Blend (Transparent) Material | This is a basic transparent material using an alpha blend.
  - Diffuse Material | A basic diffuse material, similar to the default material node but without

any specular settings.
    - Emissive Material | A basic emissive material, similar to the default material node but without any specular settings.
    - Metallic Material | A basic metallic material, similar to the default material node but default metallic settings.
    - Shadow Catcher Material | Captures shadow information from lights cast onto surfaces that apply a shadow catcher material.
    - Substance Material | Supports applying Substance materials to meshes and real-time texture updates.
- Nodes
    - Image 2D Equirectangular | Warps a cube map into an equirectangular image in 2D space.
    - Region | Allows you to create a coloured region directly on the Nodegraph.
- Particles
    - Affectors->Depth Image Collision Affector | Simulates collisions between particles and a Kinect depth image.
    - Affectors->Rigid Body Collision Affector | Simulates collisions between particles and a rigid body system.
    - Particle Cache | Allows you to store the animation of particles to disk for scrubbale deterministic playback.
- Physics
    - Phsics->Rigid Body Depth Image | This node is used to allow Kinect depth to collide with mesh in the rigid body simulation.
- Post-FX
    - Colour Processing->Colour Channel Mixer | Use the colour values from the different colour channels and blend them together.
    - Image Processing->NDI Output | Sends the video or scene render it is attached to out via NDI.
    - Image Processing->Output GBuffer | Outputs various GBuffers to the screen. GBuffers are geometry buffers.
    - Warping->Barrel Distortion | Used to simulate or correct distortions in real-world camera lenses.
    - Warping->Droste Warp | Applies a Droste function to the image, creating an infinite warp.
    - Warping->Moebius Warp | Applies a Moebius function to the image, creating an infinite warp.
- Ray Tracing
    - RT Denoiser | This node is used to control denoising parameters for the scene.
    - RT Mirror Reflection | This node is used to simulate mirrors, reflections and specular on any raytraced material or surface.
- Video Processing
    - Input Output->GBuffer To Image | Allows GBuffer channels from a rendered scene to be used as video nodes.

Added Shortcuts

- Added Ctrl+R so that a range of nodes, now connect to their closest suitable parent root.
- Added F11 and ~ key to display the Nodegraph window as fullscreen.
- Added Ctrl+1 in the Timeline window to toggle layer enable/disable.
- Added [] to trim time bars.

Added Features

- Added Unicode support.
- Added Substance support. See the Materials->Substance Material node.
- Added support for raytracing to Sky Light, Area Light, Light (omni/spot) and Directional Light nodes.
- Added new viewport navigation controls (Alt + LMB / MMB / RMB)
- Added much wider video codec import support, through a new automatic transcoder to NotchLC.
- Added support for baking lighting to textures on correctly UVed meshes with Lighting->Bake Lighting to Object node
- Add support for baking clones, fields and particles. See relevant 'Cache' nodes.
- Added GBuffer export (see GBuffer To Image and Output GBuffer nodes)
- Added Timeline Markers, use Ctrl+M to add new markers and Ctrl+Alt+Arrow to jump between prev and next markers.
- Resource load times are shown in Resource panel (for most filetypes). Helps long loading resources.
- When live editing, exposed parameters may be sent back from host app/media server into Builder – controlled via the Connection Monitor.
- Added 2D bezier interpolation of keyframes
- Added Shadow Catching (see Materials->Shadow Catcher Node and Material->Shadow Catcher Colour)
- Curve Mask overhaul to more easily used to mask video/images directly. Control points can now be keyframed. The contour must be closed manually to be filled. Improved visualisation.
- Added TUIO multi-touch surface support. See the Interactive->TUIO Transform Array node.
- Added Xsens motion tracking support.
- Text node now supports 2D bitmap rendering
- Added support for exporting 16-bit channel .exr image sequences.
- Added 16-bit RGBA floating point support to video export and rendering / compositing path throughout.
- Added the ability to select the camera to render the scene from in the export video dialog.
- Added a "Check for Updates.." option to the Help menu.
- Added additional toolbar buttons including, "Refine Render" and "Prioritise UI Updates".
- Added beta support for exporting Proxy blocks.
- Added Blacktrax support [Beta].
- Added a "Video->Image Sequence" option to the import resource menu item.

- Added a “Smoothing Angle” parameter to materials, to control the normal smoothing angle per surface for deformed objects.
- Added feathering support to the Freehand Mask and Curve Mask nodes.
- Added support for importing points from Alembic files, to be used as particle caches.
- Added Notch Product Specialist created Lighting and Material bins.
- Added Notch Product Specialist created Node presets.
- Added NFetch support to the Javascript API. This allows users to make asynchronous HTTP requests and then invoke a callback function with the result.
- Added Layer.GetNodes() and Node.GetNodeGraphPosition() to the Javascript API.
- Improved the performance of saving and loading large project files by making compression of project files optional. Added “Project Compression” tick box to Project->Settings dialog. For quicker saves, but larger files, untick this option.
- Added support to the Custom Shader Post Effect node to allow for texture inputs.
- Added “Colour”, “Blend Mode” and “Blend Amount” parameters to the Particles: Shading: Density Shading node.
- Added “Preview In Viewport”, “Preview RGB In Viewport” and “Preview Alpha In Viewport” options to a number of nodes, including Video nodes, Generators and Colour Ramps. Checkerboard mode added for visualising RGB+Alpha together.
- Added native Animation codec playback support so it works in both 32-bit and 64-bit Notch versions.
- Added “Num Blocks X” and “Num Blocks Y” parameters to the Digital Block Glitch node to ensure the effect looks the same when the output resolution changes.
- Added “Num Blocks X” and “Num Blocks Y” parameters to the Digital Chroma Glitch node to ensure the effect looks the same when the output resolution changes.
- Added a new “Duration” group to the export video dialog:
- Added a “Use Range Duration” button to set the start and end time of the export to match the specified range set in the project.
- Added Stype support to the “Connection Monitor” dialog.
- Added support for dragging multiple nodes from the node tree into the node graph.
- Added Y axis subdivision support to the Shape 3D node for the Curved Plane shape type.
- Added an “Invert Order” checkbox to the Colour Ramp node to add support for reversing the order of the colours.
- Added Notch license information to the Help->About dialog.
- Added “Blend Amount” and “Blend Modes” to the Crop node.
- Added a “Use Project Resolution” button to the export video dialog.
- Added a button to clear the recent file list in File->Preferences.
- Added support for duplicating entries in the render queue via right click->Duplicate.
- Added support for multiple input images to be provided to the Skybox node.
- Added missing tooltips throughout Builder.
- Added support for importing more than 1 bin at once via the “File->Import Bin..” menu option.
- Added a “Set As Background” parameter to the Image 2D node.
- Added a tick box in File->Preferences for disabling the loading of thumbnails from dfx project files.

- Added colour-depth alignment support to our RealSense2 integration.
- Added support to the property editor to allow for inline editing of strings.
- Added support for entering expressions, such as 1920*3, to the rendering output resolution width and height boxes in Project Settings.
- Reduced NotchLC's CPU overhead even more, by switching LZH to LZ4 CPU-side compression.
- Added support for double-clicking in the Resource Browser window to open a file import dialog to select any Notch supported file type.
- Added checks for available free disk space prior to saving files in Builder. If there is not enough free space to save the file then error accordingly.
- Added support for double-clicking on a key in the Timeline window to edit its value in place.
- Added a new checkbox called "Lock To Camera" to the Geometry: Skybox node for locking the skybox to the camera's position.
- Added colouration support and standard blending properties to the Mirror node.
- Added colouration support and standard blending properties to the Clone node.
- Added support for getting the graphics card driver version, which is now written to the log file to help diagnose issues.
- Added a "Vertices – Follow Edges" spawn mode to the Particle Mesh Emitter node.
- Added mesh reveal controls to the Particle Mesh Emitter node so Fertilizer can be used to control the emission area.
- Added a limiter parameter to the Particle Mesh Emitter node for the number of emissions per vertex, in vertex mode.
- Added the Notch Builder version number string to the Samples splash screen.
- Added more keyboard controls to Standalone executables. Use Space to toggle playback and Home to restart the selected layer.
- Node search box improvements: Added Home and End support. Added Ctrl+left or right to move caret along a word/separator. Added Ctrl+shift+arrow to move caret and highlight word.
- Added a mirror wrap mode option to a number of nodes throughout. For example, Transform Image, Material, Image Plane and Image 2D nodes.
- Added Face Heading, Pitch Estimation and Face Size parameters to the Face Tracking node.
- Added an "Offset" parameter to the Procedural Onion node for adjusting the thickness of the generated layers.
- Added support for rendering fullscreen on a third monitor via the Shift+F9 shortcut.
- Added a new "Follow Surface" mode to the Object Distance Field Affector node.
- Added "Streak Difference As Alpha" option to Streaks and Glow Post FX nodes.
- Added "Nodes", "Disabled", "Hidden" and "Unconnected" counts to the top left of the Nodegraph window.
- Added a "Trim Time Bar to Clip Length" context menu option to the Video Loader node.
- Added support for Radial Square and Rounded Square modes to Gradient generator node.
- Added an "Effect Amount Image" input to a number of Post-FX nodes, such as Streaks and warp nodes.
- Added update time mode support to the Curl Noise Warp Post FX node so that it can repeat seamlessly.

- Added a “Hard Change Threshold” parameter to the Smooth Envelope Modifier node so if value difference goes beyond this perform a hard jump.
- Added an “Outer Only” mode to the Procedural Onion node to complement the existing “Inner Only” mode.
- Added a new mode for creating radial symmetry with any number of rotations to the Procedural Mirror node.
- Added a Mapping input to the Generate Fertilizer Times Deformer node.
- Added modes for simple left/right and up/down linear gradients to the Gradient generator node.
- Added an “Active” parameter to the 3D Object Outline node.
- Added an input node to allow an image node to be connected to the Colour Image Ramp node.
- Added a depth bias adjustment property to the Screen Space Reflections node.
- Added “Colour R”, G, B and A extractor envelopes to the Video Sampler Modifier node for getting individual colour values.
- Added an “Optimise Memory Usage On Idle” parameter to the Layer Precomp node.
- Added “idle” mode to rigid body nodes. Bodies go idle when they have not moved in a while and stop simulating, until affected/moved again by another body/force etc.
- Added the ability for multiple nodes to be hooked into alpha mask input on video nodes so they can all be blended.
- Added bar minimisation to the Timeline window.
- Added support for a texture input option on the Cross Hatch Post-FX node.
- Added, “Fbm”, “Turbulence”, “Ridged Multifractal” and “Marble” noise types to the Fractal Noise generator node.
- Added a “Uniform Scale” parameter to the Ripple Effector node.
- Added presets dropdown to the “Project->Settings->Rendering” dialog for choosing typical output resolutions for social media, 360 video etc.
- Added the ability to set separate sender and receiver ports for OSC.
- Added the ability to sample the average colour from a rectangular area in the Video Sampler Modifier node.
- Added a “Normalise Spline Time” option to the Spline node.
- Added support for various missing Geometry Node types to the Affecting Objects input of the Voxel Cone Lighting node.
- Added WIP->Geometry Network Sender and WIP->Geometry Network Receiver nodes, to allow geometry to be sent in and out of Notch via network streams. If you plan on using these then please get in touch via support.
- Added additional logging for detecting NDI failures.
- Added thumbnails to the Timeline window to enable users to see frames of video.
- Added support for 360 camera and multi cameras to the Procedural Volume Generator node.
- Added the current Pixel Scaling setting value to the status bar in Builder.
- Added “Delete All Keyframes For Selected Nodes” to the Edit menu.
- Added a checkerboard preview in viewport mode to the Video nodes.
- Added a “Gravity” parameter to the Field Level Set Root node.
- Added the option to use unmodified colour channel UVs for output in the UV camera node.

- Added the ability to use a Transform Array node as the points for a Spline node.
- Added support for child nodes to a lot of procedural types, and added child node dirtiness checks.
- Added colour generation to the Procedural Volume Generator node.
- Added support for particle colours to the Procedural Particles As Primitives node.
- Added a node input for the texture map image to the Procedural Meshing Texture Map node.
- Added a new mode for the cylinder and torus shape type, which gives it flattened sides to the Procedural Primitive node.
- Added a “Blend Mode” parameter to the Particle Life Colour Shading node.
- Added an environment map input, separate diffuse and specular brightness parameters to the Probe Lighting node.
- Added a “Smoothing Angle” parameter to the Extruded Spline node.
- Added a “Add to Alpha” blend mode parameter to the Particle Attribute Shading node.
- Added a “Num Octaves” parameter to the Displacement Deformer node.
- Added “Time to Idle” and “Idle Distance Threshold” parameters to Rigid Body nodes.
- Added support for forward advection to the Fluid Solver to b used with level sets.
- Added undo support to colour dropper control.

Changes

- Updated to use FBX SDK 2019.2.
- Upgraded Builder to support NDI SDK v3.5.
- Improved the Video Export pipeline to allow even bigger resolutions and bit depths.
- Improved network editing stability
- Much-improved PNG loader performance
- Updated the Nodegraph to allow selected nodes to be deselected by clicking on them whilst holding Ctrl.
- Updated a number of nodes in the Nodegraph to be hatched out if their inputs are not valid or set correctly.
- Updated the Combine Geometry node so that it accepts all kinds of cloner input nodes.
- Changed the watermark to use a checkerboard pattern.
- Changed String Edit fields so Shift+Enter now creates a new line and Enter on its own simulates pressing the OK button. Works great for comment nodes etc.
- The export of standalone applications and media server blocks now defaults to 64-bit. Untick “Create 64 Bit Target” to export to 32-bit targets.
- Updated Deformer nodes to that when Falloff is disabled, so are the associated parameters.
- To help reduce memory usage, resizing the render window does not resize while dragging.
- Updated Procedural Primitive nodes so they can now have child-parent transformation connections and both be rendered properly.
- Updated the Volumetric Tracer node so that it correctly outputs alpha.
- Disabled the grid rendering when exporting a video.
- Updated the Digital Chroma Glitch node to reset timers accordingly when layer time is reset.
- Updated Standalone applications using the “locked to timecode / reset on loop” mode to actually

loop (and reset).
- Updated the Ruler to render line markers on timeline frames when zoomed in.
- Disabled the “Sample Location U1” and “V1” property when not sampling a rectangle in the Video Sampler Modifier node.
- Updated the Nodegraph so that link output lines are ordered by the vertical position of the destination nodes in the graph.
- Enabled the saving of project thumbnails to be on by default. These thumbnails will appear in the Recent Files tab from the Samples splash screen.
- Updated the screenshot functionality to disable the orbit camera pivot handle prior to saving.
- Updated the Area Light node to be single-sided and default to rendering the “Visible Surface”.
- Updated Procedural Renderer nodes so they check for whether the Procedural Root is enabled or not before rendering.
- Updated the Film Grading node to support the blurring of the alpha channel.
- Removed newlines from the “OSC Address” parameter and Javascript input/output parameter names.
- Updated the property control window to not show decimal places for integer properties.
- Updated Mapping nodes so they now apply vertex displacement too.
- Updated Procedural nodes to that when colours are used (and e.g. “Affect Colours” is enabled), then they now respect the geometric blending in their own blending.
- Updated the Multiplex Sources node so that it now works with DXT image inputs.
- Updated the Performance window to keep polling our website for comparison data if it fails on the first attempt.
- Updated the Voxel Cone Lighting node to support a number of object input types.
- Changed the Material node’s “Smoothing Angle” parameter to default to 45.0 instead of 89.0.
- Renamed the “Displacement Direction” parameter to “Displacement Direction” throughout all nodes.
- Renamed the Spline Affector node’s “Velocity Scale” parameter to “Velocity Amount”.
- Removed sound markers as they have been replaced by real timeline markers.
- Pressing F5 when a Comment node is selected now automatically opens the Edit String dialog to update the comment description.
- Updated drag and drop support in Resource Browser window to accept .tif and .gif files.
- Renamed the “Show Bounding Boxes While Playing” menu item to “Show Bounding Boxes And Range Indicators While Playing” to be representative of what it actually does.
- Moved the “Delete Resource” context menu item in the Resource Browser closer to the top.
- Combined the “Submit Result” and “Compare Results” button on benchmarking dialog into one button called “Submit And Compare Results”.
- Changed the styling of Notch’s tooltips.
- Updated the Auto Key Colour Mask node so that it now has Alpha enabled by default for the affected channels.
- Updated the Stretch node so that the “Rotation” parameter is now in degrees not radians.
- Updated the “Removed Unused Resources” context menu in the Resource Browser to also remove empty folders.

- Updated the property control so that you can no longer set min and max values for drop-down menu parameters.
- Replaced references to “PLE” with “Learning” throughout Builder.
- Removed “Save Optimised..” from File menu as it is no longer supported.
- Updated the property window so that you can now use Alt+mouse wheel to traverse through drop-down parameter options, such as blend modes and resources.
- Disabled the “Subdivisions Y” parameter for a Shape3D’s Circle shape type.
- Disabled the “Subdivisions Y” parameter for a Shape3D’s Ring shape type.
- Updated ? colouring for exposed parameters and set min max properties. White if min/max and exposed, light baby blue for exposed only, and darker basic blue for set min max only.
- Updated the AVI2 video export to now include audio support.
- Updated the Ctrl+E shortcut to now highlight the text by default.
- Disabled the ability to cut and then paste more than 1 root node into a layer.
- Renamed the Render Layer node’s “Layer Alpha” parameter to “Alpha” to match envelope name.
- Updated the C4D importer to retrieve the framerate from the file so the “Locked Frame Rate” parameter value is correct during import.
- Change Nodegraph spline connections to straight lines.
- Removed in-built Screen Capture support from Builder as 3rd party solutions fill this gap well.
- Updated the Curve Mask node so that masks now have to be closed by clicking on the first point.
- Updated the FBX importer to load tangent data if it exists.
- Updated the Render Window so that resizing causes a VRAM purge.
- Changed the render window composite buffer format in Builder from 8-bit to 16-bit.
- Considerably improved the stability of rendering to video from within Builder.
- Removed the “Sampler” mode from the video export dialog.
- Increased the Render To Texture node’s maximum resolution of from 8k (8192) to 16k (16384).
- When saving a bin, no longer include resources that have been marked as offline in the Resource Browser.
- Increased the hit radius of the points in the Curve Mask node.
- Improved the Face Tracker node to detect open mouths better.
- Moved the number of entries a CSV file has into the extended description box in the Resource Browser. Adding it to the name broke Javascript resource reloading.
- Disabled mouse wheel support for changing manipulator type in the render window.
- Made sure that the PresetsDirectory path is written to the registry on startup and not just when creating a preset. Previously this caused issues moving presets from one machine to another.
- The node connection type (straight lines or right-angled lines) is now serialized to the project file.
- Updated the OSC settings dialog. “Sender Port” renamed to “Send Port” and “Port:” renamed to “Recv Port:”.
- Root nodes can no longer be grouped.
- Renamed the “Artnet/OSC” tab in Project->Settings to “Protocols” as it now includes TUIO options.
- Updated the Plain Effector node to grey out “Scale Y” and “Scale Z” parameters when the “Uniform Scale” parameter is selected.
- Renamed a Particle Root node’s “Fixed Update Framerate” parameter to “Fixed Update Rate” so

that you can wire it up by dragging a node's output onto the property view.
- Renamed the "Frame Rate" parameter in a Video Loader node to "Framerate" to match the envelope name.
- Renamed the "Velocity Scale" envelope to "Velocity Amount" to match parameter name in the Particle Field Affector node.
- Updated Expression Modifier node to remove newlines from expressions.
- Updated the Nodes: Colour Ramp node so the "Num Control Points" parameter slider is clamped from 1-16. We only support 16 colours at present but the slider used to go to 20.
- Updated the Nodes: Layer Precomp node so that toggling "Preview In Viewport" disables "Preview Alpha In Viewport" and vice versa.
- Updated the Generate Normal Map node to use the same texture format as its input texture.
- Updated the Vector Blur node so the "Steps", "Step Size", "Gradient Blur Iterations" and Epsilon parameters are now envelopes, so they can be animated.
- Updated the "Focus On Selected" button so it works with non-orbit scene cameras.
- Updated the Feedback node so that the Feedback parameters are now keyable.
- Updated the Volumetric Lighting node so it now renders out an alpha channel.
- Updated the Perception Neuron node to validate the IP address that is entered before attempting to connect.
- Changed default brightness of light nodes, including area lights from 2.0 to 1.0.
- Updated the Bins Browser window so that you can open and close folders.
- Updated light nodes so that the affected/excluded object inputs affect shadow casting too.
- Updated the Environment Map node so it now uses the layer's background colour when no inputs are connected.
- Updated texture resources in the Resource Browser so they report the correct type based on a number of encoded component formats.
- Updated the Material node to replace the Parallax Mapping checkbox with a Parallax Amount slider, which allows parallax mapping to be used independently of vertex displacement.
- Removed Transform properties from a Group node. Groups should just do grouping.
- Updated the Nodegraph to make sure you cannot link a node to itself as input.
- Updated Median Filter Post-FX node so that "Num Iterations" is now an envelope.
- Moved the "OSC Text String" node from Modifiers group to the "Nodes" group.
- Updated the Particle Geometry Connection Renderer to allow it to be transformed.
- Updated Video nodes to fix a floating point rounding issue when calculating the frame index.
- Changed the default heading of the Orbit camera to 45 degrees so it aligns with the grid.
- Changed the layout of parameters in a number of nodes, for example, Material.
- Updated the Fisheye Camera and VR 360 Camera nodes to allow a max cube resolution of 4096 instead of 2048.
- Updated the Combine Geometry node so it now works with the Procedural Meshing node.
- Updated the Procedural Particles As Primitives node so individual emitters can now be plugged in as well as particle roots.
- Updated the Procedural Melt node so it now supports coloured procedurals.
- Updated the Procedural Particles node so individual emitters can now be plugged in as well as

Particle Root nodes.
- Updated the Property Editor to not merge group exposed properties.
- Updated Cloners to allow Execute Child nodes and Select Child nodes to select the cloned geometry.
- Updated the Particle Image Emitter node to allow any video node to be used as a velocity buffer.
- Updated the Render to Texture node to allow it to use motion buffers.
- Updated to use Visual Studio 2015 Update 3 redistributables, as required by RealSense.
- Updated to use Visual Studio 2013 Update 5 redistributables.
- Updated to use the new D3D shader compiler, D3DCompiler_47.dll.
- Improved the performance of the run-time shader compiler process, which should help with building scenes with procedural nodes.

Bug fixes

- Fixed the Avi video loader to correctly calculate the FPS of an imported video.
- Fixed the “Active” parameter on the Frame Buffer node so that it now works.
- Fixed a bug in the Layer Precomp node, which meant the layer precomp was not rendering at the specified resolution in some edge cases.
- Updated the image sequence import dialog, which was incorrectly referring to CSV files.
- Fixed the C4D file importer to correctly detect an animated camera’s FOV value.
- Fixed a number of bugs in our DXT compression and HAPQ rendering that made the renders bias to blue and look bad in the darks.
- Fixed text-related bugs on the splash screen when GUI scaling was set to more than 100%.
- Fixed a bug in the Timeline window relating to dragging layers bars off the edge of the screen.
- Fixed the “Show Metrics” parameter on the Procedural Meshing node so the text is not huge and cropped off the edge of the screen.
- Fixed a number of possible crashes when traversing circular dependencies in the Nodegraph.
- Fixed the “Radius” and “Outer Radius” parameters on a Turbulence Affector node so they now work.
- Fixed the Particle Mesh Emitter node so that it works correctly when the Particle Root node is transformed.
- Fixed a bug in the Probe Lighting node with respect to seams in the octahedral mapping.
- Fixed bugs related to motion vectors for skinned FBX objects.
- Fixed rendering issues in the Nodegraph when replacing nodes via the context menu. For example, replacing a Comment node with a Particle Root node caused the Particle Root node to render using a tiny icon.
- Fixed a bug in the Field Shadows node which would cause rendering artifacts if the field was non-square.
- Fixed a bug which meant scene cameras in group nodes would not be selectable when pressing the 6,7,8,9 shortcut keys.
- Fixed a bug when saving presets to filenames containing a slash character.
- Fixed a bug when instancing bins that could cause parameters values to be incorrectly set.

- Fixed a bug where a parameter's min and max values could be interpreted as radians not degrees.
- Fixed a bug enabling and disabling nodes via the property view visibility tick box when remote network editing blocks.
- Removed an unnecessary right-click context menu option in Connection Monitor window.
- Fixed a bug in the Wavefront loader where separate meshes were not being combined by material, which resulted in hundreds of meshes for an object.
- Fixed issues with alpha and UV image inputs not being picked up in the Composite Image node.
- Fixed the Ctrl+D shortcut so that it no longer interferes with the current clipboard items.
- Fixed a bug in the anti-aliasing support so that TXAA and offline renders using FSAA can work together.
- Fixed issues with disabled buttons in the GUI not rendering correctly.
- Fixed a bug where imported TGA textures were upside down. We now read the TGA file header and flip accordingly.
- Fixed a number of bugs relating to loading resources from UNC and network paths.
- Fixed a crash in the Curve Editor when deleting curves or switching projects.
- Fixed a bug copying keys in the Curve Editor when they have the same time value.
- Fixed a crash bug when selecting files from the recent files list available from the File menu.
- Fixed the Particle Primitive Collision Affector node so it works with Particle Event nodes.
- Fixed a bug in the Screen-Space Reflections node. Reflections had black edges at the fade-out regions whenever an environment map was being used.
- Fixed an OptiTrack bug relating to skeletons being detected as invalid when they were not.
- Fixed the Transform Image node's "Rotation" parameter which was previously confusing degrees and radians.
- Fixed a node ordering bug in the node tree where nodes would appear out of order.
- Fixed the Ruler where time marks were slightly offset from keys and bars.
- Fixed a bug in the Property window relating to remembering scroll positions by node type.
- Fixed the Text node so that plugging a Kill Box Effector node into it now works.
- Fixed the Depth Camera / Kinect Mesh node to set the vertex alpha to 1.0 instead of 0.5.
- Fixed the rendering of object lines so they work with UV Camera nodes.
- Fixed a bug in the Spline node, which was not correctly handling transforms loaded from C4D files.
- Fixed a bug in the Composite Image node where the transformation manipulator movement was inverted.
- Fixed the grid artifacts which occurred in the Procedural Particles As Primitives Blobs mode.
- Fixed a bug in the video export path relating to HAP renders.
- Fixed the OSC transport command for setting the time. The value passed in did not represent seconds correctly.
- Fixed a bug in the Transform Array node which broke blob tracking inputs.
- Fixed a bug in the Shape 3D node where the Rounded Cylinder shape type had incorrect polygons on the top part meaning it was not always as flat as it should be.
- Fixed a bug in the export video dialog with regards to the AVI2 export option not being remembered.
- Fixed a bug in the Image 2D node where the image would be skewed if rotated.

- Fixed the Volumetric Lighting node so that it works with high resolution renders.
- Fixed tab ordering in a lot of dialogs throughout.
- Fixed an issue with picking that meant sometimes it would not turn off once you had picked a node.
- Fixed failure to output JPEG image sequences. This was due to the quality setting being above 100 which caused the JPEG compressor to fail.
- Fixed a bug in the Particle Trail Renderer node which meant the lines were transformed twice.
- Fixed the exposed DMX view so that multichannel properties now show the use of multiple slots.
- Fixed a number of bugs relating to the “Uniform Scale” parameter on Effector nodes.
- Fixed a crash when CSV files had the “Reflect Resource Changes” option enabled and the CSV file was updated.
- Fixed the Dot Matrix node so that it works with the alpha channel. Previously when applied to alpha it was outputting squares rather than circles.
- Fixed an issue in our Javascript support relating to global time not being correctly set.
- Fixed a crash when importing an FBX file with no UVs.
- Fixed a bug where the “Export Audio” tickbox on the export video dialog would be disabled when loading from a preset using a codec that does support audio.
- Fixed a rounding error in the Expression Parser node.
- Fixed a bug in the Procedural Primitive node which caused the Torus mode to have an incorrect in-editor bounding box.
- Fixed a bug in the Value As Tex: node. There was a limit (lower than standard float limit) on how large the converted value could be, and it was possible to cause a crash when changing the separator string property.
- Fixed a bug which meant gamma correction was not being accounted for correctly in the Nodes: Image2D node.
- Fixed a bug in the Face Tracker node, which meant the “Face Found” property would not be set correctly when the “Low Latency” parameter was ticked.
- Fixed Curve Mask and Freehand Mask nodes to display in the aspect ratio of the image currently being previewed in the viewport.
- Fixed a bug resetting the Root node properties so it no longer clears the Creators property.
- Fixed a bug in the Screen Space Reflections node where the maximum sample count was raised to 256, but Poisson samples buffer size was still 64. Both are now 256.
- Fixed a bug in the Volumetric Lighting node which meant a white square could appear in the top-left of the viewport.
- Fixed a bug loading Alembic files that are marked as offline in the Resource Browser.
- Fixed a bug when importing .hdr files which could cause Builder to hang.
- Fixed a bug in the Feedback Blur node which meant it would not apply the effect to any layer other than the root.
- Fixed the TXAA Post-FX node so that it works with render layers and Render to Texture nodes.
- Fixed some bugs in general file handling where paths above 260 characters long would cause issues.
- Fixed issues viewing manual pages for multiple selected nodes in the node tree.

- Fixed a crash when deselecting nodes using Ctrl in the Timeline window.
- Fixed a crash when resetting node properties for some nodes.
- Fixed a UV indexing issue related to Alembic files.
- Fixed animation playback of Alembic files with animated topologies.
- Fixed bugs loading Alembic files with per-vertex UVs.
- Fixed a bug where Alembic files may not have been loaded in auto recovered projects.
- Fixed a bug where the “Do not embed resource” option was not being honoured for Alembic files.
- Fixed issues with duplicating nodes in the Nodegraph creating extra nodes hidden behind each other.
- Fixed a bug where resetting node properties or transforms would not update layer precomps.
- Fixed a bug in the Nodegraph where a Layer Precomp node did not correctly render the name of the layer it was referring to.
- Fixed the Radial Blur node’s “Active” parameter so that it works when connected as a child of a video node.
- Fixed a bug when tessellating the Shape 3D node’s rounded cylinder shape type.
- Fixed the word and letter spacing in the Text node so you can scale the point size and the relative spacing does not change.
- Fixed the Volumetric Lighting node so that it works with the Multi Camera node.
- Fixed undo support so that layer precomps that need updating will be updated.
- Fixed a bug in the Procedural Generator Image node’s Heightmap mode which meant changes to the wrapping modes did not have any effect until the node was re-enabled.
- Fixed bugs with slice orientations when moving into the field, or when using Multi Camera nodes alongside the Field Renderer node.
- Fixed a bug in the Procedural Particles node where the particles effect would completely fail if the bounding box became too large.
- Fixed the Triggerable Envelope Modifier node to make it reset properly.
- Fixed the Material node’s “Smoothing Angle” parameter so it now works.

NotchLC

Introduction

NotchLC was created to be a GPU powered codec that provided the quality needed to be an intermediary codec as well as the performance required to be a playback codec.

It brings the equivalent of 10bit accuracy in a scrubbable codec (with 12bit of Luma data) that is extremely fast to encode and decode, with a compression ratio of 8:1 to 4:1.

Software support

NotchLC is currently supported in:

- Notch Builder 0.9.22 and later
- Adobe CC 2018 / 2019 (After Effects, Premiere, Media Encoder) via our Adobe CC Plugin [Windows]
- Legacy Quicktime 7 [Windows] via our AVI & Legacy Quicktime Plugin
- disguise r16.0

Quality Levels & Bit Rates

Rather than specify target bitrates and end up with undetermined quality outcomes, NotchLC takes the reverse approach. When encoding you set a quality level, which is essentially an allowable ‘error level’ in encode. The encoder then searches for best fit compression in each block that meets this quality threshold. These defined coefficients of error give confidence in the quality of the resulting encoded video.
Typically our users are seeing compression ratios between 4:1 and 8:1 when compared to raw video. And as a general rule of thumb Notch (at Optimal Level) tends to be 30% larger than HAPQ (for a significant quality uplift).

NotchLC provides five quality levels:

- Good
- Very Good
- Excellent
- *Optimal*
- Best

Optimal is your go-to quality level and fit for most day-to-day purposes. It is the sweet spot of file size and quality. If you utilise *Best* you may see significantly larger file sizes for only marginal gains in quality.

Luma, Chroma, Bit Depths & Compression

The LC in NotchLC stands for Luma & Chroma. NotchLC breaks colour data down into luma and chroma (YUV). 12bits of depth are assigned to luma data, as in many scenarios this is where bit depth is most perceivable. 8bits are assigned to each of the U & V channels. Total (28 bits per pixel). Alpha data is stored at 8bit depth.

NotchLC Plugin for Adobe CC

Introduction

The Adobe CC plugin provides NotchLC import and export capabilities to Adobe After Effects, Premiere and Media Encoder for the `.mov` container format. Encoding and decoding is GPU accelerated where a DirectX11 compatible GPU is present. If no GPU is present, the plugin will fall back to a slower CPU decoding / encoding method.

The NotchLC Plugin for Adobe CC is **provided free of charge** and does NOT require a Notch Builder or Playback license.

Plugin Features

A comparison of the import / export features are listed below.

Feature	After Effects	Premiere	Media Encoder
Import			
Alpha Channel	Yes	Yes	Yes
Audio	–	–	–
High Bit Depth	Yes	Yes	Yes
Speed	OK	OK	Fast
Export			
Alpha Channel	Yes	Yes	Yes
Audio	Yes	Yes	Yes
High Bit Depth	Yes	Yes	Yes
Speed	Good	Good	Fast

Requirements

Adobe Version	CC 2018 & 2019
OS	Windows 10
GPU	DirectX 11 Compatible

Download & Installation

You can download the plugin from the Notch website

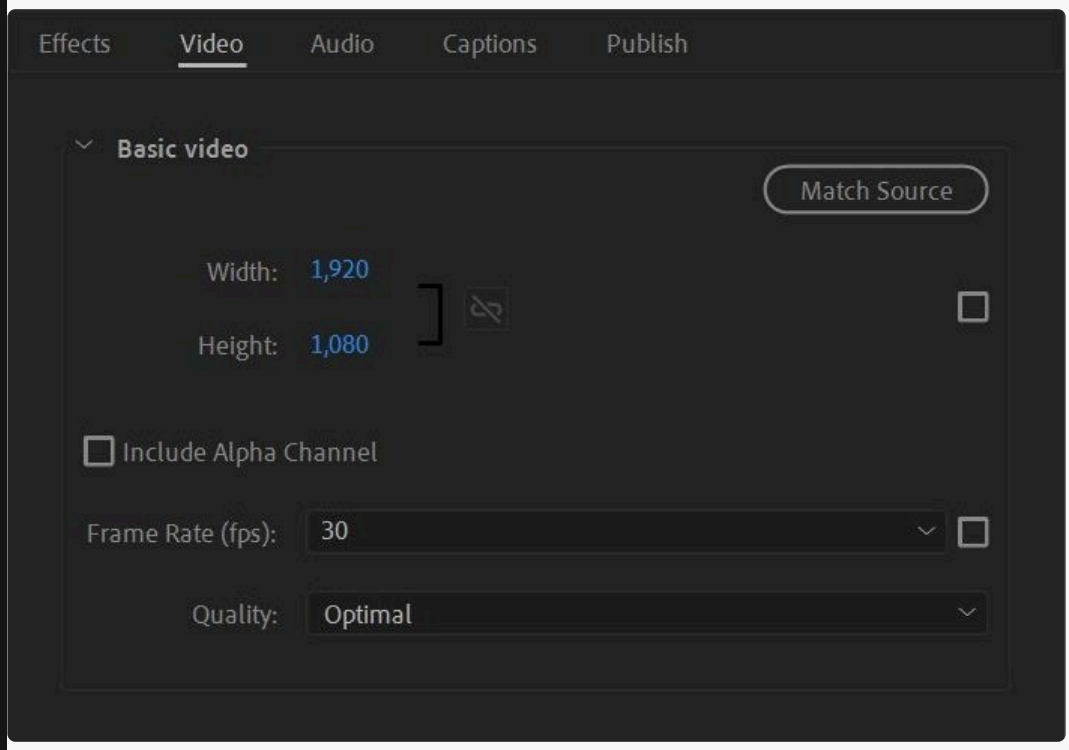
The applicable Adobe products must be installed before installing the plugin.

Adobe Media Encoder & Premiere usage

After installation of the plugin, NotchLC decoding will be supported automatically and you will be provided NotchLC as an encoding codec option. When encoding you will be presented with the following options.

✻ *NotchLC* is a top level codec, it is not under the *Quicktime* codec option.

✻ If the codec is displayed as *NotchLC (CPU)*, then the plugin was unable to find a supported DirectX 11 GPU and has fallen back to the slower CPU encoder/decoder.



The two NotchLC specific options are:

- *Quality* : [Good | Very Good | Excellent | Optimal | Best] See the NotchLC Overview for details on quality settings.

- *Include Alpha Channel* : If your source has an alpha channel, this will be encoded as part of the video.

Adobe After Effects usage

Import

The plugin will automatically provide NotchLC import support in AE. To get the benefit of NotchLCs higher bit depths, you will need to ensure that your AE project is set to 16bit or 32bit depth mode. (*Project Settings->Color->Depth->16bit per channel*)

> NotchLC does not carry colour profile information at the stage. In the vast majority of cases (including export from Notch Builder) the colour profile of your NotchLC will be sRGB. If you set a colour *Working Space* in your AE project settings, AE will incorrectly assume that all NotchLC imports are Rec. 709. You may have to force AE to interpret the imports as sRGB (*Right click clip->Interpret Footage->Main->Color Management*)

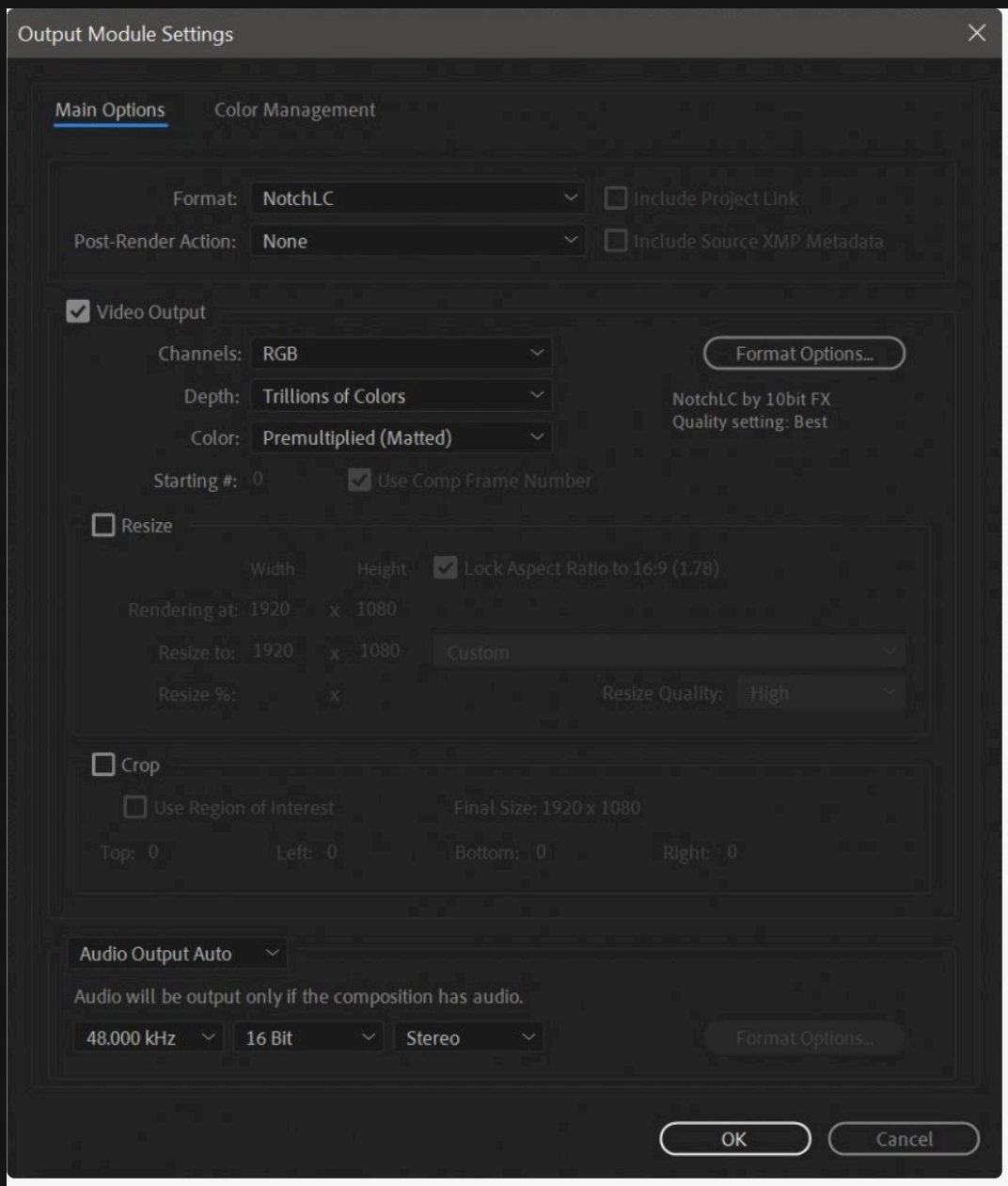
Export

> If you are doing straight transcodes of video content, use Media Encoder, it is hugely faster.

Adobe After Effects has two export pathways, both of which are supported by the plugin, but have different UI interfaces:

- Export through Media Encoder (covered in the previous section)
- Native Export

The Native Exporter's dialog looks as follows:



Key items:

- Set the *Format* to *NotchLC*
- *Video -> Depth* : Should always be set to ***Trillions of Colours***
- Set Quality by clicking the *Format Options* button

NotchLC is a top level codec, it is not under the *Quicktime* codec option.

NotchLC for AVI & Legacy Quicktime

Introduction

This plugin provides support for:

- Windows AVI containers
- Legacy Quicktime 7 for Windows.

The NotchLC Plugin for AVI & Legacy Quicktime is **provided free of charge** and does NOT require a Notch Builder or Playback license.

Download & Installation

You can download the plugin from the Notch website

The Legacy Quicktime must be installed before installing the plugin.

Plugin Features

A comparison of the import / export features are listed below.

Feature	AVI	Legacy Quicktime
Import		
Alpha Channel	Yes	Yes
Audio	Yes	Yes
High Bit Depth	Yes	Yes
Speed	OK	OK
Export		
Alpha Channel	Yes	Yes
Audio	Yes	Yes
High Bit Depth	Yes	Yes
Speed	OK	OK

Requirements

OS	Windows 8.1/10
GPU	DirectX 11 Compatible

Legacy Quicktime usage

> ! Legacy Quicktime is a 32bit application, therefore it is limited in the resolutions that it is capable of decoding/encoding.

> ! Legacy Quicktime does a small gamma shift when encoding, this has nothing to do with the NotchLC plugin.

> ! Legacy Quicktime only supports synchronous single-threaded encoding, which isn't particularly fast.

Encoding and decoding is GPU accelerated where a DirectX11 compatible GPU is present. If no GPU is present, the plugin will fall back to a slower CPU decoding / encoding method.

AVI usage

The AVI plugin uses DirectShow Filter to provide NotchLC support. Programs that utilise WIndows AVI framework will be able to utilise the NotchLC codec.