Nuke 11 Channels and Layers

Introduction

2D image processing in Nuke revolves around the concept of layers and channels.

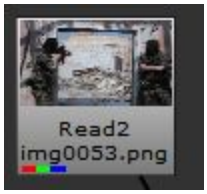
Channels store floating-point numbers that represent the data that Nuke is processing. This is typically normal color information (e.g. RGBA channels), but can also be data such as depth or velocity at a certain point in the image.

Layers are used to organize channels into logical groups. For example…
- color data (RGBA) would go into a layer of its own.
- specular/diffuse reflection data would go into a layer of its own.
- subsurface scattering would go into a layer of its own.
- depth data would go into a layer of its own.
- etc..

There is no limit to how many channels a layer can hold, but Nuke's nodes seem to limit you to handling 4 channels per layer.

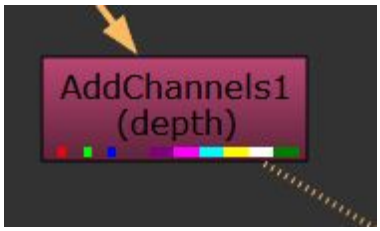
Node Badges

Nodes in Nuke will display a badges at the bottom to tell the user which channels that node is outputting out. For example...



In the example above, there's a red, green, and blue badge on the lower-left. This indicates that the node is outputting a red, green, and blue channel. If it were outputting an alpha channel, it would also contain a white badge. For example…

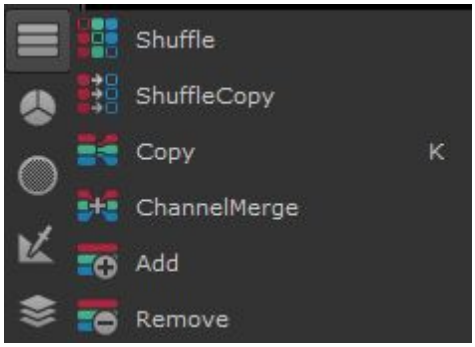
If it were outputting non-color channels (e.g. depth), the node would also have a bunch of other badges following the RGBA badges. For example...



> **NOTE**: I have no idea what all badges past RGBA mean or why some of them are only half-filled. The lesson said that dark green is the inclusion of non-color data channels but I don't think this is true? The node in the above example adds depth, motion, disparity, and a custom layer called fancylayer with 8 channels.

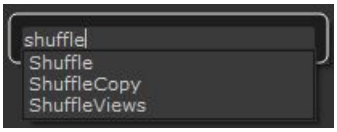
Channel Manipulation Nodes

Nuke provides a set of nodes for manipulating channels/layers in your comp…

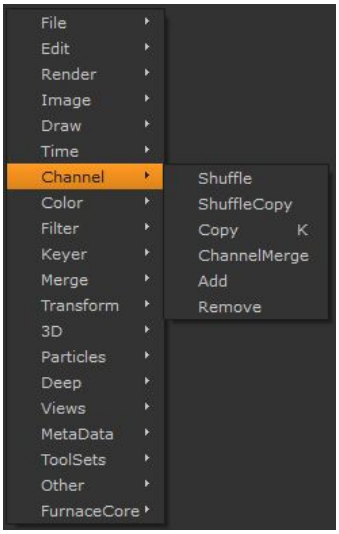


To add any of above nodes, you can use any of 3 basic methods described in the main Nuke document…

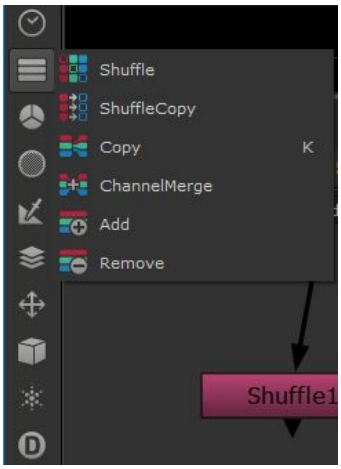
- Tab menu → hit tab in the graph and type in the name of the node…



- Context menu → right-click in the graph and goto Channels…



- Toolbar → click the stack…

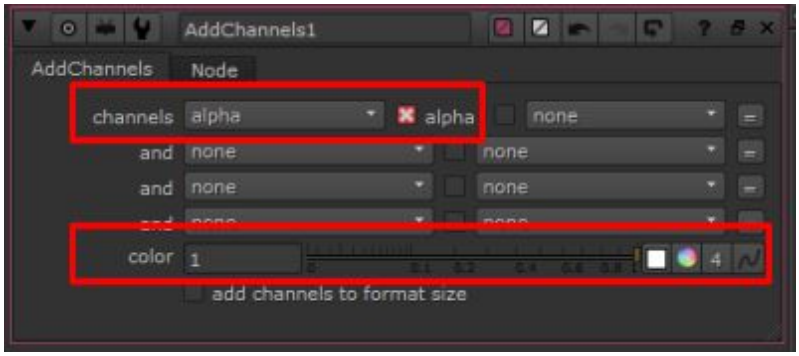


If you already have a node selected when you add a node, it'll get added to the output of the selected node. If the selected node already has an output, it'll get added between the nodes.

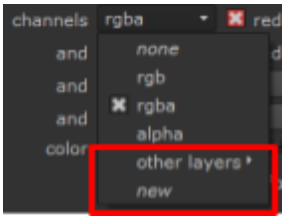
Add Channel

Add Channel node adds layers/channels.

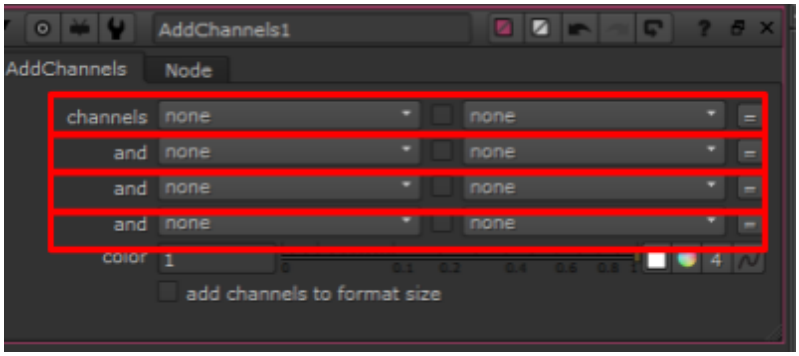
To add a new channel, goto the properties panel and select the channel from the drop-down + adjust the color slider to whatever you want the initial value to be. The new channel will get filled with that value…



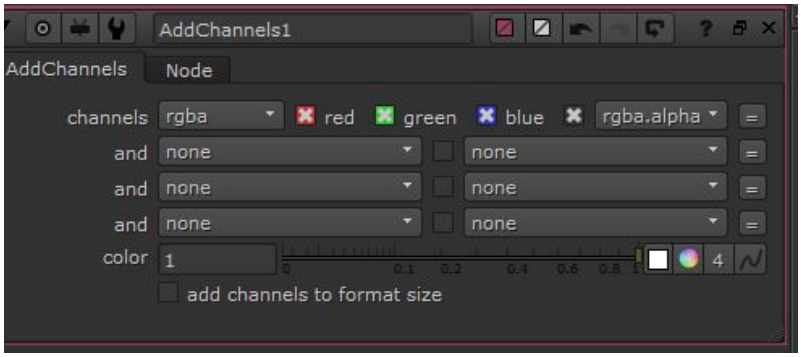
NOTE: If what you want to add isn't listed, there's a add option in the dropdown that'll let you define it. Or, you can go under the other layers submenu and choose from there. The lesson said that if it's under other layers, the layer isn't present (if it existed it would have been listed in the main dropdown?)...



You can add multiple layers/channels, but the design of the properties panel is slightly confusing. Each channel to add is a row…

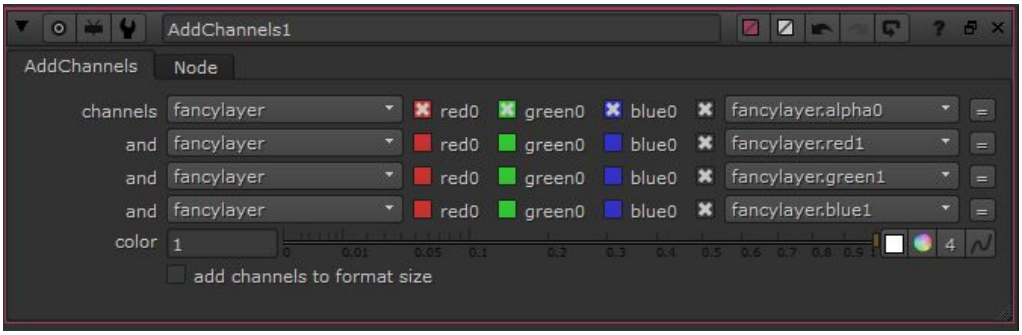


The first dropdown is where you select actually select the layer you want to add. When you select the layer, the first 3 channels of that layer show up as 3 checkboxes, and the 4th checkbox is to enable the 2nd drop-down where you can select a 4th channel from the layer. For example…



In the above example, we're adding in all channels in the rgba layer (red, green, blue alpha). If we deselect red, it won't add in the red channel. If we deselect the last checkbox (before the dropdown) it won't add in the alpha channel.

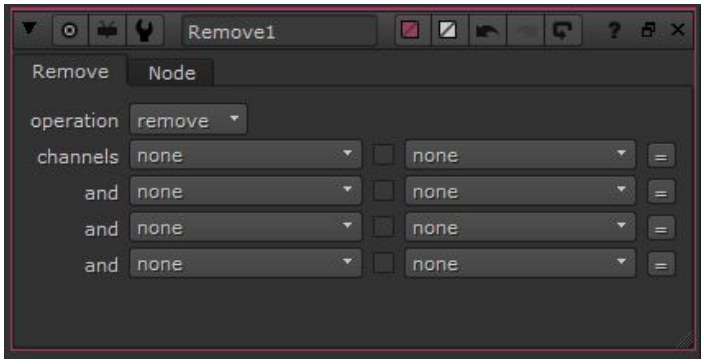
> **NOTE**: If we had a layer that had > 4 layers, we can select the 4th channel to add for the layer from this dropdown (I think). What happens if we want to add all the channels for the layer? My guess is that we would have to add the layer multiple times…



Remove Channel

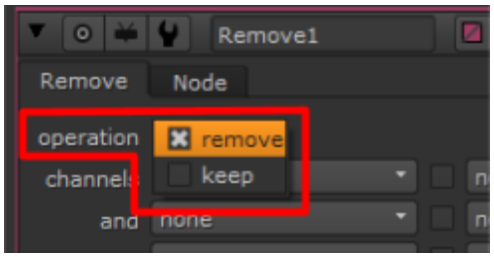
Remove Channel node removes layers/channels.

This node's properties are very similar to the Add Channel node's properties, except that you're removing channels/layers instead of adding them…



NOTE: To see how the layer/channel selection works, read the Add Channel section.

The one exception is the operation dropdown located at the top…

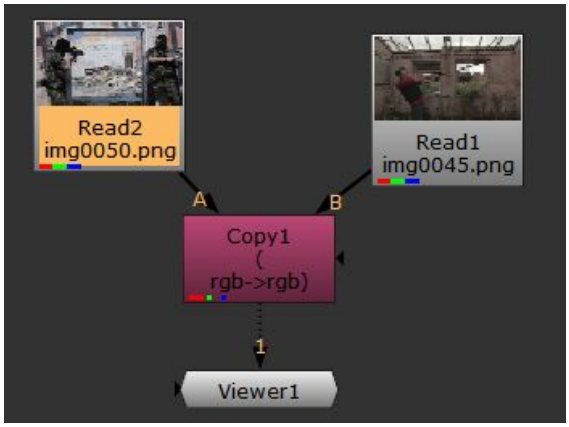


Choosing …

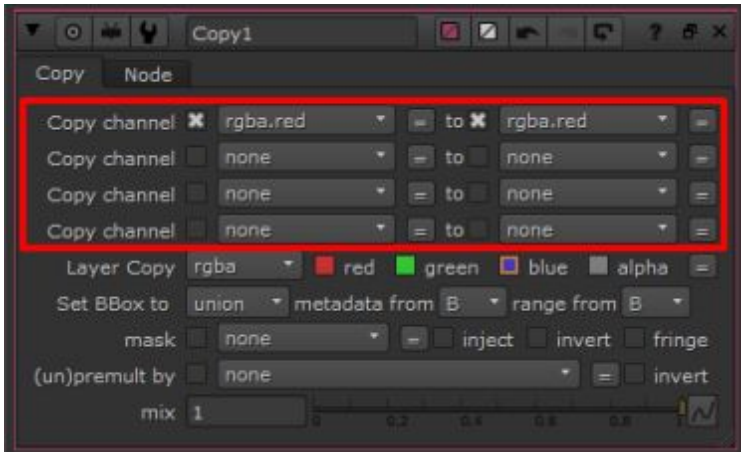
- remove → will delete the channels you've selected.
- keep → will delete all channels EXCEPT FOR the ones you've selected.

Copy

Copy node lets you copy layers/channels from one input to another.

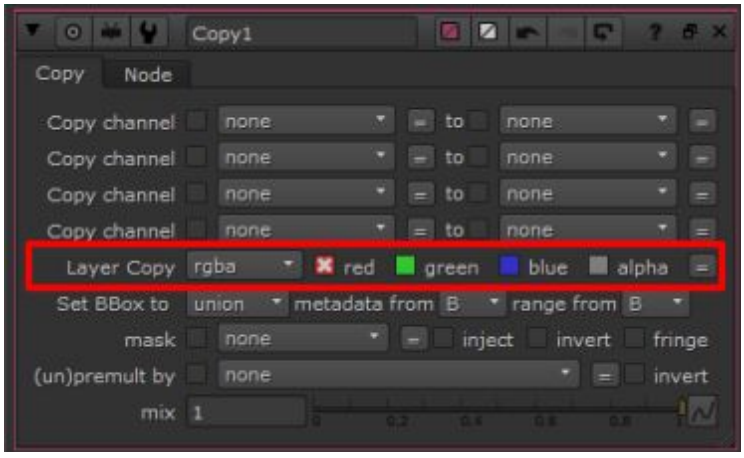


To copy a channel, goto the properties panel and select the channel to copy from in A to the channel to copy to in B. You can do this for up to 4 channels….



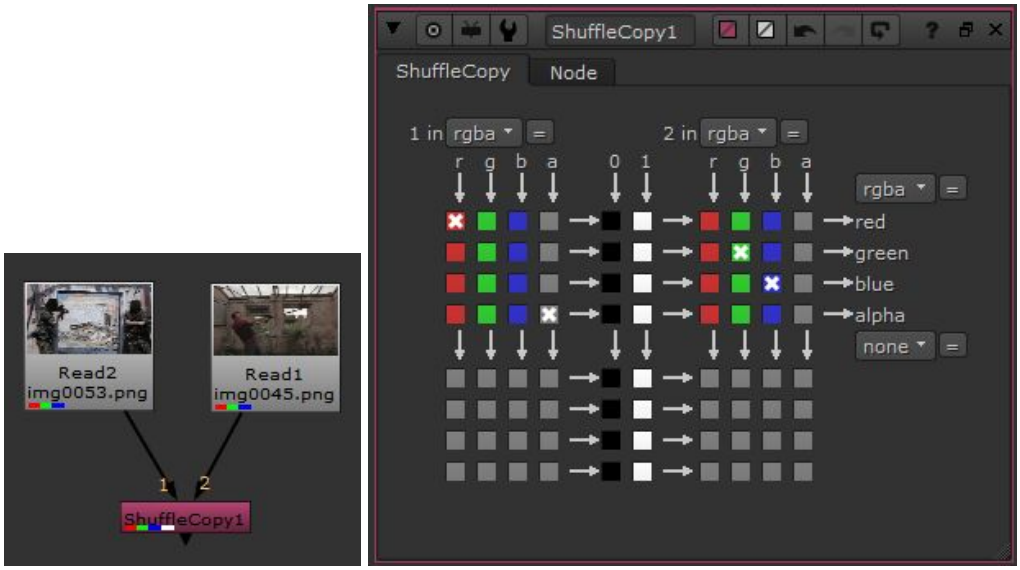
NOTE: Note that you can choose the destination channel as well. That means you can map a channel from a A to a different channel from B (e.g. A.rgba.red to B.rgba.blue).

Or, if you want, you can select the layer to copy and use the checkboxes provided to select which layers to copy…

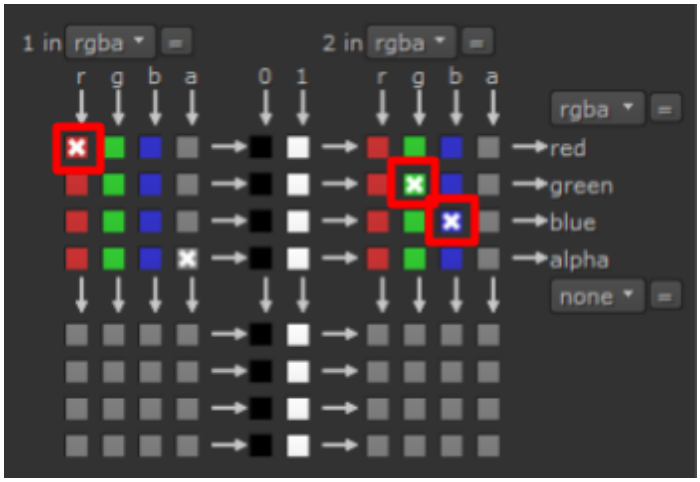


Shuffle Copy

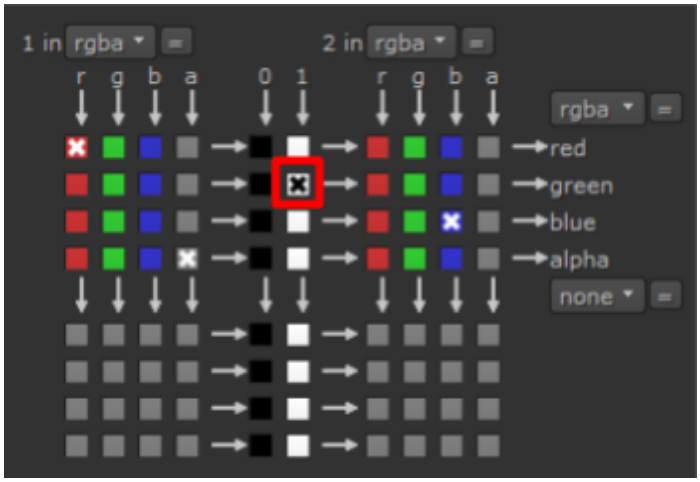
Shuffle Copy is like a mix of the Add node and Copy node, but with a convoluted properties interface that doesn't really make sense.



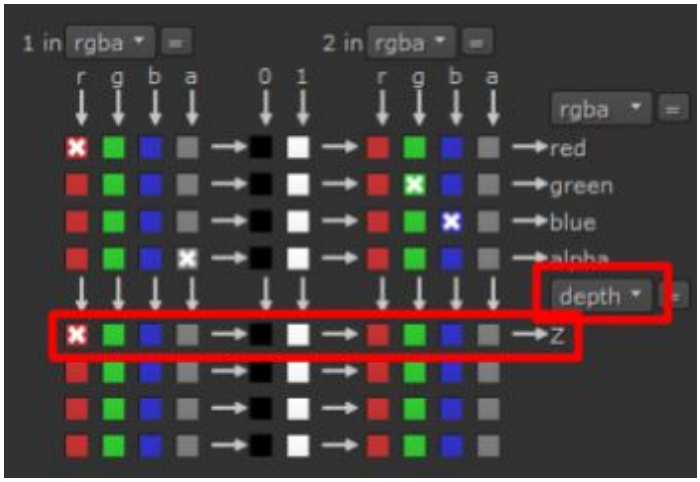
The columns represent inputs and the rows represent outputs. So for example, if I wanted my final image to have the R channel from input 1 and a B and G channel from input 2, it would look like this…



You can also force an output to be set to all 0s or 1s by selecting the appropriate constant 0 or 1. In the example below, we're forcing the G channel to 0…



You can choose 2 layers to output to. For example, if you wanted output the R channel from input 1 to the depth channel…

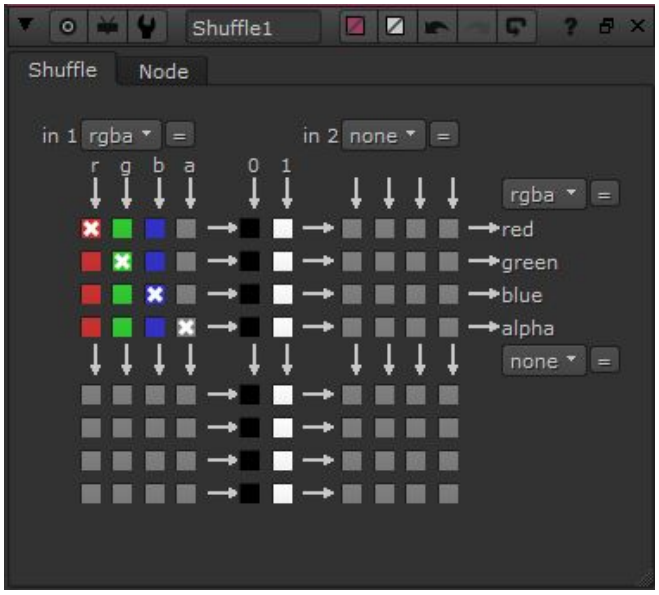


> **NOTE**: It looks like this entire interface breaks done if you select a input or output layer with > 4 inputs. A lot of the functionality here is a duplicate of Add node and Copy node -- maybe use those instead of this.

Shuffle

Shuffle is like the Shuffle Copy node, except that it only takes in 1 input.

What makes Shuffle even more confusing than Shuffle Copy is that the properties are exactly the same as Shuffle Copy. That is, it makes it seem like there are 2 inputs when there's only actually 1...



My understanding is that this works like the Shuffle Copy node, but both of the input layers come from the single input (even though the second input layer dropdown is labeled as "in 2").

See the Shuffle Copy node for more information on how to use the properties panel.

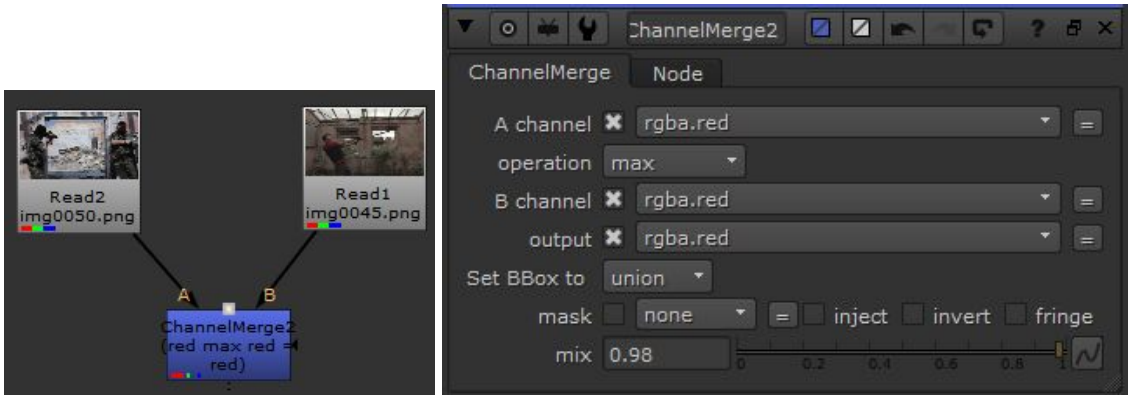
> **NOTE**: It looks like this entire interface breaks done if you select a input or output layer with > 4 inputs. A lot of the functionality here is a duplicate of Add node and Copy node -- maybe use those instead of this.

Channel Merge

Channel Merge is like a Merge node except that it…

1. only operates on channels.

2. provides a simpler set of operations.



The most important parts of the properties panel..

- A channel → channel to use from the A input.
- B channel → channel to use from the B input.
- operation → math operation to perform.
- output → channel to output the result to.

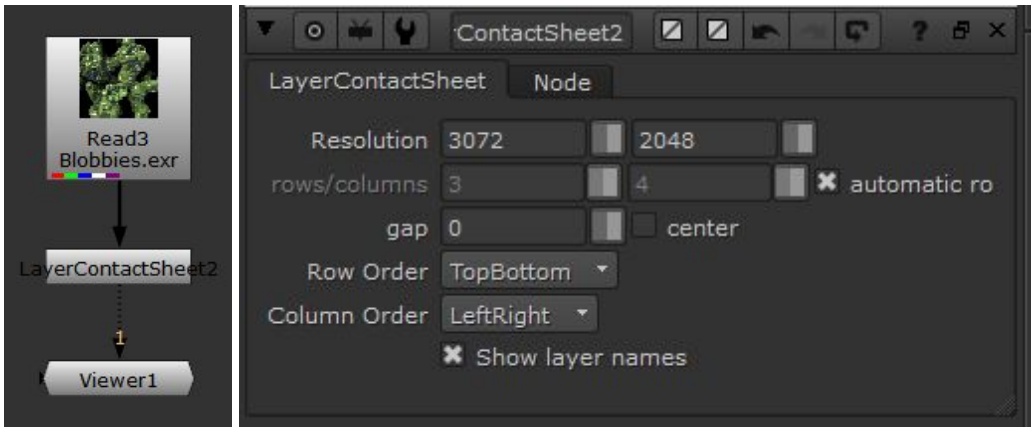
Below is a copy of the Foundry docs that talk about what each operation boils down to (math-wise). What they do conceptually do can be found here: https://help.thefoundry.co.uk/nuke/8.0/content/user_guide/merging/merge_operations.html.

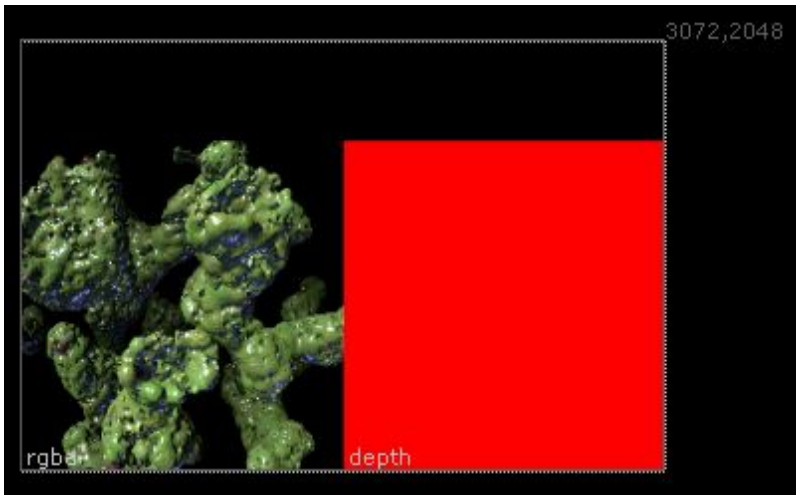
- **absminus** abs(A-B) - how much the pixels differ.
- **b if not a** A?A:B - shows A wherever A exists; otherwise shows B.
- divide A/B, 0 if A<0 and B<0 - divides the values but stops two negative values from becoming a positive number.
- **from** (B-A) - subtracts A from B.
- **in** Ab - only shows the areas of image A that overlap with the alpha of B.
- **max** (max(A,B)) - selects the lighter of the two colors as the resulting color. Only areas darker than B are replaced, while areas lighter than B do not change.
- **min** (min(A,B)) - selects the darker of the two colors as the resulting color. Any parts that are lighter than B are substituted. Any parts of the image that are darker than B don't change.
- **minus** (A-B) - subtracts B from A.
- **multiply** (AB, A if A<0 and B<0) - multiplies A by B. The result is always darker. Blending with black gives black and with white returns the color unchanged.
- **out** A(1-b) - only shows the areas of image A that do not overlap with the alpha of B.
- **plus** A+B - the sum of the two colors. Increases brightness to lighten A and reflect B.
- **stencil** B(1-a) - this is the reverse of the out operation. Only shows the areas of image B that do not overlap with the alpha of A.
- **union** A+B-AB - shows both image A and B.
- **xor** A+B-2AB - shows both image A and B where the images do not overlap.

Channel Helper Nodes

Layer Contact Sheet

Layer Contact Sheet is like a normal Contact Sheet node, except that it displays thumbnails of all the layers in the image.





> **NOTE**: The property show layer names is checked on. This shows the name of the layer on the thumbnails being output.

The example has 2 layers: rgba and depth. The rgba layer which contains the image pixels and the depth buffer contains the z-buffer. The z-buffer for this image is set to all 1s. The layer contact sheet doesn't know how to display that, so it just translates depth.z to as the color red.

For non-color channels, they automatically get translated to RGBA when being displayed by layer contact sheet… The

- 1st channel of the layer gets output as red.
- 2nd channel of the layer get output as green.
- 3rd channel of the layer gets output to blue.
- 4th channel of the layer gets output to alpha.

  NOTE: What happens if layer has more than 4 channels? I don't know.