Lesson 13

Creating Effects in Fusion

Visual effects make the fantastic and impossible look completely realistic. Whether you're in a theater watching the latest studio blockbuster, viewing a show on your iPhone, or at home on a big-screen television, visual effects are everywhere. With DaVinci Resolve, you have the power to create your own visual effects, so you can transport an audience into completely believable immersive worlds!

Producing visual effects is an exciting craft that takes time and practice to master. But once you do, you'll be able to bring virtually any story to life, no matter how imaginative! The Fusion page in DaVinci Resolve features all the tools you need to create visual effects and animated motion graphics using nodes instead of layers. You do so by linking tools together as you would combine building blocks, and then connecting them into an image-processing flowchart.

Time

This lesson takes approximately 80 minutes to complete.

Goals

In this lesson, you'll take a very simple video clip and realistically integrate it into a sci-fi scene. The exercises in this lesson will teach you how to composite shots using Fusion 's powerful nodes and keyframe animation tools. You'll acquire basic skills needed so you can continue to explore the Fusion page on your own, try out additional tools, and create your own effects.

Exploring the Fusion Interface

In most editing systems, you put together your rough cut and then refine your edited versions in the edit page timeline. If you need compositing or motion graphics work, you export frames, open up different software, import the frames, and then render out the results for importing back into the edit timeline. In this first exercise, we'll open a project that will allow us to take a quick tour of how DaVinci Resolve and the Fusion page simplify that entire process. Let's start by importing a new project and quickly get into the Fusion page.

1 Open DaVinci Resolve, right-click in the Project Manager, and choose Import.

2 Navigate to the R17 Beginners Guide lessons folder, and in the Lesson 13 folder, open the Hyperlight.drp file.

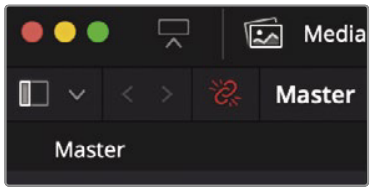
Like the Age of Airplanes, the media for this project is offline and you'll need to relink it.

3 Double-click the Hyperlight project in the Project Manager to open it.

4 Select the edit page, if necessary.

5 From the main menu bar, choose Workspace > Reset UI Layout.

6 Above the media pool, red relink button.



7 In the dialog that opens, click the locate button, navigate to the R17 Beginners Guide lessons folder, and then click Open to relink all the media.

The timeline in this project includes a shot that requires some visual effects work.

8 In the timeline, move the playhead to the start and play the two clips.

This is a scene from the sci-fi movie *Hyperlight*. The woman is supposed to be drifting through space in a capsule. It is your job as the visual effects artists to make her close-up a believable shot from this scene.

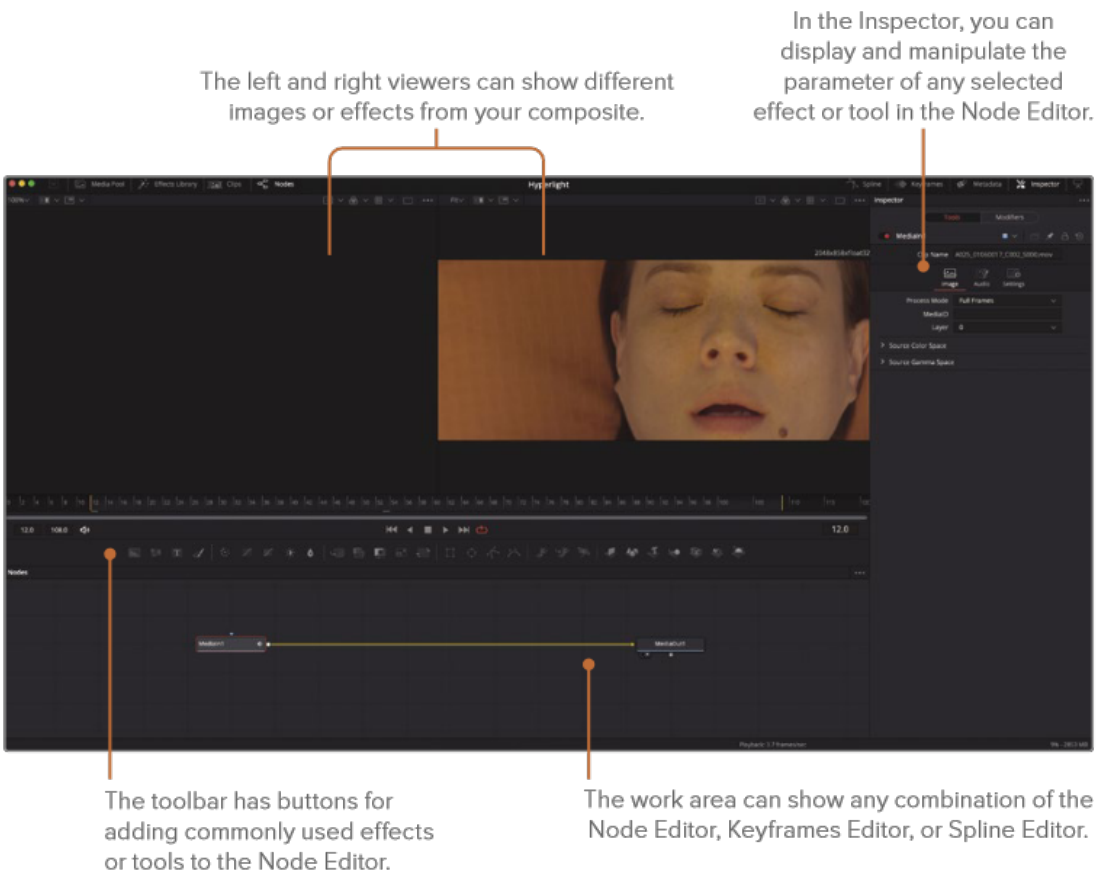
9 Position the playhead over the close-up for the actress.

10 Click the Fusion page button or press Shift-5.

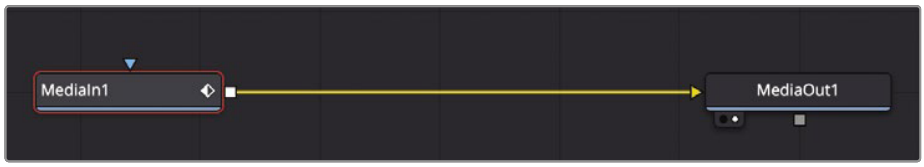
That's all it takes to bring a single shot into the Fusion page where you can apply effects.

But before you start creating those visual effects, let's get familiar with the Fusion page.

The page is organized into four main sections. The two viewers across the top display the images you are working on. Below the viewers, a toolbar includes the most used effects or tools. The lower work area, called the Node Editor, is the heart of the Fusion page where you construct your effects. Finally, the Inspector is to the right.



By default, the work area displays the Node Editor. Fusion does not use a timeline for compositing or applying effects, as does the edit page. Instead, it uses a node tree in which each image or effect is a node, as represented by a rectangular icon in the Node Editor.

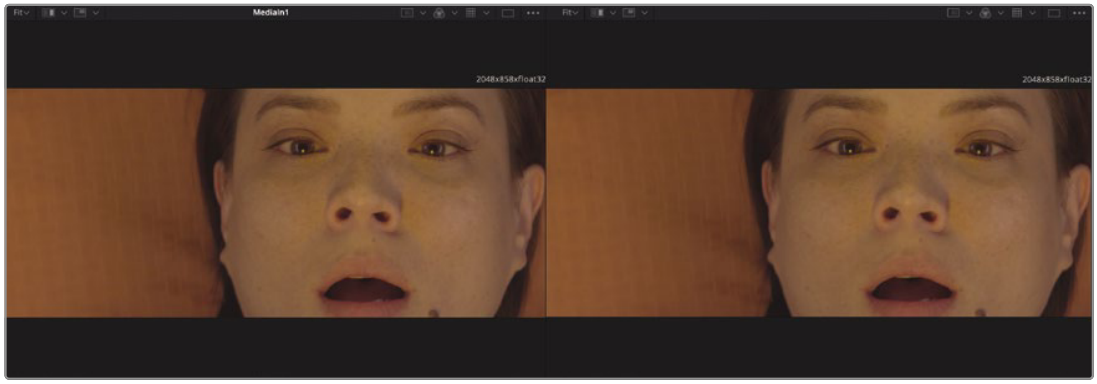


Nodes are connected in a flowchart-like style, which makes it easy for you to see the entire structure of a composite and quickly make changes. Working with nodes in Fusion is much faster than hunting through nested stacks of precomposed layers and filters, as you might have to do with a layer-based interface. The node tree flows from one node to the next: one node applies an effect to an image and then passes it to another node for additional processing or output.

11 With the mouse pointer located over an empty gray space in the Node Editor, hold down the middle mouse button and drag to pan the node tree into the center of the panel.

Every clip or image file that you bring into the Fusion page is represented by a Media In node in the Node Editor. The current Media In node represents the clip from the edit page. The Media Out node represents the image that is sent back to the timeline on the edit page.

12 In the Node Editor, select the Media In 1 node and press the 1 key to display the image in viewer 1 to the left.



TIP The terms node and tool are used interchangeably to refer to an image-processing operation.

You can rename nodes to describe their function or image.

13 Select the Media In 1 node. Press the F2 key and rename the Media In 1 node **ACTRESS**.

The node editor has no representation of time. It shows how image data is processed. Under the viewers, a time ruler shows the duration of the current effect. Dragging the red playhead in the time ruler moves to different frames just as when dragging the jog bar under the source or timeline viewer in the edit page.

> **TIP** By default, the time ruler and all time fields on the Fusion page display frame numbers. To display timecode, choose Fusion > Fusion Settings, and in the Defaults panel, configure the Fusion page to do so.

The time ruler shows the entire source clip length, and the yellow lines indicate the render range, which is that portion of that clip actually used in the timeline for final rendering.

14 Drag the playhead slowly through the render range from the first yellow line on the left to the second yellow line on the right.

As you drag the playhead through the render range, the current time display (to the right of the time ruler) displays the current frame number. To the left of the time ruler, you can see the render range start and end frame.

As the playhead moves, a green line appears along the time ruler to indicate frames that are cached into RAM for smoother playback. The more RAM you have in your system, the longer the cached region for RAM playback can be.

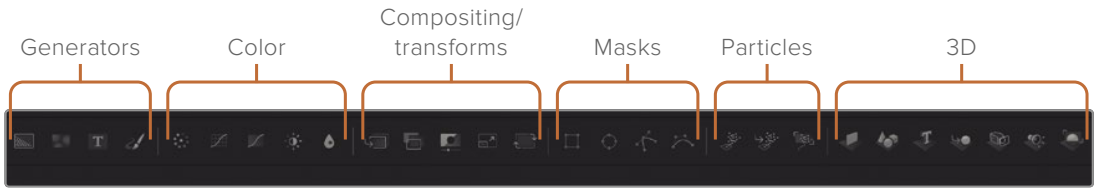
> **TIP** You can assign more or less RAM for Fusion RAM playback in the Preferences panel. The amount of RAM assigned to Fusion RAM playback is taken from the total amount assigned to the DaVinci Resolve application.

Adding the First Effect

To understand the basic principles of working with nodes instead of layers, let's add a simple effect to this clip. The most common tools or effects that you will want to use are in the toolbar.

1 Hover your mouse pointer over the first tool in the toolbar to display a tooltip with the name of the tool.

A thin divider separates each of the six toolbar categories. From left to right, the categories are generators, color, compositing/transforms, masks, particles, and 3D.

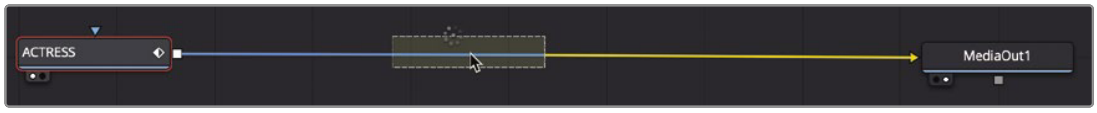


You build effects by connecting tools between the Media In and Media Out nodes.

In this example, you'll add a Color Corrector tool from the color category.

2 Move your mouse over the first tool after the first divider in the toolbar.

3 Drag the Color Corrector tool over the connection line between the ACTRESS node and the Media Out node.



4 When half of the line turns blue, release the mouse button to insert the Color Corrector tool as a new node.

5 In the Node Editor, select the Color Corrector.

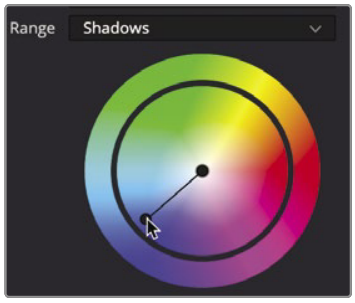
The Color Corrector results will appear in viewer 2 since that is displaying the Media Out node, while the original clip remains visible in viewer 1.

When a node is selected in the Node Editor, the parameters for adjusting that node appear in the Inspector.

To give this shot a colder, sci-fi feel, we'll add more green and blue colors.

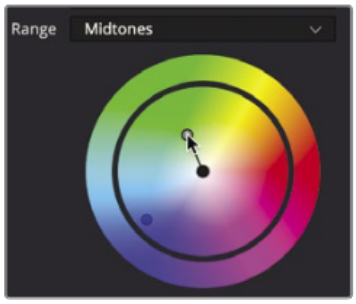
The Color Corrector can limit color adjustments to just the shadow area, midtones area, or highlights area using the Range menu at the top of the Inspector.

6 From the Range menu, choose Shadows and drag the color indicator to a saturated blue.

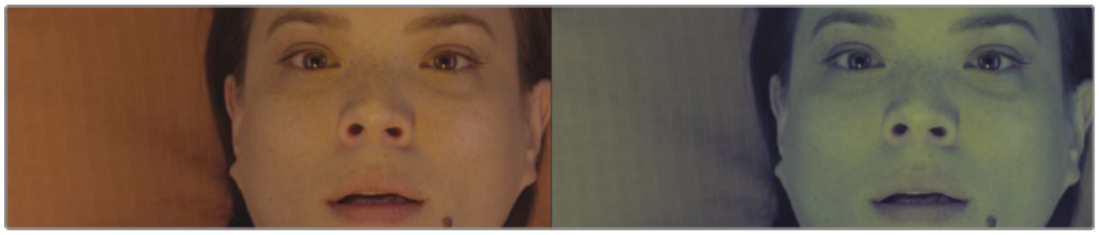


This adds a significantly bluer tint to the darkest areas of the clip.

7 From the Range menu, choose Midtones and drag the color indicator slightly toward green.



8 From the Range menu, choose Highlights and make a very slight adjustment toward yellow.



While the results are shown in viewer 2, viewer 1 still displays the original, unaltered ACTRESS image. By using the two viewers to see different aspects of your effect, you can more precisely compare and modify your adjustments.

Any effect you create in the Fusion page is also instantly visible in the timeline in the edit page.

9 At the bottom of the window, click the edit page button, or press Shift-4.

The edit page smart cache renders any Fusion effect in the background as you continue to edit.

> **TIP** If you use DaVinci Resolve's user cache instead of smart cache, you can right-click over any Fusion clip in the edit page or color page timeline and choose Cache Fusion Output > On to manually cache the Fusion effect.

That's just the start of creating this effect; now let's return to the Fusion page.

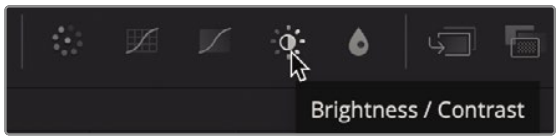
10 At the bottom of the window, click the Fusion page button, or press Shift-5. It's easy to see how the node tree functions like a flowchart with just a single image.

The image comes in at the left, the effect is applied, and at the right, the modified image is sent back to the edit page. However, most visual effects use more than a single image, so next we'll learn how to bring in additional images that don't exist in the edit page timeline.

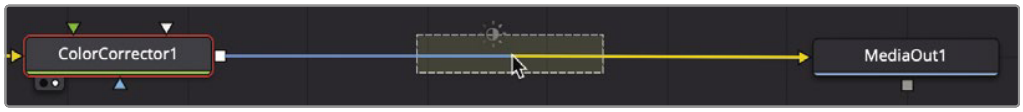
Masking Effects

Nodes have an input and an output for connecting other nodes. These connections are color coded with a yellow triangle to represent the primary input and a white square to represent an output. Nodes also have an effect mask input for connecting masks, as represented by a blue triangle. You can use the mask input to limit the area of the image affected by an effect. Let's create a subtle vignette that will darken the area around the actress's face.

1 In the toolbar before the second divider, drag the Brightness/Contrast tool over the connection line between the Color Corrector and the Media Out node.



2 When the line turns blue, release the node to insert it.



We'll change the gamma in this Brightness/Contrast node to darken the actress.

3 With the Brightness/Contrast node selected, in the Inspector, drag the gamma down to around 0.5.

You've darkened the entire image considerably. By adding a matte tool, you can limit where that darkness is applied.

4 In the toolbar after the third divider, drag the ellipse tool to an empty area of the Node Editor just below the Brightness/Contrast node.

To connect nodes, you can drag from the output of one node to the input on another.

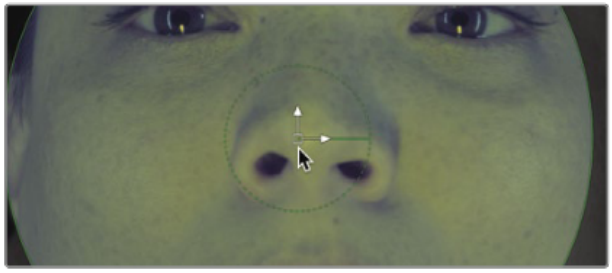
5 Drag from the square output on the Ellipse node to the blue effect mask input on the Brightness/Contrast node.

In viewer 2, the gamma adjustment is now masked inside the ellipse shape. You'll have to invert the ellipse matte so the darkness falls outside the shape.

6 In the Inspector, select the Invert checkbox to reverse the ellipse matte.

A few more adjustments will make the darkened vignette look even nicer.

7 In the viewer, use the center transform overlay to position the ellipse over the woman's face.



8 Drag the right edge of the ellipse to expand its width and cover more of the frame.

9 In the Inspector, refine the ellipse matte by increasing the soft edge slider to create a more gradual transition from the center to the darkened edges.

10 Use the Saturation slider to lower the color saturation on the outer parts of the frame.

> **TIP** A small gray dot appearing under any parameter slider indicates the default position of that parameter. Clicking the gray dot resets the slider to its default position.

You can use the onscreen controls to change the ellipse shape so it covers more of the wide aspect of the frame.

11 In the transport controls, above the toolbar, press the first frame button to move the playhead to the start of the render range, and press the Spacebar to play through the composite.

> **TIP** You can click the speaker icon on the left side of the toolbar to mute the audio if you no longer want to hear it.

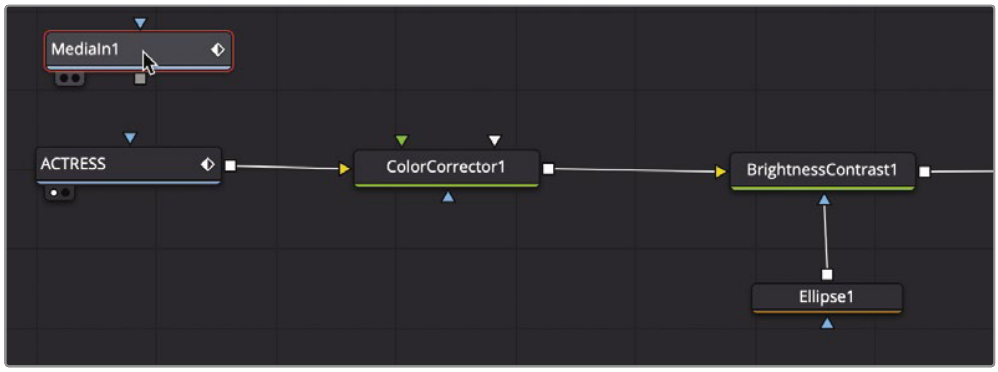
The first time the composite is played, DaVinci Resolve loads the effect into RAM. A green line under the time ruler indicates the cached regions of the composite. When the entire composite, from the start of the render range to the end, is cached into RAM, the composite plays back in real time.

Adding Clips from the Media Pool

On the most basic level, visual effects are about combining two or more images to make a new image. Although you currently have only a single clip from the edit page timeline in your composite, you can access any clip from your project in the media pool. For the creation of this sci-fi shot, you will add a computer-generated heads-up display (HUD) to make it appear that the actress is looking at a computer display.

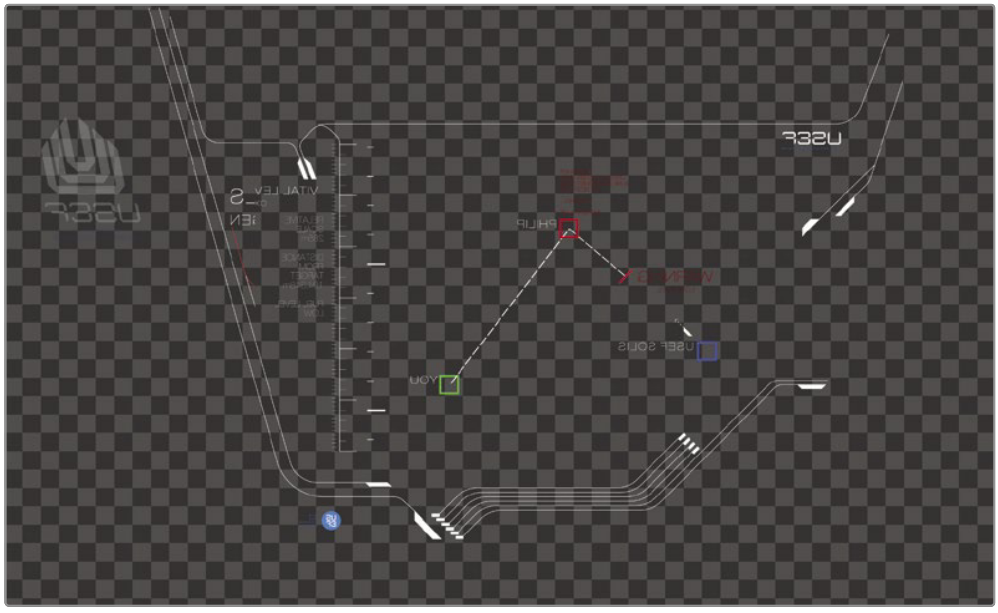
1 In the upper-left corner of the interface, click the Media Pool button.

2 From the master bin, drag the HUD clip to an empty area of the Node Editor.



A new Media In 1 node is created to represent the clip. The clip is not yet connected to your composite; it is just added to the Node Editor. Before connecting a clip to your composite, you can learn a lot about it by displaying it in the viewer.

3 Select the Media In 1 node, and press F2 to rename the node to HUD; then, press 1 to display it in viewer 1.



In the lower left of the HUD node, a small white dot, called the view indicator button, is highlighted to indicate that the node is displayed on viewer 1.

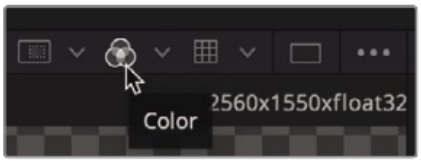
On the Media Out node, a second view indicator button is highlighted to the right of the first to indicate that this node is displayed on viewer 2. By displaying the Media Out node, viewer 2 will show you the final composite output destined for the edit page timeline.

> **TIP** Switching from the Fusion page to the edit page and back to the Fusion page will switch viewer 2 to display the Media Out node, regardless of what is selected before you leave the Fusion page.

Viewer 1 displays the HUD graphic with a checkerboard background to indicate that this computer-generated graphic has a transparent area created by the inclusion of an alpha channel.

> **TIP** An alpha channel is a fourth channel that accompanies the red, green, and blue channels of an image. Alpha channels determine which parts of an image are opaque and which parts are transparent.

4 Above viewer 1, click the Color Controls button, or click in the viewer and press the A key to view the alpha channel in the viewer.



The Color Controls button now shows the alpha channel of the currently viewed clip.

5 Click the Color Controls button, or press the A key again, to display the full color image once again.

6 Click the Media Pool button to close the media pool and provide more room for the Node Editor and viewers.

With an additional image element added to the Node Editor, you are ready to begin blending two images together.

Understanding the Merge Node

The Merge node is one of the most important and commonly used tools on the Fusion page. It composites, or blends, two images. You can add the Merge node—as you would add other effects—by dragging it from the toolbar and inserting it in the Node Editor between the Brightness/Contrast node and Media Out node.

1 Directly after the second divider in the toolbar, drag the Merge node into the Node Editor, and hover it over the connection line between the Brightness/Contrast and Media Out nodes.

> **TIP** You may need to drag the Media Out to the right to make more room for inserting a new node.

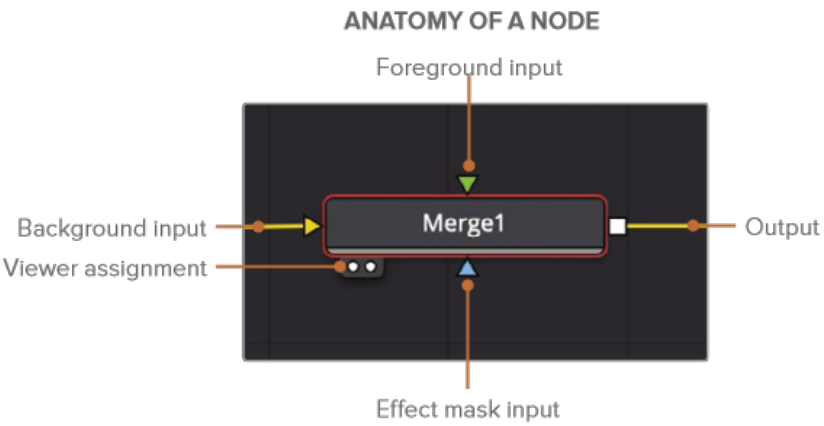
2 When half of the line turns blue, release the mouse button to insert a Merge node between the Brightness/Contrast and Media Out nodes.

> **TIP** Shift-dragging a node extracts it from the node tree and enables you to reconnect it at a new location. Alternatively, selecting a node and pressing Delete or Backspace entirely removes that node from the Node Editor.

The Merge node is now connected into the node tree, and you can use it to composite the HUD graphic over the shot of the actress. Before you combine the two images, let's explore the Merge node in more depth.

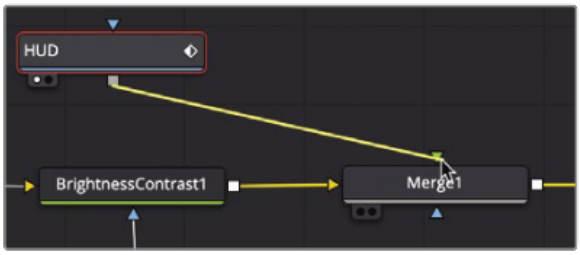
A Merge node has three inputs: there's one input for a background image (yellow triangle). You can think of this as a clip on V1 in the edit page timeline. The green triangle input represents a foreground image, similar to a clip on V2 in the edit page

timeline. The third input (blue triangle) is used exclusively for masking. Like all nodes, the Merge node also includes an output (white square).



When you insert a Merge node, it automatically connects the incoming connection line to the background input. It is up to you to manually connect the foreground image. In this node tree, the clip of the actress via the Color Corrector and Brightness/Contrast node is connected to the yellow background input of the Merge node.

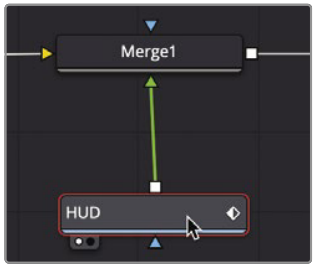
3 To connect the HUD graphic into the foreground input of the Merge node, drag the square output from the HUD node into the green foreground input of the Merge node.



By adding the HUD graphic into the foreground input, you composite that graphic on top of the actress using the graphic's built-in alpha channel transparency.

TIP When using a third display, such as a full-screen broadcast monitor connected via a Blackmagic Design UltraStudio or DeckLink card, you can press 3 on your keyboard to display the node on the third monitor.

4 In the Node Editor, drag the HUD node below the Merge node.



As you drag the node, the inputs on the Merge node rearrange themselves to make the most direct connection.

It's important to know that repositioning a node within the Node Editor in this way only visually organizes your node tree and has no impact on the compositing results. Only the connections made from node to node determine the processing order of images.

5 Return the placement of the HUD node above the Merge node to match a timeline, layer based structure.

The Merge node is the fundamental building block of almost every composite you will make in Fusion. Although it allows you to connect only two images, understanding how those two inputs interact is crucial because they enable you to link multiple merges and create much more advanced visual effects.

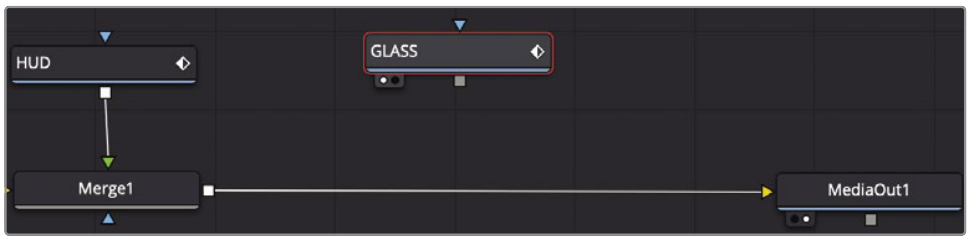
Chaining Merge Nodes Together

Merge nodes process only two images at a time: foreground and background. To add additional images, often called *elements* or *plates*, to a composite, you must chain Merge nodes together using the output of one merge as the background (or foreground) of another merge. That's how you'll add a cracked glass element making it appear as if our actress is in a damaged and dangerous space pod.

1 In the upper-left corner of the interface, click the Media Pool button.

2 From the master bin, drag the glass clip to an empty area of the Node Editor.

3 Press 1 to see the image in viewer 1, and then press F2 to rename this node, **GLASS**.



This is the image we will composite over the top of the ACTRESS and the HUD.

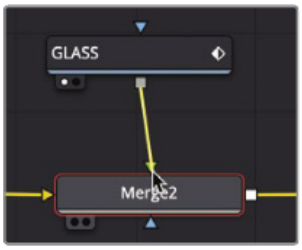
4 In the Node Editor, select the Merge 1 node.

Instead of dragging from the toolbar, selecting a node allows you to click a tool in the toolbar and connect it into the selected node.

5 In the toolbar, click the Merge tool.

The output of Merge 1 is now connected to the yellow background input of Merge 2. You can use the unconnected green foreground input on the Merge 2 node to connect the scratched glass image.

6 Drag the output of the GLASS node to the green foreground input of the Merge 2 node.



Unlike the HUD, the glass image has no alpha channel. However, you can use the Merge node to blend the images and create more realism.

7 In the Node Editor, select the Merge 2 node, and in the Inspector, drag the Blend slider to 0.5 to lower the opacity of the glass element.

You can find more sophisticated blending operations in the Apply mode drop-down menu. These settings use simple mathematical operations to blend images based on the color and luminance of the foreground and background.

Although you have several choices, the most common Apply modes can be defined based on their overall effects on the composite:

– Darken colors: darken and multiply

– Lighten colors: lighten and screen

– Increase color contrast: hard light, overlay, and soft light

Because you want the glass cracks to be seen clearly, let's use a Screen Apply mode. The Screen Apply mode causes lighter pixels to brighten the background image, which is excellent for translucent cracks in the glass. It also causes black pixels to become transparent, consequently creating a cleaner composite of the cracks over the top of the actress.

8 In the Apply mode menu, choose Screen.

If you wanted to add even more image elements beyond the glass and HUD elements, you could continue chaining merges together. Adding new Merge nodes before the existing ones would place new elements behind the current composite.

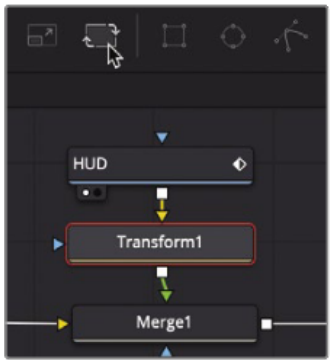
Inserting and Adjusting Effects

Node order is the single most important concept to understand in any node-based compositing system. Where you insert a node in the tree and the order in which you connect nodes determines the results of your composite.

The frame size of the HUD graphic is slightly larger than the background, so some of it is cut off. You'll need to add a Transform node—but in precisely the correct location—to resize the graphic without resizing the background.

1 Select the HUD node in the Node Editor and press 1 to view the HUD in viewer 1.

2 Just before the third divider in the toolbar, click the Transform tool to have it automatically connect to the output of the HUD node.

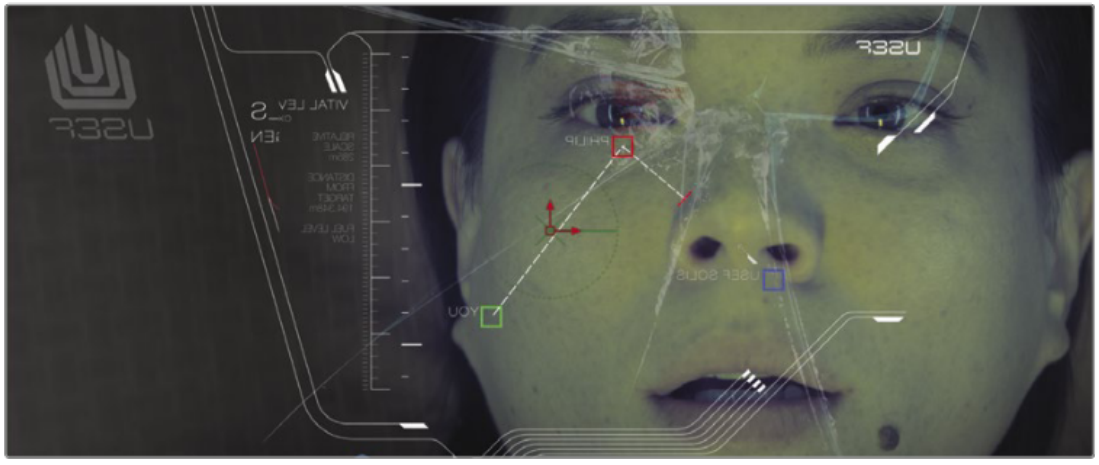


Although you have not made any changes, you can see the original graphic in viewer 1 and the transform adjustments in viewer 2 because it displays the Media Out node's results.

> **TIP** In the lower-left corner of the interface, the status bar displays basic metadata about any selected node.

When a node is selected in the Node Editor, the parameters for adjusting that node appear in the Inspector and onscreen controls are displayed in the viewer.

3 In the Inspector, drag the Transform Size slider to the left to scale down the graphic until the logo on the left is no longer cut off.



It was very important to insert the Transform tool into the node tree so it applies only to the HUD graphic. If you inserted it after the Merge tool, the Transform node would have resized the entire shot.

Since we inserted it directly after the HUD, the HUD is now resized and positioned. However, it still looks like a graphic slapped on top of an image. You can access dozens more effects in the Effects Library and use them to better integrate this HUD into the composite.

Adding Effects from the Effects Library

The Fusion page includes more effects than just those in the toolbar. It also includes over 250 Fusion-specific tools that you can access in the Effects Library.

To add more realism to this shot, we should spend a little time making the HUD appear more realistic. For example, we can use a few different nodes to add some computer scanlines and blurring effects.

Since the camera is focused on our actress, the HUD would realistically be out of focus. Let's start improving the HUD by giving it a blurred out-of-focus look.

1 In the Node Editor, select the Transform node.

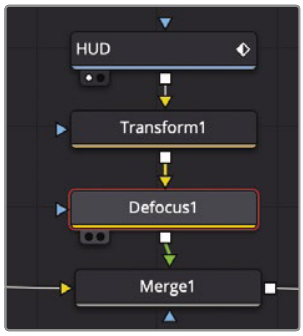
2 In the upper left of the Fusion page, click the Effects Library button.

The library is organized by category. The Tools category contain all the effect that are only available in Fusion.

3 In the Effects Library, click the Tools disclosure arrow.

There are Fusion specific categories for everything from paint and particles to masking, image filters, tracking, and more.

4 Under the Tools category, select the blur category and click the Defocus tool to add it to the Node Editor.



Since the Transform node was selected, the Defocus is connected to the output of the Transform node.

5 In the Inspector, lower the Defocus' Bloom slider to 0 to remove the over exposed white areas.

The remaining Defocus settings add a nice subtle soft focus to our HUD.