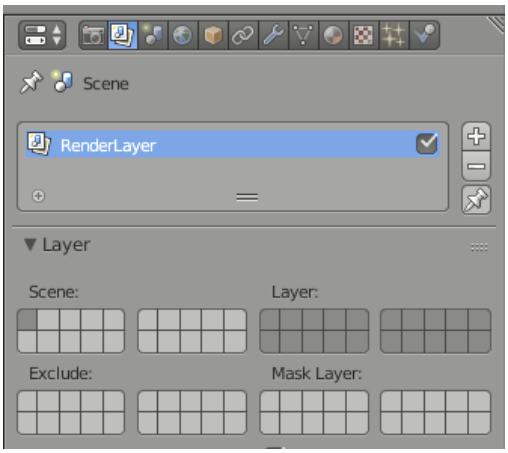
Render Layers

Render layers are a way to separately render parts of the scene so that image processing can be performed on some elements differently than on others. These parts are then usually recombined in the final compositing stages.

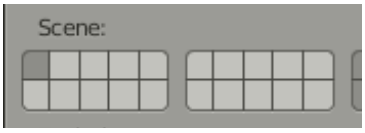
> Many users find Blender's layers to be confusing. There are a few different types and they don't behave like layers in other commonly used software packages.
>
> So… If you find them to be confusing and frustrating, know that you are not alone. The good news is that the next major version, 2.80, will include a major overhaul to Blender's handling of layers.
>
> For now… having a good example on hand to refer to in your fulldome Blending will be a great way to use the layers without investing a lot of time figuring them out.

At least one Render Layer must be active in order to render a scene.

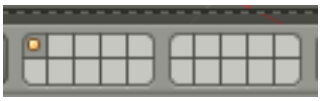


In the Layer panel of the Render Layers Properties, are the settings for managing the layer slots.

- Scene layers are the layer slots visible in the scene.



This set of layer slots is also visible in the toolbar of the 3D View.



Selected objects or groups of objects can be moved to a different layer in the 3D View by pressing the M key or through the menu: *Object* > *Move to Layer*

Individual objects can also be moved to a different layer through the Relations panel in the Object Properties.

Objects can be present on multiple scene layers. Shift-click to select multiple layers.

- Scene layers to be included in Render Layer
  In the Layer panel, to the right of Scene layers, is another set of layer slots. These are the layers to be included in the selected Render Layer.

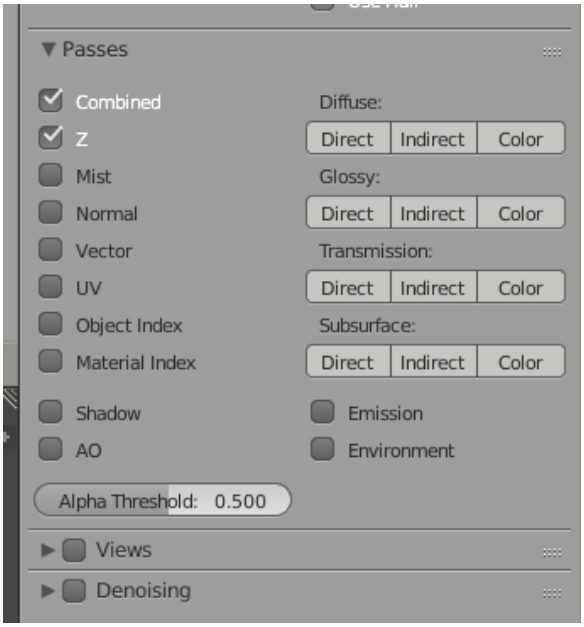
- Below those are 2 additional sets of layer slots. One is for excluding instead of including, and the final is for specialized masking.

Render Passes

Elements in a Render Layer can be further separated into *passes* carrying information about the object, materials and location in the 3D scene.

In the Passes panel, we specify the information sent to the Compositor.

We won't use many of them in our Compositing example, but we will use a few.



- Combined is all the information, including color and transparency.
- Z is depth, the distance of objects from the camera.
- Environment is the World separated from the other scene elements.

RenderLayers: Why?

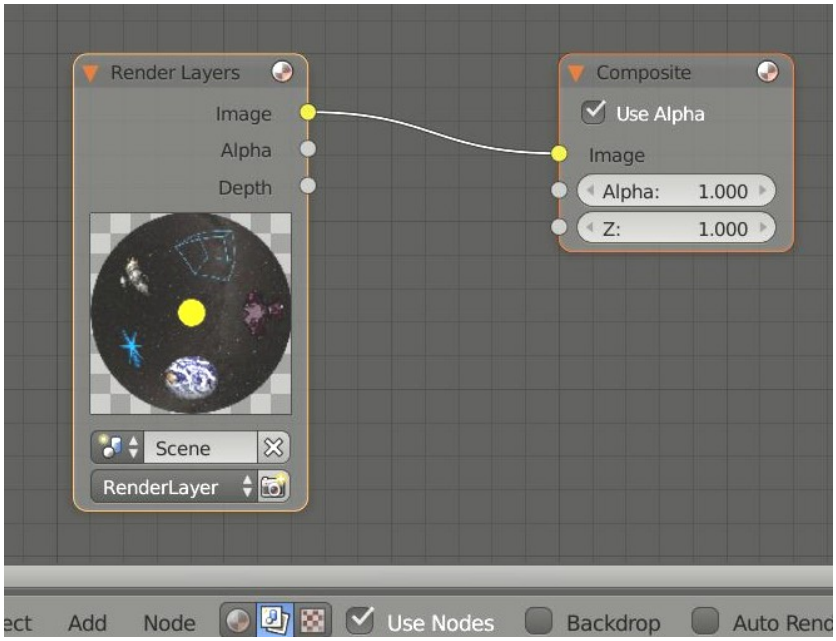
To complete our example scene, we want to make our Sun glow. We also want to apply Denoising to the objects in our scene, but we don't want Denoising applied to the surrounding starfield. So we need to separate our scene into three distinct layers. Then we must combine them in the best way possible for the effect we want to achieve.

New for version 2.79!

Denoising is a long-awaited feature finally available as of this latest version, 2.79. It reduces noisy artifacts very well without setting our render sampling super high, so it improves the quality without dramatically increasing render times.

Compositing

So far we've looked at nodes for creating object and World materials. The nodes system was originally put into Blender for compositing. This is where videos and image sequences can be combined and/or enhanced into a final product. Even if you use a dedicated software package for compositing, you may find use for Blender's built-in compositing system.

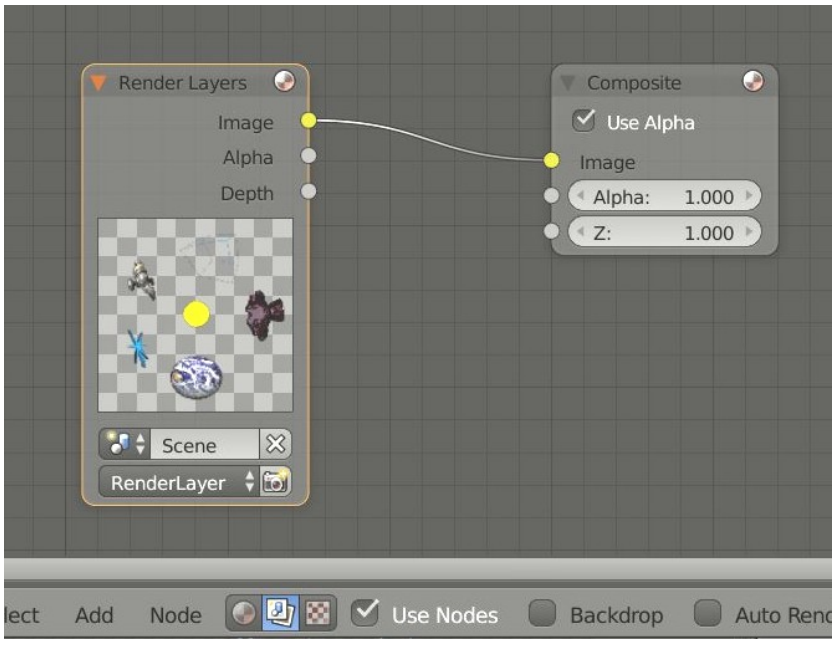


- To use the Compositing nodes, switch the Node Editor from Shader to Compositing.

- Click the check box for Use Nodes and a default node setup will appear.

  If a test render has been made, the window in the node will display the contents of the render layer.

When working with compositing nodes, it can be handy to keep the Properties Editor on the Render Settings tab to manage rendering and output settings.



- In the Film panel under the Render Settings property tab, click the box for Transparent.

  Recall that the Render Settings are under in the Properties Editor, in the tab with the little SLR camera icon. 

- Notice that the renderlayer input node now shows no background.

RenderLayers: Setting Them Up

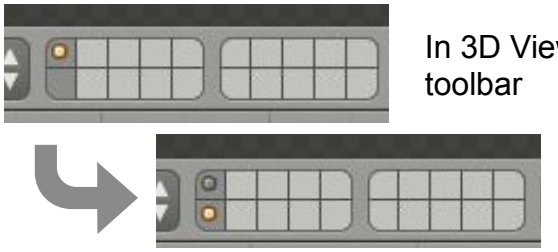
Since we plan to use a Renderlayer for glow objects, we need to isolate the Sphere.Sun object from the others.

- With the Sphere.Sun object selected, move it to the scene layer slot below the one used originally.

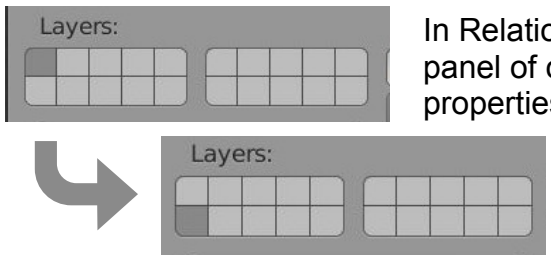
  It can be moved in the 3D View as mentioned earlier using the M key or *Object > Move to Layer*

  Or...

  The selected object can be moved in the Relations panel of the Object tab of the Properties Editor. Using this method requires only clicking the box to place in layer slot.

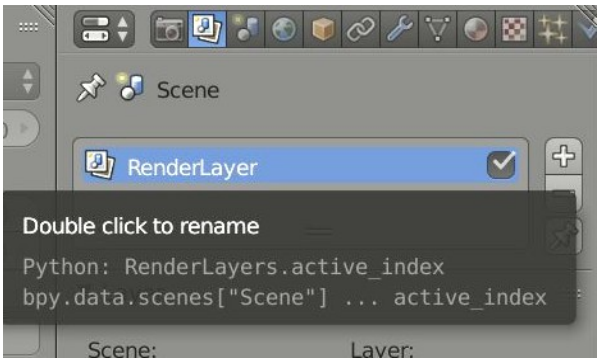


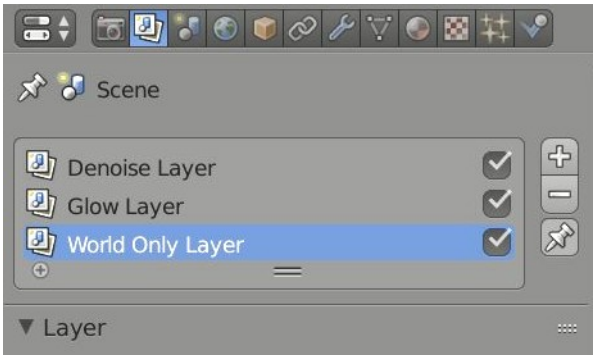
In 3D View toolbar



In Relations panel of object properties

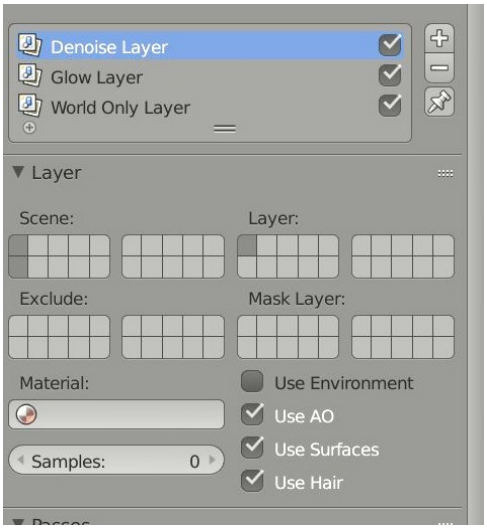
- Create two new RenderLayers, adjust settings and modify the existing one.
- Rename “RenderLayer” to “Denoise Layer”, then add two more RenderLayers, “Glow Layer” and “World Only Layer”



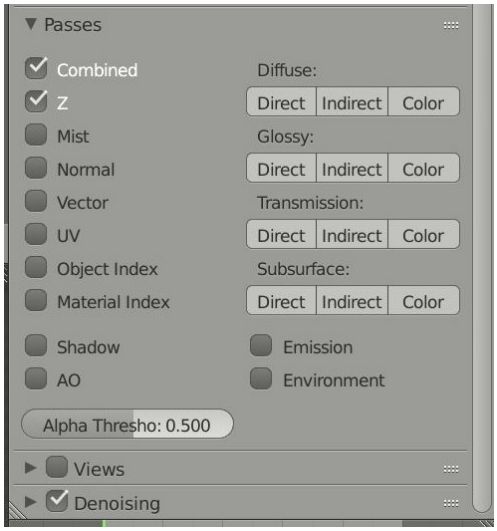


Save the Blend file.

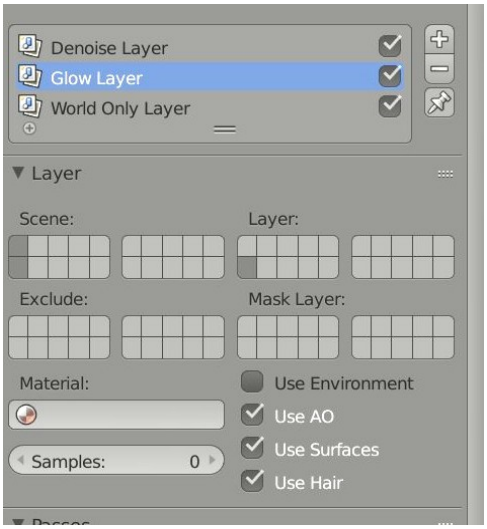
- Denoise Layer



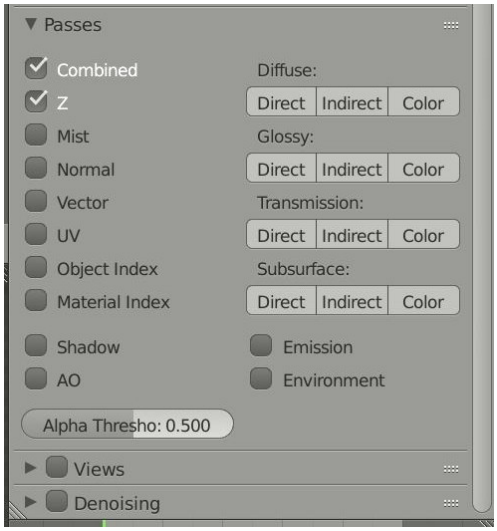
  - Scene and Layer slots
  - uncheck Use Environment
  - Enable Denoising



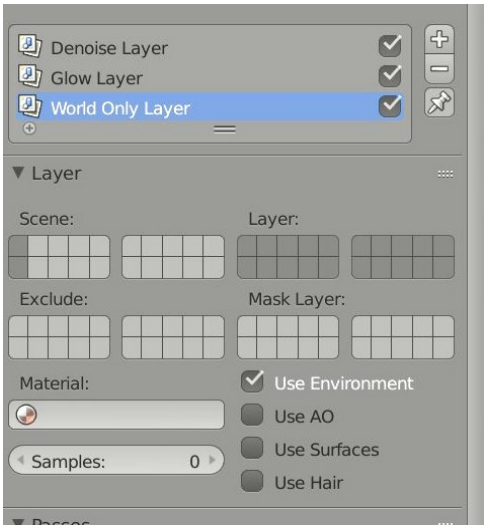
- Glow Layer



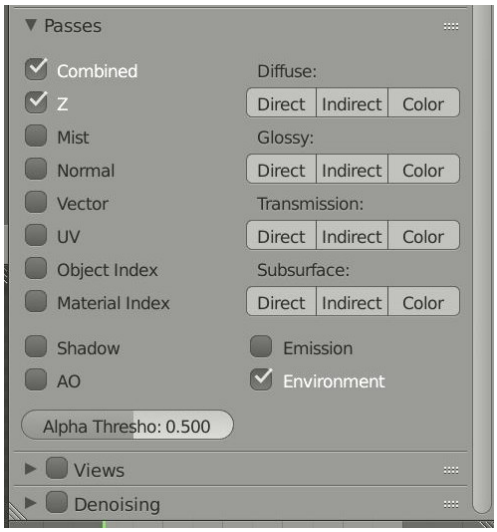
  - Scene and Layer slots
  - uncheck Use Environment



- World Only Layer

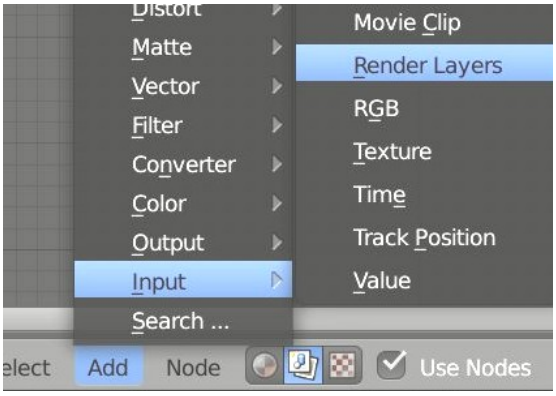


  - Scene and Layer slots (Layer slots can be any for this one.)
  - Make certain that Use Environment is enabled
  - Enable Environment pass



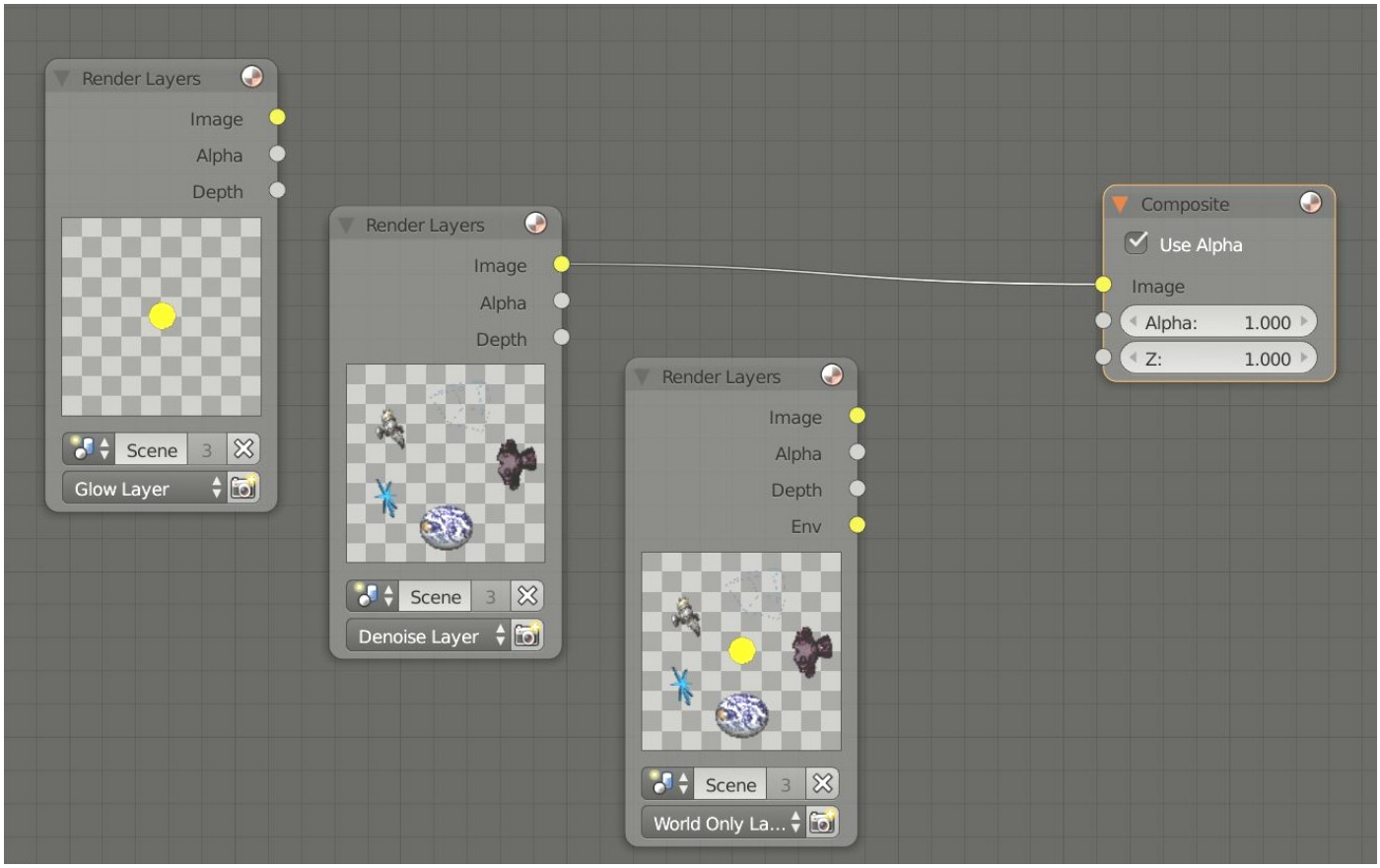
- In the Node Editor, add two more input nodes

Add -> Input → Render Layers

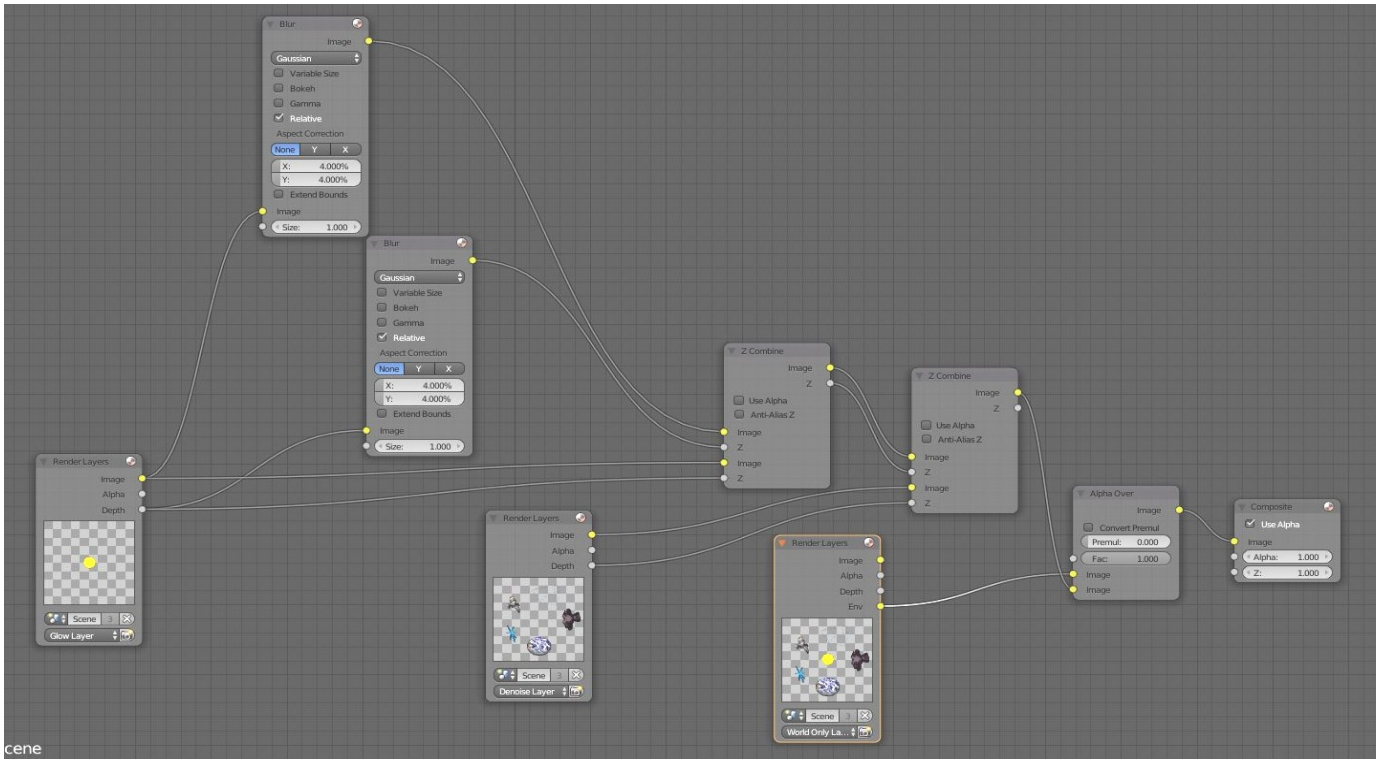


- Your node setup so far should look like this:

  Notice that the Glow Layer only contains the Sphere.Sun object and that the World Only Layer contains an extra output node socket, “Env” for “Environment”



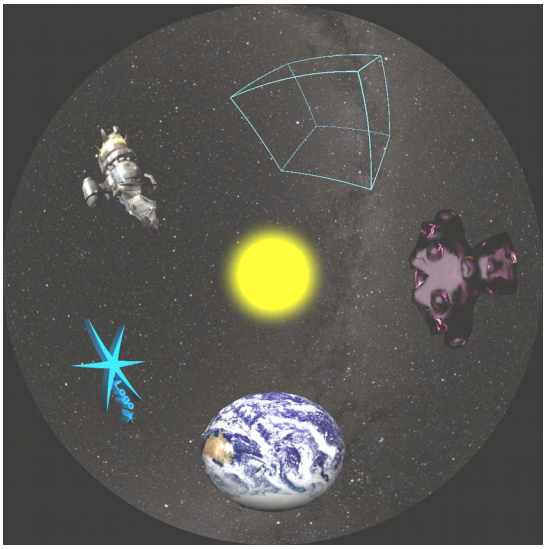
- If you feel brave, you can try adding, setting and connecting the following nodes:



We use the Glow Layer image blurred and combined with itself to get that nice glowy feel. To mix properly we use Z Combine node to account for depth.

Z Combine is also used to mix the Glow Layer and Denoise Layer. This way, if we use this scene for an animation, the glowy Sun will pass behind foreground objects with glowiness intact.

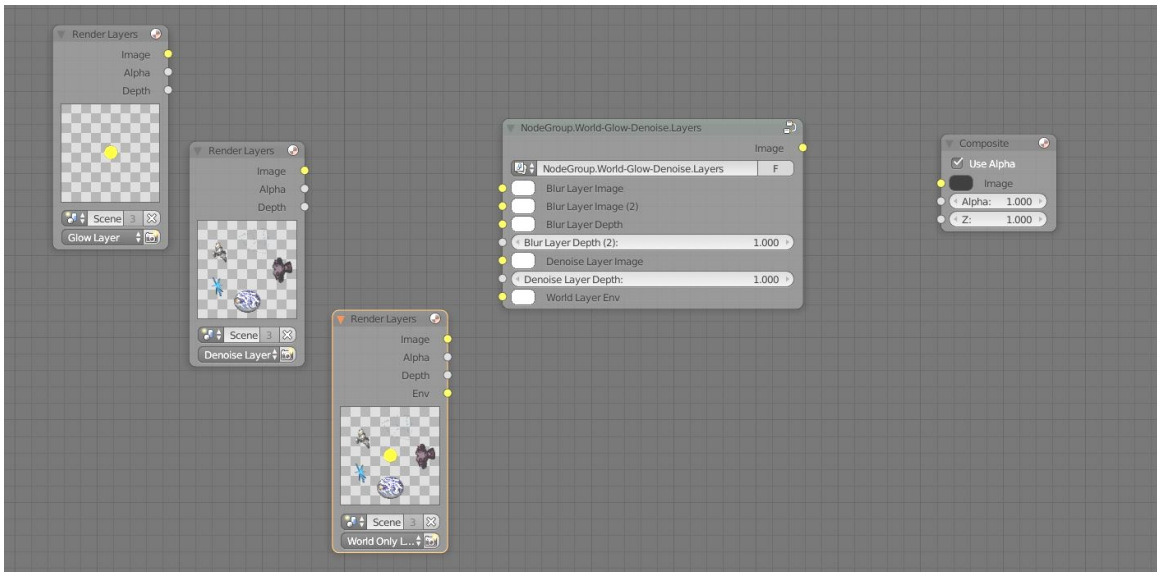
Finally an Alpha Over node is used to combine the Env output from the World Only Layer with the rest of the scene.



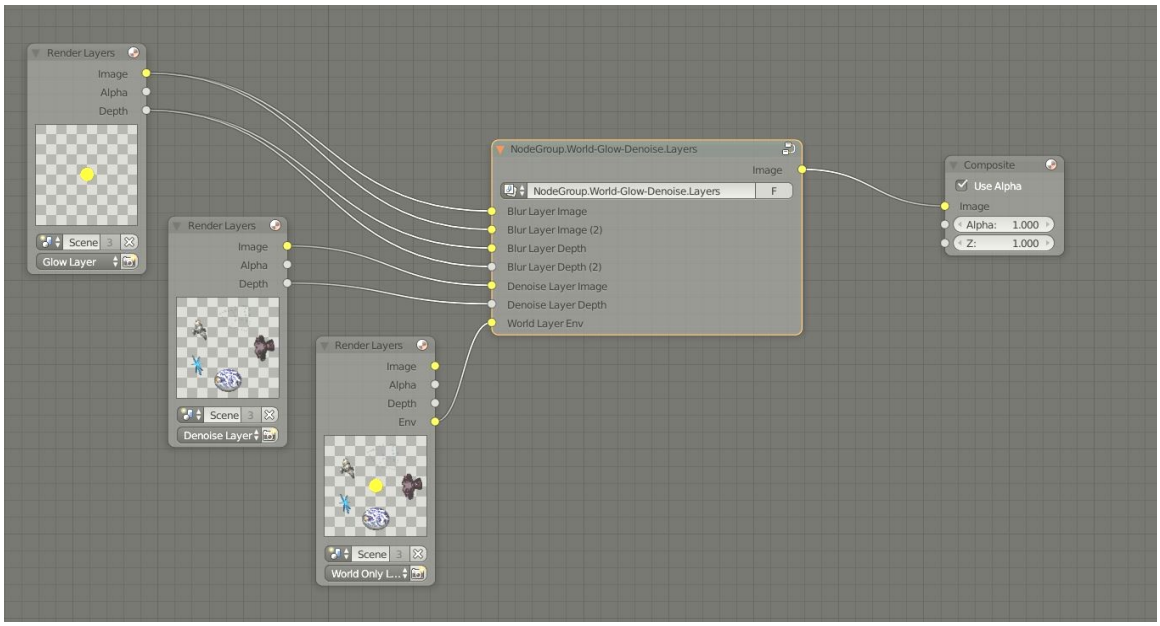
The render result combines the elements nicely.

Save the Blend file.

- If you prefer, instead of creating the entire node structure, you can append a premade node group from the Demo file. You still need to set up the RenderLayer Input nodes, and you'll need to connect them to the node group, but the rest of the work is done as an example.
- File > Append > ObjecsInSpaceDemoFile.blend
- Enter the NodeTree folder
- Select "NodeGroup.World-Glow-Denoise.Layers"
- In the node editor, Add > Group > NodeGroup.World-Glow-Denoise.Layers



- Then connect the Render Layer input nodes and the Composite output node



Save the Blend file.