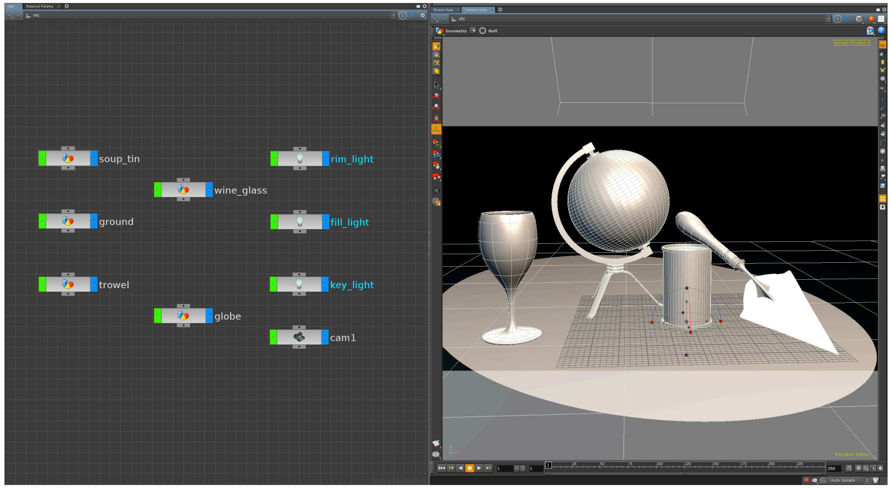
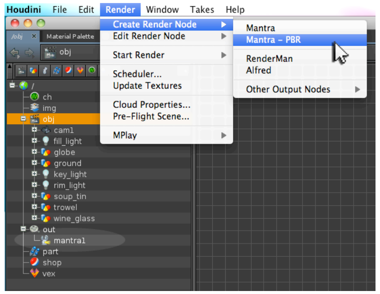
TEXTURING & RENDER PASS SETUP

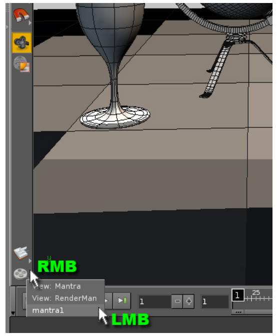
Open **globe_scene_begin.hipnc**. This scene contains some simple objects, a camera and a three point lighting setup. This scene will be utilised for demonstrating Material Palette based texturing and a simple render pass setup.



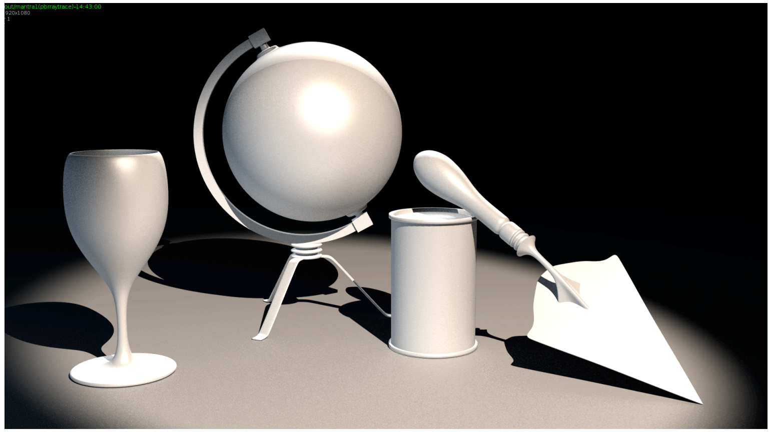
CREATING A MANTRA OUPUT DRIVER

From the main **Render Menu**, select **Create Render Node > Mantra - PBR**. This will create a **Mantra ROP** for **Physical Based Rendering** at the **Ouputs** Level of Houdini. The newly created mantra1 node can be verified in the **Operator Tree List** (**w** with the mouse over the Network Editor) and can be found in the **Render Outputs Level** of Houdini (**/out**).



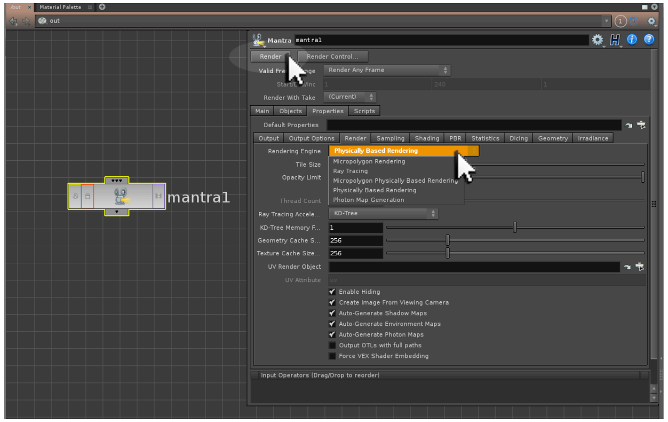


RMB on the **Viewer's Render Button** and choose **mantra1**. This will launch a MPlay Image Viewer to render the scene. By default, a Mantra ROP will automatically look for a Camera Object called **cam1** to render through, and will render images to **MPlay**, the Houdini image viewer.



When examined, the render has visible white speckles. This is an aspect of PBR (Physically Based Rendering). Fixing this aspect of the render will be tackled at the end of this example, when all the texturing and render pass setup has been completed.

Set the **Viewer** to the **Scene View Tab**, and using the **Network Editor Level Menu**, head to Outputs Level (/out) to see the Mantra ROP. Houdini has five Render Engines in total; **Micropolygon Rendering**, **Ray Tracing**, **Micropolygon Physically Based Rendering**, **Physically Based Rendering**, and a fifth non visual renderer for **Photon Map Generation**.



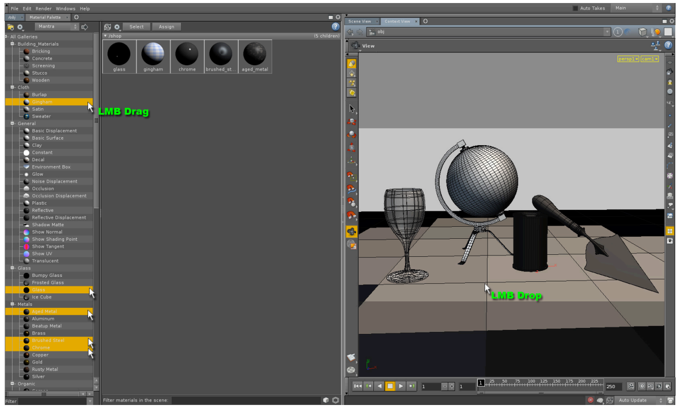
These can be found under the **Properties > Render > Render Engine** Parameter of the mantra1 node. Each Mantra node also has a **Render Button** to initiate renders. This example will primarily be looking at the PBR Render Engine; however the aesthetics and behaviours of other Render Engines can also be explored using this example.

OVERRIDING THE CAMERA RESOLUTION

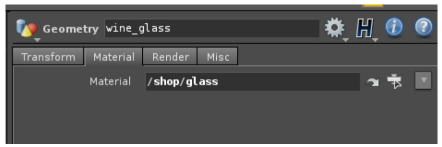
At present, the render size is **1920 x 1080,** the resolution of the scene camera. While this resolution is fine for the final output, a smaller resolution of **640 x 360** can be set for testing renders. This can be done on the **mantra1 ROP** by activating the **Override Camera Resolution** parameter found in the **Properties > Output** area of the mantra1 ROP, and entering these new lower values.

THE MATERIAL PALETTE

Using the tabs at the top the Network View, activate the **Material Palette Tab**.

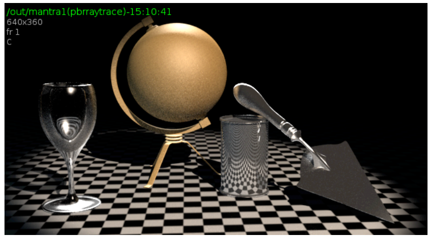


From the **All Galleries** list, **LMB DRAG** the **Checkerboard Material** directly onto the **ground object** in the **Viewer**. This will automatically create a Checkerboard Material node at the SHOP Level of Houdini, as well as creating a Shader Ball Icon in the Material Palette. Repeat this operation again, this time assigning a **Glass Material** to the **wine_glass object**, and a **Stainless Steel Material** onto the **trowel object**, a **Chrome Material** onto the **soup_tin object**, and a **Wood Material** onto the **globe object**.



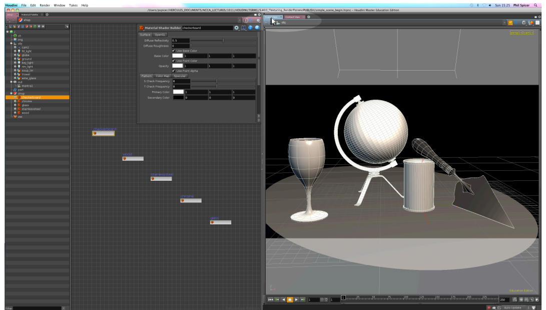
This will assign each material to an object through its Object Level Material parameter. This can be verified by switching back to the Network View and examining the parameters for one of the textured objects.

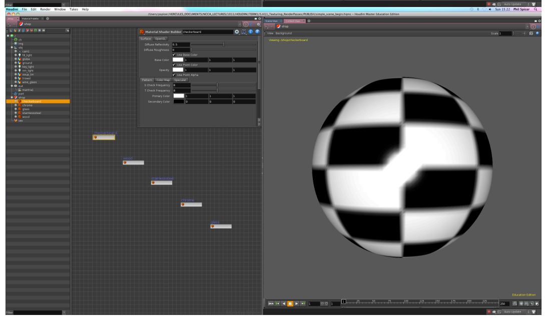
When the scene is rendered again, each object will display its assigned material.



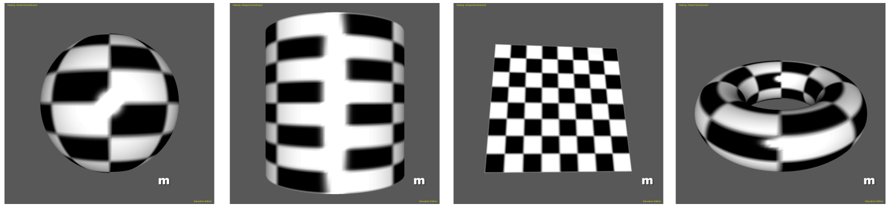
THE SHOP LEVEL

Switch to the SHOP Level (**Sh**ader **Op**erators **Level**) of Houdini to see the newly created material nodes.





The Viewer Pane can be switched between the Context View (revealing the giant Shader View Ball), and the Scene View (showing the Object Level scene through cam1). This can make refining the aesthetic easier, as both the material and how it renders can be examined. Pressing **m** on the keyboard with the mouse over the Viewer can also modify the Shader View. This will scroll through different geometry shapes allowing the aesthetic of the material to be examined.



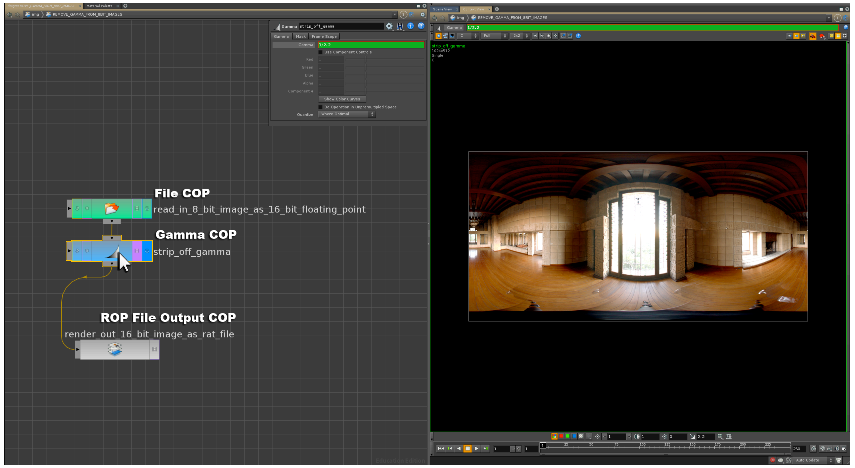
Simple backgrounds can also be activated in the **Shader View**.

REFINING THE SCENE AESTHETIC

The default parameters for each material get the scene somewhere in terms of rendering; however each material's parameters can be refined further. As many of the materials created are Glass or Metal based, the first step for the scene is to assign an Environment Map to the scene so that these reflective materials will have the appearance of reflecting a room.

ENVIRONMENT MAPS

An environment map is usually a polar-based flattened image of a real world location. When assigned as an environment map this image will be projected onto a large invisible sphere in the scene allowing reflective objects to reflect it. Environment Maps can also be HDRI (High Dynamic Range) images or standard background plates. These images are utilised in Environment Lights, with the image providing the reflection information for a scene.



IMPORTANT NOTE: Some Material Parameters at SHOP Level may have an Environment Map parameter that can be activated on the material node itself. DO NOT USE THESE PARAMETERS. USE AN ENVIRONMENT LIGHT INSTEAD. These parameters are currently being phased out of Houdini and should not be used.

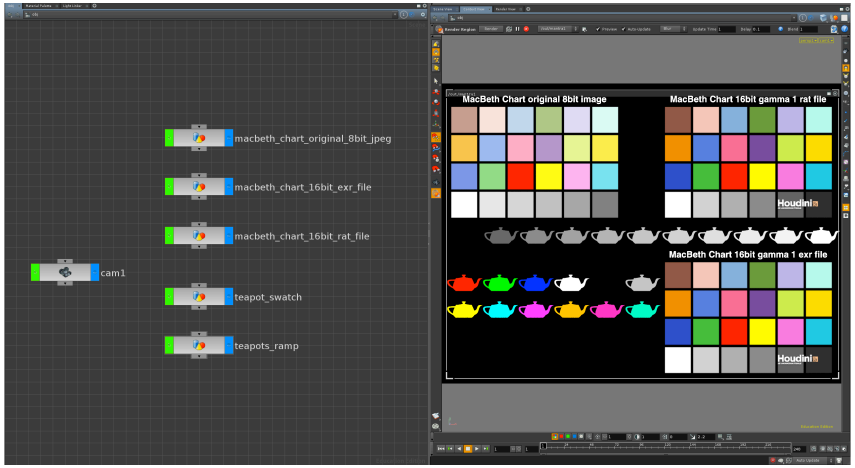
ENVIRONMENT & TEXTURE MAP FORMATS

Houdini will accept a number of image formats; however for optimum rendering efficiency the Houdini native **.rat file** format should be used. Ordinary image files can be converted into .rat files, by opening them in MPlay and re-saving them using the **.rat** extension.

For 8 bit images with Gamma encoding:

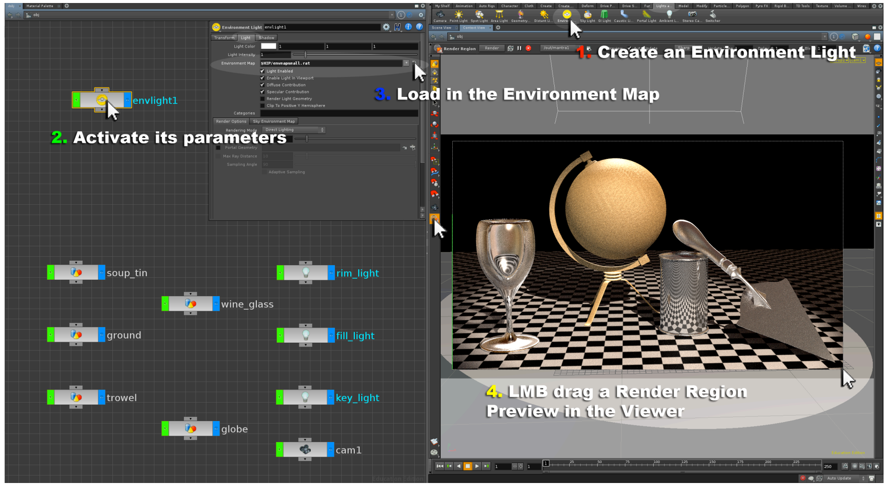
1. **Load the texture into a Compositor as a 16 bit floating point image**
2. **Use a Gamma node set to 1 / 2.2 (or 0.454545) to remove the gamma**
3. **Re-Render the texture back out to disc as a 16 bit floating point .rat image**

NOTE: All colour textures for this lecture have been processed in this way to remove any embedded gamma, and re-saved as 16 bit floating point .rat files.



NOTE: A hip file called MacBethChart_Test.hipnc and associated files have been included in these lecture notes for reference.

Return to **Object Level**, and using the **Lights and Camera Shelf**, create an **Environment Light**. In the Light section of its Parameters, load in the **envmapsmall.rat** Environment Map image. A **Render Region Preview** in the **Viewer** reveals that the objects are now reflecting (or refracting) the room image.



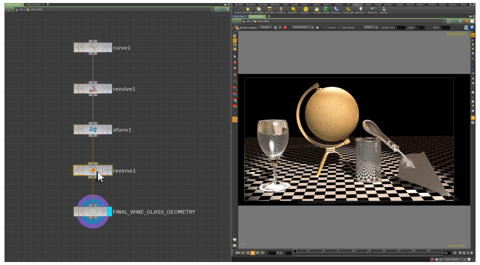
As projected light caustics for the wine glass are also required, a **Caustics Light** can also be added to the scene using the **Lights and Camera Shelf**. By default this light will assign caustics to the entire scene. The parameters of both the Environment Light and the Caustics Light can be modified when all the texturing of the scene is complete.

NOTE: PBR Rendering automatically generates bounce light (Global Illumination). The GI Light button found on the Lights and Cameras Shelf will either add GI to a non-PBR render engine; or can be used to amplify the effect of GI for PBR Renders.

See file globe_scene_stage1.hipnc

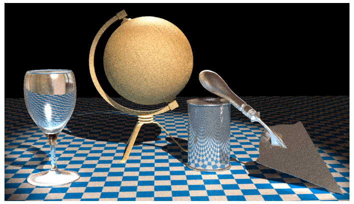
REFINING THE GLASS

At present the Glass Material assigned to the **wine_glass object** is creating a thick glass aesthetic. A more naturalised aesthetic can be achieved either by reversing the curve creating the wine_glass (by inserting a **Reverse SOP** in the wine_glass geometry network), or by swapping over the values of the **Inside and Outside Index of Refraction** parameter found in the Glass Material's parameters. **Either solution** will create a more naturalistic render for the wine_glass.

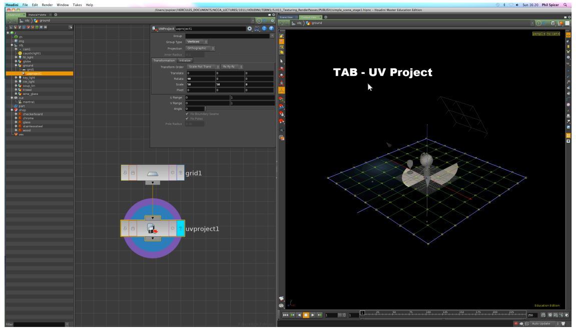


REFINING THE GROUND

At SHOP Level, locate the Parameters for the Checkerboard Material, and adjust the Secondary Color Parameter to a light blue.



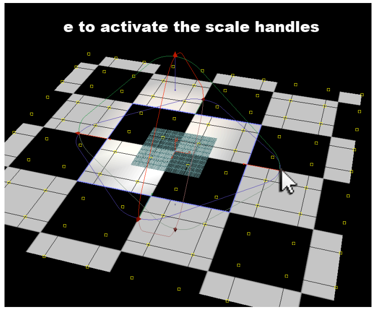
The placement of the Checkerboard Material on the ground object has yielded good results; however at present there is no control over the placement of the pattern itself. This can be rectified by projecting the ground geometry into UV Space, where the placement of the geometry relative to the pattern can be controlled.



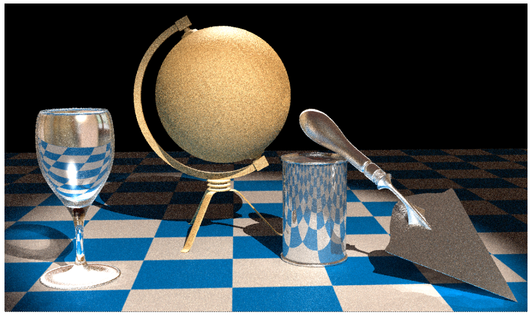
Locate the **Grid SOP** inside the ground object, and with the mouse over the Context View, press TAB and type UV Project. This will append a UV Project SOP to the Grid SOP and activate interactive handles to control the placement of the UV Square over the grid geometry. If this operator is invoked through the Viewer, the UV Square (represented in the Viewer by the blue edge) will be automatically set to cover the entire grid projecting as Vertices rather than Points.

A Render of the scene reveals that the Checkerboard pattern is now much larger that it was previously. Before initiating the UV Project, each primitive face of the grid was being textured by the (8x8 square) Checkerboard pattern. Now the entire grid is being textured by the (8x8 square) Checkerboard pattern. This is the reason the pattern now appears larger.

The hotkey e (with the mouse over the Viewer) can be used to activate the Scale handle of the UV Project SOP.



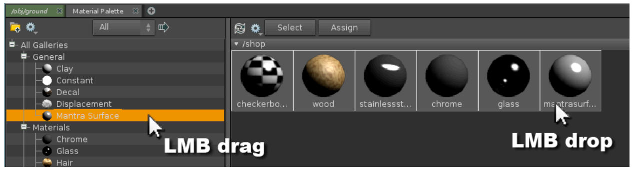
Switch back to the **Geometry Level** for the **ground object**, and press **e** with the **mouse over the Viewer** to switch the UV Project Handle to its **Scale Handle**. **Interactively scale down** the size of the Blue Edge UV Square so that it just encompasses the main geometry of the scene.



The parameters of the UV Project SOP can played with further to improve the aesthetic. The Checkerbaord Material parameters can also be adjusted to change the colour of the pattern as well as the size of the pattern.

REFINING THE TROWEL

At present the trowel object is entirely textured with the stainless_steel material. The handle however should be a different material. Switch once more to the **Material Palette** and **LMB drag** and **drop** a Mantra Surface Material into the /shop palette area. **A Mantra Surface Material can be configured to represent a wide number of surfaces and aesthetics.**



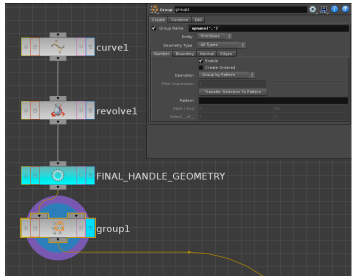
Switch back to a Network View, and at SHOP Level and rename the Mantra Surface Material to trowel_handle.

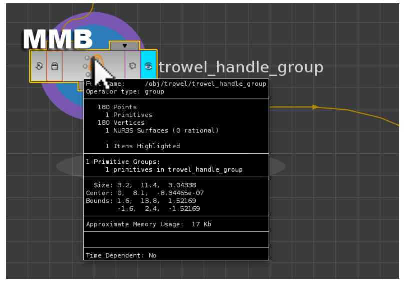
ASSIGNING TEXTURES TO SPECIFIC GEOMETRY REGIONS

The handle of the trowel needs to be defined as a region for this new material. This can be done at SOP Level, by grouping the handle geometry and assigning the material accordingly. Inside the trowel object, locate the FINAL_HANDLE_GEOMETRY Null SOP. Append to this node a **Group SOP**. This will automatically group all of the input geometry.

This expression in the Group Name parameter will automatically name the grouped geometry with the name of the node (currently called group1). The expression is surround by backtick (`) characters. This tells Houdini to evaluate the result of the expression as a text based string.

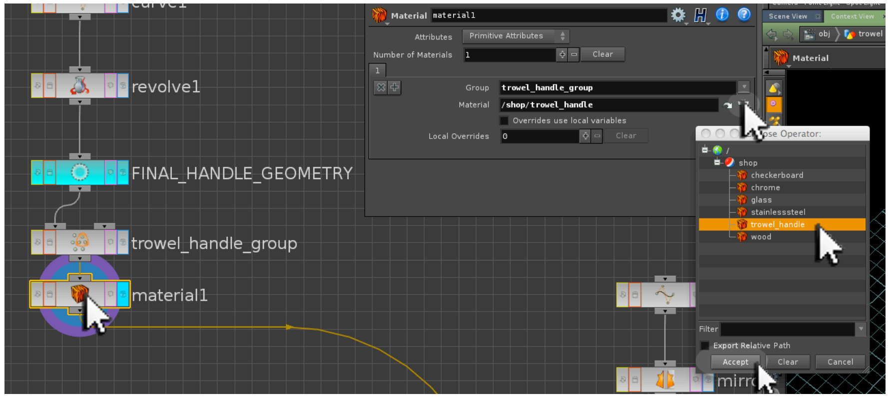
Rename the group1 node to **trowel_handle_group**. When the MMB information card is activated on the node, the group list reveals that the group is now also called trowel_handle_group.



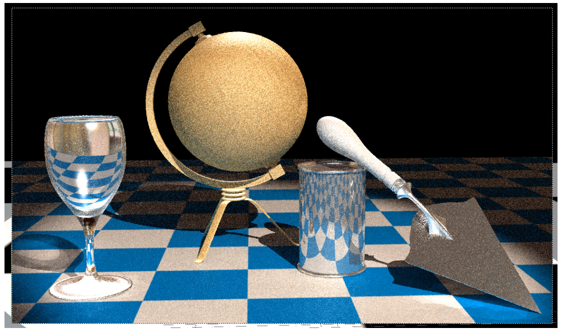


Append to the **Group SOP** a **Material SOP**. In the Parameters for it specify:

Group	**trowel_handle_group**
Material	**/shop/trowel_handle**



NOTE: Both the group and material can be set by using the corresponding button at the end of the parameter. The Group parameter button will reveal a drop down menu of possible groups. The Material Parameter button will activate an Operator Chooser window, from which the trowel_handle Material can be found.



Reset the **Display/Render Flag** back to the **final node** of the **trowel object**. The effect of both materials can now be seen on the geometry both in the **Viewer** and a **Render Region Preview** of the scene.

Keep the **Viewer** set to the **Scene View**, with a **Render Region Preview active** within it. Switch the **Network Editor** to the **SHOP Level** of Houdini, and locate the **trowel_handle material**. Modify its **parameters** to:

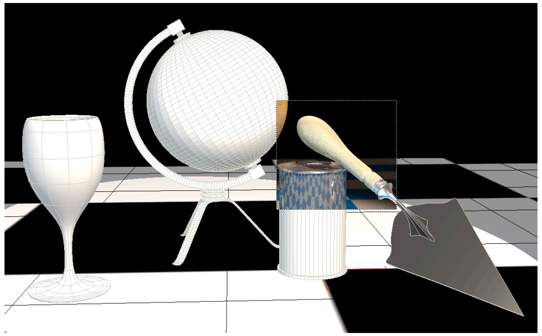
Diffuse

Base Color	**0.9**	**0.9**	**0.75**

Reflect > Reflect Objects

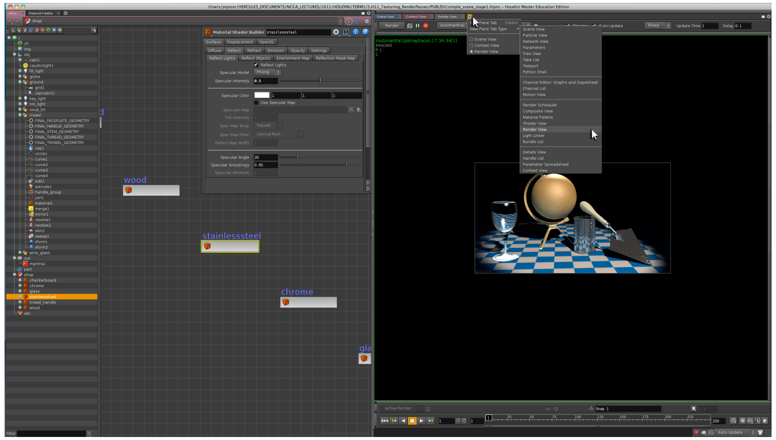
☑ **Reflect Objects**	
Reflection Intensity	**0.5**
Reflection Angle	**20**

This will create a suitably shiny ivory type material for the trowel handle.



THE RENDER VIEW

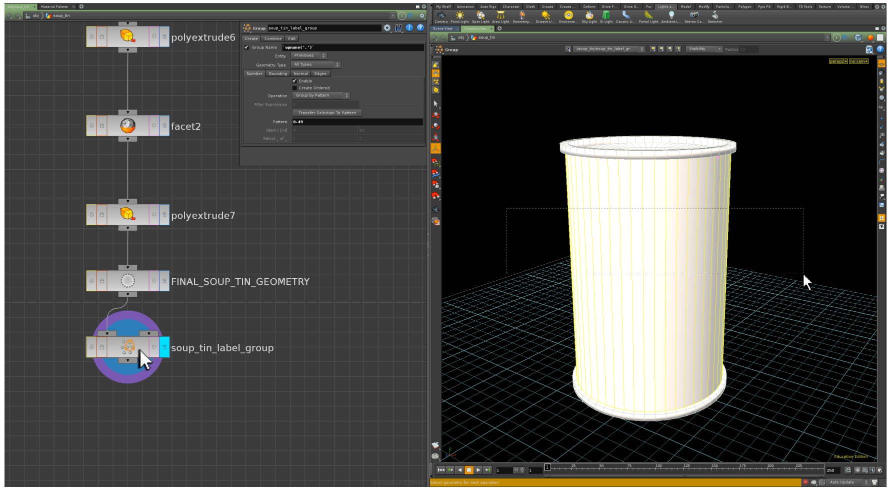
As well as a Render Region Preview, an interactive **Render View** can be activated as part of the Viewer Tabs. This view will continually render the scene, updating with any changes to the scene parameters. The Render View allows for efficient modification of material parameters as the results can be directly seen.



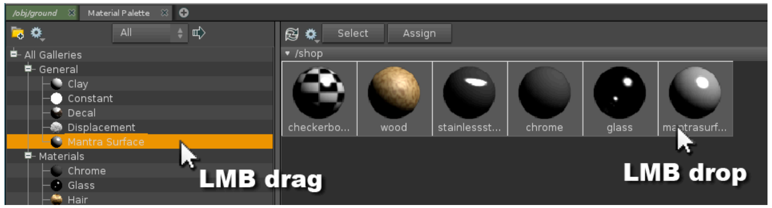
See **globe_scene_stage2.hip**

REFINING THE SOUP TIN

Locate the **FINAL_SOUP_TIN_GEOMETRY Null SOP**, and interactively in the Viewer invoke a **Group Geometry (Group SOP**) operation. Select the faces of the tin can that make up the label area and press **ENTER** to confirm the selection.



Rename and the Group Node name to **soup_tin_label_group**. With this in place, switch over to the **Material Palette** and **LMB** drag and drop a **Mantra Surface Material** into the **/shop palette area**.



At **SHOP Level**, locate this new material and rename it to **soup_tin_label**. In its parameters specify:

Diffuse

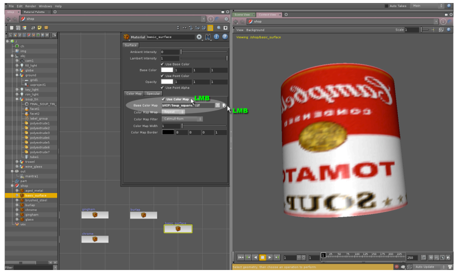
☑ **Use Color Map**

Base Color Map **$HIP/Soup_square.rat**

Reflect > Reflect Lights

Specular Intensity **0.25**

Specular Angle **90**



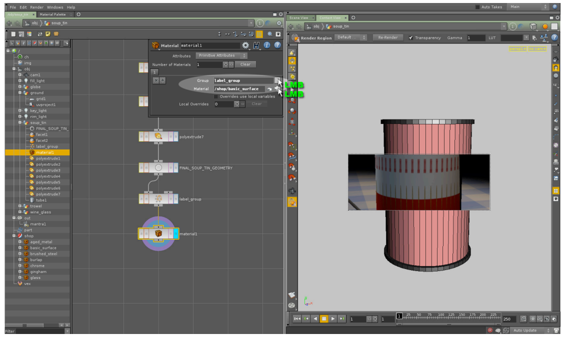
This will load into the Material an image that can be utilised as the label, and set the shininess of the material to a paper aesthetic.

$HIP – This is a global variable in Houdini that will return the directory location of the current hip file. If textures are saved relative to this location (ie inside the same folder or in a subdirectory) $HIP can be called in the file chooser path rather than writing the entire path location.

NOTE: Remember all texture files must be converted to .rat files before final rendering takes place.

Return back to the **soup_tin Geometry Level**, and append to the **Group SOP** a **Material SOP**. In its Parameters specify:

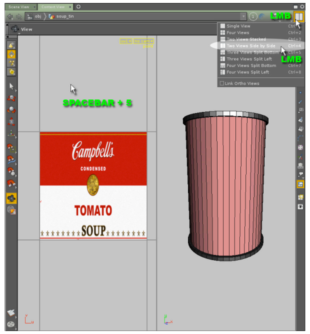
Group	**soup_tin_label_group**
Material	**/shop/soup_tin_label**

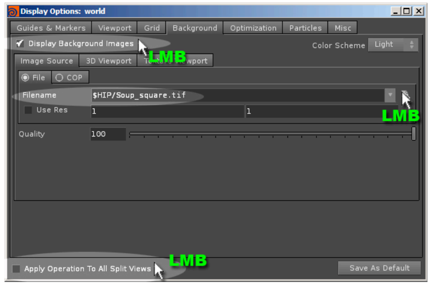


This will assign the label material to the label geometry grouping. A Render Region reveals that each face of the soup tin label area is being textured with the soup tin label. This can be rectified by projecting the label region geometry into UV Space.

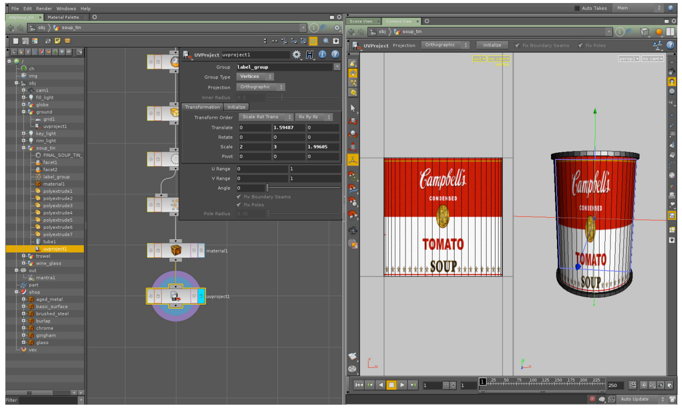
NOTE: For speed of a Render Region Preview, the Caustics Light can be temporarily deactivated to save it recalculating with each new region preview.

Using the Viewport Layout Button, assign Two Views Side by Side as the Viewer display. Activate the left hand side View to a **UV Viewport** by pressing **SPACEBAR + 5** with the mouse over the left hand side View. The left hand side view itself can be set as the **active View** by pressing **n** with the mouse over the left hand side view.



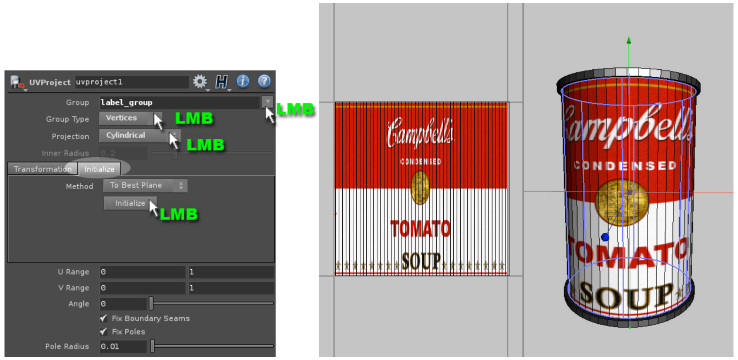


Using the **Viewer's Display Options**, turn off the **Apply Operation to All Split Views**, and activate **Display Background Images**. The **Soup_square.tif** image can be loaded in as an image for the UV Square. Displaying the texture map within the UV Square will make creating the UVs more understandable.



To the **Material SOP** append a **UV Project SOP**. By default this will produce an Orthographic projection of the geometry into the UV Square. In the **parameters** for the UV Project SOP **specify**:

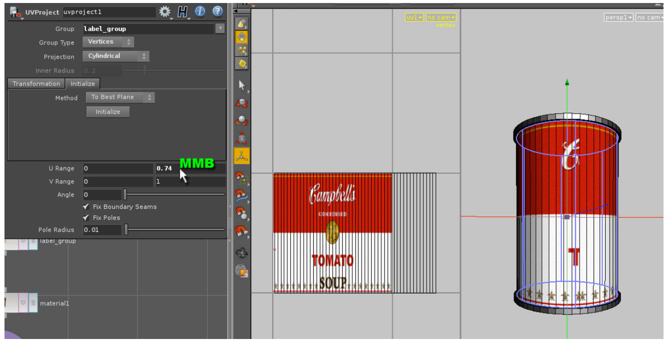
Group	**soup_tin_label_group**
Group Type	**Vertices**
Projection	**Cylindrical**

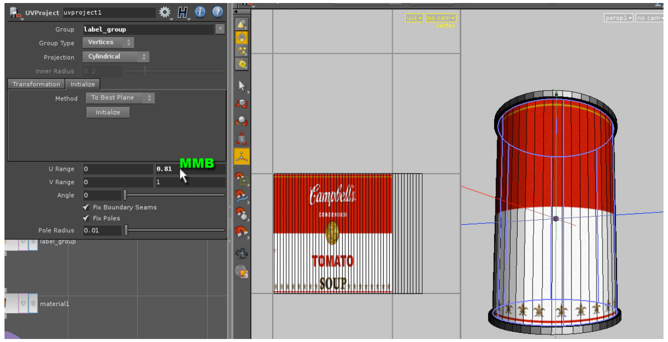


From the Initialize section of the parameters LMB the Initialize button. This will move the projection to where Houdini thinks it should be based upon the grouped geometry.

When the soup_tin geometry is examined in the Perspective View, the texturing works; however the label is a little too stretched. This can be corrected by adjusting the U Range parameter of the UV Project to:

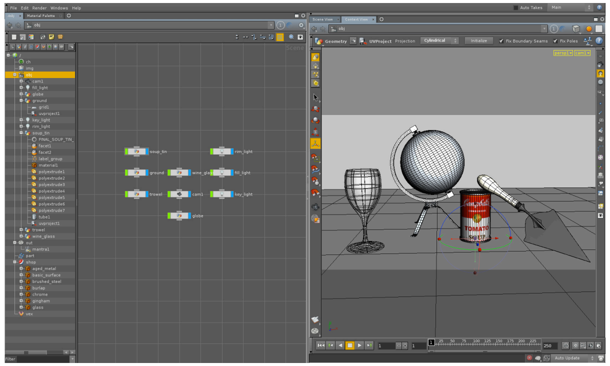
U Range	**0.01**	**0.79**

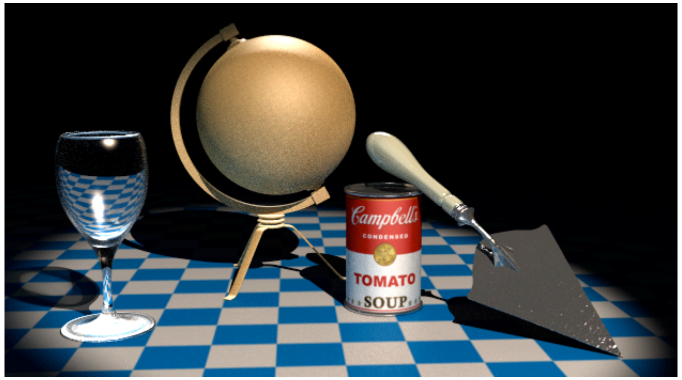




Adjusting the upper **U Range Value** will have an effect on the geometry's projection into the UV Square. This parameter adjustment will refine the aesthetic of the label projection. When modifying this parameter be aware of the texturing seam generated at the back of the soup_tin geometry. This seam will be made invisible with the correct value assigned.

The **Rotate Y** Parameter located under the **Transformation** section of the **UV Project SOP** parameters can also be adjusted to rotate the scaled label into the correct position.





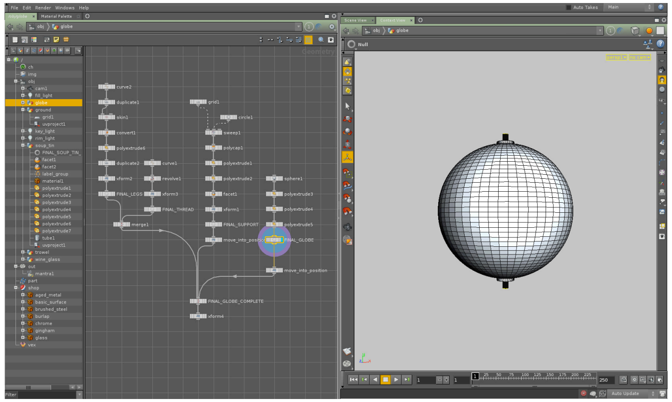
As before, a render of the scene can be generate to check the final aesthetic.

See globe_scene_stage3.hip

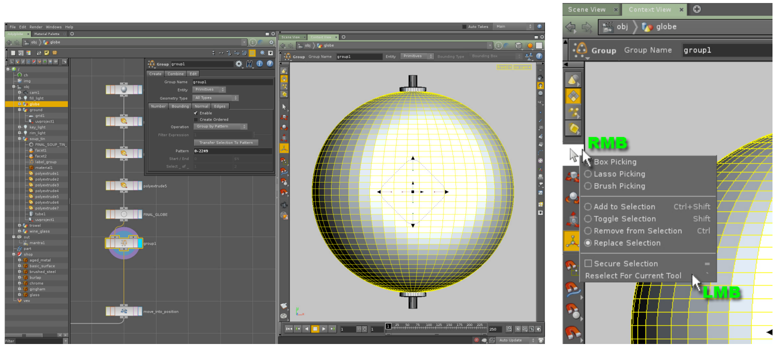
REFINING THE GLOBE

A similar texturing challenge to the soup_tin is the globe. At present this object has a wood material uniformly assigned to it. As with the soup_tin, the region of the geometry representing the globe itself can be assigned a different texture than to the wood material assigned to the stand.

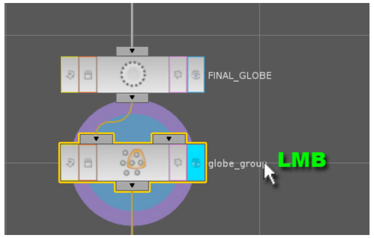
Go inside the globe object, and locate the **FINAL_GLOBE Null SOP**. Activate the **Display/Render flag** to this node. If necessary, set the Viewer only to Hide Other Objects, so that the geometry is clearly visible.



With the mouse over the Viewer, press **SPACEBAR + 3** to set the View to a **Front Orthographic View**. In this view, interactively drag select and group all of the faces of the globe itself (excluding the parts which fix the globe to the stand).

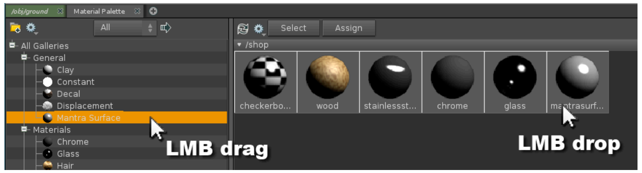


If any faces have been missed when creating this new group, the **Select button** has the **RMB** option to **reselect the geometry for the current operation**. Also, these **RMB select options** can control for example if a **selection is added to**, **replaced** or **subtracted** from the original selection. Rename the node in the Network Editor to **globe_group**



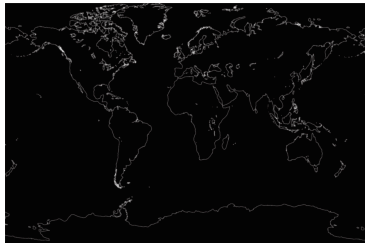
CREATING THE GLOBE MATERIAL

Switch over to the Material Palette and **LMB** drag and drop a **Mantra Surface Material** into the **/shop** palette area.



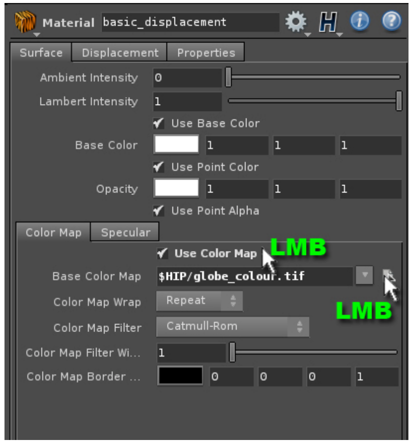
The Mantra Surface Material can be utilised for both surface and displacement shading. In the files for this lesson are two texture maps which can be assigned to the globe. One returns colour information for shading purposes, the other contains black and white information for displacement purposes.

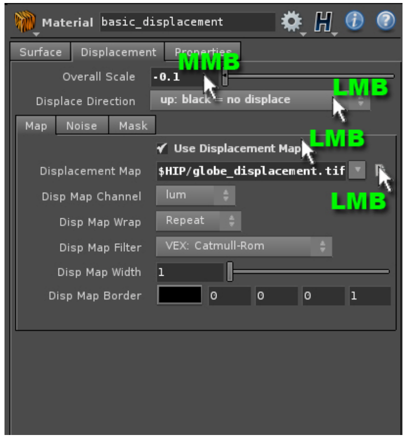
globe_colour.rat



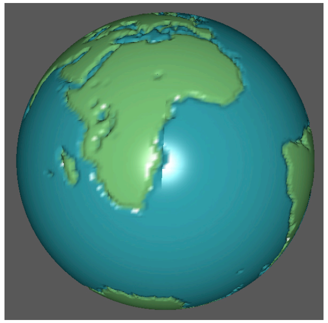
globe_displacement.rat

Locate this new **Mantra Surface Material** node in the **SHOP Level** of Houdini and rename it to **globe**. Under the **Diffuse section** of the **parameters**, activate the **Use Color Map** toggle option, and using the **File Chooser** button read in the **globe_colour.rat** image.





Under the **Displacement section** of the **parameters** activate the **Use Displacement Map** toggle option, and load into the Displacement Map parameter the **globe_displacement.tif** image file. Specify a Displace Direction of up: **black = no displace**, and specify an **Overall Scale** for the displacement of **-0.1**.

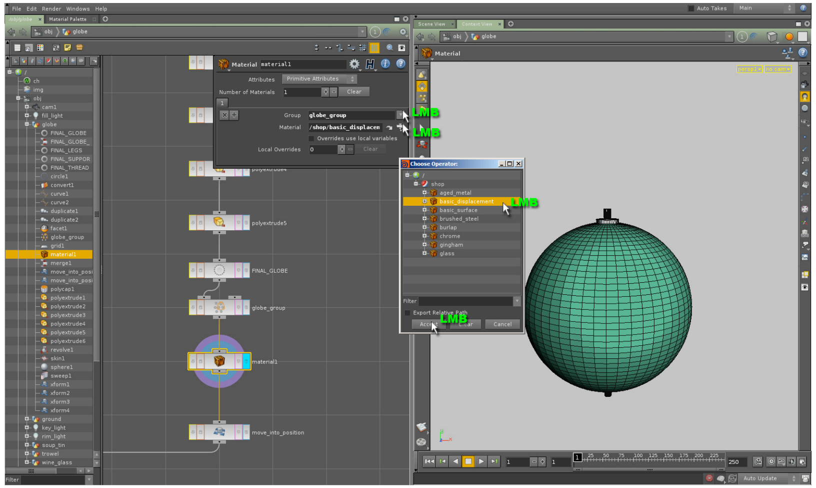


The configured material can be examined in the Material Ball View to see the effect of combining both surface and displacement shading.

Return back to the **Geometry Level** of the **globe object**. Here append to the **globe Group SOP** a **Material SOP**. In the **parameters** for the Material SOP specify:

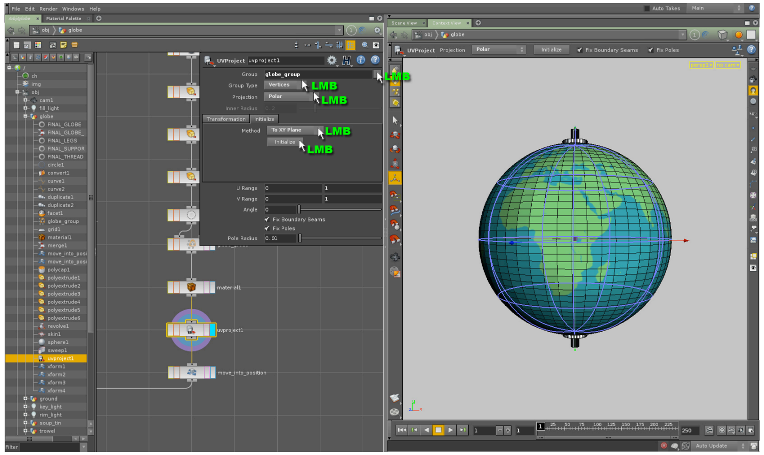
Group	**globe_group**
Material	**/shop/globe**

Use the **Operator Chooser button** to set the Material parameter to point to the globe material.



The globe_group geometry can now be projected into UV Space so that the material can be seen and rendered correctly. To the **Material SOP** append a **UV Project SOP**. In the **parameters** specify:

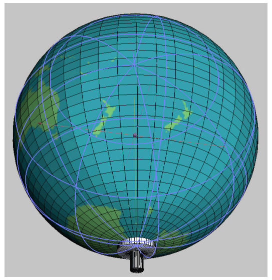
Group	**globe_group**
Group Type	**Vertices**
Projection	**Polar**

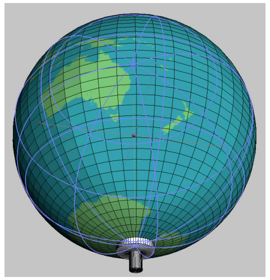


Under the **Initialize** section of the **parameters** specify:

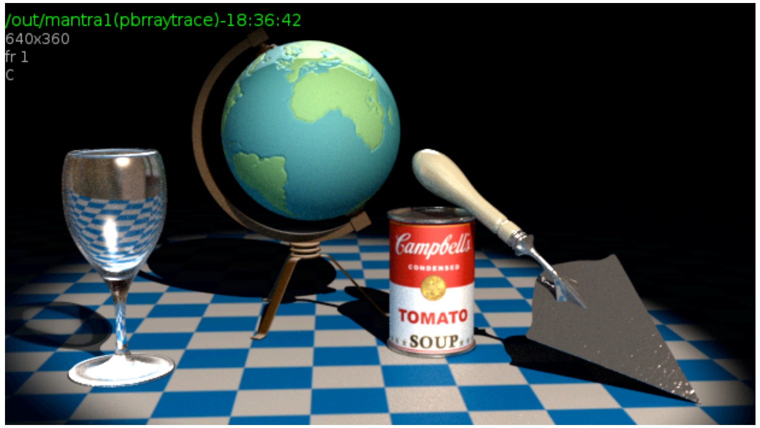
Method	**To XY Plane**

Finally press the **Initialize** button to map the projection onto the geometry.





Examination of the **Viewer** reveals that there are **two New Zealands**… As with the placement of the soup_tin label, the **second U Range parameter** of the **UV Project SOP** can be modified to correct this.



As before, the materials of the globe can be refined to produce better aesthetics.

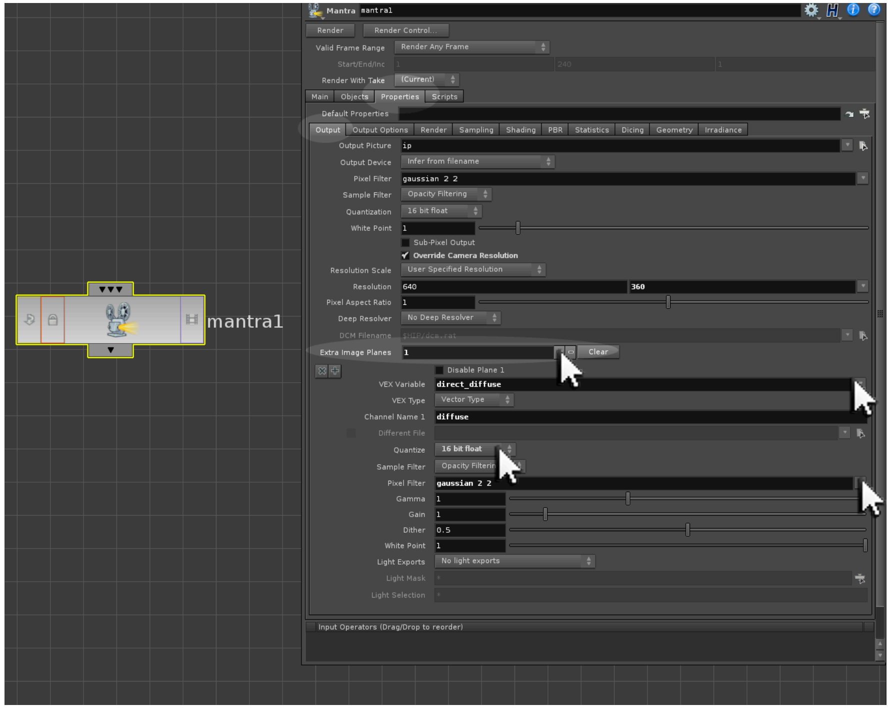
With the texturing of the globe complete, the scene can be rendered.

See **globe_scene_stage4.hip**

GENERATING RENDER PASSES

Materials created from the Material Palette can be directly outputted as render passes as well as the final image. A Render Pass contains one of the image elements, which make up the final image (for example a Reflections Render Pass would hold all of the reflection information of a scene or object).

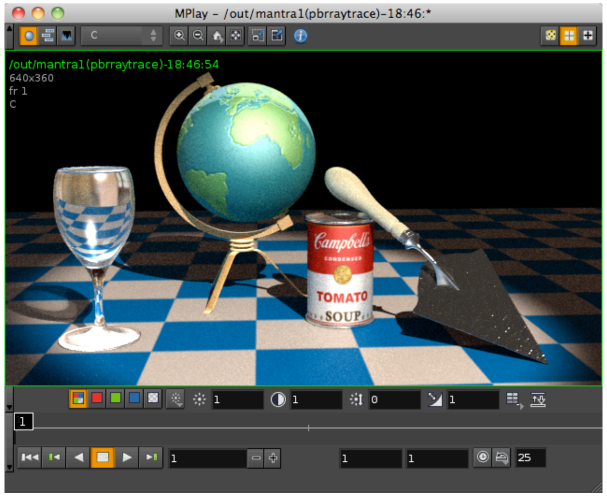
When using **Mantra PBR** (**Physical Based Rendering**), Houdini can output a number of render passes. This can be done on the **Mantra1 ROP** controlling the final output of the scene.



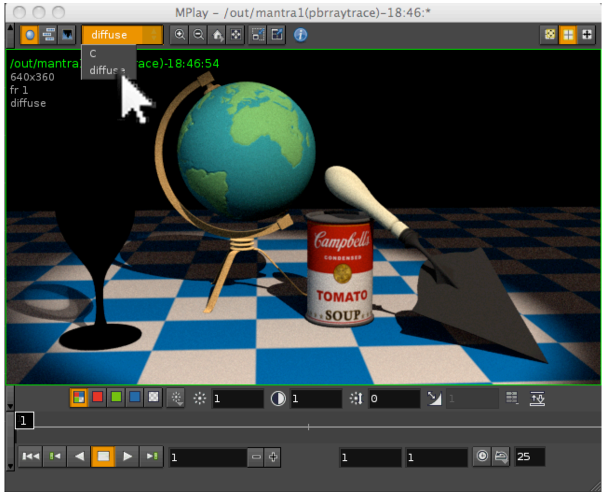
Under the **Properties > Output** section of the mantra1 ROP's parameters, locate the **Extra Image Planes** activation parameter, and create one additional image plane for the rendered image. Using the drop down menu associated with the **VEX Variable parameter**, choose **direct_diffuse**. This will tell Houdini to output all the diffuse information of the scene into this new image plane.

Specify a **Channel Name** of **diffuse**. This will be the name of the render pass, as it will be seen on the rendered image.

Set the **Quantize Parameter** to **16-bit float**, and the **Pixel Filter** Parameter to **Gaussian 2 x 2**. This will ensure the image plane renders to the same settings as the main image (found at the top of these parameter listings).



When the scene is rendered again, the main image and the diffuse render pass image can be examined.

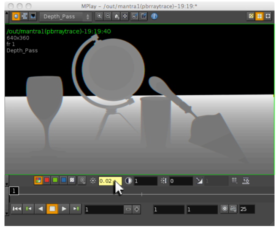


The diffuse image pass by default holds the following image components:

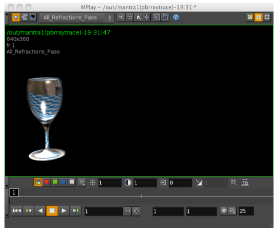
- Geometry Colour
- Scene Lighting
- Scene Shadows
- Scene Caustics

The diffuse pass will allow a composite based recreation of the original scene when additional render passes are added using Image Planes.

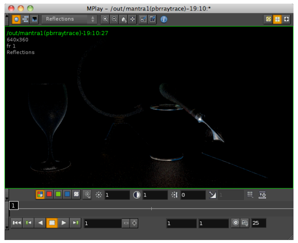
Repeat this Additional Image Plane operation creating render passes for the following VEX Variables:



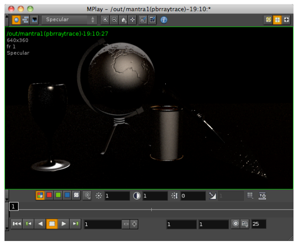
VEX Variable	Pz
VEX Type	Float Type
Channel Name	Depth
Quantize	16 Bit Float
Pixel Filter	none



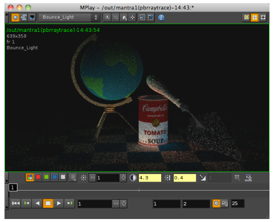
VEX Variable	Combined Refraction
VEX Type	Vector Type
Channel Name	Refractions
Quantize	16 Bit Float
Pixel Filter	Gaussian 2 x 2



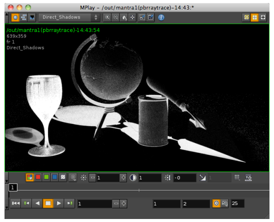
VEX Variable	Indirect Reflect
VEX Type	Vector Type
Channel Name	Reflections
Quantize	16 Bit Float
Pixel Filter	Gaussian 2 x 2



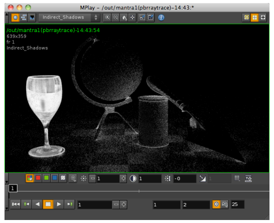
VEX Variable	Direct Reflect
VEX Type	Vector Type
Channel Name	Specular
Quantize	16 Bit Float
Pixel Filter	Gaussian 2 x 2



VEX Variable	Indirect Diffuse
VEX Type	Vector Type
Channel Name	Bounce Light
Quantize	16 Bit Float
Pixel Filter	Gaussian 2 x 2



VEX Variable	direct_shadow
VEX Type	Vector Type
Channel Name	Direct Shadows
Quantize	16 Bit Float
Pixel Filter	Gaussian 2 x 2



VEX Variable	indirect_shadow
VEX Type	Vector Type
Channel Name	Indirect Shadows
Quantize	16 Bit Float
Pixel Filter	Gaussian 2 x 2

NOTE: The Direct Shadow and Indirect Shadow Image planes are utility passes for controlling the shadows of the rebuilt image. They do not directly contribute to the rebuilding of the image from render passes.

NOTE: Physically Based Rendering and Micropolygon PBR render engines will generate these images planes. Micropolygon Rendering and Ray Trace render engines will not output Refractions or Bounce Light using this method. See the Mantra ROP Help Card for more information about image planes relative to render engine.

CAUSTICS LIGHT PHOTON MAP GENERATION

At Object Level, reactivate the **Caustics Light** in order to generate the caustic information for the render. The Caustic Light parameters also contain controls for improving the caustics aesthetics. Please see the Caustic Light Help Card for more information.

In the **parameters** for the **Caustic Light** specify:

- ☑ **Auto-generate Photon Map**
- **Photon Count** **200000**
- **Photon File** **/transfer/caustics_$F4.pmap**
- **Filter Samples** **10**
- ☑ **Prefilter Photon Map**
- **Prefilter Samples** **200**

At Outputs Level, create a new **Mantra ROP** named **caustics_photon_map** and in its **parameters** specify:

Properties > Render

Render Engine **Photon Map Generation**

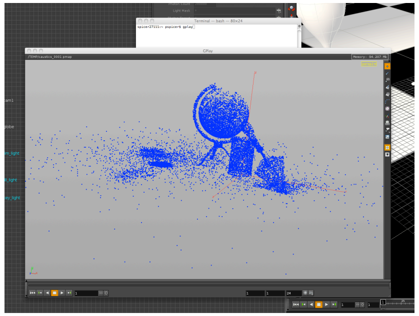
When the **Render** button is pressed, the photon map file will be generated on disk in accordance with the settings specified in the Caustics Light.

Back at **Object Level**, **deactivate** the **Auto-generate Photon Map option**. Now the photons will be read in from disk at render time.

IMPORTANT NOTE: Photon Maps should be seen as the same as Shadow Depth Maps, where for animated objects, these would need to be generated on a per frame basis.

EXAMINING PHOTON MAPS

The Houdini utility application gplay can be used to examine photon maps after they have been created. Open a Terminal Shell and type the command gplay to activate it.



As photon map data is essentially point data, Point Display of the gplay Viewer will need to be activated to see the photon data. This point data stores the additional caustics lighting information, which then gets transferred onto the geometry shading at render time.

REFINING THE RENDER AESTHETIC

At present the render still had white speckles and is of low quality. Modifying certain parameters in the main Mantra1 node at Outputs Level can rectify this. These modifications can take place using the smaller resolution rendered image, before a full resolution image is outputted. In the **parameters** for the **Mantra1 ROP**, specify:

Properties > Sampling

Min Ray Samples	**8**
Max Ray Samples	**12**

This will reduce the white speckle artefacts and the level of render noise in the final image. The render time will however increase as a result of adjusting this parameter, and therefore experimenting with these values is necessary to find the optimum trade off between render time and render quality.

NOTE: There is also the **Color Limit parameter** located under the **Properties > PBR section** of the **Mantra ROP parameters**. Reducing this parameter can also **reduce white speckles** in the render.

NOTE: At present this scene has not been optimised for rendering, and therefore render times will be longer. Render Optimisation of scenes will take place in an upcoming lecture.

NOTE: The **Environment Light** also has its own **Sampling parameter** in case its quality needs to be increased.

IMPORTANT NOTE: There is also a Pixel Samples parameter (set to 3 x 3 by default). Increasing this parameter should be seen as a last resort when improving the quality of the image due to the increase in render times it produces. This parameter will globally increase the overall sampling of the scene. Increased value settings for this parameter might include 4 x 4, 8 x 8, or 16 x 16.

REFLECTION AND REFRACTION LIMITS

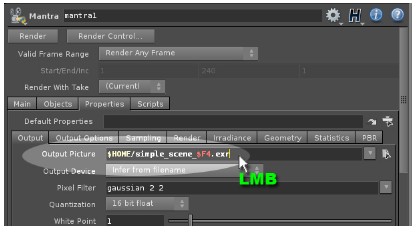
Under the **Properties > Shading** section of the parameters specify:

Reflect Limit	**4**
Refract Limit	**4**

This will reduce the number of times a ray will bounce off (reflection) or through (refraction) the scene geometry. The value for this was determined by the wine glass and the number of surfaces a ray would have to travel through it in order to penetrate fully through its surface. Modifying this parameter can help save rendering calculation time with only a negligible difference to the render quality.

RENDERING PASSES AS IMAGE FILES & SEQUENCES

As all of the render passes created have been done so using the Extra Image Plane Method, they can be rendered out to disk as a single **.exr** file image. The **.exr format** is **similar** in many ways to the **Adobe Photoshop .psd format** where the different layers of the image remain as individual separate layers.



In the **Output Picture** parameter of the **Mantra ROP**, rename the Output Picture pramater location from ip (the MPlay Viewer) to **/transfer2/globescene_$F4.exr**. This will output a file called simple_scene_0001.exr where $F4 is replaced by a padded frame number (the current frame). With the current frame set to 1, $F can be set to return the following padding options:

$F 1 $F2 01 $F3 001 $F4 0001

NOTE: single images with no Extra Image Planes set can be outputted as .tif files (these will render at 32bit even though 16bit is stated in the Mantra ROP). It is also possible to output Extra Image Planes as their own individual tif image files. It is simpler however to export a single .exr file.

A Frame Range can be created as well as a single image. To activate a frame range, modify the **Valid Frame Range** parameter to **Render Frame Range**. This will activate the Start/End/Inc parameter where the range of frames to be rendered can be set.

The $F4 option should also be specified in photon map generation, and Shadow Depth Map generation for animated scenes and objects.

REMEMBER TO DEACTIVATE THE OVERRIDE CAMERA RESOLUTION MANTRA OPTION TO GET THE FINAL FULL SIZE RENDER.

IMPORTANT NOTES:

FOR PRODUCTION RENDERING OF ANIMATED SEQUENCES, ALL FILES SHOULD BE LOCATED ON /transfer2 (1TB Hard Drive).

WHILE THIS EXAMPLE DEMONSTRATES RENDERING DIRECTLY THROUGH THE HOUDINI INTERFACE; RENDERING ANIMATED SEQUENCES SHOULD NOT BE DONE WITH HOUDINI OPEN, BUT INSTEAD RENDERED USING THE SHELL. THIS WILL BE DEMONSTRATED IN THE RENDER OPTIMISATION LECTURE.

THIS LESSON WILL HOWEVER ALLOW YOU TO GENERATE A STILL FRAME COMPOSITE IN NUKE FOR TESTING YOUR COMPOSITING NETWORK.

See file globe_scene_end.hipnc