

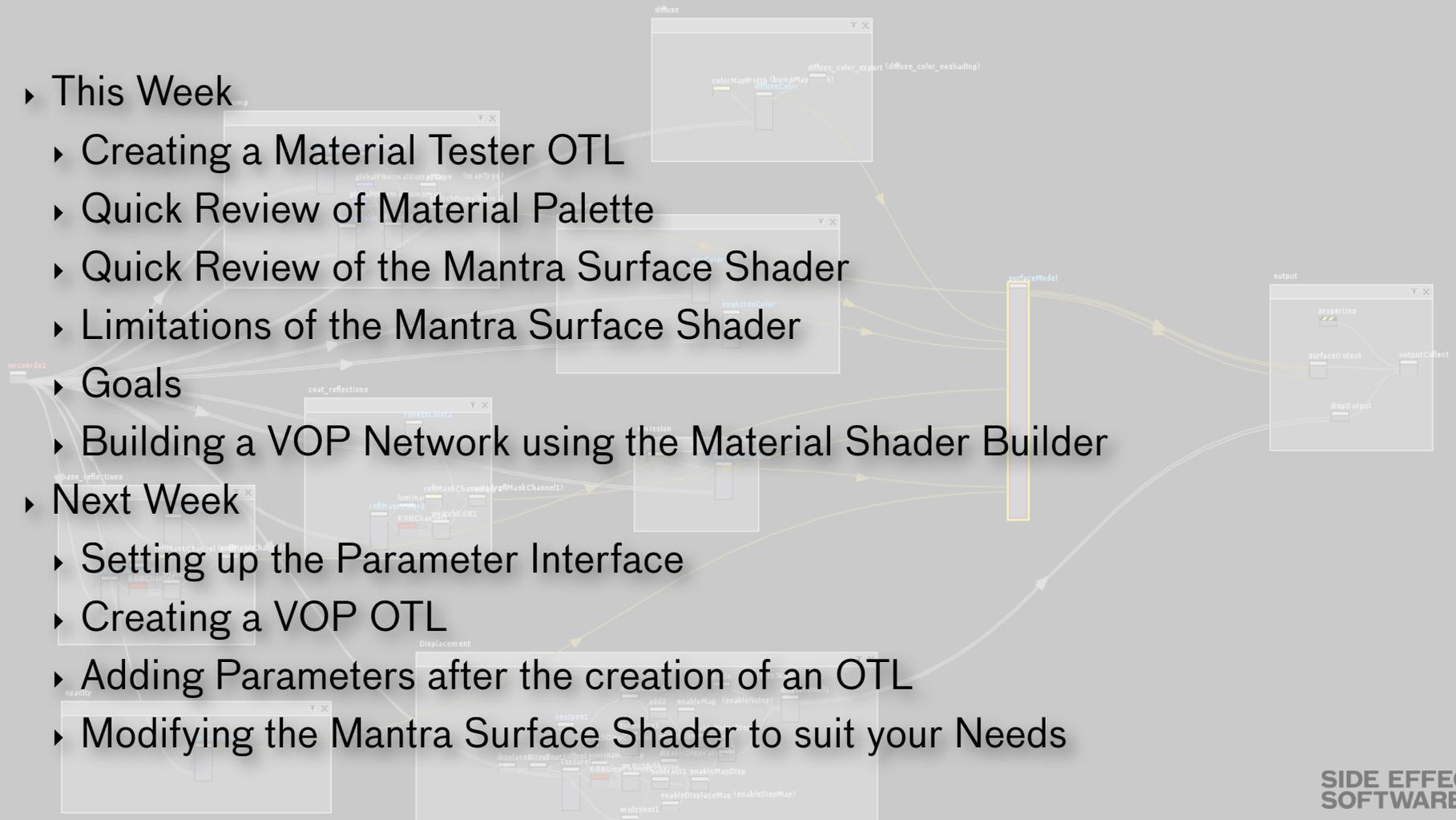
# Houdini

# Light, Shade, Render

M02: Modifying the Mantra Surface Shader

# Agenda

- ▶ This Week
  - ▶ Creating a Material Tester OTL
  - ▶ Quick Review of Material Palette
  - ▶ Quick Review of the Mantra Surface Shader
  - ▶ Limitations of the Mantra Surface Shader
- ▶ Goals
- ▶ Building a VOP Network using the Material Shader Builder
- ▶ Next Week
  - ▶ Setting up the Parameter Interface
  - ▶ Creating a VOP OTL
  - ▶ Adding Parameters after the creation of an OTL
  - ▶ Modifying the Mantra Surface Shader to suit your Needs

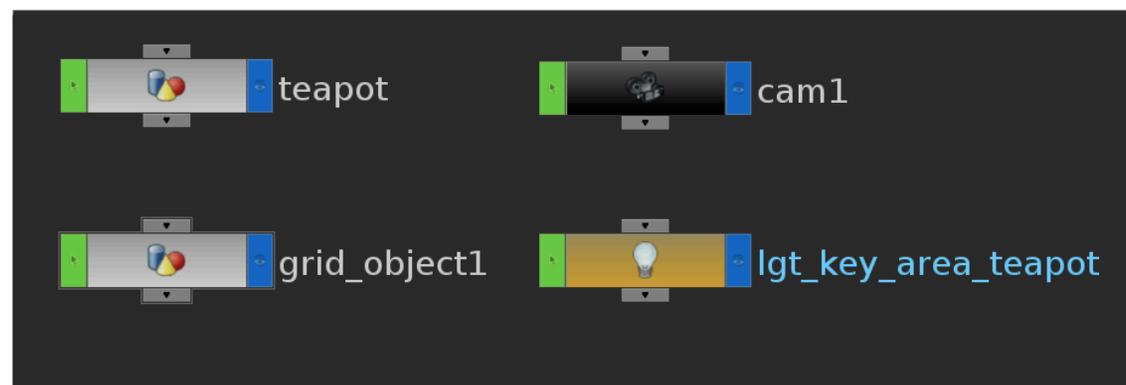




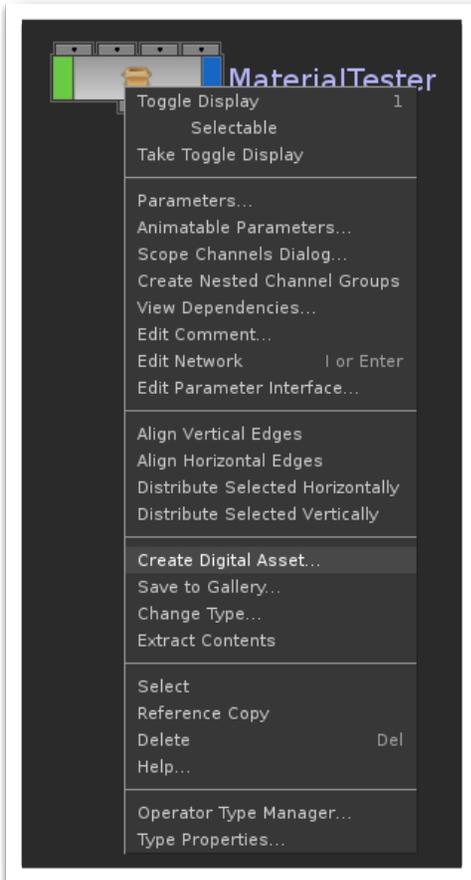
# Creating a Material Tester OTL

# Creating the Geometry, Lights, & Camera

- ▶ Create a new project folder
- ▶ Drop down a platonic teapot
- ▶ Drop down a grid
- ▶ Translate the teapot on top of the grid
- ▶ Make the grid very large (100x100)
- ▶ Zoom in on teapot and place Camera
- ▶ Drop down an area light with a nice orientation



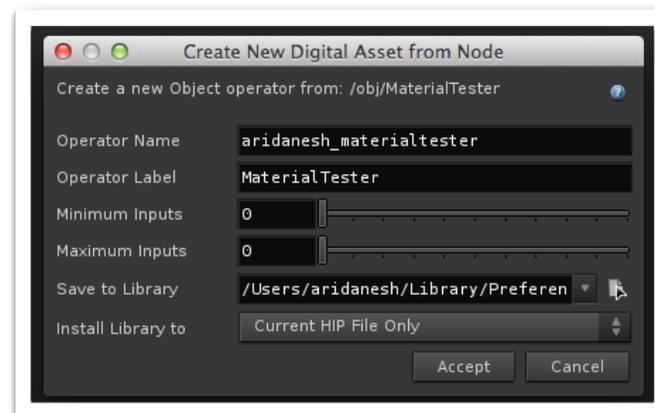
# Creating the Digital Asset



- ▶ Create a Subnet for all the items
- ▶ Name it MaterialTester
- ▶ Right Click on Material Tester and select “Create Digital Asset...”

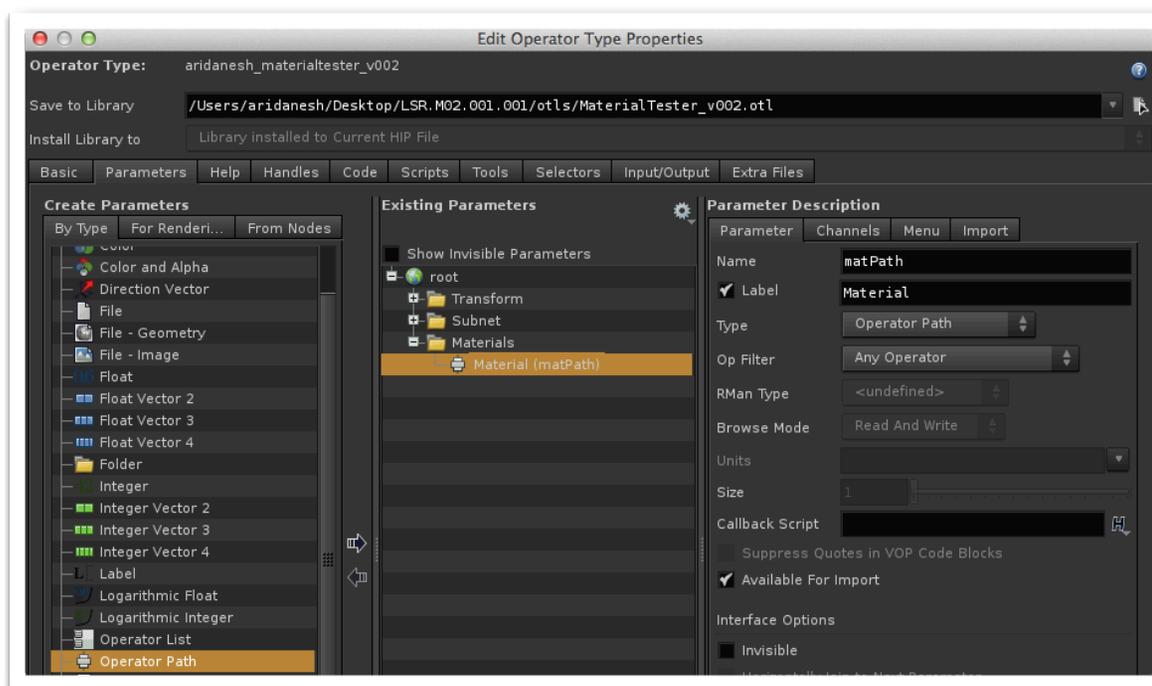
## Creating the Digital Asset (cont.)

- ▶ Create a Subnet for all the items
- ▶ Name it MaterialTester
- ▶ Right Click on Material Tester and select “Create Digital Asset...”
- ▶ In the Dialog Box that pops up:
  - ▶ Operator Name: materialtester
  - ▶ Operator Label: Material Tester
- ▶ Click on “Save to Library” to open file chooser
  - ▶ Save to - \$HIP/otls/MaterialTester\_v001.otl



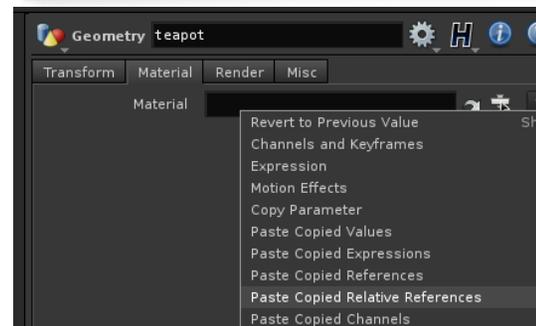
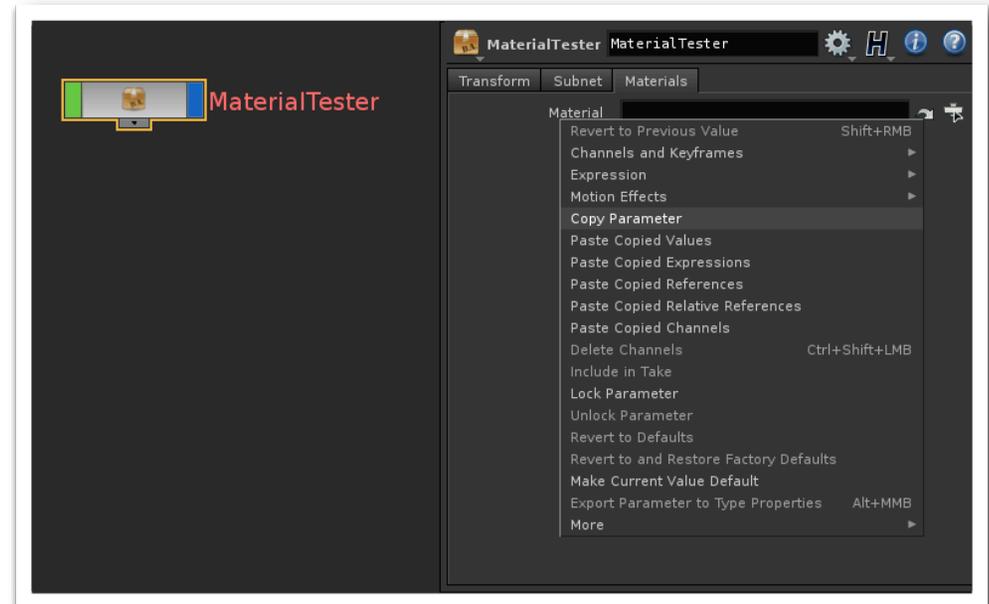
# Creating the Digital Asset (cont.)

- ▶ In the Parameters Window that opens up
  - ▶ Add a new folder
    - ▶ Label it Materials
  - ▶ In the Materials Folder
    - ▶ Add an Operator Path
      - ▶ name matPath
      - ▶ Label Material
    - ▶ Click Accept



# Creating the Digital Asset (cont.)

- ▶ Click on the Materials Tab of the MaterialTester Asset
  - ▶ Right Click on the Material Label and Copy Parameter
- ▶ Dive into the Asset and Select the Teapot
- ▶ Click on the Material Tab
- ▶ Right Click on the Material Parameter
- ▶ You will see the expression
  - ▶ ``chsop("../matPath")``



## Creating the Digital Asset (cont.)

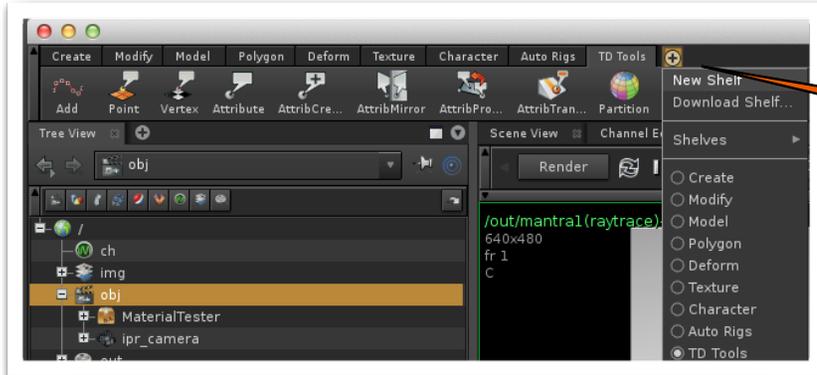


- ▶ Go back up to the /obj level
- ▶ Select the MaterialTester
  - ▶ Right Click and “Save Operator Type”
  - ▶ Right Click and “Match Current Definition”
- ▶ Text on node changes from red to blue



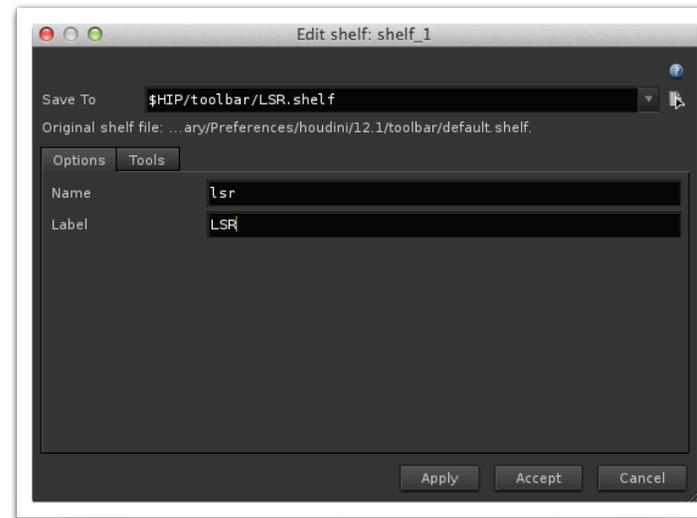
# **Making Asset into Shelf Tool**

# Creating a Toolbar

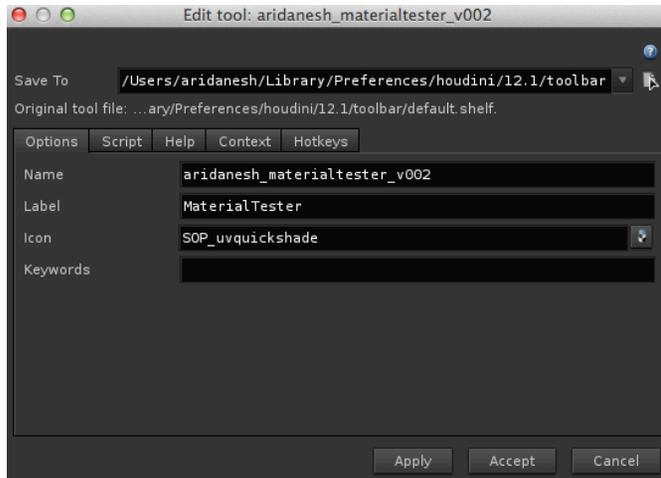


Click on “+” and  
select New Shelf

- ▶ Click the plus sign on the tool bar and select “New Shelf”
- ▶ Save to - \$HIP/toolbar/LSR.shelf
- ▶ Click Accept
- ▶ You now have a toolbar labeled LSR
  - ▶ It is EMPTY!



# Placing an Asset in the Toolbar

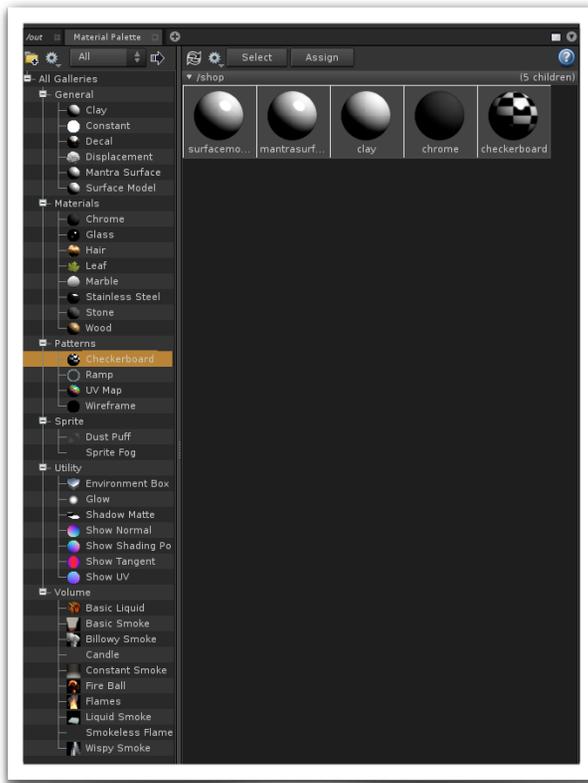


- ▶ Drag the MaterialTester Asset Node into the Toolbar
- ▶ Right Click on the Toolbar item
  - ▶ Select Edit Tool
- ▶ Save to \$HIP/toolbar/LSR.shelf
- ▶ Make the icon - SOP\_uvquickshade
- ▶ Click Accept



# Material Palette

# Material Palette



- ▶ Drop down a teapot (platonic)
- ▶ Drop down an area light & camera
- ▶ Go to render view
- ▶ Select the Material Palette tab
- ▶ Create Several Materials Including the checkerboard
- ▶ Drag the Checkerboard material on top of the teapot
- ▶ Play with the parameters

# Creating a New Material

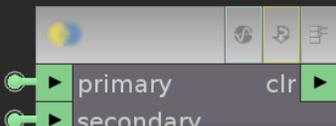
by modifying the Checkerboard material...



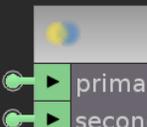
- ▶ Duplicate the Checkerboard Material
- ▶ Drag the duplicate onto the teapot
- ▶ Double Click on the material to get into VOPS
- ▶ Examine the Network

# Creating a New Material (cont.)

colormix1



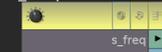
colormix1



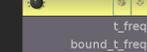
uvcoords2



s\_freq



t\_freq



checked1

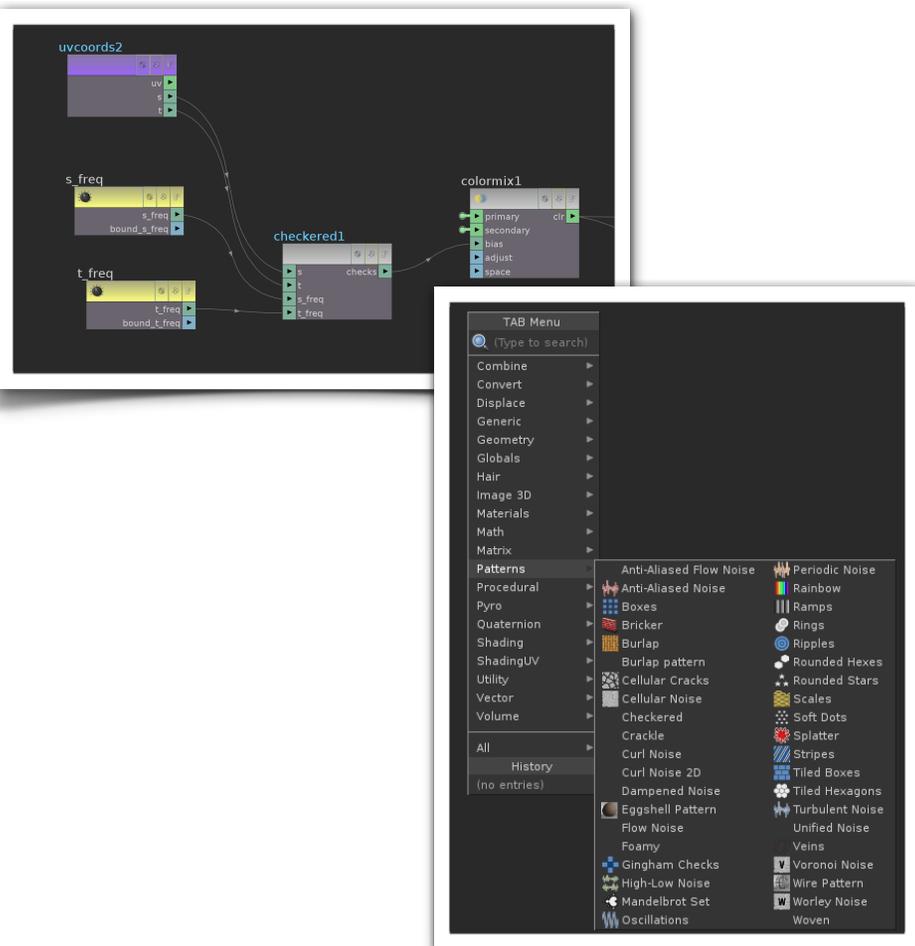


colormix1



- ▶ Notice the peg that does not have a round end
- ▶ Click on the peg to select it and then right click for menu
- ▶ Select Expose inputs (several new nodes appear)

# Creating a New Material (cont.)



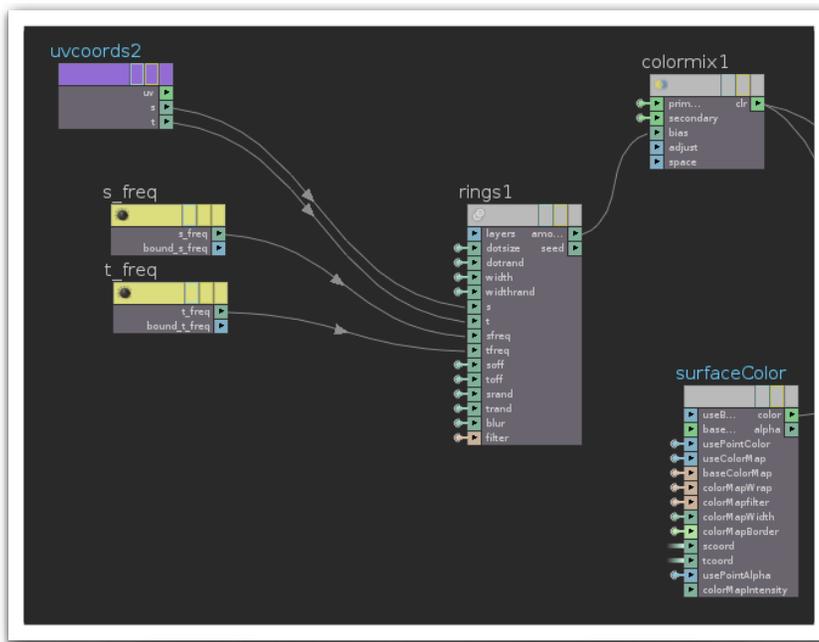
- ▶ The key node here is checked
- ▶ Is part of the Pattern Family of nodes
- ▶ Let us make a circle pattern material instead
- ▶ Drop down a Rings node

# Creating a New Material (cont.)



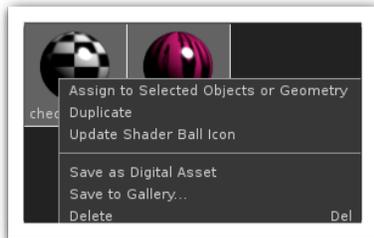
- ▶ Notice it has the same s, t, sfreq, and tfreq as the checkered node

# Creating a New Material (cont.)

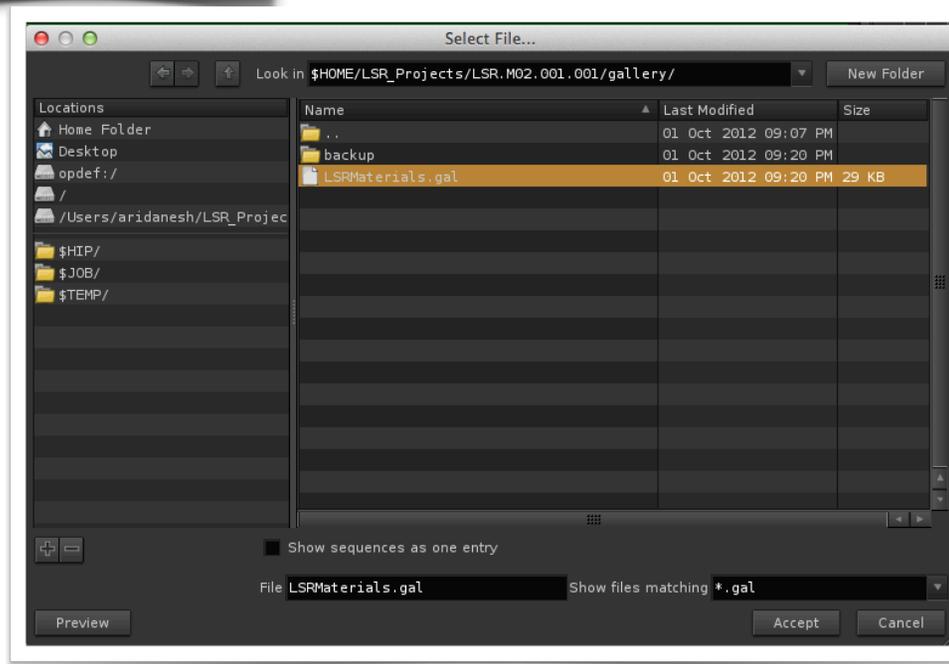


- ▶ rewire the network using the rings node
- ▶ delete the checkered node
  - ▶ Now promote all of the parameters in the rings node except for layers
- ▶ Go up one level and play with the parameters
- ▶ Notice the user interface is not great
  - ▶ Go into render interface editor and move parameters under patter and click accept
  - ▶ Much better

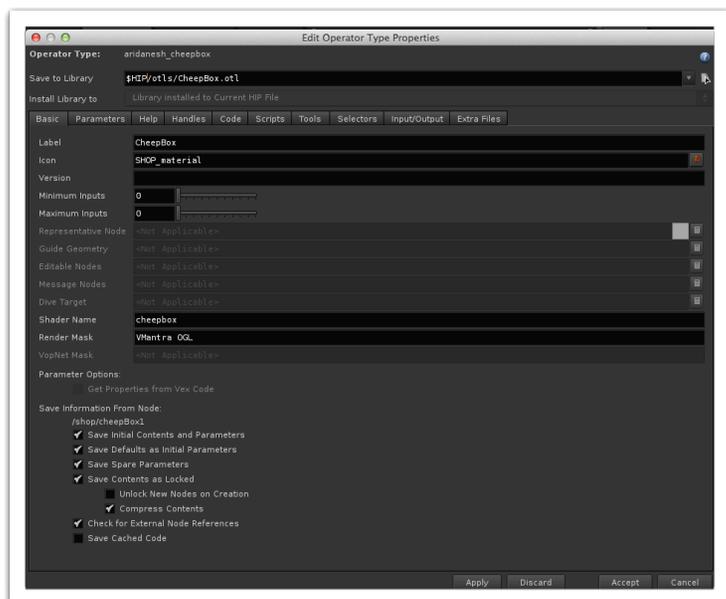
# Making a Gallery



- ▶ Select the Material in the Material Palette
- ▶ Right Click on it and choose “Save to Gallery”



# Making a Digital Asset



- ▶ Same steps as making Gallery Item but..
  - ▶ Right click on material and click on Create Digital Asset
  - ▶ Save to Library
    - ▶ \$HIP/otls/CheepBox.otl
- ▶ To use Digital Asset
  - ▶ Create SHOPNET
    - ▶ Hit Tab Key
      - ▶ Under Digital Assets - Choose your material



# Different VOP Models

# From Heavy to Light



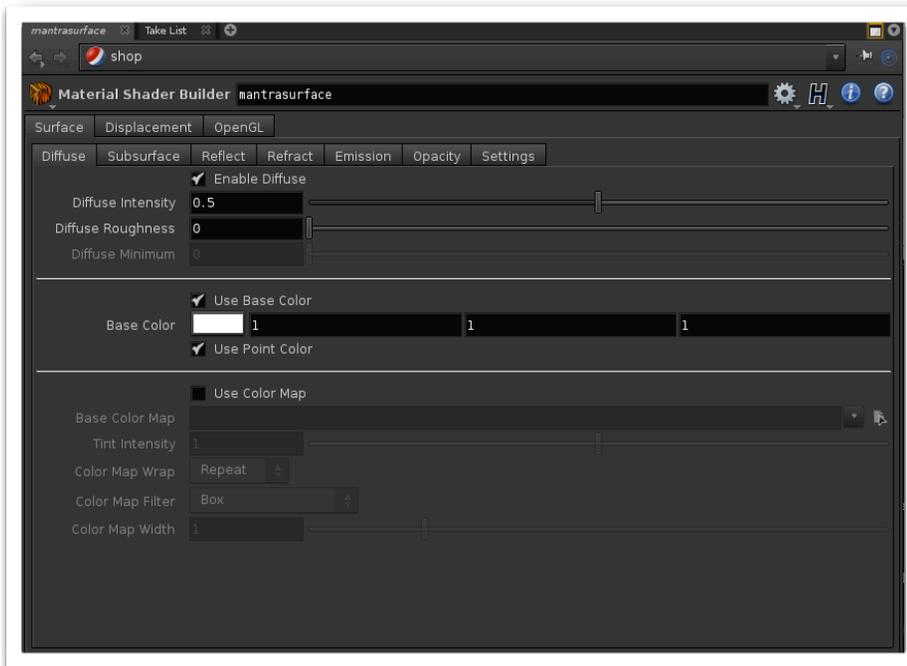
- ▶ **Every shader has to be compiled**
  - ▶ When developing pieces of a shader you do not want to be bogged down waiting for compiles
- ▶ **Mantra Surface Shader - Uber Shader**
  - ▶ Very complete shader.
  - ▶ Artist can do most of his work without diving into VOPs
  - ▶ Long compile times - When Modifying Shader in VOPs
- ▶ **Surface Model - Bare bones shader with just a surface shader built in**
  - ▶ Faster Compile Times
  - ▶ Limited functionality
  - ▶ Good place to start building your own shaders
- ▶ **Material Shader Builder - Contains only Global Variables**
  - ▶ Must build everything from scratch
  - ▶ Labeled VOPMaterial



# Quick Review of Mantra Surface Shader

- ▶ Surface tab contains sub tabs for
  - ▶ Diffuse
  - ▶ Subsurface
  - ▶ Reflect
  - ▶ Refract
  - ▶ Emission
  - ▶ Opacity
- ▶ Displacement tab contains sub tabs for
  - ▶ Displacement
  - ▶ Bump
  - ▶ Normal Maps
  - ▶ Open GL Shader

# Limitations of Mantra Surface Shader



- ▶ The Mantra Surface Shader is a very good starting point for the Shader Artist
- ▶ It lacks some nuances that would help the Shader Artist
- ▶ Examples
  - ▶ No Maps for Diffusion on Roughness
  - ▶ No Grunge Maps
  - ▶ No ability to blend between maps



# **Project for Module 02**



Modify the Mantra Surface  
Shader to Suit your Needs!

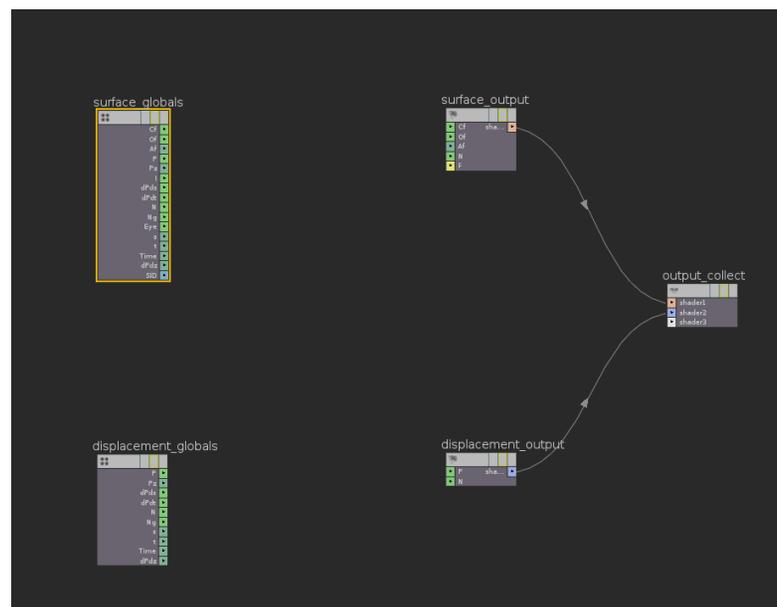
- ▶ Add the capability to incorporate
  - ▶ Diffuse Intensity Maps
  - ▶ Roughness Maps
  - ▶ Mix Color Maps with Grunge Maps
- ▶ Extract the Capability Created
  - ▶ Make it Generic
  - ▶ Wrap it up as a Digital Asset



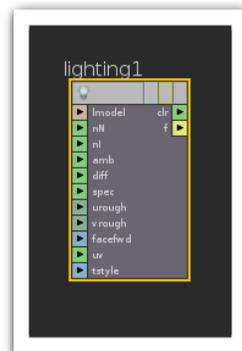
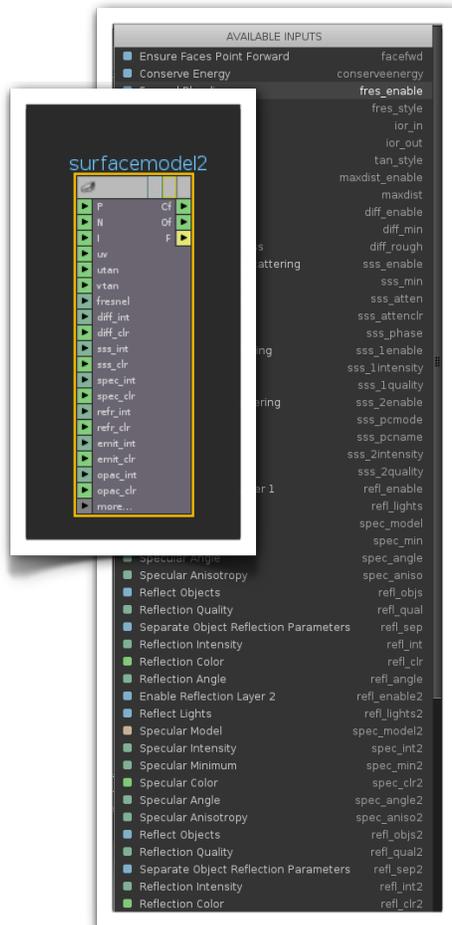
# **Building a VOP Network using the Material Shader Builder**

# Why Use the Material Shader Builder

- ▶ As stated earlier the Mantra Surface Shader is very complete
  - ▶ But making changes to it is very slow because
    - ▶ Shaders get compiled with every change
    - ▶ The shader is very large so compilation times are large
- ▶ Use the Material Shader Builder
  - ▶ Great test bed for iterating through changes quickly
  - ▶ Networks created can be copied and pasted into Mantra Surface Shader



# Surface Model vs Lighting Model VOP



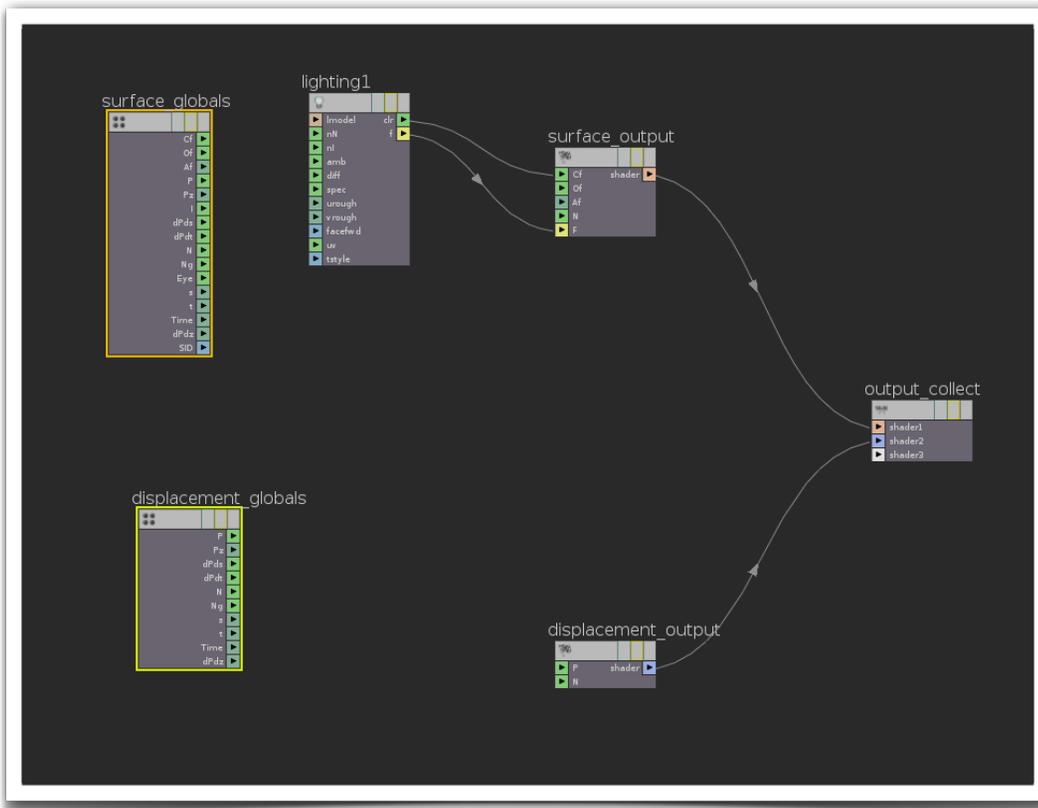
- ▶ The Surface Model is ultimately what you want to use
  - ▶ Has a huge assortment of available inputs to create your shader
  - ▶ While faster to compile than using the full Mantra Shader still sluggish
- ▶ Lighting Model is antiquated, but...
  - ▶ Very light weight
  - ▶ Compiles changes quickly
  - ▶ Great for testing shader networks

# Surface Color VOP



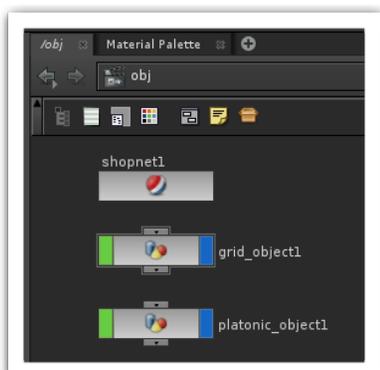
- ▶ Generates a basic color with a choice of tinting with the point color and/or a color map.

# Test Bed to Work With

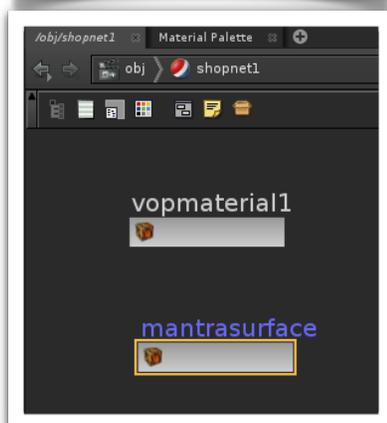


- ▶ At the Object Level (Scene)
  - ▶ Drop down a SHOPNET
  - ▶ Dive Inside the SHOPNET
- ▶ Drop down a Material Shader Builder
  - ▶ The Node will be labeled vopmaterial1
- ▶ Dive inside vopmaterial1
  - ▶ Drop down a lighting model
  - ▶ wire color out to surface output color
  - ▶ wire f out to f in

# Why Work at the Scene Level

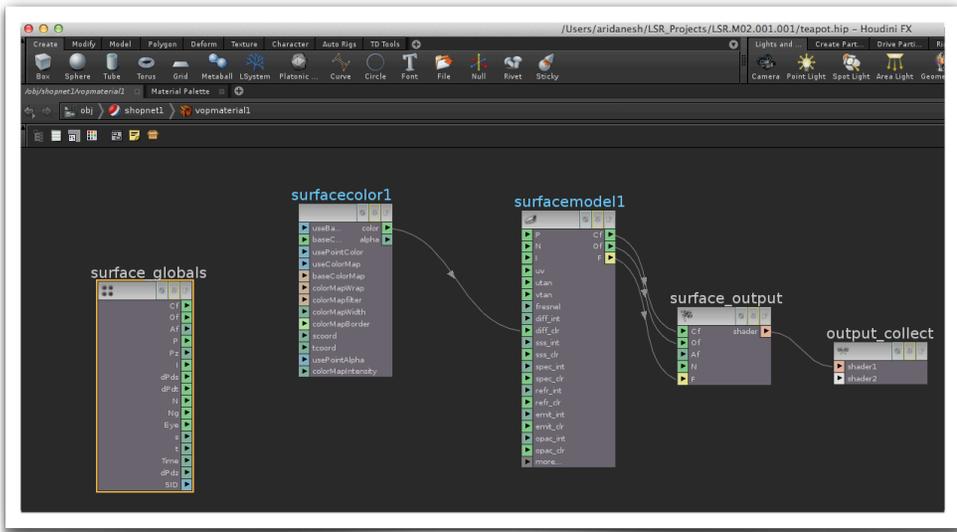


- ▶ Personal Choice
  - ▶ Like being able to package Materials and Objects into Subnets
  - ▶ Easier to make into HDA with everything at object level (for me at least)
- ▶ Dive into the SHOPNET
  - ▶ Copy and paste a Mantra Surface shader from the SHOP folder
  - ▶ Drop down a Material Shader Builder





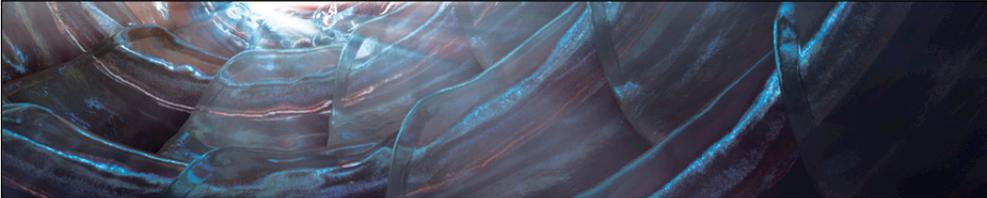
# Most Basic Network



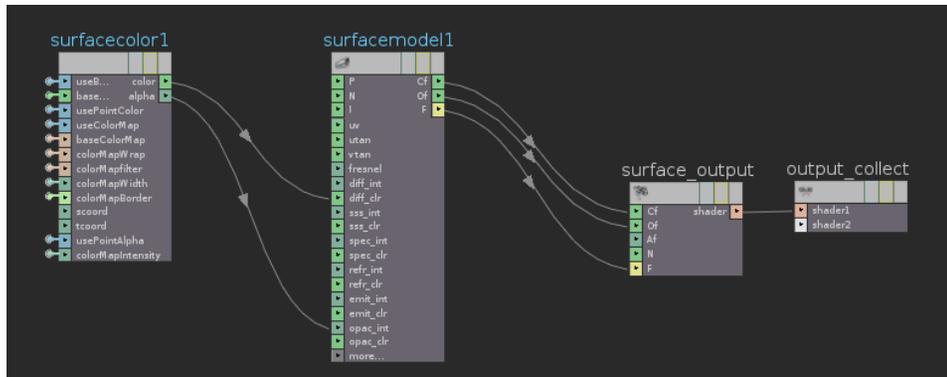
- ▶ Drag the VOP Material onto the teapot
- ▶ Dive into the VOPMaterial
- ▶ Delete the displacement nodes
- ▶ Drop down a Surface Color Node
- ▶ Drop down a Surface Model Node
- ▶ Delete Displacement nodes
- ▶ Wire as shown

- ▶ Surface Color Node - Generates a basic color with a choice of tinting with the point color and/or a color map.
- ▶ With this VOP the UI is already correctly setup.

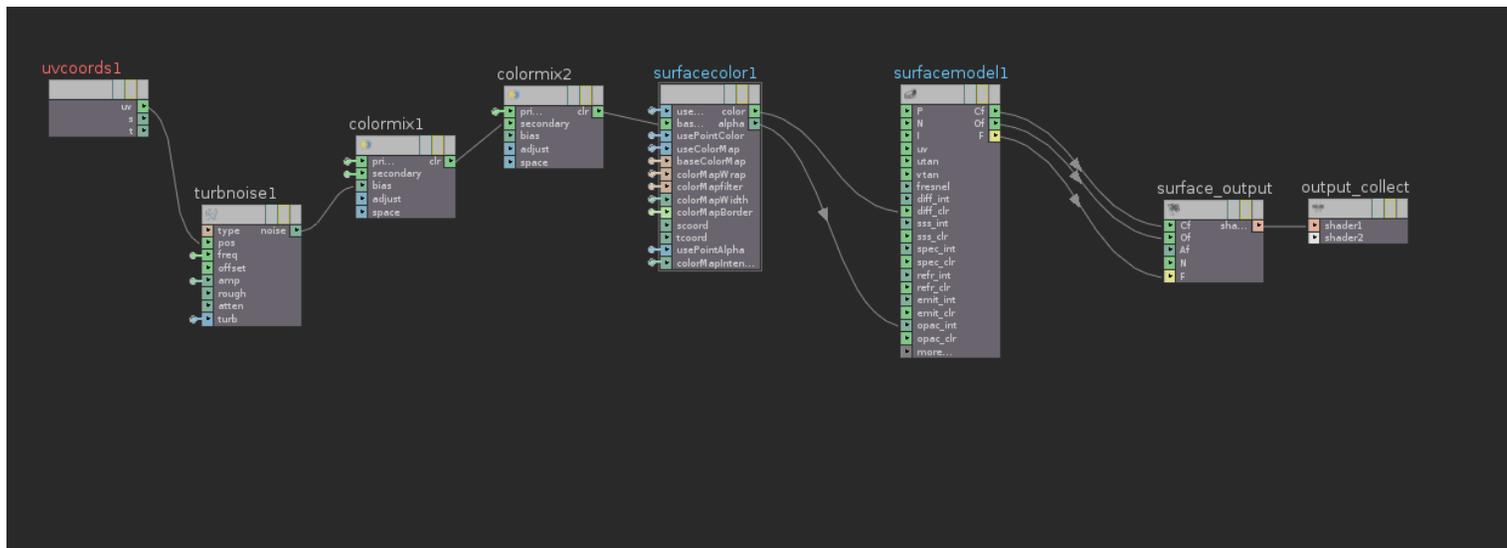
▶ Surface Model - This node is a fully featured model of surface shading. It supports diffuse, specular, and refractive components and computes direct lighting (from light sources) and indirect lighting (lighting bouncing off other objects in the scene).



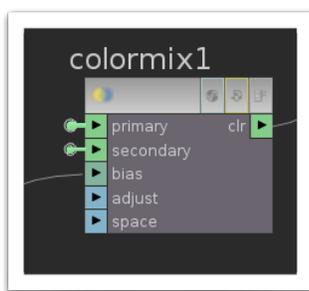
# Expanding the Network



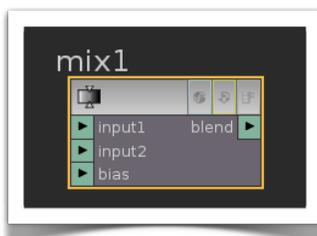
- ▶ Promote the base color parameter of the Surface Color
- ▶ In the parameters view click on the shaders view menu for base color
- ▶ Select mix with color and perlin noise



# Color Mix vs Mix Nodes

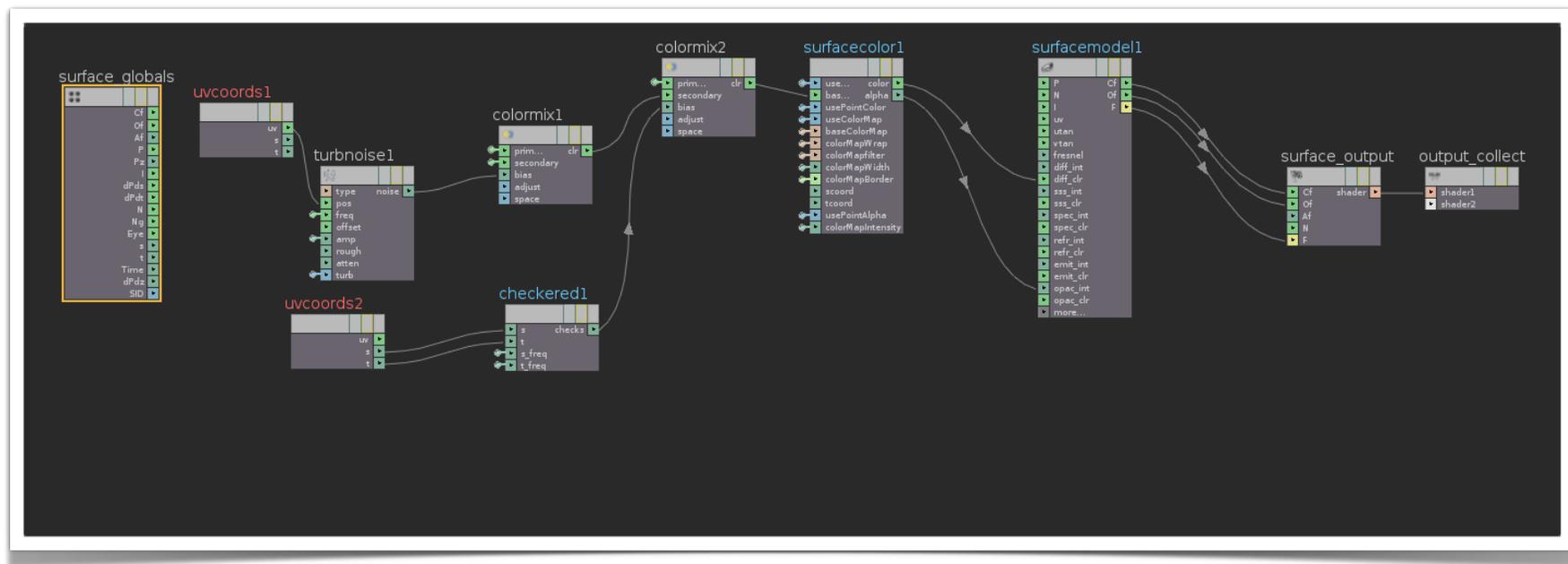


- ▶ Color Mix is used for mixing colors
- ▶ Mix for gray scale or luminance

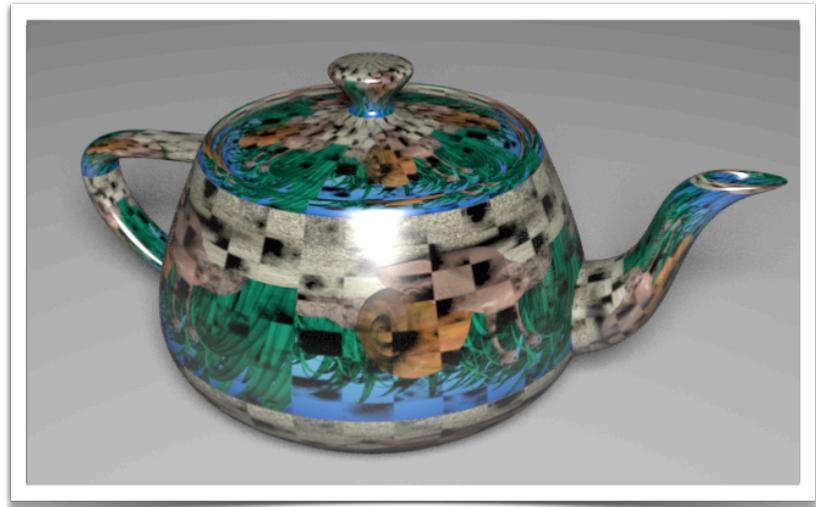
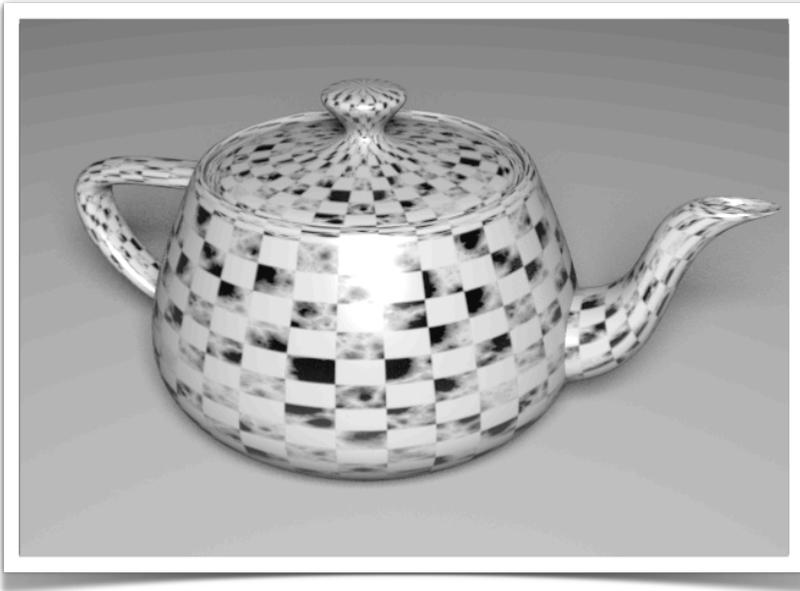


# Expanding the Network (cont.)

Adding Checkered to create checkered marble..



Result so far...



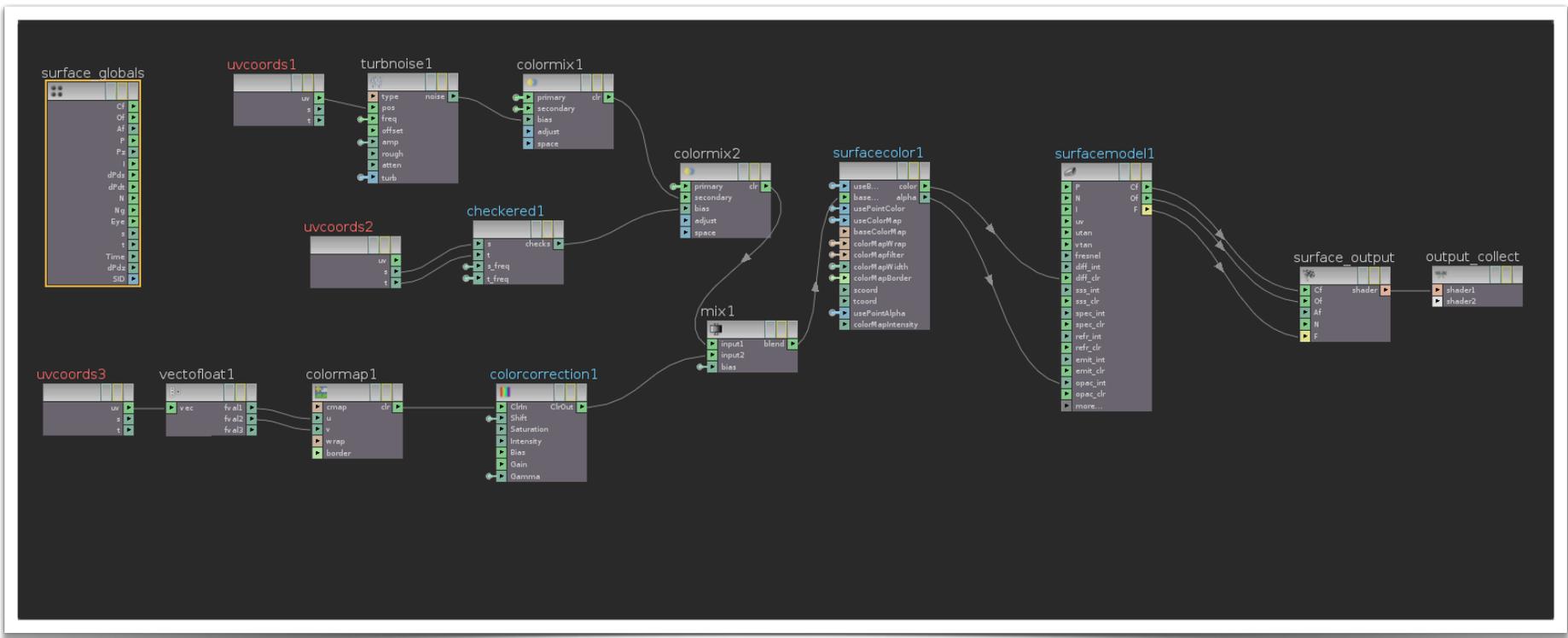
You can still use a color map and blend with patterns



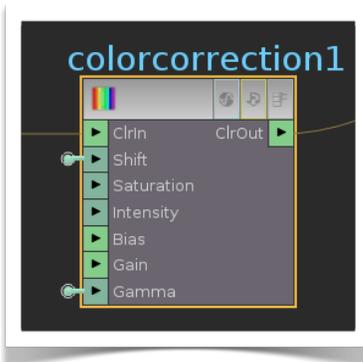
## One thing I do not like...

- Where is the Gamma Control for the Texture map?
  - Last week we said we had to convert images to linear space
- Let's fix this
  - Delete the input for "useColorMap"
  - Delete the input for "baseColorMap"
  - Add a Texture VOP
  - Add a Color Correct VOP
  - Add a uv parm. Wire as shown on next slide

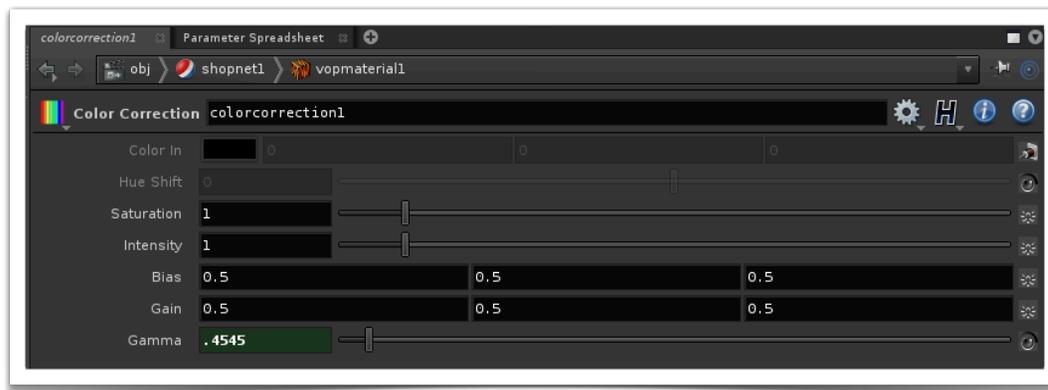
# Color Corrected Network



# Using the Color Correct Node



- ▶ We will use it here to correct image maps to linear color space
- ▶ If you need only to correct 2.2 Gamma to Linear workspace divide by  $(1/2.2 = 0.4545)$



# What is Diffuse Intensity & Diffuse Roughness



high diffusion



low diffusion

- ▶ Diffuse Intensity - The proportion of incoming light reflected back as the diffuse component, from 0 (no diffuse reflection) to 1 (all incoming light is reflected).
- ▶ Diffuse Roughness - A floating point value used to control the size or spread of the diffuse component. Higher values make the surface look less glossy with flatter color

How do I make the noise blender section into an otl?



NEXT WEEK