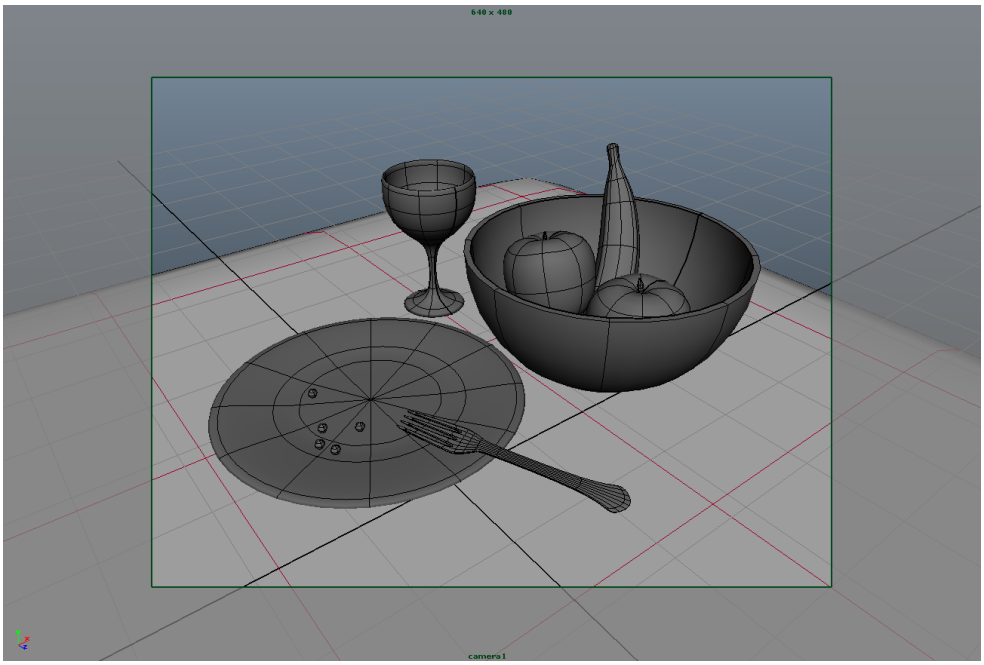
Maya 2014 - Still Life Part 1 - Texturing & Lighting

Realistic lighting and texturing is the key to photorealism in your 3D renders. Objects and scenes with relatively simple geometry can look amazing with the proper light and texture set up. By incorporating a variety of textures and lights, we can really make our models shine! For this project, we will be working from a fairly straightforward still life scene, much like you would see in an introductory painting or drawing class. A future lesson will focus more on tweaking the render settings to give our renders that extra level of shine and polish.

Scene overview

- Open up the still life scene file and you'll be greeted with this image of the scene:



- As you can see, I have created a still life scene from a mix of **Polygon** and **NURBS** objects on separate layers. Go to the **Outliner** to check out the group/object structure.
    - Applying basic materials and textures is the same for both types of objects. However, UV unwrapping and mapping is very different, as NURBS have inherent UV coordinates and polygons do not until they are created.
- You may notice several things about this scene:
    - If you move the perspective camera around and then adjust the time slider at the bottom, the camera snaps back into place. This is because we have created a new **virtual camera** and **keyframed** it's **Translation** and **Rotation** Values so that we can consistently render from one angle. To do this for yourself:
        - Go to **Create/Cameras/Camera.** You can create a **Camera and Aim** or **Camera, Aim and Up** for additional controllable objects attached to the

camera.

- To switch between our fixed camera and the perspective view, **select** the appropriate view inside the viewport in **Panels/Pespective**
- With the camera selected, you can adjust a variety of attributes in the **Channel Box** that correspond to real world settings, such as **Aperture**, **Focal Length**, **F Stop** and **Shutter Angle**. **Center of Interest** corresponds with where the camera is focusing and comes into play if you use Maya's built-in **Depth of Field** rendering.

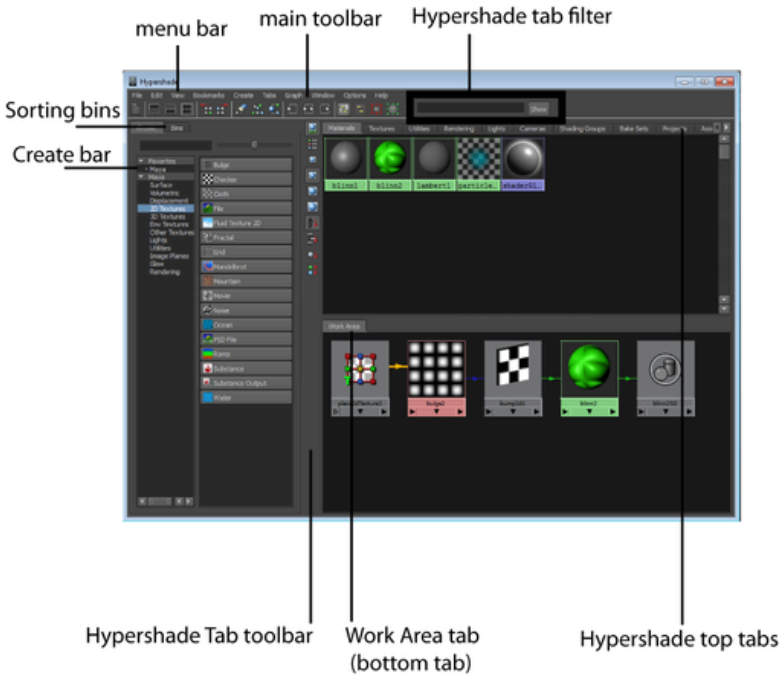
- **Select** the camera in the **Outliner** and select the name of all of its **Translate** and **Rotation** values. Press **S** to **set a keyframe** on the first frame of the animation slider, or **right click** on the selected attributes and select **"Key Selected."**

- There is a box with a green border within our viewport with a resolution displayed at the top. This is called a **Resolution Gate**, which indicates the frame that will be rendered with our current settings. Go to **View/Camera Settings** to enable or disable it.

- Now that we understand the elements of our scene, let's start slapping on some basic materials!

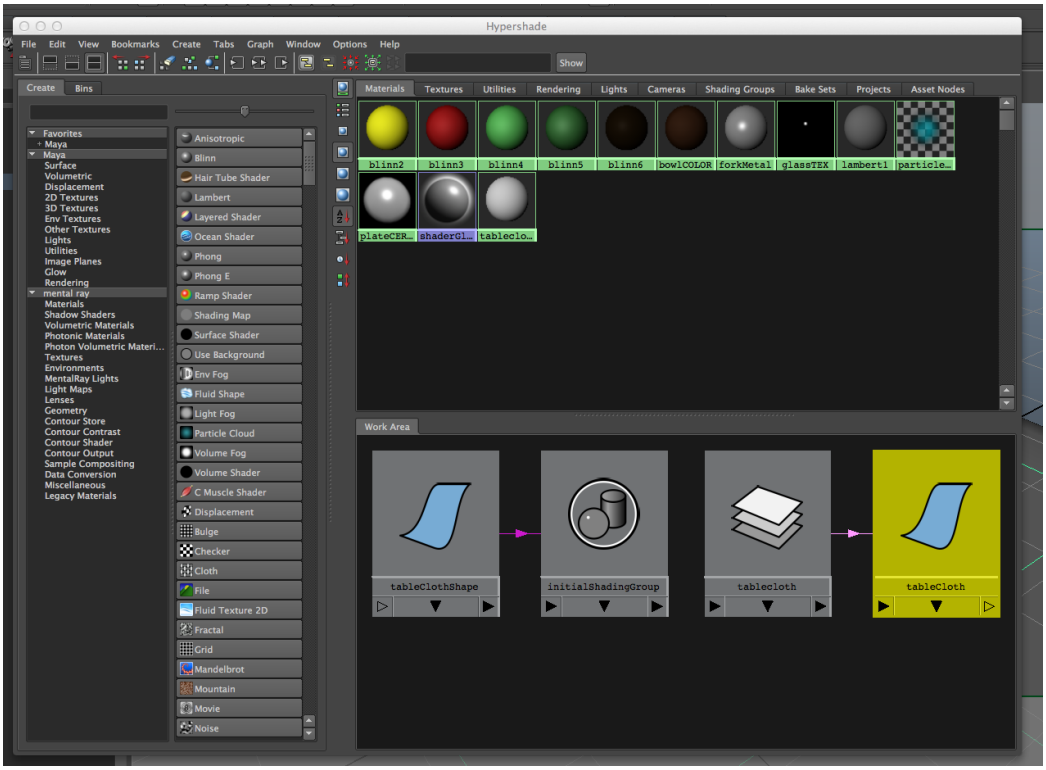
Intro to the Hypershade Editor

- The **Hypershade Editor** allows you to view, edit and apply different **Materials** and **Textures** to our models, as well as see complex connections between nodes.
- Go to **Window/Rendering Editors/Hypershade** to open it. The different elements of the Hypershade are:

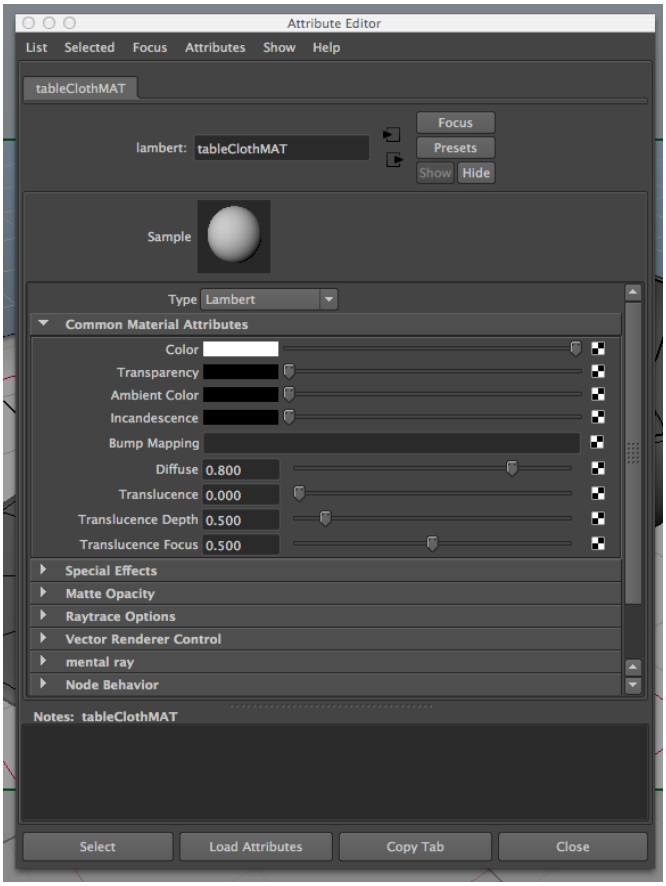


- **Menu Bar:** File, Edit, View, Bookmarks, Create, Tabs, Graph, Window, Options, Help
- **Main Toolbar**: Contains different display options, including,
    - Show tob, bottom and top+bottom tabs
    - Display Input and Output connections
- **Tab Filter:** Type in the tab filter to display nodes that match a search query
- **Sorting Bins:** Create bins to organize your materials by type
- **Create Bar:** Create new **Maya** and **mental ray** materials, lights and other objects selecting from the menu
    - Click on the node types on the left to only display certain types of materials/shaders/etc... **Shift Click** to highlight multiple categories
- **Top Tabs:** Displays all of your scene Materials, Textures, Utilities, etc..
- **Work Area (Bottom) Tab:** Temporary work area which you can use to view and edit connections between objects and materials

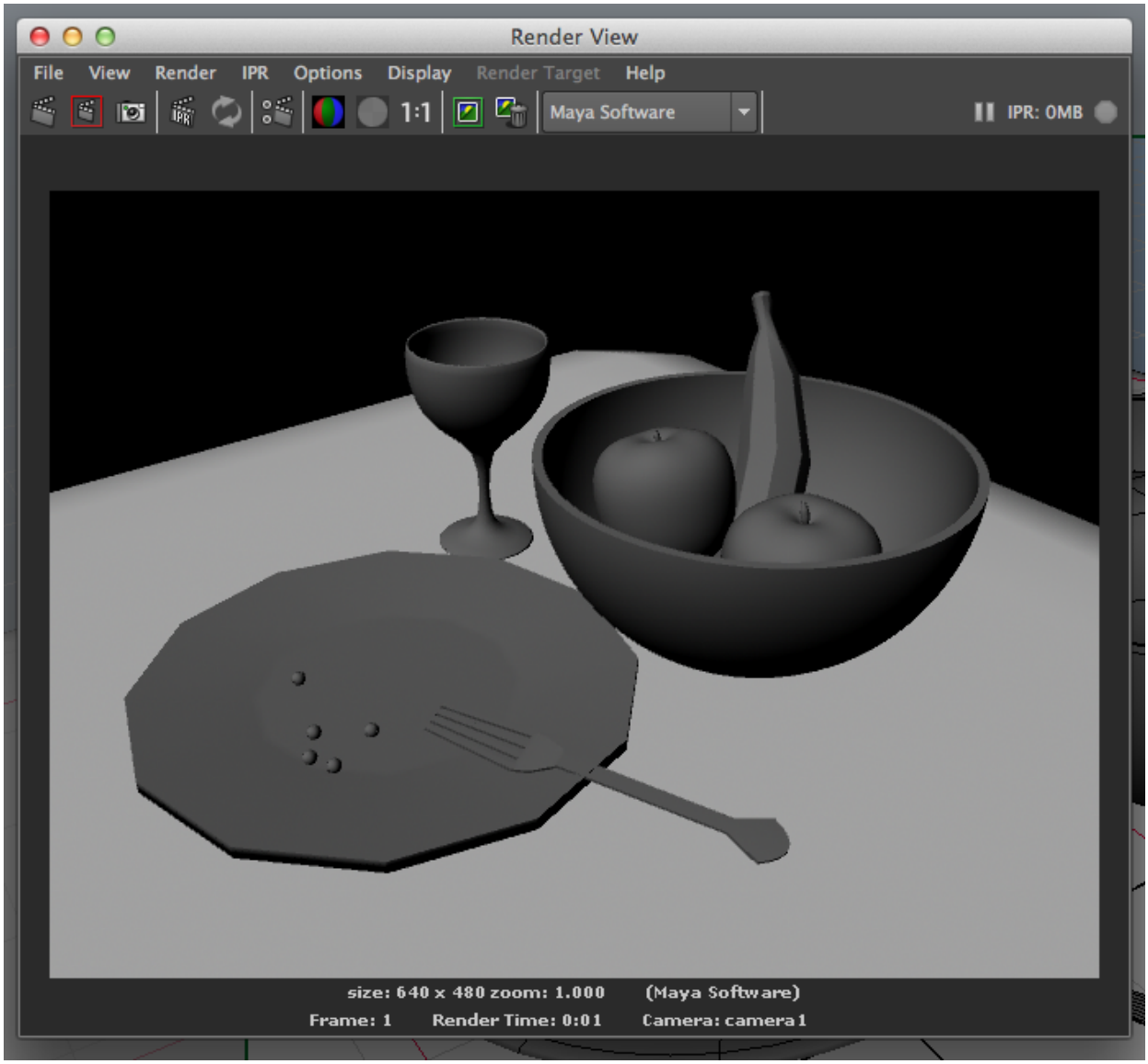
- Let's use the **Hypershade** to add a material to our tablecloth.
- **Unlock** the tablecloth layer and select it in our **Camera** view.
- In the **Hypershade Menu**, go to **Graph/Input and Output Connections** to view all of the incoming and outgoing nodes connected to that object. These nodes include:
    - **Creation**, **Shape**, **Shading Group** and **Layer** nodes
    - You can also graph the **In** and **Out** connections by clicking on the **three corresponding buttons** on the top of the **Hypershade** window.



- As you can see in our **Perspective view**, the tablecloth already has a material applied to it. Let's create a new one:
    - Go to **Graph/Clear Graph** to clear the bottom **Work Area**.
    - Create a new **lambert material** by clicking on "Lambert" from the list of materials in the Create bar.
    - **Double click** on the new **lambert material** to open it in the **Attribute Editor**. We will now define some of its attributes:
        - Change the name to **"tableClothMAT"**
        - Click on **Color** and change it to a pure white color

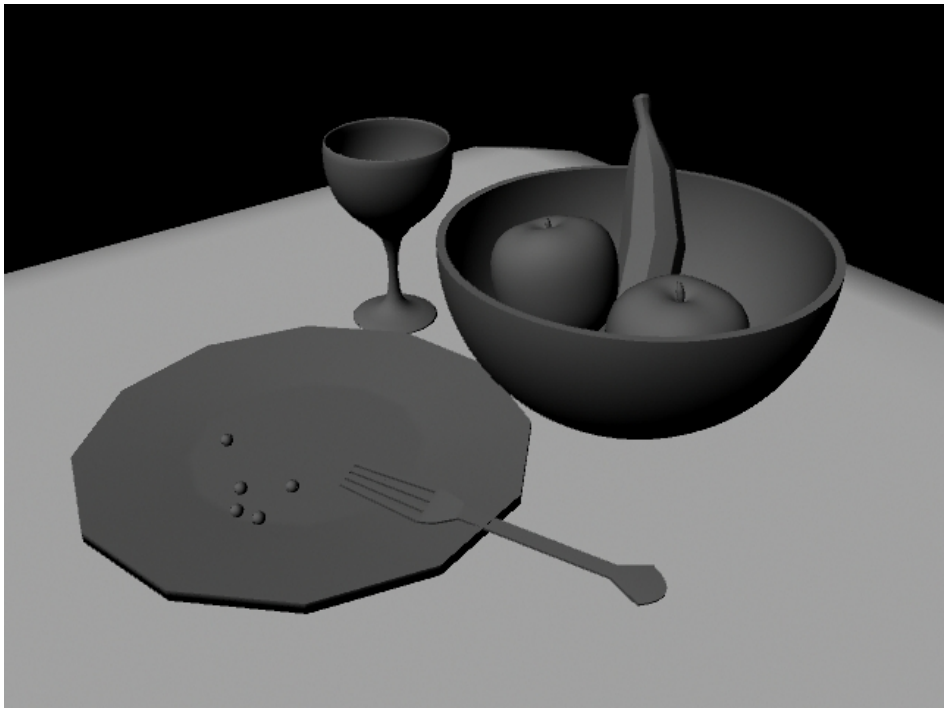


- With our new material created, there are multiple ways we can apply it to our tablecloth:
    - With the tablecloth selected, right click on the material and select **"Assign Material to Selection"** to add it to our tablecloth object.
    - Right click on the selected object(s) and **Assign New**, **Assign Favorite** or **Assign Existing Material**
    - We can also simply **Middle Mouse Drag** the material from the Work Area on to our selection
    - You can also assign materials to selected polygonal faces while in **Component Mode** to have multiple materials on the same object.
- With the tablecloth material applied, select the tablecloth and click on **Graph/Input and Output Connections** within the **Hypershade** to see our new material's connection to the tablecloth geometry.

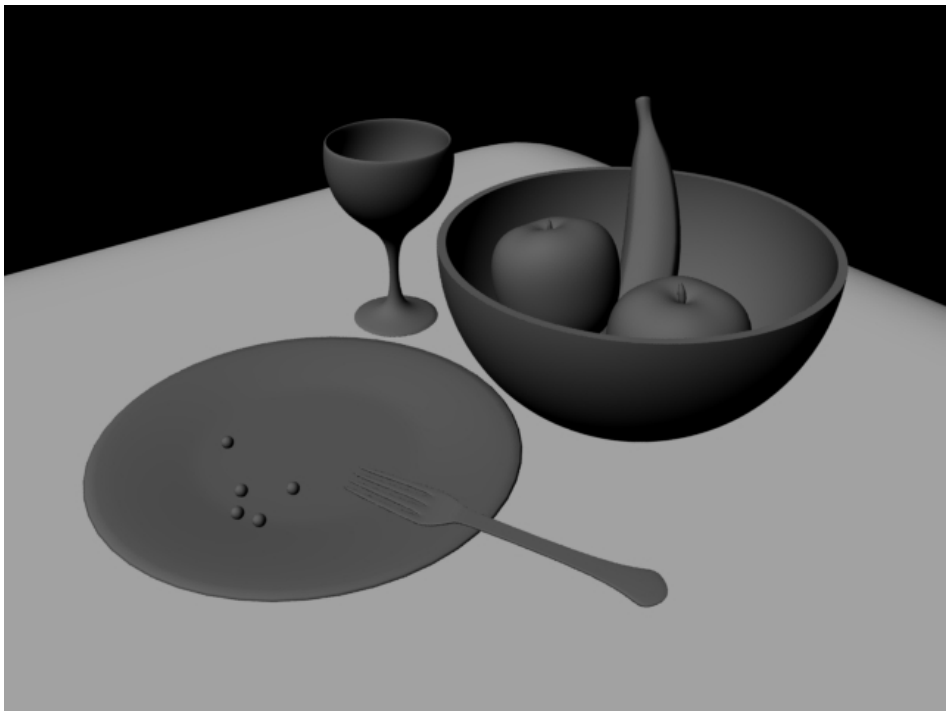


<u>The Render Window</u>

- Now that we actually have some materials in our scene, let's do a quick render!
- Press the **Render Current Frame button** on the **Status Line** to render an image from our virtual camera of the objects in our scene. The **Render Window** will pop up, showing you:
    - The Rendered Image, Resolution, Renderer, Frame Number, Render Time and Selected Camera



- You may notice that some of the objects look very angular and smooth in our render. This is due to using the default **Maya Software** render engine.
- Switch to using **mental ray** from the pulldown menu at the top of the screen. Re-render your scene and notice a dramatic improvement in the image quality.



- The **mental ray** rendering engine takes full advantage of Maya's shading, lighting, texturing and other capabilities, so always use it for the best quality renders!

- To save the rendered image onto your computer, go to **File/Save Image** from within the **Render Window** and save inside your **images** folder.

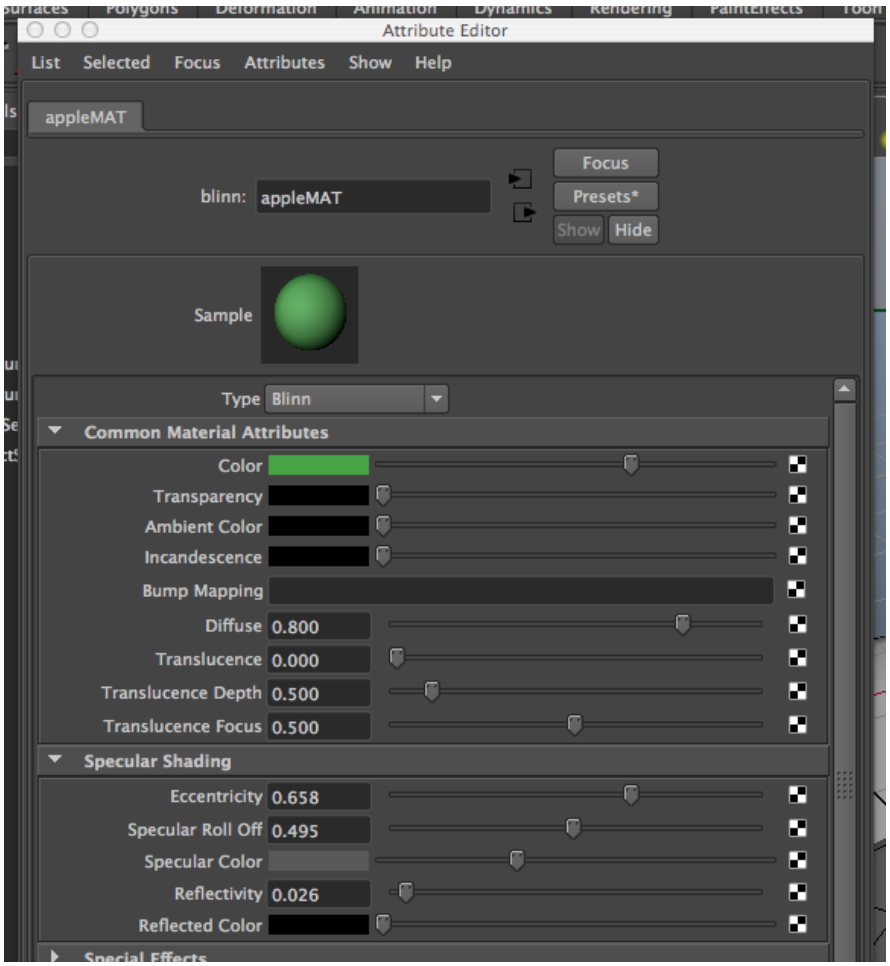
    - For better quality, switch from .JPG to an uncompressed format like **.PSD** or **.TIF. Targa(.TGA)** is also a commonly used image format for 3D renders.

- We'll talk more about fine tuning your renders in a later lesson. Back to texturing our models!

Adding Color & Texture to the Apples

- **Shift Select** both of the apples, **Right Click** and go to **Assign New Material**. Assign a **Blinn** texture to the apples by clicking on the corresponding button.

    - As opposed to the default **Lambert** texture, **Blinn** has specular highlights which allow you to control the shininess of your object's surface



- The Attribute Editor will pop up automatically. We have a lot of different settings that we can alter to make our apple look more realistic. The **Common Material Attributes** are:

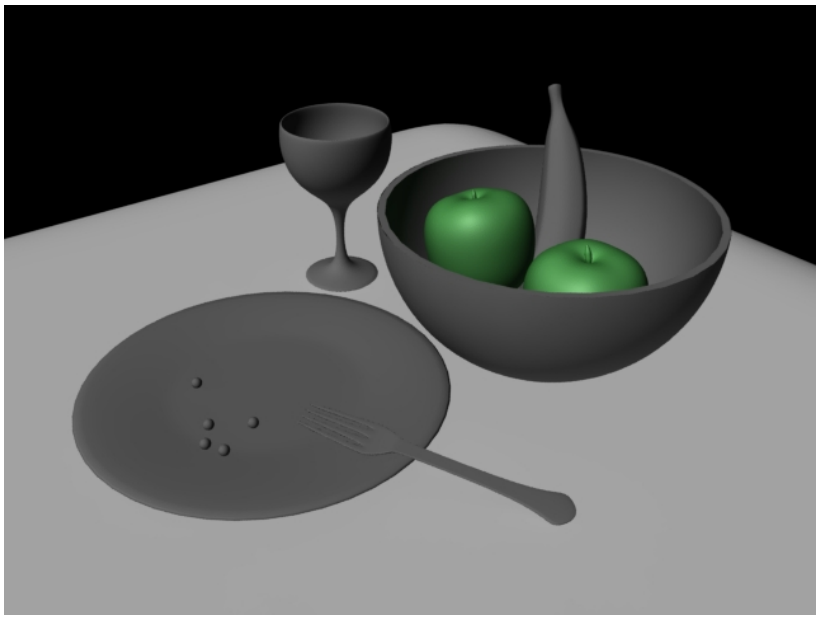
    - **Color:** Pick a nice green color

        - The color of light reflected off your object towards the camera

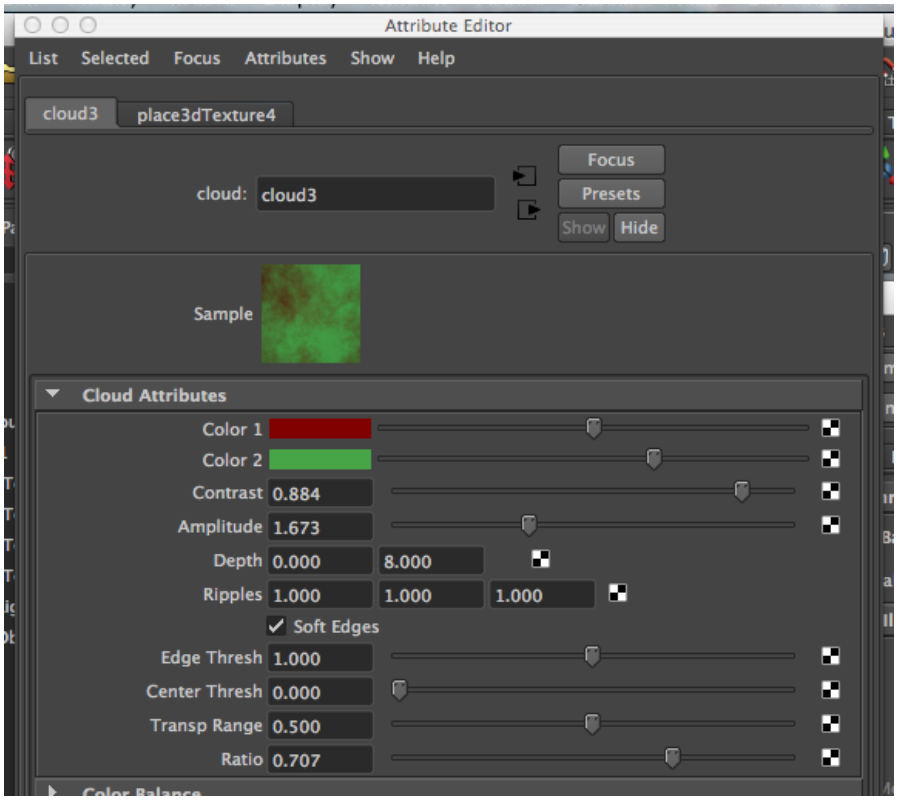
    - **Transparency:** 0 (Black)

        - How see-through the object is
    - **Ambient Color:** 0 (Black)
        - Extra color to fill in the shadowed areas of your object. Influenced by ambient lights in your scene.
    - **Incandescence:** 0 (Black)
        - Similar to Ambient Color, but overrides the ambient light in your scene and adds color uniformly across the surface
    - **Diffuse:** 0.800
        - Determines how much of an object's color is actually reflected
    - **Transluscence:** 0
        - Controls how much light is allowed to pass through an object
        - Additional attributes include **Transluscence Depth** (how far the light penetrates the object) and **Transluscence Focus** (the directionality of the light passing through the object)
        - Only works if **Raytracing** is enabled (more on that in a different lesson)
- You can also adjust the **Specular Shading** attributes to adjust the specular highlights:
    - **Eccentricity:** 0.660
        - Controls the size of the specular highlight.
    - **Specular Roll Off:** 0.500
        - Gives the surface the ability to reflect its surroundings (the environment, other surfaces) or the **Reflected Color,** when viewed at oblique angles.
    - **Specular Color:** Medium grey color
        - The color of specular highlights on the surface. Black is no highlight.
    - **Reflectivity:** 0.025
        - Similar to specular roll off, except produces mirror like reflections.
    - **Reflected Color:** Black
        - Represents the color of light reflected from the material. When raytracing, Maya multiplies the color with the light color reflected mirror-like from the surface. This can be used to tint a reflection.
- Feel free to mess around with these values until you get a result you like.

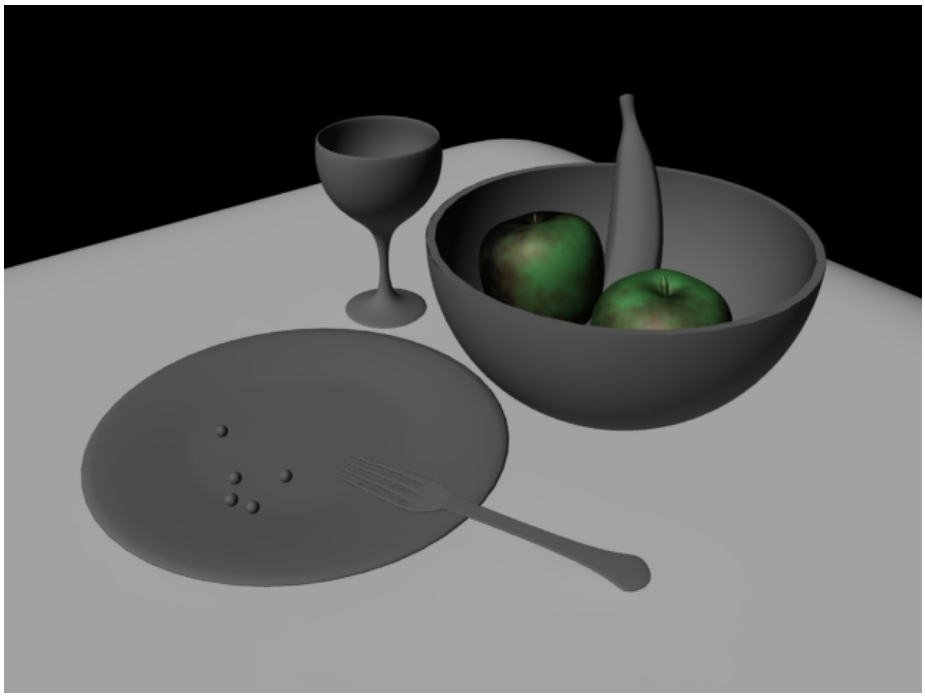
- Let’s see a render of what our apples look like:



- It looks okay, but let’s add some texture to give it some extra depth:
    - With your apple selected, open up the **Attribute Editor**
    - Click on the **checkerboard** icon next to the **Color** attribute to add a texture
        - Any attribute with that checkerboard can have a texture applied to it
    - Select the **Clouds** texture from the popup window
    - Adjust the attributes of the cloud texture to match the image below:



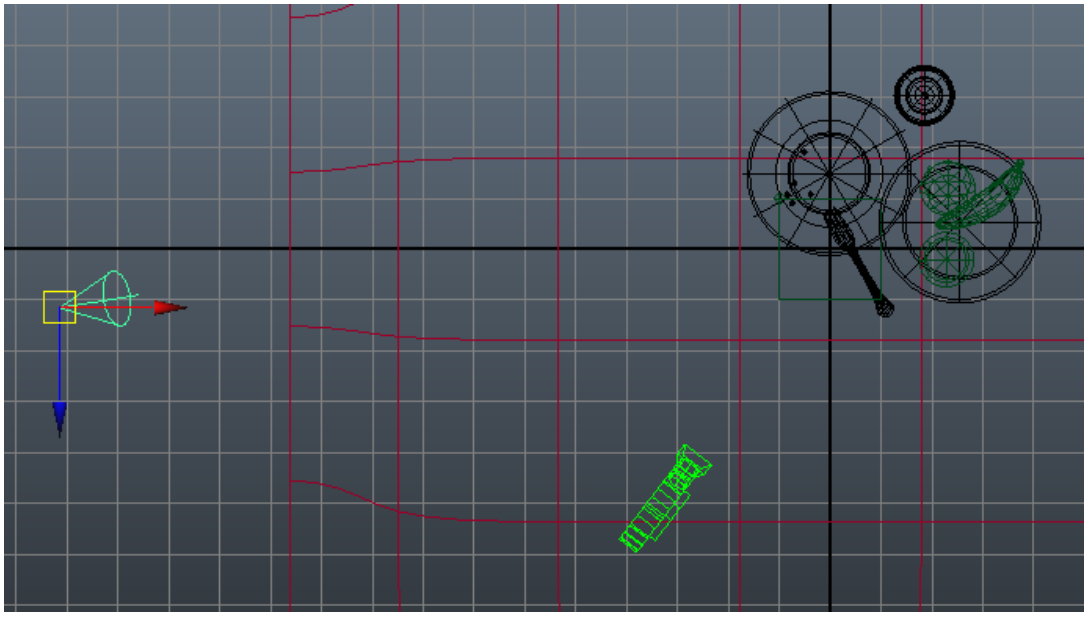
- Let's see how it looks:



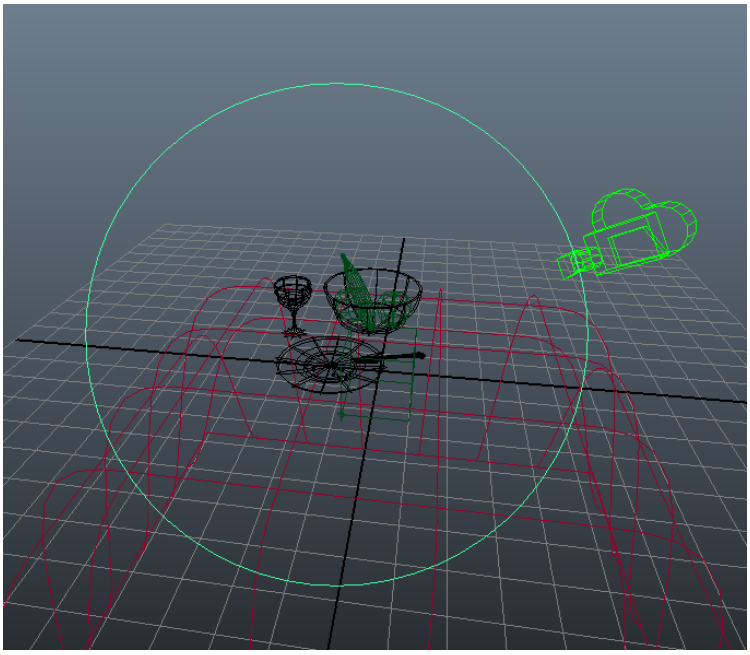
- Much better! But our lighting is still extremely flat because we haven't added any lights to our scene. Time to add some lights!

Creating Three Point Lighting

- Three point lighting is a very popular technique used in film, photography and animation to add depth and visual interest to a subject. It consists of setting up three lights:
    - **Key Light:** Main light illuminating your subject. Generally is placed at a 45 degree angle relative to the camera so that it lights the subject at a more oblique angle. Often, the key light will be higher than the camera looking down at your subject.
    - **Fill Light:** Secondary light used to fill in the shadowy areas created by the key light. A good rule of thumb is to place it on the opposite side of the camera 90 degrees from the Key light. This light will be less bright than the key light, and is typically around 50% the brightness of the Key.
    - **Back (or Rim) Light:** Generally placed behind the subject and at an angle to provide a bright “rim” that separates the subject from the foreground. Not entirely necessary, but can add some extra stylization and visual interest.
- Let’s start by adding the **Key Light** to our scene:
    - Go to **Create/Lights/Spot Light** to add a **Spot Light** to our scene. The **Spot Light** is commonly used as a key light but you could use any type you like.
    - In the Top View, position the light so that it is at roughly a 45 degree angle relative to the camera (as shown in the image below):

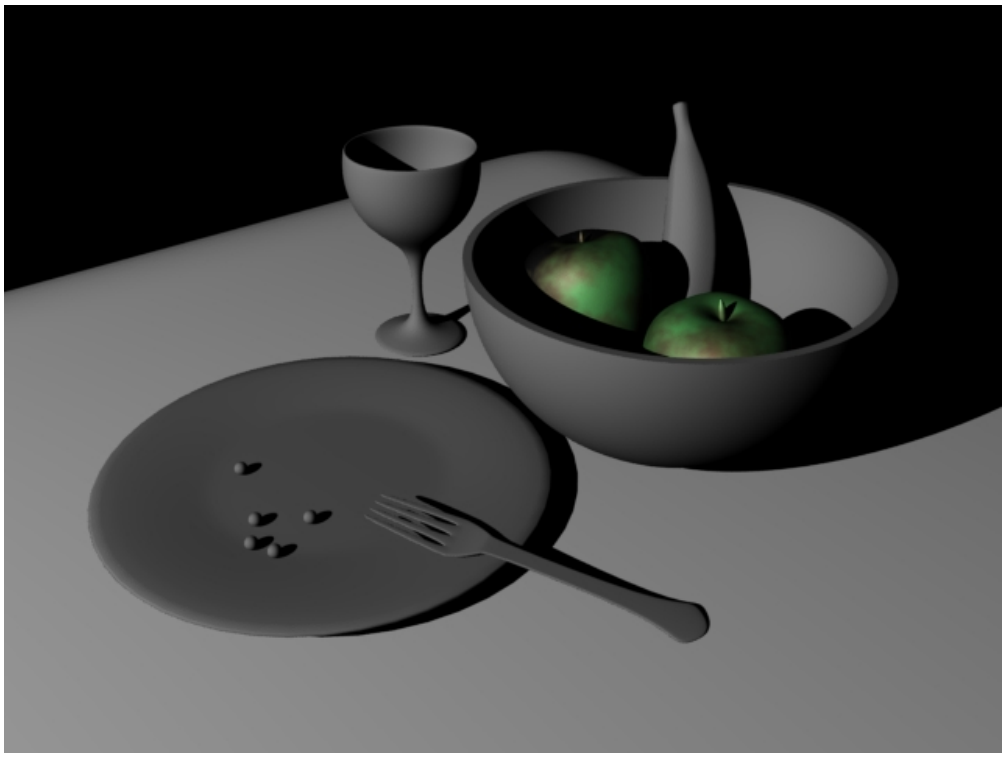


- A useful feature for setting up lighting in Maya is the ability to look through a selected light in the viewport. To do so, select the light and in the **Panel Toolbar** go to **Panels/Look Through Selected**. By using the Move and Rotate shortcuts, we can position our light so it points at our subject like this:



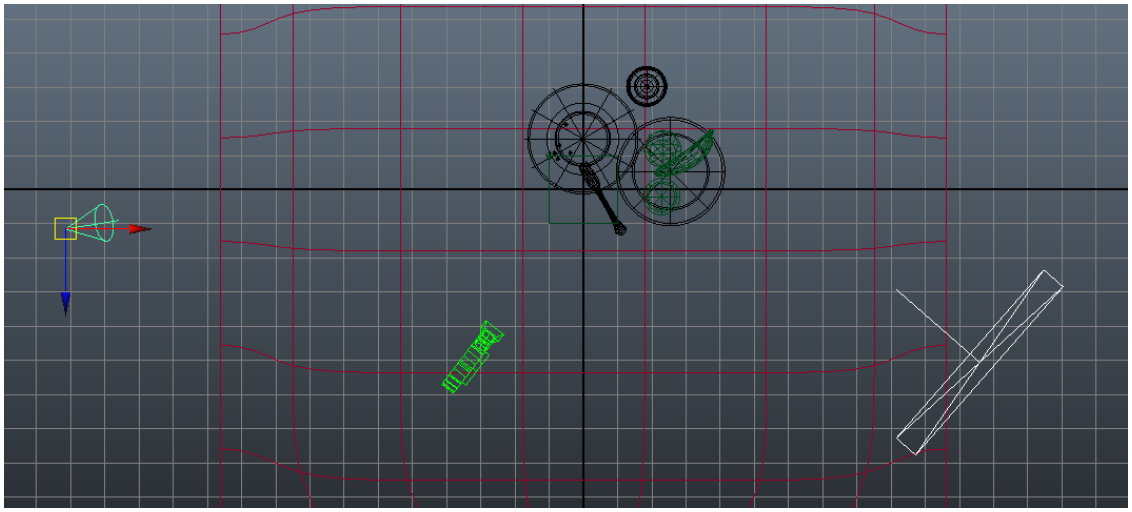
- With the **Spot Light** selected, go into its **Input attributes** and bump up the **Intensity** to 1.2 to increase the amount of light in our scene.

With our key light in place, let's see how it looks in a render:

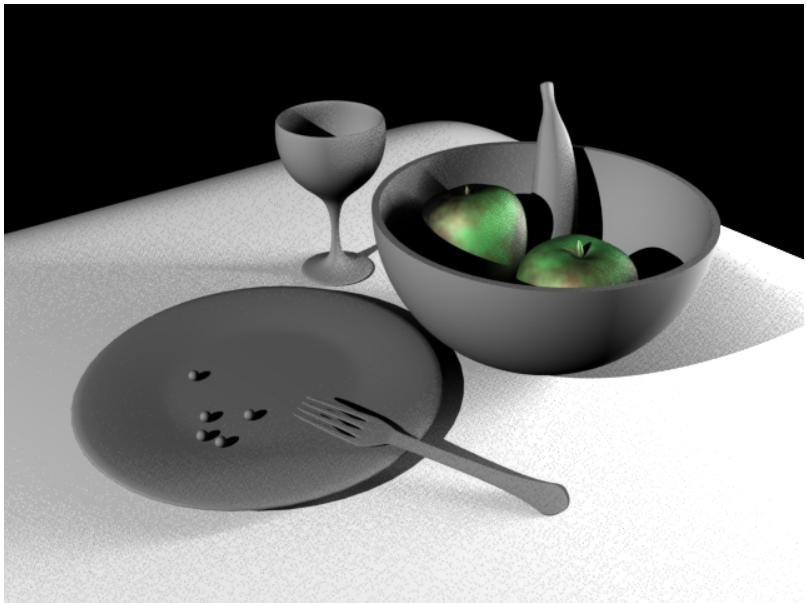


It looks so much better already! Let's keep going by adding a fill light:

- Go to **Create/Lights/Area Light**. The **Area Light** actually uses a piece of geometry (by default a flat plane) to generate light, making it similar to the light reflectors commonly used on film and photo shoots.
- **Scale up** the **Area Light** and **position** it so that it is on the opposite side of the camera and facing the subject, as you did with the fill light:

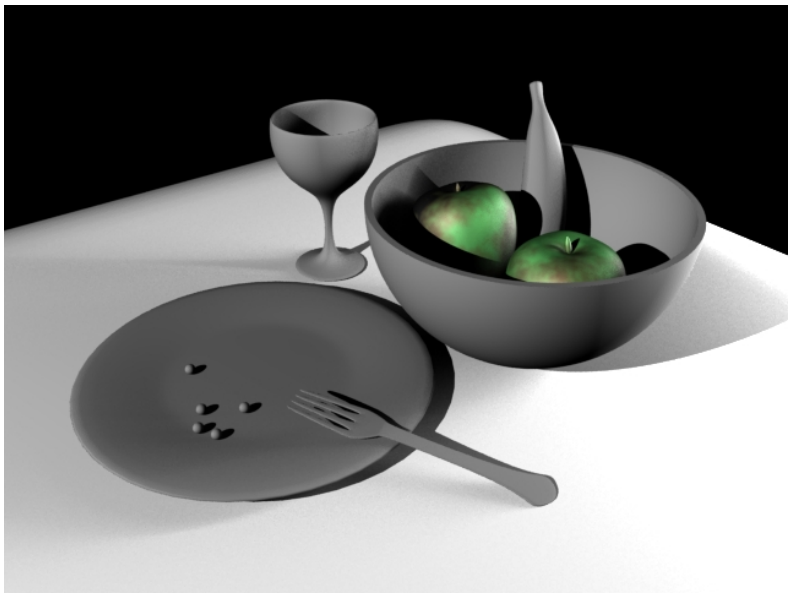


Render time!



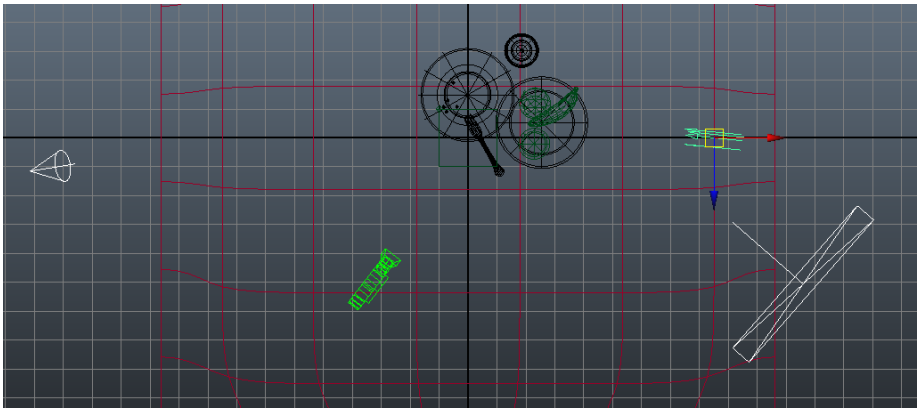
Great, our lighting setup is really starting to come together. However, you will notice a bit of graininess on our render.

- With the **Fill Light** selected, Go into the **Attribute Editor:**
    - Turn on **Ray Trace Shadows**. These are more processor intensive than **Depth Map Shadows**, but produce more accurate results for things like soft shadows and **Area Lights**.
    - Turn up the **Shadow Rays** to 30 and **Ray Depth Limit** to 7. Turning up these two attributes increases our render times dramatically but gives us much smoother, blended shadows without the graininess from before.
    - Turn the **Intensity** down to 0.75.
- Now check out our render:

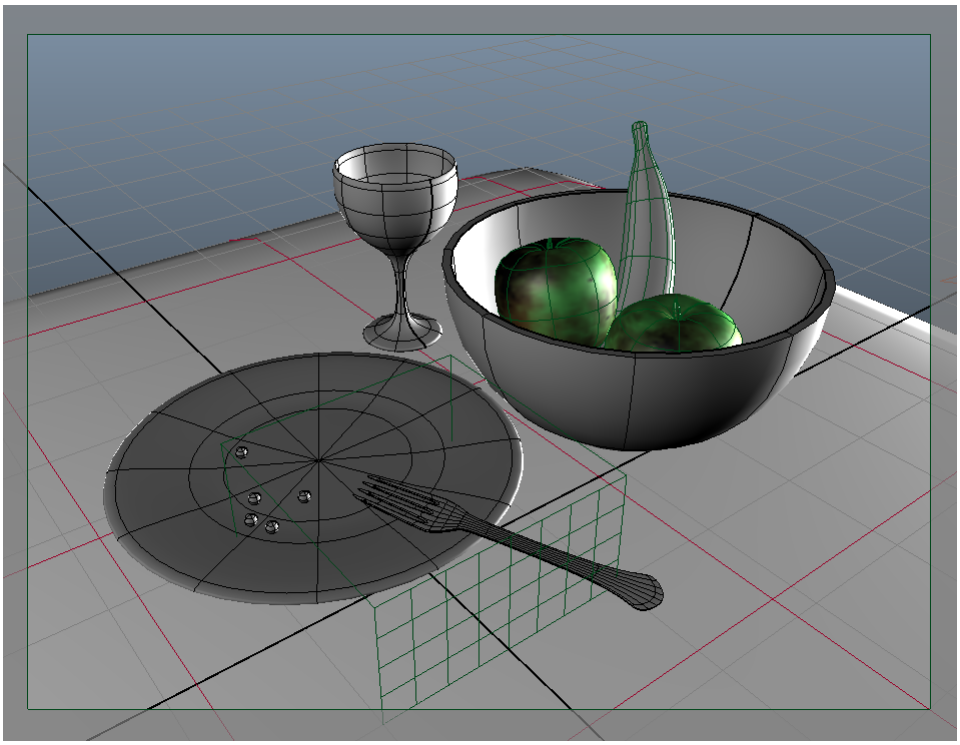


So much better! Now let's add our Back Light to finish up our lighting setup:

- Go to **Create/Lights/Directional Light.** The Directional Light ignores position entirely and simply sends light from one direction throughout the entire scene. You can also use it to simulate natural lighting from the sun.
- Position the **Back Light** behind our still life but at an angle, like this:

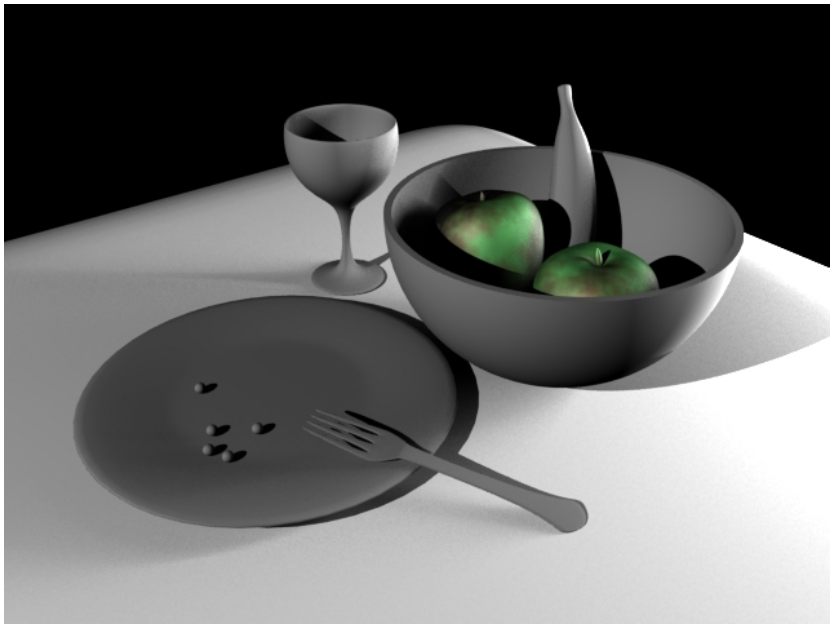


- In the Panel Toolbar:
    - Under the **Lighting** menu, enable **Use All Lights**
    - Under the **Renderer**, switch to **Viewport 2.0**



- With these two features turned on, we can actually see our scene lighting and textures within our viewport! Feel free to adjust the **Back Light** angle until it looks good.

Time for another render!



- Notice how the Back Light provides a little extra light around the edge of the banana, bowl and wine glass to make them stand out from the background. Very nice!
- With a sweet lighting setup, let's add some more textures to these objects!

<u>Adding Some More Maya Materials</u>

- Now that we know the basics of applying materials, let's go through each object and add some texture to it. There are a ton of different materials with different settings that we don't have time to cover, so if you need to know more about a specific setting, consult the **Maya Help Guide**.

The Fork:

- Apply a **Phong** material to the Fork.
    - **Phong** is a material that represents glassy or glossy surfaces (such as car moldings, telephones, bathroom fittings) with a hard specular highlight.
    - Adjust the **Cosine Power** to control the size of the shiny highlights on the surface
- Turn up the **Reflectivity** to 1 for a completely reflective, mirror-like metal surface.
- Rendered result:

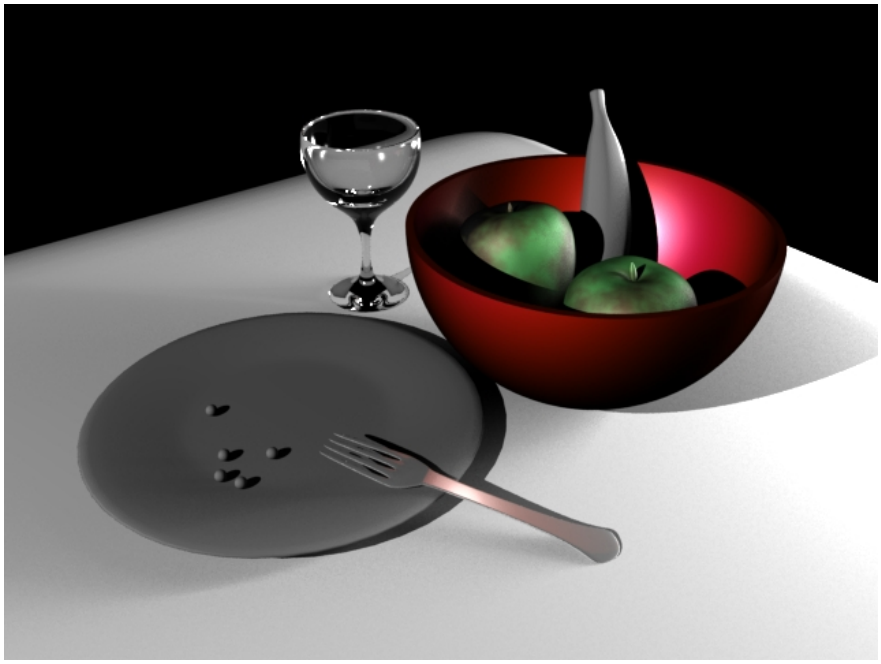
The Glass:

- Apply a **mia_material_x_passes** material to the glass:
    - **mia_material_x_passes** is probably my favorite material in Maya. It is a **mental ray** material that can also be used with Render Passes to render our individual parts of your scene on separate layers. There are a LOT of settings to adjust to recreate a large number of materials, so check it out!
- In the Attribute Editor, click on the **Presets** button and select **GlassPhysical/Replace** to replace the current materials settings with the preset material.
    - Another reason to love **mia_material_x_passes** are these presets. They can save you a lot of time trying to adjust tons of different settings by filling them all in automatically.

- Under **Advanced Refraction**, change the **Color at Max Distance** to a light grey color to remove the blue tint to the glass.
- Rendered result:

The Bowl:

- Apply a **mi_metallic_paint_x_passes** to the bowl:
    - As with **mia_material_x_passes**, this is a **mental ray** material that takes advantage of the passes system. As the name implies, it simulates a metallic paint which is often applied to cars, guitars and other objects.
    - Feel free to change the **Diffuse**, **Specular** and **Flake** parameters to customize the look of your bowl.
    - Rendered result:

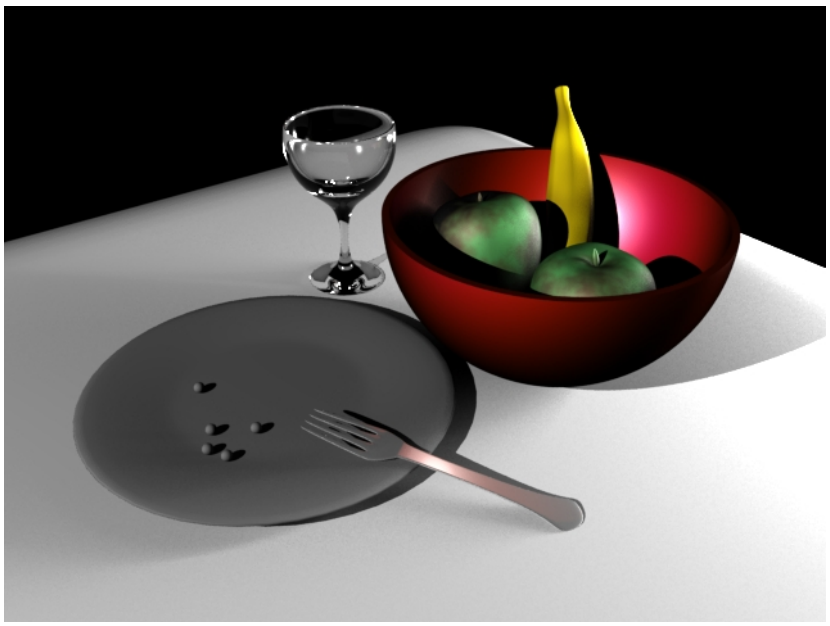


The Banana:

- Apply a **Blinn** material and click on the **checkerboard icon** to the right of the **Color attribute**. This icon allows us to apply a procedural texture, image, ramp or gradient to that attribute.
- Select **Solid Fractal** under **3D Textures** to apply that 3D texture to the banana
- Adjust the **Threshold, Amplitude, Ratio, Frequency Ratio** and **Ripples**

attributes to give the appearance of a soft banana texture.

- Under **Color Balance**, you can edit the following attributes:
    - **Default Color:** The underlying default material color.
    - **Color Gain:** Scaling factor applied to the texture's **outColor** channel. For example, you can color-correct a texture that appears too green by setting the Color Gain to a shade of blue. The default color is white (no effect).
    - **Color Offset:** Offset factor applied to the texture's **outColor** channel. For example, you can brighten a texture that appears too dark by setting the Color Offset to a shade of gray. The default color is black (no effect).
    - **Alpha Gain:** *Only has an effect if the texture is used as a bump or displacement.* Scaling factor applied to the texture's **outAlpha** channel. The default value is 1 (no effect).
    - **Alpha Offset:** *Only has an effect if the texture is used as a bump or displacement*. Offset factor applied to the texture's **outAlpha** channel. For example, if the Alpha Gain value is -1 and the Alpha Offset value is 1, the **outAlpha** channel is inverted. The default value is 0 (no effect).
    - **Alpha Is Luminance:** The alpha (mask) output depends on the luminance of the color channels. Bright areas of the texture are more opaque when compositing, and dark areas are more transparent.
- Rendered result:

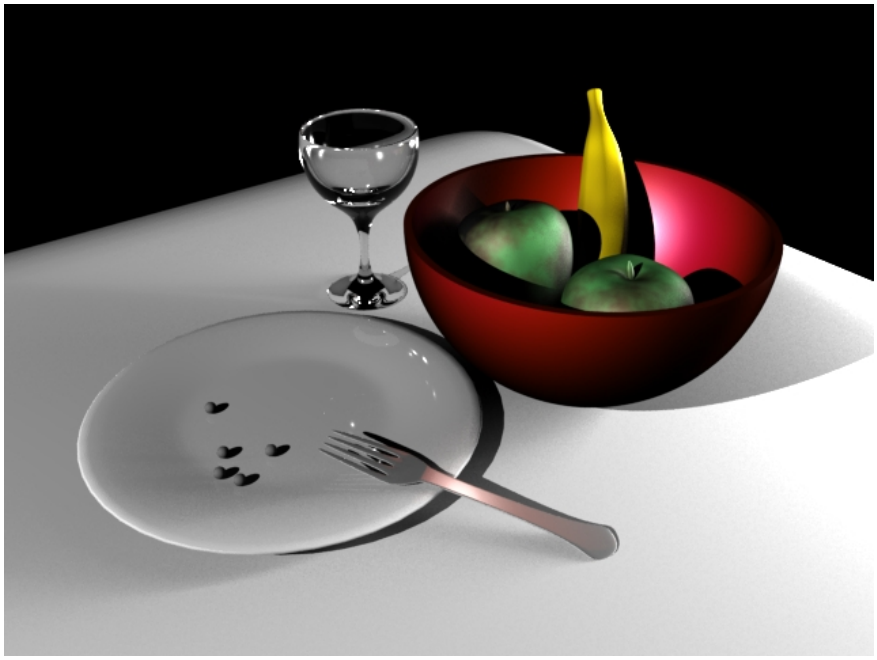


The Plate:

- Apply a **Blinn** material to the plate.
- Set the following attributes:
    - **Color:** White

- **Eccentricity:** 0.128
- **Specular Roll Off:** 0.174
- **Specular Color:** Medium Grey
- **Reflectivity:** 0.481
- **Reflected Color:** Black

- Rendered result:

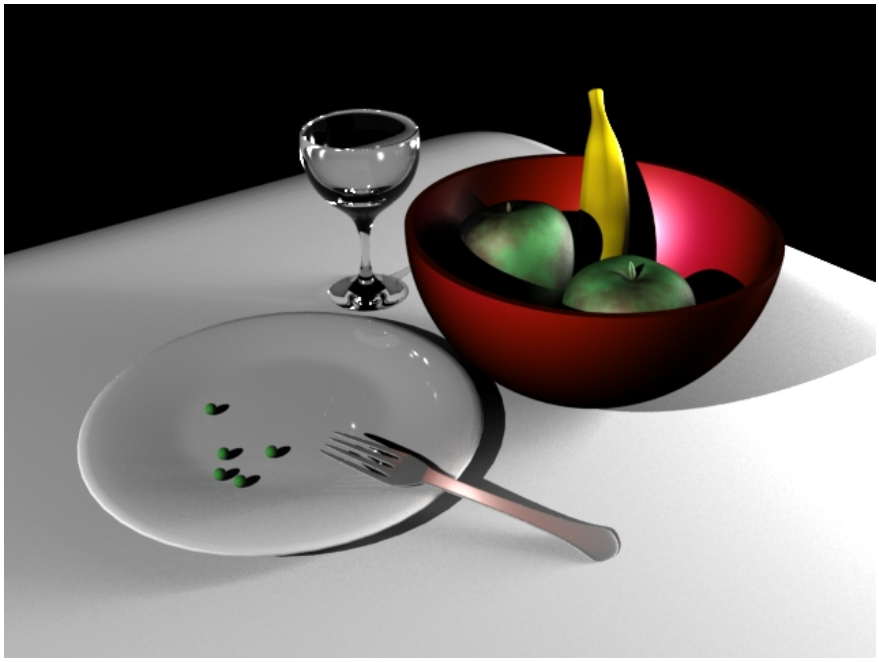


The Peas:

- Apply a **Blinn** material:
- Set the following attributes:

- **Color:** Pea Green (naturally)
- **Eccentricity:** 0.076
- **Specular Roll Off:** 0.7
- **Specular Color:** Medium Grey
- **Reflectivity:** 0.5
- **Reflected Color:** Black

- Rendered result:

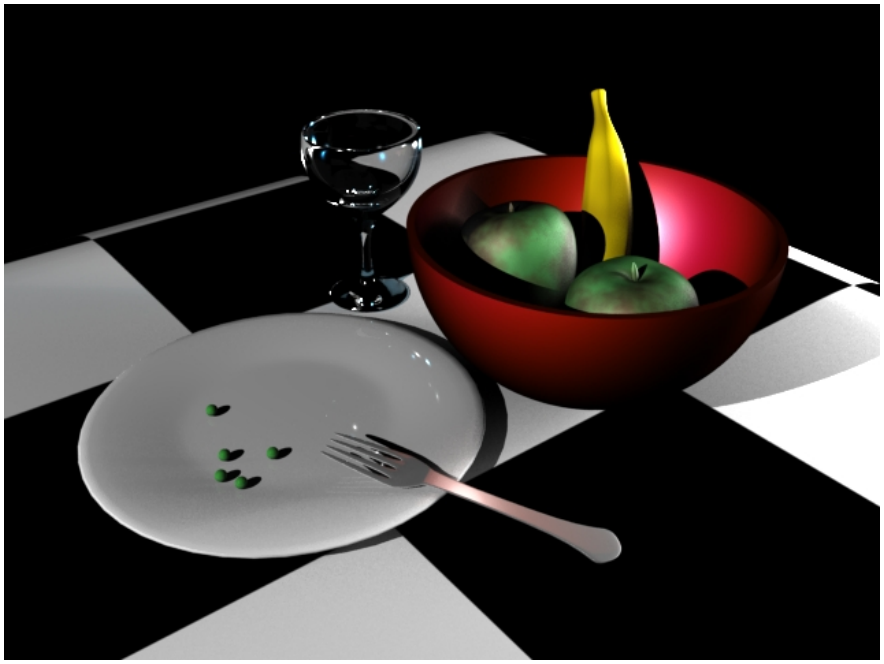


Wow, look at how our still life really came to life with the addition of those materials! As the last part of this tutorial, let's change the tablecloth from that boring white material to something with texture!

The Tablecloth:

- Select the tablecloth and open up the **Attribute Editor**.

- Click on the **checkerboard icon** next to **Color** and select the **Checker** texture to apply it to our tablecloth.
    - The **Checker** texture is a default way to check how an object will look with a texture applied to it. This is especially useful when dealing with UV mapping, which we will cover more in Part 2.
- Rendered result:



- We can also now see how the glass material refracts the colors of the tablecloth.
- The Checker is fine for testing, but let's use a much more visually appealing texture on our tablecloth.
- To remove the **Checker** texture, **right click** on the name of the **Color** attribute and select **Break Connection**. It will revert back to not having a texture.
- Click on the **checkerboard icon** again and select **File** to apply a file as a texture to the color attribute.
- Under the **file tab**, Click on the **folder icon** next to **Image Name**, navigate to the **sourceimages** folder and select the tablecloth texture.
- Previewing the texture in our viewport, it looks pretty good but could probably be scaled down a bit to decrease the size of the fibers.

- Under the **place2d tab**, there are a variety of attributes we can adjust to change the placement of our texture:

Coverage: Specifies what ratio of the surface the texture map covers. The valid range is 0 to + infinity for NURBS surfaces. A value of 1 (the default) covers the entire surface in either the U or V direction. For example, to cover half the surface, set the value at 0.5 in both the U and V directions.

Translate Frame: position the texture map on the surface and move the coverage area across the surface. The range is from - infinity to + infinity.

Rotate Frame: Rotates the texture map on the surface. This attribute is represented in degrees.

Mirror U/V: *Only works when* U Repeat *or* V Repeat *attributes are greater than 1*. Mirror in the U and V direction separately. When on, the repeat areas are mirrored—rows of images display as mirrored images of themselves. This helps to disguise the effect of seams between repeat areas.

Stagger: Maya offsets repeats of maps making alternate rows of repeats offset exactly by half (like brick walls). When off, the repeats line up horizontally and vertically.

Wrap U/V: control whether a map is repeated in U or V directions, or both U and V. Both the Wrap attributes are on by default. Turn these off to prevent seams from showing on a closed surface, such as a cylinder or sphere, or to prevent the texture from duplicating itself when you use Translation and Coverage attributes to limit the mapping to a very specific surface area.

Repeat U/V: Specifies how many copies of the texture map are mapped within the coverage area along either the U or V directions (depending on the texture). By default, Maya maps one copy of the texture. Values greater than 1 result in more copies of the map displayed in the same coverage area. Values less than 1 result in only a portion of the map displayed.

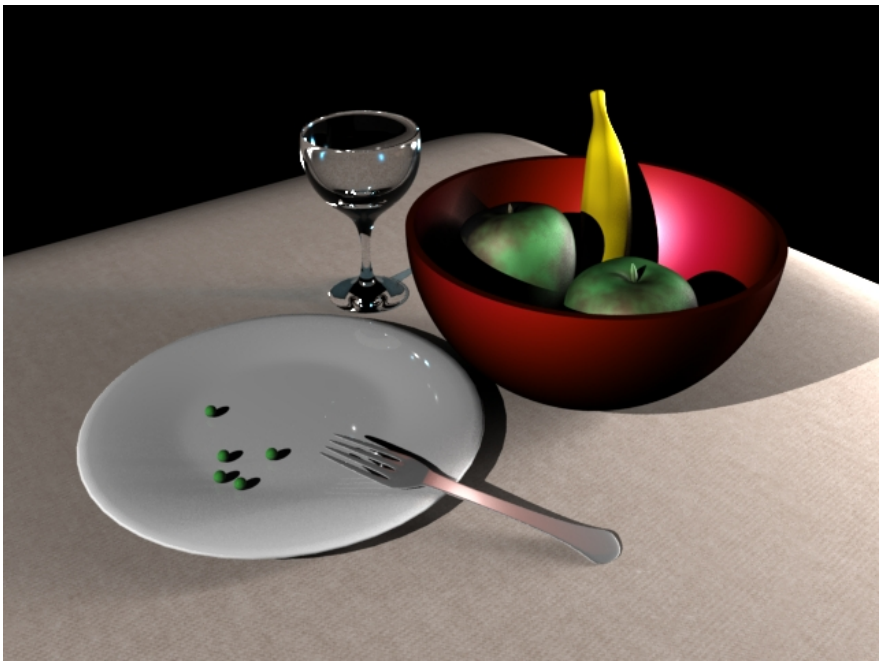
Offset: Offsets the pattern of the texture map. This can be particularly useful when fine-tuning the placement of a pattern on a surface. U Offset offsets the texture pattern along the U direction and V Offset along the V direction. Each value ranges from - infinity to + infinity.

Rotate U/V: Since you cannot use the interactive tool to rotate surface placement, use this attribute. Rotate UV is calculated in degrees. The valid range is 0 to 360 degrees.

Noise U/V: 2D noise for U and V. Displaces the colors of the texture map.

Fast: When on, Fast checks if the placement is the default and all shading-time evaluations perform less computations. Turn Fast on to slightly improve rendering speed. Fast is off by default.

- Set the **Repeat UV** to 3 to scale down the size of our texture.
- Rendered result:



Wow, that looks great! Adding the tablecloth really pulls it all together. This concludes Part 1 of the tutorial on texturing and lighting. Be sure to check out Part 2 for more attention to UV Texturing and Rendering!