

Shading Lightening Rendering

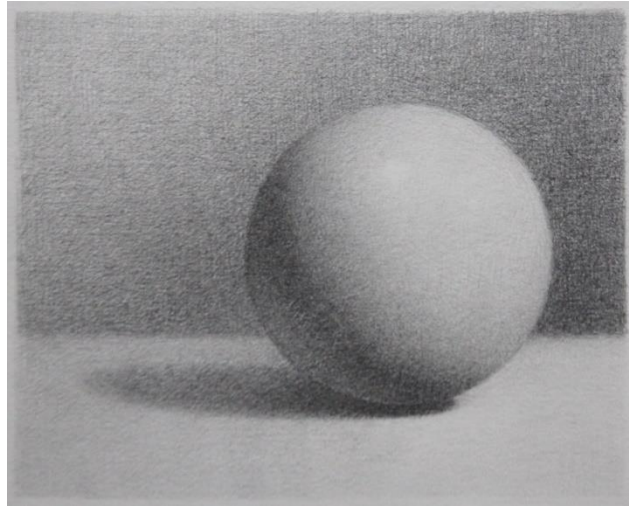
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Lab 02

Shading:

In computer graphics refers to the process of altering the color of an object/surface/polygon in the 3D scene, based on its angle to lights and its distance from lights to create a photorealistic effect.



Materials and Texture

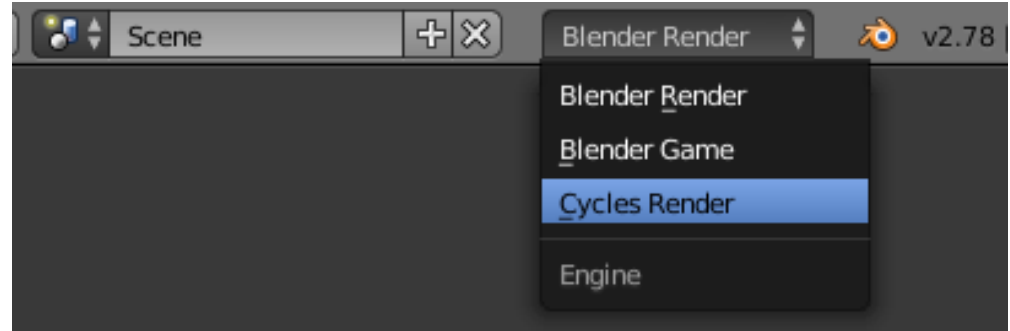
Blender has 3 different
rendering engine:

OpenGL - Internal - Cycles

Non Physically vs Physically
Based Rendering

realtime engine of Blender 2.8(beta), nicknamed Eevee

Why are we going to use Cycles for this mini-project?



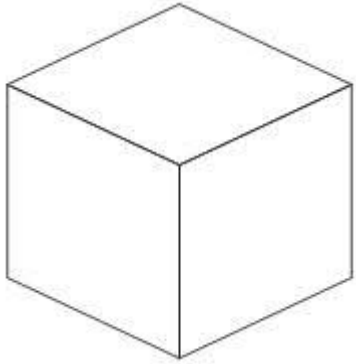
- Photorealistic
- GPU
- It's the Future
- 360° videos for free

PROS

- Noisy
- Slower

CONS

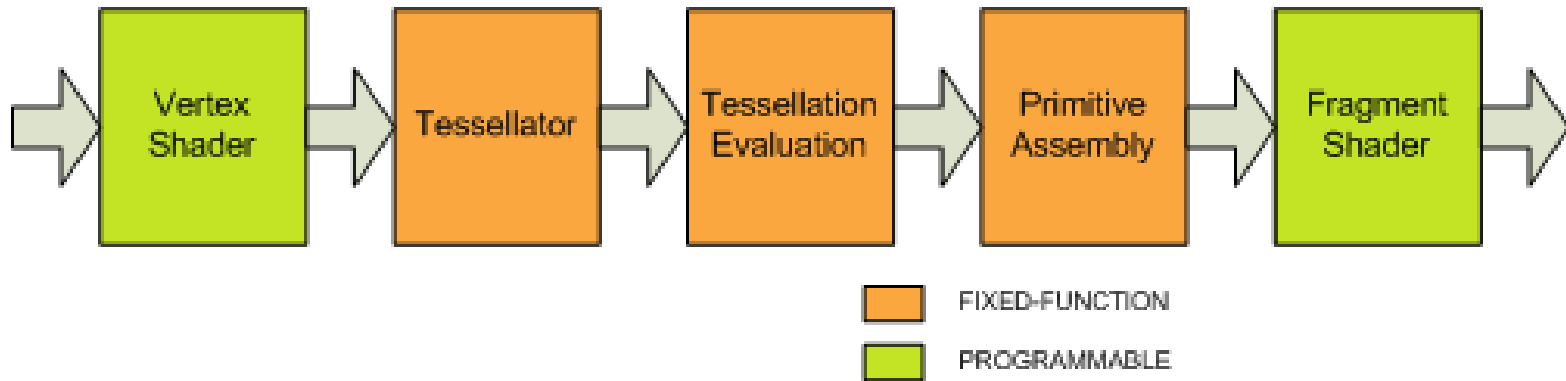
Rendering Pipeline



3D

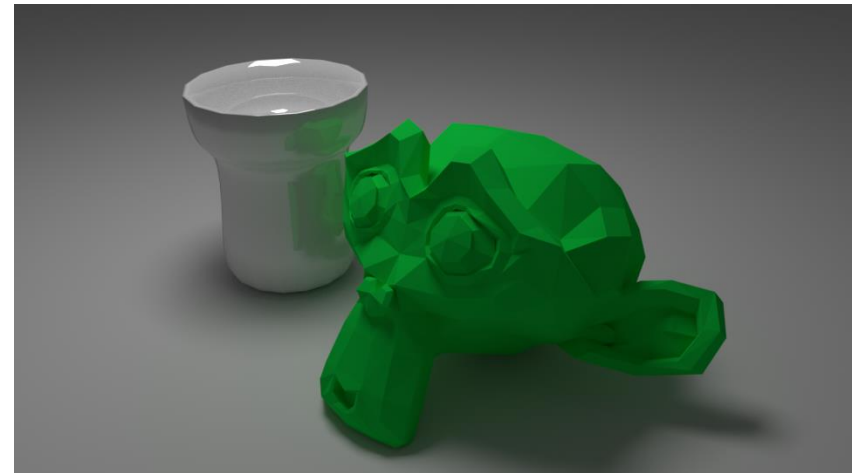
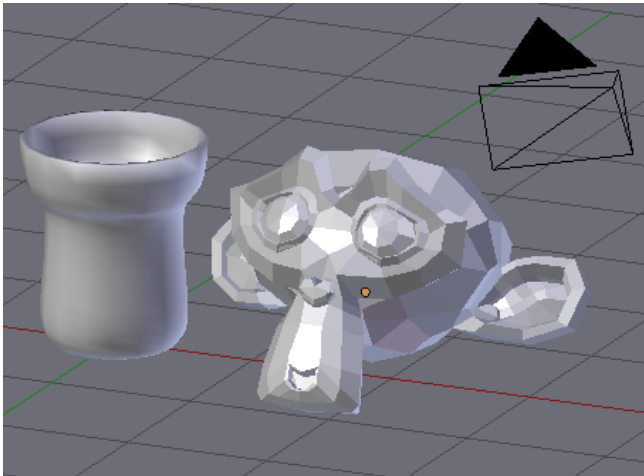


2D



Shaders:

```
shader simple_material(  
    color Diffuse_Color = color(0.6, 0.8, 0.6),  
    float Noise_Factor = 0.5,  
    output closure color BSDF = diffuse(N))  
{  
    color material_color = Diffuse_Color * mix(1.0, noise(P * 10.0), Noise_Factor);  
    BSDF = material_color * diffuse(N);  
}
```



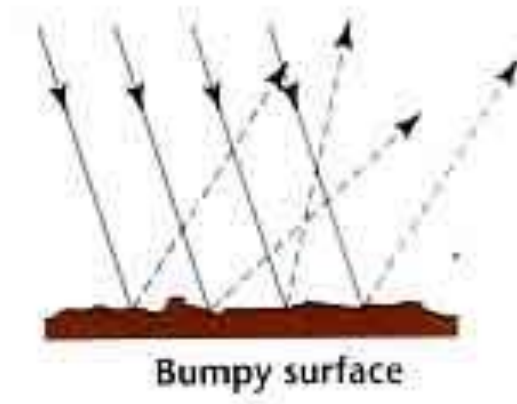
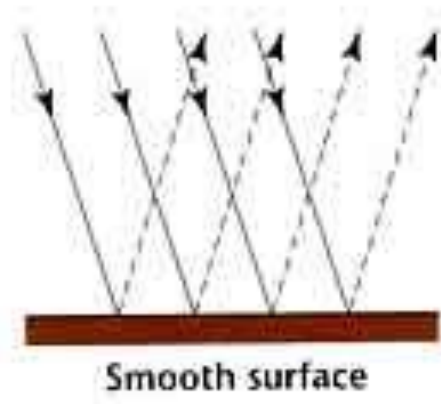
Cycles BSRF Materials

(bidirectional scattering distribution function)

“mathy description of how light interacts with a surface.”

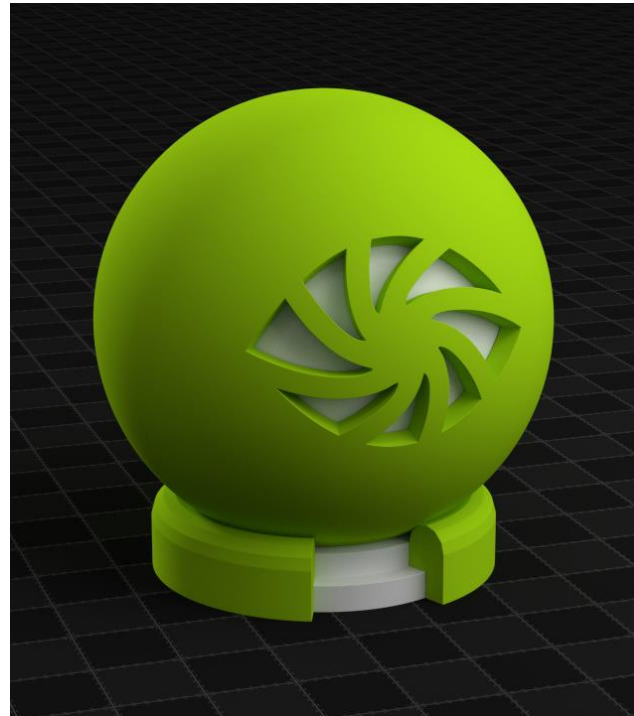


Smooth surface vs Bumpy surface



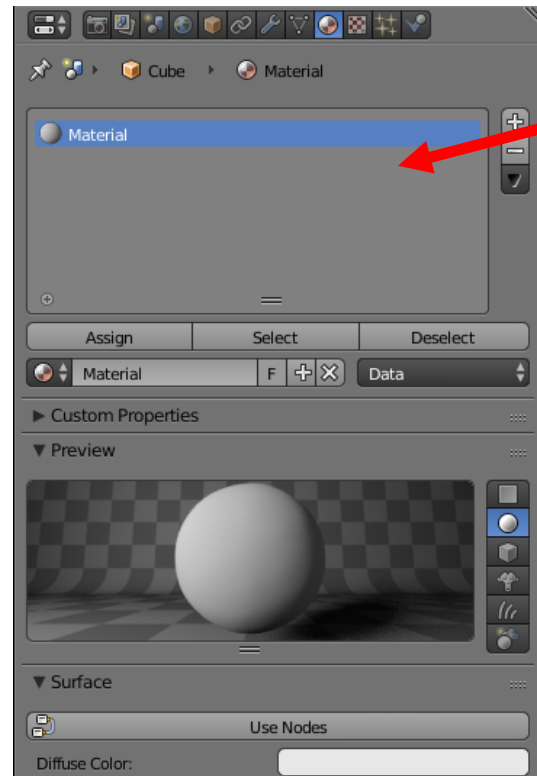
Cycle Shaders

- <https://www.blenderguru.com/articles/cycles-shader-encyclopedia>



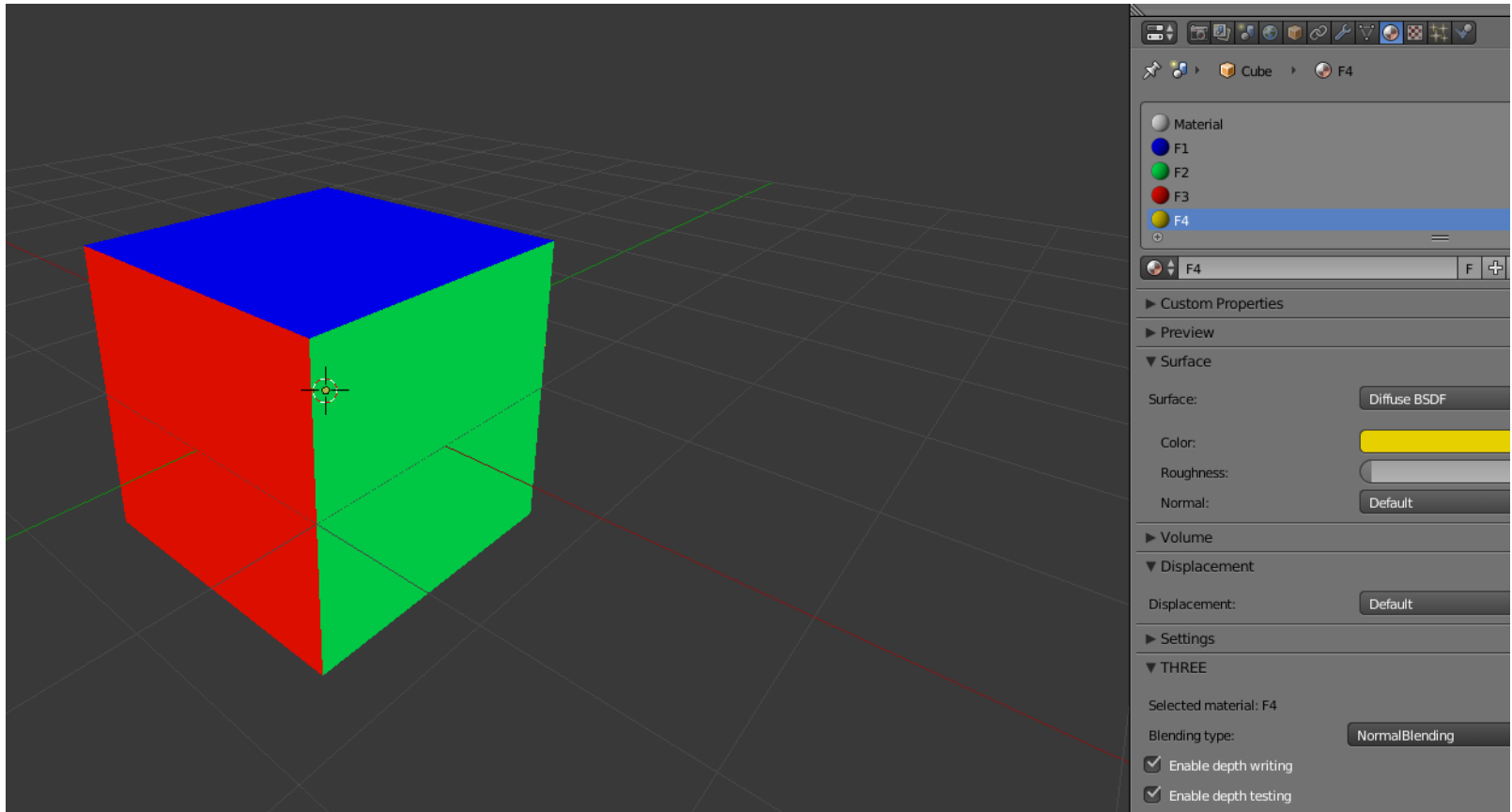
Let's try to assign more materials to the same cube.

1. Select a cube face
2. Go to the material tab in the property view
3. Add a new material and assign it to the selected face



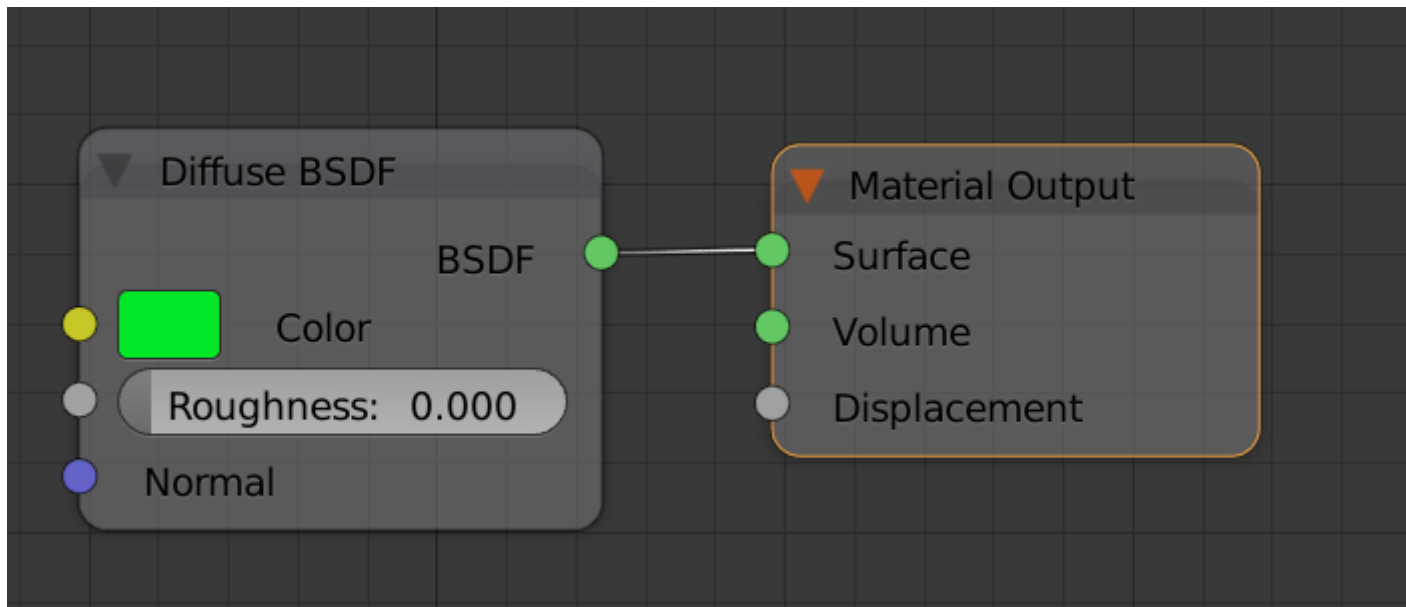
Material Slots

Cube Multi Material:

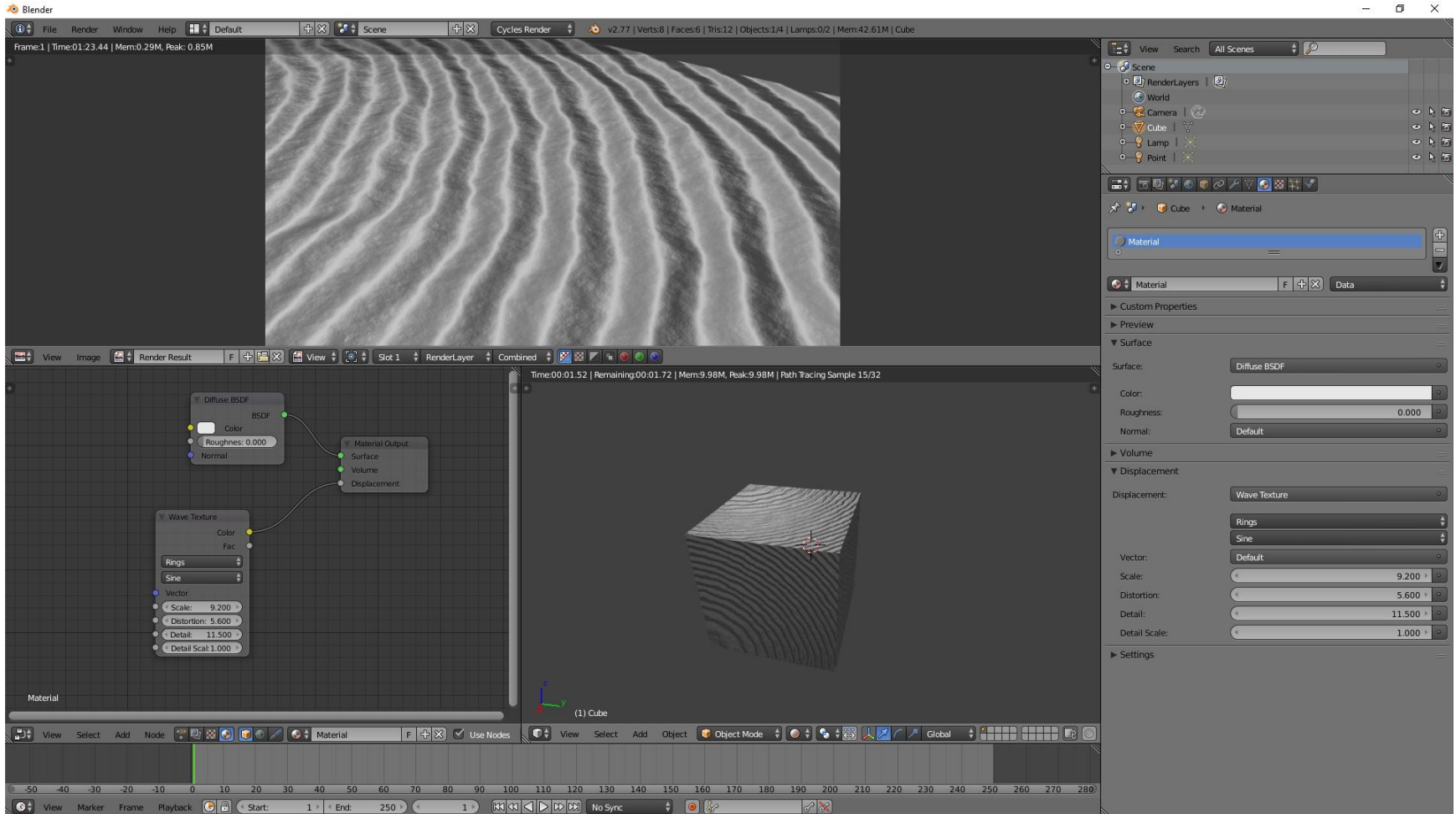


Node Editor (materials)

- How do they works?

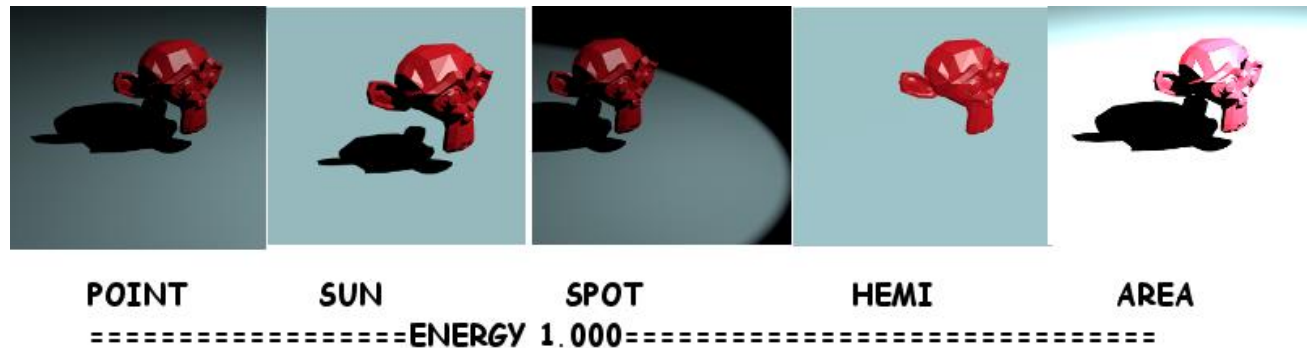


Procedural Texture: Color – Displacement – etc etc



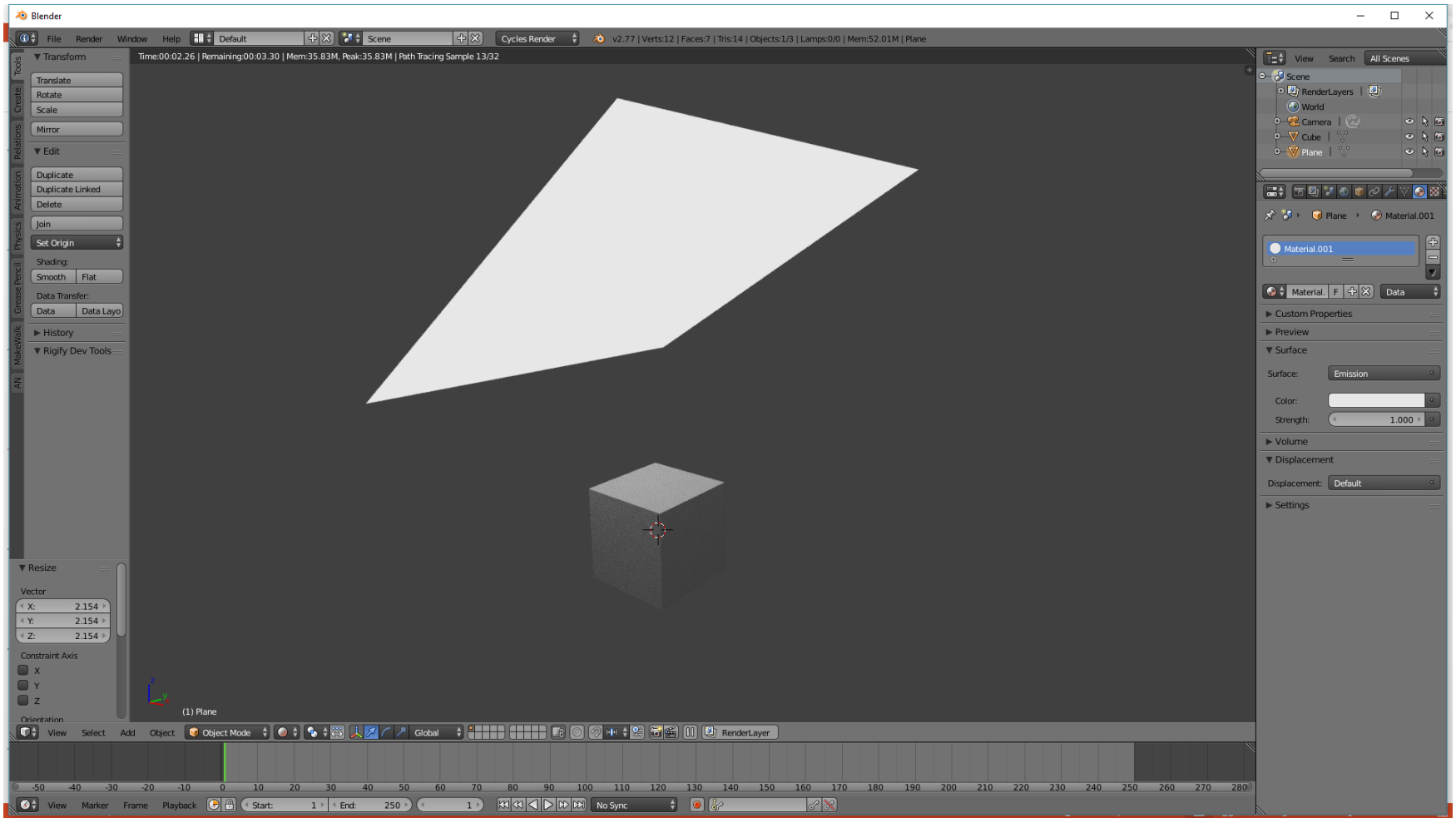
Types of Light:

- Point
- Sun
- Spot
- Hemi
- Area
- ...



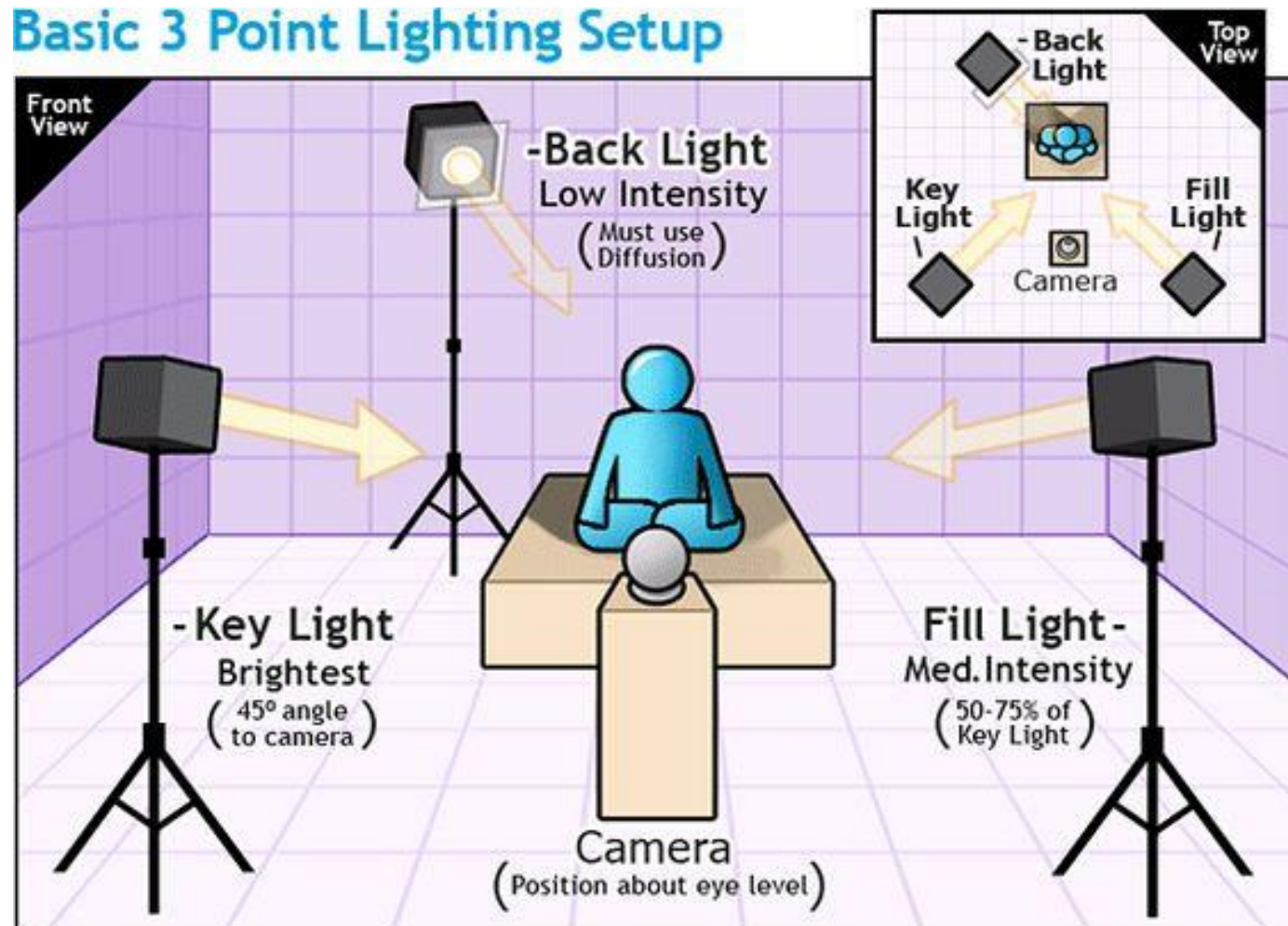
- In Cycles you are also going to use meshes with emissive material to light up the scene (scale, colour)

Let's add some plane/lights

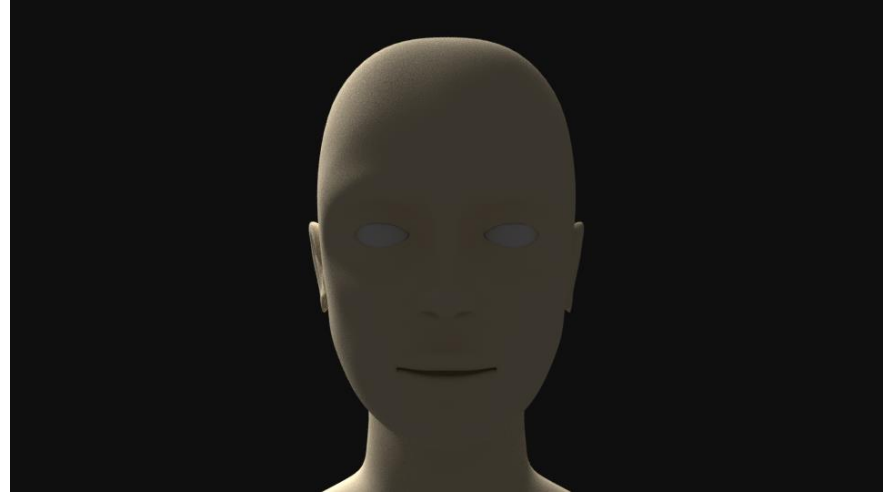
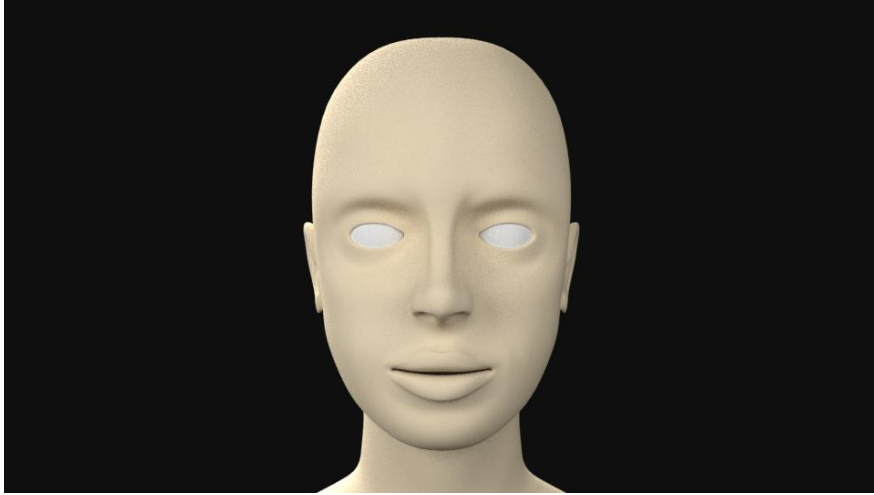


Lightening

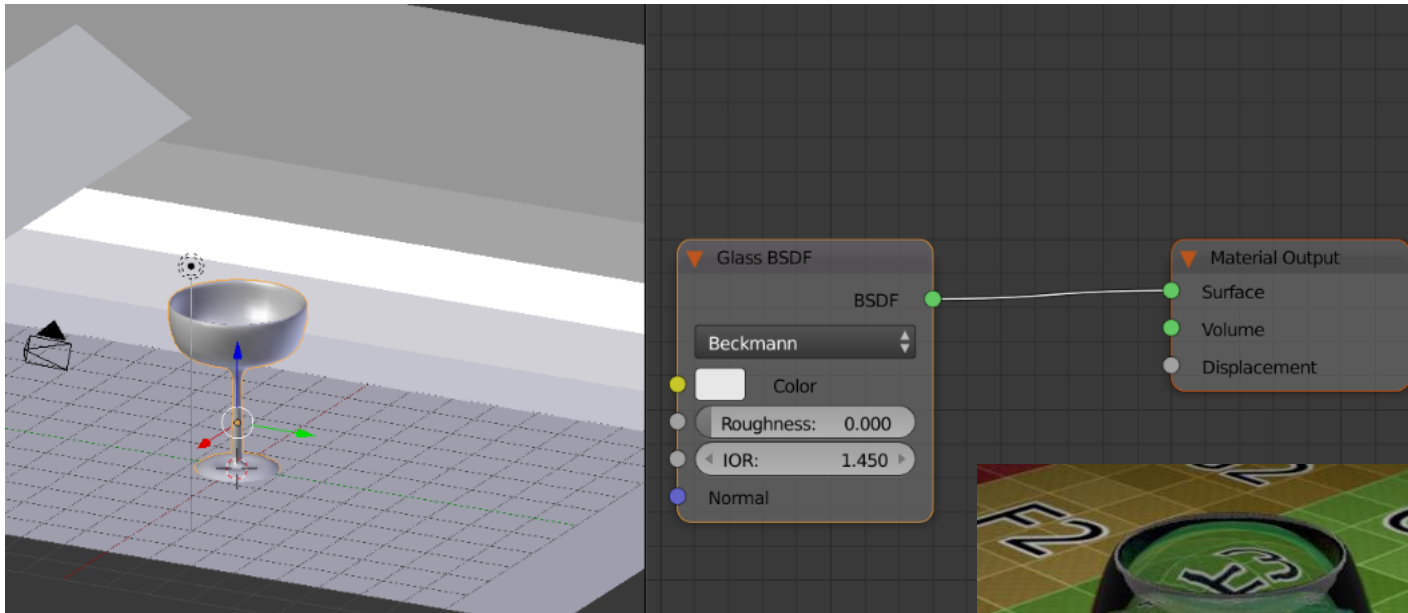
- Let's talk about the Three-point Light setup



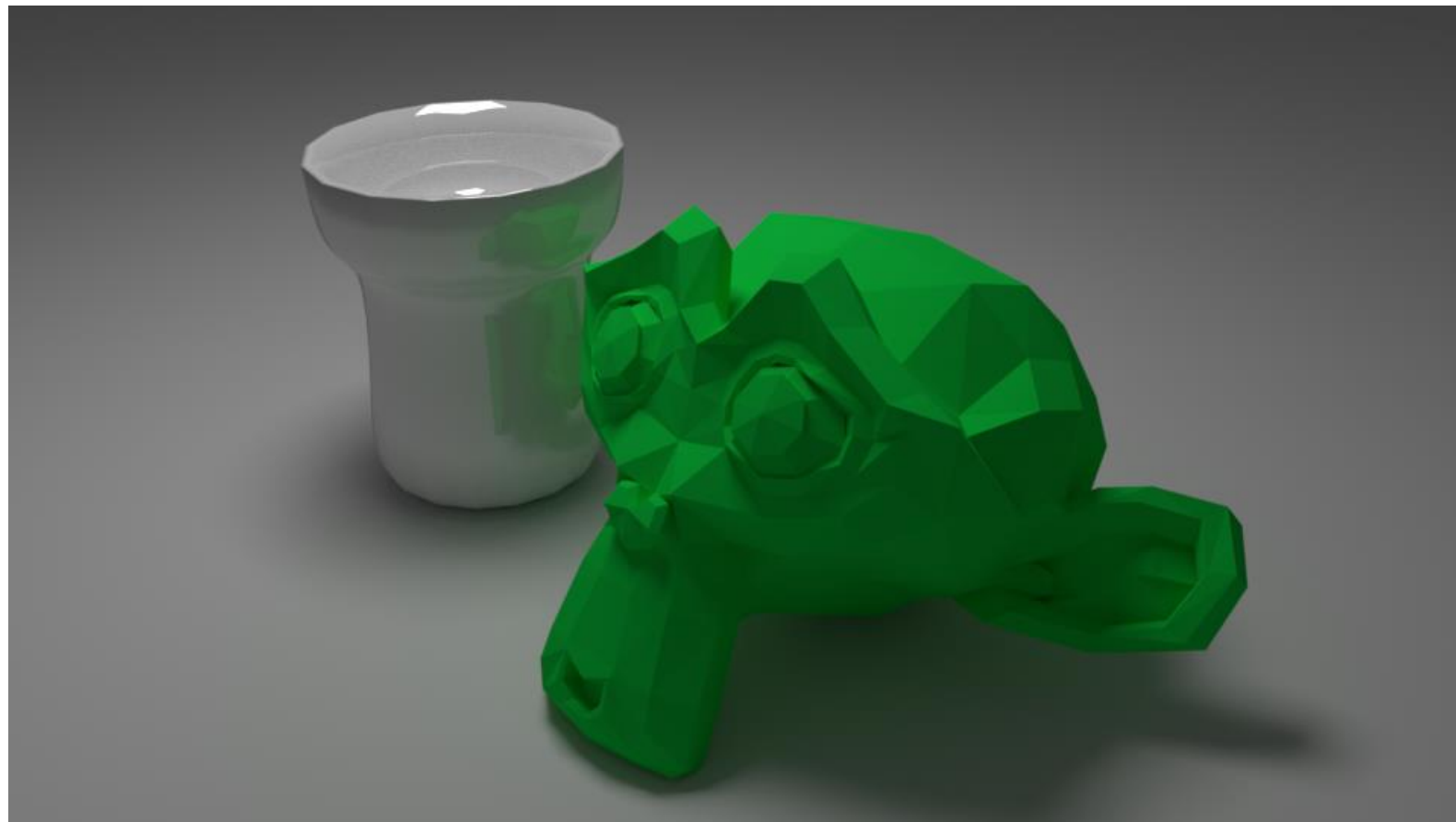
3 points light setup result:



Glass BSDF Shader:



Porcelaine (mix Shader)



What is an HDR image ?

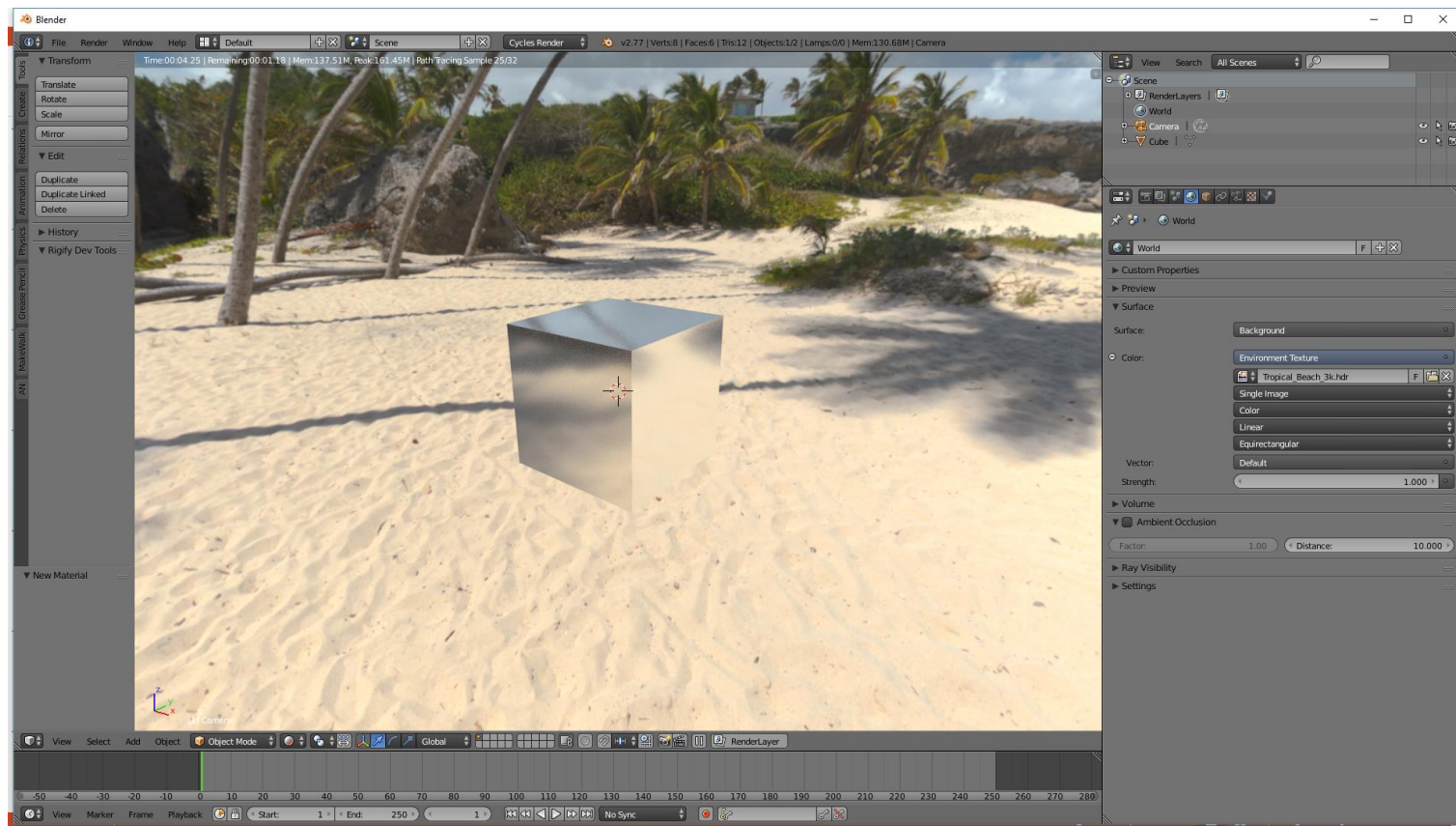
- The pixel's colour of an RGB image is defined by 3 uchar 0-255 (24-32 bit)
- The colour white for example is R=255 G=255 B=255
- In the HDR image the range values is greater



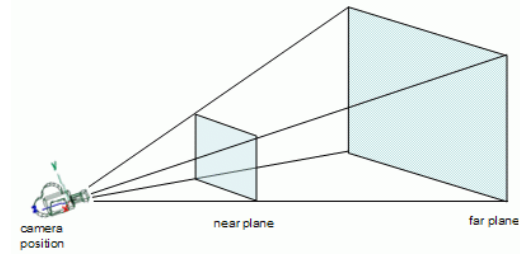
HDR Lightening: (Environment)

- Use the World nodes to add an HDR image

<http://www.hdrlabs.com/sibl/archive.html> (free hdr images)



Camera properties:



The screenshot shows the Blender Camera Properties panel. The 'Lens' section is active, showing 'Perspective' view with a focal length of 35.00 mm. The 'Camera' section shows a sensor size of 32.00 mm. The 'Display' section has 'Limits', 'Mist', 'Sensor', and 'Name' checkboxes, and 'Composition Guides' set to 0.50. The 'Depth of Field' section shows a focus distance of 0.00 and an aperture radius of 0.0000.

The screenshot shows the Blender Render Properties panel. The 'Render' section is active, showing 'Image Editor' display and 'GPU Compute' device. The 'Dimensions' section shows a resolution of 1920 x 1080 px and a frame range from 1 to 250. The 'Output' section shows the output path as '/tmp/' and format as 'PNG' with 8-bit color depth. The 'Sampling' section shows 'Path Tracing' with 128 samples and a Sobol pattern.

Output format:

- Single Images: (preferred way)
(Png Lossless vs Jpg Lossy vs openEXR hdr)
Compositing required (from image to video)

- Video:
Fine for fast prototypes, but if something goes wrong we need to render everything again... (not the optimal choice for production)

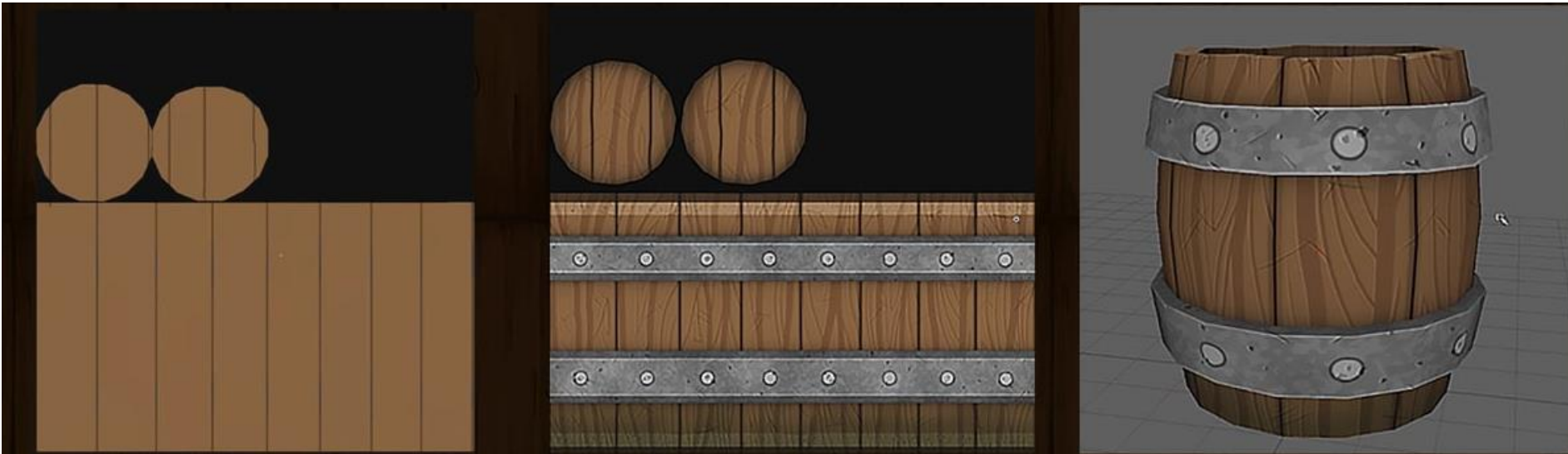
RenderFarm:

- We can also setup a Renderfarm



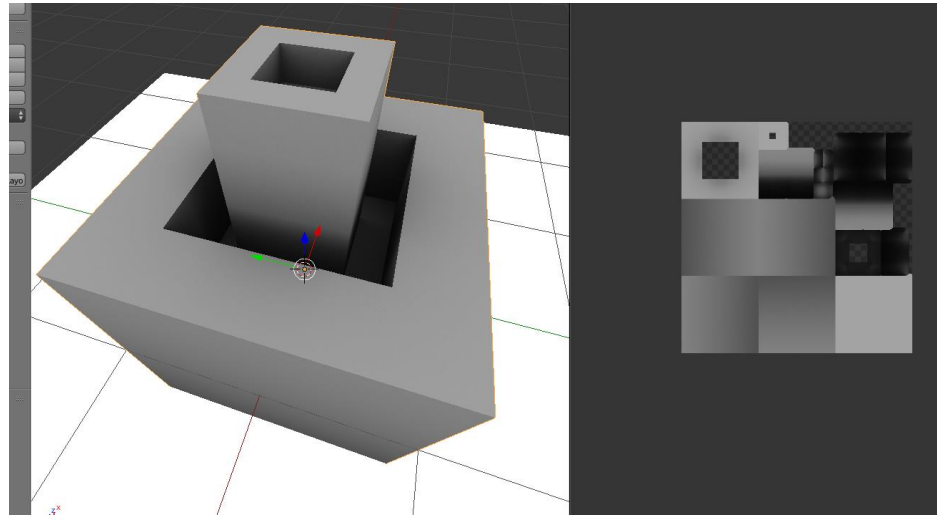
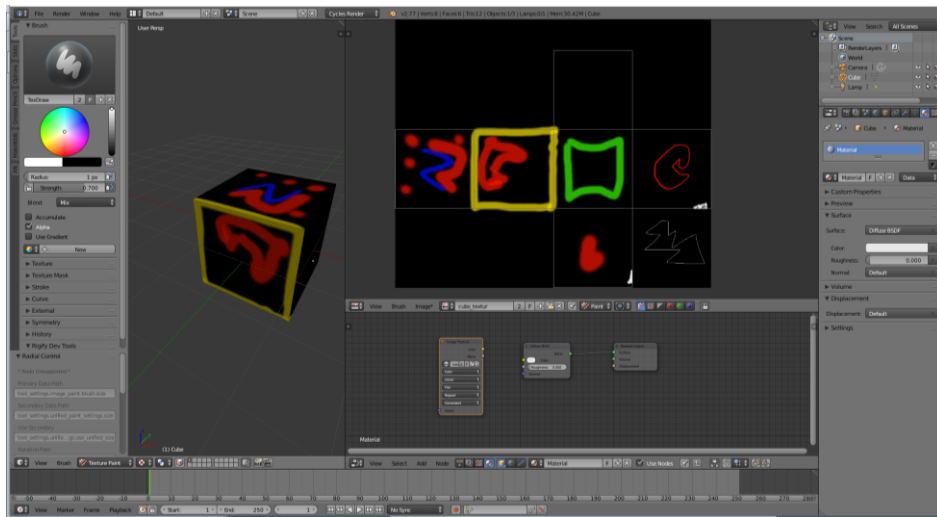
Texturing:

- From images/painting
- Procedural

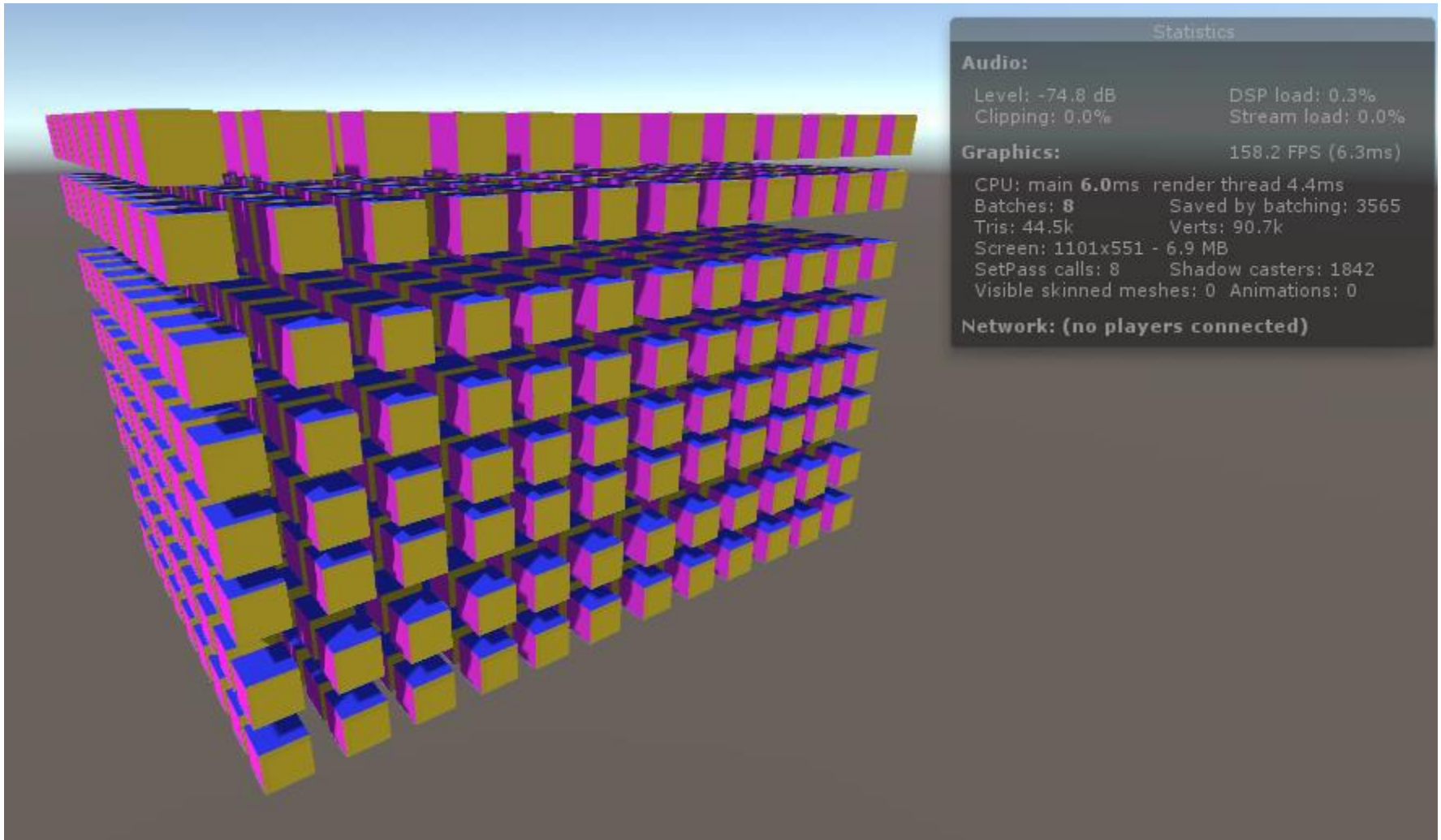


Unwrapping the mesh:

- The texture is projected (stretched) from 2D to 3D
- Automatic vs Manual unwrapping
- Mark/Remove seams (were to cut?)
- Paint texture
- Bake texture/AO

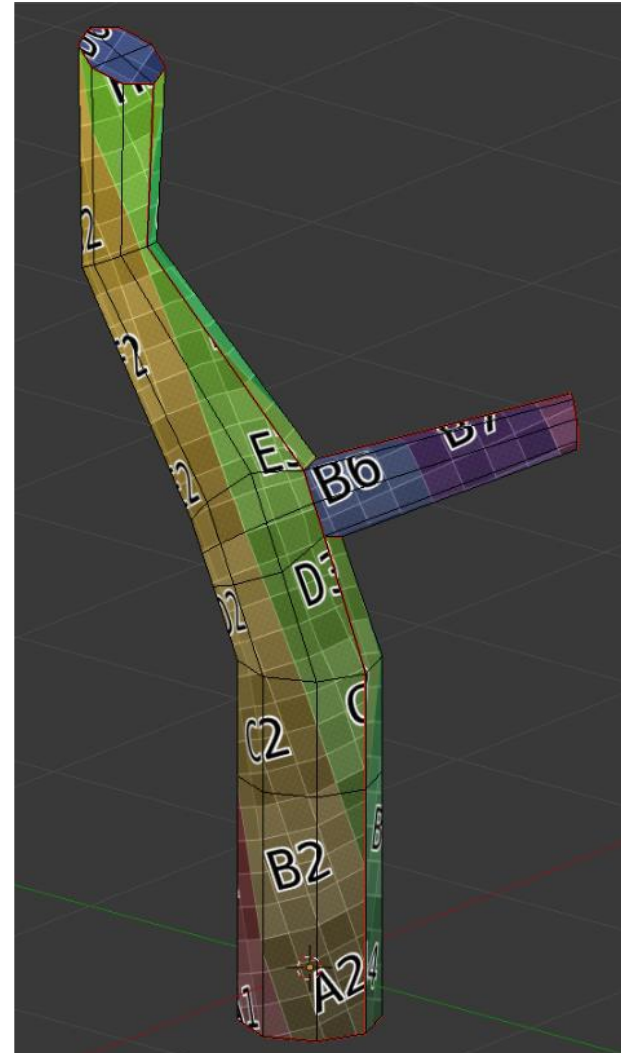


Texture vs Material in Unity3D:



Where to Mark Seam?

- Avoid stretching
- Avoid visible cut
(Seamless texture)



Texturing palette low poly scene:

