ADVANCED GRAPHICS PROGRAMMING

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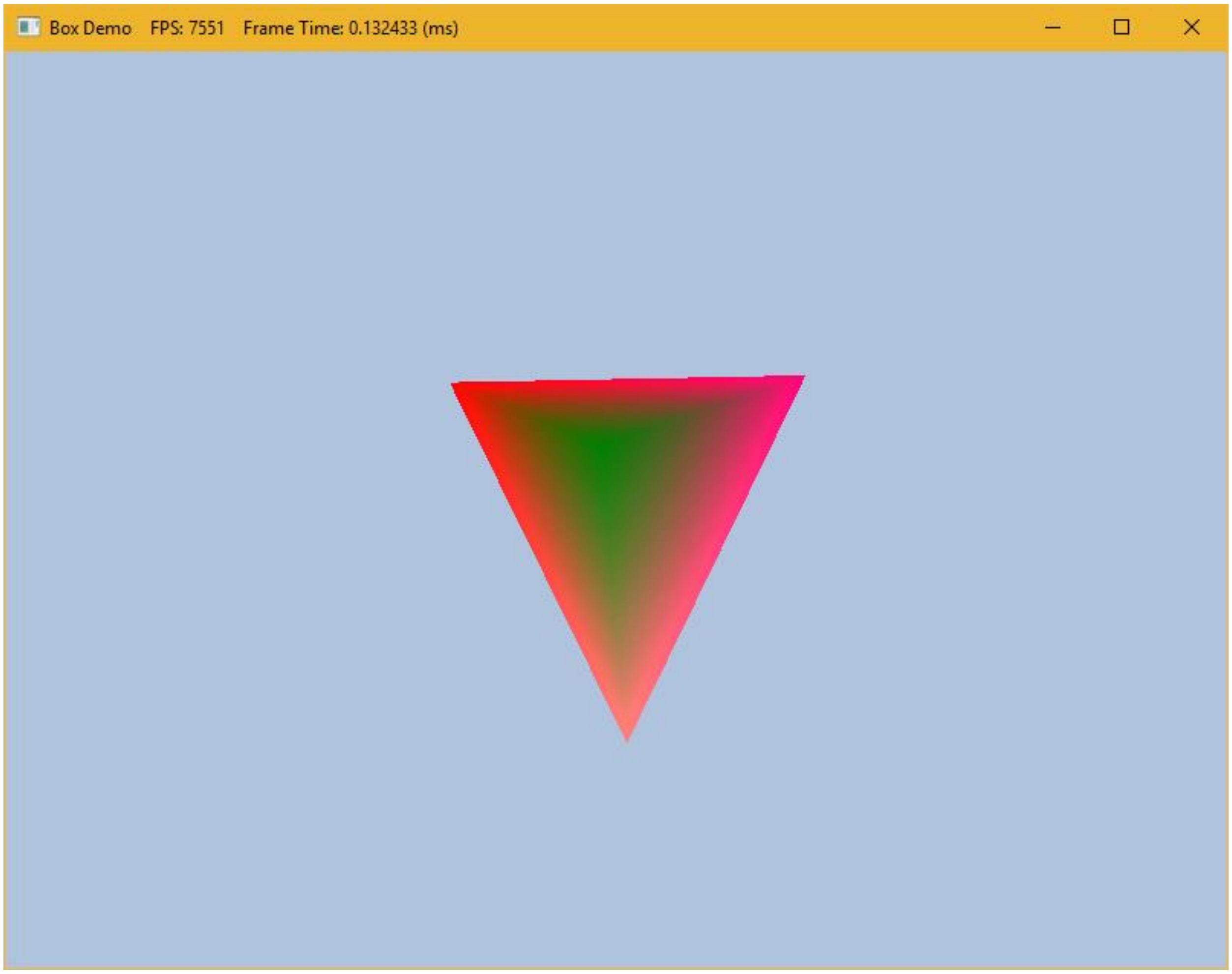
Assignment, part 1: Primitives

Basic:

I chose to render a tetrahedron.

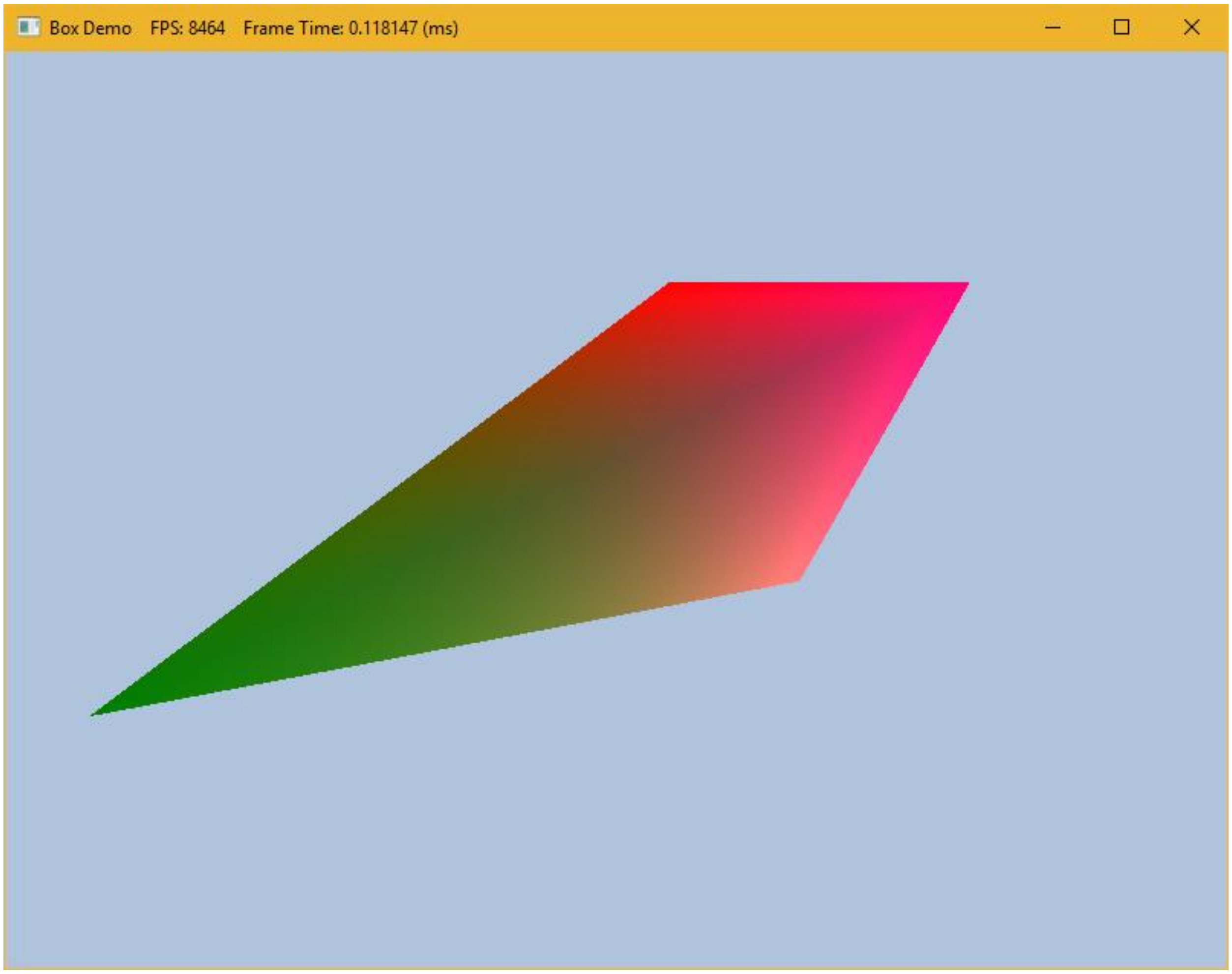


Box Demo FPS: 7551 Frame Time: 0.132433 (ms)

```
// Create vertex buffer
Vertex vertices[] =
{
        { XMFLOAT3(-0.0f, -1.0f, -1.0f), (const float*)&Colors::White   },
        { XMFLOAT3(-1.0f, +1.0f, -1.0f), (const float*)&Colors::Magenta },
        { XMFLOAT3(+1.0f, +1.0f, -1.0f), (const float*)&Colors::Red     },
        { XMFLOAT3(+0.0f, -0.0f, +1.0f), (const float*)&Colors::Green   }
};
```

Intermediate:

I decided to let the user stretch the model by holding middle mouse button and dragging the mouse. The CPU calculates the new mesh coordinates.



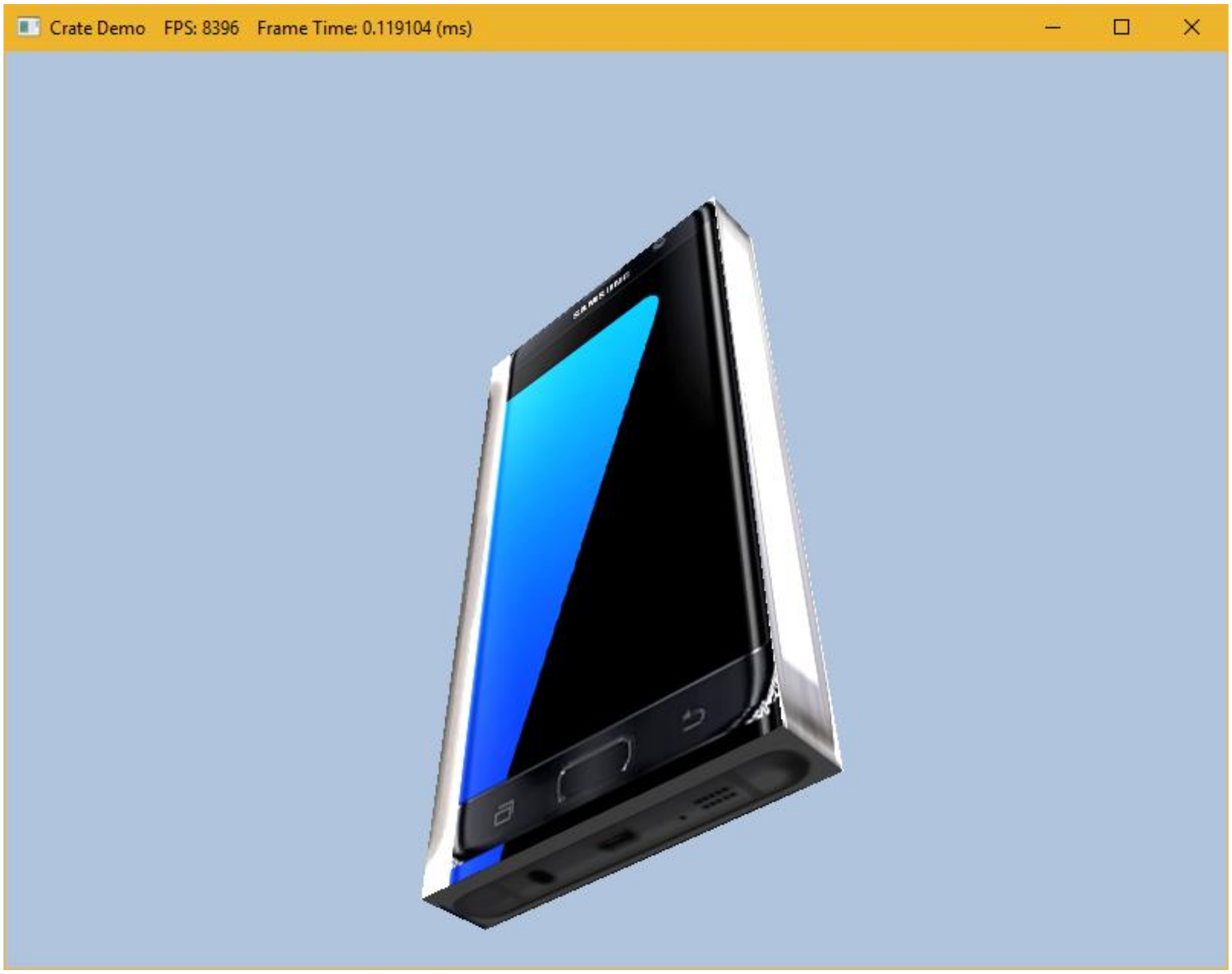
Box Demo FPS: 8464 Frame Time: 0.118147 (ms)

```
// Create vertex buffer
Vertex vertices[] =
{
	{ XMFLOAT3(-0.0f, -1.0f, -1.0f * temp1), (const float*)&Colors::White },
	{ XMFLOAT3(-1.0f, +1.0f, -1.0f * temp1), (const float*)&Colors::Magenta },
	{ XMFLOAT3(+1.0f, +1.0f, -1.0f * temp1), (const float*)&Colors::Red },
	{ XMFLOAT3(+0.0f, -0.0f, +1.0f * temp1), (const float*)&Colors::Green }
};
```

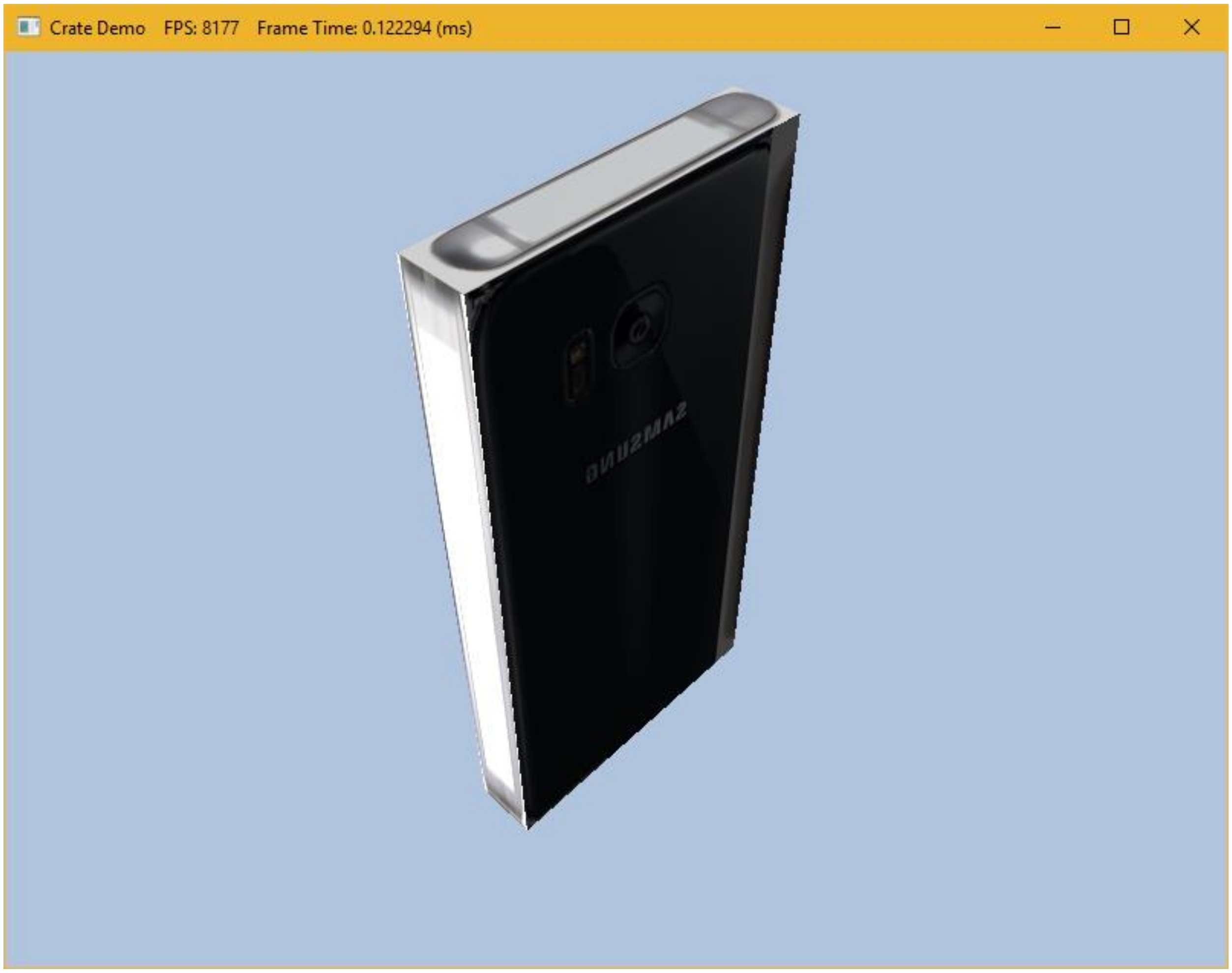
Assignment, part 2: Texturing

Basic:

I wrapped an Samsung s7 texture around a model I made with the geometrygGenerator. I manually set the texture points from the model.

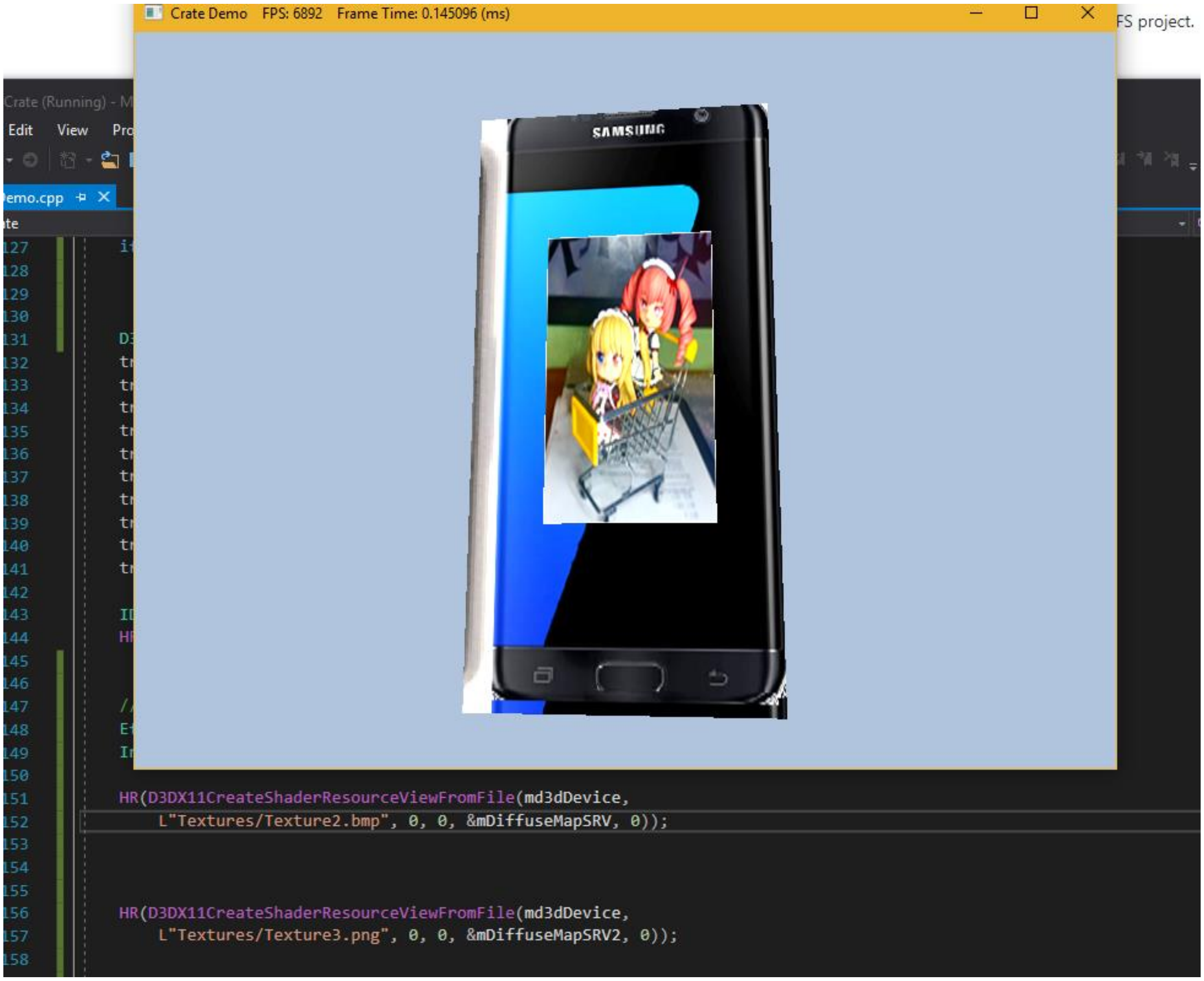


Crate Demo FPS: 8396 Frame Time: 0.119104 (ms)



```
XMFLOAT2 a[] = { XMFLOAT2(0.25f, 0.3f),
                                   XMFLOAT2(0.25f, 0.6f),
                                   XMFLOAT2(0.5f, 0.6f),
                                   XMFLOAT2(0.5f, 0.3f),

                                   XMFLOAT2(0.75f, 0.3f),
                                   XMFLOAT2(1, 0.3f),
                                   XMFLOAT2(1, 0.6f),
                                   XMFLOAT2(0.75f, 0.6f),

                                   XMFLOAT2(0.25f, 0),
                                   XMFLOAT2(0.25f, 0.3f),
                                   XMFLOAT2(0.5f, 0.3f),
                                   XMFLOAT2(0.5f, 0),

                                   XMFLOAT2(0.25f, 0.6f),
                                   XMFLOAT2(0.5f, 0.6f),
                                   XMFLOAT2(0.5f, 1),
                                   XMFLOAT2(0.25f, 1),

                                   XMFLOAT2(0, 0.6f),
                                   XMFLOAT2(0.25f, 0.6f),
                                   XMFLOAT2(0.25f, 0.3f),
                                   XMFLOAT2(0, 0.3f),
                                  XMFLOAT2(0.5f, 0.3f),
                                  XMFLOAT2(0.75f, 0.3f),
                                  XMFLOAT2(0.75f, 0.6f),
                                  XMFLOAT2(0.5f, 0.6f),
};
```

Intermediate:



```
HR(D3DX11CreateShaderResourceViewFromFile(md3dDevice,
    L"Textures/Texture2.bmp", 0, 0, &mDiffuseMapSRV, 0));



HR(D3DX11CreateShaderResourceViewFromFile(md3dDevice,
    L"Textures/Texture3.png", 0, 0, &mDiffuseMapSRV2, 0));
```

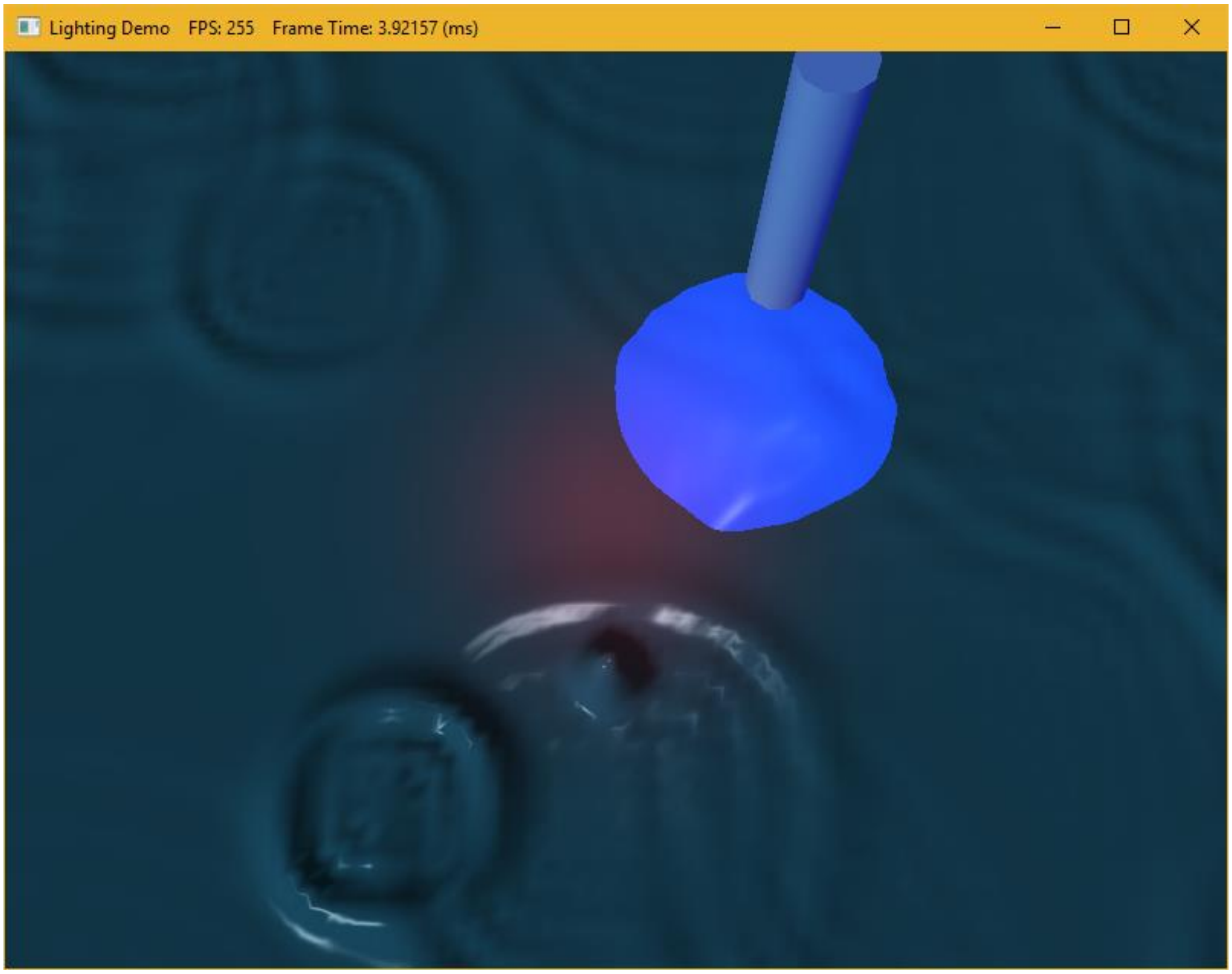
```
HR(D3DX11CreateShaderResourceViewFromFile(md3dDevice,
       L"Textures/Texture2.bmp", 0, 0, &mDiffuseMapSRV, 0));

HR(D3DX11CreateShaderResourceViewFromFile(md3dDevice,
       L"Textures/Texture3.png", 0, 0, &mDiffuseMapSRV2, 0));
```

```
if (gUseTexure)
{
       float4 result = 0;

       float4 resultColor = gDiffuseMap2.Sample(samAnisotropic, pin.Tex);
       float resultAlpha = gDiffuseMap2.Sample(samAnisotropic, pin.Tex).a;

       if (resultAlpha > 0)
              resultColor = gDiffuseMap2.Sample(samAnisotropic, pin.Tex);
       else
              resultColor = gDiffuseMap.Sample(samAnisotropic, pin.Tex);

       result = (resultColor);

       texColor = result;
}
```

Assignment, part 3: Lighting

Basic:

For basic I made a blue want with a blue light, I chose to have a harsh border around it because I thought it should look like a flash light.

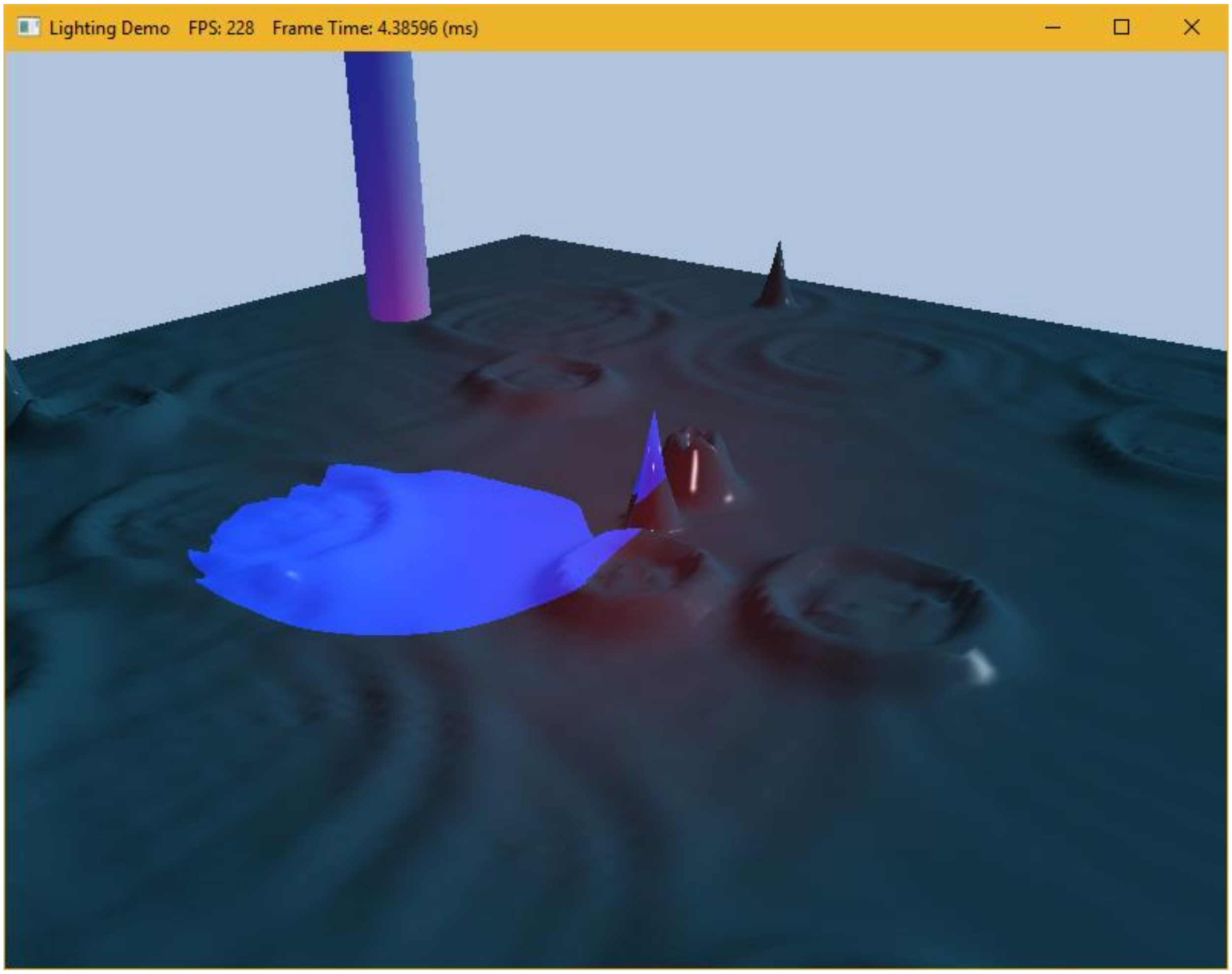


```
// Directional light.
mDirLight.Ambient  = XMFLOAT4(0.2f, 0.2f, 0.2f, 1.0f);
mDirLight.Diffuse  = XMFLOAT4(0.5f, 0.5f, 0.5f, 1.0f);
mDirLight.Specular = XMFLOAT4(0.5f, 0.5f, 0.5f, 1.0f);
mDirLight.Direction = XMFLOAT3(0.57735f, -0.57735f, 0.57735f);

// Point light--position is changed every frame to animate in UpdateScene function.
mPointLight.Ambient  = XMFLOAT4(0.0f, 0.0f, 1.0f, 1.0f);
mPointLight.Diffuse  = XMFLOAT4(0.7f, 0.7f, 0.7f, 1.0f);
mPointLight.Specular = XMFLOAT4(0.7f, 0.7f, 0.7f, 1.0f);
mPointLight.Att      = XMFLOAT3(0.0f, 0.1f, 0.0f);
mPointLight.Range    = 25.0f;

mPointLight.Position.x = 10;
mPointLight.Position.y = 20.0f;
mPointLight.Position.z = 10;
```

```
// Spot light--position and direction changed every frame to animate in UpdateScene
function.
mSpotLight.Ambient  = XMFLOAT4(1.0f, 0.0f, 0.0f, 1.0f);
mSpotLight.Diffuse  = XMFLOAT4(1.0f, 0.0f, 0.0f, 1.0f);
mSpotLight.Specular = XMFLOAT4(1.0f, 1.0f, 1.0f, 1.0f);
mSpotLight.Att      = XMFLOAT3(1.0f, 0.0f, 0.0f);
mSpotLight.Spot     = 96.0f;
mSpotLight.Range    = 20.0f;

mSpotLight.Position.x = -10;
mSpotLight.Position.y = 30.0f;
```

Intermediate:

For intermediate I made a laser light pointing from the camera perspective to the water, the user can change the size of the laser by holding the middle mouse button and dragging the mouse.

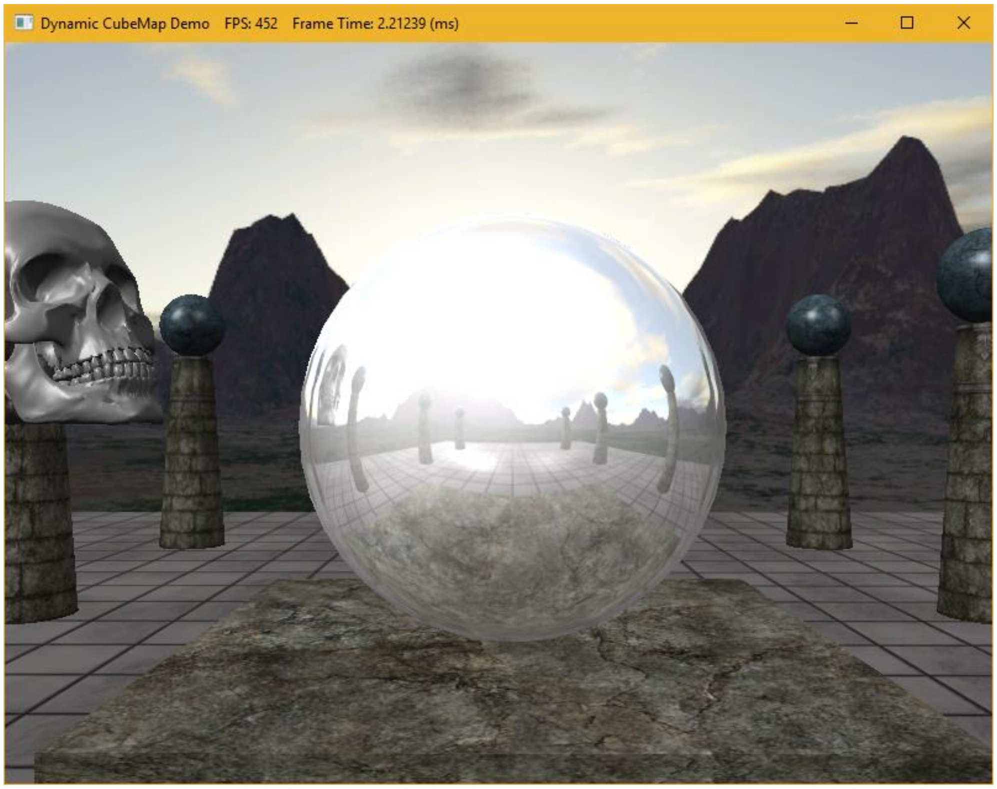


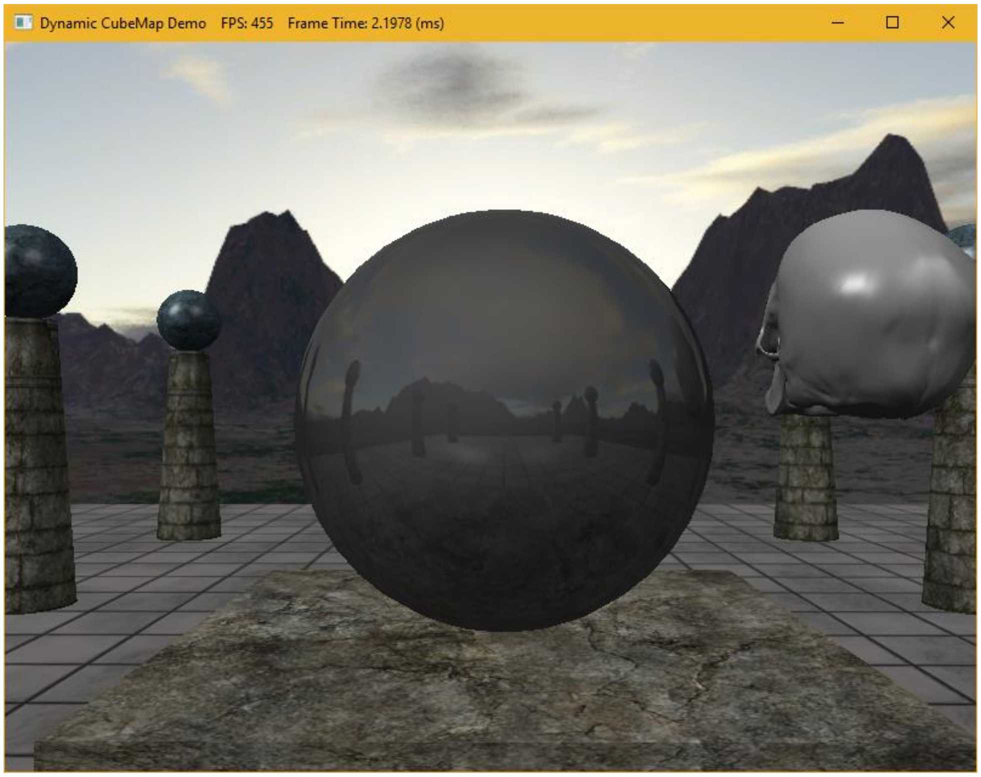
Lighting Demo FPS: 228 Frame Time: 4.38596 (ms)

Assignment, part 4: Shading

Basic:

I let the user change the chrome reflection by holding the middle mouse button and dragging from left to right.





```
if ((btnState & MK_MBUTTON) != 0)
{
        debounce = true;
        temp1 = (x / 600.0f);

        mCenterSphereMat.Reflect = XMFLOAT4(temp1, temp1, temp1, 1.0f);
        mCenterSphereMat.Ambient = XMFLOAT4(temp1, temp1, temp1, 1.0f);
        mCenterSphereMat.Diffuse = XMFLOAT4(temp1, temp1, temp1, 1.0f);
        mCenterSphereMat.Specular = XMFLOAT4(temp1, temp1, temp1, 1.0f);
}
```