Lab 7

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http://graphics.cs.aueb.gr/graphics/people.html

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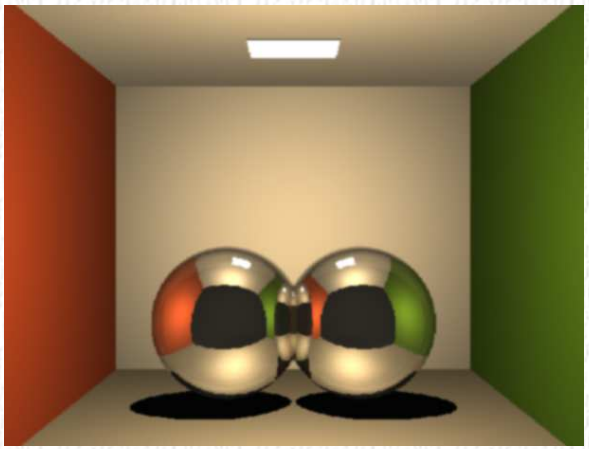


Introduction

- Framebuffer objects
- Shadows

Framebuffer objects

Redirect rendering to another location (a texture)

Creation:

```
// Generate the FBO id
glGenFramebuffers(1, &shadow_fbo);
// set the fbo active
glBindFramebuffer(GL_FRAMEBUFFER, shadow_fbo);
// create a texture that will be used as a write location
....
glFramebufferTexture2D(GL_FRAMEBUFFER,
    GL_DEPTH_ATTACHMENT, GL_TEXTURE_2D,
    shadow_tex_id, 0);
```

Framebuffer objects

Draw:

```
// Bind the FBO
glBindFramebuffer(GL_FRAMEBUFFER, shadow_fbo);
// clear the FBO textures
glClear(GL_DEPTH_BUFFER_BIT);
// set the viewport
glViewport(0.0f, 0.0f, shadow_width, shadow_height);
// draw to the FBO
...
// unbind
glBindFramebuffer(GL_FRAMEBUFFER, 0);
```

Framebuffer objects

Switch back to default:

```
// Bind the back buffer as current framebuffer
glDrawBuffer(GL_BACK);
// Clear depth and color buffers.
glClear(GL_COLOR_BUFFER_BIT |
    GL_DEPTH_BUFFER_BIT);
// set the viewport back to the actual window dimensions
glViewport(0.0f, 0.0f, current_width, current_height);
// draw to the back buffer
...
```

Framebuffer objects

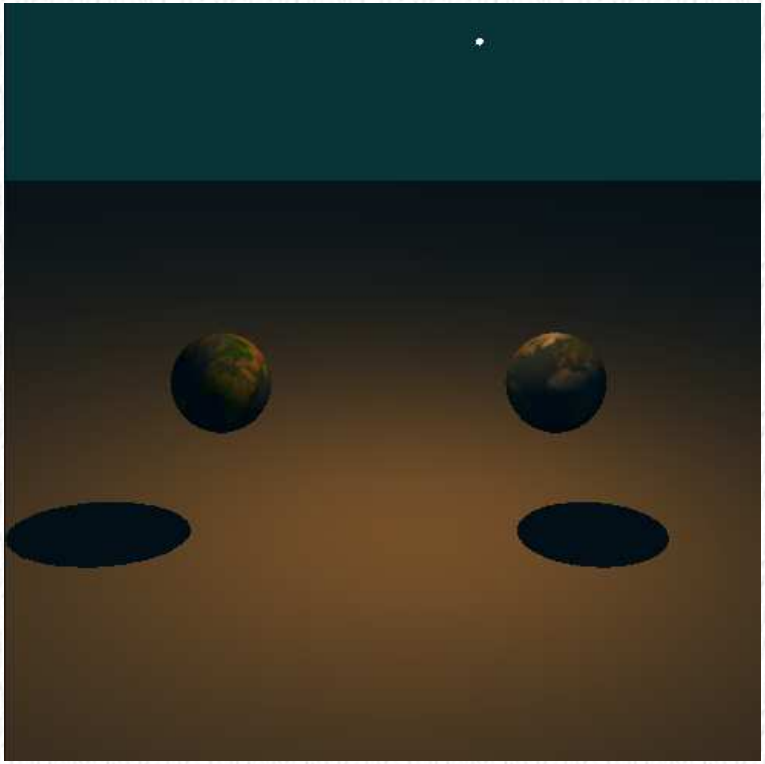
Draw:

```
// Write to Shadow Map FBO
DrawSceneToShadowFBO();
// now, render the scene as usual
// Enable Scene Graph
SceneGraphDraw();
glutSwapBuffers();
glError();
```

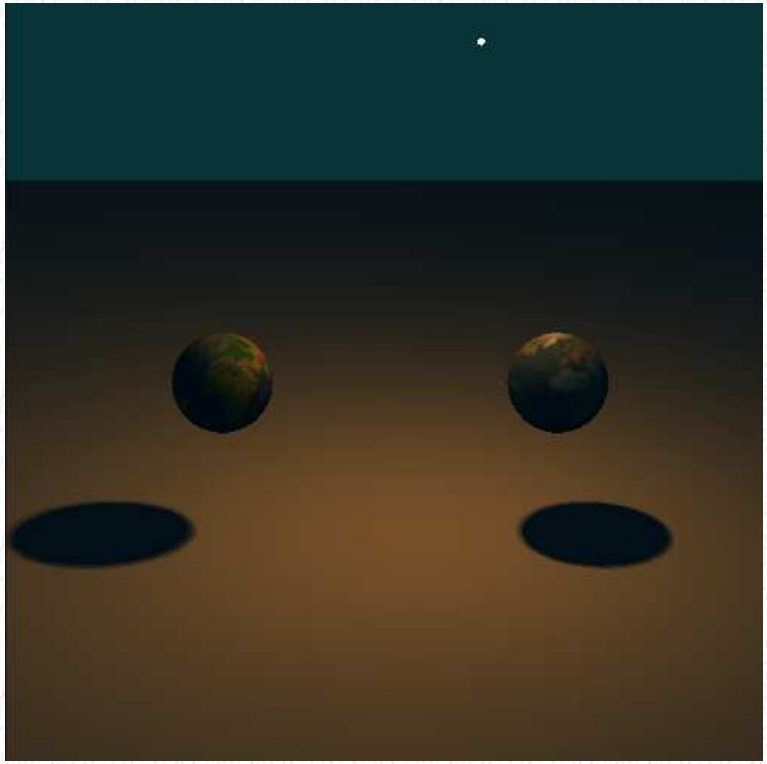
Shadows

- Create a light source (spotlight)
- Render the scene as viewed from the light using an FBO to create a shadow map
- Render the scene again as usual and pass the shadow map to the spotlight fragment shader
- In the fragment shader, check if the current position is occluded in the shadow map

Percentage Closer Filtering



without PCF



with PCF

Done!

Check lab7 project