



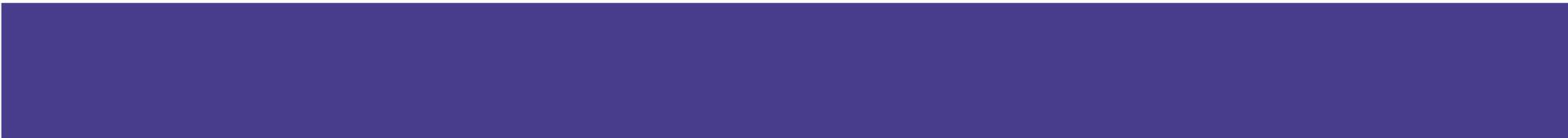
Hardware Shadow Mapping

Putting It All Together

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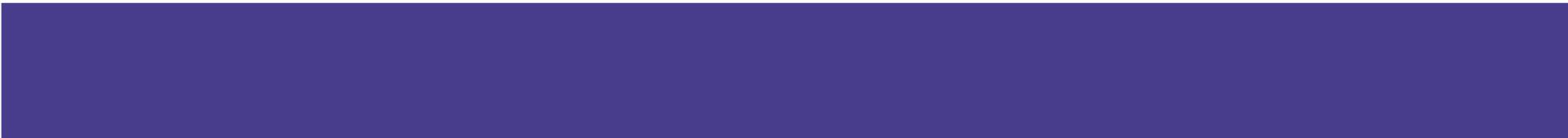
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Outline

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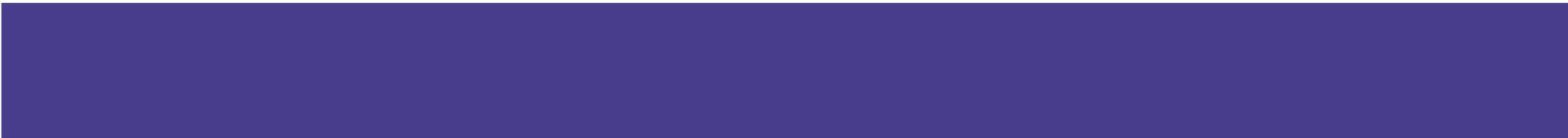
- Motivation
- More GL Extensions
- Shadow Maps



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Shadows add a sense of depth and realism.



More GL Extensions

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- `GL_SGIS_generate_mipmap`

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- `GL_NV_register_combiners`

GL_ARB_texture_border_clamp

- Clamps texture to border color
- Border color is defined through `glTexParameter...`

GL_SGIS_generate_mipmap

- Fast mipmap generation
 - Supported by NVIDIA
 - `glTexParameteri (GL_TEXTURE_2D ,
GL_GENERATE_MIPMAP_SGIS ,
GL_TRUE) ;`
- Requires main texture by power of 2

GL_SGIX_depth_texture

- Supports textures with an internal format of `GL_DEPTH_COMPONENT`
- Allows direct copying of depth information
- Supports 16, 24, and 32 bits of depth information

GL_SGIX_SHADOW

- Defines a comparison operation with the R texture coordinate
- Allows for less than or equal to or greater than or equal to comparisons
- Returns a texture value of 0 or 1 based on the comparison

GL_NV_register_combiners

- Fancier version of the ARB combiners
- Maybe worth another talk

Shadow Maps

Basic Algorithm

- 1). Update matrices for eye and light
- 2). if (need_depth_map_update)
 Update the depth map
- 3). Activate automatic texture coordinates
- 4). Configure register combiners
- 5). Draw scene
- 6). Disable register combiners
- 7). Deactivate automatic texture coordinates
- 8). Repeat

Matrix update

- Faster if done in software
- Full 4x4 matrix is needed for automatic texture coordinate generation

Updating the depth map

- Only update the depth component of the framebuffer by using `glColorMask...`
- Draw from the point of view of the light
- Copy the depth component to a texture

Automatic texture coordinates

- Map the space of the light into the eye space
- Use `glTexGen...`
- Set up so that the R coordinate is equivalent to depth

Register combiners

- `GL_SGIX_shadow` comparison is a boolean operation
- Use combiners to blend the shadow into the scene for a more natural look

Results

