ARLAB

ME/CprE/ComS 557

Computer Graphics and Geometric Modeling

MidMaps with OpenGL - Extension

October 20th, 2015

Rafael Radkowski

Building Midmaps

```cpp
// Change the parameters of your texture units.
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_MIN_FILTER,GL_NEAREST );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_MAG_FILTER,GL_LINEAR );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_WRAP_S,GL_REPEAT );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_WRAP_T,GL_REPEAT );


// Create a texture and load it to your graphics hardware. This
texture is automatically associated with texture 0 and the texture
variable "texture" / the active texture.
if(channels == 3)
    glTexImage2D(GL_TEXTURE_2D, 0, GL_RGB, width, height, 0, GL_BGR,
    GL_UNSIGNED_BYTE, data);
else if(channels == 4)
    glTexImage2D(GL_TEXTURE_2D, 0, GL_RGBA, width, height, 0, GL_BGRA,
    GL_UNSIGNED_BYTE, data);
```

Midmap level

Building Midmaps

```
// Change the parameters of your texture units.
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_MAG_FILTER,GL_LINEAR );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_MIN_FILTER,
                 GL_NEAREST_MIPMAP_NEAREST );
glTexParameterf( GL_TEXTURE_2D, GL_TEXTURE_WRAP_S,GL_REPEAT );
glTexParameterf( GL_TEXTURE_2D, GL_                         );
```

Set a min filter for midmaps.

```
// Create a texture and load it to your graphics hardware. This
texture is automatically associated with texture 0 and the texture
variable "texture" / the active texture.

if(channels == 3){
    glTexImage2D(GL_TEXTURE_2D, 0, GL_RGB, width, height, 0, GL_BGR,
    GL_UNSIGNED_BYTE, data_0);
}
else if(channels == 4)
    glTexImage2D(GL_TEXTURE_2D, 0, GL_RGBA, width, height, 0, GL_BGRA,
    GL_UNSIGNED_BYTE, data);

glGenerateMipmap(GL_TEXTURE_2D);
```
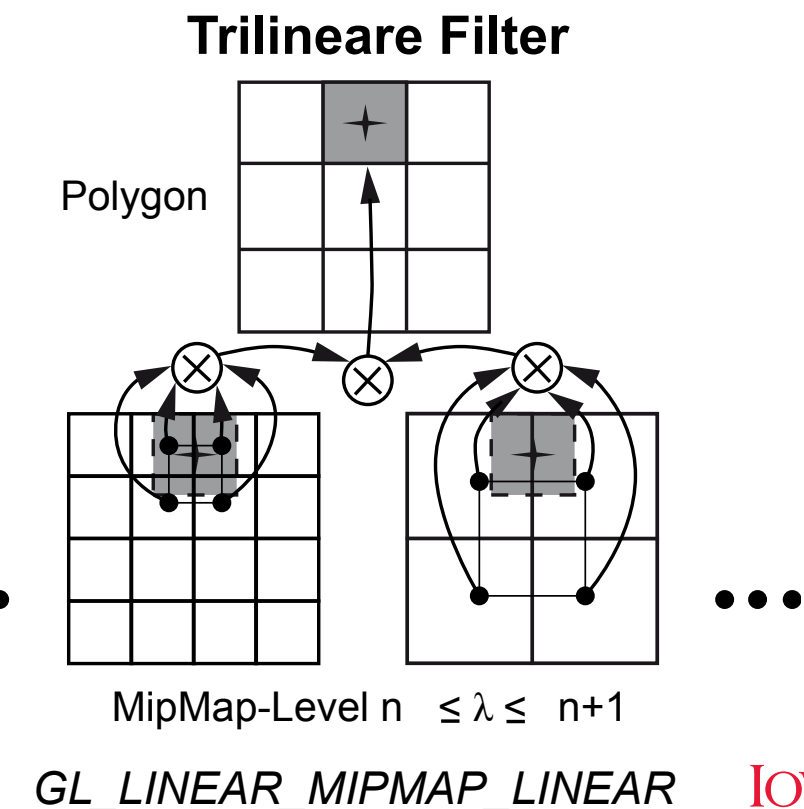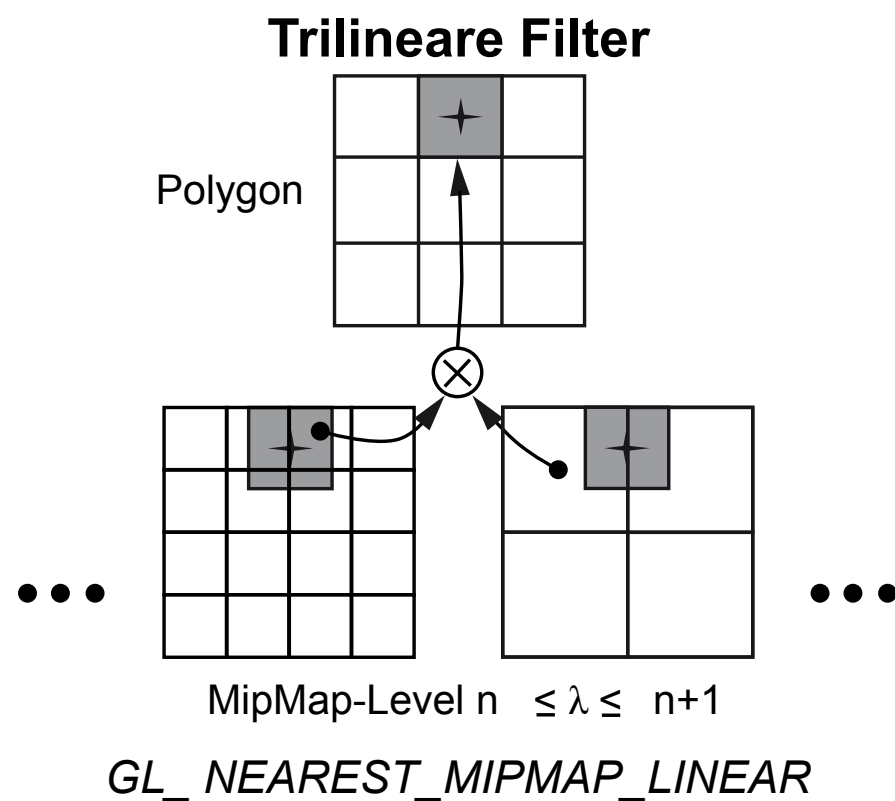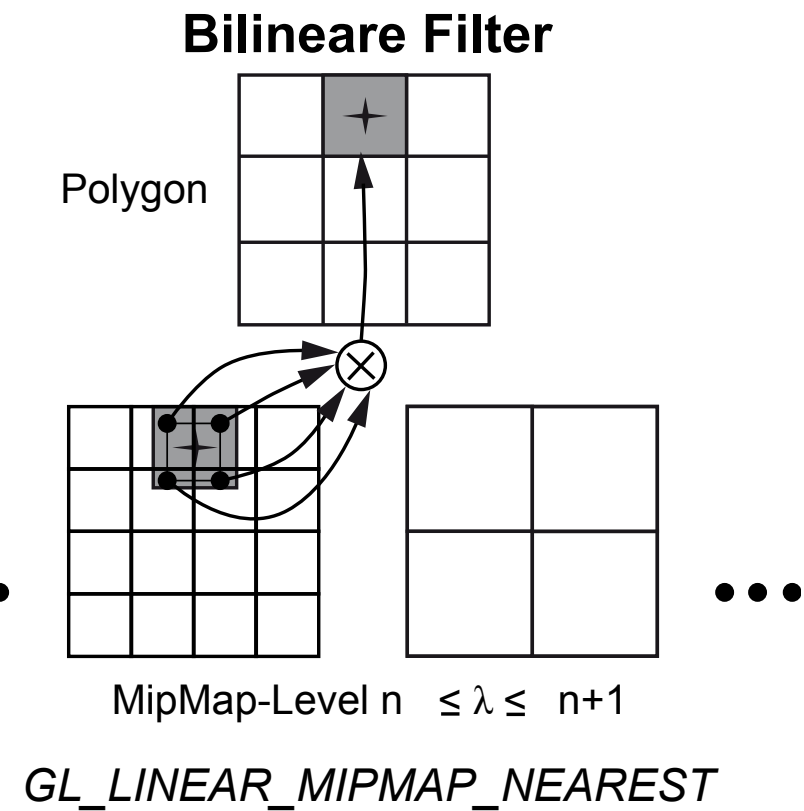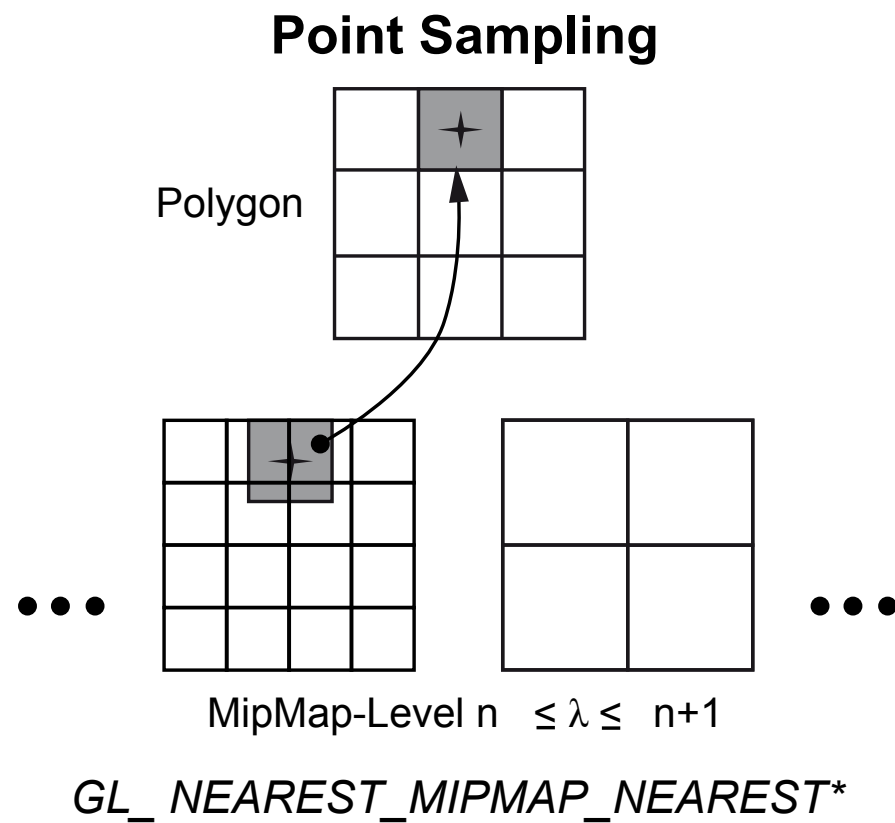
Midmap level: load the images with the highest resolution.

MipMap-Minifying Filter

Point Sampling

Polygon

MipMap-Level n   ≤ λ ≤   n+1

GL_ NEAREST_MIPMAP_NEAREST*

Bilineare Filter

Polygon

MipMap-Level n   ≤ λ ≤   n+1

GL_LINEAR_MIPMAP_NEAREST

Trilineare Filter

Polygon

MipMap-Level n   ≤ λ ≤   n+1

GL_ NEAREST_MIPMAP_LINEAR

Trilineare Filter

Polygon

MipMap-Level n   ≤ λ ≤   n+1

GL_LINEAR_MIPMAP_LINEAR

Building Midmaps

glGenerateMipmap(GL_TEXTURE_2D);

Load a big image

The highest level is
$$\log_2(\max(width, height))$$

It takes half of the size for all other textures until the size is 1x1

2048 x 2048

1024 x 1024

512 x 512

256 x 256

128 x 128

64 x 64

1x1

(11)   (10)   (9)   (8)   (7) (6)   (0)

glGenerateMipmap

generate mipmaps for a specified texture object
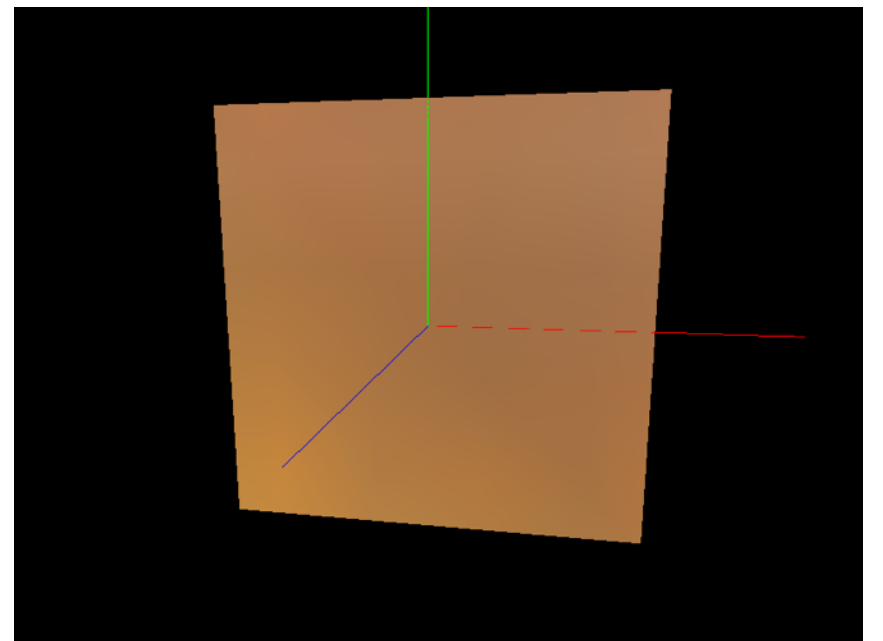
```
void glGenerateMipmap(GLenum target);
```

Parameters:

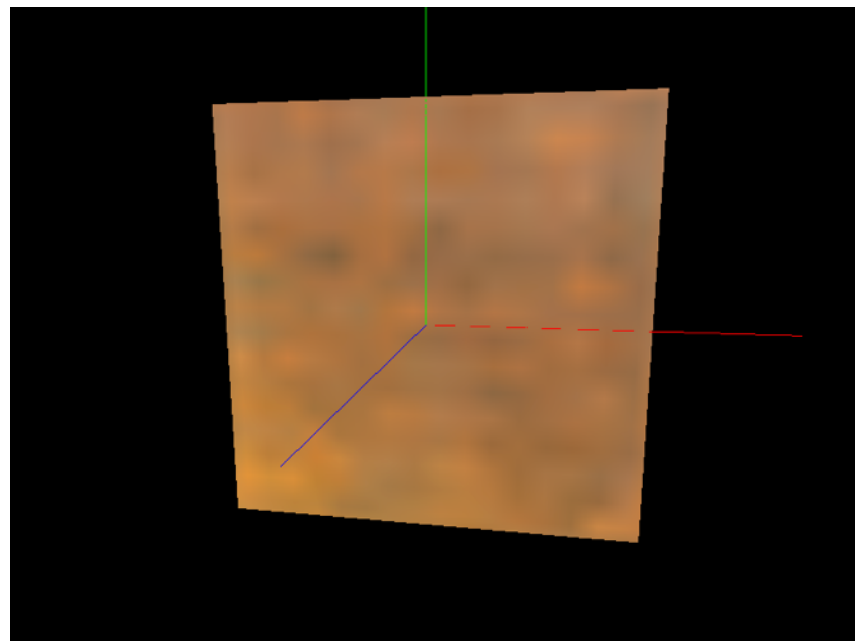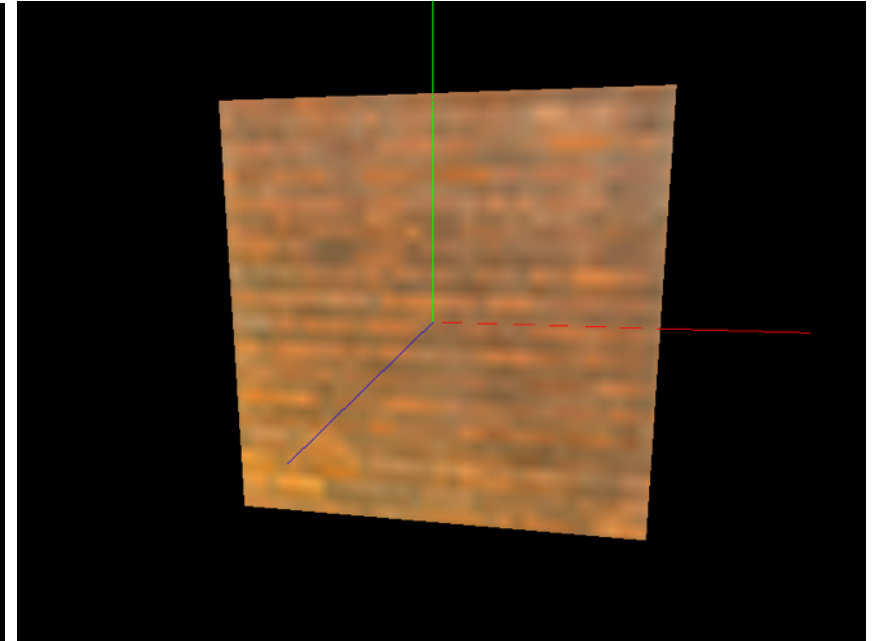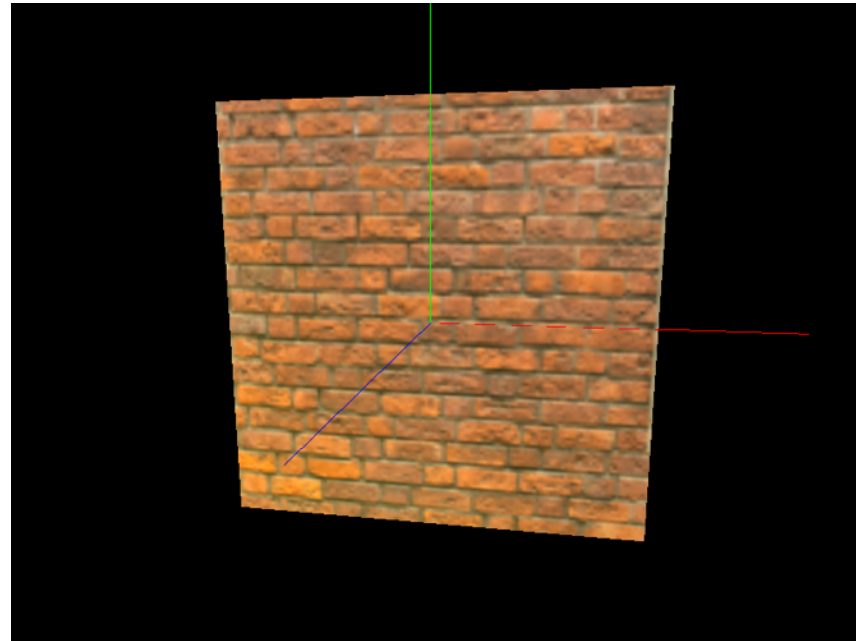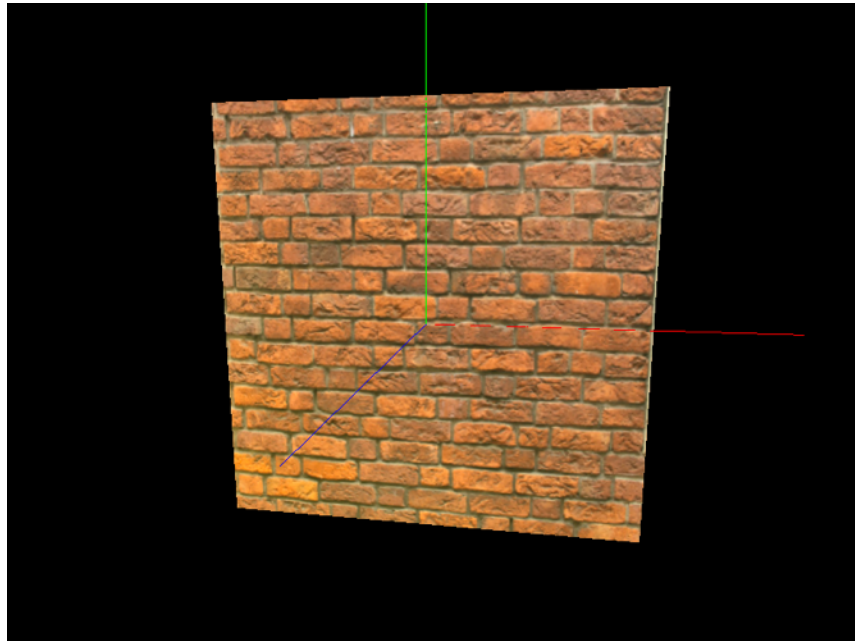target - Specifies the target to which the texture object is bound for glGenerateMipmap. Must be one of GL_TEXTURE_1D, GL_TEXTURE_2D, GL_TEXTURE_3D, GL_TEXTURE_1D_ARRAY, GL_TEXTURE_2D_ARRAY, GL_TEXTURE_CUBE_MAP, or GL_TEXTURE_CUBE_MAP_ARRAY.

texture - Specifies the texture object name for glGenerateTextureMipmap.

Example
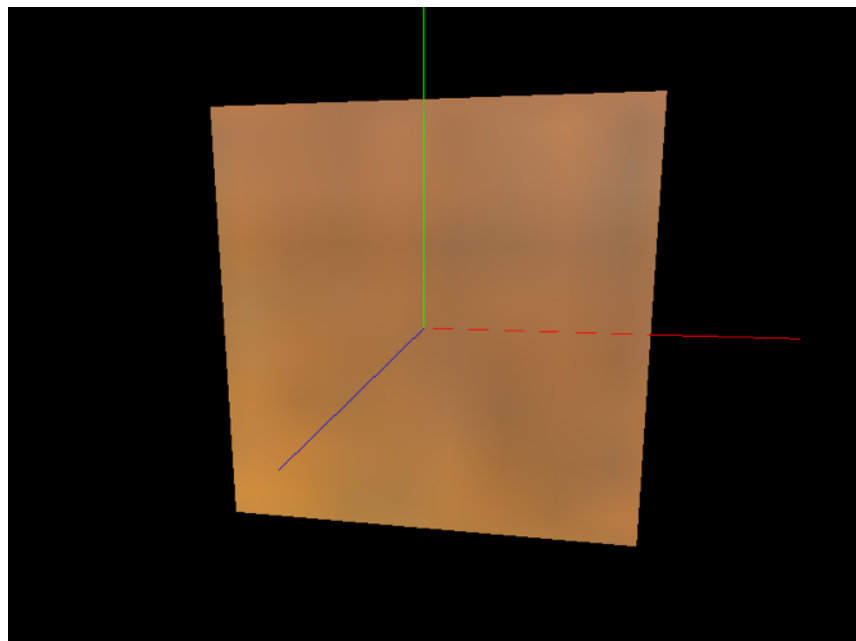
Thank you!

Questions

Rafael Radkowski, Ph.D.

Iowa State University

Virtual Reality Applications Center

1620 Howe Hall

Ames, Iowa 5001, USA

+1 515.294.5580

+1 515.294.5530(fax)

rafael@iastate.edu