

# CSE 690: GPGPU

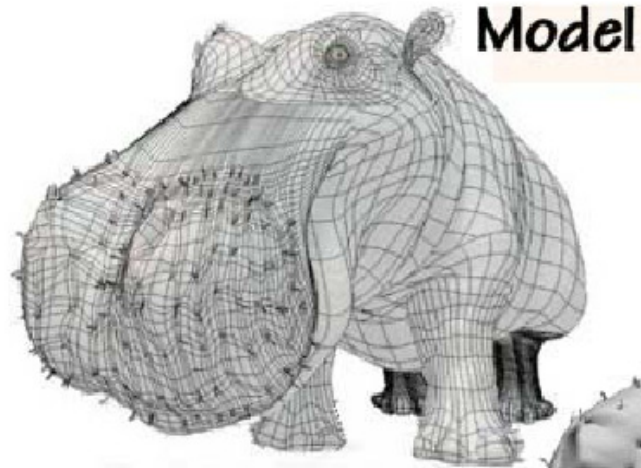
## Lecture 2: Understanding the Fabric - Texture Mapping

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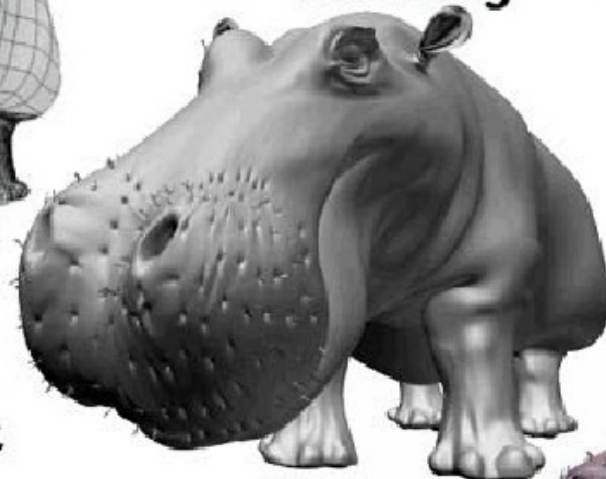
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Computer Science Department

# Texture Mapping - Realistic Detail for Boring Polygons



**Model**



**Model with  
Shading**

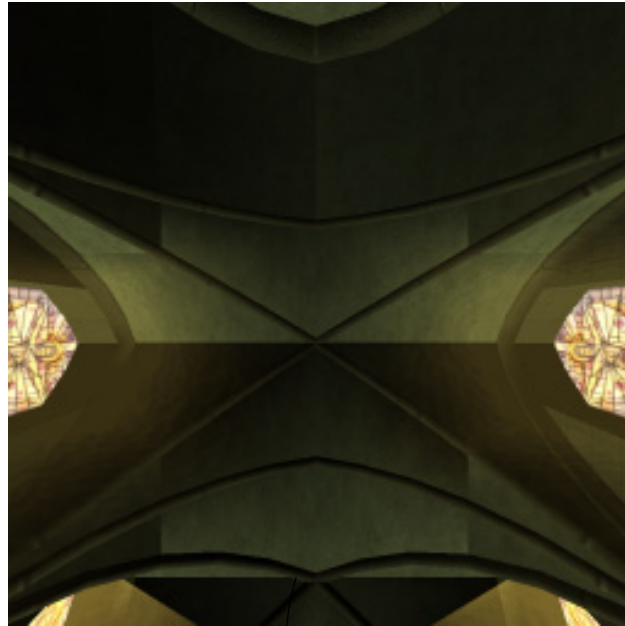


**Model with  
Shading  
and Textures**

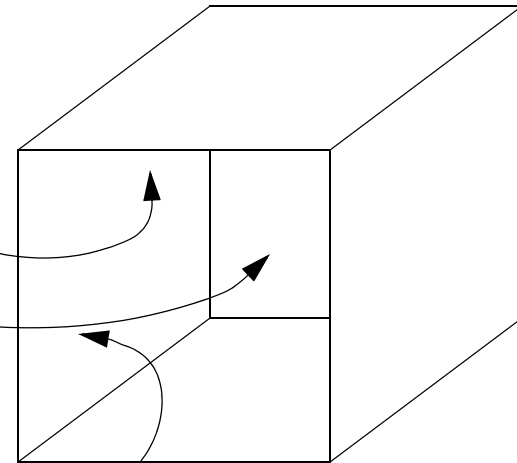


At what point  
do things start  
looking realistic?

# Texture Mapping - Large Walls



Take pictures, map as textures onto large polygon



# Texture Mapping Large Walls - OpenGL Program

```
glEnable(GL_TEXTURE_2D);
```

for each polygon

```
glBindTexture(textureName);
```

```
glBegin(GL_QUAD);
```

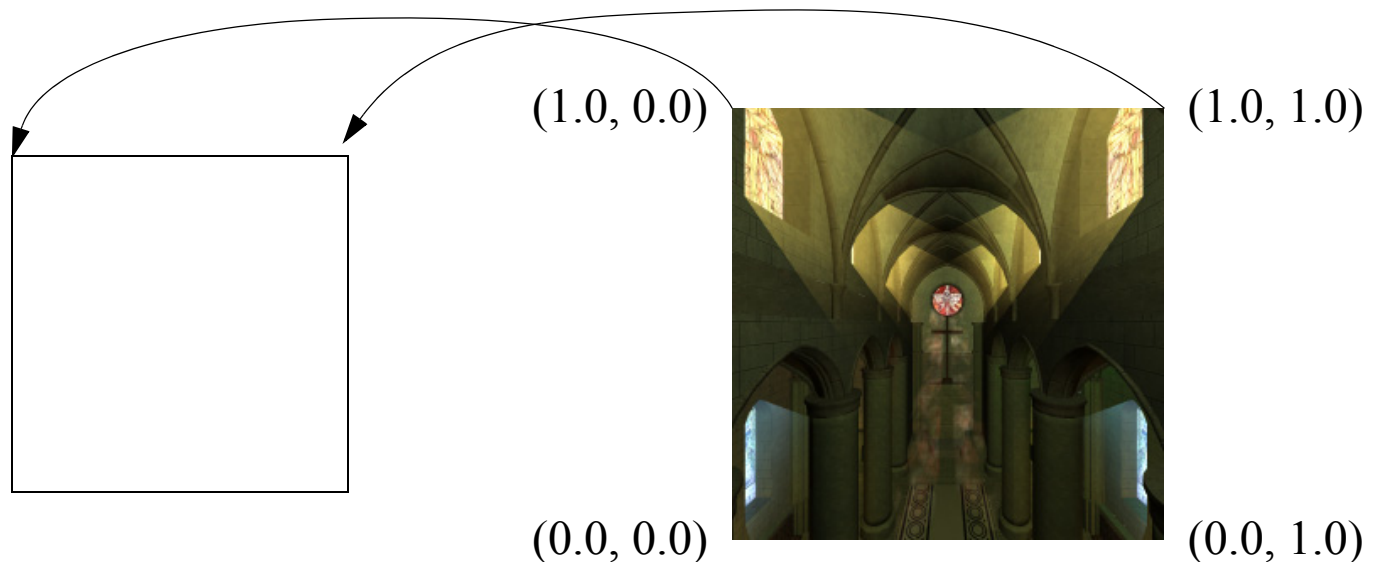
```
glColor3fv(c1); glVertex3fv(v1); glTexCoord2D(0.0, 0.0); /* vertex 1 */
```

```
glColor3fv(c2); glVertex3fv(v2); glTexCoord2D(0.0, 1.0); /* vertex 2 */
```

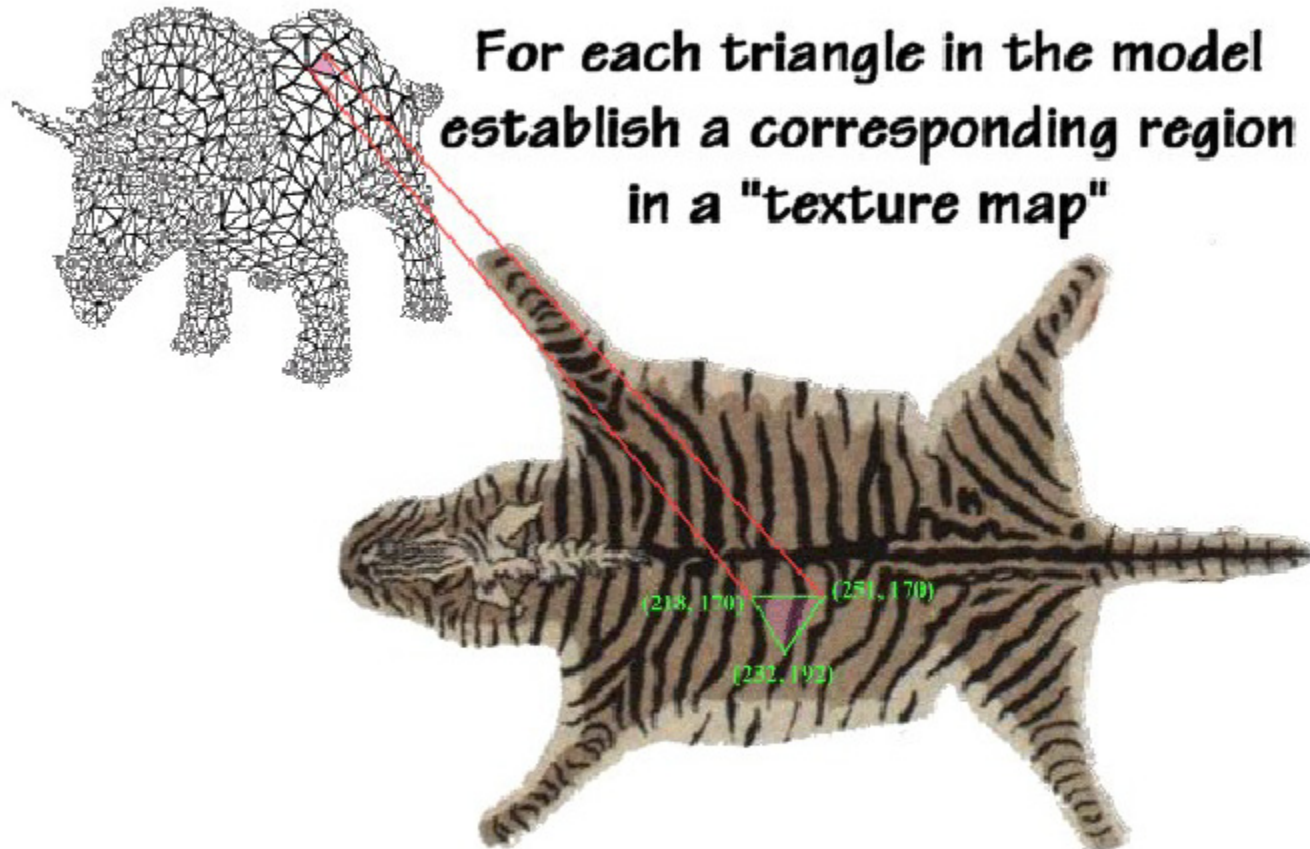
```
glColor3fv(c3); glVertex3fv(v3); glTexCoord2D(1.0, 1.0); /* vertex 3 */
```

```
glColor3fv(c4); glVertex3fv(v4); glTexCoord2D(1.0, 0.0); /* vertex 4 */
```

```
glEnd();
```



# Texture Mapping - Small Facets



**For each triangle in the model  
establish a corresponding region  
in a "texture map"**

**During rasterization interpolate the  
coordinate indices within the texture map**



# Texture Mapping Small Facets - OpenGL Program

```
glEnable(GL_TEXTURE_2D);
```

```
glBindTexture(textureName);
```

```
for each polygon  $i$  in the mesh
```

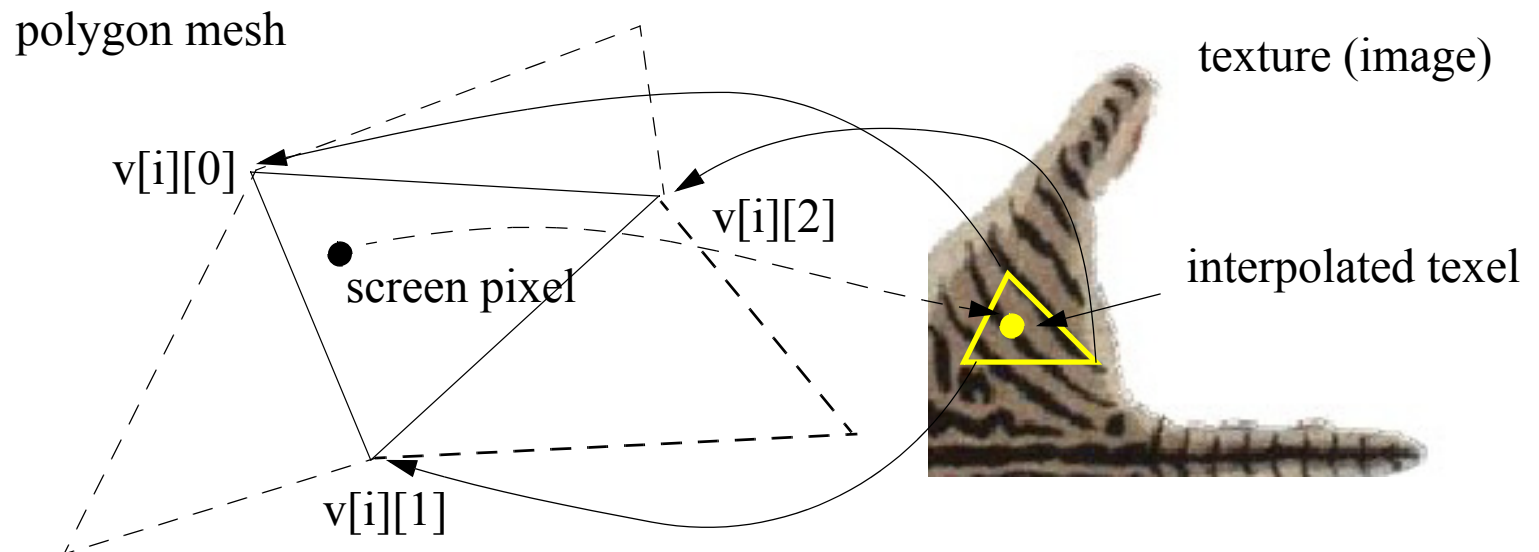
```
    glBegin(GL_QUAD);
```

```
        glColor3fv(c[i][0]); glVertex3fv(v[i][0]); glTexCoord2fv(t[i][0]); /* vertex 1 */
```

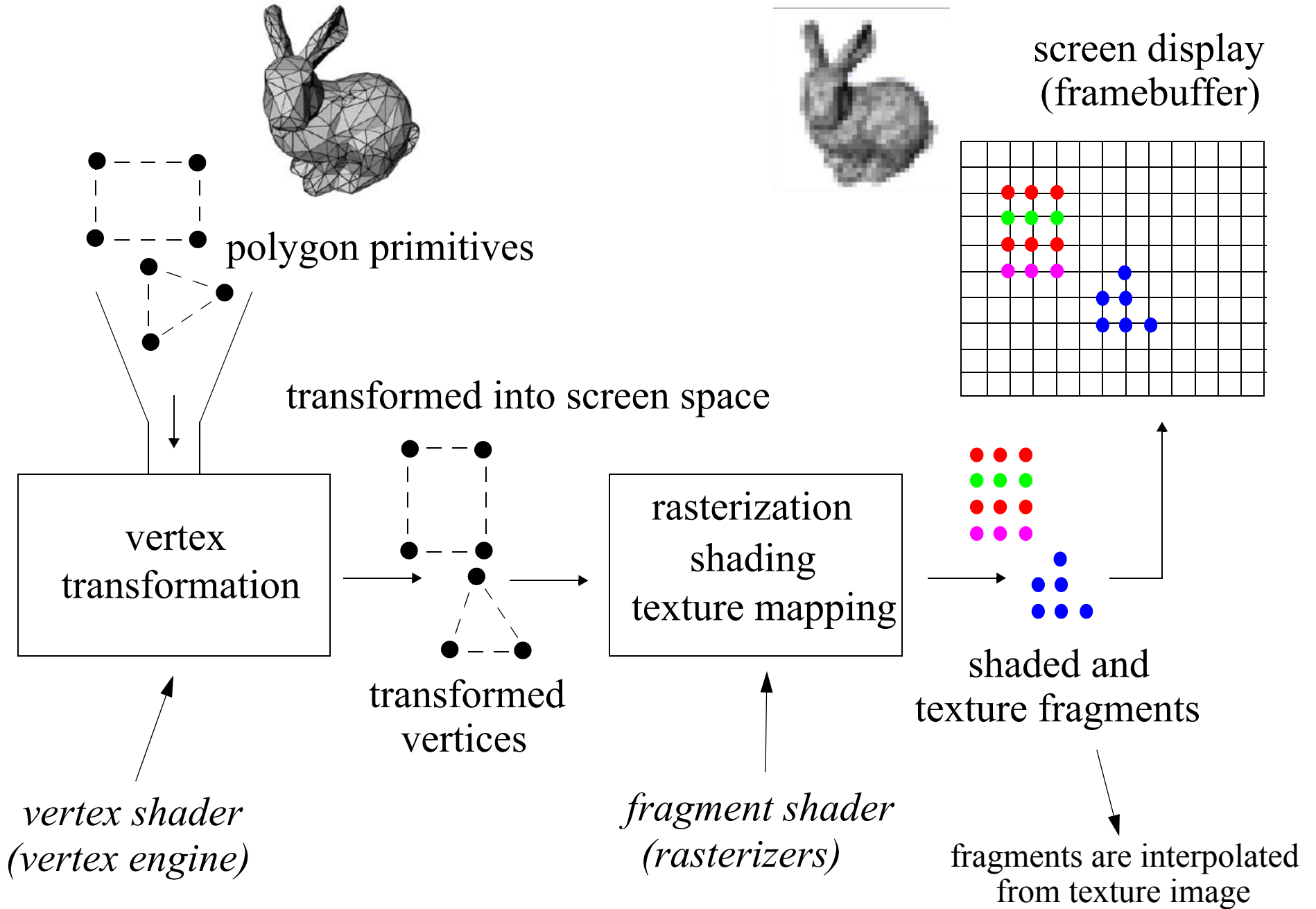
```
        glColor3fv(c[i][1]); glVertex3fv(v[i][1]); glTexCoord2fv(t[i][1]); /* vertex 2 */
```

```
        glColor3fv(c[i][2]); glVertex3fv(v[i][2]); glTexCoord2fv(t[i][2]); /* vertex 3 */
```

```
    glEnd();
```



# Complete Graphics Pipeline



# Graphics Hardware - Peeking Under The Hood

- Graphics hardware accelerates vertex and fragment shaders
  - (almost) fully programmable
  - enables accurate physics and visuals
  - realistic games
  - latest: real-time movie production on the PC
  - accelerate even general purpose, scientific and numerical computations (GPGPU)

