Perspective correct interpolation
Perspective correct interpolation

- In assignment 1, we found barycentric coordinates in 2D screen space
- but not the correct object space barycentric coords
- these coordinates were okay for z-buffer test
\[ u = \frac{1}{2} u_1 + \frac{1}{2} u_2 \]
$u = \frac{1}{2} u_1 + \frac{1}{2} u_2$
Interpolation with screen space weights is incorrect.

\[ u = \frac{1}{2} u_1 + \frac{1}{2} u_2 \]
Perspective correct interpolation

Using screen space weights looks wrong for textures

[Heckbert and Morton, 1990]
Do we need to transform back to object space?

\[ u = \frac{1}{2} u_1 + \frac{1}{2} u_2 \]

\[ \mathbf{v}_{sc} = M_{vp} M_{pers} M_{cam} \mathbf{v} \]
Do we need to transform back to object space?

NO!

\[ u = \frac{1}{2} u_1 + \frac{1}{2} u_2 \]
Environment mapping
Environment Mapping

Use a texture for the distant environment to simulate the effect of ray tracing more cheaply.
Sphere Mapping

- Project objects in the environment onto a sphere centered at the eye.
- Unwrap and store as a texture.
- Use reflection direction to look up texture value.
Cube Mapping

- Compute six projections, one for each wall
- Store as texture
- Use reflection direction to lookup texture value
Different environment maps

- Blinn/Newell latitude mapping
- OpenGL spherical mapping
- Cube mapping

www.reindelsoftware.com
Environment Mapping

Create the effect of a mirror with two-pass rendering

1. First pass: render the scene from the perspective of the mirror
2. Second pass: render from original pov; use the first image as a texture for the mirror
Shadow Mapping

2 passes:

1. render scene from pov of light and store z-buffer in a texture

2. when rendering scene from desired pov, also render from light pov and test pixel against stored texture

http://www.opengl-tutorial.org/intermediate-tutorials/tutorial-16-shadow-mapping/
Bump Mapping

perturb normal vectors

doesn’t affect silhouette
Bump Map Compression Demo
Camera Control:
- mouse to rotate
- WASD keys to move.

http://www.lg.clanhost.cz

http://www.paulsprojects.net/tutorials/simplebump/simplebump.html

Standardní bitmapa

Bump Mapping

http://www.lg.clanhost.cz
bump mapping geometric detail
Normal Mapping

Example of a normal map (center) with the scene it was calculated from (left) and the result when applied to a flat surface (right).