Environment Mapping

CS418 Computer Graphics
John C. Hart
Environment Mapping

- Stores view from a point in all directions
- When rendering a fragment, compute reflection vector for eye (like the light reflection vector for specular reflection)
- Lookup prestored color and display that color as the reflection
- How can we store a precomputed view in all directions as a texture map?

See the Story of Reflection Mapping: http://debevec.org/ReflectionMapping/
Sphere Map Idea

• Photograph a reflective sphere (like a garden gazing ball) in whatever environment you like
• All possible normals you can see appear somewhere on the sphere
• Store image of reflective sphere as texture map
• When rendering a point on a reflective object, find the point on the sphere with the same surface normal, and display the sphere’s color on the object
• Need to convert surface normal to texture coordinates
  \[ \mathbf{n} = (n_x, n_y, n_z) \text{ in viewing coordinates} \]
  \[ s = (n_x + 1)/2, \quad t = (n_y + 1)/2 \]
Cube Map

- Sphere map creates distortion near the edges of the sphere
- Can use six different texture images to form a cube map

\[ u = \frac{y}{x} \]
\[ v = \frac{z}{x} \]
