Dome Projection using a Vertex Shader

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Computer Graphics

Dome Projection – Becoming more Common
I believe that it’s only a matter of time until it becomes a routine visualization tool!

Dome Projection – Becoming more Common

Dome Distortion
Move the teapot so it surrounds the audience

A fisheye lens distorts the image so that it spreads out across the dome. The trick is pre-distorting the image in the other direction so that it looks correct after being projected.

Dome Projection:
Viewing Volume = (-1,-1) to (1,1)
The edge of the circle represents the edge of the dome projection = your left, right, bottom, top as you are sitting in the theater.

Dome Vertex Shader:
const float PI = 3.14159265;

void main() {
    vec4 pos = gl_ModelViewMatrix * gl_Vertex;
    float lenxy = length(pos.xy);
    float phi = atan(lenxy, -pos.z);
    pos.xy = (phi / (PI/2.)) * (pos.xy / lenxy);
    gl_Position = gl_ProjectionMatrix * pos;
}

God’s-eye View: As the eye sees it:
From the side:

Note: (pos.xy / lenxy) = (cosθ, sinθ)
Large Lines and Polygons Need to be Tessellated

- Bounding Box edges were not tessellated. Curved lines on the monitor produced straight lines on the dome.
- Bounding Box edges were tessellated. Curved lines on the monitor produced curved lines on the dome.