Geometric Morphing with the Vertex Shader

Morphing a Sphere into a Circle

Blend = 0.00

Blend = 0.25

Blend = 0.50

Blend = 0.75

Blend = 1.00
```cpp
// original model coords (sphere):
vec4 vertex0 = gl_Vertex;
vec3 norm0 = gl_Normal;

// circle coords:
vST = gl_MultiTexCoord0.st;
float radius = 1. - vST.t;
float theta = TWOPI * vST.s;
vec4 circle = vec4(radius*cos(theta), radius*sin(theta), 0., 1.);
vec3 circlenorm = vec3(0., 0., 1.);

vST += vec2(OffsetS, OffsetT);

// blend:
vec4 theVertex = mix(vertex0, circle, Blend);
vec3 theNormal = normalize(mix(norm0, circlenorm, Blend));

// do the lighting:
vec3 tnorm = normalize(vec3(uNormalMatrix * theNormal));
vec3 LightPos = vec3(5., 10., 10.);
vec3 ECposition = vec3(uModelViewMatrix * theVertex);
vLightIntensity = abs(dot(normalize(LightPos - ECposition), tnorm));
if (vLightIntensity < 0.2)
vLightIntensity = 0.2;

vec3 tnorm = normalize(vec3(uNormalMatrix * theNormal));
vec3 LightPos = vec3(5., 10., 10.);
vec3 ECposition = vec3(uModelViewMatrix * theVertex);

// do the lighting:
vec3 tnorm = normalize(vec3(uNormalMatrix * theNormal));
vec3 LightPos = vec3(5., 10., 10.);
vec3 ECposition = vec3(uModelViewMatrix * theVertex);
vLightIntensity = abs(dot(normalize(LightPos - ECposition), tnorm));
if (vLightIntensity < 0.2)
vLightIntensity = 0.2;

vColor = gl_Color.rgb;
gl_Position = gl_ModelViewProjectionMatrix * theVertex;
```

A possible vis application??

Original texture map

Original texture map

Mapped onto a Sphere

Morphed into a Circle
Morphing a Cow into a Sphere

```glsl
vec4 vertex = gl_Vertex;
vertex.xyz *= 4. / length(vertex.xyz);
```

Note: the “face” in the sphere cow is there because the normals were not morphed into sphere normals – they were left as cow normals.

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Morphing a Cow into a Cube

```glsl
const float SIDE = 2.;
vec4 vertex = gl_Vertex;
vertex.xyz *= 4. / length(vertex.xyz);
vertex.xyz = clamp( vertex.xyz, -SIDE, SIDE );
```

Note: the “face” in the cube cow is there because the normals were not morphed into cube normals – they were left as cow normals.
What about “Real Morphing”?  

“Real Morphing” involves interpolating vertices from one object into vertices in another. This flies in the face of graphics hardware’s philosophy of dealing with one triangle and then getting rid of any record of it. We got away with it here because we knew the equation of a disk, a sphere, and a cube; 

The first morphing I can remember is from the fantasy movie *Willow*

There is some great morphing in Michael Jackson’s *Black or White* video. Check it out!  
https://www.youtube.com/watch?v=F2AitTPi5U0 
The morphing starts at around 5:30