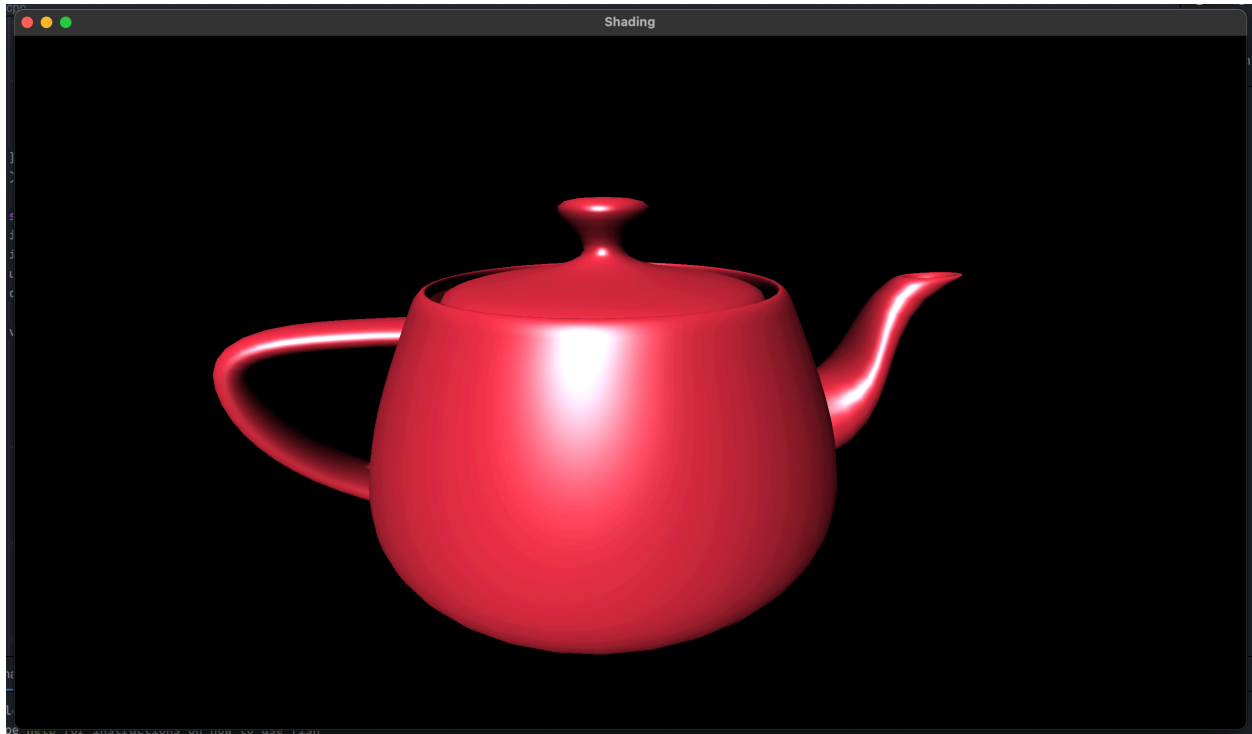


James Youngblood, CS 6610, Project 3



I am resubmitting on Feb 9, having fixed the errors with the earlier submission. My code uses `glDrawElements` and an element/index buffer to draw triangles read from an `.obj` file. It stores positions and normals in VBO's, for use in the shaders. Three transforms are computed: one for positions, normals, and light direction. Light direction can be controlled by dragging the mouse while holding Left CTRL.

The fragment shader determines diffuse shading based on the geometry term between the light direction and the fragment normal. It will determine specular shading based on the "Blinn term" of the cosine between the half vector and the normal, to some power (representing shininess). The colors of the two lights and the "shininess" value are hard-coded.

My code is a single `.cpp` file, with shaders written as string literals. My code depends on:

- GLFW (include `GLFW/glfw3.h`)
- GLEW (include `GL/glew.h`)
- OpenGL ≥ 3.3
- C++11 standard lib
- cyCodeBase headers `cyVector.h`, `cyTriMesh.h`, `cyGL.h`, and `cyMatrix.h`

To compile on my Mac M1, I installed GLFW and GLEW using homebrew (a package manager for Mac), including them and linking to their libraries using flags `-I`, `-L`, `-l`, for each when compiling with `gcc`. I also included the `cyCodeBase` headers in a

similar way, and I linked to the pre-installed OpenGL distribution on macOS using the flag `-framework OpenGL`. Finally, I included the C++ standard lib using the flags `-std=c++11 -lc++`.

Here is the compilation command I used:

```
gcc -std=c++11 \  
-I /opt/homebrew/Cellar/glfw/3.3.8/include \  
-L /opt/homebrew/Cellar/glfw/3.3.8/lib \  
-l GLFW \  
-I /opt/homebrew/Cellar/glew/2.2.0_1/include \  
-L /opt/homebrew/Cellar/glew/2.2.0_1/lib \  
-l GLEW \  
-I ../cyCodeBase/ \  
-framework OpenGL \  
-lc++ \  
transformations.cpp -o transformations
```