COSC 4370 - Homework 3

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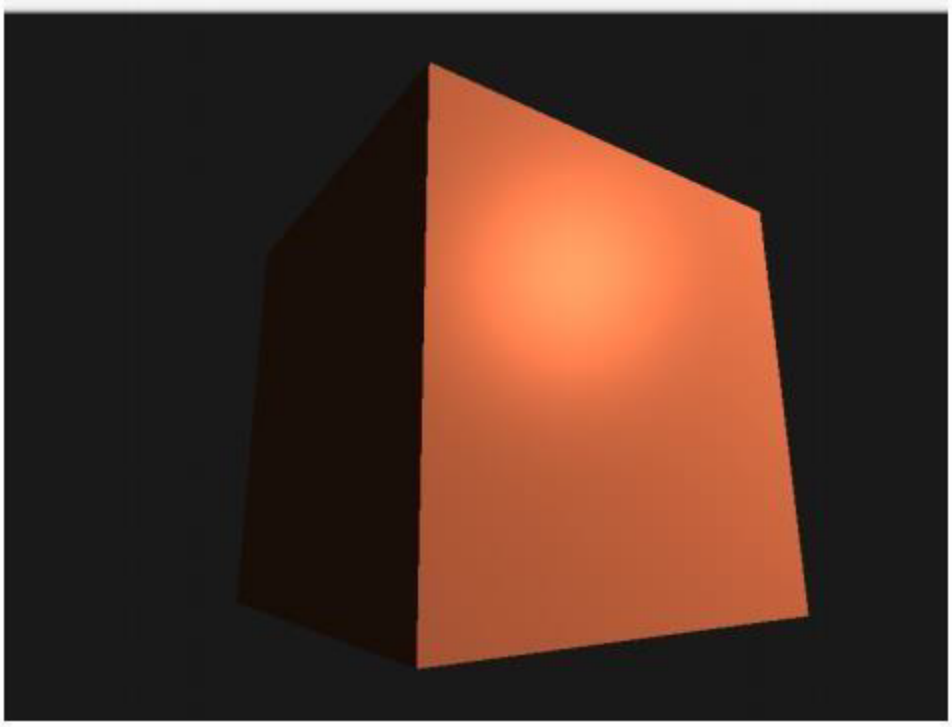
1 Problem

The goal of this assignment is to implement the 3D viewing and Phong shading model. To view the object from the camera, you need to complete the GetViewMatrix() function in Camera.h and the projection matrix in main.cpp. You will write the vertex and fragment shaders for the Phong model to shade a simple cube, whose geometry is constructed in main.cpp; stubs for the shaders are provided in phong.vs and phong.frag, respectively. If you implement everything correctly, you should be able to reproduce an image like the following



2 Method

From the given source code I altered methods in the main file, camera header, and both phong vs and frag files. In order to reproduce the above image I needed to first complete the getViewMatrix() inside the camera.h file. In the main.cpp file I also

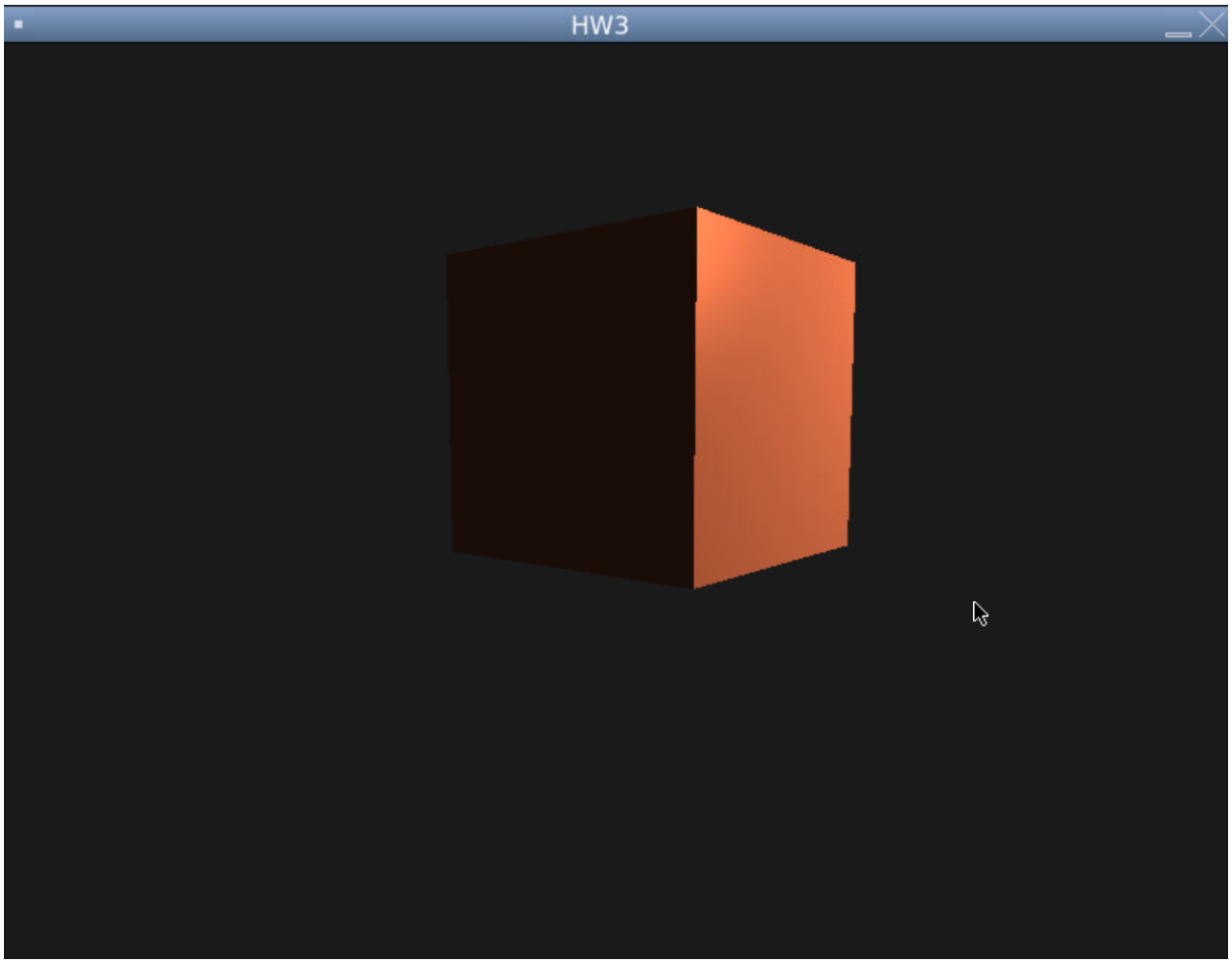
needed to set the projection matrix so there would be something in view once the program was run. The last changes were to the phong.vs and phong.frag files and this was in order to get the cube to appear as red, and this is where the shading started so I could reproduce the image.

3 Implementation

When it came to implementing the code for this project I had some difficulties trying to get some things to work. I was able to get camera.h setup by returning the lookAt() function inside the viewMatrix(). I found some resources online that helped with many of the questions that I had. The looAt function will transform the view from world space into eye space for the matrix to view. I then set up the projection in main and the perspective function will create a 4x4 projection used for a vertex shader. Finally the main part of the assignment, the shading. For the shading aspect, this is where I relied heavily on my online resources that I found for OpenGL. In phong.frag I needed to make different types of shading and layer them all together in order to achieve the correct output. Thus I created ambient lighting, diffuse lighting, and specular lighting. Once those all combined together I was able to produce the bright red cube with the correct lighting on the front and the shadowing on the rest of the cube, Inside phong.vs the main part of this code was to get the view to be in the correct space, it started in world space and then had to be transformed into view-space in order for everything to show up correctly and in the right color.

4 Results

Once putting all of this together, and using all the resources that I found online to help me I was able to produce the image below. Closely resembling the cube from the assignment directions, with the bright red front and the correct shading along the remainder of the cube. I linked all the sources that I used below as well as in a text document included in my submission



Main file- https://learnopengl.com/code_viewer.php?code=lighting/materials
Camera-
https://learnopengl.com/code_viewer_gh.php?code=includes/learnopengl/camera.h
Phong.frag-
https://learnopengl.com/code_viewer.php?code=lighting/basic_lighting-exercise2
Phong.vs-
https://learnopengl.com/code_viewer.php?code=lighting/basic_lighting-exercise2