Final Project Reflection

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**Justify development choices for your 3D scene.**

In my 3D scene there are four objects that make up some of the items that I would use. I was to create at least one of these as a complex object consisting of two or more primitive shapes. Since this is my first time working with OpenGL and creating a 3D scene for that matter, I chose these objects to not make it too difficult on myself while still providing a challenge. Some of the objects were very similar in my scene and this allowed me to reuse code that was already made for one object. In my development of these object, I reused many of the same planes and vertices to recreate multiple objects to cut back on the need of many lines of code. For instance, the book object and the tissue box both share the same planes as their sides, just duplicated and transformed in different ways. For my lighting I chose to use a white light and a very faint yellow light that is based on a candlelight color. I know that this may not be very noticeable, so I added a fun way to change the color of the lights in the scene if you so choose.

**Explain how a user can navigate your 3D scene.**

In my 3D scene there are multiple ways to navigate around the environment. The main controls are WASD movement for the forward, backward, left, and right camera movement, and Q and E for moving the camera up and down. The scroll wheel on a mouse will also allow zooming in and out on the scene. If you hold down the left alt key and hold the left click mouse button, you can orbit the scene very easily. Another function is to hold down the left alt key and click in the middle mouse button. While moving the mouse while holding these keys you can pan across the scene. Another functionality is to press 1 and 2 to switch to wireframe mode and back. Pressing F will reset the camera back to the original position in case any weird bugs happen that mess up the camera. Another fun feature allows you to play with the color of the lights in the scene. I have it setup so that pressing R, G, or B changes the lights to the corresponding colors based on the letter, R = red, G = green, and B = blue. To reset the light back to white you just press shift and R. The last feature in the scene is to be able to switch to an orthographic 2D view by pressing and holding P. If you are all done using the program, I have made it so that pressing escape will exit the program, so you have no need to move the mouse.

**Explain the custom functions in you program that you are using to make your code more modular and organized.**

In my code most of the planes or vertices that are drawn use the same number of indices. Originally, I had a separate list for each objects indices to be drawn but quickly made the change to just use one indices list to draw squares and one for basic triangles. Rather than mapping out and plotting each coordinate for each of the vertices, I utilized for loops to duplicate planes or triangles and orient them in different rotations to have less code when drawing shapes. This made it easier in the long run to create a new object as I just needed to take an already existing plane and redraw it with different transformations. I made my wireframe mode toggleable for easy debugging when drawing shapes that might appear inside of others. One function that I added to help make things easier was a process input function. This function takes in any inputs that might make a change and is called during the while loop to update the scene when a change is made. This is expandable as any new inputs can be placed inside this function to include its functionality.