Software Design and Engineering Narrative

The artifact I have chosen is from CS 330 Computational Graphics and Visualization, which was completed in August of 2019. The source code was written in C++ and implemented the use of OpenGL to produce a three-dimensional chair. This chair contained texture and two light sources, each providing different strengths of light which can be seen reflecting off opposite sides of the chair. Within this output, the user could either use the keyboard (specifically ‘w’, ‘a’, ‘s’, and ‘d’) to navigate through the virtual environment or the mousepad. If the user held down the ‘Alt’ key and the left mouse button simultaneously, the user could move the mouse around and orbit the chair. If the user held down the ‘Alt’ key and the right mouse button simultaneously, the user could move the mouse around and zoom in or out from the chair. Lastly, the user could press the ‘p’ key to toggle between perspective and orthographic views.

I chose to include this artifact because this was a tedious and challenging assignment. It displayed techniques using algorithmic principles along with standard computer science practices. Upon being successful, it showed that careful manipulation within the program could deliver a specific goal. It also included a copious amount of comments within the source code, which is essential for informing the reader about what is happening, as well as being beneficial for collaboration with one’s peers. One section that showcases my understanding is the inclusion of the vertices using positional, normal, and texture coordinates. This made up almost half of my code and I’m very proud to show that I understand how to create these coordinates. I improved this artifact by changing the shape of my light sources to a cube-like object, if one enabled the light sources to be drawn. I also added more comments throughout to help clarify my steps along the way. Most importantly, I added a table to go along with my previously made chair. This table is shown as a logical size in comparison to the chair and also reflects the same wooden texture as the chair does.

This project took many hours to enhance and plans were changed many times throughout as new obstacles presented themselves. At first, I thought about creating different class files for each object. After starting to do so, I changed my mind because I thought I found a simpler method. I then started to create separate arrays for each objects’ vertices. This became confusing to me at one point, especially when binding vertex array objects and vertex buffer objects. I actually produced something that appeared to be what I was going for, but the table wasn’t producing any color or texture. Lastly, I decided to append the table vertices to the end of the chair vertices. By modifying just a few more lines, I was able to successfully produce both objects within the same frame.

One potential flaw in my program is that the objects are all listed under the same set of vertices. If I were to expand upon this project in the future, I would like to make each object have its own class, so adding a new object to the frame could be easily done. An object could be added to my current setup, it just needs its vertices to be appended to my current set, as well as being properly labeled. This change to having modular class files could enable me to create as many objects as I would like within the program, while being organized and producing clean code too. Throughout the enhancement’s creation, I used online sources to refresh my memory on certain functions and what they used as parameters. I also used my notebook that I kept during the time I took the CS 330 course. Between these two sources and my knowledge of OpenGL and C++, I proved that my enhancement for the software design and engineering portion of my capstone was a success.