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Project One - Design Decisions Document

CS 330

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For the purposes of this project, I chose four objects found around the house which represented several different primitive shapes and included at least four different primitive shapes. The objects that I chose to include are a calculator, a ruler, a zippo lighter, and a car key; all four objects will be sitting on a desk. The calculator can be represented by a rectangular cube with cylinders along the vertical edges to represent a rounded shape. The ruler will be represented by a plane, which will display its thin makeup as compared to the objects around it. The zippo lighter is represented by two cubes, one for the base, and another cube for the cover; and also, a Cylinder to represent the hinge. The car key will be represented by a rectangular pyramid, to the best of my ability, as this is the basic shape and a very complex object to render realistically based on the scope of this project. The desk will be represented by a plane, and all of the previously mentioned objects will be sitting on top of the plane. There will be two light sources that are placed above the 3D scene in order to provide proper lighting to all of the objects. The reason that I chose the objects in the 3D scene was because each object has a certain meaning and importance. The main difficulty that I faced while coding this program was the lack of time to complete the vast quantity of work that must be done. I tried to the best of my ability to recreate the scene as realistic as possible with the time frame I had to work with due to nature of my current profession. As for programming the required functionality, the work was fairly straightforward and the github tutorials were extremely helpful. Each section of the program was broken down into individual functions in order to increase clarity of the code for ease of viewing and to make fixing the program easier in the future. Several of the functions include the main function to run the program and call the other functions, a function to create the mesh object that will be rendered on screen as output to the user, and finally, a function to create the texture that will be applied to the objects.

A user can navigate the 3D scene by using several camera controls that were programmed to work with the users mouse and keyboard. First, the users mouse has provisions to change the viewing angle of the camera by moving the mouse around and can zoom the camera in or out using the scroll wheel. Next, there were provisions added to move the camera around in the 3D scene with the press of a respective key. The keymapping for the camera controls is as follows:

“w” to move the camera forward, “s” to move the camera backwards, “d” to move the camera right, “a” to move the camera left, “e” to move the camera straight up, and “q” to move the camera straight down. There was also a provision implemented into the program to switch between orthographic projection and perspective projection based on the press of the “p” key. The math programmed into the controls allows the camera to move around the 3D scene in a realistic way that helps users view any angle of every object in the 3D scene.

Furthermore, there were many functions used to code this program, each being very important and completing a part of the programs required functionality. Each function performs a specific task related to why it was custom developed for the purposes of this program. However, each function is modular, and may be used in other programs in the future. These functions could benefit future work by applying knowledge and information that is already gathered and has proven successful. In addition to this, the finished product is easier to work on, if need be, by having each function perform an individual task. If all the programs required tasks were written and performed in the main function then the end product would be confusing and a mess with all the tasks being in one clustered bunch. This would prove to be an ineffective practice in industry and employers would rather hire and work with someone who can demonstrate proficient and organized coding practices and principles. In conclusion, the project was very challenging and was a great way to gain experience working with OpenGL, programming in C++, and thinking critically in order to solve a real world problem that would prove beneficial to use out in industry.