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# CS-330 Final Project

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Earlier in this course, I was following a tutorial in OpenGL that really helped me grasp the concepts of the material. However, at Week 6 Lighting, I ran into an issue where the tutorial went way more advanced than I could comprehend. I ended up remaking my project from scratch, which ended up being the right decision as it more similarly resembled the source code for the assignments and helped me better understand it.

To honor my late grandparents, I wanted to recreate a photo they took during their cruise to Alaska about ten years ago. I started with a white 3D rectangle on a plane with a water texture. After I figured out the lighting, I moved on to create a pyramid to serve as a mountain. It took me awhile to get the vertices in the right place so the pyramid would show up in the back corner of the plane. I kept mixing up my Y and Z value.

In my mind, I needed to shift the pyramid to the left and right, so I tried adjusting X values, but that didn’t give the result I expected. I then realized the initial orientation of the scene is different than how I’m looking at it, so I needed to shift the mountains up and down… which is Y in a 2D environment. It wasn’t until I remembered I was working in 3D that I realized the Z value controls “vertical” movement, because the pyramids needed to shift back and forth, not up and down.

After I got my mountains in the right place, I added the front and back portion of the cruise ship, which were cubes with altered indices to give it it’s shape. I ran into an issue with creating a new plane. With time constraints already a problem for me, I couldn’t add a second plane effectively since I not only needed the ocean, but also the dock and the town where they took the picture. (I’m unsure of the town or city… I want to say they were docked in Anchorage when they took the photo, but I don’t remember. I was six.) My workaround was to alter the actual texture JPG file and make half of it water and half of it a generic town. This provided the result I was intending.

The final issue I ran into was the trees. I was unable to find an effective way to add multiple trees of the same vertices and indices, which was my intention. I’m sure there’s a loop I can use that will add multiple 3D objects of the same size and shape, but that’s beyond what I can comprehend at the moment. My project satisfies the object requirement, but in the future I may go back and fix it once I find a way to add multiple trees without having to create all new VBOs, EBOs, and VAOs.

For movement, viewers of my project can move the camera forward and backward using W and S, respectively. Camera movement to the left and right are controlled with A and D, respectively. Holding down right-click and moving the mouse, W, S, A, and D will rotate the camera to see a different angle of the scene. Lastly, holding right-click and moving the mouse up will allow viewers to view the scene at a top-down angle, giving it a 2D effect. I don’t, however, have any ability to toggle 3D and 2D. The effect can be applied with the mouse and right-click combinations.

The organization of my scene allows for easy additions of new objects. I have several different classes and header files so everything isn’t clumped together in one main file. To add a new object to the scene, all that’s needed is to define new vertices, indices, create new VAO, VBO, and EBOs (which are instanced using the VAO, VBO, and EBO class files), and draw the new indices. I’m not sure if this is the correct or most effective method, but it does serve my purposes and has allowed me to quickly add new objects in a matter of seconds with immediate results.