# CS-330 Final Project Retrospective

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For my 3D scene, I selected a flat 2D landscape image featuring mountains, trees, clouds, and a grassy ground. I chose this image because it combines simple geometric shapes that can be effectively recreated with low-polygon 3D objects, making it an ideal choice for meeting the assignment's polygon count requirements. The mountains were built using pyramid primitives to reflect their triangular shape, while the trees were constructed using a combination of cylinders for the trunks and spheres for the foliage as well as a combination of overlapping pyramids for the more complex trees. By using basic shapes like cones, cylinders, and spheres, I ensured that my models stayed under 1,000 triangles while still representing the real-world components of the scene. I also applied simple textures to the ground and trees to add visual appeal and realism to the scene.

To allow smooth navigation around the 3D world, I implemented controls for both movement and camera orientation. The WASD keys allow the user to move forward, backward, left, and right, while the QE keys enable vertical movement along the Y-axis. I added mouse controls so users can adjust the camera's orientation, with the cursor enabling pitch and yaw changes, and the scroll wheel controlling movement speed. This setup gives the user complete flexibility to explore the scene from different angles and perspectives. Additionally, I integrated functionality to switch between orthographic and perspective views with the O and P keys respectively, making it easy to examine the scene in both 2D and 3D modes.

To ensure my code was organized and modular, I created custom functions for key operations such as setting up lights and placing objects. For example, I used a reusable function to position and scale objects, reducing code repetition and improving readability. Another function handled the setup for the point and colored lights, allowing me to efficiently capture the scene's visual details with Phong shading (ambient, diffuse, and specular components). Overall, my design decisions focused on simplicity, functionality, and best coding practices to ensure a polished final product.

**References**

Khronos Group. (n.d.). *Learn OpenGL*. Retrieved June 15, 2024, from https://learnopengl.com/