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CS330 MOD 7

For my 3D scene I made careful choices about what objects to include and how to build the environment because I wanted it to feel realistic and also show that I understood how to use the tools in OpenGL. I picked objects that made sense together and added to the atmosphere of the scene instead of just placing random shapes. For example, I included a courtyard with a fountain, plants along the sides, and a stone floor because these objects create a balanced and interesting place for the viewer to explore. These choices were not just about looks, but also about practicing important 3D techniques like lighting, textures, and shading. The stone walls scatter light in a soft way, while the water in the fountain reflects light with shiny highlights, which shows the difference between diffuse and specular lighting. By adding details like these, I was able to show how materials interact with light, which made the scene feel more alive and convincing. Programming for the functionality was also important, because the scene needed to respond to input and not just be a static image. I set up light sources that could be controlled, textures that wrapped correctly around objects, and objects that were placed in positions that worked together without overlapping in distracting ways. This made my project both a visual environment and a technical demonstration of 3D graphics.

A big part of making the scene work was letting the user move around in it, which meant setting up camera navigation. I wanted the viewer to feel like they were walking through the courtyard, so I programmed a virtual camera that could move forward, backward, and sideways using the keyboard, and it could also look around by moving the mouse. This made the scene interactive and gave the user freedom to explore instead of being stuck in one spot. I set up the camera so that pressing W and S moved forward and backward, while A and D moved sideways, which feels natural because it is like the controls in many games. The mouse controlled where the camera was looking, so turning the mouse left or right rotated the view, and moving it up or down tilted the camera angle. This combination of inputs created smooth movement and allowed the user to feel like they were inside the 3D world instead of just looking at it from outside. It was important for me to make the controls simple and familiar so the user could focus on the environment instead of struggling with how to move. I also adjusted the sensitivity of the camera controls to make them comfortable and responsive. All of this made the navigation feel natural and added a lot to the experience of exploring the 3D scene.

To keep the code organized I wrote custom functions that handled repeated tasks, which made the program more modular and easier to understand. For example, instead of writing the same code many times to load textures or draw shapes, I made functions that could be reused whenever I needed them. One function I developed was for loading and applying textures to different objects, and I could call it each time I wanted a new surface to look realistic. Another function handled setting up light values, so I did not have to repeat all the steps for each light source. I also created functions for drawing different objects like the fountain or the plants, which kept the main program simple and easier to read. These functions were useful because if I needed to change how something worked, I only had to update it in one place, and the change would apply everywhere the function was used. This not only saved time but also reduced mistakes that happen when the same code is copied in many places. Writing functions like this made my project better organized and more professional, and it also showed that I understood how to design code in a way that can grow and be reused. Overall, the functions helped me manage complexity while still letting me focus on the creative part of designing the scene.

By putting all these parts together, I was able to create a scene that was both visually interesting and technically sound. The objects I chose helped me demonstrate important 3D concepts like texture mapping, lighting, and shading, while also making the environment feel like a real place. The camera navigation made the scene interactive and gave the user freedom to explore, which is important for engaging experiences in 3D graphics. The custom functions made the code organized, reusable, and easier to maintain, which are good habits for any programmer.