SNHU CS 330 Final Project Reflection

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1. Justify development choices for your 3D scene. Think about why you chose your selected objects. Also consider how you were able to program for the required functionality.

I chose the daily items in the kitchen/storage room (cylindrical jars, multi-compartment grain dividers, red-capped cans, rectangular pasta boxes), because these can all be modeled through basic geometries, materials and lighting rather than complex modeling. The texture on the objects feature real photos of beans, coffee beans and other materials. And the multiple boxes of pasta in the middle serves as the "main character" model. Overall, the scene I tried my best to base on the real 2D picture.

In the scene, I added a directional light and an ambient light to make the picture look more three-dimensional. For the texture section, I wrote a texture manager to avoid repeated loading and also used a texture collection to reduce the number of switches. In terms of interaction, users can use the ray to select objects. For instance, pressing a key can open or close the cover of the distributor. I have organized all the objects in a hierarchical structure with a parent-child relationship, which makes it more convenient for both overall movement and local animation.

2. Explain how a user can navigate your 3D scene. Explain how you set up to control the virtual camera for your 3D scene using different input devices.

Users can control the scene with a keyboard, mouse, gamepad, or even a touchscreen. In the FPS mode of the keyboard, WASD moves forward, backward, left and right, and Q/E can move up and down. Combined with Shift for acceleration and Ctrl for deceleration. On the mouse side, right-clicking and dragging can rotate the view, the scroll wheel can zoom in and out, and left-clicking can also select and interact. The camera has two modes: the first-person view is suitable for immersive experiences, and the track camera is more convenient for overall viewing. You can switch between them with the C key. The camera itself uses perspective projection, and also adds a ray picking function. Thus, when the user clicks on an object, the corresponding operation can be triggered.

3. Explain the custom functions in your program that you are using to make your code more modular and organized. Ask yourself, what does the function you developed do and how is it reusable?

To make the code clearer and easier to maintain, I used the provided materials to create some code. Technically, I accomplished it by combining C++ and OpenGL. Some optimizations have been made in terms of performance. For instance, texture atlases are used to reduce switching, static objects are batch processed by material, and anisotropic filtering is enabled to ensure that labels are clear even when viewed at an Angle. This not only provides a sense of realism but also has relatively high efficiency.