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CS330

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Project One Reflection

Justify Development Choices

(Woodhouse, 2021)

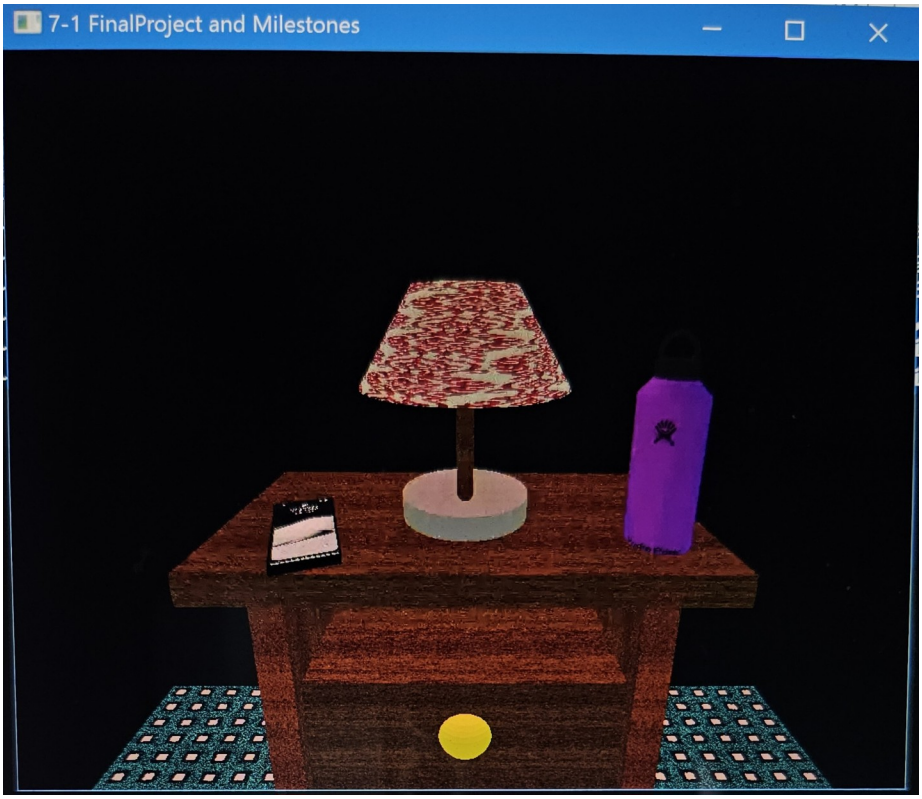
For Project One, I chose the following image from Jenwoodhouse.com (2021) (Woodhouse, 2021), to serve as the inspiration for my 3D scene in OpenGL. In order for this to be accomplished,

some of the objects in the 2D scene needed to be simplified. To do this, I decided to implement the following objects in the 3D scene: rug floor, wooden cabinet, iPhone smartphone, lamp, and a Hydro Flask water bottle. The following objects were created using a number of 3D shapes, along with some textures and lighting.

Starting with the first object, the rug floor was created using a simple 3D plane. The 3D plane served as the baseplate for the entire scene and its objects. The rug floor utilizes a rug texture, in order for it to look like an actual rug. For the wooden cabinet, I used a box, tapered cylinder, and sphere to recreate the object. All of the 3D shapes were textured using a wood texture, except for the sphere. The spheres, which served as the cabinet's handles, had the color gold. The iPhone smartphone was created using a simple box, that was reduced in height, in to create the thin shape of smartphones. The iPhone also had the texture of an iPhone front-screen. For the fourth object, the lamp was created using a cylinder and a tapered cylinder. The cylinder was used to recreate the lamp's base and the lamp bulb holder. The lamp bulb holder had a wooden texture, while the lamp base had a simple gray color. When it came to the lampshade, the lampshade, which was created using a tapered cylinder, used a lampshade texture. Last but not least, the Hydro Flask water bottle was created using a cylinder, tapered cylinder, and a torus. The cylinder was used to create the body of the water bottle, which contained the texture of the Hydro Flask logo.

Besides the 3D shapes along with their textures, lighting played an important role in the 3D scene. For instance, some of the objects contained shader materials, which allowed for a special lighting effect. The shader materials used were tile, wood, and gold. The rug floor, which was created using a plane, featured a tile shader material. For the wooden cabinet, which used boxes and tapered cylinders, it had a wood shader material. Finally, the cabinet's knobs, which were made using spheres,

utilized the gold shader material. Without the implementation of a lighting source, the shader materials would have no effect on the 3D scene. For the entire 3D scene, there is a single lighting source, which is positioned in a way to provide lighting for all of the scene.



User Navigation

In addition to the objects, navigation was also added to the 3D scene. The added navigation controls allow the user to explore the scene. The following navigation is found in the 3D scene: forward, backward, mouse cursor to look around the scene, upward, downward, ortho view, and

perspective view. The forward, backward, and mouse cursor navigation were already implemented in the scene. However, the upward and downward navigation needed to be added. They were added in the ViewManager::ProcessKeyboardEvents() method, which is found in the ViewManager.cpp file. The upward movement was set to the “q” key, while the downward movement was set to the “e” key. In addition to this, the ortho view and the perspective view needed to be added. This was done using the same ViewManager::ProcessKeyboardEvents() method. The ortho view was set to the “o” key, while the perspective key was set to the “p” key. Adding these custom navigation controls was important to the project, since it made it easier for the user to explore all of the objects in the scene.

Predefined Functions

There were some predefined functions in the project, which made it possible for the 3D scene to be created. Some of them were previously mentioned, such as SceneManager::PrepareScene(), SceneManager::RenderScene(), and ViewManager::ProcessKeyboardEvents(). For the first predefined function, the SceneManager::PrepareScene() method was used to initialized the 3D shapes. Without doing so, the 3D shapes would not be rendered even if they were declared in the SceneManager::RenderScene() method. Speaking of which, the SceneManager::RenderScene() method was where the 3D shapes were declared after being initialized. Customization of the shapes are possible, which allowed for changes in rotation, transformation, and position. Last but not least, the ViewManager::ProcessKeyboardEvents() method was used to implement the custom navigation controls essential to the project. In this method, I was able to set the “q” and “e” key for the upward/downward movement, and the “o” and “p” key for ortho view and perspective view. Using these predefined functions made it possible for me to work on the scene, without getting lost in the weeds of OpenGL.

References

Woodhouse, J. (2021, February 17). [Photograph]. Jen Woodhouse. https://jenwoodhouse.com/wp-content/uploads/2021/02/DIY-gustavian-nightstand-1.jpg