**Final Project Submission: Reflection**

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**Development Choices:**

The first object I decided to create was an elephant object to resemble a real outside environment, such as an African safari. The elephant object was selected because it is one of the most popular animals that comes to mind when thinking about going on a safari, as well as an elephant has various details, like a wide body, legs, a short tail, tusks, and a trunk, that can be used to create a complex object. Even though the elephant has unique body parts, I was able to replicate the animal into a complex object using an assortment of shapes, such as a sphere for the body, head, ears, and eyes; cylinders for the legs; a tapered cylinder for the trunk; cones for the tusks and a tapered cylinder for the tail. The texture of the elephant provided a rough, wrinkly-looking skin that was able to demonstrate proper texturing, in addition, the texture reflected light sources well without overpowering gleams to demonstrate an area of light. I also created a baby elephant using similar shapes as the adult elephant to improve the feeling of my scene to better replicate the views of an African safari, such as viewing elephants together with a baby. In the orthographic view, moving around the scene allows a viewer to see the elephant up close with the baby elephant drinking water and a giraffe leg and rock in the background, capturing that documentary feeling as seen on TV. I also decided to add trees to improve the outdoor environment and add a shading element for the areas that are under the tree or further away from the main light source. Adding four trees allowed me to fill up empty spaces I had around the scene while providing shading lighting to various objects to demonstrate the way trees can block a light source. The planes served as objects that demonstrated the ground and sky of my scene, with different lighting materials used for each one to create a sunset type of mood and show different lighting for different areas. I used a pond as a shiny object material that reflected light well to differentiate lighting material and show where the main light was hitting. The sun object was also used to improve my scene's environment and act as the main light source that beamed light around the middle of my scene. A giraffe was created to improve the animal diversity of my scene, it demonstrated another complex object, and it had shading since it was under trees that showed the connection the tree and giraffe had relative to their position. Along with rocks placed around the scene, the different objects I created allow a viewer to use the movement I created in my scene to get a better and faster view of my scene using the touch of a key and a mouse.

**Navigating the Scene:**

To navigate my scene, I used keys, mouse movement, and the mouse wheel scroll movement to allow a viewer to move around my scene dynamically. Basic key movements, like the WASD keys were used to navigate back and forth, and left and right of the scene to replicate similar controls used for other applications and games, while added keys, like Q and E, were used to move up and down the scene respectively for different types of perspectives. To look around the scene, the mouse was used by capturing and translating its movement into the scene to allow a user to look in various directions, while the mouse scroll was used to increase or decrease the forward, backward, left, right, upward, and downward movement speed of the camera. The mouse scroll allowed the viewer to slow down or speed around the scene to properly view various objects scattered around my scene at their own pace.

**Custom Functions:**

Functions added in my program helped develop various complex objects around my scene that demonstrated the theme I was going for, which was a sunset at an African safari. Functions, such as the render elephant, render baby elephant, render tree, render sun, render pond, render giraffe, and render rocks, can all be reused to represent other similar themes, such as a zoo, a national park, and even a town just by adjusting the different positions, scaling, rotation, and lighting attributes for each method. The methods can also be tweaked to represent other animals or objects similar to the complex objects, such as the render elephant function can be scaled and have its objects altered to represent a rhino and create a new method, or the render giraffe function can be altered to represent an okapi just by making it smaller and adjusting the texture. The methods I developed also take in other methods, like setting transformations, setting the shader texture and material, and setting the color, allowing different variations of similar objects by adjusting the scaling, rotation, position, color, texture, or material. As the main object of my scene, the render elephant function provided a good-sized animal to populate my scene and complement the lighting well. The render baby elephant function provided a way to scale down the elephant without tusks, also considering that elephants travel with their children naturally. The render giraffe function was used similarly to the render elephant function to take up space around the scene using a large object, while also interacting with the trees that are to the left of my scene. For details, the render tree, pond, sun, and rocks functions were all used to represent the environment of an African safari, while all objects used different lighting materials to differentiate the lighting in my scene. The scroll callback function was added to process the mouse scroll movement, increasing or decreasing the camera movement speed that can be used in other programs to customize movement speed. The load scene texture, define object materials, and setup scene lights functions were added to properly apply textures, materials, and light to my scene respectively, that my other methods used to create diverse objects around my scene.