Module 7 Reflection

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I decided to make a darker scene that would capture nighttime in order to better display the light sources. I wanted the wood floor to resemble a spotlight effect, drawing attention to the center of the scene, while the wine bottle and glass would capture specular highlights from the light source. I chose these objects—a wine bottle, wine glass, and a floor—because they reflect different lighting interactions: transparency, reflectivity, and diffusion. This let me to experiment with material properties and lighting techniques in OpenGL including ambient, diffuse, and specular components.

To meet the required functionality, I programmed lighting using the Phong reflection model and carefully adjusted the shininess and material values for each object. I also applied texture mapping to enhance realism, making sure the wood texture on the floor reflected light differently than the glass material on the wine glass.

The user can look around 3D scene using keyboard and mouse inputs. I implemented keyboard controls using the arrow keys and WASD keys to allow the user to move the camera position forward, backward, left, and right. Mouse movement is used to change the camera direction, giving the user a first-person style experience. This setup was achieved by capturing input through GLFW and updating the camera’s view matrix using a custom camera class based on the LookAt function from GLM.

To keep the code modular and organized, I created custom functions for generating objects, applying transformations, and managing lighting. For example, I applied a reusable function called renderObject() that takes in position, scale, and rotation parameters and applies transformations before drawing a shape. This makes it easy to add new objects without duplicating transformation code. I also wrote a setupLighting() function that initializes and applies the lighting settings, making it easier to tweak light colors and intensities from a central location.

Overall, the choices I made helped showcase realistic lighting behavior in a focused scene, while keeping the codebase clean and easy to expand.