Throughout the process of designing and developing my 3D scene in OpenGL, I focused on creating a cohesive and familiar workspace environment. My main goal was to ensure that each object had its own distinct identity and a sense of visual harmony when combined. The project started with a conceptual layout inspired by a real-world desktop setup, a keyboard, monitor, coffee mug, and decorative object on a wooden desk, all placed within a basic interior room.

My approach involved dividing the scene into functional components and using primitive shapes like boxes, planes, cylinders, and a torus. The monitor and keyboard were modeled with scaled box primitives. For clarity, I used solid black and grey shader colors with adjusted transformations for size and position. Textures were selectively applied to surfaces like the desk and walls to add realism, including woodgrain and plaster textures for depth and contrast.

A key technique I learned was how to manipulate texture UV scaling to control how textures stretch across surfaces. For example, by adjusting the SetTextureUVScale() method and experimenting with different UV values, I was able to improve the desk surface's realism. Additionally, carefully transforming and centering the monitor’s screen prepared it for the application of a text texture, simulating a real display.

During development, I used an iterative approach. At each milestone, I tested lighting, texture mapping, and camera angles to maintain spatial awareness and visual balance. One challenge I overcame was rendering multiple textures correctly on different shapes without overlaps from shared parameters. This required isolating each shape’s shader and texture settings before drawing.

Another important point was aligning the textured text on the monitor's screen. To do this, I analyzed the texture image’s pixel resolution and matched it with the screen’s dimensions and scale, which was set to glm::vec3(6.0f, 1.0f, 4.0f). Ensuring the texture resolution was proportional was essential for legibility and proper centering.

Over time, my workflow shifted from trial and error to a more structured pipeline, planning mesh creation, applying transformations, setting materials, and configuring textures in stages. Each step helped eliminate visual inconsistencies and enabled me to incorporate advanced features like reflective shader lighting and shadow adjustments for realism.

Ultimately, this project strengthened my understanding of computational graphics, particularly how mathematical transformations and shader logic combine to produce visual effects. These skills are valuable for future projects, such as advanced game design, simulations, or professional 3D modeling, interface development, and graphics programming.