Software Design/Engineering

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The artifact I selected for enhancement is a 3D graphics project initially created in CS330: Computational Graphics and Visualization. I've had to switch my choice due to issues with my computer and the loss of some of the files I had stored. This project involves rendering a 3D pyramid using OpenGL, GLFW, and GLEW libraries. The code was created to learn the fundamentals of 3D graphics, including shaders, transformations, and texture mapping.

I selected this artifact for my ePortfolio because it showcases my ability to implement complex software design and engineering principles in a practical, visually engaging way. The project demonstrates my skills in:

* **Graphics Programming:** Using OpenGL for rendering 3D models.
* **Shader Management:** Handling vertex and fragment shaders for rendering.
* **Transformation Matrices:** Applying scaling, rotation, and translation transformations to 3D objects.
* **Texture Mapping:** Implementing texture mapping to add realism to 3D models.

The enhancement involves adding dynamic rotation and textures to the pyramid, making it a more interactive and visually appealing artifact.

I planned to enhance this artifact in Module One by adding dynamic rotation and texturing. The goal was to demonstrate software design and engineering proficiency by implementing interactive and efficient 3D graphics features. I believe I have met the course objectives as planned, as the enhancements successfully showcase my ability to handle complex software design tasks. I don’t feel any updates to my outcome-coverage plans are necessary.

**Reflection on the Enhancement Process**

**Learning Experience:**

* **Shader Management:** Enhancing the shaders to handle dynamic textures and rotations taught me how to manage shader programs more effectively.
* **Transformation Logic:** Implementing dynamic rotations required a deeper understanding of transformation matrices and how to apply them efficiently.

**Challenges:**

* **Debugging Shaders:** One significant challenge was debugging the GLSL shader code. Errors in shader programs can be difficult to trace, requiring meticulous attention to detail and a strong understanding of the shader language.
* **Performance Optimization:** Ensuring the enhancements did not degrade performance was another challenge. I had to optimize the code to handle real-time interactions smoothly.

**Skills Demonstrated:**

* **Advanced Graphics Programming:** The enhancements demonstrate my ability to handle advanced topics in graphics programming, including dynamic transformations and texture mapping.
* **Problem-Solving:** Overcoming the challenges of debugging shaders and optimizing performance showcased my problem-solving skills.

**Submission Details**

**Artifact Files:**

* All enhanced technical artifact files have been included within a zip file.

**Narrative Document:**

* This journal entry is a narrative document explaining the selection and enhancement process and reflecting on the learning experience.

**Computer Science Program Outcomes Addressed:**

1. **Design, develop, and deliver professional-quality communications:** The enhanced artifact and this narrative document demonstrate my ability to communicate technical information effectively.
2. **Design and evaluate computing solutions:** The enhancements show my capability to design and implement computing solutions using algorithmic principles and computer science practices.
3. **Demonstrate the use of well-founded and innovative techniques:** By implementing advanced graphics programming techniques, I have demonstrated my ability to use innovative tools and methods in software engineering.

This milestone demonstrates significant progress toward software design and engineering proficiency. The enhanced artifact showcases my technical skills and ability to overcome challenges, reflecting my growth as a computer science professional.