Enhancement One: Software Design and Engineering

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**Brief Description of the Artifact**

This artifact is a C++ program originally developed for my CS-410 class, designed to simulate a simple decision-making process in an application. The program begins by printing a message and simulates checking user permissions. Based on a hardcoded status value, it conditionally displays client information or simulates changing a customer choice. The original version relied entirely on hardcoded variables, simple conditionals, and procedural function calls.

The artifact was created during my coursework in CS-410 and represents my early understanding of structuring a C++ program using basic functions and decision-making constructs.

**Justification for Inclusion**

I selected this artifact for my ePortfolio because it showcases my ability to improve and refactor an initial procedural program into a clean, modular, and maintainable object-oriented design. The original program was limited by its use of hardcoded values, lacked user input, and was not easily extensible.

The enhancement demonstrates several key software engineering skills:

* **Object-oriented design:** I refactored the code to introduce a User class that encapsulates user properties such as permission level and a Menu class that manages menu choices and actions.
* **Improved program structure and modularity:** By encapsulating responsibilities into classes, the program is now easier to maintain and extend.
* **Real user interaction:** I replaced hardcoded control variables with actual user input, allowing the program to respond dynamically to user choices.
* **Error handling:** The program now includes basic input validation and gracefully handles unexpected or invalid input.

Through these enhancements, the artifact now demonstrates a solid understanding of clean software design, maintainability, and reusability — all critical skills in modern software development.

**Alignment with Course Outcomes**

This enhancement was intended to meet the following CS 499 course outcomes:

* Design and evaluate computing solutions that address a given problem using algorithmic principles and computer science practices and standards relevant to its solution, while managing the trade-offs inherent in design choices.
* Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices to implement computer solutions that deliver value and accomplish industry-specific goals.

I believe this enhancement successfully meets these planned outcomes. No updates to my outcome-coverage plan are required at this time.

**Reflection on the Enhancement Process**

Through this enhancement, I learned how to transition a simple procedural program into a well-structured object-oriented solution, a fundamental skill in professional software development. I practiced designing classes that encapsulate related responsibilities, thinking critically about program structure, and applying input validation and error handling to make the program more robust.

One challenge I encountered was redesigning the flow of the program so that responsibilities were appropriately divided between classes, without overcomplicating the structure. I overcame this by carefully sketching out class responsibilities in pseudocode and iteratively refining the design during implementation.

Overall, this enhancement significantly improved the maintainability, scalability, and clarity of the code and helped me gain deeper experience in applying software design principles to real-world problems.