CS-499-10876-M01

Computer Science Capstone

Milestone Two Enhancement One Software Design and Engineering

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#### **Milestone Two: Enhancement One: Software Design and Engineering**

#### **Narrative**

**1. Briefly describe the artifact. What is it? When was it created?**

The artifact is a simple calculator application initially developed in Java as part of the CS310 course. It was provided as a course material to demonstrate basic software engineering principles, including the implementation of arithmetic operations and a graphical user interface using Java Swing.

**2. Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in software development? How was the artifact improved?**

I selected this calculator application for my ePortfolio because it encapsulates essential software design and engineering principles. This artifact showcases my ability to adapt and implement a functional application in multiple programming environments, specifically transitioning from Java to C++.

Specific components that highlight my skills include:

* **Modular Design**: The application is structured using well-defined classes and interfaces, promoting reusability and maintainability.
* **User Interface**: Although the initial GUI was developed using Java Swing, transitioning this to C++ requires using appropriate libraries like Qt, which is set for future enhancement.
* **Error Handling**: The addition of a divide-by-zero exception in the Divide class was initially developed in the Java version. It disappeared for some reason, but I re-implemented it in C++ to improve the application's robustness and security.

The primary improvement made to this artifact involved transferring the entire project from Java to C++. This transition demonstrates my adaptability and proficiency in multiple programming languages, particularly in converting object-oriented principles from Java to C++. The current implementation runs without errors and builds successfully, although the UI needs to be adapted to a C++-compatible framework, which is planned for future enhancement due to timetable constraints. Initially, full-stack development was considered; however, I have achieved a backend development milestone so far.

**3. Did you meet the course objectives you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?**

Yes, I met the course objectives planned in Module One by successfully converting the Java project into a C++ project. This enhancement aligns with demonstrating innovative skills and techniques in implementing design solutions, solving logic problems in software, and addressing potential design flaws related to security.

No updates are necessary for the outcome-coverage plans as this enhancement effectively demonstrates proficiency in software design and engineering. Future enhancements will focus on adapting the UI to C++.

**4. Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?**

The process of enhancing and modifying this artifact involved significant learning and overcoming several challenges:

* **Learning Outcome**: I gained a deeper understanding of both Java and C++ programming languages. This includes syntax differences, memory management, and the use of appropriate libraries for GUI development.
* **Challenges**: One of the main challenges was ensuring that the functionality remained consistent during the conversion process. This required careful consideration of class structures, method implementations, and handling exceptions such as divide-by-zero scenarios.

Overall, this enhancement project has improved my ability to think critically about software design and engineering problems, providing practical solutions while maintaining code quality and security. The current implementation runs without issues, and the adaptation of the UI to C++ is planned for future enhancement. In the same way, beyond this course, I intend to further my learning with reverse engineering (with all the ethical conditions fulfilled, of course) a new simple calculation app from a Binay/executable file and learn from it as these conditions weren’t as I expected with its level of complexity for a JAR (Java ARchive) file with Java applications.