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3-2 Milestone Two: Enhancement One: Software Design and Engineering**

**Introduction**

The artifact I chose is the investment calculator that was originally written in CS 210. This project was designed for users to input initial investment, monthly deposit amounts, annual interest rate, and number of years. The original design had users inputting this data into the command line and didn’t offer any compounding frequency options.

For the enchantment I decided to migrate the project for C++ to Python and improve the functionality and usability. I did this by adding a GUI instead of command line. This upgrade not only helped to modernize the project but also helped to show off my software engineering, Ui development, and language understanding skills.

**Justification**

The reasons I chose to include this in my Portfolio are that it demonstrates my ability to do the following :

* Adapt and enhance existing code: This was done by migrating from C++ to Python. Where I showcased my ability to work with multiple languages.
* Improve User Experience: Adding a GUI using Tkinker made this project a lot more user friendly.
* Implement advanced features: The original project only handled simple calculation, with the enhancement you can now select the compounding frequency by adding another layer to the features.
* Validation: Adding user input validation makes sure the application works as expected and is secure.

**Outcomes**

These improvements align with the Computer Science program outcomes by showing my ability to:

* Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts
* Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals (software engineering/design/database)
* Develop a security mindset that anticipates adversarial exploits in software architecture and designs to expose potential vulnerabilities, mitigate design flaws, and ensure privacy and enhanced security of data and resources

**Reflection**

During the enhancement of this artifact, I learned a good bit about the differences between python and C++. Migrating the core functionality of the program while keeping the functionality intact was a bit challenging, however the hardest part was adding the compounding frequency calculations. Another challenge was making sure that the GUI was user friendly and easy on the eyes. Adding the compounding frequency dropdown and user inputs with labels required a good understanding of UI design. By adding a good UI and better error handling I enhanced the artifacts usability and made it compatible with multiple OS instead of just windows like the original. This project helped my understanding of GUI development with Tkinter and demonstrated my ability to migrate, enhance, and modernize software solutions.