Jason Nasr

March 28, 2025

CS499

Milestone 3 Narrative

I selected the encryption-decryption program for inclusion in my ePortfolio because it clearly showcases my skills in algorithm design, data structure usage, and secure data handling. This artifact highlights a fundamental concept in computer science — symmetric encryption using the XOR bitwise operation — and reflects my ability to implement efficient, logical solutions in C++. Throughout the enhancement process, I improved the original program by modularizing the code into clear, reusable functions, such as encrypt\_decrypt, read\_file, write\_file, and compare\_files. I also added robust error handling, implemented file validation logic to confirm the success of encryption and decryption, and significantly improved the clarity of the code through enhanced commenting and structure. These refinements made the program more maintainable, professional, and scalable.

This project allowed me to meet several of the learning outcomes I set for myself in Module One. Specifically, I demonstrated my ability to apply algorithms to real-world problems, work with file input/output in C++, and organize code using modular practices. I do not have any updates to my outcome-coverage plan, as this enhancement aligns closely with the goals I originally identified. Through the process of modifying and refining this artifact, I deepened my understanding of how bitwise operations like XOR can be leveraged for data transformation, and I gained valuable insight into file handling and verification strategies in C++. One of the challenges I encountered was ensuring the program handled file errors gracefully and comparing the decrypted file to the original with accuracy. Debugging file access issues and ensuring binary integrity during read/write operations also pushed me to think critically about edge cases.

Overall, this enhancement reinforced my technical abilities and taught me the importance of writing clean, testable, and defensively programmed code. It also gave me a solid foundation for building more complex systems involving data security and file processing in the future.