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

The artifact that I have selected to complete this milestone is my “Client/Server Development Project” that I completed in CS-340. I chose this artifact because it is a full-featured web application that I designed and implemented in Python using the Flask framework and MongoDB for data storage. The project originally allowed users to perform create, read, update, and delete (CRUD) operations on a dataset containing information about animals in a shelter. This artifact was an original creation that I designed to demonstrate my understanding of client/server communication, database integration, and RESTful API design. It also represents a significant piece of my work that showcases my software design and engineering capabilities, as well as my knowledge of distributed systems and data management. I selected this artifact to be included in my ePortfolio to illustrate the level of proficiency I have achieved in backend development and the application of software design patterns and principles.

I enhanced my artifact by adding additional features and improvements to improve its functionality and usability. The enhancements included refactoring the codebase to improve modularity, implementing validation checks to handle incorrect or incomplete data input, optimizing database queries to improve performance, and adding test cases to verify the correctness of CRUD operations. I made sure to follow the design principles of clean code and separation of concerns to ensure that the modifications not only met the milestone requirements but also aligned with professional software design practices. For example, I separated the database operations and business logic into separate layers, creating a repository and a service structure, which enhanced the scalability and readability of the system. This restructuring of the codebase also made it easier for other developers to understand and maintain in the future. Furthermore, I ensured that the enhancements improved the overall user experience of the application by providing meaningful error messages and feedback during CRUD operations and by optimizing database access to minimize response time. I also documented the changes I made in the codebase to ensure future maintainability and to demonstrate my ability to communicate effectively about design choices.

The inclusion of this artifact in my ePortfolio showcases my skills in software design and engineering, as well as my understanding of computer science concepts. Through the enhancements I made to the artifact, I have demonstrated my proficiency in modular design and test-driven development, as well as my ability to optimize algorithms and data structures for improved performance. I have also shown my knowledge of security principles and practices by incorporating features that prevent common web vulnerabilities and ensure the secure handling of data. These enhancements reflect a deeper understanding of the trade-offs and design decisions involved in software development, as well as my ability to apply innovative and secure coding techniques that are expected of a professional in the field. I believe that this artifact can help me achieve several of the program outcomes for my computer science program. Specifically, in the area of software design and engineering, this artifact could help me demonstrate my proficiency in applying modular design principles and test-driven development practices to create robust and maintainable software solutions. In the algorithms and data structures outcome, I could use this artifact to showcase my ability to optimize algorithms and data structures for improved efficiency. Finally, in the security outcome, I could use this artifact to demonstrate my understanding of security principles and practices by incorporating features that prevent common web vulnerabilities and ensure the secure handling of data.

I would rate my confidence in the completeness of my milestone at 3 out of 5. While I am satisfied with the quality and depth of the analysis and reflection on my chosen artifact, I recognize that there is always room for improvement and additional detail. Specifically, I could have included more technical details about the implementation of the features and improvements I made to my artifact. For example, I could have provided more information about the specific design patterns and principles I followed when refactoring the codebase, as well as the testing frameworks and methodologies I used to verify the correctness of the CRUD operations. Additionally, I could have discussed more thoroughly the impact of my enhancements on the overall user experience and performance of the artifact. Despite these areas for improvement, I believe that the milestone meets the expectations of the course and provides a meaningful reflection on my progress and development as a software developer.