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

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**Brief Description of the Artifact**

The artifact I selected for enhancement is a data-driven application initially developed for my CS 210 course. The project involved creating a list management system that reads items from a text file, add items manually and displays them to the user. For my CS 499 Capstone project, I enhanced this application by integrating a database to store list items and user accounts, implementing user authentication, and providing a system for users to log out. These enhancements were made to demonstrate my skills in software design and engineering.

**Justification for Inclusion in ePortfolio**

I chose this artifact because it showcases my ability to design and implement a software system that involves both front-end and back-end development. The specific components of the artifact that highlight my skills include:

**Database Integration:** I integrated SQLite to store and manage list items and user accounts, which illustrates my ability to work with databases and perform CRUD operations.

**User Authentication:** I implemented a user authentication system, which showcases my understanding of security practices and my ability to develop secure login mechanisms.

**Session Management:** I added functionality for users to log out or close the application safely, demonstrating my skills in session management and user experience design.

These enhancements align with the course objectives I planned to meet in Module One, particularly in the category of software design and engineering.

**Meeting Course Objectives**

In Module One, my plan was to:

* Implement user login and authentication.
* Modify the application to save list items from a text file to a database.
* Add a system for logging out or closing the application.

I successfully met these objectives by:

* Creating a User class to manage user information and authentication status.
* Developing a Database class to handle database operations, including adding users, authenticating users, and managing list items.
* Ensuring that the application properly handles user sessions and securely logs out users.

Some Computer Science program outcomes that I demonstrated in this milestone are:

* *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*

In future milestones I plan to implement a better data structure to handle the list of items, add more options to interact with the database center and improve the security of the application.

**Reflection on the Enhancement Process**

The process of enhancing and modifying this artifact was a valuable learning experience. I learned several key lessons:

**Database Management:** Integrating SQLite and performing CRUD operations helped me understand the complexity of database management and how to efficiently interact with a database from a C++ application.

**Security Practices:** Implementing user authentication highlighted the importance of security in software development. I learned how to securely handle user credentials and protect against common vulnerabilities such as SQL injection.

**Session Management:** Adding functionality for user sessions and logout processes helped me to understand the need for a smooth and secure user experience. It taught me how to manage user states and ensure data consistency.

**Challenges Faced**

During the enhancement process, I faced several challenges. One significant challenge was ensuring that the database interactions were efficient and did not introduce performance bottlenecks. I addressed this by optimizing my SQL queries and carefully managing database connections. Another challenge was implementing secure authentication mechanisms. I overcame this by researching best practices for secure coding.

Overall, this enhancement process has strengthened my skills in software design and engineering. It has also given me a better appreciation for the importance of security and user experience in software development. This project milestone now serves as a strong demonstration of my abilities I category one and is a valuable addition to my ePortfolio.

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