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

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The original version of this project was created three months ago as part of my CS-320: Current Emerging Trends in Computer Science coursework. It was a simple contact manager application that allowed for basic operations like adding, updating, and deleting contacts. However, the application had a major limitation: the contact data was stored only in memory, meaning every time the program was closed, all contact information was lost. Additionally, there was no user interface—interactions had to occur directly through the code, which significantly limited the program's usability and accessibility.

As part of this milestone, I decided to enhance the program by focusing on improving its functionality and user experience, ensuring that it became more user-friendly, reliable, and practical for real-world use. These enhancements included implementing data persistence with a JSON-based database, adding a simple command-line interface (CLI) for interaction, and improving error handling and validation.

**Justification for Including in the ePortfolio**

This artifact was selected for inclusion in my ePortfolio because it effectively demonstrates my ability to design and implement key software engineering practices, including data persistence, user interface design, and error handling. By enhancing the program’s functionality and usability, I have showcased a solid understanding of essential software development concepts.

The improvements I made directly align with several key skills that are essential in the field of software engineering:

* Data Persistence and Storage Design: Implementing a JSON-based solution for persistent storage addressed the critical issue of data loss and demonstrated my ability to design and evaluate appropriate data storage solutions.
* User Interface Design: The addition of a simple CLI significantly improved the user experience, moving beyond direct code interactions and demonstrating my skills in creating user interfaces.
* Error Handling and Input Validation: I enhanced the program’s robustness by adding better error handling, which ensures that the program handles unexpected inputs more gracefully and provides feedback to users. This improvement showcases my understanding of creating user-friendly applications that are also resilient in the face of errors.

These enhancements align well with my goals for this project, which were to focus on improving the usability, reliability, and persistence of the application while adhering to best practices in software development.

**Course Outcome Reflection**

I aimed to address several course outcomes, particularly those related to designing computing solutions and implementing those solutions in a practical context. Here are the key outcomes I focused on:

1. Design and Evaluate Computing Solutions: By choosing JSON as a persistence solution, I made design decisions based on the project’s requirements, balancing simplicity with functionality. This showcases my ability to select appropriate technologies for a given problem.
2. Develop Computing Solutions Using Industry Standards: The implementation of CRUD operations with a file-based database and the integration of basic user input validation reflect my growing understanding of industry-standard practices in software development.
3. Error Handling and Robustness: The improvements in error handling reflect my ability to build software that is not only functional but also user-friendly and resilient—important qualities in professional software systems.

I believe I met the outcomes I planned to achieve in Milestone One, particularly in terms of applying software engineering practices to create a more functional, user-friendly application. As I move forward, I plan to continue refining my skills in these areas, especially by exploring more advanced features like adding a GUI or integrating a real database.

**Reflection on the Enhancement Process**

The process of enhancing this application was both challenging and rewarding. One of the main hurdles I encountered was deciding how to handle data persistence in a way that would be both effective and simple. Initially, I considered using a full SQL database but ultimately decided that a JSON-based solution would be more suitable for this small-scale project, offering the right balance of simplicity, portability, and flexibility.

While working on the user interface, I had to think critically about the best way to present the available options to users. The command-line interface, although basic, turned out to be an intuitive way for users to interact with the program without requiring direct code modifications. This process taught me the importance of designing accessible user interfaces, even for simple applications.

Error handling was another area where I learned a great deal. Initially, the program didn't provide helpful feedback when invalid input was entered, which made the application difficult to use. Adding clear error messages and validating user input improved the overall experience and taught me the importance of building resilient software that accounts for unexpected user behavior.

**Conclusion**

In conclusion, the enhancements I made to this contact manager application have transformed it from a simple, in-memory program into a more sophisticated and user-friendly solution. By implementing persistent storage with JSON, I solved the issue of data loss and ensured the program could retain contact information between sessions. The addition of a command-line interface made the program much more interactive, and the improvements to error handling made it more reliable and user-friendly.

This project has demonstrated my growing proficiency in several areas of software design, including data management, user interaction, and application reliability. The decision to use JSON as the data storage solution was an important one, as it allowed me to meet the requirements of this small-scale project without adding unnecessary complexity. Overall, the application is now much more functional, maintainable, and accessible, and it represents an important milestone in my development as a software engineer.