# CS 499 Module One Assignment

1. **Self-Introduction:**

I began my Computer Science degree in 2023 after completing my time in the military. When I entered the program, I had minimal experience in software engineering but a strong background in troubleshooting and working with technology. This foundation helped me transition smoothly into the technical aspects of the program.

During my time in the program, I’ve developed several key skills that are essential for a successful career in software development. Three of the most important concepts I’ve learned are:

1. **Secure Programming** – Writing code that anticipates and mitigates security vulnerabilities.
2. **Software Design and Engineering** – Understanding how to plan, design, and structure software systems effectively.
3. **Algorithms and Data Structures** – Gaining the ability to solve complex problems efficiently using appropriate programming techniques.

Each of these concepts has given me a better understanding of the diverse areas within the software development field and the different career paths available.

Based on the three enhancements—Software Engineering & Design, Algorithms & Data Structures, and Databases, the key skills I will demonstrate and tie to relevant course outcomes are:

1. **Software Engineering & Design**
   * **Skills:** Modular architecture design, deployable code and version control, UI/UX best practices.
   * **Outcomes:** Demonstrates ability to use well‑founded and innovative techniques and tools to deliver valuable, production-quality solutions (Outcome 4).
2. **Algorithms & Data Structures**
   * **Skills:** Efficient data structure selection (hash tables), algorithm implementation (sorting, searching).
   * **Outcomes:** Designing computing solutions that solve problems using algorithmic principles and managing trade-offs (Outcome 3).
3. **Databases**
   * **Skills:** Cloud integration, relational modeling, secure API/connection implementation, credential management, SSL/TLS usage.
   * **Outcomes:** Demonstrates security mindset (Outcome 5) by proactively mitigating vulnerabilities and ensuring data privacy; showcases innovative computing practices (Outcome 4).

The skills I’ll be demonstrating closely align with my career plans in software engineering by demonstrating a comprehensive and versatile technical foundation. Through this project, I’ll highlight competencies such as secure coding, mobile application development, architectural design, and user‑experience optimization. This diverse skill set will enhance my flexibility and increase my future opportunity horizon, enabling me to pursue a variety of career paths with confidence.

This contributes to the specialization I am targeting for my career by broadening my technical capabilities and adaptability. While I haven’t yet pinpointed a single specialization to pursue after graduation, gaining experience across multiple domains such as secure coding, UI/UX design, algorithmic efficiency, and cloud-integrated development ensures that I remain versatile and adaptable in an continuously changing industry.

1. **ePortfolio Set Up:**

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1. **Enhancement Plan:** 
   1. **Category One:** Software Engineering and Design

**Artifact**: Inventory App

**Origin**: CS-360: Mobile Architecture and Programming

The artifact I selected for this category is the Inventory App, which I developed during the CS-360 course. I chose this project because it demonstrates my ability to design and build user interfaces, handle databases, and implement core software engineering principles. While the design of the app met course requirements, I struggled with getting the app fully functional and deployable, especially with backend integration and real-world usability.

For this enhancement, I plan to improve both the architecture and functionality of the app so it can be considered production-ready. My key enhancements will include:

* Completing the code and creating a completely deployable application.
* Improving database integration, ensuring that CRUD operations are fully functional and persist data correctly.
* Enhancing the user interface (UI) to be more intuitive and aligned with design best practices.

These changes will showcase my growth in software engineering, focusing on maintainable architecture, clean design, and deployable functionality.

By completing this enhancement, I will demonstrate the following skills:

* Software Architecture and Design: Finishing the project to become deployable and creating a modular application that adheres to software engineering best practices.
* Database Integration and Data Persistence: Implementing robust, persistent storage with complete CRUD functionality demonstrates my skills in handling real-world data needs.
* UI/UX Design: Enhancing the front-end to provide a clean, intuitive user experience reflects my ability to design applications that are both functional and user-friendly.

This enhancement aligns with the following course outcomes:

**Outcome 4:**  
*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.*

* This project enhancement will showcase my ability to use modern software design approaches and tools to build a mobile solution that could realistically meet user and industry needs.
  1. **Category Two:** Algorithms and Data Structures

**Artifact**: Inventory App

**Origin**: CS-360: Mobile Architecture and Programming

The artifact I selected is an Inventory App developed during the CS 360: Mobile Architecture and Programming course. The original version of the app allows users to add, update, delete, and view inventory items using a basic user interface. While it accomplishes its core purpose, the app’s logic relies on simple linear data processing, such as basic arrays or lists, which limits its performance and scalability.

This makes the Inventory App a strong candidate for enhancement in the Algorithms and Data Structures category. By introducing more complex and efficient algorithms and data structures, I can significantly improve the app’s performance, responsiveness, and overall capability.

To align with the category, I plan to introduce the following data structure and algorithm improvements:

1. Replace the linear list with a hash table to ehance item lookup and management operations.
2. Allow sorting of inventory items by name, category, or quantity using a merge sort or quick sort implementation.

These enhancements will allow me to demonstrate the use of algorithmic principles and efficient data structure management.

This enhancement allows me to demonstrate the following key skills:

* Efficient use of data structures: Replacing a basic list with a showcases my understanding of selecting appropriate structures based on performance needs.
* Algorithm implementation and complexity management: By implementing sorting and searching algorithms, I demonstrate the ability to improve time complexity and scalability.

This enhancement aligns with the following course outcomes:

**Outcome 3:**  
*Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution while managing the trade-offs involved in design choices.*

* + This enhancement directly demonstrates the use of algorithmic principles to improve performance and maintainability.
  1. **Category Three: Databases**

**Artifact**: Inventory App

**Origin**: CS-360: Mobile Architecture and Programming

The Inventory App, created in CS-360, was originally built to allow users to manage warehouse inventory through a mobile interface. While the app had basic local data persistence using an embedded SQLite database, it lacked more advanced database features such as relational modeling, remote access, or scalable query management. Because of this, this app could use enhancement in the Databases category.

1. **Planned Enhancements:**

To align with the Databases category, I will significantly expand the app’s database capabilities. My enhancement plan includes:

1. Migrating from a local SQLite database to a cloud-based MySQLto support scalability, multi-device access, and remote data storage.

This enhancement allows me to demonstrate the following key skills:

* Ability to design and implement cloud-integrated mobile applications. I will set up a remote MySQL database, configure cloud access credentials, and ensure secure and persistent connections from the app to the database. This reflects an understanding of modern mobile architecture and how cloud databases can be used to improve scalability, availability, and accessibility.

This enhancement aligns with the following course outcomes:

**Outcome 5:**  
*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.*

* Implements secure credential handling, encrypted connections, and validation checks which showcase a security-first design mindset.

1. **ePortfolio Overall Skill Set**

In the code review segment of my ePortfolio, the skill set I’ll demonstrate includes:

* **Analytical and diagnostic skills**: Identifying inefficiencies, bugs, or architectural issues in my current artifacts.
* **Technical depth**: Applying software design patterns, refactoring code, boosting performance, and enhancing security.
* **Communication proficiency**: Clearly explaining my analysis and enhancement plans—communicating complex technical details in an accessible manner.

Through my written narratives accompanying each artifact, I’ll illustrate the skills and outcomes:

* **Reflective communication and storytelling**: Explaining rationale, design decisions, trade-offs, and progression from original artifact to enhanced version.
* **Technical articulation**: Describing the application of algorithms, data structures, UI/UX refinements, and cloud/database integration.
* **Refinement**: Demonstrating coherence, clarity, and adaptation to specific audiences.

In my professional self-assessment, I’ll showcase the skills and outcomes:

* Connecting my learning experiences to my growth, career objectives, and the outcomes of the course.
* Weaving together all artifacts and enhancements into a cohesive demonstration of your competencies in software engineering, algorithms, and databases.
* Highlighting areas of strength, growth opportunities, and how these competencies position you for your career path.