# CS 499 Module One Assignment Template

1. **Self-Introduction:** Address all of the following questions to introduce yourself.

My name is Abigail Sibazeu, and I have been in the Computer Science program for about 2.5 years. During this time, I have gained valuable knowledge and skills that have significantly advanced my understanding of the field. I currently work as a database engineer, a role that has given me hands-on experience with database management, optimization, and query design. While my primary focus has been on database engineering, I am eager to broaden my expertise in software engineering, computing, coding, and data analytics to prepare for my ultimate career goal of becoming a data scientist.

Throughout the program, I have developed proficiency in several areas, including programming languages, data visualization, artificial intelligence (AI), algorithms, databases, and application development. These skills have provided me with a solid foundation to understand and tackle complex problems in computer science.

For this capstone project, I aim to demonstrate my ability to integrate the skills I have learned with practical enhancements in three key areas: software engineering and design, algorithms and data structures, and databases. These enhancements will showcase my ability to design robust, efficient, and scalable solutions to real-world problems. By refining my artifacts, I will align my skills with the course outcomes and further prepare myself for a career in data science.

The specific skills I will demonstrate through this project—such as creating modular software designs, optimizing algorithms, and improving database performance—are essential for a data scientist. These skills not only support my ability to analyze and interpret data but also enable me to build efficient systems for processing and storing data. Moreover, the emphasis on clean code, testing, and secure design in this course aligns with industry standards, ensuring that I am prepared for the challenges of the field. This specialization will help me bridge the gap between database engineering and data science, making me a versatile and competitive professional.

1. **ePortfolio Set Up:**

A screenshot of a web page

Description automatically generated

1. **Enhancement Plan:**

**Category One: Software Design and Engineering**

**Artifact:** Inventory App – Android Mobile App  
**Origin:** CS360 - Mobile Architecture and Programming

**Enhancement Plan:**  
The original version of the app had limited functionality, allowing only the addition of one item in the ItemActivity list. The planned enhancement involves:

1. Improving the design of ItemActivity by adding the ability to:
   * Add multiple items to the database.
   * Edit item quantities.
   * Delete a single item or all items.
2. Enhancing the LoginActivity by introducing a password recovery feature for forgotten credentials.

**Skills Demonstrated:**

* Advanced mobile application development using Android Studio IDE, Java, and SQLite.
* Integration of database CRUD (Create, Read, Update, Delete) operations to manage app data.
* Designing robust and modular software components that transfer data between activities and utilize mobile device features.

**Course Outcomes:**

* **[CS-499-03]** Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices while managing design trade-offs.
* **[CS-499-04]** Use innovative techniques and tools to implement computing solutions that deliver value and achieve industry-specific goals.

**Pseudocode:**

1. Enhance database CRUD functionality for improved item management.
2. Add a password recovery system to the login screen.
3. Improve the app's source code to display and manage items seamlessly.

### **Category Two: Algorithms and Data Structures**

**Artifact:** Authentication and Monitoring System  
**Origin:** IT145 - Foundation in Application Development

**Enhancement Plan:**  
Expand the existing program’s capabilities by adding a dashboard to monitor animal activity and living habitats. The enhancements will include:

1. User authentication and authorization to control dashboard access.
2. A system to read input from users and output monitoring results.
3. Properly structured object-oriented programming (OOP) using Java to organize classes and methods effectively.

**Skills Demonstrated:**

* Algorithmic logic combined with appropriate data structures.
* Mastery of OOP elements, including variables, operators, methods, and classes, to assemble functional programs.
* Debugging and correcting errors to improve program reliability and functionality.

**Course Outcomes:**

* **[CS-499-01]** Employ strategies for collaborative environments that enable diverse audiences to support decision-making in computer science.
* **[CS-499-05]** Develop a security mindset that mitigates design flaws and ensures data privacy and system security.

**Pseudocode:**

1. Create control structures to manage program logic.
2. Design a terminal-based GUI dashboard.
3. Display different dashboard views based on user authentication and authorization levels.

### **Category Three: Databases**

**Artifact:** Salvare Search for Rescue App  
**Origin:** CS340 - Client/Server Development

**Enhancement Plan:**  
The original app was developed on the Apporto platform. Planned enhancements include:

1. Reproducing the app on a local machine for improved usability.
2. Refining and improving the dashboard GUI for a more intuitive user experience.
3. Revising the documentation to detail steps for running the app in different environments.

**Skills Demonstrated:**

* Python programming and MongoDB database integration using PyMongo.
* Building and modifying GUIs using the Dash Python framework.
* Testing and debugging Python scripts using Jupyter Notebook for functionality verification.

**Course Outcomes:**

* **[CS-499-03]** Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices.
* **[CS-499-04]** Use innovative techniques and tools to implement computing solutions that deliver industry-specific value.

**Pseudocode:**

1. Update documentation for multi-environment dashboard implementation.
2. Revise and document the software design patterns used in development.
3. **ePortfolio Overall Skill Set**

**Code Review:**  
In the code review section, I will demonstrate my ability to apply secure coding practices from the initial stages of software development to mitigate vulnerabilities effectively. As applications grow in complexity, the potential for security risks increases. By evaluating the structure, logic, performance, design, readability, maintainability, and functionality of the code, I will ensure robust and secure solutions.

* This process will incorporate both automated checks with third-party tools and manual reviews to evaluate software from a holistic perspective.
* Focusing on secure coding early in the software development life cycle reduces risks and streamlines testing.  
  By critically reviewing code with specific objectives in mind, I will showcase skills in developing reliable, secure, and well-optimized software solutions.

**Narratives:**  
The narratives will highlight the knowledge and skills acquired across the three key categories of software design and engineering, algorithms and data structures, and databases. These will illustrate my ability to:

* Apply data structures effectively to organize data based on problem requirements and constraints.
* Implement optimized algorithms that achieve desired functionality while maintaining computational efficiency.
* Develop modular software and integrate security practices into each stage of the development process.
* Utilize quality assurance techniques, including testing and source code audits, to identify and mitigate vulnerabilities.

These narratives will reflect my problem-solving approach, understanding of core computer science concepts, and ability to apply them to real-world projects.

**Professional Self-Assessment:**  
The professional self-assessment will summarize my motivation for pursuing computer science, my growth throughout the program, and my readiness to meet industry demands. It will showcase:

* Proficiency in programming languages such as C++, Java, Python, and SQL, and expertise in development tools for building and refining software.
* Strong organizational skills and mastery of the software development life cycle (SDLC), enabling me to excel in agile environments.
* Problem-solving abilities demonstrated through debugging, troubleshooting, and implementing industry-standard best practices.

This section will emphasize my commitment to lifelong learning, adaptability to new tools and technologies, and determination to deliver innovative and collaborative solutions.