# CS 499 Module One Assignment Template

Complete this template by replacing the bracketed text with the relevant information.

1. **Self-Introduction:** Address all of the following questions to introduce yourself.
   1. How long have you been in the Computer Science program?

**My original goal was to get an associate’s degree in information technology. I began working on this in October of 2019. I am so thankful that my employer funded the cost of my tuition and after completing my associate’s degree I did not want to stop learning. I had the opportunity to pursue a bachelor’s degree in computer science, but I did not feel like I was smart enough. My husband convinced me that even if I got bad grades I was still working on something I that loved and wanted to do for a long time. Now I am just weeks away from achieving my goal of getting a degree and pursuing my dream of becoming a full-stack developer.**

* 1. What have you learned while in the program? List three of the most important concepts or skills you have learned.

**I was very shy in high school and was a very terrible student and barely graduated with a C average because I did not know how to ask for help. I was shocked at the math and physics concepts that I have learned at SNHU. It was taught in a way that was easy for me to understand. What helped me the most was the amount of knowledge and talent each of my instructors possessed. This provided me with an outlet that I felt confident to reach out to whenever I struggled or was stuck on parts of assignments that I did not understand.**

**The three top concepts to me are**

**1. Matrix Math: Matrix math seemed hard at first,** **but it helped me learn important ideas behind complex algorithms. It also helped me understand the logic needed to handle data and transformation, which are important for software design, building algorithms, and managing databases.**

**2. Discussion Posts: Writing discussion posts helped me get better at explaining technical parts of my assignments. Being able to say what I am doing and why it is important not just for showing that I understand the material, but also to show that I can communicate well with others.**

**3. Debugging Code: Debugging used to be very frustrating, but it has helped me improve my problem-solving skills. It has taught me how to think through the steps of my project to find where the problems are and use logic which is important for making software that works well and does not break.**

* 1. Discuss the specific skills you aim to demonstrate through your enhancements to reach each of the course outcomes.

**I want to show that I can build a working apps with all the parts needed, including clean commented code, good design, and database access. For algorithms, I want to show that I know how to organize and process data, like sorting and filtering information to make apps faster and easier to use. For databases, I want to show that I know how to Create, Read, Update, and Delete data with well-structured queries. My project will store, get, and manage data to keep everything organized and working the way it should.**

How do the specific skills you will demonstrate align with your career plans related to your degree?

**The skills I want to highlight include building secure login features, organizing data with databases, and writing clean, well-structured code. This will support my goal of becoming a full stack developer. I want to create apps that are both useful and fun, and these skills are a strong starting point. Later, I plan to learn how to use tools like AWS to host and grow my apps so they can handle more users.**

* 1. How does this contribute to the specialization you are targeting for your career?

**This project will help me build the core skills I need for a full stack development role. It gives me practice working with both the front end and the back end. The class I took prior to this, CS470 Full Stack 2, prepared me to launch a full stack application to the cloud with AWS. I want to become well versed in full-stack development and then gain knowledge of app migration to the cloud.**

1. **ePortfolio Set Up:**
   1. Submit a **screen capture** of your ePortfolio GitHub Pages home page that clearly shows your URL.
      1. You already have a repository in GitHub where you uploaded projects in previous courses. Your ePortfolio will reside in GitHub but can link to work at other sites, such as Bitbucket.
   2. Use the GitHub Pages link in the Resource section for directions on:
      1. How to create your GitHub website and publish code to GitHub Pages
      2. Issues, such as adding links to other sites
   3. Paste a screenshot of your GitHub Pages home page with your URL clearly showing in the space below.

[**https://wildbulll.github.io/CS499/**](https://wildbulll.github.io/CS499/)

A screenshot of a computer

AI-generated content may be incorrect.

1. **Enhancement Plan:** 
   1. **Category One:** Software Engineering and Design
      1. **Select an** **artifact** that is **aligned with** **the** software engineering and design **category** and explain its origin. Submit a file containing the code for the artifact you choose with your enhancement plan.

**The project that I selected for my Software Engineering and Design enhancement plan is the weight tracker app that I created in CS 360 Mobile Architecture and Programming. The app was designed to let users log their weight over time and view progress. I was able to build the interface and basic navigation, but I ran out of time before I could complete the login and account creation features. This means that app cannot support multiple users or protect user data.**

**My planned enhancement will be to implement user authentication so each person can create an account, log in, and only see their data. This improvement will demonstrate my understanding of mobile app architecture, modular design, and how to manage user sessions.**

**By doing this, I will show that I understand software engineering ideas like breaking the app into clear manageable parts, designing for future growth, and building secure systems. Completing this app will be a great example of real-world software design and development skills.**

**I am submitting the original code from the app with this enhancement plan. It is also available on my GitHub repo CS360** [**https://github.com/wildbulll/CS360.git**](https://github.com/wildbulll/CS360.git)**.**

Note: Your artifact may be work from the following courses:

* IT 145: Foundation in Application Development
* CS 250: Software Development Lifecycle
* CS 260: Data Structures and Algorithms
* IT 315: Object Oriented Analysis and Design
* CS 320: Software Testing, Automation, and Quality Assurance
* CS 330: Computational Graphics and Visualization
* CS 340: Advanced Programming Concepts
* CS 350: Emerging Systems Architectures and Technologies
* CS 360: Mobile Architecture and Programming
* IT 365: Operating Environments
* IT 380: Cybersecurity and Information Assurance
* CS 405: Secure Coding
* CS 410: Reverse Software engineering
* IT 340: Network and Telecommunication Management
* IT 380: Cybersecurity and Information Assurance
  + 1. **Describe** a practical, well-illustrated **plan** for enhancement in alignment with the category, including a pseudocode or flowchart that illustrates the planned enhancement.

**My plan is to add user authentication to the weight tracker app. This means creating a “Create Account” screen where users can sign up with a username and password, and a “Login” screen for returning users to access their accounts. After logging in, users will go to the main app to log in or view their weight entries.**

**To make this secure and easy to use, I will:**

* **Design clear and simple screens for creating accounts and logging in, so users know what to do and get helpful feedback.**
* **Build backend logic to handle new user registrations and logins.**
* **Use password hashing so passwords are never saved as plain text, so user passwords are safe even if the data is exposed.**
* **Store user information and weight data in a database that links each user to their own data.**
* **Validate all user inputs and show clear error messages if something is wrong.**
* **Make sure only logged-in users can see the main weight tracking area, sending anyone else back to the login screen.**

**This plan makes the app ready for multiple users and focuses on secure design with easy-to-use features and clean modular code. It shows that I can build important parts of a mobile app while keeping user data safe and private.**

**Pseudocode:**

**If user opens app:**

**Show Login Screen**

**If "Create Account" is clicked:**

**Show Create Account Screen**

**If user enters valid info:**

**Save user data to database**

**Redirect to Login Screen**

**If user enters login credentials:**

**Check against stored credentials in database**

**If match found:**

**Redirect to Dashboard**

**Else:**

**Show "Invalid credentials" message**

For this category of enhancement, consider improving a piece of software, transferring a project into a different language, reverse engineering a piece of software for a different operating system, or expanding a project’s complexity. These are just recommendations. Consider being creative and proposing an alternative enhancement to your instructor.

Think about what additions to include to complete the enhancement criteria in this category. Since one example option is to port to a new language, that is the kind of scale that is expected. This does not mean you need to port to a new language but instead have an equivalent scale of enhancement. Underlying expectations of any enhancement include fixing errors, debugging, and cleaning up comments, but these are not enhancements themselves.

* + 1. Explain how the planned enhancement will **demonstrate** specific **skills** and align with course outcomes.
       1. Identify and describe the specific skills you will demonstrate that align with the course outcome.

**By adding account creation and login, I will show that I can:**

**Apply secure software design principles like password hashing, secure session management, and input validation, which relates to developing a security mindset = Course Outcome #5.**

**Design modular and scalable parts by creating separate authentication components and integrating them with the app, aligns with designing and evaluating computing solutions = Course Outcome #3.**

**Implement user-friendly interface and experience by designing clear login and registration screens that also have helpful error messages, falls under supporting professional communication skills = Course Outcome #2.**

* + - 1. Select one or more of the course outcomes below that your enhancement will align with.

**Secure coding – Course Outcome #5.**

**Modular and scalable design – Course Outcome #3.**

**User-friendly interface – Course Outcome #2.**

Course Outcomes:

1. Employ strategies for building collaborative environments that enable diverse audiences to support organizational decision-making in the field of computer science.
2. Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts.
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.
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.
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.
   1. **Category Two:** Algorithms and Data Structures
6. **Select an artifact** that is **aligned with the** algorithms and data structures **category** and explain its origin. Submit a file containing the code for the artifact you choose with your enhancement plan. You may choose work from the courses listed under Category One.

**The artifact I selected for the Algorithms and Data Structures category is my final project from CS 340 Client/Server Development, the Grazioso Salvare dashboard. This project involved building a web dashboard using Python and MongoDB to help a fictional dog rescue company view and manage rescue dog data.**

**Originally, I was not able to get all of the sorting functions finalized due to running out of time. I will apply sorting and filtering algorithms to show dogs by age, sex, breed, rescue training type, or shelter location and have that location appear on a map. I will use Python data structures like lists, dictionaries, loops, conditionals, and comparison logic, to sort and manage the data. This project will fit into the algorithm category because it demonstrates real-world use of algorithms and data handling to solve a problem.**

**I am submitting the original code from the app with this enhancement plan. It is also available on my GitHub repo CS340** [**https://github.com/wildbulll/CS340.git**](https://github.com/wildbulll/CS340.git)

1. **Describe** a practical, well-illustrated **plan** for enhancement in alignment with the category, including a pseudocode or flowchart that illustrates the planned enhancement.

**For this enhancement, I plan to improve the Grazioso Salvare dashboard by adding sorting and filtering features to make the dog data more useful and easier to work with. My goal is to make it possible for users to:**

* **Sort dogs by age, sex, breed, or rescue training type**
* **Filter dogs by location, availability, or rescue training type**
* **Combine sorting and filtering in the same request (for example: all dogs in Texas, sorted by age)**

**To do this, I will refactor the Python backend to accept query parameters like sort\_by=age&filter\_location=TX. Then, I will write the logic to handle these requests by using Python data structures like lists and dictionaries then use conditional filtering using loops and if-statements.**

**This plan fits the Algorithms and Data Structures category because it involves writing and applying sorting and filtering algorithms to solve a real problem**

**Pseudocode**

**FUNCTION get\_filtered\_sorted\_dogs(sort\_by, filter\_location, filter\_rescue\_type):**

**all\_dogs = fetch\_dogs\_from\_database()**

**filtered\_dogs = []**

**FOR dog IN all\_dogs:**

**IF (filter\_location IS NULL OR dog.location == filter\_location) AND**

**(filter\_rescue\_type IS NULL OR dog.rescue\_type == filter\_rescue\_type):**

**ADD dog TO filtered\_dogs**

**IF sort\_by == "age":**

**SORT filtered\_dogs BY dog.age**

**ELSE IF sort\_by == "breed":**

**SORT filtered\_dogs BY dog.breed**

**ELSE IF sort\_by == "rescue\_type":**

**SORT filtered\_dogs BY dog.rescue\_type**

**RETURN filtered\_dogs**

For this category of enhancement, consider improving the efficiency of a project or expanding the complexity of the use of data structures and algorithms for your artifact. These are just recommendations. Consider being creative and proposing an alternative enhancement to your instructor. Note: You only need to choose one type of enhancement per category.

Think about what additions to include to complete the enhancement criteria in this category. Since one example option is to port to a new language, that is the kind of scale that is expected. Perhaps you might increase the efficiency and time complexity of an algorithm in an application and detail the logic of the increased time complexity. Remember, you do not need to port to a new language but instead have an equivalent scale of enhancement. Underlying expectations of any enhancement include fixing errors, debugging, and cleaning up comments, but these are not enhancements themselves.

1. Explain how the planned enhancement will **demonstrate** specific **skills** and align with course outcomes.
   1. Identify and describe the specific skills you will demonstrate to align with the course outcome.

**This will show how I can use algorithms and data structures to:**

* **Design and apply sorting algorithms to organize dog data by age, breed, or rescue training type.**
* **Use the right data structures like lists and dictionaries to store and work with dog records.**
* **Write filtering logic that uses if statements and loops to narrow down results based on things like location or rescue type.**
* **Refactor the backend code to keep it clean, organized, and easy to update, making sure that sort and filter logic works with the existing app.**
* **These skills match the course outcomes by showing I can design and evaluate computing solutions = Outcome #3. And use proven software development techniques in my code = Outcome #4.** 
  1. Select one or more of the course outcomes listed under Category One that your enhancement will align with.

**Algorithm design to solve real problems – Course Outcome #3.**

**Clean and maintainable code – Course Outcome #4.**

**Communicating technical ideas clearly – Course Outcome #2.**

* 1. **Category Three: Databases**
     1. **Select an artifact** that is **aligned with the** databases **category** and explain its origin. Submit a file containing the code for the artifact you choose with your enhancement plan. You may choose work from the courses listed under Category One.

**For the Databases category, I am again using the Grazioso Salvare dashboard from CS 340 Client/Server Development. While I focused on sorting and filtering logic in Category Two, this enhancement will focus on how the app interacts with the MongoDB database.**

**In the original version, I used basic Python CRUD functions to connect to the database and display information about the rescue dogs. Some parts, like filtering by location and sorting by traits, did not work well because the queries were not finished. My enhancement will fix these issues by improving the way data is queried, filtered, and retrieved from the database.**

**Specifically, I plan to:**

**Refactor the database queries to use MongoDB’s built-in sorting and filtering features.**

**Use query optimization techniques to make data retrieval fast.**

**Make sure the data model links each dog to its attributes (breed, age, rescue type, etc.).**

**This work will show that I understand how to create efficient database design and usage. This aligns with the Databases category because it will focus on how the backend connects to the database, stores, and retrieves data, and making sure that data is optimized in a way that supports scalability and usability.**

**I am submitting the original code from the app with this enhancement plan. It is also available on my GitHub repo CS340** [**https://github.com/wildbulll/CS340.git**](https://github.com/wildbulll/CS340.git)

* + 1. **Describe** a practical, well-illustrated **plan** for enhancement in alignment with the category, including a pseudocode or flowchart that illustrates the planned enhancement.

**For this enhancement, I will focus on improving how the Grazioso Salvare app talks to the database, not just how it handles data in the app. Here is what I plan to do:**

**Refactor the backend code so it builds better database queries. This means the app will send filters like location or rescue training type, and sorting choices like age or breed to MongoDB and let the database handle it.**

**Use MongoDB’s .find() and .sort() functions to filter and sort records based on what the user selects in the dashboard.**

**Add indexes to fields like age, breed, and location to make these queries faster.**

**These changes will make the app faster because it will not work on loading all of the dog data, but it will sort it so the user will only see what they asked for.**

**Pseudocode:**

**FUNCTION FetchDogsFromDatabase(queryFilters, sortCriteria):**

**Connect to MongoDB**

**Select the "dogs" collection**

**Create a filter object:**

**If there's a location filter, add to query**

**If there's a rescueType filter, add to query**

**(Add others as needed)**

**Create a sort object:**

**If sorting by age, add age: 1 (for ascending)**

**If sorting by breed, add breed: 1, etc.**

**Run the MongoDB query:**

**If sort is requested, use .find(query).sort(sort)**

**Else, just use .find(query)**

**Return the list of dogs from the query**

**END FUNCTION**

For this category of enhancement, consider adding more advanced concepts of MySQL, incorporating data mining, creating a MongoDB interface with HTML/JavaScript, or building a full stack with a different programming language for your artifact. These are just recommendations; consider being creative and proposing an alternative enhancement to your instructor. Note: You only need to choose one type of enhancement per category.

Think about what additions to include to complete the enhancement criteria in this category. Since one example option is to port to a new language, that is the kind of scale that is expected. Perhaps you might increase the efficiency and time complexity of an algorithm in an application and detail the logic of the increased time complexity. Remember, you do not need to port to a new language but instead have an equivalent scale of enhancement. Underlying expectations of any enhancement include fixing errors, debugging, and cleaning up comments, but these are not enhancements themselves.

* + 1. Explain how the planned enhancement will **demonstrate** specific **skills** and align with course outcomes.
       1. Identify and describe the specific skills you will demonstrate that align with the course outcome.

**This will show that I can work with a MongoDB database and that I can:**

* **Write better database queries by using .find() and .sort() to filter and sort the dog data.**
* **Use indexes on fields like age, breed, and location to improve speed when searching or sorting large amounts of data.**
* **Keep the data accurate and organized, making sure the right dogs show up based on the user’s choices.**
* **Think about database security by preventing risky inputs and using safe query patterns to protect the system.**

**These skills connect to the course outcomes of building efficient solutions, using proper tools and techniques, and creating secure systems. They are important for working on real-world applications that require secure database design and performance.**

* + - 1. Select one or more of the course outcomes listed under Category One that your enhancement will align with.

**Algorithmic logic to solve real problems efficiently – Course Outcome #3**

**Practical coding techniques and clean implementation – Course Outcome #4**

**Clear communication to technical and non-technical audiences – Course Outcome #5**

1. **ePortfolio Overall Skill Set**
   1. Accurately describe the **skill set** to be illustrated by the **ePortfolio** **overall**.
      1. Skills and outcomes planned to be illustrated in the code review.

**In my code review, I will show that I know how to write clean code that is commented and easy-to-read. I will point out how I use computer science skills like choosing the right data structures, writing efficient algorithms, connecting to and working with databases, and building apps in a modular and scalable way. I will also show how I can fix bugs, improve my code over time, and make it run better and more securely.**

* + 1. Skills and outcomes planned to be illustrated in the narratives.

**In the narratives, I will explain the story behind each project, why I built it, what challenges I faced, and how I solved them. I will walk through how I planned my enhancements, what I changed, and why those changes matter. This will show how I have grown as a developer and how it connects what I learned in my courses to real-world problems and solutions.**

* + 1. Skills and outcomes planned to be illustrated in the professional self-assessment.

**In my self-assessment, I will reflect on how far I have come in the program. I will talk about what I do well, what I want to keep improving, and how my projects show that I am ready to work in the tech world. I will also explain how I have used technical, communication, and problem-solving skills together to prepare for a career in software or full-stack development.**

**GriggsProject3.zip = Weight Tracker App**

**GriggsProjectTwo = Grazioso Savlare Dashboard**