# CS 499 Module One Assignment

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

I’ve been enrolled in the Computer Science program at Southern New Hampshire University since early 2023 and am currently in my final term, graduating in October 2025. This program has been instrumental in helping me pivot from hardware-focused roles into software development.

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

Three of the most valuable skills I’ve gained include:

* Object-Oriented Programming (OOP): I’ve learned how to design modular, reusable code using principles like inheritance and encapsulation.
* Software Development Lifecycle (SDLC): Understanding the phases of planning, development, testing, and deployment has helped me approach projects methodically.
* Version Control and Collaboration Tools: Using Git and platforms like GitHub has strengthened my ability to work in team environments and manage codebases effectively.
  1. Discuss the specific skills you aim to demonstrate through your enhancements to reach each of the course outcomes.

To meet the course outcomes, I plan to demonstrate:

* Proficiency in coding and debugging using languages like Python, Java, and C++.
* Effective problem-solving through algorithmic thinking and structured design.
* Clear documentation and communication to support maintainability and team collaboration.
* Ethical software practices by incorporating secure coding standards and respecting user privacy.
  1. How do the specific skills you will demonstrate align with your career plans related to your degree?

These skills directly support my transition into software development. My foundation in hardware troubleshooting gives me a unique perspective on how software interacts with systems, and my growing expertise in programming and design prepares me to build scalable, user-friendly applications. I’m especially focused on backend development and systems-level programming, where my attention to detail and process discipline are strong assets.

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

I’m targeting a specialization in software development with an emphasis on building robust, maintainable applications. Whether it’s developing internal tools, automating workflows, or contributing to enterprise systems, the skills I’ve gained in this program, combined with my real-world experience, position me to deliver high-quality software solutions that improve efficiency and user experience.

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.

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 artifact I selected is a mobile Inventory Management App developed during CS 360: Mobile Architecture and Programming. The app was designed to help users track household or business supplies, update quantities in real time, and receive alerts for low stock. It was built using Android Studio and Java, following the Model-View-Controller (MVC) architecture. The UI was designed with accessibility in mind, adhering to WCAG AA standards and emphasizing clarity, responsiveness, and ease of use.

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.

To align with software engineering and design principles, I plan to refactor and expand the app with the following enhancements:

* Migrate the codebase from Java to Kotlin for modern syntax, null safety, and improved maintainability.
* Implement Firebase Authentication and Realtime Database to enable cloud-based syncing and secure user login.
* Redesign the UI using Material Design components for improved usability and consistency.
* Add automated testing using JUnit and Espresso to validate core logic and UI behavior.
* Integrate Room persistence library for structured local data storage.

Pseudocode for Firebase Sync Enhancement:

function syncInventoryToFirebase(localInventoryList):

for item in localInventoryList:

if item not in firebaseDB:

firebaseDB.add(item)

else:

firebaseDB.update(item.id, item.quantity)

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.

Skills Demonstrated:

* Mobile architecture and design using MVC and Material Design
* Refactoring and language migration (Java to Kotlin)
* Cloud integration and authentication
* Automated testing and debugging
* Accessibility and responsive UI design
  + - 1. Select one or more of the course outcomes below that your enhancement will align with.

Course Outcomes Aligned:

* Outcome 3: Design and evaluate computing solutions using algorithmic principles and computer science practices.
* Outcome 4: Use innovative tools and techniques to implement solutions that deliver value and meet industry goals.

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 same Inventory Management App includes a feature that sorts inventory items by priority and expiration date. This logic was originally implemented using basic sorting algorithms and array lists.

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

Enhancement Plan

To improve efficiency and scalability, I plan to:

* Replace the basic sorting logic with a custom comparator using a priority queue.
* Implement a binary search tree (BST) to store and retrieve inventory items based on expiration date.
* Optimize data access and reduce time complexity from O(n log n) to O(log n) for key operations.

Pseudocode for BST Insertion and Search:

function insertItem(root, item):

if root is null:

return new Node(item)

if item.expirationDate < root.item.expirationDate:

root.left = insertItem(root.left, item)

else:

root.right = insertItem(root.right, item)

return root

function searchItem(root, date):

if root is null or root.item.expirationDate == date:

return root

if date < root.item.expirationDate:

return searchItem(root.left, date)

else:

return searchItem(root.right, date)

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.

Skills Demonstrated:

* Efficient data structure implementation (BST, priority queue)
* Algorithm optimization and complexity analysis
* Modular design and encapsulated logic
  1. Select one or more of the course outcomes listed under Category One that your enhancement will align with.

Course Outcomes Aligned:

* Outcome 3: Design and evaluate computing solutions using algorithmic principles.
* Outcome 4: Use innovative techniques and tools to implement solutions that meet industry goals.
  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.

The Inventory Management App originally used SQLite for local storage. While functional, it lacked scalability and multi-user support.

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

Enhancement Plan

To align with database best practices, I plan to:

* Replace SQLite with Firebase Realtime Database for cloud-based storage and multi-device sync.
* Implement structured data models with nested collections for categories and items.
* Add user authentication and role-based access control.
* Include data validation and error handling for secure transactions.

Flowchart for Firebase Integration:

[User Login] → [Check Auth Status]

↓

[Fetch Inventory from Firebase]

↓

[Display Inventory in UI]

↓

[User Adds/Edits Item]

↓

[Update Firebase DB]

↓

[Trigger Notification if Low Stock]

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.

Skills Demonstrated:

* Cloud database integration and schema design
* Authentication and access control
* Real-time data sync and validation
* Secure coding and error handling
  + - 1. Select one or more of the course outcomes listed under Category One that your enhancement will align with.

Course Outcomes Aligned:

* Outcome 4: Use innovative techniques and tools to implement computing solutions.
* Outcome 5: Develop a security mindset to mitigate vulnerabilities and ensure data privacy.

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

The code review will showcase my ability to design and implement modular, scalable software solutions using mobile architecture principles. It will highlight my proficiency in:

* Applying object-oriented programming and MVC design patterns
* Refactoring legacy code (Java to Kotlin) for modern development standards
* Integrating cloud services (Firebase) for real-time data synchronization and authentication
* Implementing automated testing frameworks (JUnit, Espresso) to ensure reliability
* Enhancing accessibility and UI responsiveness using Material Design and WCAG standards

These skills align with the following course outcomes:

* Outcome 3: Design and evaluate computing solutions using algorithmic principles and computer science practices
* Outcome 4: Use innovative techniques and tools to implement computing solutions that deliver industry value
  + 1. Skills and outcomes planned to be illustrated in the narratives

The narratives will demonstrate my ability to reflect on the development process, articulate design decisions, and communicate technical concepts clearly.

They will illustrate:

* Strategic problem-solving and innovation in mobile app development
* User-centered design thinking and accessibility considerations
* Iterative testing and debugging across devices and edge cases
* Documentation of enhancement planning and implementation

These narratives support:

* Outcome 2: Deliver professional-quality written and visual communications adapted to specific audiences and contexts
* Outcome 3: Evaluate computing solutions while managing trade-offs in design choices
  + 1. Skills and outcomes planned to be illustrated in the professional self-assessment

The professional self-assessment will reflect my growth as a developer and my readiness to transition into a software development or PC specialist role. It will emphasize:

* My ability to connect academic learning with real-world applications
* Continuous improvement through self-directed learning and certification (CompTIA A+)
* Awareness of industry standards, security practices, and user needs
* Confidence in applying my technical and collaborative skills in professional environments

This aligns with:

* Outcome 1: Employ strategies for building collaborative environments that support decision-making
* Outcome 4: Use well-founded and innovative techniques in computing practices
* Outcome 5: Develop a security mindset to mitigate vulnerabilities and ensure data privacy