CS 499 Module One Assignment Template

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

- How long have you been in the Computer Science program?

I have been in the Computer Science program for just over a year now. I am majoring in Computer Science with a minor in Data Analytics. I initially started my undergraduate journey in the humanities, but I thought that majoring in Computer Science would be more useful and more diverse when it came to going into the field of data.

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

I learned a lot about data, specifically, trying to understand how we can utilize data in different areas to our advantage. I realized that we could use data in places other than creating traditional ways of utilizing data that I have learned through my primary education, such as using data to create more information, I realized that the field of data is much broader than that. I have also had no prior experience to coding or programming languages before my education with SNHU, so it was a big learning experience to be introduced to many different languages, though, I am not by any means, a professional, in those languages, I feel like I have gained a very insightful understanding of the field. I also learned how to create portfolios for the work that I have created during my courses.

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

Collaborative Environments: I think that I have been practicing these types of collaborative skills all throughout my education. And it is an important skill to continue to practice, because collaboration is an important factor in different fields. I think I would practice this skill by continuously being open to new ideas and opinions when it comes to my coursework.

Oral, Written and Visual Communications: The specific skills that I will be focusing on for my communication skills are always comparing my written skills against the rubric/requirements that are provided by the course for each assignment.

Computing Solutions: I think that I could practice my computing skills by actively learning instead of passively. To continuously study different computing skills and implementing them into my education will benefit my coursework.

Tools in Computing Practices: Considering that my specific industry is computer science with data analytics, I think it is important to study the different tools and practices that I could implement that can help me better myself, my portfolio and my contributions to the coursework.

Security Mindset: This is the section which I think I can show the most improvement on. I don’t have much expertise in; hence, I have a lot to research and learn about.

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

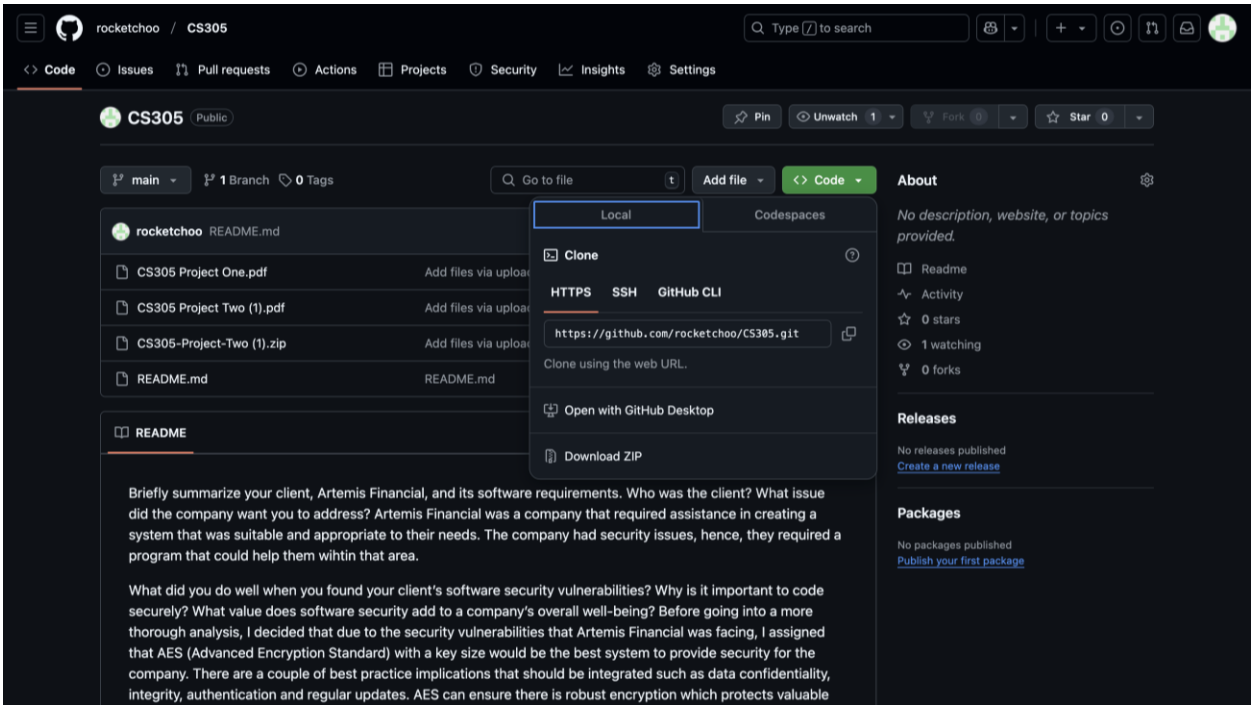
I feel that data analytics and Computer Science can be very analytical and there is a lot to understand, and I feel that it can be really overwhelming. But by applying all of these different mindsets and skills, I would be practicing different areas of expertise in segments to make it less confusing.

- How does this contribute to the specialization you are targeting for your career?

As I have mentioned before, I think that the coursework can be incredibly difficult, hence, making sure that I am able to cover all the different fields in a comprehensive manner is the most important.

ePortfolio Set Up:

- Submit a screen capture of your ePortfolio GitHub Pages home page that clearly shows your URL.



- ***Enhancement Plan:*** Category One: Algorithms and Datastructures
- 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.

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

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

I would want to be able to implement something that I enjoy doing with an artifact that I chose for this project. For example, this project could focus on enhancing client/server book recommendation application. This system would allow the users to create an account, browse books and be able to receive personalized recommendations based on what they have read in the past, what they liked and what they are in the mood for. Enhancements can include real-time notifications (where users receive alerts for new recommendations), improving personalization with a recommendation (by implementing a more collaborative filter algorithm that uses user interactions, it will enhance the personal experiences) and a system that can support many different languages.

Pseudocode:

START

1. Initialize server with REST APIs and WebSocket support

   - Set up endpoints for book search, user profiles, and recommendations

   - Enable persistent WebSocket connections for notifications

2. User Authentication:

- Login or register new users

- Validate credentials and issue JWT for secure communication

3. Recommendation Algorithm:

- Fetch user interaction data (e.g., ratings, reviews)

- Apply collaborative filtering to suggest books based on similar users

4. Real-Time Notifications:

- Push notifications for personalized book recommendations or deals

5. Multi-Language Support:

- Add language preference to user profiles

- Serve localized content based on the selected language

END

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

It will focus on these following skills, that are in connection to the course, CS340; client/server communication will be improved and demonstrated through real-time notifications to show that there are advancements in interactions between the client and the server. There is also the algorithm design where there can be a collaborative filtering system that demonstrates the understanding of complex data-driven solutions and localization where multiple languages are supported to show that it can keep up with the many diverse users. These specific aspects will be supported by designing REST APIs to ensure that interactions are sufficiently supported. The recommendation algorithm can reflect the ability to analyze the data of the users to deliver impactful solutions. And by supporting different languages, it shows that we are an accessible application.

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

With the use of data analytics, I can possibly design and evaluate computing solutions that are able to compute solutions that can solve given problems through using algorithmic principles and different computer science practices and standards to that are appropriate to the issue at hand. Designing a recommendation system which can support both accuracy and computer efficiency is the most important aspect of this system.

Course Outcomes:

- Employ strategies for building collaborative environments that enable diverse audiences to support organizational decision-making in the field of computer science.
- Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts.

- 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.
- 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.
- 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.

Category Two: Software Engineering and Design

- 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.

I will utilize the same artifact as category one, mainly because I can see the great importance in server/client interactions because that is a very big component of many systems. For this category, I could create a project that focuses on improving the relationship of server/user through applications for a restaurant ordering system. While living in a city, especially during peak hours, it can be difficult to get your food out on time due to the high demand. This system would allow customers to be able to place an order in advance through an application that communicates with the restaurant with the orders, inventories and real-time updates. And this can minimize the number of mistakes that can be made with communication. This can be carried out through implementing asynchronous communications to see real-time order status updates and scaling the server, as mentioned before, refactoring the server to a microservices architecture can improve efficiency and any fault on either side.

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

Pseudocode:

START

1. Initialize server with WebSocket support

   - Establish persistent client-server connections

2. Implement authentication:

   - User login sends credentials

   - Server validates and issues JWT

   - Verify JWT for every request

3. Handle client requests:

- Receive and validate order data
- Check inventory in the database
- Update inventory and send acknowledgment

4. Real-time updates:
   - Use WebSocket to push order status to clients
5. Refactor into microservices:
   - Split server into services: User Management, Order Processing, and Inventory
   - Use a service registry for coordination

END

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

Design and development are applied through building real-time communication features and ensuring that interactions are safely secured which can show skills in client/server development. It shows that there are factors of software engineering through different innovative techniques and tools because there will a lot of implementations of technologies like real-time order tracking and cloud-based storage for scalability, this demonstrates finding computing solutions, security and practicing with different tools in computing.

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

Besides what I have mentioned above, I also think that collaborative environments will be beneficial considering that this would have to be developed as a team as the project will emphasize the importance of strategies that involves external teams that require communication.

Category Three: Databases

- 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.

Connecting to my first category answer, I would choose a library book tracking system that can be developed in accordance with IT 145: Foundations in Application Development. This would involve a database that tracks book inventory, borrowers, due dates and files through SQL commands that are carried out by Python. And it would demonstrate skills like CRUB operations and database interactions.

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

Planned Enhancements: expand database features – this would include adding support for tracking many library brances, implementing a reservation system for library users and a fine calculator that will inform the user of their overdue books.

Database Optimization – would introduce indexing on frequently asked questions, books, authors, etc. for more efficient search results.

Pseudocode:

START

1. Patron searches for a book by title or author.

2. Check book availability in the database:

IF book is available:

- Allow patron to reserve the book.

- Update reservation table with patron ID and reservation timestamp.

ELSE:

- Notify patron of unavailability and add them to a waitlist.

END

Integration of Advanced Features – adding real-time notifications to patrons that have due dates.

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

SQL Proficiency because it requires writing complex queries for new features like branch tracking. And Application-Database Interaction would require strengthening skills in integrating Python with a database

like MySQL. Data Optimization would require indexing and normalization techniques to optimize performance with the multi-branch operations.

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

Designing and evaluating computing solutions that solve a given problem using algorithmic principles and computer science practices & 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.

ePortfolio Overall Skill Set

- Accurately describe the skill set to be illustrated by the ePortfolio overall.
- Skills and outcomes planned to be illustrated in the code review

The ePortfolio will go through skills that focus specifically on application development, database management, and problem-solving skills to show that there are many skills and abilities applied in more real-world software solutions.

- Skills and outcomes planned to be illustrated in the narratives

Efficient SQL queries for managing library branches, reservations, fines etc. There will be code integrations between Python and the database for maximum efficiency.

- Skills and outcomes planned to be illustrated in the professional self-assessment

Thinking and being able to explain how these enhancements can actually impact real-life issues, such as managing branch chains and automating processes.