# CS 499 Module One Assignment

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

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

I've been in the Computer Science program since 2023, so I've been studying for roughly two years. This trip has been a huge transition for me, as I previously studied health sciences and dentistry before pursuing a career in computer technology. The transition was difficult at first, but I eventually obtained vital knowledge and abilities that helped me navigate this new path in life.

Throughout schooling, I learned how to structure and organize software, optimize performance to handle information efficiently, and apply data security measures. These abilities are crucial in today's modern environment, and I feel they will help me as I seek a career in [Software Development / Data Engineering / Cybersecurity].

For my final project, I will improve my Animal Shelter Dashboard from CS-340: Advanced Programming Concepts. This initiative was originally intended to help an animal shelter manage its available pets by allowing people to search for specific animals. By upgrading this project, I will demonstrate my abilities to create structured, efficient, and safe software systems, all of which are required for success in the technology business. These enhancements will help me prepare for my future profession by demonstrating my ability to create dependable and scalable systems.

# ePortfolio Set Up:

A screenshot of a computer

AI-generated content may be incorrect.

https://github.com/harrielle/CS-340-Module-Eight

# 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 Animal Shelter Dashboard from CS-340 was created to help an animal shelter track and manage pet information. However, the current structure makes it difficult to update and maintain. To improve this, I plan to organize the project more effectively by making the code easier to read, modify, and scale in the future. Another key enhancement will be adding security measures to user accounts, ensuring that only authorized individuals can access and modify certain parts of the system. This will help protect sensitive data and prevent unauthorized access. By making these changes, I will demonstrate my ability to design structured, maintainable, and secure software, which aligns with best practices in the industry.

*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.*

*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.*

Improving my Animal Shelter Dashboard will, in my opinion, increase its efficacy, usability, and security. The project is functioning now, but I believe it might be a lot more well-planned and effective. Improving the system's structure to make it simpler to update and maintain is one of the key adjustments I intend to make. I'll carefully review the code, remove any extraneous portions, and rearrange it to make it flow more naturally. To help people locate animals more quickly and without having to wait a long time for results, I also intend to enhance the way the system manages searches. Ensuring the appropriate protection of user information and shelter data is another crucial improvement I wish to concentrate on. The system is currently unrestrictedly accessible to everybody, which is unsafe. A login mechanism, in my opinion, will guarantee that only authorized users are able to make significant modifications. Finally, I want to enhance the project's data storage. I want to make sure the shelter doesn't lose any crucial information in the event of an emergency. By implementing these changes, I think my project will not only work more effectively but also show that I can write secure, effective, and well-organized software that can be applied in practical settings.

* + 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.*

I think my improvements to the Animal Shelter Dashboard will show that I can boost security, optimize efficiency, and improve software structure. Putting security measures in place to safeguard sensitive shelter data is the most crucial ability I will demonstrate. There are currently no access controls on the system, which could result in unlawful modifications. I will show that I can recognize security threats and put preventative measures in place by implementing a user authentication system that will guarantee that only authorized users can alter data. I'll also show that I can safeguard data and stop loss by implementing an automated backup system. This will guarantee that the shelter's records are preserved in the event of a problem. Enhancing the system's ability to retrieve and process search requests will also demonstrate my capacity to maximize performance, making the application more user-friendly and quicker. These abilities will demonstrate my capacity to develop software that is not just useful but also safe, effective, and dependable.

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

***Selected Course Outcome:***

***"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."***

Since protecting important shelter data and avoiding unwanted access are my top priorities, this result best suits my intended improvements. Only authorized users will be able to edit records thanks to the user authentication mechanism, shielding the shelter's data from possible abuse. By ensuring that data is never lost forever, the backup system will provide an additional degree of protection. By guaranteeing that the system is safe from attacks, data is secure, and privacy is upheld, these improvements are in complete harmony with this course objective.

* 1. **Category Two:** Algorithms and Data Structures

1. ***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 have selected my Animal Shelter Dashboard project from CS-340: Advanced Programming Concepts for this category. The original purpose of this project was to store, retrieve, and display animal data in order to assist an animal shelter in managing its available pets. The option for users to look for certain animals depending on breed, age, and availability is one of the project's primary features. The project's search and filtering procedure is currently not optimized, which could cause the system to lag as more animals are added to the database. Users may find it more difficult to locate what they're seeking for as a result of this inefficiency. In order to improve this, I intend to optimize the way data is retrieved and displayed in order to improve the way the system handles search queries. By enhancing this project component, I will show that I can evaluate and improve algorithms to increase the system's scalability and efficiency. Regardless of the quantity of records kept in the database, the objective is to guarantee that searches yield correct and timely outcomes.

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

Enhancing the Animal Shelter Dashboard's processing and retrieval of search results will, in my opinion, increase the system's effectiveness and usability. As the database expands, delays may occur since the system currently retrieves all records that are accessible before filtering them when users search for animals. I intend to improve this by streamlining the search and filtering procedure to ensure that only the most pertinent information is obtained, cutting down on wait times and boosting responsiveness. Making searches faster by improving the way the system queries the database is one of the primary enhancements I will concentrate on. The system will only retrieve records that meet the search criteria, rather than retrieving all the data first and then filtering it. As a result, customers will receive results considerably more quickly, even as the shelter's database grows. Additionally, by cutting down on pointless work, I will decrease redundant searches, which will improve system efficiency.

Changing the system's data organization to improve retrieval is another improvement I intend to make. Because they do not currently prioritize frequently searched categories like breed, age, or adoption status, searches may take longer. I think I can improve search responsiveness and guarantee people receive the information they require promptly by reorganizing the way data is stored and accessible.These enhancements will show my capacity to assess an issue, provide a well-thought-out solution, and carry it out successfully. I will demonstrate my ability to improve software performance while maintaining scalability for future expansion by streamlining the system's information processing.

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.*

My capacity to create effective computing solutions by enhancing the system's retrieval and processing of search results is one of the primary abilities I will showcase with this improvement. The system may become slower as more entries are uploaded because the search function currently retrieves all data before filtering. Optimizing the database's retrieval of pertinent data will demonstrate my capacity to identify inefficiencies and put performance-enhancing fixes in place. I will also show off my ability to cut down on redundant processing by making sure the system doesn't keep looking for the same data, which will speed up and improve the efficiency of the process as a whole.I'll also point out my aptitude for data organization for improved retrieval. I will prioritize frequently searched categories like breed and adoption status to ensure users receive more accurate and timely results. This will demonstrate my comprehension of how data organization affects user experience and system performance. By making these improvements, I will show that I can assess software performance, pinpoint problem areas, and make adjustments that result in a quicker and more effective system.

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

**"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 result is the most appropriate for my intended improvement since I am creating a more effective algorithm for data retrieval, which will improve the way the Animal Shelter Dashboard handles search requests. By optimizing the way search queries are processed, I will demonstrate my ability to develop a scalable, well-organized solution that boosts efficiency. In order to ensure that consumers receive timely and pertinent search results without overtaxing the system, I will also showcase my ability to strike a balance between accuracy and efficiency when making design decisions. I will demonstrate my ability to assess a current computing solution, improve its algorithmic approach, and construct an enhanced version that improves speed and usability by coordinating my modification with this course outcome.

* 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.*

I have chosen my Animal Shelter Dashboard project from CS-340: Advanced Programming Concepts for this category. This project was created to efficiently save, retrieve, and display data in order to assist an animal shelter in managing the animals that are now available. Users can look for certain pets depending on breed, age, and availability thanks to the system's connection to a MongoDB database, which houses all animal records.

Although the current database configuration is functional, it is devoid of appropriate security protocols and a contingency plan. Important shelter records could currently be altered without authorization by anyone with access to the system. Furthermore, there is no backup to restore lost data in the event that the database malfunctions or is inadvertently erased. I intend to strengthen database security for this project by incorporating user authentication procedures and putting in place a backup system to guarantee that important data is constantly safeguarded. My capacity to manage database integrity, security, and efficiency will be demonstrated by these improvements, which will make the Animal Shelter Dashboard more robust, dependable, and secure.

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

I believe that improving the database security and backup system of the Animal Shelter Dashboard will improve system reliability and ensure that all shelter data is protected. Although all animal records are now kept in the database, there are no strong security measures in place to prevent unauthorized access. Should someone gain access, they might change or delete important information, which could cause problems for the shelter. Additionally, in the event of a database failure, all data could be lost because there is currently no backup option for the system. I intend to apply user authentication to improve the database by limiting access to and modification of records to authorized users. This will entail implementing a role-based access system, in which regular users have restricted access and administrators have complete authority. In order for the database to periodically save copies of its data, I also want to put up an automated backup mechanism.

In this manner, the shelter can restore lost data rather than beginning from scratch in the event of an emergency. The system will be more robust and secure as a result of these improvements, allowing the shelter to securely maintain its animal records without worrying about data loss or illegal alterations. This will show that I can deal with datgabases in a way that enhances data integrity, securityThis will show that I can deal with databases in a way that enhances data integrity, security, and dependability.

* + 1. *Explain how the planned enhancement will* ***demonstrate*** *specific* ***skills*** *and align with course outcomes.*

The Animal Shelter Dashboard will be enhanced with an automated backup system, role-based access control (RBAC), and user authentication to increase database security and data dependability. These improvements will guard against data loss in the event of system failures and guarantee that only authorized users can alter sensitive data. Setting up frequent database backups will show that I can create fail-safe procedures that maintain data integrity, and putting strong authentication into practice will show that I can design secure systems that protect sensitive information. The system will continue to be dependable and safe thanks to these enhancements, which are in line with best practices in database administration and cybersecurity.

* + - 1. *Identify and describe the specific skills you will demonstrate that align with the course outcome.*

My ability to secure a database system by limiting access using role-based access control and user authentication will be one of the main abilities I showcase. This will lower the possibility of malicious changes or unintentional data loss by guaranteeing that only authorized staff can update or remove animal entries. I'll also point out my ability to put in place a systematic backup strategy, which makes sure that all documents are consistently saved and accessible in case of need. This will demonstrate my knowledge of disaster recovery planning and database resilience. I'll show how I can use data validation and error handling strategies to keep systems from crashing and make sure that only legitimate data is saved. These improvements will strengthen my capacity to create database systems that put dependability, efficiency, and security first.

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

**"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."**

Since I am concentrating on protecting sensitive shelter records and guaranteeing data integrity, this course outcome directly relates to the improvements I intend to make. I will reduce the risks of unwanted access and possible data loss by putting backup and authentication measures in place. These enhancements will demonstrate my capacity to recognize security flaws, foresee risks, and put workable solutions in place to fortify the database system.

# 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*

By concentrating on three crucial areas—software design and engineering, algorithms and data structures, and databases—the ePortfolio will demonstrate my capacity to create, develop, and improve software solutions. With these improvements, I will show that I am capable of structuring and streamlining code, increasing the effectiveness of data processing, and putting security measures in place to safeguard private data. My work will demonstrate critical thinking, problem-solving, and flexibility—all of which are crucial in the computer science industry. My technological development and ability to apply industry best practices to practical applications will be professionally represented by my portfolio.

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

The code review will demonstrate my ability to analyze an existing system, identify areas for improvement, and implement structured solutions. By reviewing my Animal Shelter Dashboard, I will showcase my understanding of code organization, best practices, and security vulnerabilities. I will highlight the changes I made to improve efficiency, readability, and maintainability while ensuring the system remains functional and scalable. The review will also illustrate my ability to explain technical decisions clearly, showing that I can assess and refine software to meet industry standards. The narratives will give insight into my approach to problem-solving by outlining the rationale behind each improvement. I will show that I may assess system performance, optimize algorithms, and apply security measures using these reflections. Every improvement shall be supported by a detailed justification of how it advances the system and conforms to industry best practices. The narratives will also demonstrate my proficiency in effectively conveying technical ideas, making my work understandable to a wide range of people, including developers, stakeholders, and potential employers.

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

The professional self-assessment will provide an overview of my development and achievements during the course of the Computer Science degree. It will demonstrate how my studies have aided in the development of my technical proficiency in database administration, data structures, and software architecture. The self-evaluation will also show how well I can overcome obstacles, adjust to novel ideas, and put industry-relevant solutions into practice. This component will act as a personal assessment of how well my abilities match industry standards and career objectives, indicating my preparedness for positions in the technology sector.  
  
**POSSIBLE PSEUDOCODE**

BEGIN

// Step 1: Analyze Current Database

CONNECT to Animal Shelter Database

CHECK current authentication setup

CHECK current search performance

CHECK if database backup system exists

// Step 2: Implement User Authentication

IF user attempts to log in THEN

CHECK username and password against stored credentials

IF credentials are valid THEN

GRANT access based on user role

ELSE

DENY access

END IF

// Step 3: Optimize Search & Filtering

IF user searches for an animal THEN

APPLY optimized query to fetch only required records

SORT results based on relevance

DISPLAY filtered results

END IF

// Step 4: Implement Automated Backup

SCHEDULE backup process to run daily

IF database changes detected THEN

SAVE a copy of database records

STORE backup in secure location

END IF

// Step 5: Validate & Deploy Enhancements

TEST authentication to ensure only valid users access system

TEST search queries to confirm faster retrieval

TEST backup system by simulating data loss

IF all tests pass THEN

DEPLOY updates to live system

ELSE

FIX errors and retest

END IF

END