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CS 499 Capstone

Module 5 Journal

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Selected Trends: Cybersecurity and Cloud Computing

Cybersecurity is a big deal right now because more and more personal and private data is being shared online. That also means there's a bigger chance of people getting hacked, having their info stolen, or getting caught in some kind of data breach. This trend is making developers start thinking about security from the beginning instead of waiting until the end. Even though my capstone project was not focused just on cybersecurity, I still removed the hardcoded credentials and used environment variables instead. I also added error handling so that if the database connection fails, the app will not crash. These are small changes, but they make the app more stable and safer, which ties into how important cybersecurity is now.

Cloud computing is the second trend I picked because it keeps changing how apps are built. Instead of running everything on your own machine, you can now use cloud tools to run code and store data from anywhere. That makes things way easier and faster to work with. In my project, I stopped using Mongo shell and started using MongoDB Compass instead, which connects to a cloud-based database. I also took the time to organize all my database code into a class, so it is cleaner and easier to manage. I do not know exactly what kind of job I want yet, but I know I like backend work and dealing with data, so learning more about cloud computing definitely helps me move in that direction.

Course Outcomes and How I Met Them:

**1. Employ strategies for building collaborative environments that enable diverse audiences to support organizational decision-making in the field of computer science.**  
Working on the project enhancements, I made sure to keep the code clean, organized, and easy to understand. I used folders like controllers, models, and assets to separate parts of the project, which makes it easier for someone else to follow, contribute, or build on later.

**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.**  
I created a walkthrough code Video for my ePortfolio that explains how my dashboard works, what features I added, and what improvements I made. After receiving feedback from my instructor, I re-recorded the video to make it clearer and more organized. I also updated my README file with step-by-step setup instructions and included comments throughout my code to help others understand how everything works.

**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.**  
I improved the filtering logic in my Dash app by combining repeated code into one shared function. I also added input validation using regex so the filters would work better with flexible input. These changes made the code more efficient and helped reduce errors.

**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.**  
I moved away from using Jupyter Notebook and developed my enhanced version of the project using Visual Studio Code. I used Dash to build the dashboard, pandas for data handling, and MongoDB Compass instead of shell commands to manage my database visually. I also refactored the database code into a class to make it more organized and easier to maintain. These tools and improvements made the project more realistic and professional.

**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.**  
I removed hardcoded credentials from my code and stored them in a .env file using python-dotenv. I also added error handling to prevent the app from crashing if the database connection fails. These updates made the project safer and more stable.

**Part 2- Status on Enhancements**

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| --- | --- | --- | --- |
| **Checkpoint** | **Software Design and Engineering** | ***Algorithms and Data Structures*** | ***Databases*** |
| **Name of Artifact Used** | ***Origin:*** *CS 340 Client server development*  ***Artifact Name :*** *Animal Shelter Dashboard*  (Jupyter Notebook and Python) | **Origin:** CS 340 Client server development  **Artifact Name :** Animal Shelter Dashboard    (Filtering Logic and Search Code) | **Origin:** CS 340 Client server development  **Artifact Name :** Animal Shelter Dashboard  (MongoDB CRUD Integration) |
| ***Status of* Initial *Enhancement*** | hardcoded credentials, print statements, lack of modular design | Identified logic repetition in rescue filters and limited input checking | Identified use of Mongo Shell only, direct connection without validation |
| ***Submission Status*** | Submitted | Submitted | Submitted |
| ***Status of Final Enhancement*** | Feedback was applied on my narrative, and the final polish was applied; Replaced hardcoded credentials with environment variables, used logging instead of print, modularized settings into files | Feedback applied to my narrative, Combined all rescue filter logic into one method, added input validation, used regex for flexible matching | Migrated from Mongo Shell to MongoDB Compass, modularized DB operations into classes, added safe connection handling |
| ***Uploaded to ePortfolio*** | Uploaded revised Code review from Instructor Feedback (redone the video and posted ) | Uploaded but still refining it daily for missing info or errors | Uploaded but still refining it daily for missing info needed |
| **Status of Finalized ePortfolio** | Done | Almost complete but it uploaded to ePortfolio | Almost complete but it uploaded to ePortfolio |