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CS 499 Capstone

Southern New Hampshire University

Final Project Module 7

“Self-Assessment Narrative”

August 8, 2025

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**Self-Assessment**

**Program Reflection**I am proud to be completing my Bachelor of Science in Computer Science at Southern New Hampshire University. Over the course of the program, I progressed from learning how to write basic code to becoming a developer capable of designing and building secure, modular, full-stack applications. Through project-based learning, I gained practical experience with database integration, RESTful APIs, and user interface development using tools like Dash and Flask. I also learned how to apply version control, secure coding practices, and professional documentation standards to deliver real-world software solutions.

While I am still figuring out exactly which path I want to take, I feel confident in the skills I have gained and excited for what comes next. I am especially interested in backend development and working with databases, and I am looking forward to applying these skills in a professional role. At the same time, I plan to keep learning and growing by exploring more advanced topics and continuing to improve as a developer.

**Skills Learned While Attending School**

***Technical Skills***

* Programming Languages: Python, Java, JavaScript
* Web Development: Dash, Flask, Node.js, Express
* Database Management: MongoDB (Compass & Shell), MySQL, Mongoose
* Data Handling: pandas, NumPy, CSV/JSON parsing
* Data Visualization: Plotly, Dash, Power BI
* API Development: RESTful API design, CRUD operations
* Version Control: Git and GitHub
* Testing & Debugging: Postman, Python logging, console debugging
* **Development Tools: VS Code, Android Studio, MongoDB Compass**

***Professional Skills***

* Modular software design (MVC pattern)
* Secure coding using environment variables and .env files
* Writing clean, well-documented, and reusable code
* Independent project planning and execution
* Agile-style task management and iteration
* Communicating technical concepts clearly
* Problem-solving through algorithmic thinking
* Creating user-friendly, accessible applications

**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.**

* Met through modular code structure, clear documentation, and organized folders to support team understanding.  
  In my Capstone, I structured the project into separate model, controller, and view files to clearly organize each function. I used descriptive naming conventions and inline comments so any collaborator could pick up where I left off without guessing the purpose of a file or function. My README and enhancement documentation explain setup and usage in plain terms so that even someone new to the project could get it running. I also kept my file organization consistent, so everything has a logical place, making it easier for others to troubleshoot, extend, or adapt the code later.

1. **Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts.**

* Met through README files, .md pages, inline comments, and a narrated video code walkthrough.  
  My enhancement documentation includes markdown files for each improvement category, a narrated code review video, and multiple screenshots of the updated features. I made sure all the materials had the same formatting style and were easy to follow, no matter the reader’s background. I avoided overly technical jargon in key summaries, so the information stayed accessible, but I also included technical explanations for those who wanted more detail. The video walkthrough allowed me to talk through the logic step-by-step and show the results visually, which is helpful for people like me who learn better by seeing the code in action.

1. **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.**

* Met through refactored filtering logic, modular callback design, and efficient pandas usage.  
  I optimized the filtering logic for breed and color selections using vectorized operations like .isin() and .between() in pandas, which reduced processing time and made the code cleaner. I eliminated repetitive filter logic by moving it into one reusable function and added conditional checks for special cases. This made the code easier to maintain while keeping it flexible for future updates. I weighed performance against readability and found a way to achieve both, which is important for long-term project health.

1. **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.**

* Met through use of VS Code, MongoDB Compass, Dash, and .env for secure, modern development.  
  I used modern tools such as VS Code and MongoDB Compass to design a working animal shelter dashboard. I employed python-dotenv to load credentials securely and used Dash for building a responsive data-driven web interface. I also implemented logging and exception handling to create a maintainable and production-ready application. These practices not only made the project more professional but also more reliable for real-world use.

1. **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.**

* Met through .env integration, removal of hardcoded credentials, and safe DB connection handling.  
  I replaced hardcoded MongoDB credentials with environment variables stored in a .env file, which prevents sensitive data from being exposed in the source code. I also ensured that database connections are opened and closed properly, and I wrapped all database interactions in try-except-finally blocks to handle errors safely. This prevents the application from crashing unexpectedly and reduces the risk of leaving open database sessions. These changes protect the integrity of the data and align with secure coding practices.

**Personal Growth**Throughout the CS program and this Capstone, I learned how to take a project from concept to deployment using real development workflows. I strengthened my problem-solving and debugging skills, and I developed a professional approach to security, version control, and application structure. As the assignments progressed week by week, I began to see how the course outcomes connected and built upon each other. This made it clear how I was able to meet all five outcomes through my work in the Capstone. I feel more confident tackling development tasks with industry tools and techniques, and I feel more confident to continue learning and growing as I move forward in my career. I am ready to contribute to backend and data-driven software teams.