CS-499-18349-M01 Computer Science Capstone 2025

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Milestone 2 (Enhancement One): Software Design

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**Milestone 2 (Enhancement One) – Software Design:**

The Grazios Rescue System is a comprehensive Node.js application I developed to manage animal rescue operations. Originally created in early 2023 as part of a database management course, the system facilitates tracking of rescued animals, their medical records, training programs, and staff assignments. The application was initially functional but lacked proper documentation and contained numerous debug console logs that cluttered the codebase, making it difficult for other developers to understand and maintain.

I selected this artifact for my ePortfolio because it demonstrates my ability to architect a complete MVC (Model-View-Controller) backend system using modern JavaScript practices while showcasing my proficiency with MongoDB, Express, and RESTful API design. The system's complexity—handling different animal types through inheritance models, managing interconnected training and medical systems, and implementing proper authentication—exemplifies my capability to design comprehensive solutions for multifaceted business requirements. My enhancement process focused on transforming the codebase into a professionally documented project following industry best practices. I systematically added JSDoc documentation to all files, clarifying the purpose of each module, class, and method while documenting parameters, return values, and potential errors. I removed hundreds of diagnostic console logs that were originally used for debugging, streamlining the code for production readiness. Additionally, I restructured some components to improve maintainability, particularly in the validation middleware where I resolved static class property issues that were causing runtime errors.

This enhancement directly addressed the course outcomes I planned to meet, particularly demonstrating my ability to "employ strategies for building collaborative environments that enable diverse audiences to support organizational decision making" through code documentation that makes the system accessible to new team members. The improved code organization and thorough documentation support the outcome of designing and evaluating computing solutions that solve a given problem using algorithmic principles. One area where I expanded beyond my initial outcome plans was in security implementation—through this enhancement process, I identified and addressed potential security vulnerabilities in the authentication system and database connection handling.

The enhancement process proved to be more enlightening than I anticipated. As I documented each component, I gained a deeper understanding of how the entire system interconnects and discovered opportunities for architectural improvements. One significant challenge was deciding the appropriate level of documentation detail—too little would fail to provide adequate guidance, while too much would create maintenance overhead. I learned that effective documentation should explain not just what code does but why certain design decisions were made. The most challenging aspect was refactoring the validation middleware, which required understanding static class property behavior across different JavaScript engines. This reinforced how important it is to consider cross-environment compatibility when building production systems. Through this process, I've developed a more disciplined approach to documentation that I now implement from the beginning of projects rather than as an afterthought. This enhanced Grazios Rescue System stands as evidence of my commitment to creating not just functional software, but professionally maintainable code that supports team collaboration and long-term system evolution.