**Jeanelyn Roman**

**CS-499 Computer Science Capstone**

**Dr. Troy Hawk**

**Professional Self-Assessment**

My name is Jeanelyn Roman, and this portfolio represents the culmination of my Bachelor of Science in Computer Science at Southern New Hampshire University. Throughout my coursework, I have built technical expertise in software engineering, algorithms and data structures, databases, testing, and security, while also strengthening my professional communication and collaboration skills. This ePortfolio showcases three enhanced artifacts that demonstrate my growth and readiness to succeed in the software development industry.

The artifacts I selected represent the three core areas of computer science:

* **Software Design & Engineering:** My CS-330 OpenGL 3D Scene enhancement demonstrates my ability to design, structure, and improve complex graphical applications while following best practices for maintainable code.
* **Algorithms & Data Structures:** My CS-320 Unit Testing Suite enhancement highlights my understanding of test-driven development, data-driven testing, and the use of structured test cases to ensure software reliability.
* **Databases:** My CS-465 Full Stack Database Project enhancement showcases my skills in backend development, MongoDB schema design, validation, and secure data handling.

Through these enhancements, I have shown that I can collaborate effectively by incorporating feedback into stronger designs, apply algorithmic principles to make projects faster and more reliable, and build secure databases that follow industry standards. I have also learned how to identify and mitigate security risks early in the development process and create clean code and documentation that can be understood by both technical and non-technical audiences. Completing this program has prepared me to contribute to real-world projects, and my goal is to continue building useful, innovative applications by applying my skills in full-stack development, software engineering, and emerging technologies.

**Artifact Narrative 1 – Software Design & Engineering**

**Artifact: CS-330 OpenGL 3D Scene**

For this project, I enhanced the original 3D scene by adding Phong lighting for more realistic shading, applying texture mapping with *stb\_image.h*, and reorganizing the scene management structure to make the code modular and easier to expand. I also improved inline comments and updated the README to ensure the project could be more easily understood and maintained by other developers. Along the way, I tackled challenges such as shader implementation and dependency path issues, resolving them through careful debugging and feedback integration. These improvements not only strengthened the technical quality of the project but also aligned with key course outcomes by demonstrating solid software design practices, applying a security mindset through file validation and error handling, and enhancing communication through clear documentation. Together, these enhancements show my growth in both technical skill and professional development, producing a polished artifact that balances functionality, maintainability, and reliability.

**Artifact Narrative 2 – Algorithms & Data Structures**

**Artifact: CS-320 Unit Testing Suite**

For this project, I enhanced the original unit testing suite by adding negative test cases, introducing data-driven testing with CSV files, and improving overall test coverage to make the suite more reliable. I also reorganized the test structure to make it easier to read, maintain, and extend in future iterations. One of the main challenges was creating negative tests that were meaningful and revealed weak points in the system, which required me to think through edge cases and anticipate real-world errors. Using external data files allowed me to run multiple scenarios without duplicating code, making the testing process more efficient and scalable. These changes not only strengthened the accuracy of the tests but also aligned with key course outcomes by demonstrating how structured algorithms can validate data handling, applying a security mindset through invalid input testing, and improving collaboration by documenting the suite clearly so it could be expanded by others. Altogether, these enhancements transformed a simple test collection into a more professional, reliable, and maintainable testing framework.

**Artifact Narrative 3 – Databases**

**Artifact: CS-465 Full Stack Database Project**

For this project, I enhanced the *travlr.js* Mongoose model by adding field-level validation to enforce data integrity, cleaning up the schema for better readability, and including detailed comments so future developers could easily maintain it. I also strengthened the backend by ensuring it handled invalid or malicious inputs securely, reducing the risk of injection attacks and other vulnerabilities. One of the main challenges was tightening the validation rules without breaking the existing frontend, so I ran extensive API tests to confirm everything worked smoothly across the stack. Feedback from earlier milestones guided me in refining field types and clarifying error messages, which improved both usability and reliability. These enhancements not only made the schema more professional and secure but also demonstrated my ability to design and validate a MongoDB database that meets application requirements, apply a strong security mindset with server-side validation, and communicate effectively by documenting the model for future maintainers.