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CS-499
Milestone Two

Enhancement One: Software Design/Engineering

This artifact project is a cohesive software development and data analysis package centered on animal shelter outcomes. It brings together Python scripts and Jupyter notebooks to process, analyze, and visualize real-world data from an animal shelter, using the primary dataset found in "aac_shelter_outcomes.csv." The project features a Jupyter notebook for interactive data exploration and visualization, a Python script containing essential backend logic, and another script dedicated to implementing Create, Read, Update, and Delete (CRUD) operations for robust data management. Testing of these operations is handled in a separate notebook to ensure reliability and correctness. Additionally, a logo image is included to enhance the professional presentation of reports and dashboards. Collectively, these artifacts demonstrate a complete workflow from data ingestion and backend logic to analysis, testing, and presentation, highlighting strong skills in Python programming, data analysis, software testing, and project presentation.

I selected this artifact for my ePortfolio because it represents a comprehensive example of my ability to design, enhance, and maintain a real-world software application. This artifact demonstrates my skills in backend development, data validation, and robust error handling. Specifically, I enhanced the project by implementing schema validation using JSON, which ensures that all incoming data adheres to a defined structure before being processed. This not only improves data integrity but also makes the application more resilient to malformed input. Additionally, I integrated structured logging using Python’s logging module, which provides clear, timestamped logs for all major operations and errors. This enhancement greatly improves the maintainability and debuggability of the application, making it easier to monitor and troubleshoot in production environments.

Enhancing particularly the main.py file taught me the importance of anticipating and handling invalid data early in the processing pipeline. Implementing JSON schema validation required me to carefully define the expected data structure and handle validation errors gracefully. Integrating the logging module also deepened my understanding of how structured logs can be used for both debugging and monitoring application health. One challenge I faced was ensuring that logging did not expose sensitive information while still providing enough detail for troubleshooting. Another challenge was designing the schema to be flexible enough for future changes without sacrificing strictness. Overall, these enhancements improved both the reliability and maintainability of the application, and the process reinforced the value of iterative improvement in software engineering.