**CS 499 Milestone Two: Software Design/Engineering Enhancement**

**Artifact Description**: The chosen artifact for this milestone is the Animal Shelter Dashboard project. It is a final project od CS-340, this project is web-based dashboard developed using dash, python libraires like pandas, matplotlib and database such as MongoDB. Using python libraries, I developed interactive interface for users to filter animals data by species, visualizing the breed distribution in a pie chart and viewing the location of animals on interactive map. The dashboard easily helps to see the management of animal shelter records, decision making regarding animal care and adoption done by animal shelter management team.

**Justification for Inclusion in eportfolio**:

The main reason to choose this artifact in my eprotfolio because it demonstrates my technical skills in software design and engineering, full stack development and deep knowledge of MongoDB. Some key aspects that highlight my software development abilities are as below:

1. Web Application Development: Developing a Functional and user-friendly interactive dashboard with Dash that shows technical skills in frontend-backend integration.
2. Software Engineering Principles: Reusable Implementing modular and efficient code on the best practices.
3. Interactive Visualization: Using Pandas Libraries such as plotly, made interactive dashboard and utilizing it for dynamic data representation, highlighting my skill and capability to show data insights more effectively.
4. **Data Processing: Demonstrating proficiency in handling structured and semi-structured data and using pandas for data manipulation.**
5. **Backend Integration: Using NOSQL database such as MongoDB showcasing database design, integration and querying with a web application.**

**All these key aspects made to the artifact further strengthen inclusion in my eprotfolio by refining its performance, usability and functionality.**

**Enhancements and Improvements:**

**In the beginning Module one, I planned specific enhancements to improve the software design and engineering aspects of the project. Some modifications were implemented:**

1. Optimizing Database: To ensure data consistency adding schema validation. To handle larger datasets efficiently indexing and querying performance in MongoDB.
2. Error Handling and Optimizing Performance: To reduce computational overhead and enhance responsiveness optimizing callback functions. For database connection and API request integrating exception handling for database connections.
3. Data Visualization: Adding more chats (bar charts) to provide ore insights into shelter data. Better color schemas and tooltips for better readability with enhancing the pie chart.
4. UI Enhancements: Worked on additional filter options for better data navigation. Figuring and improving layouts and responsiveness of the dashboard using dash components.

**Achievement of Course Outcomes**:

1. The proper documentation, refined UI shows my ability to design clear and meaningful software.
2. Optimizing UI responsiveness and Optimizing databases involves balancing performance and usability considerations.
3. Restructured or improved software demonstrates ability to create efficient, scalable and user-friendly applications.

**Reflection on the Enhancement Process:**

1. **Data visualization Improvement: To improve interactivity in visual elements choosing appropriate color schemas and enhancing user experience.**
2. **Database Optimization: Efficient data retrieval requires learning about MongoDB indexing and aggregation pipelines. To maintain integrity schema validation is requires but it even requires more development effort.**
3. **Frontend and backend Coordination: To handle user interaction smoothly optimizing interactive components. To implement UI elements in dash requires careful callback management to avoid performance bottlenecks.**

**To sum-up, this milestone strengthened my understanding in database, full stack development and reinforced my ability to develop efficient, user-friendly and efficient software solutions. This will improve quality of the artifacts for my eportfolio, demonstrating all my technical skills in software design and engineering.**