**CS 499 Milestone Four Narrative: Databases**  
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**Artifact Description**

The artifact I selected for the Databases category is a MongoDB CRUD module from the Animal Shelter project, originally created for Grazioso Salvare. This project supports an animal rescue organization by analyzing shelter data from the Austin Animal Center. The purpose of the project was to identify dogs suitable for specialized rescue training by filtering and interacting with data stored in a MongoDB NoSQL database. The original version included a basic connection to the database and limited filtering functions.

**Justification for Inclusion**

I chose this artifact because it highlights my skills in working with a real-world, document-based database using Python and PyMongo. The enhancements I made for this milestone focused on expanding the functionality of the CRUD module to include the full range of Create, Read, Update, and Delete operations, all with robust error handling, dynamic queries, and user input validation. I also added better documentation and modularized the code into distinct functions to improve readability and maintainability.

This artifact demonstrates my ability to design, build, and manage a MongoDB-based system, which is an essential skill for many modern development roles. It also reflects my understanding of how to structure data access logic, validate user input, and maintain clean data interactions—skills that are directly transferable to industry settings.

**Course Outcomes and Updates**

This enhancement directly supports the following CS program outcome:

*"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."*

By enhancing the database component of the Animal Shelter project, I’ve strengthened my technical foundation in NoSQL database development. I’ve also improved my ability to communicate complex technical functionality clearly through structured documentation. This meets the outcome I planned to target in Module One. At this point, I have no updates to my outcome-coverage plans.

**Reflection on the Enhancement Process**

Throughout this enhancement, I learned the value of modularizing code when working with databases. I refactored the CRUD operations into reusable functions that accept flexible query parameters, making the code easier to scale and reuse. I also implemented user-friendly error messages and input checks to prevent issues like malformed queries or missing fields, which are common challenges in working with NoSQL databases.

One of the most rewarding parts of the enhancement was implementing the “Update” and “Delete” functions safely. I learned how to avoid destructive operations by validating that a document exists before modifying or removing it. This process helped me develop a security-first mindset while working with persistent data.

Another challenge was designing an intuitive and efficient way to display query results and enable dynamic filtering. I solved this by creating a helper function that lets users search for animals based on multiple traits (e.g., breed, age, or outcome type), which helped simulate real-world use cases for staff members at a rescue organization.

In the end, this enhancement gave me a deeper appreciation for the power and flexibility of MongoDB, and how to use it responsibly in a professional application. It also reaffirmed how much good design and thoughtful implementation matter when it comes to database interactions, especially in real-world systems that deal with sensitive or mission-critical information.