# CS 499 Milestone Four – Database Enhancement Narrative (Grazioso Salvare)

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Course: CS-499 Computer Science Capstone  
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## Artifact Description

The selected artifact for this milestone is the Grazioso Salvare MongoDB CRUD and Dash Application, originally developed in CS 340: Client/Server Development. This project showcases my ability to design, implement, and manage database-driven applications using MongoDB as the core database system. The artifact was first created to manage and visualize animal rescue data through CRUD operations and a web-based dashboard built with Python Dash. It includes database authentication, query filtering, and interactive visualization features that demonstrate a complete data lifecycle—from data creation and retrieval to analysis and display.

## Justification for Inclusion

This artifact was selected for inclusion in my ePortfolio because it best represents my skills in database development, data manipulation, and secure client-server integration. Enhancements made for this milestone focused on improving data performance, implementing proper user authentication, and optimizing MongoDB queries for faster data retrieval. I also refined error handling for data access and integrated input validation to enhance data integrity. These updates transformed the project from a functional prototype into a production-ready data solution that adheres to professional standards. This project directly aligns with the database category of the capstone because it demonstrates my ability to implement secure, efficient, and scalable data systems that support real-world decision-making.

## Course Outcomes Met

Through this enhancement, I have met multiple program outcomes, including the ability to design and evaluate computing solutions using algorithmic principles, apply innovative techniques in database implementation, and maintain a security-first mindset in system design. Specifically, this milestone aligns with Outcome Four: '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.' Additionally, it contributes to Outcome Five by reinforcing a security mindset through the implementation of user authentication, secure database connections, and the mitigation of potential data vulnerabilities.

## Reflection on the Enhancement Process

Enhancing this artifact provides valuable experience in optimizing database interactions, debugging integration issues, and applying professional documentation practices. I learned how to analyze query execution performance in MongoDB and apply indexing to reduce latency in large datasets. The most challenging aspect of the enhancement was managing secure access to the database and avoiding hardcoded credentials while maintaining usability for testing. To address this, I configured environment variables for connection strings and revised the data model to better support modular scalability. These improvements reflect a deeper understanding of both database efficiency and software security. Overall, this process strengthened my confidence in designing database-driven applications that are reliable, maintainable, and aligned with industry best practices.

In conclusion, the Grazioso Salvare database enhancement demonstrates my growth as a computer science professional with hands-on experience in managing, optimizing, and securing databases for real-world applications. It solidifies my ability to bridge software design and data management in a way that supports analytical decision-making and contributes meaningful value to users and organizations.