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5-2 Milestone Four: Enhancement Three: Databases

For the database category of my ePortfolio, I selected my CS 340 MongoDB CRUD module originally created for the Grazioso Salvare project. The original implementation focused on achieving functional CRUD operations but lacked advanced security features, validation, and extended database capabilities. Because of these limitations, it was an ideal candidate for enhancement to meet professional database and backend development expectations.

The enhancements transformed the module into a secure and robust data-access layer. I added application-level authentication with hashed and salted passwords, audit logging for all CRUD operations, input validation to reduce injection risk, and MongoDB aggregation pipelines to support analytical queries. To validate these features, I tested authentication scenarios using both valid and invalid credentials to ensure access was properly restricted. Audit logs were reviewed after each operation to confirm accurate tracking of user actions, timestamps, and affected records.

Input validation was tested by attempting to insert malformed or incomplete documents, verifying that invalid fields were rejected before reaching the database. Aggregation pipelines were tested by executing sample analytics queries, such as grouping records by outcome or location, demonstrating how MongoDB's aggregation framework can provide meaningful insights without requiring external processing. These features improve both security and the practical usefulness of the module.

The audit logging enhancement also demonstrates real-world applicability. In a production environment, such logs could support troubleshooting, compliance auditing, and incident investigation. Adding these capabilities required careful design to avoid overcomplicating the CRUD interface while still enforcing accountability and traceability.

One challenge during this enhancement was balancing security and usability, particularly when adding authentication and logging without impacting existing workflows. However, structuring helper methods and validating inputs consistently improved maintainability and clarity. This artifact now demonstrates secure database design, backend validation, and analytical capability, making it a strong representation of my database skills and an asset to my professional ePortfolio.