# Milestone Four: Database Enhancement Narrative

## Artifact Description

The artifact selected for this milestone is the 'Travlr' full stack travel management application, originally developed in CS-465: Full Stack Development. The application is composed of a Node.js and Express.js backend connected to a MongoDB database, and a frontend built using Angular. The project features both a customer-facing site and an administrative single-page application. The artifact was created in 2024 and demonstrates a practical implementation of a NoSQL database structure integrated into a full stack app.

## Justification for Inclusion and Enhancements

This artifact was selected for enhancement because of its robust use of a database and its relevance to modern software development workflows. To elevate its quality and align with course outcomes, the following enhancements were made:  
- Added JWT-based authentication for secure route access  
- Introduced role-based access control to restrict admin-specific operations  
- Implemented Mongoose schema validation for data integrity  
- Applied secure error handling and route-level input validation  
- Updated the README with full configuration, usage, and testing instructions  
These improvements demonstrate real-world skills in building secure, efficient, and scalable database-driven applications.

## Course Outcomes Achieved

This enhancement meets the following CS-499 course outcomes:  
- Outcome 2: Delivered professional-quality documentation and configuration instructions in the updated README.  
- Outcome 3: Designed and evaluated secure API route structures using algorithmic principles and authentication logic.  
- Outcome 4: Applied innovative tools such as JWT, Mongoose validations, and middleware in line with best industry practices.  
- Outcome 5: Developed a security mindset by implementing user role restrictions, error handling, and protection from unauthorized access.

## Reflection on the Enhancement Process

Enhancing the Travlr application helped me deepen my understanding of secure full stack development. I learned to integrate middleware for route protection, structure Mongoose schemas with detailed validations, and manage user roles effectively. One challenge I faced was setting up token-based authentication across multiple user types while maintaining clear separation of concerns in the backend. By breaking the logic into middleware and controller layers, I ensured maintainability and clarity. Overall, the process enhanced my confidence in working with modern backend frameworks and secure database interactions.