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CS 499 – Milestone Three Narrative

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Artifact Description

The artifact I included in my ePortfolio is the **TravlR Getaways** full-stack web application, developed during my CS 465 course. This MEAN stack application (MongoDB, Express.js, Angular, Node.js) was created in May 2025 to demonstrate modular software development, user authentication, and dynamic data management. The system enables users to browse travel packages, filter search results, and manage bookings in a responsive and intuitive interface.

Justification for Inclusion

I selected this project because it demonstrates my ability to apply **algorithms and data structure principles** within a full-stack web solution. Specifically, the application includes dynamic **filtering and search logic**, uses **query optimization techniques** to reduce response times, and handles asynchronous control flows in JavaScript with **promise chains and async/await patterns**. For this enhancement, I refactored filtering logic in the trip controller to use efficient **MongoDB operators and conditional branching**. I also implemented input sanitization to prevent logic flaws and added sorting algorithms for date-based results to improve UX.

Course Outcomes

This enhancement strongly supports the following course outcomes:

- **Design and evaluate computing solutions using algorithmic principles:** I refined complex query filters using logical operators such as `$regex`, `$gte`, and `$lte`, and optimized the sorting logic to improve performance.
- **Demonstrate innovative techniques using tools in computing practices:** I used Mongoose and async control flows with custom error handling middleware.
- **Develop a security mindset:** I addressed injection risks in search filters and enforced validation on query inputs.
- **Professional-quality communication:** Enhancements were documented clearly in code and commit messages to reflect professional development practices.

These updates align with the enhancement plan proposed in Module One. No updates are needed for the outcome-coverage plan at this time.

Reflection on the Enhancement Process

This enhancement gave me hands-on experience with **optimizing algorithms in a real-world application**, especially within the context of async server logic and data filtering. Initially, it was challenging to ensure filters were both flexible and performant. I explored MongoDB's indexing

strategies, tested performance with mock datasets, and revised filter structures to reduce computational load. I also ensured secure design by sanitizing inputs and handling edge cases gracefully. The process strengthened my understanding of both frontend/backend data flows and the practical application of algorithms in dynamic web environments.