Michael Wheeler Jr

CS 499: Computer Science Capstone

Date: September 28, 2025

# **CS 499 Milestone Three**

**Enhancement Two: Algorithms and Data Structure**

The artifact I selected again is my *Travlr Getaways* web application, built using Node.js, Express, MongoDB, and Angular. This time, I focused on improving the site’s functionality using algorithmic logic and efficient data handling. Specifically, I added a **search algorithm** that filters trips based on multiple fields and a **rate-limiting mechanism** that controls repeated login attempts for better security.

I chose this artifact because these updates show practical use of algorithms and structured data operations in a real-world web application. The search feature uses a case-insensitive regular expression to match queries against several database fields, returning only the relevant results. This required thinking through how to query efficiently and update the front-end dynamically. I also implemented **rate limiting** on the login route to help prevent brute-force attacks, which shows both algorithmic decision-making and attention to secure design.

While these enhancements worked as planned, one challenge I faced was balancing query performance and responsiveness in Angular when filtering results. Another was tuning the rate limiter so it was effective without being overly restrictive. These steps helped me think critically about real-world tradeoffs between usability, efficiency, and protection.

This enhancement shows that I can design and apply structured, algorithmic logic within a full-stack application. The project continues to evolve, and my next step will be finalizing the “similar trips” feature, which will use comparison-based logic to recommend related travel options based on resort type and trip length.