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CS-499 Computer Science Capstone

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CS 499 Module 3-2 Milestone Two: Enhancement One: Software Design and Engineering?

Artifact Description

The artifact I selected for my software design and engineering enhancement is my Travlr Getaways Full-Stack Web Application, which I originally created in CS 465: Full Stack Development I. The project started as a partially functional travel listing website that relied on server-side Handlebars templates. The earlier version did not fully implement RESTful communication, persistent data storage, or secure authentication.

For the CS-499 enhancement, I rebuilt the application as a true MEAN stack solution using MongoDB, Express, Angular, and Node.js. I redesigned the admin portal as a modern single-page application and added secure API endpoints, authentication workflows, and complete CRUD features.

Why This Artifact Is in My ePortfolio

I selected this artifact for my ePortfolio because it is the strongest representation of my growth as a full-stack engineer. This project demonstrates my ability to design, develop, and enhance a complete software system using industry-standard tools. The enhancements show my

skills in software architecture, API engineering, authentication systems, and user interface design.

Several components highlight my software engineering capabilities:

- I implemented a complete RESTful API with GET, POST, PUT, and DELETE routes.
- I developed secure JWT authentication using Passport and LocalStrategy.
- I redesigned the Angular admin portal using modular components, reactive forms, and service-oriented architecture.
- I added Angular interceptors to automatically attach authorization tokens.
- I improved the visual layout and added features like welcome messages and error handling.

The updated version clearly demonstrates growth in my software engineering skills and aligns with the program outcomes I planned to meet.

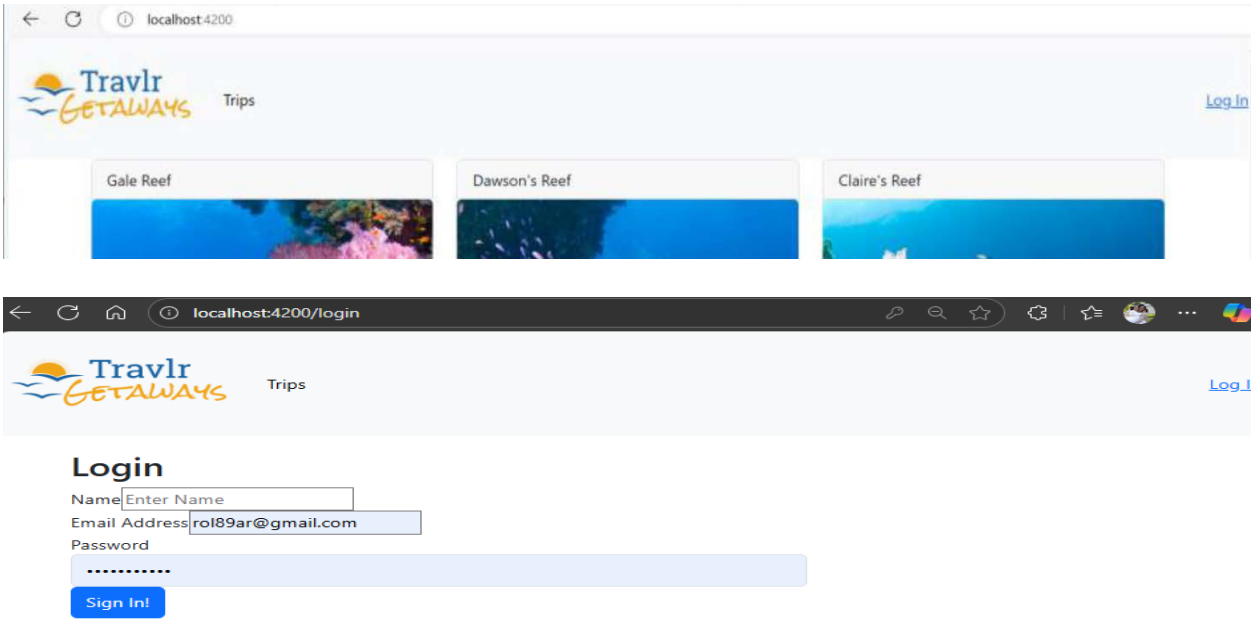

Figure 1: Your original CS-465 homepage or code snippet showing the original structure.

Purpose: Demonstrates where the artifact began.

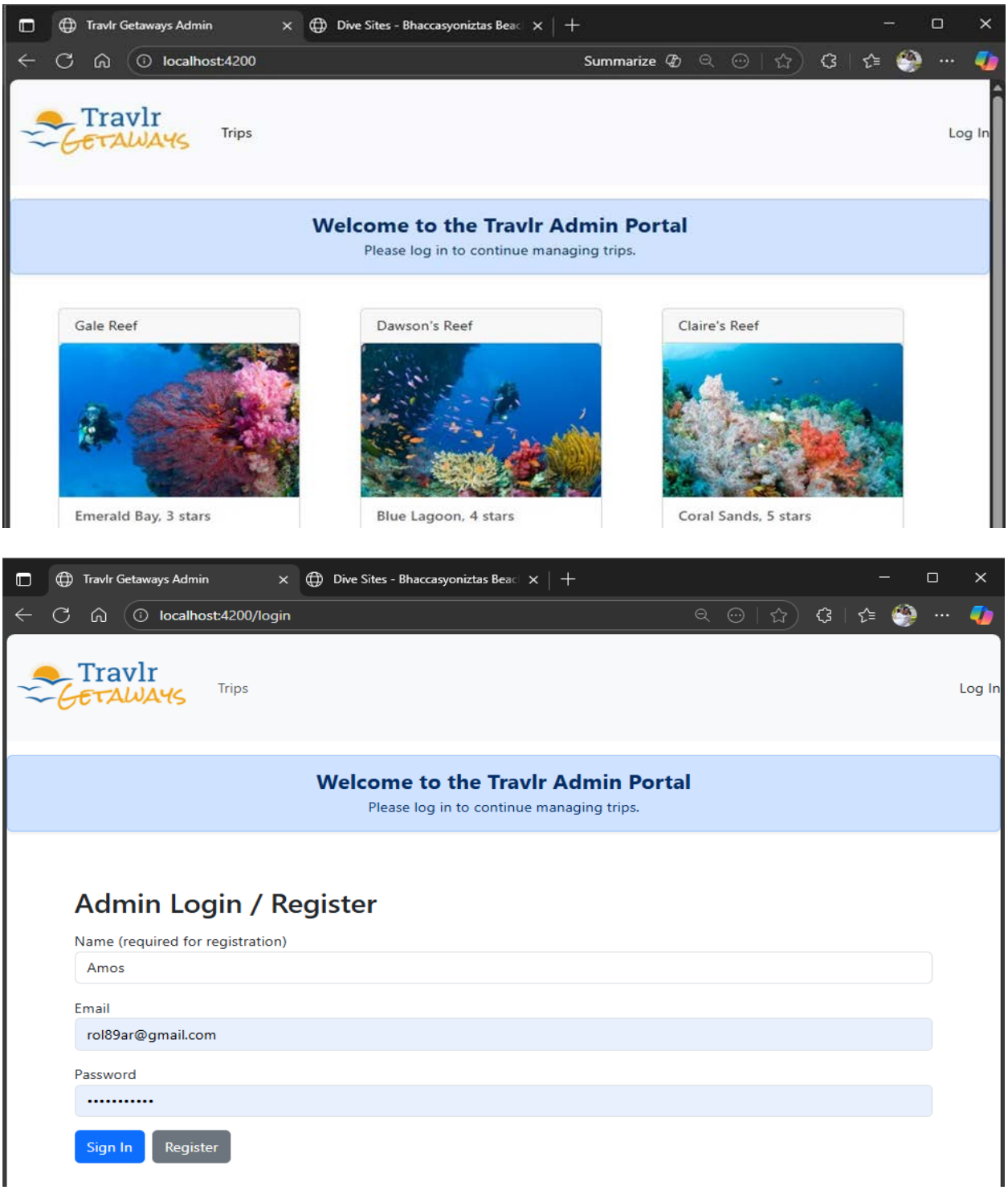

Figure 2: Angular Trip Listing page (logged out) with the welcome message.

Purpose: Shows improved UI and front-end design.

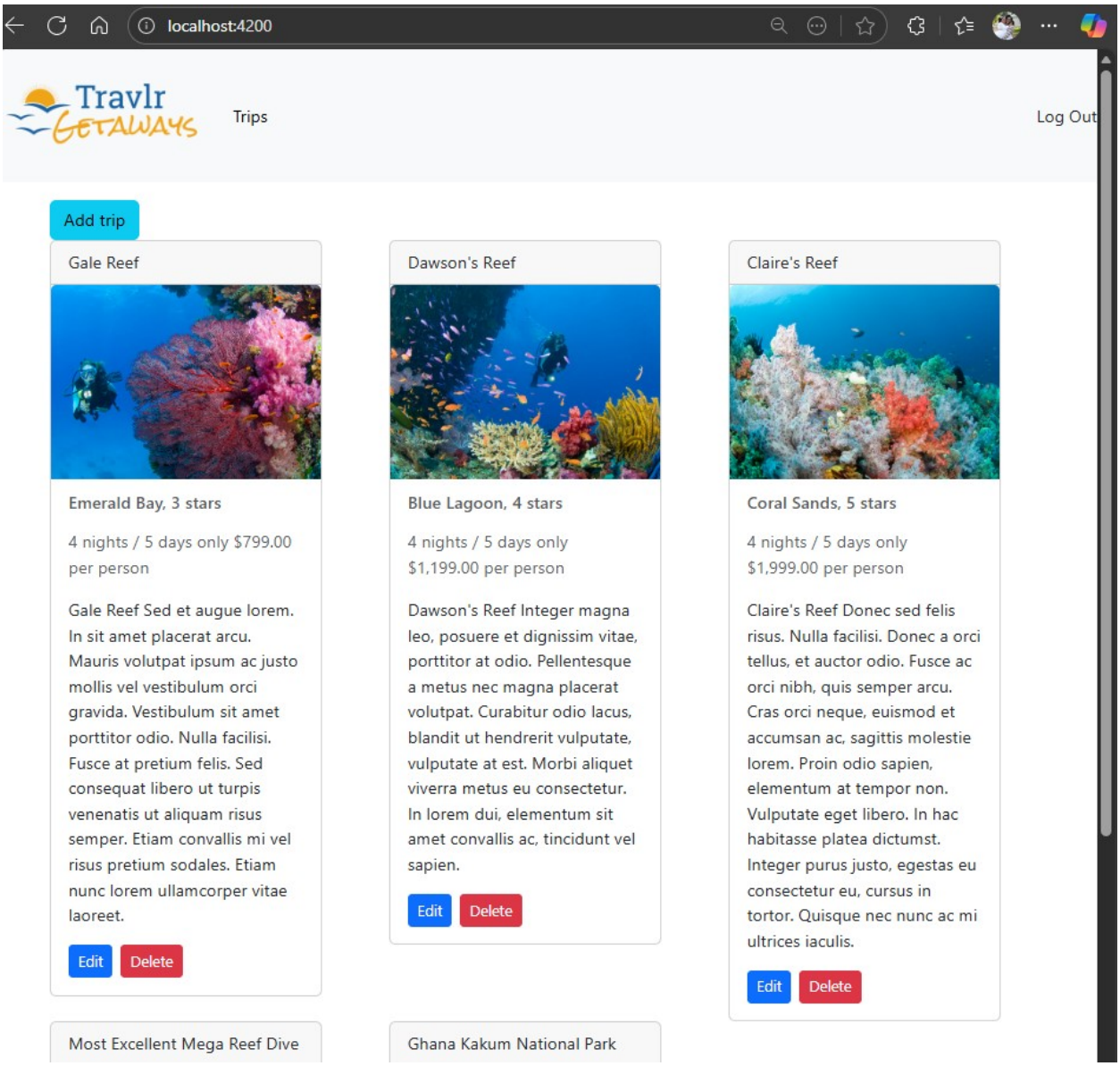

Figure 3: Angular Trip Listing page (logged in) displaying Edit + Delete buttons.

Purpose: Shows authenticated state and admin actions.

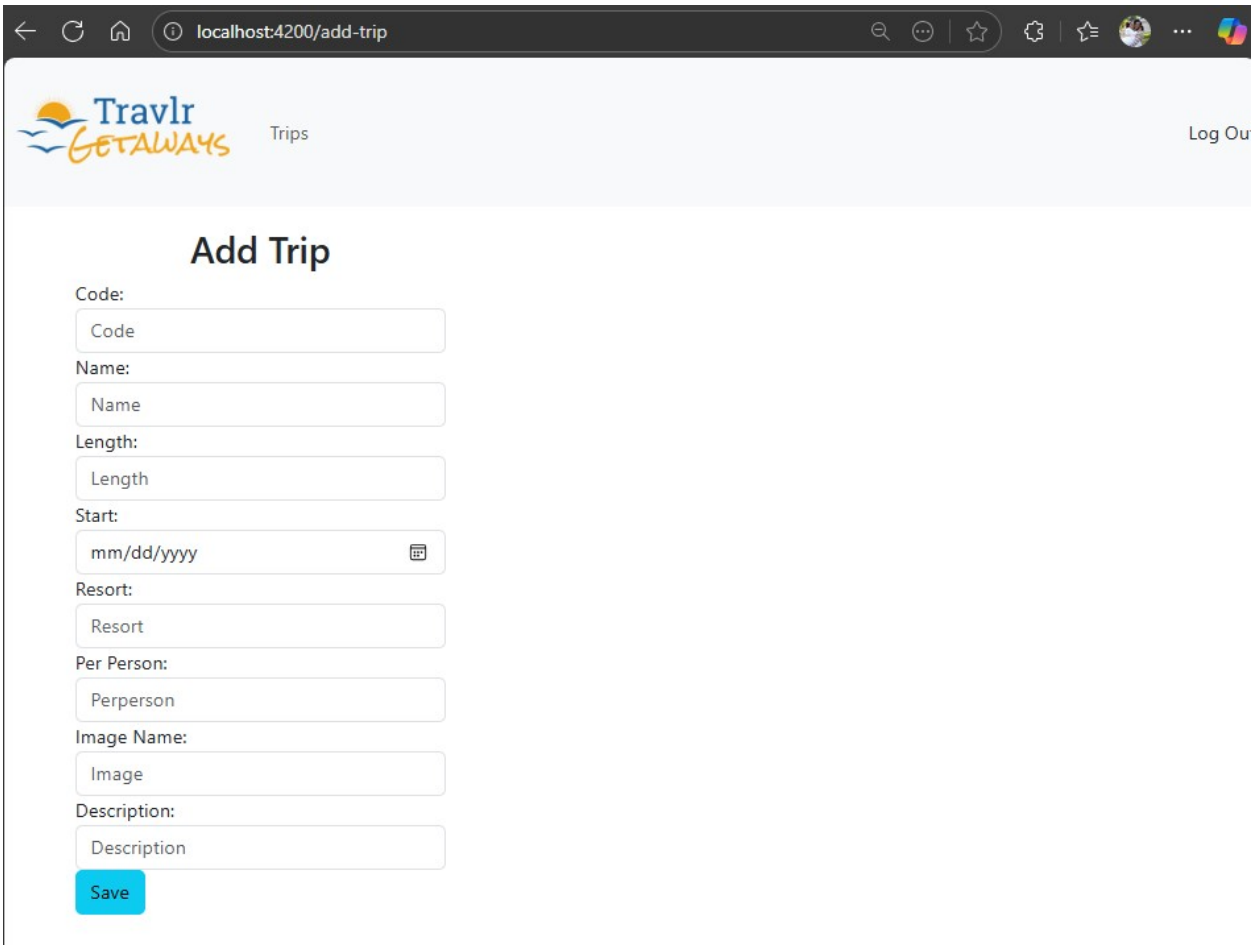

Figure 4: The Add Trip or Edit Trip form.

Purpose: Demonstrates reactive forms and user interaction.

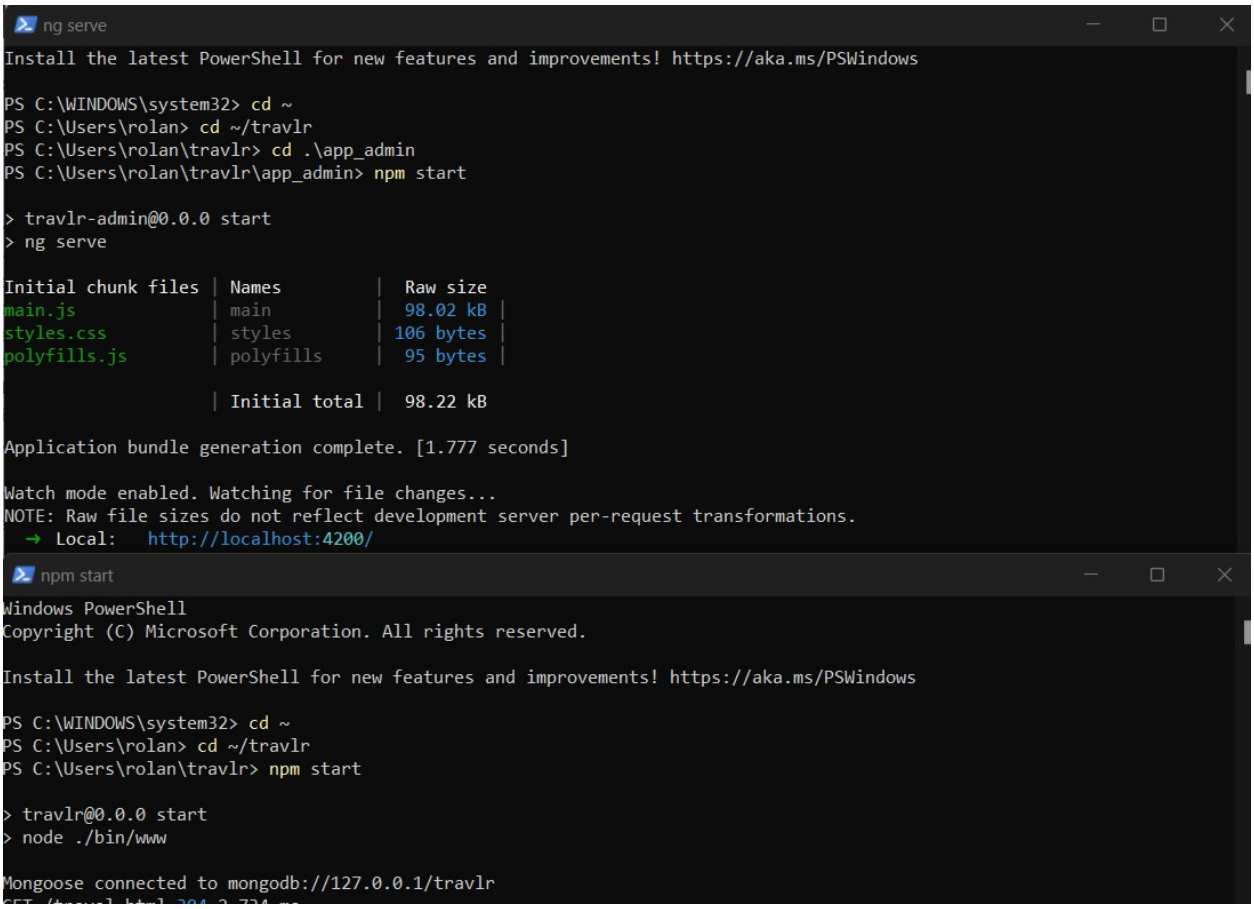

Figure 5: Terminal running the Node API showing successful startup and MongoDB connection.

Alignment to Course Outcomes

In Module One, I planned to meet the outcomes related to software design and engineering by transforming this artifact into a fully functional, authenticated full-stack application. After completing the enhancement, I successfully met the outcomes I targeted. Specifically:

- I demonstrated the use of innovative coding techniques, including interceptors, structured services, and secure API workflows (Outcome: Software Engineering).

- I improved the system's security posture by implementing JWT authentication and protected API routes (Outcome: Security Mindset).
- I produced a modular and scalable solution aligned with industry practices in full-stack development (Outcome: Computing Practices and Standards).

At this stage, my next outcomes will focus on Algorithms and Data Structures, and Databases as I complete the remaining enhancements later in the modules.

Reflection on the Enhancement Process

Enhancing this artifact taught me how much work goes into transforming a partially functioning web application into a secure, production-ready system. One key lesson I learned was the importance of the separation of concerns. Splitting responsibilities between the Angular front-end, Express API routes, controllers, services, and database models made the application far easier to scale and debug.

I also learned more about authentication. Implementing JWT security forced me to understand how tokens work, how to protect routes, and how to safely store and retrieve user credentials. Adding full CRUD functionality also strengthened my understanding of REST design principles.

A major challenge I faced was ensuring that Angular components communicated properly with asynchronous authentication calls. Another challenge was debugging CORS issues and making sure the front-end and back-end were aligned. By working through these issues, I improved my debugging skills and developed a better understanding of full-stack workflows.

All in all, the enhancement process strengthened my confidence and showcased my ability to build full-stack applications that follow industry standards. This artifact now represents my capabilities in designing, securing, and deploying modern software solutions.

References:

Auth0. (n.d.). *JSON Web Tokens - jwt.io*. Auth0. Retrieved November 12, 2025, from https://www.jwt.io/

OWASP Foundation, the Open Source Foundation for Application Security. (n.d.). OWASP Foundation. Retrieved November 13, 2025, from https://owasp.org/