# CS 499 Module 3-2 Narrative

# Software Design and Engineering

**Translating the Inventory Management Android Mobile App to a MEAN Stack Application**

**Artifact Description**

The artifact presented is an Inventory Management System originally developed as an Android Mobile App. This mobile application was designed to help users manage inventory items, providing features such as adding, updating, and deleting inventory records. The original artifact was created as part of a course project for course CS-360, which aimed at showcasing my learning in Android development, including Java programming, use of Android SDK, and implementation of user interface components.

**Justification for Inclusion**

I selected this artifact for inclusion in my ePortfolio because it exemplifies my growth as a software developer and my ability to adapt to new technologies and paradigms. By translating the original Android application into a web application using MEAN (MongoDB, Express.js, Angular, Node.js) stack, I demonstrated my proficiency in full-stack development. This transformation highlights several key competencies:

1. **Backend Development with Node.js and Express.js:** Developing RESTful APIs and handling server-side logic.
2. **Frontend Development with Angular:** Creating dynamic and responsive user interfaces.
3. **Database Management with MongoDB:** Implementing CRUD operations and managing data in a NoSQL database.
4. **Integration and Deployment:** Ensuring seamless communication between frontend and backend and deploying the application in a development environment.

The artifact showcases my ability to work with modern web development frameworks and tools, adapt existing solutions to new contexts, and enhance the functionality and user experience of an application.

**Meeting Course Objectives**

The enhancements made to this artifact align with the course objectives outlined in Module One, which included demonstrating advanced technical skills, solving complex problems, and improving software quality. Specifically, I achieved the following:

**Technical Skill Development:** I gained hands-on experience with the MEAN stack, enhancing my knowledge of both client-side and server-side development. This included aligning the project structure with an MVC-like architecture according to MEAN project best practices, ensuring a clean separation of concerns. Additionally, I adhered to Angular best practices for component organization and service implementation.

**Problem Solving:** Throughout the project, I addressed and resolved various challenges, such as ensuring efficient data handling and implementing user authentication and notification systems. By implementing a modular structure, I was able to reduce redundancy and improve the maintainability of the codebase. This included reducing waste by ensuring that each file and module was being utilized effectively.

**Software Quality Improvement:** Transitioning the application to a modern web-based architecture significantly enhanced its reliability, maintainability, and scalability. I expanded the project documentation through comprehensive JSDoc comments, which improved code readability and facilitated easier future maintenance and collaboration. These comments provided detailed explanations of the functionality and usage of various components and services within the application.

Through this project, I gained a deeper understanding of full-stack development and improved my capability to deliver high-quality software solutions. The structured approach to project organization, thorough documentation, and focus on best practices ensured that the enhanced artifact was robust, efficient, and easy to maintain.

**Reflecting on the Process**

The process of enhancing and modifying the artifact was both challenging and rewarding. The primary challenge was ensuring a smooth transition from the mobile application to the MEAN application while retaining core functionality of the original application. Having limited experience with mobile app development and web application development on the MEAN stack, this enhanced my understanding of the following areas:

1. **Full-Stack Development:** I learned how to effectively integrate frontend and backend technologies, ensuring seamless data flow and user interaction.
2. **Database Management:** Gained proficiency in using MongoDB for data storage, including schema design and query optimization.
3. **API Development:** Enhanced my skills in developing RESTful APIs with Express.js.
4. **User Authentication and Authorization:** Implemented robust user authentication mechanisms, including JWT for secure user sessions.
5. **Notification Systems:** Developed a notification system that respects user preferences, demonstrating the importance of user-centric design.

**Challenges Faced:**

* **Data Handling:** Implementing data storage and retrieval in a NoSQL database, particularly when dealing with complex queries and data relationships affecting multiple collections.
* **Project Structure Complexity:** Navigating the complexity of the various folders, including app\_api, app\_server, and app\_public, was a significant challenge. Ensuring that each part of the application was correctly structured and that the interaction between these folders was seamless required meticulous organization and attention to detail.
* Real-Time Updates: Implementing real-time updates in the Angular frontend to reflect changes in the inventory without requiring a page refresh was challenging. This involved managing state effectively and ensuring that the UI remained responsive and up-to-date.
* **User Preferences:** Implementing the logic to toggle notifications and managing user preferences for notifications across different operations was a complex task given that it affected the db, server, and frontend of the application.

In conclusion, this project was a significant learning experience that allowed me to hone the skills I acquired from two previous courses, CS-360 (Mobile development) and CS-465 (Full Stack Development), to produce a robust and scalable web application. The inclusion of this artifact in my ePortfolio is a testament to my ability to adapt, learn, and deliver high-quality software solutions, making me a well-rounded and competent software developer.