

Report On Internship at Omega Solution as a Software Engineer Intern

by

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An internship report submitted to the Department of Computer Science and
Engineering
in partial fulfillment of the requirements for the degree of
B.Sc. in Computer Science and Engineering

Department of Computer Science and Engineering
BRAC University
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Declaration

It is hereby declared that

1. The report submitted is my own original work while completing degree at BRAC University.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

Student's Full Name & Signature:

A handwritten signature in black ink that reads "Faazia Islam". The signature is written in a cursive style with a long, sweeping underline.

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Approval

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Abstract

This report presents my internship experience at Omega Solution, a technology company specializing in ERP, HRM, and CRM solutions. As part of my CSE400 course at BRAC University, I worked as a Software Engineer Intern, contributing to the Warehouse Automation System project for Smart Factory Worx, a Singapore-based company. During my internship, I gained hands-on experience in backend development, database management, and collaborative software engineering. I was actively involved in developing and optimizing system functionalities, enhancing data processing efficiency, and collaborating with cross-functional teams. The report also discusses key project features, my technical contributions, challenges faced, and solutions implemented. Through this experience, I improved my problem-solving skills, technical expertise in software development, and ability to work within a large-scale team, preparing me for real-world software engineering challenges.

Keywords: Software Engineering; Backend Development; Database Management; Warehouse Automation; Team Collaboration

Acknowledgement

I would like to express my sincere gratitude to my academic supervisor at Brac University for his guidance throughout my internship. I am also deeply grateful to my mentors at Omega Solution, whose constant support and feedback allowed me to grow professionally. Finally, I extend my appreciation to my family for their encouragement and motivation during this experience.

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Nomenclature

The next list describes several symbols & abbreviation that will be later used within the body of the document

AI Artificial intelligence

API Application Programming Interface

ASN Advance Shipping Notice

CRM Customer Relationship Management

CRUD Create, Read, Update, and Delete

CSV Comma Separated Value

DevOps Development Operations

ERP Enterprise Resource Planning

FMCG Fast Moving Consumer Goods

HRM Human Resource Management

JSON JavaScript Object Notation

JWT JSON Web Token

ORM Object Relational Mapper

PI Proforma Invoice

POS Point of sale

RESTful Representational State Transferful

SaaS Software as a Service

SQL Structured Query Language

WMS Warehouse Automation System

Chapter 1

Introduction

1.1 About the Internship

Internships are an integral part of a student's journey, providing a bridge between academic knowledge and real-world application. They offer a unique opportunity to experience professional work environments, gain practical insights, and enhance both technical and interpersonal skills. For students, internships not only help in understanding industry standards but also foster the ability to adapt to dynamic work scenarios. This experience is invaluable in transitioning from the academic world to the practical world of work.

Brac University, through its CSE400 course, emphasizes the importance of internships as a key component of its curriculum. After completing 75 credits, students are encouraged to engage in internships to apply their theoretical knowledge to challenging real-world problems. I chose to undertake an internship at Omega Solution, a renowned software company specializing in enterprise-grade business solutions such as ERP, HRM, and CRM systems. As a Software Engineer Intern, I had the opportunity to work on an impactful and exciting project for Smart Factory Worx, a Singapore-based company.

During my six-month internship, I had the privilege of working on the development of a Warehouse Automation System, a project aimed at streamlining operations and integrating advanced technologies to optimize workflow efficiency. My responsibilities ranged from backend development to database management. This hands-on experience helped me sharpen my technical skills while improving my teamwork, deadline management, and ability to address complex client needs.

Internships like this provide students with the opportunity to bridge the gap between theory and practice, fostering professional growth and preparing them for future challenges. Through my internship, I developed skills that are essential for my career as a software engineer, including problem-solving, technical documentation, and effective communication. I am immensely grateful for the support of my academic supervisor at Brac University, as well as my mentors at Omega Solution, who guided me throughout this transformative journey. This report serves to document my experiences, challenges, and achievements during this internship and highlights the significant growth I have achieved.

1.2 About This Report

This report is submitted as part of my CSE400 course at Brac University, fulfilling the requirements for my internship evaluation. It provides a comprehensive overview of my internship experience at Omega Solution, where I worked as a Software Engineer Intern. The report outlines my work environment, responsibilities, and contributions, focusing on the development of a Warehouse Automation System for Smart Factory Worx. It also captures my learning experiences, the challenges I encountered, and the professional and technical growth I achieved over six months.

1.3 Objectives

The main goal of this internship was to translate the theoretical knowledge from my undergraduate studies into practical applications while enhancing my professional skills. In my role at Omega Solution, I focused on contributing to the development of the Warehouse Automation System for Smart Factory Worx. This internship aimed to achieve the following specific goals:

- Develop and implement backend features for a large-scale Warehouse Automation System.
- Design and optimize database structures to handle complex data efficiently.
- Translate client requirements into technical solutions through collaboration with the business development team.
- Gain hands-on experience with tools and technologies such as Node.js, Prisma ORM, PostgreSQL, and Jira for project management.
- Enhance my problem-solving skills by tackling challenges in file processing, validation rules, and system optimization.
- Contribute to the documentation of API endpoints and software features for clients.
- Build teamwork and communication skills by collaborating with senior engineers and cross-functional teams.

This internship not only aimed to bridge the gap between academic learning and industry requirements but also provided a platform for professional growth, preparing me for future challenges in the software engineering field.

1.4 Literature Review

Warehouse Automation Systems have become a cornerstone in modern logistics and supply chain management. These systems leverage cutting-edge technologies to streamline operations, enhance efficiency, and reduce manual labor. Research highlights the integration of automation in tasks such as inventory tracking, pallet management, and error logging, which improves operational accuracy [4].

The Warehouse Automation System developed at Omega Solution for Smart Factory Worx builds upon established principles of warehouse management, incorporating advanced features such as Agile methodology, real-time validation checks, and database optimization. Existing solutions in the market, such as SAP Extended Warehouse Management and Oracle WMS, focus on improving supply chain visibility and efficiency. Similarly, Smart Factory Worx aims to achieve higher productivity by integrating AI-powered tools and dashboards tailored to specific client needs [3].

Additionally, iterative development methodologies like Agile allow teams to adapt flexibly to changing requirements and client feedback. Literature on Agile underscores its efficiency in managing complex projects by breaking down development into manageable sprints, which aligns with the approach followed during this internship project [1].

In summary, the Warehouse Automation System synthesizes best practices in warehousing, software development, and client collaboration to deliver a scalable and efficient solution.

1.5 Methodology

1.5.1 Requirement Gathering and Analysis

- **Initial Requirements:** Smart Factory Worx shared a set of preliminary project requirements.
- **Internal Analysis:** The business team at Omega Solution analyzed these requirements, discussed them with the development team, and conducted research on:
 - Real-life warehouse operations.
 - The functionality of existing warehouse management software in the market.
- **Proposal Preparation:** Following the analysis, a detailed proposal was developed, covering budget and timeline estimates, along with prioritized features based on client needs and market research.
- **Approval Process:** After further discussions with the client, the project was approved, marking the start of the development phase.

1.5.2 Client Collaboration

- Smart Factory Worx provided:
 - An initial database design to serve as a foundation for system architecture.
 - A low-fidelity prototype was created using Figma, detailing the user interface and user flows.

- [illegible]

Figure 1.1: A Part of Initial Database Design from Client (Smart Factory Worx)

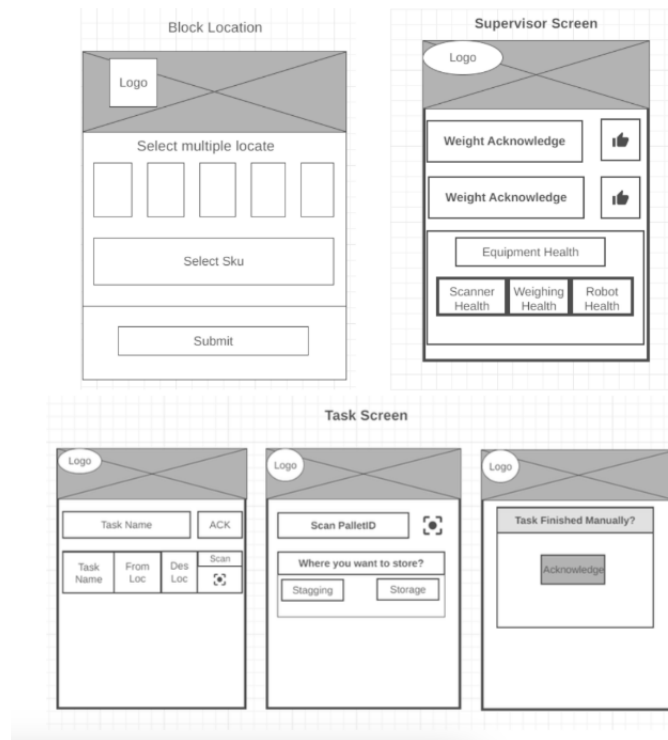


Figure 1.2: Initial Low-Fidelity Design from Client (Smart Factory Worx)

1.5.3 Development Process

- **Agile Methodology:** The project followed Agile principles, allowing for flexibility and continuous improvement through iterative development.
 - Features were developed and delivered incrementally in sprints.
 - Each sprint included prioritizing requirements, development, testing, and feedback review.
- **Backend Development:** Key tasks included implementing backend features, optimizing database performance, and managing complex validations.
- **Validation Rules:** A significant part of the development process was creating and testing rules to prevent operational errors, such as:
 - Pallet weight limits.
 - Product multipack and loose unit handling.
 - ASN file quantity checks.
- **Database Management:**
 - The database structure, initially designed by the client, was enhanced using Prisma ORM and PostgreSQL.
 - Optimization was performed to ensure efficient data handling and query performance.

1.5.4 Communication and Feedback

- Continuous communication with Smart Factory Worx was maintained throughout the project.
- Feedback loops allowed for:
 - Addressing client concerns promptly.
 - Refining features based on real-time input.
 - Adapting to any changes in requirements.

1.5.5 Report Preparation

- The data for this report was collected from multiple sources:
 - My hands-on experience with backend development and database management.
 - Discussions with mentors and colleagues at Omega Solution.
 - Client-provided resources and official documentation.
 - Online research and reference materials from Smart Factory Worx.

This combination of systematic analysis, iterative development, and effective communication ensured the successful execution of the project while also providing valuable learning opportunities during my internship.

Chapter 2

Company Profile

2.1 Overview of Omega Solution

Omega Solution is a software company specializing in enterprise-level business management solutions, including ERP, HRM, and CRM software. As the technology wing of the Omega Cluster Group, Omega Solution serves clients in over 30 countries, with more than 600 businesses relying on its solutions. Established in 2019, Omega Solution began as an internal software team for Omega Express, a logistics company within the Omega Group. By 2021, Omega Solution had evolved into a standalone company, offering cutting-edge solutions for industries such as FMCG, Chain Shops and Restaurants, Trading Groups, Transportation, Logistics, and Agro-industry. The company's mission is to help businesses automate processes and achieve efficiency with intelligent software solutions.

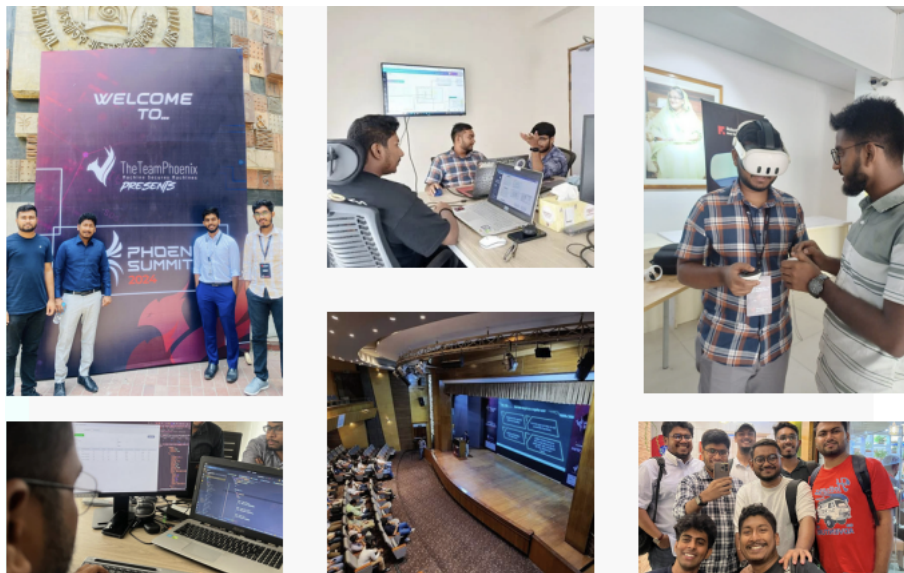


Figure 2.1: A glimpse of the work of Omega Solution

2.1.1 Vision and Mission

Omega Solution aims to empower businesses globally with cutting-edge software solutions designed to streamline operations and boost productivity. Aligned with the

Omega Cluster Group, the company’s mission is to deliver smart, AI-powered ERP, HRM, CRM, and automation systems tailored to industries like logistics, retail, and agriculture. By fostering automation, Omega Solution aims to simplify complex processes and offer scalable, sustainable solutions for global enterprises.

2.1.2 Key Achievements

- **Global Reach:** Omega Solution serves over 600 clients across 30+ countries, demonstrating its rapid growth and global impact within just 4 years of operation.
- **Client Base:** Includes renowned companies in industries like FMCG, logistics, and retail, such as Walton Group, Haier Bangladesh, Gulf Distribution, and more.
- **Industry Recognition:** Known for delivering innovative and customer-centric solutions, achieving significant success in the software industry.

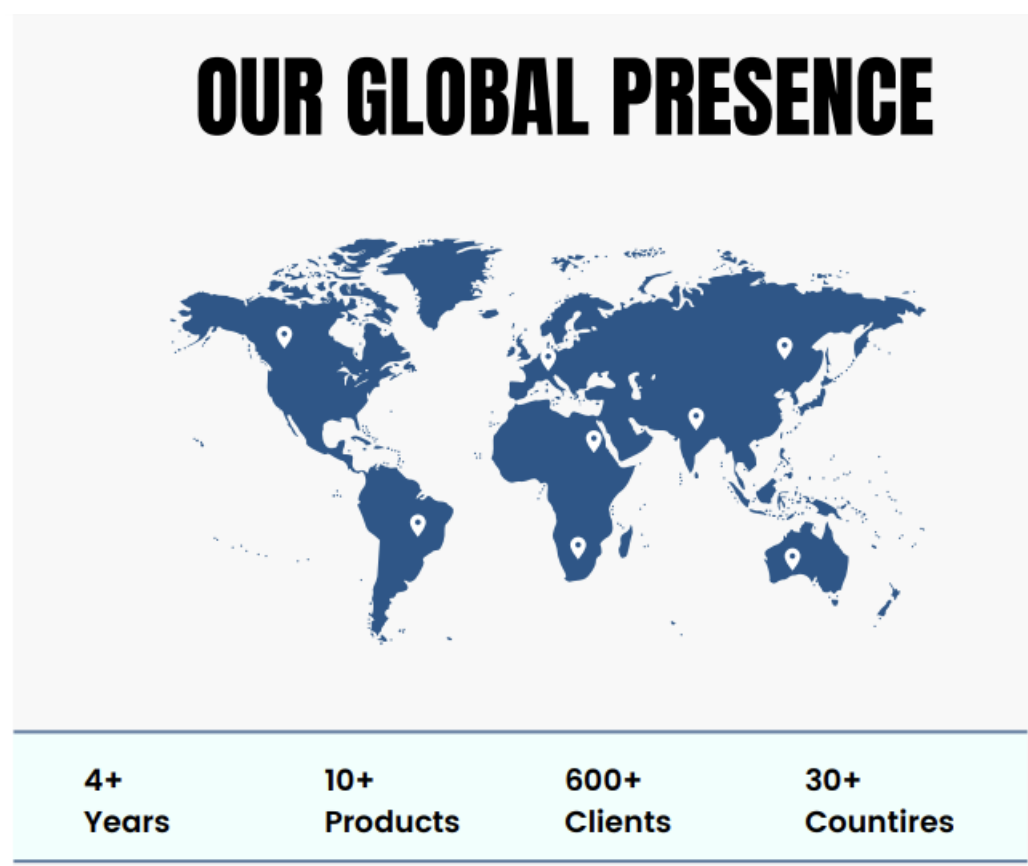


Figure 2.2: Global presence of Omega Solution

2.1.3 Office Location and Registration

Omega Solution is a globally registered entity operating under the name **One Omega Solution LLC** in the United States and **One Omega Solution LTD**

in Bangladesh. Its strategically located offices support efficient collaboration with clients across different regions, including North America, South Asia, and beyond. The USA office establishes a strong presence in the western hemisphere, while the Bangladesh office serves as a vibrant hub for innovation and development in South Asia.

- **USA Office:** 2201 Menaul Blvd NE Suite B, Albuquerque, NM 87107, United States.
- **Bangladesh Office:** Level 2, House 68, Road 12, Sector 10, Uttara, Dhaka - 1230, Bangladesh.

2.1.4 Software Products and Services

Omega Solution provides a wide array of enterprise software products designed to streamline operations, improve efficiency, and cater to businesses across various sectors. These products combine cutting-edge technology with user-friendly interfaces to address operational, management, and customer-centric needs effectively. Below is a detailed list of Omega Solution's software products, including their features and links:

- **ERP OS Single Store**[7]
 - Specifically designed for single-store operations.
 - Features include:
 - * Purchase management and inventory tracking.
 - * Supplier and sales management.
 - * Integrated POS module.
 - * Advanced reporting and accounting.
 - * Role-based permissions and staff management.
- **ERP Multi Store** [10]
 - Tailored for multi-store or branch-based businesses.
 - Features include:
 - * Multi-store inventory and purchase management.
 - * Shop-specific POS module and reporting.
 - * Advanced role-based permissions.
 - * Centralized accounting and staff management.
- **HRM PRO** [9]
 - Comprehensive human resource management software.
 - Features include:
 - * Attendance and leave management.
 - * Payroll and employee management.
 - * Shift, holiday, and weekend management.

- * Recruitment management and job desk features.
- * Financial reporting and project management tools.
- **CRM PRO [6]**
 - A powerful tool for managing customer relationships.
 - Features include:
 - * Lead collection and customer management.
 - * Sales pipeline and quotation management.
 - * Email integration and customer support system.
 - * Advanced filtering and task management.
 - * Staff and company management tools.
- **POS OS [12]**
 - Optimized for retail and sales operations.
 - Features include:
 - * Ready-to-use POS module with sales tracking.
 - * Inventory and discount management.
 - * Customer and staff management.
 - * Advanced reporting and accounting tools.
- **Warehouse Automation System [8]**
 - Built to optimize warehouse operations.
 - Features include:
 - * Inbound and outbound logistics management.
 - * Automated inventory tracking and reporting.
 - * Real-time error logging and validation systems.
 - * Role-based permissions and user-friendly dashboards.
 - * Customizable to meet client-specific needs.
- **SaaS Accounting Software [5]**
 - Cloud-based accounting solution.
 - Features include:
 - * Invoicing and billing.
 - * Financial reporting and reconciliation.
 - * Multi-user access with role-based permissions.
 - * Real-time analytics and dashboards.
- **All-in-One ERP, CRM, and HRM System [11]**
 - A unified solution integrating ERP, CRM, and HRM functionalities.
 - Features include:
 - * Employee, customer, and resource management.

- * Centralized reporting and analytics.
- * Advanced project and task management.

- **Custom SaaS Development**

- Omega Solution also offers customized SaaS solutions, including:
 - * Tailor-made modules to meet specific business needs.
 - * Multi-language support and API integrations.
 - * Workflow automation and personalized branding.
 - * Scalable architecture and dedicated maintenance support.

These products and solutions highlight Omega Solution’s commitment to addressing operational challenges faced by businesses and providing advanced software tools to optimize efficiency and growth.

2.1.5 Technology and Framework

Omega Solution employs modern, robust technologies to develop scalable solutions:

- **Backend and Frontend:** Node.js, Laravel, React, Next.js, Express.js, Redux, and Flutter.
- **Database:** PostgreSQL, MySQL, Redis, Firebase, and others.
- **Cloud and DevOps:** AWS, Azure, GCP, Docker, DigitalOcean, and Others.
- **Development Tools:** Tailwind CSS for UI design and Prisma ORM for efficient database management. This diverse stack ensures compatibility, scalability, and security for all their software products.



Figure 2.3: Technology uses of Omega Solution

2.2 Overview of Smart Factory Worx

Smart Factory Worx is a Singapore-based company dedicated to providing innovative factory automation solutions that enhance operational efficiency, reduce costs, and drive productivity. With over 30 years of experience in the packaging and FMCG (Fast-Moving Consumer Goods) industries, the company leverages its expertise to integrate AI-powered systems into manufacturing and production environments. Their solutions are designed to optimize production processes, improve real-time decision-making, and provide unparalleled transparency across operations.

The company stands out for its ability to collaborate with clients at all levels, ensuring buy-in from stakeholders and operators alike. Smart Factory Worx develops customized dashboards and automation systems tailored to the unique needs of its clients, enabling data-driven decision-making and seamless integration into existing workflows. The company prioritizes productivity, cost efficiency, and accuracy, making it a trusted partner for businesses looking to modernize their manufacturing and packaging processes.

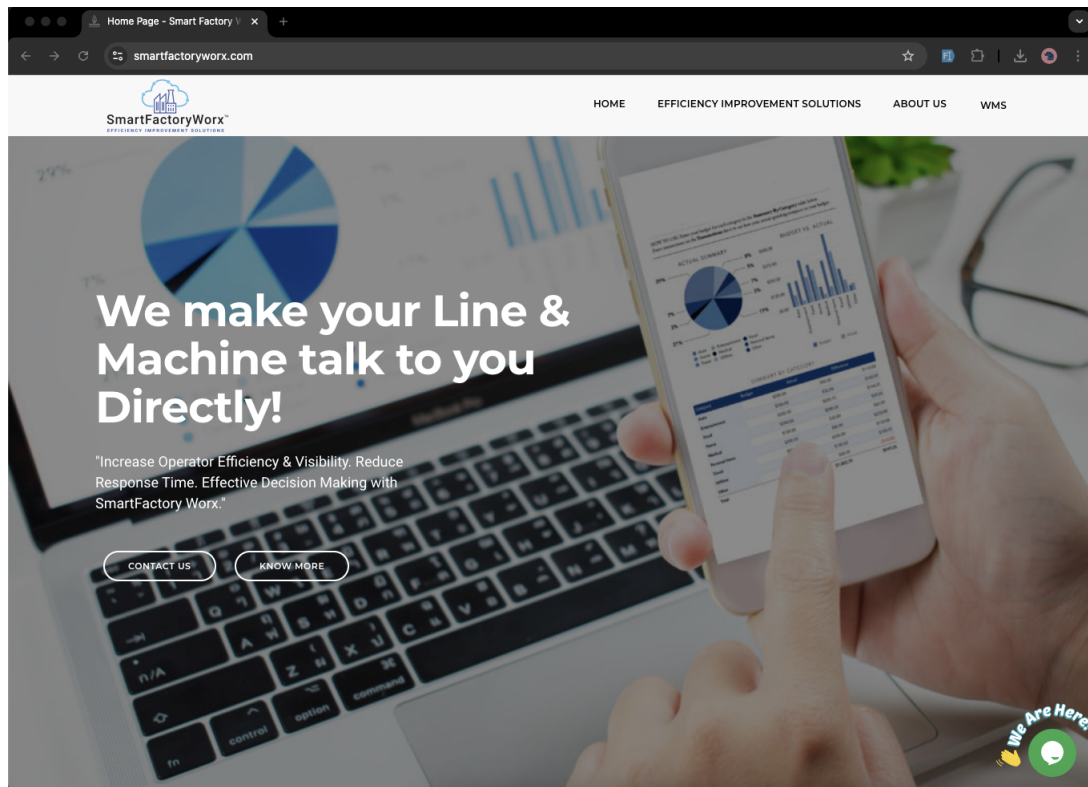


Figure 2.4: About Smart Factory Worx from their website's first page

2.2.1 Operations and Specializations

Smart Factory Worx operates in two primary domains:

- Efficiency Improvement Solutions
 - Automated Data Collection: Uses non-invasive transducers to extract real-time data on energy consumption, processes, and production metrics.

- Real-Time Dashboards: Provides web- and mobile-accessible dashboards with live tracking, alerts, and notifications for improved operator efficiency and effective decision-making.
 - Transparency and Control: Enhance visibility across operations to identify bottlenecks, improve resource allocation, and ensure seamless workflow management.
- Packaging Automation
 - Focuses on improving line efficiency and increasing accumulation between packaging lines without extending their length.
 - Offers solutions for raw material traceability, lab sample tracking, and advanced packaging techniques, including the use of palletizers, case packers, and bundling machines.
 - Emphasizes precision, cost reduction, and quality in packaging operations to meet industry-specific needs.

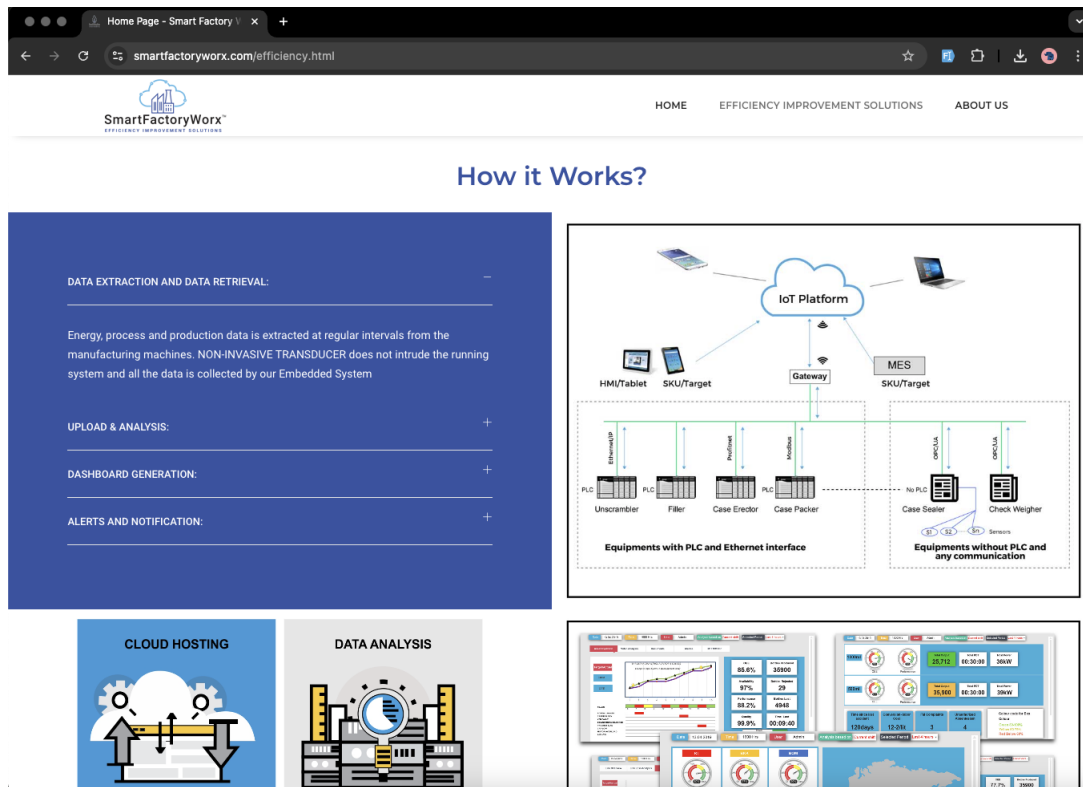


Figure 2.5: Products of Smart Factory Worx

2.2.2 Partners and Global Presence

Smart Factory Worx collaborates with a diverse network of global partners to ensure its solutions meet the highest industry standards. By working closely with hardware and software providers, the company delivers comprehensive automation systems tailored to its clients' specific requirements.

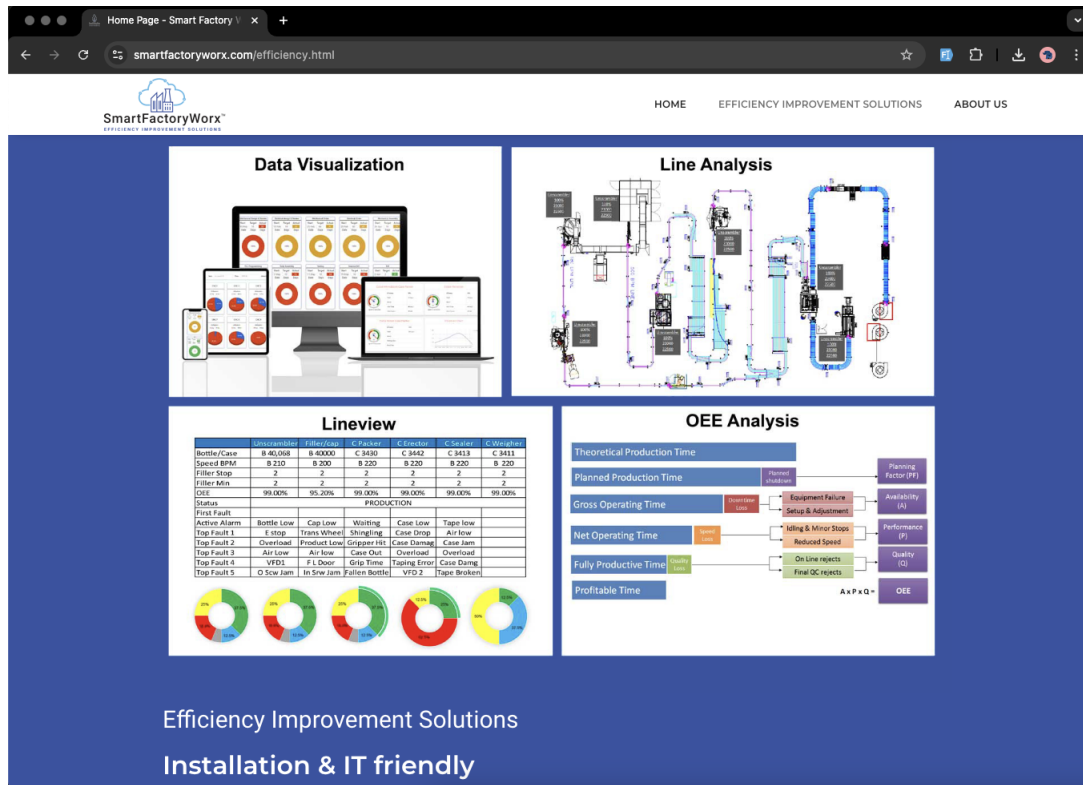


Figure 2.6: Services provided by Smart Factory Worx

- **Singapore Headquarters:** 67 UBI Road 1, 10-06, Oxley Bizhub, Singapore 408730.
- **India Operations:** Plot No. 9, Ecotech-1 Extension, Greater Noida 201308.
- **Contact Information:**
 - Singapore Office: +65 67414077, info@smartfactoryworx.com.
 - India Office: info@smartfactoryworx.com.

With a presence in Singapore and India, Smart Factory Worx effectively serves clients across Asia and beyond. Their advanced solutions and commitment to operational excellence have positioned them as a leader in the factory automation industry. Their expertise, combined with their focus on client collaboration and customization, ensures that they remain at the forefront of automation innovation.

Chapter 3

Internship Role and Responsibilities

This section outlines my role and responsibilities during my six-month internship as a Software Engineer Intern at Omega Solution. The role involved diverse tasks ranging from backend development to collaboration with cross-functional teams, all within the framework of developing a Warehouse Automation System for Smart Factory Worx. Below is a detailed account of my role and contributions.

3.1 Role Overview

As a Software Engineer Intern at Omega Solution, I began my internship on June 1, 2024, with a six-month tenure. My role adopted a hybrid work model, enabling me to complete most tasks remotely while attending occasional in-person team meetings. I was assigned to the Warehouse Automation System project, a critical initiative for Smart Factory Worx, a Singapore-based company specializing in factory automation. The project involved collaboration with senior engineers, business analysts, and the client's technical team to ensure its successful execution. My responsibilities involved backend development, database design, and ongoing communication to align technical solutions with client requirements.

3.2 Responsibilities

The internship required me to undertake a variety of technical and non-technical responsibilities, each contributing to the overall success of the project. Below is an in-depth look at my key responsibilities:

3.2.1 Backend Development

Backend development formed the core of my responsibilities, where I utilized technologies such as Node.js, Express.js, and PrismaORM. My tasks included:

- **Developing Features:** I built scalable backend features for the Warehouse Automation System, including database level validation for the inbound operations to ensure data accuracy and error prevention.

- **CRUD Operations:** Implemented Create, Read, Update, and Delete (CRUD) functionalities for various features such as product and product type, pallet and pallet type, ASN uploads.
- **API Development:** Designed and developed RESTful APIs for seamless integration with the frontend and other services, ensuring proper data flow and secure operations.
- **Performance Optimization:** Improved the backend's performance by optimizing database queries and reducing processing times for file uploads containing large datasets using Prisma ORM (a Rust Engine-based modern ORM).

3.2.2 Database Design and Optimization

Database management was a significant aspect of my role, requiring expertise in Prisma ORM and PostgreSQL. My contributions in this area included:

- **Database Schema Design:** Collaborated on the design and optimization of database schemas to ensure efficient data storage and retrieval, accommodating nested data and complex foreign key relationships.
- **Query Optimization:** Researched and assist in implementing strategies to enhance query performance, particularly for processing large Excel files with 150,000+ rows and 20+ columns.
- **Data Validation and Integrity:** Ensured data integrity by implementing validation rules directly within the database, using transactions to roll back operations in case of errors.
- **Error Logging:** Contributed to the development of a robust error logging system to track issues during file uploads and API calls, enhancing debugging and maintenance efforts.

3.2.3 Collaboration with Business Development

As an intern, my collaboration with the business development team primarily focused on understanding client requirements and gaining insights into real-life warehouse operations. I worked alongside the team to ensure the development aligned with the client's needs. My contributions included:

- **Understanding Client Requirements:** Collaborated with the business team to understand the client's operational needs and the key requirements for the Warehouse Automation System.
- **Learning Real-Life Warehouse Processes:** Participated in discussions to learn about real-world warehouse operations and how they influence system design and functionality.
- **Research and Observation:** Assisted the team in gathering information about existing software solutions in the market and understanding their applications in warehouse management.

- **Team Discussions:** Contributed to internal discussions, provided support in organizing and documenting client requirements for the development team.
- **Update Bug Reports:** I assisted senior engineers in updating the bugs reported by the client and handled my assigned task and kept the status updated.

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Figure 3.1: Bug Reporting Sheet from the Smart Factory Worx

This collaborative experience helped me understand the importance of aligning technical solutions with business operations and enhanced my ability to contribute effectively as part of a cross-functional team.

3.2.4 Documentation and Communication

Documentation and effective communication played a crucial role in ensuring the project's success. My responsibilities included:

- **API Documentation:** Prepared detailed API documentation to guide the client's technical team in integrating and testing APIs.
- **Feature Documentation:** Collaborated with senior engineers to document software features, providing clear and concise explanations for client review and future reference.
- **Communication Tools:** Utilized tools such as Jira and GitHub to track progress, manage code repositories, and maintain effective communication within the team.
- **Knowledge Sharing:** Shared insights and solutions during team meetings, contributing to a collaborative and innovative work environment.

My role as a Software Engineer Intern was dynamic and multifaceted, requiring a balance of technical expertise, collaboration, and adaptability. This experience significantly enhanced my technical skills and professional competencies, preparing me for future challenges in the software development industry.

Chapter 4

Overview of the Warehouse Automation System

The Warehouse Automation System developed for Smart Factory Worx is designed to streamline warehouse operations, from inbound and outbound logistics to real-time inventory management. The system boosts efficiency by automating essential tasks, leveraging AI-powered solutions, and enforcing stringent validation rules to avoid errors.

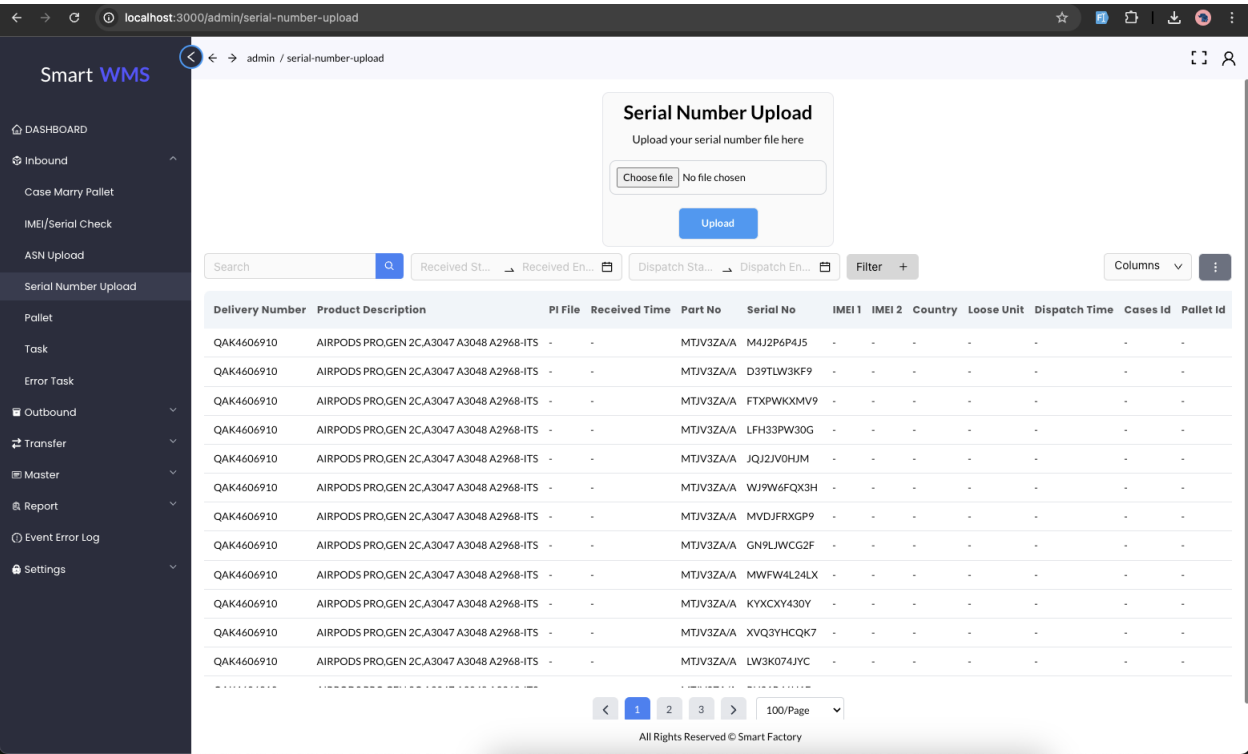


Figure 4.1: Serial Number File Upload and View Page of the Warehouse Automation Software

4.1 Features of the Warehouse Automation System

4.1.1 Inbound Operations

- Serial Number File Upload: Automates the process of uploading manufacturer-provided serial number files in Excel format.
- ASN File Upload: Automated uploading of Advance Shipping Notices, detailing delivery numbers and product information.
- Pallet Creation: Automated creation of pallets to group products for storage.
- Case Marry Inbound: Products are grouped into cases and loaded onto pallets, which are then stored in warehouse racks with specific storage limits and capacity validations.

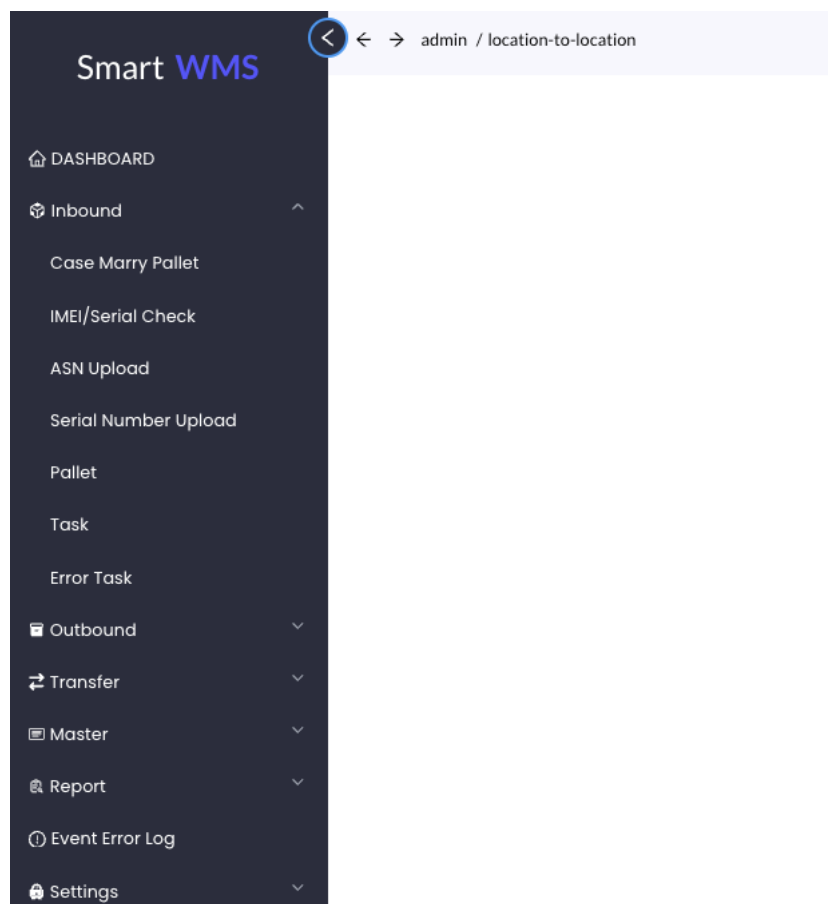


Figure 4.2: Expanded Side Nav of the Inbound Module of the Warehouse Automation Software

4.1.2 Transfer Operations

- Case to Case, Pallet to Pallet, and Location to Location Transfers: Movement of cases and pallets within the warehouse based on real-time needs and storage availability.

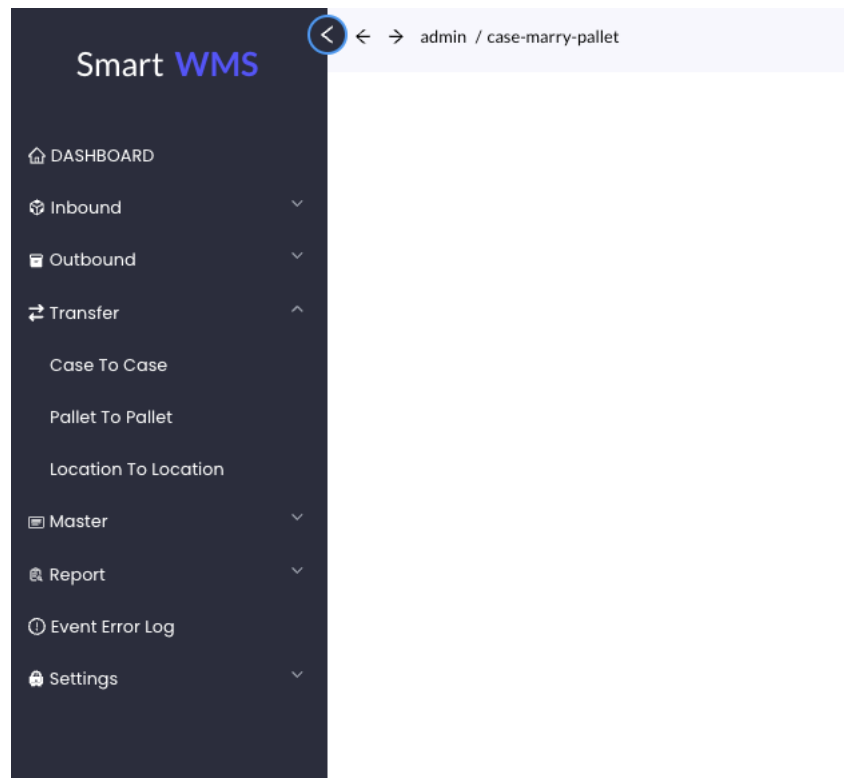


Figure 4.3: Expanded Side Nav of the Transfer Module of the Warehouse Automation Software

4.1.3 Outbound Operations

- PI File Upload: Uploading of PI Invoices containing delivery information.
- PI Queue Management: Ensuring one PI is processed at a time for efficient workflow.
- Pallet Pickup: Picking pallets based on PI part numbers and product quantities.
- Case Marry Outbound: Marrying pallets with delivery products to create finished goods.
- Packing List Creation: Generating a detailed packing list for each PI.
- Dispatch: Tracking and dispatching finished goods to clients via vehicles.

4.1.4 Master Data Management

- Management of product group, product, pallet type, and location data for streamlined inventory control.

4.1.5 Reporting

- Real-time reporting of inbound operations, stock levels, finished goods and dispatched goods.

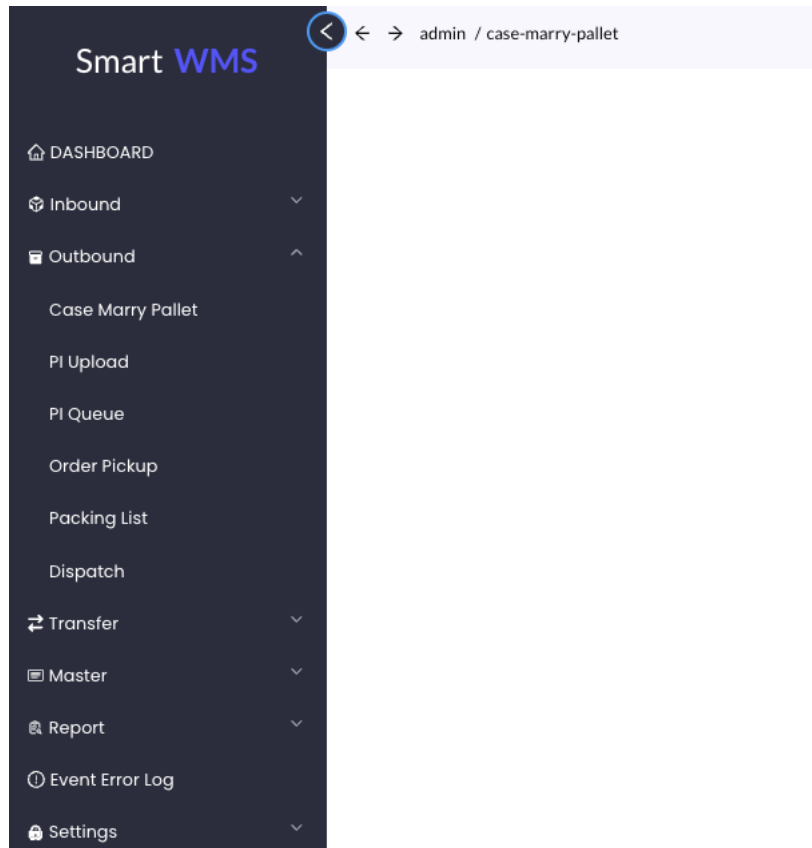


Figure 4.4: Expanded Side Nav of the Outbound Module of the Warehouse Automation Software

4.1.6 Error Log

Detailed logging of errors that occur during file uploads (e.g., serial number, ASN, PI, or product files).

4.1.7 Settings

- User and role management, including permission assignments for different users.

Chapter 5

Project Contributions

During my internship, I contributed to several aspects of the warehouse automation system. My main focus was backend development, which included the following areas:

- **CRUD Operations:** I wrote code to create, read, update, and delete functionalities for managing product types, products, pallet types, pallets, ASN uploads, and PI uploads.
- **Database Design:** I worked on designing and optimizing the database using Prisma ORM and PostgreSQL, ensuring that all tables and relations are properly structured for efficient data management.
- **Validation Logic:** I assisted in creating complex validation rules to ensure error-free inbound and outbound processes, focusing on case-marry operations.
- **Error Handling:** I assisted in the development of the error logging system, which tracks and stores errors occurring during 'serial file' uploads.
- **Performance Optimization:** I worked on optimizing query performance, especially for handling large file uploads, ensuring the system stayed responsive under high data loads.

Here are some reference figures for the Postman API Collection of the warehouse automation software I worked on:

Chapter 6

Tools and Technologies Used

Throughout my internship, I gained proficiency in the following tools and technologies:

- **Node.js:** Used for backend development and implemented server-side logic as a JavaScript runtime environment.
- **Express.js:** A web application library for building RESTful APIs.
- **Prisma ORM:** A Object-Relational Mapping tool for database management.
- **PostgreSQL:** A relational database system utilized for storing and managing warehouse data efficiently.
- **Table Plus:** A database agnostic free and lightweight relational database visualization tool.
- **Jira:** A project management tool used to track tasks, manage deadlines, and collaborate with the team [2].
- **GitHub:** Using for version control and code collaboration.
- **Postman:** Used for documenting and testing APIs to ensure seamless integration.
- **In-House Attendance System:** Used for attendance tracking and time management by giving fingerprints.

Chapter 7

Challenges and Learning Experiences

I faced several challenges during this internship:

- **Handling Large File Uploads:** One challenge involved uploading a massive CSV file with 150,000 rows and 17 columns. Initially, the frontend attempted to send the JSON payload, but it became too large and failed. We solved this by chunking the data, but some chunks were lost during the process. Eventually, we sent the file directly to the backend for processing, which succeeded but was slow due to nested data and foreign key relations. I along with my Senior engineer optimized the queries to reduce processing time, by implementing a Redis Database based caching server. It was a significant challenge that required collaboration and research.
- **Update Previous ASN and PI Data:** One challenge involved when user wanted to update a previously uploaded ASN or PI file by just uploading another ASN or PI file. That time I had to check the two unique keys of the ASN/PI which were Delivery Number and the Part Number. Based on those unique key I had find the previous data from the database and updated them with the new ASN/PI data. It was a quiet challenging task to find on the basis of two unique keys.
- **Complex Validation Rules:** The system required various validations to prevent operator errors during key operations. For example, the inbound case marry feature had validations for ASN file quantity limits, pallet weight limits, and product multipack and loose unit conditions.
- **Location Management:** Assisted in managing warehouse locations and handling the logical statuses of products (pending, received, finished goods, dispatched) was complex. We needed to ensure the system was both optimized for fast response times and capable of handling these various product states.

Overcoming these challenges significantly enhanced my skills as a developer, particularly in problem-solving and optimization.

Chapter 8

Conclusion

My internship at Omega Solution has been a transformative experience, connecting academic knowledge with practical applications. The internship has provided a unique opportunity to work on industry-grade software solutions, allowing me to apply my theoretical knowledge in a professional setting. Throughout this experience, I have grown both technically and personally, honing my skills in backend development, database management, and collaboration.

Challenges like optimizing large file uploads, implementing intricate validation rules, and learning real-world warehouse operations played a crucial role in honing my problem-solving skills. These challenges taught me the importance of perseverance, adaptability, and teamwork in overcoming obstacles and delivering effective solutions.

Moreover, working closely with senior engineers and collaborating with the business development team has given me invaluable insights into the software development lifecycle and client interaction. I learned how to align technical implementations with business needs, ensuring that the solutions we delivered met client expectations. This experience also enhanced my communication and documentation skills, which I believe will be invaluable in my future career.

Overall, this internship has equipped me with the confidence and skills required to excel in the field of software engineering. It has solidified my interest in pursuing a career in this dynamic industry and has prepared me to take on more significant challenges in the future. The knowledge and experience gained during this time will serve as a strong foundation for my professional journey, enabling me to contribute meaningfully to future projects and teams.

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