Web based Ordering and Tracking for Joey's Aggregates Trading

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1 Introduction

Joey's Aggregates Trading offers construction materials like sand and gravel, but they currently rely on manual methods for order taking and delivery tracking. These outdated processes frequently result in delays, mistakes, and ineffective communication. To enhance this situation, a Web-based Ordering and Tracking System is suggested. This system will enable customers to place orders online, get real-time updates, and easily track their deliveries. Additionally, it will assist the business in managing orders more effectively and delivering improved, quicker service to its customers.

1.1 Project context

The global construction and infrastructure sectors continue to experience significant growth due to rapid urbanization, increased demand for housing, and the development of large-scale infrastructure projects. As a result, the supply of construction aggregates such as sand, gravel, and crushed stone has become crucial to supporting these projects. To address growing logistical complexities and ensure efficient material distribution, businesses worldwide are increasingly adopting digital platforms and supply chain management systems to modernize operations, minimize errors, and enhance service delivery [1].

At the national level, the Philippines' construction industry has been steadily expanding, driven by government infrastructure initiatives and private sector investments. This growth amplifies the need for reliable and efficient aggregate

supply chains, which are vital for timely project completion. However, many companies in the building materials sector still rely on manual and traditional processes, resulting in operational inefficiencies, order miscommunication, and inventory management issues. As highlighted by Lee et al. [2], the integration of digital innovations into the building materials supply chain is necessary to improve accuracy, reduce delays, and enhance customer satisfaction.

In the local context, businesses engaged in aggregates trading often face operational challenges due to outdated practices such as manual record-keeping, phone-based ordering, and paper documentation. These conventional methods contribute to order processing delays, miscommunication, stock discrepancies, and difficulties in tracking deliveries [3]. Logistics coordination, particularly in scheduling and dispatching trucks, frequently requires extensive manual adjustments, further affecting operational efficiency [4]. The absence of automated order tracking systems leads to customer dissatisfaction as clients remain uncertain about their delivery schedules and order status.

To address these challenges, companies within the local aggregates trading sector are beginning to consider the implementation of web-based ordering and tracking systems. Such solutions offer digital platforms for customers to place orders, monitor delivery status, and receive real-time updates, while providing businesses with tools for inventory management and logistics coordination. As Nguyen et al. [5] noted, digital platforms significantly improve supply chain performance by reducing human error, enhancing process transparency, and strengthening customer relationships.

In this context, Joey's Aggregates Trading, a local supplier of construction materials, aims to modernize its operational workflows by adopting a Web-based Ordering and Tracking System. This initiative seeks to improve internal processes, reduce transaction errors, and foster better customer engagement through the provision of a reliable, digital transaction platform tailored to the demands of the construction materials supply industry.

1.2 Purpose and Description

Joey's Aggregates Trading faces challenges in managing orders and tracking deliveries due to manual processes, leading to delays, errors, and inefficiencies. This study aims to develop a Web-based Ordering and Tracking System to streamline operations, improve order accuracy, and enhance transparency for both the business and its customers. By automating order management and providing real-time tracking, the system will reduce miscommunication, optimize workflow, and improve customer satisfaction. Ultimately, this project benefits the business by increasing efficiency and customers by ensuring a smoother and more reliable ordering experience.

The Web-based Ordering and Tracking System for Joey's Aggregates Trading is designed to streamline the entire order management process, enhancing efficiency, transparency, and customer satisfaction. This system will serve as a centralized platform for both the business and its customers, ensuring smooth and hassle-free transactions.With this system, customers can conveniently place orders online, track their deliveries in real-time, and receive automated updates, reducing the need for manual follow-ups. On the business side, Joey's Aggregates Trading can efficiently manage orders, optimize logistics, and monitor transactions through a user-friendly dashboard. The system will also feature automated notifications to keep customers informed about their order status and expected delivery time.

Beneficiaries:

Customers: Gain a more convenient and reliable ordering experience with real-time tracking and updates.

Joey's Aggregates Trading: Improves order management, reduces operational inefficiencies, and enhances customer service.

Delivery Personne: Have a structured system for tracking and managing deliveries, reducing errors and delays.

This system will modernize and simplify the business operations of Joey's Aggregates Trading, ensuring faster, more transparent, and more efficient order processing while improving overall customer satisfaction.

1.3 Objectives of the Study

This project aims to develop a Web-based Ordering and Tracking System for Joey's Aggregates Trading to enhance order management, improve tracking transparency, and optimize overall business operations through automation and digitalization.

1. 1. To Create and implement a well-structured product profiling module for Joey's Aggregates to optimize product information management.
   1.1 Administrator
   1.2 Customer

2. 2. To Improve the ordering process by developing a more robust order management system with the following features: Order management
   2.1 Product Management
   2.2 Order Transaction
   2.3 Tracking Order
   2.4 SMS Notifications

3. 3. To Evaluate the system using the ISO/IEC 25010 standard, focusing on these system characteristics:
   3.1 Functionality Suitability
   3.2 Usability
   3.3 Reliability

1.4 Scope and Delimitation

Product profiling is essential in ensuring that all stakeholders—especially customers and administrators—have access to accurate and updated product information. In the context of Joey's Aggregates Trading, where products such as sand, gravel, and other construction materials are core to the business, it is important to display critical details like type, size, availability, and price in a structured and easy-to-navigate manner.For the Administrator, this module will serve as a central control panel where product information can be added, updated, or removed with ease. This will eliminate the traditional manual method of updating records and reduce the risk of errors or outdated data. Administrators will also be able to monitor which products are in demand, manage stock information, and ensure that the displayed product listings reflect real-time inventory status.For the Customer, this module will enhance the browsing and ordering experience by offering clear and reliable product data. With a well-organized product catalog, customers can make informed decisions without needing to inquire manually via calls or messages. This promotes faster transactions and a smoother ordering process, ultimately leading to improved customer satisfaction and repeat business.Overall, the implementation of a structured product profiling module will not only improve internal processes but also contribute to a more professional and user-centered service delivery.

An efficient ordering process is the backbone of any product-based business. Joey's Aggregates Trading currently faces challenges in managing orders manually, which can lead to delays, lost information, and miscommunications between staff and clients. To address this, the proposed system will introduce a robust Order Management System that simplifies the entire transaction process from product selection to delivery confirmation.The Product Management submodule allows the admin to keep product data up to date, ensuring that only available items are listed and that pricing and specifications are consistent across the system. This is directly tied to Order Transactions, where customers can place orders, review order details, and receive automated confirmations. This removes the need for verbal agreements and physical receipts, streamlining the documentation process.The Tracking Order feature provides customers with visibility into the status of their orders—from processing to delivery. In industries where delivery timing is critical, this transparency builds trust and minimizes the need for repeated customer follow-ups.One of the system's unique offerings is SMS Notification, which

automatically sends real-time updates to the customer's phone regarding their order status. This is especially useful in areas where internet access may be intermittent but mobile connectivity is strong. Notifications such as "Order Confirmed," "Out for Delivery," and "Delivered" provide a sense of assurance to customers and reduce inquiries to the admin.

Beyond developing and implementing the system, it is essential to assess whether the system truly meets the needs of its users and stakeholders. To achieve this, the evaluation will be guided by the ISO/IEC 25010 software quality model, a globally recognized framework for assessing software quality. This standard is particularly useful in ensuring that the developed system is both effective and user-friendly.The evaluation will focus on two key characteristics: Functionality Suitability and Usability.Functionality Suitability refers to the system's ability to provide functions that meet stated and implied needs. This involves assessing whether the system performs all expected tasks, such as displaying product information, handling orders, sending notifications, and tracking deliveries. By focusing on this characteristic, the developers can ensure that no critical feature is missing and that the system works as intended under typical usage conditions. Usability, on the other hand, measures how easy and pleasant the system is to use. Even if a system is functionally complete, poor usability can still result in user dissatisfaction and errors. To evaluate this, the system will be tested by both administrators and customers to gather feedback on interface design, navigation, and overall experience. Special attention will be given to how intuitive the layout is, how quickly users can learn the system, and whether the design supports efficient task completion.Through this evaluation process, the development team will be able to identify strengths and areas for improvement, ensuring that the final system is not only technically sound but also accessible and convenient for its users.Altogether, this objective will significantly reduce manual workload, enhance customer communication, and ensure that orders are processed more reliably and efficiently.

The Web-based Ordering and Tracking System for Joey's Aggregates Trading is designed to streamline order processing and delivery tracking. However, certain limitations are set to keep the project focused and aligned with the company's operational needs. First, the system will not include an online payment feature; transactions will strictly be cash on delivery. This ensures that the company maintains its current payment method without the complexities of integrating online payment gateways. Second, inventory management will not be part of the system. The focus will be on order placement and tracking, while stock monitoring and supply management will continue to be handled through the company's existing processes. Third, the system will be web-based only and will not support a mobile application. Users will access the platform via web browsers, ensuring ease of use without the need for mobile app development and maintenance. Fourth, the project is exclusively for Joey's Aggregates Trading in Bulusan, Sorsogon, meaning it will not be designed for multiple branches or external expansion. The system's scope is

specifically tailored to the business processes of this location.

2 Review Related System

2.1 Introduction

With the rapid growth of the construction and infrastructure industries, implementing effective digital solutions is essential for optimizing order management and delivery tracking. This study explores current web-based ordering and tracking systems, focusing on UI/UX design,Automated Notifications and Alerts,Implementing Outsystem for Joey's Aggregates Trading.

2.2 Theme 1: UI/UX Implementation for Web-Based Ordering and Tracking Systems

User-Centric Design for Web-Based Systems . Nielsen emphasizes the importance of user-centric design in web-based systems, highlighting that simplicity and intuitiveness significantly enhance user experience. The research suggests that using clear navigation, consistent color schemes, and responsive layouts improves user satisfaction and reduces cognitive load [1].

For Joey's Aggregates Trading, adopting these principles can lead to a more efficient and user-friendly ordering and tracking experience.Importance of Mobile-Responsive UI.According to Kim and Lee , mobile responsiveness is a critical factor in modern web applications. Their study found that 68% of users are likely to abandon a system that is not mobile-friendly. They emphasize using flexible grids and adaptive images to ensure a seamless experience across devices [2].

Since Joey's Aggregates Trading may have clients accessing the system on different devices, ensuring mobile compatibility will be vital for broader accessibility.Real-Time Order Tracking UX .In their research on logistics tracking platforms, Zhao et al. highlight that real-time updates and interactive dashboards improve user trust and engagement. The study reveals that features like live order status, estimated time of arrival, and push notifications enhance the user experience by providing transparency and reducing uncertainty [3]. Implementing similar features in Joey's Aggregates Trading system could lead to better customer satisfaction.

2.3 Theme 2: Implementing an Automated Notification and Alerts System

In the context of Joey's Aggregates Trading, an efficient Automated Notification and Alerts System is crucial for managing the dynamic production and sales of hollow blocks in Bulusan, Sorsogon. Leveraging established communication platforms and monitoring tools, this system aims to streamline operations and enhance responsiveness.

Twilio stands out as a robust platform for integrating SMS and voice call functionalities. Utilizing Twilio's Programmable SMS API, Joey's Aggregates Trading can automate order confirmations, delivery schedule updates, and critical alerts regarding raw material shortages or equipment malfunctions. This ensures timely communication, particularly vital in a region where mobile communication is prevalent. Unlike general SMS platforms, Twilio's API allows for granular control and integration with existing systems, enhancing the specificity of notifications [4].

For detailed transactional communication, Mailgun offers a reliable email delivery service. Joey's Aggregates Trading can utilize Mailgun to automate the sending of detailed invoices, delivery confirmations, and daily production reports. This ensures clear and comprehensive communication with customers and management, facilitating efficient record-keeping and decision-making. While standard email services offer basic functionalities, Mailgun's focus on transactional emails ensures high deliverability and detailed analytics, crucial for business operations [5].

To provide real-time operational visibility and trigger alerts based on defined thresholds, UptimeRobot can be adapted. While primarily known for website monitoring, its alerting capabilities can be customized to track key production and inventory metrics. Integrating UptimeRobot with a dashboard displaying production progress, sales figures, and inventory levels allows for immediate notifications when critical thresholds are breached, enabling proactive management and minimizing disruptions. Unlike generic monitoring tools, UptimeRobot's flexibility in custom alerts allows for tailoring notifications to specific operational needs [6]. For urgent, direct communication, Vonage provides voice call APIs. In scenarios requiring immediate attention, such as major equipment breakdowns or urgent delivery delays, Vonage's voice call capabilities ensure that key personnel are promptly informed. This is particularly crucial in a business where timely responses can significantly impact operational efficiency. While general voice call services offer basic call functionalities, Vonage's API allows for programmable voice calls with advanced features, enhancing the effetiveness of urgent notifications [7].

Joey's Aggregates Trading's Automated Notification and Alerts System is designed to be a comprehensive solution, integrating these platforms to provide real-time updates and alerts for key business activities. Unlike generic notification

systems, this system is tailored to the specific needs of hollow block production and sales in Bulusan, Sorsogon , ensuring timely and relevant information delivery. By focusing on production monitoring, delivery tracking, and customer-specific alerts, it ensures reliable and continuous information flow, essential for managing the dynamic operations of Joey's Aggregates Trading.

2.4 Theme 3: Implementing Outsystem Technology in Joey's Aggregates Trading

Toyota Motor Corporation is one of the world's leading automakers. The company adopted OutSystems in 2014 to modernize legacy systems and improve development productivity in the digital domain. Starting with small-scale departmental applications, Toyota slowly expanded the use of OutSystems to various internal departments and to a few companies that were part of the Toyota Group and SI partners. By 2020, all the group's companies had adopted the platform. OutSystems has become one of the essential tools for IT and for promoting digital transformation in the Toyota Group [8] AVA, the ranked global insurance company, wanted to strengthen relationships with independent brokers by providing them with immediate online access to customer claims data from any device. AXA needed a new platform to drive legacy system modernization. AXA made brokers and customers happy (and reduced costs) by building an insurance portal for brokers in three months using the OutSystems platform [9] Bosch, a worldwide leader in technology and services, has incorporated OutSystems into its operations, especially within its Digital Factory project, to enhance manufacturing processes and reduce IT system inefficiencies. Although Bosch mainly concentrates on industrial solutions, its adoption of OutSystems showcases the benefits of low-code development for managing extensive operations [10]

Toyota Motor Corporation, AXA Insurance, and Bosch's use of OutSystems with Joey's Aggregates Trading System, we can analyze their objectives, implementation strategies, outcomes, and key benefits. Toyota adopted OutSystems in 2014 to modernize legacy systems and improve development productivity, starting with small-scale departmental applications and eventually scaling across the entire Toyota Group by 2020. This led to improved IT efficiency, streamlined processes, and enhanced collaboration with System Integration (SI) partners. AXA Insurance used OutSystems to build an insurance portal for brokers in just three months, aiming to strengthen relationships with independent brokers by providing real-time access to customer claims data. This resulted in improved broker and customer satisfaction, reduced operational costs, and faster service delivery. Bosch incorporated OutSystems into its Digital Factory project to enhance manufacturing processes and reduce IT inefficiencies, achieving improved operational efficiency, reduced downtime, and better integration with existing systems.

In contrast, Joey's Aggregates Trading System is likely focused on streamlining aggregates trading processes, improving data accuracy, and enhancing the user experience for traders and stakeholders. It may include features like real-time pricing, inventory management, and reporting, leading to improved trading efficiency, better decision-making through real-time insights, and potential cost savings through automation. While Toyota, AXA, and Bosch leveraged OutSystems for large-scale digital transformation, Joey's system could benefit from OutSystems' rapid development capabilities, scalability, and customization to meet specific trading needs. For example, like AXA, Joey's system could quickly adapt to new requirements, or like Toyota, it could scale to include more features or users over time. Similarly, Bosch's focus on operational efficiency highlights how Joey's system could streamline trading processes and reduce inefficiencies. Overall, OutSystems' versatility across industries demonstrates its potential to enhance Joey's Aggregates Trading System, offering faster development, scalability, and tailored solutions to meet unique business needs.

3 Technical Background

This chapter provides an overview of the system's technical aspects, including the hardware, software, and service specifications used during development. It also outlines the minimum and recommended system requirements for users, along with explanations of key technical terms mentioned in the chapter.

3.1 System Development Specifications

This section outlines the hardware, software, and service specifications required for the system's development. It details the technical requirements n ecessary to build and deploy the project.

3.1.1 Hardware Specifications

This section details the hardware specifications used for the project's development, which were critical to ensuring proper system functionality. Below, Table 1: Developer's Hardware Specifications outlines the required components for the systemto operate as intended. The development hardware includes the AMD Ryzen 5 processor (3.30 GHz) and a 64-bit operating system, providing sufficient performance for tasks such as web browsing and word processing. These specifications were carefully selected to meet the project's technical demands allowing

Table 1: Developer's Hardware Specification

HARDWARE	DESCRIPTION
System Type	64-bit operating system, x64-based processor
Processor	AMD Ryzen 5 @ 3.30 GHz
Memory	16 GB, 3200 MHz
Storage	30 GB (free space)
Internet Connection	20 Mbps or higher
Display	16.1-inch, FHD (1920 x 1080)

The developers to work smoothly. With 16.0 GB of memory, the system has enough RAM to run multiple applications simultaneously without experiencing significant slowdowns. The system also comes with 30 GB of storage, which is enough for storing a moderate amount of files, documents, and multimedia content. An internet connection of 20 Mbps or higher ensures fast and reliable internet access, making the system smoothly runs.

3.1.2 Software Specifications

The software requirements include the essential tools and platforms needed to build and operate the system effectively.

Table 2: Developer's Software Specification

Component	Specification
Operating System	Windows 11 64-bit, x64-based processor
Web Browser	Google Chrome Version 134.0.6998.178
Development Platform	OutSystems
Database	MySQL
IDE	OutSystems Service Studio
Web Server	OutSystems
Diagrams	Draw.io
Prototype/Wireframe	Figma
Documents	LaTeX Overleaf

Joey's Aggregates Trading System relies on carefully selected software components to ensure smooth order processing and tracking. The system is built on Windows 11 for stability, with Google Chrome providing optimal browser performance for the web-based interface. TheOutSystems platform accelerates development, allowing for quick creation of order management modules and

real-time tracking dashboards. MySQL serves as the backbone for data storage, securely maintaining order records, inventory data, and transaction history. The OutSystems Service Studio IDE streamlines UI development, making order submission and status checks user-friendly. A scalable OutSystems web server handles peak order volumes efficiently, while Figma/Balsamiq prototypes help refine the system's usability. LaTeX Overleaf ensures thorough documentation for maintenance and upgrades. This well-integrated tech stack delivers a fast, reliable, and intuitive solution for managing aggregate orders and tracking shipments.

3.1.3 Service Specifications

This section outlines the services utilized throughout the development process to guarantee accessibility and reliability.

Table 3: User's Service Specification Requirements

Service	Provider
Integration Platform	OutSystems Integration Hub
Internet Connection	PLDT/Converge

This table lists the tools and providers utilized for specific services. The OutSystems Integration Hub serves as the platform for linking various systems or applications. Internet access is supplied by either PLDT or Converge, both of which are internet service providers.

3.2 User's System Specification Requirements

This section outlines the minimum and recommended system requirements for users to ensure the system runs efficiently.

List of Computer Hardware

Component	Minimum Requirements	Recommended Requirements
System Type	64-bit operating system, x64-based processor	64-bit operating system, x64-based processor
Processor	Any processor	AMD Ryzen 5 @ 3.30 GHz
Memory(RAM)	8 GB	16 GB, 3200 MHz
Storage	30 GB (Free space)	50 GB (Free space)
Internet Connection	10 Mbps	20 Mbps or higher
Display	15.6-inch, HD (1366 x 768)	16.1-inch, FHD (1920 x 1080)

List of Computer Software

Component	Minimum Requirements	Recommended Requirements
Operating System	Windows 10 Home 64-bit	Windows 11 64-bit, x64-based processor
Web Browser	Google Chrome Version 120.0.6099.304 Microsoft Edge Version 91.0	Google Chrome Version 134.0.6998.178 Microsoft Edge Version 91.0 or newer
Development Platform	OutSystems	OutSystems
Database	Cloud-based MySQL	Cloud-based MySQL
IDE	OutSystems Service Studio	OutSystems Service Studio
Web Server	OutSystems	OutSystems
Diagrams	Draw.io	Draw.io
Prototype	Figma	Figma
Documents	LaTeX Overleaf	LaTeX Overleaf

List of Service

Service	Minimum Requirements	Recommended Requirements
Internet Connection	10 Mbps	20 Mbps or higher

3.3 Technical Terms

These technical terms are essential for grasping the workings of Joey's Aggregates Trading, as each contributes significantly to its operation and performance

Order Management System (OMS) - An OMS helps you organize and automate key parts of the purchasing/fulfillment processes for you and the customer. After an order is placed and a delivery method is selected, an automated process is triggered for fulfillment. Whether it's shipping from the nearest and/or most cost-effective location, or preparing the item for in-store pickup, OMS platforms help fulfill orders quickly. It also helps you monitor inventory levels to avoid stockouts and backorders and even manage other steps in the customer lifecycle, such as returns. It enables your employees and customers to view and track each order from start to finish, and it helps you analyze the overall efficiency of the process [16]. Refers to the feature of the system that allows Joey's Aggregates to manage customer orders digitally, from order placement to fulfillment. It streamlines the ordering process by automating transactions and reducing manual errors.

Product Catalog Management - Product Catalog Management enables your organization to manage your product offerings by grouping them into catalogs and categories, which streamlines the ordering process and helps manage leads, opportunities, quotes, and orders in Sales and Order Managemen [17]. This module enables the administrator to organize and manage detailed information about aggregates and related products. It allows for the creation, updating, and removal of product entries to ensure accurate product profiling.

Real-time Order Tracking - Real-time order tracking is a system that provides up-to-the-minute updates on the status of an order from the moment it is placed until it is delivered. This system uses a combination of technologies and processes to ensure transparency and efficiency in the supply chain. Here's a detailed look at how it works [18]. A system function that provides customers with live updates on the status and location of their orders. This enhances transparency and builds customer trust by allowing them to monitor their deliveries through the platform.

SMS Gateway Integration - An SMS Gateway enables a computer to send and receive SMS text messages to and from an SMS capable device over the global telecommunications network (normally to a mobile phone). The SMS Gateway translates the message sent, and makes it compatible for delivery over the network to be able to reach the recipient [19]. This component of the system sends automated SMS notifications to customers, such as confirmation messages, order status updates, and delivery alerts. It ensures timely communication between the business and its clients.

User Roles and Authentication - A user role determines the client network

privileges, the frequency of reauthentication, and applicable bandwidth contracts along with other permissions. Every client is associated with a user role or the client is blocked from access to the network. The system differentiates access levels between administrators and customers. It uses login credentials to authenticate users and assign role-based functionalities, ensuring secure access and proper system operation.

4 Design and methodology

The purpose of this chapter is to present the methods, strategies, instruments and documentation tools used in this study. It also presents several figures, tables, and diagrams to further explain the methodology used.

4.1 Concept

The concept of this study focuses on developing a Web-Based Ordering and Tracking System to streamline the ordering and delivery process of construction aggregates for Joey's Aggregates Trading. It aims to design a system that allows clients to place orders online, monitor their order status in real-time, and minimize the need for manual coordination. Through this system, customers can view available products, submit orders anytime, and track the status of their deliveries efficiently and hassle-free. This study adopts a Top-down development methodology and utilizes the Rapid Application Development (RAD) model for its system development life cycle to ensure fast delivery, flexibility, and user involvement throughout the process.

4.1.1 System Architecture Diagram

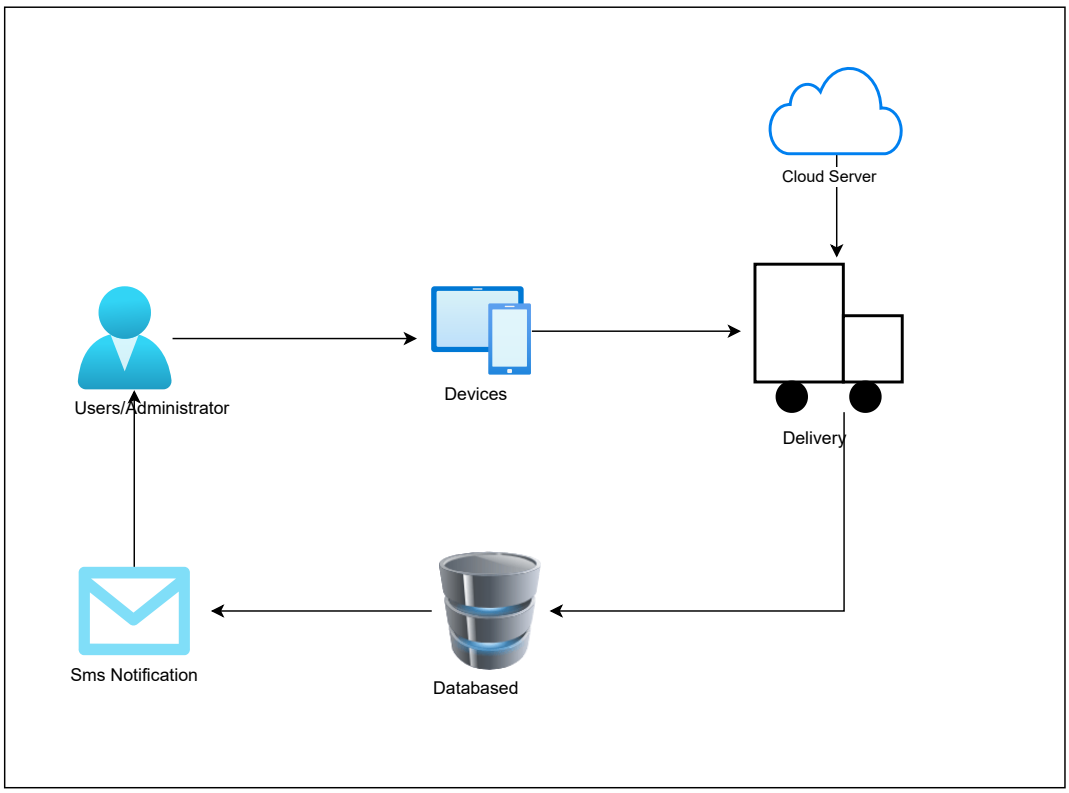


Figure 1: System Architecture Diagram

The system architecture diagram shows a clear layout of the main components and their connections. It starts with users or administrators who access the system using various devices. These devices link to a central cloud server. The cloud server is the heart of the system, managing user interactions and system functions. It processes data and allows users to operate the system from different locations.

Another important part of the architecture is the database, which holds all system information. The diagram also features SMS notifications and delivery services, indicating that the system provides real-time updates and logistics coordination. Notifications keep users informed, while the delivery aspect ensures that goods or services are tracked properly. This design emphasizes a modern, cloud-based system that enhances efficiency, accessibility, and real-time communication.

4.1.2 Data Flow Diagram

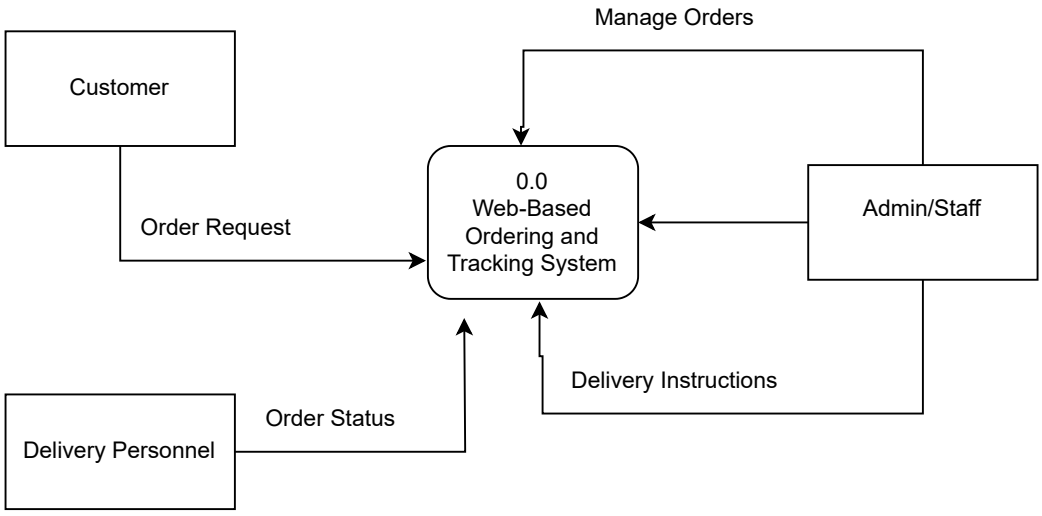


Figure 2: Level 0.0 Data Flow Diagram

This diagram illustrates how a web-based ordering and delivery system functions from beginning to end. It starts when a customer places an order online. The system promptly sends the order details to the admin or staff. This enables the staff to handle the order, prepare it, and provide delivery instructions to the delivery team. The process is straightforward and organized, which contributes to fast and efficient service.

After the delivery instructions are sent, the delivery team executes the task. They update the system with the order status—like picked up, on the way, or delivered. These updates are crucial as they keep everyone involved informed about the order's status in real time. This minimizes confusion and enhances service reliability.

The system also keeps the customer updated through status notifications. This allows customers to track their orders without needing assistance. Admins and staff can also oversee each step of the process, making it simpler to manage several orders. In summary, the diagram presents a simple yet effective system for managing online orders and deliveries seamlessly.

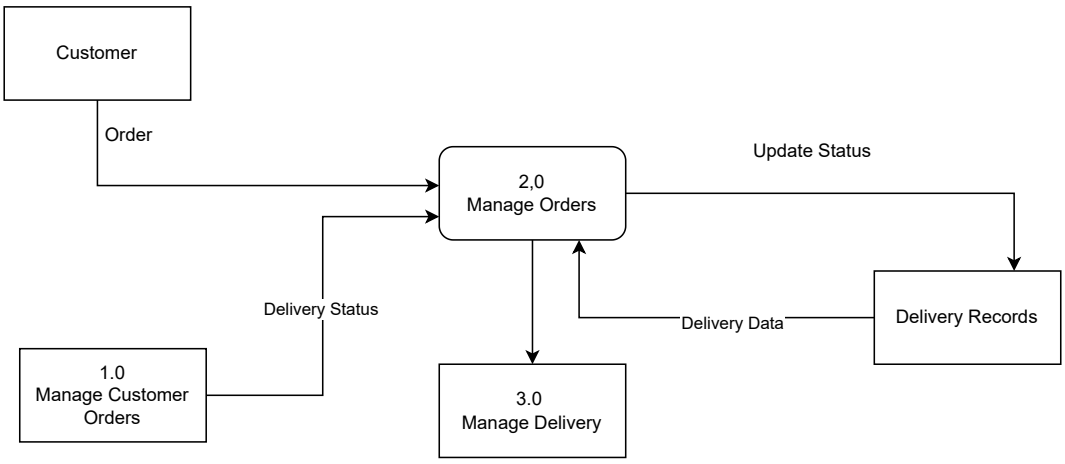


Figure 3: Level 1.0 Data Flow

This diagram illustrates how a straightforward system processes customer orders step by step. It starts when a customer places an order, which is received by the 'Manage Orders' process. This process is responsible for managing the order and monitoring its progress. It also collaborates with the 'Manage Customer Orders' process to receive updates about the delivery. These updates are crucial for keeping the customer informed about their order status.

The system also features a 'Manage Delivery' section, which oversees the actual delivery of the order. After the 'Manage Orders' process provides the delivery details, the delivery personnel follow the instructions to complete the task. Once the order is delivered, the delivery information is sent back to 'Manage Orders.' This update helps maintain accurate records and reflects the current status of each delivery.

Finally, the updated delivery information is stored in the 'Delivery Records' section. This enables the system to keep a complete record of all past and current deliveries. The entire process is designed to ensure that orders are handled correctly, deliveries are made on time, and all records are kept current. This organized structure facilitates smooth service for customers and efficient management for the staff.

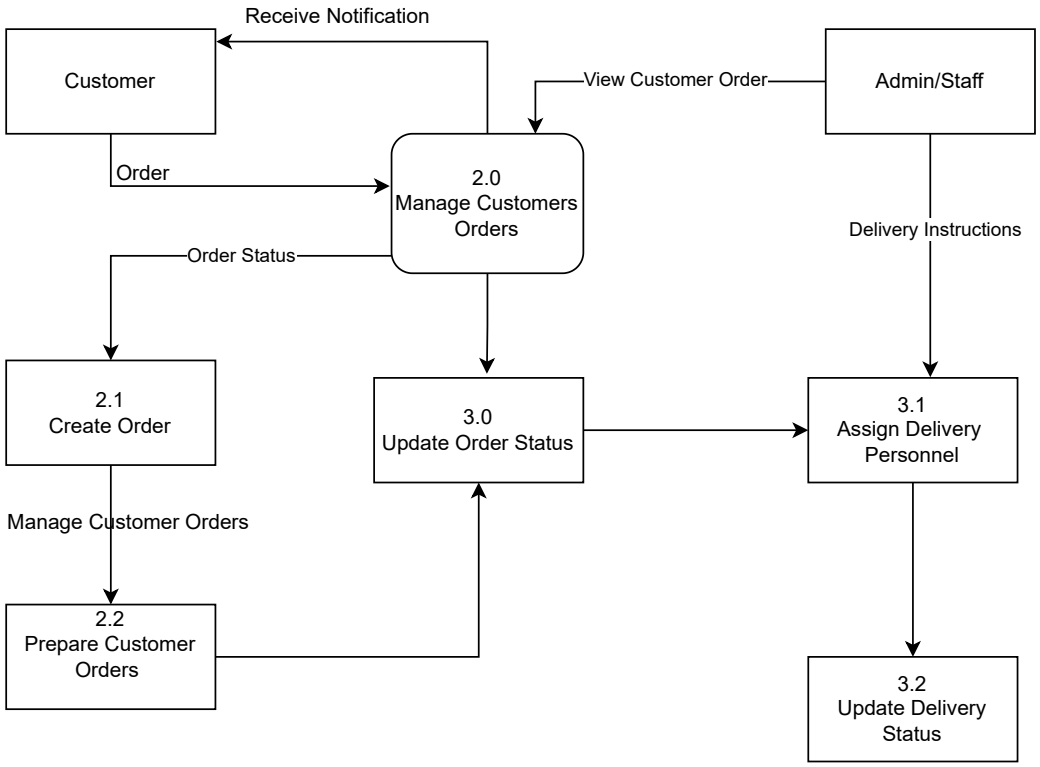


Figure 4: Level 2.0 Data Flow

The Data Flow Diagram (DFD) 2.0 gives a clear picture of how customer orders are handled in the system. It begins with managing customer data and progresses to creating orders. Admins or staff can view and arrange customer orders at various stages. The diagram divides the process into smaller sections, like preparing orders and assigning delivery staff. This ensures that every step is managed correctly and nothing is missed.

Additional processes involve updating order and delivery statuses, keeping everyone informed. Customers get delivery instructions and status updates, enhancing their experience. This flow guarantees that tasks are done in order and that communication among users, staff, and delivery personnel is effective. In summary, the DFD highlights a well-organized and responsive system for handling customer orders.

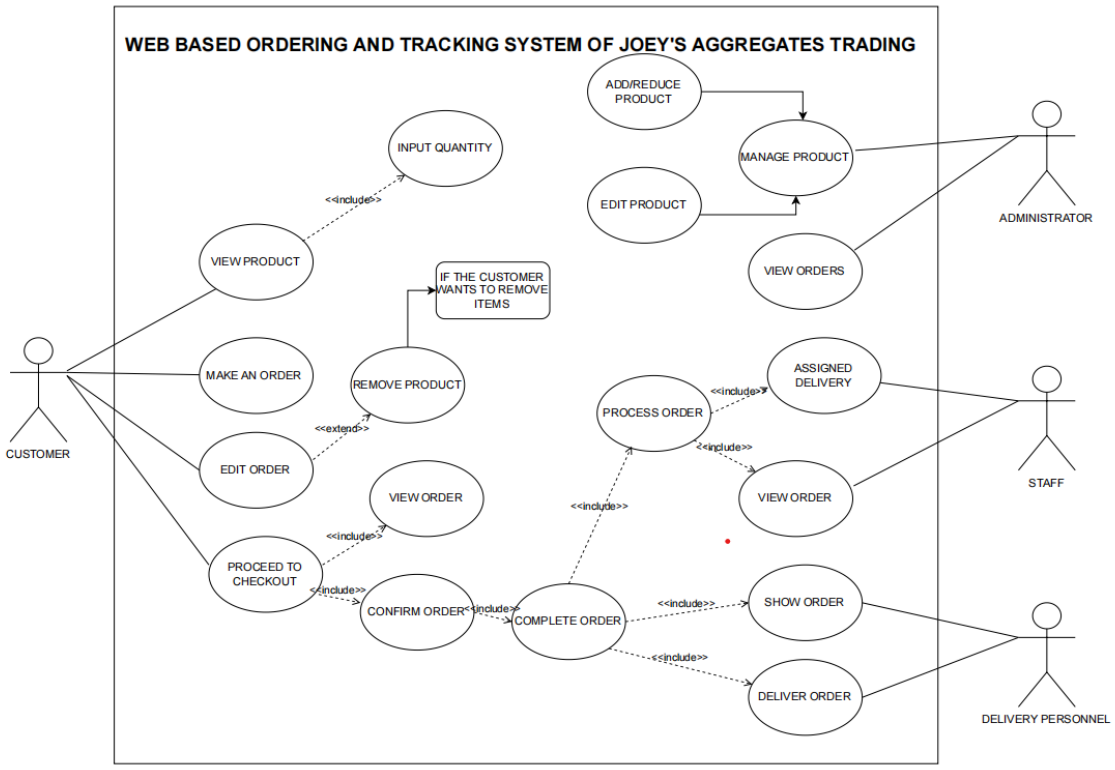


Figure 5: Usecase Diagram

In the first figure the Customer in the system is an individual with an existing account who interacts with the system to browse products, place orders, and manage their cart. They can view available products and input quantities before adding them to their order. If needed, the Customer can edit their order by removing unwanted items. After reviewing the order, the Customer proceeds to checkout, where they confirm their selections before finalizing the purchase. The Administrator manages the product catalog, adding or removing products to ensure it reflects the available inventory. Meanwhile, the Staff is responsible for processing the confirmed order, which includes tasks like packaging and preparing the products for delivery. This structure allows for a smooth interaction between all actors involved, from product selection to order fulfillment.

In the second Figure Customer can track their completed order and choose their preferred payment method, such as paying via a walk-in option or Cash on Delivery (COD). Once the order is ready for payment, the Customer is given the option to select the delivery type, either opting for pick-up or having the order delivered. If the Customer chooses delivery, a Tracking ID is provided for real-time tracking of the order. The Delivery Personnel plays a crucial role in this process. They are responsible for viewing the order details, printing the order summary, and delivering the order to the Customer's provided location. This streamlined process ensures that the Customer can monitor their order's progress and receive timely

updates, while the Delivery Personnel handles the logistics of delivering the product efficiently.

4.1.3 Activity Diagram

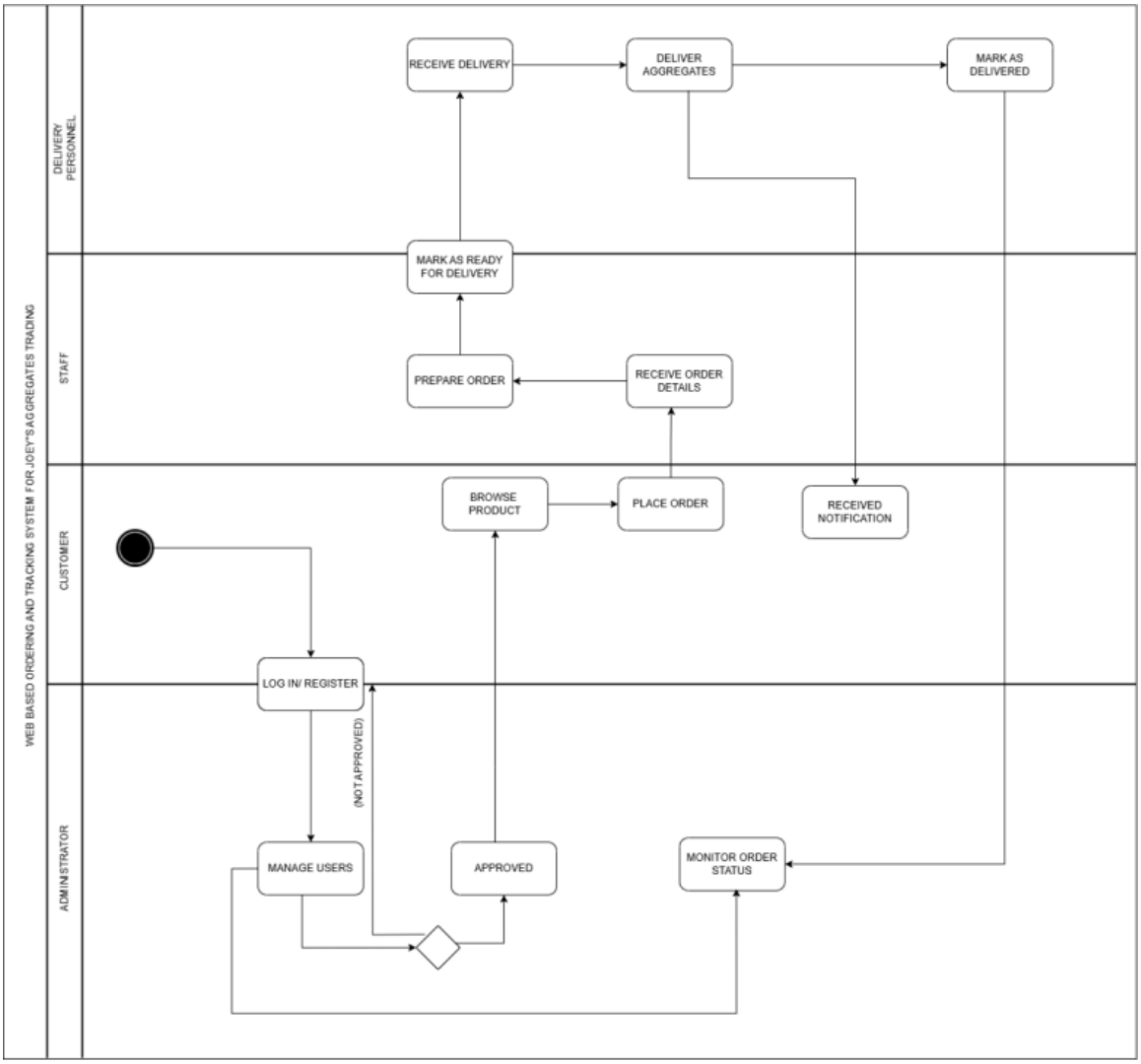


Figure 6: Activity Diagram

This activity diagram shows the step-by-step process in the system, starting from the customer's login up to the delivery of aggregates. Customers can browse products, place orders, and track their order status. Once an order is placed, the admin reviews and approves it while also managing users and monitoring the system.

After approval, staff members prepare the order and mark it as ready. Then, the delivery personnel picks up the assignment, delivers the aggregates, and marks

the order as delivered. Each user has a specific role that keeps the process flowing smoothly from start to finish.

4.1.4 Entity Relationship Diagram

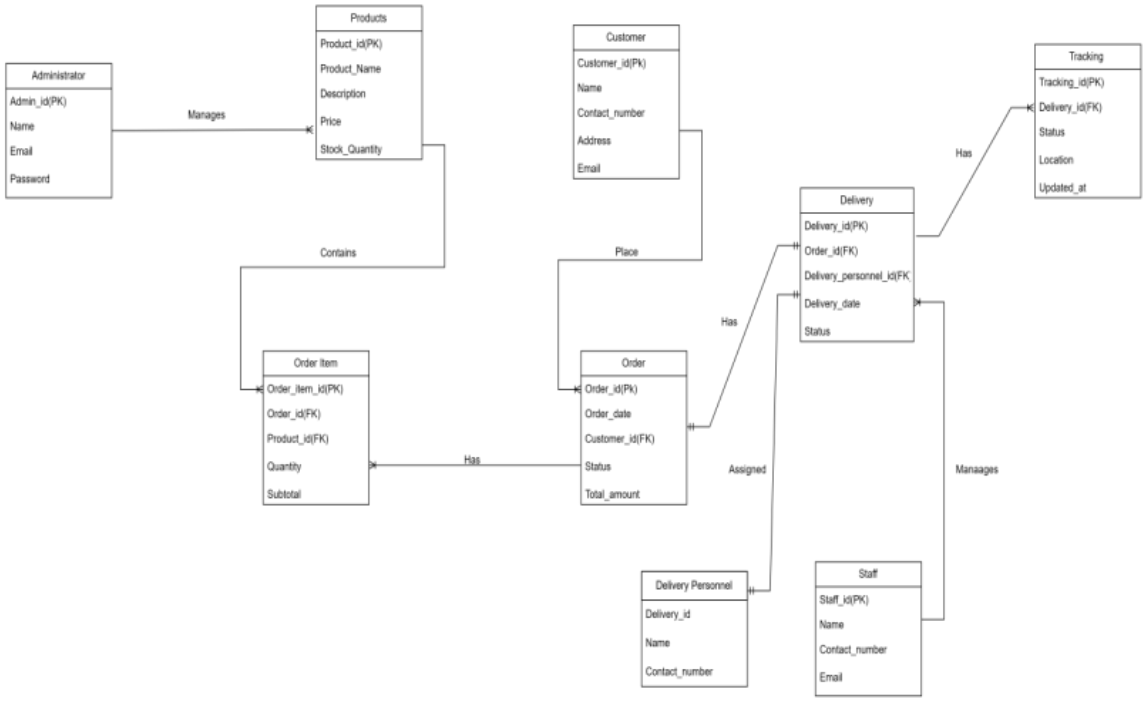


Figure 7: Entity Relationship Diagram

The Entity Relationship Diagram (ERD) for the Web-Based Ordering and Tracking System of Joey's Aggregates Trading illustrates how data entities are structured and related within the system. It identifies key entities such as Administrator, Customer, Staff, Delivery Personnel, Products, Order, Order Items, Delivery, and Tracking, each with its corresponding attributes to support system functionalities. The Administrator manages multiple Products, while a Customer can place several Orders, with each Order consisting of multiple Order Items. Each Order Item is linked to a single Product, ensuring accurate tracking of inventory and sales. An Order may or may not have a corresponding Delivery, depending on whether it is for pick-up or delivery, and each Delivery is overseen by one Staff member and assigned to a single Delivery Personnel for fulfillment. Furthermore, a Delivery can have multiple Tracking updates to monitor its status and location in real-time. The cardinalities used in this ERD reflect realistic business processes, such as one-to-many, many-to-one, and zero-or-one relationships, providing a clear and efficient data model that supports the smooth operation of the ordering and delivery processes while ensuring data integrity and scalability for future

enhancements.

4.2 Analysis Design

This chapter focuses on understanding the requirements and characteristics of the proposed system. This contains the requirement analysis and the functional and nonfunctional requirements.

4.2.1 Requirements Analysis

Requirements Analysis is the process of understanding what the users and stakeholders expect from the Web-Based Ordering and Tracking System. It involves discussions with those involved to clarify their needs, address any issues, and make sure everyone is on the same page. This step focuses on identifying the system's key features, such as order management, payment tracking, and product inventory, as well as its performance needs, like speed and reliability. By gathering and documenting these requirements, the system is designed to meet the actual needs of its users and the business.

4.2.2 Functional Requirements

This section outlines the key features and operations that the Web-Based Ordering and Tracking System must include to ensure smooth interaction for both customers and administrators.

Task Requirement	Task Reference
User registration and log in . Customers must be able to register and log in to place and track orders	Log in process
Order Management . Customers can place orders, view their order history, and track the status.	Order Management
Order Tracking . Customers and Administrator can track the status of ongoing orders.	Order Tracking
User Management . Administrator can manage customer accounts and monitor order activity.	User Management

4.2.3 Non functional Requirements

Non-functional requirements describe the overall performance and usability expectations for the system, ensuring a reliable and efficient experience for users.

Task Requirement	Task Reference
The system should process orders,display product details, and updates order statuses without delays.	Functional suitability
The system should must be intuitive and easy to navigate for both customers, and administrators.	Usability
The system should be stable and function consistently without downtime.	Reliability

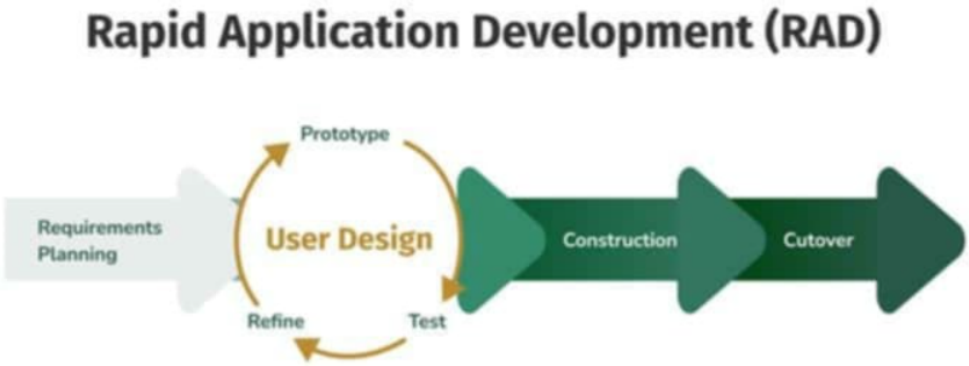


Figure 8: Development Model

4.2.4 Development Model

For the development of the Web-Based Ordering and Tracking System of Joey's Aggregates Trading, the Rapid Application Development (RAD) model will be used. RAD is a flexible and fast-paced approach that focuses on quick development through ongoing user feedback and frequent updates. This model is ideal for the project as it allows the team to quickly build, test, and refine the system based on real-time input, helping deliver a functional product faster and more efficiently.

Requirements Planning Phase

In the requirements planning phase, the development team, together with the stakeholders of Joey's Aggregates Trading, conducted consultations and data gathering activities to identify the existing issues and challenges in the company's manual ordering and tracking process. Through interviews, surveys, and informal discussions with the administrator, staff, delivery personnel, and selected customers, the team was able to gather important insights and business requirements. These requirements included the need for a real-time order placement feature, a systematic

order approval process, and an efficient delivery tracking mechanism. This phase served as the foundation for identifying the core functionalities of the system and ensuring that the proposed web-based platform directly addresses the operational needs of the business.

User Design Phase

The user design phase involved close collaboration between the system developers and the intended users of the system to conceptualize the processes, system flows, and user interface designs. Using mockups and wireframes, the development team presented visual representations of the ordering form, delivery tracking dashboard, and administrative control panels. Feedback from the staff, admin, and delivery personnel was gathered and considered to improve the usability and layout of each interface. Additionally, Data Flow Diagrams (Level 0, 1, and 2) were created to visually map out the flow of information within the system. This phase ensured that the system's design aligned with the actual workflow and operational preferences of the users, minimizing future usability issues.

Construction Phase

During the construction phase, the actual development of the system was carried out based on the approved designs and agreed functionalities. Using rapid development tools and techniques, the developers built the core modules of the web-based ordering and tracking system, including customer registration, order placement, order approval, delivery personnel assignment, and real-time tracking of orders and deliveries. Each module underwent unit testing immediately after completion to identify and resolve any functional issues promptly. The iterative nature of this phase allowed the team to make quick adjustments and enhancements based on continuous feedback, thereby ensuring that the system was built efficiently without compromising its quality and reliability.

Cutover Phase

The cutover phase marked the final stage of the system development, where the system was transitioned from development to actual implementation. The completed web-based ordering and tracking system was deployed on Joey's Aggregates Trading's designated server and environment. Prior to the full implementation, training sessions were conducted for the administrator, staff, and delivery personnel to familiarize them with the system's features and functionalities. A pilot testing period followed, where the system was used in real transaction scenarios to evaluate its performance and identify any remaining issues. Feedback from this pilot run was gathered and used to

make final adjustments before the official launch of the system. This phase ensured a smooth transition to the new digital platform while securing user confidence in its operation.

4.3 Development Approach

The development of the Web Based Ordering and Tracking System for Joey's Aggregates Trading followed an Rapid Methodology .

4.4 Software Development Tools

The following development tools are the front-end and back-end tools used for the implementation of the Web-Based Ordering and Tracking System of Joey's Aggregates Trading. This includes both the conceptual and operational definitions, which contribute to a clearer understanding of the tools used in the development process.

Outsystem

OutSystems is a low-code development platform that enables users to build, deploy, and manage web and mobile applications with minimal hand-coding. It provides a visual development environment that allows developers to create applications by assembling pre-built components through a drag-and-drop interface. This approach simplifies the development process while maintaining flexibility and scalability. OutSystems is utilized as the primary development platform for the Web-Based Ordering and Tracking System of Joey's Aggregates Trading. The platform provides a visual environment where researchers design the system's web interface and functionalities. Using OutSystems' pre-built components, the system is developed to support features such as order placement, delivery tracking, customer notifications, and real-time updates. The tool's rapid development capabilities enable efficient iteration based on stakeholder feedback throughout the development process.

Figma

Figma is a web-based design tool primarily used for user interface (UI) and user experience (UX) design. It enables real-time collaboration among team members and offers interactive prototyping capabilities. The platform allows users to manipulate

interface elements such as text, color, images, and animations, providing an efficient environment for designing responsive and interactive layouts.

Balsamiq

Balsamiq serves as the collaborative workspace for the proponents in designing the prototype of the Web-Based Ordering and Tracking System of Joey's Aggregates Trading. It is used to create the system's wireframes, layout structure, and user interface designs. Through Balsamiq, the team can visualize and refine the user experience while ensuring that the design aligns with the system requirements and client expectations.

Amazon Web Services

Amazon Web Services (AWS) is a comprehensive cloud-based service platform offered by Amazon that provides a wide range of infrastructure services such as computing power, storage, networking, and databases. These services allow individuals and organizations to build, deploy, and manage applications and systems through the cloud with flexibility, scalability, and reliability. AWS is utilized as the cloud computing platform to host the Web-Based Ordering and Tracking System of Joey's Aggregates Trading on the World Wide Web. The platform ensures that the system is accessible to users anytime and anywhere, while also providing reliable performance, secure data management, and scalable deployment for future system enhancements.

MySQL

MySQL is the chosen relational database management system for the Web-Based Ordering and Tracking System of Joey's Aggregates Trading. It is used to store and manage structured data such as customer details, order information, delivery records, and system configurations. MySQL supports the backend functionalities of the system by enabling efficient data handling, ensuring data integrity, and providing fast query processing for real-time operations.

Twilio

Twilio is a cloud communications platform that provides programmable communication tools through web service APIs. It enables developers to integrate messaging, voice, video, and other communication features into applications,

allowing them to send and receive text messages, phone calls, and other forms of communication programmatically. Twilio will be integrated into the Web-Based Ordering and Tracking System of Joey's Aggregates Trading to facilitate communication between the system and its users. It will be used to deliver automated notifications, alerts, and updates related to order status, shipment tracking, delays, and other important logistics information. Through Twilio, customers, handlers, and managers will receive timely and relevant messages, improving coordination and overall communication within the ordering and delivery process.

Draw.io

Use to create system diagrams such as System Architecture Diagram (SAD), Data Flow Diagram (DFD) Entity Relationship Diagram (ERD) and Use Case Diagram for planning and documentation.

4.5 Schedule and Timeline

A schedule and timeline are essential tools used in planning, organizing, and managing tasks, events, or projects. A schedule outlines the sequence of activities, their estimated durations, and the necessary resources, while a timeline visually represents these activities in chronological order. These tools help in identifying task dependencies, setting deadlines, and allocating resources effectively. A well-structured schedule and timeline ensure that projects remain on track, goals are met on time, and productivity is maximized.

4.5.1 Work Breakdown Structure (WBS)

Task ID	Description	Duration (Days)	Start Date	End Date	Precedence
PLANNING PHASE					
T1	Look for potential client	4	01/27/2025	01/30/2025	None
T2	Think of the possible title	5	01/31/2025	02/04/2025	T1
T3	Review existing literature and previous studies	10	02/05/2025	02/14/2025	T2
T4	Present the title	1	02/15/2025	02/15/2025	T2, T3
T5	Refine the title	2	02/16/2025	02/17/2025	T4
T6	Gather data: Data Gathering	8	02/18/2025	02/25/2025	T4, T5
T7	Identify the resources needed	4	02/26/2025	03/01/2025	T6
T8	Identify potential risks and challenges	3	03/02/2025	03/04/2025	T7
T9	Develop a project schedule	5	03/05/2025	03/09/2025	T7, T8
T10	Document the findings, changes, and decisions	2	03/10/2025	03/11/2025	T9
T11	Establish a budget for the project	5	03/12/2025	03/16/2025	T9, T10
REQUIREMENTS ANALYSIS PHASE					
T12	Identify requirements through interviews, surveys, and observation	8	03/17/2025	03/24/2025	T11
T13	Document the needs and expectations of stakeholders	4	03/25/2025	03/28/2025	T12
T14	Create flowcharts and diagrams to represent requirements	6	03/29/2025	04/03/2025	T12, T13
T15	Review the flowcharts for non-functioning requirements	4	04/04/2025	04/07/2025	T14
T16	Prioritize requirements based on their importance	4	04/08/2025	04/11/2025	T15
T17	Validate requirements to ensure accuracy and completeness	4	04/12/2025	04/15/2025	T16
SYSTEM DESIGN PHASE					
T18	Design the overall structure of the system	5	04/16/2025	04/20/2025	T17
T19	Create detailed design specifications for each system component	8	04/21/2025	04/28/2025	T18
T20	Design the database schema	4	04/29/2025	05/02/2025	T19
T21	Create wireframes, mockups, and prototypes	7	05/03/2025	05/09/2025	T19
T22	Specify the data flow, inputs, outputs, and interfaces	5	05/10/2025	05/14/2025	T20, T21
T23	Review and validate the design	4	05/15/2025	05/18/2025	T22

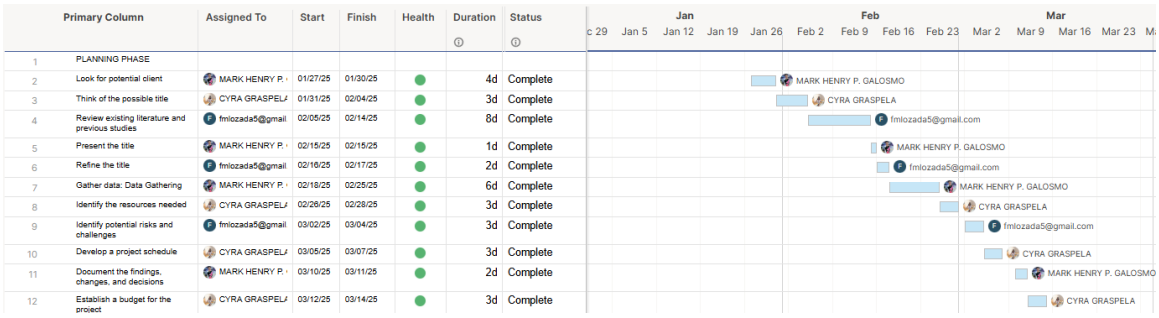
Figure 9: WBS

IMPLEMENTATION PHASE					
T24	Create implementation plan and schedules	3	05/19/2025	05/21/2025	T23
T25	Test individual components to ensure they function correctly	8	05/22/2025	05/29/2025	T24
T26	Integrate the components	5	05/30/2025	06/03/2025	T25
T27	Conduct system testing	6	06/04/2025	06/09/2025	T26
TESTING PHASE					
T28	Set up the test environment, including hardware, software, and network	4	06/10/2025	06/13/2025	None
T29	Create survey questionnaires	3	06/14/2025	06/16/2025	T28
T30	Conduct testing	5	06/17/2025	06/21/2025	T29
T31	Validate that the system meets the expected result	4	06/22/2025	06/25/2025	T30

DEPLOYMENT, MAINTENANCE AND SUPPORT PHASE					
T32	Develop a detailed deployment plan	4	06/26/2025	06/29/2025	T31
T33	Create user's manual	3	06/30/2025	07/02/2025	T32
T34	Deploy the system	2	07/03/2025	07/04/2025	T33
T35	Monitor the system's performance	3	07/05/2025	07/07/2025	T34

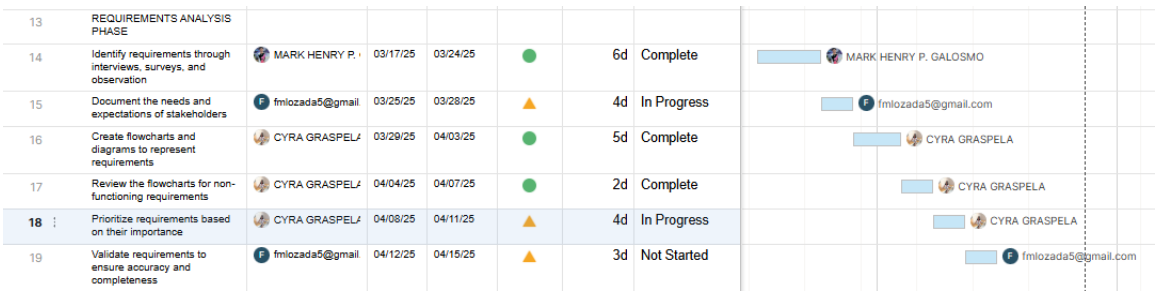
Figure 10: WBS

4.5.2 Gantt Chart



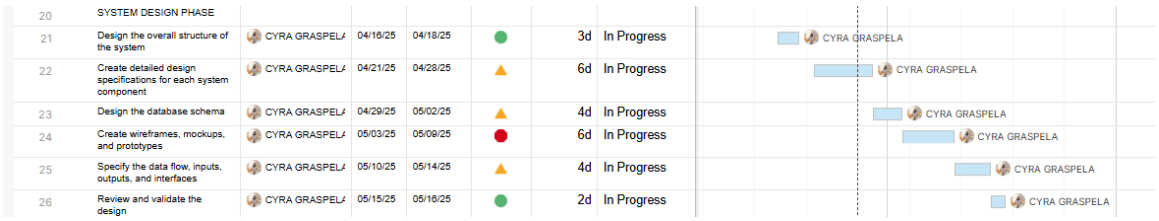
	Primary Column	Assigned To	Start	Finish	Health	Duration	Status
1	PLANNING PHASE						
2	Look for potential client	MARK HENRY P.	01/27/25	01/30/25		4d	Complete
3	Think of the possible title	CYRA GRASPELA	01/31/25	02/04/25		3d	Complete
4	Review existing literature and previous studies	fmlozada5@gmail	02/05/25	02/14/25		8d	Complete
5	Present the title	MARK HENRY P.	02/15/25	02/15/25		1d	Complete
6	Refine the title	fmlozada5@gmail	02/16/25	02/17/25		2d	Complete
7	Gather data; Data Gathering	MARK HENRY P.	02/18/25	02/25/25		6d	Complete
8	Identify the resources needed	CYRA GRASPELA	02/26/25	02/28/25		3d	Complete
9	Identify potential risks and challenges	fmlozada5@gmail	03/02/25	03/04/25		3d	Complete
10	Develop a project schedule	CYRA GRASPELA	03/05/25	03/07/25		3d	Complete
11	Document the findings, changes, and decisions	MARK HENRY P.	03/10/25	03/11/25		2d	Complete
12	Establish a budget for the project	CYRA GRASPELA	03/12/25	03/14/25		3d	Complete

Figure 11: Gantt Chart



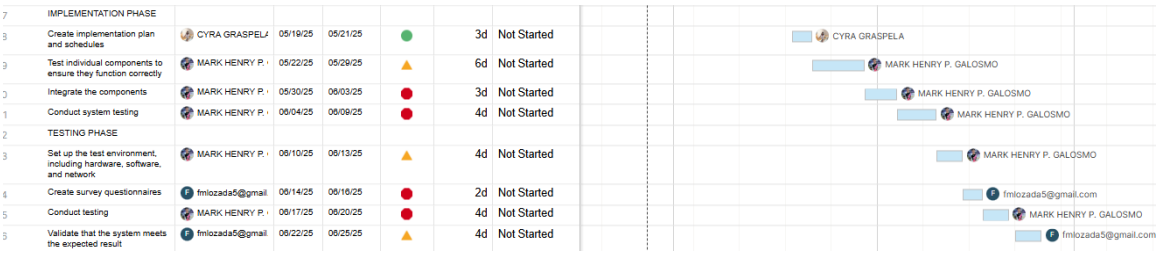
13	REQUIREMENTS ANALYSIS PHASE						
14	Identify requirements through interviews, surveys, and observation	MARK HENRY P.	03/17/25	03/24/25		6d	Complete
15	Document the needs and expectations of stakeholders	fmlozada5@gmail	03/25/25	03/28/25		4d	In Progress
16	Create flowcharts and diagrams to represent requirements	CYRA GRASPELA	03/29/25	04/03/25		5d	Complete
17	Review the flowcharts for non-functioning requirements	CYRA GRASPELA	04/04/25	04/07/25		2d	Complete
18	Prioritize requirements based on their importance	CYRA GRASPELA	04/08/25	04/11/25		4d	In Progress
19	Validate requirements to ensure accuracy and completeness	fmlozada5@gmail	04/12/25	04/15/25		3d	Not Started

Figure 12: Gantt Chart



20	SYSTEM DESIGN PHASE						
21	Design the overall structure of the system	CYRA GRASPELA	04/16/25	04/18/25		3d	In Progress
22	Create detailed design specifications for each system component	CYRA GRASPELA	04/21/25	04/28/25		6d	In Progress
23	Design the database schema	CYRA GRASPELA	04/29/25	05/02/25		4d	In Progress
24	Create wireframes, mockups, and prototypes	CYRA GRASPELA	05/03/25	05/09/25		6d	In Progress
25	Specify the data flow, inputs, outputs, and interfaces	CYRA GRASPELA	05/10/25	05/14/25		4d	In Progress
26	Review and validate the design	CYRA GRASPELA	05/15/25	05/16/25		2d	In Progress

Figure 13: Gantt Chart



7	IMPLEMENTATION PHASE						
8	Create implementation plan and schedules	CYRA GRASPELA	05/19/25	05/21/25		3d	Not Started
9	Test individual components to ensure they function correctly	MARK HENRY P.	05/22/25	05/29/25		6d	Not Started
0	Integrate the components	MARK HENRY P.	05/30/25	06/03/25		3d	Not Started
1	Conduct system testing	MARK HENRY P.	06/04/25	06/09/25		4d	Not Started
2	TESTING PHASE						
3	Set up the test environment, including hardware, software, and network	MARK HENRY P.	06/10/25	06/13/25		4d	Not Started
4	Create survey questionnaires	fmlozada5@gmail	06/14/25	06/16/25		2d	Not Started
5	Conduct testing	MARK HENRY P.	06/17/25	06/20/25		4d	Not Started
6	Validate that the system meets the expected result	fmlozada5@gmail	06/22/25	06/25/25		4d	Not Started

Figure 14: Gantt Chart

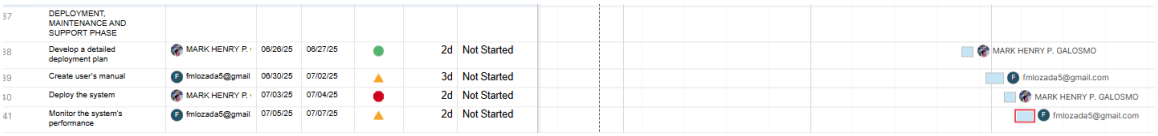


Figure 15: Gantt Chart

4.5.3 Critical Path Method (CPM)

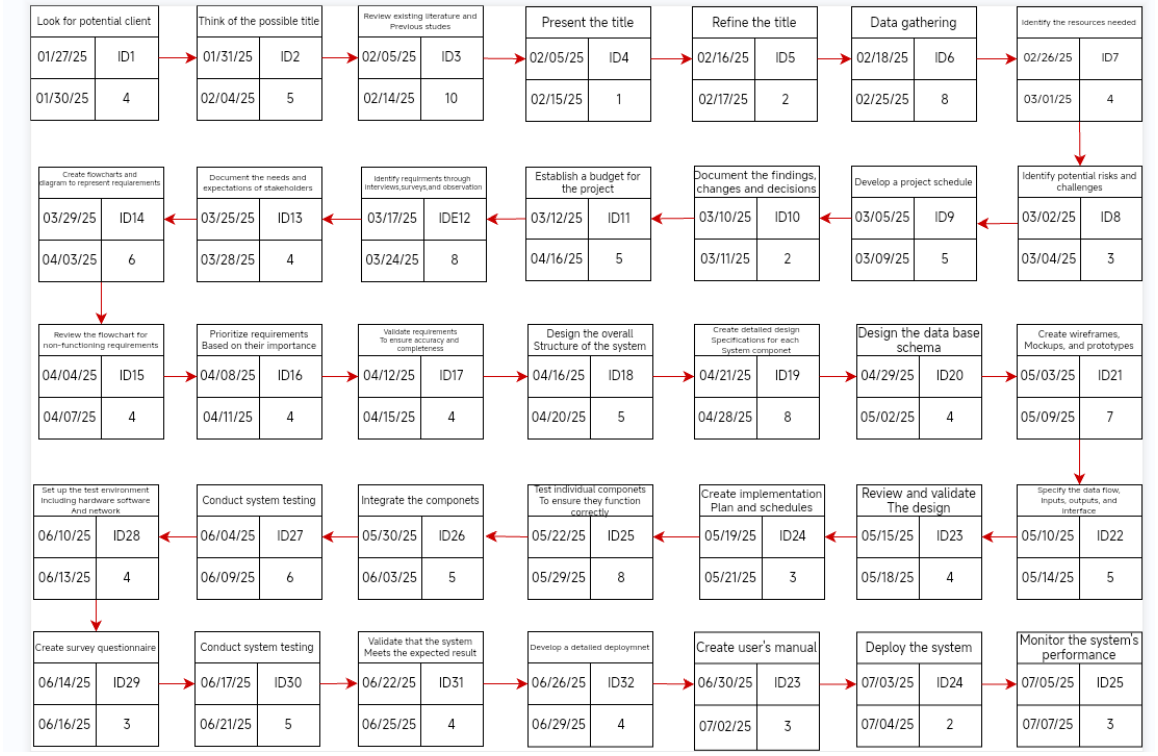


Figure 16: CPM

4.6 Responsibilities

Name	Position	Responsibility
Ms. Cyra G. Graspela	System Analyst	Was responsible for analyzing system's requirements and functionalities. The one who created system models, flowcharts, diagrams and also designing a wire-frame for the proposed system.
Mr. Francis Marnol Lozada	Technical Writer	Responsible for documenting all written reports, including the capstone manuscript. Handled formatting, referencing, and also editing all project-related documents.
Mr. Mark Henry Galosmo	Programmer	Was responsible for developing the system using Outsystems and other development tools. The one who conducted debugging and testing of the system.

4.7 Budget and Cost Management

This section presents the estimated cost required for the development, testing, and deployment of the proposed system. The budget covers software tools, hardware usage, internet service, documentation and other resources needed for the project success.

4.8 Developers Budget and Cost Management

The materials in Table 9 were needed for the Development of the software system. Laptop for creating the manuscript, system's diagrams, system design also known as prototyping and also for project management tools, Bondpaper for printing all the documents of the study. Budget for printing as it needed for the printed copies of the manuscript for the proposal and final defense and the safekeeping of the deliverables. Internet was needed for learning, searching informations, hosting, and communicating with the researchers and their adviser. The budget of the proposed project is PHP 44,99

4.8.1 Proponent's Budget and Cost Management

Table 1. Materials and Supply

Item Name	Quality	Unit Price	Total Amount
Bond paper(long/short)	2 ream	₱ 240.00	₱ 480.00
Pencil	3 pcs	₱ 12.00	₱ 36.00
Ballpen (black)	3 pcs	₱ 12.oo	₱ 36.00
Pentel Pen	4 pcs	₱ 20.00	₱ 80.00
White Folder	5 pcs	₱ 12.00	₱ 60.00
Total			₱ 322.00

4.8.2 Service and Hosting Budget

Table 2. Service Expenses

Service	Provider	Monthly Fee	Total Amount
Internet	Converge	₱ 799.00	₱ 9,588.00
Total			₱ 9,588.00

4.8.3 System Operation Cost in Development

Table 3: System Operation Cost

Service	Provider	Monthly Fee	Total Amount
Cloud Hosting	OutSystem	Free	Free
Total			Free

4.9 Verification and Validation

To ensure that the Web-Based Ordering and Tracking System for Joey's Aggregates Trading meets both technical specifications and end-user expectations, comprehensive verification and validation processes will be conducted. These steps are essential to confirm that the system is accurate, reliable, efficient, and ready for actual deployment in a business environment.

4.9.1 Verification

Verification focuses on evaluating whether the system has been developed correctly according to its specified requirements. This involves systematic testing of

functionality, usability, and performance to identify and resolve issues such as bugs, logic errors, or missing features. By thoroughly examining each module of the system such as order placement, inventory updates, delivery tracking, and user management developers ensure the system functions as intended. Verification guarantees that the system meets the internal design specifications before moving on to user testing.

4.9.2 Validation

Validation ensures that the system fulfills its intended purpose and meets user needs. To assess this, the researchers will utilize a structured ISO/IEC 25010-based survey questionnaire focusing on key quality attributes, including functional suitability, usability, and reliability. The validation process involves gathering feedback from intended users such as customers, dispatch staff, and admin personnel of Joey's Aggregates Trading. This feedback helps determine whether the system is practical, user-friendly, and effective in simplifying the ordering and delivery tracking process.

Liker Scale

Mean	Range	Verbal Interpretation
1.00	1.80	Stongly Disagreel
1.81	2.60	Disagreel
2.61	3.40	Neither Agree or Disagree
3.41	-4.20	Agree
4.21	5.00	Strongly Agree

4.10 Testing

The testing phase is a critical step to ensure everything works as expected before the system is deployed. It's designed to catch any issues and confirm that the system aligns with user needs and meets the standards set by ISO/IEC 25010. During this phase, we verified that all the functional requirements were met, meaning each feature worked as intended. To test the system, we used Black Box Testing. This approach focuses purely on the inputs and expected outputs, without worrying about how the system works internally. The goal was to make sure everything functioned properly when different modules interacted with each other. A key part of the testing was checking if the system could handle appointment scheduling accurately across various service providers. We also applied the cause-effect testing technique. This method involved identifying the desired outcome and then designing test scenarios

that would trigger that outcome. This helped us understand how the system responds under specific conditions.

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