MedChain

Java and Spring Framework Lab (CS3603-1)

Mini Project Report submitted

by

Ansh Vashisht

(NNM22CS029)

Yashas Hegde

(NNM22CS209)

Under the Guidance of

Ms. SOWMYA S
Assistant Professor Gd.-II

In partial fulfillment of the requirements for the award of the Degree of

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Department of Computer Science and Engineering

NMAM Institute of Technology, Nitte - 574110

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

Certified that the Mini project work entitled

"MED CHAIN"

is a Bonafide work carried out by

Ansh Vashisht (NNM22CS029)

Yashas Hegde (NNM22CS209)

in partial fulfilment of the requirements for the award of

Bachelor of Engineering Degree in Computer Science and Engineering

prescribed by NITTE (Deemed to be University)

during the year **2024-2025**.

The project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the Bachelor of Engineering Degree.

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Signature of the Guide

ABSTRACT

This project involves the development of **Med Chain**, a comprehensive platform designed to revolutionize the medical supply chain by ensuring seamless interactions among three primary stakeholders: chemist shop owners, wholesalers, and delivery personnel. Med Chain addresses the critical need for a structured and efficient system to manage the flow of medical supplies while prioritizing accuracy, transparency, and scalability.

Chemist shop owners benefit from an intuitive interface that allows them to submit medicine orders effortlessly. The system provides real-time tracking of their requests, offering transparency and control over the order's journey through the supply chain. This feature ensures that chemists can monitor the progress of their orders, enabling them to plan and manage their inventory effectively.

Chemist Shop owners play a pivotal role in this platform, receiving and processing orders while maintaining stringent inventory checks. The system supports them in approving orders promptly, minimizing errors, and ensuring timely fulfilment. By optimizing the order management process, Med Chain enhances the overall efficiency and reliability of the supply chain, reducing potential bottlenecks and middleman.

Once orders are confirmed, they are seamlessly assigned to delivery personnel, ensuring that the distribution process is both swift and reliable. Delivery personnel are integrated into the system to guarantee the smooth transportation of medical supplies, ultimately meeting the end-user's needs without delays.

Med Chain prioritizes building a strong, scalable, and transformative solution to address the challenges of the medical supply chain, setting the stage for a revolutionary impact in this critical domain.

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INTRODUCTION

In today's rapidly evolving healthcare landscape, access to essential medicines remains a critical challenge, especially within urban areas where chemists and wholesale suppliers operate independently without an integrated platform for communication, order management, and inventory tracking. This fragmented approach often leads to inefficiencies such as delays in order processing, inaccurate inventory records, and miscommunication between stakeholders, resulting in medicine shortages that leave customers without timely access to critical treatments. Furthermore, delivery personnel frequently face logistical challenges due to the absence of centralized coordination, further exacerbating delays in the supply chain.

The **Med Chain** project seeks to bridge these gaps by establishing a unified digital platform that fosters seamless interaction among chemists, wholesalers, and delivery personnel. By digitizing and streamlining the supply chain, the platform aims to eliminate inefficiencies, enabling chemists to quickly place and track orders, wholesalers to manage inventory and approvals in real-time, and delivery personnel to ensure prompt and accurate distribution of medical supplies. This interconnected system not only reduces bottlenecks but also enhances transparency and accountability, fostering trust and collaboration among stakeholders.

In addition to addressing immediate logistical challenges, **Med Chain** lays the foundation for a scalable solution capable of integrating advanced functionalities in the future. Features such as automated order tracking, predictive inventory management, and efficient communication channels promise to transform the supply chain into a robust and intelligent system. This innovative approach aims to ensure that no individual is deprived of essential medicines due to inefficiencies in the supply chain, ultimately contributing to a more resilient and equitable healthcare infrastructure.

PROBLEM STATEMENT

In many cities and villages, chemists operate without a unified platform, creating significant challenges in ensuring the timely availability of essential medicines. Small medical shops, in particular, face difficulties maintaining a comprehensive inventory due to limited access to wholesale networks, inefficient communication channels, and delays in the restocking process. This disjointed system often forces customers to visit multiple pharmacies in search of their required medications, causing frustration and delays in receiving critical treatments. Moreover, big chemist shops struggle to manage inventory efficiently, often leading to errors in tracking and order fulfilments, while delivery personnel face logistical inefficiencies due to a lack of coordination and real-time updates.

The **Med Chain** project directly addresses these issues by introducing a cohesive digital network that bridges the communication and operational gaps among chemists, wholesalers, and delivery personnel. By providing a centralized platform, Med Chain streamlines the entire supply chain, enabling chemists to submit orders seamlessly, track their status, and receive timely updates. Wholesalers benefit from tools to manage inventory accurately and process orders efficiently, while delivery personnel are equipped with optimized routing and real-time delivery tracking, ensuring medicines reach their destinations without unnecessary delays.

This integrated approach not only enhances operational efficiency but also ensures that customers can access essential medicines without disruption. By fostering better collaboration and transparency, Med Chain reduces the burden on small medical shops and helps wholesalers scale their operations more effectively. The platform's ability to unify stakeholders into a single ecosystem paves the way for a more reliable and accessible medicine distribution network, meeting the growing demands of urban healthcare systems and ensuring that no patient is left without the treatments they need.

OBJECTIVES

1. Timely Medicine Access for All:

Med Chain is dedicated to establishing a seamless and reliable supply network that ensures every chemist, whether a small local shop or a large retail pharmacy, has uninterrupted access to a comprehensive range of medicines. This approach minimizes delays in restocking, reduces the risk of stockouts, and empowers chemists to serve their communities better, ultimately improving the overall availability of essential healthcare products.

2. Bridging Retailers and Wholesalers:

The platform focuses on bridging the gap between small retailers and wholesalers by offering an intuitive and accessible system for inventory management and order placement. By doing so, it enables small businesses to maintain a steady supply of essential drugs, enhancing their ability to compete with larger chains and fostering a more equitable and balanced pharmaceutical ecosystem that benefits all stakeholders.

3. Enhancing Wholesaler Efficiency:

Med Chain supports wholesalers by providing tools to streamline order management, inventory tracking, and customer relationship management. This not only helps wholesalers process orders faster but also allows them to expand their reach and build stronger partnerships with chemists. The platform's efficiency-oriented design contributes to reducing operational bottlenecks, increasing profitability, and strengthening the overall pharmaceutical distribution chain.

METHODOLOGY

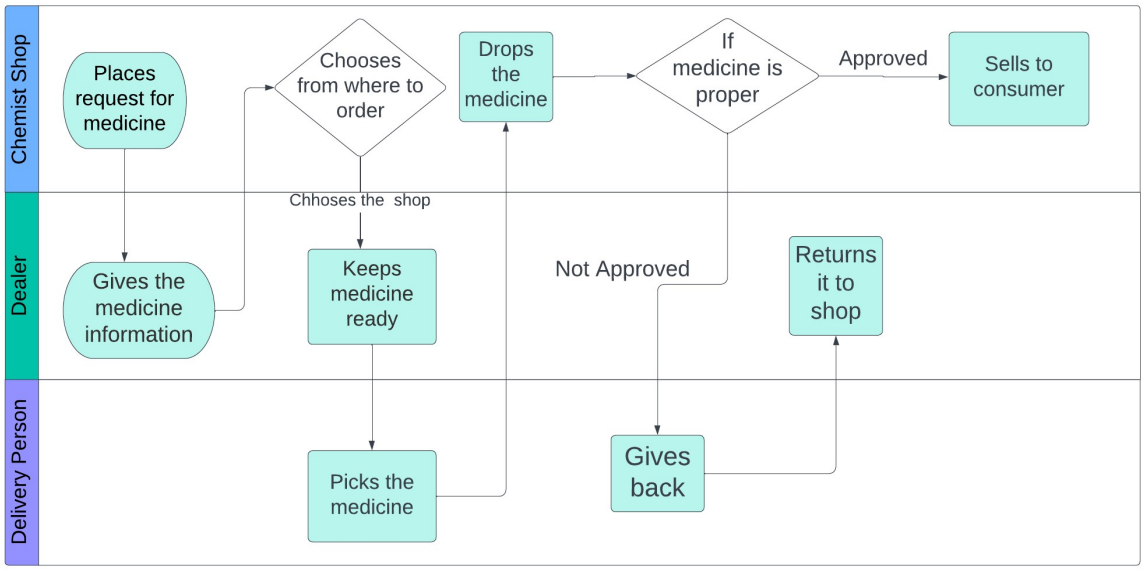

Fig 1.1: Methodology of Website

1. **Streamlined Medical Supply Chain Management:**

Med Chain connects chemist shop owners, wholesalers, and delivery personnel to facilitate efficient order placement, processing, and delivery.

2.Frontend Interface:

Built using JSP pages styled with HTML and CSS. Provides an intuitive platform for chemists (both supplier and requesting chemist) and delivery person to log in, browse available medicines or orders, and place orders and deliver.

3. Secure Order Storage:

Orders are securely stored in a MySQL database for quick and reliable access during processing.

4.Robust Backend Operations:

Powered by Java to ensure orders are routed promptly to wholesalers based on inventory

availability and location.

5. Wholesaler Order Management:

Wholesalers receive orders in real-time. Check stock levels, confirm orders, and update their status to notify chemists of successful processing.

6. Delivery Assignment:

Confirmed orders are assigned to delivery personnel for timely fulfilment.

7. Integrated System:

Combines JSP, JDBC, HTML, CSS, Java, and MySQL to create a secure, user-friendly platform. Simplifies the medical supply chain, ensuring timely access to medications for all.

SYSTEM DESIGN

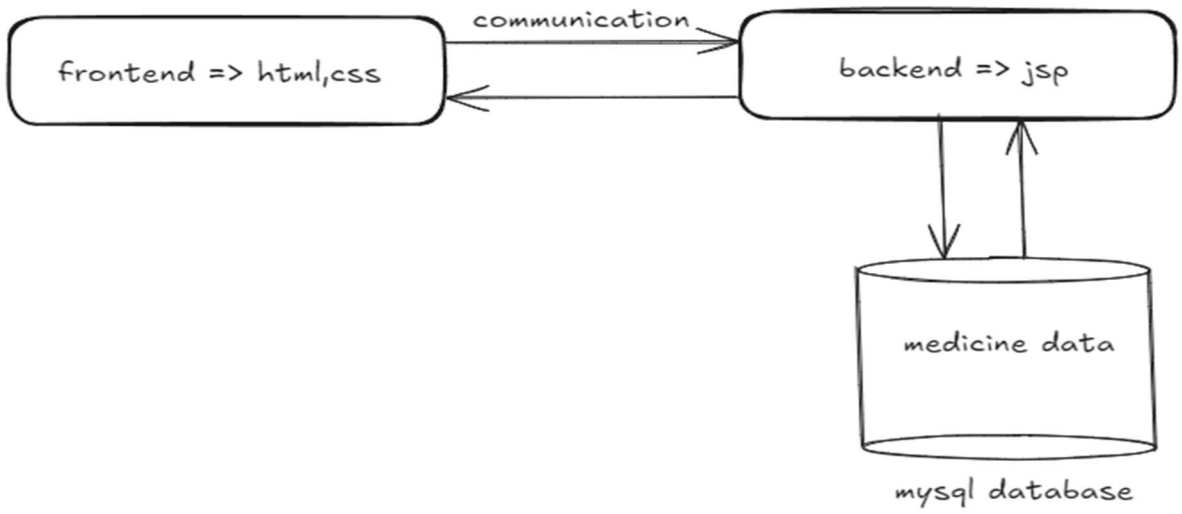

Fig 1.2: System Design

The Med Chain system adopts a modular design to streamline the medical supply chain. The frontend, built using **HTML and CSS**, provides a user-friendly interface for chemist shop owners, wholesalers, and delivery personnel to interact with the system. The interface ensures seamless navigation and data entry, facilitating an efficient user experience.

The backend of the application is powered by **JSP (Java Server Pages)** enabling dynamic content generation and business logic execution. It serves as the bridge between the user interface and the database, processing requests from the frontend and communicating results back. The backend ensures data validation, order processing, and smooth interaction between stakeholders in the supply chain.

The **MySQL** database forms the foundation for data storage, holding critical information such as medicine inventory, user profiles, and order details. The backend interacts with the database to fetch and update medicine data as required. This centralized repository ensures data consistency and allows the system to scale efficiently while maintaining accuracy and reliability.

IMPLEMENTATION DETAILS

Frontend: HTML, CSS, Ajax

The **frontend** of the MedChain project served as the interface between users and the system, enabling seamless interaction with its features. It was developed using **HTML, CSS, and JavaScript**, with a focus on simplicity and usability. The frontend provided intuitive forms for login, signup, and order management, along with dashboards tailored for requesting chemists, supplying chemists, and delivery personnel. It ensured that users could easily navigate the platform, view relevant data, and perform actions like accepting or rejecting orders with minimal effort. By maintaining a visually appealing and responsive design, the frontend contributed to the overall user experience.

HTML was used as the backbone of the frontend to structure the web pages for various functionalities. It organized content such as forms, tables, and buttons to ensure proper alignment and hierarchy of information. In the **salesform.jsp** page, we utilized an HTML table to display pending orders with columns for details like order ID, requesting chemist information, and medicine details. Forms were crafted using input fields for login, signup, and manual address entry. Proper semantic tags and attributes were employed to ensure accessibility and compatibility across devices, laying the groundwork for other frontend technologies to enhance.

CSS played a key role in styling and making the web pages visually appealing. Custom color schemes, such as those applied to the **login.jsp** page, were used to maintain a professional look. CSS was also used for consistent font styles, button designs, and responsive layouts to accommodate different screen sizes. Features like hover effects, spacing, and alignment were implemented to ensure user actions, such as submitting forms or interacting with tables, were visually clear and intuitive. CSS ensured a cohesive aesthetic throughout the platform while enhancing usability.

JavaScript and AJAX were employed to add interactivity and ensure dynamic updates on the web pages without requiring full page reloads. AJAX was used to fetch or update data asynchronously

from the backend, such as updating the order status on the **salesform.jsp** page. When a user accepted or rejected an order, an AJAX request was sent to the backend to update the database, and the change was reflected on the page immediately. This minimized delays and improved responsiveness, ensuring that users could manage orders efficiently. JavaScript also handled client-side validations for forms, ensuring only valid data was submitted to the backend.

This combination of technologies created a robust, user-friendly frontend that facilitated smooth interaction with the MedChain platform's features.

Backend: Java, JSP, Servelts

The **Backend** of the MedChain project served as the core engine, managing business logic, database interactions, and server-side operations. It was developed using **Java** with **JSP** and **Servlets** for dynamic content generation and request handling. The backend ensured smooth functionality by processing user requests, validating inputs, managing sessions, and interacting with the **MySQL** database. Its primary role was to securely and efficiently handle the flow of data between the frontend and the database, ensuring users could perform tasks like managing orders, logging in, and signing up.

Java formed the backbone of the backend, providing a robust and scalable platform to implement server-side logic. It was used to create servlets that handled HTTP requests, such as login authentication and order status updates. For instance, when a delivery person marked an order as "**Accepted**," the backend servlet processed the request, updated the database, and sent a response back to the frontend. Java's object-oriented capabilities allowed for modular design, making it easier to manage different functionalities like order management, user authentication, and session handling.

JSP (Java Server Pages) was utilized for generating dynamic content and integrating server-side data into web pages. Each user type—requesting chemists, supplying chemists, and delivery personnel—had dedicated JSP pages, such as **dashboard.jsp** and **salesform.jsp**, that dynamically displayed data based on the logged-in user's session. JSP tags and embedded Java code enabled seamless interaction with the backend to fetch and display data, like pending orders or user-specific details, ensuring a personalized experience for every user.

This combination of technologies ensured that the backend of MedChain was robust, secure, and efficient, effectively supporting the complex workflows and seamless user experience of the application.

Database: MySQL

The **database** in the MedChain project played a pivotal role in ensuring smooth data management and efficient application functionality. It acted as the central repository where all critical information, such as user details, medicine orders, and inventory data, was stored. The database facilitated the backend's ability to retrieve, update, and manipulate data efficiently, enabling seamless operations like user authentication, order tracking, and inventory updates. Its structured design ensured that data remained consistent, secure, and easily accessible, forming the backbone of the project's functionality.

The database was implemented using **MySQL**, a reliable and scalable relational database management system. MySQL provided robust support for executing SQL queries to handle tasks like inserting new users, validating login credentials, fetching pending orders, and updating order statuses. The platform utilized MySQL's relational capabilities to establish connections between tables, such as linking orders to specific chemists. Its transaction management and indexing features ensured efficient handling of large datasets and quick response times, crucial for real-time interactions in the MedChain application.

The **database schema** included several tables tailored to the application's requirements. Key tables included **users** (for storing details like name, username, email, and password for requesting chemists, supplying chemists, and delivery personnel), **orders** (tracking order ID, medicine name, price, quantity, and status), and **medicines** (containing information about available drugs). Each table was designed with primary keys, unique constraints, and appropriate data types to maintain data integrity. For instance, the orders table used a **status** column to track the progress of an order, while the users table enforced unique email and username constraints to ensure secure logins. This comprehensive database structure provided a robust foundation for handling the complex workflows of the MedChain platform.

Schema Diagram:

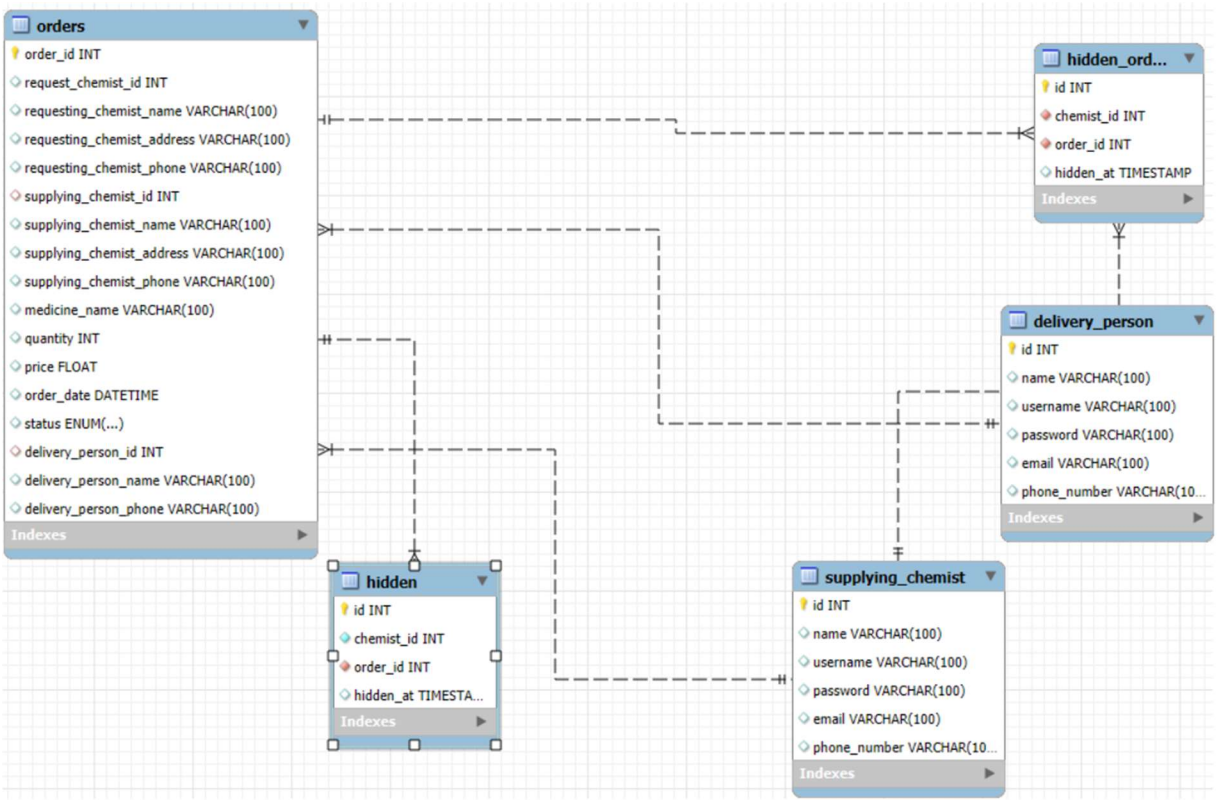

Fig 1.2: Schema Diagram

The schema diagram represents the database design for the MedChain platform, showcasing the relationships between various tables and their respective attributes. At its core is the **orders** table, which serves as the primary link between key entities such as requesting chemists, supplying chemists, and delivery personnel. This table records critical order details, including `order_id`, `requesting_chemist_id`, `supplying_chemist_id`, `delivery_person_id`, `medicine_name`, `quantity`, `price`, `order_date`, and `status`. The `status` column is of type ENUM, allowing the database to track the order's current stage (e.g., pending, accepted, or delivered). Additionally, the **orders** table captures information about the involved chemists and delivery personnel, including their names, addresses, and phone numbers, making it central to managing the order workflow and ensuring seamless communication between stakeholders.

The database also includes supporting tables such as **supplying_chemist**, **delivery_person**, **hidden_orders**, and hidden. The **supplying_chemist** and **delivery_person** tables store essential details like `id`, `name`, `username`, `password`, `email`, and `phone_number`, ensuring secure user authentication and unique identification. The **hidden_orders** and hidden tables facilitate advanced features like order visibility management. For instance, the **hidden_orders** table links a `chemist_id` to an `order_id` and records the time it was hidden (`hidden_at`), allowing orders to be temporarily hidden rather than deleted. These auxiliary tables enhance flexibility and user experience. The relationships between tables are depicted using dashed lines, indicating foreign key dependencies, which ensure efficient data retrieval, consistent updates, and a structured database design.

Tools and Framework: Apache , Eclipse

The MedChain platform was built using a combination of tools and frameworks to ensure smooth development and functionality. The frontend was developed using HTML, CSS, JavaScript, and AJAX for creating a responsive and dynamic interface. On the backend, Java and JSP handled the server-side logic, while MySQL managed the database operations. These tools were chosen to ensure efficiency and ease of development throughout the project.

Eclipse was used as the primary Integrated Development Environment (IDE) for the frontend and backend development of the MedChain platform. Its powerful debugging tools, code completion, and easy integration with Java made it ideal for writing and testing server-side code efficiently. Eclipse's support for plugins also enhanced the development experience.

Apache Tomcat served as the web server for deploying and testing the application locally. It allowed the JSP pages and backend services to run seamlessly, simulating real-world scenarios. Tomcat’s ease of configuration and support for Java-based web applications made it a reliable choice for hosting the MedChain project during development and testing.

RESULTS

Landing Page:

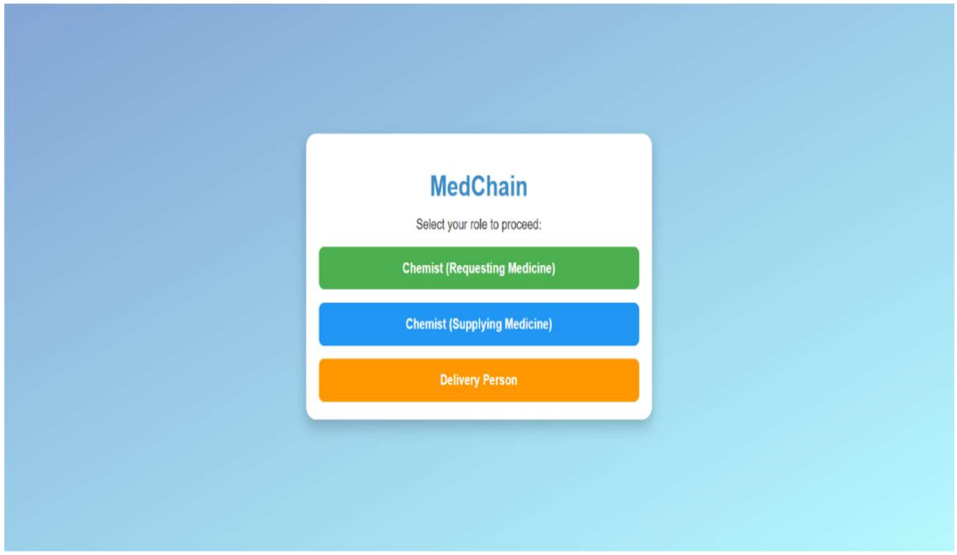

Fig 1.3: Landing Page for Chemist and Delivery Person

Sign Up Page:

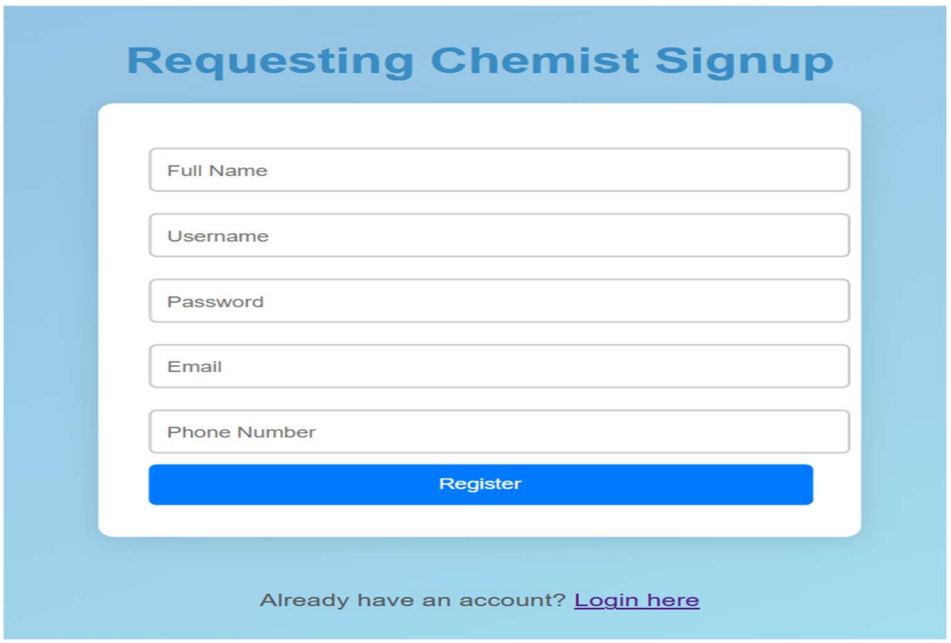

Fig 1.4: Sign Up Page for Requesting Chemist

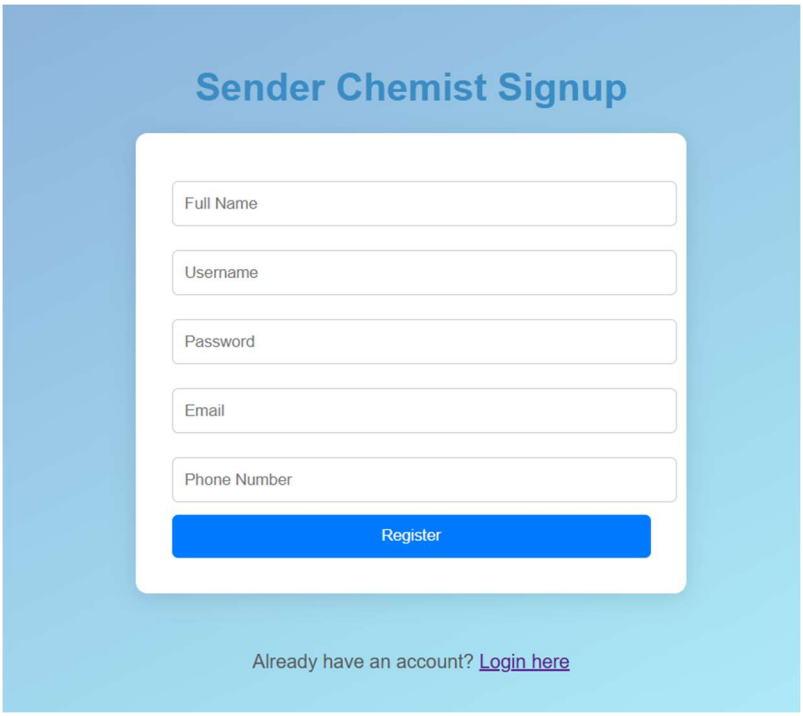

Fig 1.5: Sign Up Page for Supplier Chemist

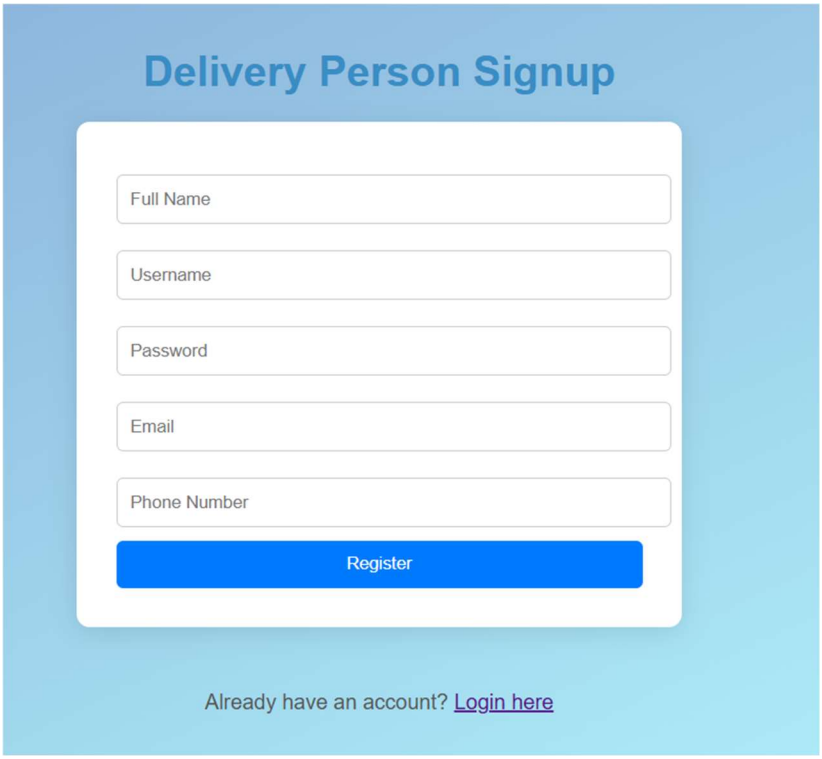

Fig 1.6: Sign Up Page for Requesting Chemist

Log In page:

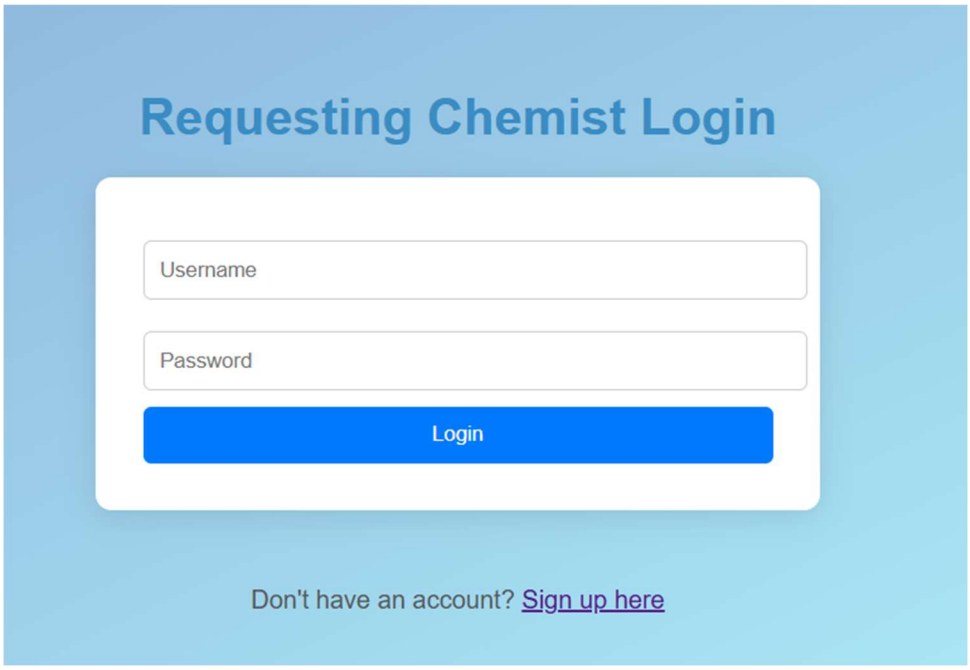

Fig 1.7 : Log In Page for requesting Chemist

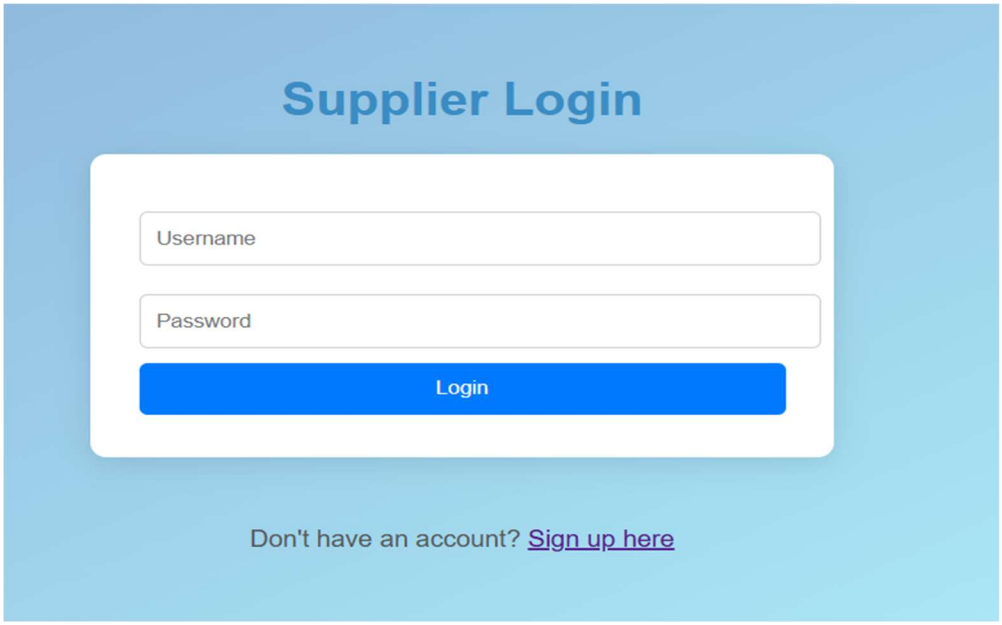

Fig 1.8: Log In Page for Supplier Chemist

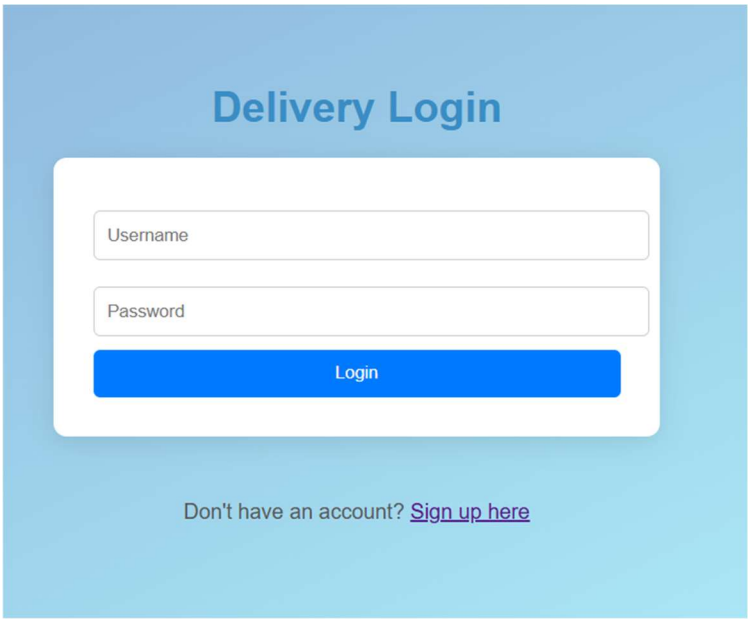

Fig 1.9: Log In Page for Delivery Person

Requesting Chemist:

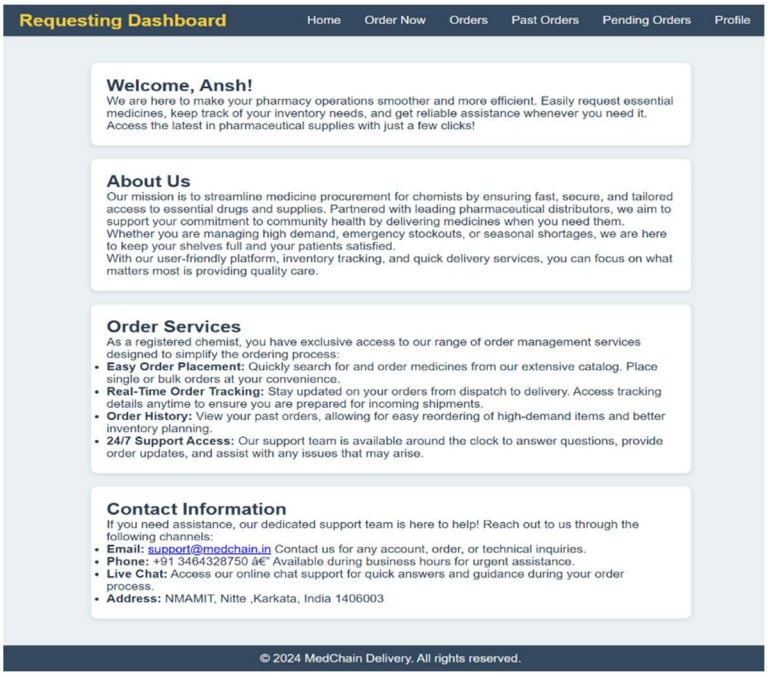

Fig 1.10: Personalised Dashboard for Requesting Chemist

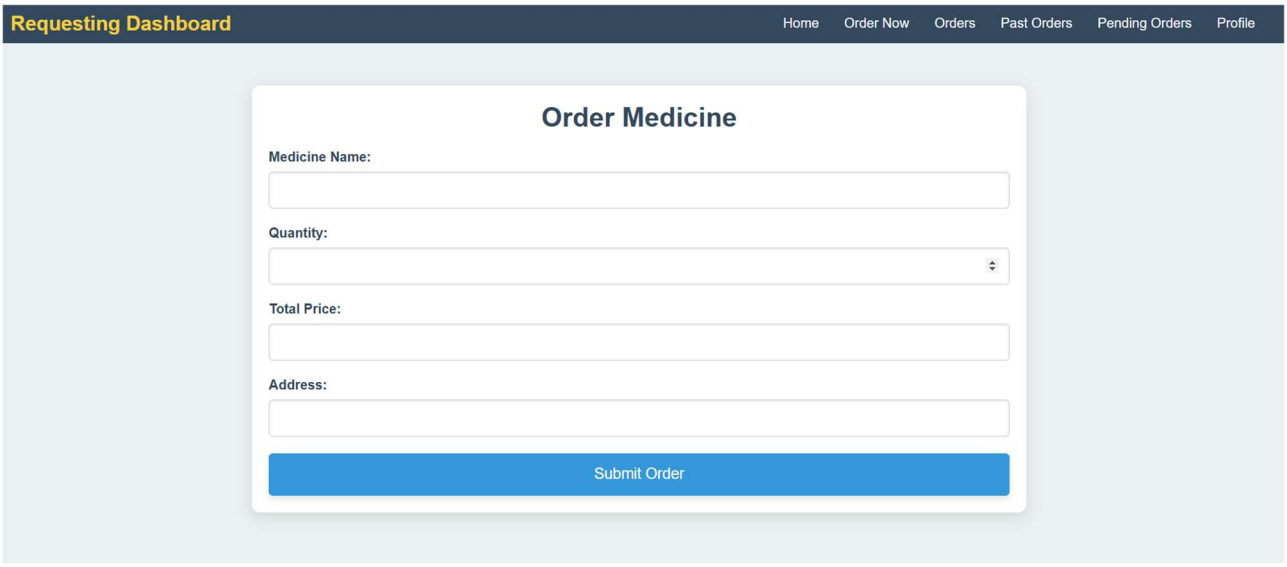

Fig 1.11: Medicine Order Page for Chemist

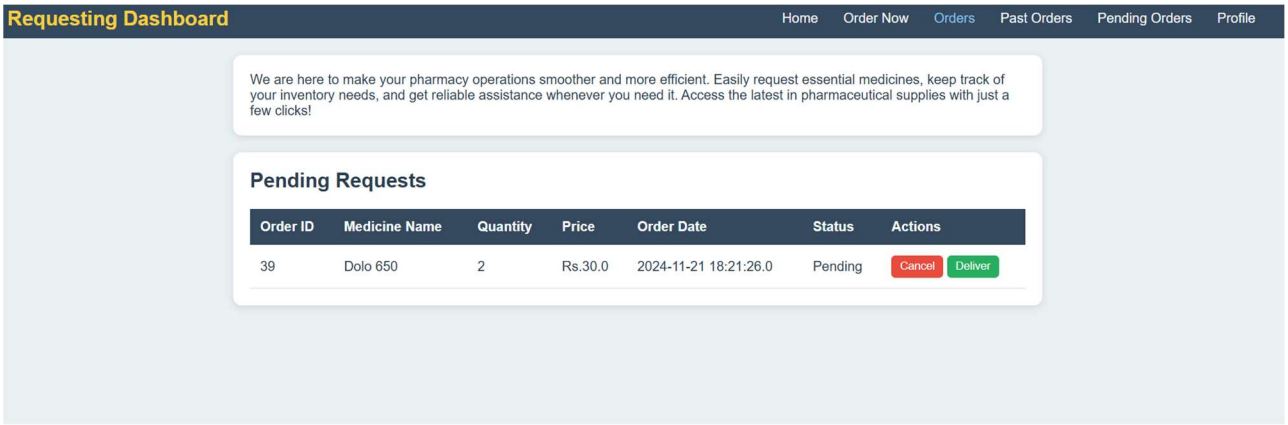

Fig 1.12: Medicine Request Page for Chemist

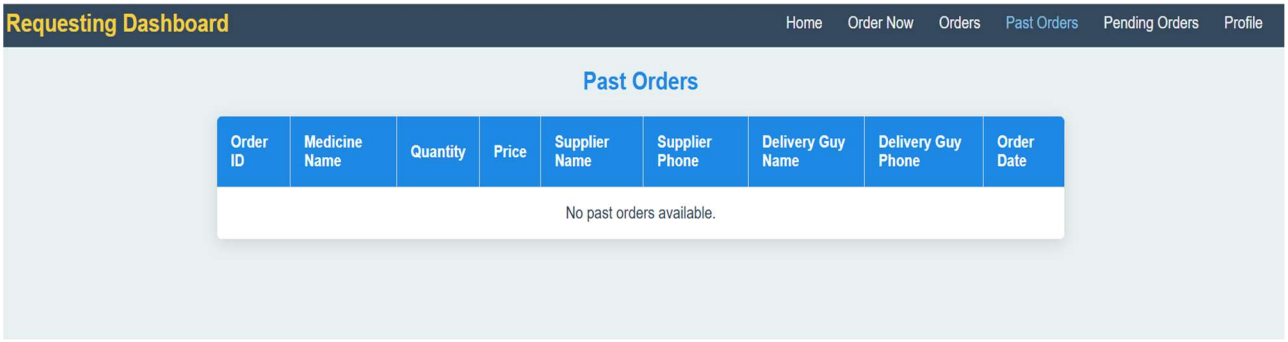

Fig 1.13: Past Order Page for Requesting Chemist

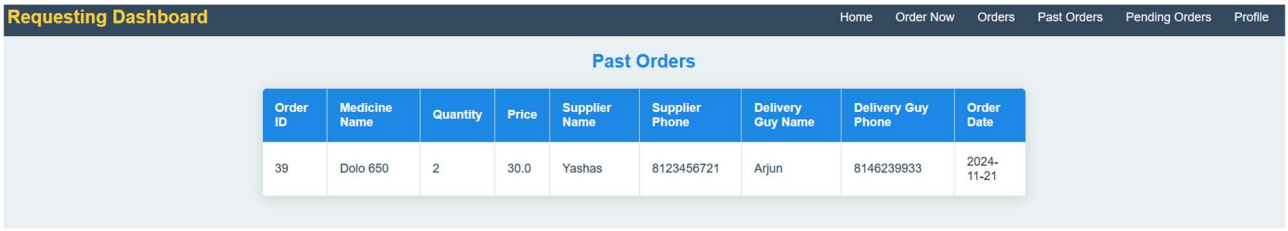

Fig 1.14: Placed Orders

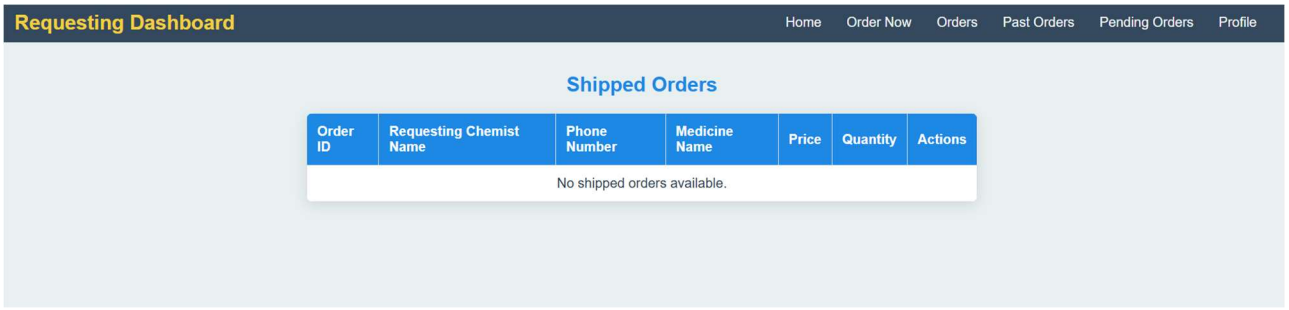

Fig 1.15: Shipped Orders

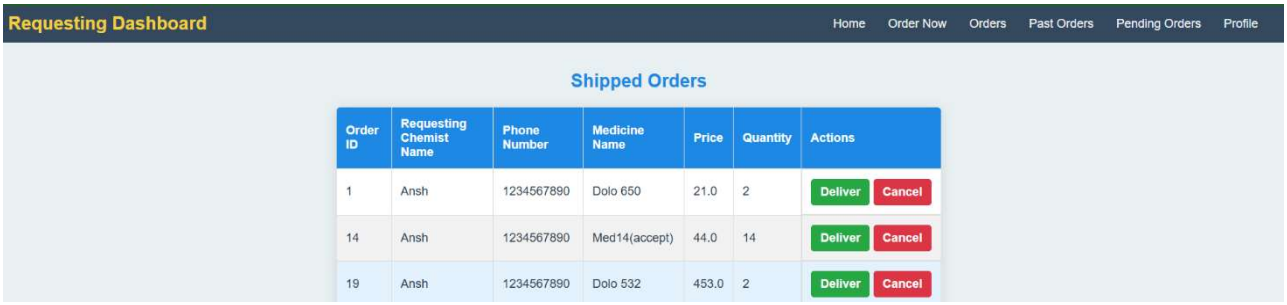

Fig 1.16: Shipped Orders

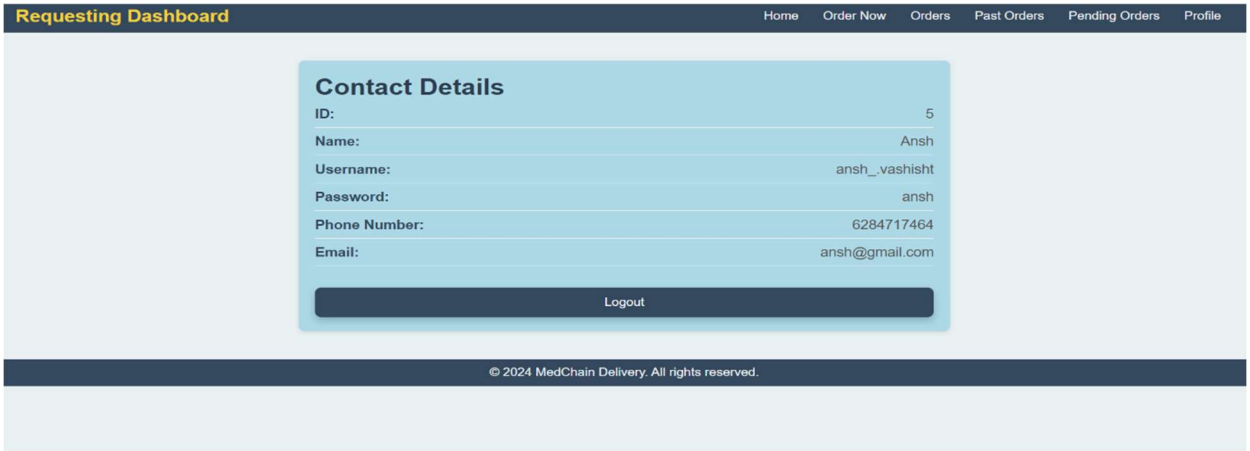

Fig 1.17: Profile of Requesting Chemist

Supplier Chemist:

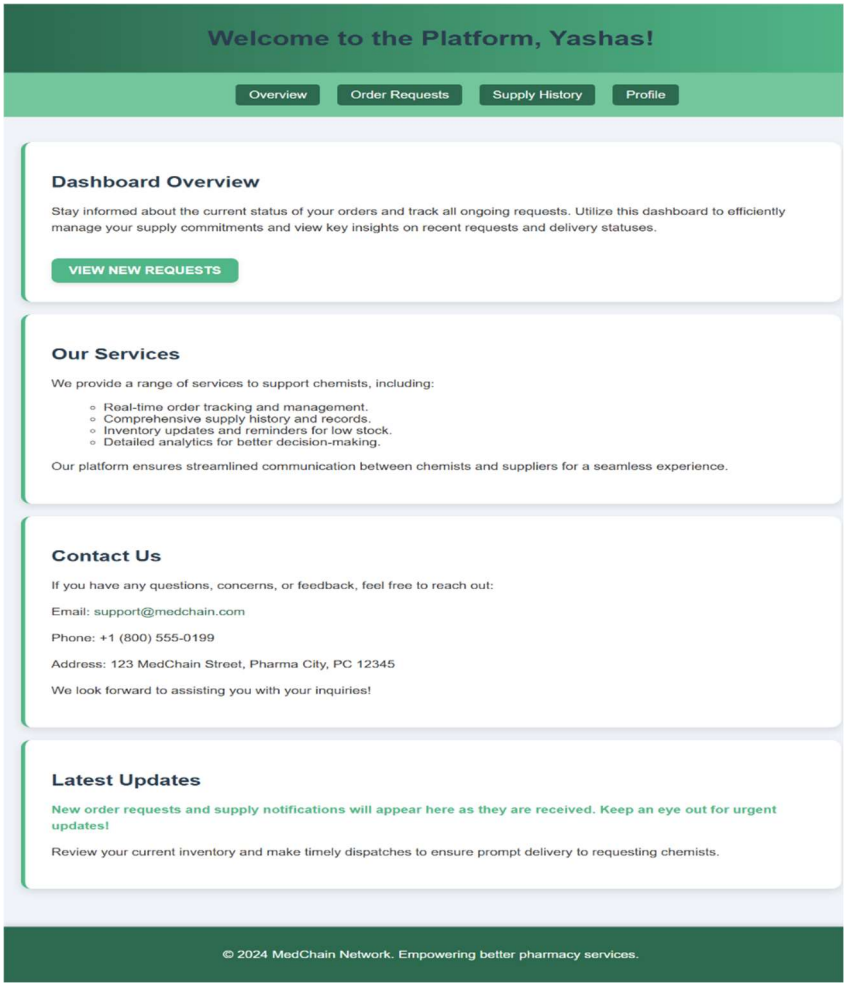

Fig 1.18: Personal Dashboard of Supplier Chemist

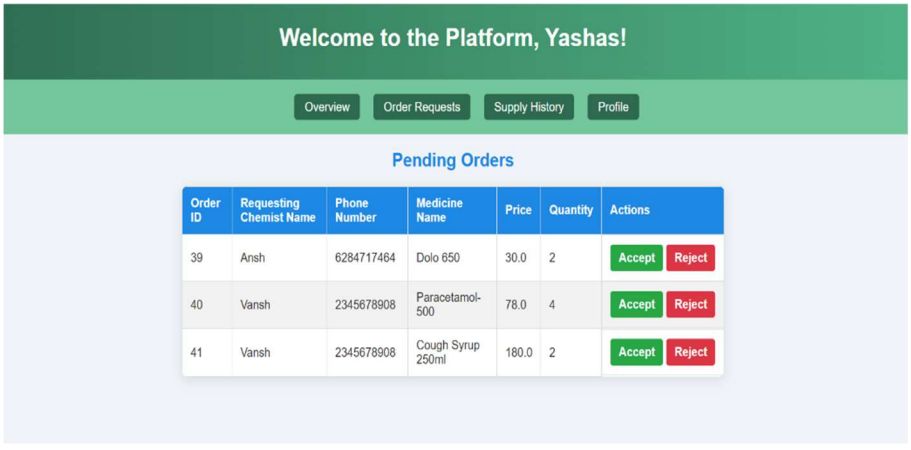

Fig 1.19: Medicines Request recieved of Supplier Chemist

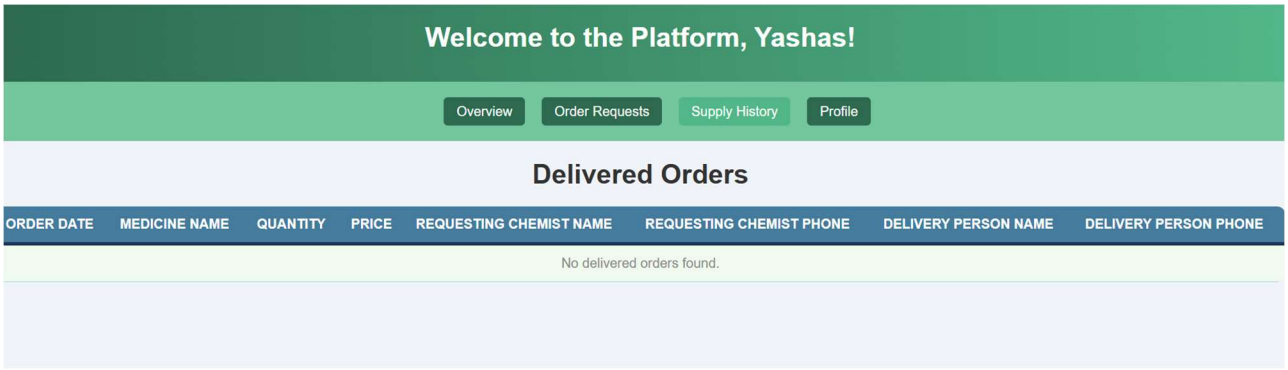

Fig 1.20: Medicines successfully delivered

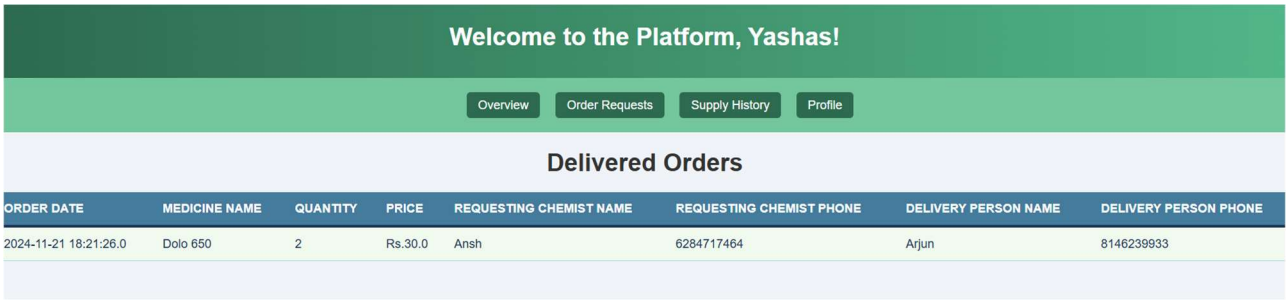

Fig 1.21: Medicines Successfully Delivered

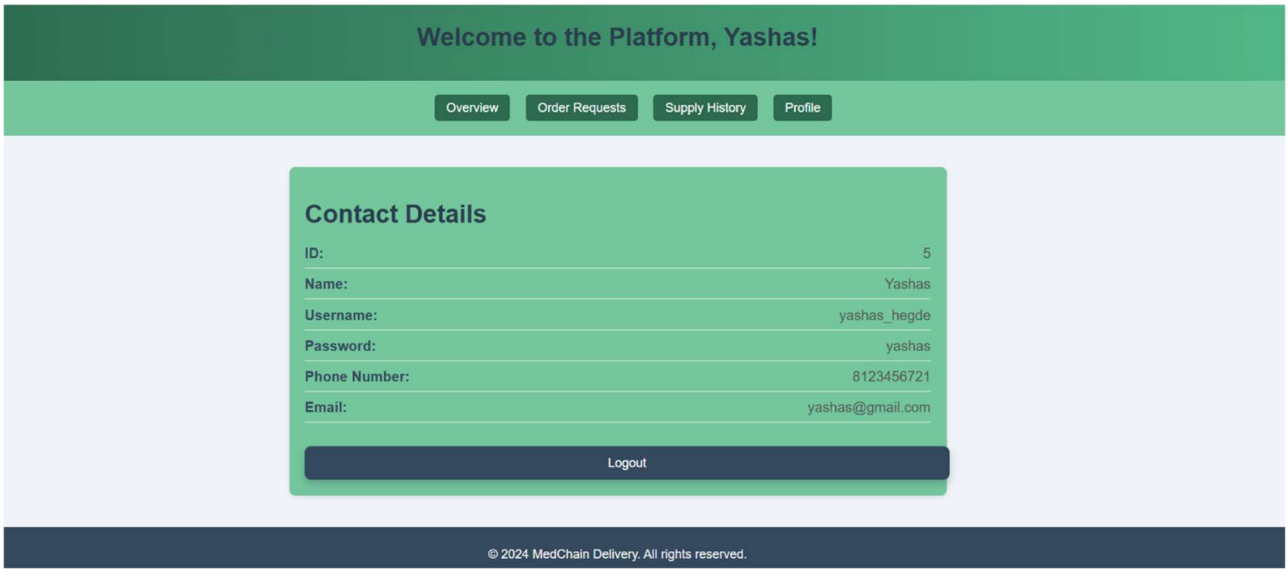

Fig 1.22: Profile for Supplier Chemist

Delivery Person:

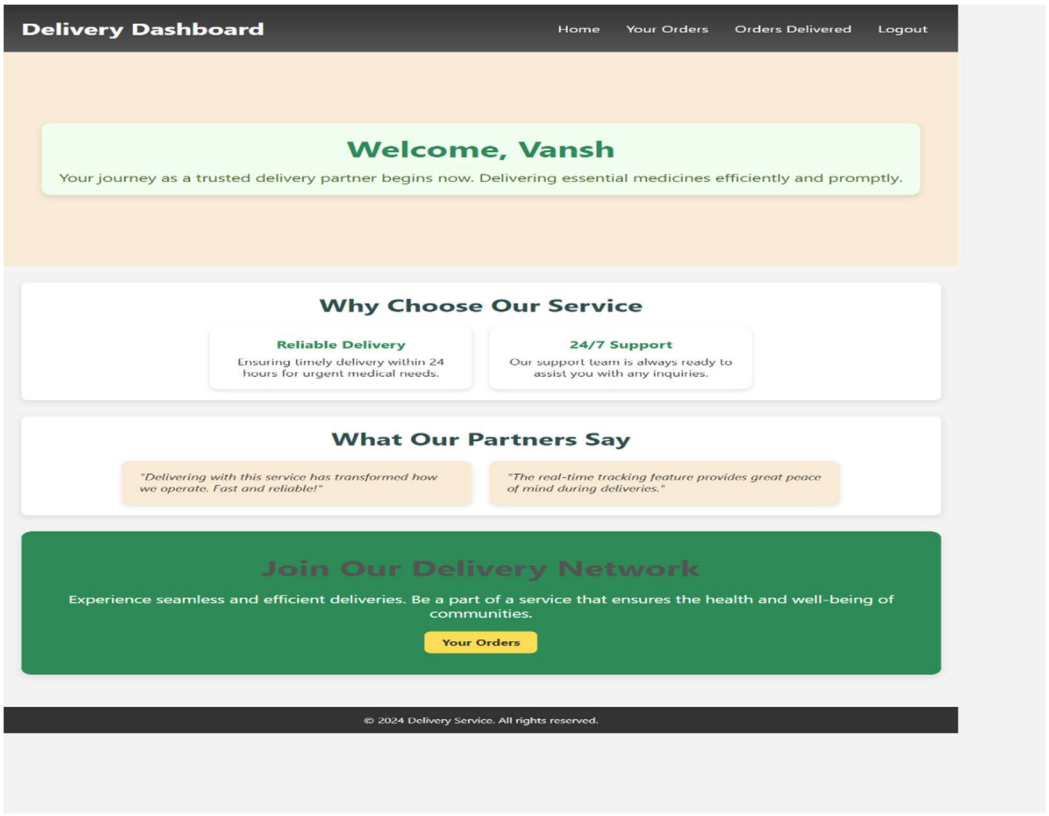

Fig 1.23: Dashboard for Delivery Person

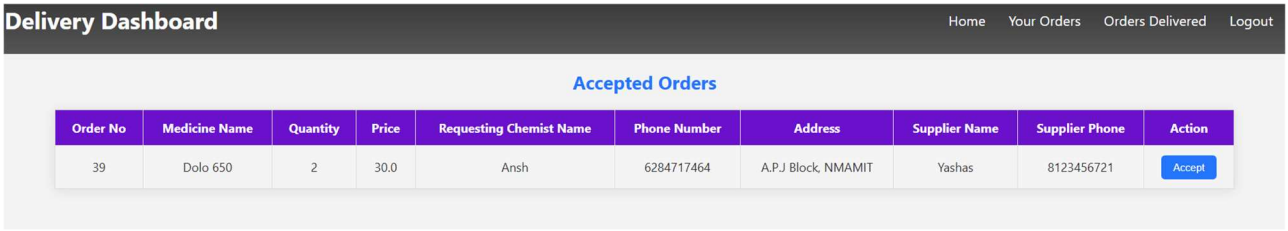

Fig 1.24: Orders for Delivery Person

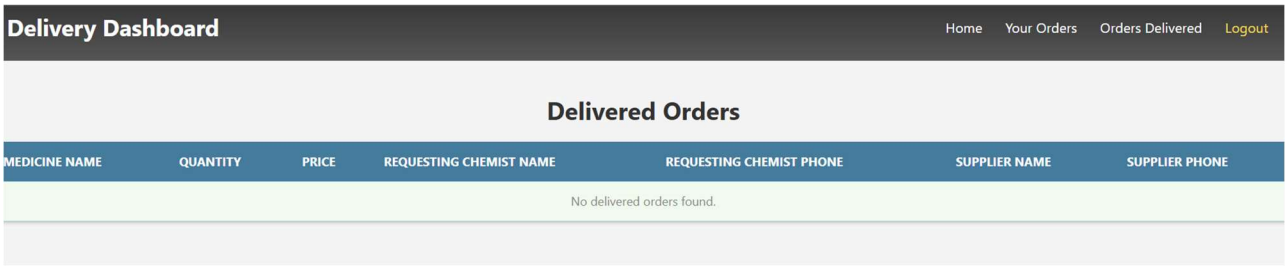

Fig 1.25: Orders delivered by the Person

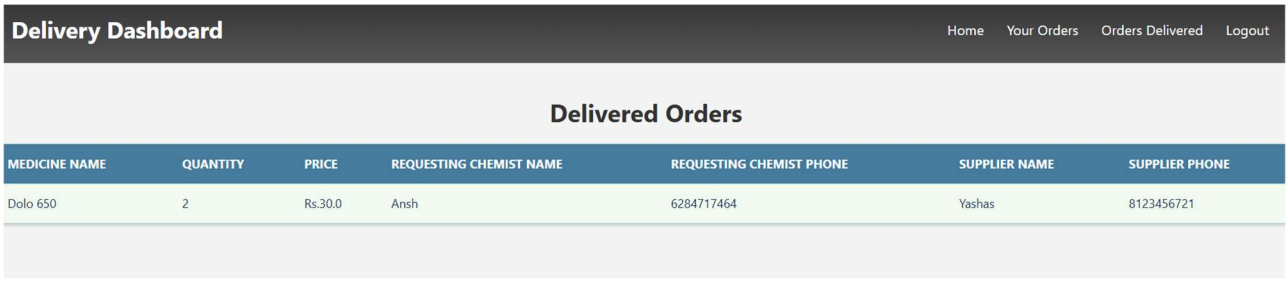

Fig 1.26: Orders successfully delivered by the Person

CONCLUSION AND FUTURE WORK

The MedChain platform successfully addresses the challenges faced by chemists and patients in managing medicine inventory and timely delivery. By leveraging a robust combination of frontend and backend technologies, the platform ensures a user-friendly interface, efficient order processing, and seamless communication between chemists, suppliers, and delivery personnel. Its database design plays a central role in maintaining data integrity and supporting advanced features like order visibility and dynamic status updates. The project not only simplifies the supply chain but also enhances accessibility and reliability in the healthcare sector.

The use of tools such as Eclipse, Apache Tomcat, and MySQL enabled the development team to build a scalable and efficient system. With features like real-time data synchronization through AJAX, secure authentication, and responsive design, the platform is equipped to handle real-world healthcare demands. MedChain stands out as a solution aimed at improving operational efficiency while keeping the user experience at the forefront.

The MedChain platform has immense potential for future enhancements to increase its effectiveness and reach. Features such as integration with AI-powered analytics could help predict medicine demand, optimize inventory, and reduce shortages. Real-time delivery tracking and automated notifications could further enhance operational transparency and improve user satisfaction.

Additionally, the platform could be expanded to include multilingual support, making it more accessible to diverse populations, especially in rural areas. The integration of secure payment gateways and partnerships with pharmacies or hospitals could also transform MedChain into a comprehensive healthcare management system. These advancements would solidify its impact in revolutionizing healthcare logistics.

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