CANTEEN MANAGEMENT SYSTEM

A PROJECT REPORT

Submitted By

SHRUTI VAIDYA

In partial fulfillment for the award of degree of

BACHELOR OF ENGINEERING

in

Information Technology

Madhuben and Bhanubhai Patel Institute of Technology, Anand

The Charutar Vidya Mandal (CVM) University,
Vallabh Vidyanagar- 388120

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Madhuben and Bhanubhai Patel Institute of Technology, Anand

New Vallabh Vidyanagar, PO Box 8, Vitthal Udyognagar, Anand 388121

CERTIFICATE

This is to certify that **SHRUTI VAIDYA** has submitted the Industrial Internship report based on internship undergone at Tech Elecon Pvt. Ltd. for a period of **16** weeks from **01/01/2025** to **30/04/2025** in partial fulfillment for the degree of Bachelor of Engineering in Information Technology, Madhuben and Bhanubhai Patel Institute of Technology at The Charutar Vidya Mandal (CVM) University, Vallabh Vidyanagar during the academic year 2024-25.

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Internal Guide

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DECLARATION

I, **SHRUTI VAIDYA** hereby declare that the Industrial Internship report submitted in partial fulfillment for the degree of Bachelor of Engineering in Information technology, Madhuben and Bhanubhai Patel Institute of Technology, The Charutar Vidya Mandal (CVM) University, Vallabh Vidyanagar, is a bonafide record of work carried out by me at Tech Elecon Pvt. Ltd. under the supervision of **Sr. Satyam Raval** and that no part of this report has been directly copied from any students' reports or taken from any other source, without providing due reference.

Name of the Student **Sign of Student**

Shruti Vaidya

ACKNOWLEDGMENT

We hereby, would like to have the privilege to show our gratitude to all the persons, helped me in whatever way for the successful completion of this internship without hindrance. I am grateful to all our mentors who inspired me by setting an example of them for the kind purpose of motivating me to reach my targeted objective. Without their knowledge and wisdom along with experience and specialization in their specific field, We would not have been able to think of doing or completing this work. All the persons who have contributed directly or indirectly with their kind support and humble approach are highly appreciative and I would always remain indebted to them in all the ways. I am especially thankful of is our internal guide and HOD respectively, for their kind support and motivation. I extend my heartfelt thanks to **Mr. Raval**, Senior Manager for his co- operation in our project work.

Shruti Vaidya

ABSTRACT

We carried out my internship at Tech Elecon Pvt. Ltd, Anand. Internship is an opportunity to relate what has been covered in class and what is applicable in the field in an operational environment. The purpose of the program is to fulfil the core equipment for the award of bachelor's degree in Information Technology to get a practical aspect of theoretical work studied at the university and to understand the operations in the IT industry and to enable students gain experience in different tasks.

During Internship period I have worked on the Canteen Management System (Cafeteria Project), as React Intern.

In conclusion, this was an opportunity to develop and enhance the skills and competencies in my career field which I achieved.

TO WHOM IT MAY CONCERN

This is to certify that **SHRUTI SANJAYBHAI VAIDYA**, a student of **BACHELORE OF ENGINEERING of MADHUBEN AND BHANUBHAI INSTITUTE OF TECHNOLGY, ANAND** has successfully completed her internship in the field of **React.js from 01/01/2025 to 30/04/2025** under the guidance of **Mr. Satyam Raval,** Deputy General Manager at **Tech Elecon Pvt Ltd.**

Her internship activities include successful completion of the assigned project at the given period of time along with abiding by companies' rules and regulation.

During the period of her internship program with us, she had been exposed to different processes and was found diligent, hardworking, and inquisitive.

We Wish her every success in her life and career.

For Tech Elecon Pvt. Ltd.

List of Figures

Table of Contents

CHAPTER 1: OVERVIEW OF THE COMPANY

1.1 HISTORY

Tech Elecon Pvt. Ltd is the IT division of the Elecon group of companies and has more than 25 years of experience in the fields of hardware, software, and networking solutions. Situated in the heart of Vitthal, Udyognagar Industrial Estate and in the proximity of the educational town of Vallabh Vidyanagar. Tech Elecon is all set to reach new heights in the field of IT solutions.

Tech Elecon is ready with all sorts of solutions and deliver any application that is web based and further our solutions are designed to adapt your business rather than your business adapting the software. Their solutions are 100% fruitful and empower you to take control of client's business online and in real time.

Tech Elecon have more than 100 employees with specialized skills in software development, custom software development, and e-commerce software development using custom software programming including.NET, C#.NET, PHP, and Open Source and Oracle.

Tech Elecon delivers quality products and services with a focus on integrating the same with existing technologies, providing the required automation to our customers to help them achieve their business objectives.

Mr. Nilesh Naik, the company's general manager, is at the helm of the Techelecon organization. Mr. Satyam Raval, as Senior Manager, and after that, Manager and Associate Manager Positions are listed. At the bottom, there are trainees at entry level, who follow up to engineer, senior engineer, also executive and senior executive engineer.

1.2 COMPANY PROFILE

Company Name	Tech Elecon Pvt. Ltd.
Company Type	Service Base
Company Address	Anand - Sojitra Road, Vithal Udyognagar, Vallabh Vidyanagar-388120, Anand, Gujarat.
Contact No.	+91 90990 36045
Website	http://www.techelecon.com/
Location	Anand, Gujarat
Company Manager	Mr. Satyam Raval
Company Logo	TECHELECON TECHNOLOGY SIMPLIFIED

Table 1.2 Company Profile Table

1.3 DIFFERENT DOMAINS OF THE COMPANY

Tech Elecon has extensive experience in providing IT services and has successfully adapted to technological advancements, making it the leading IT infrastructure management service provider in the region. Our cutting-edge delivery model covers all stages of the solution lifecycle, including planning, deploying, managing, maintaining, auditing, upgrading, and improving.

Tech Elecon recognize that each client has unique needs and expectations when it comes to infrastructure and service providers. Our clients have the flexibility to choose from a wide range of IT infrastructure management and performance services based on their specific requirements. They can opt for on-site services or hybrid solutions that include on- site troubleshooting and support services.

Tech Elecon Provide Following Service for Business

- Hardware maintenance and repairing
- Service desk management
- Desktop management
- Network management
- Messaging administration
- Back-up management

Other Services

- Software Development Services
- Software Licensing
- Microsoft Product Implementation
- Linux Servers / Desktop Implementation

1.4 CAPACITY OF THE COMPANY

Currently our company holds over more than 100 employees. But as the company is growing rapidly, capacity is going higher and higher.

CHAPTER 2: OVERVIEW OF DIFFERENT DEPARTMENT

2.1 DIFFERENTDEPARTMENT

Customer Service: The customer service department plays a crucial role in enhancing user experience by providing assistance with inquiries, complaints, and troubleshooting issues related to order placement and payments. It ensures that customers have a seamless experience while using the canteen management system. Additionally, it handles customer feedback, which helps in improving the quality of services offered.

Order Processing: The order processing department is responsible for managing and verifying all incoming orders. Once a customer places an order through the system, this department ensures that the payment is successfully processed, the order details are recorded, and the request is forwarded to the kitchen. It also keeps track of order modifications, cancellations, and refunds, ensuring that users receive accurate and timely updates on their purchases.

Kitchen Operations: The kitchen operations department is in charge of food preparation and maintaining quality standards. It receives order details from the order processing unit and ensures that meals are prepared efficiently and hygienically. The kitchen staff follows standardized recipes and packaging procedures to maintain consistency. Proper coordination with the inventory management department is essential to ensure ingredient availability for timely order fulfillment.

Administration: The administration department oversees the entire operation of the canteen management system. It is responsible for managing staff, financial transactions, and compliance with food safety regulations. The administrative team ensures that all departments work in harmony, resolving any operational challenges that arise. It also focuses on performance evaluation, system upgrades, and implementing new features to enhance the functionality of the canteen management system.

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2.2 SEQUENCE OF OPERATION FOR MANUFACTURING OF END PRODUCT

The main flow of software development is as per below:

1. **User Places an Order via the System:** The process starts when a user selects food items from the digital menu, adds them to the cart, and proceeds to checkout. The user reviews the order, chooses a payment method, and submits the request.

2. **Order is Processed by the Backend:** The system verifies order details, assigns an order ID, and checks inventory for item availability. If all items are in stock, the order moves to the payment stage; otherwise, the user is notified.

3. **Payment is Validated:** For online transactions, the system securely processes payments through gateways. Upon successful payment, a confirmation is sent to the user, and the order is forwarded to the kitchen.

4. **The Kitchen Receives Order Details:** The kitchen staff receives a notification with order details and any special instructions. Orders are prioritized based on preparation time to ensure smooth workflow.

5. **The Order is Prepared and Packed:** Food items are prepared following quality standards, packed securely, and labeled with order details. The system updates the status to "Ready for Delivery" or "Ready for Pickup."

6. **The Delivery or Pickup is Confirmed:** For delivery, the order is assigned to a delivery agent with real-time tracking. For pickup, the user is notified when the order is ready. Once collected, the system marks it as "Completed."

2.3 DIFFERENT STAGES OF DOMAIN

The production process in the canteen management system begins with **ordering**, where customers browse the digital menu, select items, and proceed to checkout. Next, **payment processing** ensures secure transactions before the order is sent to the kitchen. Once confirmed, the **food preparation** phase starts, where the kitchen staff prepares the meal according to order specifications. After preparation, the food undergoes **packaging** to maintain freshness and quality, whether for delivery or pickup. Finally, in the **delivery** stage, the packed order is either handed over for self-pickup or delivered to the designated location, with the customer receiving a notification once it is ready.

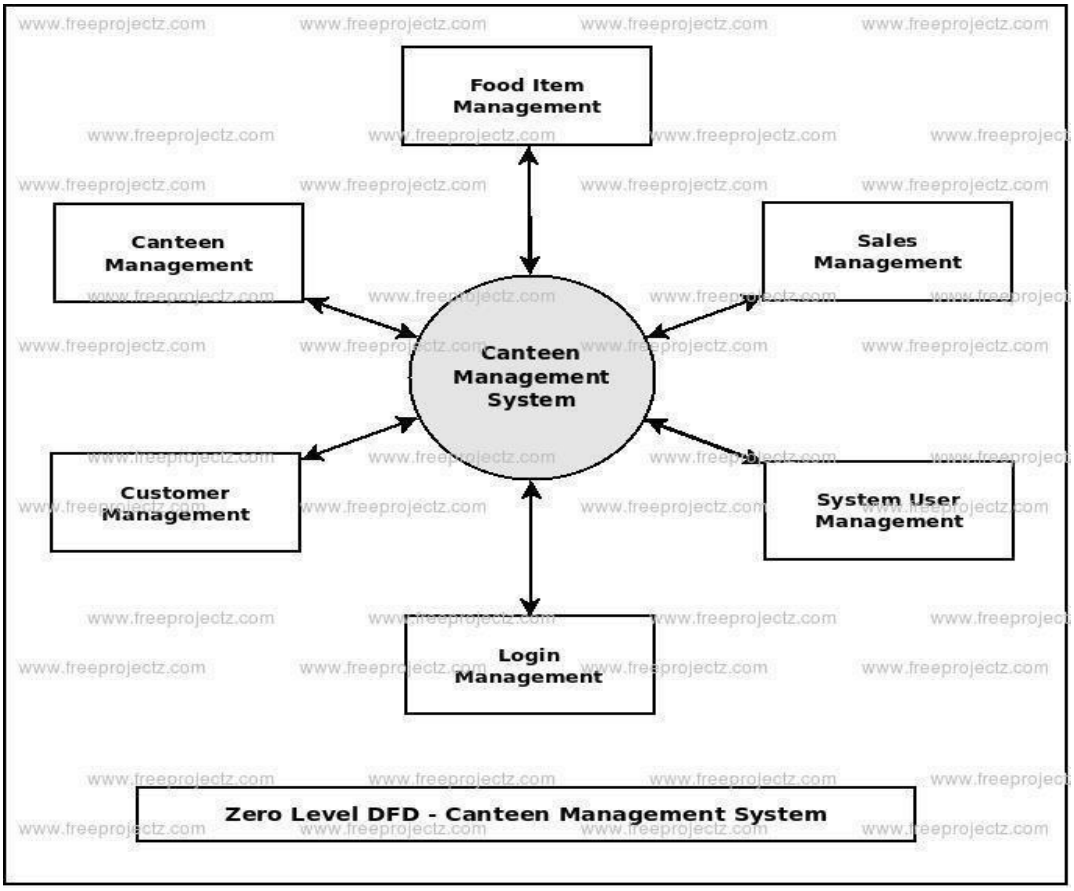

Figure 1 Production Process

CHAPTER 3: INTRODUCTION TO INTERNSHIP AND PROJECT

3.1 INTERNSHIP SUMMARY

The project is centered on designing and implementing an advanced canteen management system that enhances efficiency and user experience. It leverages modern web technologies to streamline operations, including order placement, payment processing, and order tracking.

Project Title: Canteen Management System

A canteen management system is a digital solution designed to automate and optimize food ordering, payment processing, and order tracking in a canteen or cafeteria. This project aims to enhance operational efficiency, reduce waiting times, and provide a seamless user experience through a web-based platform.
The main objective of this system is to integrate an intuitive interface for customers and administrators, ensuring smooth order management, real-time updates, and improved service quality.

Key Features of the Canteen Management System:

- **Order tracking** to keep users informed about their order status
- **Secure payment processing with multiple payment options**
- **Admin dashboard for managing inventory, orders.**

  User authentication and role-based access for enhanced security and control

3.2 PURPOSE

The primary purpose of this project is to modernize and enhance canteen operations by implementing an automated management system. Traditional canteen processes involve manual order-taking, cash transactions, and inefficient tracking, which often lead to delays, errors, and mismanagement of resources. By integrating a digital system, this project aims to eliminate these inefficiencies, ensuring a smooth and organized workflow.

The system is designed to minimize human intervention in routine tasks such as order placement, payment processing, and order tracking, thereby reducing the workload for staff and improving overall service quality. With features.qrcustomers can browse the menu, place orders, and make payments seamlessly through an intuitive interface. This not only enhances user experience but also speeds up the entire transaction process.

Additionally, the project aims to improve operational efficiency by providing real-time updates on order status, reducing wait times, and optimizing kitchen workflows. Through an admin dashboard, management can monitor daily transactions, track inventory levels, and analyze sales trends, leading to better decision-making and resource allocation. The introduction of secure digital payments will also ensure accuracy in financial transactions, reducing the risk of cash handling errors.

Overall, this project seeks to transform traditional canteen operations into a more efficient, technology-driven system that benefits both customers and management, ensuring a seamless and hassle-free dining experience.

3.3 OBJECTIVE OF PROJECT

To provide order tracking and payment simulation: Customers will have access to real-time order tracking, enabling them to monitor the preparation and delivery status of their food. This feature improves transparency and enhances the user experience by reducing uncertainty about wait times. Additionally, a payment simulation module will be implemented to test and validate payment processes without actual transactions, ensuring a secure and error-free payment system before full deployment.

To create an admin dashboard for order management: The admin dashboard will serve as the central control panel for managing the canteen's operations. It will provide a detailed overview of order statuses, inventory levels, and customer feedback. Administrators will be able to update menu items, track sales trends, and generate reports for better decision-making. This dashboard will improve efficiency by providing real-time insights, helping staff manage peak hours effectively, and ensuring smooth day-to-day operations.

3.4 SCOPE

The **Canteen Management System** is designed to enhance the overall efficiency of canteen operations by incorporating various digital features.

- **Online Menu Browsing**: Customers can conveniently browse a digital menu that displays available food items, prices, and descriptions. This feature eliminates the need for printed menus and ensures real-time updates on item availability.

- **Secure Payment Processing**: The system supports digital payment methods, ensuring secure and hassle-free transactions. Users can pay via various modes such as UPI, credit/debit cards, and mobile wallets, reducing cash handling errors and transaction delays.

- **Order Status Updates**: Customers receive real-time updates on their order status, from confirmation to preparation and completion. This feature minimizes confusion, reduces waiting time, and improves customer satisfaction by keeping them informed throughout the process.

By integrating these features, the system streamlines the entire canteen workflow, improving both user experience and operational management.

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3.5 TOOLS AND TECHNOLOGY

- **Frontend Technologies:** The frontend is responsible for the user interface and interactions, providing a responsive and interactive experience.
    - **React.js:** A JavaScript library used to build dynamic and efficient user interfaces, ensuring a smooth and interactive user experience.
    - **HTML & CSS:** These core web technologies define the structure and styling of the application, ensuring a visually appealing layout.
    - **Bootstrap:** A CSS framework that helps in designing a responsive and mobile-friendly user interface with prebuilt components.
    - **Redux:** A state management library used for handling global states like the cart system and order tracking, ensuring smooth data flow across the application.

- **Backend Technologies**: The backend is responsible for processing Requests handling business logic, and communicating with the database.
    - **Node.js:** A runtime environment that enables the execution of JavaScript on the server side, ensuring fast and scalable backend performance**.**
    - **Express.js:** A lightweight framework for Node.js that simplifies API development, request handling, and middleware integration, making the backend more efficient and modular.

- **Database Technology**: The system uses a NoSQL database for storing and managing data efficiently.
    - **MongoDB:** A document-oriented NoSQL database that stores user details, menu items, orders, and transaction records in a flexible and scalable manner. Its schema-less nature allows easy updates and modifications.

- **Authentication Mechanism**: To ensure secure access and user data protection, an authentication mechanism is implemented.

    - **JWT (JSON Web Token**): A secure token-based authentication system that validates user identities. It allows users to log in and perform authorized actions while ensuring data protection and preventing unauthorized access.

By integrating these advanced tools and technologies, the **Canteen Management System** delivers a highly efficient and user-friendly platform that enhances the overall canteen operations.

3.6 PROJECT PLANNING

The **Canteen Management System Project Life Cycle (CMSPLC)** provides a structured approach to designing and implementing an efficient digital ordering and management system for canteens. This project aims to streamline operations, enhance user experience, and reduce manual workload through modern web technologies.

The **CMSPLC** phases are as follows:

1. **Requirement Analysis & System Design::** Define project objectives, scope, and key features. Research and analyze user requirements for a seamless canteen management experience. Design system architecture and database schema for efficient data handling.
2. **Frontend Development:** Develop a responsive and modern UI using **React.js, Bootstrap, and Redux.** Implement core frontend functionalities like menu browsing, cart management, and order placement. Optimize UI/UX with animations and interactive elements.
3. **Backend Development:** Set up the backend using **Node.js and Express.js**. Implement **user authentication (JWT-based login/signup)** and **admin dashboard functionalities**.
4. **Frontend-Backend Integration:** Establish API connections between the **React.js frontend and Node.js backend**. Ensure smooth data exchange for user authentication, order management, and admin controls.Implement error handling mechanisms and security enhancements.
5. **Testing & Debugging**: Conduct **unit testing, API testing, and UI testing** to identify and fix bugs. Optimize system performance for faster response times & seamless user experience .
6. **Deployment & Documentation:** Deploy the system on a cloud platform or local server for final testing. Deploy the system on a cloud platform or local server for final testing. Conduct final demonstrations and handover the project for evaluation.

3.7 PROJECT SCHEDULING

The The project followed a structured **10-week schedule**, balancing frontend and backend development, integration, testing, and final refinements.

- **Week 1-2: Project Initiation & Planning**
- Define project scope, objectives, and functionalities.
- Research QR-based ordering systems, authentication methods, and admin control panels.
- Set up development environment, version control (GitHub), and project repository.

  - **Week 3-5: Frontend Development**
- Develop UI components using React.js, Bootstrap, and Redux.
- Implement login/signup pages with authentication mechanisms.
- Build the menu browsing, cart system, and order placement features.
- Apply UI/UX best practices for responsive and interactive design.

  - **Week 6-8: Backend Development & API Integration**
- Set up Node.js server, Express.js framework, and MongoDB database.
- Implement user authentication (JWT-based login/signup).
- Develop backend API endpoints for order management, payment simulation, and order tracking.
- Integrate the React.js frontend with backend APIs.

  - **Week 9-10: Debugging, Testing & Dashboard Implementation**
- Debug frontend and backend functionalities to resolve errors.
- Conduct unit testing, API testing, and UI testing.
- Develop and refine the admin dashboard for order status management.
- Optimize performance, security, and user experience.

CHAPTER 4: SYSTEM ANALYSIS

4.1 STUDY OF CURRENT SYSTEM

The study of the current system in a canteen management environment involves a comprehensive review of the existing processes and procedures related to food ordering, payment, and order management. The aim is to identify areas where the current system is functioning effectively and areas that require improvement.

The review generally includes the following phases:

1. **Review of Ordering and Payment Processes:** The first step involves analyzing the current ordering and payment procedures. This includes evaluating how customers place orders, how payments are processed (cash/card), and the efficiency of these processes. Manual ordering and cash transactions often lead to delays, miscommunication, and errors.

2. **Order Management and Tracking Analysis:** This phase examines how orders are received, processed, and delivered. Traditional canteen systems lack real-time tracking, which leads to confusion among customers and inefficiencies in food preparation. Identifying bottlenecks in this process helps in streamlining order fulfillment.

3. **User Feedback Collection:** Gathering feedback from customers, canteen staff, and administrators is crucial to understanding the challenges faced in the existing system. Surveys, interviews, and direct observations help in identifying key pain points such as long waiting times, incorrect orders, and lack of digital payment options.

4. **Benchmarking Against Modern Solutions:** The current system is compared with automated and digital canteen management solutions to identify potential improvements. Best practices from modern food-ordering platforms, such as QR-based ordering, real-time tracking, and cashless payments, serve as a reference for enhancing the existing system.

5. **SWOT analysis:** A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is conducted to assess the efficiency of the traditional canteen system.

6. **Strengths:** Simple and familiar process for customers who prefer manual ordering.
7. **Weaknesses:** Slow service, manual errors, no tracking system, and reliance on cash transactions.
8. **Opportunities:** Implementing an automated system to improve efficiency, reduce waiting times, and enhance customer experience.
9. **Threats:** Resistance to technological change from staff and potential technical issues in implementation.

Based on this study, it is evident that the traditional canteen system has several inefficiencies that can be resolved through digital transformation. Implementing a **Canteen Management System** with QR-based ordering, real-time tracking, and automated payment options will enhance operational efficiency, improve customer satisfaction, and streamline the overall workflow.

4.2 PROBLEM AND WEEKNESS OF CURRENT SYSTEM

The traditional canteen management system faces several issues that impact efficiency, accuracy, and customer experience. Below are the key problems and weaknesses:

- **Lack of automation:** The current system relies on manual order-taking and payment processing, which slows down operations and increases workload. Staff members have to record orders manually, leading to inefficiencies and potential errors.
- **Limited Order Tracking:** Customers do not have real-time updates on their order status, leading to frequent inquiries and dissatisfaction. Staff members struggle to manage multiple orders simultaneously due to the lack of a centralized tracking system.
- **Inaccurate Inventory Management:** Stock levels are not updated in real time, causing mismanagement of inventory. Sudden shortages of essential ingredients can disrupt operations and cause delays in fulfilling customer orders.
- **Manual Payment Processing:** Customers have to wait in long queues to make cash payments, leading to inconvenience. The absence of digital payment options limits customer flexibility and slows down transactions. Manual cash handling is prone to errors and increases the risk of miscalculations and fraud.
- **Lack of Customer Feedback Integration:** There is no structured mechanism for collecting and analyzing customer feedback. Without proper feedback, canteen management struggles to address service issues and improve food quality. The absence of a review system reduces opportunities for improvement and customer satisfaction.

The existing canteen system lacks automation, real-time tracking, and efficient management, leading to delays, errors, and customer dissatisfaction**.**

4.3 REQUIREMENT OF NEW SYSTEM

To overcome the limitations of the traditional canteen management system, the proposed **Canteen Management System** must fulfill several key requirements to ensure efficiency, accuracy, and a seamless user experience. The primary requirements include:

- **Digital Ordering System:** Customers should be able to place orders through a **menu** instead of waiting in queues. Orders should be automatically processed and sent to the kitchen for preparation.
- **Real-time Order Tracking:** The system should provide **real-time updates** on order status (e.g., Processing, Ready for Pickup, Completed). Customers should be able to check their order status from their mobile devices without manual inquiries.
- **Integrated Cart System:** A **cart functionality** should be available where users can add multiple items before placing an order. **Redux-based state management** should ensure a smooth and efficient user experience.
- **Secure and Flexible Payment Options:** The system should support various payment methods, including UPI, credit/debit cards, and wallets (or at least a **payment simulation** for demo purposes). **Transaction security** should be ensured through secure encryption techniques.
- **Inventory and Stock Management:** The system should track available stock in real time to **prevent overordering or stock shortages**. Automated alerts should notify the admin when stock levels are low.
- **Admin Dashboard for Order and User Management:** A dedicated **Admin Panel** should allow canteen managers to track, update, and manage orders efficiently.
- **User Authentication and Order History:** Users should have **frontend-only authentication** to manage their orders and view their order history. Users should have **frontend-only authentication** to manage their orders and view their order history.

4.4 SYSTEM FEASIBILITY

Before implementing the **QR Code-Based Canteen Management System**, a **feasibility study** must be conducted to evaluate the project's viability in various aspects.

- **Technical Feasibility:** The system will be built using **React.js for the frontend** and **Node.js for the backend**, ensuring a scalable and efficient architecture A database (MongoDB/MySQL) will be used for order management and user authentication..
- **Economic Feasibility:** The project will reduce operational costs by **minimizing the need for manual order-taking and cash handling**. Investment in automation will lead to higher efficiency and customer satisfaction, making it cost-effective in the long run.
- **Operational Feasibility:** The system will be **easy to integrate into existing canteen operations** with minimal disruption. Training requirements for staff will be minimal due to the **intuitive admin dashboard and automated workflows**.
- **Legal Feasibility:** The system must comply with **data protection regulations**, ensuring user information and transaction security. Necessary legal agreements must be followed for digital payments and transactions.
- **Ethical Feasibility:** The system will **ensure fair pricing, transparent order processing, and secure transactions**, maintaining ethical standards. Customer feedback mechanisms will allow for service improvement based on real user experiences.
- **Risk Analysis:** Potential risks include: **System Downtime** → Implement cloud-based backups and a contingency plan. **Payment Failures** → Integrate secure payment gateways with error handling. **User Data Security** → Implement encryption and **secure authentication** to prevent unauthorized access.

4.5 FEATURES OF SYSTEM

The **QR Code-Based Canteen Management System** will include the following key features:

- **Automated Ordering with QR Code:** Users can scan a **QR code** to access the digital menu and place orders. Orders are directly processed and sent to the kitchen, **reducing wait times**.
- **Real-time Order Status Tracking:** Customers will receive **live updates** on their order status. The kitchen and admin panel will have **order tracking features** for efficient management.
- **Inventory and Stock Management:** Automated stock tracking ensures real-time **inventory updates**. Admins receive alerts for **low-stock items** to avoid shortages.
- **Cart System with Redux for State Management:** Users can add multiple items to their cart before finalizing their order. Redux ensures **fast and smooth state management** for better UI performance.
- **Secure Online Payment Simulation:** Users can simulate payments using **dummy transactions** for testing. Future upgrades can integrate actual payment gateways like **UPI or Stripe**.
- **Order History and User Authentication:** Users can view **past orders and track previous transactions**. Basic **frontend authentication** allows users to log in and manage their profiles.
- **Admin Dashboard for Order and User Management:** Admins can view, manage, and process orders in a **dedicated dashboard**. The dashboard provides **analytics on orders, customer behavior, and stock levels**.
- **Fast and Secure Backend with Node.js:** The backend will be optimized for speed and scalability, handling multiple orders efficiently. Security measures like JWT authentication and input validation will ensure data integrity and protection.

4.6 SELECTION OF HARDWARE AND SOFTWARE

The hardware and software requirements for the **Canteen Management System** depend on the scale of implementation and project needs. Below are the recommended specifications:

Software Requirements:

- Operating System: Windows, Linux or macOS
- **Frontend**: React.js, Redux, Tailwind CSS/Bootstrap NumPy
- **Backend**: Node.js, Express.js
- **Database**: MongoDB or MySQL
- **Authentication**: Frontend-only (JWT/local storage)
- **Order Processing**: WebSockets or Polling PostgreSQL
- **Payment Simulation**: Dummy payment gateway
- **Deployment (Optional)**: Heroku, Firebase, AWS

Hardware Requirements:

- **Processor**: Intel Core i5 or higher
- RAM: 8GB or more
- Hard Drive Space: 50GB or more
- **Network**: Stable internet, local/cloud hosting

CHAPTER 5: SYSTEM DESIGN

5.1 SYSTEM DESIGN & METHODOLOGY

5.1.1 Use Case Diagram

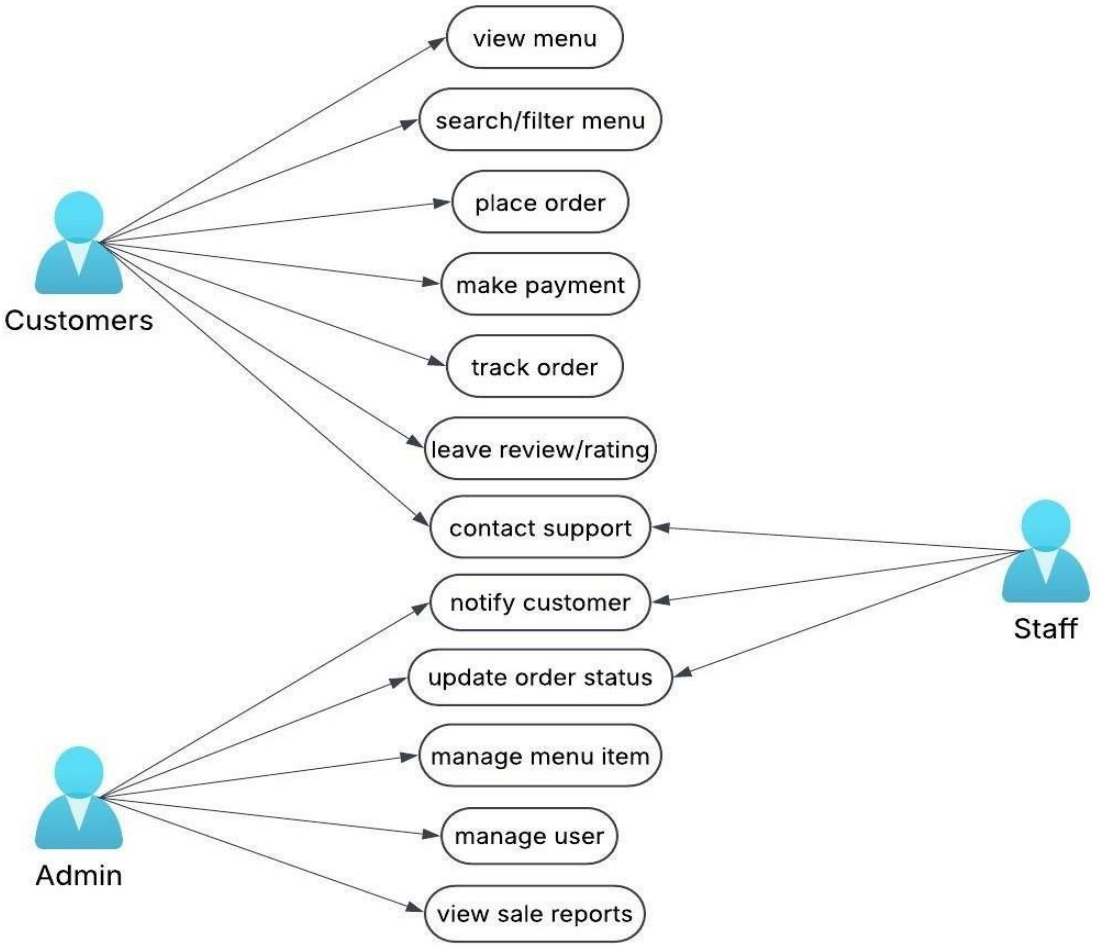

Figure 2 Use Case Diagram

The **Canteen Management System** involves three primary actors: **Customers, Admin, and Staff**. Each actor interacts with the system to perform various tasks, as shown in the use case diagram. The key processes and interactions are described below:

1. **Customers (Actor):**
   Customers interact with the system to place orders and manage their canteen experience. Their use cases include:

   - **View Menu: Customers can browse the available food items.**
   - **Search/Filter Menu**: Users can search or filter menu items based on

categories, price, or availability.

- **Place Order**: Customers can add items to their cart and place an order.
- **Make Payment**: The system allows users to simulate payments via available methods.
- **Track Order**: Customers can check the status of their orders.
- **Leave Review/Rating**: After receiving their orders, users can provide feedback and ratings.
- **Contact Support**: Customers can reach out to staff for assistance.
- **Receive Notifications**: Customers get notified about order updates and promotions.

2. Staff (Actor):

The staff interacts with customers and admin to manage orders efficiently. Their use cases include.

- **Contact Support: Staff members assist customers with queries or issues.**
- **Notify Customers**: Staff can update customers about their order status.

3. Admin (Actor):

The admin manages the entire canteen system, including orders, users, and reports. Their use cases include**:**

- **Update Order Status**: Admins can change order statuses (e.g., preparing, ready, delivered).
- **Manage Menu Items**: Admins can add, remove, or update food items.
- **Manage Users**: Admins can add or remove users, including staff and customers.
- **View Sales Reports**: Admins can generate reports on sales and customer orders for analysis.

5.2 DATA DICTIONARY:

5.2.1 Food Table:

Field Name	Data Type	Description	Example Value
_id	ObjectId	Unique identifier for the food item	680b6df07fb18f19010cd9f7
name	String	Name of the food item	cake
description	String	Short description of the food item	desert
price	Integer	Price of the food item in currency (e.g., INR)	80
image	String	Image file path or filename of the food item	1745579504958174499840 4283food_10.png
category	String	Category to which the food item belongs	Deserts
__v	Integer	Version key (for Mongoose document versioning)	0

5.2.2 Orders Table:

Field Name	Data Type	Description	Example Value
_id	ObjectId	Unique identifier for the order	680b6b6c7fb18f19010cd9e2
userId	ObjectId (String)	ID of the user who placed the order	680b69c17fb18f19010cd9cd
items	Array of Objects	List of food items included in the order	See item subfields below
amount	Integer	Total price of the order	270
address	Object	Delivery or billing address details	See address subfields below
status	String	Current status of the order	Food Processing
date	Date (Timestamp)	Order placement date and time	2025-04-24T06:23:34.109Z
payment	Boolean	Payment status (true = paid, false = unpaid)	true
__v	Integer	Version key (Mongoose document versioning)	0

5.2.3 Items Table:

Field Name	Data Type	Description	Example Value
_id	ObjectId	Food item ID	680b69377fb18f19010cd9c6
name	String	Name of the food item	big burger
description	String	Description of the food item	Full meal burger for perfect meal
price	Integer	Price of the food item	100
image	String	Filename or path of food image	1745578295030174500548621 1food_4.png
category	String	Food category	Burger
__v	Integer	Version key	0
quantity	Integer	Quantity ordered	1

5.2.4 Address Table:

Field Name	Data Type	Description	Example Value
firstName	String	First name of the customer	Aarti
lastName	String	Last name of the customer	Ka.patel
email	String	Email address	aarti@gmail.coom
employee_email	String	Company email	aarti@gmail.coom
department	String	Department in organization	ITTechnology
sub_department	String	Sub-department	IT Support & Helpdesk
floor	String	Office floor number	5
desk_location	String	Desk location within the floor	124
phone	String	Contact number	9867545672

5.2.5 Users Table:

Field Name	Data Type	Description	Example Value
_id	ObjectId	Unique identifier for the user	680b65b47fb18f19010cd9be
name	String	Full name of the user	chesta
email	String	Email address of the user	chesta@gmail.com
password	String	Hashed password (bcrypt hash used for authentication)	$2b$10$Yl3gqeoODAA5YVCd.Dn7XuWMXIXdcJrluWg8K97odrXYo/RYbk7KW
cartData	Object	Stores user-specific cart-related information (currently empty)	{}
__v	Integer	Version key (Mongoose document versioning)	0

CHAPTER 6: IMPLEMENTATION

6.1 IMPLEMENTATION PLATFORM

- **Visual Studio Code (VS Code):** Visual Studio Code (VS Code) is a lightweight, open-source code editor developed by Microsoft. It provides extensive support for JavaScript, React.js, and Node.js, making it an ideal choice for web development. The integrated terminal, debugging tools, and support for extensions simplify the development process.
    - Supports **React.js** and **Node.js** for frontend and backend development.
    - Offers an inbuilt **Git integration** for version control.
    - Provides an extensive marketplace for **extensions** like ESLint, Prettier, and REST Client.

- **Node.js:** Node.js is an open-source, cross-platform runtime environment used to build backend services. It enables server-side JavaScript execution, making it efficient for handling real-time applications like the **Canteen Management System**.
    - Uses **Express.js** for routing and API management.
    - Supports **asynchronous, event-driven architecture**, improving performance.
    - Works seamlessly with **MongoDB** for database management.

- **MongoDB:** MongoDB is a NoSQL database that efficiently manages unstructured and semi-structured data. It is used to store user details, orders, menu items, and payment records for the **Canteen Management System**.
    - Ensures consistent **state management** across the application.
    - Improves performance with **efficient data handling**.
    - Enables **debugging and logging** through Redux DevTools.

6.2 TECHNOLOGIES

React.js:
React.js is a JavaScript library used for building dynamic and interactive user interfaces. It is utilized in the **Canteen Management System** to provide a seamless frontend experience.

- Component-based architecture ensures **code reusability**.
- **Virtual DOM** improves performance and rendering speed.
- Supports **state management** using hooks and Redux.

Node.js & Express.js:
The backend of the **Canteen Management System** is developed using **Node.js** with **Express.js**, a lightweight web framework.

- **Handles API requests efficiently** using middleware.
- Supports **RESTful API development** for smooth frontend-backend interaction.
- Uses **JWT (JSON Web Token)** for user authentication.

MongoDB & Mongoose:
MongoDB is used as the primary database, while **Mongoose** is used for schema modeling.

- **Stores user profiles, orders, menu items, and payment transactions**.
- Supports **real-time order updates**.
- Allows **schema validation** to maintain data integrity.

QR Code Generation:
The system includes a **QR code-based ordering** feature where users can scan a QR code to place orders directly.

- **Uses qrcode.react library for generating QR codes.**
- Integrates **order tracking and cart management** through scanned QR data.

Payment Simulation:
Since the system supports **payment simulation**, transactions are processed within the application for testing purposes.

- **Uses dummy payment methods for simulating different payment scenarios.**
- Provides **success/failure responses** for transaction handling.

6.3 RESULTS

The Canteen Management System was successfully implemented with the following key features:

6.3.1 Home Page:

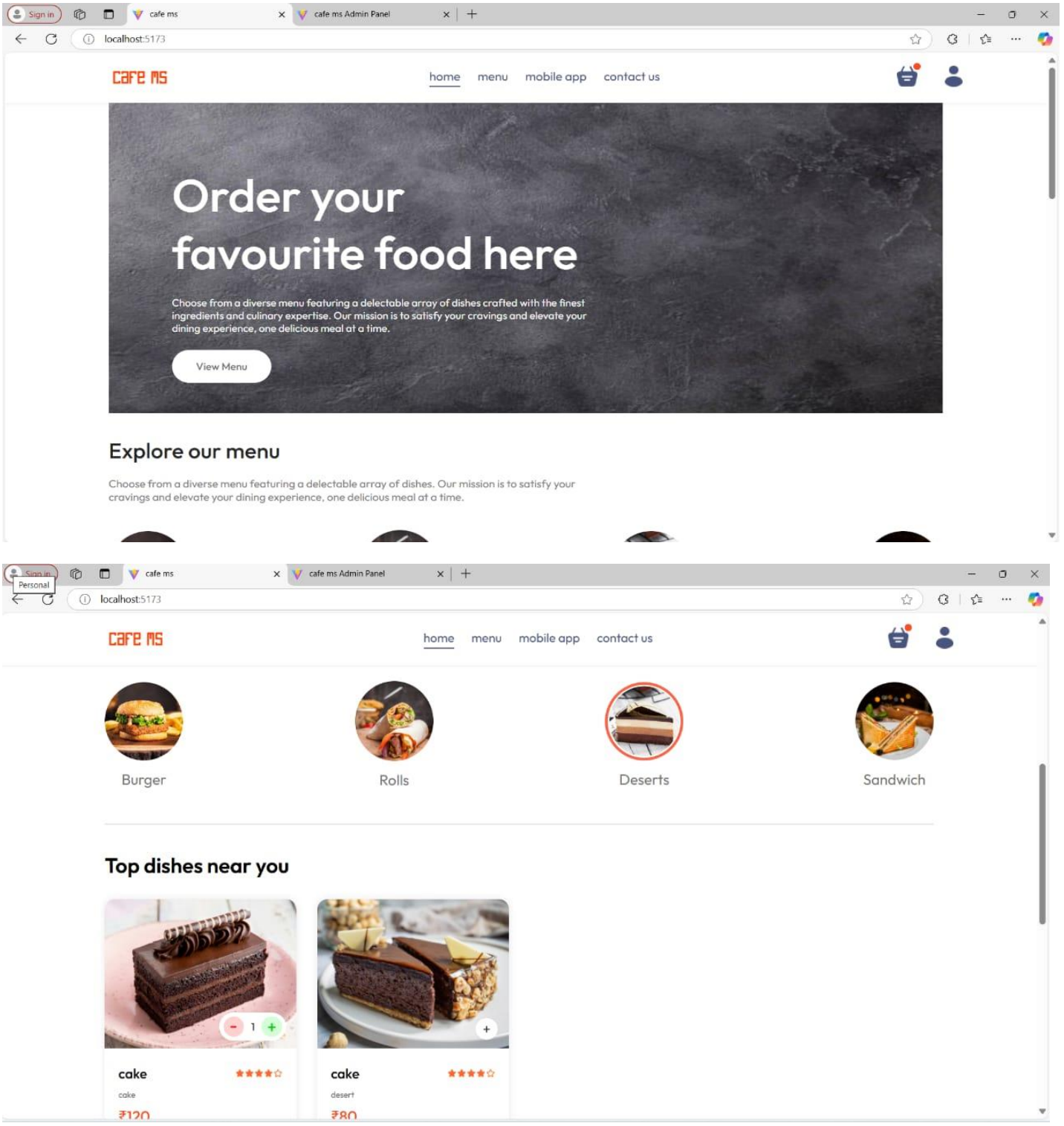

Figure 4 Home Page

- The **Home Page** serves as the entry point for users, providing an overview of the canteen services.
- It includes **navigation links** to key sections such as the menu, cart, contact page, and login/signup.
- A **QR code scanner** option is integrated for quick access to the ordering system.
- The UI is designed with a **modern and interactive layout** to enhance the user experience.

6.3.2 Login/ Sign up Page:

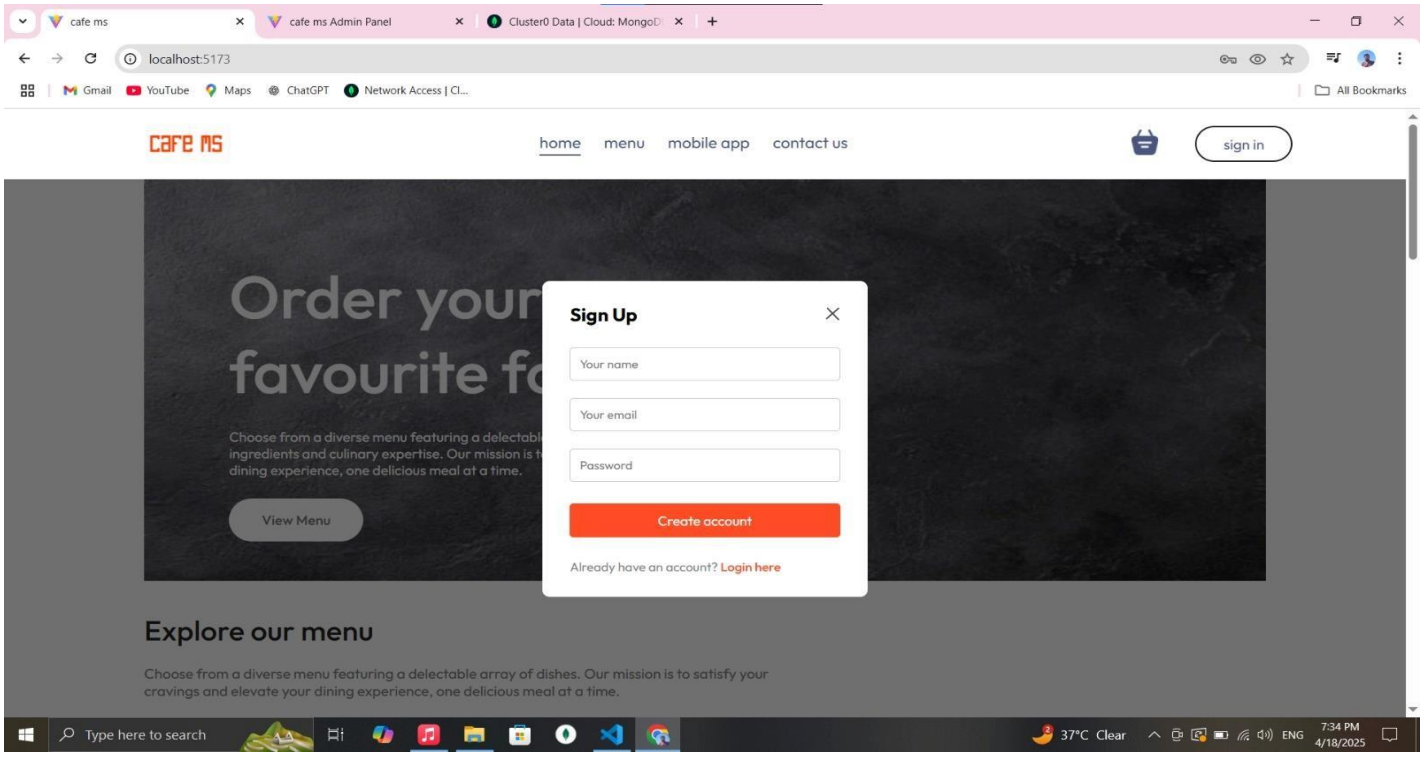

Figure 5 Sign up Page

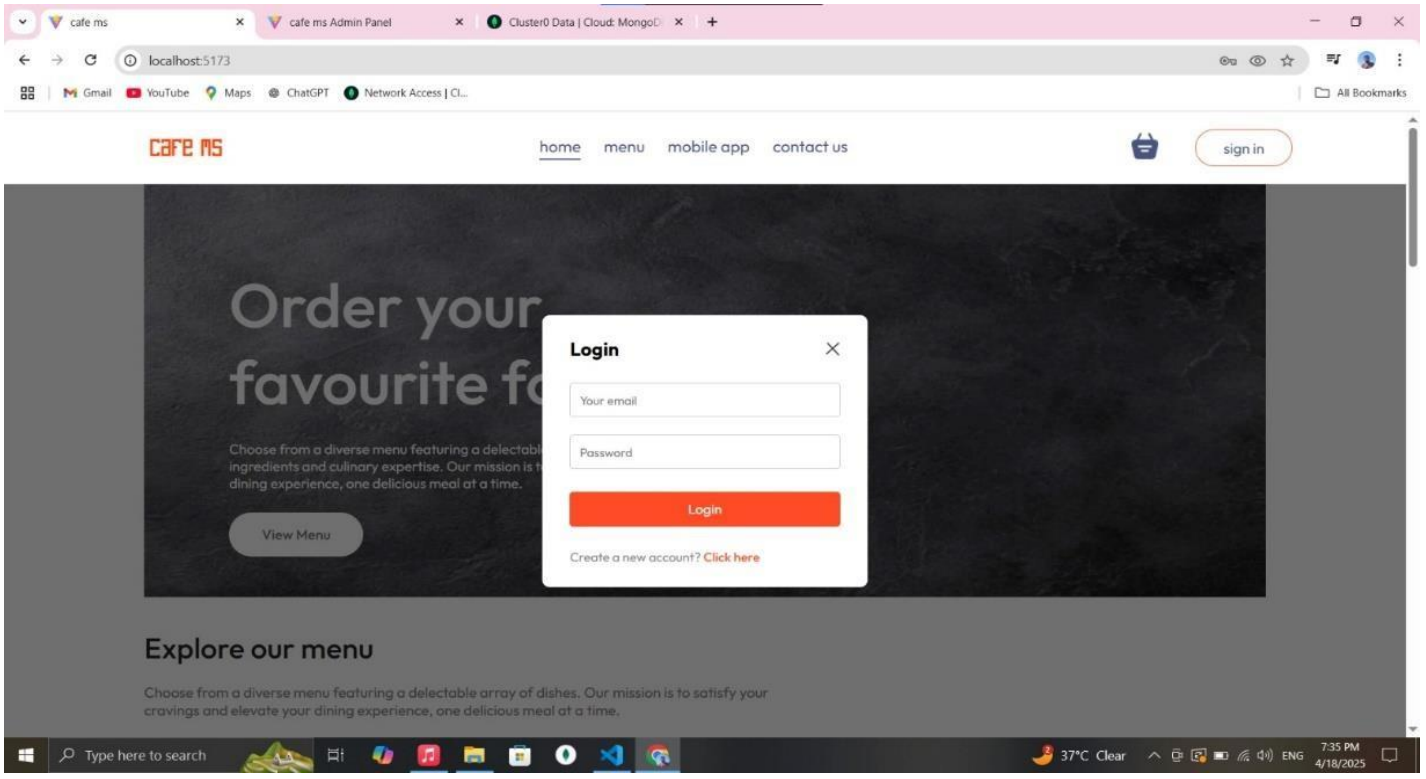

Figure 6 Login Page

- The system includes user authentication, allowing customers to create an account and log in securely.
- The Sign Up Page collects basic details like name, email, password, and phone number.
- The Login Page verifies user credentials before granting access to the system.
- Admins have separate login credentials, granting them access to the Admin Dashboard for managing orders and menu items.

6.3.3 Menu Page:

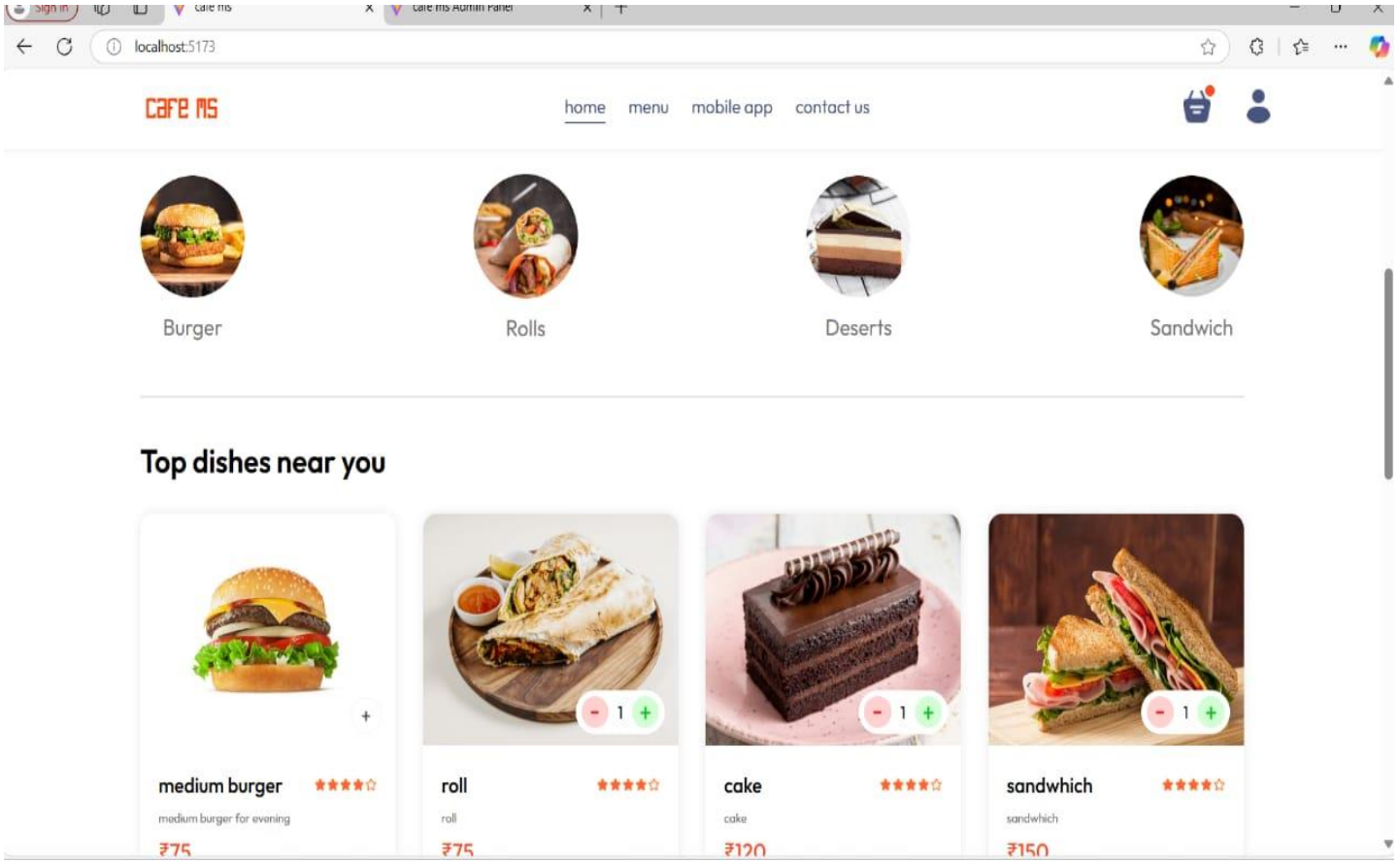

Figure 7 Menu Page

Custmers can add multiple items to their **shopping cart** before proceeding to checkout.

- The **cart page** displays a list of selected items along with **quantities, prices, and total amount**.
- Users can **increase, decrease, or remove items** from the cart before confirming the order.
- A **"Proceed to Checkout" button** allows users to finalize their purchase.

6.3.4 Order Tracking Page:

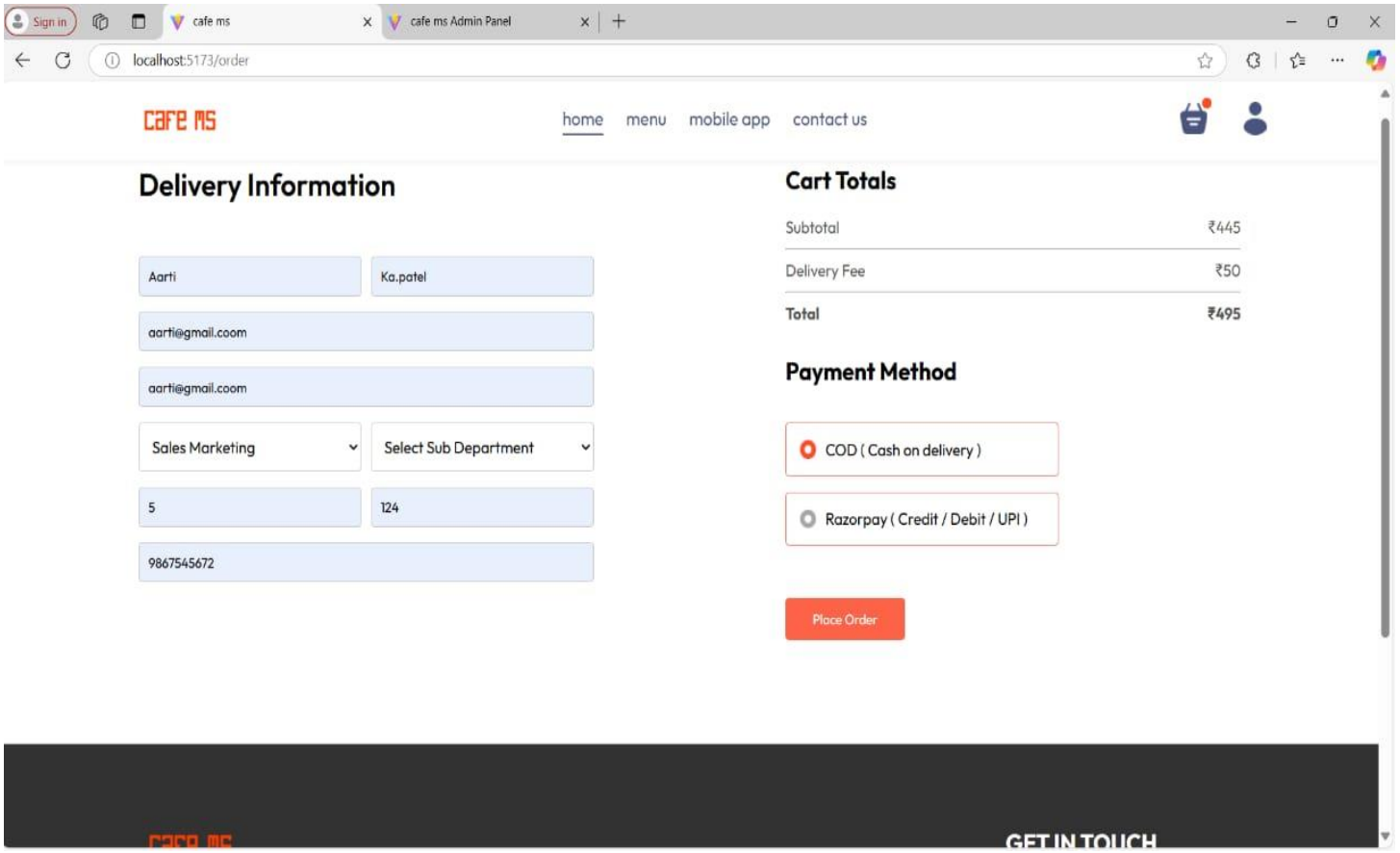

Figure 8 Payment Page

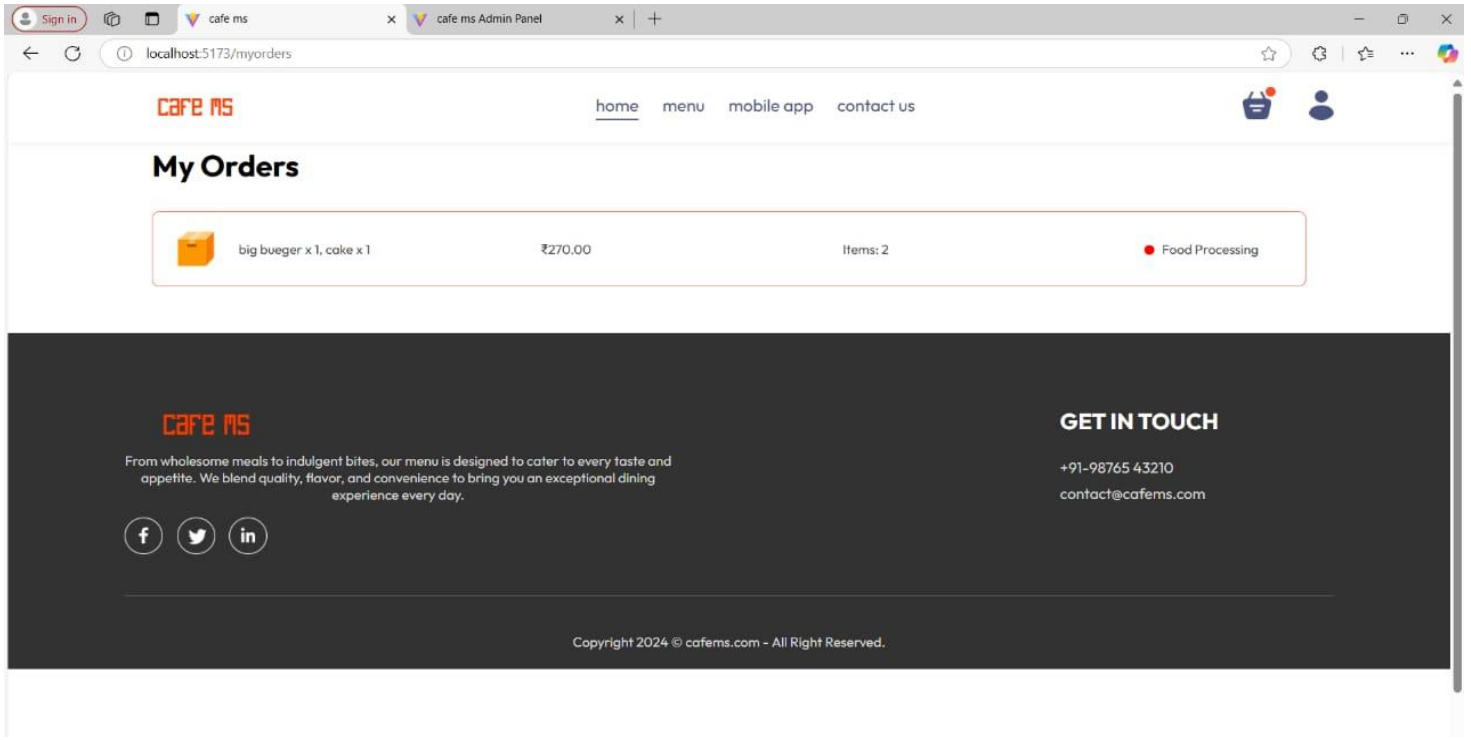

Figure 9 Order Page

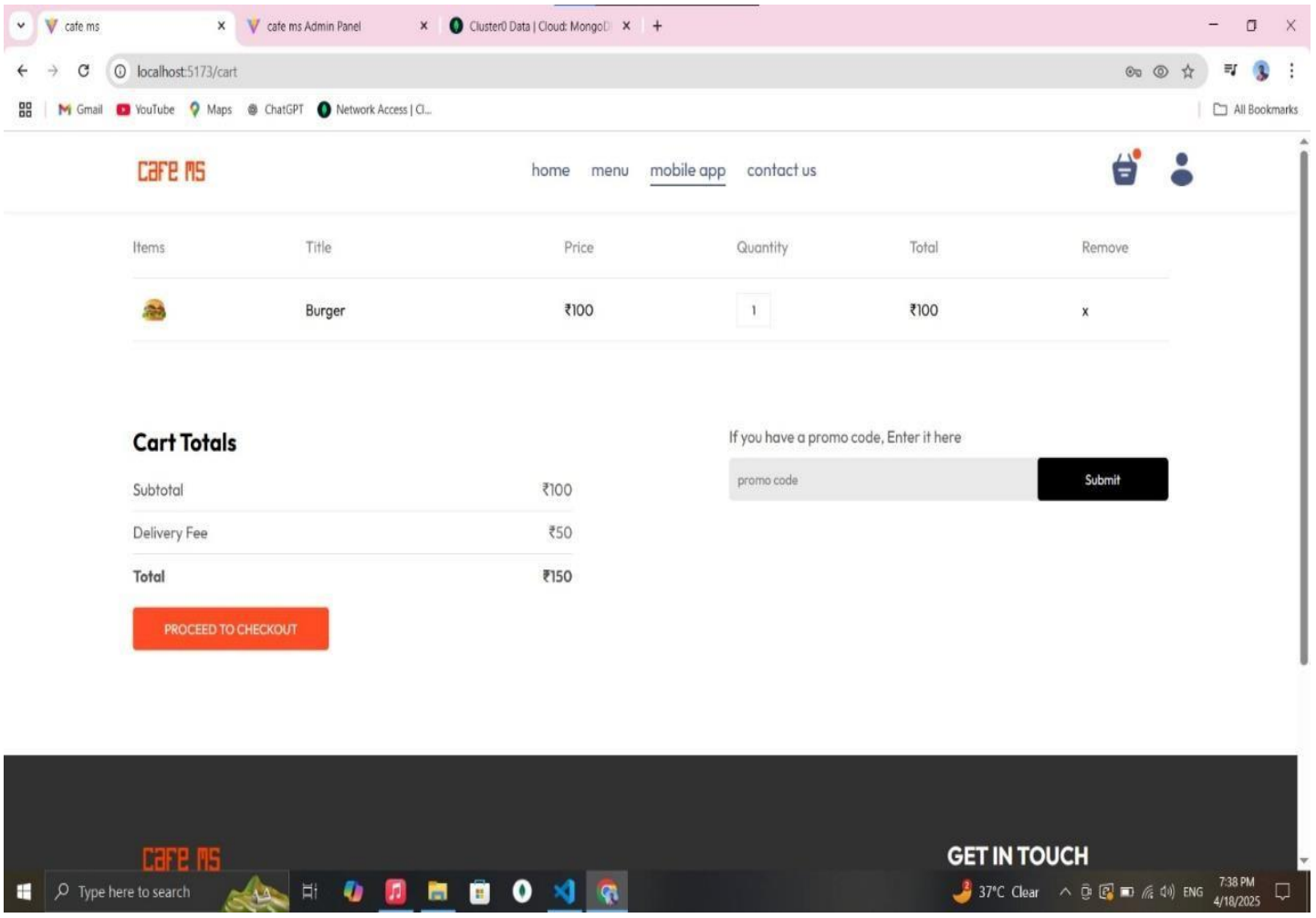

Figure 10 Cart Page

6.3.5 Admin:

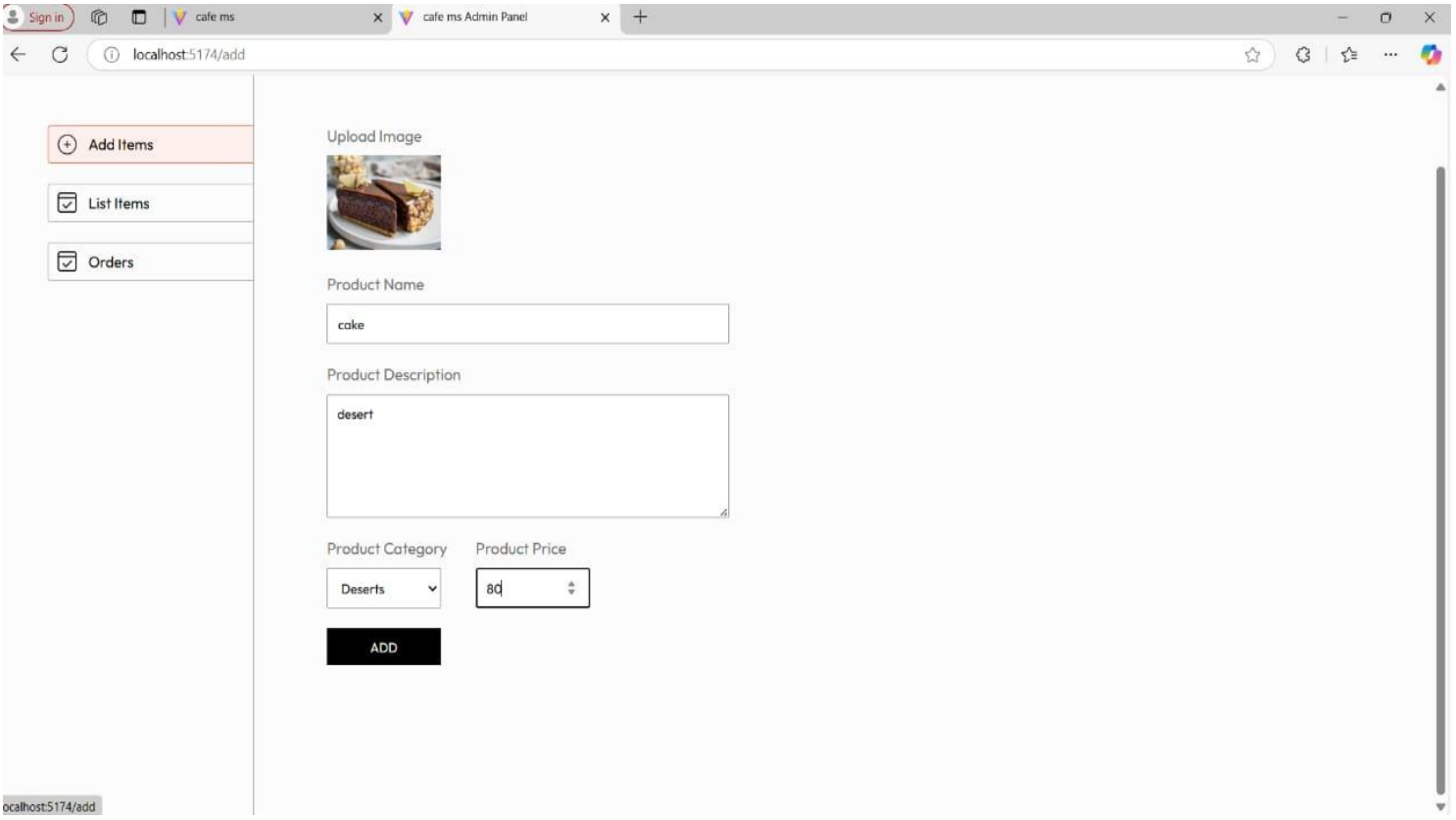

Figure 11 Add Items Page

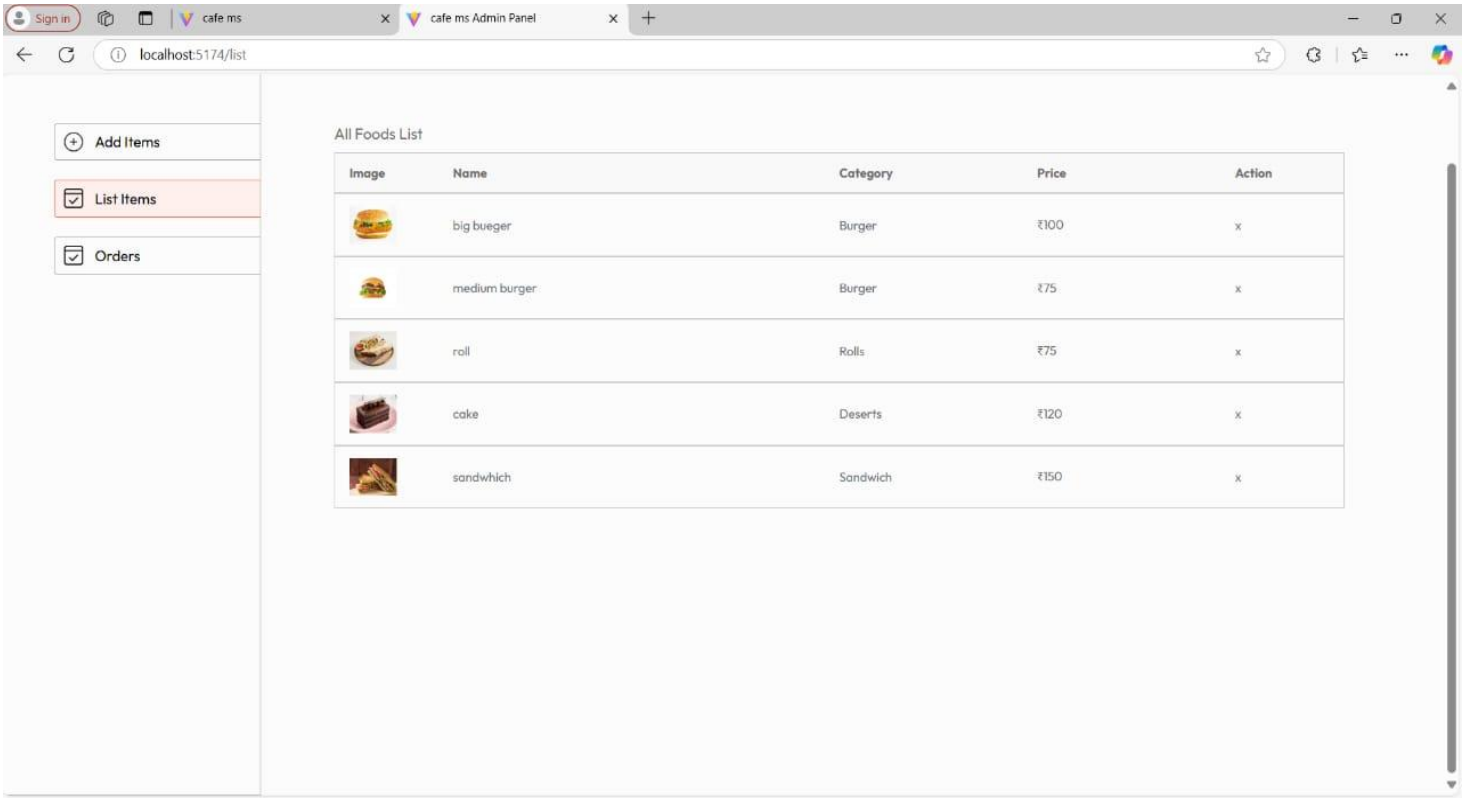

Figure 12 List Item Page

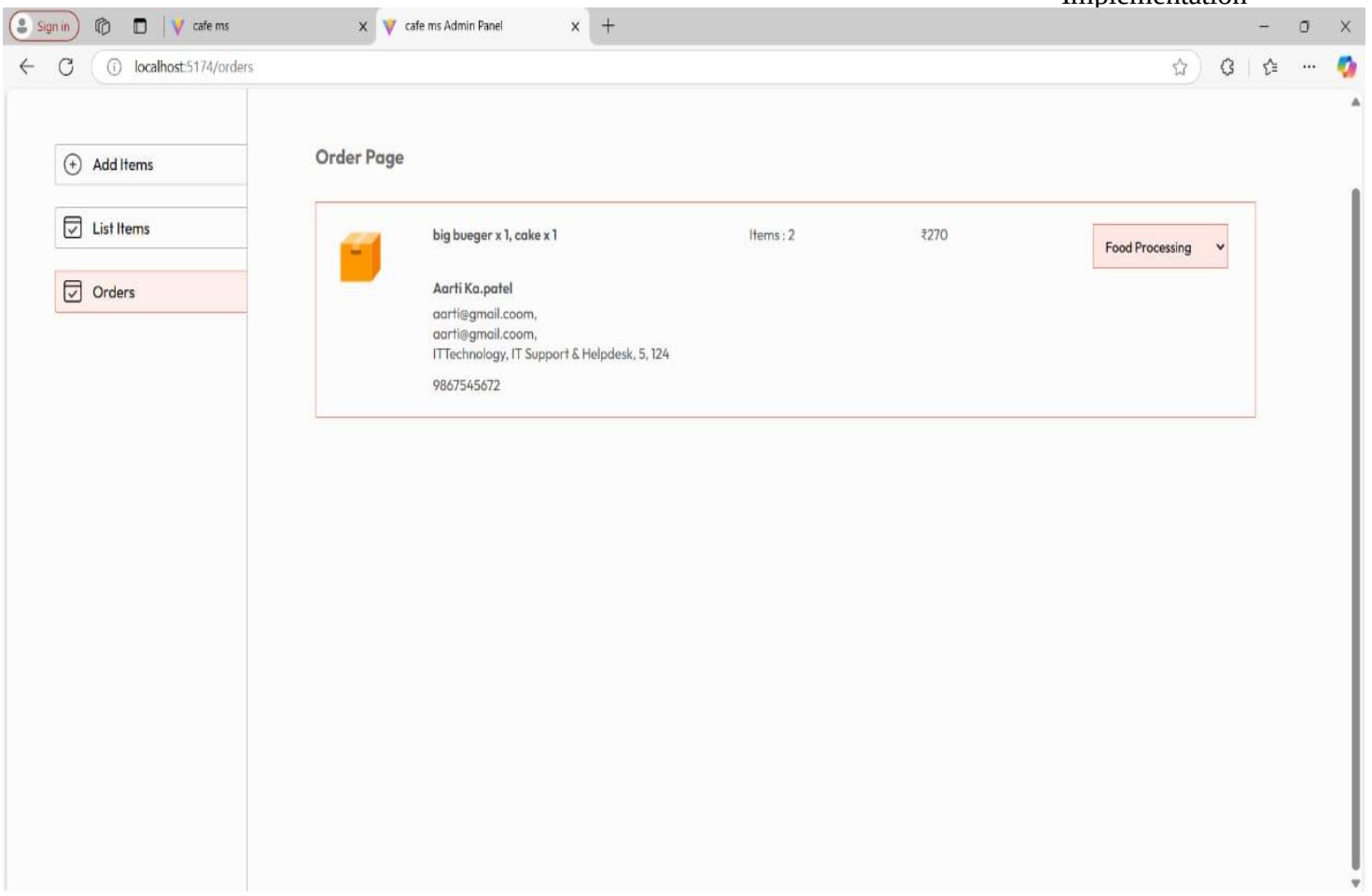

Figure 13 Orders Page

CHAPTER 7: CONCLUSION

7.1 LEARNING OUTCOMES

During the development of the **Canteen Management System**, I gained extensive knowledge of full-stack web development, including frontend and backend integration. I learned how to design and implement key features such as QR-based ordering, user authentication, and order tracking.

I improved my problem-solving skills by working with **React.js, Node.js, Express.js, and MongoDB** to build a scalable and efficient system. Through Redux, I understood state management and how to maintain a seamless user experience. Additionally, I explored the integration of APIs, handling real-time order updates, and implementing a secure authentication system.

Throughout the project, I faced various challenges that enhanced my debugging and optimization skills. Collaborating on different aspects of the system strengthened my ability to work in a structured and organized manner. I also improved my ability to document and present my work effectively.

Overall, working on this project provided a hands-on experience in modern web development and prepared me to tackle real-world application development challenges.

7.2 EXPERIENCE

Working on the **Canteen Management System** project was an enriching experience that provided a deep understanding of **full-stack development**. The development process involved working in a structured and collaborative environment, where each module was designed, developed, and tested iteratively. This helped in improving problem-solving skills, debugging techniques, and the ability to work with modern web technologies like **React.js, Node.js, Express.js, MongoDB, and Redux**.

During the project, I faced real-world challenges such as **state management, backend integration, authentication, and handling API calls efficiently**. Overcoming these challenges refined my ability to think critically and optimize application performance. Implementing features like **QR-based ordering, cart functionality, order tracking, and admin dashboard** required not only technical expertise but also a strong understanding of **user experience and interface design**.

Working on a **team-based** project enhanced my communication and collaboration skills, preparing me for real-world software development environments. The experience also strengthened my ability to write clean, maintainable code and effectively document the project's progress.

Overall, this project was a great opportunity to gain hands-on experience in modern web application development and strengthened my ability to build **scalable, efficient, and user-friendly** systems.

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7.3 CONCLUSION

The **Canteen Management System** successfully automates the traditional canteen workflow, significantly improving **efficiency, accuracy, and user experience**. By implementing a **QR-based ordering system, cart functionality, and real-time order tracking**, the project eliminates the inefficiencies of manual order-taking and payment processing. The integration of **React.js for the frontend, Node.js for the backend, and MongoDB for data storage** ensures a seamless and robust system.

The admin dashboard provides **order management and tracking capabilities**, allowing for better monitoring of orders, reducing errors, and streamlining canteen operations. The use of **Redux for state management** improves performance and maintains a smooth user experience.

Through this project, I learned the importance of **scalability, security, and user-centric design** in web development. The insights gained from this experience will be valuable in future projects involving **full-stack development, API integration, and database management**.

In conclusion, the **Canteen Management System** serves as an efficient, modern solution to traditional canteen operations and demonstrates the power of **technology in automating and optimizing** daily processes.

CHAPTER 8: REFERENCES

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