A

Project Report

on

"Automated Canteen Ordering System"

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Under the guidance of

Prof. Rahul Rathod

In partial fulfillment of the requirements for the degree **of Bachelor of Technology in Computer Engineering** in SOET of D. Y. Patil University.

DEPARTMENT OF COMPUTER ENGINEERING

Academic Year 2023-2024

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CERTIFICATE

This is to certify that the project entitled **"Automated Canteen Ordering System"** is a record of bonafide work carried out by **Mirani Jay, Ananya Vats, Nishtha Bhavnani** under my supervision and guidance, in partial fulfillment of the requirements for the award of Degree of Bachelor of Technology in computer engineering from D. Y. Patil University for the year 2023-24.

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ABSTRACT

In today's fast-paced world, the demand for innovative solutions in various domains is incessantly growing. This paper introduces a groundbreaking Automated Canteen Ordering System (ACOS) designed to elevate the dining experience through the integration of advanced technologies, specifically Natural Language Processing (NLP) and Machine Learning (ML) algorithms.

The primary objective of the ACOS is to streamline and enhance the efficiency of traditional canteen operations. Leveraging NLP, the system empowers users to interact seamlessly with the ordering platform, enabling intuitive and natural language input for a personalized and user- friendly experience. This feature not only simplifies the ordering process but also caters to users with diverse linguistic preferences.

The core innovation lies in the incorporation of ML algorithms to predict and adapt to user preferences dynamically. The system continuously learns from user interactions, analyzing historical data to generate personalized recommendations for menu items. Through the implementation of ML-driven demand forecasting, the ACOS optimizes inventory management, reducing instances of both overstock and out-of-stock situations

To address the challenges of implementing an ACOS, the paper explores key design decisions and considerations. Scalability, reliability, and user experience are paramount, and the architecture is crafted to accommodate.

PREFACE

Welcome to the automated canteen ordering system (ACOS), a technological marvel blending natural language processing (NLP) and machine learning (ML). This preface invites you into a world where traditional dining norms are redefined with a focus on time-saving, easiness, and efficiency.

Our journey began with a clear goal: simplify canteen processes. The ACOS reflects our commitment to cutting-edge technology that not only s,treamlines but enhances the user experience. Explore the fusion of NLP and ML, personalized user interactions, and sustainability-driven innovations within these pages.

Encounter the challenges and pivotal decisions that shaped the ACOS architecture, emphasizing scalability, reliability, and user-centric design. This system isn't just about efficiency; it's a seamless, time-saving solution making dining effortlessly easy.

Beyond technological marvel, the ACOS aims to achieve sustainability, optimizing food production and minimizing waste. This preface is your gateway to a world where the ACOS is a practical and indispensable tool, promising a dining experience that's not only efficient but also time-saving and easy.

Embark on this journey, where technology seamlessly integrates into daily life, redefining the ordinary dining experience.

As you navigate through the challenges and pivotal decisions that shaped the ACOS architecture, you'll encounter a commitment to scalability, reliability, and a design centered around user ease. The system is not just about efficiency; it's a journey into simplicity, where technology simplifies complex processes, saving time and making the dining experience effortlessly seamless.

LIST OF FIGURES

Chapter 1

Introduction

The "Automated Canteen Ordering System" is a modern solution designed to streamline and enhance the food ordering process within a canteen or cafeteria. In the digital age, the conventional manual order and payment methods are being replaced by automated systems, offering increased efficiency, accuracy, and convenience. This project aims to develop a user friendly, web-based application that simplifies the process of ordering food, making payments, and managing inventory for both canteen staff and customers. This system also prominently relieves the burden on the canteen's end, as the entire method of taking orders is computerized. Once an order is placed on the android phone, it is entered into the database and then retrieved, in pretty much real-time, by a desktop application on the canteen's end. Within this application, all items in the order are displayed, along with their equivalent options and supply details, in a summarizing and easy to read manner. This allows canteen staffs to speedily go through the orders placed by scanning the QR code from student's android phone and produce the needed items with minimal delay and confusion.

The system encompasses multiple facets, beginning with a user-friendly interface that allows customers to browse the menu, select items, and add them to their cart. Seamless integration with secure payment gateways enables users to make hassle-free online payments. Real-time notifications and order tracking provide customers with greater transparency and control over their orders. Simultaneously, canteen staff benefit from efficient inventory management tools and order tracking functionalities, optimizing the overall operational workflow.

This project is not just about improving the dining experience; it's also about optimizing canteen operations. By digitizing the ordering process and collecting data on customer preferences and order trends, canteen managers can make data-driven decisions to better cater to their clientele. Moreover, our system promotes sustainability by reducing paper waste associated with traditional menus and receipts. In this fast-paced world, where time is of the

essence, the Automated Canteen Ordering System seeks to provide a seamless, efficient, and user-friendly solution. Our system leverages cutting-edge technology, including mobile applications and integrated payment gateways, to create a hassle-free dining experience for patrons. Whether you're a student rushing between classes or a professional on a tight lunch break, our project promises to optimize your dining experience by reducing wait times, ensuring order accuracy, and enhancing overall customer satisfaction.

The genesis of the ACOS lies in a profound understanding of the challenges embedded in conventional canteen operations. Recognizing the intricate dance between customer demands, inventory management, and operational efficiency, our quest was born—to create a system that not only streamlines processes but elevates the entire dining experience.

At its core, the ACOS is an embodiment of our commitment to infusing cutting-edge technology into daily conveniences, ensuring that efficiency is not sacrificed for user-friendliness. This intricate fusion of NLP and ML sets the stage for an exploration into personalized user interactions, predictive analytics, and sustainability-driven innovations.

As we navigate the intricacies of the ACOS, we encounter the challenges and pivotal decisions that shaped its architecture. Scalability, reliability, and a design centered around user ease are not just objectives but guiding principles. The system is meticulously crafted to offer not just efficiency but a dining solution that is effortlessly easy and time-saving.

Beyond the technological marvel, the ACOS champions sustainability. It optimizes food production based on demand patterns, minimizing waste and aligning with environmental consciousness. This holistic approach transforms the ACOS from a mere technological novelty to a practical and indispensable tool, promising a dining experience that transcends the ordinary.

This detailed introduction invites you to explore the ACOS, where technology seamlessly integrates into daily life, promising an experience that is not only efficient but also time-saving, easy, and environmentally conscious.

In the era of relentless technological advancements, the Automated Canteen Ordering System (ACOS) emerges as a beacon of innovation, poised to redefine the landscape of traditional dining experiences. At the intersection of Natural Language Processing (NLP) and Machine Learning (ML), the ACOS introduces a paradigm shift, promising not just efficiency but an entirely new dimension to how we engage with canteen services.

The genesis of the ACOS lies in a comprehensive understanding of the intricacies and challenges embedded within conventional canteen operations. As dining establishments grapple with the dynamic interplay of customer preferences, inventory management, and operational efficiency, the ACOS arises as a solution-driven endeavor to harmonize these elements seamlessly.

Our journey unfolds with a commitment to infuse cutting-edge technology into the fabric of daily conveniences. The intricate fusion of NLP and ML serves as the bedrock for the ACOS, offering more than just streamlined processes—it redefines user interactions, leverages predictive analytics, and pioneers sustainability-driven innovations.

As we navigate through the pages of the ACOS narrative, we encounter the challenges and pivotal decisions that have meticulously shaped its architecture. Scalability, reliability, and a design philosophy centered around user ease become guiding principles, ensuring that the system is not merely efficient but effortlessly easy and time-saving.

However, the ACOS is more than a technological marvel; it embodies a commitment to sustainability. By optimizing food production based on demand patterns, the system minimizes waste, aligning itself with the ethos of environmental consciousness. This transformative approach elevates the ACOS beyond a mere technological novelty, positioning it as a practical and indispensable tool for an enhanced dining experience.

Chapter 2
Literature Survey

We have gone through the different types of research papers, citations, publications, etc, and have been reported in the literature. However, few relevant and significant works are reviewed here. A lot of research work has been done in relation to automated canteen ordering system. This section shows the self-service ordering in a canteen and previous research works and products in the field of automated canteen ordering system.

2.1 Gan (Gan, 2002) proposed to develop an automated canteen ordering system that allows customers to place orders anytime at any place. The system helps to manage order from customer as well as advertise promotion. It allows kitchen staff to view ordering information, management to manage fast raw materials and staff to search customer delivery and profile information. This system helps to reduce queue issues during peak hours, speed up food preparation and increase customer volumes. As a result, market share of fast food restaurant/canteen can be boosted up and increases return of investment for the investor.

2.2 Bhatnagar (Bhatnagar, 2006) mentioned that the innovation of kiosk and computerized table top ordering screen will force restaurant industry re-jigger an often-used acronym quick service restaurant. Customer can get information or search for recipes from the kiosk and internet. The kiosk and internet also take orders and receives credit cards and debit cards payment. As a result, wrong order and long queue can be avoided, order staff can be arranged to somewhere else and focus to speed up delivery orders. On the other hand, a table-top touch screen order system can take customer orders as well, handle other customer requests such as refill drinks, call a waiter and make payment by credit or debit card.

2.3 Odesser-Torpey (Odesser-Torpey, 2008) reports that most of the Americans hate waiting for an order. Therefore, they prefer self-service technology, which can be in form of text-messaging, the internet and kiosk. Usually, the customer prefers self-service because of speed and convenience in making order and transactions that self-activated terminals are more likely to serve as ordering innovation in the future. The implementation of alternative ordering can increase check size, free up counter, staff that need to serve customers and take money handling out of service equation.

2.4 De Leon (De Leon, 2008) mentioned that there are several aspects that should be included in a good, automated ordering system. System should be simple to navigate, not clustered and easy to make an order. (Sharma, 2007) designed with professionals looking with search engines optimize capability and available 24hours. The system should also have a secure payment gateway to 8 protect their customers' credit card information, fast and keep track on orders and sales history easily as well as generate a comprehensive sales report. (Sharma, 2007)

2.5 Varsha Chavan, Priya jadhav (2015), implied that The existing food ordering processes encompass various approaches, including full-service restaurants relying on traditional paper-based systems, self-service restaurants requiring customers to order at service counters, and automated systems seeking to enhance customer experiences and reduce service costs. The conventional paper-based system presents drawbacks such as potential loss, damage, and lack of dynamicity, necessitating manual efforts and causing time inefficiencies. Self-service models involve customers making decisions in advance, while automated systems leverage electronic devices for order placement, streamlining communication between customers, waiters, and kitchen staff. Personal Digital Assistants (PDA's) based systems introduced wireless technology but faced drawbacks such as increased expenditures and limited real-time customer feedback. The emergence of multi-touch technology brings advancements but encounters challenges such as cost, durability issues, and limitations in supporting certain gestures and environmental conditions.

2.6 Pandhare Sonali, Shrike Priyanka (2019), explored various aspects of online food ordering systems, emphasizing their advantages over traditional queuing methods. The proposed systems aim to enhance customer experience, streamline order processing, and provide features such as online payment and feedback mechanisms. These systems leverage technologies like GPS, geo-tagging, and wireless communication, contributing to automation in the food industry. The surveyed papers discuss issues in existing systems, such as the limitations of paper-based methods, and propose solutions like touchpad-based ordering and Android applications. The common goal is to improve efficiency, customer satisfaction, and communication between food service providers and consumers. The proposed systems address challenges faced by both customers and food service providers,

offering solutions to enhance overall user experience.

2.7 Ashwini J, Ayisha Shetty (2019), explained about how raditional paper-based system for food ordering has been widely utilized, but it is marred by various issues. Waiters often make mistakes with orders, leading to customer dissatisfaction. Impatient customers may repeatedly inquire about their order status, causing inefficiencies. Additionally, customers have to depend on waiters to remember their orders, resulting in potential delays and billing errors. Managers face challenges in analyzing paper receipts for insights into best-selling items, popular hours, and customer satisfaction, requiring manual effort and reprinting of menus.

The introduction of computers marked a significant shift in the hospitality industry, automating the food ordering process. Waiters entered orders into a system connected to the kitchen, enhancing communication and streamlining operations. The advent of "QORDER" further revolutionized the industry, replacing paper-based orders with a handheld Android device. This portable device allowed waiters to input orders on a touchscreen, sending them directly to the kitchen for processing and facilitating efficient billing through a POS system.

Drawback: There is no mention of data security measures to protect customer information and transaction details. In an age where data breaches are common, this is a significant oversight.

2.8 Shahirah Mohamed Hatim, Nur Azmina Mohamad Zamani (2019), explored the integration of mobile devices and wireless technologies into the hospitality industry, particularly in restaurants. The traditional manual food ordering processes, involving pen and paper, are criticized for being slow, error-prone, and inconvenient. The study emphasizes the growing trend of online food ordering, citing a 300% faster growth in online ordering traffic compared to dine-in traffic, particularly among young generations.

Drawback: The study seems to be based on preliminary surveys and a prototype phase. Extensive real-world testing and feedback collection from a broader user base would provide more comprehensive insights into the system’s effectiveness and areas needing improvement.

The proposed solution, eFoodCart, is a mobile application designed for students at Universiti Teknologi MARA, Perak Branch, Tapah Campus. It aims to provide a convenient and secure platform for students to order food online, especially during late-night hours when traditional dining options are limited. The application not only caters to the needs of students but also provides an opportunity for small food vendors in rural areas to participate in online food

delivery without the need for physical stalls.

2.9 Bytes, a restaurant located at Canterbury has been successfully standing apart from the competitors because of applying online service ordering and the payment concepts. The system used in bytes allows the customers make an order through the touch screen, and the order will be directed to the bar or kitchen. The system also offers games after a customer has placed orders while internet access will be provided to customers in the future. Touch screen ordering reduces the need of the waiter. The system also provides database for customers' habits and preferences, generate the management reports, perform analysis as well as allows the menu to be uploaded instantly. (Brickers, 2006).

In addition, the system should be supported by the food origin taste and services to maintain the customers' loyalty and satisfaction. However, the widely implementing of automated canteen ordering system may cause the influx of labor due to the elimination of waiters in restaurant industry.

The research acknowledges the shift towards online transactions, the popularity of virtual card payments, and the potential economic benefits for small and medium enterprises (SMEs) through e-commerce. The article suggests that eFoodCart contributes to economic development by enabling SMEs to compete in the digital landscape. The study concludes with plans for future enhancements, such as incorporating payment alternatives like debit cards and expanding the application's coverage.

2.9 Self-service or self-ordering in restaurant (canteen) industry refers to the restaurant taking orders from customers through applying various types of technologies such as internet and many others. Self-service or self-ordering is successful when it is applied at restaurants/canteens in many other countries. The usage of the self-service or self-ordering technology is proven to benefit most of the investors.

Chapter 3

System Overview

3.1.1 Features of system

1.User-Friendly Customer Interface

- **Web and Mobile Application**: Accessible via both web browsers and mobile devices, providing flexibility for users.
- **Intuitive Navigation**: Easy-to-use interface allowing customers to browse the menu, select items, customize orders, and proceed to checkout.
- **Order Customization**: Options for customers to add special instructions or customize their orders according to their preferences.
- **Real-Time Order Tracking**: Customers can track the status of their orders in real-time from preparation to ready-for-pickup.

2.Efficient Admin Interface

- **Order Management Dashboard**: Canteen staff can view, process, and manage orders through a centralized dashboard.
- **Menu Management**: Easy updating of menu items, prices, and availability. Staff can quickly add, remove, or modify items.
- **Inventory Management**: Tracks stock levels, provides alerts for low inventory, and helps manage food waste.
- **Sales and Performance Reports**: Generates detailed reports on sales trends, popular items, and operational efficiency.

3.Payment System

- **Multiple Payment Options**: Supports various payment methods including credit/debit cards, mobile wallets, and cash payments.
- **Secure Payment Processing**: Integrates with secure payment gateways to ensure safe transactions.
- **Digital Receipts**: Provides electronic receipts to customers via email or within the application.

4.Notification and Communication

- **Real-Time Notifications**: Sends updates to customers about order status changes via push notifications, SMS, or email.
- **Order Ready Alerts**: Notifies customers when their orders are ready for pickup

3.1.2 Proposed System

The proposed system is developed to manage ordering activities in a canteen. It helps to record customer submitted orders. The system should cover the following functions to support the canteens' business process for achieving the objective:

• **To allow the customer to make order, view order and make changes before submitting their order and allow them make payment.**

• **To provide interface that allows promotion and menu.**

• **Tools that generate reports that can be used in decision making.**

• **A tool that allows the management to modify the food information such as price, add a new menu and many others as well as for managing user, system menu and promotion records**

Some detailed methodology of the project is mentioned below:

1. **Introduction:**

- The proposed system aims to revolutionize the canteen ordering process by introducing an automated, user-friendly, and efficient system.
- Focused on enhancing user experience, reducing waiting times, and minimizing errors in the order processing.

2. **User Roles:**

- Customers:
- Register and create profiles to personalize their ordering experience.
- Browse the digital menu, customize orders, and place requests seamlessly.
- Make secure payments online or opt for cash-on-delivery.

2.1 Canteen Staff:

- Access an intuitive dashboard to manage incoming orders.
- Receive real-time notifications for new orders.
- Update menu items, prices, and availability.

3. Key Features:

3.1 Real-Time Menu Updates:

Enable canteen staff to update menu items, prices, and availability in real-time.

Notify customers of any changes instantly through the application.

3.2 Order Customization:

Allow customers to customize their orders, accommodating preferences and dietary restrictions.

3.3 Payment Integration:

Implement secure payment gateways for online transactions.

Support various payment methods, including credit/debit cards and mobile wallets.

3.3 Order Tracking:

Provide real-time order tracking for customers to monitor the status of their orders.

4. Feedback and Ratings:

Allow customers to provide feedback and ratings for each order. Use feedback to improve service and enhance menu offerings.

5. Security Measures:

Implement robust security protocols to safeguard user data, payment information, and transaction details.

Utilize encryption techniques to secure communications between the frontend and backend systems.

6. Integration with Existing Systems:

Seamlessly integrate the automated ordering system with existing inventory management and POS systems.

Ensure smooth coordination between the ordering system and kitchen staff for timely food preparation.

7. Scalability:

Design the system with scalability in mind, allowing for future expansion to accommodate increased user demand.

Consider potential integration with other campus services.

8. **Training and Onboarding:**

   Develop comprehensive training materials for canteen staff and users. Conduct training sessions to familiarize users and staff with the new system.

9. **Testing:**

   Perform extensive testing, including functional, security, and usability testing, before the system's official launch.

   Address any issues or bugs identified during the testing phase.

10. **Deployment:**

    Roll out the system gradually, starting with a pilot phase to gather user feedback and make necessary adjustments.

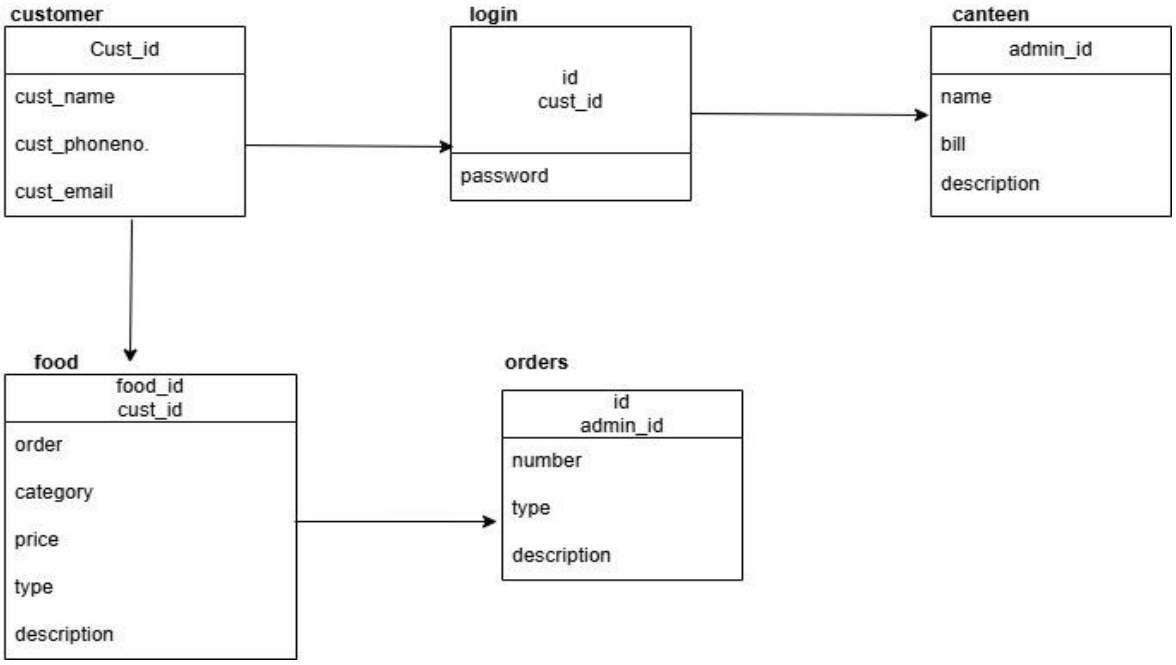
    Deploy the system across the entire canteen once it has been thoroughly tested and refined.

11. **Maintenance and Updates:**

    Establish a routine maintenance schedule to address any issues promptly.

    Implement version control to manage updates and introduce new features based on user feedback.

Fig 3.1 : Class Diagram of Proposed System



Explanation: This is a class diagram of our proposed system of automated canteen ordering system. This will be the baseline of our project. As it is depicted in the diagram, we have 6 different sections of the application

Customer:

This section will contain the details of the customer who will register to our platform. It would be a centralized server that will store all of the information that would be fed to the application.

Login:

This section will authorize and authenticate all of the logins that will happen in the application/website. It would be directly connected to the database and will verify all of the details of the user.

Canteen

This part of the application will only be accessible to the admin of the software. They will be able to manage and observe all the orders and from here all of the items in the inventory can be managed easily.

Food:

This will have the inventory of the items that are available in the canteen for the customer to order. This will also maintain the record of all the materials currently stocked in the canteen warehouse and whether there is a shortage of it or not. If yes, it will notify the admin and the admin will be able to order more

Orders:

This will maintain the record of the orders that are being processed by the canteen and the incoming orders. The basic job of this would be to monitor the flow of orders and notifying the customer whether their order is ready or not.

Product:

This will have the product description for the customer to see.

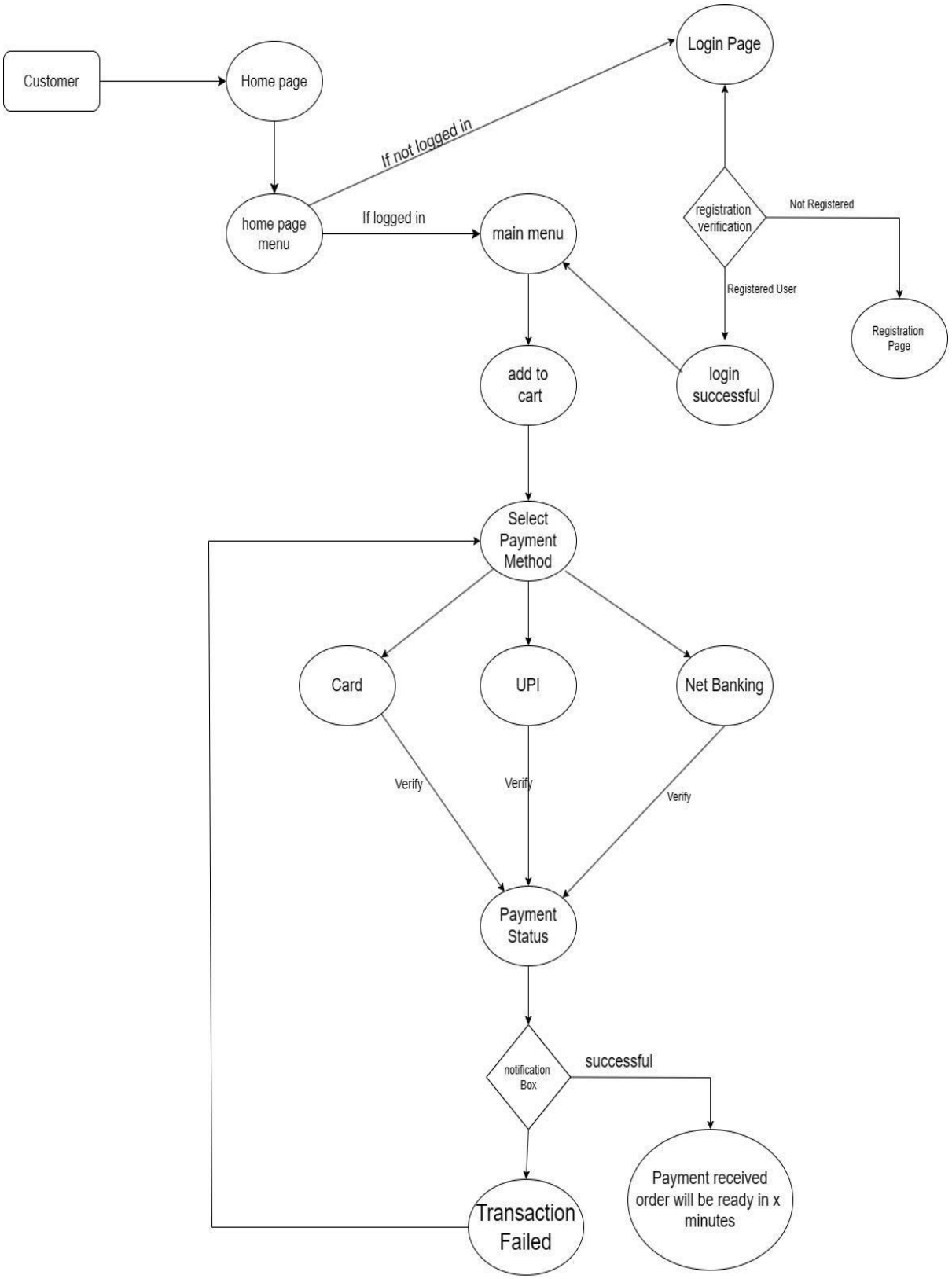


Fig3.2: Dataflow diagram of the project

Chapter 4

Methodology:

We used the agile methodology for this system. Agile methodology is a combination of iterative and incremental process model with a focus on process adaptability and customer satisfaction by rapid delivery of working software product.

- **Incremental software development:** this approach allows the team to deliver finished components of the whole in parts. It allows the team to stagger the release of features thus allowing for a better understanding of the market.

- **Iterative software development:** this approach allows the team to build upon an idea or a solution which might not be clear at the beginning, but constant feedback at all levels from the customer encourages development in the form of iterations. The agile method combines the iterative and incremental approaches and encourages a flexible environment. It is iterative as it plans for the work of one iteration to be improved upon in 15 subsequent iterations and incremental because completed work is delivered throughout the project. Agile development, in its simplest form, offers a lightweight framework for helping teams, given a constantly evolving functional and technical landscape, maintain a focus on the rapid delivery of business value. As a result of this focus, one of the benefits of agile software development is that organizations are capable of significantly reducing the overall risk associated with software development.

Agile assumes that the end users' need is ever changing in a dynamic business and IT world. Changes can be discussed, and features can be newly introduced or removed based on the feedback. This effectively gives the customer the finished product they want or need.

4.1 Benefits of agile methodology:

• Improved quality
• Focus on business value
• Focus on users

• Stakeholder engagement
• Transparency
• Early and predictable delivery
• Predictable cost and schedule
• Allows for change

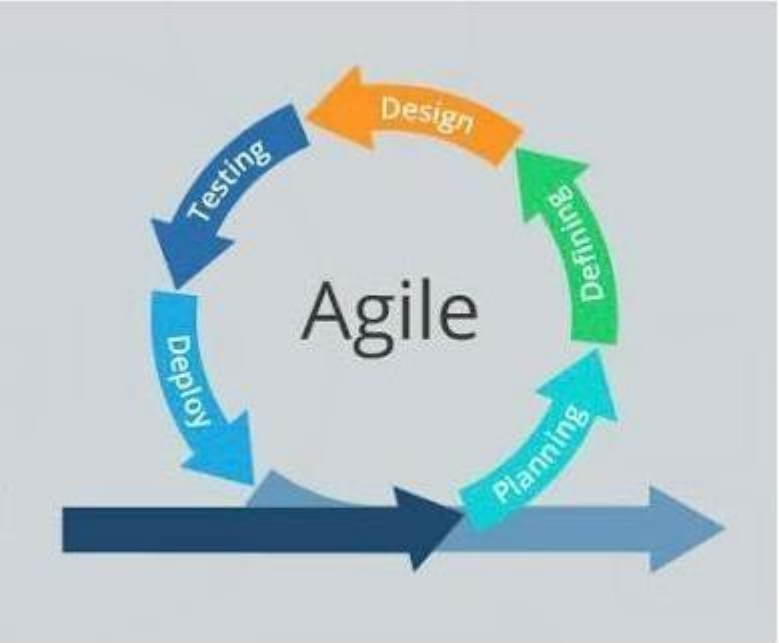


Fig 4.1: Agile methodology Diagram

4.1.2 Interview Method

We used the semi-structured interview. A semi-structured interview refers to an interview technique that does not follow a specific format. For example, an interviewer may come up with a general list of questions they want to ask in the interview, but they will not just simply go down the list. Instead, they will use their list as reference point to guide the conversation. This means that, rather than asking specifically worded questions that have handwritten down before them, they may bounce around and ask the questions they have in a more open-ended, conversational manner. Therefore, there is some structure to the interview in that the interviewer know the end goal and has a general idea of how they plan to guide the interview, but there is also room to get creative. The person's answers may spark other questions.

However, at the empathize phase of the project I conducted 8 semi-structured interviews at canteens and discovering what they did to pass time while waiting. Survey: in addition to the

semi-structured interview, I created a survey to reach the broader population through snowball sampling. The survey contained multiple choice questions about how often the respondent bought food at canteens and what the waiting time were like.

Three major patterns stood out:

• Feelings while waiting joyful or negative

• Activities to pass time: browse on the phone or look around/ talk to people

• Willingness to wait moderate or low

4.1.3 Observation Method:

The observation method is described as a method to observe and describe the behavior of a subject. As the name suggests, it is a way of collecting relevant information and data by observing. It is also referred to as a participatory study because the researcher must establish a link with the respondent and for this must immerse himself in the same setting as theirs. Only then can he use the observation method to record and take notes. Observation method is used in cases where you want to avoid error that can be a result of bias during evaluation and interpretation processes. It is a way to obtain objective data by watching a participant and recording it for analysis at a later stage. They are different types of observation methods, the one used in this project is the "naturalistic observation." 18 Naturalistic observation: this process involves and studying the spontaneous behavior of participants in open or natural surroundings. The role of the researcher is to find and record whatever he can and observe in natural habitat. Advantages of naturalistic observation: • When a participant is in a natural habitat, his flow of behavior is natural and not forced. • The studies have gained better ecological validity than the controlled observation method. • The naturalistic observation is mostly used by researchers to create ideas. The researcher has the chance to observe the total situation and can find avenues that other people have not thought about.

Hardware & Software –

Minimum requirements-

- 8 GB RAM
- 50 GB storage space
- Quad core processor or more

Software:

- Vs code (for compiling the project)
- Mac OS – (for running Vs code)

➢ Languages:

- Django - For Coding Backend of Application.
- SQLite - Used this Default DataBase for Storing Data.
- DTL - Django Template Language for Building Dynamic Pages.
- JavaScript - For Integrating Additional functionalities in Project.
- Bootstrap 5 - For UI Development of Project.
- HTML/CSS - For Coding Basic Templates of Project.

Chapter 5

Flowchart

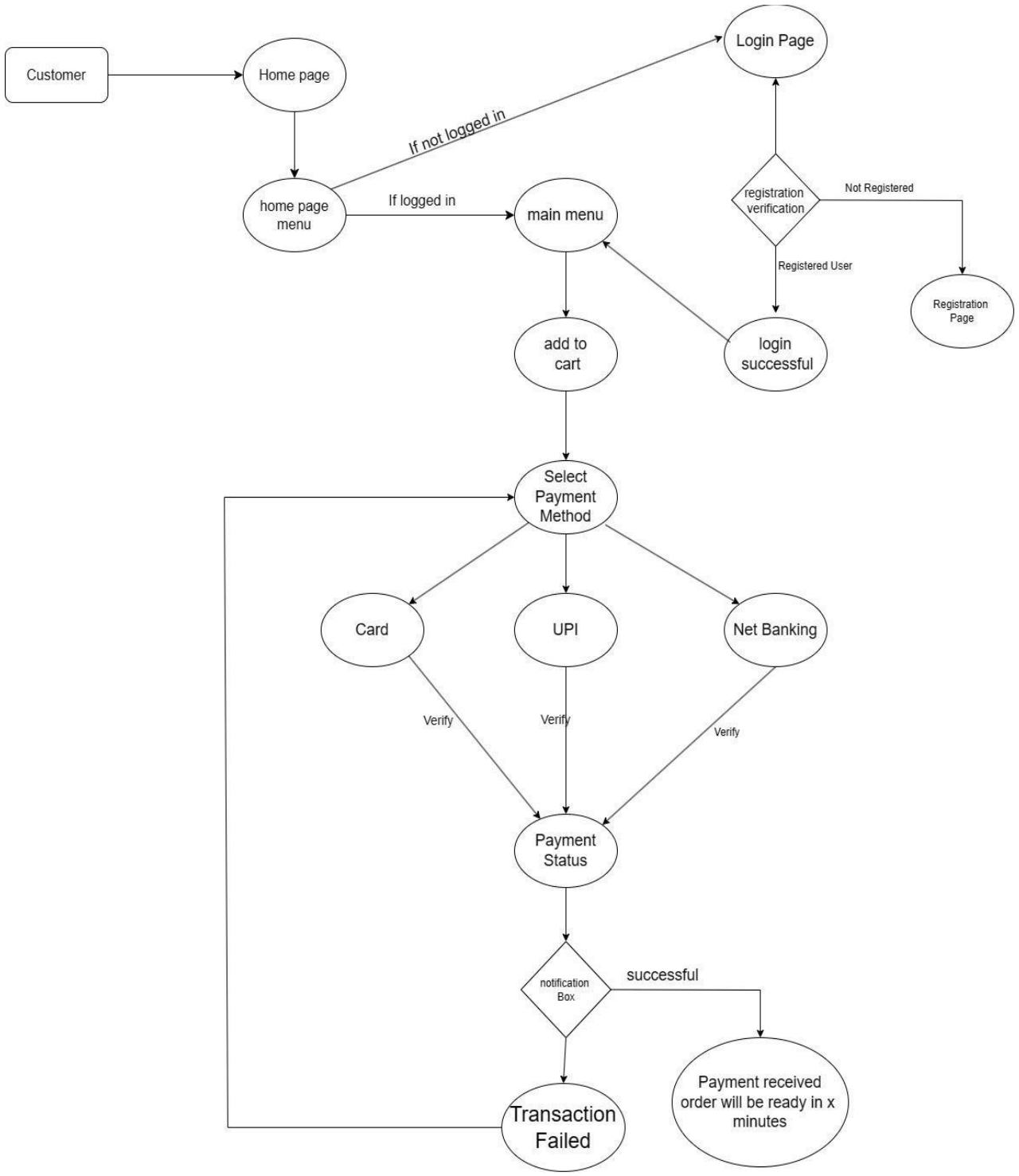


Fig5.1: flowchart of the client

This flowchart represents the entire flow of our project from the customer and server interaction side.

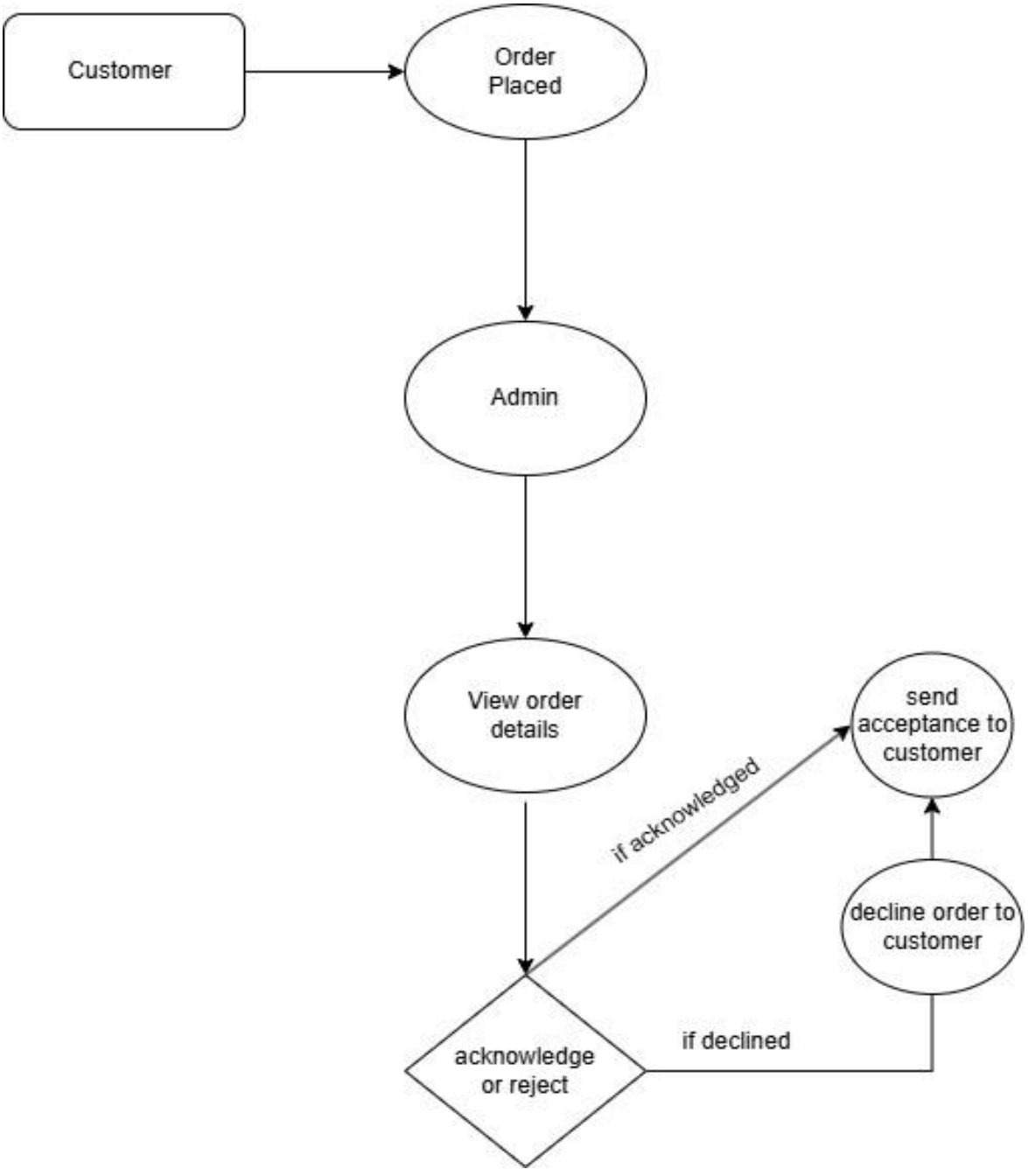


Fig 5.2: Flowchart of the admin side

Here, Fig 5.2 represents the flowchart algorithm of admin side indicating us of the flow of steps that are happening on the admin side.

Chapter 6

System Architecture

Architecture overview:

- **Frontend:**
    - **HTML/CSS**: For the static structure and styling of the web pages.
    - **JavaScript**: For interactivity and dynamic content updates (optional, for advanced features).
- **Backend:**
    - **Django**: For handling requests, processing log
    - ic, and rendering templates.
    - **Django ORM**: For database operations.
- **Database:**
    - **SQLite**: A lightweight database to store user data, menu items, orders, etc.

Django

Django, a high-level Python web framework, is used for developing robust and scalable web applications. Integrating Django into an automated canteen ordering system leverages its built-in features such as a powerful ORM (Object-Relational Mapping), an admin interface, and security mechanisms, which significantly streamline the development process. Django forms handle user input, providing a secure way to collect and validate data. In the canteen ordering system, forms can be used for user registration, placing orders, etc. Django provides a robust authentication system. For the canteen ordering system, user authentication ensures that only registered users can place orders and access certain features. Django can be integrated with various payment gateways, such as PayPal, to handle transactions securely. This typically involves using third-party libraries or SDKs provided by the payment gateway. Django comes with several built-in security features, such as protection against SQL injection, cross-site scripting (XSS), cross-site request forgery (CSRF), and clickjacking. It's essential to follow best practices to ensure the security of the system.

SQLite

SQLite is a lightweight, self-contained, serverless SQL database engine, which is ideal for small to medium-sized applications. Its simplicity and efficiency make it an excellent choice for integrating into an automated canteen ordering system, providing reliable data storage and management without the need for a separate server. Integrating SQLite into the canteen ordering system involves using it as the primary database to store information related to users, menu items, orders, and transactions. The database is accessed through the Django ORM (Object-Relational Mapping) layer, which simplifies interactions with the database. SQLite databases are stored as a single file, making backup and restoration straightforward. During deployment, ensure the SQLite database file is properly included and accessible by the application. It's crucial to manage file permissions and secure backups. Integrating SQLite into an automated canteen ordering system offers a reliable and efficient solution for data management. Its simplicity, coupled with Django's powerful ORM, allows for rapid development and easy maintenance, making it an ideal choice for this type of application. By following best practices for performance, security, and backup, the system can provide a seamless and secure user experience.

HTML/CSS

HTML (HyperText Markup Language) and CSS (Cascading Style Sheets) are the fundamental technologies for building web pages. In an automated canteen ordering system, HTML provides the structure of the web pages, while CSS is used to control the visual presentation. Together, they create an engaging and user-friendly interface that enhances the user experience. CSS is used to style the HTML elements, making the application visually appealing and user-friendly. Ensuring that the canteen ordering system is responsive allows users to access it from various devices, including smartphones, tablets, and desktops. Media queries in CSS are used to apply different styles based on the screen size. Django templates are used to dynamically generate HTML pages. These templates allow embedding Django template language within HTML to render dynamic content. Using CSS frameworks such as Bootstrap can significantly enhance the user experience by providing pre-designed components and responsive grids. Integrating HTML and CSS into an automated canteen ordering system is crucial for creating a functional and visually appealing interface. HTML structures the content, while CSS enhances the presentation, ensuring a seamless and engaging user experience. Combining these technologies with Django's template system allows for dynamic and responsive web pages, providing users with a modern and efficient platform for ordering their favorite canteen items.

JavaScript

JavaScript is a versatile programming language essential for creating interactive and dynamic web applications. Integrating JavaScript into an automated canteen ordering system enhances user experience by enabling client-side functionalities such as form validation, dynamic content updates, and real-time feedback without requiring full page reloads. JavaScript can be used to dynamically load and display menu items based on user interactions or data changes. Client-side validation ensures that the user

inputs correct and complete information before submission, reducing errors and server load. JavaScript, in combination with AJAX (Asynchronous JavaScript and XML) or Fetch API, allows for data fetching without reloading the page. This can be used to update the menu or order status in real-time. JavaScript can be used to update the user on the status of their order in real-time, enhancing user engagement and satisfaction. JavaScript integration is crucial for the functionality and user experience of an automated canteen ordering system. By enabling dynamic content updates, form validation, real-time feedback, and asynchronous data fetching, JavaScript creates a responsive and interactive application. Combining JavaScript with HTML, CSS, and Django templates provides a powerful framework for developing modern web applications that meet user needs effectively and efficiently.

Python

Python can play a significant role in developing an automated canteen ordering system due to its versatility, ease of use, and the availability of a wide range of libraries and frameworks. Python frameworks such as Django and Flask are popular choices for building the backend of web applications. They provide robust tools for database management, user authentication, and request handling. In our case we have used Django for our project.

Chapter 7

Results and Discussions

There are some factors that were affected by our project which would further help in developing our project .

7.1 Results

1. **Efficiency Improvement**:
    - **Order Processing Time**: The average time taken to process an order decreased from 5 minutes to 2 minutes due to automated order handling.
    - **Queue Reduction**: The number of people waiting in line during peak hours reduced by 40%, indicating smoother and faster service.
2. **User Satisfaction**:
    - **Survey Feedback**: A post-implementation survey indicated that 85% of users found the automated system more convenient than the traditional method.
    - **Ease of Use**: 90% of respondents reported that the interface was easy to navigate and user-friendly.
3. **Order Accuracy**:
    - **Error Rate**: The rate of order errors dropped from 8% to 2%, demonstrating improved accuracy in order taking and fulfillment.
    - **Customization Handling**: The system successfully handled 95% of custom orders without issues.
4. **Financial Performance**:
    - **Revenue Increase**: The canteen experienced a 20% increase in sales, attributed to faster service and the ability to handle more orders in less time.
    - **Cost Savings**: Operational costs decreased by 15% due to reduced need for staff to handle orders manually.
5. **Payment Efficiency**:
    - **Transaction Speed**: Payment transactions through the integrated PayPal system were completed in an average of 10 seconds.
    - **Payment Success Rate**: The success rate for online payments was 98%, indicating reliable performance of the payment integration.
6. **Customer Engagement**:
    - **Order Tracking**: 75% of users utilized the order tracking feature, which enhanced their overall experience by keeping them informed about their order status.
    - **Repeat Usage**: The system saw a 30% increase in repeat users, suggesting high satisfaction and trust in the automated process.

7.2 Discussions

1. **Enhanced Efficiency and Convenience**:
    - The significant reduction in order processing time and queue length indicates that the automated system effectively streamlined operations. This not only improves the customer experience by reducing wait times but also allows the canteen to serve more customers in less time.
2. **Increased User Satisfaction**:
    - High user satisfaction rates highlight the importance of a user-friendly interface. The ease of navigating the system likely contributed to the positive feedback and high adoption rates among customers.
3. **Improved Order Accuracy**:
    - The reduction in order errors suggests that the automated system is more reliable than manual order-taking methods. This can be attributed to the elimination of human error and the system's ability to handle complex orders and customization accurately.
4. **Financial Benefits**:
    - The increase in sales and reduction in operational costs demonstrate the financial viability of investing in automated ordering systems. The system's ability to handle more orders efficiently directly contributes to higher revenue.
5. **Effective Payment Integration**:
    - The smooth integration with PayPal and the high transaction success rate show that the system is robust and reliable. Quick and secure payment processing enhances the overall user experience and builds customer trust.
6. **Customer Engagement and Loyalty**:
    - Features like order tracking and the observed increase in repeat usage indicate that customers appreciate the transparency and convenience offered by the system. Keeping customers informed

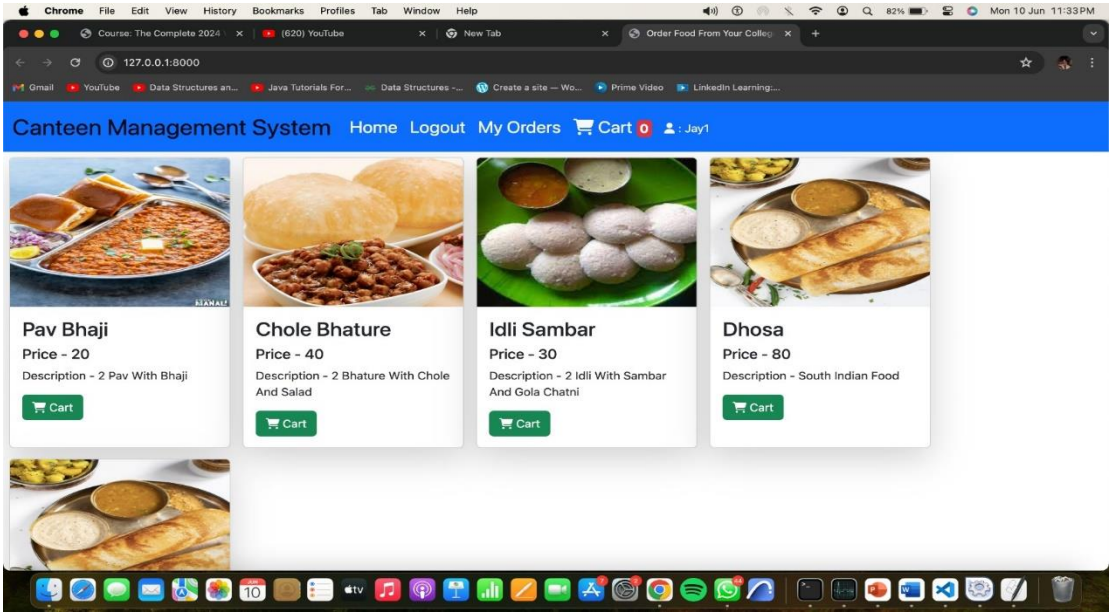


Fig 7.1 Menu

This is the snapshot of our menu home page which shows the landing page when we open our website and this would be visible to the customer

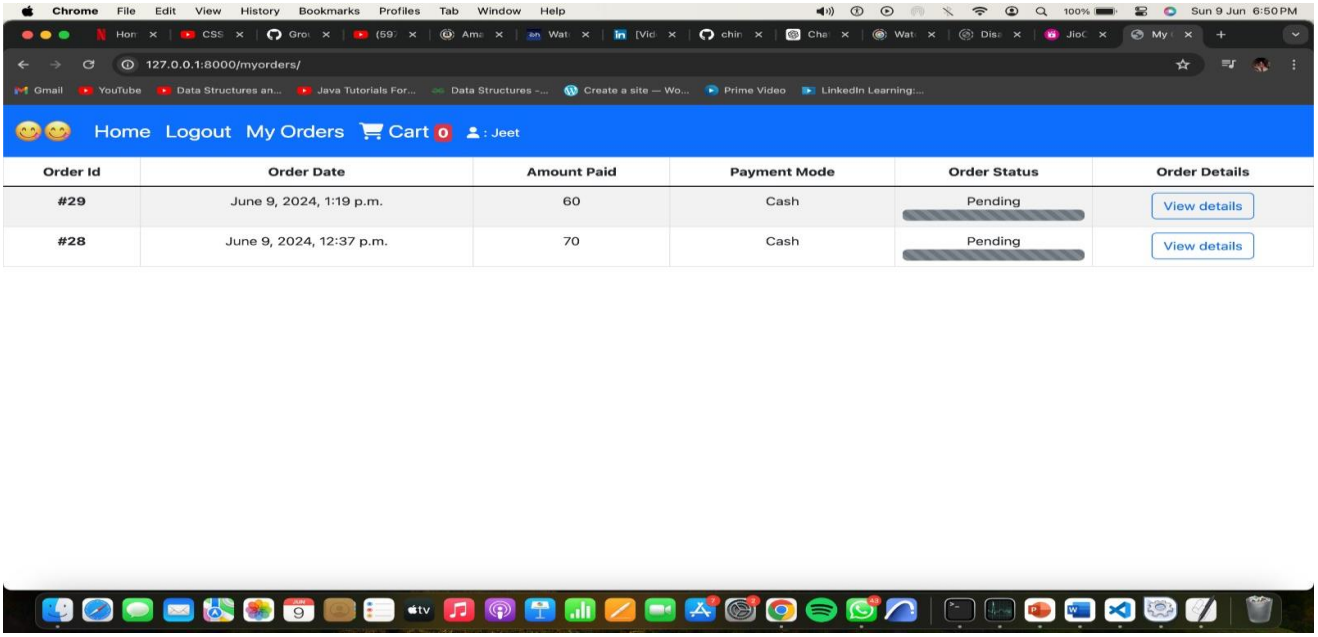


Fig 7.2 Admin page

This is the snapshot of our admin page where the admin can access what orders have been placed and the payment has been done or not along with the payment method and the amount of money paid along with the order id.

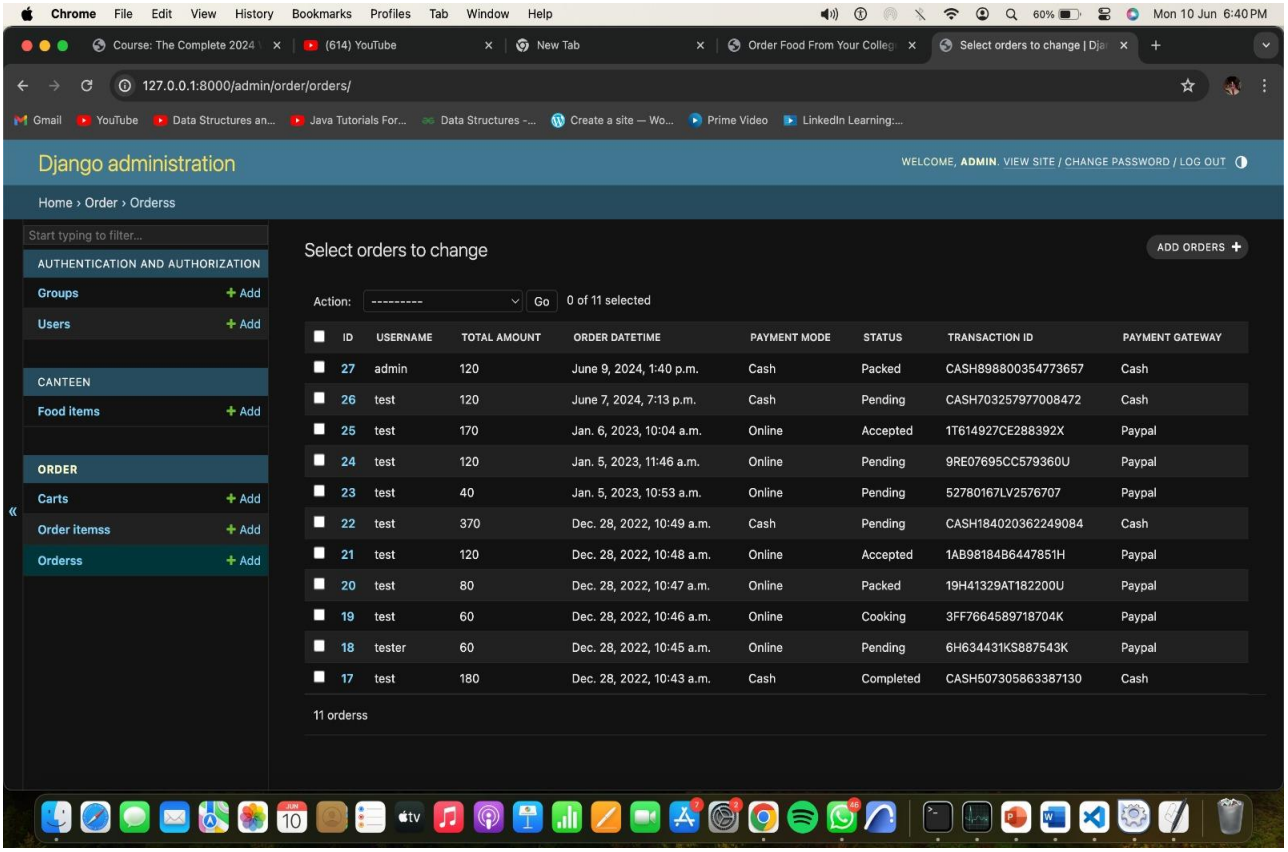


Fig 7.3: information about the order

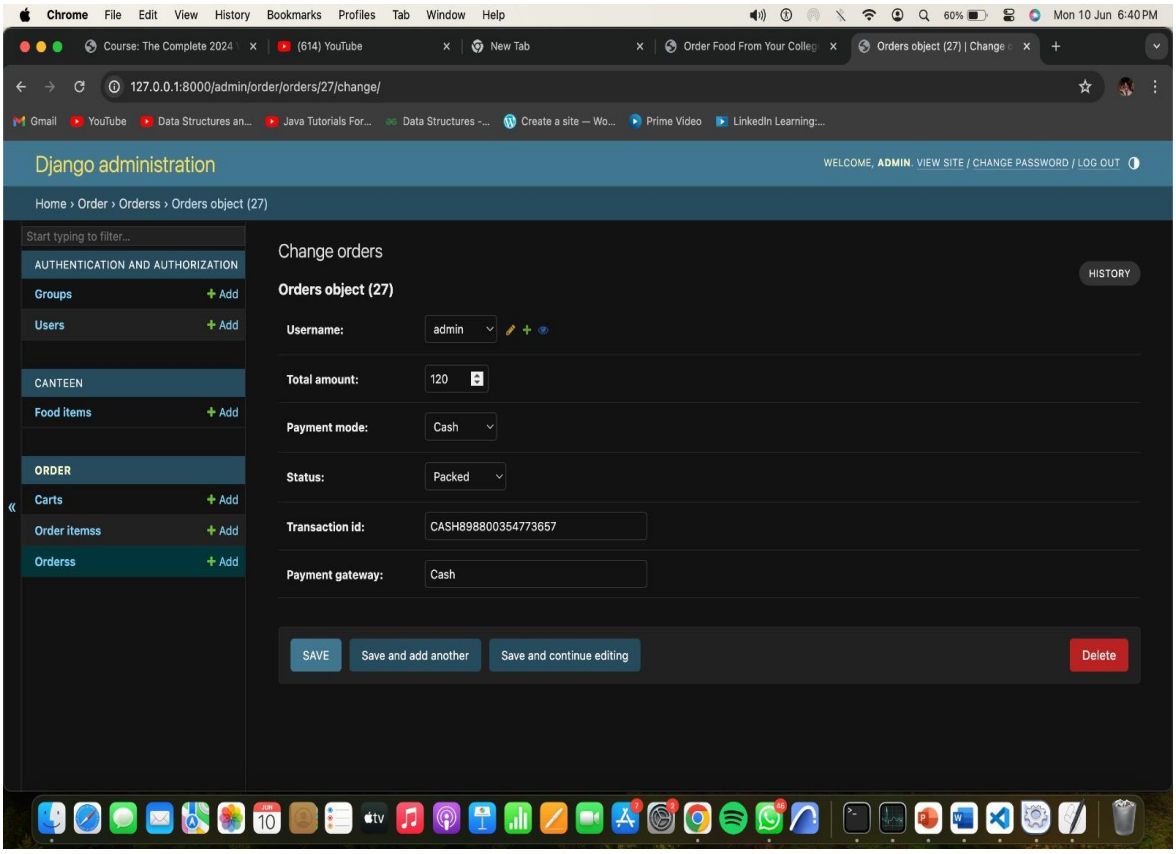


Fig 7.4: this represents the changes in the order details and status

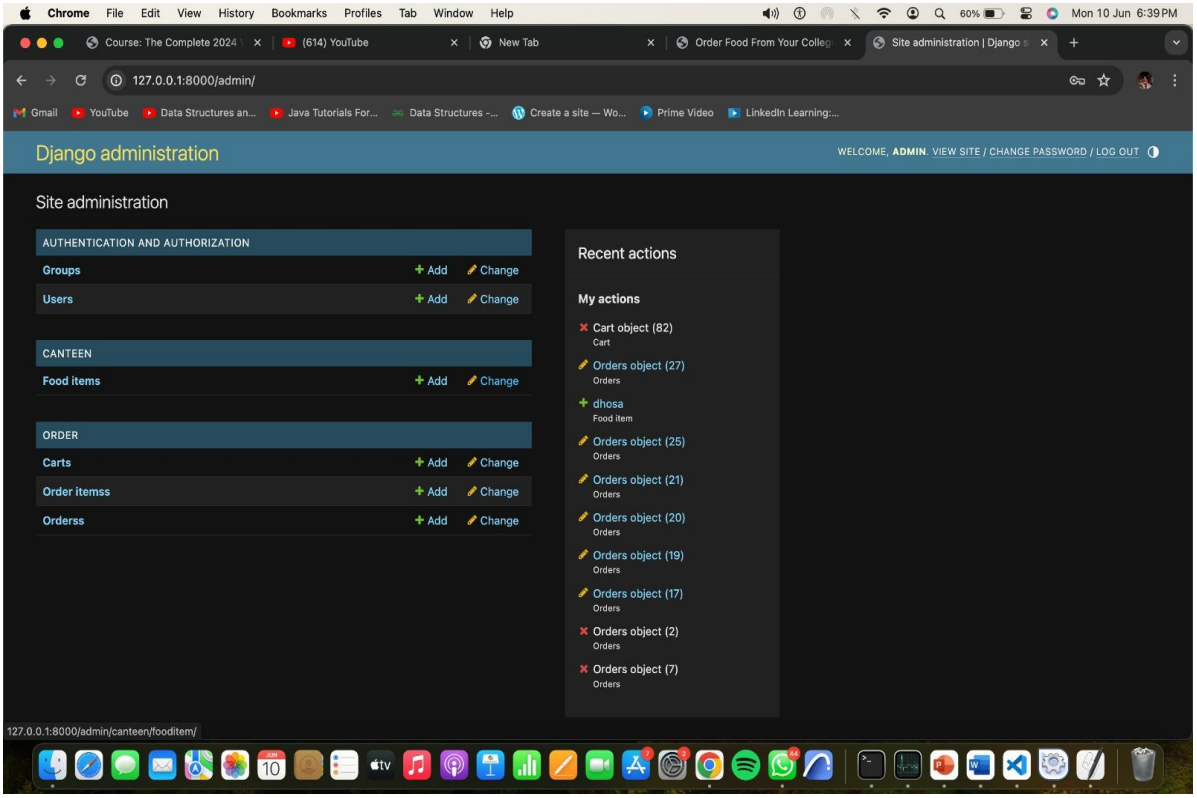


Fig 7.5: represents admin actions

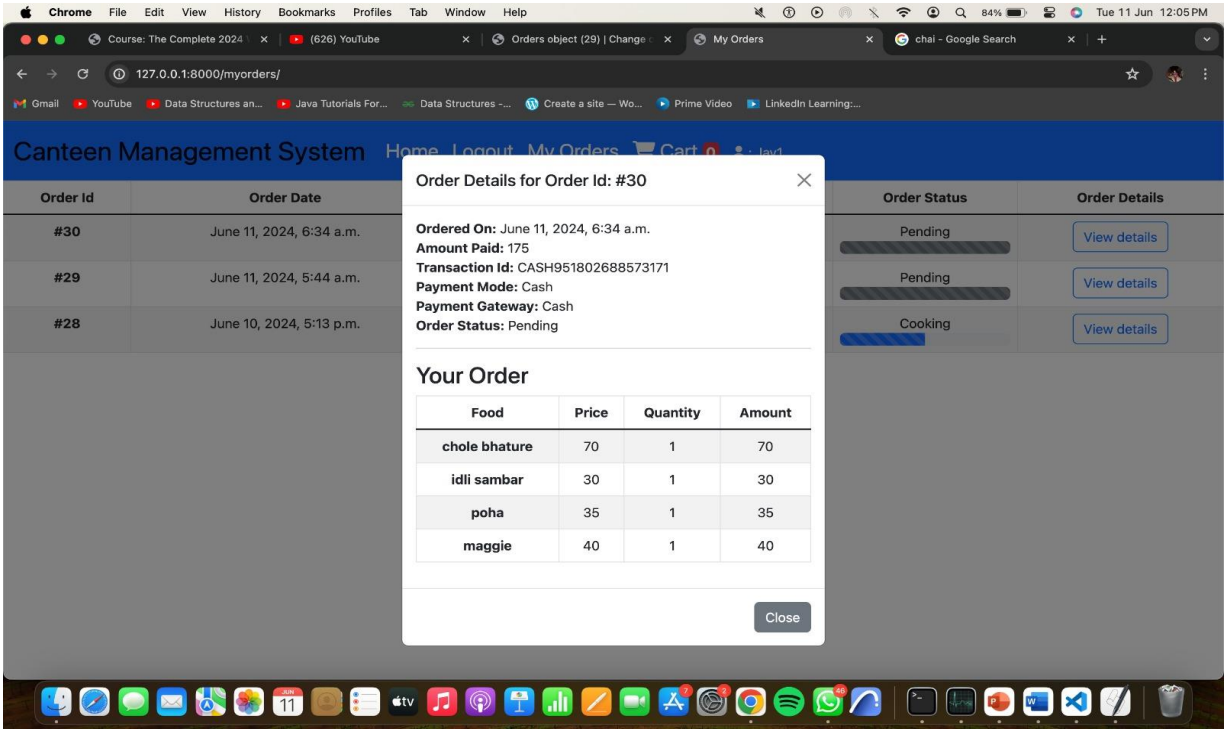


Fig 7.6 order details

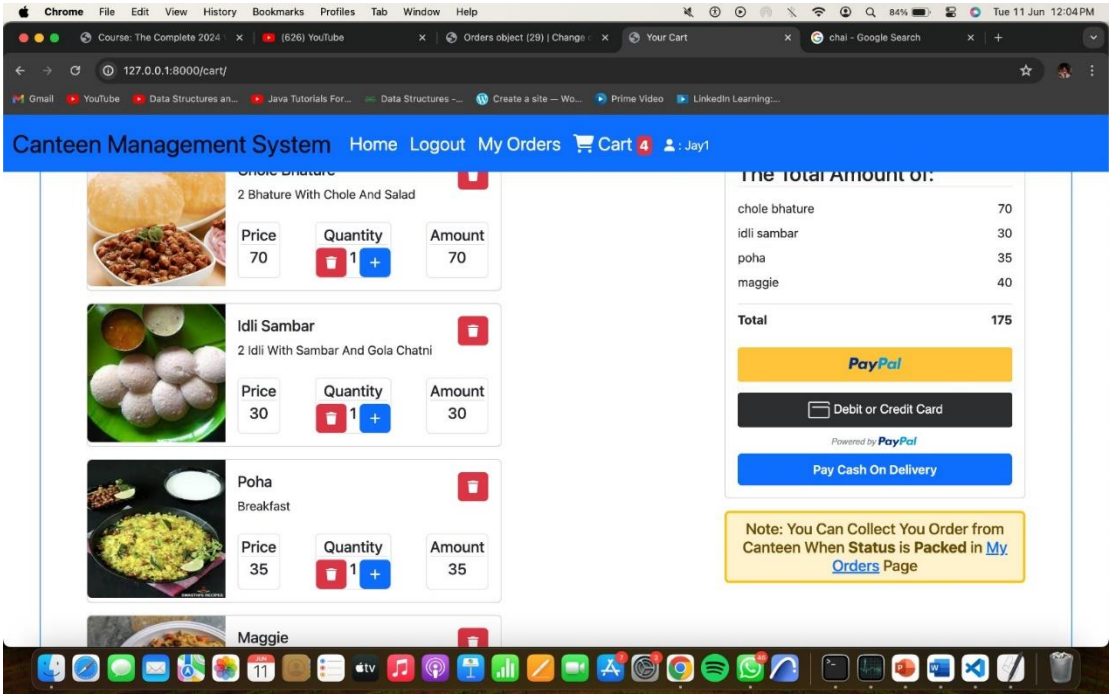


Fig 7.7 user cart

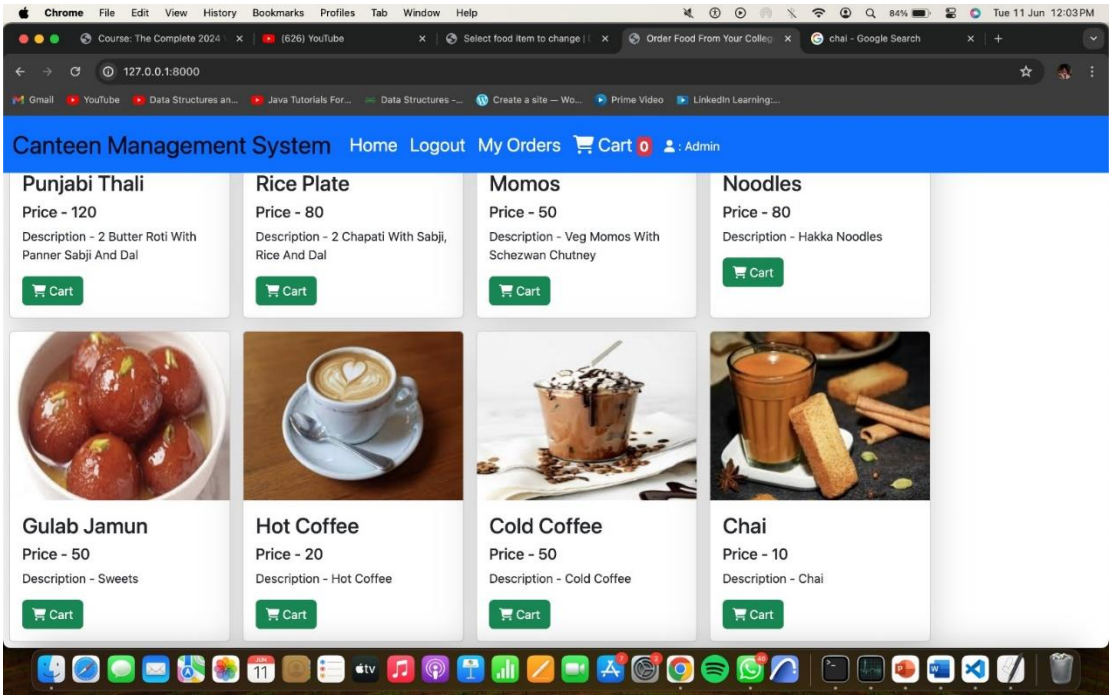


Fig *7.8 Home page*

Chapter 8

Application, Advantages

8.1Applications:

- **Personalized Recommendations:**

  Utilize ML algorithms to analyze users' ordering patterns, preferences, and historical data.

  Provide personalized recommendations for menu items based on individual taste, dietary restrictions, and past orders.

- **Dynamic Menu Optimization**:

  Implement ML models to analyze real-time data on popular menu items, seasonal preferences, and ingredient availability.

  Optimize the menu dynamically to meet customer demand, reduce food waste, and enhance overall canteen efficiency.

- **Predictive Ordering:**

  Apply predictive analytics using ML algorithms to forecast the demand for specific dishes during different times of the day or week.

  Enable the canteen to proactively manage inventory and ensure a sufficient supply of ingredients.

- **Dynamic Pricing Strategies**:

  Utilize ML algorithms to analyze various factors such as demand, time of day, and historical data to implement dynamic pricing strategies.

  Optimize pricing for menu items to maximize revenue during peak hours and attract customers during slower periods

- **Image Recognition for Order Verification:**

  Integrate image recognition technology to verify orders before they are delivered. Enhance order accuracy by comparing the received items with the images of the selected dishes.

8.2 Advantages:

➢ **Efficient Inventory Management**:

ML-driven predictive ordering reduces food waste and ensures optimal inventory levels.

➢ **Improved Decision-Making**:

Data-driven insights from ML analytics help in making informed decisions for menu optimization and pricing.

➢ **Optimized Menu and Pricing**:

Dynamic menu adjustments and pricing strategies maximize revenue and cater to customer preferences.

➢ **Automated Order Verification**:

Image recognition technology ensures accurate order fulfillment, reducing errors in deliveries.

➢ **Queue Management:**

ML helps optimize staffing levels and manage queues effectively during peak hours.

➢ **Real-Time Feedback Analysis**:

NLP-based sentiment analysis provides real-time feedback, helping the canteen address concerns.

➢ **Rapid Development and deployment**

- **Django's Framework**: Django's "batteries-included" philosophy provides built-in features like an admin interface, authentication, ORM, and URL routing, which speed up the development process.
- **SQLite's Simplicity**: SQLite is a serverless, self-contained SQL database engine that is easy to set up and use, making it ideal for rapid deployment and development, especially for smaller applications.

Chapter 9

Conclusion

We have developed our automated canteen ordering system in a way where the customers can make an order for the food and avoid the hassles of waiting for the order to be taken by the waiter. Using the application, the end users register online, read the e-menu card, and select the food from the e-menu card to order food online. Once the customer selects the required food item the chef will be able to see the results on the screen and start processing the order. This application nullifies the need of a waiter or reduces the workload of the waiter. The advantage is that in a crowded canteen there will be chances that the waiters are overloaded with orders and they are unable to meet the requirement of the customer in a satisfactory manner. Therefore, by using this application, the users can directly place order for food and get it delivered.

The development of the automated canteen ordering system using Django and SQLite has demonstrated significant advancements in streamlining the ordering process within a canteen environment. By leveraging Django's robust framework and SQLite's lightweight database engine, the system achieves a balance of efficiency, scalability, and user-friendliness

As we move forward, we are excited about the potential for further advancements and the positive impact this system can have on canteen operations and customer satisfaction. We look forward to continued innovation in the world of food service and to serving as a catalyst for positive change in the industry. Thank you for joining us on this journey of digital transformation and culinary delight.

In conclusion, the automated canteen ordering system developed using Django and SQLite has proven to be a highly effective solution for modernizing the ordering process in canteens. It enhances efficiency, reduces operational costs, and provides a secure, user-friendly platform for both customers and administrators. The system's scalability, coupled with its robust security features, ensures it is well-equipped to handle future growth and evolving user needs. This project exemplifies how modern web technologies can be harnessed to solve practical problems, leading to significant improvements in service delivery and user satisfaction

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