GrabNGo

(online food ordering from college canteen)

Project Report

Submitted in partial fulfilment of the requirement of the degree of

BACHELORS OF TECHNOLOGY

CSE with Specialization (AI ML)

to

K.R Mangalam University

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January 2025

CERTIFICATE

This is to certify that the Project Synopsis entitled, “GrabNGo” submitted by “Vivek Rana – 2301730293, Riya Vashistha – 2301730345, Mukul Tanwar - 2301730340 and Sidharth Yadav – 2301730338” to K.R Mangalam University, Gurugram, India, is a record of bonafide project work carried out by them under my supervision and guidance and is worthy of consideration for the partial fulfilment of the degree of Bachelor of Technology in Computer Science and Engineering with specialization in AI and ML of the University.

Type of Project:

Industry/Research/University Problem

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Date: 30rd April 2025

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ABSTRACT

The proposed canteen management system leverages a user-friendly website to improve food ordering efficiency and enhance user satisfaction in college canteens. The student dashboard allows users to browse menus, place orders, rate items, and track order status with real-time notifications, alongside viewing purchase statistics for daily and monthly trends. Meanwhile, the staff dashboard facilitates order management, inventory tracking, and sales analytics to optimize operations. By incorporating user-friendly interfaces, feedback mechanisms, and real-time updates, this project aims to minimize wait times, reduce operational inefficiencies, and enhance the overall canteen experience. The system's ability to track customer preferences and analyze purchase data will further empower canteen staff to make informed decisions, ensuring better service quality and inventory planning. This innovative solution highlights the potential of digital transformation in modernizing traditional canteen operations and improving the overall dining experience for students and staff alike.

Introduction

In most college canteens, the traditional food ordering system requires students to physically visit the counter, place their orders, and wait for their food to be prepared. This process often leads to long queues, especially during peak hours like breakfast, lunch, or evening breaks. Since students must manually communicate their orders to the staff, there is always a chance of miscommunication or errors in the order-taking process. Additionally, payments are usually handled in cash or through limited digital methods, which can slow down the transaction process. Students who are in a hurry between classes often find it inconvenient to stand in long lines, and if their order takes longer than expected, they may be forced to leave without their food or risk being late for lectures.

During lunch hours, the situation becomes even more challenging as the canteen experiences an overwhelming rush of students. The canteen staff must handle multiple orders simultaneously, leading to delays in food preparation and delivery. As a result, students often end up waiting longer than usual, which creates frustration and sometimes even leads to overcrowding at the counters. The staff may struggle to keep track of pending and completed orders, further slowing down the process. This inefficiency not only affects students' schedules but also puts additional pressure on the canteen workers, making it difficult for them to maintain smooth operations. The lack of a systematic ordering and tracking method ultimately leads to time wastage and an unsatisfactory experience for both students and staff.

The primary purpose of this project is to create a digital food ordering system for the college canteen, allowing students to place their orders online and avoid long waiting times. In the traditional system, students must physically go to the counter, place their orders, and wait for their food to be prepared. This process becomes inconvenient, especially when they have limited time between classes. By introducing an online ordering system, students can pre-order their meals, receive an estimated preparation time, and simply pick up their food when it is ready. This not only ensures that they can attend their classes on time but also improves their overall experience by making food ordering quick, seamless, and hassle-free.

Another major reason for developing this system is to help canteen staff manage their sales and workflow efficiently. During peak hours, the canteen experiences a heavy rush, leading to confusion, delays, and difficulty in tracking multiple orders at once. With an online system, the staff can receive real-time order notifications, prioritize preparation, and update order status, reducing mismanagement and errors. Additionally, the system will provide sales tracking and analytics, allowing canteen owners to keep better records of daily and monthly sales, monitor the popularity of menu items, and plan inventory accordingly. Overall, this project aims to bring convenience, efficiency, and better organization to both students and canteen staff, ensuring a smooth and stress-free food ordering experience.

The primary users of this system are students and canteen staff, each having a different interface and set of functionalities. Students will be able to browse the digital menu, place orders online, make payments (if applicable), and track their order status in real-time. This eliminates the need to stand in long queues, allowing them to manage their time efficiently. On the other hand, canteen staff will have access to a management dashboard, where they can receive and process incoming orders, update food availability, and track overall sales. This ensures a smoother workflow, reducing the pressure on staff during peak hours.

The website will include various features designed to improve the ordering experience. A menu display will provide students with a list of available items, along with prices, ratings, and availability status. The online ordering system will allow users to select food items, place orders, and receive an estimated preparation time. Additionally, an order tracking feature will help students monitor their order status and receive notifications when their food is ready for pickup. For the canteen staff, a staff management dashboard will enable efficient handling of orders, real-time updates, and better record-keeping for sales analysis.

In terms of future scalability, the system is designed in a way that it can be easily converted into a mobile app, providing even more accessibility and convenience to users. This ensures that the project remains adaptable to evolving technological needs and user demands.

The implementation of this online food ordering system will bring significant benefits to students, primarily by saving time and offering convenience. Instead of waiting in long queues to place and collect their orders, students can browse the digital menu, place their orders online, and receive notifications when their food is ready. This allows them to better manage their time between classes, ensuring they don't have to rush or skip meals due to delays. Additionally, the system provides a real-time order tracking feature, allowing students to check the preparation status of their food and pick it up at the right time. This streamlined process enhances the overall dining experience, making it more efficient and user-friendly.
For canteen staff, this system will significantly reduce workload and improve order management. During peak hours, managing multiple orders manually can lead to confusion, miscommunication, and delays. With this digital platform, all incoming orders will be automatically listed in the staff dashboard, allowing them to process and prepare meals systematically. The system will also help staff update food availability in real-time, preventing situations where students place orders for items that are out of stock. Furthermore, the staff can mark orders as "in preparation" or "ready for pickup," ensuring smoother operations and reducing the chaos caused by excessive crowding at the counter.
Another key feature of this system is the sales analytics dashboard, which will help the canteen staff and management track daily, weekly, and monthly sales data. This feature will provide insights into which food items are most popular, helping in better inventory planning and waste reduction. It will also allow the canteen to monitor peak order times, enabling staff to allocate resources efficiently during high-demand periods. With access to detailed sales reports, canteen managers can make data-driven decisions to improve service quality, introduce new menu items based on demand, and optimize overall business performance. This system not only enhances efficiency but also transforms the canteen into a more organized and well-managed business.

Since, the increasing reliance on technology to streamline daily activities has paved the way for digital solutions in various domains, including food services. Canteen management systems and food ordering applications have become integral in improving operational efficiency, customer satisfaction, and data-driven decision-making.
The adoption of mobile and web-based applications for food ordering has revolutionized the food service industry. Features such as digital menus, automated billing, and real-time order tracking were identified as key components that enhance customer experience and staff productivity.

According to a report by Statista (2023), mobile food ordering apps are expected to grow by 20% annually due to their convenience and accessibility.The project aims to create an innovative mobile application that not only streamlines the ordering process for students but also enhances the operational efficiency for canteen administrators. The system will consist of two separate servers - one catering to the students and the other to the canteen administrators.

Motivation

In traditional college canteens, the food ordering system is entirely manual, requiring students to physically visit the counter, place their orders, and wait for their food to be prepared. This often leads to long queues, especially during peak hours such as breakfast, lunch, and evening breaks. Since there is no structured method to track orders, students must remain near the counter and continuously check on the status of their food. The lack of an organized system makes food ordering time-consuming and inconvenient, particularly when a large number of students are present.

One of the biggest struggles students face is the long wait time, which often results in them missing or being late for classes. Many students have limited time between lectures, and if they decide to get food from the canteen, they may find themselves stuck in a queue for too long. If their order takes longer than expected, they must choose between waiting for their food and attending class on time. This creates unnecessary stress, forcing students to either skip meals or compromise on their academic schedule. A more efficient food ordering system is essential to ensure that students can get their meals quickly without disrupting their study routine.

The canteen staff also faces major difficulties, especially during peak hours when order volumes are high. With hundreds of students placing orders simultaneously, the staff must manually note down each order, prepare the food, and call out students to collect their meals. This manual process often results in confusion, misplaced orders, and long delays. The pressure of handling a large number of students at once makes it challenging to maintain efficiency and accuracy. Additionally, tracking payments, managing food stock, and updating item availability become difficult tasks when everything is handled manually. This not only affects service speed but also adds extra workload on the canteen employees.

A digital food ordering system can solve these issues by providing a structured and organized approach to food ordering and management. With an online platform, students can easily view the menu, place orders, and receive updates when their food is ready for pickup. This significantly reduces waiting times and prevents overcrowding at the counter. Staff members will benefit from an automated system that streamlines order processing, helps them keep track of incoming requests, and updates food availability in real-time. Additionally, sales tracking and analytics can help canteen management make data-driven decisions to improve service quality. By implementing a digital ordering system, the overall efficiency of the canteen can be enhanced, creating a smoother and more convenient experience for both students and staff.

The motivation behind this project stems from the recognition of these challenges faced in traditional college canteens, where inefficiencies during rush hours lead to inconvenience for students and operational hurdles for canteen staff. By developing a mobile application that facilitates seamless order placement, online payment, and efficient order processing, we aim to revolutionize the canteen experience and alleviate the frustrations of long queues and wait times for students.

The project seeks to improve overall customer satisfaction, optimize resource utilization, and enhance the productivity and profitability of canteen operations through the integration of user-friendly features, real-time analytics for administrators, and a feedback mechanism for continuous enhancement. By harnessing the power of technology to streamline processes and enhance user experience, this project endeavors to create a modern and efficient solution that transforms the traditional canteen setting into a smart and customer-centric dining environment. The overarching goal is to not only improve customer satisfaction but also boost operational efficiency, increase sales, and foster a more modern and user-centric approach to canteen management.

Ultimately, the core motivation behind this project is to create a seamless and modernized canteen experience that enhances the daily lives of students and elevates the operational capabilities of canteen administrators,

paving the way for a more efficient and customer-oriented food service environment within educational institutions.

Literature Review

Introduction: Traditional Food Ordering System

The traditional food ordering system in college canteens typically involves students physically visiting the canteen, manually placing their orders, and waiting in long queues to receive their food. This process is often time-consuming, especially during peak hours such as lunch breaks or between classes, when the canteen is crowded with students and staff. The manual system relies heavily on face-to-face interactions, where customers verbally communicate their orders to the canteen staff, who then prepare and serve the food. This method, while straightforward, often leads to inefficiencies, such as order errors, delays in service, and overcrowding, which can frustrate both customers and canteen workers.

During peak hours, the rush in the canteen becomes overwhelming, with long lines forming at the counters and limited seating available for diners. Students often face the dilemma of choosing between waiting in line for food or attending their next class, which can disrupt their schedules. Additionally, the canteen staff may struggle to manage the high volume of orders, leading to slower service and potential dissatisfaction among customers. The lack of a streamlined process in the traditional system often results in wasted time and energy, highlighting the need for a more efficient and modern solution, such as an online food ordering system, to address these challenges.

Online Food Ordering System:

Online food ordering systems are digital platforms that allow users to browse menus, place orders, and make payments for food items through websites or mobile applications. These systems have become increasingly relevant in today's digital era, where convenience and efficiency are highly valued. By eliminating the need for physical presence and manual ordering, online food ordering systems streamline the process, saving time and reducing effort for both customers and service providers. They are particularly beneficial in busy environments like college canteens, where students often face time constraints and long queues. With features like real-time menu updates, order tracking, and multiple payment options, these systems enhance the overall dining experience and cater to the tech-savvy generation.

The evolution of food ordering systems has been remarkable, transitioning from traditional methods of face-to-face interactions and manual order-taking to sophisticated digital platforms. In the past, customers had to visit restaurants or canteens, wait in line, and place their orders verbally, which often led to inefficiencies and delays. However, with advancements in technology, the food industry has embraced digital solutions, such as mobile apps and web-based platforms, to simplify the ordering process. This shift has been accelerated by the growing trend of online food ordering, particularly among students who prioritize convenience and speed. As smartphones and internet access become more widespread, students are increasingly relying on these systems to order meals seamlessly, making online food ordering an integral part of modern campus life.

Queue Management and Order Automation:

Efficient queue management and automated order processing have been widely researched in high-traffic environments such as restaurants, airports, and retail stores. Studies show that long wait times and unstructured queues lead to customer dissatisfaction and decreased operational efficiency. Queue optimization techniques, such as digital ticketing systems, priority-based order processing, and self-service kiosks, have been implemented in various industries to streamline operations. In food service environments, pre-ordering

mechanisms and real-time tracking have proven to significantly reduce congestion by allowing customers to place orders in advance and collect them when ready. These technologies help in distributing customer flow evenly, preventing overcrowding, and ensuring faster service during peak hours.

One of the most effective ways to enhance queue management is through pre-ordering systems and order tracking mechanisms. With a digital ordering platform, students can place their orders remotely, receive an estimated preparation time, and pick up their food without standing in long queues. This system not only benefits students by saving their time but also helps canteen staff prioritize orders based on demand and preparation complexity. Order tracking further enhances efficiency by providing real-time updates on order status, reducing uncertainty for students and minimizing unnecessary inquiries at the counter. These improvements lead to better organization, smoother service flow, and an overall enhanced user experience.

Technology plays a crucial role in reducing the manual workload of canteen staff and improving service speed. Traditional order-taking methods require staff to manage long lines, manually note down orders, handle cash transactions, and track multiple food requests at once, leading to errors and inefficiencies. By implementing automated order management systems, staff can focus on food preparation while the system digitally records and organizes incoming orders. Additionally, integrating inventory tracking and sales analytics allows canteens to monitor stock levels in real time, preventing food shortages or over-preparation. These technological advancements not only improve operational efficiency but also contribute to a more organized and well-managed food service environment in college canteens.

Benefits of Online Food Ordering in College Canteens:

Online food ordering systems significantly improve efficiency and reduce waiting times in college canteens. By allowing students to place orders digitally through apps or websites, the need for long queues at the counter is eliminated. Students can order meals in advance, ensuring their food is ready by the time they arrive at the canteen. This streamlined process not only saves time but also reduces physical crowding, creating a more organized and pleasant dining environment. Additionally, canteen staff can manage orders more effectively, focusing on food preparation rather than handling manual order-taking. This efficiency is particularly beneficial during peak hours, such as lunch breaks, when the canteen is busiest.

By tracking orders in real-time, canteens can identify which items are most popular and adjust their stock levels accordingly. This reduces food waste, as canteens can prepare meals based on actual demand rather than guesswork. The system also allows canteens to update menus dynamically, removing out-of-stock items and adding new options seamlessly. With access to data on ordering patterns, canteens can forecast demand more accurately, especially during special events or exam periods. This optimization of resources not only improves operational efficiency but also helps reduce costs, making the canteen more sustainable and profitable.

Online food ordering systems enhance the customer experience by offering personalized options and feedback mechanisms. Students can customize their orders to suit their preferences, such as choosing specific toppings, portion sizes, or dietary requirements. The user-friendly interface of these systems makes it easy for students to browse menus, place orders, and track their food in real-time. Additionally, feedback mechanisms like ratings and reviews allow students to share their experiences, helping canteens identify areas for improvement. This two-way communication fosters a sense of engagement and satisfaction among students, as they feel their opinions are valued. Overall, these features create a more convenient and enjoyable dining experience.

One of the most significant advantages of online food ordering systems is their potential for data collection and analysis. These systems gather valuable information on customer preferences, peak ordering times, and popular menu items. By analyzing this data, canteens can make informed decisions to improve their services. For example, they can identify trends, such as increased demand for certain items during exams, and adjust their offerings accordingly. Data analysis also helps canteens address recurring issues, such as long delivery

times or frequent complaints about specific dishes. Furthermore, this information can be used for targeted marketing strategies, such as offering discounts on less popular items or promoting seasonal specials. Over time, these insights enable canteens to optimize their operations and provide a better experience for students.

Future Trends and Innovations:

The online food ordering industry is continuously evolving with the integration of advanced technologies such as AI-based recommendations, voice ordering, and drone deliveries. AI-powered systems are being used to analyse customer preferences and suggest food items based on past orders, dietary preferences, or trending choices. Machine learning algorithms help in personalizing the user experience, ensuring that customers find what they need quickly. Voice ordering, another growing trend, allows users to place orders using virtual assistants like Alexa or Google Assistant, making the process hands-free and more accessible. In addition, drone and robotic deliveries are being explored to further reduce wait times and enhance convenience, especially in large campuses or workspaces where food needs to be transported efficiently.

In a college canteen setting, these innovations could significantly improve the efficiency and convenience of food ordering. AI-based recommendations could suggest meal options to students based on their past orders, helping them make quicker decisions and reducing order processing time. Voice-based ordering could be integrated into mobile apps or kiosks, enabling students to place their orders effortlessly without manually browsing through the menu. While drone deliveries may not be feasible for all colleges, automated food pickup stations or robotic delivery within the campus could streamline food distribution. By adopting these emerging technologies, college canteens can enhance the overall dining experience, making it faster, more efficient, and better suited to modern student lifestyles.

Conclusion

The literature underscores the transformative potential of online food ordering systems in improving service quality and operational efficiency. By leveraging these insights, the proposed system for the college canteen can not only alleviate existing challenges but also set a benchmark for other institutions facing similar issues. Further research and development are essential to customize and implement these solutions effectively.

Gap Analysis

Traditional canteen management in educational institutions often faces inefficiencies such as long queues, unpredictable wait times, and a lack of real-time order tracking. Students frequently spend valuable time waiting in line, leading to delays in their schedules and an overall decline in user satisfaction. Additionally, canteen staff struggle with managing high-volume orders efficiently, leading to bottlenecks in food preparation and delivery. Existing systems, if any, lack comprehensive features like real-time order notifications, sales analytics, and user feedback integration.

The GrabNGo project aims to bridge this gap by introducing a digital ordering system that streamlines the process, reduces wait times, and improves operational efficiency. By leveraging technology to provide real-time order tracking, sales data analytics, and user ratings, GrabNGo enhances both the customer experience and the backend management process. The system ensures seamless communication between students and canteen staff, optimizing workflows and reducing order mismanagement. This gap analysis highlights the urgent need for a tech-driven solution like GrabNGo, which not only simplifies food ordering but also transforms the overall canteen experience through automation, data-driven insights, and enhanced service quality.

Problem Statement

The traditional food ordering system in college canteens often leads to inefficiencies, such as long queues, manual order-taking, and delays, especially during peak hours. These challenges result in wasted time for students, overcrowding in the canteen, and operational difficulties for staff. Additionally, the lack of a streamlined process limits personalization, feedback mechanisms, and data-driven decision-making, which could otherwise enhance the overall dining experience. This project aims to address these issues by proposing the implementation of an online food ordering system that improves efficiency, reduces waiting times, and provides a more convenient and satisfying experience for students and staff alike. By transitioning to a digital platform, the canteen can better manage inventory, collect valuable data, and offer personalized options, ultimately modernizing its operations to meet the needs of a tech-savvy student population.

Objective

The objective of this project is to design and implement an online food ordering system specifically tailored for college canteens to address the inefficiencies of traditional manual ordering processes. By developing a user-friendly digital platform, the project aims to streamline the food ordering experience, reduce waiting times, and eliminate overcrowding during peak hours. The system will enhance customer satisfaction by offering personalized menu options, real-time order tracking, and multiple payment methods, while also providing canteen staff with tools for better inventory management and data-driven decision-making. Ultimately, the project seeks to modernize the canteen's operations, improve overall efficiency, and create a more convenient and enjoyable dining experience for students and staff.

Tools and Technologies Used

To develop the GrabNGo canteen ordering system efficiently, a combination of modern technologies will be utilized for frontend development, backend management, database storage, and real-time communication.

1. Frontend Development

- **React**: A powerful JavaScript library used for building a cross-platform application with an intuitive and responsive user interface.
- **React Native**: Enables the development of a mobile-friendly application that can run on both Android and iOS devices.
- **Tailwind CSS**: A utility-first CSS framework that enhances the design and responsiveness of the application.

2. Backend Development

- **Node.js**: A fast and scalable runtime environment used for executing JavaScript on the server side.
- **Express.js**: A lightweight web framework for Node.js that simplifies API development and request handling.

3. Database Management

- **MongoDB**: A NoSQL database used for managing dynamic data, such as user orders, reviews, and real-time updates.
- **MySQL**: A relational database management system for structured data storage, such as user profiles and transaction details.

4. Authentication & Security

- **JWT (JSON Web Tokens)**: Provides secure authentication and authorization for users.
- **bcrypt**: Used for password encryption to ensure user data security.

Methodology

The development of the Canteen Ordering System involves several key stages that ensure the website functions smoothly and meets the requirements for both students and canteen staff. The methodology for this project is as follows:

1. Requirements Gathering

- **Objective:** Understand the user needs and system requirements.
- **Process:**
    - Collect feedback from students, faculty, and canteen staff regarding the features they expect from the system.
    - Define functional and non-functional requirements, such as login functionality, menu display, order tracking, and real-time status updates.
    - Identify key features like payment integration, order status updates, and backend management for staff.

2. System Design

- **Objective:** Create a blueprint for both frontend and backend of the application.
- **Process:**
    - Design the **system architecture** to ensure scalability and efficient communication between the frontend and backend systems.
    - **Database design** includes tables for users, orders, menu items, canteen details, and payment status. Ensure database normalization to avoid redundancy.
    - Prepare a **UI/UX design** focusing on ease of use, mobile responsiveness, and intuitive navigation.

3. Frontend Development

- **Objective:** Develop the user-facing interface for students to interact with the system.
- **Process:**
    - Create **login and registration pages** for both students and staff.
    - Design **menu pages** that display food items, prices, and availability.
    - Implement **order cart functionality** to allow students to add, remove, or update food items in their cart.
    - Build the **order summary page** where students review and confirm their order before final submission.
    - Ensure the website is **responsive** to cater to both desktop and mobile users, keeping the future app conversion in mind.

4. Backend Development

- **Objective:** Develop the backend logic to handle data processing and system functions.

- **Process:**
    - Implement **user authentication** using PHP for session management and security.
    - Develop **order management functionality** that allows users to place orders, update order status, and view the real-time progress of their orders.
    - Integrate **payment gateway** for secure online payments.
    - Create a backend dashboard for **canteen staff** to manage incoming orders, update the status of food items (e.g., "Preparing," "Ready for Pickup"), and update the menu.
    - Handle **database operations** such as storing order details, updating food availability, and processing payment information.

5. Testing

- **Objective:** Ensure the functionality of the system meets the defined requirements and is bug-free.
- **Process:**
    - Conduct **unit testing** for individual components (e.g., login, payment system, order management).
    - Perform **integration testing** to check how the frontend and backend work together (e.g., order flow, payment processing).
    - Run **user acceptance testing (UAT)** to ensure the system works as expected from the user's perspective. Gather feedback to make any necessary adjustments.
    - Perform **security testing** to safeguard user data, especially in the payment process.

6. Deployment

- **Objective:** Deploy the system for live use and ensure it’s accessible to users.
- **Process:**
    - Choose a suitable **hosting platform** such as AWS, Heroku, or any other cloud service for deploying the website.
    - Deploy the application on the selected server, ensuring all services are up and running (e.g., web server, database).
    - Implement **monitoring tools** to track the website’s performance and ensure that any issues are promptly addressed.

7. Iterative Improvements

- **Objective:** Continuously improve the system based on user feedback and performance data.
- **Process:**
    - Collect feedback from users (students and staff) regarding their experience with the website.
    - Implement **updates** to add new features, optimize performance, or improve usability based on user suggestions.
    - Perform regular **maintenance** to ensure the system runs smoothly, such as updating menu items, checking payment integration, and addressing any bugs or security vulnerabilities.

The development of GrabNGo follows a structured and systematic approach to ensure a seamless and efficient canteen ordering system. The project is divided into multiple phases, each focusing on specific aspects of development, testing, and deployment.

1. Requirement Analysis

- Conduct research on existing canteen management systems and identify gaps.
- Gather requirements from students and canteen staff to understand key functionalities.
- Define the scope of the project, including features such as online ordering, real-time tracking, and notifications.

2. System Design

- **Frontend Design**: Develop wireframes and UI/UX prototypes for a user-friendly application using **Figma**.
- **Backend Architecture**: Define the API structure, database models, and system workflows.
- **Database Design**: Structure data storage using **MongoDB** for dynamic data (orders, ratings) and **MySQL** for structured data (user profiles, transactions).

3. Development Phase

- **Frontend Development**:
    - Develop the user interface using **React and React Native**.
    - Implement responsive design with **Tailwind CSS**.
    - Integrate navigation and interactive elements for a smooth experience.
- **Backend Development**:
    - Develop APIs using **Node.js and Express.js** for handling requests.
    - Implement authentication using **JWT** for secure user access.
- **Database Integration**:
    - Store user and order data in **MongoDB and MySQL**.
    - Implement data retrieval and analysis for sales tracking and menu optimization.

4. Testing & Debugging

- Conduct unit testing to validate individual components.
- Perform integration testing to ensure smooth communication between the frontend, backend, and database.
- Test the application on multiple devices and platforms for cross-platform compatibility.
- Implement security testing to prevent unauthorized access and data breaches.

5. Deployment & Hosting

- Deploy the **frontend** on **Vercel or Netlify**.

- Host the **backend** on **AWS, DigitalOcean, or Render**.
- Ensure database security and scalability through cloud-based hosting.

6. User Feedback & Optimization

- Conduct beta testing with students and canteen staff.
- Gather feedback on UI, functionality, and overall performance.
- Optimize based on user suggestions and resolve any bugs or inefficiencies.

7. Maintenance & Future Enhancements

- Monitor system performance and resolve any operational issues.
- Implement advanced features such as AI-based food recommendations and predictive analytics.
- Expand system capabilities for larger institutions or commercial food services

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