SmartMess: An Online Mess Food Ordering Platform

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Abstract: ***SmartMess is an online food ordering platform designed to address the dietary needs of students living away from home by providing a reliable source of nutritious and affordable meals. Students, often constrained by limited access to high-quality food, can use the platform to connect with local mess services and home-based food providers, ensuring a variety of options for healthier eating habits. The system offers flexible subscription plans for periods of days, weeks, or months, as well as on-demand meal ordering to accommodate varying preferences. By facilitating delivery to fixed campus locations such as hostel parking areas, the platform streamlines logistics, making food pickup convenient for students. Additionally, homemakers can leverage the platform to sell home-cooked meals, empowering them economically. Built using modern technologies such as Spring Boot, Flutter, and AWS, the platform ensures scalability, security, and ease of use. The Smart Mess system aims to enhance the student dining experience while promoting local entrepreneurship and community engagement.***

Index Terms: ***Online food ordering, Affordable meal solutions, Home-cooked meals, Flexible subscription plans.***

I. INTRODUCTION

In recent years, the demand for convenient, nutritious, and affordable food has increased, especially among students living away from home. With limited access to quality meal options, many students resort to unhealthy fast food or home-based food providers, particularly women with culinary skills, face challenges in reaching a broader customer base despite the growing need for their services.

The SmartMess platform is designed to address these issues by bridging the gap between students and local mess services. By offering an online marketplace, SmartMess enables students to conveniently order nutritious, home-cooked meals from verified mess providers within their locality. This system not only promotes healthier eating habits but also supports women entrepreneurs and small-scale mess owners by providing them with a wider audience to sell their meals.

This paper surveys existing food delivery platforms, examines the challenges faced by students and mess owners, and explores how SmartMess can provide a unique solution to these issues by fostering community-based food ordering. Through this platform, we aim to create a win-win situation for students seeking healthier meal options and local food providers looking for sustainable business growth.

II. LITERATURE REVIEW

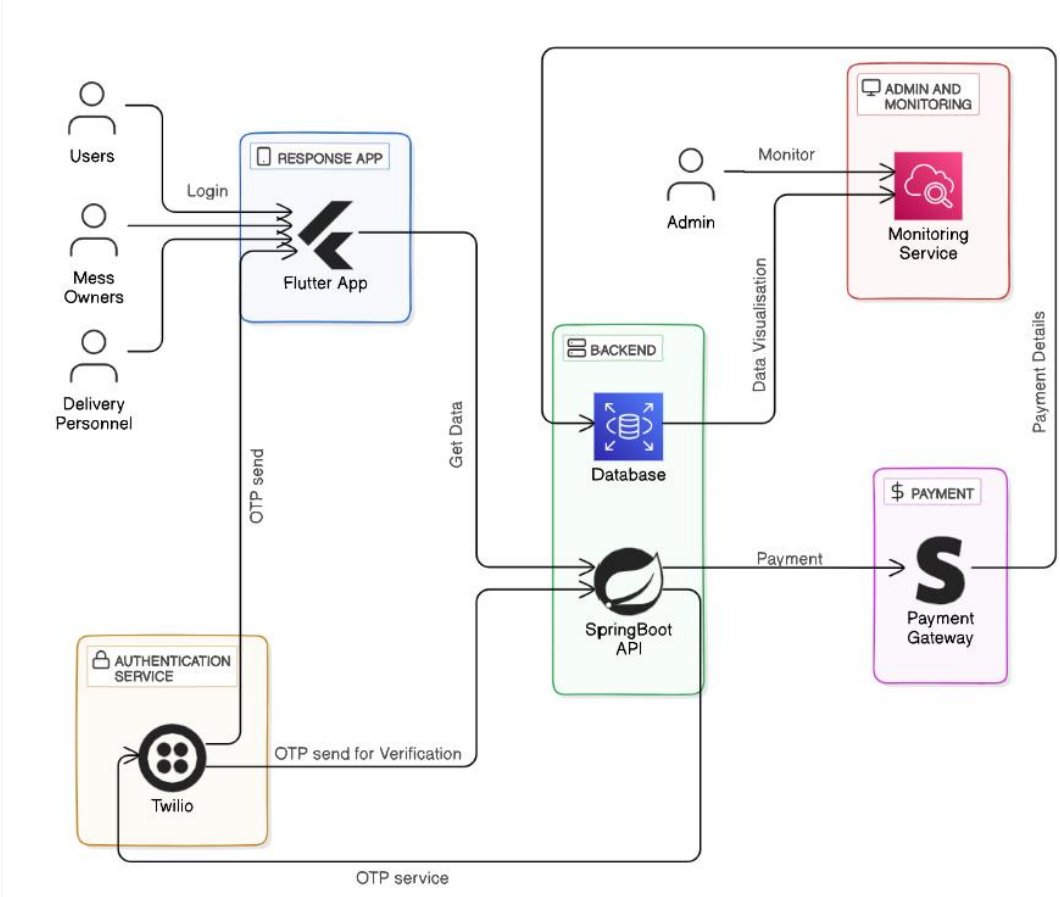
The need for efficient and convenient food ordering systems has become increasingly relevant in recent years, especially for institutions like colleges, where traditional methods often result in inefficiencies. The demand for such systems is driven by the rapid adoption of smartphones and the growing dependence on online services for daily needs. Multiple studies and research projects have explored the implementation of digital food ordering systems, focusing on different aspects such as convenience, customization, real-time updates, and automation.

One study discussed the development of a pre-ordering mobile application using Flutter and Firebase, aimed at reducing wait times and managing orders efficiently during peak hours. The application allows users to place orders online and provides an admin interface for managing products and orders, reducing human error and labor costs in manual ordering processes. This system's relevance to the online mess food ordering concept lies in its focus on handling peak-time rushes and enhancing the user experience by allowing pre-orders.
Similarly, another project implemented an online food ordering system using Android Studio and Firebase. This system introduced features like order tracking, customer feedback, and payment options, addressing challenges such as inconsistent meal availability and lack of transparency. These systems successfully overcome the drawbacks of traditional queuing systems and manual order processing by digitizing the entire process, from menu browsing to payment.

Moreover, online food ordering systems tailored for mess services also incorporate location-based services and mess provider recommendations, making it easier for users to find nearby meal services. By integrating GPS and real-time updates, such systems enhance the convenience of ordering meals, especially for students new to a campus or a city. This not only streamlines the food ordering process but also helps users manage their dietary preferences more effectively.

In conclusion, existing literature emphasizes the importance of online food ordering systems in addressing the inefficiencies of traditional mess services. These systems provide transparency in menu availability, allow for meal customization based on dietary needs, and offer secure and convenient payment options. As the use of mobile technology continues to grow, the implementation of such systems becomes increasingly critical to meet the evolving needs of students and institutions.

III. PROPOSED SYSTEM



System Architecture

The proposed system architecture for an Online Mess Food Ordering System integrates a variety of services and components to streamline the meal ordering process. The architecture ensures smooth user interaction, real-time updates, secure payment processing, and system monitoring through a multi-layered design. The system is primarily built using Flutter for the front end and Spring Boot for the back end, with external services integrated for authentication, payments, and monitoring. This paper discusses the components and interactions of the system and their role in achieving a robust and scalable architecture.

1. User Interaction (Flutter App):

Flutter App: The Flutter application serves as the user interaction layer and supports multiple stakeholders, including:

Users (students ordering meals)

Mess Owners (managing food orders and availability)

Delivery Personnel (tracking and handling deliveries)

The app provides interfaces for users to log in, browse meal options, place orders, and make payments. It also allows mess owners to manage meal availability and delivery personnel to update order statuses. The choice of Flutter ensures cross-platform compatibility, allowing the app to run on both Android and iOS devices with a single codebase.

Login and OTP-based Authentication: To ensure secure access, the system incorporates OTP (One-Time Password)-based authentication. This adds an extra layer of security over conventional password systems, preventing unauthorized access. Upon login, an OTP is sent to the user's registered mobile number, ensuring that only verified users can access the system.

2. Authentication Service (Twilio Integration):

Twilio-based OTP Service: The system utilizes Twilio for sending OTPs to users. The Authentication Service is a crucial component responsible for generating and verifying OTPs during user login. The integration of Twilio ensures high availability and reliability, as Twilio is a robust platform widely used for SMS-based communication. The OTP Verification Workflow can be explained as : User initiates the login request via the Flutter app. Spring Boot API requests Twilio to send an OTP. User receives OTP, enters it in the app, and the system verifies it for login.

3. Backend Layer (Spring Boot API):

Spring Boot API: The core logic of the system resides in the backend, built using Spring Boot, a Java-based framework that simplifies the creation of microservices and APIs. The backend is responsible for handling requests from the Flutter App, processing data, and managing business logic. It integrates with various components, such as the database, payment gateway, and monitoring service, ensuring smooth data flow and functionality. The use of Spring Boot ensures that the system is Scalable: Able to handle increasing user load and multiple concurrent requests, Secure: Providing mechanisms for secure communication, user data protection, and proper authentication workflows, Extensible: Supporting integration with external services like Twilio (for authentication) and payment gateways.

4. Database Layer:

Database: The Database acts as the central repository for storing system data, such as user information, mess meal details, orders, and payment records. The system's database management follows a relational structure, ensuring normalized storage of data to maintain consistency and integrity. Data Storage Highlights are User information (profile, preferences, orders), Mess-specific meal data (menu, availability, nutritional information), Transaction data (order history, payments, delivery status), Real-time updates (meal schedule, queue lengths, etc.). The database is designed to handle Real-time queries for updating users on meal availability and order status and Historical data for generating insights on user preferences and mess performance

5. Payment Processing (Payment Gateway):

Payment Gateway Integration: The Payment Gateway is responsible for facilitating secure payments through external payment processors. The Spring Boot API interacts with the gateway to process payments initiated by users, ensuring secure transaction handling, encryption of sensitive data, and compliance with financial regulations. Payment Workflow is firstly User selects meal and proceeds to checkout after that Spring Boot API sends payment request to the Payment Gateway then User makes payment through the gateway (e.g., via card or digital wallet) and Upon successful payment, the gateway sends confirmation back to the backend. The order is finalized and payment details are stored in the database.

6. Monitoring and Admin Dashboard:

Monitoring Service: For effective system management, an Admin Dashboard and Monitoring Service are integrated to give administrators real-time insights into system performance, user activities, and financial transactions. The Monitoring Service helps in detecting anomalies, tracking key metrics (such as active users, orders processed, etc.), and visualizing data trends. Key Monitoring Metrics are Order processing times, Payment success/failure rates, User engagement levels, Delivery status and timing. The data collected is presented in a visual format, such as graphs and charts, allowing admins to easily track system health and user behavior, making it easier to take corrective actions when necessary.

IV. CONCLUSION

The development of an Online Mess Food Ordering System is a significant step toward improving the meal management experience for college students.

By addressing the limitations of traditional systems such as long wait times, menu uncertainty, and lack of customization the online system offers a more efficient, transparent, and user-friendly approach to meal ordering. The integration of features like real-time updates, meal customization, and feedback mechanisms ensures a better dining experience while catering to students' nutritional needs. Additionally, the system provides mess owners with the opportunity to improve their services based on customer feedback, thus promoting overall food quality and service efficiency.

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