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Design and Development of FeedMe: A Scalable and Secure Web-based Food Delivery App

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Abstract**—***This paper presents the design and development of FeedMe, a web-based food delivery app that is scalable and secure. The app was developed to cater to the needs of customers and restaurant managers in Surigao City, Philippines. The app's design was based on user requirements gathered from restaurant managers and selected customers. Object-oriented models and programming methodology were utilized to aid the development process. The app features a user-friendly interface, real-time order tracking, and secure payment processing. An evaluation of the app based on usability, performance, security, availability, customer support, and pricing was conducted, and it received high ratings in usability, availability, and pricing. FeedMe app provides an alternative solution for efficient and convenient food ordering and delivery services.*

Keywords**—** *Food delivery app, scalable and secure web application.*

I. Introduction

In recent years, the popularity of food delivery apps has surged as they provide the convenience of ordering food with a few taps on a smartphone, attracting millions of users worldwide. This has led to intense competition in the food delivery market, with numerous apps competing for a larger market share. Consequently, creating a scalable and secure web-based food delivery app presents both an opportunity and a significant challenge in this highly competitive industry.

The main focus of this paper is the design and development of FeedMe, a web-based food delivery app that is highly scalable and secure. The resulting app is illustrated using the appropriate user interfaces. Additionally, the paper delves into the evaluation of the app, which comprises feedback gathered from customers who have used the app, as well as restaurant staff. The purpose of this evaluation is to offer insights into how well FeedMe functions as a food delivery app, and how successfully it fulfills the needs and preferences of both restaurant proprietors and customers.

The development of FeedMe was made in response to the challenges faced by customers in the local food delivery market. These challenges include high delivery fees, inconsistent delivery times, and issues related to food quality and technical glitches. The FeedMe app was designed to address these issues by providing a user-friendly and convenient platform for ordering food from a wide range of restaurants with affordable delivery fees.

To ensure the app's effectiveness, extensive user research and testing were conducted during the design process. The app features a variety of restaurants and cuisines, with user-friendly features such as real-time tracking and order history, aimed at simplifying the ordering process.

The development of FeedMe was aimed to create a solution that not only addresses the common complaints of existing local food delivery apps but also delivers an improved user experience. It leverages on Google Cloud infrastructure and services to build a scalable and secure application. The app is envisioned to provide customers with a hassle-free and enjoyable way to order food from their favorite restaurants, while also supporting local businesses in the food industry.

II. Background Of the Study

The food delivery industry has witnessed significant growth in recent years, with the emergence of several food delivery apps that enable users to order food from local restaurants and have it delivered to their doorstep. This literature review will provide an overview of the existing food delivery apps, including their features and popularity.

Food delivery apps have become increasingly popular among consumers, with a recent study by Statista showing that the global revenue from food delivery apps is expected to reach $151.5 billion by 2024 [1]. Some of the most popular food delivery apps include Uber Eats, DoorDash, Grubhub, Postmates, Deliveroo, and FoodPanda.

Uber Eats is a food delivery app that enables users to order food from local restaurants and track their delivery in real-time. The app also provides a variety of payment options, including credit cards, debit cards, and PayPal. Uber Eats is available in several countries, including the United States, Canada, and Australia [2].

DoorDash is another popular food delivery app that operates in several countries, including the United States, Canada, and Australia. The app offers a user-friendly interface that enables users to search for restaurants and cuisines based on location and price. DoorDash also provides real-time delivery tracking and a variety of payment options [3].

Grubhub is a food delivery app that operates in several countries, including the United States and the United Kingdom. The app offers a comprehensive restaurant selection and a variety of cuisines, as well as real-time delivery tracking and a loyalty program for frequent users [4].

Postmates is a food delivery app that operates in several cities in the United States, offering a variety of cuisines and local favorites. The app provides real-time delivery tracking and a user-friendly interface, as well as a variety of payment options [5].

Deliveroo is a food delivery app that operates in several countries, including the United Kingdom, Australia, and France. The app offers a user-friendly interface and a

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comprehensive restaurant selection, as well as real-time delivery tracking and a loyalty program for frequent users [6].

Food Panda is a food delivery app that operates in several countries, including Asia, Europe, and the Middle East. The app enables users to order food from local restaurants and provides real-time delivery tracking [7]. One common complaint about Food Panda is the high delivery fees, which can vary depending on the restaurant and location. Additionally, some users have reported inconsistencies in delivery times and quality control over food preparation. There have also been reports of technical glitches and errors, such as delayed or canceled orders [8].

The scalability of food delivery apps has become an important consideration as the popularity of these apps continues to grow. Scalability refers to the ability of a system to handle increasing demands and workloads as the user base and transaction volumes grow. In the case of food delivery apps, scalability is essential to ensure that the system can handle a large number of orders and deliveries without compromising on the quality of service.

One study found that the scalability of food delivery apps depends on various factors, including app architecture, database design, and server infrastructure [9]. The study recommended the use of cloud-based infrastructure and microservices architecture to enhance scalability and performance. Another study suggested that using containerization technology such as Docker and Kubernetes can help improve the scalability of food delivery apps [10].

Aside from scalability, the security of food delivery apps is essential to protect customer data and ensure the safety of online transactions. One study found that the security of food delivery apps is often compromised by vulnerabilities in the app code, such as insufficient data validation and authentication mechanisms [11]. The study recommended the use of secure coding practices and regular security audits to identify and address vulnerabilities. Another study highlighted the importance of securing user data and recommended the use of strong encryption and secure storage mechanisms to protect sensitive information such as credit card details and personal data [12].

The researcher chose to use Google Cloud infrastructure and services to address concerns about scalability and security. Google Cloud Platform is a cloud computing platform that provides a wide range of infrastructure and services to enable developers to build, deploy, and manage applications. It offers a variety of services, including storage, compute, and networking, that are designed to help developers build scalable and secure applications [13][14][15].

By using Google Cloud infrastructure and services, FeedMe could leverage the benefits of a cloud-based infrastructure, which provides the ability to scale resources up or down based on demand. This means that FeedMe could handle an increasing number of users without experiencing performance issues [14]. Furthermore, Google cloud services offer a range of security features, such as firewalls, encryption, and monitoring tools, which help to protect against security threats and data breaches [15].

In summary, the FeedMe app was developed with scalability and security as top priorities. The app was designed to provide an improved user experience and protect user data while offering affordable delivery charges. By leveraging Google Cloud infrastructure and services, FeedMe can handle an increasing number of users without experiencing performance issues while also benefiting from robust security features such as encryption, firewalls, and monitoring tools. In addition to scalability and security, the researcher focused on providing an easy-to-use interface and convenient delivery services. The app aims to offer a hassle-free and enjoyable food delivery experience for customers while supporting local businesses in the food industry. With its commitment to scalability, security, and user experience, FeedMe is well-positioned to be a leading food delivery app.

III. System Diagram

Fig. 1 shows the visual model of the system, its components, and their interactions. The system is designed to be scalable and secure, ensuring that it can handle a large number of users and transactions without compromising performance or data security.

The FeedMe user interface component includes the graphical user interface (GUI) of the app, which provides an interactive and user-friendly interface for restaurant staff and customers. It also includes colorful and attractive graphics, animations, and sound effects.

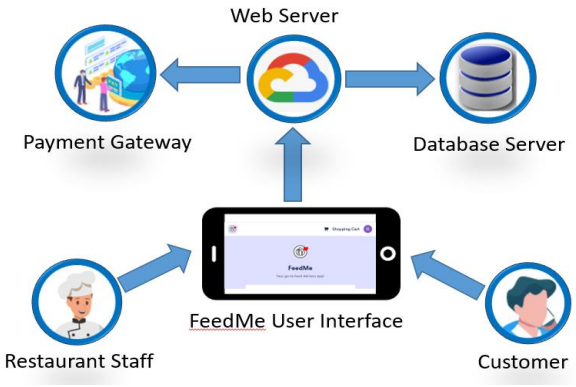

Fig. 1. System Diagram

The web server, using Google Cloud infrastructure and services hosts the FeedMe app. The app communicates with a database server to store and retrieve data related to restaurants, menus, orders, etc. Additionally, the app integrates with a payment gateway to securely process payments made by customers.

IV. Results

As part of this study, the researcher conducted interviews with a specific group of restaurant managers and prospective customers in Surigao City, Philippines. The main objective of these interviews was to gather relevant data that would inform the design of the food delivery app, with a focus on identifying key project requirements.

The gathered data revealed several crucial design considerations that would be essential for the success of the app. First and foremost, the app should have a simple and user-friendly interface that is intuitive and easy to use. It should also

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provide a wide selection of restaurants and menus to cater to a diverse range of user preferences.

Another important feature of the app would be the ability to track orders in real time, providing users with regular updates on the status of their delivery. Additionally, the app should ensure that orders are delivered promptly, with timely and reliable delivery services that meet the user's expectations.

The delivery fee for the service was also identified as a key consideration, with the researcher noting that it should be reasonable to attract more customers to the app. The insights gathered from the interviews were invaluable in shaping the design of the app, helping to ensure that it meets the needs and expectations of its target users.

A. Design and Development

To capture the requirements of the app a use-case diagram was prepared for the app [16]. Figure 2 shows the design use-case diagram of the app. It illustrates the various operations the app is capable of carrying out as well as the actors it is capable of interacting with. The two primary actors interacting with the app are the Customer and Restaurant Staff.

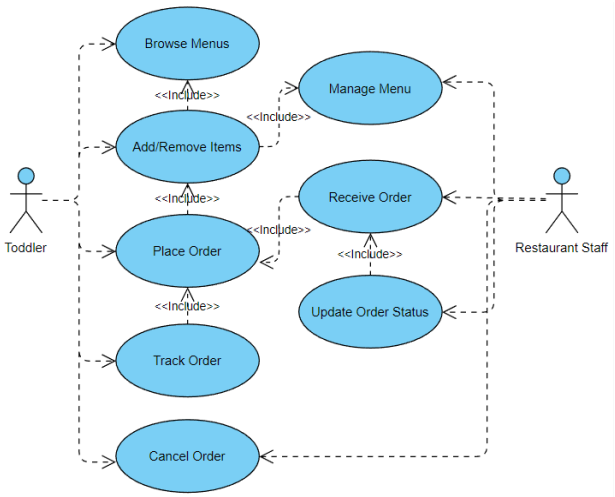

Fig. 2. Design Use-Case Diagram

Customers can register and login to the app to gain access to the different features. Once logged in, they can browse through various menus, select items to order, and add or remove items from their cart. After selecting their food items, they can place an order and then track the order status in real time. If necessary, they can cancel the order before it is delivered.

Restaurant Managers can register and login to the app to manage their restaurant's menu and receive orders. They can update the order status and add or remove items from the menu as needed.

Figure 3 shows the class diagram to provide a visual representation of the system's architecture [17]. It gives a high-level overview of the different classes and their relationships in the FeedMe food ordering app. In this class diagram, we can see four main classes: Customer, Order, Item, and Restaurant.

The Customer class represents the app's customer users. It contains attributes such as their username, password, first and last name, email, and address. It has methods for registering and logging in, browsing menus, adding and removing items from the cart, and placing orders.

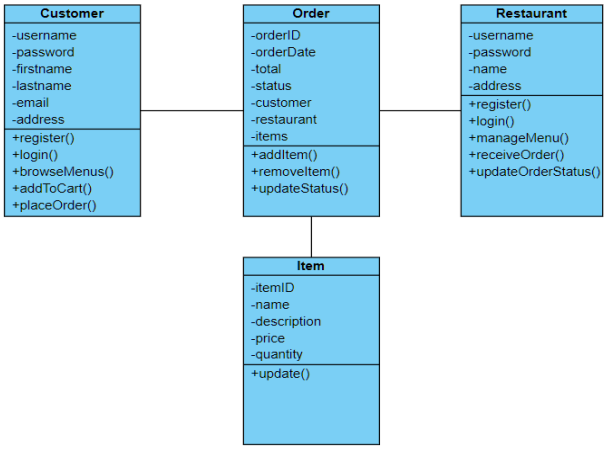

Fig. 3. System Class Diagram

The Order class represents an order made by a customer. It contains attributes such as the order ID, date, total amount, status, customer, restaurant, and a list of items. It has methods for adding and removing items from the order and updating the status.

The Item class represents a menu item. It contains attributes such as the item ID, name, description, price, and quantity. It has a method for updating the item details.

The Restaurant class represents the app's restaurant users. It contains attributes such as their username, password, name, and address. It has methods for registering and logging in, managing menus, receiving orders, and updating order status.

The class diagram played an important role in the development of the app using object-oriented programming. The identified class were directly mapped to the classes of objects in the code that were used at the time of construction.

B. The FeedMe Food Deliver App

The FeedMe food delivery app has been designed with a focus on user experience, providing intuitive interfaces that enable users to navigate the app easily. The welcome and login screens (shown in Figures 4 and 5, respectively) offer clean and straightforward interfaces, helping users to quickly get started with the app.

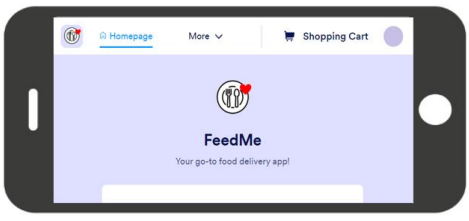

Fig. 4. Welcome Screen

To ensure secure and personalized usage of the app, users are required to authenticate themselves by entering their app credentials. The login screen serves as a gateway for users to access the app's features and track their orders. By implementing a robust credentials system, the app ensures the privacy of user information and transaction data, thereby

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providing users with a sense of security and trust in using the app.

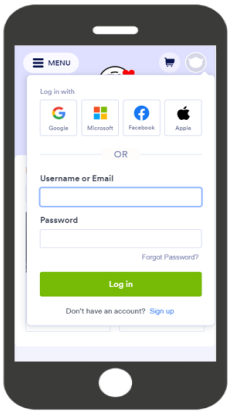

Fig. 5. Login Form

Fig. 6 displays a sample food list of items that are currently available for free delivery as part of a promotional offer. The food listings and categories can be customized by individual restaurants according to their preferences. In addition, the app enables restaurants to offer various promotions to entice more customers, which can be a powerful tool in increasing customer engagement and loyalty. This flexibility enables restaurants to tailor their offerings to the unique preferences and needs of their customers, thereby enhancing their overall experience with the app.

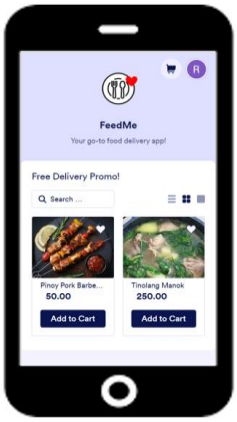

Fig. 6. Sample Customizable Food Listing

Fig. 7 depicts the FeedMe shopping cart, which allows users to review and edit their orders before submitting them. The cart displays an order summary that lists all the items that have been added to the cart, along with their respective quantities and prices. The cart interface enables users to easily adjust the quantity of each item or remove items from their order altogether. Once the user has finalized their order, the cart calculates the total amount due, including any applicable taxes and delivery fees. This feature provides users with greater control and transparency over their orders, helping them to make informed decisions and avoid any surprises at checkout.

Fig. 8 depicts the checkout screen of the FeedMe app, which is displayed after the user has submitted their order. This screen confirms that the order has been received by the restaurant and is being processed. Additionally, the screen informs the user that they can now track the progress of their order in real-time, providing them with greater visibility and peace of mind.

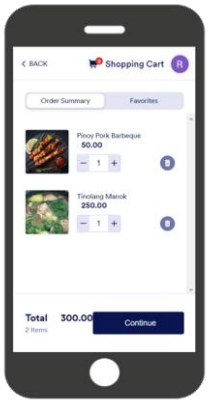

Fig. 7. The FeedMe Shopping Cart

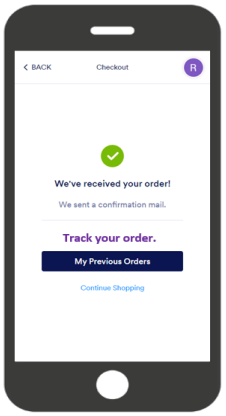

Fig. 8. Checkout Screen

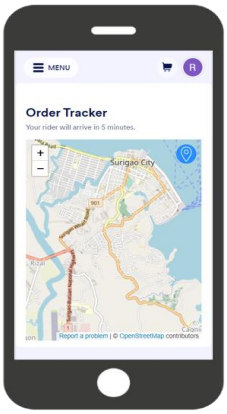

Fig. 9. Order Tracker Page

The order tracker page is depicted in Figure 9. The page displays on the map the current location of the delivery rider and the expected delivery time, the order number, and the contact details of the rider in case the user needs to get in touch with them. By providing users with clear and concise feedback on their order status, the app enhances the user experience and fosters greater trust and satisfaction among its users.

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C. App Evaluation

The evaluation of the "Design and Development of FeedMe: A Scalable and Secure Web-based Food Delivery App" was conducted to assess the app's usability, functionality, performance, security, availability, customer support, and pricing. The evaluation aims to provide insights into the application's strengths and weaknesses to help improve the user experience. It was conducted by assessing the application's user interface, navigation, performance, customization, and feedback features. The results of the evaluation are as follows:

Usability: Usability is a critical aspect of any app, and the FeedMe app has been designed with a user-friendly interface in mind. The intuitive and easy-to-navigate interface of the app earned an impressive score of 4.6 out of 5.0 from the evaluators in terms of usability. The app's graphics, animations, and sound effects are visually appealing and engaging, making for a pleasant user experience.

Functionality: The app is highly functional and delivers on its intended purpose. FeedMe App provided all the necessary features for users to browse menus, place orders, track deliveries, and provide feedback on their experience. The app was rated an average of 4.4 out of 5.0 in terms of functionality.

Performance: Another crucial aspect of any app is its performance, and the FeedMe app does not disappoint in this regard. The app's smooth and efficient operation earned it an impressive performance score of 4.4 out of 5.0 from the evaluators. The app can process orders quickly and accurately, ensuring that customers receive their food promptly.

Security: Security is also a top priority for the FeedMe app, and the evaluators gave it a security score of 4.5 out of 5.0. The app's robust security measures, including encryption of user data, protect users' personal information and payment details from unauthorized access or data breaches.

Availability: In terms of availability, the evaluators rated the app 4.6 out of 5.0. The app is accessible to users on a wide range of devices and operating systems, including smartphones, tablets, and desktops. This accessibility ensures that users can easily access the app and place their orders from anywhere, at any time.

Customer Support: The customer support rating of the app was 4.5 out of 5.0. You can instantly call the restaurant and the delivery rider for any feedback about orders, menus, items, and delivery status. FAQs and other useful information is also available in the app's website.

Pricing: FeedMe app's pricing obtained an average of 4.6 out of 5.0. The app's pricing model is competitive and transparent with reasonable delivery fees.

After conducting the evaluation of the FeedMe App it can be concluded that the application is highly effective in terms of usability, functionality, performance, security, availability, customer support, and pricing with a general average rating of 4.51. It is an above-average score indicating that the app's performance is good and meets users' expectations.

V. Conclusion

In conclusion, the development of FeedMe, a scalable and secure web-based food delivery app, has been a success. The app was designed with user-friendliness and security in mind, incorporating a simple and intuitive interface, efficient order processing, robust security measures, and compatibility with a range of devices and operating systems. The app was evaluated positively by users, with high scores in usability, availability, and pricing.

The insights gathered from the interviews with restaurant managers in Surigao City, Philippines, were crucial in identifying the key project requirements, which ultimately shaped the development of the app. Overall, FeedMe provides a convenient and reliable solution for food delivery services, connecting customers with a variety of restaurants and menus and ensuring timely and secure transactions.

In the future, further improvements and updates can be made to the app to enhance its features and capabilities. However, the current version of FeedMe provides a strong foundation for a successful food delivery app and demonstrates the potential for web-based solutions in the food industry.

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