

## Food Ordering System Mobile Application

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**Abstract:** Food Ordering System is a mobile application developed for a café to help taking care of the customers' calorie intake of their meals. The main objectives are to solve the existing problems of having long queue and to implement healthier meal for the customers, which may help in getting their business process smoother. I have chosen Android Studio as my integrated development environment (IDE) and Google Firebase as my database storage. Java language will be used as the main programming language to implement object-oriented programming method. This project is done during the COVID-19 pandemic and therefore, there are some Standard Operating Procedure (SOP) to be followed by the café. This mobile application may provide some assistance in helping them to increase their business performance during this pandemic.

**Keywords:** Food Ordering System, Restaurant Ordering, Android, Mobile Application

### 1. Introduction

The growing number of restaurants makes restaurant development more competitive. In compliance of the SOP during the COVID-19 pandemic, almost everything has gone online to increase the convenience and to reduce the contact between people. Therefore, I have decided to develop a food ordering system mobile application for Alexandria's Café as there are some known issues to be solved after having a conversation with the café administrator. One of the problems is that this café is having long queue which has affected the cashier processing speed. Another problem is that some customers care about their daily diet, but Alexandria's Café does not provide sufficient information about the calorie intake of the meal. The menu is also causing confusion as some items may not be available on a particular day, but it is not informed to the customers.

The main objectives of this project are to design a mobile application with online menu for customers to order themselves, to provide calorie information of the food served for customers, and to update daily available menu about the food to be served. The scopes of this project are to have two main modules which are food ordering system module accessible by customer, and menu management module accessible by the café administrator. The expected outcome is that this mobile application can register new users and customer can start ordering right away. The calorie information is also provided

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to let the customer have more acknowledgement of their calorie intake of their meal. The menu also can be updated every day.

## **2. Related Work**

### **2.1 Food Ordering and Delivery System**

The growing number of restaurants and cafes makes their business landscape more competitive. Therefore, all caterers keep improving their quality of service [1]. One of the major services is delivering take-away order in time. Restaurants and cafes are starting to be innovative in their business by adapting technologies in their business process. The same trend is happening in Malaysia where a new emerging wave has reached the food and beverage industry, which is the online food ordering and delivery service. There are other companies such as Hungry, GrabFood, DahMakan and more. The main constraint about the coverage is understandable because the food ordering and delivery services face the challenge of location and coverage boundary. [2]

Online food ordering and delivery system is slowly becoming the trend now as the people prefer to order via mobile application to get their desired food without stepping out of their home.

### **2.2 Mobile Application**

Mobile application is a software application developed specifically for use on small, wireless computing devices, such as smartphones and tablets, instead of desktops or laptops. The rapid adoption of smartphones and subsequent development of mobile applications have been changing the ways in which customers interact with a brand. over 6 billion apps have been downloaded in India [3] a Kapoor 2018 an account for more than 50% of time spent on digital media, suggesting that mobile applications are deeply involved in human's daily life.

### **2.3 Mobile Commerce**

Mobile commerce (M-commerce) it's a process of selling and buying goods or services through mobile devices [4]. M-commerce is a technological frontier and is an attractive area for research because of its relatively novelty, rapid growth, and potential applications [5]. Due to this current pandemic of COVID-19, m-commerce has been more crucial than ever before. People tend to prefer using a mobile application instead of ordering face-to-face to keep a safer distance. Thus, m-commerce has an important role in helping to maintain, sustain, and even improve the business performance in the current situation.

## **3. Methodology/Framework**

The software development method selected for this project is the object-oriented software development method. Object-oriented development is a partial-life cycle software development method in which the decomposition of a system is based upon the concept of an object [6]. The programming language that is used in development of this software is Java, which is an object-oriented programming language required in this development method. the standard SDLC process includes five phases, which are analysis, design, implementation, testing and release.

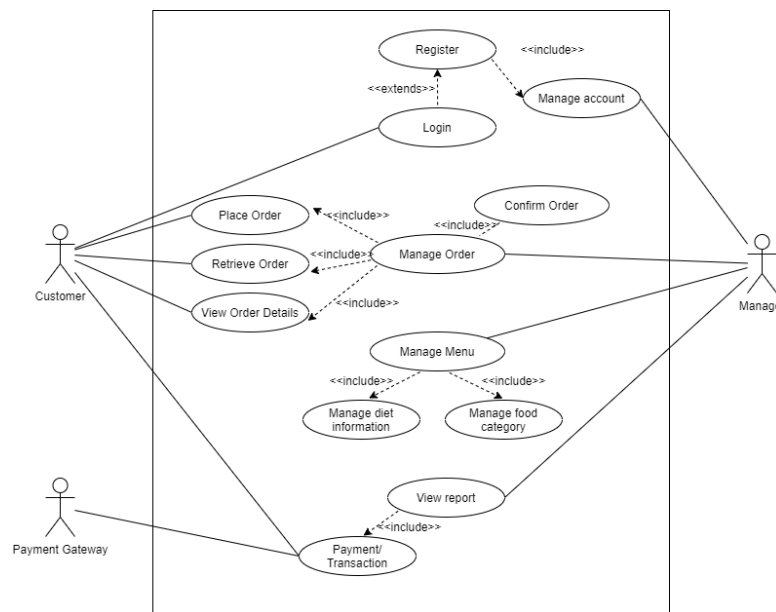
### **3.1 Project Planning**

The overview of the system and its requirements are defined during the analysis phase. This project starts off with project planning phase where the main problem is identified and prepare a proposal after having a discussion with the owner of Alexandria's Café. The next phase is the design phase where the system's database and user interfaces of different modules are designed. This phase is expected to occupy 30 days. Implementation phase will take approximately 100 days. Testing phase will take place after the system is done and it will take around two to three weeks to complete.

### 3.2 Analysis and Design

System requirements analysis is an important step where it determines the needs of situations to fulfill the proposed project as it may conflict requirements of the stakeholders, analyzing, documenting, verifying and validating the system requirements. The functional requirements, non-functional requirements and user requirements are listed in this phase.

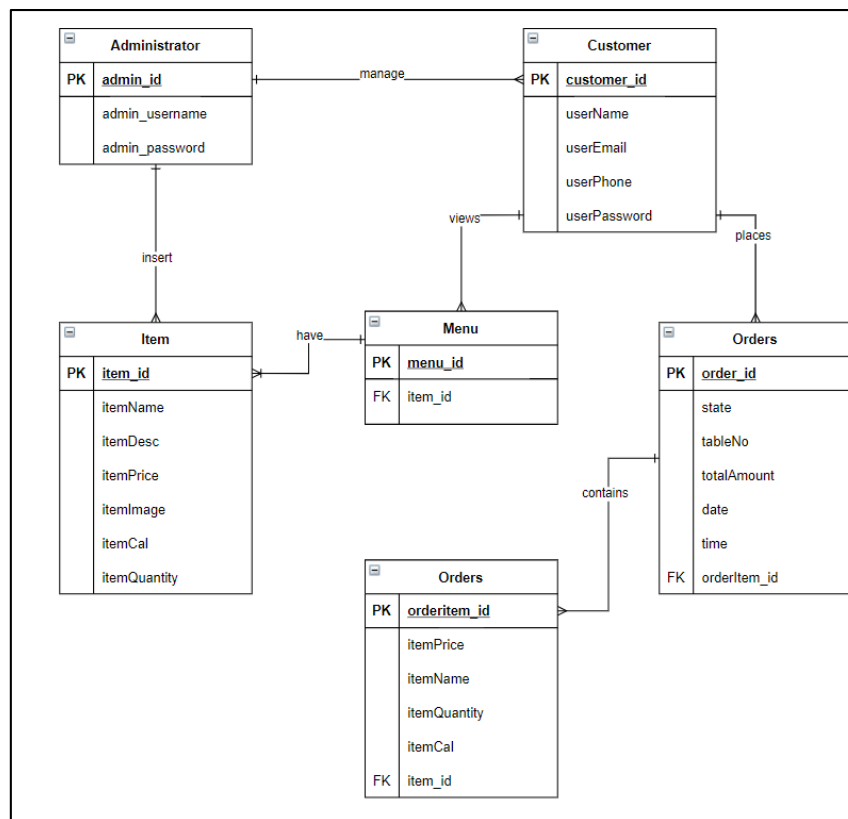
A use case diagram is developed to define the system's high-level requirements. These requirements are expressed through different use cases. Figure 1 illustrates the use case diagram of the food ordering system. Each use case is documented with their respective use case specifications. There are a few main use cases to be mentioned such as the Login module, Register module, Manage Order module, Manage Menu module and Report module.



**Figure 1: Use case diagram**

In the design phase, diagrams such as flowcharts, class diagram, entity relationship diagram and data dictionary are designed. These diagrams will be a guidance for developing the software to give the developer a big picture of how the software works for both administrator and user.

Figure 2 shows the entity relationship diagram (ERD) of the proposed system. Entity relationship diagram is a visual presentation of entities and relationships.



**Figure 2: ERD of the proposed system**

From the ERD, there are six tables in the database which are Administrator table, Customer table, Menu table, Orders table, OrderItem table and Item table. Each of them has unique primary key to identify each table and foreign key associated with other tables. The relationships between tables are also shown in Figure 2 to give a clearer picture to the developer.

The diagrams included in the paper are just giving a general information about the software structure as Google Firebase does not act the same as the traditional databases such as phpMyAdmin. Google Firebase is a cloud-hosted database instead of a table-structured database.

The interfaces of each page are also designed using Adobe XD which also give the developer a reference on the front-end interface designing.

Figure 3 shows the flow chart of the system to give a brief idea on how the system works for the administrator whereas Figure 4 shows the flow chart of the system for the customer side.

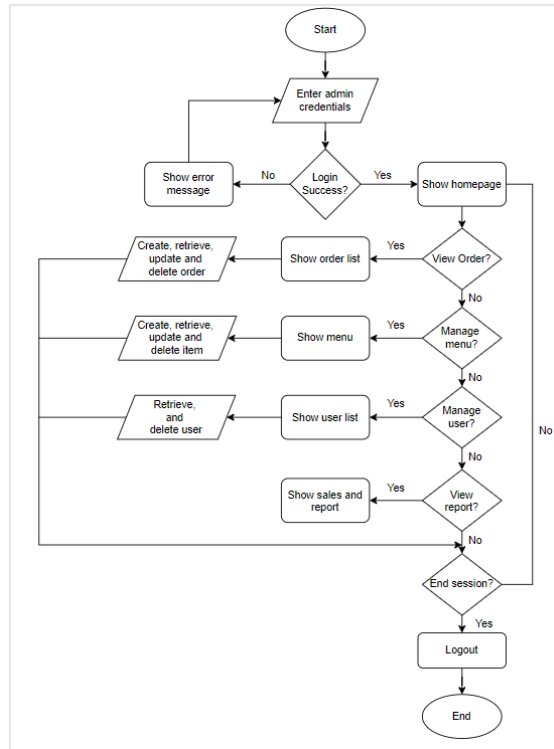


Figure 3: Flowchart for administrator

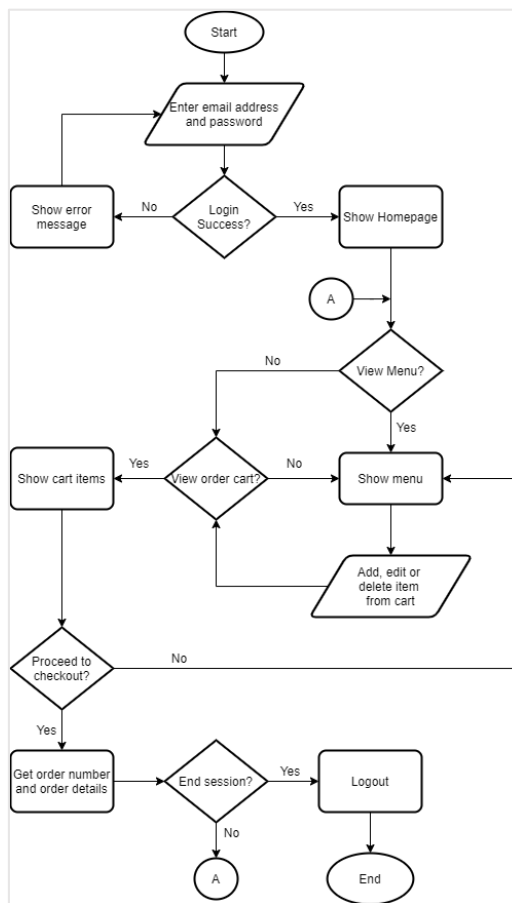
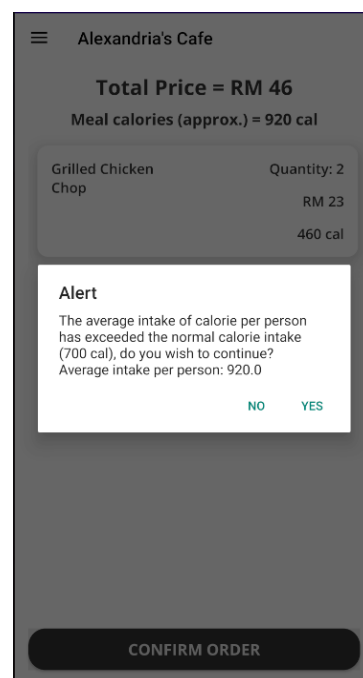


Figure 4: Flowchart for user

### 3.3 Implementation

Android Studio is used to develop this food ordering system as mobile-based system. The system database is developed through Google firebase, which is a platform developed by Google for developing mobile and web applications. There are two different mobile applications to be used, for both user and administrator.

During this phase, the codes are implemented in Android Studio for both front end and back-end implementation. The feature to be highlighted is when the user is checking out, the system will calculate the total calorie intake of all the item in the cart. It will then ask the user to input the total number of pax to calculate the average calorie intake per person. If the average calorie intake per person has exceeded the standard calorie intake per meal, it will show an alert message warning the user. The user can choose to continue to check out all to edit the item in the cart. An example of the alert message is shown in Figure 5.

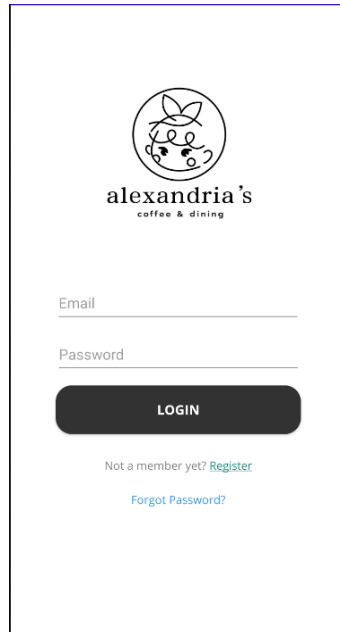


**Figure 5: Warning dialog**

Android Studio provides a very convenient way of click-and-drag method to design the interfaces of each activity. The interfaces are designed with default ConstraintLayout which can ensure the positions of the components to be fixed at the position. Android Studio also has a straightforward Java programming language for its components such as Button, TextView, AlertDialog and more. For function wise, it uses traditional Java language which can be easily handled by a beginner mobile application development.

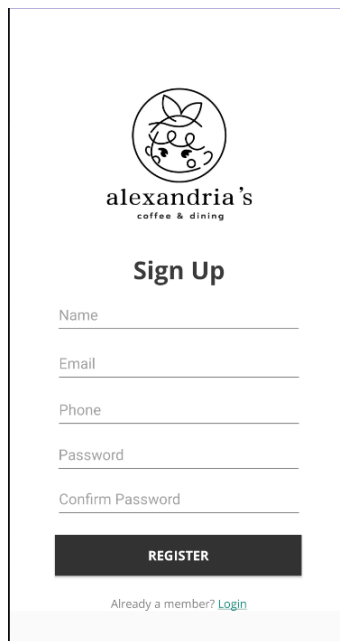
The design of the interfaces uses minimalistic approach to let the interfaces look simple and easy without having many patterns. The main colors used are white and eclipse, which is a dark greyish red. The font used is Open Sans which also provide simplicity and clean interface.

The following figures show some interfaces of some key activities in Food Ordering System mobile application.



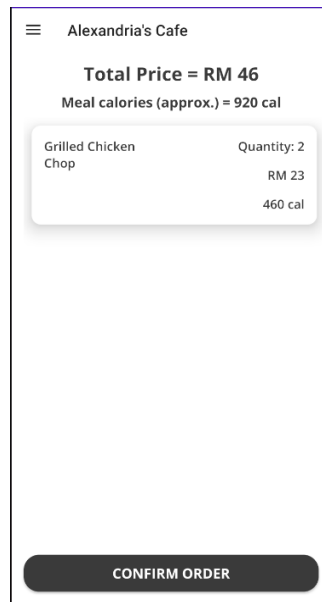
The login interface features the 'alexandria's coffee & dining' logo at the top. Below the logo are two input fields labeled 'Email' and 'Password'. A dark grey button with the text 'LOGIN' is positioned below the password field. At the bottom, there are two links: 'Not a member yet? Register' and 'Forgot Password?'.

**Figure 6: Login interface**



The register module features the 'alexandria's coffee & dining' logo at the top. Below the logo is the heading 'Sign Up'. There are five input fields labeled 'Name', 'Email', 'Phone', 'Password', and 'Confirm Password'. A dark grey button with the text 'REGISTER' is positioned below the 'Confirm Password' field. At the bottom, there is a link: 'Already a member? Login'.

**Figure 7: Register module**



**Figure 8: Cart interface**



**Figure 9: Profile interface**

### 3.4 Testing

When the program has been fully designed and developed, a validation step will be conducted to ensure all functions are functioning properly. Therefore, it can ensure that the application can work accordingly in any devices. The approach taken to test the functionality is by unit testing, which means testing each component on its own after finishing developing it, then each module is tested through integration testing. After the whole system is complete, it undergoes system testing where the mobile application is tested.

The test results will be discussed in Section 4.



## 4. Results and Discussion

In this section, results of test cases will be documented and discussed. After the implementation is completed, the development is then entered testing phase where a set of test cases is prepared to be executed on the developed mobile application.

### 4.1 Results

Table 1 shows the list of test cases and their respective results.

**Table 1: Test cases**

Test Case	Expected Result	Result	Status
<b>TC_100 Login</b>			
TC_100_01	System should allow the user to login to the system using email and password.	Email and password can be inserted properly.	PASS
TC_100_02	System should allow the user to enter a valid email and password to login as a user.	Email and password can be inserted properly.	PASS
TC_100_03	System should prompt alert message when invalid input is detected.	System prompts "The password is invalid, or the user does not have a password" message.	PASS
TC_100_04	System should prompt error message when empty field is detected.	System prompts error message "This field is required" on respective fields.	PASS
TC_100_05	If the user has successfully logged in, the user should be redirected to the main menu page.	The user is redirected to the main menu after logging in successfully.	PASS
<b>TC_200 Register</b>			
TC_200_01	New user is required to register before navigating the mobile application.	A button is developed to allow user to enter the register page.	PASS
TC_200_02	System should prevent existing user from registering again.	System prompts error message "The email address is already in use by another account".	PASS
TC_200_03	System should prompt error message when empty field is detected	System prompts error message "This field is required" on respective fields.	PASS
TC_200_04	System should redirect user to main menu after completing the registration.	User is redirected to main menu after the registration is completed.	PASS
<b>TC_300 Order (User)</b>			
TC_300_01	System should allow user to add item into cart.	User is able to add item into cart.	PASS
TC_300_02	System should allow user to edit item quantity in cart.	User is able to edit item quantity in cart.	PASS
TC_300_03	System should allow user to delete item from cart.	User is able to delete item from cart.	PASS

**Table 1: Test cases (continued)**

<b>Test Case</b>	<b>Expected Result</b>	<b>Result</b>	<b>Status</b>
TC_300_04	System should allow user to place order.	User is able to place order after the items are reviewed.	PASS
TC_300_05	System should allow user to check the order status.	User is able to check the order status.	PASS
TC_300_06	System should allow user to check the order details.	User is able to check the order details.	PASS
<b>TC_400 Manage Order (Admin)</b>			
TC_400_01	System should allow admin to change the order status.	Admin is able to change order status.	PASS
TC_400_02	System should allow admin to view the order details.	Admin is able to view order details.	PASS
<b>TC_500 Manage User</b>			
TC_500_01	System should allow admin to view the user list.	Admin is able to view user list.	PASS
TC_500_02	System should allow admin to remove user.	Admin is able to remove user.	PASS
<b>TC_600 Report</b>			
TC_600_01	System should be able to display the sales and profits.	The sales and profits are shown in the interface.	PASS

## 4.2 Discussions

From the testing results shown in Table 1, the testing is carried out by module to ensure each module integrates with each other, synchronizing the data. All test cases have passed successfully. The mobile application is also developed according to the software design, and it is proven to be working as intended.

The test cases shown in Table 1 are also a list of simple test cases as there are still rooms for improvement when having another discussion after this application is delivered to the client.

## 5. Conclusion

This system has followed the properties as a distributed system as there are two different applications accessing the same database. This project aims to provide a solution to allow customers to order without having a long waiting time, solving the problem of the long queue due to the Standard Operating Procedure (SOP) during this COVID-19 pandemic. This project also aims to manage their business more smoothly. Although the system has reached its overall objectives, there is still room for improvement to increase the satisfactory level of it.

### 5.1 Recommendations

There are some recommendations to be taken into consideration such as developing notification push when changing order status to customer, developing a platform for customers to provide feedback regarding the application to have more improvements and including transaction platform such as FPX Online Banking for customers to make payments.

## Acknowledgement

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