

# Canteen Food Ordering and Management Application

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**Abstract:** School canteens play an important role in providing food to students and the rest of the school community and normally, students have to make long queues for placing the order but in fact, with the state of the country facing this Covid-19 pandemic, the queuing method to buy food at school is no longer appropriate. The purpose of developing this application is to help parents to place orders on behalf of their children in order to avoid overcrowding at the canteen. Agile-based methodology is used as the methodology to develop this application. Several technologies are used such as mobile technology (android platform), Android Studio with Flutter and Dart Extensions and object-oriented programming. This application is expected to help parents and canteen workers find an automated way to order food easily while at the same time curbing the transmission of covid-19 among students when buying food.

**Keywords:** Canteen, Agile, Flutter with Dart Language, Android Studio, Food Ordering Application.

## 1. Introduction

A canteen, as part of the school environment, has a unique opportunity to contribute to students' health and well-being [1]. They play an important role in providing food to students and the rest of the school community, as well as being an important part of the school environment. Normally, students have to make long queues before placing the order at the canteen and when the order is placed, they have to wait near the counter until the order is prepared. The current system is a non-computerized operating system in which all operations are performed manually by a worker holding a piece of paper and taking down the customer's order or placing an order over the counter. Moreover, it often happens where students or workers have trouble understanding what other individuals are saying, mostly during busy times in the canteen i.e. break time.

Until recently, there were many disadvantages of this system, including the inconvenience of students having to queue, students having to read physical menus that can result in wasting others' time waiting for their turn to make an order, lack of visual confirmation that the order was placed correctly,

and the need to have employees to take orders, complete orders and cashing in and out. In fact, with the state of the country facing this Covid-19 pandemic, the queuing method to buy food at school is no longer appropriate. Moreover, primary school students are mostly difficult to control when buying food in the canteen. This is because the World Health Organization (WHO) has confirmed that the virus is easily spread when there is no social distancing [2].

The aim of this project is to develop a mobile application for canteen food ordering and management specifically for SK Cherating. It helps parents to place orders on behalf of their children in order to avoid overcrowding at the canteen. The payment is made via digital food wallet and it is a prevention measurement during the pandemic in order to facilitate a cashless payment environment. This proposed application requires a new food ordering method which is led to provide an interface that allows all up-to-date menus, to allow the parents to make order on behalf of the children, view order and make changes before submitting their order and allow them make payment. Given that the world is now facing a Covid-19 pandemic, this canteen food ordering and management application is one way to curb the spread of this virus. This is because students do not have to queue and put themselves in a crowded situation with many people where this way, student can avoid being infected.

There are six sections to this article. The project's context is explained in the first segment. The second section clarifies the literature review. The methodology is explained in the third section. The fourth section depicts the system's research and development. Conclusion is the final segment.

## **2. Related Work**

In this covid-19 endemic situation, all activities that require multi-party interaction in the school canteen are not encouraged to curb the spread of Covid-19 virus. Guidelines and standard operating procedures (SOPs) that have been prepared as a reference for divisional officers in the Ministry of Education Malaysia (MOE), State Education Department (JPN), District Education Office (PPD) and administrators and teachers in schools in controlling the spread of Coronavirus Disease 2019 (COVID-19). Also covered in the SOP is that every purchase of food must be packaged and students are only allowed to eat the purchased food in class [3]. According to TheStar, students should not be permitted to congregate in the canteen during recess when schools reopen. Instead, they should be able to use a mobile application to place orders for food [4].

### **2.1 Online Food Ordering System**

The method used for the development of this system is the online food ordering system method. The online food ordering system is an easy and quick way for customers to order food from a canteen without having to go there. This method is made possible by the internet, which connects the canteen or food business on the one hand and the customer on the other. According to Orpilla [5], among the factors that can continue to increase the importance of online food ordering systems today include easily reordering orders, eliminating the need to wait in a long line at the canteen, and improving order accuracy and seamless processes. Customers can order food online at virtually any time and from any location, saving time. Other than that, minimal interaction during COVID-19 helps to keep the virus from spreading to customers, staff, and the general public. The concept and features of the online food ordering system will be applied in the development of this application to manage student information data, orders record and manage menu details.

### **2.2 Comparison of Existing System**

A study of the existing systems is conducted to identify the problems and drawbacks. In addition, improvements can be implemented as a result of this study by making comparisons between existing

systems and systems to be developed. Table 1 shows a comparison between the existing applications with the proposed canteen food ordering and management applications.

As a result of the comparison that has been carried out, there are some shortcomings in the existing system. Among the shortcomings that can be detected are notes for customers leaving messages, modules for order confirmation reports and customer order billing details.

**Table 1: Comparison between existing applications**

System Modules	Vircle Application	Flexischools Application	SHS Canteen Application	Canteen Food Ordering and Management App
Login	Present	Present	Present	Present
Food Order	Present	Present	Present	Present
Confirmation Order	Present	Absent	Absent	Present
Order Report	Absent	Absent	Absent	Present
Daily Sales	Absent	Absent	Absent	Present
Food Items	Present	Present	Present	Present
Logout	Present	Present	Present	Present

### 3. Methodology

In this phase of application development and design, Agile methodology was chosen to be used in developing the project. The agile model or methodology is a hybrid of iterative and incremental process models that emphasizes process adaptability and customer satisfaction through the rapid delivery of working software solutions [6]. Furthermore, because this methodology allows for code reuse and is more data-centric, it can make application development run more efficiently. As stated in Table 2, each phase has its own task and output that must be completed throughout the progress of the development.

**Table 2: Software development activities and their task**

Phase	Task	Output
Planning	<ul style="list-style-type: none"> <li>Proposed the project</li> <li>Determine the project schedule, activities and output</li> <li>Construct flowchart</li> </ul>	<ul style="list-style-type: none"> <li>Project proposal</li> <li>Gantt chart</li> <li>Flowchart</li> </ul>
Iteration 1		
Analysis	<ul style="list-style-type: none"> <li>Create a requirement elicitation and analysis for the Canteen Food Ordering and Management Application for SK Cherating.               <ol style="list-style-type: none"> <li>An interview on what the client wants for the project will be conducted.</li> <li>Review the requirement specification given.</li> </ol> </li> <li>Analyze the software and hardware development model to be used for Module 1.0.</li> </ul>	<ul style="list-style-type: none"> <li>Application requirement report</li> <li>Use case diagrams, user activity diagrams, sequence diagrams, and class diagrams.</li> </ul>
Design	<ul style="list-style-type: none"> <li>Design the flowchart for Module 1.0</li> <li>Design the program specifications and interface structure for Canteen Food Ordering and Management Application Module 1.0</li> </ul>	<ul style="list-style-type: none"> <li>Flowchart Module 1.0</li> <li>User interface design Module 1</li> <li>Database schema</li> <li>Data dictionaries</li> <li>Application architecture</li> </ul>
Development	<ul style="list-style-type: none"> <li>Develop welcome interface</li> <li>Developing the module for 1.0.</li> </ul>	<ul style="list-style-type: none"> <li>User welcome interface</li> <li>Module 1.0</li> <li>Program code</li> </ul>
Testing	<ul style="list-style-type: none"> <li>Perform alpha and beta testing for Module 1.0 of Canteen Food Ordering and Management Application.</li> </ul>	<ul style="list-style-type: none"> <li>The tested application.</li> </ul>
Review	<ul style="list-style-type: none"> <li>Proposed Module 1.0 to client</li> <li>Collect feedback from client</li> </ul>	<ul style="list-style-type: none"> <li>Review report for Module 1.0</li> </ul>

Iteration 2		
Analysis	<ul style="list-style-type: none"> <li>• An interview again on what the client wants for the project will be conducted.</li> <li>• Review the requirement specification given.</li> <li>• Analyze the software and hardware development model to be used for Module 2.0.</li> </ul>	<ul style="list-style-type: none"> <li>• Application requirement report</li> <li>• Use case diagrams, user activity diagrams, sequence diagrams, and class diagrams</li> </ul>
Design	<ul style="list-style-type: none"> <li>• Design the flowchart for Module 2.0</li> <li>• Design the program specifications and interface structure for Canteen Food Ordering and Management Application Module 2.0</li> </ul>	<ul style="list-style-type: none"> <li>• Flowchart Module 2.0</li> <li>• User interface design PModule 2.0</li> <li>• Database schema</li> <li>• Data dictionaries</li> <li>• Application architecture</li> </ul>
Development	<ul style="list-style-type: none"> <li>• Developing the Module 2.0.</li> <li>• Develop user interface for parents</li> </ul>	<ul style="list-style-type: none"> <li>• Module 2.0</li> <li>• Program code</li> </ul>
Testing	<ul style="list-style-type: none"> <li>• Perform alpha and beta testing for Module 2.0 of Canteen Food Ordering and Management Application.</li> </ul>	<ul style="list-style-type: none"> <li>• The tested application</li> </ul>
Review	<ul style="list-style-type: none"> <li>• Proposed Module 2.0 to client</li> <li>• Collect feedback from client</li> </ul>	<ul style="list-style-type: none"> <li>• Review report for Module 2.0</li> </ul>
Iteration 3		
Analysis	<ul style="list-style-type: none"> <li>• An interview again on what the client wants for the project will be conducted.</li> <li>• Review the requirement specification given.</li> <li>• Analyze the software and hardware development model to be used for another module</li> </ul>	<ul style="list-style-type: none"> <li>• Application requirements report</li> <li>• Use case diagrams, user activity diagrams, sequence diagrams, and class diagrams</li> </ul>
Design	<ul style="list-style-type: none"> <li>• Design the flowchart for another module</li> <li>• Design the program specifications and interface structure for Canteen Food Ordering and Management Application another module</li> </ul>	<ul style="list-style-type: none"> <li>• Flowchart for another module</li> <li>• Interface of all the module</li> <li>• Feature design</li> </ul>
Development	<ul style="list-style-type: none"> <li>• Developing another module</li> <li>• Develop other functions in the application.</li> </ul>	<ul style="list-style-type: none"> <li>• Prototype for proposed application</li> </ul>

Testing	<ul style="list-style-type: none"> <li>• Perform alpha and beta testing for whole application</li> </ul>	<ul style="list-style-type: none"> <li>• The tested application</li> </ul>
Review	<ul style="list-style-type: none"> <li>• Proposed the whole application to client</li> <li>• Launch the application</li> </ul>	<ul style="list-style-type: none"> <li>• The completed Canteen Food Ordering and Management Application.</li> </ul>

### 3.1 Planning Phase

In this phase, the team needs to define issues, goals and resources such as people and costs. And then, the team needs to propose a project, determine its schedule, activities and the expected outcome. Ultimately it will produce a set of plans to guide the team to implement the project phases. The sub activities for this phase are producing a project proposal, planning out a Gantt chart and a flowchart.

### 3.2 Analysis Phase

The purpose of requirement analysis is to determine the users' and system needs for the proposed application. The two most important parts of the system requirements are the functional and non-functional requirements. These requirements verify that the functions of the proposed application are capable of achieving the project's objectives. These requirements are also important in determining the app's usefulness and quality, as well as developing an app that meets the user's needs. Table 3 and Table 4 show the functional and non-functional requirements, respectively.

**Table 3: Functional requirements for proposed application**

No	Module	Functionalities
1	Manage Users Registration	<ul style="list-style-type: none"> <li>School admin able to register users' detail in the account.</li> </ul>
2.	Login Account	<ul style="list-style-type: none"> <li>The application is able to verify the users.</li> <li>The application shall save details of the user's account.</li> <li>The application able to verify registered users or not</li> </ul>
3.	Menu List	<ul style="list-style-type: none"> <li>The application shall save details updated</li> <li>The application able to display menu list</li> </ul>
4.	Child List	<ul style="list-style-type: none"> <li>The system able to save student/children details</li> <li>The system shall save information updated</li> </ul>
5.	Place Orders	<ul style="list-style-type: none"> <li>The application able to display menu list</li> <li>The application shall save details of the order list</li> <li>The application able to add the selected item to cart</li> </ul>
6.	Payment	<ul style="list-style-type: none"> <li>The application able to verify the payment details</li> <li>The application shall save details of status of payment</li> </ul>
7.	Receive Orders	<ul style="list-style-type: none"> <li>The application able to display the order list</li> <li>The application able to display status of order</li> </ul>
8.	Order Report	<ul style="list-style-type: none"> <li>The application able to record the number of orders in a day</li> <li>The application shall record the daily sales</li> </ul>

**Table 4: Non-functional requirements for proposed application.**

No	Type	Description
1.	Operational Requirement	<ul style="list-style-type: none"> <li>This application will operate by using android studio on smartphones and the system is only available when there is internet connection and GPS turned on.</li> </ul>
2.	Usability Requirement	<ul style="list-style-type: none"> <li>The application provides interesting, user-friendly and easy to understand applications and provides a variety of modules for the users.</li> </ul>
3.	Security Requirement	<ul style="list-style-type: none"> <li>Users need to enter their email and password to access in this application so that the user information can be protected. non-registered members will not be able to access the functionalities</li> </ul>
4.	Portability Requirement	<ul style="list-style-type: none"> <li>The application is portable due to it can run on any android smartphones.</li> </ul>

A use case diagram depicts a user's interaction with a system and depicts the user system connection. Figure 1 shows the use case diagram of the proposed application, Canteen Food Ordering and Management Application, which depicts the user's interactions with the app. The actors or users identified for this system are Parents, Canteen Worker and School Admin. A sequence diagram is used to show the interactions in this application in greater depth. The Canteen Food Ordering and Management Application's sequence diagram is shown in Figure 2. Activity diagram is also a graphical representation that comprises activities workflow and actions to facilitate stepwise selection, iteration and concurrency management. Figure 3 shows the Activity Diagram of the Canteen Food Ordering and Management Application.

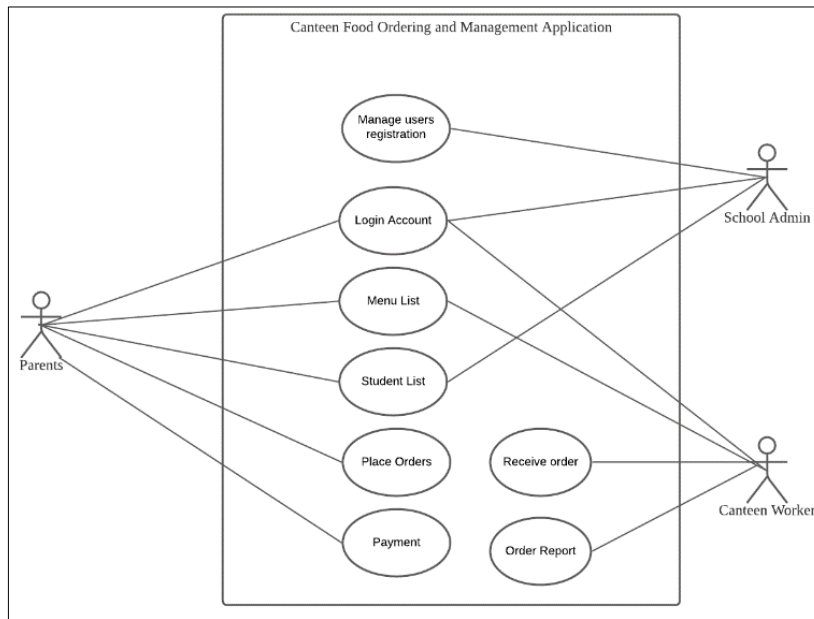


Figure 1: Use Case Diagram

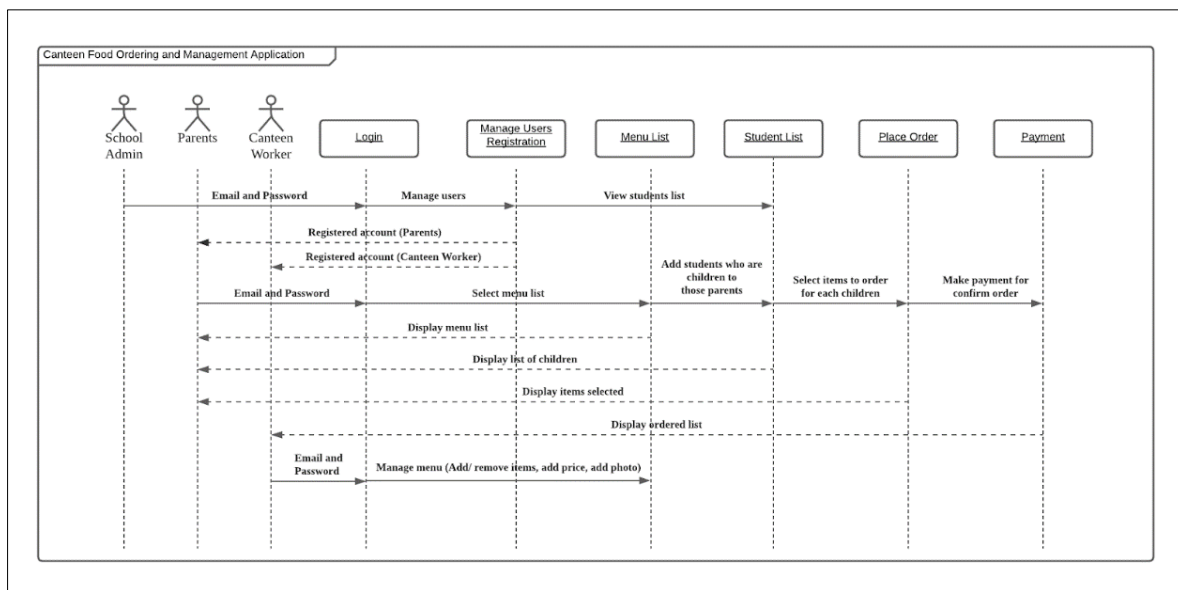


Figure 2: Sequence Diagram

Activity diagram is also a graphical representation that comprises activities workflow and actions to facilitate stepwise selection, iteration and concurrency management. Figure 3 shows the Activity Diagram of the Canteen Food Ordering and Management Application. A class diagram is a static model that depicts the relationships between classes and the proposed system. Figure 4 shows the class diagram for the Canteen Food Ordering and Management Application.



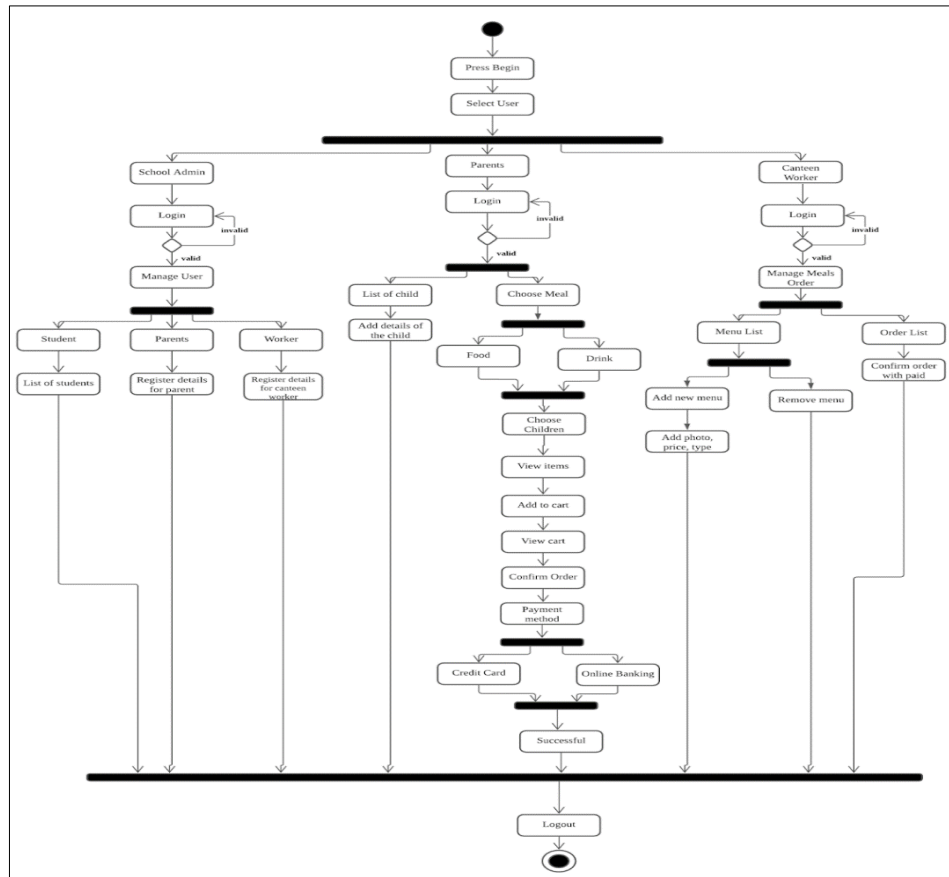


Figure 3: Activity Diagram

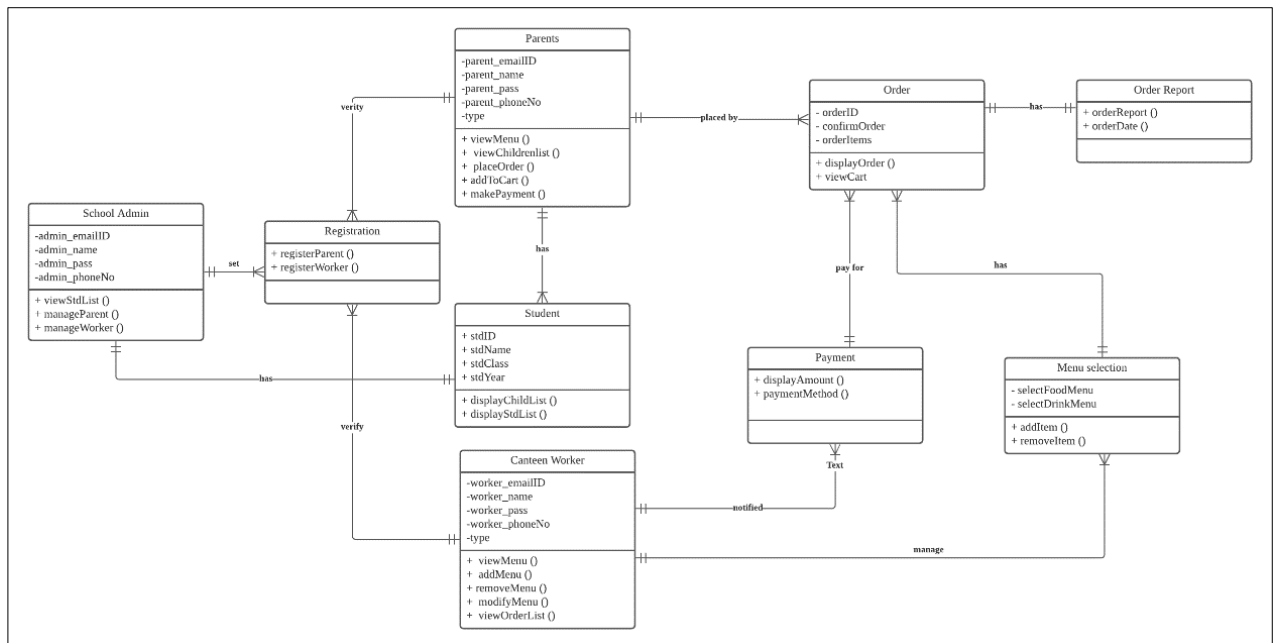
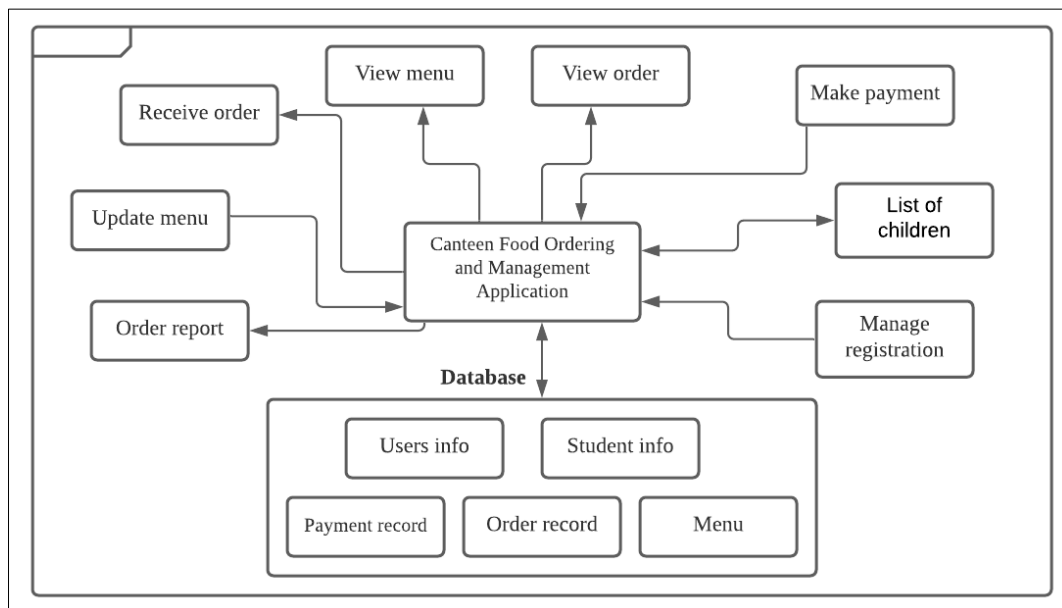


Figure 4: Class Diagram

### 3.3 Design Phase

The process of defining the architecture, modules, and data for a system in order to meet specific criteria is known as system design. The architecture of the mobile component of the application is included in the design of this system model, which is utilized in the development of the Canteen Food Ordering and

Management Application. Figure 5 shows the architecture of the mobile component used in constructing the Canteen Food Ordering and Management Application. The design below, which resembles block diagrams, aids in understanding and visualizing the system at a high level.



**Figure 5: Architecture Diagram**

### 3.4 Implementation Phase

Several technologies are used such as mobile technology (android platform), Android Studio Development Tools with Dart language and object-oriented programming. Table 5 lists 2 software used to build the Canteen Food Ordering and Management Application. Android Studio is a desktop application that runs on Mac, Windows, and Linux computers. Furthermore, the Dart and Flutter extensions add Dart functionality to Android Studio, as well as tools for editing, refactoring, executing, and reloading Flutter mobile apps. Flutter mobile apps may be created with any text editor and our command-line tools and Android Studio is one of the editor plugins. Flutter uses Dart to build Android and iOS apps, and Android Studio is a mobile development IDE. Finally, XAMPP is a distributor that allows researcher to implement MySQL database with ease.

**Table 5: Software for System Development**

Software	Purpose
Android Studio	To develop the application interface and system function
XAMPP	Provides support for creating and manipulating databases

#### 3.4.1 Database Connection

MySQL is chosen for the authentication of the proposed application. MySQL authentication is used in the register, login side. Figure 6 shows the one of the MySQL database connections of the proposed application in Android Studio.

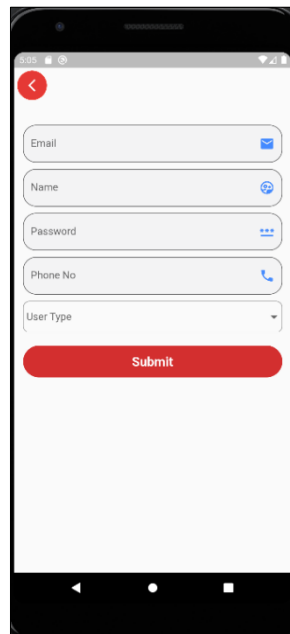
```
var url = Uri.parse("https://localhost/phpmyadmin/canteen/AddChild.php")

final response = await http.post(url,body: {
  "NAME":_name.text,
  "CLASS":_class.text,
  "YEAR":_year.text,
  "PARENTID":appData.userid.toString(),
});
```

**Figure 6: One of Code for MySQL Database Connection**

### 3.4.2 Manage Registration Page

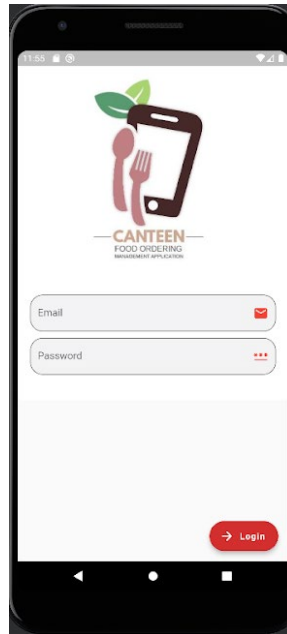
Figure 7 shows the interface of the registration page for Canteen Food Ordering and Management Application which is the first module for this proposed application. Since this application is an internal system, the function of the registration module is used to register the users who are the parents of the student and the canteen worker in SK Cherating. The registration place will allow the registered users to perform the login page once the registration has been made successfully.



**Figure 7: Registration Page**

### 3.4.3 Login Page

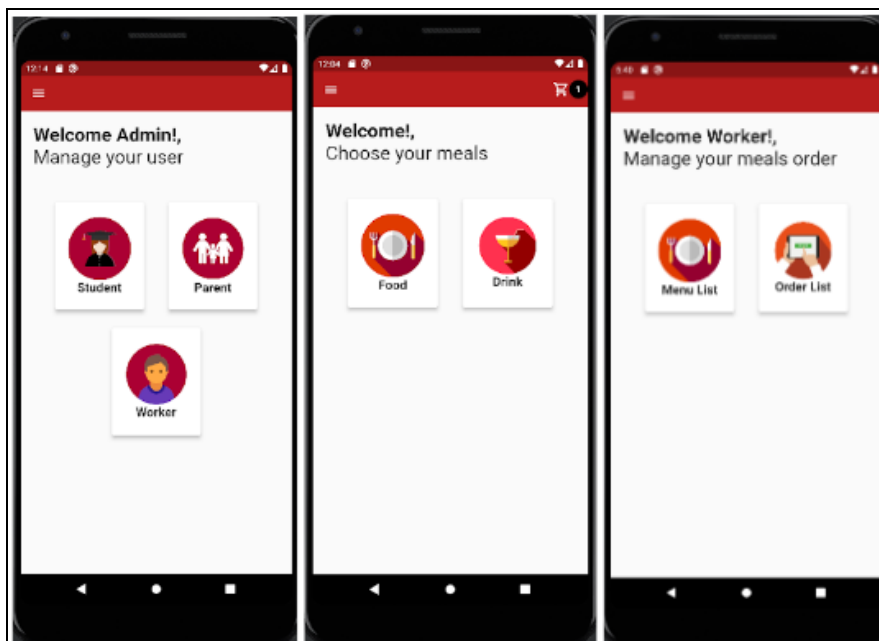
This module is used to let the users log into the application. Each of the users with a different registered email and password will access their own account. If the email or password are incorrect, an alert will pop out to remind the users and let the users re-enter again. Figure 8 shows the interface of the login page and every user have the same interfaces.



**Figure 8: Login Page**

### 3.4.4 Main (Home) Page

Homepage is the first interface that all users will see after successful log into the application. For admin, the homepage displays the category of users which is student, parent and worker where it functions to register the parents and workers whereas for the student, it will only display the list of name and details. The homepage for parents displays the category of meal which is food and drink. Other than that, the parents' homepage also has the button for add to cart where parents can view all the orders before check out. The homepage for canteen workers displays the menu list and order list. For the menu list its function is to manage the menu and order list is where the worker can view the order report like order with the name and class, order by type and daily sales. Figure 9 (a) shows the homepage for admin, Figure 9 (b) for parents and Figure 9 (c) for canteen workers respectively.



**Figure 9: Homepage for (a) admin, (b) parents and (c) canteen worker**

### 3.4.5 Add Menu Page

This module will be used for canteen workers. Figure 10 shows the add menu interface where this module requires the canteen worker to upload the photo of the meal and then insert the details such as meal name, price, description, and meal type. For the meal type, the canteen worker needs to choose the option of either food or drink.

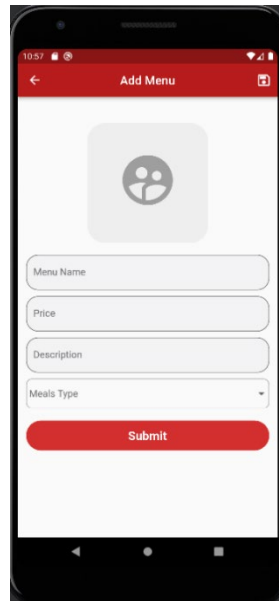


Figure 10: Add Menu Page

### 3.4.6 Item List Page

Figure 11 shows the interface of the item list for foods and drinks respectively of the proposed application. This interface is for parents to view the item list which is the food list and drink list where it includes the meal name, meal type and price. Figure 11 (a) shows item list for food while Figure 11 (b) shows item list for drink.

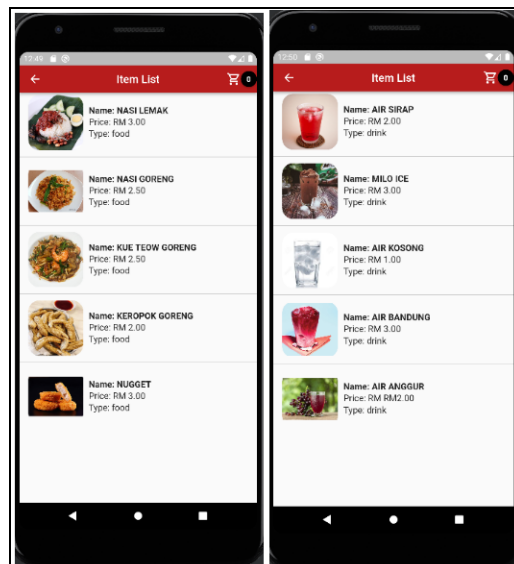


Figure 11: Item List Page for (a) food and (b) drink

### 3.4.7 Order List Page

This module will be used by canteen worker. Figure 12 shows the order list interface for canteen workers. In this page, the worker can view the list of orders with student name and class and also the status of payment.

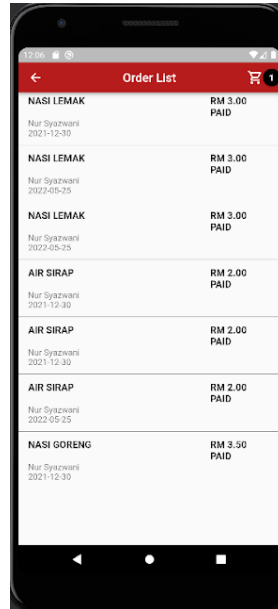


Figure 12: Order List Page

### 3.4.8 Child List Page

This module will be used by parents and admin. This module has two function which are user can update details or can only view the details that already registered. In this module, the parent can add child details and then can view the list of named children including class and year. And then, for the admin, the user can view the details of the student that already registered by parents as their children. Figure 13 (a) shows the child list interface for parents while Figure 13 (b) shows the student list interface for admin.

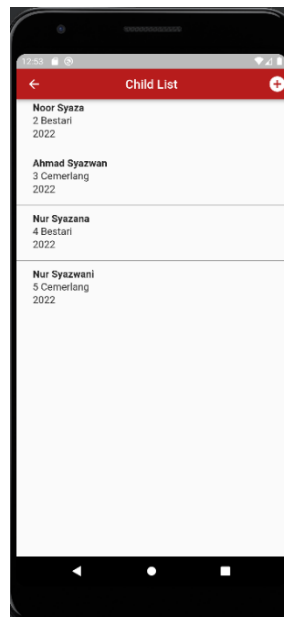


Figure 13: Child List Page

### 3.4.9 Payment Page

Figure 13 shows the add to cart interface for parents before the parent makes payment. In this page, the parent can view the order list that has been added. To continue the ordering process, parents must and only can place an order within 8am to 10am as shown in Figure 14 (b) If it exceeds 10am, parents cannot checkout as per the Figure 14 (a) below. After that, to continue the payment, parents can choose either to use credit card or online banking. Figure 15 shows the payment interface for the parents.

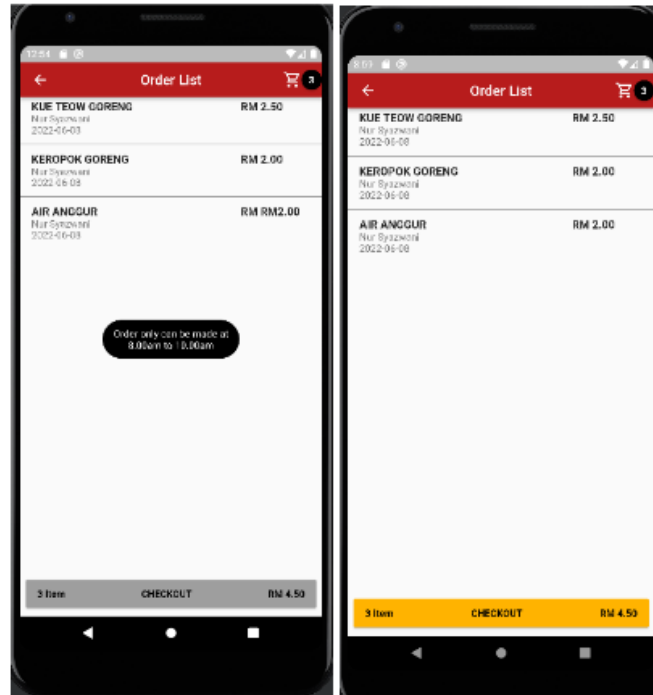


Figure 14: Add to Cart Page for (a) not 8am-10am and (b) at 8am-10am

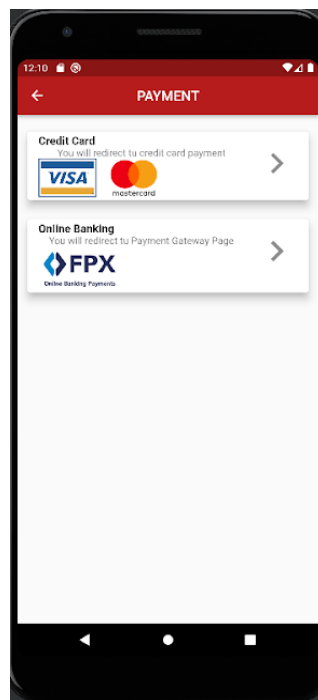


Figure 15: Payment Page

### 3.4.10 Daily Sales Page

This module will be used by school canteen management. The daily sales can be determined by calculating the total sales on each day. The canteen management can see and know their sales results for each day through this application. The interface of this daily sales module shows in Figure 16 below.

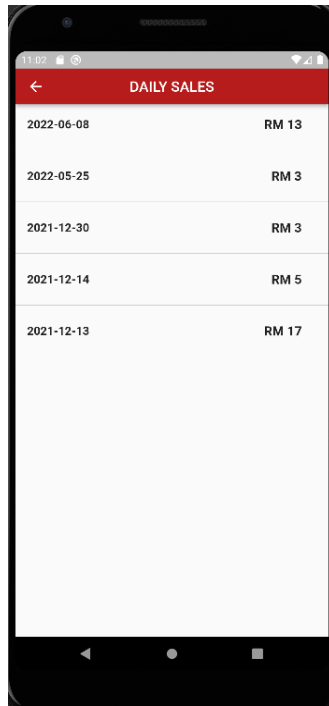


Figure 16: Daily Sales Page

## 4. Result and Discussion

The test reports for the functional testing done on each module in this system are presented in the subsections below. Following the implementation of the proposed application, the test plan is carried out.

Table 6 illustrates the test plan for the registration module of the functions in the Canteen Food Ordering and Management Application. This module is able to register the users by admin to login into the application. Table 7 shows the test plan for the login module. In this page, the registered email and password will be verified and users are able to login to the homepage of the application. The test plan for the add menu module is shown in Table 8. The user (worker) can add menu details to be viewed by the parent in this module. The test plan for the add child module is shown in Table 9. The users can add the information about their children in this module. The test plan for the placing order module is shown in Table 10. Users can choose the meal type for each child, view the item list page, and select the item to order in this module. After that, it will successfully be added to the cart page. Table 11 shows the test plan for the payment module. In this module, the users need to choose the payment method before the order is successful.

Table 6: Test Plan for Registration Module

No.	Test Cases	Expected Output	Actual Output
1.	Fill all the information required	Successful added and automatic back to homepage	As expected,



2.	Not fill all the information required.	Pop up message “Not success”	As expected,
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**Table 7: Test Plan for Login Module**

No.	Test Cases	Expected Output	Actual Output
1.	Enter correct registered email and password with correct login interface	Login successful with correct user type	As expected,
2.	Enter wrong registered email or password with correct login interface	Pop up message “Failed”	As expected,

**Table 8: Test Plan for Add Menu Module**

No.	Test Cases	Expected Output	Actual Output
1.	Add meal details	Successful adding and displaying meal details at parent and worker page.	As expected,
2.	Add drink details	Successful adding and displaying drink details at parent and worker page.	As expected,
3.	Add all details except price	Not successful and pop up message “failed”	As expected,

**Table 9: Test Plan for Add Child Module**

No.	Test Cases	Expected Output	Actual Output
1.	Add child information	Successful adding and displaying child details at parent and student details worker page.	As expected,
2.	Add all child information except class	Not successful and pop up message “Failed”	As expected,

**Table 10: Test Plan for Placing Order Module**

No.	Test Cases	Expected Output	Actual Output
1.	Select meal type	Automatic go to child list page	As expected,
2.	Select child name	Automatic go to item list page	As expected,
3.	View item list page and select item to order	Successful added to add to cart page	As expected,

**Table 11: Test Plan for Payment Module**

No.	Test Cases	Expected Output	Actual Output
1.	Select the payment method	Automatic go to payment info page	As expected,
2.	Fill the information required	Successfully paid status	As expected,

## 5. Conclusion

In this study, a canteen food ordering and management application has been proposed. Through this application, parents can place orders for their children's food without having them to wait for the order to be taken by the canteen worker. Canteen workers will receive the orders through notifications and start preparing the foods. Upon completion, the food will be delivered to the respective student. The main features of this proposed application are for ordering foods. This application makes ordering fast, easy and efficient. Registered users can log in, view the up-to-date e-menu, select items and order food for their children online using the application.

Other than that, making payment easy is also one of the features for the proposed application because parents can pay directly online through a digital food wallet. In addition, order management is also a feature of this proposed application. It is easy to update menus and handle orders in the canteen. As a result, both overcrowding in the canteen and the spreading of Covid-19 over the school grounds will be reduced.

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