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A Development of Personal Shopper Mobile Application

Ameer Asfa Azhari[1], Munirah Mohd Yusof[1]*

[1]Faculty of Computer Science and Information Technology,
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

*Corresponding Author Designation

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Abstract: The movement control order (MCO) in Malaysia on March of 2020 to fight against Covid19 has exponentially increase the growth of online shopping. Personal Shopper Mobile Application is a mobile application made with Flutter to fill in the gap between personal shopper and customer where there is currently no dedicated platform for users to purchase item efficiently. This project goes through an incremental prototyping methodology where the application is design, developed and test incrementally to solve the problem. The main significance of this project is that both customers and personal shopper can have a dedicated platform to view all available product at one medium rather than the various mediums used currently. Customers can also view all available product rather than going through the tedious step of asking personal shopper whether items are available. This project will help create a more effective, fluid and efficient process for all parties involved. The application development succeeded in meeting the user requirements and this creates a positive impact for the users.

Keywords: Personal Shopper, Mobile Application, Flutter, E-commerce

1. Introduction

On March 2020, Malaysia was imposed by the movement control order (MCO) in order to fight against the Covid19 pandemic and caused the growth of online shopping to skyrocket. Even after the MCO was lifted, the consumers prefer to online shopping as this approach is more convenient and preferable. Other than eCommerce, some consumers prefer to shop through personal shoppers. This trend has been growing significantly since the past five years in Malaysia. Personal shoppers are basically people who do a paid service to help consumer to purchase items that are most probably not available online [1]. Personal Shopper are different from typical e-commerce as these personal shoppers typically take orders before buying items in bulk from retailers.

In Malaysia, social media such as Facebook and Instagram are widely used to help personal shoppers to promote their services. However, there are scammers on social medias, and this might have caused the consumers to doubt the service. Not only that, but it is also difficult for customers to find specific

Corresponding author: munirah@uthm.edu.my

seller that sells certain items as Instagram and Facebook saturates the search results. The customers also must contact the seller before purchasing an item to check whether the item is available which creates a layer of friction for buying.

Which is why, the system Personal Shopper Mobile Application is proposed to effectively solve this issue and enhance the growth of this service in Malaysia. Moreover, research from Google and Temasek estimates that more than 90 percent of Southeast Asia's internet users use smartphones as their primary device [2] and e-commerce growth is primarily being driven by consumers using their smartphones. Hence, why this system is proposed to be developed as a mobile application.

This article is organized into five sections. The first part is an introduction describing the context of the project. The second section describes the analysis of the relevant work. In the third section, the methodology is explained. The implementation and testing of this system are describe in the fourth section. In the last section, a conclusion with some instructions for future employment is given.

2. Related Work

The three existing systems were studied and compared with the proposed system. All three application has similarities of a registration and log-in features, rating and review features, a check-out feature and etc. which is shown in Table 1. The proposed system will allow personal shopper to have control on the products these shoppers are selling which lacks in all three systems due to the nature of the system itself. In-app chat was also lacking in one of the systems which will be a feature to be added in the proposed system. All three system have some sort of rating and review system for the users which will also be implemented in the proposed system. This is important for customers to gauge which services are best.

The biggest difference between the three existing system and proposed system is that two of the system focus more on groceries and delivery and TaskRabbit is more on service hiring whereas the proposed system will be focused on personal shoppers who are selling any products or items for customers.

Table 1: Comparison of Existing System

Features / System	Instacart [3]	Shipt [4]	TaskRabbit [5]	Proposed System
Platform	iOS, Android, Web			
Domain	Groceries and Delivery		Services	Any items or products to be sold
Register and Log In	√	√	√	√
User Profile	√	√	√	√
Catalogue Page	√	√	√	√
Generate Report	√	√	√	√
Selling Module	X	X	X	√ Sellers have control over the products and items to be sold

3. Methodology

The chosen software process model for the personal shopper mobile application will be the prototype model. The prototype model will be divided into seven phases which goes from planning to analysis, design and implementation and then a prototype shall be made. A system development methodology helps to improve overall management and control of the software development process [6]. In the case that the prototype is unsatisfactory, it will be revised again at the design phase. If the prototype reaches the threshold of quality, it will then be proceeded to implementing all the features to the full system. Table 2 shows the activity and deliverables of each phase. There are a total of two phases for the prototype. The first phase was developed using Figma and then the second phase was a development of the whole application using Flutter, Dart and NodeJS.

Table 2: Activity and Deliverable of each Phase

Phase	Activity	Deliverable
Planning	● Plan out schedule, identify problems, case-study, scopes, and objectives	● Proposal ● Gantt Chart
Analyzing	● Interview personal shoppers ● Analyze all the data and turn into meaningful information. ● Figure out requirements for the system.	● Functional Requirements and non-functional requirements of the system ● Use Case Diagram ● Class Diagram ● To be model ● Requirements Traceability Matrix (RTM) ● Flowchart
Designing	● Design potential user-interface of the system. ● Design the database for guidance.	● Data Dictionary ● Wireframe of the system ● Database Design
Implementation	● Develop the system based on requirement	● Program Code ● Test cases
Prototype	● Find bugs and errors in the system ● Figure out which part of system is unsatisfactory ● If prototype is unsatisfying, return to design phase	● Prototype model
System	● Deploy system to the public as a demo ● Prep for presentation for the panel	● Complete System ● Final report

Requirement analysis refers the process of determining the user requirement of the proposed system [7]. System requires entails both functional and non-functional requirement, user requirement and system requirement. Requirement analysis is crucial in ensuring the application meets user's expectation to a certain degree. Table 3 shows the system modules, functionalities and the users of each module for the proposed application.

Table 3: Modules, Functions and User for Personal Shopper Mobile Application

No	Module	Function	User
1.	Registration and Login Module	This module handles the authentication of registered users and registration of new ones.	Administrator Personal Shopper Customers
2.	User Management Module	This module acts as the profile page where both users can add, update or delete personal information. Customers can also view all purchased products.	Personal Shopper Customers
3.	Selling Module	This module is the main features for personal shopper. Personal shopper can add, update or delete products and also update order status and tracking number.	Personal Shopper
4.	Buying Module	This module is the main feature for customers. Customers view all products in the catalogue page and add items to cart. This module also controls the tracking and rating of the product.	Customers
5.	Payment Module	This module redirect users to payment gateway	Personal Shopper Customers
6.	Report Module	This is a module for administrator retrieve a summarized report of sales.	Administrator

Functional required depicts what must be done by identifying all task, activity or action that are required to be done [8]. Non-functional requirement on the other hand, describes how the system should perform a specific task which includes the performance, reliability, security and portability of the system [9]. Table 4 describes the functional requirement of the proposed application. On the other hand, Table 5 explains the non-functional requirement of the system.

Table 4: Functional Requirement Specific for Personal Shopper Mobile Application

No.	System Module	Functionality
1.	Registration and Login Module	• The system should allow users to sign up by inserting their email, password • The system shall allow users to log in with valid username and password • The system shall display error message if username or password is invalid • The system shall allow users to logout • The system shall redirect users to the homepage upon successful login
2.	User Profile Module	• The system shall display all user's information • The system shall allow users to update their information • The system shall allow users to view purchased products
3.	Selling Module	• The system shall allow personal shopper to add product by inserting product information • The system shall allow personal shopper to update product • The system shall allow personal shopper to delete product
4.	Buying Module	• The system shall allow users to view product

		• The system shall allow users to search product • The system shall allow users to browse product through the catalogue page • The system shall allow users to add item to cart • The system shall allow users to remove item from cart
5.	Payment Module	• The system shall allow customers to proceed to checkout • The system shall allow customers to make payment • The system shall allow personal shopper to check payment status • The system shall allow personal shopper to update tracking number • The system shall allow customers to view tracking number • The system shall allow customer to write a review and give rating for the product
6.	Report Module	• The system shall allow administrator to generate monthly and yearly sale

Table 5: Non-functional Requirements Specification for Personal Shopper Mobile Application

No.	Requirements	Description
1.	Performance	• The application should be available to use almost all the time • The interaction between user and the application should not exceed 1 minute
2.	Operational	• The application should be user friendly • The application should be easily maintained and updated • The system should work only on Android operating system
3.	Security	• Only administrator can generate the report • Users must insert their email and password before using the system • Users can only access their own account with their own email and password • The password should be kept as encrypted

User requirements defines the users' expectation of the functionality of the proposed application. Table 6 depicts all user requirement of the proposed application.

Table 6: User Requirement of Personal Shopper Mobile Application

No.	User Requirements
1.	Users need to be registered in order to use the system
2.	Users can log in the system with the valid username and password
3.	Each role of users will be redirected to their specified homepage
4.	Registered users can update their information and password
5.	Customers can view all available products by browsing or searching
6.	Customers can add products to the cart
7.	Customers can make payment for the items in cart
8.	Customers can view history of purchased products
9.	Customers can view tracking number of order

10.	Personal shopper can add or update product and the information
11.	Personal shopper can view payment of each order
12.	Personal shopper can update tracking number of the order
13.	Administrator can view a summarized report of sales

3.1 Class Diagram

Class diagram refers to a visualization of classes, attributes and relationships used for the development of the system. Figure 1 shows the class diagram of the proposed application. There are a total of nine classes which are admin, shopper, customer, product, order_products, order, cart, cart_products and report.

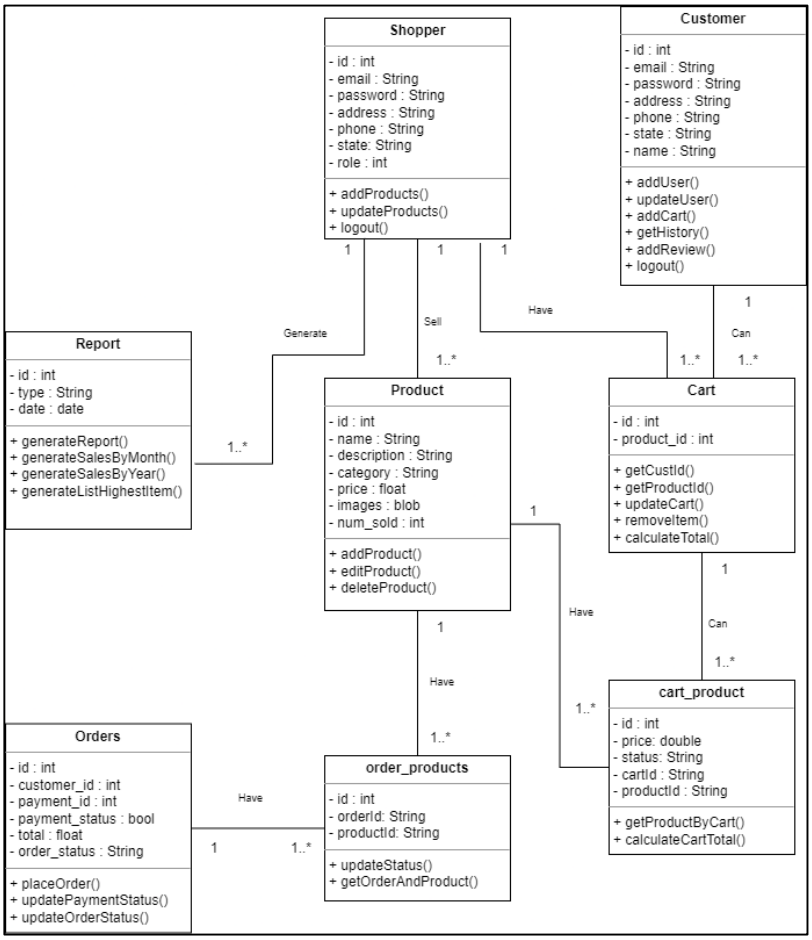

Figure 1: Class Diagram of Proposed Application

3.2 To-be Model

To-be model diagram describes the flow of actions for the users in the proposed application. Figure 2 displays the To-be model of the proposed application using swim lane diagram.

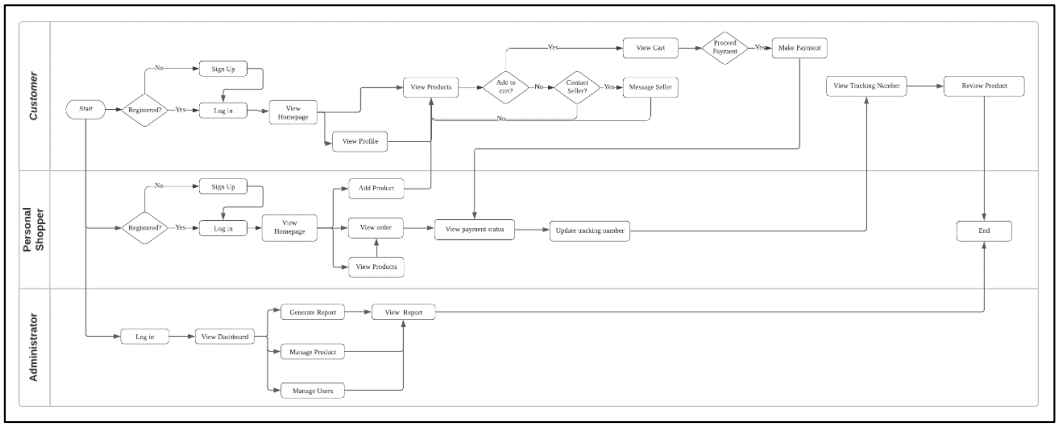

Figure 2: To-be Model of Proposed Application

Database by definition is a mechanism that is used to store data and/or information [8]. Database design elaborates the steps taken and details on how the creation, implementation and maintenance of the application. This helps the developer to view the structure and flow of the system. The database schema for the proposed application are listed as follows:

i. **Customer** (id, username, email, password, address, phone, state, name)

ii. **Shopper** (id, username, email, password, address, phone, state, name)

iii. **Report** (id, type, date)

iv. **Product** (id, description, category, price, images, num_sold)

v. **Order** (id, customer_id, payment_id, payment_status, total, order_status)

vi. **Order_products**(id, product_id, cart_id)

vii. **Cart** (id, product_id)

viii. **Cart_product** (id, price, status, cartId, productId)

4. Results and Discussion

4.1 System Implementation

The implementation phase refers to the phase where the system is being developed based on the programming languages that has been identified at the start of the development. The application being developed must also refer to the system requirement specifications and design document. The programming languages used to develop the application are Dart, Flutter, NodeJS for the mobile application and HTML, CSS, Javascript for the frontend and PHP as backend for the admin's interface. Each application uses MySQL as the database.

4.1.1 Registration and Login Module

This module of the mobile application is for users to log in before being able to use the application. Users are prompted to enter their email and password. Then choose either customer or personal shopper. An error will be prompted if the credentials entered are invalid.

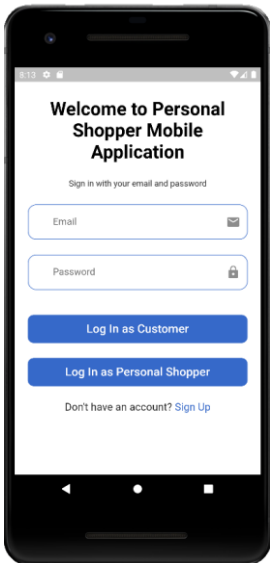

Figure 3: Login Interface for Mobile Application

If users do not have an account, there is an option to register by clicking the Sign Up button. Users are then redirected towards the registration page. The registration page is divided into two where the first page is mainly on user's account and on the second page, the personal information of the user.

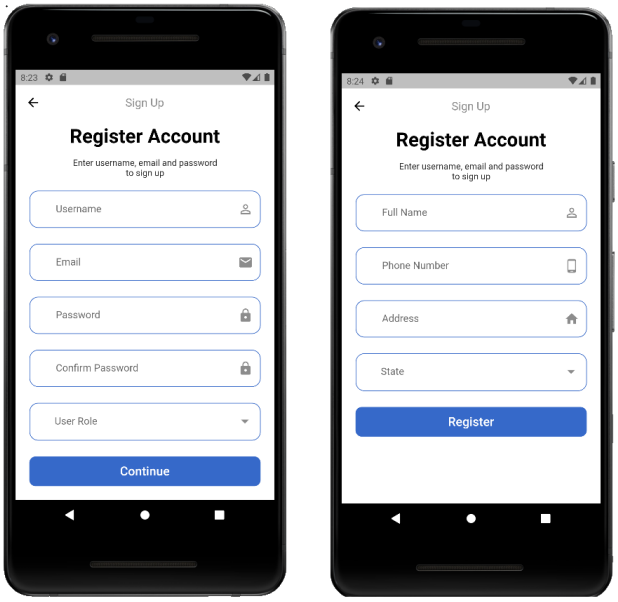

Figure 4: Registration Interface

4.1.2 User Management Module

This module focuses on the user's ability to update or delete information on the profile page. If the users click on the Edit Profile, users are redirected to the Edit Profile page where the users can update all necessary information. Users are also able to update their password by clicking on the Update Password button. Clicking the Log Out button will log users out from the account and be redirected back to the Login Page.

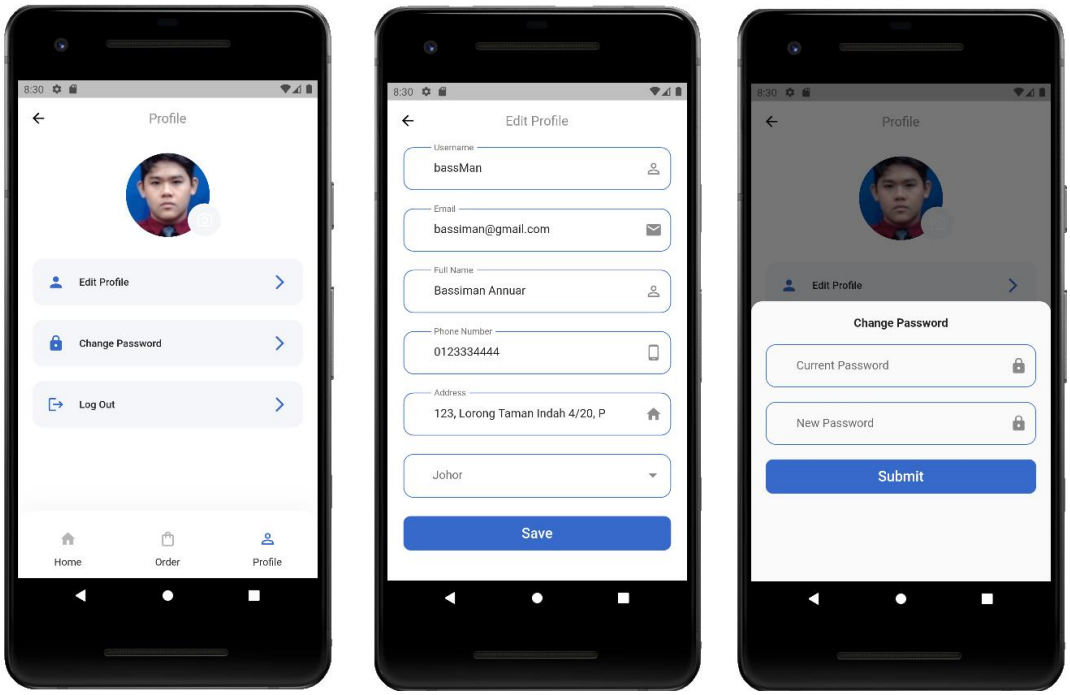

Figure 5: User Profile Interface

4.1.3 Buying Module

This module focuses more on customers' ability to view all available products and add products to cart. Customers can view all products either at the homepage or viewing the catalogue. Customer can click on the product card to view the product details. At the product detail page, customer can click the "Add To Cart" button which will add the product to the customer's cart. Then, customers can proceed to checkout for payment.

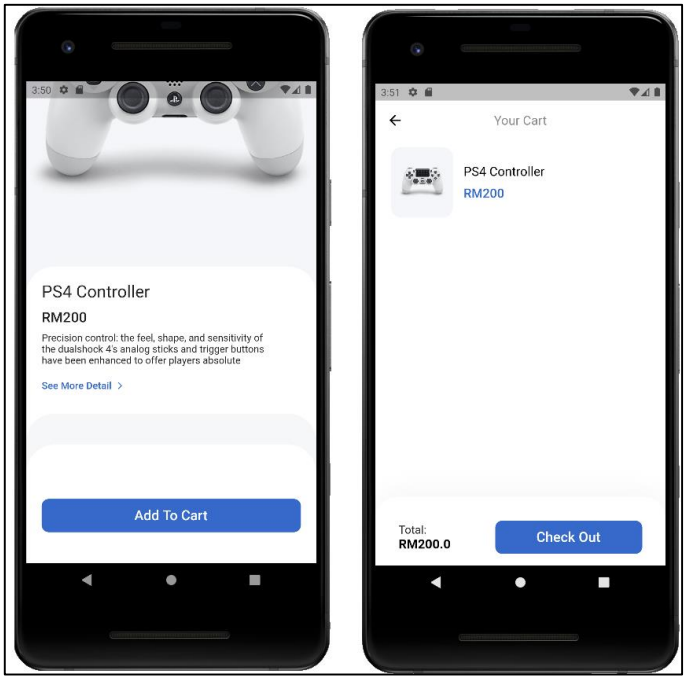

Figure 6: Buying Module Interface

4.1.4 Selling Module

This is the main module for personal shoppers. Personal shoppers can add, update or delete product. Then, shoppers can also view all orders under the Order tab, update the tracking information and wait until the customer receive the product. Both users also have the option to update or delete information on their profile. Figure 7 shows the interface for selling module.

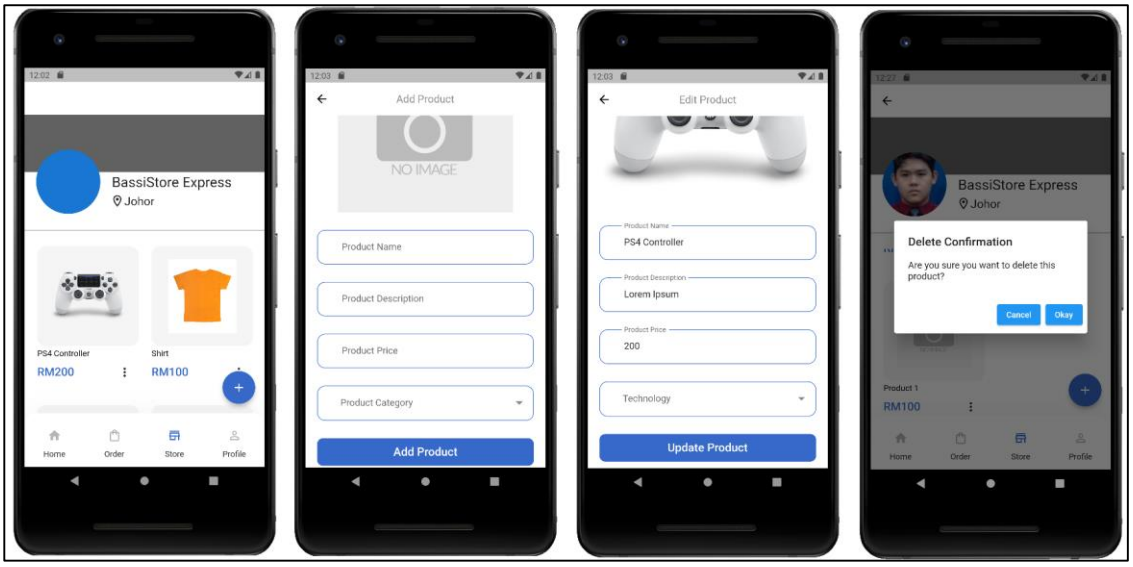

Figure 7: Selling Module Interface

4.1.5 Payment Module

This module is for customers to proceed to check out and make payment after adding item to cart. Customer can view the order history of the orders being made at the order page. Shoppers are also able to view the order made by every customer and update the tracking information.

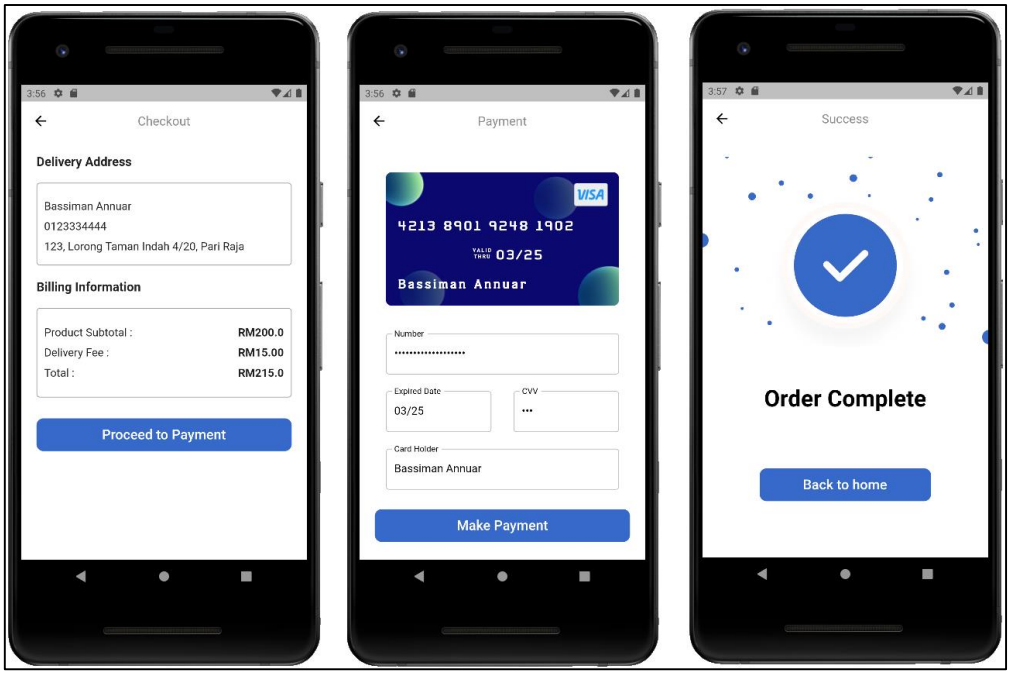

Figure 8: Payment Module Interface

4.1.6 Report Module

This module focuses on the final user which is the administrator. Administrator must log in using the web interface. Administrator can view a summary of all orders made and sales made. Figure 9 shows the homepage for administrator interface. Figure 10 shows the generate report page where administrator can choose to generate monthly or yearly sales report. Figure 11 shows an example of generated report for the month of June.

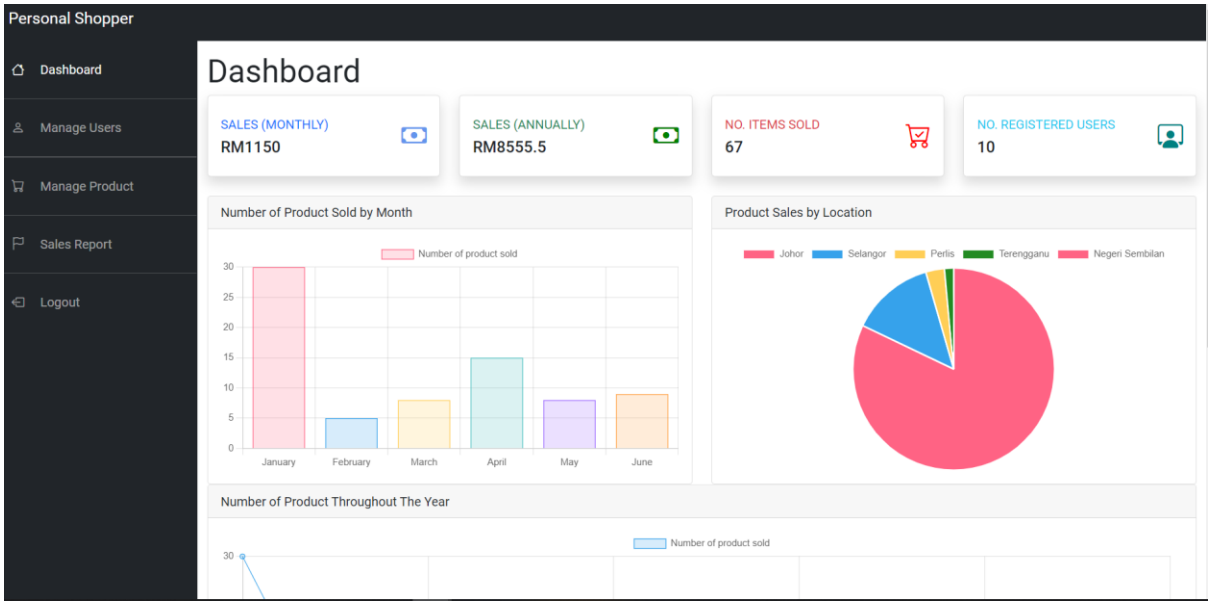

Figure 9: Homepage for Administrator Interface

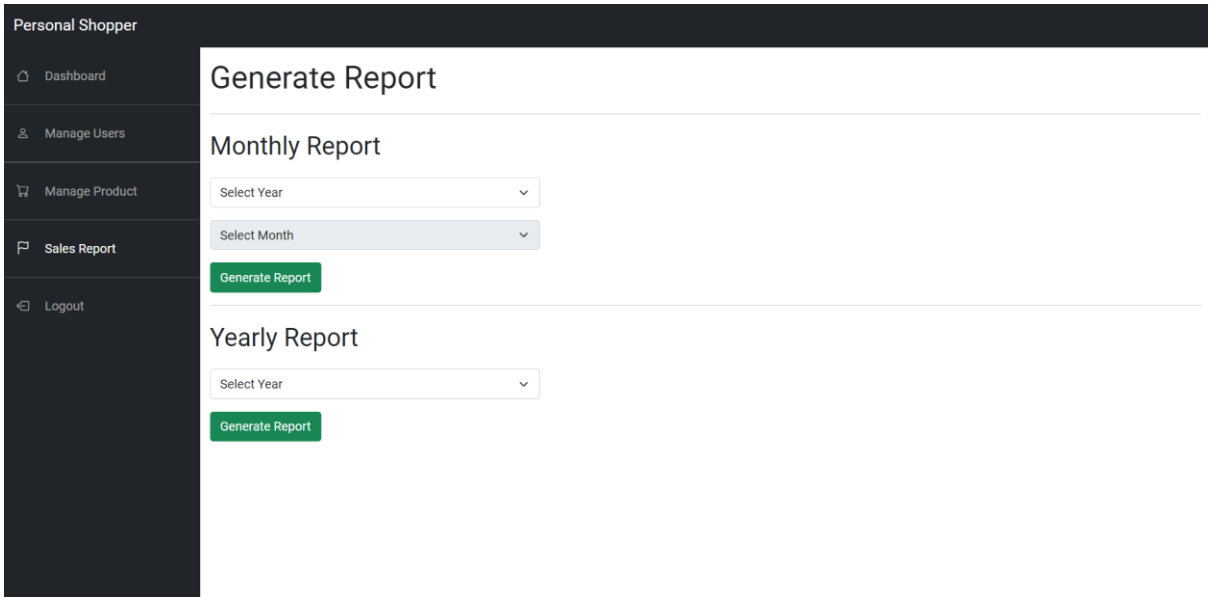

Figure 10: Sales Report in Administrator's Interface

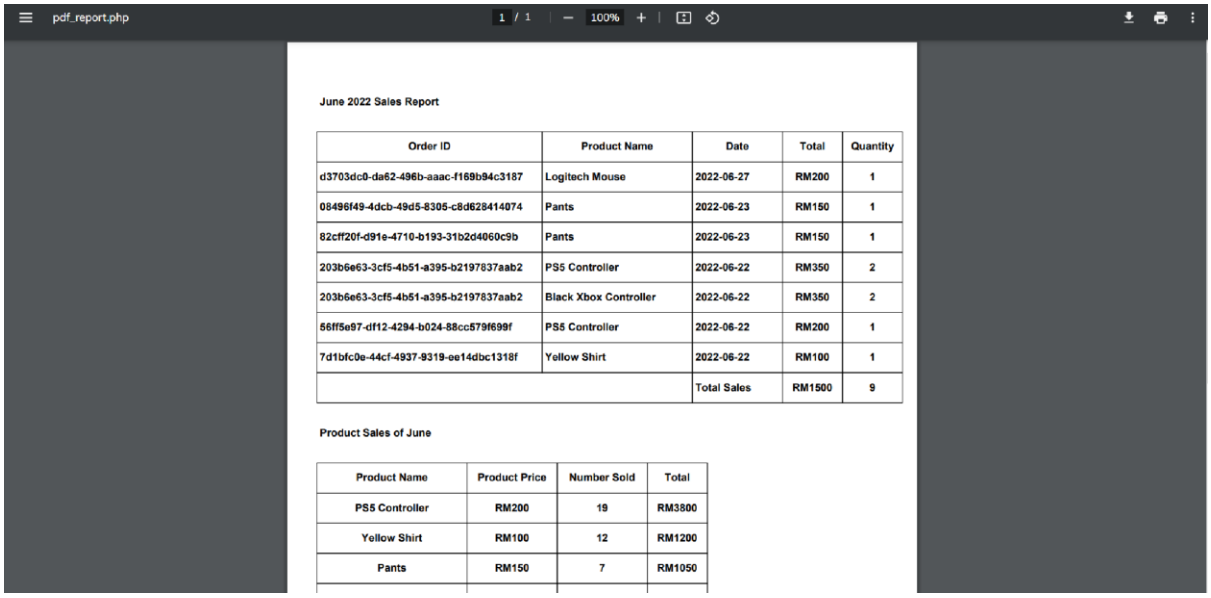

Figure 11: Example of Generated Report

4.2 System Testing

The system testing marks the final process throughout the application development. System testing is the process checking and testing the system to find potential issues or bugs. The outcome of the testing will indicate whether each function or requirement meets the expected outcome. Two different testing was done for the application, which are functional testing and user acceptance testing. Table 7 shows the functional testing performed and the result.

For the user acceptance testing the test was conducted by three personal shoppers and 13 customers. Respondents were asked to test the application either physically or using parsec to test the application. Respondents are then asked to fill in the questionnaire after testing the system. The result of the user acceptance testing is shown in Table 8, which is the interface evaluation by both users. On the other hand, feature evaluations were divided to two tables, which are, Table 9 that shows the feature evaluation made by the customer and Table 10 which shows the feature evaluation made by personal shoppers.

Table 7: Functional Testing and the Result

Test Case	Software Requirement Specification	Description	Status
TEST_100_01	SRS_REQ_101	Login page view	PASS
TEST_100_02	SRS_REQ_102	Admin/Personal Shopper/Customer logs in the system with valid information	PASS
TEST_100_03	SRS_REQ_103	System display error message if login credentials are invalid	PASS
TEST_100_04	SRS_REQ_104	Personal Shopper/Customers register by inputting personal information	PASS
TEST_100_05	SRS_REQ_105	System stores all information in database if the registration is successful	PASS
TEST_100_06	SRS_REQ_106	System display error message if registration information is invalid or empty	PASS
TEST_200_01	SRS_REQ_201	System display user's information	PASS
TEST_200_02	SRS_REQ_202	Users edit profile	PASS
TEST_200_03	SRS_REQ_203	Users change password	PASS

TEST_200_04	SRS_REQ_204	Customers view purchased history	PASS
TEST_200_05	SRS_REQ_205	System stores edited information in database	PASS
TEST_300_01	SRS_REQ_301	Personal Shoppers add products into the catalogue	PASS
TEST_300_02	SRS_REQ_302	Personal Shoppers edit products information	PASS
TEST_300_03	SRS_REQ_303	Personal Shoppers delete products from catalogue	PASS
TEST_300_04	SRS_REQ_304	System display order status for each order	PASS
TEST_300_05	SRS_REQ_305	Personal Shopper add tracking number for each order	PASS
TEST_300_06	SRS_REQ_306	Personal Shopper update order status for each order	PASS
TEST_300_07	SRS_REQ_307	System stores new and edited product into database	PASS
TEST_400_01	SRS_REQ_401	System displays available products in catalogue page	PASS
TEST_400_02	SRS_REQ_402	Customers filter products at catalogue page	PASS
TEST_400_03	SRS_REQ_403	Customers add products to cart	PASS
TEST_400_04	SRS_REQ_404	Customer search product using the search bar	PASS
TEST_400_05	SRS_REQ_405	System display products in cart after added	PASS
TEST_400_06	SRS_REQ_406	System displays total cost in cart	PASS
TEST_400_08	SRS_REQ_407	System saved purchased products into database	PASS
TEST_500_01	SRS_REQ_501	Customers perform payment	PASS
TEST_500_02	SRS_REQ_502	Personal Shopper receives payment	PASS
TEST_500_03	SRS_REQ_503	System displays error message if payment fails	PASS
TEST_500_04	SRS_REQ_504	System stores purchased information in database	PASS
TEST_600_01	SRS_REQ_601	Administrator and Personal Shopper view summarized report	PASS
TEST_600_01	SRS_REQ_602	System list out highest selling item from which state	PASS

Table 8: Interface Evaluation by both Users

No.	Characteristics	Ranking					Total
		1	2	3	4	5	
1	Ease of Understand	0	0	1	7	8	16
2	Layout of content	0	0	3	7	6	16
3	Font Style	0	0	2	5	9	16
4	Interface Design	0	0	1	8	7	16

Table 9: Feature Evaluation by Customer

No.	Features	Ranking					Total
		1	2	3	4	5	
1	Log in	0	0	0	8	5	13
2	Register	0	3	0	3	10	13
3	Buying	0	0	1	8	4	13

Table 10: Feature Evaluation by Personal Shopper

No.	Features	Ranking					Total
		1	2	3	4	5	
1	Log in	0	2	0	2	1	3
2	Register	0	3	0	0	3	3
3	Selling	0	0	0	3	0	3

5. Conclusion

In conclusion, the development of this application can help reduce the problem especially in the lack of existing system. The main objective is to ensure the overall process for all users will be more fluid and efficient. Having a proper medium for personal shopper to record and track all products and sale will help the workflow of the sellers to be more systematic and organized. Customers, on the other hand, have all available products visible in one platform rather than having to search at different places. The development of this application will be impactful for the users.

Acknowledgment

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

Appendix A

Figure 12 shows the use case diagram that represents the overall activity of the Personal Shopper Mobile Application. There are a total of three users which are the customers, personal shopper and administrator. The diagram illustrates the features for each user. Figure 13 and 14 shows the sequence diagram and activity diagram for buying module. On the other hand, Figure 15 and 16 shows the sequence and activity diagram for selling module.

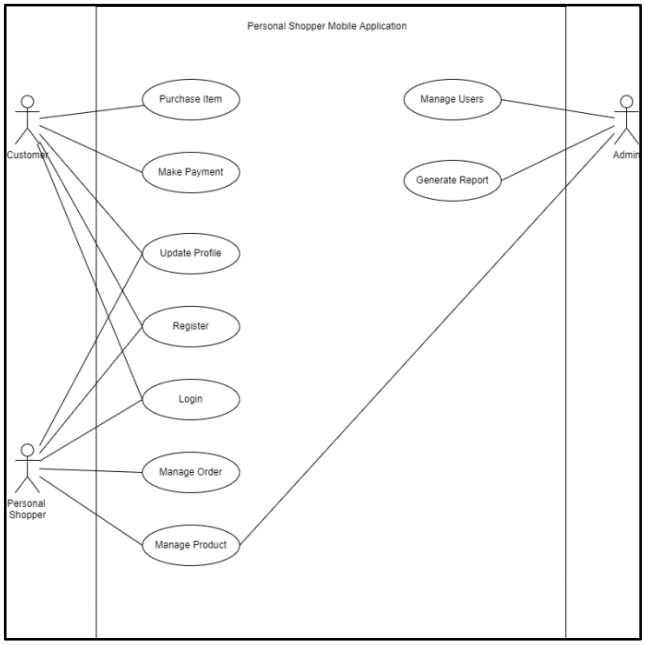

Figure 12: Use Case Diagram of Proposed Application

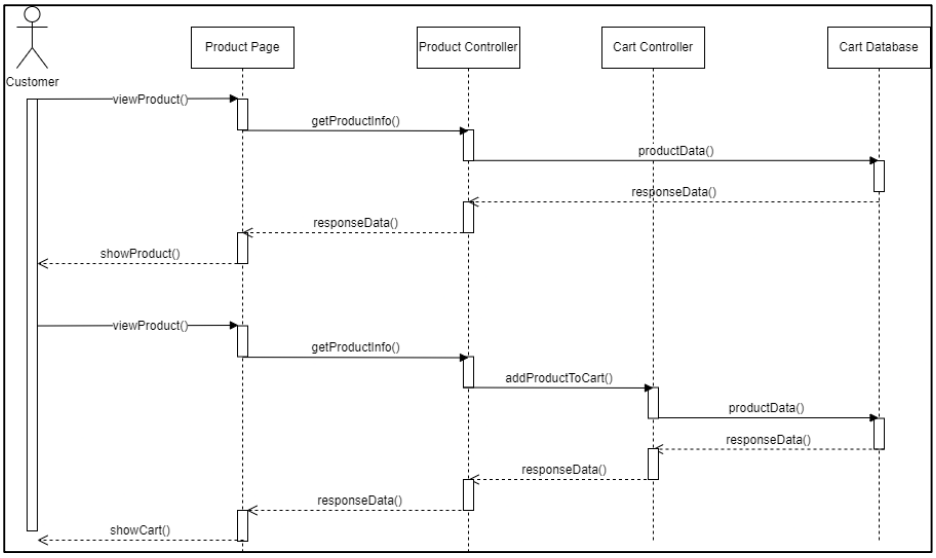

Figure 13: Sequence Diagram for Buying Module

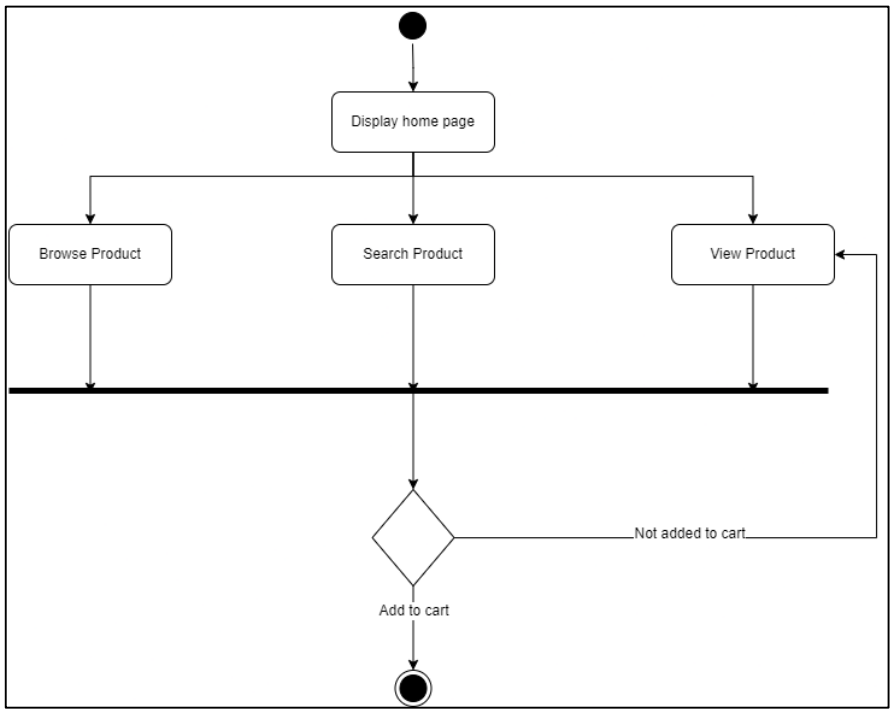

Figure 14: Activity Diagram for Buying Module

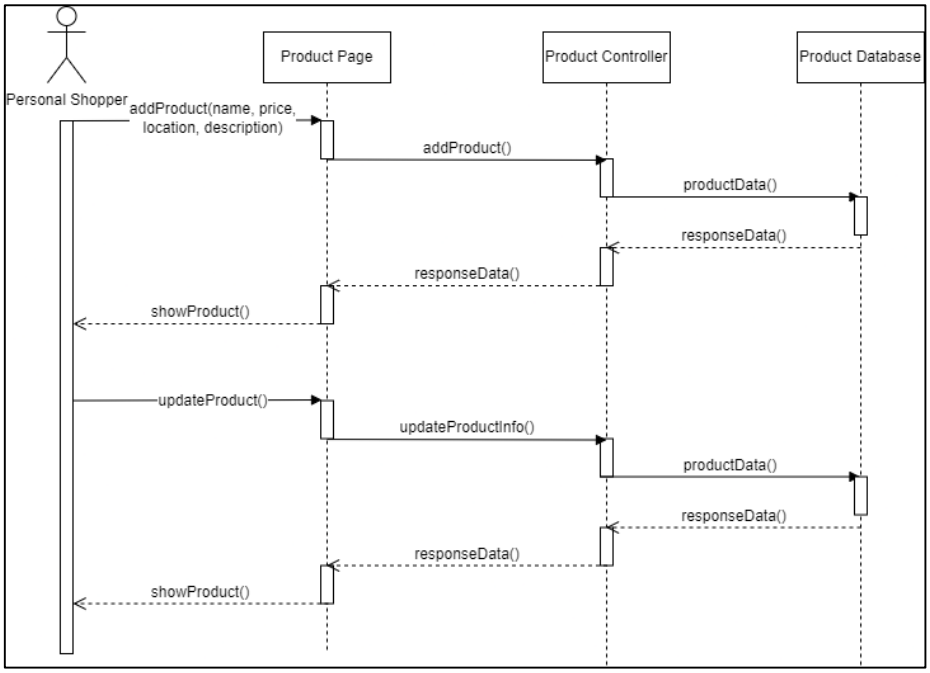

Figure 15: Sequence Diagram for Selling Module

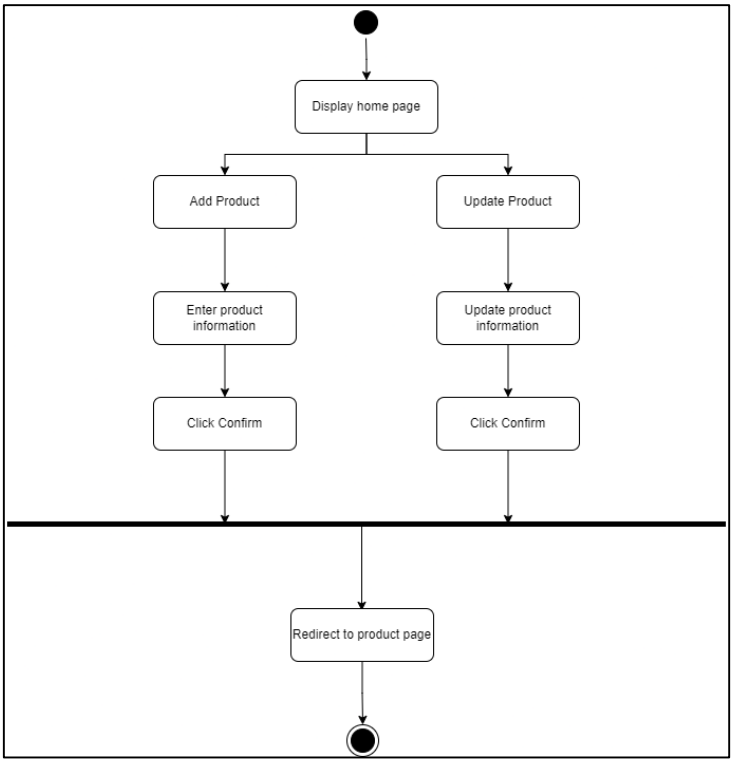

Figure 16: Activity Diagram for Selling Module

Appendix B

System architecture refers to the building block of the system where it shows how each component and modules relate to one another [7]. Figure 17 depicts the system architecture of the proposed application.

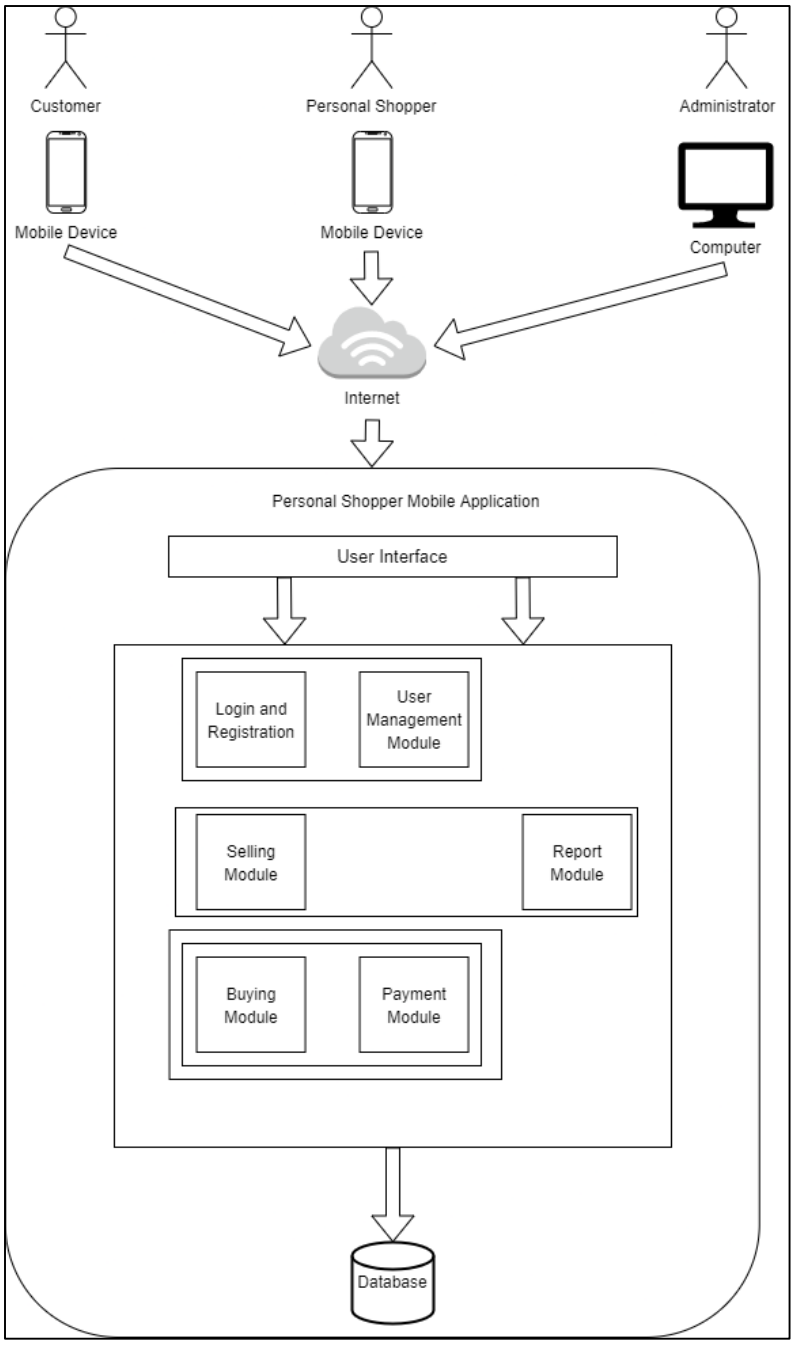

Figure 17: System Architecture

Appendix C

The questionnaire given to tester for user acceptance test. The participants were required to test the application before filling the questionnaire. Figure 18, 19 and 20 below shows the google form users filled for the testing.

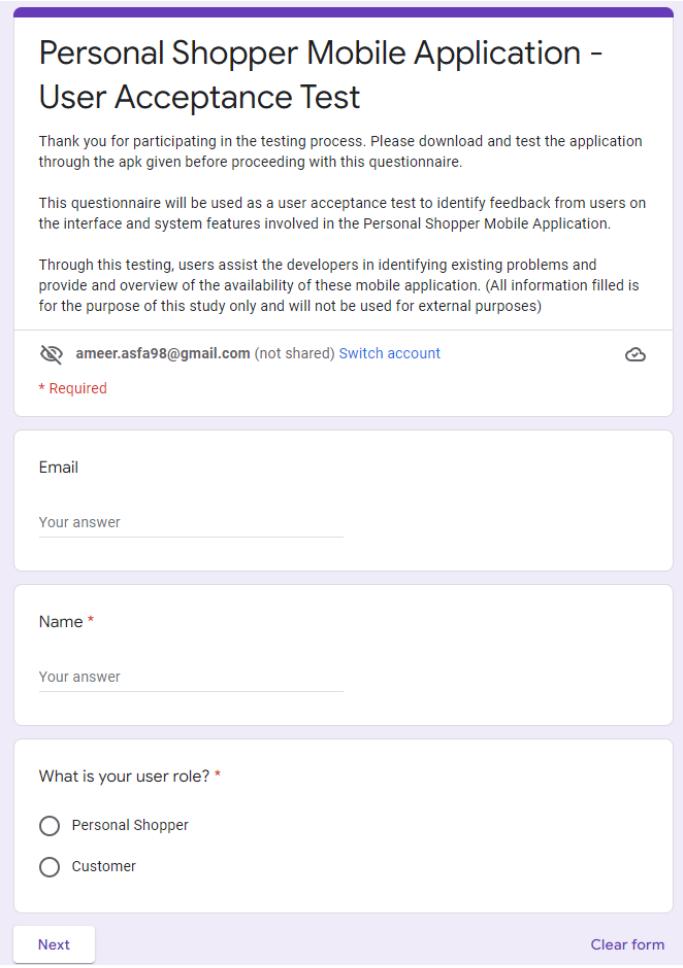

Figure 18: Questionnaire form for User Acceptance Test

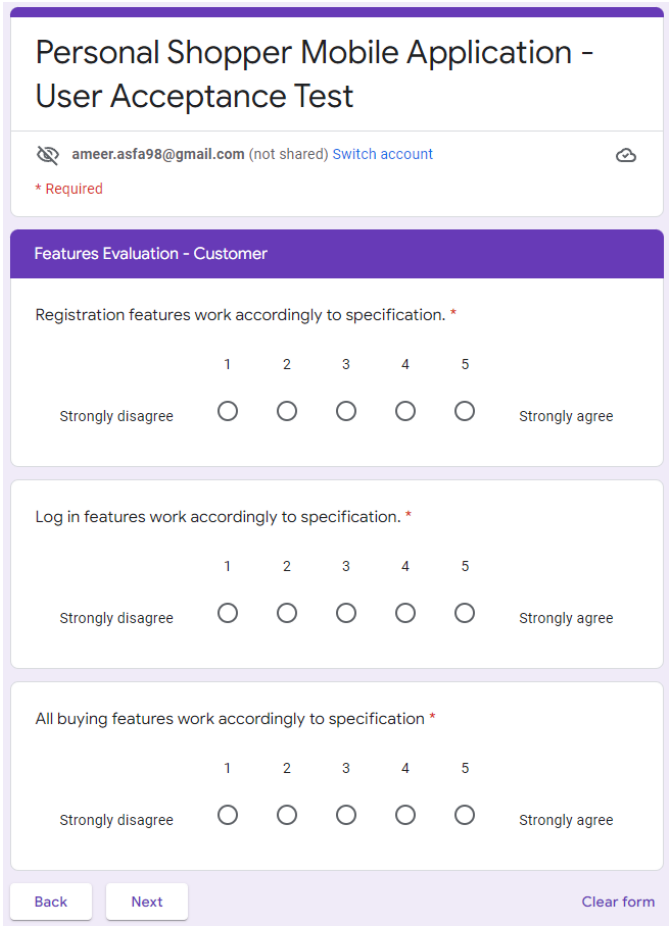

Figure 19: Questionnaire for Features Evaluation Customer

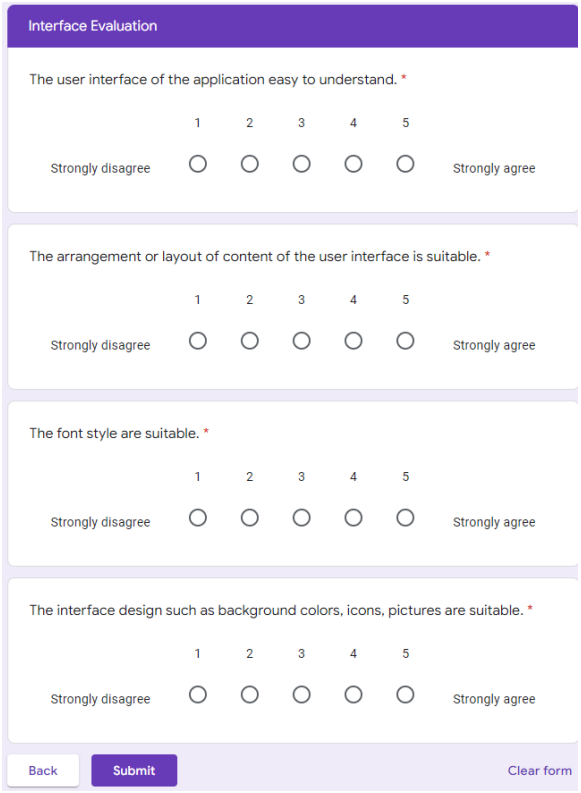

Figure 20: Questionnaire for Interface Evaluation

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