THE SMART SHOPPING ASSISTANT APP

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BORANG PENGESAHAN STATUS TESIS

JUDUL: THE SMART SHOPPING ASSISTANT APP

SESI PENGAJIAN: 2015/2016

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Tarikh: 24/8/2016

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THE SMART SHOPPING ASSISTANT APP

NURFARIHATUL JANNAH BINTI ABU BAKAR

This report is submitted in partial fulfillment of the requirements for the

Bachelor of Computer Science (Artificial Intelligence)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2016

DECLARATION

I hereby declare that this project report entitled

THE SMART SHOPPING ASSISTANT APP

Is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT: _____ Date: 21 AUGUST 2016

(NUR FARIHATUL JANNAH BINTI ABU BAKAR)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Computer Science (Artificial Intelligence) With Honours.

SUPERVISOR: _____ Date: 24/8/2016

(DR. SITI AZIRAH ASMAI)

DEDICATION

This project is a dedication for my family, lecturers and friends whom have taught me that everything is achievable as long as there are desire that burn inside. Besides, knowledge is important that do not have an easy way in the process of gaining it and always work hard to achieve success. They are also available by my side and always cheering me up in my despair time and always helping me in giving idea during this project is being develop.

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I want to express my gratitude toward all my friend that contribute to help me completing this Final Year Project. Your opinions and all the time we had spent brainstorming together are brilliantly helpful to provide me with better ideas.

Last but not least, my thanks are dedicated to all parties or person that I have not mentioned. Thank you for your support.

ABSTRACT

Smart Shopping Assistant App (SSAA) is a system that can help user to choose the best shopping mall that available in the user area. The decision making is made based on the item prices and the distances of the shopping mall from the location of the customer. By using this app, daily life cost of the customer can be reduce, besides this app help saving time for the customer in term of making decision to choose the best shopping mall. This system apply Image Processing technique which is OCR in Artificial Intelligence to solve the problem and also using crowd sourcing to gain data from target shopping mall such as item prices. Furthermore, waterfall model can be used in the methodology part which have requirement, design, implementation, verification and maintenance for completing this system successfully. Other part for the methodology are flow chart, Gantt chart and milestone and date to be the reference to make sure the project can be completed on time. Lastly, this system can assist customer in making the right decision during choosing the best shopping mall that suitable for the customer based on the requirement that is, distances of customer from the shopping mall and the prices offer from the shopping mall. So, this can help in saving time and cost for the customer.

ABSTRAK

Smart Shopping Assistant App (SSAA) merupakan satu sistem yang akan membantu pengguna untuk memilih pusat membeli-belah yang terbaik di kawasan berdekatan dengan mereka. Keputusan akan dibuat berdasarkan harga barang yang terdapat di pusat membeli-belah dan jarak pusat membeli-belah dari lokasi pengguna. Melalui penggunaan aplikasi ini, kehidupan pengguna akan menjadi lebih produktif apabila dapat mengurangkan kos kehidupan seharian dengan membuat pilihan untuk berbelanja di pusat membeli-belah yang berdekatan sekaligus memberi harga yang paling murah. Sistem ini menggunakan teknik pemprosesan imej iaitu OCR(Kepintaran Buatan) bagi menyelesaikan masalah dan juga menggunakan informasi daripada pengguna untuk mendapatkan data dari pusat membeli-belah. Data yang diperoleh daripada pengguna adalah seperti harga barangan. Selain itu, Waterfall Model akan digunakan di bahagian metodologi dalam membangunkan aplikasi ini. Model ini mempunyai lima peringkat iaitu keperluan, reka bentuk, pelaksanaan, pengesahan dan penyelenggaraan. Bahagian lain untuk kaedah ini adalah Flow Chart, Gantt chart dan peristiwa penting dan tarikh yang menjadi rujukan untuk memastikan projek itu dapat disiapkan pada masanya. Akhir sekali, sistem ini akan membantu pengguna dalam membuat keputusan yang tepat ketika memilih pusat membeli-belah yang terbaik dan sesuai untuk pengguna berdasarkan keperluan iaitu, jarak pengguna dari pusat membeli-belah dan harga yang ditawarkan dari pusat membeli-belah. Jadi, ini akan membantu dalam menjimatkan masa dan kos kepada pengguna.

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LIST OF ABBREVIATION

SSAA	➢ Smart Shopping Assistant App
DBMS	➢ Database Management System
MySQL	➢ My Structure Query Language
PHP	➢ Hypertext Pre-Processor
PSM	➢ Projek Sarjana Muda
OCR	➢ Optical Character Recognition

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CHAPTER I

INTRODUCTION

1.1 Introduction

Based on the current Malaysian economy, many of the people want to save their money in a good way to avoid financial loses. So, if they want to buy every type of thing such as groceries, they must think carefully such as where is the nearest shopping mall located to their current location and shopping place that offer the best prices to the user. This is because, it will cut their budget to make more saving. So, we must have the one application that give the user information or comparison of the price to the user by mobile phone that most everyone bring it anywhere and anytime.

By build the system like “Smart Shopping Assistant App (SSAA)”can give user information about the price comparison and distance between the user and malls location. Then, user can make the best decision where they must to go based on the best price item and nearest from their location. This SSAA use the Image Processing (OCR) technique which is the user can only take the picture of price and then automatically change it into numeral characteristic to save into database to share with

other user and SSAA also can update the prices information using the community based platform to simply interact with community (crowd) about the prices of item.

Besides that, SSAA can display the map that view the current location of the user and shopping mall. This can help user to choose the mall that have short distance with the user current location. This system using the Java language in Cordova Apache software. By the SSAA, user can get help to make decision for shopping with the best and suitable shopping mall by the distance of user location to the shopping mall and the best price of that shopping mall offered.

1.2 Problem statements

Planning a destination of the shopping mall is complex problem solving activity especially when we do not know which shopping mall is the best for us to go based on the distance from user current location to the shopping mall and the price that the shopping mall offers. In this problem can make the user suffer a financial lose if they choose the wrong shopping mall. Here discuss with the problem statement that happen in the real life scenario and also prove that this SSAA can assist the user choose the suitable shopping mall to avoid wasted the time and money.

1) User need a system that can give them the information of the price for the user make the right decision of shopping mall that offer the best prices for them.
    - Users always shopping at shopping mall near with their house but they do not know that have other shopping mall make the sale that offer the best price to them. So, this system help the user to get information about the other shopping mall price offered the other user.

2) User need the system that can show where the shopping mall location that near with the user current location.
    - For the user that travel at the new place, they must need some guide to go any shopping mall. This is because they do not know where shopping mall near with their current location. This system can view to the user, their current location and the shopping mall location nearer them.

1.3 Objective

1. To design and implement a smart shopping assistant app for user
    - Smart shopping Assistant App can use in android that user can always bring the phone everywhere to use it easily

2. To propose the Image Processing technique in the system.
    - To explore how to make the data information of price by using the photo captured and convert into numeral characteristic to save into system to share that to all user.

3. To make recommendations of shopping mall based on distance and price offers.
    - This system was build to help user to make decision which the best shopping mall that user must go that can save the money and time for them.

1.4 Scope

In this project, only three shopping mall that we use which is Mydin, Aeon Jaya Jusco, and Tesco in Melaka and the prices of groceries that can examined. This system designed for anyone that want to shopping at anywhere they are located and want save their money and time by choosing the best shopping mall that offer the best prices and short distance from the user current location. This system focusing on design and development of shopping guide system to help user to make best decision of shopping place.

1.5 Project Significance

Make decision of the location for shopping is very annoying and complicated job. This is because, it can make financial loses if we make the wrong decision. To get the best decision we must aware about the distance of the shopping mall location with user current location and the prices offered by that shopping mall. By this system, it make the user save their money and time.

1.6 Expected Output

Since the system is an intelligent system, it should be able like human being. Moreover, the system was used the Image Processing technique which is in the Artificial Intelligent course to save the data by captured the image and then convert it into the numeral characteristics and then save into database. It can view all the data to show the other user. This technique help user (member) to add any information of the

prices or sales at the shopping mall easily and save time without typing (community based). Besides that, this system was used geometry which is show our current location and the shopping mall location. So, it make the user easily know where the location of the shopping mall that have short distance with the costumer current location. This can save the time for user to go to the shopping mall that near with them. Apart of that, this system was used in android mobile phone, so it easily use at everywhere they go because mobile phone always be bringing by user.

1.7 Conclusion

This chapter can discuss what are the most problems that faces by the user to shopping at the shopping mall. It also overview about the system. Objective and scope of this project is determined so that the problem can be solved and improve the function of the system.

For the next chapter, literature review and project methodology can be discussed. It can summarize the main concerns of the project, study previous approaches that used to build Smart Shopping Assistant App, identify differences caps between existing methods and finally come out with the agree and degree point.

CHAPTER II

LITERATURE REVIEW & PROJECT METHODOLOGY

2.1 Introduction

This chapter tells the reader in details about Literature Review and Project Methodologies. Literature review describes the background of the project proposed which is The Smart Shopping Assistant App. Besides that, this chapter provides summary and evaluation of the previous research or work that is the same or related to the project which can be developed. The purposed of the literature review is to justify the exact choices of research or a project. Moreover, it exposes the important of the topic or the system to be developed. Furthermore, in order to understand the project, literature review can assist to gather the background information needed. It function as the key to show readers that the developer of the system is familiar with significant and the latest research that is relevant with the topic. Literature review provides chance to discover what has been investigated and what has not and also to discover how the project is related to the work of others.

Methodology is a method or process of activities that is use to developed the system. Methodology has phases which crawls phase by phase to develop a system until it completely finished. Each step of this phase is show by modeling it. Usually, physical work product is the only end goal of the process is manifested. Besides that, the analysis and design activities in the software are normally driven by a specific methodology. There are two common methodology that always been implemented

during developing a system which is Object-Oriented Analysis and Design(OOAD) and Structured System Analysis and Design Method (SSADM).

2.2 Facts and Findings

Computer system in the twenty-first century are dramatically different from those that have been the norm over the last 50 years. This changes, which have seen fast improvements in computer power and capacity, modern computing is essentially defined but interconnection of computers, and all that it brings not like before. (Malani, 2011). Obviously, it need some degree of the autonomy for enable components to respond dynamically changing circumstances when trying to achieve objective without the need for user intervention.

Shopping application act as a purchasing products by using the Internet network. Online shopping was grown in popularity over the years. It is because of the people that can find it convenient and easy to directly shop something needed only from their home or office that no need to drive the car or walking at outside. The thing that be the most factor about online shopping during a holiday season, this is because it many customer need to wait in long lines or search from store to store for a particular item.

Google was developed the operating system which is Android that is a mobile operating system that increasingly used by many people. The Android operating system is generally used in touchscreen mobile devices, such as tablets, cell phones and soon. The software and application of the developers can use Android to build some mobile apps that are sold through app stores, as we known is Google Play. Because it is build up as a Google product and Android users are given the opportunity to link their mobile device to other Google products, such as cloud storage, email, and video services. The design of the Android can allows users to make mobile devices

intuitively by phone interactions by follow the common motions such as pinching, swiping, and tapping.

E-commerce farers to use fast, low-cost electronic and simple means of communication, sellers and buyers conduct a variety of business activities without face-to-face. E-commerce can be achieved by a variety electronic means of communication such as phone or fax. But now people are exploring e-commerce based on the internet and EDI (electronic data interchange) (Xiaoyan Jiang, 2009).

Nowadays, people are getting used to acquiring information through mobile platforms due to the popularity of smartphone and accessibility of wireless networks. For instance, they use smartphone for shopping, navigation, communication and soon. Currents mobile system increasingly powerful in term of providing a wide variety of services. Most of the time, simple installation of several apps can meet people's most daily need (Philip Guo, 2015).

The rapid advancement of information and communication technology has made it possible for people to buy various products on internet. Consumer can buy personal television set, books and computer at a cyber-store through internet. It is rare for people to buy food groceries on an electronic market. The absence of standards in groceries accounts for low electronic transactions of the groceries on internet. Another reason is that there are no proper mechanisms to facilitate their electronic transactions (Kwang Hyoun Joo, 2000).

2.2.1 Domain

The Smart Shopping Assistant App is about to help customer to make the smart decision about the suitable place to shopping based on the user current location and the price of the item. Moreover, this app can make the customer to save their budget in term of money and time. This app can show user where their current location to easy the user if they at the outstation or not familiar place. This app also used image processing which is Artificial Intelligence technique to easier the user to share the data

or information about price by taking the image of the price and it can process to be numeral characteristic for save it at application database and share to other user.

2.2.1.1 Shopping Assistant

Assistant is refer to the person that can be supporter or helper. In term of shopping assistant, it can be virtual helper that help the user to make right decision based on the situation that the user faced. It can make the easier to the user make decision to shopping such as groceries at the place that give the cheaper price and the same time nearer with the current location of the user. It can assist user to show the current location of the user in the map that can help user when they at the outstation or not familiar place to go find the shops that near with them.

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2.2.1.2 Image Processing Technique

Image processing system is processing the image by using the mathematical operation by any signal processing form, where the input is in a term like an image and the output of the image processing may be either an image or a set of characteristics that related to that image used. User that used this system can gain the data like price of the item by the captured the image of the price tag then by the image processing technique, the image can be processed to convert the price image to the digit number of the price and save to data base of system to share with other user about the prices of item in that mall.

Business information retrieval usually refer to the term of the organization, including information storage, commercial information retrieval and performance information, such as access to all aspects of its core text for indexing and retrieval of

information. Information Retrieval has grown to a network and intelligent stage. Internet on-line information retrieval is the most common search keyword, in order to improve the precision, careful analysis should be subject to choose the right keywords, and to master to use google search syntax riles, designed to express accurately the demand for search-and repeat adjust the search strategy in order to obtain high quality search result (Xianyi Qian,2009).

2.2.2 Existing System

There are a few existing android system that is commercially used for the shopping system that almost closely related to the system that going to be developed. In order to gain the better point that used to developing this system, those the existing system can give be good use for guiding and coming up the better ideas to improving the newly created system which is The Smart Shopping Assistant App. There are three samples shopping system which is Shopping Assistant, Grocery Shopping and Smart Shopping.

2.2.2.1 Shopping Assistant

This Shopping assistant app was built by Mihai Campean This android system is useful in shopping list management application that allows it's users to create and manage shopping lists and to check items from a list when in a store. It shows the total to pay at checkout as each item on the list is checked and its price entered and it notifies the users when a bought item expires. The application also provides some statistical reporting functionality in order for its users to keep track of their shopping expenses. In order to see the reports for previously bought items, you need to close the lists in

which these items were by using the Close context menu on the shopping list your items were in.

- (http://hypersynapse.blogspot.my/2010/12/shopping-agent-user-guide.html).

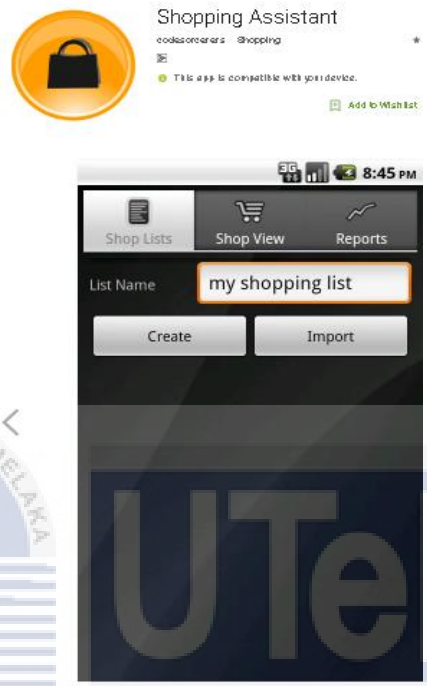

Figure 2.1: Shopping Assistant App

2.2.2.2 Jimat Malaysia Price Checker

This application was built by AndroidRich. The application serves as a guide or reference to check consumer product prices. This app is suitable for Malaysian people who want to save cost and avoid unfair price especially after GST. This apps using offline and online search. User can check local price and compare with shopping list and also include 30 tips for saving money.This apps can plan monthly budget and do mykira - kira correctly and easily for user. Main features of this app are compare price offline without Internet connection, compare latest price online with Internet connection, jimat and avoid unfair price, 30 tips for saving money, modern and mobile interface and this app is free.

- (https://play.google.com/store/apps/details?id=com.androidrich.gstprice&hl=en)

Figure 2.2: Jimat Malaysia Price Checker

2.2.2.3 Smart Shopping

This app was built by Adarsh,Madhura, Monali, Pooja and Arti on 2015. The research paper that have been made by them was explain that Smart Shopping android application can help the user to scan the item which he wants to purchase with the help of scanner provided by this app. After scanning of the item a web service can get called which can create a connection with the database of the shop. As the connection is established, the user is now synched with the database and information related to that item is provided to him. In this whole procedure the overall time of scanning of

individual items is saved and thus reducing the time of the shopping. The assumptions for the app are the shop has the Wi-Fi facilities and user has installed the app.

- (ijarcet.org/wp-content/uploads/IJARCET-VOL-4-ISSUE-3-874-878.pdf)

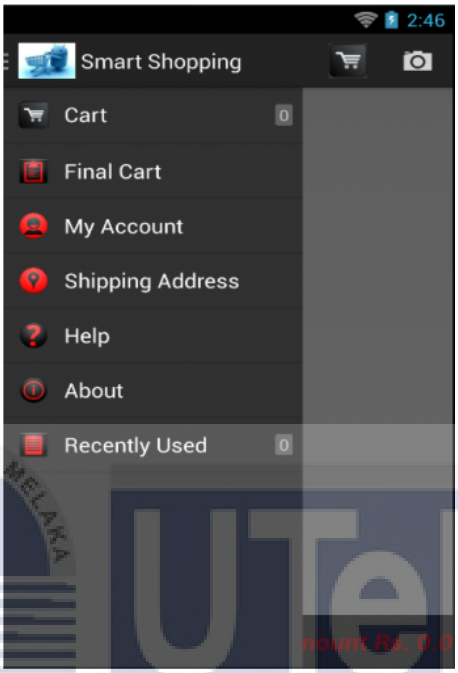

Figure 2.3: Smart Shopping App

2.2.3 Existing System vs. Proposed System

The Shopping Assistant, Grocery Shopping and Smart Shopping are among the android shopping application samples that used to help the user to be easier to shopping the thing by the using smartphone. There are the certain features that this system do and do not provided. At the table below is the summarization of the comparison between this three android shopping system and the proposed system.

	Shopping Assistant System	Jimat Malaysia Price Checker	Smart Shopping System	Proposed System
GUI look and feel	Simple design	Simple design	Interesting but less intuitive	Simple design and intuitive
Comprising Item Price	Not Involved	Involved	Not Involved	Involved
Authentication	No	No	No	Yes
Simplicity	No, congested side	Slightly	Yes	Yes
Camera Use	No	No	No	Yes
Location View	No	No	No	Yes

Table 2.1: Existing System vs. Proposed System

Based on the summarization above, we can conclude that the existing system have good services to the user but there are some lacking features or weakness that can be found in that system. Therefore, it is hoped that this proposed system can fulfill the best requirement of the new system.

2.2.4 Technique

In other to obtain a better output of the system to be developed, there are several techniques that are used to gathering the information to develop the new system according the requirement and user needed. There are two techniques that want to

being used which are Image Processing Technique and Geolocation Technique. The techniques have been described as below:

2.2.4.1 Image Processing Technique

Image processing is a technique that include in the in Artificial Intelligence used to perform some operations on an image. By this technique, it can get an enhanced image or to extract some useful information from it. It is a type of signal processing which is the input is an image and output can be a characteristics/features that related with that image. By this technique, we can enter data or information about the prices at the mall by captured the image not entered the data like the traditional method which is enter the data by our self by type. The image of the price that we captured automatically process and save to database and share to the other user to make pricing comparison.

Groceries shopping system requires autonomy, user adaptability and multiple store server access to automate the groceries shopping process. It is said that an agent system has characteristics of autonomy, user adaptability, and social ability (Norio Shiratori, 2000).

2.2.4.2 Geolocation Technique

The geolocation object provides access to location data based on the device's GPS sensor or inferred from network signals. Geolocation provides information about the device's location, such as latitude and longitude. Common sources of location information include Global Positioning System (GPS) and location inferred from network signals such as IP address, RFID, Wi-Fi and Bluetooth MAC addresses, and GSM/CDMA cell IDs. So by this technique, user can visualize their current location

and the mall surrounding their location. It can show, where the location of mall that nearer to them.

2.3 Project Methodology

The first process in building an intelligent system begins with getting hold of an understanding of the problem domain. The problem and the data available need to be considered first in order to solve the problem. Once the problem is understood, an appropriate tool can be chosen and can be used to develop the system. The process of building intelligent knowledge based system is called knowledge engineering. It has six basic phases (Waterman, 1986 and Durkin, 1994).

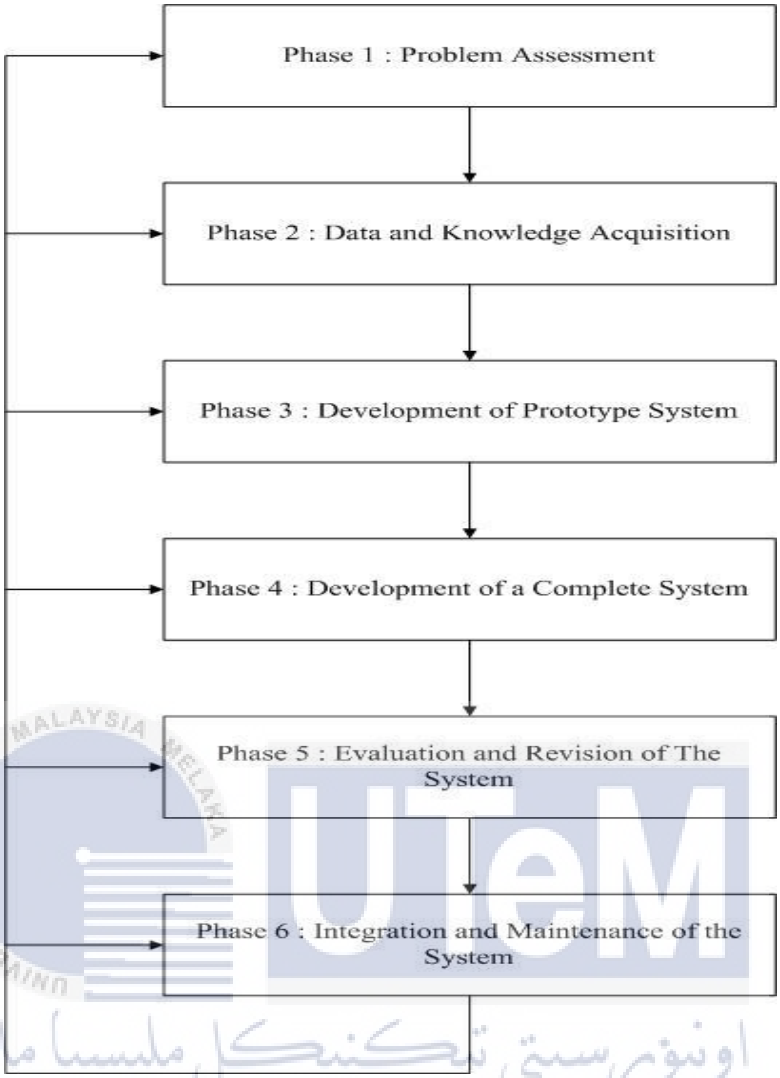

Figure 2.4: The process of knowledge engineering

Phase 1: Problem assessment

The major concept of the problem and behavior of an existing system that involved in the problem was described in the problem assessment. In this phase, the problem characteristics, participants involved in the project, objectives of the project and the resources required building the system needs to be determined. It is important to have clear objective as it can help in order to bring the project to a successful completion.

Phase 2: Data knowledge acquisition

In this phase further understanding of the problem domain was obtain given that it is critical especially for building intelligent system, hence a lot of data researches and knowledge need to be analyzed and done. The data and knowledge was get from the books, paper, and documents about past research that have been done. However, as there are too many sources and method used for intelligent system, Therefore, the available data and methods can be investigated and compared before deciding which tool to apply.

Phase 3: Development of a prototype system

Prototype system is used to test how well a problem is being understood. Since during phase 2 already involved the problem-solving strategy, so this phase is confirm that the strategy chosen is work and the tool selected is suitable for building the system. If the building system tools are chosen wrongly, the prototype can be thrown away and prototyping phase can be started again. Once it is successfully built, the same input data can be tested and the solution can be compared with the original solution.

Phase 4: Development of a complete system

When the develop prototype start to work the developing process can be start in full-scale, it means that everything that involved in developing a full-scale system also can be accessed. In addition data collections need to be done in so that the system can handle cases more specific and to get the more accurate result. System's interface starts to build and must easily for user to obtain any details they need.\

Phase 5: Evaluation and revision of the system

When the itinerary planning model has been fully implemented its performance can be evaluated. The evaluation need to be done in order to check whether the system does what is supposed to do, and make sure that the system performs can satisfied the user's need . It evaluates the stability and performance of the system with all the function integrate to execute as a package instead of functioning independently. From the evaluation phase we can identify the weakness of the system.

Phase 6: Integration and maintenance of the system

This phase is the final phase in developing the itinerary planning model. System integration defined as the process of bringing together the component subsystem into one system and they can work function together. Integrating the system into the environment can be involved in this phase. It can operate and establishing an effective maintenance program. All the function, button in the system can be tested and make sure they can work together.

2.4 Project Requirement

This section can describes the types of the software, hardware, and network requirements, and brief descriptions. These requirements can collaborate to develop the project which is The Smart Shopping Assistant App.

2.4.1 Software Requirement

Sublime Text 2	Design and coding tool
Php My Admin	Database
Xampp-win32	Software Package that consist of server and database
Samsung Usb Driver	Connect the system in with the smartphone
Android Studio	Platform to develop project
Node .js	Mobile application

Microsoft Word 2013	Documentation
Microsoft Power Point 2013	Presentation
Microsoft Project 2013	Project planning and scheduling

Table 2.2: Software Requirement

2.4.2. Hardware Requirement

Personal Computer	Intel core i5, 1BG RAM,

Table 2.3: Hardware Requirement

2.4.3. Other Requirement

-not available

2.5 Project Schedule and Milestone

PSM1

Week	Task	Note
1 22-26 Feb 2016	Submit and present proposal	Action: Student
	Proposal evaluation and approval	Action: Supervisor and Evaluator
2 29 Feb-9 March 2016	Correction and improvement of Chapter 1 (Proposal)	Action: Student
3 7-11 March 2016	Chapter 1 : Start develop the project	Action: Student and Supervisor
4 14-18 March 2016	Chapter 1 : Introduction Chapter 2 :Literature Review and Project Methodology	Action: Student
5 21-25 March 2016	Chapter 2 :Literature Review and Project Methodology	Action: Student

6 28 March-1 April 2016	Chapter 2 :Literature Review and Project Methodology Chapter 3: Analysis Submit and present progress 1	Action: Student and Supervisor
7 4-8 April 2016	Chapter 3 : Analysis Chapter 4: Design	Action: Student
8	Mid Semester Break	
9 18-22 April 2016	Chapter 4: Design	Action: Student and Supervisor
10 25-29 April 2016	Chapter 4: Design Submit and present progress report 2	Action: Student and Supervisor
11 2-6 May 2016	Get the status either proceed or repeat	Action: AJK PSM/PD and Supervisor
12 9-13 May 2016	Final report	Action: Student, Supervisor and Evaluator
13	Final report	

16-20 May 2016		Action: Student, Supervisor and Evaluator
	Final presentation schedule	Action: AJK PSM/PD
14 23-27 May 2016	Submit final report	Action: Student, Supervisor and Evaluator
15 30 May-3June 2016	Final presentation	Action: Student, Supervisor and Evaluator
16 6-10 June 2016	Correction Get the final mark	Action: Student, Supervisor, Evaluator and AJK PSM

Table 2.4: Project Schedule and Milestone for PSM1

PSM 2

Week	**Tasks**	**Note**
1 27 Jun – 1 July	Chapter 4: Design Chapter 5: Implementation	Action: Student

2 11 – 15 July	Chapter 5: Implementation Correction and improvement	Action: Student, Supervisor, Evaluator and AJK PSM
3 18 – 22 July	Chapter 5: Implementation Chapter 6: Testing	Action: Student
4 25 – 29 July	Chapter 6: Testing Correction and improvement	Action: Student and Supervisor
5 1 – 5 August	Chapter 6: Testing Chapter 7: Conclusion Presentation Timetable	Action: Student, Supervisor and AJK PSM
6 8 – 12 August	Chapter 7:Conclusion Correction and improvement	Action: Student and Supervisor
7 15 – 19 August	Last Presentation (PA) Summit Full Draft PSM	Action: Student, Supervisor and Evaluator
8 22 – 26 August	Full Draft PSM Correction and improvement	Action: Student, Supervisor and AJK PSM
9 29 August – 2 Sept	Submission of Logbook and Full Report	Action: Student and Supervisor

Table 2.5: Project Schedule and Milestone for PSM2

2.6 Conclusion

In this chapter, literature review and methodology is done. The summary of some of the research papers have been discussed at this chapter as well. On the other hand, methodology consist the method or technique that used throughout the whole paper. A proper software development can bring the successful of development process. Hence, it plays an important role during the developing process. Next chapter can explain about the analysis phases and how the system going to be develop can be discussed. Both functional and non-functional requirements can be shown as well.

CHAPTER III

ANALYSIS

3.1 Introduction

Analysis phase is the process of breaking complex or substance matter into smaller parts in order to get a better understanding of it. This phase is the part in the most of the existing methodology while in the previous chapter, lots of knowledge from journals, research paper and from other resources was gained. Usually, the problem in the analysis techniques used, requirement resources and delivery platform are required in the analysis. The problem was reviewed and the process of identifying problem is the process for defining the differences to get the problem solving by finding the way to reduce the differences. This chapter begin by presenting the problem analysis and showing how the current system run with the information background of the current system.

During the analysis, the requirement for the new system was gained. The system requirements are including data requirement, functional requirement, non-functional requirement and other requirement. Data requirement show the type of data need for the system to functioning properly and the amount of data stored in the

database. Functional requirement explained about the function that can be used during system implementation. It includes use-case diagram and description. While, non-functional requirement define the other basic function that a system should have. Other requirement show another requirement that less significant to the system. Methodology used to collect the requirement is explained for each requirement part. Flow charts are shown during the progress in this chapter.

3.2 Problem Analysis

Problem analysis is the way to understand and identify the problem in term of causes and effect. Furthermore, the analysis can show the constraint that can limit the solution of the problem. The analysis was made for the current system's to solve the problems from the lacking feature that the existing system not provided.

3.2.1 Background of Current System

The current system that was build is the shopping system that help the customer to gain the information on particular mall. The information is in term of price, the location of the customer and the location of the mall. This system can allow the customer to insert the data, not only by the admin. By get the picture of the price image can make easier to the customer member insert the data into the system. The customer that not register as the member still can view the price info, their current location with the mall, make the comment for the system and view other comment about the system. This system focus on help the user to insert data by the captured the picture. When captured the picture, the picture can be process by using the image processing (AI)

technique while the image can convert to the numeral characteristic form to save into database and display to other customer.

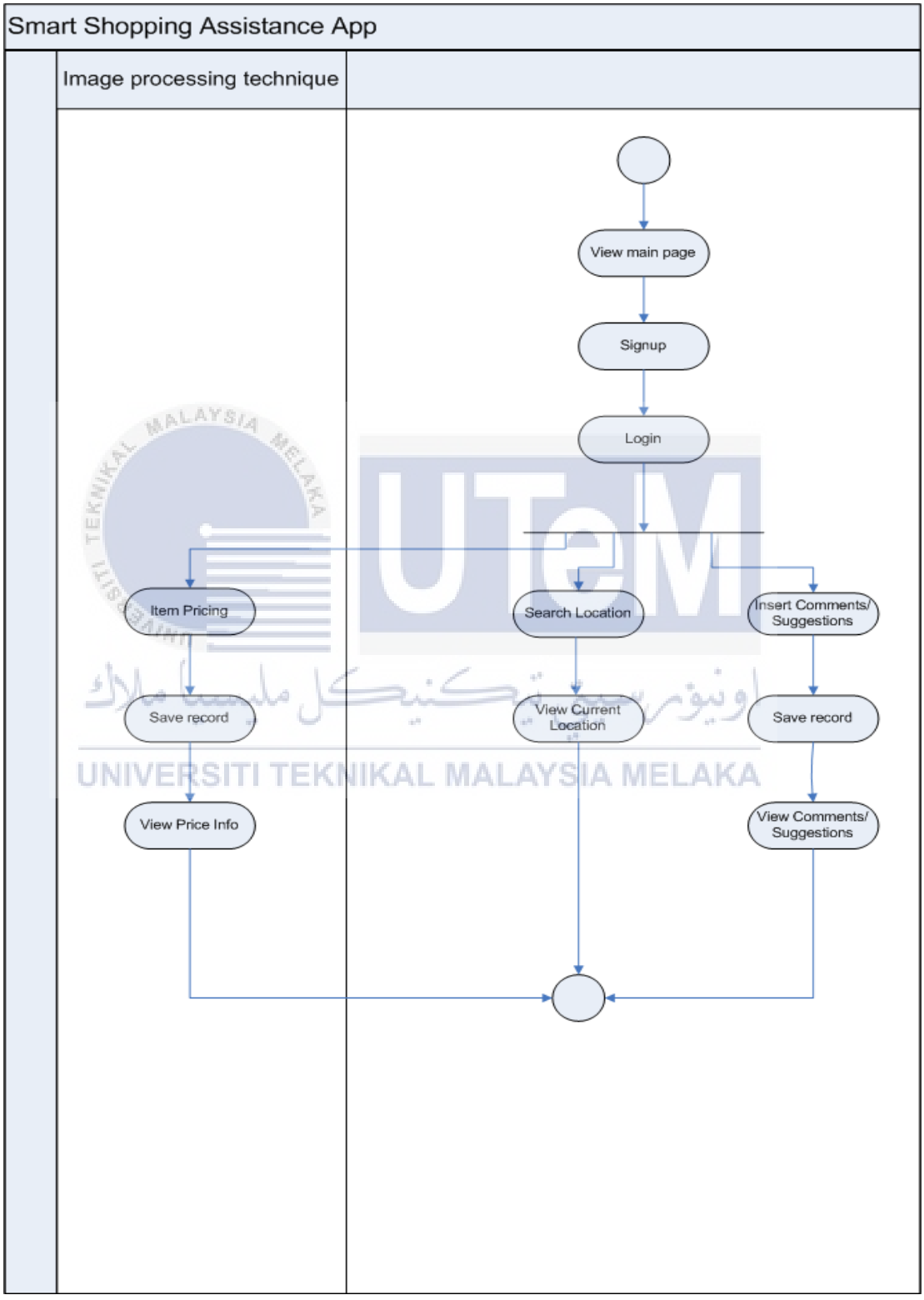

Figure 3.1: Activity Diagram of the Current System

3.2.2 Problem Statement

Make the decision for find the right place to shopping such as buy some groceries is complex problem solving activity especially when we do not know which shopping mall is the best for us to go based on the distance from our house to the shopping mall by customer current location and the price that the shopping mall offers. Usually, customer can go to the mall that nearest with their location somehow the price at that mall in expensive. Moreover, some customer go outstation for holiday or more and want to buy some food but they do not know where the mall location nearer their place. Besides, customer do not have information about comparison the price at some all that can help them to make the right decision to choose the mall that give them advantage and profit. By this problem can make the customer suffer a financial lose if they choose the wrong shopping mall.

3.3 Requirement Analysis

The word of 'Requirement' meaning that what some system must do or must have and what the characteristic it need to have. "Requirement can be either functional or non-functional in the nature. A functional requirement relates directly to the process the system for the next step of the analysis process. This is because it define the function that the system must have. Non-functional requirement refer to behavioral properties that the system need to have such as usability and performance. " [Dennis A. and Wixom B. H., 2003]. The requirement analysis for this chapter for comprises of functional, software, hardware and network requirements.

3.3.1 Data Requirement

Data requirement is important for identify the required data needed in system. The information can gained by the gathering of all the data requirements. In this section, the system input or what data should be in the system store by internally and data dictionary are provided.

User		
Attribute	**Description**	**Sample Data**
u_id	User's id	2
u_firstname	User's firstname	Jannah
u_lastname	User's lastname	Bakar
u_message	User's message/comments	Awesome!
u_password	User's password	Abc123
r_id	Role's id (admin/user)	1

Table 3.1: Table Database for User

Item		
Attribute	**Description**	**Sample Data**
i_id	item's id	3
i_barcode	Item's barcode	
i_price	Item's price	2.30

i_description	Item's description	1kg
i_name	Item's name	Sugar
m_id	Mall's id	1

Table 3.2: Table Database for Item

Mall		
Attribute	**Description**	**Sample Data**
m_id	Mall's id	4
m_name	Mall's name	Tesco
m_description	Mall's description	Batu berendam, Melaka
m_location	Mall;location	Latitude:2.2187664, Longitude:102.25193

Table 3.3: Table database for Mall

Role		
Attribute	**Description**	**Sample Data**
r_id	Role's id	1
r_name	Role's name	admin

Table 3.4: Table Database for Role

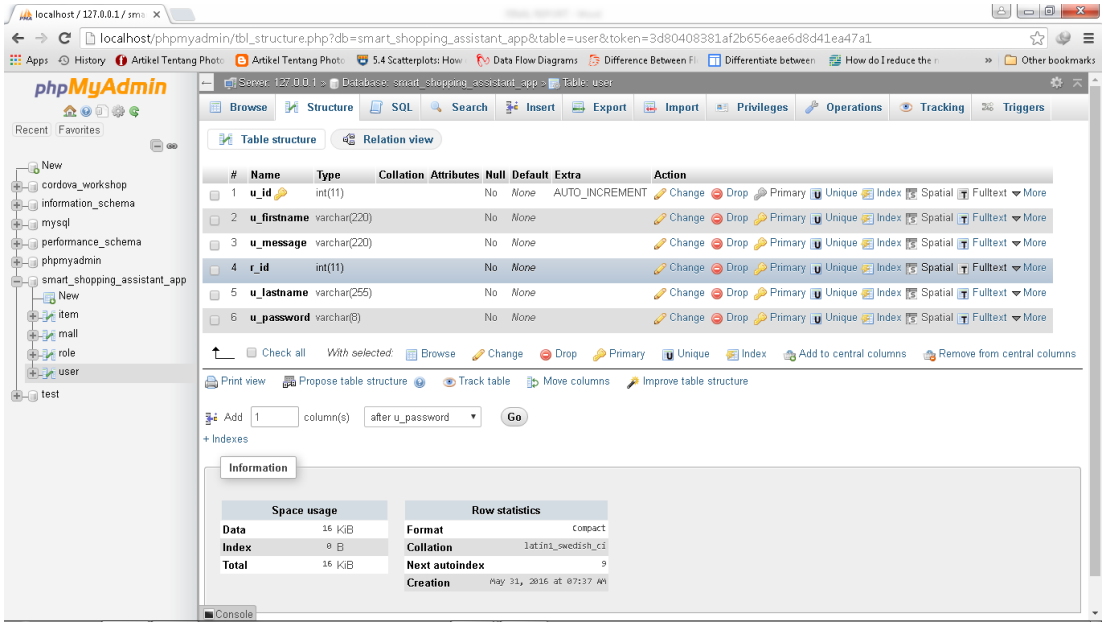

Figure 3.2: Data Dictionary for User

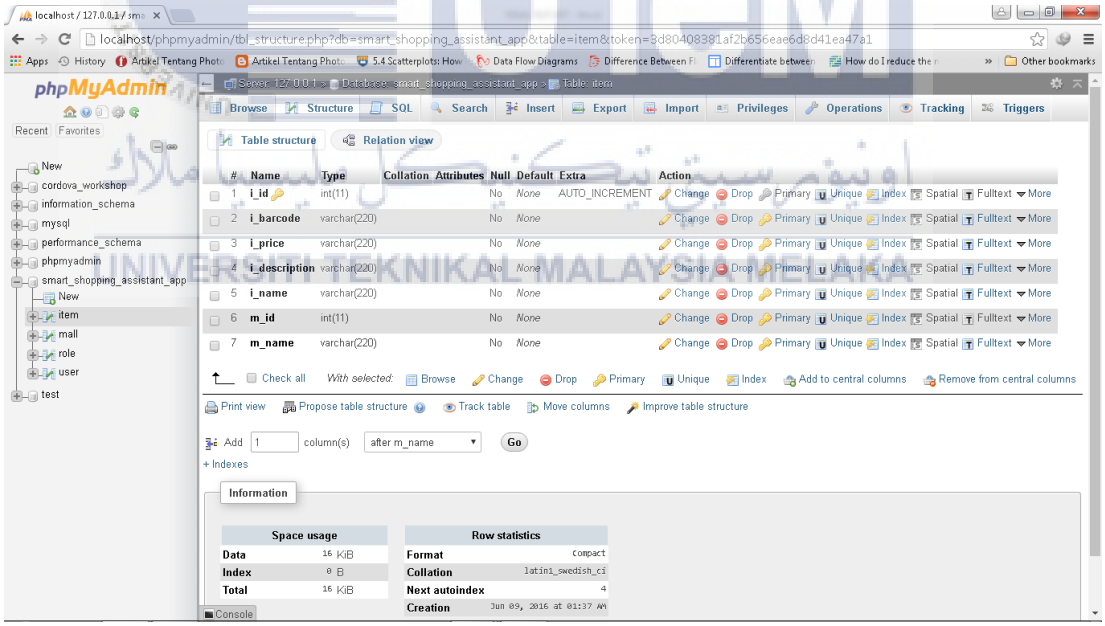

Figure 3.3: Data Dictionary for Item

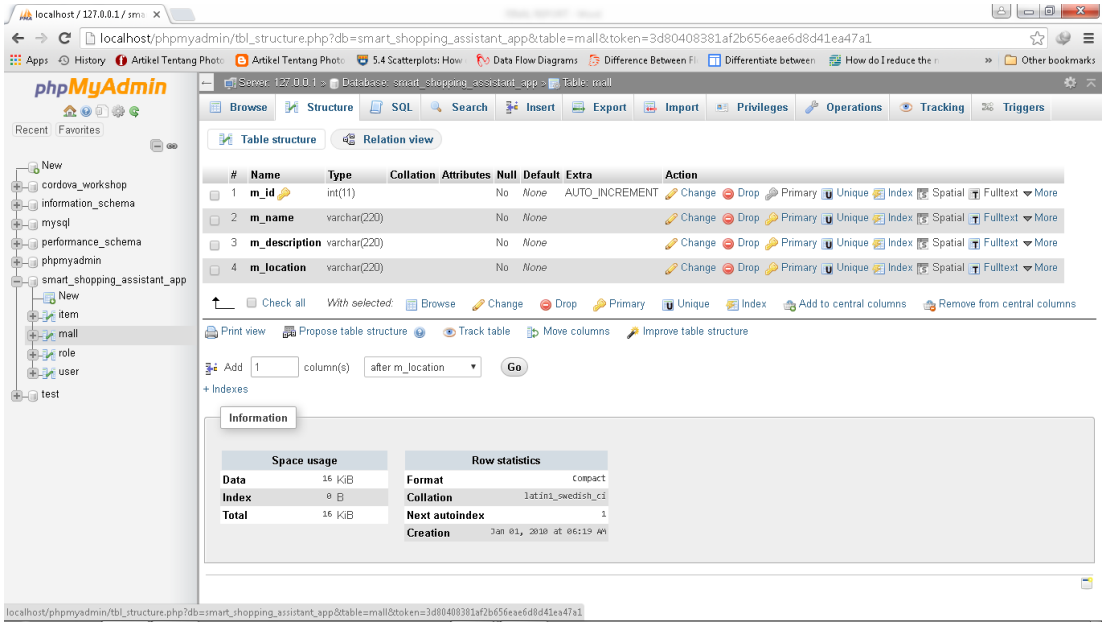

Figure 3.4: Table Data Dictionary for Mall

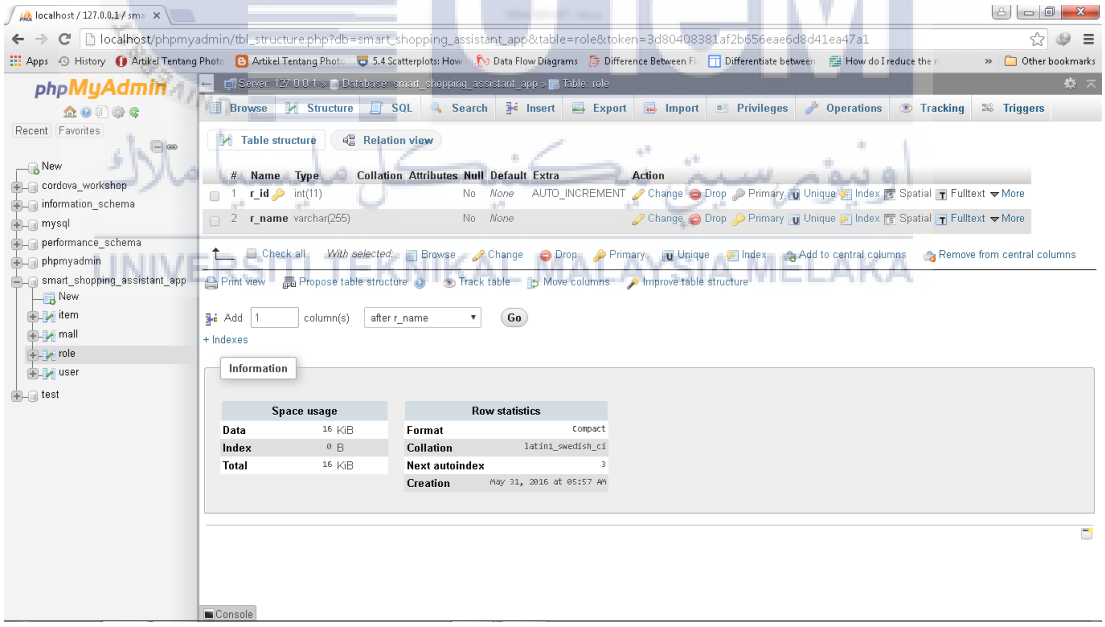

Figure 3.5: Table Data Dictionary for Role

3.3.2 Functional Requirement

This stage for describe and define the functional requirement of the Smart Shopping Assistant App. This requirements are high capabilities for that system that are necessary to deliver benefits to the user. Moreover, this stage can describe the function of that system.

This Smart Shopping Assistant App using the artificial intelligence technique to produce the result in term of data to save in the database. The Cordova Apache software that have JAVA, HTML and CSS are being used to make the functionality and interface in the system. In the main page of the system will need user to sign up and login if the user want to be a member of shopping app while other user that not signup and login as the member still can use the system but have the limit of the functionality of the system. User that sign up as the member can insert the information in database by take the picture of the price and it can be process to form in numbering form and save in database. So that not only admin can insert the data.

The all price information that insert by member or admin can view to all the user as the info to guide the user to make decision to choose right place to shopping. Moreover, all the user that not member or member can give comment about that system and the comment can view to all the user. Furthermore, this system can show the user current location in term of map that can help the user find the shopping place if the user in the not familiar place or location.

3.3.2.1 Use Case Description

- **Sign Up**

Use Case: Sign Up
Use Case ID: 1
Primary Actors: User
Preconditions: User that use the system for the first time
Flow of Event: 1. Use case start when the first time user clicks on "Sign Up" button at the login page. 2. Registration page can be display. 3. User is required to key in their personal details. 4. Click sign up button. 5. Successful user information can be stored in the database. 6. User can be navigate to the user menu page. 7. The use case ends.
Post Conditions: Sign up successful.

Table 3.5: Sign Up Use Case Description

- **Login**

Use Case: Login
Use Case ID: 2
Primary Actors: User
Preconditions: None
Flow of Event: 1. The used case begins when login page was displayed. 2. Username and password was key-in by the user. 3. The system validates the login details with the information in the database. 4. The user case ends.
Exceptional Flows: Error 1: Invalid Personal Details • The user cannot login • Used case ends.
Post Conditions: Login Success

Table 3.6: Login Use Case Description

- **User Menu**

Use Case: User menu
Use Case ID: 3
Primary Actors: User
Preconditions: User is a member

Flow of Event: 1. User menu can be displayed by the system. 2. When the user has successfully login into the system the use case can begin. 3. The system can display Item Pricing, Nearer Mall Location and Comments/Suggestions button and user can select according to their choices. **4.** The use case ends
Exceptional Flow: None
Post Conditions: go to the next page

Table 3.7: User Menu Use Case Description

- **Item Pricing**

Use Case: Item Pricing
Use Case ID: 4
Primary Actors: User
Preconditions: User is a member
Flow of Event: **1.** Item Pricing page can be displayed by the system. **2.** The system can display Picture Scanning and View Price Info button and user can select according to their choices. **3.** The use case ends
Exceptional Flow: None
Post Conditions: go to the next page

Table 3.8: Item Pricing Use Case Description

- **Picture Scanning**

Use Case: Picture Scanning
Use Case ID: 5
Primary Actors: User
Preconditions: User is a member
Flow of Event: **1.** Picture scanning page can be displayed by the system. 2. User can take the picture of the prices and the image can be process by image processing. 3. The data from picture convert to numbering form and save to database. **4.** The use case ends
Exceptional Flow: None
Post Conditions: price information save into the database

Table 3.9: Picture Scanning Use Case Description

- **View Price Info**

Use Case: View Price Info
Use Case ID: 6
Primary Actors: User
Preconditions: none
Flow of Event: 1. View Price Info page can be displayed by the system.

2. The price info from database can show on that page according price ascending order 3. The use case ends
Exceptional Flow: None
Post Conditions: price information was viewed

Table 3.10: View Price Info Use Case Description

- **My Shopping List**

Use Case: My Shopping List
Use Case ID: 7
Primary Actors: User
Preconditions: none
Flow of Event: 1. User can make the groceries list **2.** The total calculation price according mall will appear to make the comparison
Exceptional Flow: None
Post Conditions: will make shopping list and the prices comparison between malls will appear

Table 3.11: View Price Info Use Case Description

- **Nearer Mall Location**

Use Case: Nearer Mall Location
Use Case ID: 8
Primary Actors: User
Preconditions: none
Flow of Event: 1. Nearer Mall Location page can be displayed by the system. 2. The current location of the user can view. 3. The use case ends
Exceptional Flow: None
Post Conditions: Current Location Of the user was viewed

Table 3.12: Nearer Mall Location Use Case Description

- **Comments/Suggestions**

Use Case: Comments/Suggestion
Use Case ID: 9
Primary Actors: User
Preconditions: none
Flow of Event: 1. Comments/Suggestions page can be displayed by the system. 2. The user can key in the comments or suggestions about the system 3. The comments or suggestions can save into the database 4. The use case ends

Exceptional Flow: None
Post Conditions: the comments or suggestions can save into the database

Table 3.13: Comments/Suggestions Use Case Description

- **View Comments/Suggestions**

Use Case: View Comments/Suggestion
Use Case ID: 10
Primary Actors: User
Preconditions: none
Flow of Event: 1. View Comments/Suggestions page can be displayed by the system. 2. The comments or suggestions from database was viewed in that page 3. The use case ends
Exceptional Flow: None
Post Conditions: the comments or suggestion was viewed

Table 3.14: View Comments/Suggestions Use Case Description

3.3.3 Non-Functional Requirement

Non-functional requirement considered important because of their function in ensure that the system to function as expected and perform well without any error or other problem

Requirement	Description
Database Security	All data inside the database need to be secure to ensure the integrity of the data and unauthorized access cannot intervene with the data.
Simple GUI	The interface and should be easy to understand to the user and the navigation through the system interface is smooth and easy.
Reliability	The system should be reliable and the function of the system should be working.

Table 3.15: Non-functional Requirements

3.3.4 Other Requirement

- **Software Requirement**

Item	Description
Microsoft Window 7	An operating system from Microsoft
Cordova Apache	For system development
PHP MyAdmin	For database

Microsoft Visio	Flow Chart Software
MySQL Workbench	platform to store data in MYSQL
Microsoft Words 2007	Project documentation editor
Google Chrome	Web Browser
Matlab 2015a	Image processing

Table 3.16: Software Requirement

- **Hardware Requirement**
  I. At least 1GB RAM
  II. Any keyboard and mouse

3.4 Conclusion

In this analysis phase system requirement was gather in order to ensure the functionality of the system before proceed to the next stages and in order to fit to the system scope. This chapter has provided several flow chart as early visual of the itinerary planning system. By visualizing through the flow chart the system process can be seen clearly as it been explain through symbols and text.

CHAPTER IV

DESIGN

4.1 Introduction

In this stage, the outcomes from the analysis of the preliminary or high level design of the Smart Shopping Assistant App was defined. In design need the process of defining solution to satisfy all requirement that was identified during the analysis stage.

Design chapter is mostly related to the previous chapter which is analysis. Therefore, the design of the current system can effected by previous stage because the system must designed according to the requirement needed that has been reached in the analysis stage.

In the architecture design, the logical or high-level design is a standard decomposition in the product developed. The specification was analyses and the result which is the module structure that have functionality is formed. The output of this

activity is the data that gain by the image processing process that convert the image into the numeral form.

In this document was gather both of the low-level and high-level design based on the functionality that was covered in the previous chapter. High-level design more on overview of system layout, system architecture, raw data, graphical interface, database design and business function while low-level data more to both of physical database design and detailed design

4.2 High –Level Design

In Smart Shopping Assistance App high-level design was focuses on find the needs in the project by add the classes (driven) by the technical architecture in the project. High-level view of SSAA can be described and the higher level modules of SSAA was illustrated with the high-logical view that related analysis classes can be placed in a group according to package.

This high-level design contains input or output data for the SSAA database, high-level logical view, high –level class diagram, static organization, and user interface design including navigation design, logical database design and input and output design.

4.2.1 System Architecture

System architecture is the structure of the program component and data that are required to build the computer-based system. Architecture is the architecture style that

the system can take, the properties and structure of the component that establish the system and relationship that develop among all architectural components in that system.

In the figure 4.1 describes about the three-tier architecture layer of the Smart Shopping Assistant App. There are three architecture layer for the system which is Presentation Layer, Business Logic Layer and Database Service Layer. In the Presentation Layer contains the Graphical User Interface (GUI) design. GUI can directly access the data service layer by collaborate with the middle layer. Moreover, Business Logic Layer contains the calculation system controlling, verification and management. In the business logic layer must be deployed by the client side. Furthermore, the Database Service Layer can deals with all of the record which related with the system. Generally, the object in the data service layer are stateless and transactional, and designed according to transaction requirement of the business. It is certainly possible the object in data service layer are used to save the procedures defined in the database.

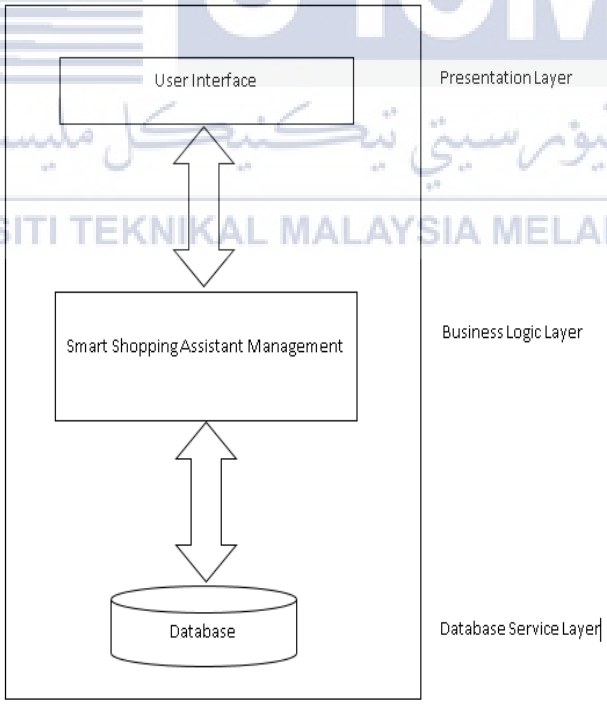

Figure 4.1: The Smart Shopping Assistant App Three-tier Application

4.2.2 User Interface

This is a section that discuss about the interface design of the system that include the user interface design, navigation design, input design and output design.

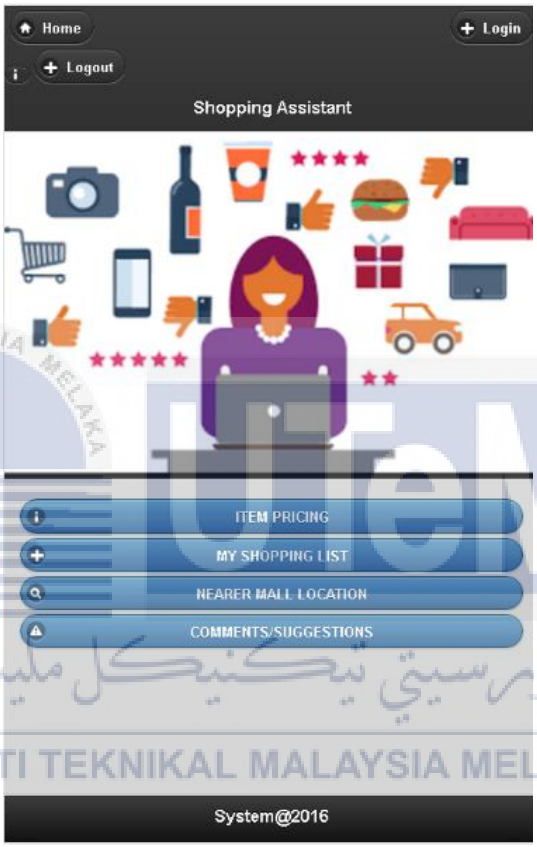

Figure 4.2: Main Page Prototype

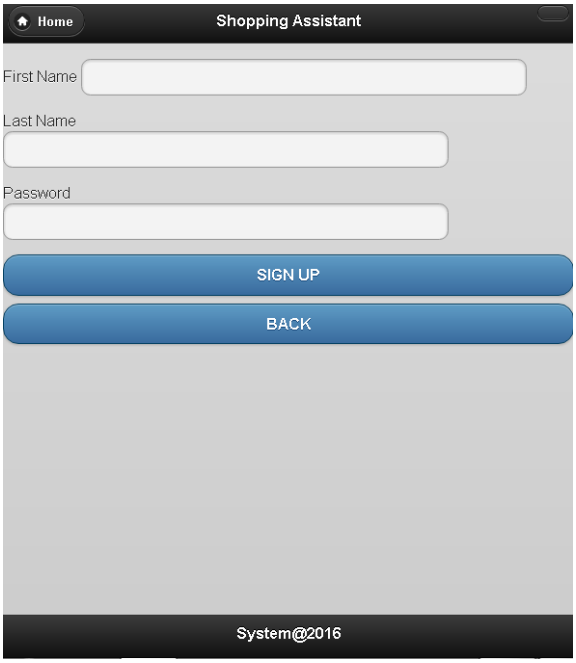

Figure 4.3: Sign up Prototype

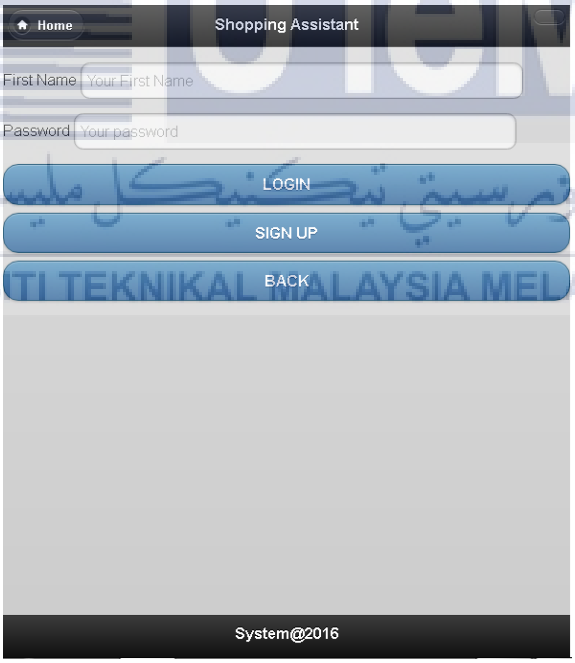

Figure 4.4: Login Prototype

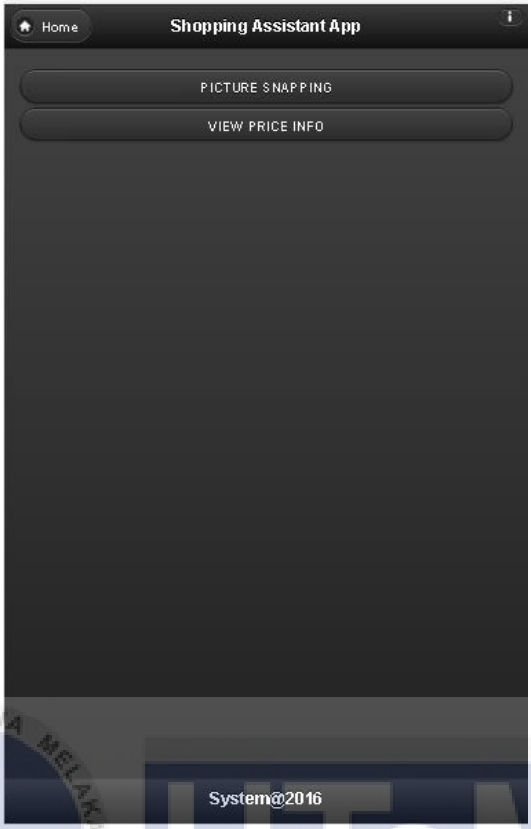

Figure 4.5: Item Pricing Prototype

Figure 4.6: Picture Scanning Prototype

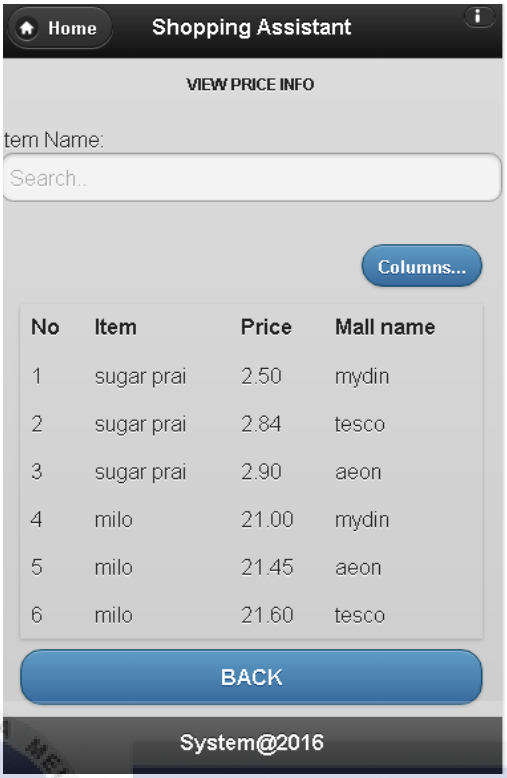

Figure 4.7: View Price Prototype

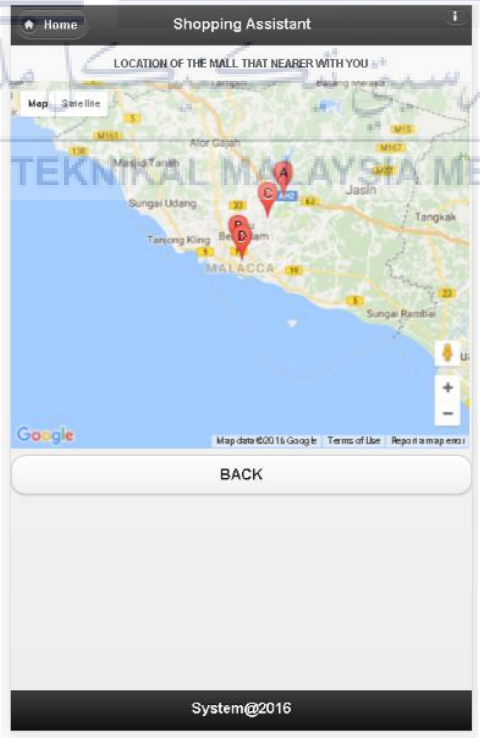

Figure 4.8: Nearer Mall Location Prototype

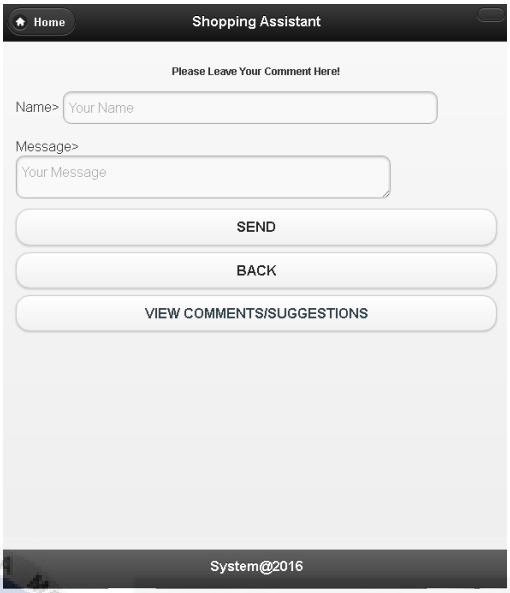

Figure 4.9: Comment and Suggestion Prototype

Figure 4.10: View Comment or Suggestion Prototype

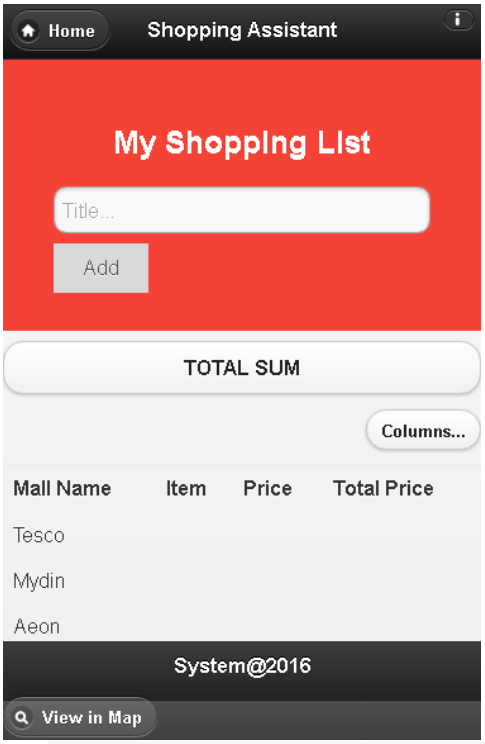

Figure 4.11: My Shopping List Prototype

4.2.2.1 Navigation Design

In Navigational design flow of graphical user interface when user interact with the system can be explains. Hence it shows that navigation design is important in every system that can be developed. The navigation design aim to help user understand the flow of the system, so the system navigation design should always be direct and simple without any unnecessary function or interface.

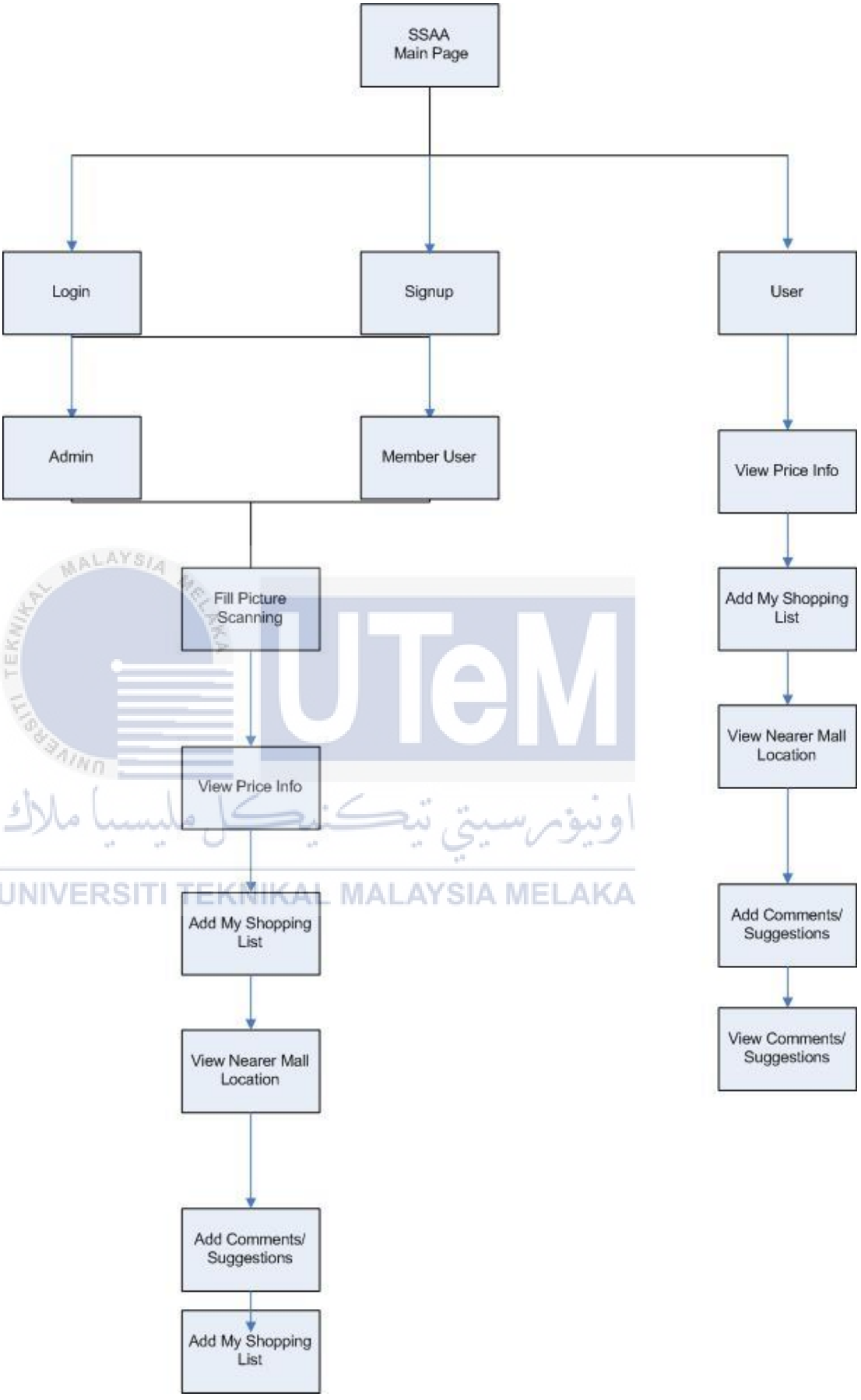

Figure 4.12: SSAA Navigation Design

4.2.2.2. Input Design

Input design is the information produces by the user by the purpose of controlling the control diagram. The user can provide the input through the interface of the system. The interface can determines the kind of input that the program accept such as text type or control string with the mouse and keyboard clicks. The table show below is the input design that to be use in the SSAA system.

System interface	Input	Input Type	Edit Control
User Sign Up	Firstname	Text Field	Max 220 varchar
	Lastname	Text Field	Max 220 varchar
	Password	Text Field	Max 8 varchar
Login	Firstname	Text Field	Max 220 varchar
	Password	Text Field	Max 8 varchar
Picture Scanning	Mall Name	Text Field	Max 220 varchar
	Item	Text Field	Max 220 varchar
	Price	Text Field	Max 220 varchar
Comments/Suggestions	Firstname	Text Field	Max 220 varchar
	Message	Text Field	Max 220 varchar

Table 4.1: SSAA Input Design

4.2.2.3 Technical Design

Image processing technique (Artificial Intelligence) was used to process the image of the price that pictured by the user (member). This technique can convert the image of the price into the numeral form to save into the database. The Optical Character Recognition (OCR) function is used to compare the each individual character against the complete alphanumeric database. The OCR actually uses correlation method to match individual character and finally the number is identified and stored in string format in a variable. So that, the user was save the number of the price, not the picture of the price.

4.2.2.4 Output Design

Output is information gained by the system and the received by the user. The user interface was defines the input acceptance and the output produced. Output is refer to the specifically for explicit output by something intentionally provided for user.

Interface	Description	Output
Login	Registered user can need to input their firstname and password to login	The Picture Scanning and View Price button can be seen
Picture Scanning	The user (member only) take the picture of the price as the input and the	the price in the numeral form can be appear and

	image can be process using image processing	automatically inserted in the text field of the price
My Shopping List	The user can make the shopping list. Based on the shopping list	The total price according mall will appear to make price comparison between malls
Nearer Mall Location	The user click the button of nearer mall location at the main page	User current location map can be appear
View Price Info	The user click the button of the View Price Info at the Item Pricing page	Price information can viewed in form of table
View Comments/Suggestions	The user click the View Comments/Suggestions button at the Comments/Suggestions page	All the comments/suggestions can appear from databased in form of table

Table 4.2: Output Design

4.2.3 Database Design

Database Design is used to show the data used in the system, and also the relationship between each other. A good database design can improved the efficiency of the system.

4.2.3.1 Conceptual and Logical Database Design

The process in the database design is to produces a detailed data model of the database. In this model have all the needed physical and logical design chooses and also physical parameter storage needed to form a design in the Data Definition Language. It can be used to build the database and detailed attributes for each entity can form by fully attribute data model.

Term of the database design can be used to describe the difference part of the design in the overall database system. It can be thought design as the logical design of base data structure that used to save the data. However, the term database design also can be used for applying the overall process in designing.

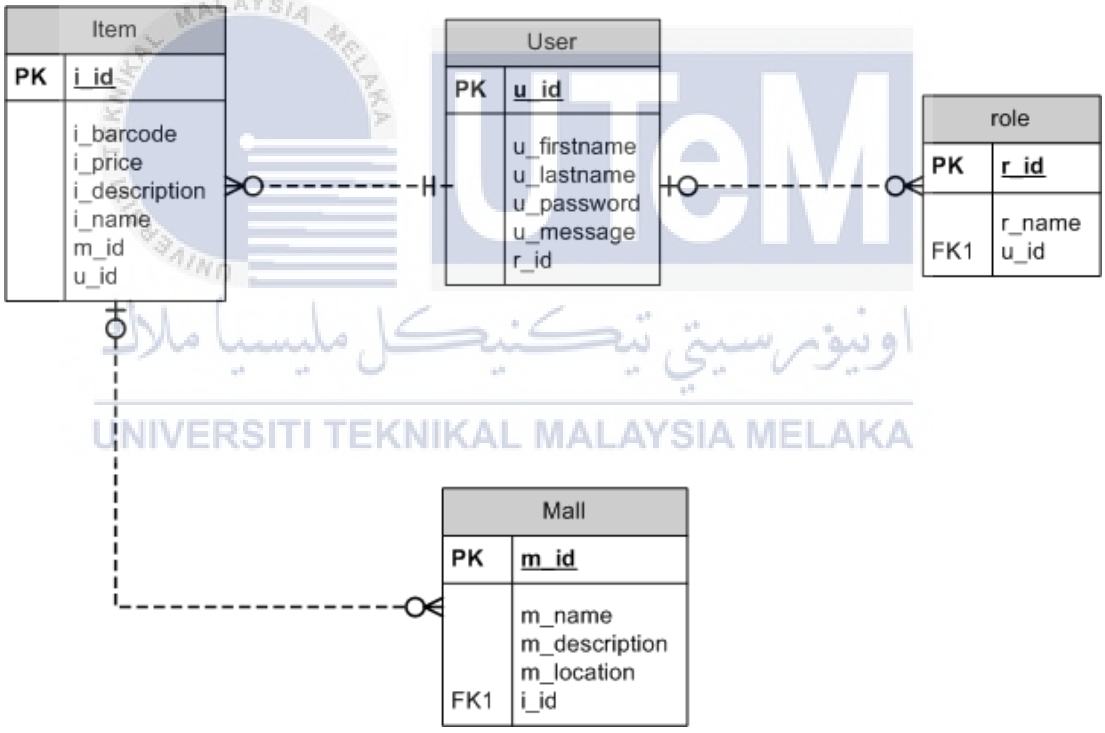

Figure 4.13: Logical Database Design of SSAA

4.2.3.2 Business Rule

i. Admin and Member user only can do the picture scanning
ii. User that want to be member must sign up first
iii. A comments/suggestions must have one user
iv. A picture scanning must have one user
v. A user may have zero or more comments/suggestions

4.3 Detailed Design

This section can be focusing more on the detail design which was considered as a low level design. Each module task of the system can be specified clearly in the detail design. The proposed algorithm can also be elaborate. Detailed design at link implementation, full specification of all methods and detailed data typing of attributes. At the end result is the complete design for the full SSAA system.

4.3.1 Software Specification

4.3.1.1 User Sign Up

Function	**Attributes method/operations**	
For the user that want to be a member	**Load1()**	**Responsibility:** Display Signup interface

		Input: none **Output:** none **Pre-condition:** none
	AddNewUser()	**Responsibility:** user creating an account **Input:** firstname, lastname, password **Output: none** **Pre-condition:** none

Table 4.3: Methods and Operation for User Sign Up

Algorithm:

1.0 Start

2.0 IF

2.1 IF AddNewUser

get input data and save

2.2 ELSE

Return to signup page

3.0 End IF

4.0 End

4.3.1.2 Login

Function	Attributes method/operations	
To allow user to access the system	**Load2()**	**Responsibility:** Display login interface **Input:** none **Output:** none **Pre-condition:** none
	Login()	**Responsibility:** checking user verification **Input:** firstname and password **Output:** none **Pre-condition:** none

Table 4.4: Methods and Operation for Login

Algorithm:

1.0 Start
2.0 Get firstname from user
3.0 Get password from user
4.0 IF
4.1 IF
Login success can view 3 button in item view
4.2 ELSE
Only can view 1 button in item view
5.0 End if
6.0 End

4.3.1.3 User Menu

Function	Attributes methods/operations	
Users can start choose button in user menu	**Load3()**	**Responsibility:** Display user menu interface **Input:** none **Output:** none **Pre-condition:** user need to choose the button
	User Menu()	**Responsibility:** user can go to Item Pricing, Nearer Mall Location, and Comments/Suggestions page **Input:** none **Output:** next page can display **Pre-condition:** none

Table 4.5: Methods and Operation for user menu

Algorithm:

1.0 Start

2.0 Provide the next page

3.0 End

4.3.1.4 Item Pricing

Function	**Attributes methods/operations**	
View 2 button that user must choose	**Load4()**	**Responsibility:** display system interface **Input:** none **Output:** none **Pre-condition:** member user can choose 3 button while normal user only can click 1 button
	Item pricing()	**Responsibility:** none **Input:** none **Output:** view the next page **Pre-condition:** System need to be login first

Table 4.6: Methods and Operation for item pricing

Algorithm:

1.0 Start

2.0 Provide next page

3.0 End

4.3.1.5 Picture Snapping

Function	**Attributes methods/operations**	
Process the image that taken by the user (member) or admin	**Load5()**	**Responsibility:** display system interface **Input:** image **Output:** numeral form **Pre-condition:** member user and admin only
	Picture Scanning()	**Responsibility:** none **Input:** none **Output:** view the next page **Pre-condition:** System need to be login first

Table 4.7: Methods and Operation for picture scanning

Algorithm:

4.0 Start

5.0 Provide next page

6.0 End

4.3.1.6 View Price Info

Function	**Attributes methods/operations**	
View price Information from database	**Load6()**	**Responsibility:** display system interface **Input:** none **Output:** price information table **Pre-condition:** none
	View Price Info()	**Responsibility:** none **Input:** none **Output:** view price information table **Pre-condition:** none

Table 4.8: Methods and Operation for View Price Info

Algorithm:

7.0 Start

8.0 View Price Info

9.0 End

4.3.1.7 Nearer Mall Location

Function	**Attributes methods/operations**	
View user current location	**Load7()**	**Responsibility:** display system interface **Input:** none **Output:** none **Pre-condition:** none
	Nearer Mall Location	**Responsibility:** none **Input:** none **Output:** view the user current location **Pre-condition:** none

Table 4.9: Methods and Operation for Nearer Mall Location

Algorithm:

10.0 Start

11.0 View user current location

12.0 End

4.3.1.8 Comments/Suggestions

Function	**Attributes methods/operations**	
User insert the comments/suggestions	**Load8()**	**Responsibility:** display system interface **Input:** none **Output:** none **Pre-condition:** none
	Comments/Suggestions	**Responsibility:** none **Input:** username, message **Output:** none **Pre-condition:** none

Table 4.10: Methods and Operation for Comments/Suggestions

Algorithm:

13.0 Start

14.0 Insert the comments/suggestions

15.0 End

4.3.1.9 View Comments/Suggestions

Function	**Attributes methods/operations**	
View comments/suggestions table	**Load9()**	**Responsibility:** display system interface **Input:** none **Output:** none **Pre-condition:** none
	View Comments/Suggestions	**Responsibility:** none **Input:** none **Output:** view the comments/Suggestions table **Pre-condition:** none

Table 4.11: Methods and Operation for View Comments/Suggestions

Algorithm:

16.0 Start

17.0 View comments/suggestions

18.0 End

4.3.1.10 My Shopping List

Function	**Attributes methods/operations**	
My Shopping List	**Load10()**	**Responsibility:** display system interface **Input:** shopping list **Output:** none **Pre-condition:** none
	My Shopping List	**Responsibility:** none **Input:** none **Output:** prices comparison between malls **Pre-condition:** none

Table 4.12: Methods and Operation for My Shopping List

Algorithm:

19.0 Start

20.0 My Shopping Mall

21.0 End

4.3.2 Physical Database Design

User					
No	**Attribute**	**Data Type**	**Length**	**Primary Key**	**Mandatory**
1	u_id	Integer	11	Yes	Yes
2	u_firstname	Varchar	220	No	Yes
3	u_lastname	Varchar	225	No	Yes
4	u_message	Varchar	220	No	Yes
5	u_password	Varchar	8	No	Yes
6	r_id	Integer	11	No	Yes

Table 4.13: Data Dictionary for User

Item					
No	**Attribute**	**Data Type**	**Length**	**Primary Key**	**Mandatory**
1	i_id	Integer	11	Yes	Yes
2	i_barcode	Varchar	220	No	Yes
3	i_price	Varchar	220	No	Yes
4	i_description	Varchar	220	No	Yes
5	i_name	Varchar	220	No	Yes
6	m_id	Integer	11	No	Yes

Table 4.14: Data Dictionary for Item

Mall					
No	**Attribute**	**Data Type**	**Length**	**Primary Key**	**Mandatory**
1	m_id	Integer	11	Yes	Yes
2	m_name	Varchar	220	No	Yes
3	m_description	Varchar	220	No	Yes
4	m_location	Varchar	220	No	Yes

Table 4.2.3.3: Table Data Dictionary for Mall

Role					
No	**Attribute**	**Data Type**	**Length**	**Primary Key**	**Mandatory**
1	r_id	Integer	111	Yes	Yes
2	r_name	Varchar	225	No	Yes

Table 3.3.2.4: Table Data Dictionary for Role

4.4 Conclusion

Design is the one of the most importance stages in the developing the project. Design is needed to avoid major problem while doing implementation and includes of user interface which comprises of navigation, input and output design and system architecture. It gives a picture of real output for the final design. Design of the project is a continuous stage from the previous analysis.

CHAPTER V

IMPLEMENTATION

5.1 Introduction

The system development is based on the requirements and architectural design. In this chapter inspire following by developing the best and right system to fulfil all of the requirement by using the right setup, tool and soon.

The Smart Shopping Assistant App environment architecture in development is illustrated using the deployment diagram. There have been much activities stated in the Development phase that addresses the thing that make up the system but this Implementation Phase also put on place of the software, hardware and other important elements of this system.

5.2 Software Development Environment Setup

In the Smart Shopping Assistant App, there are consist three parts that consist of user services, business services, and data services. The user services are for the graphical user interface that is displayed to the user and manipulated the system by this interface. Moreover, for the business service, the user interact with the server which is Apache Server using the TCP/IP network. MYSQL acts as the database to store the data in this system and this situation called data services.

The software configuration also involved in the environment setup. Cordova Apache, matlab2015a, android studio, Samsung USB Driven and phpMyAdmin are needed to be installed before configure the database.

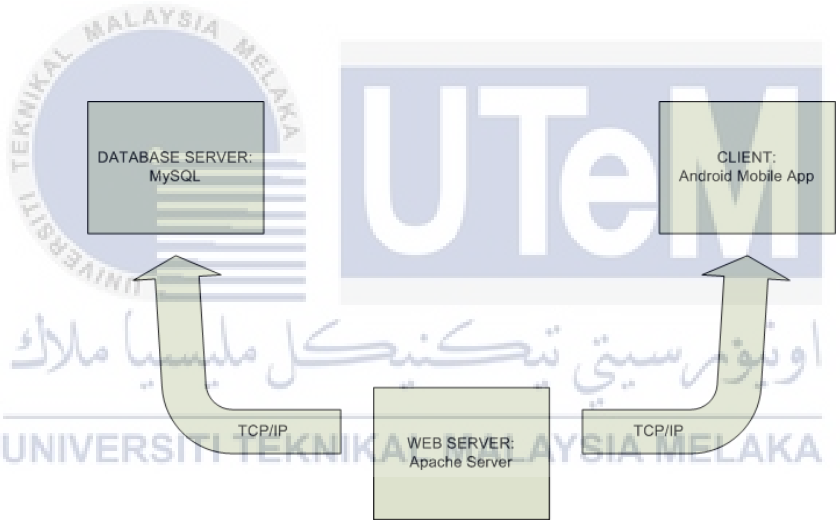

Figure 5.1: Deployment diagram for Smart Shopping Assistant App

- Server
  Apache server
  MySQL

- Client
  Internet Explorer/Mozilla Firefox
  Personal Computer/Laptop
  Android Mobile Phone

5.3 Software Configuration Management

In this phase, it is use to control the change in the software which occurs during the whole implementation process. It includes version control of the system and also the establishment of the system baselines. In order to complete the development of the system, after the environment setup, there are another software that is needed to develop the system.

Software and database required are needed to be install and all the required tool must be install in the operating system that acts as the platform. The sequence for the installation of the Smart Shopping Assistant App is shown below:

5.3.1 Configuration Environment Setup

5.3.1.1 Start

5.3.1.2 Operating System (Windows 7)

5.3.1.3 XAMPP Control Panel (Apache,MySQL)

5.3.1.4 Sublime Text 2 (JAVA,CSS,HTML)

5.3.1.5 End

5.3.2 Version Control Procedure

During the implementation of the system, the documentation and the coding process keep changing. The changing of the version is recorded for future reference. It is to make sure that the system has its own history record. With this version control

procedure, a latest version of the document can be obtained at any time. Below shows the version of the system:

Version	Description
SSAA V1.0	This version only consist of interfaces without working function
SSAA V1.1	This version has started to include functions in modules stage by stage.
SSAA V1.2	This version is for unit testing. The function in each module are tested and error being corrected
SSAA V1.3	This is for system testing. The SSAA V1.2 is corrected and enhanced with better specifications. The whole system is being tested
SSAA V1.4	The full version of system is complete.

Table 5.1: Version Control Procedure

5.4 Implementation Status

Implementation is the status is the milestone for the whole project. It is used to see the status and also the progress of the project in a specific time. Below are the modules for the project:

Module	Description	Duration to Complete
Register module	For registered user to register for using the picture snapping function in the app	1 week
Login module	The registered user must login first to make thr picture snapping button appear and allow to use	1week
Shopping list module	For user make the shopping list in android and other process	3 days
Item price info module	User can view the price info that sequence according best price	1 week
Nearer mall in map module	User can view the user current location with three mall location in a map	2 week
Picture snapping module	User can enter the price information by taking the picture of the prices	2 week
Comment module	User can insert the comment about the app	5days
View comment module	User can view the comment about the app by other user	3 days

Table 5.2: Implement Status of Each Module

5.5. Conclusion

This chapter explains the entire required setup environment to show the deployment of the system during the implementation process. The software required and environment setup has been shown in this chapter along with the installation steps.

In software development environment setup, the step to install all required software has been shown. Database configuration is also mentioned in order to setup MySQL database in phpMyAdmin. The version control procedure also shows the latest version of the system and the details of backup management process. At the end, the system can be ready for testing .Testing and integration of the system can be carried out later to make improvement.

In the next chapter, it can be the system testing phase which test plan, test strategy, test design and test result can be discussed.

CHAPTER VI

TESTING

6.1 Introduction

In this chapter comprises of The Smart Shopping Assistant App testing. The crucial in this system testing phase is the correct expected outcome can be obtained by testing the algorithm. For this chapter, the testing phase of the system can be discussed. Software testing is an important part that must be carry out to evaluate the capability of the system and to determine the requirement it needs to fulfil. Test plan and the results of testing can be discussed in this chapter to find out whether it fulfils the requirement for the project. The test can make certain of the system quality, verify and validate the system functionality. The testing process can be discussed first by test plan then follow by test strategy, test design and test results.

6.2 Test Plan

Test plan is the design to get systematic approach for the testing itself to execute the test. It also observe and evaluate the testing outcomes. The test plan for test environment, test schedule, SSAA involves test organization, classes of test and test strategy. Test plan can help the developer to produce more quality system within the project duration.

6.2.1 Test Organization

The developer of the system can be the tester and observer each of the testing along with chosen critical thinking students. This outcomes of the test can evaluated and analysed by developer. The observer assures that the tester or developer carries the testing procedures according have been planned and get the satisfaction of the outcomes.

6.2.2 Test Environment

In the test environment consist of the location and the environment of the testing task in term of software and hardware that prepared regarding to the test. For the testing purpose, the suitable environment is created for the SSAA system component. The development environment is located in one logical partition unit of the operating system Window 7.

System Configuration	Specification
Operating System	Window 7
Database	MySQL from phpMyAdmin
Computer RAM	200MB and above
Computer Speed	Pentium M,1.7GHz and above
Computer Hard Disk Space	100MB
Display Monitor	Any Standard Monitor

Table 6.1: System Configuration and Specification

6.2.3 Test Schedule

Testing activities can be done by the developer's computer. The system can processes under all basic testing necessary and the time taken distribution for each activities are identified as shown below:

No	Activity	Days
1	Prepare test plan	2 days
2	Prepared test specification	2 days
3	Prepared for hardware and software environment	2 days
4	Execute test procedure	4 days
5	Perform unit testing	3 days

6	Perform testing cycles	8 days
7	Prepare test summary report	2 days

Table 6.2: Test Schedule

6.3 Test Strategy

Test strategy has been prepared to test the feature of the system whether it meets the requirements or not. The testing strategies in SSAA are categorized as functional or structural. Functional testing based on the specification or model while structural testing related to the implementation.

6.3.1 Classes of Test

In this project, the project phases provide classes that have been involve in the testing task and procedure. White-box Testing, Black-box Testing and Performance Testing are included in this project

- White-box Testing

  Test cases are derived from the program structure. There are many techniques available in this testing because the problem or intractability is eased by specific attention and knowledge on the structure of the system under test.

- Black-box Testing

Test cases are mainly focuses on how to maximize the effectiveness of testing, mostly the number of the test cases with minimum cost. It is not possible to thoroughly test a subset of the input space.

- Performance Testing

  The system not take infinite resource or time to execute. Typical resources that need to be considered include disk space, CPU cycle, memory usage and disk access operation. The evaluation, bottleneck identification and performance comparison are the goal for the performance testing.

6.4 Test Design

Test design is use to setup an environment to test the system featuring the test case and lets the user gain information from real world.

6.4.1 Test Description

All the test case available in the system has been identifying out and documented in form type. Tester can so the testing based on the script given and the report can be record in a document.

Module/Functional Component	Test Case ID	Description
Admin and Register User Login	SSAA_T01	• Test the login's success with valid username and password. The main page displayed after success login • Test the unsuccessfulness of the login if username and password is incorrect. The user need to re-enter the username and password.
User Registration	SSAA_T02	• Test to enter the new data for new register user is working properly and automatically save in database. • Test attribute about user registration is working properly. • Data that have been entered and can be viewed properly.
Item Pricing	SSAA_T03	• Test to available the Picture Snapping button to registered user and admin only. • Test to view the View Price Info to unregister user.
View Price Info	SSAA_T04	• Test to view the price information by searching and the price sequence ascendingly.
Picture Snapping	SSAA_T05	• Test to take the picture and the image can proses to convert the image into the digit characteristic.

		• Test to place the digit characteristic placed into the price field automatic. • The price info can save properly in database.
My Shopping List	SSAA_T06	• Test to make the shopping list. • Test to view the total price based on the shopping list and mall. • Test to view the map to show the current location and malls
Nearer Mall Location	SSAA_T07	• Test to view the current location of user and the malls that use marked symbol. • Test to get distances between user current location with each mall
Comments/Suggestions	SSAA_T08	• Test to insert the comments/suggestion about the system properly. • Comments/suggestions can be insert into database.
View Comments/Suggestions	SSAA_T09	• Test to view he comments/suggestion to other user properly.

Table 6.3: Test Description

6.4.2 Test Data

Test data has been created during the process of testing. The data can be used for all the test phase. Same test data can be used for System and Integration and there is little type of test data for all the test levels. Test data must contain valid data as well as invalid data for a good testing phase. The test data for this system has been identify and attached to the test case to use.

6.5 Test Result and Analysis

After the testing is completed, the result was documented. The test case results documents the outputs from sets of input tested. When the predicted outputs are achieved, the SSAA is functioning according to its specification.

Test Case Identification	**Tester Identification(OK/NOT OK)**	**Result(OK/NOT OK)**
SSAA_T01	OK	OK
SSAA_T02	OK	OK
SSAA_T03	OK	OK
SSAA_T04	OK	NOT OK
SSAA_T05	OK	OK
SSAA_T06	OK	NOT OK

SSAA_T07	OK	NOT OK
SSAA_T08	OK	OK
SSAA_T09	OK	OK

Table 6.4: Test Case Result

6.6 Conclusion

In this chapter, the entire test plan, test strategies and test phase has been discussed. The test result is shown in the last part and most of the result is OK and have some NOT OK for the test phase. This proves that the testing phase is a useful phase in order to determine the error or mistake in the system. The result can be used in the future to make corrections. It also can give contribution in further system development.

For next chapter, it can be the conclusion for whole project which include the project strength and weakness, plans for future development, and the contribution of the project.

CHAPTER VII

PROJECT CONCLUSION

7.1 Observation on Weaknesses and Strengths

The observation of the weaknesses and strengths of the system that have been developed in this project, its contribution to the user and proposition for improvements in the future. In this chapter, it can review the project whether the system developed is successfully achieved its scope and objectives that was discussed in the previous chapter. The weaknesses and the strengths are normal to have in any system development. The strengths in the system are good thing that can be the system be successful while the weaknesses in the system are the thing that important to addresses in the future the improvement.

7.1.1 Strengths

The Smart Shopping Assistant App have the strengths which is it can help the user to make decision on where the mall that give the best decision based on the price and the short distance between the mall and the current location of the user. This can prevent the financial lost to the user according the situation of economy nowadays that increases steadily in term of the living cost but the income is unlikely growth to support the house living.

Besides that, this app is the community based platform which is the registered user can help to share the price information between the malls on the app to view by other user. These can make the fast and continuously update price because community is the first reflect the changes.

Moreover, by using the image processing in this app, the user can intelligently snap the image of the prices and then the image of prices can be processes to convert to digit characteristic to save into database and share to other user.

Lastly, in this app can show the current position of the user and the malls in the map that using the geolocation data. This can show clearly to the user where the mall that more nearer with the user to save the time and cost to shopping at that mall.

7.1.2 Weaknesses

After doing a full analysis on the whole project, some flaws has been identified for the Smart Shopping Assistant App. Firstly, this app only can show the current position of the user and the malls but not showing up the calculated distance between the user and each of the malls.

Secondly, this app only can view all the prices in database that sequence the prices ascendingly but cannot be view it by the search one item. My Shopping list can be

listed but the total sum of the prices based on the mall not success to make the price comparison.

7.2 Proposition for Improvement

This application needs more improvement to recover all the weaknesses and find the suitable solution to make this application more useful and same level with other android mobile application. Moreover, this application must always tested by real user before continue the completeness of this project. The comments and suggestions from the user also required to find the solution and solve the problem but the suggestion must be analysed first before use it.

The SSAA can be enhanced more at the calculation part which is the calculation in the My Shopping List page that must show the total prices according to the shopping listed and based on the mall to make comparison. Moreover, the calculation of the distance between the current locations of the user with each of the mall must be shown on the map.

The searching part in the view price info must be enhanced to make easier to the user find what they want in the many data of prices in the database.so, the data of the price info can view based on the user search and the price can sequence ascendingly to show that the cheaper prices is on the top according to the mall.

To make the enhanced of the feel to SSAA interface, it would be good to add some interesting multimedia elements to make it look more extruding and in the same time make the interface that can easier to use and understand by the user.

7.3 Contribution

- Contributions to university: This system is the results of the project of a degree student in UTeM, thus it can be as reference for other student who doing the similar project and domain.

- Contribution to groceries shopper: This system can be used to help them to make the best decision of the place to buy groceries.

- Contribution for an individual: For the individual who do this project, it let them to gain more knowledge on procedure to create an android mobile app.

- Contribution to shopping mall: This application can help to make increasing the marketing of the mall if the mall is offer the best price and short distance with the user.

7.4 Conclusion

The project documentation for the project is come to the end for this part. The introduction, literature review, project methodology, analysis and high-level design have been successfully accomplished in the provided time period. Most of the requirements and specification of the project has been fulfilled with meeting the conditions for objectives

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APPENDICES

APPENDIX A: PROJECT SCHEDULE AND MILESTONE

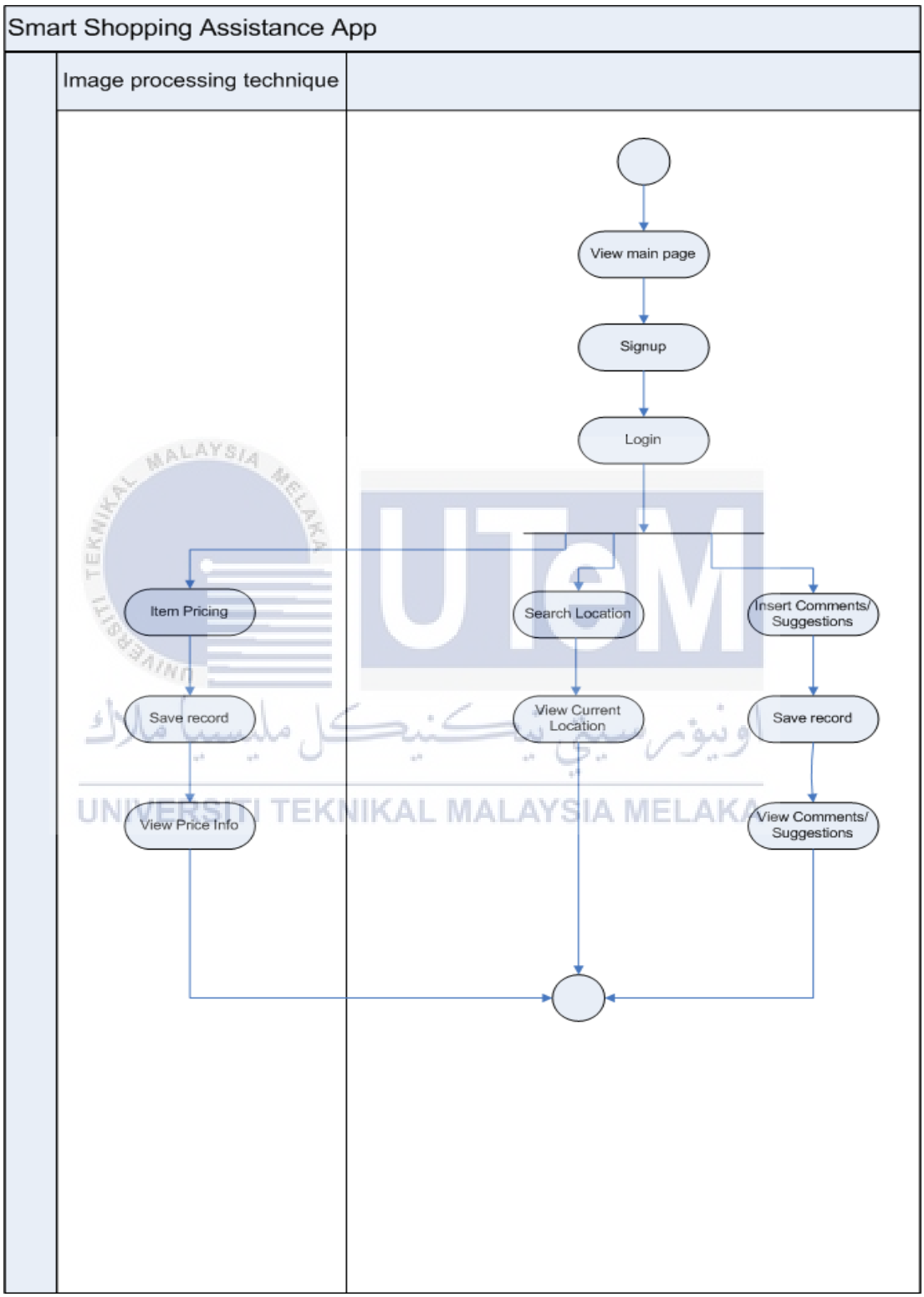
PSM1

Week	**Task**	**Note**
1 22-26 Feb 2016	Submit and present proposal	Action: Student
	Proposal evaluation and approval	Action: Supervisor and Evaluator
2 29 Feb-9 March 2016	Correction and improvement of Chapter 1 (Proposal)	Action: Student
3 7-11 March 2016	Chapter 1 : Start develop the project	Action: Student and Supervisor
4 14-18 March 2016	Chapter 1 : Introduction Chapter 2 :Literature Review and Project Methodology	Action: Student
5 21-25 March 2016	Chapter 2 :Literature Review and Project Methodology	Action: Student

6 28 March-1 April 2016	Chapter 2 :Literature Review and Project Methodology Chapter 3: Analysis Submit and present progress 1	Action: Student and Supervisor
7 4-8 April 2016	Chapter 3 : Analysis Chapter 4: Design	Action: Student
8	Mid Semester Break	
9 18-22 April 2016	Chapter 4: Design	Action: Student and Supervisor
10 25-29 April 2016	Chapter 4: Design Submit and present progress report 2	Action: Student and Supervisor
11 2-6 May 2016	Get the status either proceed or repeat	Action: AJK PSM/PD and Supervisor
12 9-13 May 2016	Final report	Action: Student, Supervisor and Evaluator
13 16-20 May 2016	Final report	Action: Student, Supervisor and Evaluator

	Final presentation schedule	Action: AJK PSM/PD
14 23-27 May 2016	Submit final report	Action: Student, Supervisor and Evaluator
15 30 May-3June 2016	Final presentation	Action: Student, Supervisor and Evaluator
16 6-10 June 2016	Correction Get the final mark	Action: Student, Supervisor, Evaluator and AJK PSM

APPENDIX B: ACTIVITY DIAGRAM OF SYSTEM



APPENDIX C: USER TESTING FORM

System: Smart Shopping Assistant App

Date:

Tester's Name:

No Tel:

(a)Tasks		Result (OK/NOT OK)	Comments /Remarks
Admin and Register User Login	• Log into system		
User Registration	• Creates new user registration		
Item Pricing	• User will view item pricing page		
	• The View Price Info will appear for normal user		
	• The View Price Info and picture snapping will appear for the registered user		
View Price Info	• The table of the price information according mall will appear with the price sequencing ascendingly		
Picture Snapping	• Take the image of the price		
	• Convert the image into digit characteristic		
	• Save the data of price into database		
My Shopping List	• Make the shopping list		
	• Make total sum based on the shopping list according the mall		
Nearer Mall Location	• View current location of the user and malls		
	• Show the distance between the current location of the mall with each of the malls		
Comments/Suggestions	• User make comments/suggestions about the app		
	• The comments/suggestions save into database		
View Comments/Suggestions	• View the comments/suggestions from other user		
(b) Issues		Rating (1-5)	Comments /Remarks
Efficiency	Easy to load		

Test	Readable		
	Understandable		
Data	Accuracy and consistency		
Interface Design	Good Navigation		
	User Friendly		
	Intuitive		
	Linking		
	Proper Error Message		

APPENDIX D: User Manual

USER MANUAL

THE SMART SHOPPING ASSISTANT APP

Smart shopping app use for planning daily shopping. Here is the user manual of smart shopping app.

1. Open the Smart Shopping Apps. The main interface will be display. Normal user only can user certain features like item pricing, my shopping list, nearer mall location and also comments/ suggestion. User can click the button to use the features. Only register user can use upload the picture of pricing item or detail in the application. Click “Login” for login to user account.

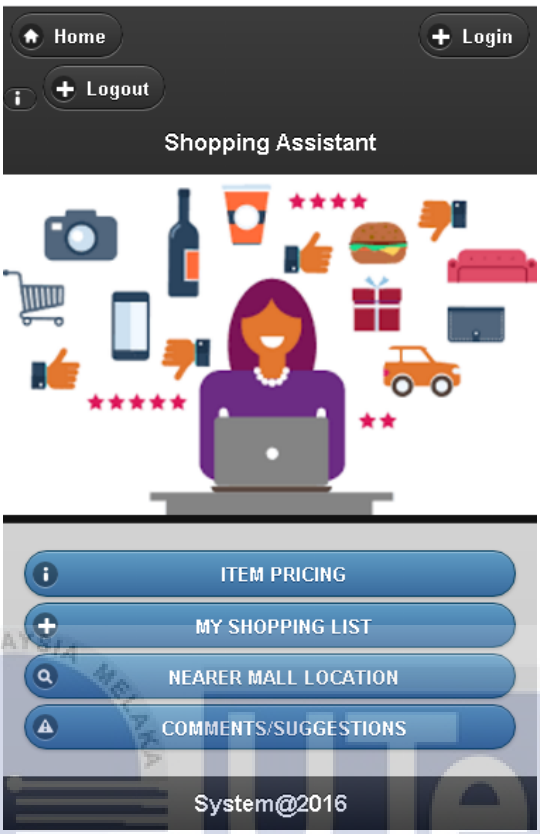


Figure 1: Main Page

2. For login, fill the first name text field with <Your first name> and fill the password text field with <Your password>. Then click the button “LOGIN”. Click button “SIGN UP” for new user.

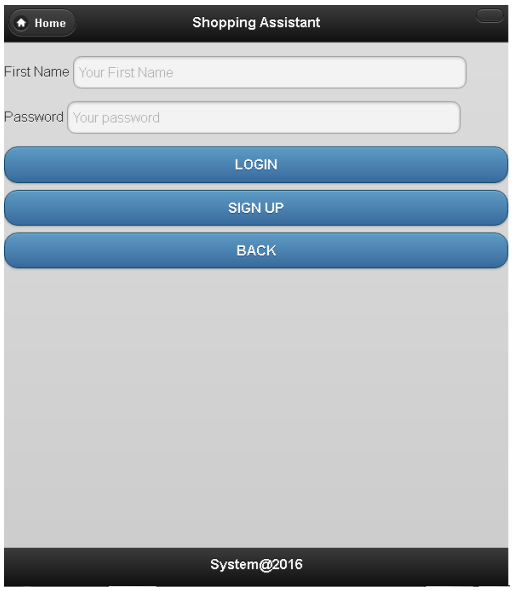


Figure 2: Login

3. To register user, fill the first name text field with <Your first name>, fill the last name text field with <Your last name> and fill the password text field with <Your password>. Then click the button “SIGN UP”.

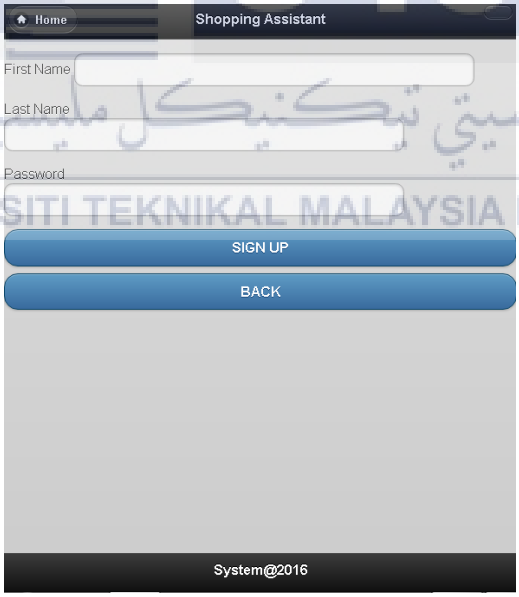


Figure 3: Sign up

4. Figure 4 is the interface for registered user. Registered user can use picture scanning features and also view price info. Click the button to use the features.

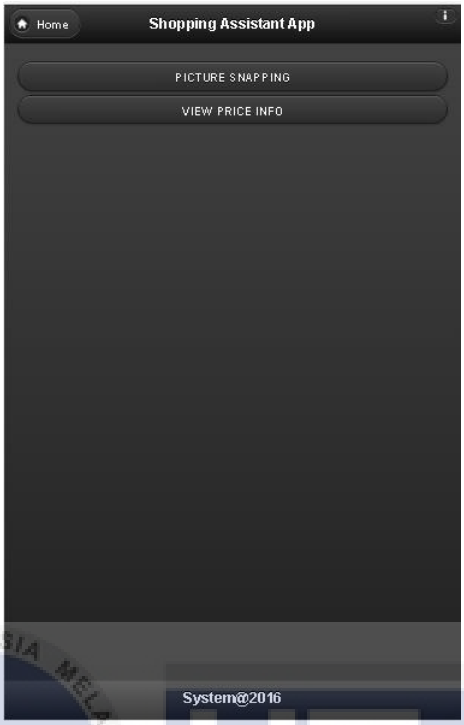


Figure 4: Item pricing

5. For picture scanning, user must fill the text field of “MALL NAME”, “ITEM”, “PRICE” and then click the button “CAPTURE”. After that, to save the information click button “SAVE”.

Figure 5: Picture scanning

6. Figure 6 show the price info for user. Click button “BACK” to go back to the menu.

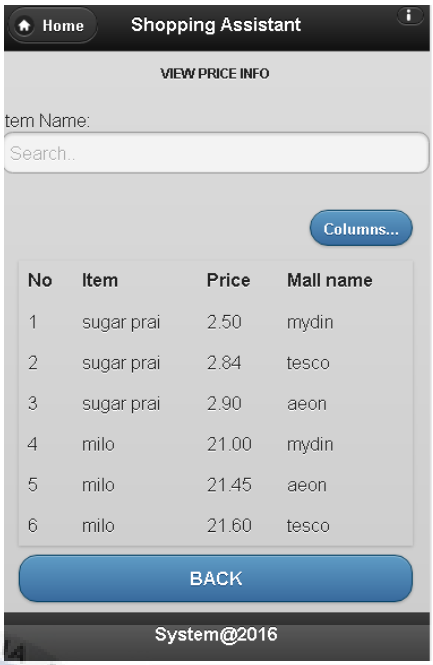


Figure 6: View price

7. Figure 7 show the shopping list for user. Fill the text field mall name to add and click button “Add”. The shopping list will appear in table.

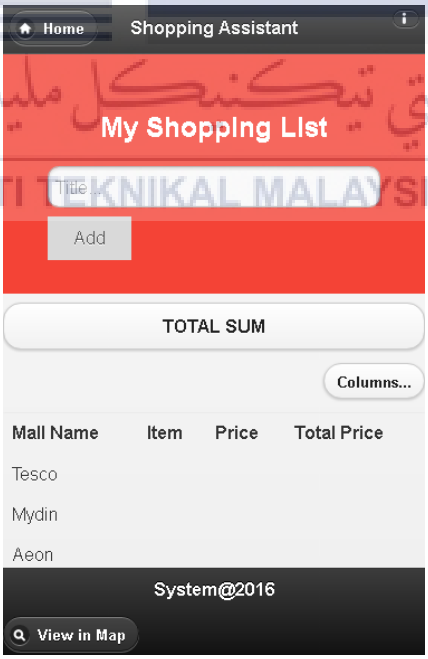


Figure 7: My shopping list

8. Figure 7 show the location of the nearer mall to the user. Click button “BACK” to go back to the menu.

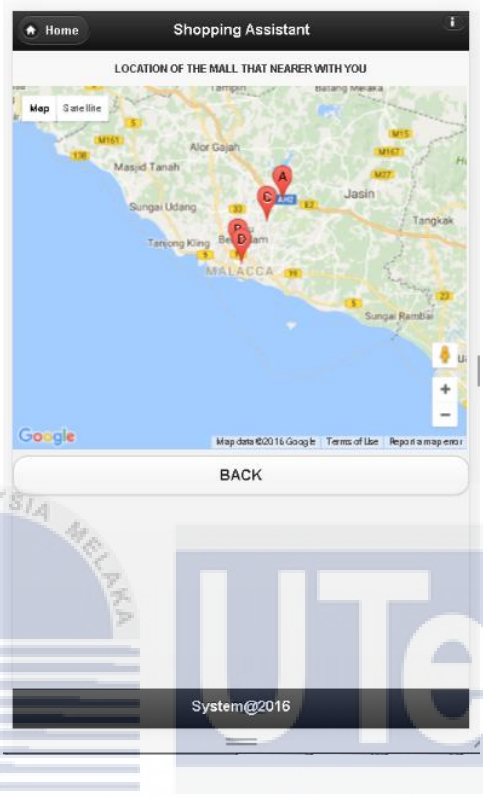


Figure 8: Nearer mall location maps

9. User can leave their comment and suggestion to the app. Fill the “Name” and “Message” text fields. Then click button “SEND”. Click button “BACK” to go back to the menu. Click button “VIEW COMMENT/ SUGGESTION” to view the comment and suggestion.

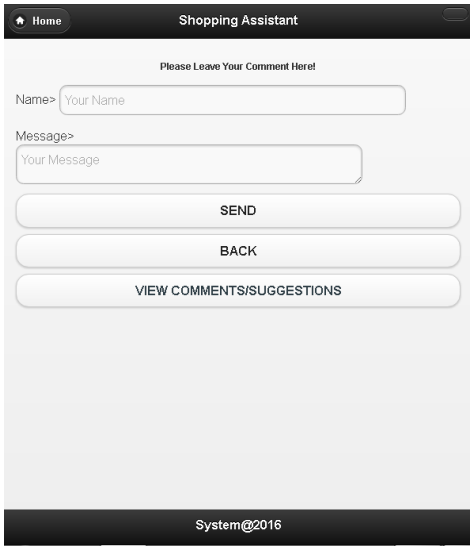


Figure 9: Insert comment and suggestion

10. Figure 9 show the comment and suggestion avaliable. Click button “BACK” to go back to the menu.

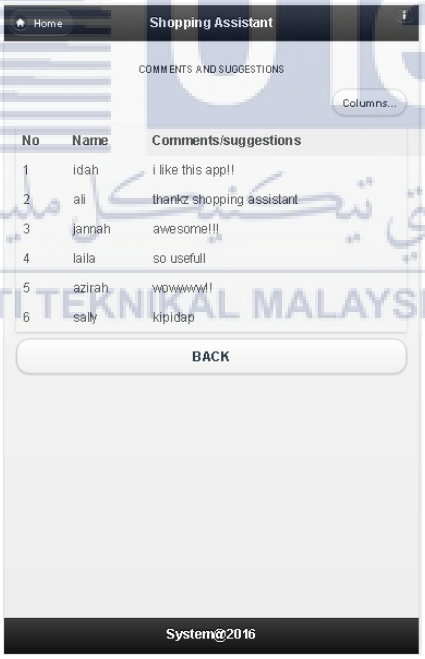


Figure 10: View comment or suggestion