Mobile Application on Halal Status Checking

By

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15468

Dissertation submitted in partial fulfillment of
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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
Computer and Information Science Department
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Approved by,

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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Abstract

For a Muslims, to find and eat a halal is compulsory as stated long time ago in the Al-Quran and Hadith. Halal is not only comprised on food as usually understand by a non-Muslims but also on other daily product that need to be used. The communities nowadays are exposed to a lot of uncertainties in determining food's Halal status such as with the issue of fake Halal logo, non-Muslims food manufacturer, imported foods from non-Islamic country and many others. The purpose of the project is to study, design and develop a mobile application that will enable the Muslims to check food product Halal status in the market. The scope of this project is focused on manufactured food and the target user for this product would be the Muslims. Although there are an existing similar mobile application in the market, the initiative taken by the developer is to enhance the by developing all possible method for determining the halal status in just one application. An example of all possible method on checking the halal status developed in this system are Searching by the product name, Scanning the barcode on the product and capture a product's label to be translated to understandable language for the user.

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ABBREVIATIONS AND NOMENCLATURES

OCR	Optical Character Recognition
SMS	Short Messaging System
JAKIM	Jabatan Kemajuan Islam Malaysia
RAD	Rapid Application Development

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Consuming Halal products is of great concern to all Muslims. It is written in the Holy Quran that all Muslims are obliged to prepare and consume Halal products. Halal is an Arabic or Quran word meaning lawful, permitted, or permissible. The opposite of Halal is Haram, which means "unlawful" or "prohibited". Halal and Haram cover aspects of slaughtering, storing, preparation and sanitation for both food and non-food products. In order to help Muslim consumers in Malaysia to validate the Halal status of their purchases, the Department of Islamic Development (JAKIM) has introduced a standard Halal logo. The Department of Islamic Development (JAKIM) is an Islamic organization based in Malaysia that manages and grants Halal status for manufactured products and food premises.

Most of Muslim seriously concerned on the food that served for them to eat either they is fully practicing Islam or not. Muslims observe the divine laws in every aspect of life. There is a complete code of dietary laws present in the Holy Quran for the followers of Islam. Some basic principles are described as all foods are permitted except those mentioned clearly in the Holy Quran. The most recent advancements of biotechnology in field of food industry like status of GMO's, use of genes, enzymes, food additives or enhancer in food in Islam deduced by the Ijma or Qiyas. These if obtained from plant origin would be considered as *Halal*. If obtained from animals then Islamic Shari'ah put some restrictions about the animal that it should be permitted by Supreme law giver, and should be fit, clean and wholesome for health. The world has become global supermarket with the presence of improved communication and transportation system. Islam is the world second largest religion and more than 1.2 billion Muslims consume Halal products. The need of Halal food increases with the increase of Muslim population globally. The Halal foods should be mentioned clearly by labeling the hidden food ingredients, for example enzymes.

Thus, the writer have proposed on developing a mobile based on Android application to overcome the problem with a few of enhancement and functionality and stressed on the user friendly features since there are already similar existing application in the market.

1.2 Problem Statement

The problem statements for this project are:

1) Fake or Imitation of *Halal* Logo
    - Led to consumer confusion and misunderstanding of a product
    - Add to a manufacturer competitive advantage
2) Current approaches are not user-friendly
    - SMS (Short Messaging System)
    - WEB Application

Research done by Nasir, et al. (2009) stated that manufacturer in the industries usually chose to use fake or imitate the *Halal* logo because by doing that, it will help them to be more competitive in the food industries. With the fake and imitation of the halal logo by irresponsible manufacturer, the situation has led to confusion and misunderstanding of a product by the consumer. The reason why certain manufacturers opt to take such illegal action is because the process of obtaining a halal certification usually takes a long time. The authorities need to conduct a thorough background check of the manufacturers that request the *halal* certification. Kassim, et al. (2012) also added that the process of identifying and recognizing *halal* food and products become more difficult since many of the manufacturer of the food product especially frozen food is a non-Muslim agencies. Some ingredients also is difficult to be identified on its *Halal* status because they are imported from others countries. Thus, Muslim consumer faces problem in identifying and verifying the *Halal* products not only food but other usable products in the industries.

It must be realized that the halal food industry is currently developing and become larger from day to day. Halal consumer products have become a crucial concern that affects Malaysian's Muslims—as well as around 1.5 billion Muslim throughout the world (Junaini, S., N., Abdullah, J., 2008). The halal food industries not also become a concern for Muslim but also have attracted a non-Muslim consumer and communities due to due to its hygienic and contamination-free principles in food production (Kassim, M., and et al., 2012).

The authority body in Malaysia that is Jabatan Kemajuan Islam Malaysia (JAKIM) current already introduced a Short Messaging System (SMS) for the consumer to verify the *halal* status of a product which called "SMS *Halal* JAKIM". Consumer could use the services by typing the barcode of the product to obtain the status of the product since it used the concept that every product has its own unique barcode number. Every barcode number will only represent only one product and the verification can be made by matching the barcode number sent by the consumers with the number listed in JAKIM Halal products database.

1.2.1 Problem Identification

Consumer nowadays has becoming wiser in choosing and buying products especially Halal products. Upon realizing that, manufacturers also have started moving towards Halal industry to maintain their products market and also their products competitiveness. Somehow, as more manufacturers are striving to have Halal certification logo on their products packaging, this leads to the arising of problems with Halal certificate validity.

One of the main problems is that, there are many organizations that issues Halal certification out there regardless whether they are following the standards or not. Therefore, this could lead consumers to be tricked or confused with the Halal certification when buying products.

Other than that, there are also issues where the products manufacturers displaying unrecognized Halal logo such as the logo that shows Halal word in Arabic. The actions could be either lack of knowledge on the Halal concept or ignorance (Power, C., 2009). Many product manufacturers is non-Muslims, therefore, they only believe that a product is Halal if there is no element of pork in the product. Somehow, there are also other factors that need to be considered such as the processes involved and also the resources of the items ingredients (Riaz, M.N.,2004).

Also, there are also imported products in which the products will be using different Halal certification logo, thus, increase the variety of Halal certification logos in the market. It will make it harder for the Muslims to be certain of product's Halal status as they do not have much knowledge whether the Halal certification issuer body is following the standard or not.

Furthermore, in Malaysia, there is Department of Islamic Development Malaysia (JAKIM) that is responsible in checking products' Halal status as long as the manufacturer requested for JAKIM Halal certification. Other than issuing Halal certification to local products manufacturers, JAKIM also inspect the international organizations that issues Halal certificate. Therefore, consumers may choose products with JAKIM Halal certificate or products with certificate that been issued by JAKIM's recognized Halal certificate issuer.

Although JAKIM has all the Halal related information required by the consumers especially the Muslims, but there is no efficient platform for conveying the information to the consumers especially at times of needs like the times when consumers are buying products in the market. JAKIM has taken initiatives to provide platform for consumers to get the products information such as the e-Halal portal and also SMS e-Halal. There are two technologies that have been implemented by JAKIM for consumers to check product's Halal status. One of it is e-Halal portal and the other one is SMS e-Halal (Projakim, 2006).

The e-Halal portal consists of information about JAKIM, news related to Halal matters other than source of reference for not only the consumers but also for the industry or the manuthcturer to understand better about Halal certification matters (Utusan Malaysia, 2005) Though this portal make it easier for the consumer to check product's Halal status, but its limitation in terms of mobility makes it not that efficient fbr the consumers to use it in when they are buying products in the market. Realizing the needs of customer to have information while on the go, JAKIM also introduced SMS e-Halal (Projakim, 2006). Consumers just need to type HALAL "Product Barcode" and send to DAPAT (32728). Supposedly, consumers shall receive the response within minutes. Although this technology is able to overcome the limitation of e-Halal portal in terms of mobility, this implementation also has its own weaknesses. One of the weaknesses is it requires the user to pay fifteen cent per SMS send and fifty cents per SMS receive. Basically, consumers need to pay sixty-five cents for every item that they want to check. Somehow, that would be very costly if the consumer wants to check all the items that she is buying (Ariff, M. M., 2009). The second weakness with this implementation is that consumers need to look for the product's barcode and type it to their mobile phone before sending it to DAPAT. It is very tedious especially when the consumer is in the midst of shopping. This brings to the next weakness of this

implementation that is it is very time consuming. Time is involved when the consumer need to type the product's information and send it to the system. Besides that, the consumer also needs to wait for the system to respond to the SMS sent which very often took sometimes (Ariff, M. M., 2009).

1.2.2 Problem Significant

Based on the problem identification above, it can be deducted that consumers are having serious problem in validating products' Halal status. There are just many issues that cause the problem to happen.

This means, consumers is in need of a tool or application that could help them validating food products' Halal status. As there are many factors that are needed to be taken into account in determining products' Halal status, so, the best way to determine products' Halal status is to check it from authorized organization which responsible in monitoring and governs Halal matters and for this country, it would be JAKIM.

Even though JAKIM has introduced two technologies that act as a platform for user to check product's Halal status, but the limitations possess by the technologies implemented causes they are hard to be accepted by the consumers. Therefore, a new tool or application need to be developed to help the Muslims with the problem in validating products' Halal status. The tool developed should also overcome the limitations with the current technologies implemented.

Consequently, a study should first be made to understand the situation when consumers are in need of the Halal checker and also to understand users' requirements and behavior. For example, consumers would need to check the products' Halal status at the times when they want to purchase the product. For the behavior part, often, consumers would want to settle with their shopping fast as they have other responsibilities such as cook for their family and others. This means, in terms of the characteristics of the tool needed is that, the tool should be very convenience and also easy and fast to use.

Other than that, a research on the problems with the current technologies also should be made so that there will be no repetition of the same mistakes that have been

done before. There is also a need to study the current technologies that people are coming up with so that, the research that they have made could provide better understanding of the problem with current technologies other than to prevent coming up with the same solution. Somehow, it is possible to come up with similar idea but more improvement should be made.

1.3 Objective of the Project

1) To study the requirements for a user-friendly mobile application that enables consumers to detect halal ingredients in a product.
2) To design and develop a mobile application that enables consumers to detect halal ingredients in a product based on the requirements.
3) To conduct a usability testing on the developed prototype.

1.4 Project Scope

1) Target user is a Muslim and people who are concerned on the ingredients of certain product.
2) Expand the uses of the mobile application at the international level.

CHAPTER 2

LITERATURE REVIEW

2.1 Definition of Halal

The word 'halal' and 'tayyib' have been mentioned repetitively in the holy Qur'an. However, it understands by many Muslims is shallow to say the least. Many understood that food is halal as long as it does not contain pork or liquor. The word halal in Arabic means something that is permissible (Ibrahim Mustaffa et.al. 1989). From the perspective of Islamic Jurisprudence (Fiqh), the word means a choice that is allowed by the Islamic law (syari'at). That is one has a choice either to do or not to do it. In other word, it is synonym with another Arabic word which is "mubah" (Sanu, 2000). The opposite is *haram* which means totally not allowed or forbidden. According to the fundamental of Islamic Jurisprudence (Usul Fiqh) it is defined as something that must be avoided according to the Islamic law (Ibn Abd al-Barr, 2000). Both terms however are a part of the principles of Fiqh. There maybe changes according to place, time and situation. However, each difference must be based on the due process of *ijtihad* (decision making process). Based on the language definition, the word tayyiban been traditionally translated as pure (Ibn Rajab, 1980), good and superb 1. The opposite of it is "al-khabith" which means something that is not good, not perfect, bad, rotten and bring harms (al-Marbawi, 1990). It connotes bad quality, imperfection and impurity.

2.2 Halalan Tayyiban and the Use of Halal Haram as a Concept

The aspect of halal and haram should be made a priority in a Muslim life. It should be a determinant factor for each of his action anywhere and anytime. It is an easy form of self-discipline that is based on faith to Allah SWT and confidence at His beneficence. Man is born with needs. To fulfill these needs, he must consume. He must use and consume what he can gather from his surrounding for survival. From a tauhid (monotheistic faith) perspective, only Allah is "qiyāmuhu bi nafsih[1]" while all creatures are in need for other things.The appointment of man to be the vicegerent of God or khalifah of Allah in this world illustrates this permission for man to be consumer. According to Islam, the creation of the universe is for the benefits of men.

This understanding is derived from the holy Qur'an, Chapter Two (al-Baqarah–The Cow) sentence 29 which means

"He (Allah SWT) created for you all that is in the world"

The right granted to man to make use or consume what the universe can offer is described clearly and repetitively in the holy Qur'an by the use of the words "**سخر لكم** " which means "is made easy for you to use". However, these resources and material goods that must be strived by man is not the only vision for man. Instead, it is only an infrastructure or facilities for man to achieve real goal in life that is to gain the pleasure of Allah SWT. Islamic law in principle allows man to make use of or consume what is available in this world and it is nothing to be amazed about. In fact, all are regarded as life's infrastructure that must be utilized, developed and preserved well. There have been many discussions on this matter in the Qur'an and *sunnah*. Muslim scholars have concluded this matter in a well-known General Doctrines of Fiqh or Qawa'id al- Fiqhiyyah (al-Sadlan, 1427H),

صلالا في الا شيا حةباالا

which means, at the beginning, all matters are permissible.

Nothing is haram or forbidden without a clear and explicit words of Allah SWT and/or from the Prophet SAW as a logical proof. In the absence of clear and explicit evidence (nas) for example, in the case of when a weak hadith is detected in the chain of evidence or when there is no clear and explicit evidence that says it is forbidden or haram, therefore, the matter is regarded as is which means it is mubah (a neutral act, whose commission and omission is equal). A few matters that are prohibited by Allah SWT are precisely so, for reasons that may or may not be reached by human's conscience and are regarded as blessings.

Within the norms of Islamic law (syari'at Islami), matters that are regarded as *haram* or prohibited are thus very small in numbers in comparison to matters that are allowed. Other matters retain their status quo that is halal or permissible in the absence of clear prohibition being mentioned of their halal or haram status and considered as matters that are forgiven or exempted by syari'at (law). However, it must be understood that the margin of this permissibility and neutrality are bound by specific context regarding the matter, situation and time. In other words, it refers to internal factor or characteristic of each act or ingredient. Nonetheless, the lawful status of a matter is not judged based on its' characteristics or ingredients alone.

Other external factors such as how a particular product is produced, how it is being utilized, for what purpose and its' short and long term impact should also be taken into account. A particular product maybe essentially cleans and pure but still can be haram due to external factors. Therefore, when debating on the lawfulness or unlawfulness of a matter, the expert scholars in the fundamental of Islamic Jurisprudence have listed every minute detail. They have categorized it into two main parts.

First: Harmfulness and defectiveness that are caused by the matter itself ("**تهالذ** العر**مة**"). It is defined as something that is prohibited by *syari'at* to begin with because it contains certain harm or defect that cannot be removed (Zaydan, 1997). Among those in this category are fleshes of swine, carcass, intoxicants, fornication etc.

Second: Harmfulness and defectiveness that are in reality stemmed by internal factor and definitely not external factor "**هلغير** العر**مة**" (Hassan Ahmad, 2002, al-Zuhayli, 1986). In the fundamental of Islamic Jurisprudence, it is defined as something that is essentially permissible from the Islamic law to begin with but becomes haram due to external factors (Zaydan, 1997). Take for example, giving a knife to a chef in the kitchen as a gift is mubah and even commendable. However, giving the same knives as gift to two men who are in the middle of a fight is not allowed. Even though the knife is not something *haram* in Islam but in the situation and condition as such would make giving the knives deemed to be forbidden.

Muslims understand "**تهالذ** العر**مة**" and normally being watchful from consuming or using products or services but have a fuzzy understanding about "**هلغير** العر**مة**". However, the understanding of the former is sometime further limited or narrowed to physical impurity elements such as swine and intoxicants. Inasmuch, many would be watch in cleanliness and purity aspect of their food or clothing for solat (Obligational prayer), but at the same time they are being less vigilant when it comes to bussiness dealings (mu'alamalah) such as partaking in buying and selling insurance or financial products that is part of usury system which has helped to support the enemy of Islam.

The prohibition that is based on external factor may be specified as existing before, during or maybe after a particular matter exist. An example of an external factor that is identified as before-factor as in in the case of one performing solat when he is wearing a stolen clothes or imagining to be drinking alcoholic beverages when one is drinking plain water. Meanwhile, the after-factor is demonstrated in the case of when someone is selling sniffing glue to well-known addicted youngsters. Unfortunately, the authorities or bodies that is responsible in

deciding the standardization for halal *haram* are less sensitive when it comes to this aspect in granting the use of halal logo (Anas Mohd Yunus et.al, 2006)

2.3 Tayyib

Besides the problem of *halal haram*, the second aspect that must necessarily be given attention to is the word *tayyib*. This word is not only used in relation to food in general, but it also covers various circumstances such as ones intentions, words, acts, and beliefs (Ibn Rajab, 1980) In general, the concept derived from this word is rather abstract and seemed to suggest to a separate standard.

First: The use of the word *tayyib* in the holy Qur'an is always associated with the acceptance of a particular deed. It is linked closely with purity of one's heart in doing something. For example, a saying of the prophet narrated by

Abu Hurairah RA stated that the Messenger of Allah SAW which means:

"Verily Allah the Exalted is pure. He does not accept but that which is pure. Allah commands the believers with what He commanded the Messengers. Allah the Almighty has said: "O you Messengers! Eat of the good things and act righteously" [23:51-53]. And Allah the Almighty also said: "O you who believe! Eat of the good things that We have provided you with" [2:167-172]. Then he (the Prophet) mentioned (the case of) the man who, having journeyed far, is untidy and dusty and who stretches out his hands to the sky (saying): "O Lord! O Lord!" (while) his food was unlawful, his drink was unlawful, his clothing was unlawful, and he is nourished with unlawful things, so how can he be answered?" (Muslim)

Second: *Tayyib* as a quality standard for goods or products. In this matter, Al-Sonhadji 1992) said: "Allah commands the believers to eat good and pure things that Allah has provided and be grateful if they really worship Him." Good and pure foods are divided into two categories:

i- Good and pure in quality.
ii- Good and pure because it is *halal*.

Food that is of good quality is well-known. Besides having good taste, it also has necessary vitamins and nutrients. As for *halal* food, it is a term defined by religion. At times, a particular food type is not of quality but *halal* status. So men are asked to give priority to food of good quality, both in terms of decency or healthy when choosing food and lawful in terms of religious requirement as well.

2.4 Usability of a system

Usability or also called user-friendly is an important characteristic when developing an application or a system. For system developer, it is quite crucial to be able to develop and meet the objective of developing user-friendly software because it will determine to what extent that the software could assist a user and satisfy the user needs. Eason (1988) defined the word usability as "the degree to which the users are able to use the system with the skills, knowledge, stereotypes and experience they can bring to bear". From the above authors' statement, it could be seen that the research and the work on defining usability has existed long ago since 1980s' and perhaps before than that. Usability is defined as the characteristic of being easy to use ("Usability First," 2001). More precisely, the usefulness of a product can be assessed by two key features – its utility and its usability (Nielsen, 1993). Utility refers to a product's capability to carry out an intended function. Usability refers to how easy users find it to accomplish that intended function.

A wide variety of products have been tested for their usability, including written documents, websites, computer programs, consumer products, medical equipment, and voice response systems to name a few. Usability is an important consideration for all types of products. There are four signs that indicate to product developers that a product has a low level of usability (Dumas & Redish, 1993).

- User dissatisfaction with the usage experience.
- The presence of workarounds.
- The need for rework.
- Low levels of product usage.

2.4.1 An Operational Definition of Usability

Recognizing usability problems in products is powerful, but product developers can go beyond simply recognizing them. Ideally, they can build usability into new products by obtaining user feedback on the product's ease of use throughout the development process. This feedback can be qualitative – user feedback about the quality of the product or some aspect of it – or quantitative – a measurable result such as the time it takes to complete a task. In either case, product developers must create an operational definition of usability for a product in order to collect feedback in a systematic way. Some criteria that can be used to develop an operational definition follow.

2.5 Related Work

Characteristic	Proposed Project	SMS	Web	RFID
Learnability	Y	Y	N	Y
Efficiency	Y	N	Y	Y
Usability	Y	N	N	Y
Memorability	Y	N	N	Y

Table 1: Comparison on current approaches in obtaining information on product halal status

Characteristic	Proposed Project	Halal Check	Halal Checker	I Only Eat Halal
Keyword Search	Y	Y	Y	N
Barcode Scanning	Y	Y	N	N
OCR	Y	N	N	Y

Table 2: Comparison on features used by existing mobile application for obtaining information on product halal status

Legend: Y – Yes
N - No

i- **Learnability**

Describes how quickly a novice user can develop a basic proficiency with the product and generate results at some desired level. Users prefer products that allow them to be productive after only a short training period (Miami University of Ohio, 2002). In this case, the proposed project and two of the existing approaches had this characteristic. The characteristic of a good product, software or application is when a user takes a fewer time to understand how to use the product or application.

ii- Efficiency

Can measure how productive an experienced user can be with the product (Miami University of Ohio, 2002). For example, one measure of efficiency for a Mobile Halal Ingredients Checker application might be the result of certain search that the system could process per hour after they have become proficient at using the software. Users desire a high level of efficiency so that they can be more productive. Short Messaging System (SMS) do not have this characteristic because it will take some time for user to receive the result since they need to wait for the reply or feedback from the system.

iii- Usability

Define as to what extent user find how easy and convenient to use the system (Miami University of Ohio, 2002). It is also could be said that how a user could use and operate a certain system or product without much effort needed. For this characteristic, the SMS and Web application does not have it while the proposed project and RFID could help the user to ease their task.

iv- Memorability

Refers to how well an occasional user can use the product after having not used it for a certain time. If the product has poor memorability, it may be difficult for the occasional user to remember how to use it effectively. High memorability can eliminate the need for retaining in order to use the product properly (Miami University of Ohio, 2002). The proposed project would have this characteristic as user will get familiar to the interface and function of the application in no time.

2.6 Drawback of Current Approaches

Basically, there are two main technologies used in checking product's Halal status; those are e-Halal portal and also SMS e-Halal. E-Halal portal provides all of the information require by consumers in validating products' Halal status. Somehow it has limitation in terms of mobility. The portal is meant for user to view it from the computer based on its resolution and other factors. Often, computer or laptop is being used in a static place such as home or office. Other than that, it is immobile due to its size and weight. Often, users need to check products' Halal status when they are already in the hypermarket or shop that is when they want to buy or choose the item. This means, this portal would not able to help them in times of needs, therefore, it is ineffective.

In overcoming problem with mobility, JAKIM has introduced SMS e-Halal. Somehow, it takes sometimes for user to type the item details, send it to the respective number and eventually receive the response (Projakim,2006). It would be very tedious especially if the user plans to buy many items. Just imagine if checking one item takes five minutes How much time does it requires for consumer to check ten items. That would be nearly an hour. This shows that, SMS e-Halal is not efficient in terms of the time it consumed.

All of these problems show that user needs a tool that could allow them to check the Halal status of food product in the market which can give them instant result and that. Other than that, the tool should not be as complicated as the available technologies. The tool should eliminate the need of the user to spend extra money when using it so that it could attract more people especially the Muslims. The most important aspect for this kind of application is that, the application should be built on mobile device. This is to ensure the effectiveness of the application. The reason is that, consumers will need this kind of application at times of need especially when they are at the supermarket or shops buying products. It is important to attract more people to use this tool as it could prevent Muslims from unintentionally buy and eventually consume non Halal or Syubhah food.

2.7 Smartphone and Android Technologies

The problems with the available technology on checking food Halal status are they are costly, timely and not convenient. Therefore, the best hardware platform to develop the application would be Smartphone.

There are many reasons for Smartphone to be chosen as the hardware. The most obvious reasons are they are light, small, and it often been carried anywhere by the user. Besides that, the capabilities and features of Smartphone itself are among the reason for it to be chosen. One of the reasons is that, Smartphones has third party operating system such as Android and iOS (Nicole, L., 20l0). Other than that, Smartphone also has the capability to run third-party software which commonly known as "apps". The existence of "apps store" also becomes one of the attractions for user to buy Smartphone as user can easily installed from more than hundred thousands of application from the apps store; known as "Google Play" nowadays.

Furthermore, it is recorded by GFK retail and technology Asia in 2010 that the sale of Smartphone in Malaysia has doubled compared to the previous year. This shows steep increases in demand for Smartphone.

There are several types of operating system in Smartphone. There are iPhone OS (iOS). Blackberry OS, Android, Windows OS, and others. Gartner's analysis on global Smartphone sales shows that, Android market controls the overall market by forty-three percent compared to iOS which controls only eighteen percent of the total market share (Casaretto, J.,20ll). Other than that, Android also has recorded a very massive growth as it earns "year over year (YoY)" of three hundreds and fifty-two percent (Casaretto,J.,20ll). Year over Year is a method to evaluate the company's financial performance by comparing the increase or decrease of the financial records between the current year and the previous year's (Investopeida).

Looking at the technical side, each OS has their own advantages over the other. For example, iPhone operating system is well known for its slick and simple interface. It has multi-touch gestures for smooth navigation and the interface is designed for user ease of use. Compared to BlackBerry, the interface is very straightforward (Rene, R., 2008). Somehow, Android has more advantages compared to other operating system because of its flexibility and choices (Whitson, G., 201l). One of the flexibility shows by Android is on the

hardware options. Android software platform is able to be implemented in wide range of phone manufacturers (Rene,R.,2008)(Whitson, G., 20ll). This means, people can have more options from several phone manufacturers thus, this reduce the price of the phone due to the stiff competitiveness. Other than that, Android is an open source operating system which is based on LINUX and uses Java as its programming language. Therefore, the software development in Android would be limitless (Rene, R., 2008). Android which developed by Google also has a lot of advantages in terms of cloud connectivity Android application can easily use the information and data from the wide sources of Google such as the Google Search, Google Maps and others (Rene, R., 2008). In terms of storage, Android also has better adaptability compare to iOS and an example of it is that it allows users to change the memory card on the phone without hassle.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In designing the end product which is the prototype on Halal Ingredients Checker Mobile Application, the methodology used is the combination waterfall model and Rapid Application Development (RAD). All phases in waterfall model is included in RAD but at a compress and intensify rate. Phases involved in RAD are; Requirements Planning, User Design, Construction, and Cutover.

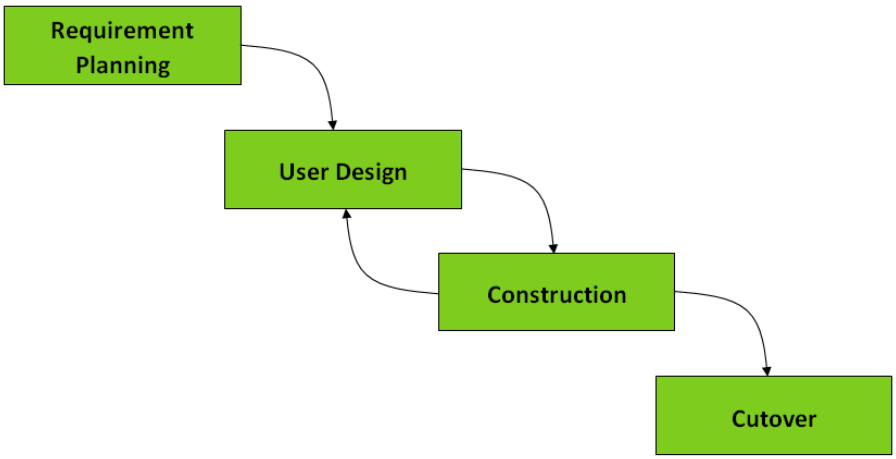


Figure 1: Rapid Application Development (RAD) Diagram

Rapid application design is an approach to the developing of the information system that does promise the better and cheaper system with rapid development. RAD put the emphasis on low cost and fast delivery. Based on the diagram in Figure 1 it can be seen that analysis and planning take done before coding is initiated. While design is done after the requirement had been determined. Coding, testing and debugging are done as a whole activity in construction phase and finally if the cutover is the final delivery to the end user.

3.2 Project Activities

3.2.1 Requirements Planning

This is where the research to develop Halal Ingredients Checker Mobile Application will be done. The research will be conducted in three phases. In Phase 1, the research is done to determine the requirements for user-friendly mobile application to detect halal ingredients. While Phase 2 will be is focusing on designing the interface and also designing the interaction between the process and data. Finally, Phase 3 involves derivation and validation of the proposed design.

To gather the entire requirement needed, various methods are used for example, detail examines on previous research papers and also questionnaire and the outcome from these phases will be:

- Preliminary draft of the storyboard
- Basic knowledge and understanding of Mobile Application on *Halal* Tracking
- Draft of the conceptual framework

3.2.2 User Design

During this time, the supervisor of the project and the developer participate in discussion, where those involved used integrated tools to support the rapid prototyping of system design. Supervisor will give some opinion on how the prototype should work to ensure that it will successfully assist user to complete certain task. Supervisor and developer will work closely and quickly to create prototypes that capture systems requirements and that become the basis for the physical design of the system being developed. At the end of user design, the outcome should be as below:

- Diagrams defining the interactions between process and data
- Preliminary draft of the interface

3.2.3 Construction

During this phase, the developer will start to develop the prototype code using the Adobe Flash CS5. Instructors also will participate to validate screens and other aspects of the design as the application system is being built. When developing small systems, construction and user design are combined together. The outcomes from this activity are:

- Finalized system architecture of the system.
- Finalized design of the prototype.
- The system builds using the Adobe Flash CS5

3.2.4 Cutover

Cutover is the delivery of the application to its end users. Planning for cutover must begin early in the RAD process because the RAD approach is so fast. Cutover involves many of the traditional activities of implementation, including testing the system, user acceptance testing and training users. The outcome from this activity is that the new application will be implemented.

3.3 Gantt Chart

Refer to Appendices section for a Gantt Chart (Page 26)

3.4 Development Tools Required

- MIT App Inventor
- Adobe Photoshop
- Eclipse
- Xampp
- PHP
- MySQL

CHAPTER 4

RESULT AND DISCUSSION

4.1 Story Board of Proposed System

Figure 2 shows first two interface design which is Startup Menu on the left and Main Menu when user press the Enter Button on the right.

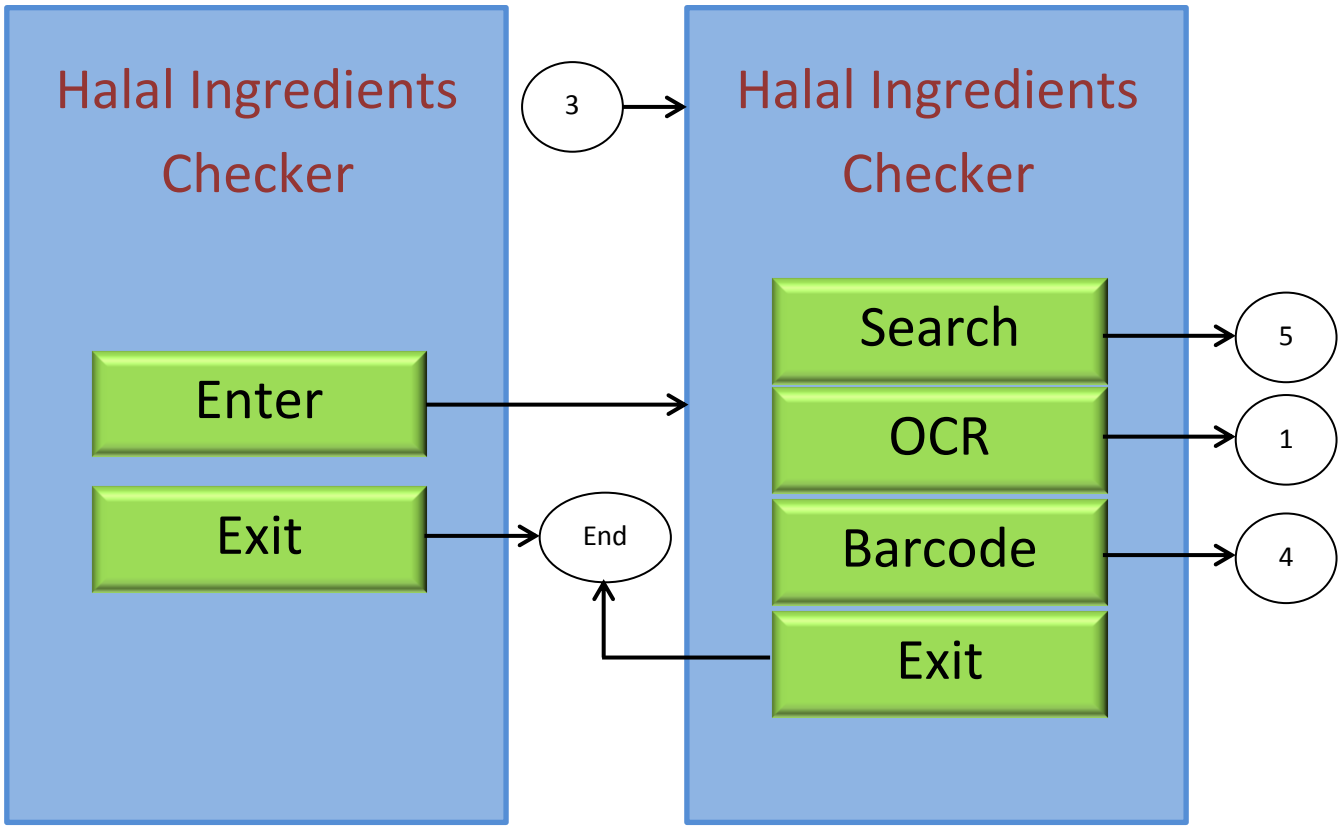


Figure 2: Storyboard design of Startup Menu and Main Menu of the proposed project.

The Startup Menu appeared when user launches the application by touching the application icon on their Smartphone. It will contain two (2) buttons which is Enter Button and also Exit Button. The Main Menu screen on the right will be displayed after users touch the Enter Button and the application will be close if users decide to exit the application by touching Exit Button. On the Main Menu screen, there will be four (4) buttons which is Search Button, Optical Character Recognition (OCR) button, Barcode Button and also Exit Button.

Figure 3 is showing Search Menu screen and also the Optical Character Recognition (OCR) screen after a Search Button and also OCR Button is selected.

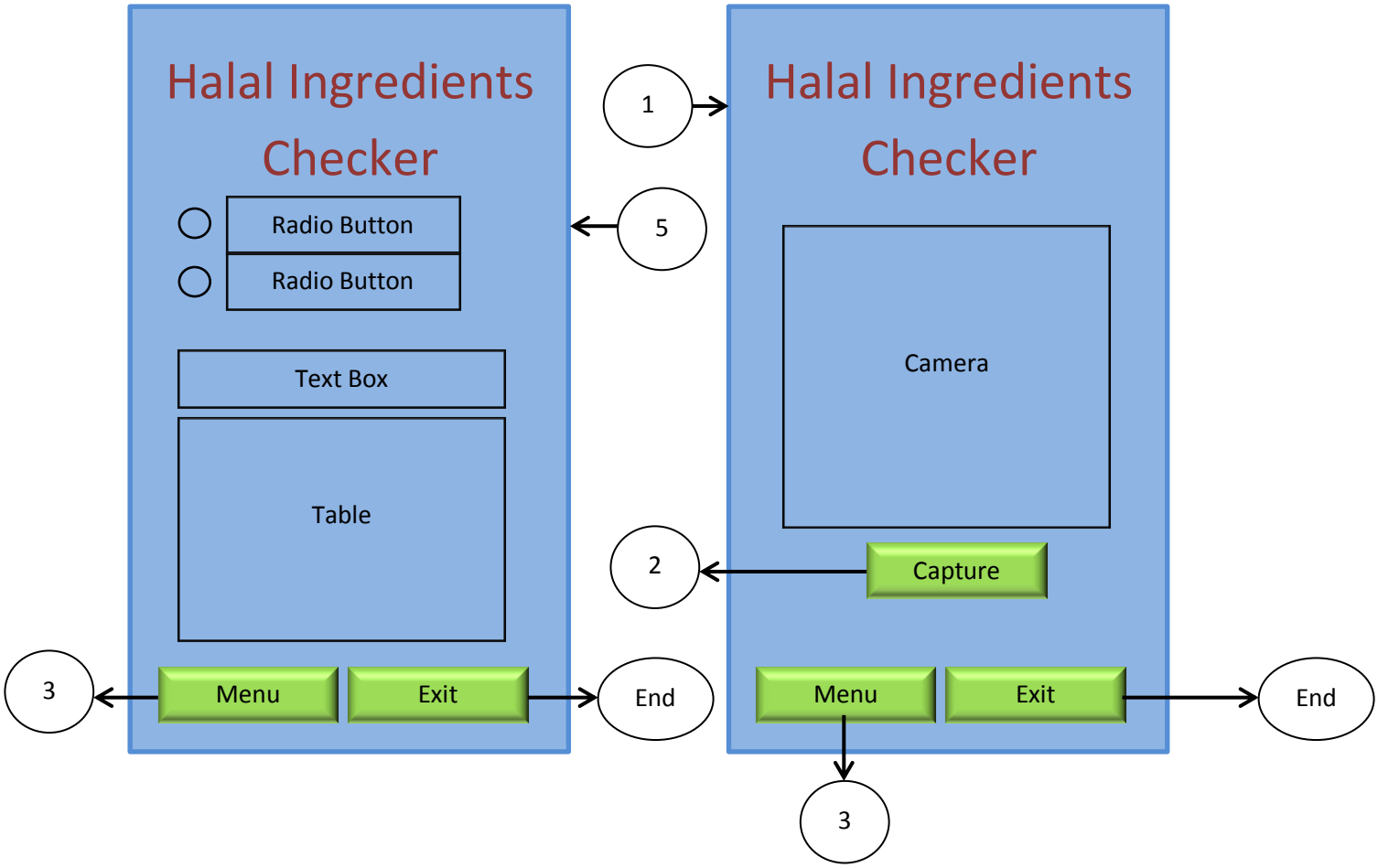


Figure 3: Storyboard design of Search Menu and OCR Menu of the proposed project.

The left screen is the Search Menu screen. User can perform search action in this screen. The radio buttons in the screen provide an option for a user either to search the database based on the Product name or based on ingredients of a product. After user has choose the option, they are required to enter a text in the Text Box provided and a result of the search will be display in the table. On the right of the Figure 3 is the OCR screen after user touch the OCR Button on the Main Menu screen. In this scree, user will be able to capture the image of the list of ingredients of the product on the label. The captured image will then will be converted to an understandable text. The purpose of having this function is for users who are usually like to travel to other country and faced a difficulty to understand the labels of the product when looking for halal product. The Menu Button on both screens will navigate user back to the Main Menu screen and the Exit Button will enable the user to quit and close the application.

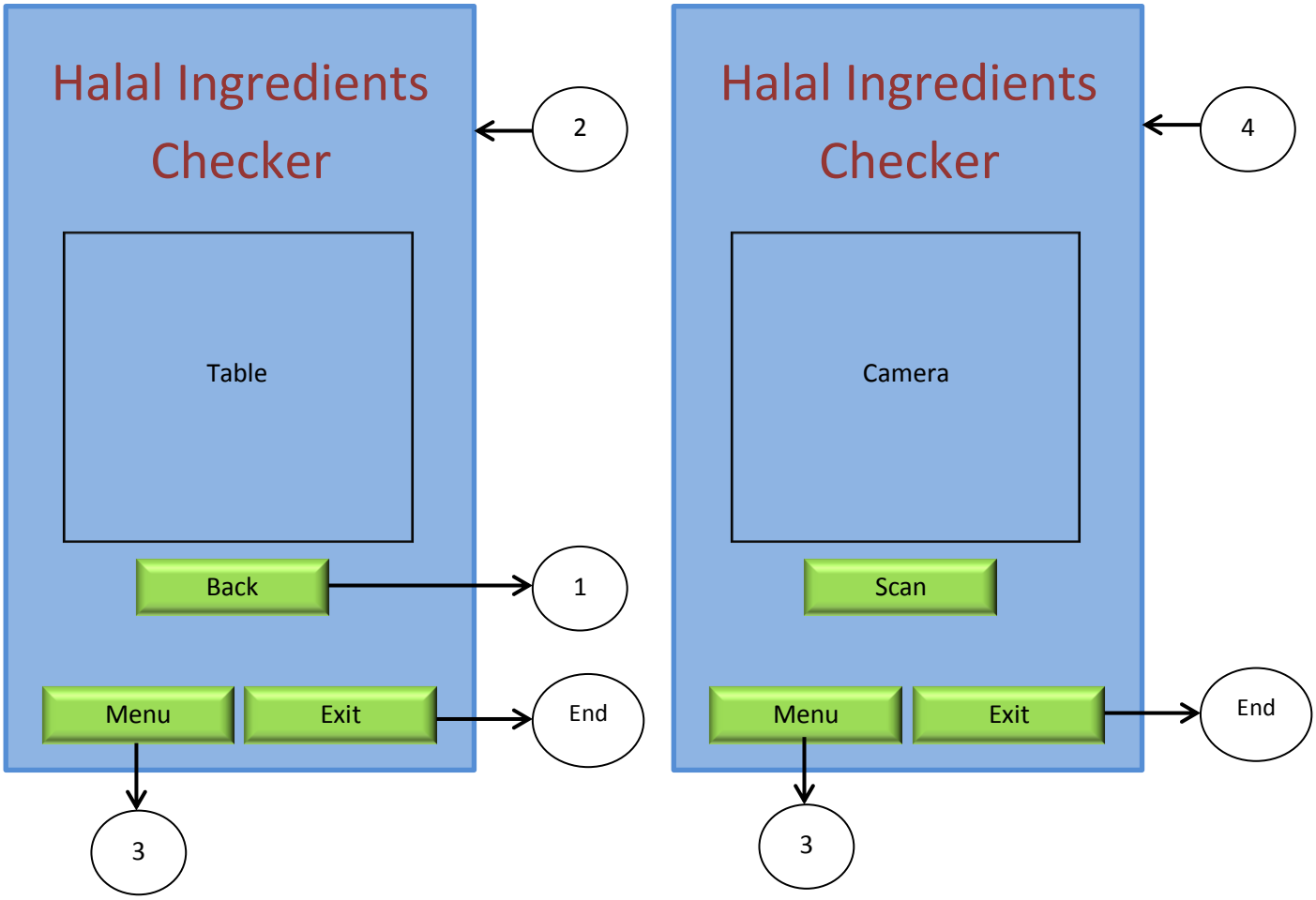


Figure 4: Storyboard design of OCR Menu and Barcode Menu for the proposed project.

Slightly similar with the Optical Character Recognition (OCR) menu, the screen on the right is Barcode Menu screen. User will be able to scan the barcode of the product and retrieve the information regarding halal status of the product. The screen on the left is the result of the OCR function will be display in this screen. The Back Button will navigate user back to image capture function of the OCR function in OCR Menu screen while the Scan Button will enable user to scan the barcode of the products. The Menu Button will navigate user back to the Main Menu screen and the Exit Button will enable user to quit and close the application.

4.2 Overview of the prososed system (System Architecture)

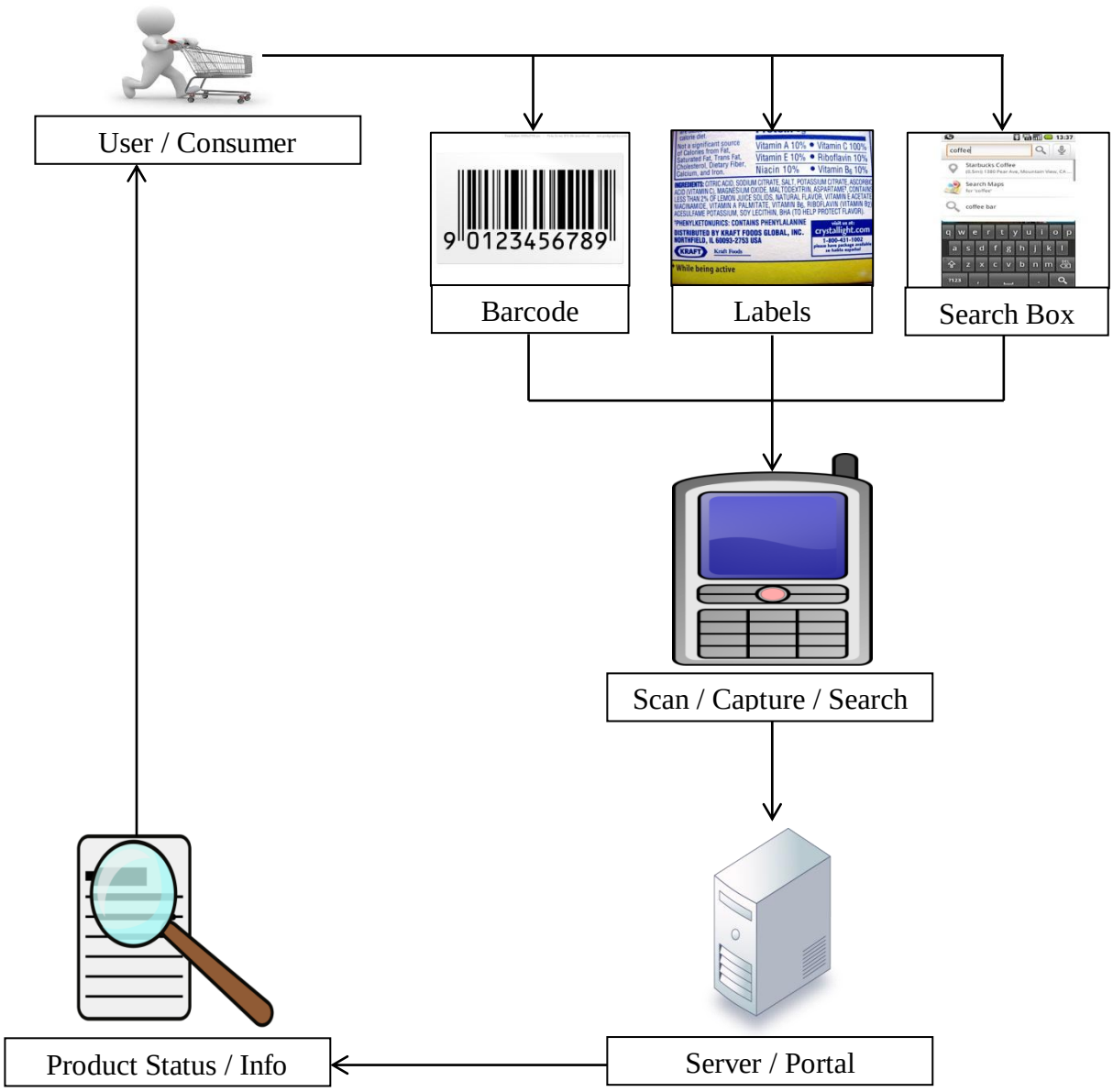
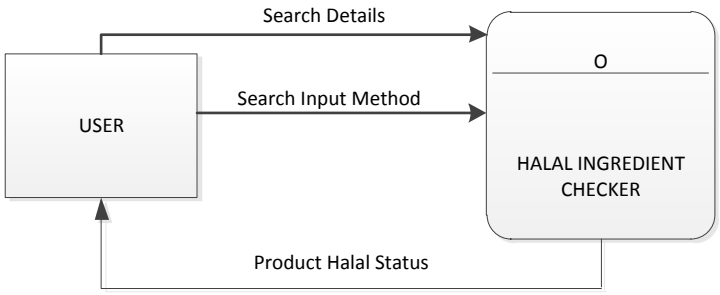


Figure 5: Overview of the proposed project

Figure 5 shows the overview of the proposed project and how the flow or the process of the system. Consumer or user will browse for their desired product in the convenience store or supermarket. They could either choose to scan the barcode of the product, capture the image of the products label or search the product or the ingredients of the products. After that, the operations perform by user will be send to the server. Server will process the user request and send the status or information of the product back to the user.

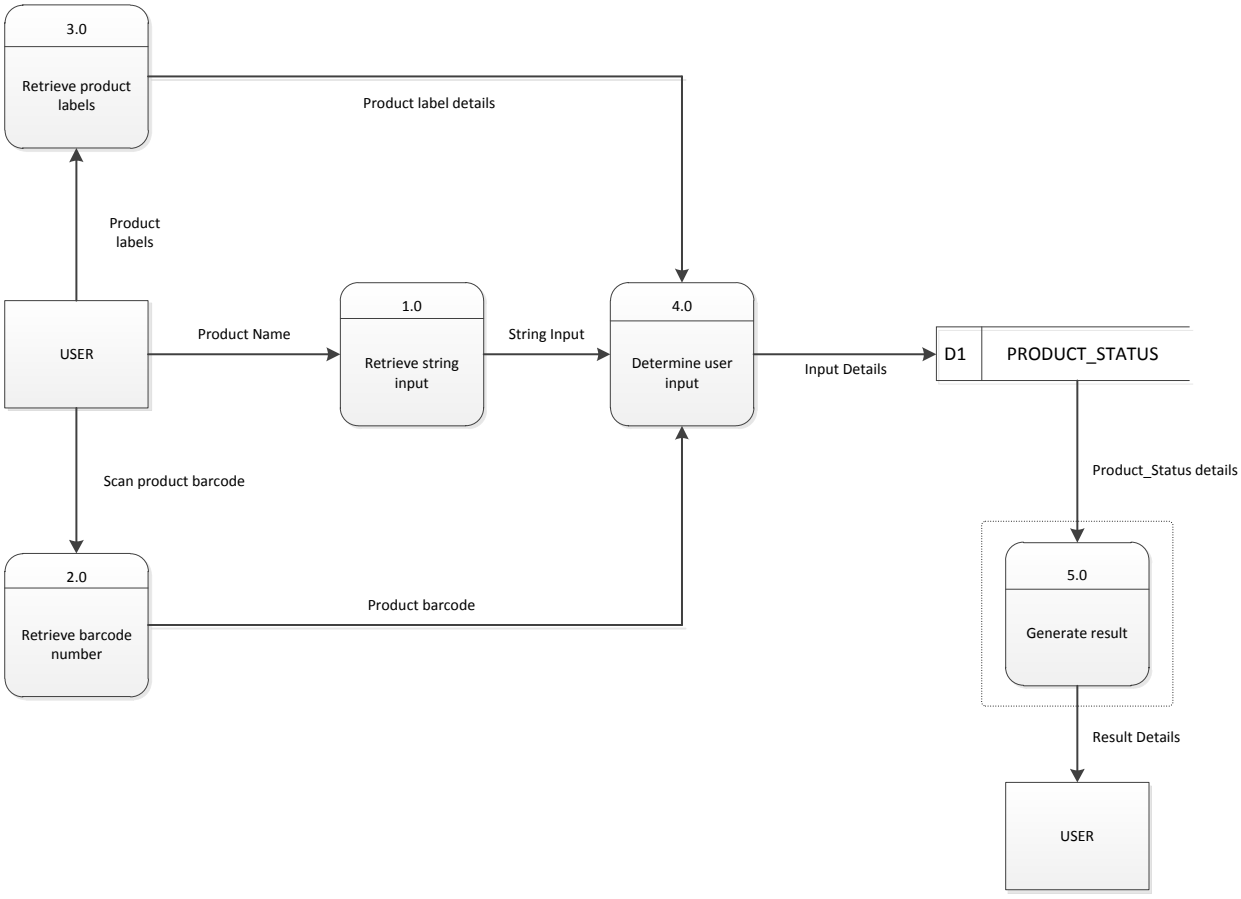
4.3 Process Modeling

Context Diagram (CD)



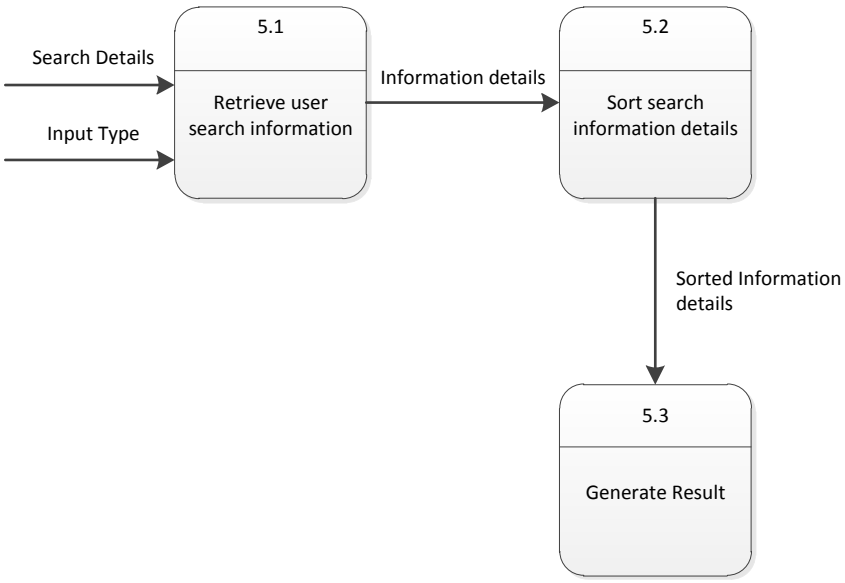
Data Flow Diagram (DFD)

DFD Level 0



DFD Level N

Decomposition of Process 5.0



4.4 Prototype

The propose solution should be very simple for the convenience of the users. The application shall not take much of the user's time as the application may be use during hectic time.

There are three main functionalities of the application. The first one is to search for a product's name. The second functionality is to scan the barcode of the product. After a scan function is performed, the returned barcode is used to search for the product barcode located in the database resides currently in local host. The third functionality is to capture the labels on the product and after that convert the labels into a text. This function makes use of the Optical Character Recognition (OCR) technology. The converted text is then will be translated into a user understandable language by using the Google API's.

The main menu of the application is shown below.

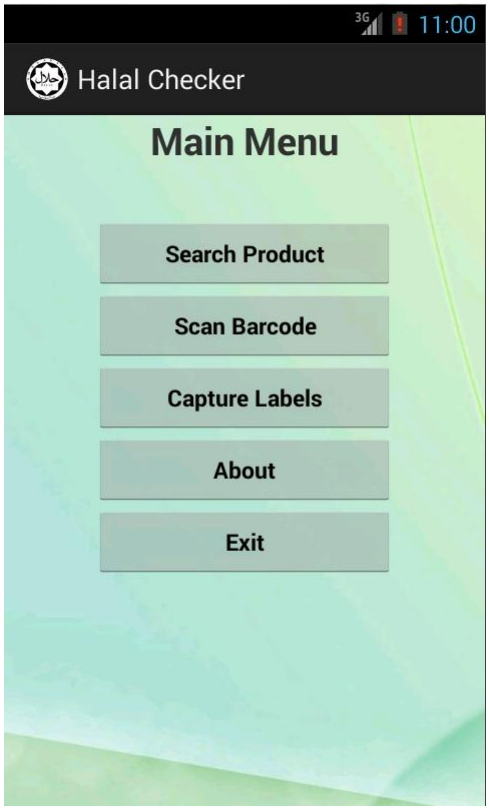


Figure 6: Main Menu of the application

When the **Search Product** button is pressed, the system will display the below screen page for user to Search for a product Halal status.

Figure 7: Search Product page

In this page, user will be prompt to enter a Search Keyword (Product name) and after that click on the **Search** button. Based on a user feedback, it has been said that they find it difficult to use it for the first time as they need to insert the full product's name and it is kind of inconvenient to use. After that, the developer has come with a solution by changing the back-end coding of the system so that user will only needs to enter either initials or main keywords for the product.

Below is page with a keyword has been typed in and in this is example is the word "*Mister*".

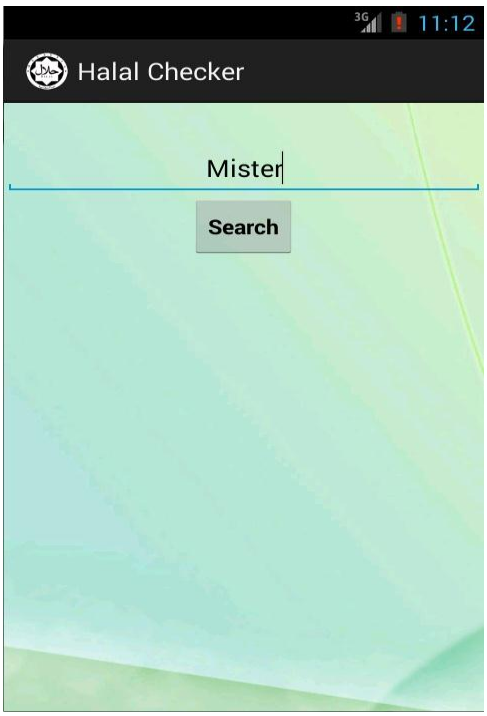


Figure 8: Keyword "Mister" typed in the search box

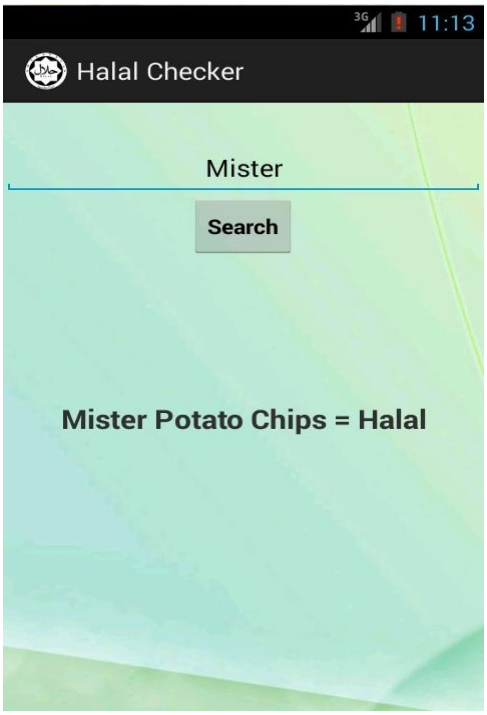


Figure 9: Results after a search has been performed.

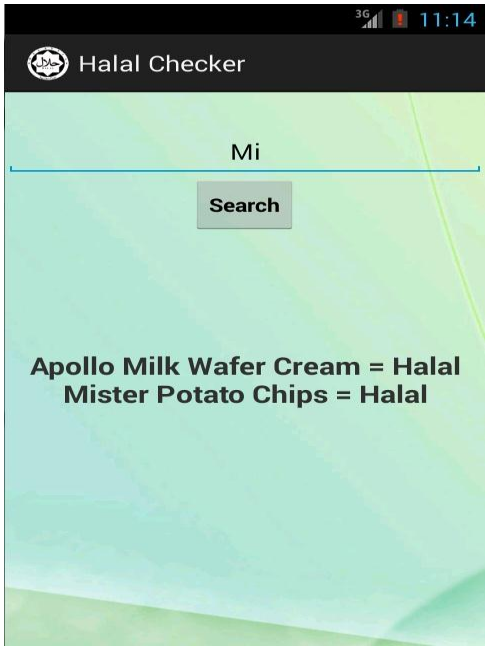


Figure 10: Part of the keyword for the product inserted

The Figure 10 above shows that the application will list down all products with the status that match with the keyword that the user has entered.

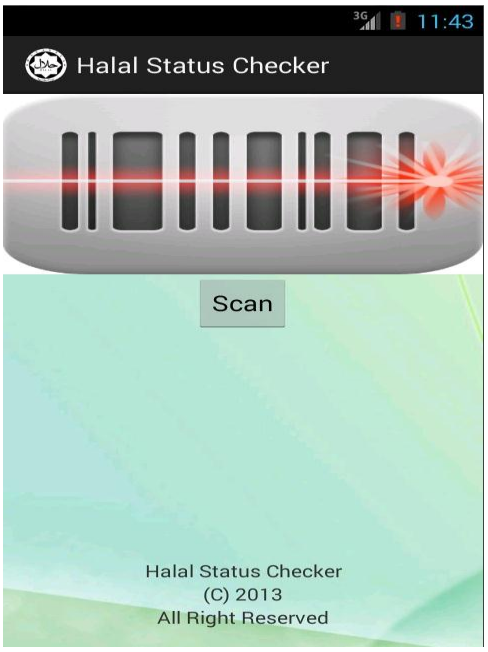


Figure 11: Scan Barcode page

This page; **Scan Barcode** page will be display when users pressed on the **Scan Barcode** button on the **Main Menu** page. When user pressed on the **Scan** button, the below activity will be started.

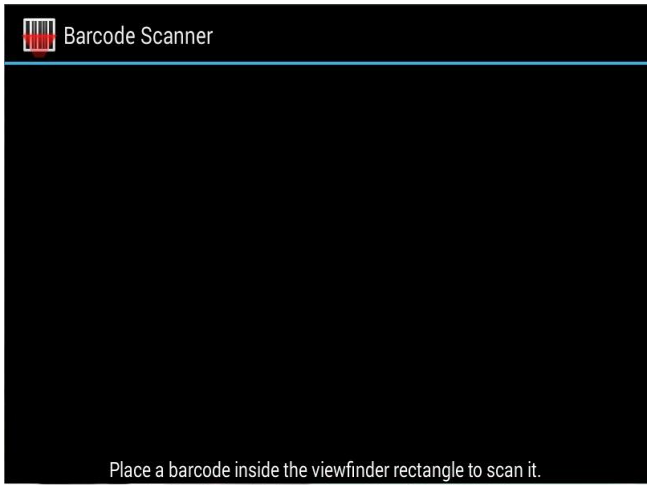


Figure 12: Scan Activity started

The blank screen is due to launching the application and start the scanning barcode function in the emulator. The returned results will be the barcode of the product that will be used then to search for the product in the database.

Figure 13: About Section Display

This about message will appear when user pressed the **About** button on the **Main Menu** page.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Islam has set guidelines for Muslims to follow. Among the most important guidelines, there is one that always revolved around Muslims everyday life that is guidelines on Halal. Halal concept covers wide areas of Muslims life but one of the most close to the Muslims is the Halal concept in food. For a human, food supplies energy to the body so that, human able to live their everyday life. The Halal guideline set on food is meant to keep the body healthy, which may harmonize the society other than to preserve the Muslims' faith.

As food products come from many different countries, there would be a wide variety of Halal certification in the market. Therefore, Muslims need to be extra careful when buying food products in the market. The reason is that, Halal certification logo used on the food packaging may not come from organizations that have been approved by JAKIM. Some products manufacturer display Halal logo which is very simple that is it only writes Halal word in Arabic.

Realizing the fast growing of Muslims community has open manufacturers' eyes to participate in the Halal industry. More and more manufacturer ventures into Halal industry every day. Food products sold in the market does not only come from local manufacturer but also from other countries including those non Islamic countries.

Other than that, there are many issues have been lodged with regards to Halal certification. One of them is one the fake Halal logo. Often, manufacturer display fake Halal logo in their packaging to attract more customers especially Muslims to buy their product. Besides that, there could be reasons behind they do not have the real Halal certification. One of it might be because there are processed in non Halal way or they obtain their resources from non Halal supplier. Therefore, it is very threatening for Muslims consumers as they might not have the knowledge to validate products' Halal status.

There are also other issues revolved around Halal certification such as if the Halal certification is being retracted by the certificate issuer. There should be strong

reason for product's Halal statuses get retracted and normally the reason would be the products are no longer compliance to Halal standards. Somehow, when the products' Halal certificates are being retracted, the products that have been distributed should already reach the market. Out of knowledge, consumers will still buy the products as the packaging still displaying the Halal logo. This could also lead to Muslims especially to consume non Halal food unintended.

In Malaysia, there is one main organization that governs issues related to Halal matters. They do inspection based on Halal standards and the certificate is recognized by many countries as it has been established for a very long time and it also follows strict standard in issuing the Halal certificate to the manufacturers. The only problem that consumer is having is on the platform to go the information from JAKIM. Although JAKIM has introduces two technologies that helps consumer to check product Halal status, but due to its inefficiency, many of the consumers does not use the technologies.

It is a hope that the application developed would contributes to the Muslims society and becomes one of the most important tools in Muslims' everyday life as Muslims nowadays are very exposed to being tricked to consume Haram products which will results in many negative impacts.

5.2 Recommendation

Due to a time constraints and commitments on other task besides this project, it is unfortunate that the third functionality for this Mobile Application on Halal Status Checker couldn't be completed. In the future, it is a hope that all proposed function could be developed and functioning well in order to help the user to identify halal status of a product easily as this research is focusing more on the usability of the system.

For the Muslim's community to contribute, it has been identified that for the future development, it would be better to have Sign-up and Login function for a registered user to login and contribute on the database of the product.

On the 8th April 2012, JAKIM has announced Halal Verified Engine (HVE). HVE would enable user to check the Halal status of products not only from Malaysia but also products from all over the world. HVE would store information about products that are certified Halal by JAKIM and also products that are certified Halal by all of the Halal organization that are approved by JAKIM. If this project can collaborate with

HVE project by JAKIM, this project could become huge. This will greatly expand the capability and the scope of this application as it could be used by Muslims all over the world.

Last but not least, technology always evolved. Thus, it is also hopes that this application would also evolve and fits with every technology that will be introduced in the future.

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APPENDICES

Gantt Chart

No.	Project Activities (FYP1)	Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	**Selection of Project Title**														
	Search for Project Title														
2.	**Planning & Research Analysis**														
	Literature review research														
	Define system scope														
	Determine system outline														
	Questionnaire														
3.	**User Design**														
	Design storyboard diagram														
	Preliminary screen layout														

No.	Project Activities (FYP2)	Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
4.	**System Construction**														
	• Build														
	Develop User Interface														
	Create pages in Flash according to storyboard														
	Write coding														
	• Demonstrate														
	Run simple test to show the workability														
	Ensure all components interrelated and working														
	• Refine														
	Debug														
	Reconstruct the system														

5.	**System Cutover**														
	Testing system functionality and usability														
	Check system specification aligned with requirements														
	System implementation														

Process

Suggested Milestone