E-PAYMENT MODEL FOR ISLAMIC E-COMMERCE

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ABSTRACT

The twenty-first century have witnessed several major technological renaissances and many technological achievements as well, which led to a competition among many countries to adapt this trend. Rapid development of E-payment model in the Internet is an innovative E-payment system developed and tested commercially. Actually E-payments are made in variety of ways and method of value exchange in E-commerce. However, there are some issues present in Shariah compliance E-payment model as illustrated in problem statement. Therefore, this study review current E-payment models, identify the requirements for E-payment model Shariah compliance, proposes Payment Model Shariah compliance adheres to Islamic principles. The system called O-IS-BS is an Islamic E-payment model using Internet technology. Finally a comparison between Islamic Shariah compliance E-payment model with other traditional E-payment models were presented.

ABSTRAK

Abad dua puluh yang pertama telah menyaksikan beberapa teknologi renaissances yang besar dan banyak pencapaian teknologi, yang menyebabkan persaingan diantara banyak negara untuk mengadaptasi tren ini. Perkembangan yang pesat bagi model E-pembayaran di Internet adalah satu inovatif yang dibangunkan dan diuji secara komersial. Sebenarnya E-pembayaran boleh dibuat dalam berbagai cara dan kaedah pertukaran nilai di E-dagang. Terdapat beberapa isu dalam model E-pembayaran berpandukan syariat Islam seperti digambarkan dalam pernyataan masalah. Oleh karena itu, kajian ini meninjau model E-pembayaran berpandukan shariah, mendapatkan analisisi keperluan untuk model E-pembayaran, mengusulkan Model Pembayaran berlandaskan Islam. Satu prototaip sistem yang dipanggil O-IS-BS telah dibangunakan berdasarkan model E-pembayaran menggunakan teknologi Internet. Akhirnya perbandingan antara E-pembayaran mengikut Islam dengan model tradisional model E-pembayaran yang turut dibincangkan.

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إلى من نحتت بدموعها تفاصيل فراقي ، وأضاءت بصلواتها ضلمات غربتي ،
ورسمت بأشواقها خطوات مستقبلي،
الى العظيمه دوما.
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عائلتي الكبيرة
واصدقائي

أهدي هذا الجهد المتواضع تقديرا، ومحبة، وعرفانا.

مصعب

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LIST OF ABBREVIATIONS

ACH	Automated Clearing House
Aqad	Contract or agreement
Arbun	Down payment
ASP.NET	Active Server Pages .Net
Ayah	prodigy, verse in the Holy Quran
B2B	Business to Business
B2C	Business to Consumer
C2B	Consumer to Business
C2C	Consumer to Consumer
DB	Database
Dirhams	Basic unit of money in many Arab countries
E-banking	Electronic banking
E-business	Electronic business
E-cash	Electronic cash
E-cheque	Electronic cheque
E-check	Electronic check
E-commerce	Electronic commerce
E-economic	Electronic economic
E-finance	Electronic finance
E-payment	Electronic payment
E-mail	Electronic mail
E-money	Electronic money

E-pay	Electronic pay
E-purse	Electronic purse
E-wallet	Electronic wallet
Fatwa	religious advices
Fiqhi	Doctrine
Gharar	Specious
Hikmat	Wisdom
Maisir	Games of chance
Muallaq	Suspended
Muslim	adherent of Islam
O-IS-BS	Online Islamic Bookshop
p.b.u.h	peace be upon him
PC	personal computer
PSP	Payment Service Provider
P2P	Person to Person
REQ	Requirements
Riba	Usury
Shariah	Islamic law or Islamic principles
Shirkat	Partnership
SQL	Structured Query Language
UUM	Universiti Utara Malaysia
VB.NET	Visual Basic .NET
WWW	World Wide Web

CHAPTER ONE

INTRODUCTION

1.1 Overview

Besides free Internet services, E-commerce sites which require some form of payment for (part of) their services are the main segment of growth in the Internet landscape. Muslims were trying to find means of applying E-payment (electronic payment) operations within the boundaries of Islamic Shariah in everywhere and at all times, Assuming that electronic payment will be employed on a large scale in the coming future and based on state of the art payment systems, the discussion in this chapter include seven parts starting with a background in this project, followed by a problem statement over this study, project objectives, scope of study, outline of this dissertation and finally the summary for this chapter.

1.2 Background

The continuous use of the Internet augments annually and speedily, the rapid growth of Islamic E-commerce (electronic commerce) and payment methods connected with E-commerce such as E-payment (Sawama, 2003). The E-commerce

has been affected in Muslim businesses, and individual consumers. Reformed E-marketplace relationships and trading between the Muslim and non-Muslim over the Internet (Ramayah & Jantan, 2003). Most organizations need to adopt the new technology in the new markets and enhance their businesses efficiency to gain competitive advantage and to succeed in the global market.

Some of the challenges in the competitive and global market is E-payment conducted in different E-commerce categories such as Consumer to Consumer (C2C), Consumer to Business (C2B), Business to Consumer (B2C) and Business to Business (B2B), each of which has special characteristics that depend on the value of order and some other factors that bond with it such as the E-payment model (Mihimester, & McKelvey, 2000).

As it is well known, the Holy Quran descended upon the prophet Mohammad peace be upon him (p.b.u.h) and blessings of ALLAH Almighty to all nations to assist them to be due in every aspect. That's why Muslims should apply the Islamic Shariah in everywhere and at all aspects of life. One of these things is trade along with many factors that to it has been, and remains to be, the most important sources of life for Muslims. The Almighty ALLAH sent down the prophet Mohammad (p.b.u.h) and blessings verses of the Holy Quran that show the rule of Islam in the trade.

Therefore this study propose to apply the Shariah compliance payment model for E-Commerce in global E-Commerce without usury (Riba), and will regard transactions on the issues of payment model to be studied in order to clear the Muslims doubt on the Islamic prospect of E-Commerce without usury.

Whilst E-Commerce is spreading world-wide, many Muslims are wondering whether this new form of commerce is acceptable from the Shariah (Islamic Law) point of view (Zainul, et al., 2004). The spreading of E-commerce along with other factors which relates to it, were it is seen clearly how E-payment model is basically money but in an electronic form, and the money is the root business which must be safe precisely without Riba, because money is the main business mundane which is given to us all by ALLAH Almighty, which has been mentioned in the Quran:

(الْمَالُ وَالْبَنُونَ زِينَةُ الْحَيَاةِ الدُّنْيَا وَالْبَاقِيَاتُ الصَّالِحَاتُ خَيْرٌ عِندَ رَبِّكَ ثَوَابًا وَخَيْرٌ أَمَلًا)

(الكهف: 46)

And the meaning of this Ayah:

Wealth and Children adornment of the life of this world. But the good righteous deeds, that last, are better with your lord for rewards and better in respect of hope[1].

(Al-Kahfi: 46)

Therefore, the main interests in this study are what are the Islamic principles which need to be applied to E-payment model? How Islamic Shariah can be used as a guide in E-payment? The world is witnessing rapid development of contemporary trade at the international level, in the types of trade, has emerged types of commerce that were not known. By virtue of technical progress, E-commerce, one of the easier methods to buy and sell on Internet and easier to exchange and make commerce dealings, should follow Islamic principles in order to suit Muslim countries. However the E-commerce need to be confirmed of its use of the Islamic Shariah where a clear

1. Translation of the Ayah from Quran by Alhilali & Khan, 1998.

understanding should be achieved over this type of trade with the position of Islam and how to apply it over the Internet and how to apply transactions of E-payment model without Riba.

1.3 Problem Statement

Referring to Figure1.1, online E-payment model systems were divided into two groups, as shown.

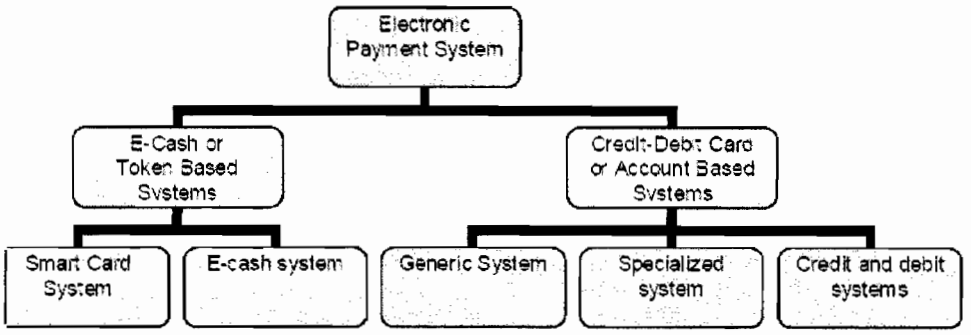


Figure 1.1: Classification of E-Payment System (Abdulhamid & Hattab, 2005; Abrazhevich, 2001)

The E-payment models have been used in E-commerce and do not consider Islamic law where Islamic principles are to be applied to E-commerce. Thus, where credit card transactions are the norm, conventional credit card transactions are prohibited in Islamic principles, as illustrated by the Islamic Bank system and the 'Murabaha sale' because Riba had been used in the process. Therefore, there are some

issues present in E-payment model that comply with Shariah which is not available in the current E-payment which are:

1- The absence of the subject matter during the contract formation.

2- The subject matter could be legally unrecognized or prohibited.

3- The subject matter cannot be delivered at the time the contract is concluded.

4- The subject matter is unspecific not sufficiently known to both contracting parties.

Considering the issues above, the main interests in this study are

(i) What are the available payment models for E-commerce?

(ii) Which E-payment model can be used in Islamic E-commerce?

(iii) What are the requirements for the E-payment model according to Islam?

1.4 Objective

The objectives of this study are

(i) To review current E-payment models used in E-commerce.

(ii) To propose an Islamic Shariah compliance E-payment model for E-commerce.

(iii) To identify the requirements for Islamic Shariah compliance E-payment model.

(iv) To develop a prototype that use Islamic Shariah compliance E-payment model.

1.5 Scope of the Study

This study focuses on E-payment model for Islamic E-commerce highlighting the possibilities of using E-payment model which depend on Islamic Shariah. The methods of conventional E-payment model will be explained and what is E-payment principle which is prohibited and not prohibited in Islamic Shariah.

1.6 Organization of the Thesis

In this chapter, the motivation for this study was described and introduced, by explaining the needs of E-payment model based on Islamic Shariah and how it can be applied into our life. The remaining chapters of this study are organized as follows:

Chapter 2 give the insight about the E-payment models and how it can work, the system use in the world by applying payment how Islamic perspectives, relative techniques are available for Islamic Shariah compliance E-payment and an overview over payment protocols, payment frameworks and related work concerning E-commerce systems.

Chapter 3 describe the methodology which has been used in executing all the phases associated with this study as proposed by Vaishnavi and Kuechler,

(2007) to build prototype as an example of applying Islamic Shariah compliance E-payment to O-IS-BS system for example.

Chapter 4 focuses on analysis and design of the system and the evaluation of the Web-Based is described.

Chapter 5 provides the explanation for the findings of the study.

Chapter 6 concludes the study, recommend future work.

1.7 Summary

The emergence of web sites activities and the Internet is opening up a new access channel to connect with the world, spreading through the usage of World Wide Web (WWW) to apply the commerce in the web and pay the money accordingly. In addition to the revolution, the E-payment methods will extend the business production in many fields. This chapter introduces the concern of the study which is the E-payment that adheres to the Islamic principles. Next chapter will further discuss related work to this topic.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The background and brief description of the study settings were introduced in the previous chapter. This chapter will continue the discussion of previous work related to Islamic Shariah prohibitions, conventional E-payment methods, explaining physical or electronic transfer of money on Internet, and discussion on the adoption of Islamic E-payment for E-commerce.

2.2 Business From the Islamic Perspectives

In Islam there are three basic principles in business transactions which are avoidance of Riba (usury), Gharar (specious) and Maisir (games of chance) to make it lawful according to the Shariah.

2.2.1 Prohibition of Riba in the Al-Quran and Sunnah

Riba is prohibited clearly and explicitly in the Quran and Sunnah. Allah and His Messenger (p.b.u.h), have proclaimed war upon those who do not abstain from it. It is very important to note here that there are two types of Riba:

(a) Riba al-jahiliyyah.

(b) injustice/exploitation as the hikmat (wisdom).

Riba should be prohibited, but interest is widely accepted and exists in modern E-business, E-banking and E-payment today. Some of the relevant Ayats regarding Riba in accordance with the Holy Quran are presented as follows: Allah says in the Quran:

وَمَا آتَيْتُم مِّن رِّبًا لِّيَرْبُوَ فِي أَمْوَالِ النَّاسِ فَلا يَرْبُواْ عِندَ اللَّهِ وَمَا آتَيْتُم مِّن زَكَاةٍ تُرِيدُونَ وَجْهَ اللَّهِ فَأُولَئِكَ هُمُ الْمُضْعِفُونَ

(الروم : 39)

That which ye lay out for increase through the property of (other) people, will have no increase with Allah. But that which ye lay out for charity, seeking the Countenance of Allah, (will increase): it is these who will get a recompense multiplied.

(Ar-Room: 39)

وَأَخْذِهِمُ الرِّبَا وَقَدْ نُهُواْ عَنْهُ وَأَكْلِهِمْ أَمْوَالَ النَّاسِ بِالْبَاطِلِ وَأَعْتَدْنَا لِلْكَافِرِينَ مِنْهُمْ عَذَابًا أَلِيمًا

(النساء: 161)

(Al-Baqara: 275-276)

يَا أَيُّهَا الَّذِينَ آمَنُواْ اتَّقُواْ اللّهَ وَذَرُواْ مَا بَقِيَ مِنَ الرِّبَا إِن كُنتُم مُّؤْمِنِينَ (278) فَإِن لَّمْ تَفْعَلُواْ فَأْذَنُواْ بِحَرْبٍ مِّنَ اللّهِ وَرَسُولِهِ وَإِن تُبْتُمْ فَلَكُمْ رُؤُوسُ أَمْوَالِكُمْ لاَ تَظْلِمُونَ وَلاَ تُظْلَمُونَ (279) وَإِن كَانَ ذُو عُسْرَةٍ فَنَظِرَةٌ إِلَى مَيْسَرَةٍ وَأَن تَصَدَّقُواْ خَيْرٌ لَّكُمْ إِن كُنتُمْ تَعْلَمُونَ (280) وَاتَّقُواْ يَوْمًا تُرْجَعُونَ فِيهِ إِلَى اللّهِ ثُمَّ تُوَفَّى كُلُّ نَفْسٍ مَّا كَسَبَتْ وَهُمْ لاَ يُظْلَمُونَ (281)

(البقرة: 278-281)

O ye who believe! Fear Allah, and give up what remains of your demand for usury, if ye are indeed believers (278) if ye do it not, Take notice of war from Allah and His Messenger. But if ye turn back, ye shall have your capital sums: Deal not unjustly, and ye shall not be dealt with unjustly (279) if the debtor is in a difficulty, grant him time Till it is easy for him to repay. But if ye remit it by way of charity, that is best for you if ye only knew (280) and fear the Day when ye shall be brought back to Allah. Then shall every soul be paid what it earned, and none shall be dealt with unjustly (281).

(Al-Baqara: 278-281)

In line with the Ayah of the Holy Quran, the following Al-Ahadith (traditions) of the holy prophet (p.b.u.h) reiterates the prohibition of Riba:

1. From Jabir (Gbpwh): "The Prophet (p.b.u.h) cursed the receiver and the payer of interest, the one who records it and the witnesses to the transaction and said: they are all alike [in guilt]"(Muslim, 1981; Tirmidhi, 1988).

2. From Anas ibn Malik (Gbpwh): "the prophet (p.b.u.h) said: when one of you grants a loan and the borrower offers him a dish, he should not accept it; and if the borrower offers a ride on an animal, he should not ride , unless the two of them have been previously accustomed to exchanging such favours mutually" (Baihaqi, 1344 H).
3. Zaid B. Aslam reported that interest in pagan times was of this nature: "When a person owed money to another man for a certain period and the period expired, the creditor would ask: 'you pay me the amount or pay the extra'. If he paid the amount, it was well and good, otherwise the creditor increased the loan amount and extended the period for payment again" (Malik, 1985).
4. The holy Prophet (p.b.u.h) announced the prohibition of Riba in express terms at the occasion of his last Hajj, which was the most attended gathering of his Companions. The Prophet (p.b.u.h) said: "Every form of Riba is cancelled; capital indeed is yours which you shall have; wrong not and you shall not be wronged. Allah has given His Commandment totally prohibiting Riba. I start with the amount of Riba which people owe to my uncle Abbas and declare it all cancelled". He then, on behalf of his uncle, cancelled the total amount of Riba due on his loan capital from his debtors (Al-Khazin, 1955).
5. The Prophet (p.b.u.h) said, "Gold for gold, silver for silver, wheat for wheat, barley for barley, dates for dates and salt for salt – like for like, equal for equal, and hand to hand; if the commodities differ, then you may sell as you wish, provided that the exchange is hand to hand" (Muslim, 1981).
6. Bilal (Gbpwh) once visited the Messenger of Allah (p.b.u.h) with some high quality dates, the Prophet (p.b.u.h) inquired about their source. Bilal explained that he traded two volumes of lower quality dates for one volume of that of the

higher quality. The Prophet (p.b.u.h) said: "This is precisely the forbidden Riba! Do not do this. Instead, sell the first type of dates, and use the proceeds to buy the others" (Muslim, 1981).

7. A man deputed by the holy Prophet (p.b.u.h) for the collection of Zakat/Ushr from Khyber brought for him dates of very fine quality. Upon the Prophet's asking him whether all the dates of Khyber were such, the man replied that this was not the case and added that he exchanged a Sa'a (a measure) of this kind for two or three (of the other kind). The holy Prophet (p.b.u.h) replied: "Do not do so. Sell (the lower quality dates) for dirhams and then use the dirhams to buy better quality dates. (When dates are exchanged against dates) they should be equal in weight" (Muslim, 1981).

However in world of business today, Riba is considered the norms despite the introduction of Islamic banking and finance. With the growth of Internet and online commerce or E-commerce, the issue remains on how to conduct online commerce that observes the Islamic principles. As at the moment there is a need of a standard guidelines on Islamic E-commerce that can be adhere by companies who are concern on doing business within the boundary of the Shariah. However this study will only focus on the payment method for Islamic E-commerce.

2.2.2 Prohibition Of Specious (Gharar)

The second major ban in Islamic laws is Gharar in the contract in accordance to uncertainty or hazard caused by lack of clearness regarding the subject matter or the

cost in a Aqad (contract) or exchange. The Islamic jurists derive the general legal principle in Islamic Shariah that a contract must not be doubtful and uncertain as far as the rights and obligations of the parties are concerned, otherwise it would be tantamount to deceiving any of the parties then the contract will be Haram. In particular, Ayub (2007) explained that Shaikh Al-Dhareer has classified the principles covering Gharar under the following headings as shown in Table 2.1.

Table 2.1: Principles and Types of Gharar

Principles	Gharar in the terms and essence of the contract	Gharar in the object of the contract
Types	(a) Two sales in one. (b) Down payment (Arbun) sale. (c) "Pebble", "touch" and "toss" sales. (d) Suspended (Muallaq) sale. (e) Future sale.	(a) Ignorance about the genus. (b) Ignorance about the species. (c) Ignorance about attributes. (d) Ignorance about the quantity of the object. (e) Ignorance about the specific identity of the object. (f) Ignorance about the time of payment in deferred sales. (g) Explicit or probable inability to deliver the object. (h) Contracting on a nonexistent object. (i) Not seeing the object.

In order to avoid uncertainty, Islamic law denies the power to sell in the following three situations:

(a) Things which, as the object of a legal transaction, do not exist.

(b) Things which exist but which are not in possession of the seller or the availability of which may not be expected.

(c) Things which are exchanged on the basis of uncertain delivery and payment.

Thus, doing business over the Internet raise these issues of uncertainty which does influence the Islamic contract between buyer and seller such as the questions on how does buyer make the online payment whereas the product cannot be seen in with bare eyes? Is there any assurance that after payment the product will be delivered? What if the product delivered is damaged due to the transportation? The answers however are beyond the scope of this study which is the Islamic online payment.

2.2.3 Prohibition of Maisir/Qimar (Games of Chance)

Maisir refers to an easily obtained available wealth or gaining of wealth by chance, whether or not it deprives other's right, to get something valuable with ease and without paying an equivalent compensation for it, without working for it or without undertaking any liability against it, through a game of chance, in other word, Maisir refers to reception of money, benefit or usufruct at the cost of others, having entitlement to that money or benefit by resorting to chance (Ayub, 2007; Tamer, 2007).

In the following section, the discussion continues on contract in Islam which is an important element on business transaction that is Shariah compliance. The legalness of contract in Islam depends on the three entities as mentioned above: Riba, Gharar and Maisir.

2.3 Aqad (Contract) in Islam

The objectives from Islamic contract are elimination of Riba, Gharar, Qimar and Maisir, to the Islamisation of the E-payment, E-commerce, E-finance currency, banking and the insurance sector. The contract must explicitly deal with the issue of prohibition of Riba, Gharar, Qimar and Maisir, from a Fiqhi (doctrine) point of view (Obaidullah, 1999).

A general agreement among majority of scholars on the view of currency exchange on a forward basis is not permissible. For example the settlement of the transaction from both ends (payer and payee) is deferred to a future date. All current and future payments are invalid in Islamic Shariah. Further, future contracts are totally impermissible regardless of their subject matter (Kotby, 1996).

The contract must be in agreement between the payer and payee together and connected to Islamic bank using Islamic payment and merchant according to Islamic Shariah in his / her dealings. There are two conditions in Islamic payment where consumer must know the good's cost and kind of goods when using E-payment

(Vadillo, 2006). Some of these contracts in Islamic Shariah are Shirkat (Partnership), Qirad, where Islamic business contracts need to be written in a form of a contract specifying the negotiable conditions agreed by both parties.

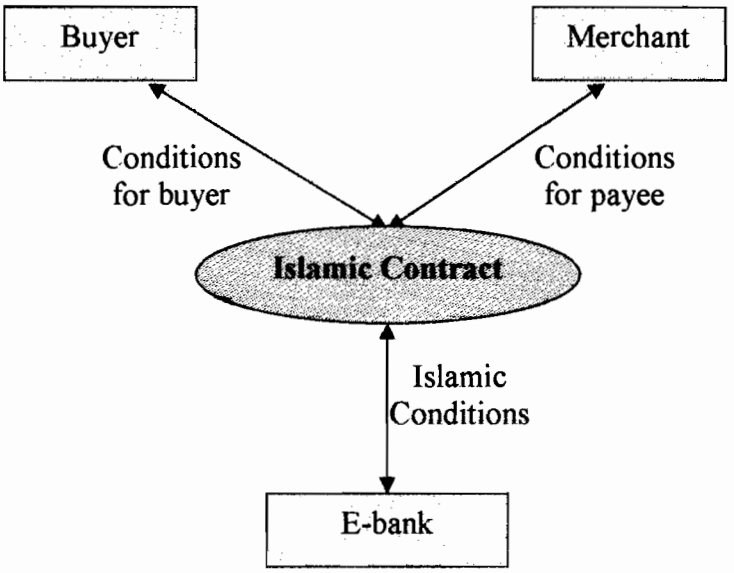


Figure 2.1 E-Contract Includes Islamic Shariah

Figure 2.1 illustrate the connection between the buyer and merchant within Islamic contract. The E-contract is an agreement between the buyer and merchant using Internet to conduct commercial transactions through the bank, connected online between the bank and the buyer or merchant. Islamic contract must be used over the Internet to agree upon the operation tread using E-payment and fulfill the process between the buyer and merchant with the bank through Internet.

2.4 Type of Islamic Payment Contracts Models

The objectives for Muslims are application of Islamic laws and rules also referred to as Islamic jurisprudence avoiding Riba, Gharar, and Maisir in finance payment.

Muslim scientists who are interested in applying ~~Islamic~~ Shariah in the world develop the Islamic financial products and instruments for banking, capital market and insurance sectors, so that Muslims are able to use the E-payment with banking and purchasing process, adopting Islamic contracts that are Shariah compliance.

a) Mudharabah (Profit-sharing)

Mudharabah means "A contract, which is made between two parties to finance a business venture. The parties are a rabb al-mal or an investor who solely provides the capital and a mudarib or an entrepreneur who solely manages the project. If the venture is profitable, the profit will be distributed based on a pre-agreed ratio. In the event of a business loss, the loss shall be borne solely by the provider of the capital." (OICU-IOSCO, 2004).

b) Musharakah (Profit and Loss Sharing)

Musharakah means "A partnership arrangement between two parties or more to finance a business venture whereby all parties contribute capital either in the form of cash or in kind for the purpose of financing the business venture. Any profit derived from the venture will be distributed based on a pre-agreed profit sharing ratio, but a loss will be shared on the basis of equity participation." (OICU-IOSCO, 2004).

c) Murabahah (Trade with mark up or cost-plus sale)

Murabahah means "A contract that refers to the sale and purchase transaction for the financing of an asset whereby the cost and profit margin (markup) are made known and agreed by all parties involved. The settlement for the purchase can be settled either on a deferred lump sum basis or on an instalment basis, and is specified in the agreement." (OICU-IOSCO, 2004).

d) Bai bithaman ajil (Deferred-payment sale)

Bai bithaman ajil means "A contract that refers to the sale and purchase transaction for the financing of assets on a deferred and an instalment basis with a pre-agreed payment period. The sale price will include a profit margin." (OICU-IOSCO, 2004).

e) Bai al- salam (Advance purchase)

Bai al-salam means "A contract whereby the payment is made in cash at the point of contract but the delivery of asset purchased will be deferred to a pre-determined date." (OICU-IOSCO, 2004).

f) Istisna (Purchase order)

Istina means "A purchase order contract of assets whereby a buyer will place an order to purchase an asset that will be delivered in the future. In other words a buyer will require a seller or a contractor to deliver or construct the asset that will be completed in the future according to the specifications given in the sale and purchase contract. Both parties to the contract will decide on the sale and purchase prices as they wish and the settlement can be delayed or arranged based on the schedule of the work completed." (OICU-IOSCO, 2004).

g) Ijarah (Lease financing)

Ijarah means "A manfaah (usufruct) type of contract whereby a lessor (owner) leases out an asset or equipment to his client at an agreed rental fee and pre-determined lease period upon the Aqad (contract). The ownership of the leased equipment remains in the hands of a lessor." (OICU-IOSCO, 2004).

The following section will discuss the main topic of interest in this study whish is E-payment.

2.5 E-Payment

The rapid growth worldwide on the proliferation of Internet contributed toward the birth of E-payment communications, transformation of information and money through E-commerce or E-business to the usage of E-payment services on an Internet (Schlager, et al., 2006; Lee, et al., 2001). Table 2.2 shows classification of E-payment system. Researchers classified E-payment system either based on the communications between payer and payee or the tools used to transits the money. The E-payment tools also depend on E-payment communication, and as a means to classify E-payment systems according to the way money transits.

Table 2.2: Classification of E-Payment Systems

According to E-payment communications	According to E-payment tools
Abad Peiro, et al., 1998	Lee, et al., 2001
Weber, 1999	Abrazhevich, 2001
Al-Meaither, 2004	UNCTAD secretariat, 2001
Majeri, 2006	Abdulhamid & Hattab, 2005
	Meng, & Xiong, 2003

The following sections will elaborate on the E-payment systems listed in Table 2.2.

2.5.1 E-Payment System

Figure 2.2 below shows an E-payment system that can be classified into two types of complicated E-payment models. The branches for each type depend on the

classification of the E-payment system as in Table 2.2 where each branch can contain more than one type of E-payment method.

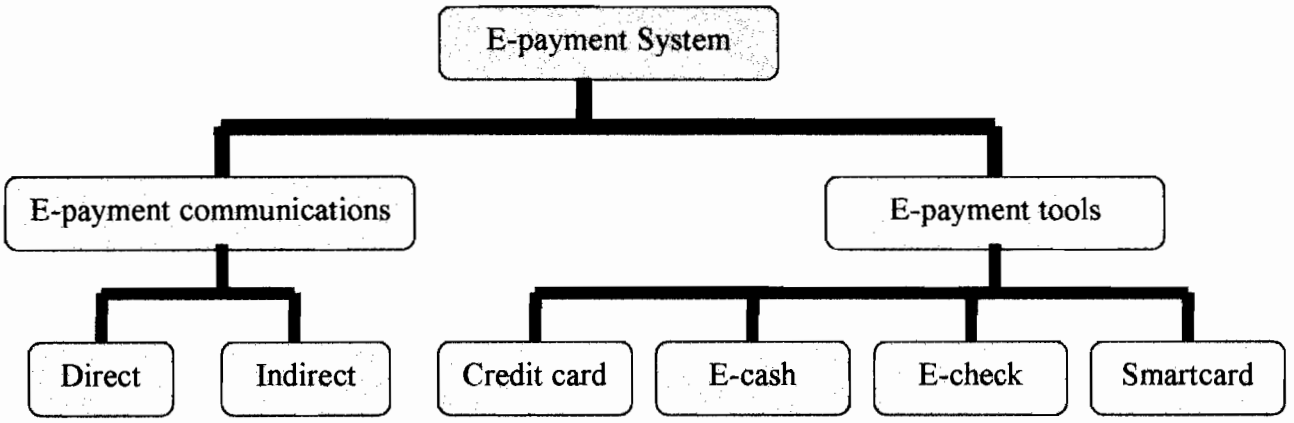


Figure 2.2: Classification of E-payment systems

2.5.2 E-payment System Based on Communications

~~According to~~ Ikbal Majeri (2006) introduced an E-payment model, as shown in Figure 2.3.

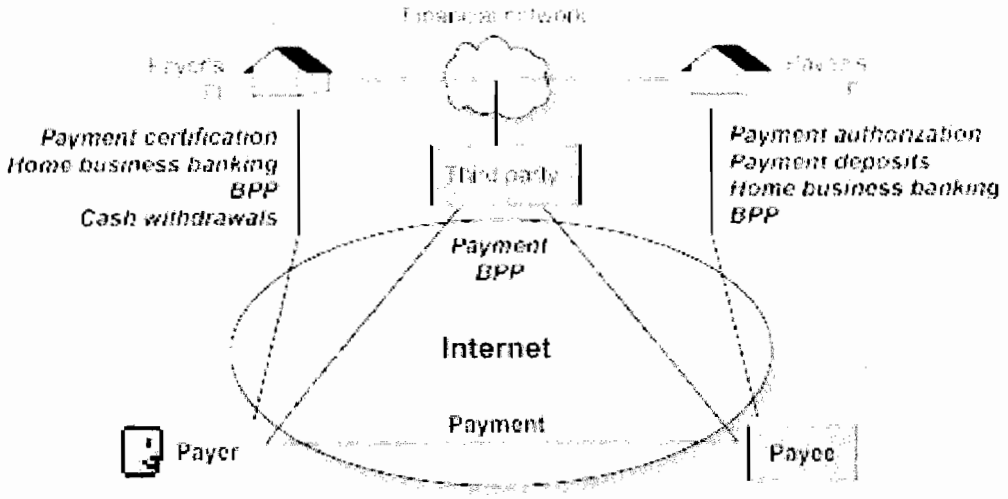


Figure 2.3: Model of an E-payment system (Majeri, 2006)

The model involves interactions between four players; a payer, buyer or consumer that will make the payment by means of an E-payment instrument obtained from the issuer, a payee, seller or merchant that receive the funds resulting from the payment from a buyer, the issuer which is a financial institution that provides E-payment instruments to the payer to use in a payment, and an acquirer which is a financial institution associated with the payee that verifies the validity of the deposited payment instrument by clearing it with the issuer (Al-Meaither, 2004).

As shown in Figure 2.2 the branch of E-payment communications was further classified by Abad Peiro, et al., (1998) into four types based on the method of payment as depicted in Figure 2.4.

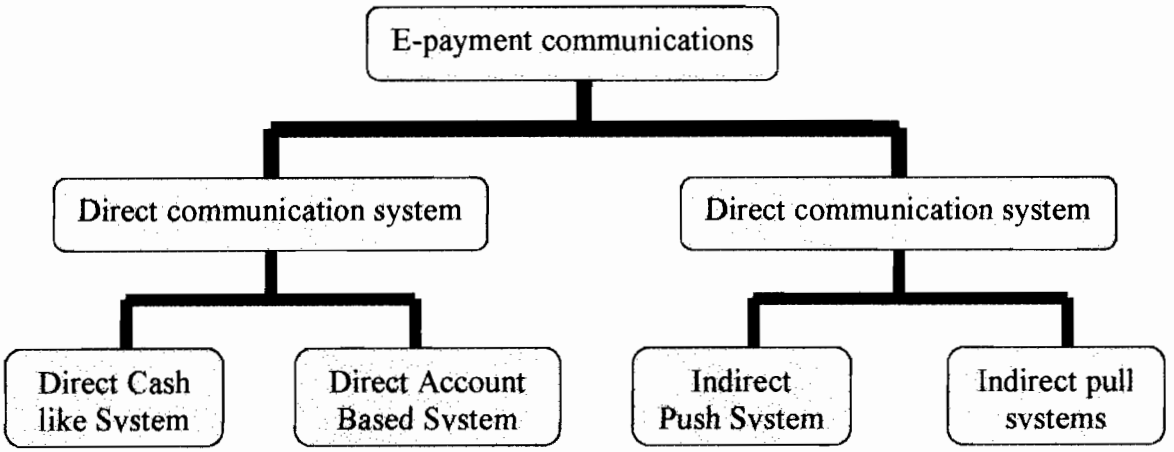


Figure 2.4: Classification of E-Payment System Based on Communications

The basic distinction for communication between E-payment systems is the presence or absence of a direct communication between buyer and merchant. In an indirect communication, the payment itself concerns only the promoter of the payment – which may be the buyer or the merchant – and the issuer and acquirer (Xu,

& Zhao, 2000). Indirect payment systems are usually measured as part of home banking in the context of E-payments on the Internet. Most current E-payment systems implement direct payments. Another distinction is the time when pertaining the money value is actually taken from the payer, i.e. pre-paid and post-paid systems. Pre-paid systems are usually referred to as cash-like or token-based and post-paid systems are usually called account-based or notational (Weber, 1999).

2.5.2.1 Direct Cash Like System

In a direct cash like system, the payer withdraws money from his account at the issuer in the form of an E-payment instrument, the payer hands the payment tokens over to the payee who in return deposits the payment with its acquirer. Direct cash-like payment system is similar to conventional cash, the acquirer then asks the issuer for settlement. Participants exchange electronic instruments that represent value, just as banknotes determine the value of paper money.

Such payment systems usually involve either tamper proof hardware like smart cards, like Mondex, or online validation by the issuer, like E-cash / Digicash, the payer's instruments can be kept locally at the payer PC or in a payer smart card, or they can be managed centrally at the issuer, to protect against double spending of digital cash which is of course trivial to copy, if no payer information is included in the E-payment instrument, or in other payment data, then the transaction can be anonymous (Abad Peiro, et al., 1998). Figure 2.5 explain the operation. All arrows from figure 2.5 to 2.8 represent the following:

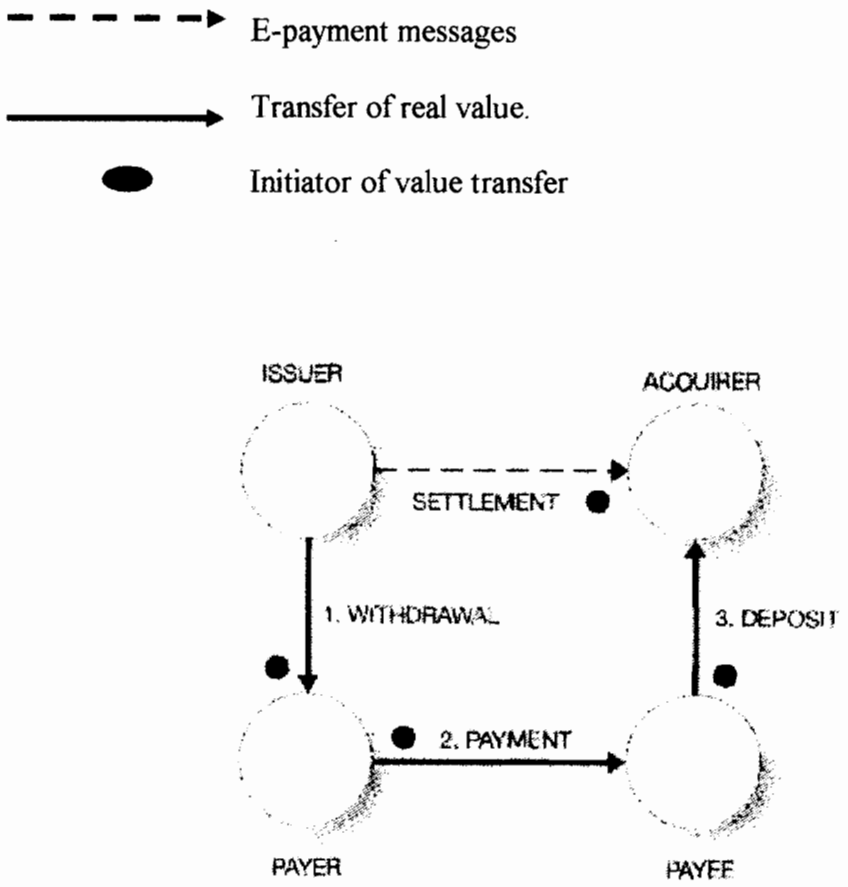


Figure 2.5: Direct Cash Like System (Abad Peiro, et al., 1998)

2.5.2.2 Direct Account Based System

These direct account-based systems resemble conventional check systems. The payer creates and signs an E-payment instrument (cheque) and sends it to the payee, who presents the payment authorization to its acquirer who in turn redeems it from the issuer. Then the issuer arranges for the funds to be transferred from the payer's account to the payee account, and the issuer notifies the payer after completion of the payment. Here the scheme does not allow the payer's identity to be secret from the issuer, and also the payer's information cannot be hidden from the payee (Abad Peiro, et al., 1998). Figure 2.6 explains this system.

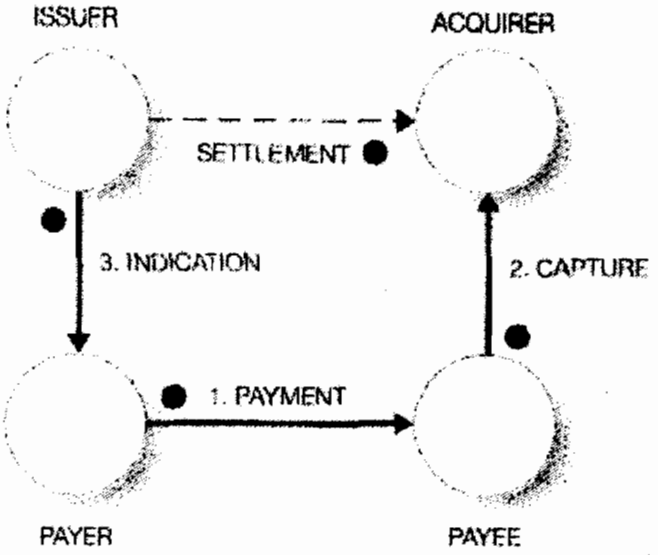


Figure 2.6: Direct Account Based System (Abad Peiro, et al., 1998)

2.5.2.3 Indirect Push System

In the indirect push payment model the payer instructs the issuer to transfer funds to the payees account at the acquirer, the system requires the issuer to be on-line for every payment transaction, and it is assumed that both the payer and the payee have an account with a bank. If they use separate banks it is assumed that the banks concerned are able to communicate securely, these systems resembles the use of credit transfer system between public institutions payments, this model resembles most a traditional bank transfer the payee is just notified of the incoming payment.

The payee's only involvement is to receive notification of the incoming payment, Systems of this type do not allow anonymous transactions, the payer's identity must be known to the issuer in order to directly transfer funds from his account. The payer does not need to communicate any of his details to the payee, although in practice it is

necessary for the payee to be provided with an identifier for each payment, so that the payee knows with which transaction the payment is associated (Abad Peiro, et al., 1998), figure 2.7 explains this system.

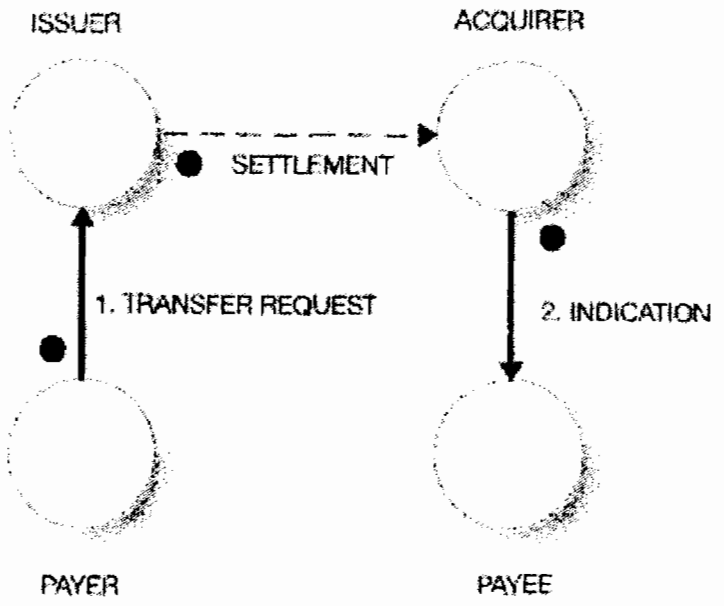


Figure 2.7: Indirect Push System (Abad Peiro, et al., 1998)

2.5.2.4 Indirect pull systems

Consequently In this type of system "Indirect pull model" the payee instructs the acquirer to charge the payer's account at the issuer, there must be a pre-existing agreement between payer and payee, these systems resembles the use of ACH (Automated Clearing House) payments, the traditional banking equivalent is a debit advice, and the payer is just notified of the outgoing payment as shown in a figure 2.8 (Abad Peiro, et al., 1998).

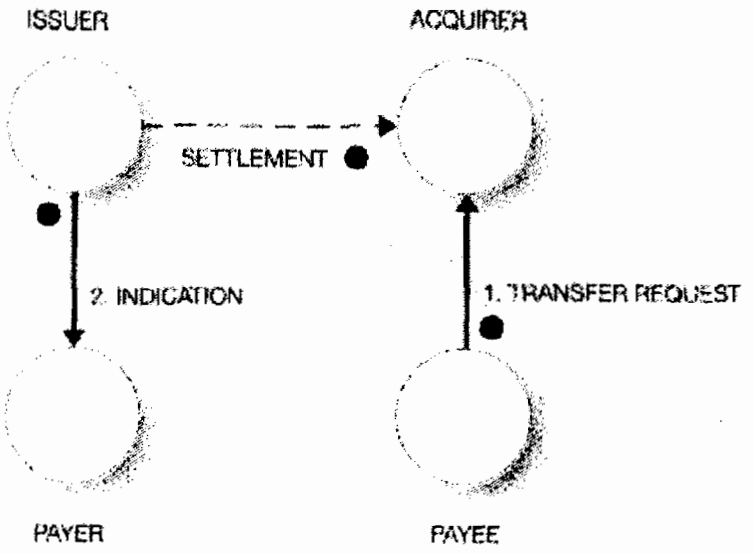


Figure 2.8: Indirect pull systems (Abad Peiro, et al., 1998)

Next section will explain the other classification of E-payment system based on tools.

2.5.3 E-payment Tools

E-payment tools can be divided into four general types: credit card systems, E-cash systems, E-cheque systems, and smartcard system based on E-cash systems (Lee, et al., 2001). All of the type of E-payment depend on E-banking to pay and connect with customer or corporation to complete the operation on internet as shown in figure 2.9 depict the architecture on the banking payment system acts as an internet, wire transfers and other bank networks (UNCTAD secretariat, 2001).

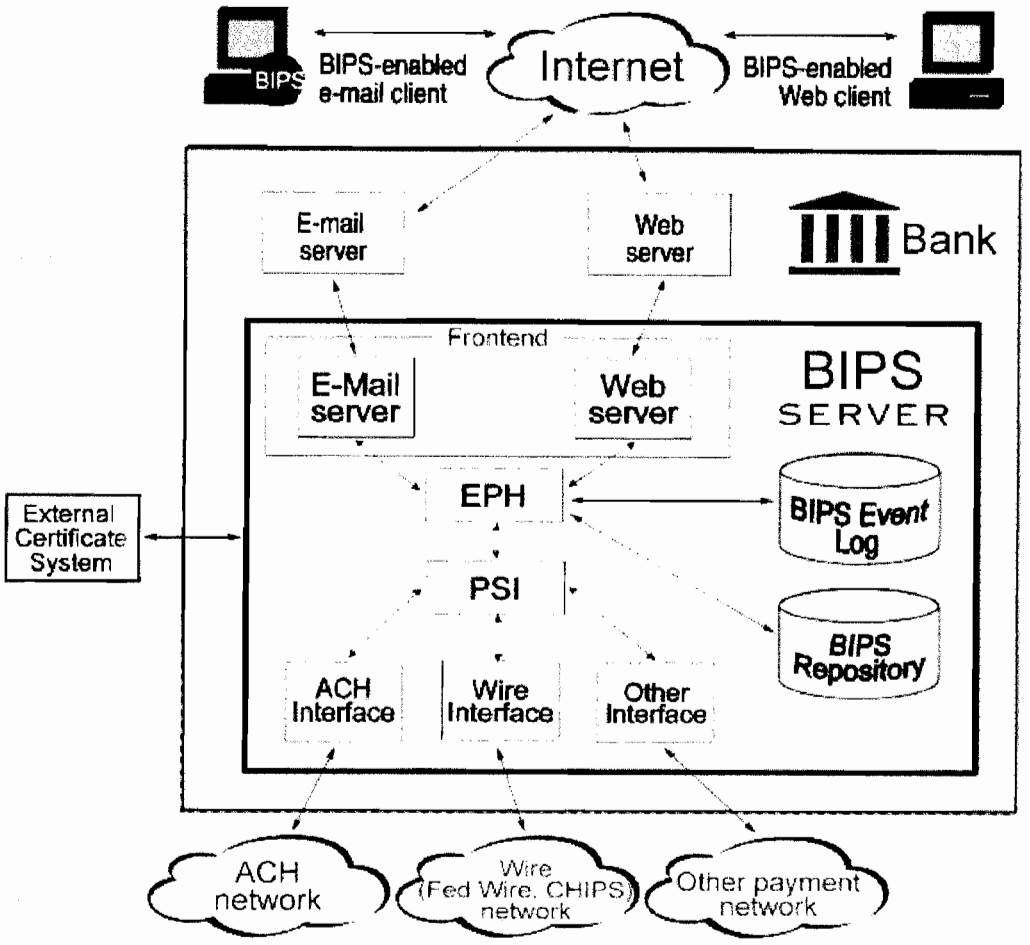


Figure 2.9: The Bank Internet Payment System (BIPS) architecture

(UNCTAD secretariat, 2001)

There are various payment methods available in the current E-commerce or E-banking commercial transactions. The following discussions will present some examples of these methods.

(a) PayPal

PayPal system is proposed to support payer to payee (P2P) to send and receive money between the users through E-mail which is one of the successful method in online payment systems on the market at the beginning of the century. PayPal is a third party that organizes the money transfer among users. It acts as an agent between the users to transact the money withdrawn from the credit card account to the automated clearinghouse with confirmation of the fund transfer (PayPal, 2008). PayPal is one method presented for reducing the costs of post payments because it is cheap and fast (Rader & Maghiros, 2001).

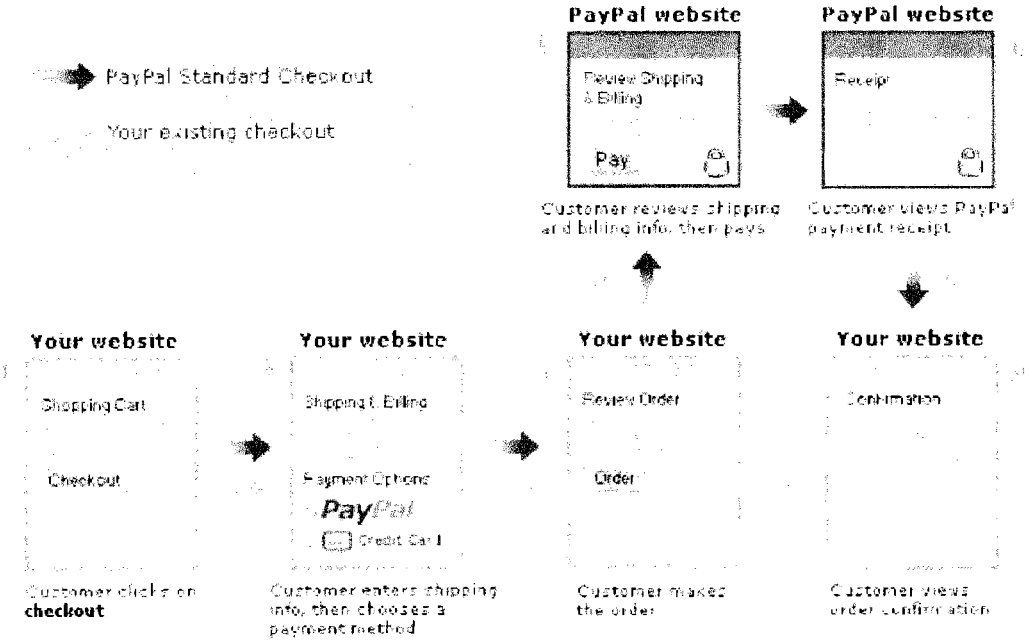


Figure 2.10: Standard Checkout Process with the PayPal (PayPal, 2006)

Figure 2.10 above; portray how the consumers use a PayPal to pay goods costs over the Internet. Begins when the buyers have added items to their shopping cart and passing on this step enter their shipping information and choose PayPal as their

payment method, order and press the Order button. Buyers will review or edit their shipping address and billing information then click Pay to complete the payment. Their payment is processed, and PayPal sends buyers a confirmation email, review their PayPal payment receipt then automatically redirected to an auto return facility, lastly ending with the order confirmation screen (PayPal, 2006).

(b) E-cash

E-cash is supporting P2P E-cash payment transactions, E-cash replaces the cash over the Internet, people use E-cash as payment tool to pay bills, and some of the other advantages of E-cash are independence, non-reusability and anonymity.

Anonymity involves transferring payments between individual parties, and low transaction handling fees. As shown in Figure 2.11 payers take E-cash from the bank and connect with payee. When the time comes to pay the invoice, the E-cash sends E-mail, then the payee sends this E-mail or E-cash to the bank to deposit the amount being transferred to payee's account (Shaobin, 2006; Meng & Xiong, 2003; El Islamy, 2002)

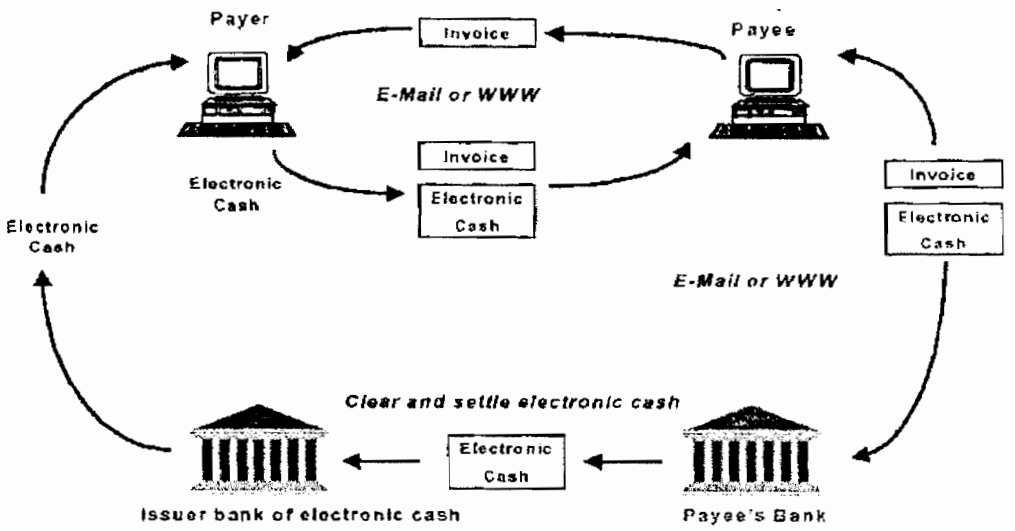


Figure 2.11: E-cash payment model (Meng & Xiong, 2003)

Figure 2.11 also show how E-cash mode can be used between the payer, issuer bank of E-cash, payee, payee's bank and how it can be used for online payments.

(c) E-Credit Card

In E-credit card the payer uses E-credit card to pay the invoice or bill. E-credit card works like credit card and has the same legal treatment for it. In the figure 2.12 shows the E-credit card payment model.

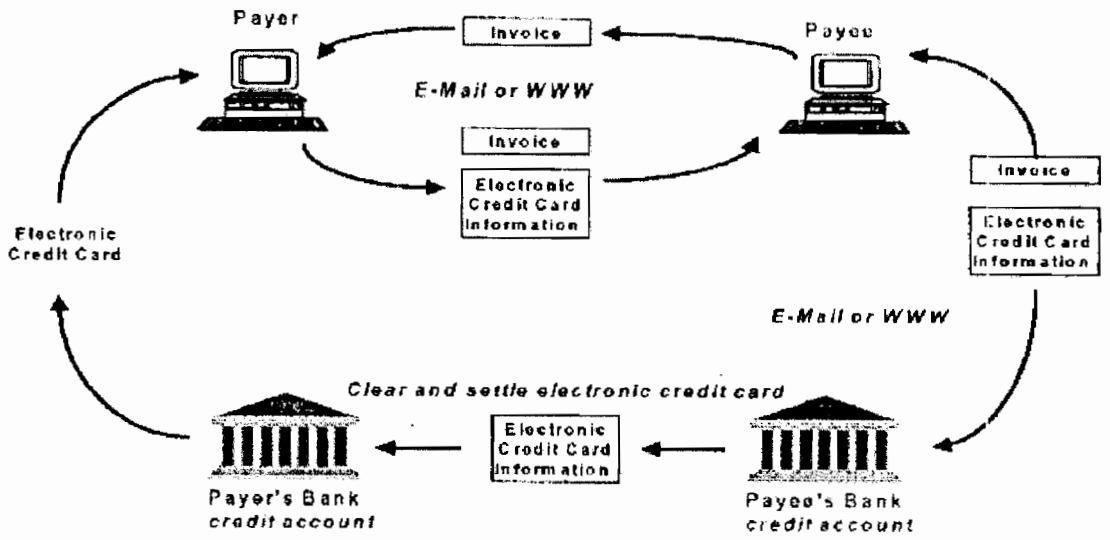


Figure 2.12: E-credit card payment model (Meng & Xiong, 2003)

The payer must use credit card which includes information on the payer. When the payer buy something from the Internet, the information will be sent to join with the payee by E-mail, when the time comes to pay the invoice, The payee verifies the payer's signature on the payment instruction information and invoice and detaches the invoice information, then the payee makes a deposit over the payer account in the bank with the amount (Shaobin, 2006; Meng & Xiong, 2003; El Islamy, 2002), a major problem in E-credit is the fraud between buyer and payer. For example, the merchant has no legal proof of purchase unless the buyer uses authentication certificate.

(d) E-Check

In E-cheque payment model payers can pay bills. The advantages of E-cheques over debit/credit cards include the ability of paying for high-value transactions and B2B payments, and it allows easy integration with existing banking systems, E-cash is

replaced by paper cheque. The E-cheque works when the time comes to pay the invoice where the information will be verified for E-check. Then after being signed electronically, the E-cheque will be sent to the payee by email, afterward, the payee confirm the payer's information and verify the information, then forwards the cheque to a bank to confirm the information and deposit credit to the payee's account (Shaobin, 2006; Meng & Xiong, 2003; El Islamy, 2002). Figure 2.13 illustrate the use of E-cheque payment model between the payer, issuer bank of E-cash, payee, payee's bank and how to use it to pay online.

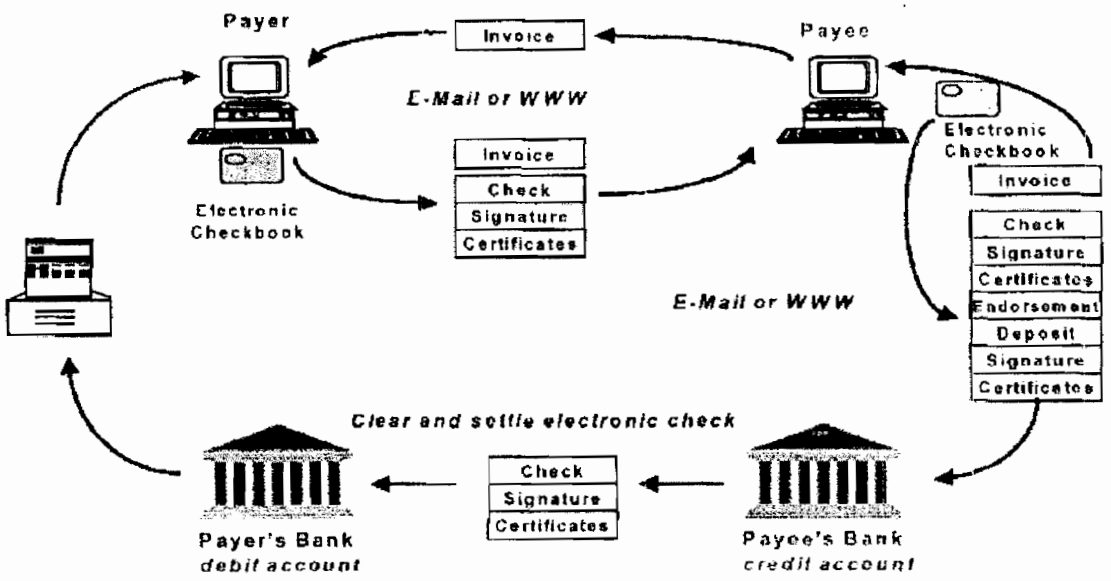


Figure 2.13: E-check payment model (Meng & Xiong, 2003)

(e) E-purse or E-wallet

E-purse is similar to E-wallet and it is a chip card with software based schemes. This involves transfer of E-money between E-purses of payer and payee (Freitas, & Woodcock, 2006). The E-purse or E-wallet software is simple to use to shop online,

to recall important information about the shopper, such as payment information. E-purse depends on the payer to open stored personal information such as credit card and other information, when the payer starts to buy and fill in the personal information, the payer sends it to payee where payment is performed. The payer of E-wallet contacts the payee E-purse and validates the parties and organizes concurrent payments. E-wallet gets the E-cash and changes the owner part of the reference number and re-generates a new check digit (Abdulhamid & Hattab, 2005).

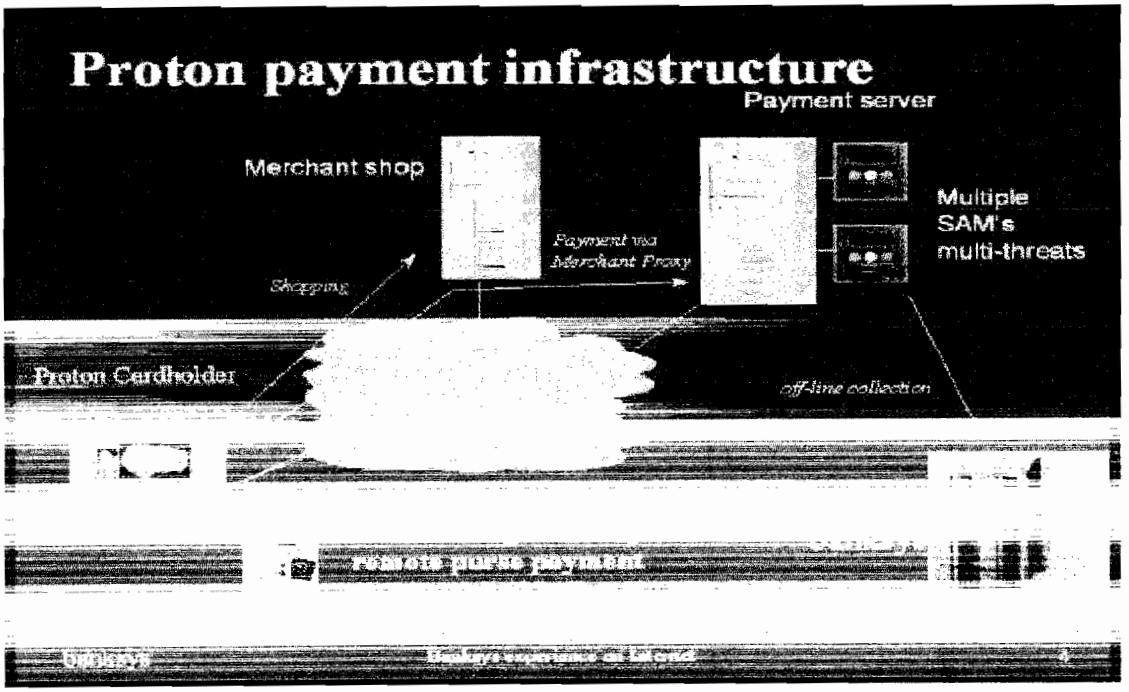
E-purse potential as an alternative to cash is expected to get easy acceptance in E-commerce. It has many advantages and makes them attractive to merchants and the operators of vending machines and automats since they were pre-paid, and reduced risks of fraud, theft and vandalism in addition to the costs of handling cash. Such as their potential for the replacement of cash, this is still the main engine installment deals and face to face around the world (Rader, & Maghiros, 2001).

Then E-purse can hold digital money that is purchased similar to traveler's checks or to a prepaid account. The wallet may reside in the user's machine or on the servers of a web payment service. When stored in the client machine, the wallet may use a digital certificate that identifies the authorized card holder. Microsoft's Passport and Yahoo! Wallet are examples of digital wallets.

The Mondex (Mondex International Ltd, 2008) is an application on E-cash system operates on a smart card. The microchip contains a "purse" in which monetary value is held electronically. The purse is divided into five pockets, allowing up to five different currencies to be held on the card. The E-purse can be loaded with monetary

value where it is stored until it is used as payment for goods and services or transferred to another Mondex card by inserting the card into a card reader. The E-purse can also be locked with a personal code so that only the card's owner can access the value on it.

The way E-purses work over the Internet is the merchant must first have subscribed to the Proton acceptance service with a payment server. The payment server holds the security module specific to the merchant Payment Security Access Module (PSAM), a micro smart card located in the merchant's terminal or a payment server. The PSAM receives the E-money which comes from an E-purse when a payment transaction takes place. Figure 2.14a illustrates the payment transactions by E-purse.



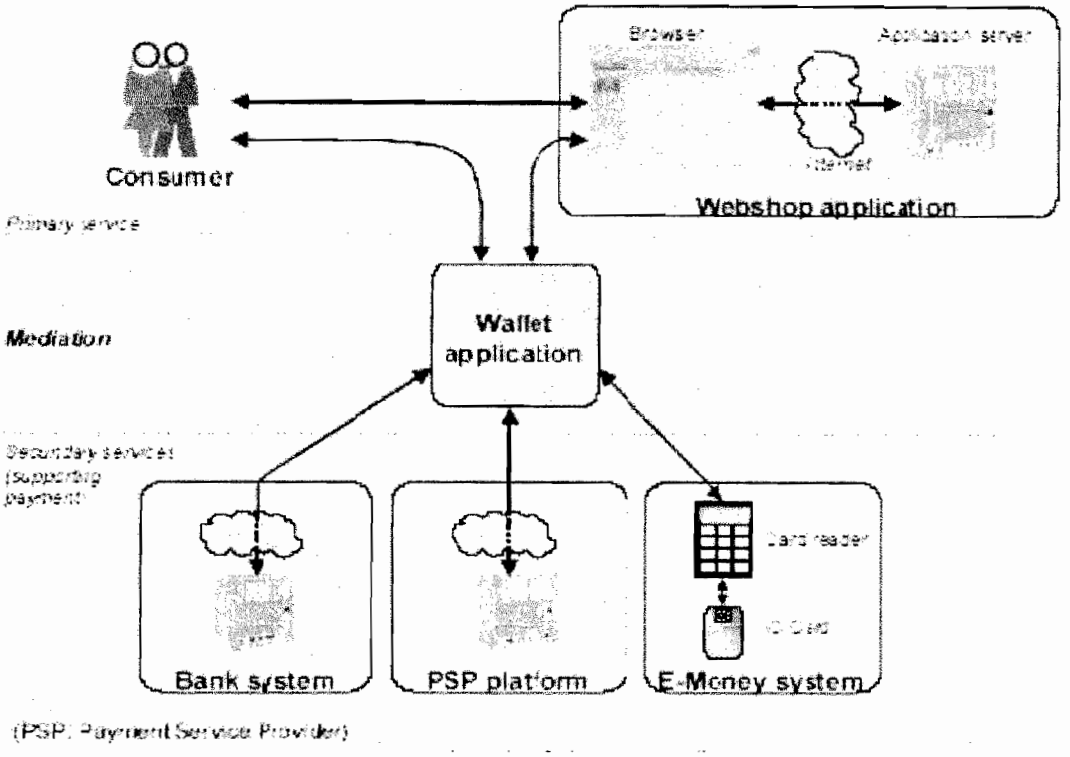


Figure 2.14b: The role of E-wallets (Vassiliou, 2004)

First, a customer agrees to make online payment portfolio as shown in Figure 2.14b. It depict the role for E-purse between the consumer, payment service provider (PSP) and web shop application, this explains how the purse application mediation between the consumers and web shop application (Vassiliou, 2004).

When the consumers click on the screen to indicate that the chosen means of payment, a commercial Web client is required to provide E-wallet card reader, cardholders, merchants to send details of the deal and details of electronic used portfolio, received from client to server installment where the server analyzes the data. The portfolio calculates electronic data needed to reduce the amount on the card and the server sends the data to the card which enquires the customer card reader for the ratification installment of OK button pressure cards reader (Murthy, 2001).

Afterwards, the E-purse is debited the E-money amount. Statement on the debited E-purse (debit proof) and a registration certificate of the debit are then sent to PSAM merchant to deliver the data. PSAM merchant certified money-mail server installment. The deal is believed to enable the trader's account to be generated with a bank which respects such contracts (Second Sub-group meeting of the PSTDG and PSULG, 2000).

2.5.4 E-payment method

E-payment method is the application in E-payment system which includes several services from the payment model on E-commerce. Every company implementing E-commerce use one of the methods listed in Table 2.3 to assist consumers to pay the goods cost (Schuldt, et al., 2000).

Table 2.3: Some of E-payment methods under E-payment tools

E-payment tools	E-payment methods
Credit card systems	E-payment cards (credit, debit and charge) MasterCard Cirrus Visa Electron
E-cash system	Stored-value card payments Loyalty cards Netcash E-cash Millicent
E- check system	E-cheque NetBill NetCheque
Smartcard system	E-wallets (or E-purses) Mondex

	Chipper Proton

Due to the availability of these services, the client can use the Internet to sell and pay for anything at anytime, meaning customers have a 24/7 availability worldwide markets and machines in E-commerce domain (Koponen, 2006). E-payment methods are interchangeably used to describe the process of finance and payments mainly using the medium of the Internet (UNCTAD secretariat, 2001).

2.6 Islamic E-payment

The main focus of this study is E-payments which adheres to the Shariah principles. Based on the discussion above, the lawfulness of the online payment will very much depend on the contract whether it abides to the Islamic law or not. In principle every method is lawful unless there are evidences that the methods are not compliance to Islamic Shariah. This requires an in depth study of each method. Interestingly these contracts differ from one Muslim country to another with different argument and justification from the Al-Quran and Sunnah.

2.6.1 Islamic payment mode in Malaysia

The decision to use Islamic E-payment depends on the availability of Islamic electronic capital marketing including the modern financial system, and this system contains at least two types of capital markets, namely, the Stock Exchange and the

Commodity Exchange that use the money in accordance with Islamic Shariah together with the implementation of the Islamic contracts (Alhabshi, 2004).

With the increase use of E-commerce there are certain conditions that must be observed to ensure the legality of payment model on E-Commerce in Islam such as clarity in the communication, the products offered must be clearly defined, the mode of delivery and the mode of payment must be clearly stated and conclude the contract and continuity in the communication (Zainul, et al., 2004).

Analysis on the security system for Murabaha techniques to improve the Islamic payment depends upon Murabaha sale, applying new method and secure E-payment process, as exemplified by some of the Islamic banking system where credit card transactions are not consistent with Islamic E-payment (Al-Meaither & Mitchell, 2003).

In Malaysia there is an introduction of a multi-pronged program of action that seeks the development of an overall infrastructure for Islamic capital and money markets such as the International Islamic Financial Market (IIFM), a Master Agreement for Islamic Treasury Murabahah Contracts, and it is also currently assessing the development requirements for Sukuk at primary as well as secondary market levels (The World's Global Islamic Finance News Provider, 2007).

2.6.2 Islamic payment mode with out Riba, Gharar, and Maisir

of payment, but Muslims should avoid using credit card when account registration is made at a Non-Muslim country or banks, because it involves interest Riba. Muslims may use other alternatives such as payment through bank that will be permissible (Halal) (Zainul, et al., 2004). As discussed in detail previously in this chapter, the principle is that Gharar and Maisir must be avoid like such as present-day lotteries and prize schemes based purely on luck come under this prohibition.

2.7 Summary

This chapter discussed previous related work in E-payment; explain mechanism of E-payment, including some applications of E-payment methods over the Internet. The Basic prohibitions of business according to Islam with Islamic payment model must be without Riba, Gharar, and Maisir. For example, in Malaysia, the Islamic payment is adopted, an agreements which includes Islamic marketing, and Islamic contracts. Beside that, this study encourages Muslims to use the web and Internet through as Islamic payment model from online marketing, connect with Islamic banking and marketing. The basic principle is that every method is lawful unless there is evidence that proof otherwise from the Islamic perspectives.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Previous chapter has brought the light upon the related work and E-payment types in this area of research. This chapter will focus on the methodology used to achieve the objective of this program, and describe the system operation and process of applying the Islamic principles; create a web based system depending upon an Islamic E-payment model. Another objective of this chapter is to discuss the implementation of propose Islamic E-payment model for E-commerce.

The methodology has all phases needed to achieve a software system. The system development started in **Awareness of Problem** phase to achieve a general proposal for the main problem. Then, **Suggestion** phase where a Tentative Design indicates output obtained, the **Development** phase real building the prototype which will be evaluated by users in the **evaluation** phase. In this project, it is divided into two phases **evaluating** and **testing.** These phases are shown in Figure5.

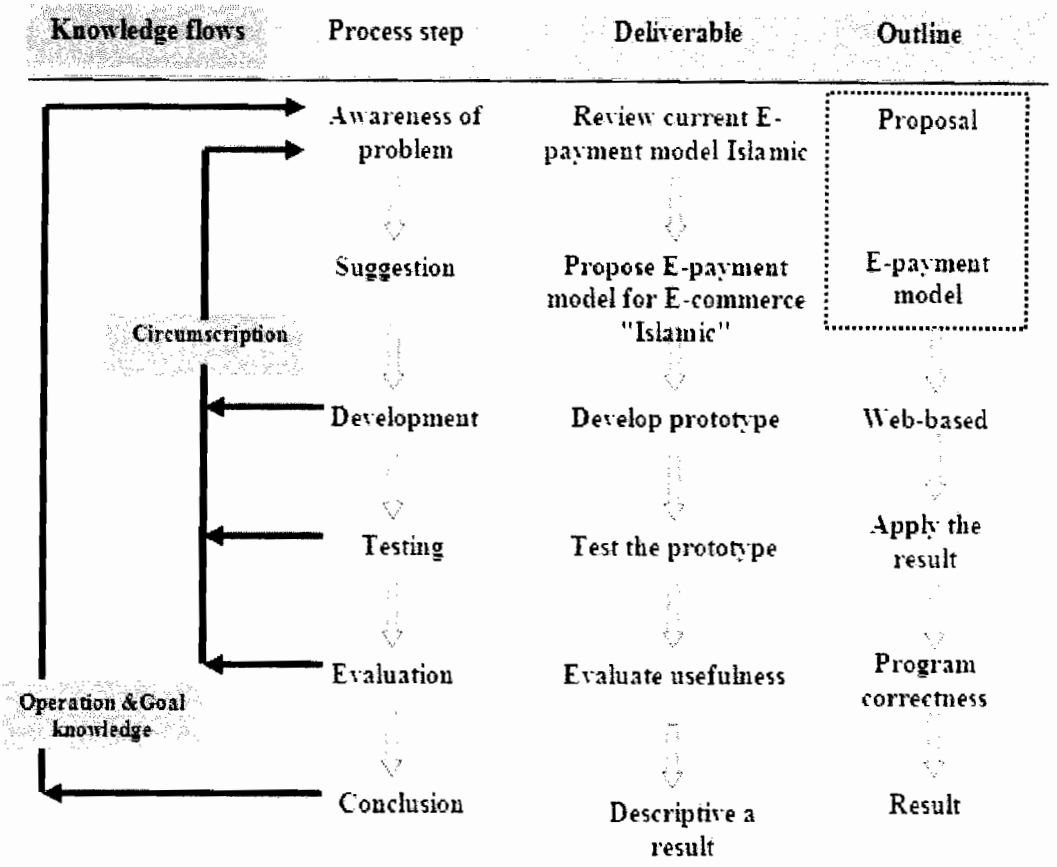


Figure 3.1: The General Methodology of Design Research (Vaishnavi, & Kuechler, 2007)

3.2 Awareness of Problem

In this phase, the problem had been identified based on Islamic Shariah and principle, all commercial transactions that should be side by side with Islamic principles and the objectives of Islamic law relating to E-business, E-commerce, and E-payment.

The primary objectives of the Islamic Shariah or law are succinctly described in the following definitions (Alhabshi, 1994):

"The very objective of the Shariah is to promote the welfare of the people, which lies in safeguarding their faith, their life, their intellect, their posterity and their wealth. Whatever ensures the safeguarding of these five serves public interest and is desirable." Al-Ghazali.

"The basis of the Shariah is wisdom and welfare of the people in this world as well as the Hereafter. This welfare lies in complete justice, mercy, well-being and wisdom. Anything that departs from justice to oppression, from mercy to harshness, from welfare to misery and from wisdom to folly, has nothing to do with the Shariah." Ibn al-Qayyim.

From the above, it is concluded that E-payment, E-business and E-commerce transactions all of which should be equitably undertaken so that no one suffers from any form of injustice or loss. All Muslims must evade Islamic prohibitions in E-payment when using E-payment models like:

- Riba neither "interest" nor "usury": There is Riba without interest, and interest without Riba.
- Gharar neither "gambling" nor "uncertainty": Many examples of unnecessarily vague contracts.
- Lack of knowledge about the existence or non-existence of the subject matter, or concerning its quality, quantity or data of performance, was held to trigger Gharar.
- As a guideline, Muslim jurists put the following condition for lawfulness of a subject matter of contract:

1. The subject matter must be in existence during the contract formation.

2. The subject matter must be legally recognised.
3. The subject matter must be capable of delivery at the time the contract is concluded.
4. The subject matter must be specific and sufficiently known to both contracting parties.

Therefore, the contract or agreement between the buyer and merchant should be bounded to Islamic principle in E-payment models, Islamic banking utilize the money in Islamic way according to Islamic Shariah. Accordingly, the goods should be obtained from Islamic capital marketing to be Halal (permissible) in Islamic Shariah. Nevertheless, the web based system should depend upon an Islamic E-payment model through the development of O-IS-BS which uses methods based on Islamic Shariah rules.

3.3 Suggestion

In this stage the suggestions will be formed according to the concept discussed in the previous chapters which were used to establish similar design to build the system. Any suggestions for any problem solution should be derived from a previous knowledge or theory related to the problem area as previously discussed in E-payment system in chapter two. Additionally, the suggestions will be based on the collected data in order to make it more convenient and compatible.

After providing a general model for an E-payment system the study suggested the design of the web Based system to apply Islamic E-payment by developing a prototype for O-IS-BS system. The output of this phase is the Tentative Design as that includes UML diagrams, formulation of suitable methods to achieve the desired result as well as UML diagrams involved in requirements, use case diagrams, use case specification, class diagram and sequence diagrams.

3.4 Development

The overall prototype development in this round is that of evolutionary prototyping. A development phase is the first step in the process of building the working system and here according to Islamic Shariah E-commerce the web based established the Islamic E-payment model. The overall steps to establish the web based development depend on evolutionary prototyping methodology used for website development and E-commerce applications (Sommerville, 2001).

In this phase, project, ASP.NET was used to build O-IS-BS system. That depend on VB.NET as well as linked to the database using SQL Server Database to store and retrieve all information. The functional requirements that have been mentioned previously have been developed to reach the proposed prototype. In snapshots of the screens are presented in Appendix A including the explanations of how the users can interact with the system.

3.5 Testing

The main purpose of conducting testing is to reduce the possibility of having bugs within the prototype. Furthermore, a system testing will be conducted over the interaction of the entire dialog components when all the components are combined for the first time.

3.6 Evaluation

This stage is considered as one of the most important stages in this method since it is used to evaluate the partially or fully successful implementations. The evaluation will be according to the view points of the users and this can be done by matching the system results and functionality with the desired objectives, and by checking the performance quality while performing the main operations.

System evaluation is the final phase in system development which depends upon the results acquired during the testing phase. The evaluation will be performed to determine the usefulness of the system. A usability testing will be carried out for the application. This project uses interview technique to evaluate and test the web based system, with the use of a User Testing to rate the user satisfaction with the web based and to evaluate the system in several dimensions. Consequent chapters explain more details about the methodology used.

3.7 Conclusion

This final phase of the methodology provides project idea to build O-IS-BS via an Islamic E-payment model using internet technology. Some of the suggestions provide several advanced research, talk about Islamic E-payment model, and the methodology which will make a full presentation about the system and its final results as well as it's criticizing the performance of the system, the efficiency, and compatibility with its environment.

3.8 Summary

In this chapter, the methodology which is suggested for this study is presented. A generalized sequence of the several steps for building and deploying traditional and enterprise applications is discussed. Finding, evaluation and testing of the proposed system will be discussed in the next chapters.

CHAPTER FOUR

ANALYSIS AND DESIGN

4.1 Introduction

In the previous chapter, the methodology of research that was applied in this study has been explained considerably. The methodology consists of six phases which includes awareness of the problem, suggestion (tentative design), development, testing, evaluation and conclusion. In this chapter, the middle phase which is suggestion (tentative design) phase will be discussed in a more detail elaboration. Among others, it explains on the requirements determination and structuring activity as well as the production of system design according to functional requirements.

4.2 Analysis

In this phase, object oriented approach was used for the analysis of the web based application Object-oriented is considered as an important and suitable technique in software development due to its features over many methodologies (Selvan &

Swarup, 2004). The final result is very important as it determines the direction of the remaining process of constructing the web based O-IS-BS and the outcome of this phase is a conceptual model (Brown, 2002).

The analysis process should not be taken easily as most observers agreed that many errors occurs in an information system was due to the consequence of inadequate efforts in analysis and design phase (Hevner et al., 2004). In this phase, the user requirement will be modeled to ease the design of the prototype in the next step in this research. For that reason, any requirements for the web based O-IS-BS system was defined as to make sure that it meets the needs of the end user.

The eventual aim of this phase is to identify what user would require from the web based O-IS-BS. In order to come out with the result, the steps for analyzing the requirements had been started since at the early stage of the development. The project initiation and planning phase had boosted up the decision of pursuing the study thus ignited the analysis process (Ashrafi & Ashrafi, 2008). Basically, analyzing the system involved two major activities that are requirements determination and then structuring the determined requirements.

4.2.1 Requirements Determination

Determining the requirements for an information system is actually the steps of gathering of existing procedures relevant and important information on what the system should be able to do according to the needs of the system's users. There are

several techniques or methods of gathering information which includes interviews, joint application design sessions, document analysis and observation. In this study the researcher gathered the required information from on interview with experienced programmer in E-commerce as well as articles, analysis and related documents available (Dennis, et al., 2002).

This table 4.1 shows comparison between Islamic payment model with others E-payment models.

Table 4.1: Comparison of E-Payment Systems with Islamic Payment System

Features	Shariah compliance E-payment	Credit Card	E-cash	E-checks	Smart Card
Actual Payment Time	Flexible based on aqad	Paid later	Prepaid	Paid later	Prepaid
Transaction information transfer	Exhibit the names of parties involved	The store and bank checks the state of the credit card	Free transfer. No need to leave the name of parties involved	Electronic checks or payment indication must be endorsed	The smart card of both parties make the transfer
Online and offline	Offline & Online	Online transactions	Online transactions	Offline & Online	Offline & Online
Bank account involvement	The Islamic bank account	Credit card account makes the payment	No involvement	The bank account makes the	The Smart card account makes the

	makes the payment			payment	payment
Users	Legitimate users	Any legitimate credit card users	Anyone	Anyone with a bank account	Anyone with a credit card or bank account
Party to which payment is made out	Store	Distributing bank	Store	Store	Store
Consumer's transaction risk	Consumers, merchant and bank bear most of the risks, but the consumer can stop check payment at any time.	Most of the risk is borne by the distributing bank; consumers only have to bear of the risk.	Consumers are at risk of the E-cash getting stolen lost, or misused.	Consumers bear most of the risk, but the consumer can stop check payment at any time.	Consumers are at risk of the smart card getting stolen, lost or misused.
Current degree of popularity	New method, but if rely on smart card will be become more widely used.	Credit card organization checks for certification then total the purchase. Therefore, it can be used internationally, and is the most popular payment type.	Unable to meet financial Internet standards in the areas of expansion potential and internationalism.	Cannot meet international standards, therefore its not very popular.	Credit card organization checks for certification then total the purchases. Therefore, it can be used internationally, and is become more widely used.
Anonymity	Must	Partially or	Entirely	No	Entirely

	provide information about consumer. Not anonymous.	entirely anonymous.	anonymous.	anonymous.	anonymous, but if needed, the central processing agency can ask stores to provide information about consumer.
Database safeguarding	Safeguards regular account information.	Safeguards regular credit card account information.	Needs to safeguards a large database, and maintain records of the serial numbers of used E-cash.	Safeguards regular account information.	Safeguards regular account information.
Transaction information face value	Fact value is often set, and cannot give change.	Can be signed and issued freely in compliance with the limit.	Fact value is often set, and cannot give change.	Can be signed and issued freely in compliance with the limit.	Can be deducted freely in compliance with the limit.
Real/Virtual world	Can be used in real worlds.	Can be partially used in real word.	Can only be used in the virtual world.	Limited to virtual world, but can share a checking account in the real world.	Can be used in real or virtual worlds.
Limit on	Dependent	Dependent on	Dependent on	No limit.	Dependent on

transfer amounts	on how much money is saved.	the limit of the credit card.	how much prepaid.		how much money is saved.
Mobility	No.	Yes.	No.	No.	Yes.

4.2.2 The Use Case Diagram for the Whole System

This diagram describes the whole interaction by the users with the system and describes the use case model with two aspects. The first aspect is described as a static view, which by considering the system as relations between uses cases and actors. The second aspect is a dynamic view that captures the behavior as an interaction between actors and the system.

The use cases captured in the detailed use case analysis are: ***Register, Login, Logout, Search Books, Purchase Books, and Modified (Add, Delete, and Edit) Books***.

The O-IS-BS has developed to enable Admin and Users for entry into the prototype. Through the login page, Admin can enter main page to modify a books while the users can enter page to show and buy books in the books page after registration in this web based. The Admin and Users should login the system with there user name and password.

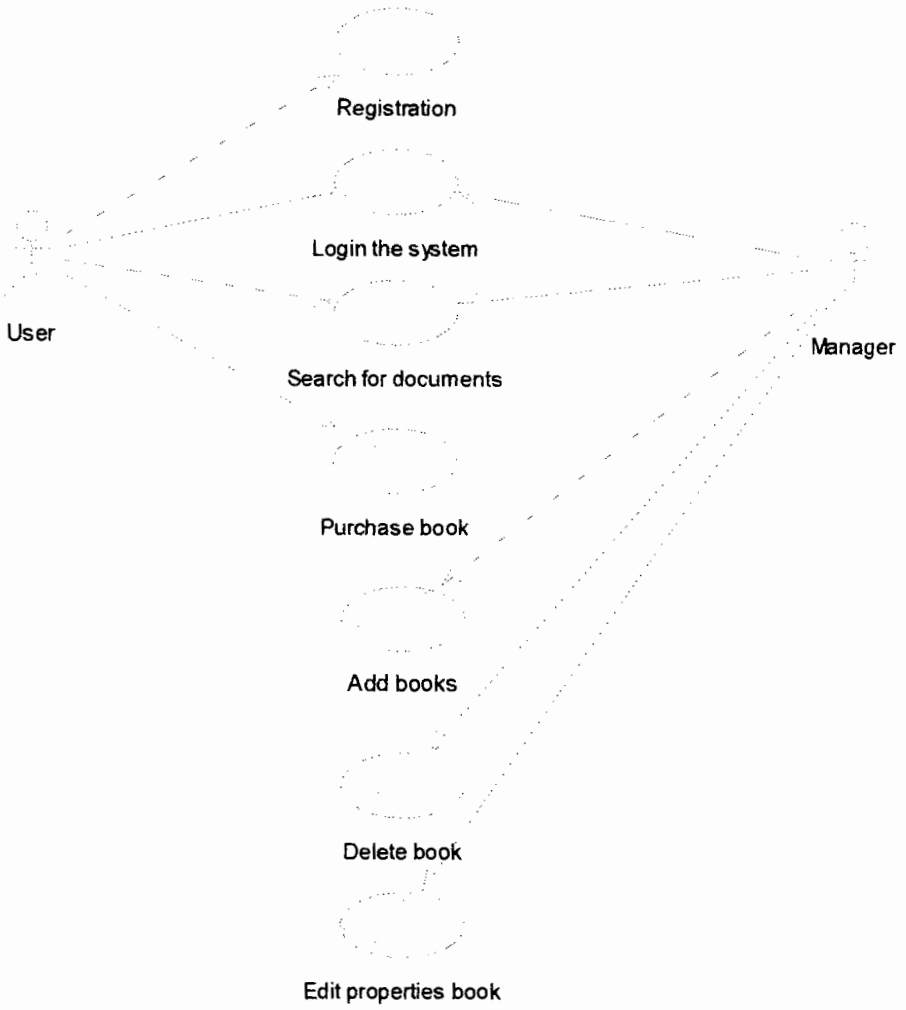


Figure 4.1: Use Case Diagram for Web Based O-IS-BS

4.3.1 Sequence Diagram

The sequence diagram is a unified modeling language (UML) diagrams that shows the processes that execute in sequence, the sequence diagram shows the sequence of message, which are exchanged among roles that implement the behavior of the system, arranged in time, it shows the flow of control across many object that

collaborate in the context of a scenario (Fowler, 2004). The sequence diagram captures the behavior of single use case by showing the messages passed between those object of the case and describe the sequence of operation in that use case.

The sequence diagram consists of three main objects:

1. Boundary: the interface that the actor can interact
2. Entity: the database.
3. Control: the control logic of the system.

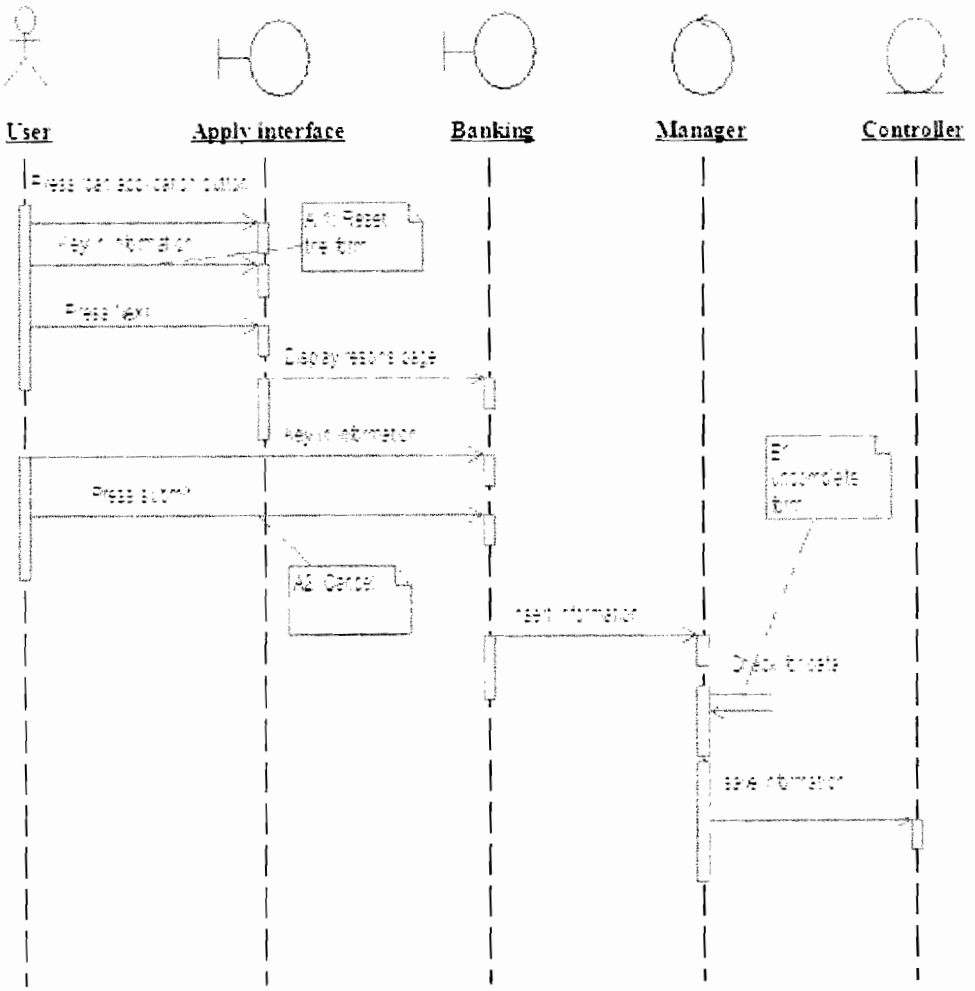


Figure 4.2: Sequence Diagram for Purchase Books

4.3.2 Class Diagram

Chitins (2002) defined the class diagram as a diagram showing a collection of classes and interfaces, along with the collaborations and relationships among classes and interfaces. Figure 4.8 describes the database in the whole system as a model.

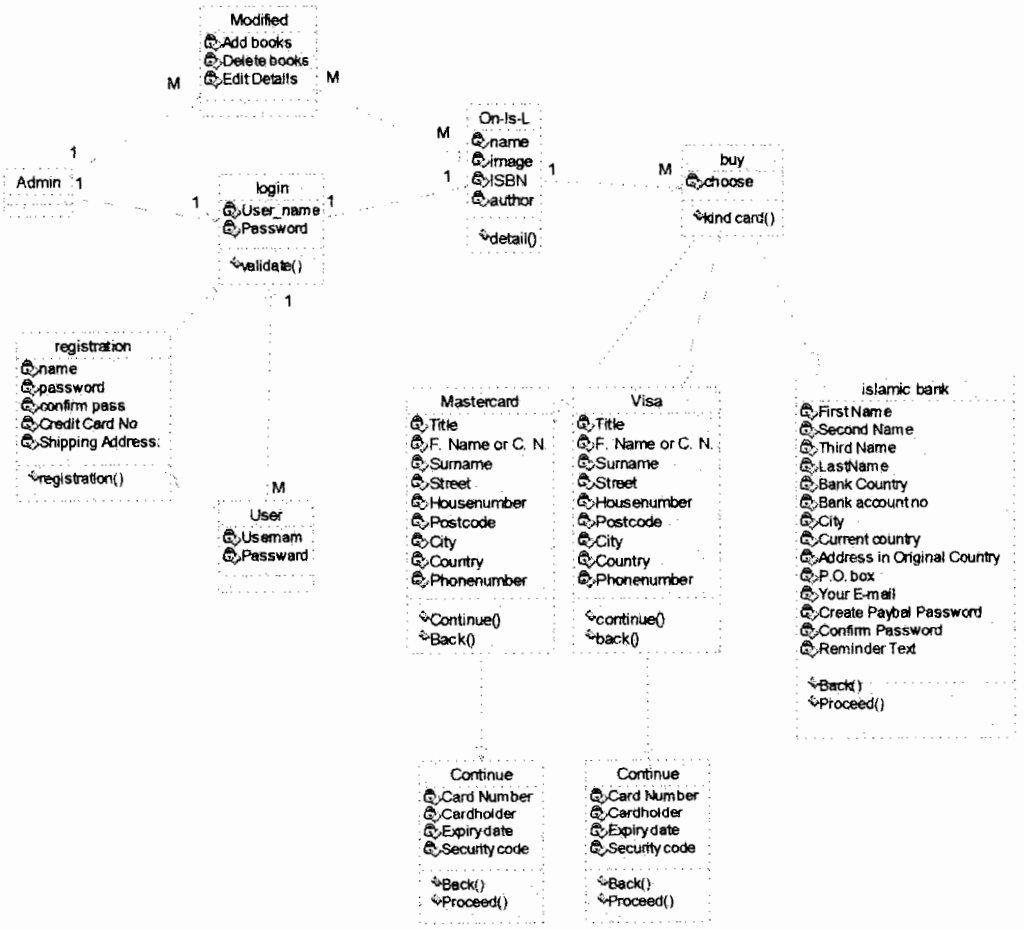


Figure 4.3: Class Diagram for Web Based O-IS-BS

4.3.3 Physical Design

Meanwhile, physical design deals with the process of converting the logical design into a more technical specification of the system development. In designing the physical part of the system, all diagrams that were produced in the logical design were turned into a structured systems design. During physical design, the researcher determined which programming language and database system will be used as well as the determination of which hardware platform, operating system and network environment the system will run under. The specifications are as follows:

Table 4.2: H/W.S/W Specifications

Purpose	H/W.S/W Requirements
Programming Language	ASP.NET with VB.NET 2005 and SQL Server 2005
Operating System	Microsoft Windows Operating System (Win98,Windows2000,WindowsME,Windows XP, Windows Vista)
Hardware	Monitor, CPU, RAM (256B and above), Disk Space (minimum 12MB)

The programming part of the study was dependent on the result from the designing process which include the system's functions, entities involve, hardware and operating system determined. After everything was designed, the physical system specifications were ready to be turned over to programmers for the next phase which is the implementation phase.

4.3.4 Implementation

For the system development, ASP.NET was used in coding web based O-IS-BS. The system was completely developed with .NET Framework using ASP.NET 2005. Microsoft SQL Server 2005 was used as Database to store and retrieve all information. The functional requirements that have been mentioned in the previously has been developed to reach the proposed prototype, in this section will be recalled how developed these functions, which are combined with each other to constitute the web based O-IS-BS system. All screens are presented in (Appendix A) and explanations of how the users can interact with the system.

4.3 Summary

The result of the analysis was then referred to be the guide for designing the system, from the analysis conducted, requirements for the O-IS-BS have been able to be determined, in the design process, and there were two steps involved: Logical Design and Physical Design. The study also adopted the object oriented analysis which applied the use case diagram for the purpose of designing user interface. A sequence diagram was also generated to see the sequence of interaction between the system and the user. Class diagram was also generated to describe the entities inside the system.

Beside the analysis in this chapter the implementation had been covered also. The implementation of the sequence of the several steps for building the system is discussed. Web based O-IS-BS prototype for the users was developed. The result of the running system showed that the objective of the study was achieved successfully. The output of this chapter is to the develop prototype.

CHAPTER FIVE

DISCUSSION AND RESULTS

5.1 Introduction

This chapter describes a detailed discussion over this web based O-IS-BS mainly on the requirements already mentioned in previous chapters. In this chapter both of the system architecture and user interface design for web pages to purchase the books have been developed, it also explains the system evaluation along with the outcome of this evaluation.

5.2 Proposed System

The proposed system is a web based O-IS-BS, by providing a general model for an E-payment system as shown in figure 5.1. A description of some of the properties that distinguish the various types of E-payment systems is given in chapter two. The project then reviews examples of E-payment schemes that are relevant to this project. The main concepts underlying Islamic finance are also introduced. It is concluded that the Islamic capital market is a necessity of the present and surely of the future, when

more and more Muslims and their funds become increasingly involved in the capital market.

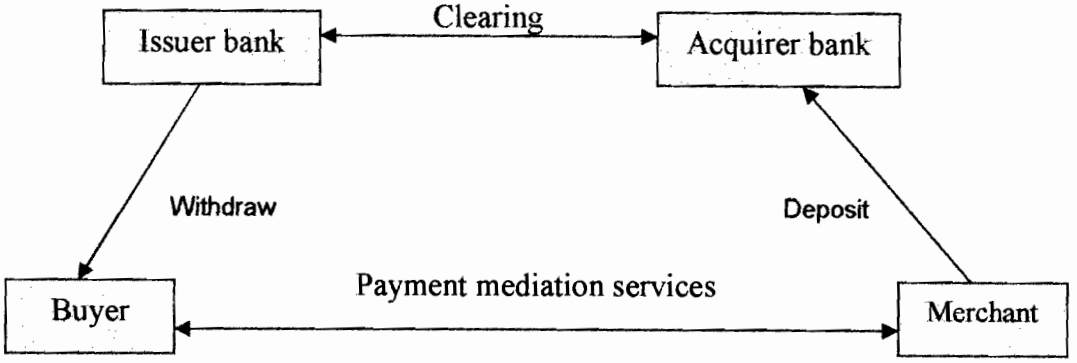


Figure 5.1: General Model for E-Payment System

This project suggests a method for online payments through the usage of an Islamic contract based on Islamic Shariah between buyer and merchant within Payment mediation services, which is connected with an Islamic banking. Therefore, the buyer shopping at merchant's website and the website connect with Islamic bank through provider (Payment mediation services). The buyer chooses the Islamic payment then the provider send a contract to buyer to accept. If the buyers accept the condition of an Islamic contract, then he will be asked to fill his profile application and provide details of his account in one of the Islamic banks.

The provider communicates with the merchant at an Internet site and completes the purchase of the goods. Then the provider sends the buyer's profile to the bank to check his information. If all information are true, the provider sends the cost based on an Islamic contract to the buyer. Once the purchase of the goods is settled between the provider and the merchant, the provider notifies the buyer with the completion of the

purchase and offers him the goods. The provider commit the buyer which the purchase of the goods from the provider on an Islamic Shariah basis. Finally, the provider asks the merchant to deliver the goods to the buyer as shown in figure 5.2.

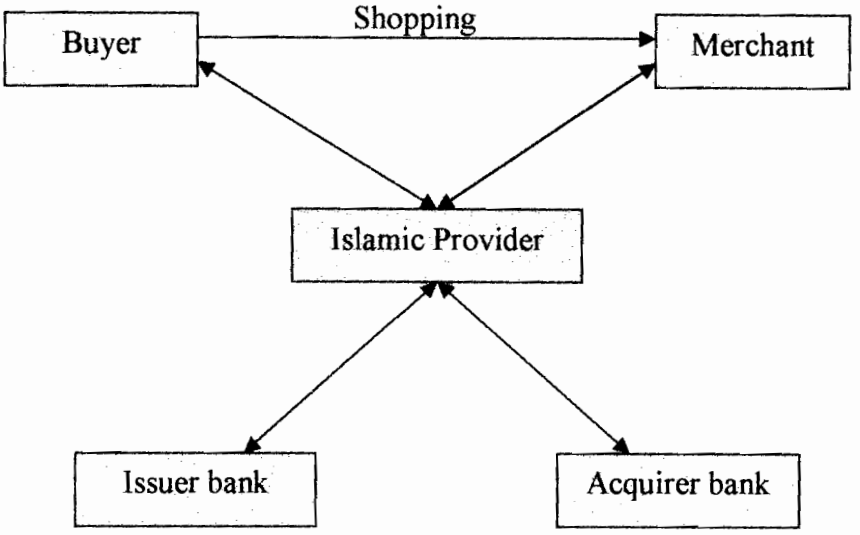


Figure 5.2: E-Payment Method Using Islamic Shariah

Therefore, O-IS-BS contains the Islamic E-payment method, built along with some other methods which apply some current E-payment models, which represent the payment methods in the system, how it can be done, and who uses the system. Not to mention that the system needs to be linked with an Islamic bank, on the basis that the user has an account with the intended bank, provided the user has an access to the developed system. In this phase the study proposed a web based prototype to help Muslims use E-payment model in E-Commerce, using the Islamic principle in their usages.

5.2.1 Overview

A prototype allows users to pay for purchased books from the web based O-IS-BS, and they allow them to determine the E-payment method, based on Islamic Shariah to purchase books which is add to prototype as a new method, whereby, the Administrator for the web based O-IS-BS can add, delete, edit the books from the system, modifying users data according to their functions.

In this project design for the O-IS-BS site, the user can login to the system after completing the registration process and inserting all required information, after that, the user can login and search for desired document in the system over the book need, there are two main searching methods, you can either search for the book's name search for the author's name, users can preview the details of the book before buying it, looking back at chapter two, it is clearly defined that one of the condition needed to be met between the buyer and merchant is that the buyer should be able to see the goods before paying the cost, this condition is one of many other condition available in Islamic contract, then the user can agree to buy the book from O-IS-BS prototyp. After the user pays the cost, the buyer will receive a message with a link to download the book, as shown in Appendix A.

Taking a closer look at the sequence of actions during Islamic E-payment interaction between O-IS-BS system and the user, Figure 5.5 shows the sequence

diagram for Islamic E-payment in project model, and how applies it in O-IS-SB system.

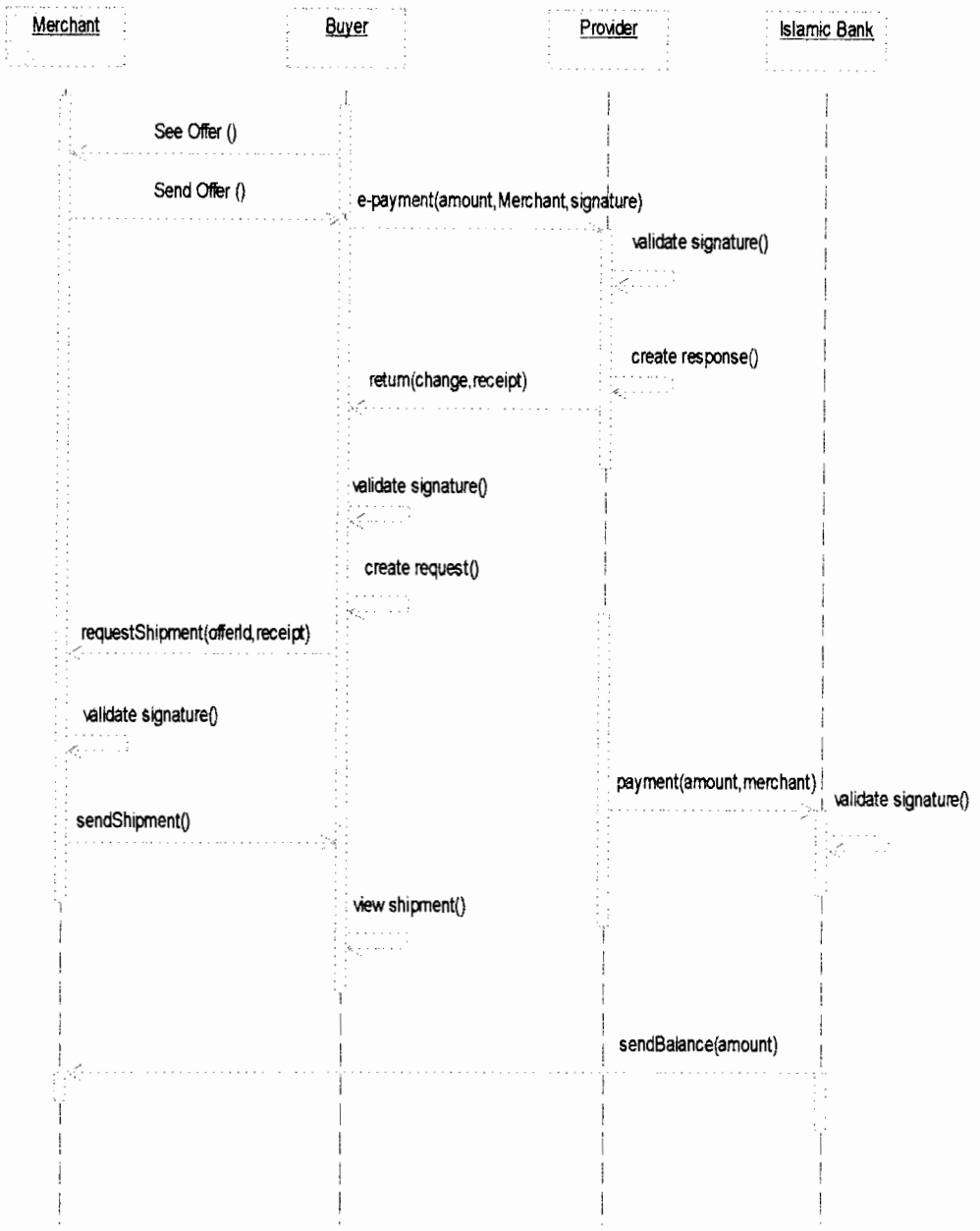


Figure 5.3: Islamic Payment Sequence Diagram

Initially the customer see the offer (book) on the website, the merchant provide an offer with price and payment information to the customer. If the customer accepts the

payment terms and wants to buy, the customer authorizes the payment and sends a payment request using the default payment instrument to the Provider. Besides the information required for the payment instrument, the request includes Merchant information and a digital signature of the customer. The Provider validates the request to check the authenticity, performs the payment according to the payment instrument, generates and returns an attribute certificate, the receipt, to the customer upon successful completion.

The attribute certificate is generated by signing the customer-signature together with the amount and the Merchant information. In a time-based business model for example, this payment step may be skipped if the customer already has a valid attribute certificate which may be presented to the Merchant as proof of payment as described below.

The customer validates the attribute certificate in order to approve the authenticity of the Provider and can now be sure that the server has accepted the payment and the amount will be transferred to the Merchant's account. This transfer can be done via an arbitrary payment protocol and employs similar authentication checks using digital signatures.

Upon successful validation the customer sends a shipment request to the Merchant containing offer information, customer information and information from the certificate from the provider's response (amount, id of provider, serial number, expiration date, provider signature) to the Merchant.

The Merchant validates the shipment request by checking the Provider's signature which guarantees that the required amount will be paid to the Merchant's account. Upon successful validation, the Merchant sends the shipment plus an updated version of the attribute certificate to the customer.

Last two Steps may be repeated as many times as the attribute certificate guarantees a value which is higher than the requested shipment. The Provider transfers the paid amount to the Islamic payment using an arbitrary protocol either immediately or when a certain threshold amount has been accumulated, or in regular intervals, or according to some other defined procedure they agreed upon Islamic Shariah.

The administrator of the system can modify the books details by Adding, Editing and Deleting the book.

5.2.2 Functional Requirements

This system consists of two user's management user (administration) as coordinator of the system, and the users for the system to purchase the books as beneficiary of the system as will the user may interact with the system through interfaces of the website Application. Therefore the functional requirements represent it based on the users interface.

Website Functional Requirements

When it comes to the website's functional requirements, they have been divided according to the users of the website.

Administrator

1) Administrator needs to login first in order to access the system.

2) Administration has privilege to access all the pages of the system.

3) Administrator can view, monitor, and modify the data (Add, Delete, Edit) that requirements entries by users and Data on the web base O-IS-BS through website.

4) Administrator should check if the users got the books from the website.

Users

1) Users require registering to the system to join the web based O-IS-BS.
2) Users should login to the system using website registration form page.
3) Students must insert all information in the registration page.
4) Users can modify the information through website page.
5) Users can choose the payment method after keying in all requirements through the system and download it.
6) Users can view the final summary report of the purchased books.

5.3 Non Functional Requirements

Speed

- The system will increase the speed of all daily activities to purchase the books.

Security

- This will be guaranteed by assigning different privileges to different users

Reliability

- Availability of the system.
- Rate of failure occurrence is very low.

Robustness

- By using specific techniques to recover from any unexpected corruption happened to the system.

Performance Characteristic:

- Huge capability of storage.
- Multi-user.
- Short Response Time.

Quality Issues:

- Friendly to use.

- Secure:

End users should not be allowed to modify the data saved at the data base.

5.4 System Testing and Evaluation

The system testing will be performed on the interaction of the entire dialog components when all the components are combined for the first time in addition to two phases to test the project based on Objectives of Testing, and Test Level.

3.4.1 Objectives of Testing

In this phase the researcher try to test the web based and evaluate it by observing the performance of the system testing. Testing is performed to evaluate whether the proposed solution is a quality one. The objective of testing is not to show absence of errors or defects, rather to show that errors are present. However, some important objectives are as follows:

1. To uncover different cases of potential errors and bugs.
2. To find out whether the software functions work according to the specification.
3. Ensure that the produced system is complete, performs efficiently.
4. To evaluate whether the software perform all activities specified without crashing individual modules after integration with the existing operating environment (hardware, software etc.)
5. To measure up the reliability and overall quality of the software.

3.4.2 Test Level

In this phase the test level include three levels, which are as follows:

a. Unit Test

In unit testing individual modules are tested separately in O-IS-BS project to find out whether there is any error in coding, logic, if any error is found must be looking of module to fix and revised it because possible cause of error is defined and corrected.

b. System Test

In this phase the system testing includes integration of the modules and test whether they perform suitably as expected when combined together, designed or any bugs, improper behaviours are there, after completion of all modules have performed this testing, the errors found during integration were caused by syntax errors and were solved with the help of few related books.

c. Expert Test

This is final phase in test level the researcher test the web based O-IS-BS with primary resources by observing the performance of the system testing and the previous chapters include more information about it. Table 5.1 list opinions of users who used the prototype.

Table 5.1: Expert Users Test and Evaluation the Prototype

No	Description of user	Input	Result Success/Fail	Observation/Comment
1	Name: Dr. Abdul Aziz Bin Hanafi. Assoc. Prof. Dr. Fathy El Sayed Ahmed El Rashidy. Assoc. Prof. Dr. Ibrahim Mahmoud Ibrahim Dorgham. Assoc. Prof. Dr. Mohamed Mohamed Ahmed Abou. Assoc. Prof. Dr. Abdel Salam Abdel Fattah. Position: Lecturer's in Shariah department in College University Insaniah Location: Kolej Universiti Insaniah Syariah (Academic) Alor Star, Kedah, Malaysia	Username & Password	Fail	_____
		Show the books	Success	_____
		Show the books Details	Success	_____
		Purchase the books	Success	_____
		Choose the Islamic payment model	Success	The Islamic scientists said when met them, that the system require more attention and deep investigation to be assured the comply with Islamic Shariah, they recommend to arrange with them more than sixth times meeting to discuss current E-payment and all related aspect, in addition, dimensions which may lead to find decision.
2	Name: Assoc. Prof. Dr. HJ. Abdullah HJ AbdGhani Position: Lecturer in Islamic contract Location: Doctor in COB University Utara Malaysia	Username & Password	Fail	_____
		Show the books	Fail	_____
		Show the books Details	Fail	_____
		Purchase the books	Success	_____
		Choose the Islamic payment model	Success	These methods depend on what..... You must go to doctors have knowledge about Islamic contract to get

				the fatwa.
3	Name: Alaa Al-mabhouh Position: PHD student in CAS & Programmer in SERINEL Location: University Utara Malaysia	Username & Password	Success	_____
		Show the books	Success	Want more book in data base
		Show the books Details	Success	_____
		Purchase the books	Success	Easy to choose the type of E-payment models
		Choose the Islamic payment model	Success	_____
4	Name: Omar Mohammed Al-Momani Position: PHD student in CAS & Programmer Location: University Utara Malaysia	Username & Password	Fail	_____
		Show the books	Success	_____
		Show the books Details	Success	Send message to the admin for notice
		Purchase the books	Success	Add new method to a system
		Choose the Islamic payment model	Success	Add more details to connect with bank "know more about Islamic bank"
5	Name: Ahmad Mohammad Ali Al-Qutatiat Position: PHD student in CAS & Programmer Location: University Utara Malaysia	Username & Password	Fial	_____
		Show the books	Success	_____
		Show the books Details	Success	_____
		Purchase the books	Success	Add other website have this book
		Choose the Islamic payment model	Success	_____
6	Name: Mashal Kasim Soliman Al-	Username & Password	Success	_____
		Show the books	Success	_____
		Show the books	Success	_____

	Qudah Position: Master student in CAS & Programmer Location: University Utara Malaysia	Show the books Details	Fail	_____
		Purchase the books	Success	Easy to choose the type of E-payment models
		Choose the Islamic payment model	Fail	Did not use this choose

5.5 Summary

The testing and evaluation of this study was covered by using the User Testing to evaluate the usability of the system. The results show that the system is convenience with user and help the process of the web based more efficient and effective. This chapter has brought to light the result and findings of this project which is in line with the requirement of the objectives stated out at the introductory chapter. The next chapter will give a conclusion of the project.

CHAPTER SIX

CONCLUSION

6.1 Introduction

This chapter revises the findings found in this study based on predefined research objective as well as highlighting the contribution. In addition, this chapter includes some suggestion on future work. There is much more work to be done in developing an efficient and effective system in order to make the way of applying an Islamic E-payment easily and accurately and to help in solving the problems or the difficulties in the traditional E-payments facing Muslims nowadays.

6.2 Finding

On the suggestion finding a method which can apply an Islamic E-payment as described in chapter one, this study is concurring to development of system that suggests method based upon an Islamic E-payment using Islamic Shariah. The aim of this study is to design a prototype that comply to Islamic E-payment system, and describe the specific objectives as follow:

1) To review current E-payment model used in E-commerce

In chapter two, the researcher had reviewed E-payment models used in E-commerce in addition to this objective; it has been met with references to other previous studies on similarity features that had been used in other similar applications as described in greater details in chapter two.

2) To propose an Islamic Shariah compliance E-payment model for E-commerce

As in chapter three suggests a new method which uses Islamic Shariah to propose E-payment model depending on Islamic principles. The user can buy the books through the use of an Islamic E-payment model and other method in this system.

3) To identify the requirement for Islam Shariah compliance in E-payment model

Through the analysis and design phase, the researcher had managed to identify the requirements of the web based O-IS-BS is compare it with other E-payment models.

4) **To develop a prototype that use Islamic Shariah compliance E-payment model**

A prototype for web based O-IS-BS was developed and evaluated for paying the books and chooses the E-payment models as shows in Appendix A.

6.3 Problems and Limitations

The main problems and limitations of this study are:

The traditional of E-payment models have been used in E-commerce do not consider Islamic Shariah to be applied in E-commerce. As an example, some E-payment models on operation use Riba because a delayed payment is needed and cannot apply the system over the Internet with the use of E-payment models to purchase the books.

6.4 Contribution of the Study

The major contribution of this study can be summarized as follows:

- O-IS-BS web based system was developed to propose the new method to E-payment that comply to Islamic Shariah. Through this system the user will be able to purchase online books in O-IS-BS system in addition to the ability of choosing the type of E-payment models.

- VB.NET had been used in the coding of O-IS-BS system. The system was completely developed with .NET Framework using ASP.NET 2005. Microsoft SQL Server 2003 was used as Database to store and retrieve all information. The performance of the prototype is evaluated and found that the whole system fulfils the objectives and usability of the system.

This project aims to clarify that E-payments are important to adhere to Islamic principles. E-commerce using E-payment is virtuous in Islam. Therefore it is found that Islamic scholars nowadays mentioned above were mostly working in a commerce field.

The non-Muslims from the east and west do not pay interest in E-business and E-payment from the consideration of the Shariah (Islamic law). The Muslims is interested with of the E-payment model within Islamic Shariah in a legitimate ethical framework. The buyers and sellers must know the terms of E-payment, as well as the needs of each owner must learn how to sell and buy using E-payment model. The purpose of the project explained the E-payment model and uses a best way to reach for global markets in the lowest possible cost within use Islamic principles. Which opens people's horizons and wide in dealing realize gains. It explains that the E-payment models form the Islamic perspective use is without Riba.

6.5 Future Work

Future systems for Muslim E-commerce must comply with Islamic Shariah to keep Muslims far away from Forbidden according to Islam. This web based system one of the many prototypes which can be implemented in real life to be published in order to find software capable of applying the Islamic E-payment in E-commerce within Islamic markets, whereby any Muslim can use this new method in order to purchase any products using Internet via Islamic E-payment.

6.6 Summary

O-IS-BS web based system was developed to suggest a system which helps Muslims to Purchase books through the adoption of Islamic Shariah. In this study, the use of E-payment in the prototype depends very much on the costumers whether comply to Islamic Shariah or not in terms of usage. In addition to help in solving the problems or the difficulties those are facing Muslims in the traditional E-payment models.

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APPENDIX A

- **Login Admin and Users**

This function has developed to enable Admin and Users for entry into the system. Through the login page shown in **Figure 7.1**, Admin can enter main page to modify a books while the users can enter the show and buy books page, in addition to register page. The Admin and Users should login the system with there user name and password. Which divided this appendix to appendix (Users and Admin) depends to login Admin and users.

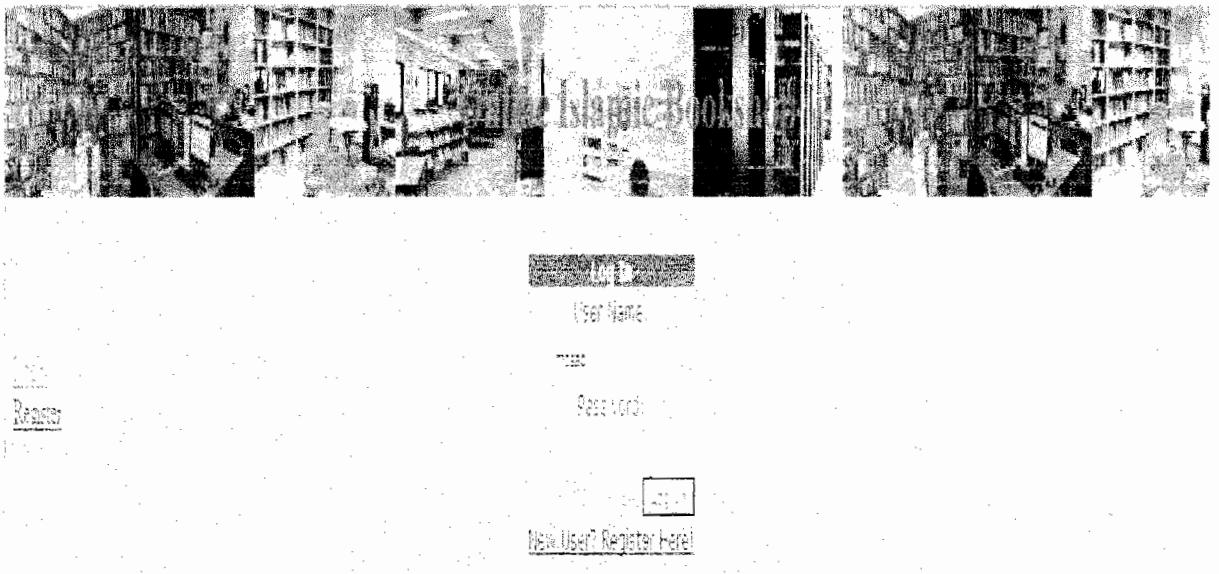

Figure 7.1: Login the System

APPENDIX USERS

The users can be login on the system after registration and the figure 7.2 explain how can be register.

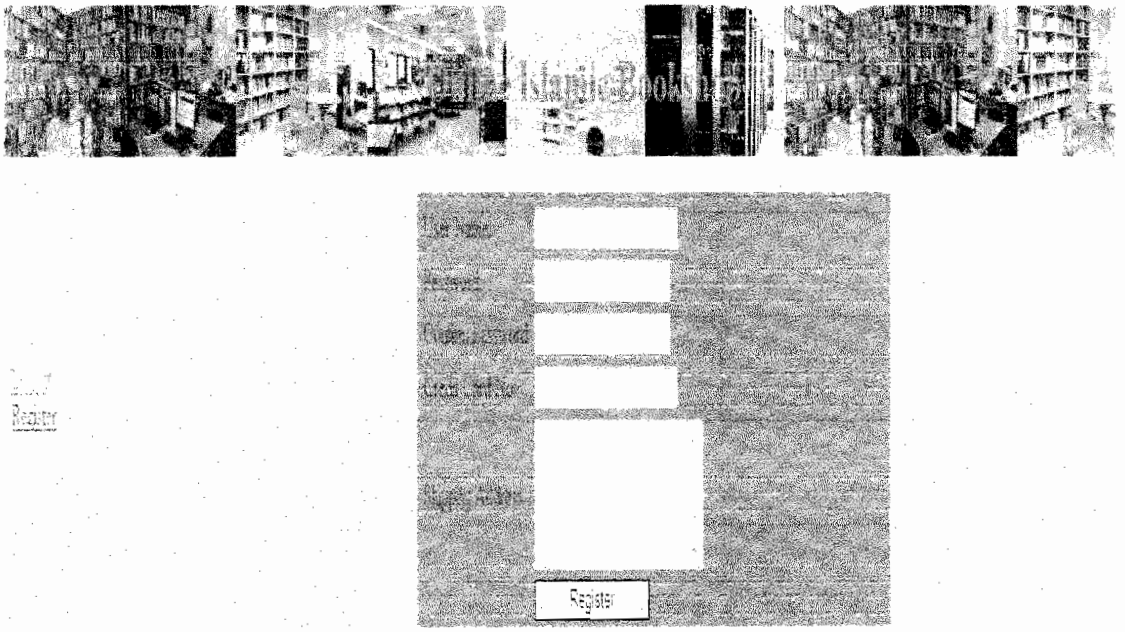

Figure 7.2: Registration Form

After the register and login the user can be enter to the system as shown in figure 7.3.

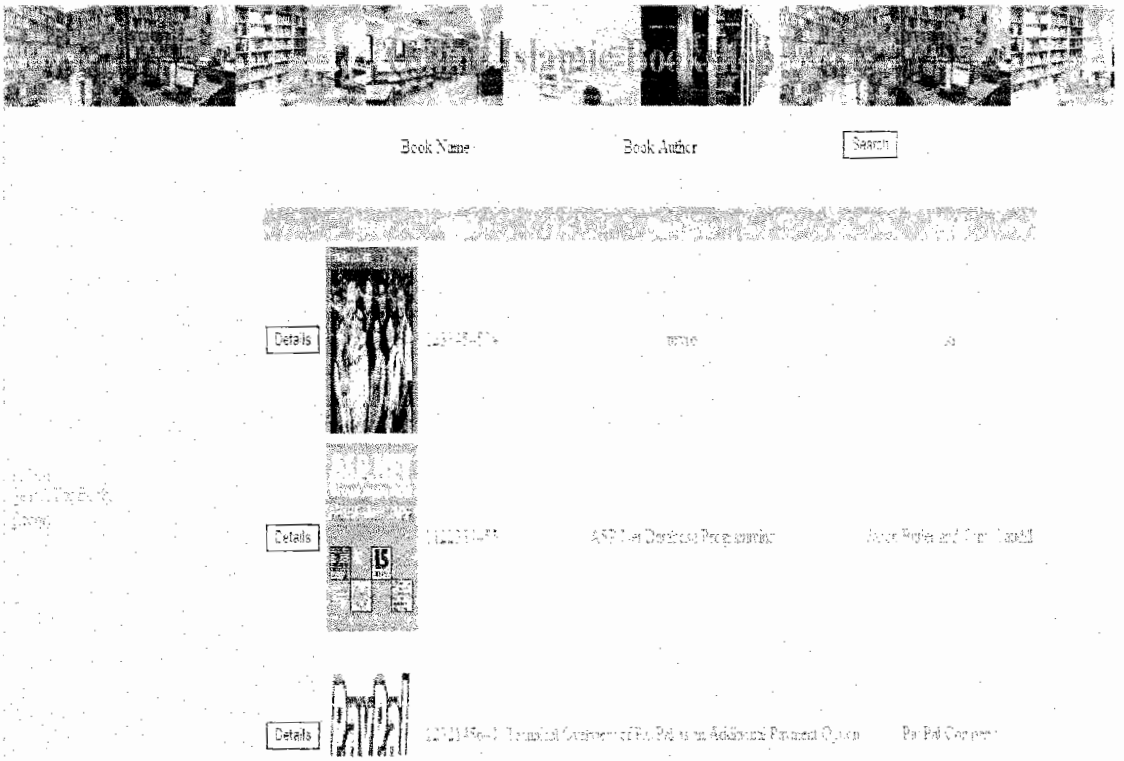

Figure 7.3: Main User Page

In above figure the user is able to search on books by book name's or book author and the book details can be identified by the user when press on the details button as shown in figure 7.4.

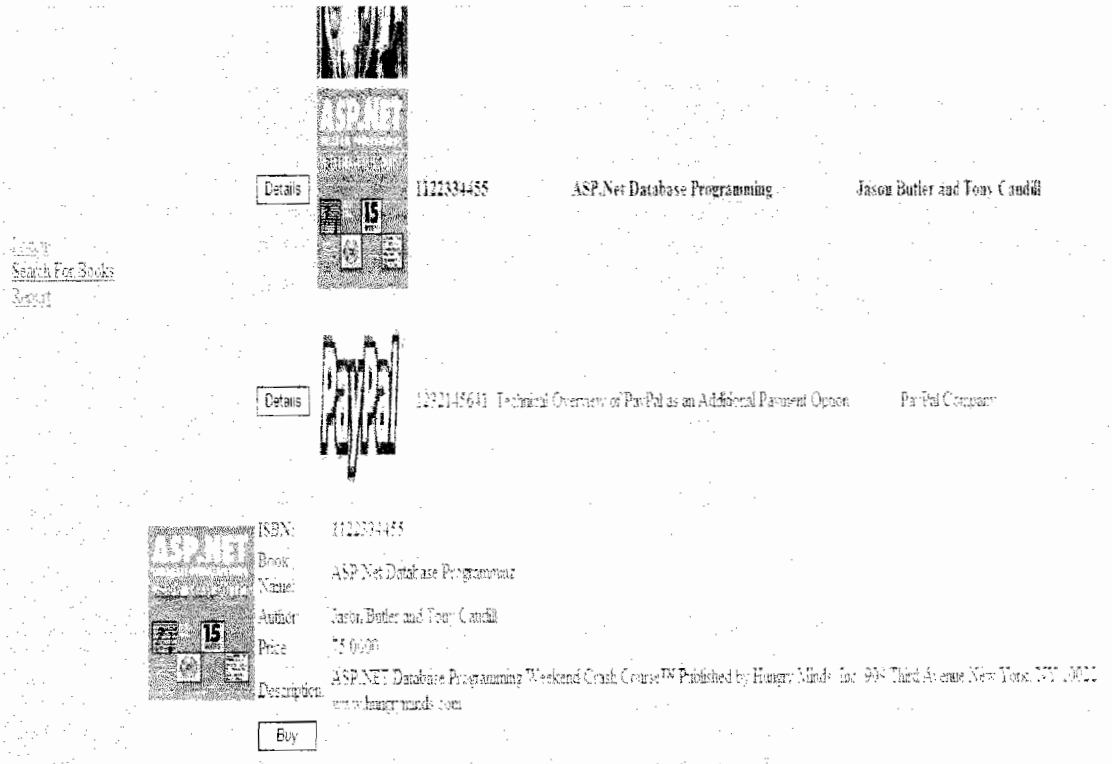

Figure 7.4: Book Details

Then the user can purchase the book by press on the buy button as well as must be choose the E-payment method available to purchase the book as shown in figure 7.5.

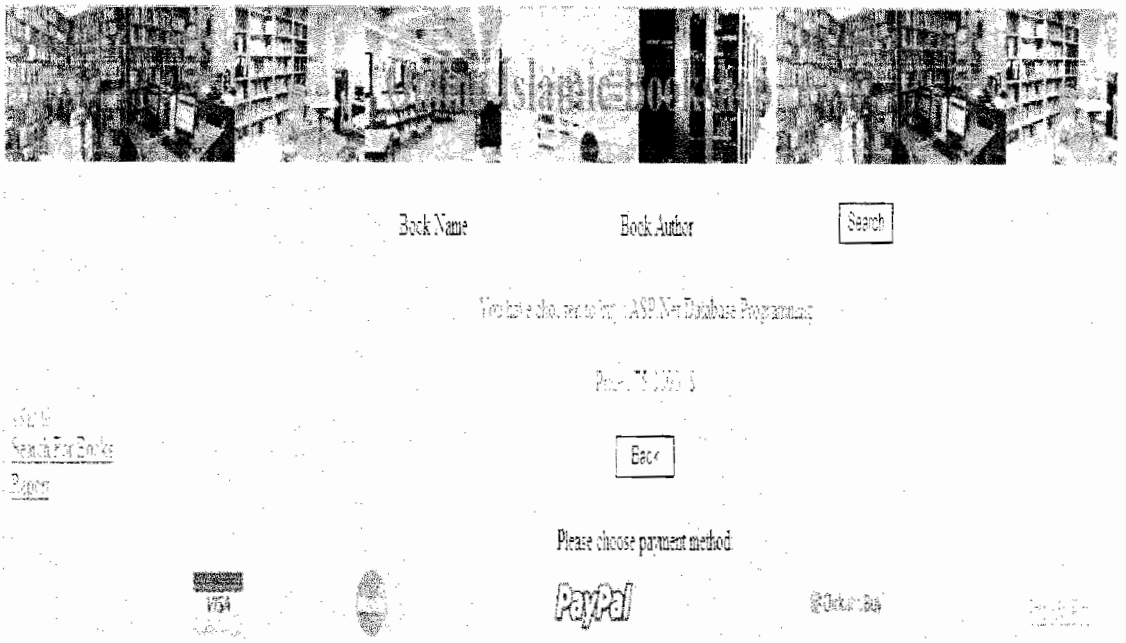

Figure 7.5: E-Payment Method Page

Then the user can choose any method to pay book price and can be cancel purchase books by click back button as shown above figures or continue to pay book price via choose any method and some one of methods is Islamic payment apply Islamic Shariah, in addition to next figures from 7.6 to 7.9 descriptive the E-payment methods.

Figure 7.6 below shows the E-payment methods via Visa and MasterCard. The users must be fulfill all field to proceed the process to continue to other step to buy a book also can be cancel this step by press back.

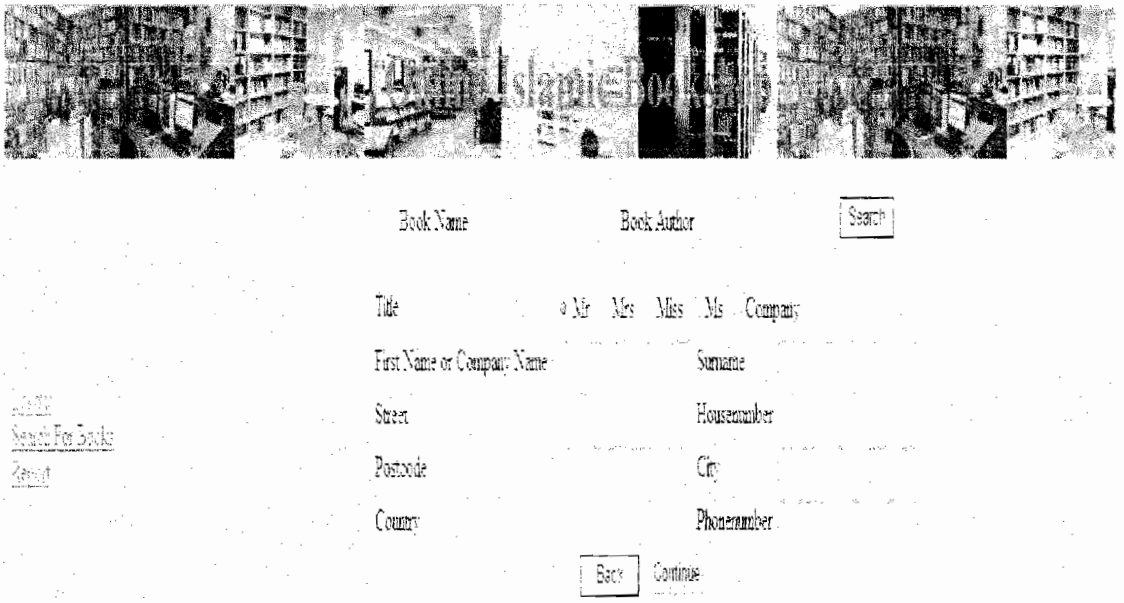

Figure 7.6: Visa and MasterCard E-Payment Methods

Figure 7.7 below shows the complete E-payment method via Visa and MasterCard, also the users can be cancel this step by press back or press proceed to complete purchase a book.

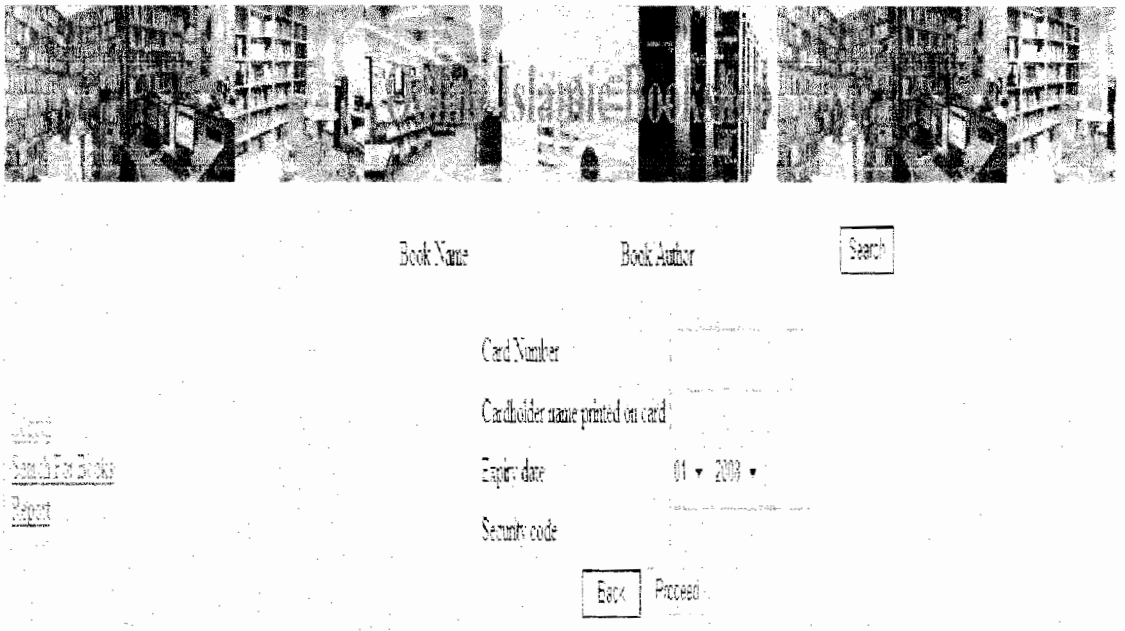

Figure 7.7: Completion of Visa and MasterCard E-Payment Methods

Figure 7.8 below shows the E-payment methods via PayPal and ClickandBuy. The users must be fulfill all field to proceed the process to purchase a book by press on proceed button also can be cancel this step by press back to return to main page.

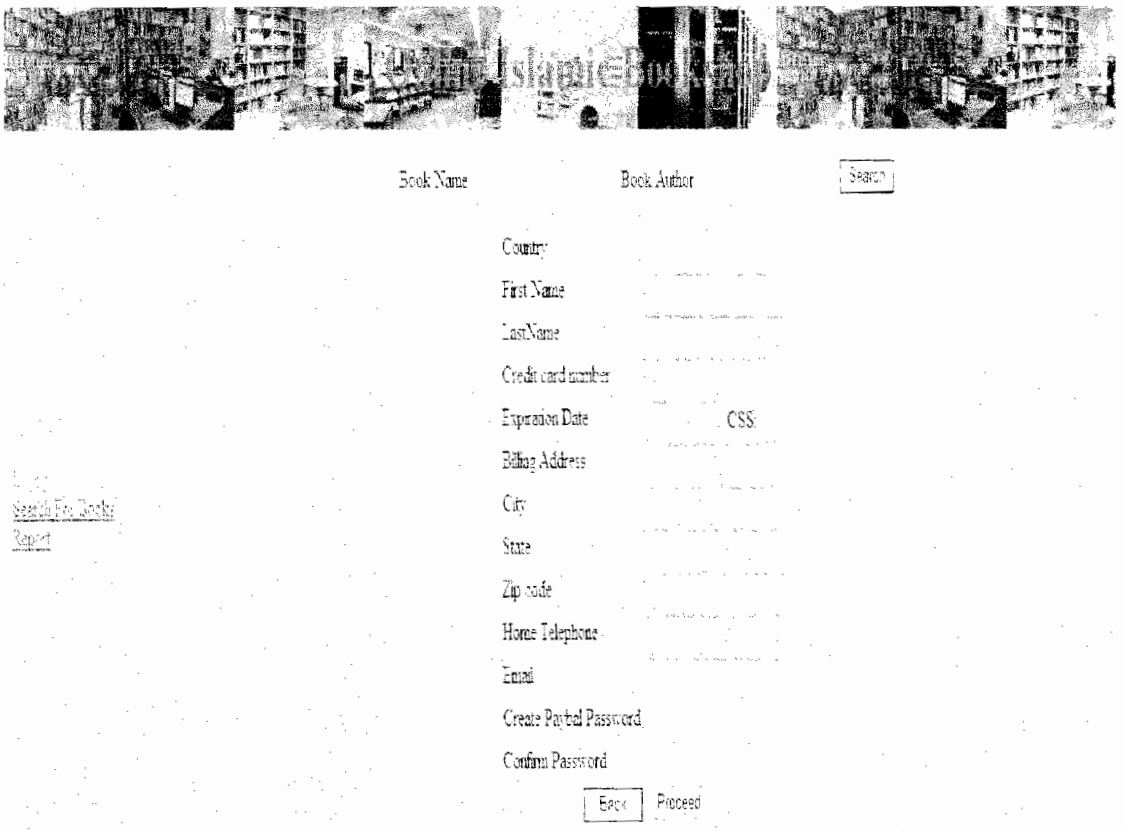

Figure 7.8: PayPal and ClickandBuy E-Payment Methods

Figure 7.9 below as shows represent suggestion E-payment method via Islamic pay. The users must be fulfill all field to proceed the process to purchase a book by press on proceed button also can be cancel this step by press back to return to main page.

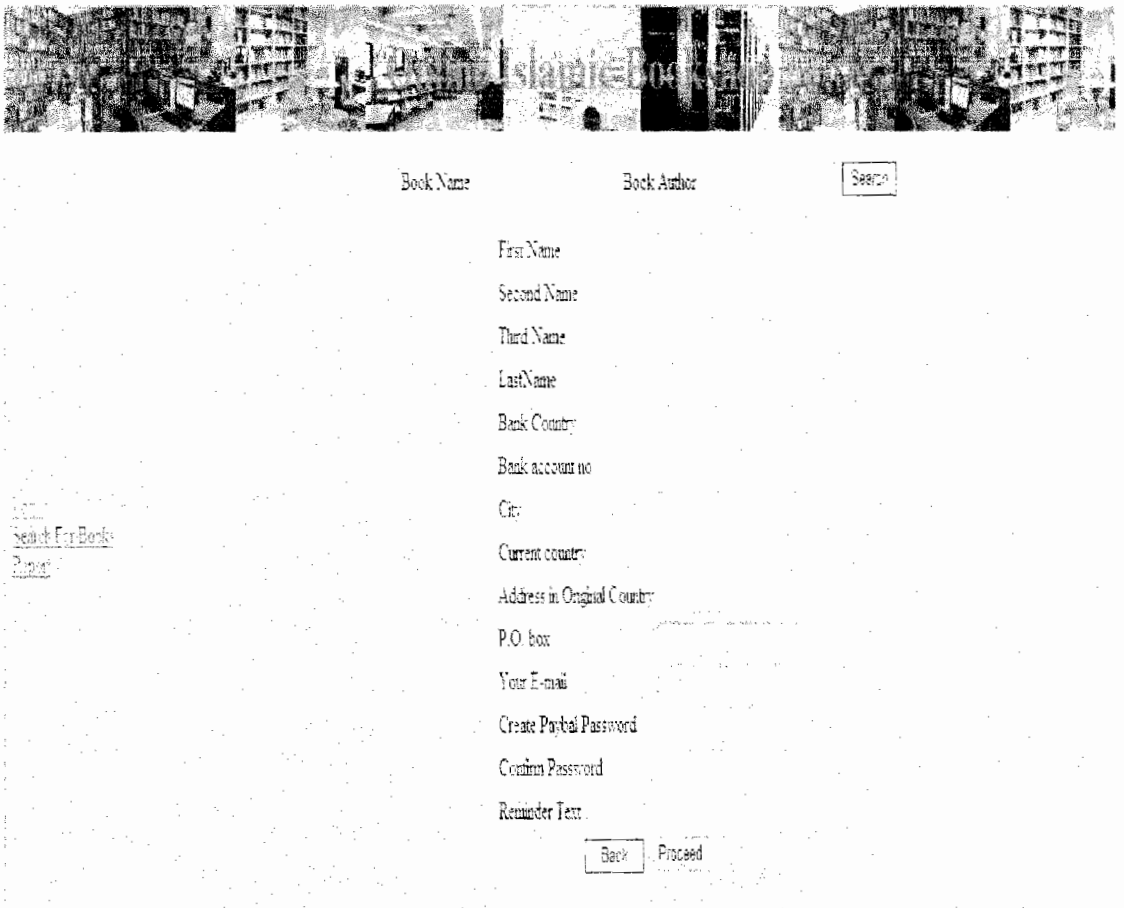

Figure 7.9: Islamic Pay E-Payment Method

The purchasing report will appear when the users click on proceed button And also can be appear the purchase report when the user press report link on lift page as shown in figure 7.10.

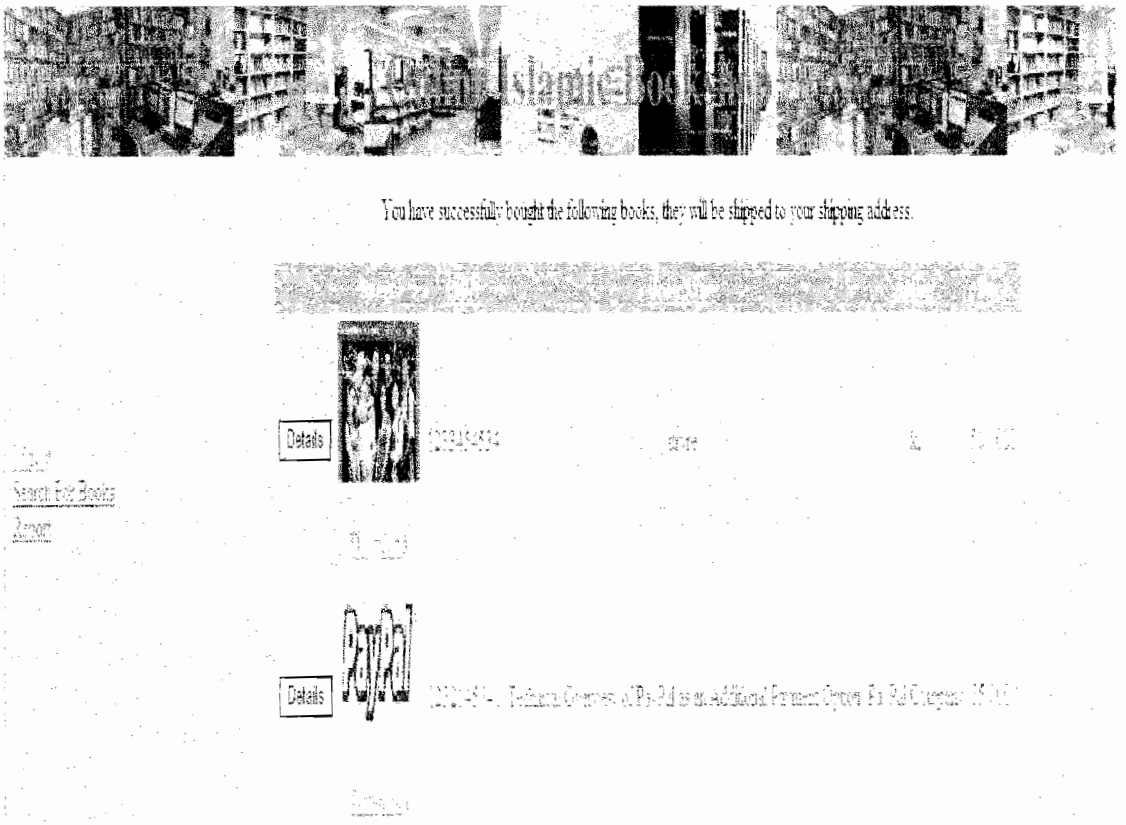

Figure 7.10: Report Page

Then the user can be download the book as well as the book stored in a users page and can see purchased books details on this page as shown in Figure 7.11.

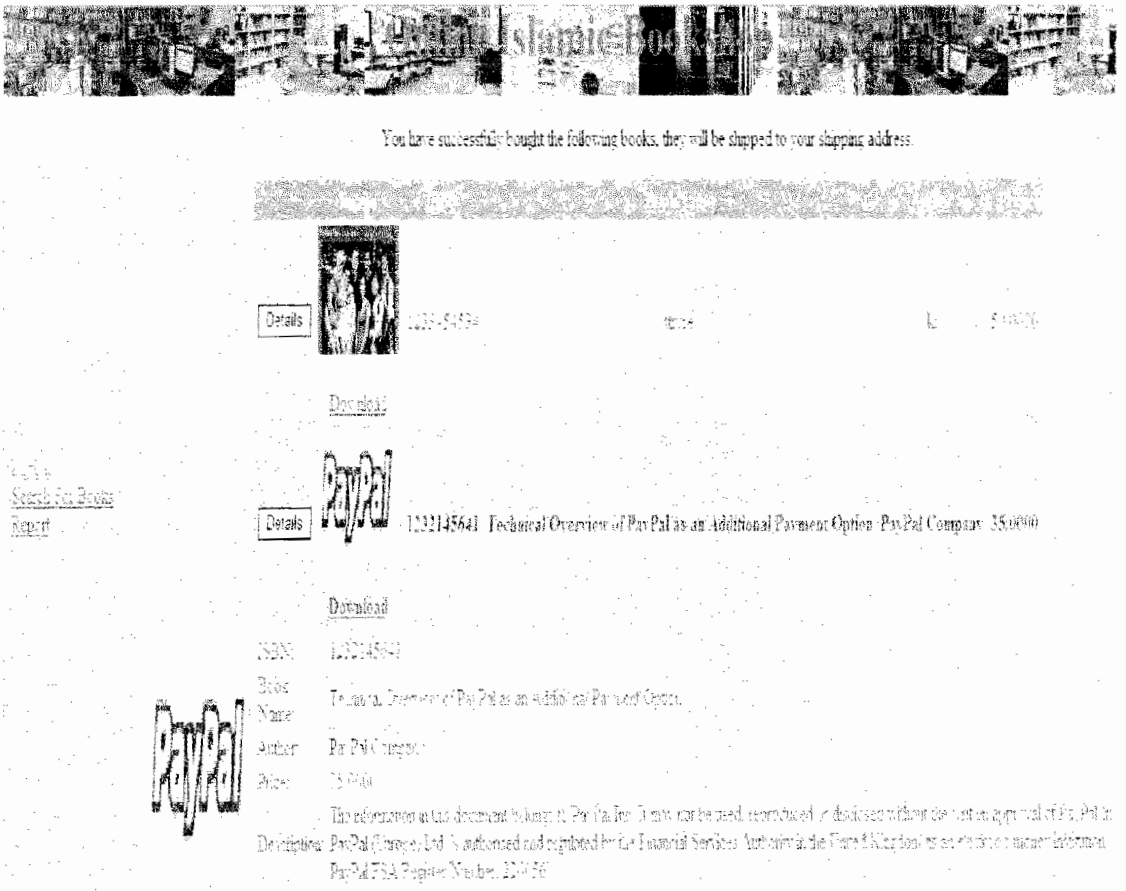

Figure 7.11: User Page

Figure 7.12 below shows the download page when the user press download button in the report user page it will convert the book to PDF format to allow them to download the books.

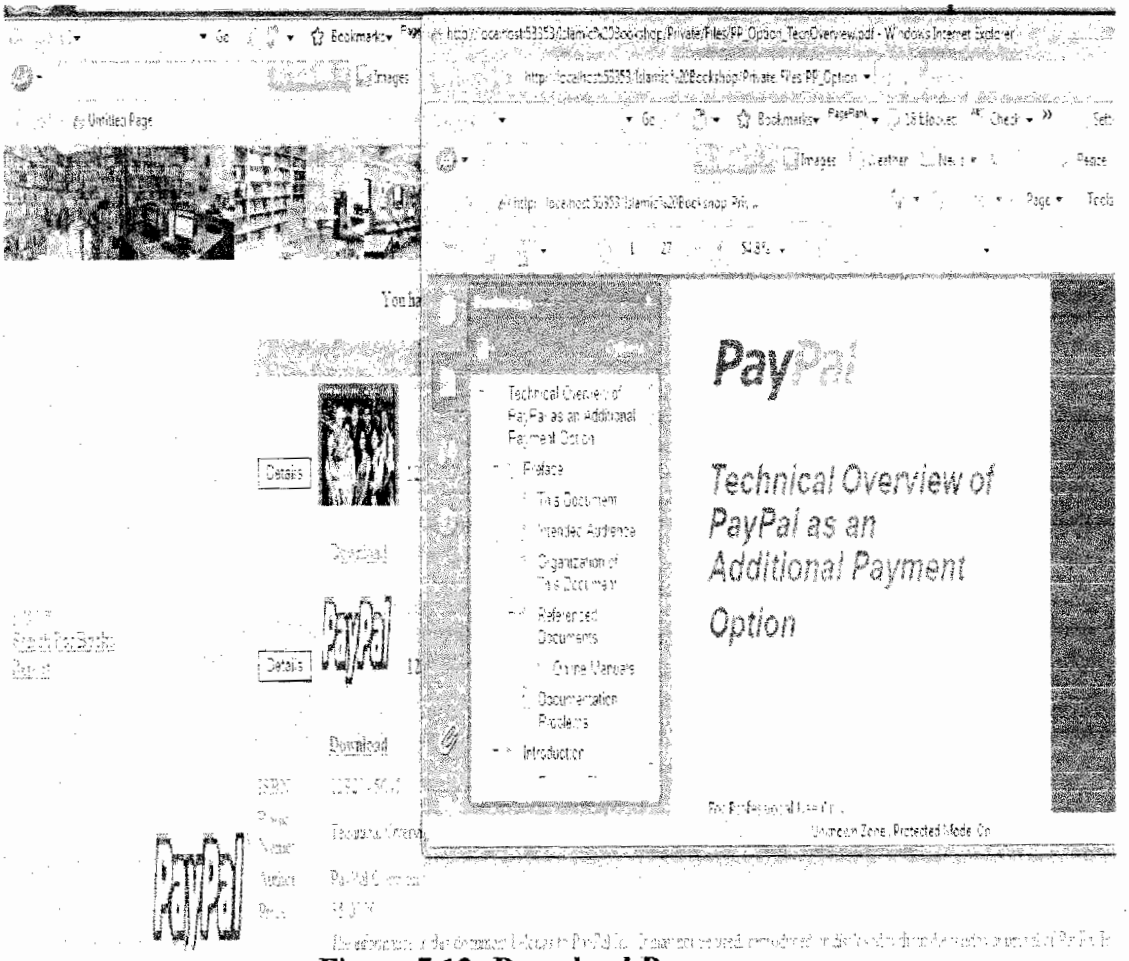

Figure 7.12: Download Page

APPENDIX ADMINISTRATOR

After the Admin login to system will enter to Admin page. Then the Admin can modify books from this page, can be deleting and add a books. And also can be edit details books as shown in figure 7.13.

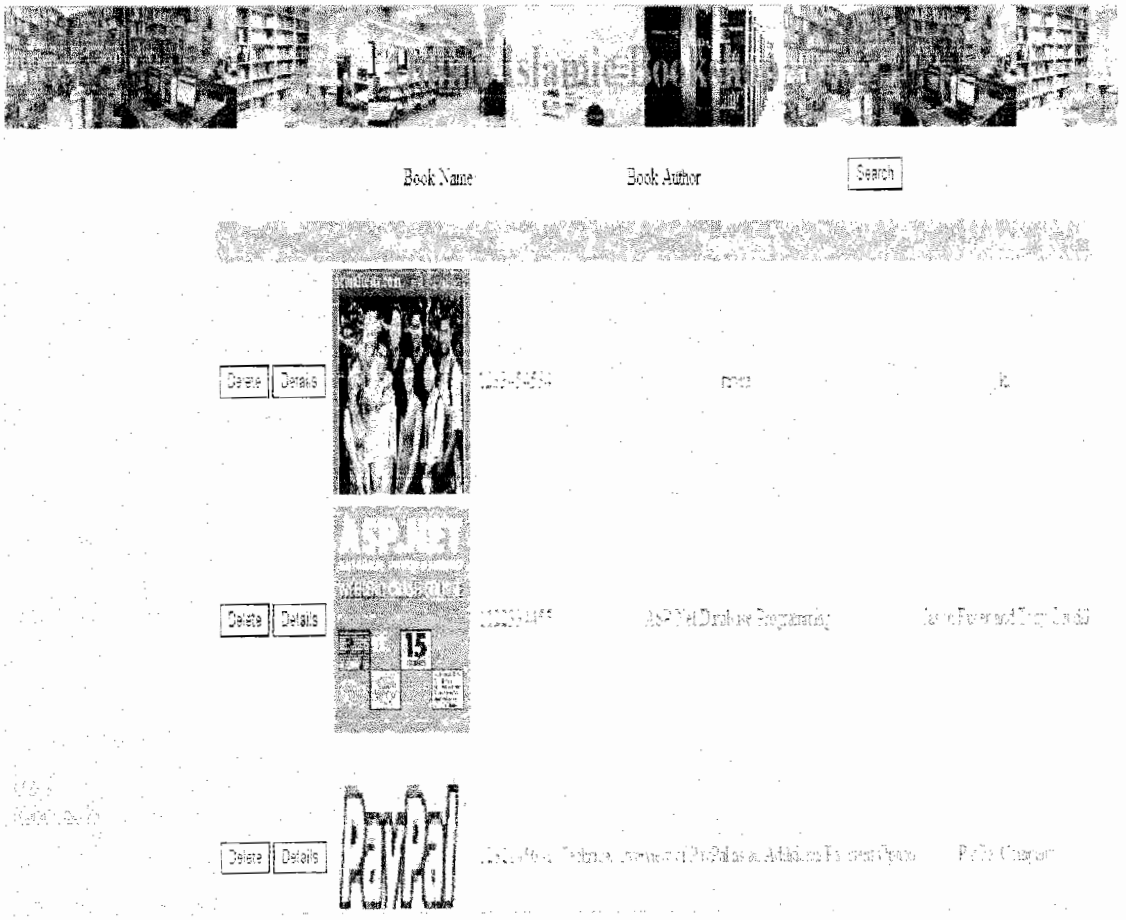

Figure 7.13: Admin Page

Then the admin can be modify the detail books as shows the figure 7.14 the admin can be add, delete and edit a books to the O-IS-BS database when press detail books.

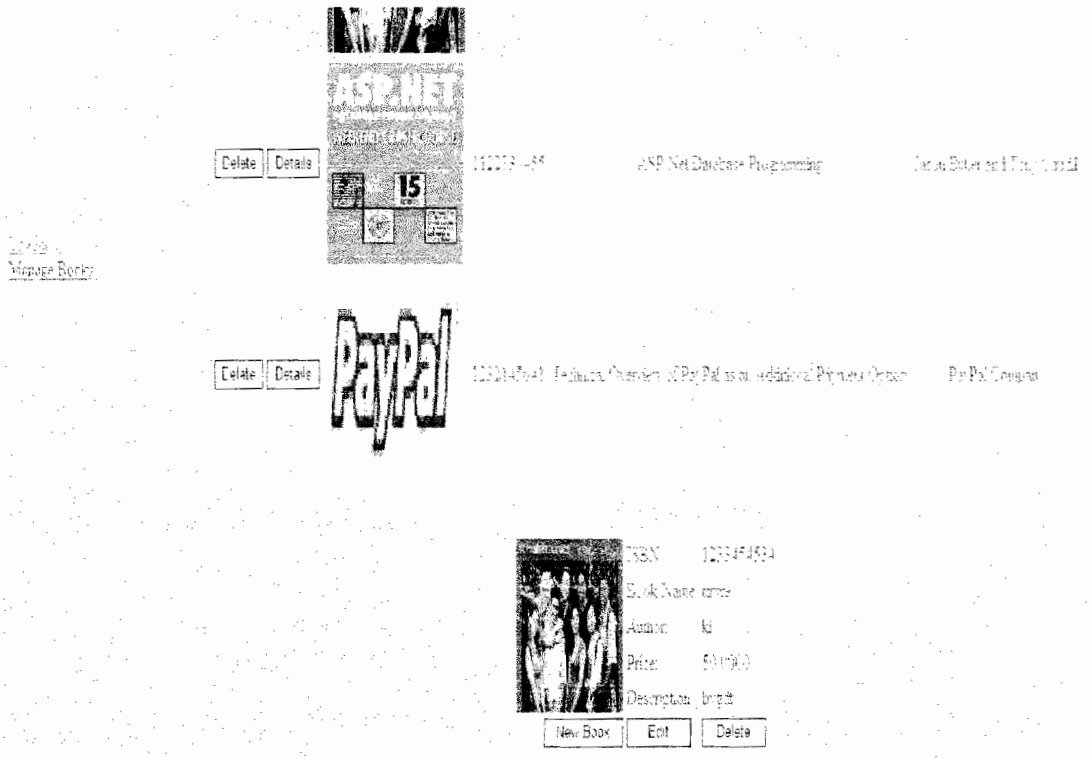

Figure 7.14: Modify Books

Figure 7.15 below represent how the Admin can add new books to O-IS-BS database and must be fulfill the entire field.

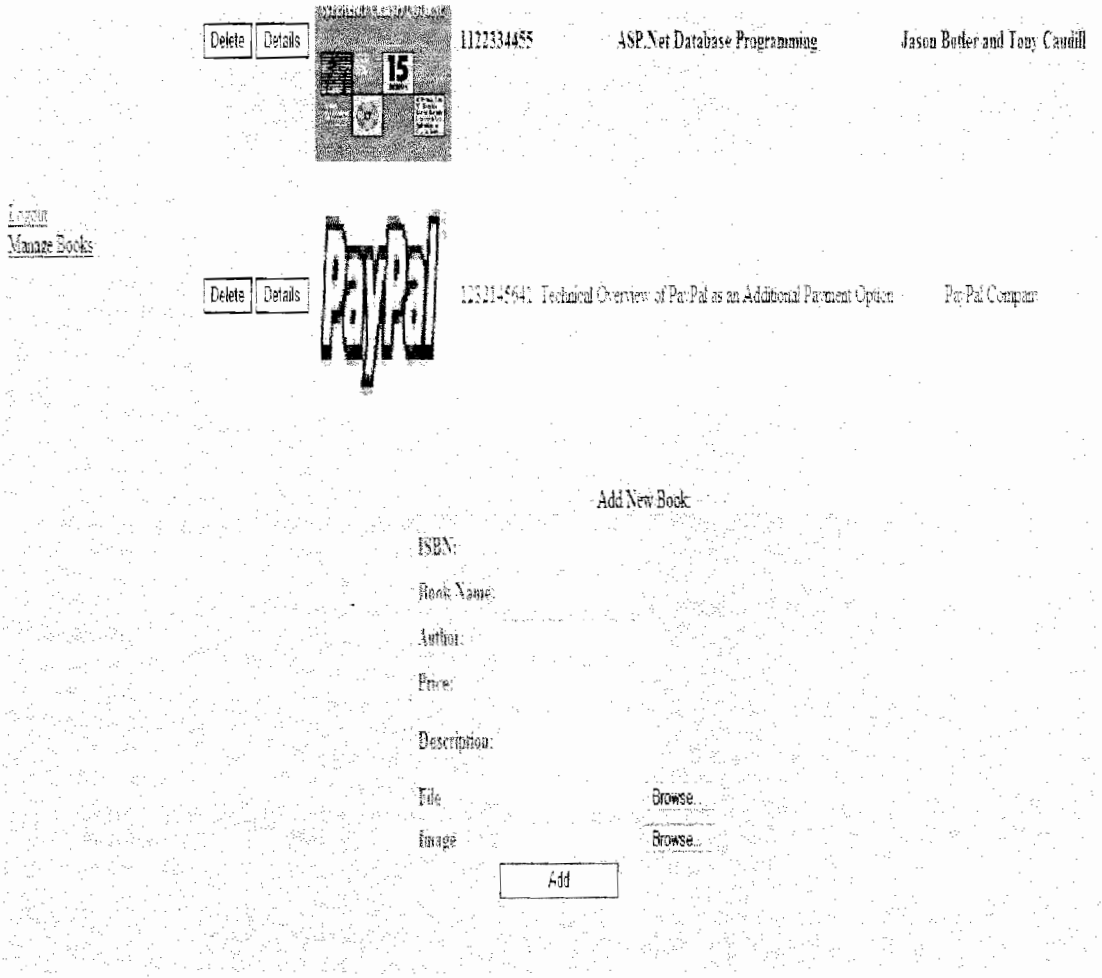

Figure 7.15: Add New Books

Figure 7.16 below shows the edit books as well the admin can be edit the books relying on fill all field and can save the editing or cancel it.

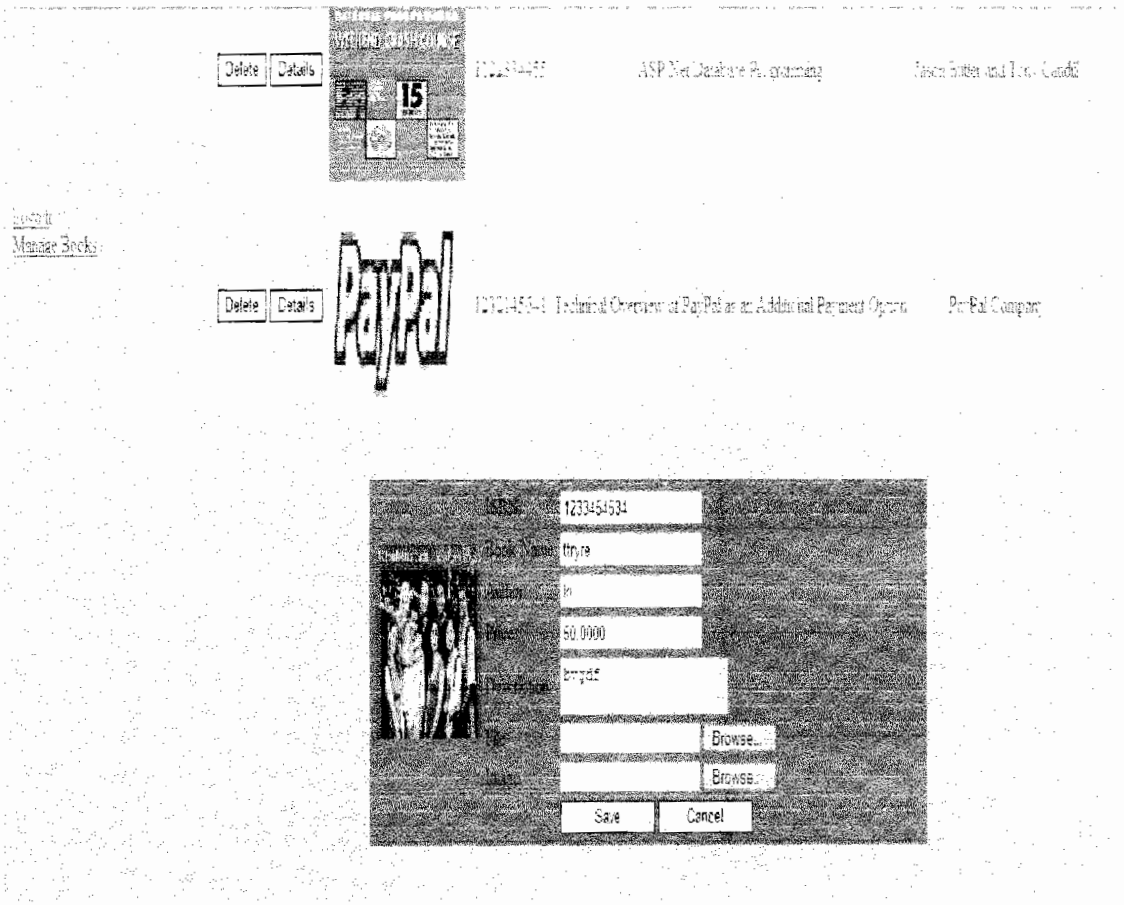

Figure 7.16: Edit Books

In addition, the Admin can delete the books by press on delete button as well as the Admin and Users can be logout any time from the system by press on logout link. If the Admin or Users entered incorrect User Name or Password, the system will not accept the users or admin and appear attempt page with unsuccessful message for them as shown in figure 7.16.

Figure 7.16: Attempt Page

Appendix B

8.1 Use Case Diagram

A use case define as a piece of actions of a classifier without revealing its internal structure by describing the actions of a system from a user's standpoint, providing a functional description of a system and its major processes, and providing a graphical description of users and interactions (Boger, et al., 2004). The use case method was developed by Ivar Jacobson as a part of his methodology (Brown, 2002). The main purposes of use case are:

i. To view what the user want.

ii. To provide an outside view of the system and what it must do.

A use case diagram is a graph of actors, a set of use cases enclosed by a system boundary, communication (participation) associations between the actors and the use cases, and generalizations among the use cases.

8.1.1 Actor

An actor who interacts with the system as well as charge to initiate a use case or more than one (George, et al., 2004), in this system there are a group of users interacting with the web based O-IS-BS and they are the bellow:

1) Users.
2) Administrator.

8.1.2 Identification Use Case

A use case defines a set of use-case instances, where each instance is a sequence of actions a system performs that yields an observable result of value to a particular actor (Rational Software Corporation, 2003).

Bellow the whole use cases for all the users:

1) **Use Case for the Users:**

a) Registration.
b) Login to the system.
c) Search Documents.
d) Purchase Books.
e) Logout.

2) Use Case for the Administration:

a) Login to the system.

b) Search Documents.

c) Modified Books.

d) Logout.

8.2 System's Requirements

As all requirements has been identified, it was then studied and reviewed before it was put into a structure according to their inter-relationships among the requirements gathered. The reviews was then brought to the elimination of any redundancies of requirements occurred. The functional requirements are one part of the system requirements and refined the Functional requirements as requirements that capture the intended behavior of the system. This behavior may be expressed as services, tasks or functions the system is required to perform (Malan, & Bredemeyer, 2001).

Table 8.1: Functional Requirement

No.	Requirement ID	Requirement Description	Priority
	O-IS-BS_01	**Login**	
1.	**O-IS-BS** _01_01	User and admin can key in User ID and Password.	M
2.	**O-IS-BS** _01_02	System detects validity of User and admin ID and	D

		Password.	
3.	**O-IS-BS _01_03**	User can cancel the log in.	O
	O-IS-BS _02	**Modified Books**	
4.	**O-IS-BS _02_01**	Admin can display the books	M
5.	**O-IS-BS _02_02**	Admin can edit the Books Details.	M
6.	**O-IS-BS _02_03**	Admin can add the Books on a system.	M
7.	**O-IS-BS _02_04**	Admin can Delete the Books from the system.	M
8.	**O-IS-BS_02_05**	System shall save the new step.	M
	O-IS-BS _03	**Registration**	
9.	**O-IS-BS _03_01**	User can key in the information fill the registration form.	M
10.	**O-IS-BS _03_02**	User can preview the information.	O
11.	**O-IS-BS _03_03**	User can submit the information.	M
12.	**O-IS-BS _03_04**	User can cancel the submission.	O
13.	**O-IS-BS _03_05**	System should save the submission applications.	M
14.	**O-IS-BS _02_06**	System shall detect error for incomplete form availability	D
	O-IS-BS _04	**Search for Books**	
15.	**O-IS-BS _04_01**	Users & Admin can search for Books name	M
16.	**O-IS-BS_04 _02**	Users & Admin can search for Books Authors	M
17.	**O-IS-BS _04 _03**	The system shall display the request Books	M
	O-IS-BS _05	**Purchase Books**	
18.	**O-IS-BS _05_01**	User can determine the payment type.	
19.	**O-IS-BS _05_02**	User can key in the information.	M

20.	**O-IS-BS _05_03**	User can preview the information.	O
21.	**O-IS-BS _05_04**	User can submit the application	M
22.	**O-IS-BS _05_05**	User can cancel the submission	O
23.	**O-IS-BS _05_06**	System should save the submission applications.	M
	O-IS-BS _06	**Log out**	
24.	**O-IS-BS _06_01**	All users can log out the system	M
25.	**O-IS-BS _06_02**	The system shall display the login screen after log out	M

8.3 Design

The second phase in general methodology involves the process of designing the system which in the case of this study is the web based O-IS-BS. During this phase, the focus has to be put on how things must be done to develop the web based O-IS-BS. All necessary documents were produced in this phase which had been the guides for the coding process during the construction phase. Theoretically, designing the web based O-IS-BS involved two main processes that were categorized into logical design and physical design.

8.3.1 Logical Design

Logical design is the phase where all functional features that have been chosen for the development of the system are described without regard of any computer platform. Assuming that the developed system could be implemented on any hardware or systems software, the aim of this phase is actually to make sure that the system can really functions as it should be (Hevner et al., 2004).

This also involved the representation of functional requirements of the system in the form of notation which in the case of this study, the Object Oriented approach was adopted by the researcher. The adoption of this approach is in line with the needs to produce more details design besides the increasingly complex system requirements (Purao, 2002). Object oriented offers conceptual structures of the system to assist in understanding the whole system's functions especially during implementation or writing programs. The researcher had produced use case diagram to represent the whole functions available in the web based O-IS-BS.

8.3.2 Use Case Specification

Bellow in this section the researcher described the use cases by using the use case specifications to go through the details of use cases.

1 USE CASE: LOGIN SYSTEM

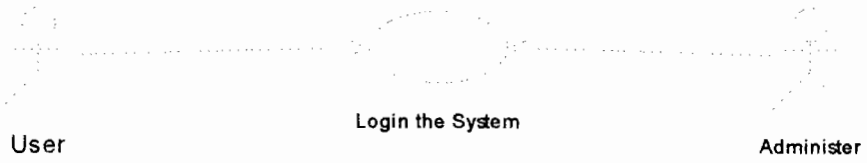

Figure 8.1: Use Case Diagram for Login the O-IS-BS

1.1 BRIEF DESCRIPTION

This use case is initiated by Users (User and Admin). This use case will enable the user to access the system.

1.2 PRE-CONDITIONS

The user should have a User name and Password.

1.3 CHARACTERISTIC OF ACTIVATION

Event Driven by (User and Admin).

1.4 FLOW OF EVENTS

1.4.1 Basic Flow (REQ 101)

- This use case begins when the user insert his/her User name and Password.
- The User should press login button. [A-**1: Cancel login].**
- The system will send information to verify user name and Password. **[E-1: Invalid User name or Password]**

• The system will allow the user to access the system if the user name and Password are valid.

• The function ends when the user logout the system.

1.4.2 Alternative Flow

A-1: Cancel (REQ 101)

The system shall a massage the login canceled by user demand.

1.4.3 Exceptional Flow

E-1: Invalid User name or Password (REQ 102)

The system will display massage for the user that the User name and password are Invalid.

1.5 POST-CONDITIONS

• The user can do any action through the system via the authorization that gift by the management.

1.6 RULE(S)

Not applicable.

1.7 CONSTRAINT(S)

Not applicable.

2 USE CASE: Modified Books

Figure 8.2: Use Case Diagram for Modified the Books

2.1 BRIEF DESCRIPTION

This use case is initiated by Admin. This use case Admin enable any time to Modified (Add, Delete and Edit) the Books.

2.2 PRE-CONDITIONS

The Admin should login to the system.

2.3 CHARACTERISTIC OF ACTIVATION

Event Driven by (Admin).

2.4 FLOW OF EVENTS

2.4.1 Basic Flow (REQ 101)

- This use case begins when the Admin press to Modify (Add, Delete and Edit) any button.
- The system shall display the process step.

- Admin can key in the information [A1: Reset the process step].
- Admin can submit the process step [A1: Cancel].
- The system should check the data [E 1: uncompleted form].
- The system shall save the submitted application.

2.4.2 Alternative Flow

A-1: Reset the process step

The system shall empty the process fields by Modified demand.

A-2: Cancel

The system will cancel the submission by Modified demand.

2.4.3 Exceptional Flow

E-1: Uncompleted form

The system will display massage for the application form is uncompleted.

2.5 POST-CONDITIONS

- Not applicable.

2.6 RULE(S)

All this processes should be done by Admin only.

2.7 CONSTRAINT(S)

Not applicable.

3 USE CASE: REGISTRATION

Figure 8.3: Use Case Diagram for Login Registration

3.1 BRIEF DESCRIPTION

This use case is initiated by Users. This use case will enable the Users to edit information in the register application after received demand.

3.2 PRE-CONDITIONS

The Users should fill the form application.

3.3 CHARACTERISTIC OF ACTIVATION

Event Driven by (Users).

3.4 FLOW OF EVENTS

3.4.1 Basic Flow (REQ 101)

- The User is provided with the Registration form.
- The user fills the registration form and submits it (E1).
- The system checks whether the information is complete and inserts the data in the database (E2).

• The system sends the confirmation page to the user.

3.4.2 Alternative Flow

E1:

1. The input parameters are incorrect or the form is not filled properly.

2. The system provides the form again to enter the correct and complete information.

E2:

1. The ID chosen by the user may be in use by some other user .The system provides a page for the user to register with some other ID.

3.4.3 Exceptional Flow

E-1: Uncompleted form

The system will display massage for the Registration form is uncompleted.

3.5 POST-CONDITIONS

• Not applicable.

3.6 RULE(S)

Not applicable.

3.7 CONSTRAINT(S)

Not applicable.

4 USE CASE: SEARCH FOR BOOKS

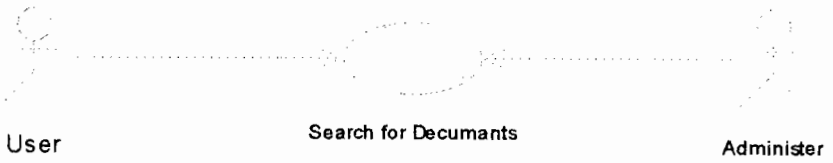

Figure 8.4: Use Case Diagram for Search on the Books

4.1 BRIEF DESCRIPTION

This use case is initiated by Admin or Users. This use case will enable the Admin or Users to search on the books and the system submitted the process to data base and refer the book to users.

4.2 PRE-CONDITIONS

The Admin or Users should login to the system.

4.3 CHARACTERISTIC OF ACTIVATION

Event is driven by (Admin or users demand).

4.4 FLOW OF EVENTS

4.4.1 Basic Flow (REQ 101)

- This use case begins when the Admin & Users press search link.
- The system shall display the search interface.
- The Admin & Users should key in name and authors books.
- The system retrieves the books from the database. [E1: Not exists application]
- The system shall display the application form.

4.4.2 Alternative Flow

Not applicable.

4.4.3 Exceptional Flow

E-1: Not exist application

The system shall display a massage "Not exists application".

4.5 POST-CONDITIONS

Not applicable.

4.6 RULE(S)

Not applicable.

4.7 CONSTRAINT(S)

Not applicable.

5 USE CASE: PURCHASE BOOKS

Figure 8.5: Use Case Diagram for Purchase a Books

5.1 BRIEF DESCRIPTION

This use case is initiated by User. This use case will enable the User to choose the E-payment models to pay and fill the E-payment application and submit it to the Library.

5.2 PRE-CONDITIONS

The User should login to the system.

5.3 CHARACTERISTIC OF ACTIVATION

Event is driven by (Users demand).

5.4 FLOW OF EVENTS

5.4.1 Basic Flow (REQ 101)

- This use case begins when the Users press on E-payment models button.
- The system shall display the application form for E-payment model chose.

- Users can key in the information. [A1: Reset the application form].
- Users can submit the application [A1: Cancel].
- The system should check the data [E 1: uncompleted form].
- The system shall save the submitted application

5.4.2 Alternative Flow

A-1: Reset the application form

The system shall empty the form fields by user demand.

A-2: Cancel

The system will cancel the submission by user demand.

5.4.3 Exceptional Flow

E-1: Uncompleted form

The system will display massage for the application form is uncompleted.

5.5 POST-CONDITIONS

Not applicable.

5.6 RULE(S)

Not applicable.

5.7 CONSTRAINT(S)

Not applicable.

6 USE CASE: log out the system

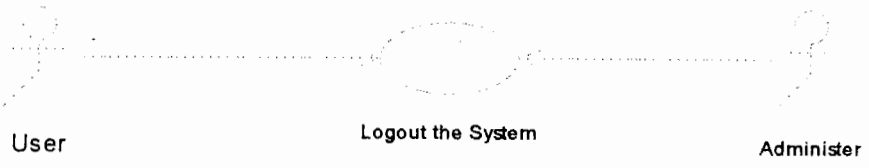

Figure 8.6: Use Case Diagram for Logout the O-IS-BS

6.1 BRIEF DESCRIPTION

This use case is initiated by Users (UUM Staff, Bursary Staff, Bursary Management, Registrar, VC, Head of department and Program manager). This use case will enable them to log out the system.

6.2 PRE-CONDITIONS

The users should be login to the system.

6.3 CHARACTERISTIC OF ACTIVATION

Event is driven by (Admin & Users) demand.

6.4 FLOW OF EVENTS

6.4.1 Basic Flow (REQ 101)

- This use case begins when the user press logout hyperlink.
- The system shall execute the demand and go back to the main page (login page).

6.4.2 Alternative Flow

Not applicable.

6.4.3 Exceptional Flow

Not applicable.

6.5 POST-CONDITIONS

Not applicable.

6.6 RULE(S)

Not applicable.

6.7 CONSTRAINT(S)

Not applicable.

8.3.3 Sequence diagram

The sequence diagram is a unified modeling language (UML) diagrams that shows the processes that execute in sequence, the sequence diagram shows the sequence of message, which are exchanged among roles that implement the behavior of the system, arranged in time, it shows the flow of control across many object that collaborate in the context of a scenario (Fowler, 2004). The sequence diagram captures the behavior of single use case by showing the messages passed between those object of the case and describe the sequence of operation in that use case.

The sequence diagram consists of three main objects:

4. Boundary: the interface that the actor can interact
5. Entity: the database.
6. Control: the control logic of the system.

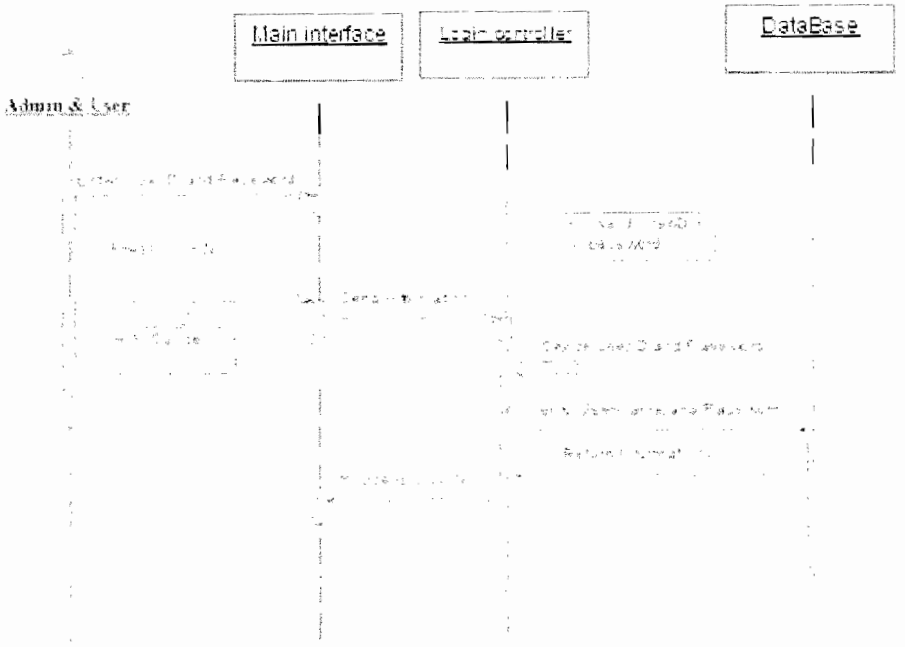

Figure 8.7: Sequence Diagram for Login to the System

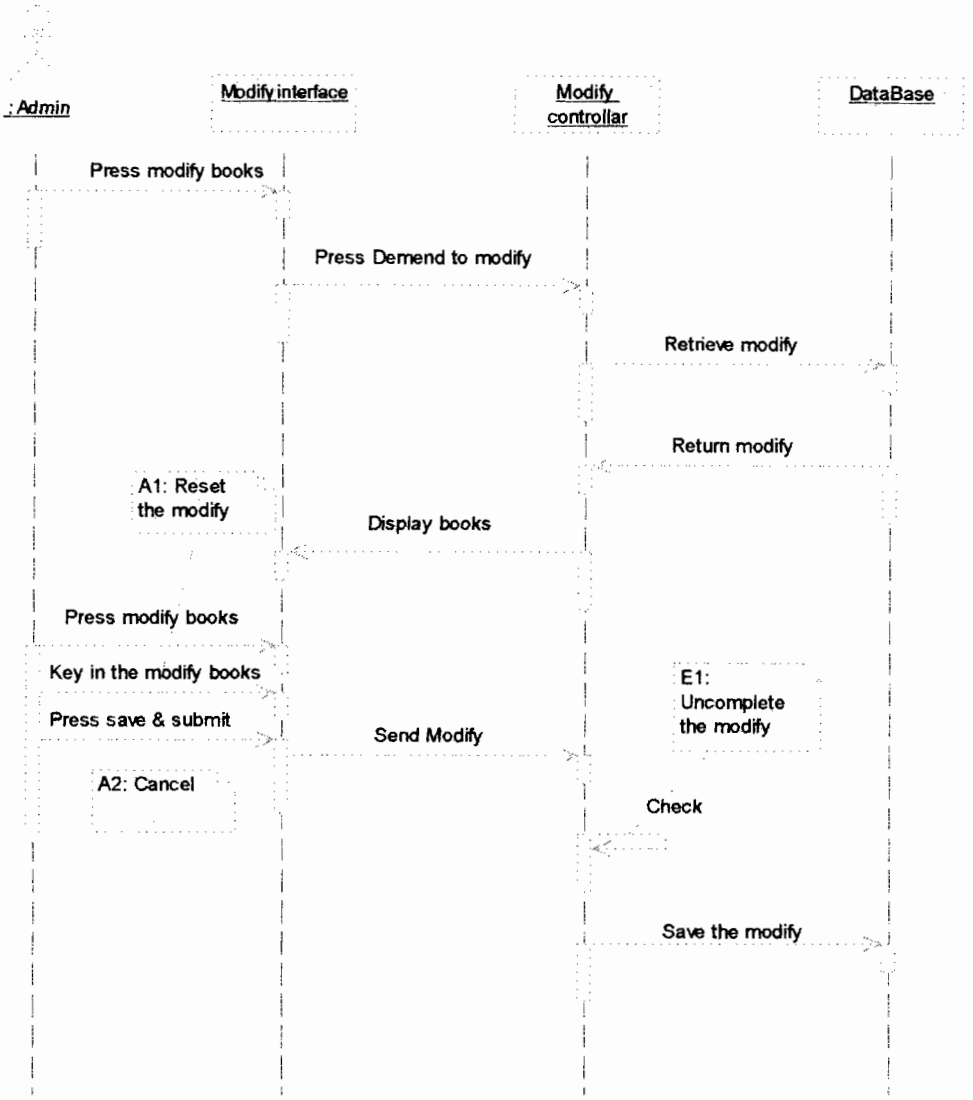

Figure 8.8: Sequence Diagram for Modified Books

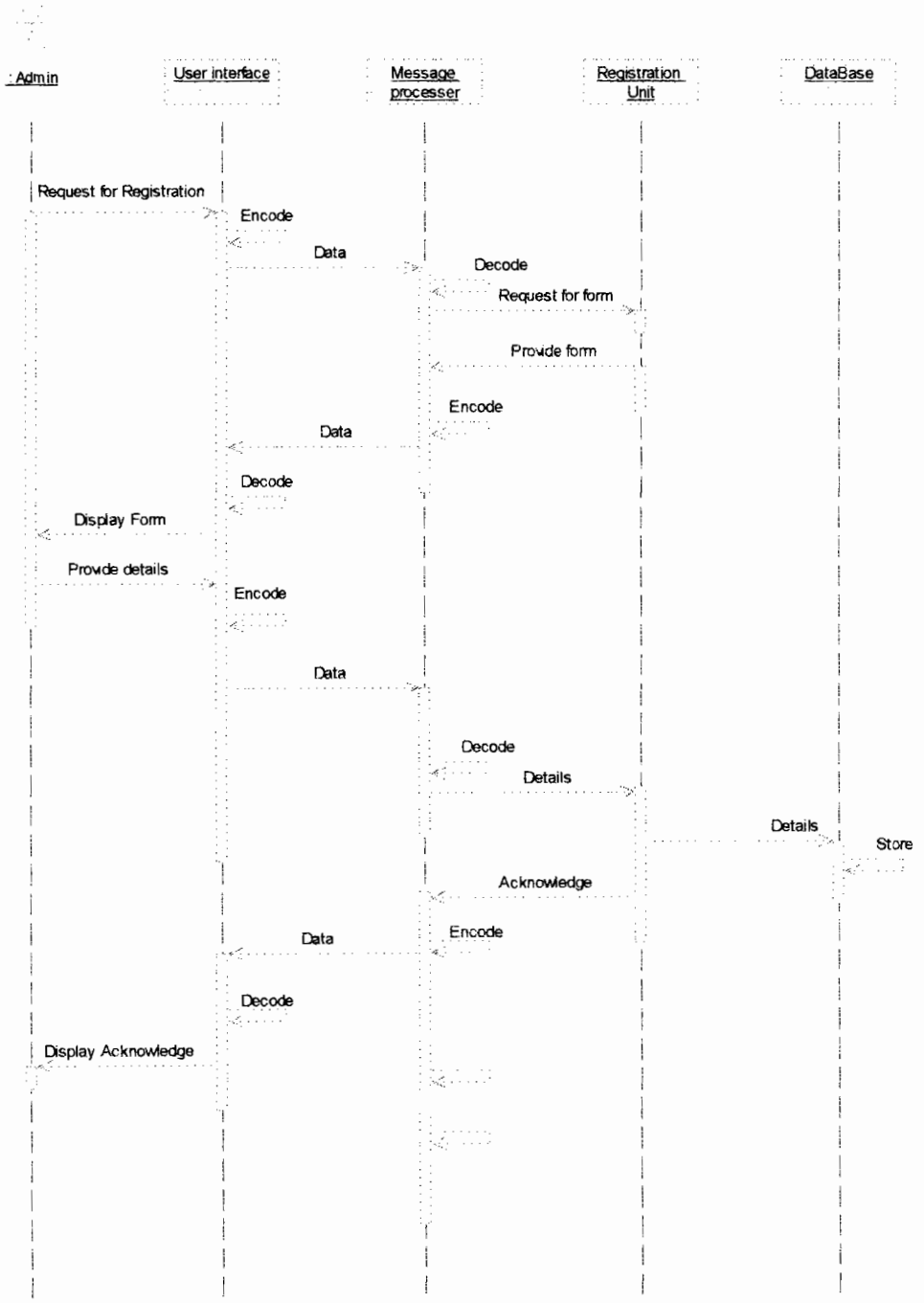

Figure 8.9: Sequence Diagram for Registration