Commerce Application with Multiple Accessible Methods (ECMC)

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Abstract

The E-Commerce M-Commerce (ECMC) is a B2C application which provides different accessibility for reading materials' marketing within Malaysia by using e-commerce and m-commerce applications. This system can be accessed through Internet, PDA or handphone. It is divided into both user and administrator module with appropriate access control for different types of users.

The e-commerce and m-commerce's history, categories, scope, WAP technology, client/server architectures and reading material's publishers have been discussed. Furthermore, the analysis of systems has been carried out to identify the strength and weaknesses of each system to develop a better system.

The methodology chosen for the project is waterfall model. Besides, the chosen development tools and system requirements are analyzed. The program design, database design, interface design is elaborated to make the development process easier and more efficient.

Meanwhile, the four phases involved in the implementation stage are database implementation, module implementation, interface implementation and security implementation.

The testing strategies involved are unit testing, integrated testing and system testing. The top-down approach is adopted for integration testing. In system testing, functional testing, performance testing, acceptance testing and end user evaluation were carried out. System evaluation discusses the problems encountered during the development stage and solutions, strength, limitation, future enhancement of the

system. Moreover, knowledge and experience gained are also elaborated in this topic.

In short, ECMC project increases the convenience and efficiency of user without being restricted by time and location as well as minimizes the time needed to perform a transaction.

Acknowledgement

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1.1 Introduction

With the tremendous growth of the Internet, businesses are beginning to find new ways to expand their opportunities. Approximately 300 million people worldwide (Nielsen//NetRatings, September 2000) have now access to the Internet. The astonishing growth of the Internet, has led to a critical mass of consumers and companies participating in a global on-line marketplace. Business owners around the world are increasingly turning to the Internet to increase their efficiency and profitability. A large number of companies have come to the Net to maintain an electronic presence, market products, generate sales leads, provide customer support and open up electronic stores that can be accessed by the Internet users. Some of the benefits enjoyed by these companies include lower purchasing costs, reduced inventory, lower cycle times, more efficient and effective customer service, lower overhead, lower sales and marketing costs, increased awareness of competition, new sales opportunities and a global customer base. The Internet is also proving to be the great equalizer, allowing the smallest of companies to access markets and present a presence that allows them to compete against the giants in the industry. The potential scope, size and overall economic impact of this economic system is much larger than what we can comprehend today.[1]

Mobile commerce has been called the next big growth opportunity besides e-commerce. It combines the two most explosive technologies of the new economy--the Web and wireless communications. However, no matter how powerful the Web becomes, as long as it is desk-bound on PCs, it will restrict people by time and location. Wireless devices are paving the way for people to interact, inform and

communicate on the move. Today there are already over 200 million wireless subscribers, and by 2003 it is predicted that there will be more than one billion. Organizations across the world are realizing the compelling advantages created by emerging mobile technologies. These technologies hold great promise for businesses and consumers alike. Some consumers are already doing mobile window-shopping. For example, let say you are in the retail business and sell clothing. If you have an m-Commerce enabled site, a potential customer can be shopping at the mall, see an item they are interested in buying, submit a query to your site and compare prices. If you have the better price, the consumer may even purchase the article from you on the spot. [29]

1.2 Overview of the Project

The aim of E-Commerce M-Commerce (ECMC) project is to provide different accessibilities for reading material marketing. This system can be accessed through Internet accessed devices such as computer, PDA or hand phone by using web and WAP applications. In other words, it means that similar system is developed into e-commerce and m-commerce applications. It is developed with appropriate access control for different types of users, who are the system administrator and normal user.

The category of ECMC is called business-to-consumer (B2C) which allows computer, PDA or hand phone users to browse through and order reading material from the storefront's online catalogues. Any user who accesses into the system is able to view the catalogues but whoever wishes to make any purchase order must register as a member. According to the real-world shopping experience, a unique reference number will be generated each time a user agrees at making a purchase order. However, any payment information will not be included into this ECMC project development. Users are able to keep track on the order status by using the reference number while the administrator can update the latest product catalogue information and order status if necessary.

1.3 Project Objective

ECMC is a combination of e-commerce and m-commerce applications. It provides the opportunities for the marketing of reading materials such as books, magazines and newspapers. It enables everyone to browse through the catalogues. However, only those who have registered as members (owns user names and passwords) are able to make purchase orders or view order status. The objectives of ECMC project are:

1. To provide easy and wide accessibility to the system through Internet accessed devices such as computer, PDA or hand phone user.
2. To increase convenience of using the system without being restricted by time and location.
3. To increase the efficiency by minimizing the time needed to perform a transaction such as making a purchase order and checking an order status.
4. To provide appropriate access control for users and the system administrator and enable them to update personal information and change passwords.
5. To enhance the management of the system administrator by providing the functions such as generating reports which shows the statistics of the purchase orders within a period as well as updating the catalogue information displayed on the interface by making changes on the database. Any knowledge in programming languages or changes on the source code is not required from the system administrator.

1.4 Project Scope

ECMC project is a B2C development of a client/server system. It is divided into 2 categories, the normal user module and system administrator module with appropriate access control for different types of users. The normal users are restricted from entering into the system administrator's module. It is developed for commerce marketing within west Malaysia.

Both normal user module and system administrator module will be developed in e-commerce application. However, the m-commerce application will only contains some parts of the user module, which enables users to make purchase orders, check order status, change personal information and passwords. The new user registration will not be included in the m-commerce application development due to the limitation of screen seize and difficulties entering too much information by using PDA or hand phone.

The normal user module is accessible by an individual who has registered to become a member. This module enables users to browse through the product catalogue, register as members, check order status, change personal information and passwords as well as search for help.

While the administrator module is a complete module in which only the system administrator with an appropriate password is able to access the system. It includes all functions in user side menu. In additional, it also allows the system administrator to update or delete books, magazines, newspapers catalogue

information and purchase status. It also enables the system to generate reports, insert new catalogue item and to access database.

The payment information and security features will not be included in ECMC development. Besides, the system only allows one system administration to monitor the information. Any registration for other administrator is not available.

The product category is divided into three main parts: books, magazines and newspapers. Emphasis will be given to books and newspapers produced in foreign countries while only the local newspaper will be sold.

1.5 End User

The ECMC end users are the normal users and system administrator. The normal users are the public users among the resident of west Malaysia who have registered as a member. The area of delivery is restricted to west Malaysia in order to standardize the price, enhance the efficiency of the service due to lower delivery cost and time saving advantages. Furthermore, it is easier to enhance the marketing strategy due to the same currency and policy of the country.

The target of the main system user is specified for young generation such as students or working members who particulary using Internet and WAP technology. The majority of the magazines and books will be based on different fields from foreign countries while the newspapers will only contain those types which are commonly sold in this country.

The system administrator is the person who is in charge of monitoring the system information such as catalogue information, purchase order, order status, etc.

1.6 Project Schedule

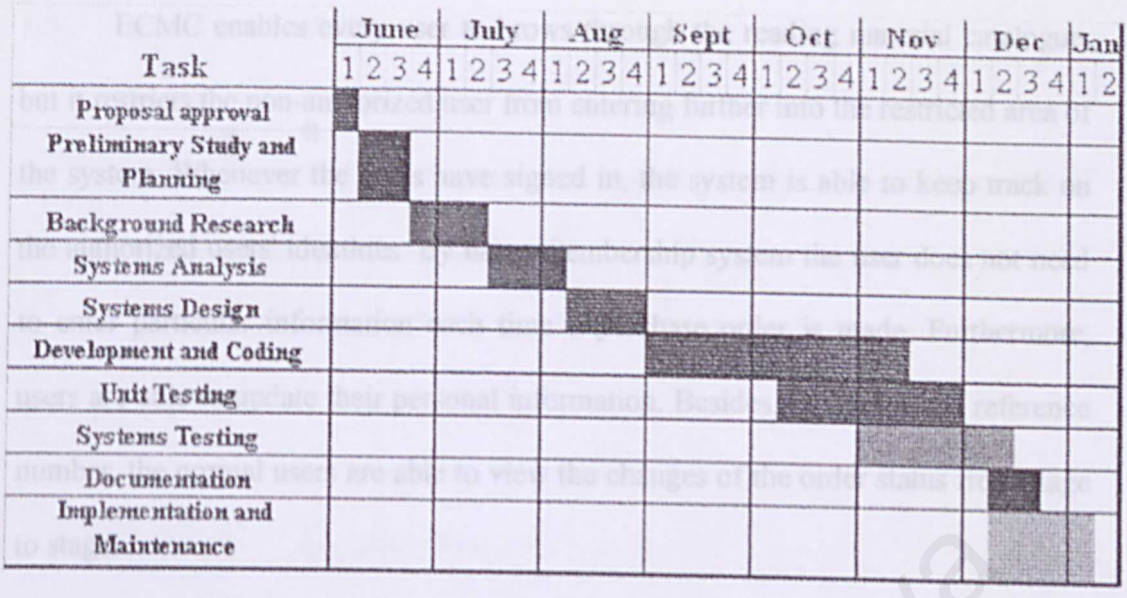


Figure 1.1: Project Schedule

The first task of ECMC is writing the thesis proposal and waiting for its approval. It takes approximately 1 week. The next task is the system study and planning, which takes about 2 weeks to identify the objective, scope, end user and outcome of the project. Next, background research involves studies about general issues in e-commerce and m-commerce features, history, web database, reading material company and web database as well as the current available commerce system analysis, which takes about 3 weeks.

The following task is the system analysis which is carried out to analyze the appropriate methodology, functional requirements, non-functional requirements, developing tools such as suitable programming languages used. These take approximately 21 days.

The system design also takes about 21 days to accomplish the program, interface as well as database design.

1.7 Expected Outcome

ECMC enables every user to brows through the reading material catalogue, but it restricts the non-authorized user from entering further into the restricted area of the system. Whenever the users have signed in, the system is able to keep track on the authorized users' identities. By using membership system the user does not need to enter particular information each time a purchase order is made. Furthermore, users are able to update their personal information. Besides, by having the reference number, the normal users are able to view the changes of the order status from stage to stage.

In order to enhance the convenience in making purchase order in ECMC system, a shopping cart is provided to enable the user to view the selected product when they are doing window shopping. Once they are satisfied with the entire items in the shopping cart and submit the order, a unique reference number will be generated for each purchase order.

The update catalogue in the e-commerce application enables the system administrator to add, delete and modify the system the catalogue information.

This multiple accessible methods will overcome the problem of accessibility due to the restriction of location and time. For example, by m-commerce application, users are able to do mobile window shopping by the time they are shopping at the mall and compare prices. The same application may also accessible through the Web on PCs, so it is extremely convenient.

1.8 Organisation of Chapters

Chapter 1 *Introduction*

The topic of introduction gives an overall idea about the e-commerce and m-commerce technology, overview of the project, project objectives, scope, end-user, project schedule, the expected outcome and organisation of chapters.

Chapter 2 *Literature Review*

The topic of this chapter includes the e-commerce's categories, scope, client/server architecture, m-commerce features and history, WAP, overview of the reading material company, web database and the comparison between the current available systems and the summary of literature review.

Chapter 3 *Methodology* and *System Analysis*

The topic of system analysis contains the methodology chosen in the development of this system and the advantages of the particular model. The analysis has been made about information gathering approach. The system requirements are analyzed from the view point of functional requirements and non-functional requirements. Besides, in determining the server and client software and hardware requirements, the existing development tools such as servers, programming languagues and databases have been analyzed.

Chapter 4 *System Design*

This topic has discussed about the process of the program design which is demonstrated in flow chart. The other features in the system design phase include interface design, database design with entity relationship diagram and data dictionary.

Chapter 5 *System Implementation*

The topic of System Implementation elaborates the software development tools and hardware development requirements. The four phases involved in the implementation stage are database implementation, module implementation, interface implementation and security implementation.

Chapter 6 *Testing*

The testing strategies involved are unit testing, integrated testing and system testing. Each strategy perform different testing task to ensure that the fully functionality and quality of the whole system. Each of these strategies will be discussed in the further detail.

Chapter 7 *System Evaluation*

System evaluation discusses the problems encountered during the development stage and solutions, strength and limitation of the system. It achieves and fulfills the system requirements as stated in the previous chapters. However, there are always rooms for improvement as stated in the future enhancement section. Moreover, knowledge and experience gained are also elaborated in this topic.

Chapter 2 Literature Review

2.1 Introduction

Literature review is an important step to understand the e-commerce and m-commerce's history, categories, scopes, compare the client/server architectures, introduction to WAP technology, web database as well as find out the reading material publishers and analyze the current available systems. This research is relevant to the ECMC system development.

2.2 E-commerce

E-commerce, ecommerce, or *electronic commerce* is defined as the conduct of financial transactions by electronic means. With the growth of commerce on the Internet and the Web, *ecommerce* often refers to purchases from online stores on the Web, otherwise knows as *e-commerce Web sites*. They may also be referred to as "*virtual-stores*" or *Cyber stores*. Since the transaction goes through the Internet and the Web, some have suggested another term: *I-commerce* (Internet commerce), or *icommerce*.[10]

Electronic Commerce (e-commerce or EC) is a general term applied to the use of computer and telecommunications technologies to support trading in goods and services. It is defined as "any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact". In simple words, it is a term for buying, selling, ordering, or delivering something (goods, services, etc.) electronically - usually over a network. Technology is transforming many aspects of business and market activities. In its broadest sense, e-commerce refers to the use of electronic means and technologies to conduct commerce between following interactions:

- Business-to-Business (B2B)
- Business-to-Consumer (B2C)
- Business-within-Business (Intra-Company) [1]

2.2.1 Business-to-Business (B2B)

The Internet can connect all businesses to each other, regardless of their location or position in the supply chain. This ability presents a huge threat to traditional intermediaries like wholesalers and brokers. Internet connections facilitate businesses to bargain directly with a range of suppliers, thereby eliminating the need for such intermediaries. An example in this category would be a company that uses a network for ordering from its suppliers, receiving invoices and making payments. This category of e-commerce has been well established for several years, over private or Value-Added Networks (VANs).

The end-to-end business processes, such as fulfillment and procurement, are being reengineered to function electronically and without the need for private and value-added networks. This is an area where many business application suppliers in the accounting, supply-chain, and manufacturing sectors are focusing their attention right now.

Business-to-business (B2B) e-commerce is the catalyst behind the rise of the extranet, an intranet whose boundaries extend beyond internal corporate users to include external business partners, such as customers and vendors.

2.2.2 Business-to-Consumer (B2C)

The business-to-consumer (B2C) e-commerce is focused on the use of a virtual storefront on the World Wide Web that allows an Internet user to browse and order goods or services from the storefront's online catalogue. This category largely

equates to electronic retailing. It is clearly modeled on the real-world shopping experience, with "carts" (order forms) to drop your goods into and "checkouts" (payment processing) to settle your bill with a credit card. There are now shopping malls all over the Internet offering all kinds of consumer goods, from sweets and cakes to computers and cars.

Companies are rushing to take advantage of this market. Availability of secure web transactions is enabling companies to allow consumers to purchase products directly over the Web. The most prominent of the new paradigms is that of relationship marketing. Because consumer actions can be tracked on the Web, companies are experimenting with this commerce methodology as a tool for market research and relationship marketing. An example of a company that has leveraged the power of Internet interactivity to revolutionize customer relationships is Firefly. Firefly is creating a custom product for each of its customers, based on the customer's profile and buying behavior.

2.2.3 Business-within-Business (Intra-Company)

Companies worldwide are embracing the application of web-based technology to improve and transform internal business communications and processes. The business-within-business e-commerce takes the intranet beyond its popular role as a corporate and product information center. Here the e-commerce is strictly intra-company and payment processing is not an issue. The transfer of funds is purely an accounting transaction via a charge back or an inter-company billing, rather than a true payment where details of a credit card or bank account are being passed over the Internet.

In this scenario the intranet becomes a service center for the exchange of goods and services among the subsidiaries of a large company. This is a significant new market opportunity for existing and startup e-commerce application vendors to exploit.

2.2.4 The Scope of E-Commerce

E-commerce encompasses a broad range of activities. The core component includes electronic trading of physical goods and services and of information-based electronic material (digital products). The conventional activities include:

- Searching for product information
- Ordering products
- Paying for goods and services
- Customer service

The whole of the commercial transaction, including ordering, invoicing and payment, and delivery cycle can be supported electronically. What characterizes electronic commerce is the pervasiveness of technology. The use of the Internet to support marketing and customer-interface is only part of electronic innovations that are changing the way firms do business. With intranets, corporations distribute internal memos and announcements to their employees, and knowledge exchange and scheduling communications flow worldwide in a timely fashion. With direct connection to suppliers using extranet, the same technology is used for manufacturing and supply-chain management. To sum up, the electronic commerce process also includes the following business activities:

- Pre-sales and post-sales support
- Internal electronic mail and messaging

- Online publishing of corporate documents and forms
- Managing corporate finance and personnel systems
- Manufacturing logistics management
- Supply chain management for inventory, distribution, and warehousing
- Facilitation of contacts between traders
- Tracking orders and shipments
- Advertising and promotion of products and services

There are a number of other business activities that are also covered by e-commerce. More important than the mere number of areas being affected by e-commerce is the fact that these activities can be integrated into a holistic business process. Thus, all the areas mentioned above are not really a separate application, but rather, one aspect of the whole electronic commerce process. Hence, the business potential of e-commerce is the capability to innovate and integrate business and market processes.

A distinction should be made between electronic trading of physical goods and services and electronic trading of digital products that can be delivered directly through the network. The electronic trading of physical goods and services represents an evolution of present systems of trading. This form of electronic commerce is expected to have a great impact on competitiveness and a limited impact on employment. The trading of digital products (music, video, software, images, etc.) represents a revolutionary new way of trading, for which the full commercial transaction cycle, including delivery, can be conducted simultaneously via the same network. Depending on the solutions that will be successful in the market place, traded "electronic products" could create totally new markets. This highly innovative

form of e-commerce is expected to have an important impact on competitiveness and create employment. [1]

2.2.5 Client/server architecture.

As a result of the limitations of file sharing architectures, the client/server architecture emerged. This approach introduced a database server to replace the file server. Using a relational database management system (DBMS), user queries could be answered directly. The client/server architecture reduced network traffic by providing a query response rather than total file transfer. It improves multi-user updating through a GUI front end to a shared database. In client/server architectures, Remote Procedure Calls (RPCs) or standard query language (SQL) statements are typically used to communicate between the client and server.

Client

Client is a networked information requester, usually a PC or workstation, which can query database and/or other information from a server. Clients rely on servers for resources, such as files, devices, and even processing power.

Server

Server is a computer, usually a high-powered workstation, a minicomputer, or a mainframe, that houses information for manipulation by networked clients. Server is dedicated to managing disk drives (file servers), database (database servers), printers (print servers), or network traffic (network servers).

Client-server

Client-server is network architecture in which each computer or process on the network is either a client or a server. Client-server architecture implies a cooperative processing of requests submitted by a client, or requester, to the server, which

processes the requests and returns the results to the client. The client manipulates the data and presents the result to the user.

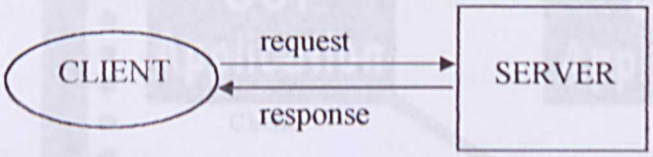


Figure 2.1 : One-to-One Client Server

Client-server solutions can be in a many-to-one design that is more than one client typically makes requests of the server.

2.2.5.1 Two tier architectures.

2-tier architecture refers to client/server architectures in which the user interface runs on the client and the database is stored on the server. The actual application logic can run on either the client or the server. There are only the architecturally tiered data server and client.

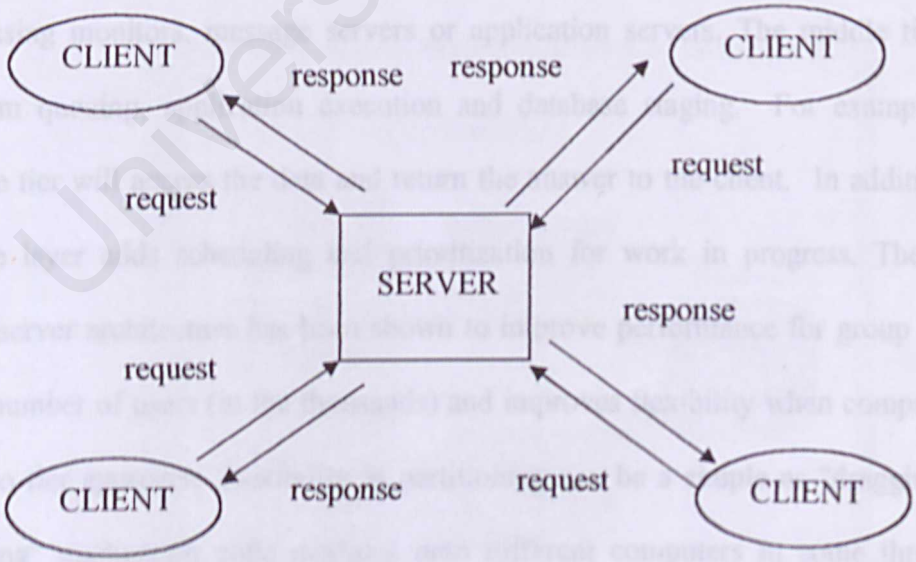


Figure 2.2: Many-to-One Client Server

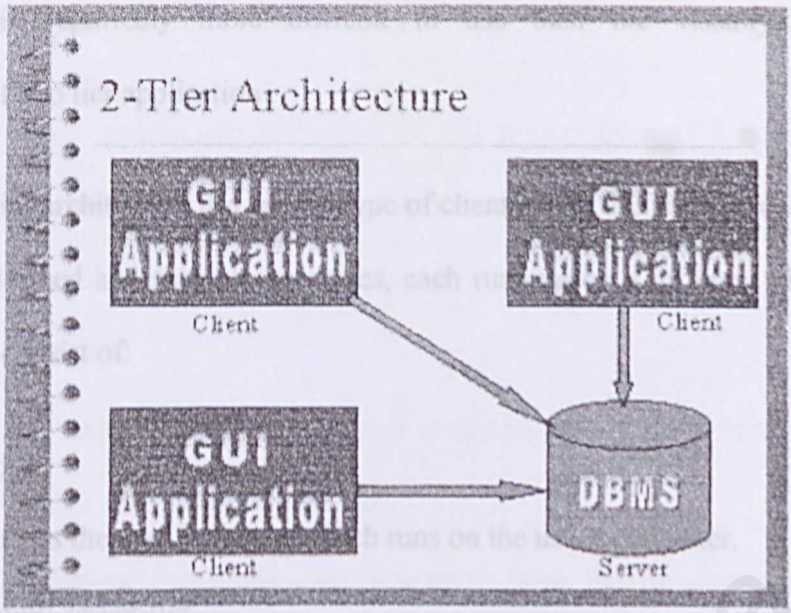


Figure 2.3 : 2-Tier Architecture

2.2.5.2 Three tier architectures.

The three tier architecture emerged to overcome the limitations of the two tier architecture. A middle tier was added between the user system interface client environment and the database management server management server environment. There are a variety of ways of implementing this middle tier, such as transaction processing monitors, message servers or application servers. The middle tier can perform queuing, application execution and database staging. For example, the middle tier will access the data and return the answer to the client. In addition the middle layer adds scheduling and prioritization for work in progress. The three client/server architecture has been shown to improve performance for group with a large number of users (in the thousands) and improves flexibility when compared to the two tier approach. Flexibility in partitioning can be a simple as "dragging and dropping" application code modules onto different computers in some three tier architectures. A limitation with three tier architecture is that the development

environment is reportedly more difficult to use than the visually-oriented development of two tier application

Three-tier architecture is a special type of client/server architecture consisting of three well-defined and separate processes, each running on a different platform. The three tiers consist of:

1. Client-tier

   Client-tier is the user interface, which runs on the user's computer.

2. Application-server-tier

   Application-server-tier is the functional modules that actually process data. This middle tier isn't present in 2-tier architecture in this explicit form. This tier protects the data from direct access by the clients.

3. Data-server-tier

   Data-server-tier is a database management system (DBMS) that stores the data required by the middle tier.

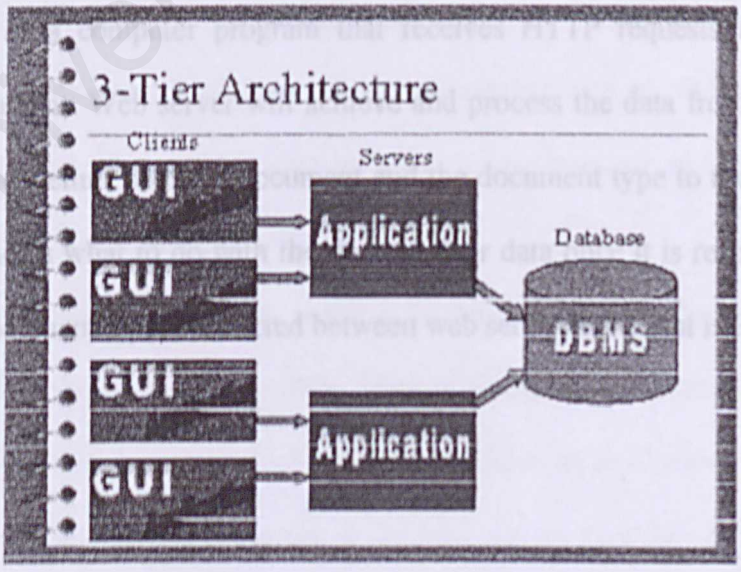


Figure 2.4 : 3-Tier Architecture

2.2.5.3 Conclusion for Software Architecture

The three-tier architecture is chosen for this project because it is easier to implement and design. The three-tier design has many advantages over traditional two-tier or single-tier designs, the chief ones being:

- The added modularity makes it easier to modify or replace one tier without affecting the other tiers.
- Separating the application functions from the database functions makes it easier to implement load balancing.
- Three tier architecture have been used successfully since the early 1990 on thousands of systems of various types throughout commercial industry, where distributed information computing in a heterogeneous environment is required.

In this project, the three tiers consists web browser as client-tier, web server as application-server-tier and database server as the data-server-tier. A web server can be defined as a computer program that receives HTTP requests from web browser for document. Web server will achieve and process the data from database server. Web server return both the document and the document type to the client so that the client knows what to do with the document or data once it is received. The most common document type transferred between web server and client is HTML.

2.3 M-Commerce

The m-Commerce unit produces value-added services for mobile phones. In Finland, Jippii Group began offering value added services for mobile phones in October 1999. The first products to be launched were logos and ring tones that can be ordered with a mobile phone using SMS, and that are used to personalize your phone. This was immediately successful and so the product range was expanded to provide other SMS based information and entertainment services. The m-Commerce unit was formed in August 2000 to support the internationalization of Jippii and constantly provide customers with new information and entertainment services based on current and future phone technology. [4]

M-Commerce has been defined as the use of mobile handheld devices to communicate text and data via connection to public or private networks. Organizations across the world are realizing the compelling advantages created by emerging mobile technologies. Typical uses for mobile devices include stock quotes, instant driving directions (GPS), wireless financial transactions, and access to mobile enabled web sites. These are some of the everyday activities that will be forever changed by mobile technology. Many more applications are in the works as well. Literally, there are millions of tasks, operations, and applications where the influence and use of mobile technology make practical sense. These tasks are as simple a time clock applications or as complex as delivery logistics.

These technologies hold great promise for businesses and consumers alike. Some consumers are already doing mobile window shopping. For example, lets say you are in the retail business and sell clothing. If you have an m-Commerce enabled site, a potential customer can be shopping at the mall, see an item they are interested in buying, submit a query to your site and compare prices. If you have the better

price, the consumer may even purchase the article from you on the spot. M-Commerce will be a major revenue stream for many companies in the near future. The technology is still evolving, bandwidth is limited, screen size is limited, and security is still issues that have yet to be completely worked out. [1]

2.3.1 Wireless application protocol (WAP)

Wireless application protocol (WAP) is an application environment and set of communication protocols for wireless devices designed to enable manufacturer-, vendor-, and technology-independent access to the Internet and advanced telephony services. WAP bridges the gap between the mobile world and the Internet as well as corporate intranets and offers the ability to deliver an unlimited range of mobile value-added services to subscribers - independent of their network, bearer, and terminal. Mobile subscribers can access the same wealth of information from a pocket-sized device as they can from the desktop. WAP also defines a wireless application environment (WAE) aimed at enabling operators, manufacturers, and content developers to develop advanced differentiating services and applications including a micro browser, scripting facilities, e-mail, World Wide Web (WWW)-to-mobile-handset messaging, and mobile-to-telefax access. [5]

2.4 Reading Material's Publisher

2.4.1 Book's Publisher

2.4.1.1 McGraw-Hill Education

McGraw-Hill Education is one of the leading education publishers in Asia. Incorporated in 1970, it is a wholly-owned subsidiary of the McGraw-Hill Companies, Inc. It distributes books produced by McGraw-Hill Education either in English or in translated editions, and publishes original products for local markets. Principal Products/Services:

- Educational Publishing: including Higher Education, School and English Language Teaching materials
- Professional Business & Computing: include Business General References & Osborne Media Group.
- Science, Technical, Medical Publishing(McGraw-Hill Healthcare, Appleton & Lange) [7]

2.4.1.2 Popular Holding Limited

Popular Holding Limited has come a long way from its beginnings in 1924, when the first bookstore was established in Singapore. In the past 77 years, the Group has been transformed into a diversified business and a multinational player. We are now one of the largest media groups in Asia with business in print and multimedia publishing, content creation, education, retail, distribution, logistics and franchising in Singapore, Malaysia, Taiwan, Hong Kong, China, Canada and Macau. The transformation continues. The Group has been proactively in search of new opportunities, new markets, and new strategic alliances, to leverage the existing distribution channels, to tap into external expertise and to complement the core

business. In line with the e-revolution in the global environment, the Group is moving from the physical market to the cyber market. [8]

2.4.1.3 Falcon Press Sdn Bhd

Falcon Press is a leading publisher of:

- English Language Teaching books for Asia Pacific
- maps, tourist guides and commissioned books on Malaysia

The company has established a reputation for high quality, innovative products for the Malaysian and Asia Pacific market.

In the English Language Teaching field the company works closely with leading publishers or distributors in the United Kingdom, the U.S.A., Japan, Hong Kong, Taiwan, Malaysia, Singapore and Thailand.

It specializes in reference, reading and supplementary material, including

- English for Everyday Activities: A Picture Process Dictionary
- The Minimal series

The company seeks to cooperate with English Language Teaching publishers and distributors worldwide for its existing and forthcoming materials.

The company also specializes in commissioned works and major customers include

- The Asean Secretariat, Jakarta,
- Petronas (The Malaysian National Oil Company),
- Sime Darby Bhd (one of Malaysia's leading conglomerates),

- The Malaysian International Chamber of Commerce and Industry (investment maps),
- Malaysian Timber Council (including Tropical Evergreen Forests of Malaysia: An Informative PosterMap in English, Malay, German, Dutch and Japanese editions). [11]

2.4.2 Newspaper Publisher

2.4.2.1 The News Straits Time Press (Malaysia) Bhd

The News Straits Time Press (Malaysia) Bhd was started with one product in 1845. The Straits Times. From that very first newspaper, they have evolved with the beliefs, ideas and passion of a people who had an inherent power and need to excel ... an evolution that is reflected in the changes and growth of our numerous publications as the country pressed forward from the time of the Federated Malay states to a vibrant democratic nation that Malaysia is today. A nation whose leadership has taken the world stage by storm and it looks forward with vision and determination to a fully developed nation status by year 2020.

Today, they have 11 major titles in our stable; information vehicles that meet the numerous niches and market segments in a society growing in affluence and sophistication. Over 478,000 copies of our daily newspapers are bought every day. At an estimated average of four adult readers per copy (above the age of 15 yrs), our newspapers have a reach of 1.9 million daily. This is a figure which is only exceeded by our Sunday newspapers which soar above 665,745 copies nationwide. That's nearly 2.66 million potential consumers every Sunday. [13]

2.4.2.2 The Nanyang Press Holdings Bhd (NPHB) Group

The Nanyang Press Holdings Bhd (NPHB) Group has become the largest Chinese language publisher in Malaysia. NPHB had started out as the advertising and distribution agent of Nanyang Siang Pau, a Chinese language newspaper, with the installation of its onion which are The China Press Bhd and Life Publishers Bhd (LPB) in 1993.

All in, the Group now publishes a total of 14 periodicals and two Chinese daily newspapers (Nanyang Siang Pau and China Press) in Malaysia. Nanyang Siang Pau is the flagship of the Group with a circulation of 187,458 copies daily. [28]

2.4.3 Magazine's Company

2.4.3.1 Golf (Malaysia) Publication Sdn Bhd

With over 19 years of publishing experience on the Malaysian golf scene, Golf Malaysia is your most reliable guide to golfing in the region. They cover all major golfing events around the world, the latest developments in golf, features, reviews, instructions and much more. [14]

2.4.3.2 Kumpulan Karangraf Sdn Bhd

Kumpulan Karangkraf Sdn Bhd (KKSB) Kumpulan Karangkraf Sdn Bhd was organized in year 1977 with 23 years of publishing experience. Now, it is is among the biggest publisher in Malaysia. Now, there are 14 magazines being published emphasize on different issues and acpects. KKSB involve in the whole publication activity from generating idea to marketing and delivery. KKSB's branches are Ultimate Concepts Sdn Bhd, Ultimate Print Sdn Bhd, Media Network Sdn Bhd and Alaf 21 Sdn Bhd which playing respective roles in publication. Besides, KKSB also focuses on the interest of different age of reader. It also provides editorial service for customer. [15]

2.4.3.3 Chip Computer and Communication

CHIP is an integrated media comprising a magazine, an interactive CD-ROM and Online content, specially designed to meet the computing and computing and communication needs of discerning PC users of today and tomorrow, in Singapore and Malaysia. These publications serve either the beginner level at the lower end of

the market or the IT professionals and the enterprises at the upper end. There is no magazine that caters to readers in between these two levels. CHIP Singapore and Malaysia is specifically positioned to cater to the computing and communications needs of these readers. [16]

2.5 Web Database

2.5.1 Definition

A web database is a database that

- Sets up, managed and use through the Web
- Has the look and feel of a web based application
- Conforms to the informal standards of Web services such as search syntax, navigation principles.
- Integrates well with other Internet services such as email, chat or videoconferencing.
- Uses hyperlink to point to information within itself and the outside world.[26]

2.5.2 Architecture of Web Database

The process of getting a full-fledged database on the Web requires three essential components that are often referred as the "Trinity": A database, a Web server, and an application server to glue everything together. As Figure 2.5 shows, there are interfaces between all three possible pairs as well as the interaction between all three components. These gray areas are where Web database technology lives.

A typical Web database project will involve a relational database. This makes life easier for the designer since most of these can be accessed using a standardized protocol (ODBC) and a common language (SQL).

Structured Query Language, or SQL, is a query language for databases that evolved out of the pioneering work by Dr. E. F. Codd at IBM in the early 1970s. Virtually all commercial (relational) database products understand SQL, though most also have their own special dialects. This means that for the most part, database

queries developed for use with a particular database are portable from one product or tool to another. This means that you will rarely spend time learning proprietary languages for use with Web databases, but it also means that SQL code developed by a programmer using a desktop database (such as Microsoft Access) can be used on the production system running a high-end database (such as Oracle) with virtually no changes. While SQL provides a common syntax for query building, there still needs to be a protocol that can take that standard syntax and translate it into the native procedure calls to actually perform the query. The Open Database Connectivity (ODBC) standard provides an abstraction layer between the application interface and the database, which effectively hides the differences and peculiarities of each specific database. [25]

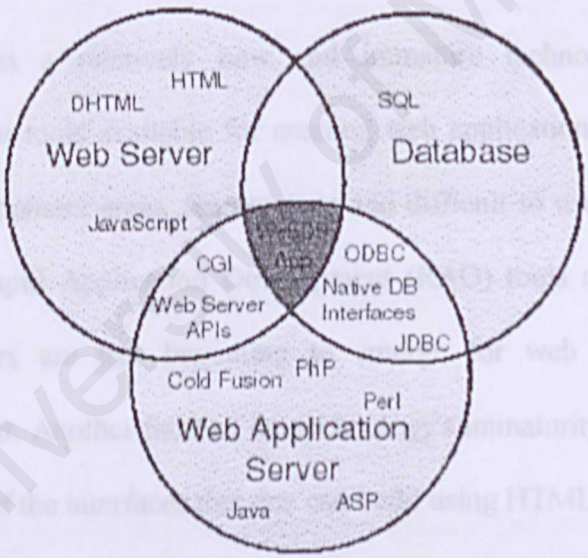


Figure 2.5 : The Trinity

2.5.3 Advantages and Disadvantages of Web Database

2.5.3.1 Advantages

- Easy updating from a previously designed WWW page, by an authorised person no matter where he or she is located.
- Provides the basis for 'dynamic' WWW pages in the sense that the information in an updated online database can be made immediately available to those accessing the WWW.
- The fact that the online database can be updated means that there is no need to amend and republish the WWW pages which display the data. It is a way of publishing on the WWW without any expertise being required.

2.5.3.2 Disadvantages

- The web is a relatively new and immature technology, and so the development tools available for creating web applications are, compared to other development areas, feature-poor and difficult to use. For example, the types of Rapid Application Development (RAD) tools available to C/C++ programmers are just beginning to emerge for web and Java® based development. Another facet of the technology's immaturity is reflected in the simplicity of the interfaces that one can build using HTML forms. Developers are limited to a small set of graphical widgets for use in presenting a user interface.
- Web-based applications can require a high investment in software, as well as maintenance costs for the software and personnel for software administration. [27]

2.6 Current Available System Analysis

2.6.1 Amazon.com

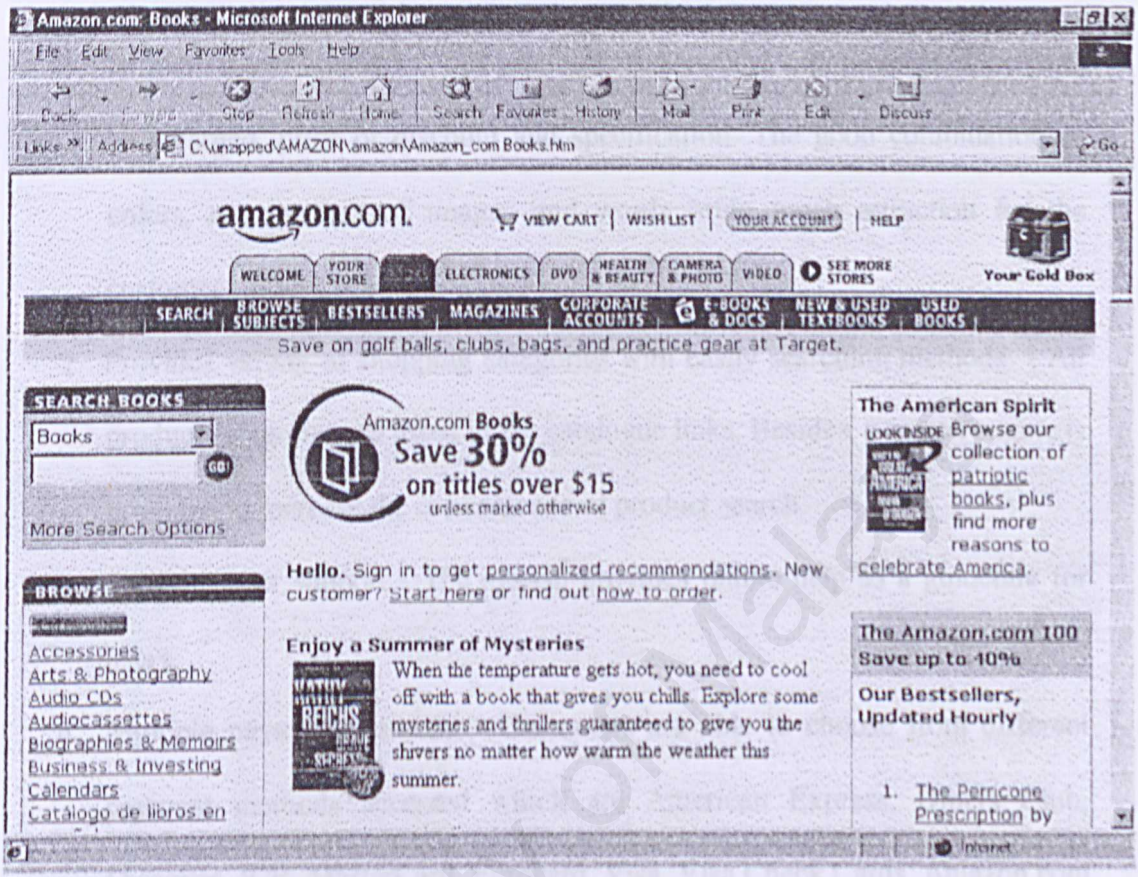


Figure 2.6 : Amazon.com

2.6.1.1 Description

It is an e-commerce application, which provides a comprehensive function for book shopping where a wide range and categories of books are provided for international user. It also provides a search engine for book search. Amazon.com is an international e-commerce application which provides a comprehensive function for the Internet user to do on-line shopping over a wide range of product's categories, which are books, software, DVD, music, electronics, kitchen and house wares.

2.6.1.2 Analysis and Synthesis

i) Strength

1. Attractive user interfaces - All products are provided with pictures, which can be enlarged, price or discount and specification. The good combination of colors, arrangement of images and words bring much attraction for the customers to visit it again.
2. Provides variety of shopping categories with easily searching methods - All product categories are listed in the catalogue links. Besides, a search engine is provided to increase the convenience of product search.
3. Provides user support - The system provides online help as a guideline for users.
4. Multiple payment methods – Customers are able to choose from different payment methods accepted which are American Express, Diners Club, Discover, JCB, MasterCard, Eurocard, Visa, Visa Check Cards, Amazon.com gift certificates, and checks, money orders, or cashier's checks denominated in U.S. dollars and drawn on a U.S. bank.
5. High security over confidential information – The security protection of customers' information during transmission is done by using Secure Sockets Layer (SSL) software, which encrypts information.
6. Available in varies languages such as English, France, Germany and Canada.

ii) Weaknesses

1. Delivery Restriction – Not all products are able to be shipped to all geographical locations. Long delivery journey may destroy the goods.

2. Payment Restriction – It is highly expensive for customers in most countries who need to pay in U.S. dollars.

2.6.2 Barbes & Noble.com (www.bn.com)

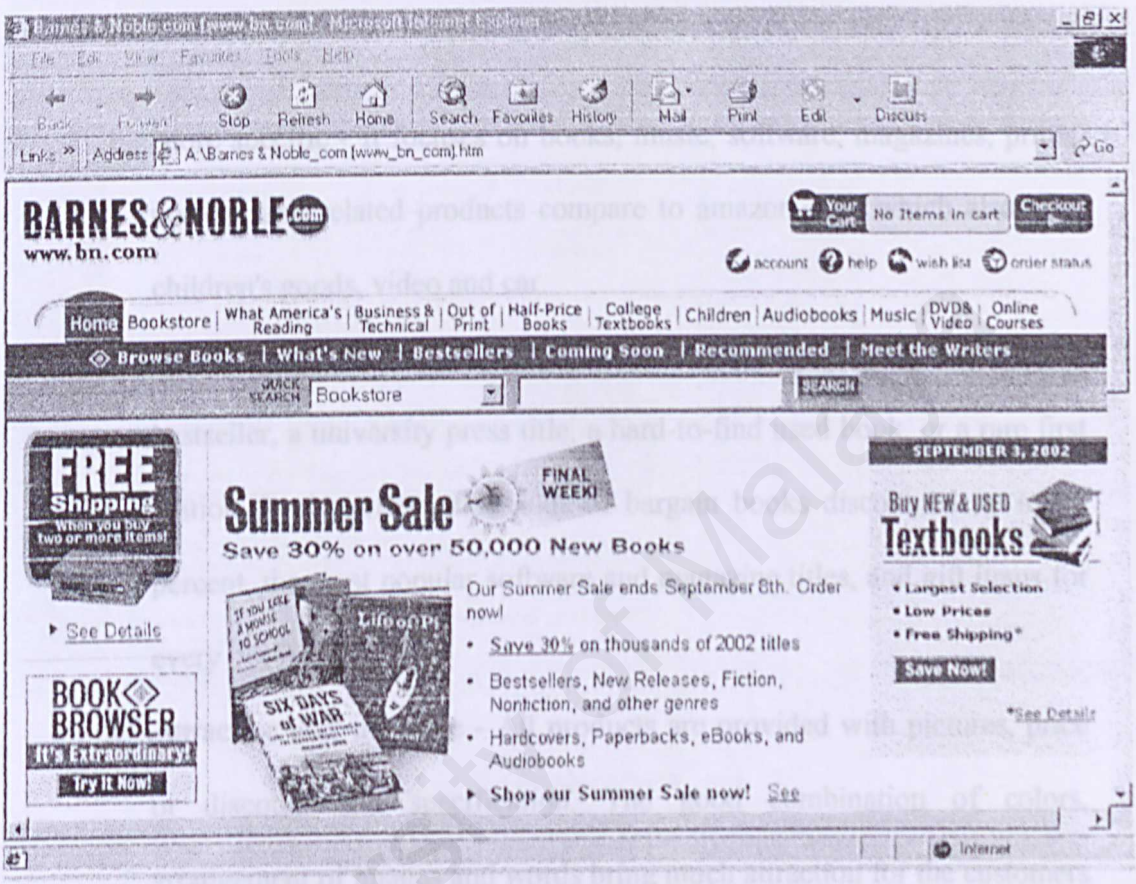


Figure 2.7 : Barbes & Noble.com

2.6.2.1 Description

Since launching its online business in March 1997, Barnes & Noble.com (Nasdaq: BNBN) has become one of the world's largest web sites and the fourth largest e-commerce retailer, according to Media Metrix. Focused largely on the sale of books, music, software, magazines, prints, posters, and related products, the company has capitalized on the recognized brand value of the Barnes & Noble name

to become the second largest, and one of the fastest growing, online distributors of books.

2.6.2.2 Analysis and Synthesis

i) Strength

1. More specific - It focuses on books, music, software, magazines, prints, posters, and related products compare to amazon.com, which also sells children's goods, video and car.
2. Provides more variety of choices - The user is able to look for the latest bestseller, a university press title, a hard-to-find used book, or a rare first edition. It also offers thousands of bargain books discounted up to 91 percent, the most popular software and magazine titles, and gift items for every occasion.
3. Attractive user interface - All products are provided with pictures, price or discount and specification. The good combination of colors, arrangement of images and words bring much attraction for the customers to visit it again.

ii) Weaknesses

1. Payment Restriction - It is highly expensive for customers in most countries who need to pay in U.S. dollars.

2.6.3 Bookmallusa.com

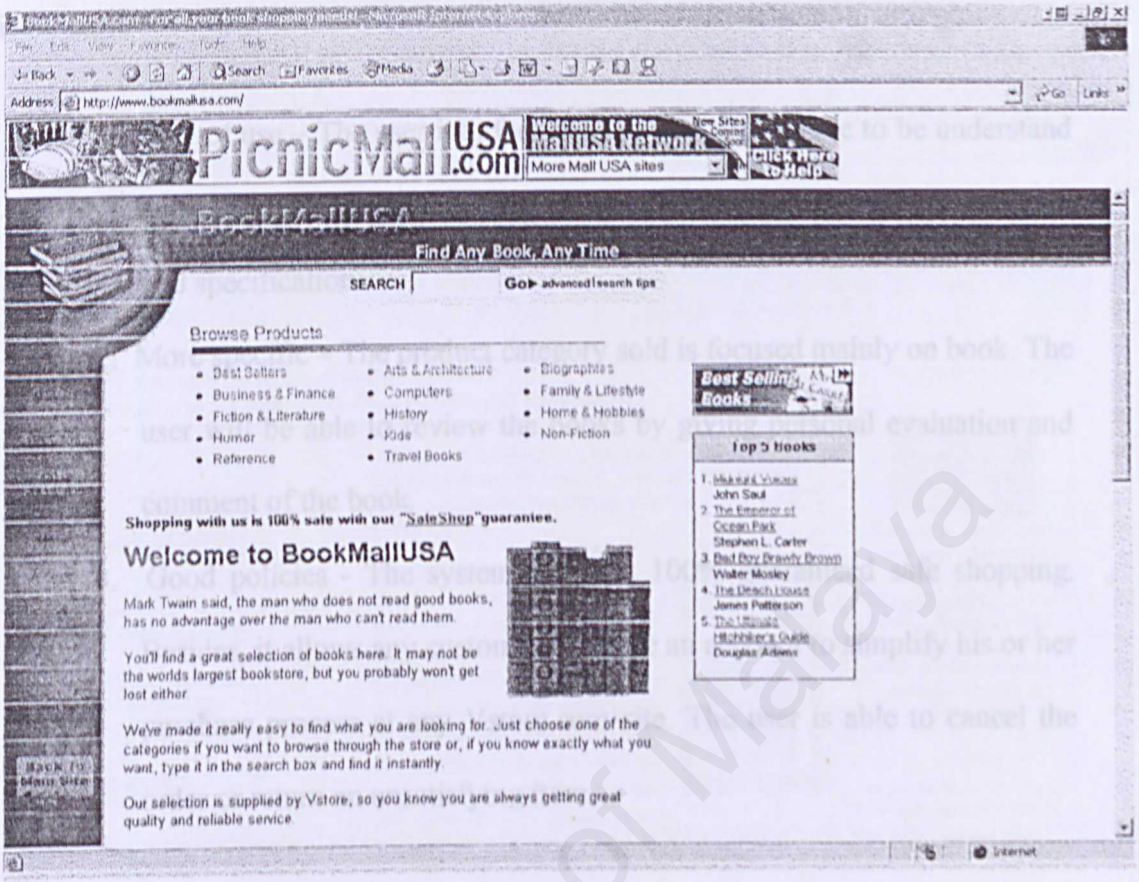


Figure 2.8 : Bookmallusa.com

2.6.3.1 Definition

BookMallUSA a simple online shopping for books and information application provided for customers in USA. It provides a search engine to simplify the book search. It aims to make the online shopping experience as easy and simple as possible.

2.6.3.2 Analysis and Synthesis

i) Strength

1. Ease of use – The user interface used is easy and simple to be understand and used by a new user. Each product is provided with a picture, price and specification.
2. More specific – The product category sold is focused mainly on book. The user will be able to review the books by giving personal evaluation and comment of the book.
3. Good policies - The system provides 100% guaranteed safe shopping. Besides, it allows any customer to create an account to simplify his or her purchase process at any Vstore.com site. The user is able to cancel the order or return an unsatisfying item.

ii) Weaknesses

1. Unattractive interfaces – This site is lack of good combination of colors or other images which make the user feels bored.
2. Limited payment methods – The system only accepts major credit cards such as: Discover Card, Visa, MasterCard, and American Express.

2.6.4 ArthursBooks.com

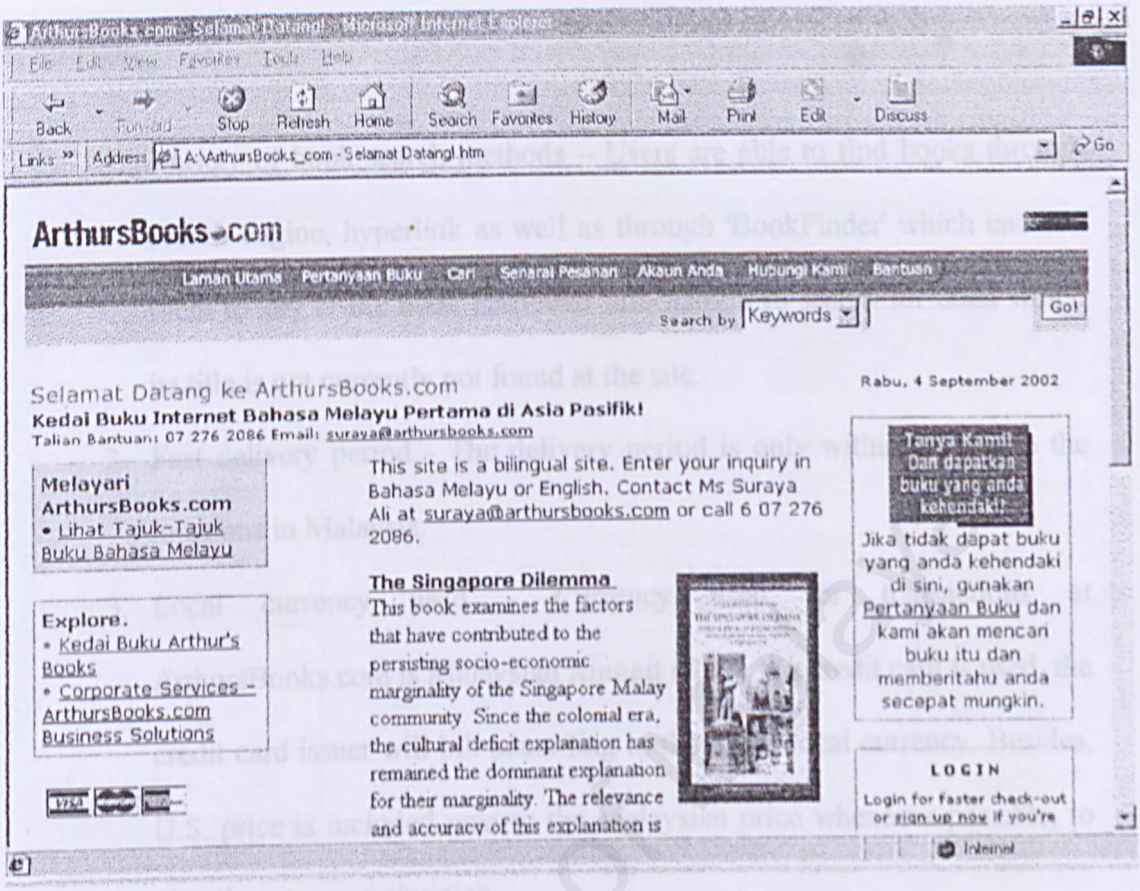


Figure 2.9 : ArthursBooks.com

2.6.4.1 Definition

ArthursBooks.com is an online retailer of books and other information products. The site offers a collection of Asia-published titles as well as titles from around the globe. ArthursBooks.com is in cooperation with Spiral Creation Sdn Bhd, which manages Arthur's Books retail stores in Malaysia.

2.6.4.2 Analysis and Synthesis

i) Strength

1. Variety of book search methods – Users are able to find books through search engine, hyperlink as well as through 'BookFinder' which enabled them to key in the book particular information to search for book which its title is not currently not found at the site.
2. Fast delivery period - The delivery period is only within 3 days to the locations in Malaysia.
3. Local currency used - Currency used for transactions at ArthursBooks.com is Malaysian Ringgit (RM). If a credit card is used, the credit card issuer will bill according to the user's local currency. Besides, U.S. price is included next to the Malaysian price whenever possible, to give the user an estimation.

ii) Weaknesses

1. Unattractive interface – This site is lack of good combination of colors and the color used is not attractive which make the site looked dull.
2. Poor catalogue presentation- The arrangement of the book specification in catalogue is not easily read.

2.6.5 Pelangibooks.com

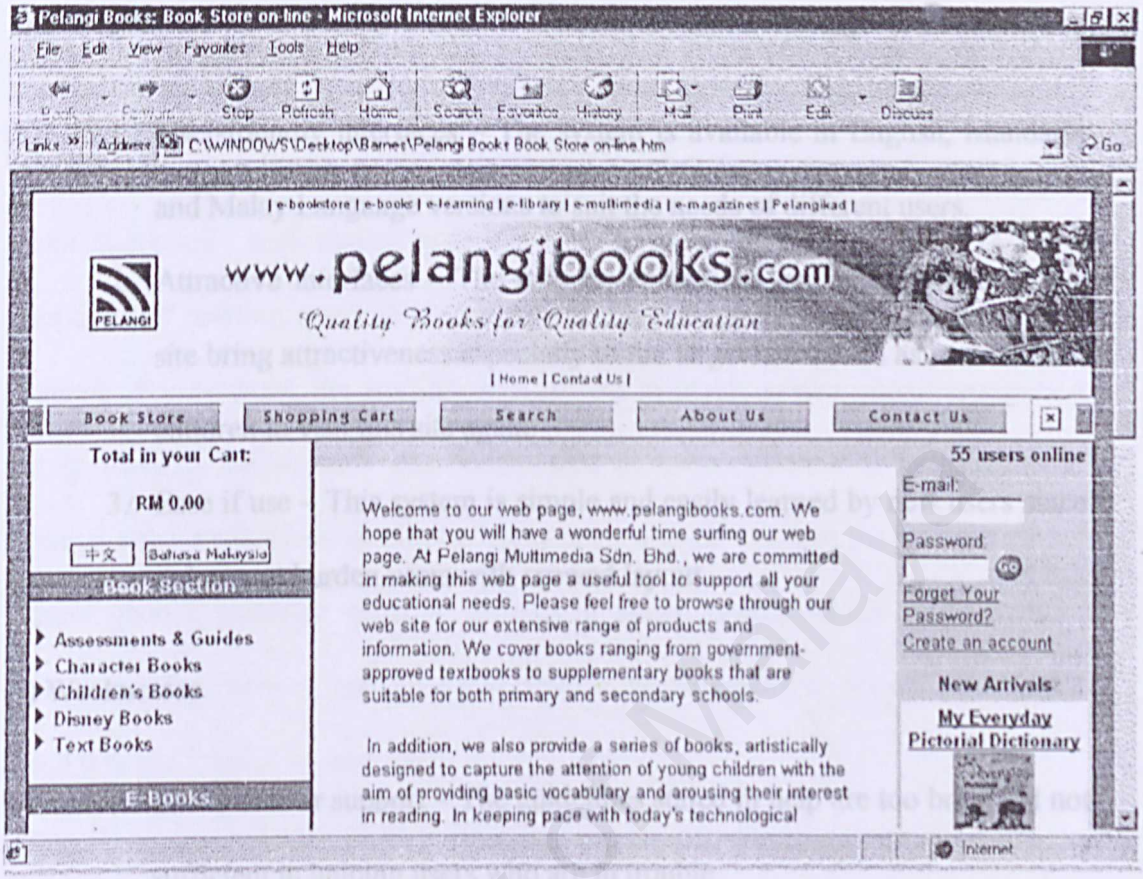


Figure 2.10 : Pelangibooks.com

2.6.5.1 Definition

Pelangibooks.com is an on-line retailer of books and other information products which publishes a wide range of books and materials for different markets and readerships, up-to-date information on Children's Books, School Books, College Books, and General Books.

2.6.5.2 Analysis and Synthesis

i) Strength

1. User-friendly interfaces – The system is available in English, Mandarin and Malay Language versions to suit the needs of different users.
2. Attractive interfaces – The colorful animations and images used in this site bring attractiveness especially to the target users such as students and children to visit this site again.
3. Ease if use – This system is simple and easily learned by new users since it does not burden users with crowed layout.

ii) Weaknesses

1. Lacks of user support – The guidelines stated in help are too brief and not sufficient in helping users who are in trouble.
2. No prompt error messages – When the users input is inaccurate, the system does not have scripting language that informs users as regards to the error(s) on the sport

2.7 Summery

The e-commerce and m-commerce's history, categories and scope as well as WAP technology have been discussed. It is important to understand the basic of the relevant topics. Moreover, the characteristics of different types of client/server architectures have been studied to define the best choice for the system. Besides, the overviews of reading material publishers have been done to define the marketing strategy. Furthermore, the analysis of 5 current available systems has been carried out to identify the strength and weaknesses of each system. It is essential to overcome the weaknesses of current systems as well as to adapt the strength of the current good systems in order to develop a better system which contains more attractive and consistent interfaces and contains better catalogue presentation which made it easily learned by new users.

Chapter 3 Methodology and System Analysis

3.1 Introduction

The development of a project requires the process of planning before the project implementation to ensure that such a project is under the control of the developer. A careful planning and analysis can avoid the problem such as overrun, time delay and incorrect system requirement of a project.

3.2 Project Development Strategy

3.2.1 Methodology

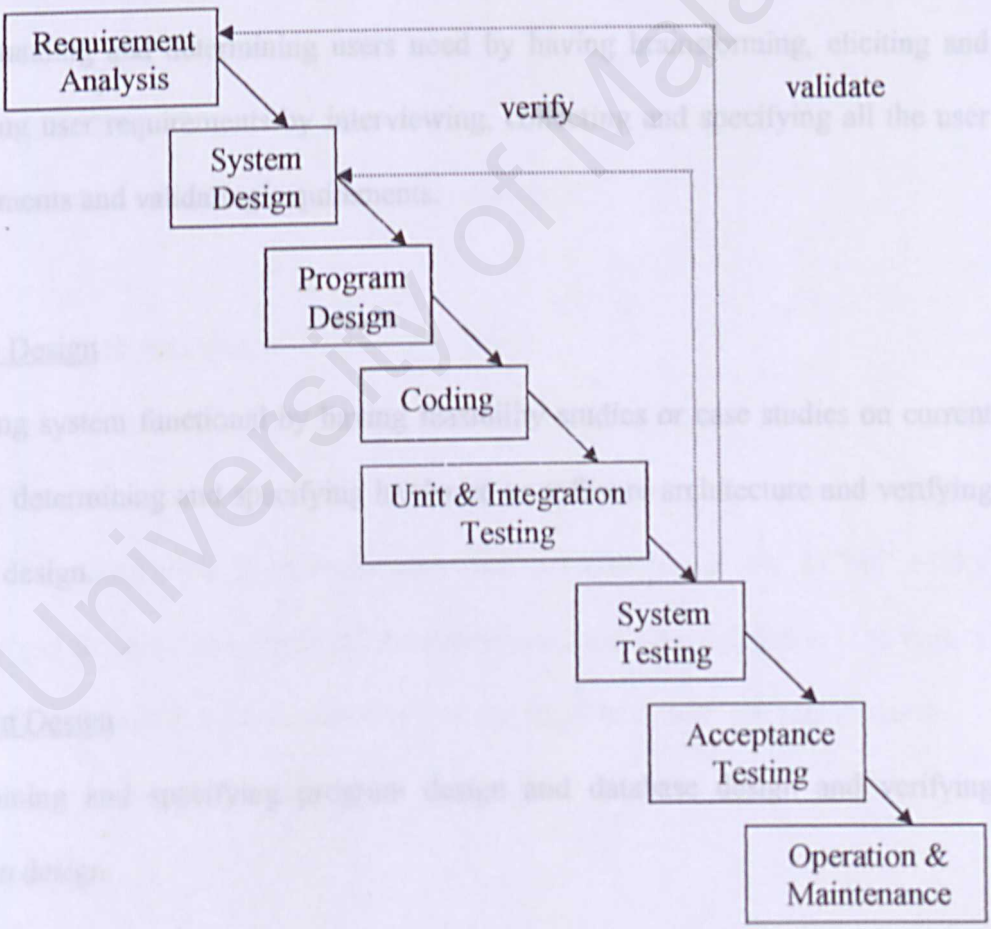


Figure 3.1: The Waterfall Model

Waterfall model is a life-cycle model demands a systematic, sequential approach to software development that begins at the customer's software requirements and progresses through requirement analysis, design, implementation and unit testing, integration and system testing and operation and maintenance. It is considered an ideal choice when the user's software requirements are clearly stated at the inception of the project.

Waterfall Model is consists of eight stages, each development stage should be completed before the next begins. The eight stages are:

Requirement Analysis

Understanding and determining users need by having brainstorming, eliciting and analyzing user requirements by interviewing, collecting and specifying all the user requirements and validating requirements.

System Design

Outlining system functional by having feasibility studies or case studies on current system, determining and specifying hardware or software architecture and verifying system design.

Program Design

Determining and specifying program design and database design and verifying program design.

Coding

Involve programming, personal planning, tool acquisition, database development, component level documentation and programming management.

Unit and Integration Testing

Test units separately and integrate the tested units. Then, test on the integrated units.

System Testing

Combining all the integrated units into a system. Testing on the system. Specifying, reviewing and updating of the system test and validating of system.

Acceptance Testing

Testing on system completed. The system is delivered.

Operation and Maintenance

Control and maintain the system as well as revalidate the system.

The system has to be validated and verified during the stage of system testing. The verification is to make sure that the function in the ECMC works correctly and to check the quality of the implementation. The validation is to ensure that ECMC project has been implemented all the requirements in the specification.

3.2.2 Methodology's Advantages

The Waterfall Model has been chosen because:

- It ensures a consistent, systematic and standard system to be developed which meets the user requirement and scope.
- Each phase of development proceeds in strict order, without any overlapping or iterative steps.[19]
- In general, the model is transparent and easy to understand.
- It ensures a system which has many uncertainties in the earlier stages to be developed successfully through the staging process.
- It ensures that developers build the right system according to the specification and verification of the system.

3.3 System Analysis

3.3.1 Techniques Used To Define Requirements

Effective and appropriate techniques must be used to define and elicit users' requirements. Research methods that usually used are internet research, library research, interview and survey.

3.3.1.1 Library Research

Library Research is an important method to gain information from books related to this system to have a deeper understanding on the system design and how it is implemented effectively using web-based and WAP technology.

3.3.1.2 Interviewing

A few interview sessions had been conduct with internet and WAP application users and developer to have a grasp on the features of a good application and a clearer view to produce a more effective commerce system. A system needs attractive interfaces, least system failure and flexible accessible method. Some helpful despondences have given some precious advices and suggestions to produce a better system.

3.3.1.3 Internet Surfing

Internet surfing is one of the method to gain deeper understanding about web-based and WAP technologies. Through the Internet, some good ideas that related to the technology aspect had been collected as a guideline for system analysis. The Internet also provides the accessibility to relevant current systems which enable the analysis and comparison between systems to identify their strength and weaknesses.

Besides, the techniques on how to use the development technologies and tools can be found in the Internet.

3.3.1.4 Reading Books

Reading books that are related to e-commerce and WAP technology is important in order to pick up sufficient skills for system design and implementation. The information on the development has been gathered and highlight for reference. The relevant information such as the concept, application technology and programming language and tool can be found in the books.

3.3.2 System Requirements

3.3.2.1 Functional Requirements

The functional requirements describe the functionalities or services that a system is expected to provide. It depends on the type of software and the type of system which is being developed. The functional requirements for this system are stated as below:

1. **Process the registration of new user**

When a user wants to involve making purchase order on this system, a user name and password is needed for authentication, therefore a non-member needs to register as a member. The user's particular information will be store in the system.

2. **Update/Delete/Add catalogue information**

The product information stated in the system's catalogue is prone to changes and therefore the system enables the administrator to add, delete and modify the catalogue information.

3. **Handle the purchase order process**

This system enables the user to pick and drop the product on the shopping cart and keep on shopping. The system also performs total price calculation and generates a unique reference number for each request order after the user has made a purchase order confirmation.

4. **Update personal information**

The system will provide the function of the user to change or update personal information and password.

5. **Display purchase order status**

The user can view the purchase order status which is being updated from one stage to another.

6. **Update purchase order status**

The administrator should be able to view and change status of purchase orders.

7. Generate Report

The system will be able to generate the statistics of reading material order made by customers within a period.

8. Provide Help

It contains guidelines for users on how to use the system.

9. User Authentication

Whenever the user wants to login or entering into the restricted area, the system is able to perform authentication and give different access view for different type of users. For example, the normal user will be restricted from viewing the administrator menu. Whenever a user has signed in, the system is able to keep track the authorized user's identity. Besides, the system is able to handle logout function.

3.3.2.2 Non-functional Requirements

Non-functional specifications are the constraints under which a system must operate and the standards which must be met by the delivered system. [24] This commerce application system must ensures certain web application qualities like reliability, ease of use, accuracy and flexibility,

1. Flexibility

For this application, flexibility of the system is stressed on multiple accessibilities. The system is able to receive user request from multi-method. For example, a user can make a purchase order from an on-line computer; the order

status can be checked by using other device such as PDA or hand phone. This is indeed the strength of the technology used in developing this system.

2. **Ease of use**

User interfaces design creates an effective communication medium between a human and a computer. Therefore, it is very important to make sure that the interfaces fulfill user-friendliness so that it would not cause trouble to users. It is achieved by

Making the interface consistent

The interface design should apply to consistent fashion where all visual information must be organized according to a design standard that is maintained throughout all screen displays. Apart from that, input mechanisms are constrained to a limited set that are used consistently throughout the application. Lastly, mechanisms for navigating from task to task are consistently defined and implemented.

3. **Accuracy**

The system should be able to perform an accurate result on the product price being calculated and displayed. Besides, the updated information must also perform correctly. Accuracy is the degree to which the software performs its required function. To ensure this application quality, lots of testing and trial-and-errors will be carried out.

4. **Reliability**

Reliability is the extent to which a program can be expected to perform its intended function with required precision. It is closely related to correct link processing, user input validation and form completeness checking.

3.3.3 Technology and Project Development Tools Analysis

3.3.3.1 Server Side Scripting

1. **PHP**

PHP (Hypertext Preprocessor) is an open-source server-side, HTML embedded scripting language used to create dynamic Web pages for e-commerce and other Web applications. In an HTML document, PHP script (similar syntax to that of Perl or C) is enclosed within special PHP tags. Because PHP is embedded within tags, the author can jump between HTML and PHP (similar to ASP and Cold Fusion) instead of having to rely on heavy amounts of code to output HTML. And, because PHP is executed on the server, the client cannot view the PHP code. [18]

2. **JSP**

JSP stands for Java Server Page. JSP is a Java technology that affords dynamical content and various functionalities to static web pages such as regular HTML or XML pages. JSP provides a number of server-side tags that allow developers to perform most dynamic content operations. So developers who are only familiar with scripting, or even those who are simply HTML designers, can use JSP tags for generating simple output. Advanced Java developers can also use the tags, or they can use the full

Java language if they want to perform advanced operations in JSP pages. [21]

3. ASP

An Active Server Page (ASP) is an HTML page that includes one or more scripts (small embedded programs) that are processed on a Microsoft Web server before the page is sent to the user. An ASP is somewhat similar to a server-side include or a common gateway interface (CGI) application in that all involve programs that run on the server, usually tailoring a page for the user. Typically, the script in the Web page at the server uses input received as the result of the user's request for the page to access data from a database and then builds or customizes the page on the fly before sending it to the requestor. [22]

3.3.3.2 Client Side Scripting

1. JavaScript

JavaScript is a scripting language developed by Netscape to enable web authors to design interactive sites. JavaScript is different from Java. Although it shares many of the features and structures of the full Java language, it was developed independently. JavaScript can interact with HTML source code to enable web authors to spice up their sites with dynamic content. JavaScript is endorsed by a number of software companies and is an *open* language that anyone can use without purchasing a license. It is supported by recent browsers from Netscape and Microsoft, though Internet Explorer supports only a subset, which Microsoft calls Jscript.

2. **VBScript**

VBScript is one of the members of Microsoft Visual Basic family. It is a scripting language that inherits from Visual Basic and embedded inside the Hypertext Markup Language (HTML) to perform such a function in web application. The structure of a VBScript program is similar to the Visual Basic application program. The major difference between Visual Basic application and VBScript is the dangerous operation that can be done in Visual Basic have been removed from VBScript, including the capability to access dynamic link library directly and to access the file system on the client machine.

3.3.3.3 Web Database

1. **MySQL**

MySQL is the world's most popular Open Source Database, designed for speed, power and precision in mission critical, heavy load use. Open Source means that it is possible for anyone to use and modify. Anybody can download MySQL from the Internet and use it without paying anything. Anybody can study the source code and change it to fit their needs. MySQL AB is the company that develops, supports and markets the MySQL database server globally. [4]

2. **BizDB**

BizDB is a flexible, easy-to-use, all-in-one Web database software with built-in image support, search engine and online reporting functions. With its powerful Add-Ons (optional) and Html template driven data management facilities, most users can setup their first online database within days. BizDB is

proved to be most suitable to Webmasters and Web design professionals who have the basic knowledge of Html language but no Perl CGI programming experience. [6]

3. Microsoft SQL Server

Microsoft SQL Server 7.0 is a single process, multithreaded relational database server primarily intent for transactional processing. It is based on the client/server architecture, which divides processing into two components: a front-end, or client component, that run on a local workstation and a back-end, or server component that runs on a remote computer.

SQL Server 2000 offers a complete database and analysis solution for rapidly delivering the next generation of scalable Web applications. As a core component of Microsoft Windows DNA, it dramatically reduces the time required to bring e-commerce, line-of-business, and data warehousing applications to market. SQL Server 2000 includes rich support for XML and HTTP and also takes full advantage of Microsoft Windows 2000, including support for Microsoft Active Directory. [24]

4. Oracle

Oracle is a multi-user database. It provides unprecedented ease-of-user and is pre-tuned and pre-configured for today's dynamic workgroup and line-of-bus environment.

Oracle includes a fully integrated set of easy-to-use management tools, full distribution, replication and web features. Oracle also provides the highest levels of availability through fast failover, easier management, and zero data loss disaster protection, with Data Guard, the only complete data protection solution available on the market. Oracle can runs on UNIX, Linux and Windows platform. However, it is expensive and separate licenses are required for each of its database engine.

3.3.3.4 Web Server

1. Apache Web Server

Apache is a high-end enterprise-level server developed by a loosely knit group of programmers. The original version of Apache was written for UNIX, but there are now versions that run under OS/2, Windows and other platforms. Apache has become the world's most popular Web server. According to the Netcraft (www.netcraft.com) Web server survey in February, 2001, 60% of all Web sites on the Internet are using Apache (62% including Apache derivatives), making Apache more widely used than all other Web servers combined.[19]

2. Internet Information Server (IIS)

IIS (Internet Information Server) is a group of Internet servers (including a Web or Hypertext Transfer Protocol server and a File Transfer Protocol server) with additional capabilities for Microsoft's Windows NT and Windows 2000 Server operating systems. IIS is Microsoft's entry to compete in the Internet server market that is also addressed by Apache, Sun Microsystems, O'Reilly, and others. With IIS, Microsoft includes a set of programs for building and administering Web sites, a search engine, and support for writing Web-based applications that access databases. Microsoft points out that IIS is tightly integrated with the Windows NT and 2000 Servers in a number of ways, resulting in faster Web page serving. [19]

3. Personal Web Server

PWS, an abbreviation for Personal Web Server, is Microsoft's version of a Web server program for individual PC users who want to share Web pages and other files from their hard drive. PWS is a scaled-down version of Microsoft's more robust Web server, Internet Information Server IIS. PWS can be used with a full-time Internet connection to serve Web pages for a Web site with limited traffic. It can also be used for testing a Web site offline or from a "staging" site before putting it on a main Web site that is exposed to larger traffic. [19]

3.3.3.5 Authoring Tools

1. EditPlus

EditPlus is an Internet-ready 32-bit text editor, HTML editor and programmer's editor for Windows. While it can serve as a good replacement for Notepad, it also offers many powerful features for Web page authors and programmers.

EditPlus supports powerful and customizable syntax highlighting for HTML, CSS, PHP, ASP, Perl, C/C++, Java, JavaScript and VBScript by default.

2. Notepad

Notepad is the world's most versatile HTML editing tool absolutely free when purchase this software: Windows version 2.0 and above.

Notepad has one of the simplest user interfaces of any Internet Web authoring tools. The menus are logically laid out, conforming to all standards in design, so users can understand them before use Notepad.

3. Microsoft Front Page 2000

Microsoft Front Page 2000 is one of the software that comes along with Microsoft Office 2000. It is a tool to create and design web pages, which enable the user, develops a web page in a short time. It has the limited function in use as compare with others web page development tools. Hence, it is a weaker but easier application to use for develops a small-scale project.

3.3.3.6 WML

WML is a tag-based language designed after the model of HTML for Web content. The designers of WML (and its companion scripting language, WMLScript) created an environment that demands less memory and processing power from browsers than HTML and JavaScript. WML also includes features that tailor it for the relatively small display sizes of today's wireless devices. WML and HTML differ in significant ways. Although WML strips some features from HTML and co-opts others, WML also incorporates some powerful programming constructs not found in HTML like variables, tasks, and events. WML implements a stricter tag syntax than HTML and includes a DTD for use with XML parsers.[20]

3.3.3.7 HDML (Handheld Device Markup Language)

HDML is the so-called handheld device markup language that allows users to make their web-site portable. People can view it on their mobile phones, pages and other tiny devices. HDML is the only language that older phones understand.

3.3.3.8 WAP Browser - M3 Gate

M3 Gate is the WAP browser that enables the developers to browse the WAP application. This means that the developers can compile and check their coding errors in the emulator, the only test the application which is free of error by using WAP browser. This is to see the output and the flow of the system.

3.3.3.9 The Nokia WAP Toolkit 1.2

It enables WAP application developers to create complete application without event a handset or access to carrier infrastructure. It makes testing and demonstrating WAP application straightforward and developers can navigate and request URLs on any WAP gateway or any web server on the Internet. In addition, application can be stores and queried directly from the PC file system.

3.3.3.10 Server Platform

1. Windows 2000 Server

Windows 2000 (W2K) is a commercial version of Microsoft's evolving Windows operating system. Previously called Windows NT 5.0, Microsoft emphasizes that Windows 2000 is evolutionary and "Built on NT Technology." Windows 2000 is designed to appeal to small business and professional users as well as to the more technical and larger business market for which the NT was designed. Windows 2000 is reported to be more stable (less apt to crash) than Windows 98/NT systems. A significant new feature is Microsoft's Active Directory, which, among other capabilities, enables a company to set up virtual private networks, to encrypt data locally or on the network, and to give users access to shared files in a consistent way from any network computer. [22]

2. Unix

UNIX (often spelled "Unix" in news media) is an operating system that originated at Bell Labs in 1969 as an interactive time-sharing system. Ken Thompson and Dennis Ritchie are considered the inventors of UNIX. The name (pronounced YEW-nihks) was a pun based on an earlier system, Multics. In 1974, UNIX became the first operating system written in the C language. UNIX has evolved as a kind of large freeware product, with many extensions and new ideas provided in a variety of versions of UNIX by different companies, universities, and individuals. UNIX operating systems are used in widely-sold workstation products from Sun Microsystems, Silicon Graphics, IBM, and a number of other companies. The UNIX environment and the client/server program model were important elements in the development of the Internet and the reshaping of computing as centred in networks rather than in individual computers. Linux, a UNIX derivative available in both "free software" and commercial versions, is increasing in popularity as an alternative to proprietary operating systems.[9]

3. Macintosh

The Macintosh (often called "the Mac"), introduced in 1984 by Apple Computer, was the first widely-sold personal computer with a graphical user interface (GUI). The Mac was designed to provide users with a natural, intuitively understandable, and, in general, "user-friendly" computer interface. Many of the user interface ideas in the Macintosh derived from experiments at the Xerox Parc laboratory in the early 1970s, including the mouse, the use of icons or small visual images to represent objects or actions, the point-and-click

and click-and-drag actions, and a number of window operation ideas. Microsoft was successful in adapting user interface concepts first made popular by the Mac in its first Windows operating system. [22]

3.3.3.11 Server Side Software Requirement

The chosen development tools, platform, web server and database for this ECMC project according to the categories and advantages are:

1. Tools

i) **Server side scripting : *PHP***

- PHP syntax structure borrows heavily from C, making it an easy language to learn for even the novice programmer.
- PHP code can be inserted directly alongside HTML makes the language all the more convenient.
- PHP offers excellent connectivity to most of the common databases (including Oracle, Sybase, MySQL, ODBC and many others).
- PHP is an open source software which can download from the Internet and use it without paying.
- PHP can be implemented on a variety of UNIX platforms, Linux, Windows NT, Windows 95/98 and Windows 2000 alternative to Microsoft's Active Server Page (ASP) technology (which runs only on Microsoft's Windows NT servers).

ii) **Client side scripting : *JavaScript***

- Automatically change a formatted date on a Web page
- Cause a linked-to page to appear in a popup window
- Cause text or a graphic image to change during a mouse rollover

- Supported by both Microsoft and Netscape browsers compare to VBScript which does not supported by Netscape and only best used for intranet Web sites that use the Internet Explorer browser only.

2. Web Database: *MySQL*

- MySQL is a small, compact, easy to use database server, ideal for small and medium sized applications.
- MySQL can be implemented on a variety of UNIX platforms, Linux, Windows NT, Windows 95/98 and Windows 2000.
- MySQL is Open Source Software which is possible for anyone to use and modify or download MySQL from the Internet and use it without paying. Anybody can study the source code and change it to fit their needs.
- MySQL is a relational database management system which stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility.

3. Development Platform: *Windows 98 Second Edition*

Windows 98 Second Edition will be chosen as the platform for software development. This is because it's strength and reliability compares to other platform.

In order for the web server to send files to the WAP emulator in the correct format, the developers need to configure to the MIME types. One of the reasons that the Windows 98 is being chosen is because it is easier to configure

the MIME type by just adding in the "wapmime" registration entries in the directory that being used to test the WAP application.

Besides, there are some extra features that make Windows 98 Second Edition more suitable as the development platform than Window 2000 Server, which are

Features	**Windows 98**	**Windows 2000 Server**
Web Server Ready	Apache and Personal Web Server	IIS and Netscape Enterprise Server
Database	Microsoft Access and MySQL	SQL Server, MySQL, Oracle
Scripting Languages	PHP, ASP, Perl, JavaScript, VBScript, Perl, AWK	PHP, ASP, Perl, JavaScript, VBScript, Perl, AWK

Table 3.1 : Comparison between Windows 98 and 2000

4. Web Server: ***Apache Web Server***

- Apache is a freely available Web server that is distributed under an "open source" license.
- Apache server contains freely distributed source code, and active user support for the server.

5. Authoring Tool: *EditPlus*

- EditPlus contains toolbar allows users to insert common HTML tags quickly and easily. It also supports useful tools such as HTML Color Picker, Character Picker, Table Generator and Object Picker.
- EditPlus supports user-defined tools, help files and keystroke recording files. The output of tool execution can be captured in the Output Window, so that users can double-click the error line to automatically load the file and locate the cursor to that line.
- The cliptext window is collection of text clips for quick and easy access. Users can easily customize them, and can also create on cliptext file. EditPlus contains document template offers a quick start when create a new document.
- EditPlus supports powerful and customizable syntax highlighting for HTML, CSS, PHP, ASP, Perl, C/C++, Java, JavaScript and VBScript by default. User can create their own syntax file to support other programming languages.

6. WAP Development Script: *WML*

The reasons why WML has been chosen but not HDML are

- WML is XML-based, while HDML is not. The main benefit of being XML-based is that a company can use commercially available XML tools to generate, parse and manipulate WML. They can also use XSL/XSLT to construct WML desks from XML meta-languages.
- Another major difference between HDML and WML is that HDML does not allow scripting, while WML allows it's own version of

JavaScript, called WML Script. WML Script allows the programmer to check the validity of user input, generate messages and dialogs and the other device-specific tasks. HDML has the functionality to do most network traffic by performing the task locally.

- HDML does not have a DTD (Document Type Definition) while WML does. As expected, there are also other smaller functionality and syntax difference such as WML's intrinsic events and the ways in which variable are set and pass.

7. WAP Browser- M3 Gate

M3 Gate is being chosen because it contains more features compares to other WAP browser. It is also free and can easily get from the M3 Gate web site. Furthermore, it has many different downloadable skins that can make the browser look nicer. It is very stable software where developers find it very user-friendly and easy to use. Therefore, M3 Gate is being chosen as the WAP browser in process development.

8. The Nokia WAP Toolkit 1.2

The Nokia Toolkit has been chosen because it offers developers a PC environment for creating, testing and demonstrating WAP applications. It includes tools for creating WML and WML Script content, adding WBMP graphics as well as debugging and simulating WAP application on WAP enabled handsets.

3.3.4 Server Side Hardware Requirement

The development of a project requires devices as the backbone. The hardware requirements for ECMC project are stated as below:

Processor Type	:	Intel(R) Pentium(R) 4 CPU
Memory	:	120MB RAM
Network adapters	:	D-Link DWL-650 11 Mbps WLAN Adapter
Optical Drive	:	DVD/CD-ROM drives- Liter- On LTN 486 48X Max
Casing	:	AT/AT Compatible 130
Hard Drive Capacity	:	13.0 GB

3.3.5 Client Side Software & Hardware Requirement

1. E-comerce application

Software

Miscrosoft Internet Explorer or Netscape browser.

Hardware

Processor Type	:	Intel(R) Pentium(R) 4 CPU
Memory	:	120MB RAM
Network adapters	:	D-Link DWL-650 11 Mbps WLAN Adapter
Optical Drive	:	DVD/CD-ROM drives- Liter- On LTN 486 48X Max
Casing	:	AT/AT Compatible 130
Hard Drive Capacity	:	13.0 GB

2. M-commerce application

PDA or hand phone use WAP technology with service provider.

3.4 Summary

The topic of methodology and system analysis has discussed about the methodology used in the development of ECMC project. The methodology chosen for the project is waterfall model. Besides, an analysis has been done on the system requirement, software requirements, hardware requirements, technology and project development tools. The system requirements are analyze from the view of functional requirements and non-functional requirements.

Chapter 4 System Design

4.1 Introduction

System Design is a phase of the waterfall model that the entire system requirements are translated into system characteristics. System design is an important process that ensures the purpose of project development is fulfilled. System design includes the following issues:

- Program Design
- User Interface Design
- Database Design

4.2 Program Design

Flow chart is a graphical representation of process flow on the logic of the data flows in the system which provides a guide for program design.

4.2.1 Flowchart for login module

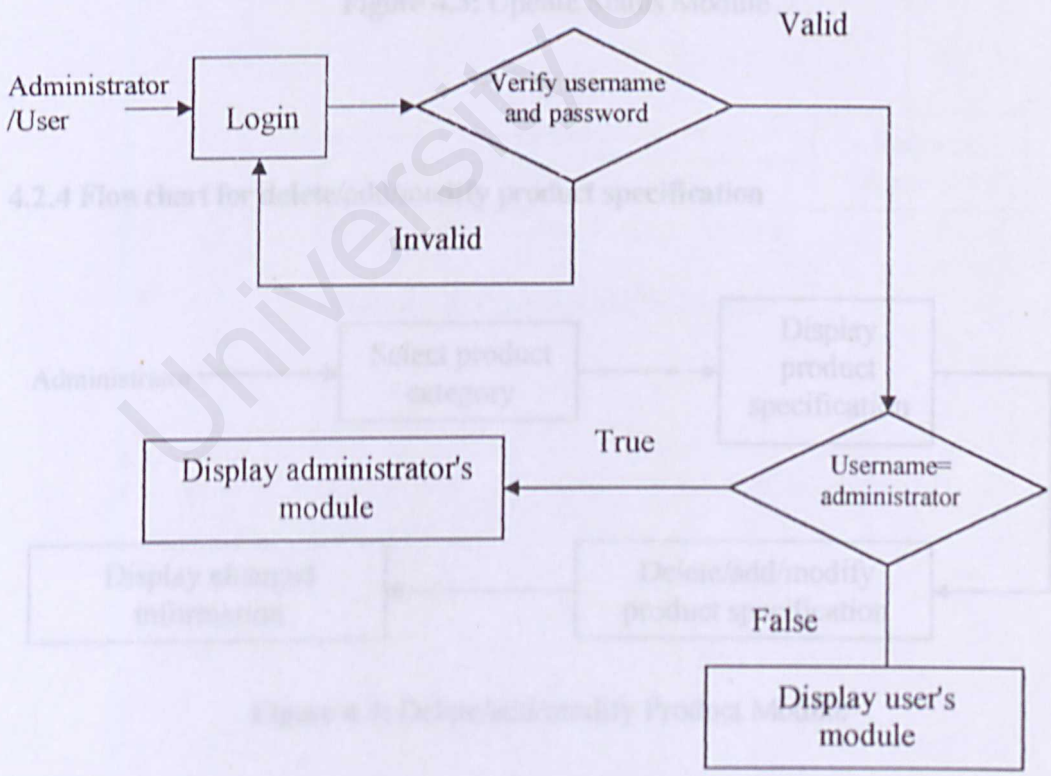


Figure 4.1: Login module

4.2.2 Flowchart for viewing status

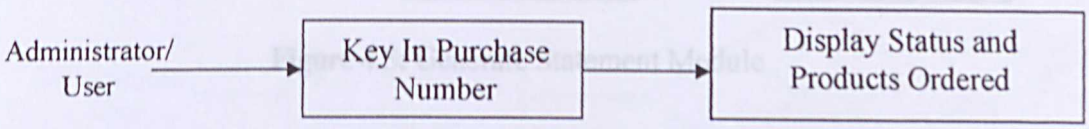


Figure 4.2: View Status Module

4.2.3 Flowchart for updating status

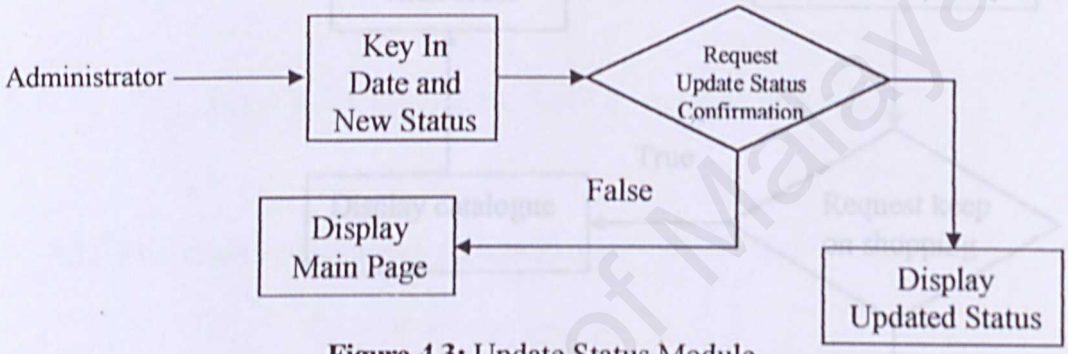


Figure 4.3: Update Status Module

4.2.4 Flowchart for delete/add/modify product specification

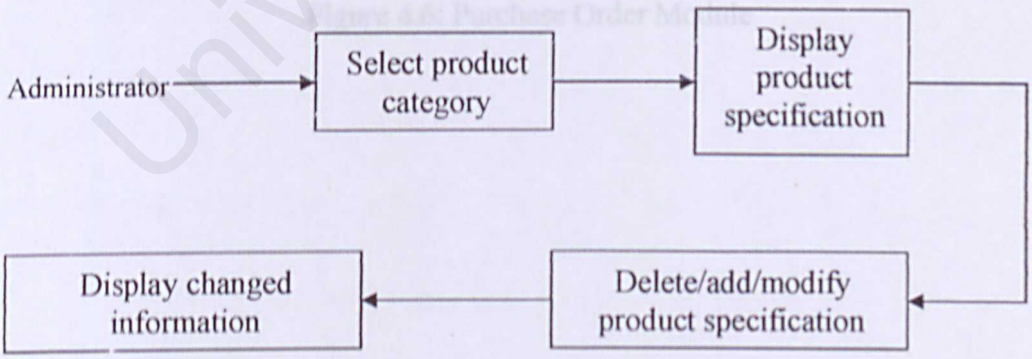


Figure 4.4: Delete/add/modify Product Module

4.2.5 Generate Report

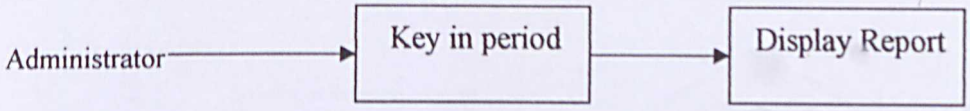


Figure 4.5: Generate Statement Module

4.2.6 Flowchart for making purchase order

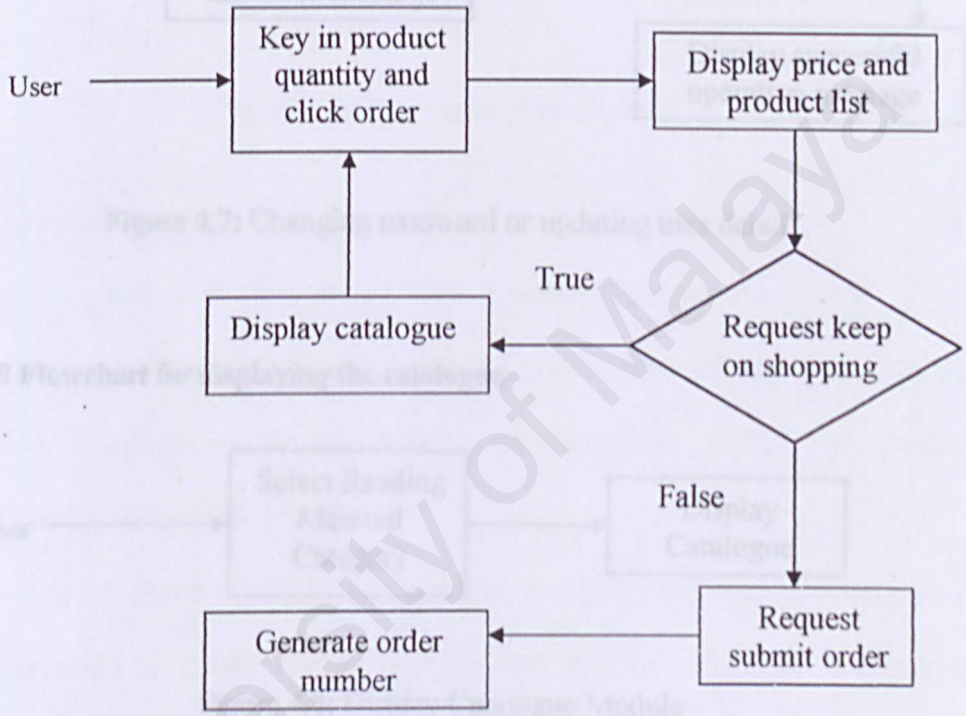


Figure 4.6: Purchase Order Module

4.2.7 Flowchart for changing password or updating user's detail

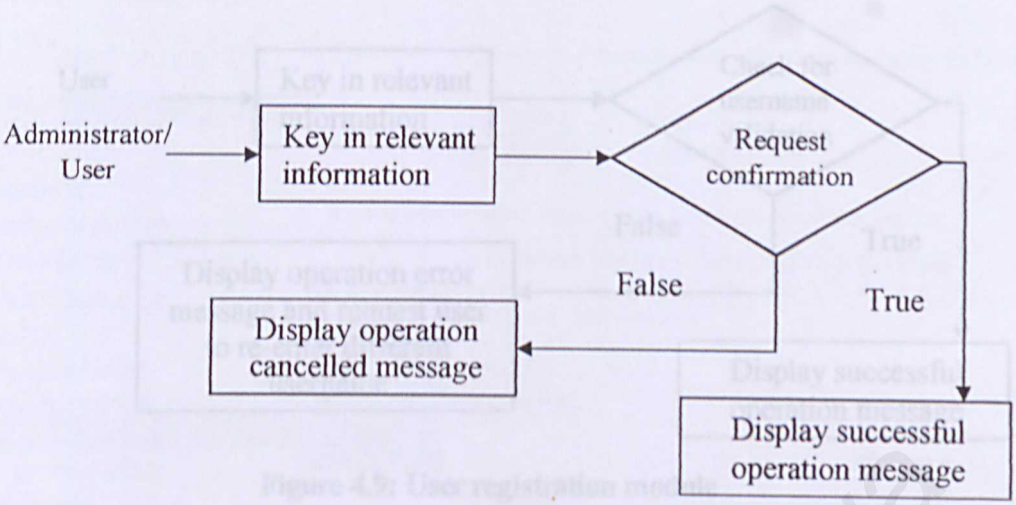


Figure 4.7: Changing password or updating user detail

4.2.8 Flowchart for displaying the catalogue

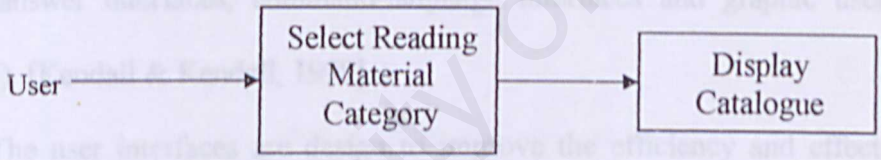


Figure 4.8: Display Catalogue Module

4.2.9 Flowchart for user registration

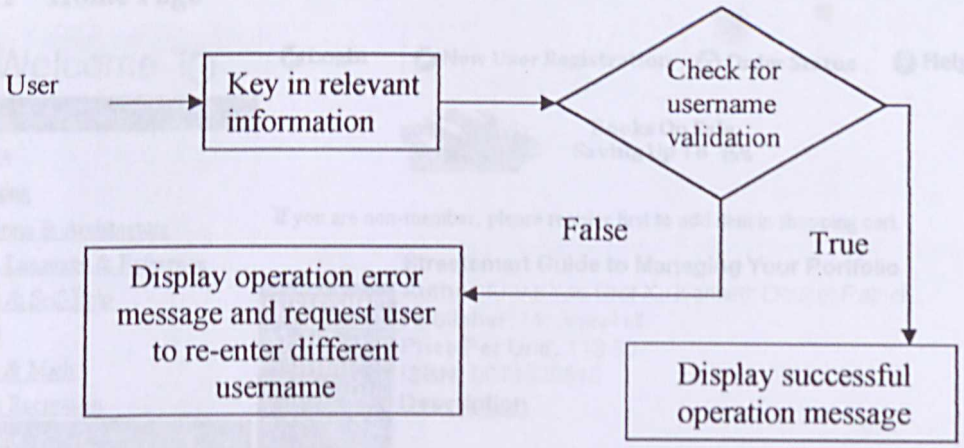


Figure 4.9: User registration module

4.3 User Interface Design

The user interface is the system for most users. There are seven kinds of user interfaces, such as natural language interfaces, menus, form-fill interfaces, question and answer interfaces, command-language interfaces and graphic user interface (GUI). [Kendall & Kendall, 1999]

The user interfaces are design to improve the efficiency and effectiveness of users when using the entire system. Thus, the user interface of ECMC is easy to be used and learned. Users need not remember any complex commands since everything is done at the click of the mouse. So, the interface in ECMC will be designed as attractive as possible in order to convince the customers to visit it and purchase the product of the catalogue.

4.3.1 User interface On E-commerce Application

4.3.1.1 Home Page

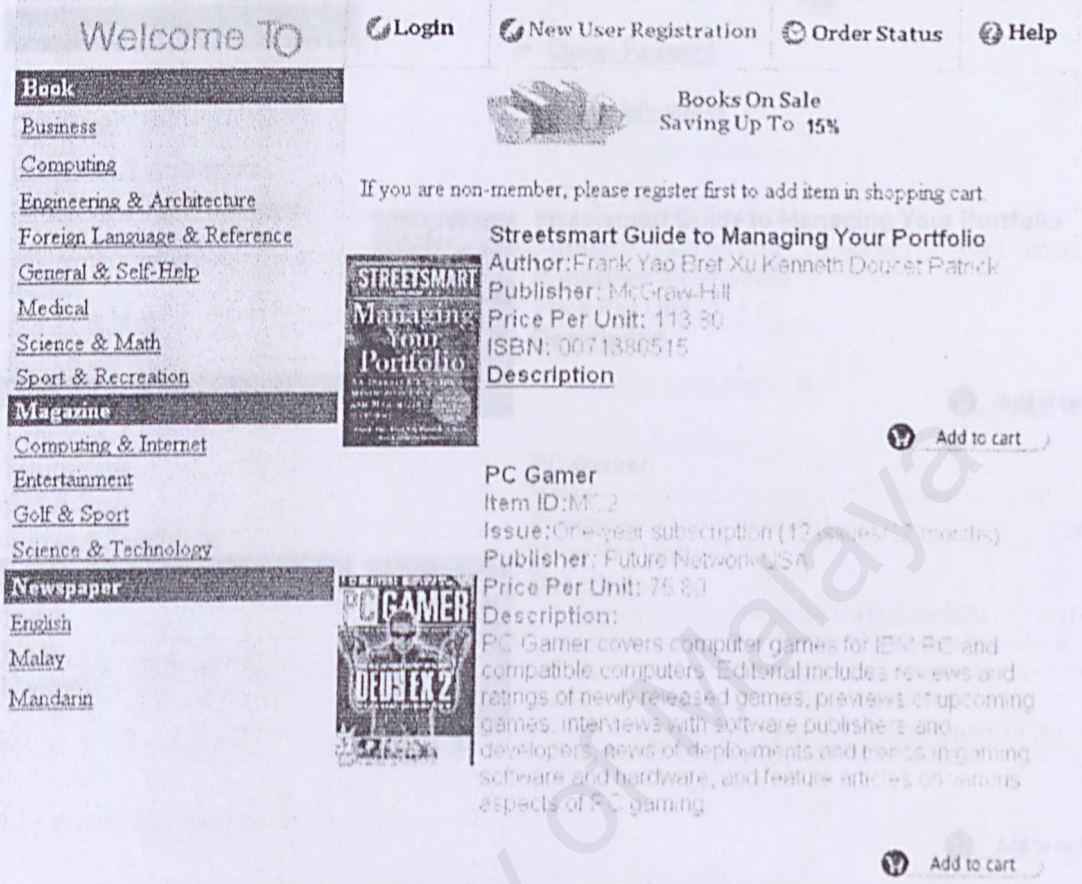


Figure 4.8 : Home

4.3.1.2 User Module Page(After Login)

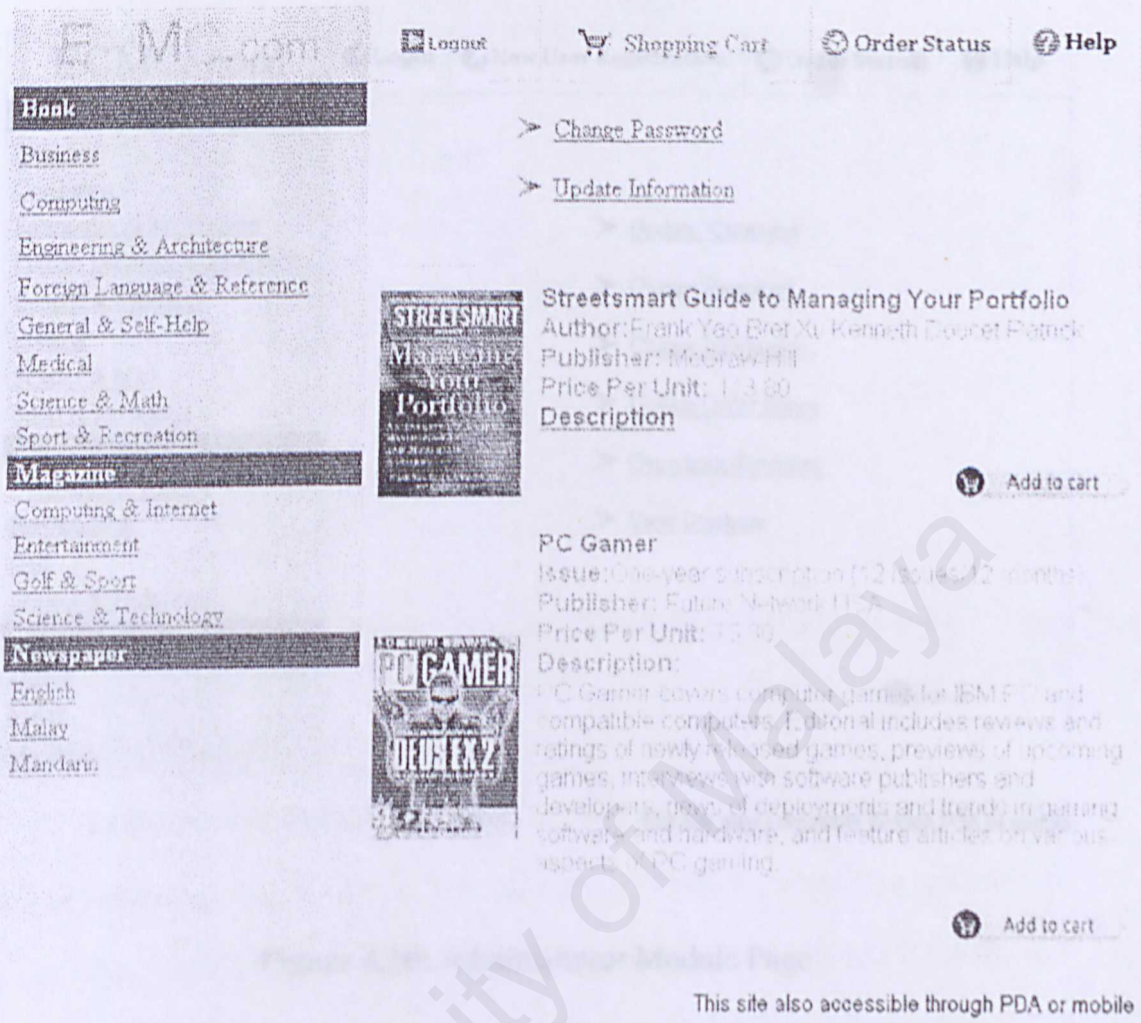


Figure 4.9 : User Module Page

4.2.1.1 Administrator Module Page(After Login)

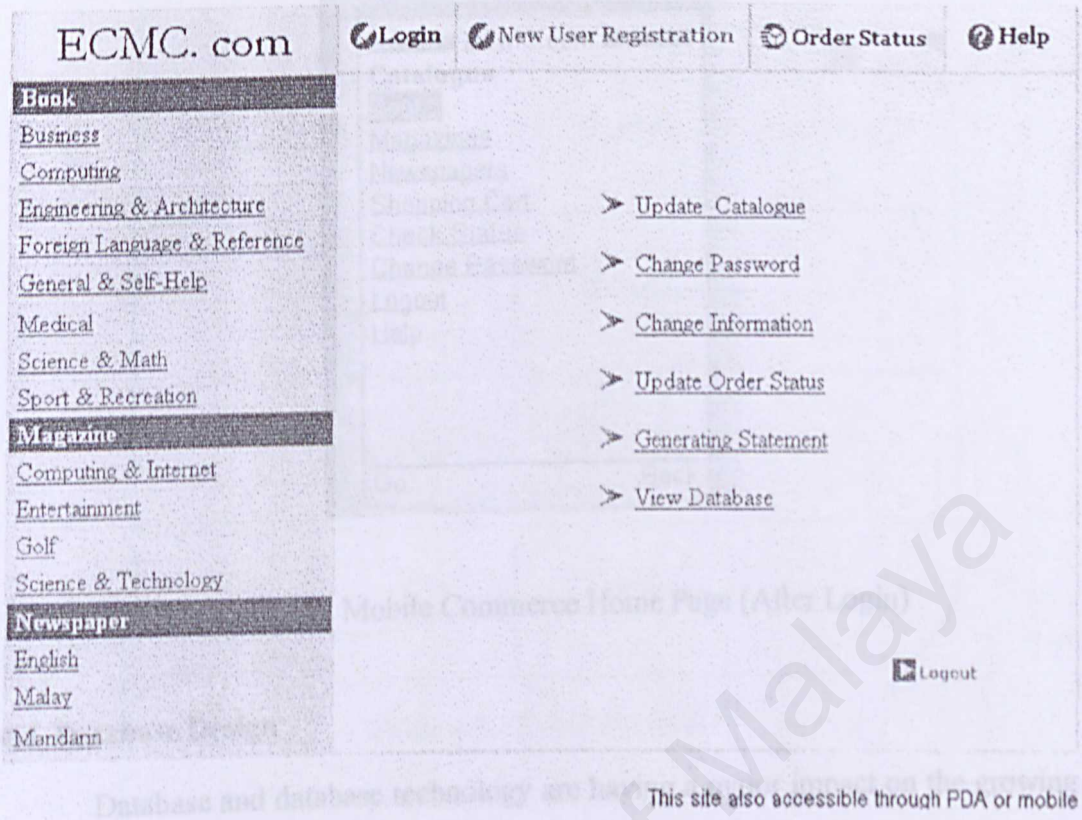


Figure 4.10: Administrator Module Page

4.3.2 User Interface On M-commerce application

4.3.2.1 Home Page

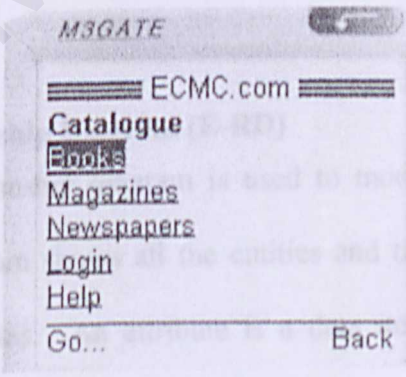


Figure 4.11: Mobile Commerce Home Page

4.3.2.2 Home Page (After Login)

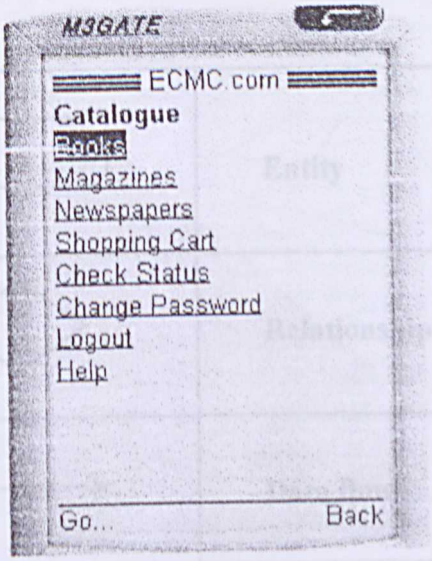


Figure 4.12 : Mobile Commerce Home Page (After Login)

4.4 Database Design

Database and database technology are having a major impact on the growing use of computers. It is fair to say that database will play a critical role in almost all areas where computers are used. A database Management System (DBMS) is a collection of programs that enables user to create and maintain a database. The DBMS is hence general purpose software systems that facilitate the process of defining, constructing and manipulating database for varies application.

4.4.1 Entity-Relationship Diagram (E-RD)

An entity relationship diagram is used to model the logical aspect of the system. The E-R diagram shows all the entities and the relationship among them. Each entity has attributes. An attribute is a data item belonging to entity. An association between the two entities is called the relationship. A relationship can be done of three types, namely one to one (1:1), one to many (1:M) and many to many (N:M). A relationship may also have attributes.

There are symbols used in an E-R diagram.

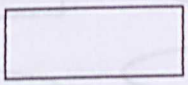
	**Entity**
	**Relationship**
	**Data flow**
	**Attribute**

Table 4.1 : E-RD Symbols

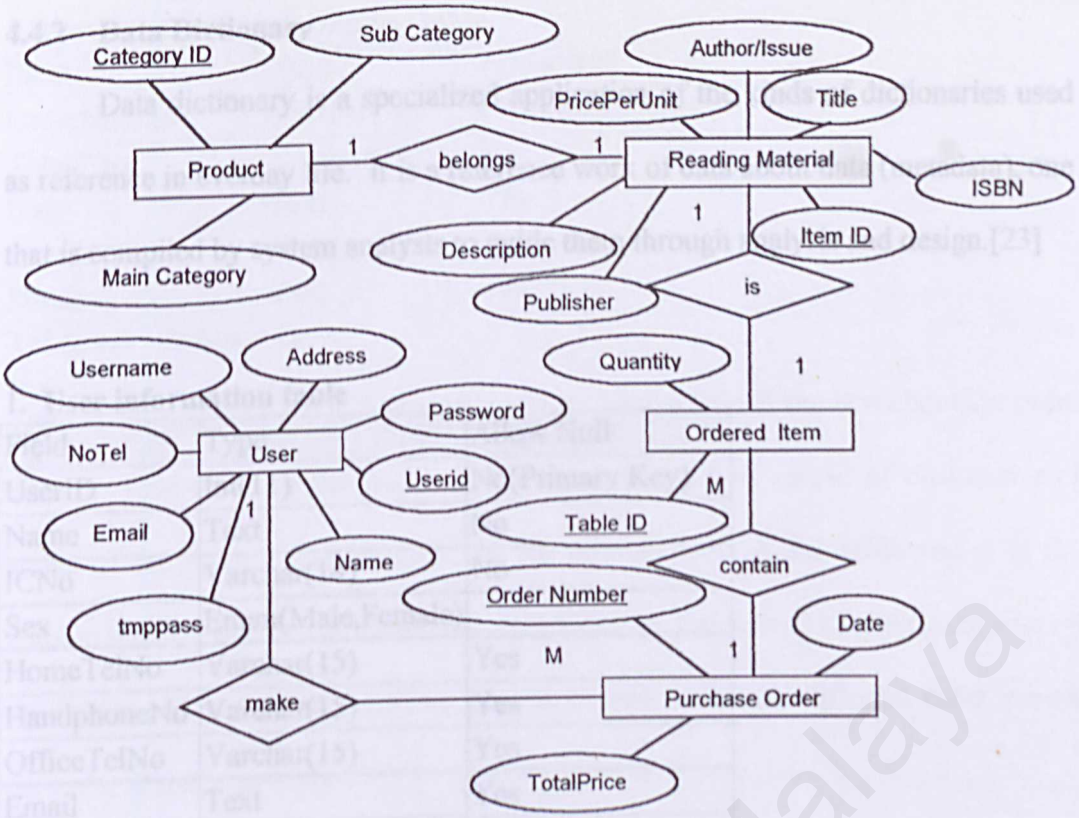


Figure 4.13 : Entity Relationship Diagram

4.4.2 Data Dictionary

Data dictionary is a specialized application of the kinds of dictionaries used as reference in everday life. It is a reference work of data about data (metadata), one that is compiled by system analysts to guide them through analysis and design.[23]

1. User information table

Field	Type	Allow Null
UserID	Int(11)	No(Primary Key)
Name	Text	No
ICNo	Varchar(14)	No
Sex	Enum(Male,Female)	
HomeTelNo	Varchar(15)	Yes
HandphoneNo	Varchar(15)	Yes
OfficeTelNo	Varchar(15)	Yes
Email	Text	Yes
Address	Text	No
Password	Varchar(12)	No
Username	Text	No
Tmppass	Varchar(12)	Yes

Table 4.2 : User

The user table stores the information such as userid, username, name, telephone number, e-mail address and password name about the system administrator and normal users. There is only one system administrator and each user holds a unique user name. The primary key for this table is UserID. The attribute named Tmppass will be used for logout process when the password will be deleted from the Password column and stored in Tmppass column. Whenever the user login again, the entered password will be compared to the password in the Tmppass column. If they are matched, the accessibility to the system is given and the password value in the Tmppass column will be transferred back to Password column.

2. **PurchaseOrder information table**

Field	Type	Allow Null
OrderNumber	Varchar(20)	No(Primary Key)
TotalPrice	Varchar(20)	Yes
Date	Text	Yes
UserID	Varchar(20)	Yes
Status	Text	Yes

Table 4.3 : Purchase Order

The purchase order table is designed in order to store the information about the order number, total price of the purchase order, ordering date, userid of customer and status of the order. OrderNumber is the primary key of this table and it is the combination of 'userid' and timestamp generated by the system to make sure that no duplicated order number would be generated even when two different users submit the order at the same time.

3. **OrderItem information table**

Field	Type	Allow Null
TableID	Bigint	No(Primary Key)
Quantity	Varchar(10)	Yes
OrderNumber	Text	Yes
ItemID	Varchar(10)	Yes

Table 4.4 : Order Items

The OrderItem information table handles the information of all the order items under a particular order number such as table id, quantity, order number and item id. The primary key of this table is table id. It is designed to store the item(s) ordered under an order number in reference to the order number in the PurchaseOrder table.

4. **ReadingMaterial catalogue table**

Field	Type	Allow Null
ItemID	Varchar(10)	No(Primary Key)
Title	Text	Yes
PricePerUnit	Varchar(10)	Yes
CategoryID	Varchar(10)	Yes
AuthorOrIssue	Text	Yes
Publisher	Text	Yes
Description	Text	Yes
BriefDescription	Text	Yes
Image	Text	Yes
ISBN	Varchar(10)	Yes

Table 4.5: Reading Materials

The reading material catalogue table is designed to store the detail information of the catalogues, which are displayed on the interface. It enables the system administrator to change the information easily on the database by using the administrator menu without searching or changing scripting codes. It contains 'ItemID', title, price per unit, 'CategoryID', author (if the product category is book) or issue (if the product category is magazine or newspaper), publisher and the description of reading materials. The image column contains the directory of files displayed in the catalogue. The description will be displayed on e-commerce application while the shorter description stored in 'BriefDescription' column will be displayed on m-commerce application.

5. **Status definition table**

Field	Type	Allow Null
StatusNumber	Varchar(4)	No(Primary Key)
Definition	Text	Yes

Table 4.6 : Statuses

The status definition table is designed to store the information of status involved in a purchase order which is represent in status numbers and definitions.

6. **TempOrder Table**

Field	Type	Allow Null
TableID	Bigint	No(Primary Key)
UserID	Int(11)	Yes
Quantity	Int(11)	Yes
ItemID	Varchar(20)	Yes

Table 4.7 : TempOrder

The TempOrder table is design to store the information of the product(s) in the shopping cart and user identification (UserID) before the particular purchase order is submitted. After submitting the order, all item(s) in the TempOrder which are belongs to the particular user will be deleted and transferred to the table named orderitem.

7. **Product category information table**

Field	Type	Allow Null
CategoryID	Varchar(20)	No(Primary Key)
MainCategory	Text	Yes
SubCategory	Text	Yes

Table 4.8 : Product Category

The category information table is designed to store the information of product category such as CategoryID, MainCategory and SubCategory.

4.5 Summary

The topic of system design has discussed about the process of system design phases which are the program design, database design and interface design. Each of these phases has been thoroughly explained in this chapter. The program design is illustrated by using flowchart whereas the database design is discussed by using table structure and entity relationship diagram. The interface design is drafted to give the look and feel of the ECMC System to the user as well as developer. In conclusion, system design makes the system development process easier and more efficient.

Chapter 5 : System Implementation

5.1 Introduction

After the system designing phase on how the system should be functioning, the next process will involves the implementation phase. System implementation is a process that converts the system requirements and designs into program codes. The flowchart design of each module and the file structure design for each table in database as well the interface design are moved from the design scratch to real implementation by using software development tools and hardware development requirement. The system implementation phase plays an essential role to ensure the existence of the system.

5.2 Development Environment

The suitable development tools are needed in the development environment of the system to ensure the fulfillment of the entire system requirements and maintain the quality of the system.

5.2.1 Hardware Development Requirement

The hardware development requirements used in developing ECMC system are as stated as below:

Processor Type : Intel(R) Pentium(R) 4 CPU

Memory : 120MB RAM

Network adapters : D-Link DWL-650 11 Mbps WLAN Adapter (for connectivity between client and server.)

Optical Drive : DVD/CD-ROM drives- Liter- On LTN 486 48X Max

Hard Drive Capacity : 13.0 GB

5.2.2 Software Development Tools

The software development tools that used in developing ECMC system are as stated as below:

- Server side scripting : *PHP (Hypertext Preprocessor)*
- Client side scripting : *JavaScript*
- Web Database: *MySQL*
- Development Platform: *Windows 98 Second Edition*
- Web Server: *Apache Web Server*
- Authoring Tool: *EditPlus*
- Web browser: *Microsoft Internet Explorer*
- Web Front-end Development Script: *HTML*
- WAP Development Script: *WML*
- WAP Browser- M3 Gate
- Animation generator: SWiSH
- Microsoft Front Page as the design interface tool.
- Microsoft Paint as the design interface tool.
- Microsoft Word as the documentation tool.

5.3 Development and Implementation

The development and implementation of the system is a process to implement the system from the design scratch. There are four phases that involve in

implementation stages, which are database implementation, module implementation, interface implementation and security implementation.

5.3.1 Database Implementation

The ECMC database implementation involved seven tables, which are OrderItem, PurchaseOrder, ReadingMaterial, Status, TempOrder and User. All the tables are created under a database named 'ecommerce'. The fail structure for each table such as the field names and data types are created based on the database design in the previous chapter. Each table contains a primary key to enable cross-reference among other tables for data sharing in processing purposes. The tables and attributes are listed as the following:

1. User(UserID, Name, ICNo, Sex, HomeTelNo, HandphoneNo, OfficeTelNo, Email, Address, Password, User name, Tmppass)
2. PurchaseOrder(OrderNumber, TotalPrice, Date, UserID, Status)
3. OrderItem(TableID, Quantity, OrderNumber, ItemID)
4. ReadingMaterial(ItemID, Title, PricePerUnit, CategoryID, AuthorOrIssue, Publisher, Description, BriefDescription, Image, ISBN)
5. Status(StatusNumber, Definition)
6. TempOrder(TableID, UserID, Quantity, ItemID)
7. Product(CategoryID, MainCategory, SubCategory)

The dummy data have been inserted into the database for testing purposes in conjunction with the implementation.

5.3.2 Module implementation

The module implementation phase is a process to change the flowchart of design for each module to become an executable system. In order words, it translates the design scratch of each module into coding by using appropriate programming languagues. Here are the descriptions of how the modules in the system are implemented.

5.3.2.1 Web Application

The front-end of each module are coded by using Hypertext Markup Language (HTML) for static part. Meanwhile PHP also plays the essential role for processing data as well as connecting to database at the back-end of each module. PHP will be the default server side scripting to produce consistent results regardless of the browser used by clients. The scripting delimiter <?...?> has to be inserted for the server side execution. Codes located within these delimiters are invisible to the client and are only executed in the server.

Besides, JavaScript is embedded in the HTML codes for further enhancement of functionality. In ECMC, most of the client side scripting is employed to perform interactive tasks at the client side such as perform form completeness checking and validate the user's input information. As an example, when a non-numeric input is entered into a quantity form which required a numeric input, then it forces the browser to open an alert box which displays a relevant error message. Besides, JavaScript also forces the browser to open a confirm box to receive confirmation from user before proceeding to the next step.

1. Login module – The AUTHENTICATE () function sends a 401 HTTP response code. This header forces the browser to open a user name and password box shown in Figure 5.1 for login. This type of authentication is available only if PHP is installed as an Apache module.

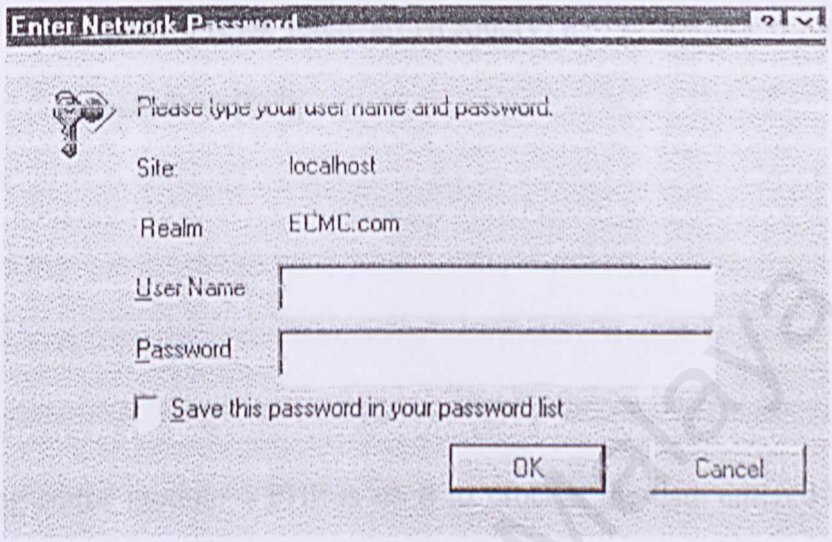


Figure 5.1 : Results of a 401 header

2. Viewing status module – PHP is used to connect to database and search for the purchase status according to the purchase number entered by user through the interface. Here is an example of PHP code for data retrieval from database which is also used in ECMC project.

```
?
mysql_connect("localhost", "root", " ") or
        die("Could not connect to localhost");
mysql_select_db("ecommerce") or
        die(mysql_error());
```

```
$query1=mysql_query("select PurchaseOrder.Status as a, Status.Definition as b from
PurchaseOrder, Status where PurchaseOrder.OrderNumber='$RefNo' and
Status.StatusNumber=PurchaseOrder.Status")or
                    die(mysql_error());
                    $row=mysql_fetch_array($query1);
                    echo$row["a"];

?>
```

3. Updating status module – PHP is used to process the date entered by user and retrieve and update data in the database. JavaScript forces the browser to open a confirm box to get the administrator's confirmation before updating status.

4. Delete/add/modify product specification module - PHP is used to delete, update or insert data in the database. JavaScript is used to open a confirm box to get the administrator's confirmation before delete, add or modify the product specification.

5. Generate report module - JavaScript is used to open an alert box which displays a prompt error message if the administrator forgets to enter and required month value. Then PHP is used to retrieve relevant data from the database and perform data processing in order to calculate the statistics of ordered reading material.

The report displays the statistics according to the subcategory of each reading material.

6. Making purchase order module – HTML is playing an essential role to fetch the product information from one page to another before users are confirmed to order the particular item by specifying a quantity. PHP is also used to insert the information of confirmed ordered item(s) into a temporary table and allow the user to keep on shopping. When the user has satisfy with the items in the shopping cart (item(s) in the temporary table), PHP is used to remove data from the temporary table into the permanent table. Moreover, PHP will also generate an unique number by combining the user id with timestamp (by using time() function). So, no duplicate reference number will be generated.

7. Changing password or updating user's information module – PHP is used to retrieve relevant data from the database. Consequently, the JavaScript will be used to validate the user's input. If there is any error, the browser displays a prompt error message in an alert box. Otherwise, a confirm box will be displayed to get the user's confirmation before PHP is used to update the data.

8. Display catalogue module – According to the category and subcategory of reading material, PHP will be used to retrieve the relevant data to be displayed in the catalogue.

5.3.3 Interface Implementation

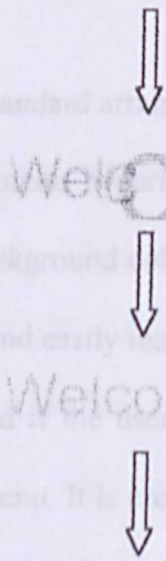
The interface implementation is the process after implementing each module. When each module has been established completely, the implementation of interface comes in on the road to design and arrange the information that is to be displayed.

5.3.3.1 Web Application

The purpose of interface implementation is to setup an attractive and user-friendly interface for user. This includes

1. Creating animation using SWiSH

   The logo for ECMC is created and placed in the welcome page in order to gain users interest. SWiSH exports the SWF file format used by Macromedia Flash so the animation will play on any machine that has the Flash Player installed. The animation is shown on Figure 5.2 is played continuously according to the sequence.



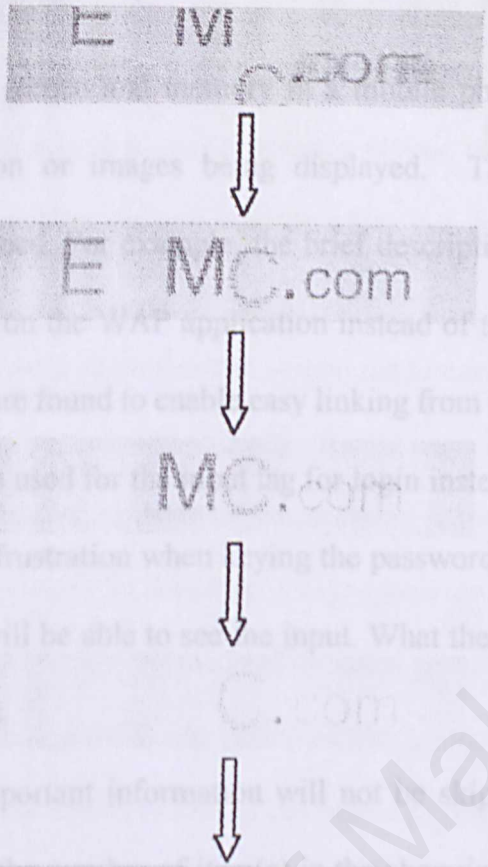


Figure 5.2 : Animation

2. Consistent header with the standard arrangement of hyperlink is found on the top of each page. Each page contains hyperlinks to enable easy linking among web pages. The choice of the background color, font size, style and color have been made base on attractiveness and easily read advantages.

3. The onmouseover is triggered if the user moves the mouse over the document object on the administrator menu. It is created by using JavaScript. The example is shown in the figure 8.4 in Appendix C.

5.3.3.2 WAP Application

Since the size of screen and memory in a mobile phone or PDA is limited, there will be no animation or images being displayed. Therefore, the displayed information is being shortened. For example, the brief description of books, magazines or newspapers is displayed on the WAP application instead of the concrete one on web application. Besides, links are found to enable easy linking from one card to another.

The text type will be used for the input tag for login instead of the password type in order to avoid the users' frustration when keying the password. So, whenever the user key in the password, they will be able to see the input. What they need to do is just turn away the device from others.

Furthermore, the important information will not be skipped from displaying in the screen. As an example, the number of item(s) in the shopping cart will be displayed on the card title to avoid confusion since it is needed to link from one card to another to view all the items in the shopping cart. The Appendix C shows the interface in the WAP application.

5.4 Summary

The topic of System Implementation elaborates about the development and implementation of the system from the design scratch to become real system execution software. Meanwhile, the software development tools and hardware development requirements are being specified. The four phases involved in the implementation stage are database implementation, module implementation, interface implementation and security implementation. The combination the above four phases has contribute to the system completeness.

Chapter 6 Testing

6.1 Introduction

After the development and coding in implementation phases, this is followed by the system testing stage. Here is a testing principle which can help to guide system testing.

- All tests should be traceable to system requirements.
- Test should be planned long before testing begins. Testing planning can begin as soon as the requirement model is complete.
- Test should begin "in the small" and progress towards testing "in the large". The first test planned and executed generally focus on individual components. As testing progress, focus shifts in an attempt to find errors in integrated clusters of components and ultimately in the entire system.

Testing is an essential series of steps that helps assure quality of the system. It is done on many different levels at various intervals as work progresses. The testing strategies that will be used include unit testing, integrated testing and system testing. Each of these strategies will be discussed in the further detail in the following sections.

6.2 Unit Testing

After a program is completely coded, it will be tested under unit testing. Individual components are tested to ensure that they operate correctly. Each component is tested independently, without other system components. Test cases are developed to show that the input is properly converted to the desired output. The following are examples of the unit testing that have been done previously.

6.2.1 Web Application

6.2.1.1 User Menu

1. Unit test case for login.

Whenever the user wants to login or entering into the restricted area, the system is able to perform authentication and give different access view for different type of users. For example, the normal user will be restricted from viewing the administrator menu. Whenever a user has signed in, the system is able to keep track the authorized user's identity.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Insert the valid administrator's user name and password.	Able to log in successfully.	The administrator menu will be displayed which is different than the user menu.
2.	Insert valid user name and password.	Able to log in successfully.	The user menu will be displayed which is different than the administrator menu.
3.	Insert invalid user/administrator's name and password.	Access is denied.	Error message is prompt to inform user after three trial changes are given.
4.	Insert an invalid user/administrator's name and a valid password.	Access is denied.	Error message is prompt to inform user after three trial changes are given.
5.	Insert valid user/ administrator's name and an invalid	Access is denied.	Error message is prompt to inform user after three trial changes are given.

	password.		
6.	The cancel button is clicked.	Access is denied.	Error message is prompt. The interface remains in displaying the welcome page.

Table 6.1 : Unit test case for login.

2. Unit test case for user registration process.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Submit button is clicked without inserting all the required data such as name, I.C. number, sex, address, post code, town, user name or password.	No errors found.	The system will check and validate the form completeness. An alert box will be displayed if any of the required data is empty. When the user clicks the OK button, the cursor will points to the empty text or password box.
2.	The non-numeric value besides dash (-) is entered to the phone number entry box.	No errors found.	An alert box will be displayed. When the user clicks the OK button, the cursor will point to the relevant text box.
3.	Insert all the required and valid value.	Errors found are corrected.	An alert box will be displayed. If the user clicks the OK button, the system proceeds to the next page and otherwise if the user clicks the

			CANCEL button.
4.	Insert different passwords value in both password entry boxes.	No errors found.	The system will check the value of both password and re-enter password.
4.	Insert an existing or already used user name.	Errors found are corrected.	Error message is prompt to inform user. Changes are given for the user to input another user name.
5.	Insert all the required and valid value with the non-existing user name.	Errors found are corrected.	The registration successful message is displayed together with the accepted user name. The system must be able to store all the information correctly to the database, so checking to the database is a necessary step for verification.

Table 6.2 : Unit test case for user registration process.

3. Unit test case for making purchase order

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Add an item into the shopping cart, specify the quantity and click the confirm order	The information of items in the shopping cart will be displayed. The total price will also	The information of items in the shopping cart which are being confirmed is inserted into the temporary table according to the user id and can be viewed

	button. Then click on the 'Keep On Shopping' button and add more items into the shopping cart.	be displayed. No errors found.	whenever the shopping cart is selected. Besides, the system will also calculate the total price of all items.
2.	Edit the quantity of item(s) and delete the unwanted item(s) in the shopping cart.	The information displayed in the shopping cart will be changed. No errors found.	The quantity edited will be updated in the temporary table while the deleted item(s) will be deleted from the table. The total price which is calculated on the spot will also be updated according to the previous changes.
3.	Click the 'I Agree' button to submit the item(s) in the shopping cart.	A unique reference number will be displayed.	The system will be able to check whether content in the shopping cart which is belongs to a particular user is empty. If it is non-empty, then a reference number will be generated.
4.	After a reference number is generated, click the back button and try to submit it again.	An error message will be displayed to inform the user that the shopping cart is empty	Since all the item(s) in the temporary table (shopping cart) is being deleted and transfer the permanent tables after a reference number is generated. This is to avoid the unintentional duplicate

			submit of the same group of items.

Table 6.3 : Unit test case for making purchase order

4. Unit test case for updating user's information and password.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Insert the old password, different new passwords and click the submit button.	No errors found.	An alert box will be displayed to inform users the error when different new passwords are entered.
2.	Insert the incorrect old password, the same new passwords and click the submit button.	No errors found.	The old password entered will be compared to the one stored in the database. If the old password is incorrect, the error message will be displayed and request user to re-enter the form.
3.	Insert the correct old password, the same new passwords and click the submit button.	No errors found.	The old password entered will be compared to the one stored in the database. If the old password is correct, the password will be updated and the operation successful message will be generated.

Table 6.4 : Unit test case for updating user's information and password.

5. Unit test case for displaying purchase order status.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	The submit button is clicked without entering any value.	No errors found.	An alert box will be displayed if the required data is empty. When the user clicks the OK button, the cursor will points to the empty text box.
2.	An invalid reference number is entered.	No errors found.	An error message is displayed and user is able to try again.
3.	A valid reference number is entered.	No errors found.	The status number, definition and definition of that particular purchase order are being displayed.

Table 6.5 : Unit test case for displaying purchase order status.

6. Unit test case for logout.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Click the logout button and login again.	Errors found are corrected.	The login box will be displayed to require the username and password from the user.

Table 6.6 : Unit test case for logout.

6.2.1.2 Administrator Menu

1. Unit test case for update/delete/add catalogue information

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Select the update option according to the subcategory of reading material.	No errors found.	The relevant information of selected subcategory of reading material will be displayed.
2.	Change the information of the existing catalogue information and click the UPDATE button	Errors found are corrected.	A confirm box will be displayed to receive confirmation from the administrator for updating the information. If the user clicks OK, then the information will be updated.
3.	The DELETE button is clicked to delete the information of the particular item.	No errors found.	A confirm box will be displayed to receive confirmation from the administrator for deleting the information. If the user clicks OK, then the item will be deleted.
4.	Select the insert option according to the subcategory of reading material. Click the INSERT button without filling up the	No errors found.	A form for inserting the item information will be displayed. An alert box will be displayed if the required data is empty. When the user clicks the OK button, the cursor will points to the empty text box.

	information.		
5.	Select the insert option according to the subcategory of reading material. Fill up the information and click the INSERT button	Errors found are corrected.	A confirm box will be displayed to receive confirmation from the administrator for inserting the information. If the user clicks OK, then the item will be inserted.

Table 6.7 : Unit test case for update/delete/add catalogue information

2. Unit test case for updating purchase order status.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Fill in the date and click the SUBMIT button.	Errors found are corrected.	The purchase order information will be displayed according to the date. If no purchase orders have been made, a message will be displayed.
2.	Select a new status and click the UPDATE STATUS button.	No errors found.	A confirm box will be displayed to receive confirmation from the administrator for updating the information. If the user clicks OK, then the status will be updated. Then, a message will specify the order number, new status and

			whether the status remains the same or being updated.

Table 6.8 : Unit test case for updating purchase order status.

3. Unit test case for generating report.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Click the submit button without fill in any period.	No errors found.	Check for form completeness, an alert box will be displayed if the required data is empty.
2.	Fill in the period.	No errors found.	The statistics of the purchase item will be counted and displayed according the subcategory of each reading material.

Table 6.9 : Unit test case for generating report.

6.2.2 WAP Application

1. Unit test case for login.

2. Unit test case for making purchase order

The above use cases are similar with use cases found in the web application.

1. Unit test case for changing password.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	Insert different new passwords and click the submit button.	No errors found.	An error message will be displayed to inform users the error when different new passwords are entered.

2.	Insert the same new passwords and click the submit button.	No errors found.	Both new passwords are compared. If both are the same, the password will be updated and the operation successful message will be generated.

Table 6.10 : Unit test case for changing password.

4. Unit test case for displaying the purchase order status.

No.	Test procedure	Output / Error	Analysis of Test Result / Solution
1.	The submit button is clicked without entering any value.	No errors found.	An error message will be displayed if the required data is empty. The user is able to try again or return to the main menu.
2.	An invalid reference number is entered.	No errors found.	The reference number will be compared to the one stored in the database. If unmatched, an error message is displayed and the user is able to try again or return to main menu.
3.	A valid reference number is entered.	No errors found.	The status number, definition and definition of that particular purchase order are being displayed.

Table 6.11 : Unit test case for displaying the purchase order status.

6.3 Integration Testing

Integration testing is performed after all objects, components and individual sub menus have passed local unit tests. It is where combined menus dependent on each other are tested to determine whether they function together as one system. The testing is necessary because problems might occur only when the menus are integrated together, although the menus have been individually tested to be functioning properly. Integration testing aims to expose the problem resulted from the combination of menus.

Performing integration testing will ensure that there is valid linking and dynamic relationship established between sub menus and menus of the whole system. Testing is carried out in small segments so that errors will be easier to isolate and correct. Testing is repeated for every menu of the system to ensure that all the menus are functioning properly and error- free.

The top-down approach is adopted for integration testing. The top level, usually one controlling components called by the tested component(s) are combined and tested as a large unit. This approach is reapplied until all components are incorporated.

A component being tested may call another that is not yet tested, so a stub is written to simulate the activity of the missing component. The stub answers the calling sequence and passes back output data that lets the testing process continue. For example, if the edit quantity component is not yet tested when the testing of making purchase order component, then a stub will be written to pass back a fixed

address to allow testing to proceed. The figure 6.1 shows the component hierarchy in ECMC project.

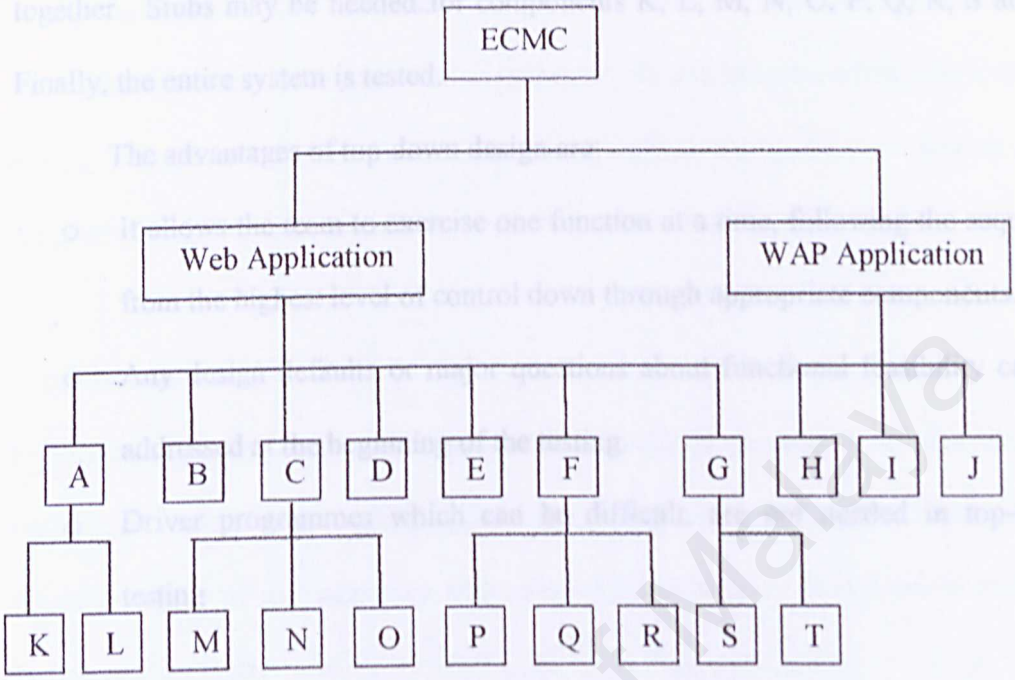


Figure 6.1 : Component Hierarchy

Definition
A - User Authentication
B - User Registration Process
C - Making Purchase Order
D - Update Information
E - Update Password
F - Changing Catalogue Information
G - Purchase Order Status
H - User Authentication
I - Making Purchase Order
J - Displaying Purchase Order Status
K - Login
L - Logout
M - Edit Quantity
N - Delete Item
O - Generating Reference Number
P - Update Item
Q- Delete Item
R - Add Item
S - Display Status
T – Update Status

First of all, only the top component, ECMC is tested by itself, with stubs needed for Web application and WAP application. Once tested, it is combined with the components in the next level, which are A, B, C, D, E, F, G, H, J and tested together. Stubs may be needed for components K, L, M, N, O, P, Q, R, S and T. Finally, the entire system is tested.

The advantages of top-down design are:

- It allows the team to exercise one function at a time, following the sequence from the highest level of control down through appropriate components.
- Any design defaults or major questions about functional feasibility can be addressed at the beginning of the testing.
- Driver programmes which can be difficult, are not needed in top-down testing

6.4 System Testing

System testing is the final step of the testing stages that involves a series of different tasks with the primary purpose to fully exercise the complete system. System testing is the stage where the whole system integrated. The objective of the system testing is to validate and verify the functional requirements and non-functional requirements. Several steps, such as functional testing, performance testing and acceptance testing were carried out.

a) Functional testing

Functional testing focuses on system functionalities. Several guidelines were employed for the functional testing

i) High fault detection probabilities
ii) Know and anticipate expected input and actions.
iii) Test all valid and invalid input types.

iv) Include stopping criteria.

Besides, every process flow of the system is being tested to ensure the overall flow function properly. Furthermore, it also ensures well communication and linking among each menu. The connection between the program and database is tested to ensure the accuracy of the input and output data. Test cases are carried out to ensure that all components in the menus work accordingly as a larger system testing after integrating with the software elements as well as hardware elements

b) Performance testing

Performance testing addresses the non-functional requirements of the system. Performance objectives highlighted in the non-functional requirements such as flexibility, ease of use, accuracy and reliability are used as guidelines to measure system performance.

c) Acceptable testing

Acceptable testing is carried out to determine whether the system is indeed usable or able to meet the expectation of users especially the lecture and modulator.

6.5 End User Evaluation.

End user evaluation is a process of evaluating the capability and usability of the developed system. This phase involves several assessment procedures that will gauge the success level of ECMC project. The evaluation was carried out to 2 office clerks, 2 human resource officers, 3 computer science students, 2 students of other faculties and 3 youngsters from secondary school. The evaluation form is attached as Appendix B at the end of this report. Overall, the clerks and human resource

officers comment that the whole design of ECMC system is fine and pleasant-looking. Their recommendation is to enhance the functionality of the system, in terms of payment procedure and strengthen the security features.

Most of the students agree that the process functionality is easy to be learned and attractive. Besides, they also find the navigation from one page to another is easy. Their average evaluation for graphic user interface and system functionality is good. The suggestion received is to increase the variety of books and magazines.

6.6 Summary

Conclusively, the topic of system testing is discussed about the objectives and plan in testing. The testing strategies involved are unit testing, integrated testing and system testing. Each strategy perform different testing task to ensure that the fully functionality and quality of the whole system.

Chapter 7 System Evaluation

7.1 Introduction

System evaluation is a process at the end of development process. Generally, several technical and non-technical problems were encountered during the development stage. However, most of the problems were defeated and resolved eventually. In this phase, ECMC system will be evaluated to identify its total strength and limitation. Changes and current enhancement will be stated as a reference. Besides, proper recommendations and proposal will be suggested to enhance system performance and functionality in the future.

7.2 Problems Encountered and Solutions

7.2.1 Difficulties in Determining the System Scope

Due to the insufficient knowledge in system analysis and time constraint, it is impossible to build a full, complete scale system within the given time frame. To solve this problem, reference on current web site has been done in order to understand the system design. Besides, discussion with the supervisor has also been conducted to adopt some ideas into the system design.

7.2.2 Lack of knowledge in the WAP application

The ECMC developer has some experience in developing Web application but lack of knowledge in WAP application. It consumes a lot if time to explore the WAP development method, such as the WML configuration in Apache server as well as PHP and WML code integration.

To solve this problem, Internet is the most vital source. There are a lot of source codes, free tutorials and development ideas. In additional, the forum is

another way to help on solving the problems occurred during the ECMC system development.

7.2.3 Difficulties in Designing User Interface

The problem that faced during the early stage of WAP application development is lack of knowledge of the layout of standard user interface. At the beginning stage, it is difficult to transfer items in the web application and arrange them in a mobile phone or PDA simulator due to a limited screen space.

7.3 System Strengths

7.3.1 Multiple Accessible Method

Since the ECMC system is developed in both Web and WAP application, it enables the user to perform purchase order and status checking by using Internet accessed devices such as computer, PDA or hand phone. It is also able to increase convenience of using the system without being restricted by time and location. In short, it provides different accessibilities for marketing of reading material.

7.3.2 User Friendly and Attractive Interface

The interface has been design in a way that reduces user's input through typing by having hyperlink, icons or selection control. As an example, a standard header and hyperlinks are placed in every page to make sure that the users are able to navigate smoothly through the web site by using the simple 'point and click' mechanism.

Furthermore, the interface design has been made attractive by choosing the appropriate color and font combination as well as text arrangement. Furthermore, colorful animations have been design for the welcome page to draw users' attention.

7.3.3 Database Connected Catalogue and Easy Data Manipulation Functions

Since the catalogue information displayed is taken from the database, any changes to the information in the database will lead to changes in the catalogue of ECMC system. The administrator can manipulate the database easily by clicking the appropriate hyperlink for adding, deleting or updating the data. Thus, this has eliminated any needs to write and run any SQL statements or understand the database design.

7.3.4 Authorization and Authentication

Only registered users with the correct user name and passwords are given access to certain modules of the system. Users will be given 3 changes to login. If the users' attempts fail, they will only be given the opportunity to view the system catalogues without the privilege to proceed further. Thus, the users can be assured that others will not be able to view or modify their personal information or passwords. Besides, the users are able to logout before leaving the system. This is important to give users the security assurance.

7.3.5 Setting Up an Own Web Server

A customized Apache server has been configured for both Web and WAP application. This open source software can be customized by changing the setting to improve the performance. Therefore, no commercial uploading services (e.g.

Geocities.com, Angelfire.com) are needed which at time are not functioning properly.

7.4 System Limitations

There are several limitations in ECMC system due to lack of time and knowledge in certain aspect of the system. The limitations of the system are as stated in the following section.

7.4.1 Lack of Security Features and Payment Procedure.

Since the payment procedure is not found in ECMC system, SET or SSL technologies were also not enforced. Besides, ECMC system also does not include password encryption as well as database security features such as concurrency control.

7.4.2 Final Testing doesn't Involved Real Wireless Environment

ECMC system testing will not involve the real wireless devices since it is too expensive. Therefore, the system can only be tested on the emulator. It actually provides the same flow and performance. The only difference between the emulator and real WAP device is the speed of the data process. Normally, the emulator will perform faster than the actual wireless device.

7.4.3 Lack of Additional Functions

ECMC system does not include a search function to enable faster catalogue retrieval. Besides, it is also lack of print out and e-mail function for management in the administrator menu.

7.5 Future Enhancement

7.5.1 Searching Function

This enhancement will help users to find the reading material they need in a better and faster way. At this moment, the number and variety of reading material is limited and displayed through hyperlink linking. The searching function may be useful to the system when the number and variety of reading material are increasing.

7.5.2 Provide a Print Out and E-mail Function for Management

It is recommended that a print out function is added so that the administrator can have any transaction record to be printed out easily. Besides, the current ECMC system is not build with a mail service. In future, a mail function can be incorporated into this system where it allows the administrator to send any information to the users easily.

7.5.3 Implement Credit Card Payment System and Security Features

At the moment, ECMC system does not implementing any payment system. In real environment, the credit card payment system is the most complicated part of the system. A greater amount of security can be implemented in ECMC system by enforcing SET and SSL technologies. By employing these technologies, customer identification can be recognized by the banking system and therefore online payment can be made. Hence, reduce the possibility of fraud. Besides, customer payment information can be guaranteed safe and will not be intercepted by other unauthorized party since encryption technique is provided by SSL and SET technologies.

7.5.4 Encryption and Retrieve Forgotten Password

It is recommended that the ECMC system perform encryption of passwords in the database to enhance the data confidentiality. Moreover, a function should be set up to retrieve the password if any user forgets it.

7.6 Knowledge and Experience Gained

In conclusion, the system has fulfilled its objectives and requirements. This project is very important and beneficial since a lot of knowledge and valuable experience are gained. These include the knowledge of setting up the Apache server configuration for PHP and WML, concepts of programming languages such as PHP, JavaScript, WML, HTML and MySQL database. Moreover, the experience in graphic editing using Swish also gives the developer a chance to learn on how to create an animation.

Many lessons are learned through the persistent effort in finding out solution when problems are encountered. Working alone without help on programming coding has been a valuable experience in problem solving. Besides, communication skills are learned by asking people for opinion and advices. Furthermore, better documentation and report writing skills are obtained. Also, learning to keep up to datelines and time management skills are polished.

Conclusively, the involvement in the ECMC system development is a valuable experience for the developer. The skills learned in Web and WAP applications development would be helpful in the developer's future career.

7.7 Summary

The ECMC system has been completed successfully, with some strength and limitation mentioned previously. It achieves and fulfills the system requirements as stated in the previous chapters. However, there are always rooms for improvement as stated in the future enhancement section. This project has created wide opportunity for individual who is creative and innovative to further modify and tailor the system based on their needs. Much knowledge was gained throughout the project development; it is a valuable and enriching experience.

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Appendix A
Questionnaires

Title : Commerce Application with Multiple Accessible Methods (ECMC)
Subject : Questionnaires for interviewee
Prepared by : Yang Mei Lin (WEK 000062)

Questionnaires

1. What do you think that greatest factor which defines a good system ?

   _____

   _____

2. If you are an e-commerce system administrator, what are the processes which involve in the system?

   _____

   _____

3. If you are an e-commerce system developer, what are the features needed in the user and administrator module?

   _____

   _____

Appendix B
User Evaluation Form

A. Please fill in the information below:

1.) Name: _____

2.) Occupation : _____

Part 1: *Web Application*

B. Please evaluate the web base according to the scale given.

1: Very poor
2: Poor
3: Moderate
4: Good
5: Very Good

a. Navigation/hyperlink _____
b. Color/background. _____
c. Download time. _____
d. Image / graphic arrangement. _____
e. Animation. _____
f. Text style. _____
g. Text color. _____
h. Color combination. _____
i. Easily read. _____

C. Evaluation of the system functionality.

1: Strongly Disagree.
2: Disagree
3: Don't know
4: Agree
5: Strongly Agree

a. This system is easily learned. _____
b. The types of reading material provided are

i) Suitable. _____
ii) Sufficient. _____

c. The process of making purchase order is easily done. _____
d. The function of changing the system catalogue information such as update, insert or delete item is efficient. _____

Part 2: *WAP Application*

B. Please evaluate the WAP application according to the scale given.

1: Very poor
2: Poor
3: Moderate
4: Good
5: Very Good

a. Navigation/hyperlink _____
b. Download time. _____
c. Text arrangement. _____
d. Text style. _____
e. Easily read. _____

C. Evaluation of the system functionality.

1: Strongly Disagree.
2: Disagree
3: Don't know
4: Agree
5: Strongly Agree

a. This system is easily learned. _____
b. The types of reading material provided are

i) Suitable. _____
ii) Sufficient. _____

c. The process of making purchase order is easily done. _____

D. Please specify the error(s) in the system.

_____

_____

User Manual

A. *E-commerce Application*

The E-commerce application contains the normal user's menu and administrator's menu. The following are the modules provided for both menus.

- Login
- Change Password
- New User Registration
- Update Information
- Catalogues – Books, Magazines, Newspapers
- Add To Cart/Making Purchase Order
- Display Check Status
- Help

The following are the modules provided for administrator's menu.

- Update Catalogues – Books, Magazines, Newspapers
- Generating Report
- Update Order Status
- Delete Purchase Order
- Insert New Catalogue Item
- View Database

a) Login

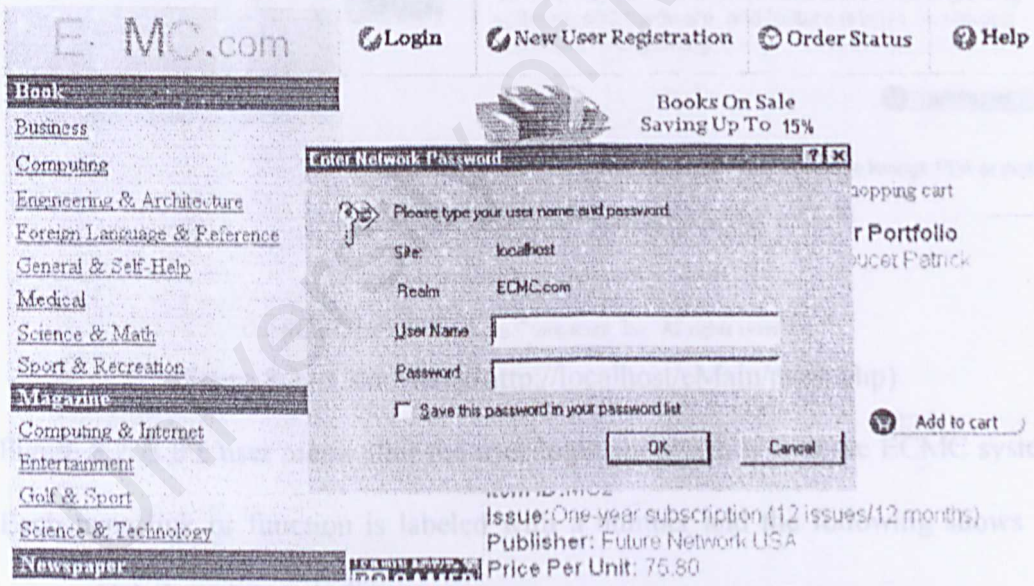

Figure 8.1 : Welcome page (http://localhost/eMain/firstpage.php)

Figure 8.1 is the welcome page which allows every user to view the system catalogue, chose to login and register as a member. When the user clicks login, a popup login box appears. The user is required to login by filling in the user name, password and click OK.

b) i. **User Menu** – This page will be displayed if the user name entered belongs to the normal user.

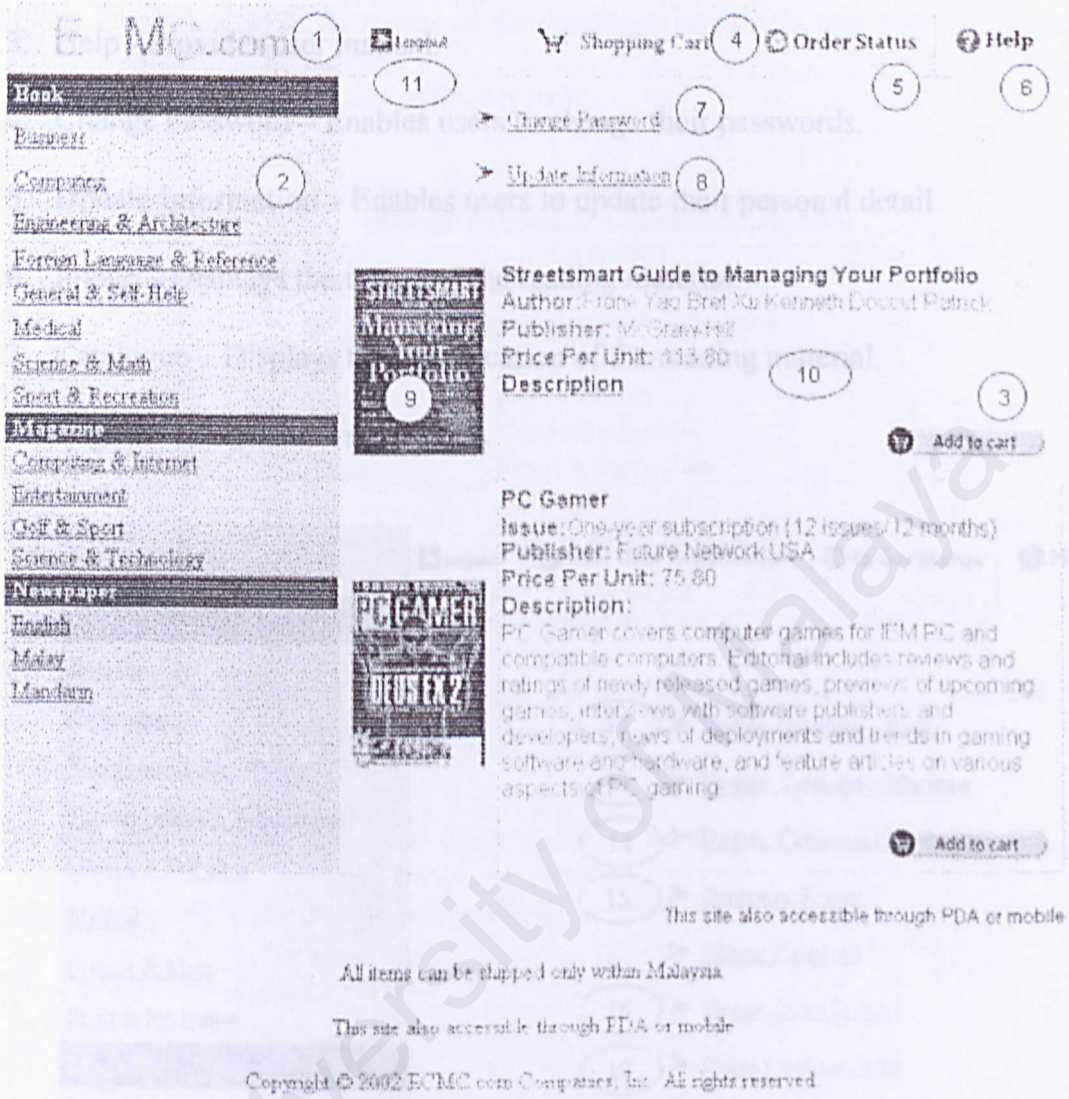

Figure 8.2 : User Menu (http://localhost/eMain/main.php)

Figure 8.2 is the user menu after the user login successfully into the ECMC system. Each hyperlink or function is labeled with a number and the following shows the name of labels and descriptions.

1. Animation – It attracts users to ECMC.com
2. Reading material list – Contains hyperlinks to catalogue(s) according to the subcategory of books, magazines and newspapers.
3. Add to Cart – Allows user to add an item to shopping cart.

1. Shopping Cart –Enables users to view the item(s) in the shopping cart.
2. Order Status – Enables users to check status of purchase order(s).
3. Help - Provides user manual.
4. Change Password – Enables users to change their passwords.
5. Update Information – Enables users to update their personal detail.
6. Image – Displays the image of the reading material.
7. Catalogue – Displays the specification of the reading material.
8. Logout –Enables users to logout.

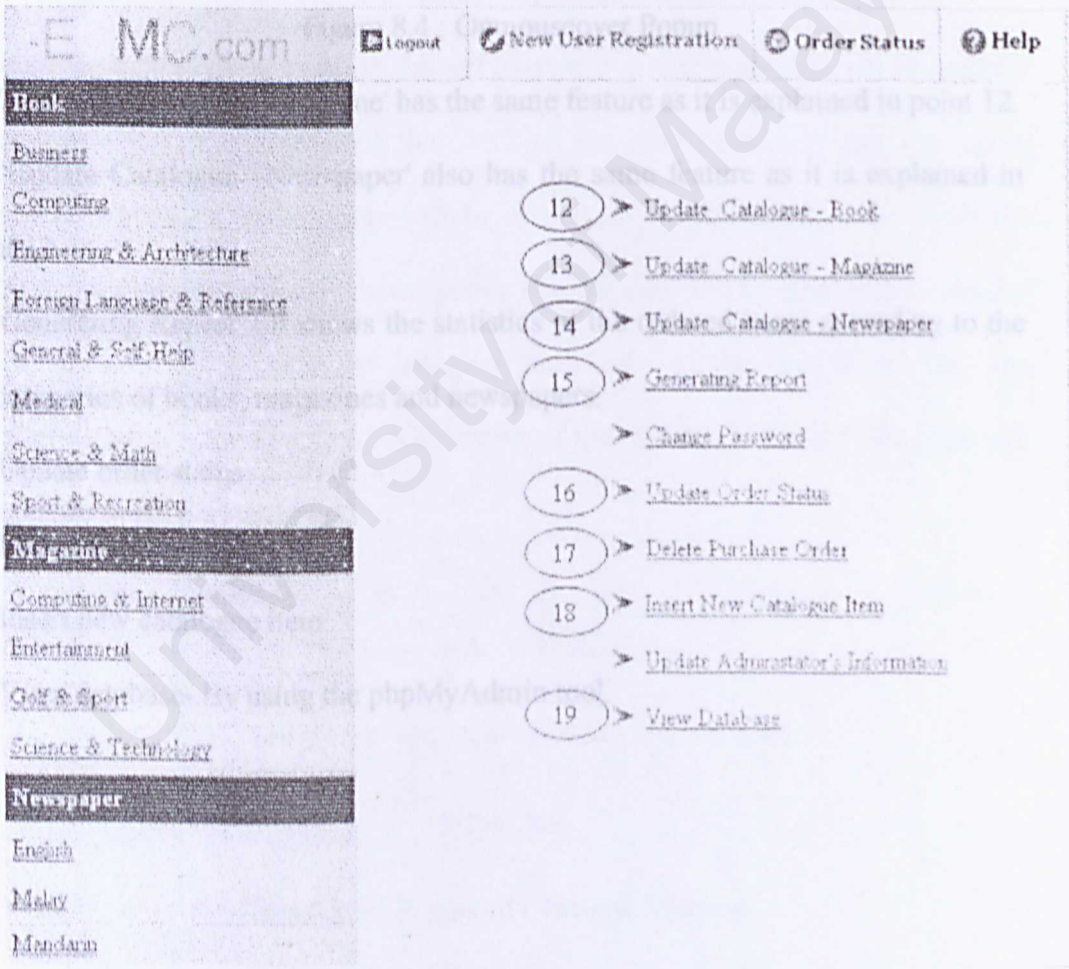

Figure 8.3 : Administrator Menu (http://localhost/eMain/main.php)

12. When a user points the mouse on 'Update Catalogue – Book', a popup shows the subcategories of book such as Business, Computing etc. as shown in figure 8.4. When the mouse is placed on one of the subcategories, a dark blue line will appear and react as a hyperlink to that particular page.

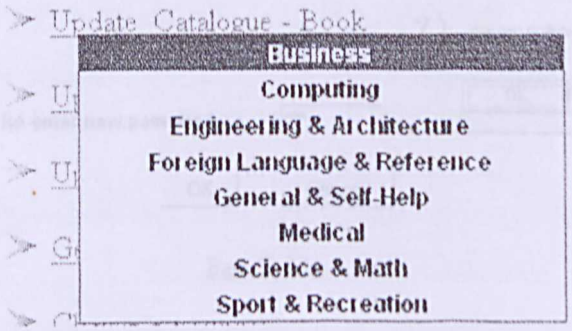

Figure 8.4 : Onmouseover Popup

13. 'Update Catalogue – Magazine' has the same feature as it is explained in point 12.

14. 'Update Catalogue –Newspaper' also has the same feature as it is explained in point 12.

15. Generating Report. –It shows the statistics of the ordered items according to the subcategories of books, magazines and newspapers.

16. Update order status

17. Delete purchase order

18. Insert new catalogue item

19. View database- By using the phpMyAdmin tool.

c) Change Password

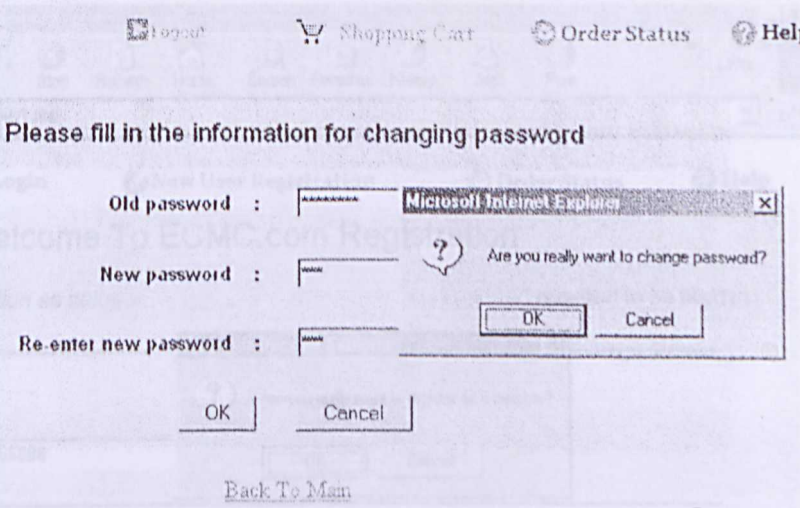

Figure 8.5 : Change Password (http://localhost/eMain/passwchange.php)

Figure 8.5 requires users to fill in the old password, a new password and the reenter new password. It is important that both of the new passwords are the same, otherwise a popup error message will be displayed. If the user has fill in all the relevant information correctly, then a popup confirm box will be displayed to request confirmation from the user for changing password. If the user clicks OK, the following page will be displayed. Otherwise, if the user clicks Cancel, the page will remain the same.

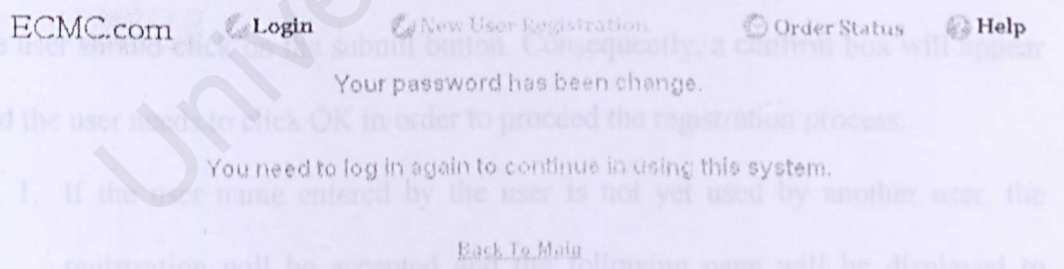

Figure 8.6 : Password Changed Message

(http://localhost/eMain/changepasswnext.php)

When Figure 8.6 is displayed, it shows that the password has been change successfully. Thus, the user needs to login again to continue in using ECMC system.

d) New User Registration

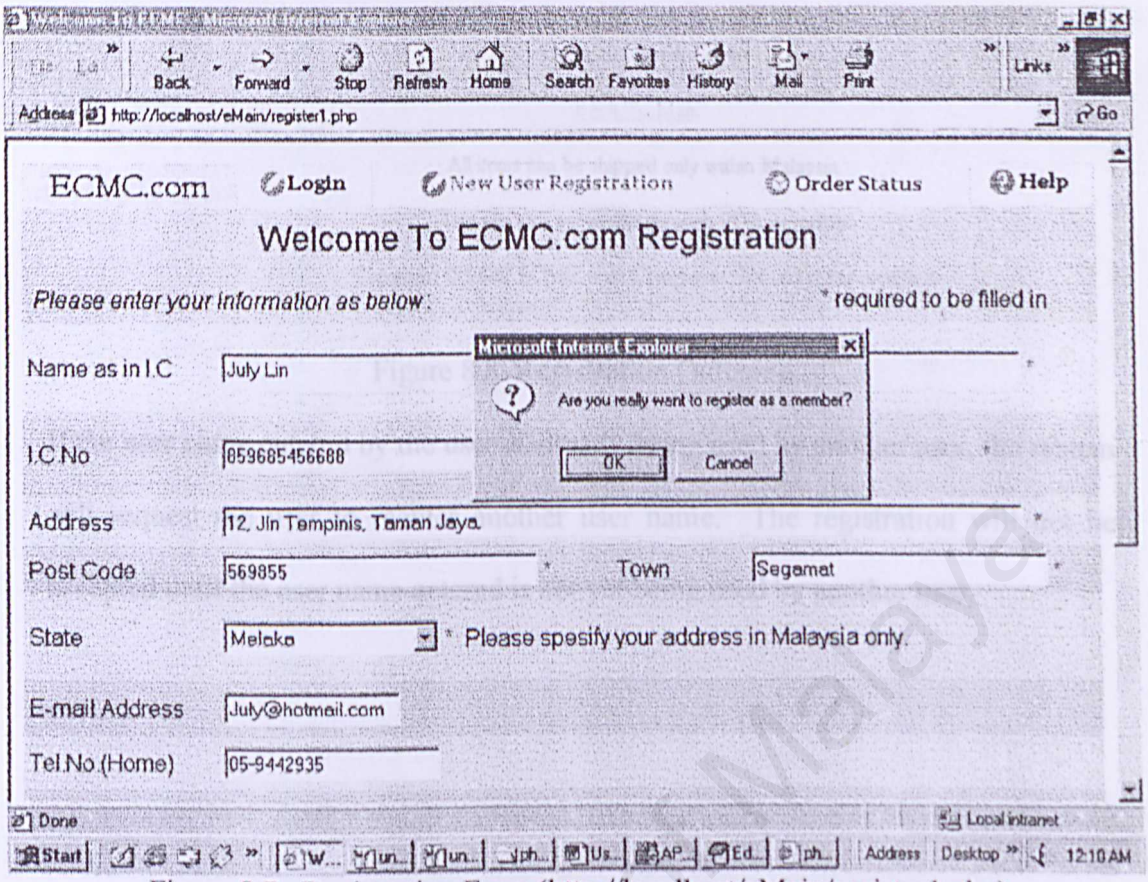

Figure 8.7 : Registration Form (http://localhost/eMain/register1.php)

Figure 8.7 displayed a registration form for new user. The hyperlink to this page appears in the welcome page before login. The important information which required to be filled in is label with red star. When all the information is filled up, the user should click on the submit button. Consequently, a confirm box will appear and the user needs to click OK in order to proceed the registration process.

1. If the user name entered by the user is not yet used by another user, the registration will be accepted and the following page will be displayed to specify the accepted user name.

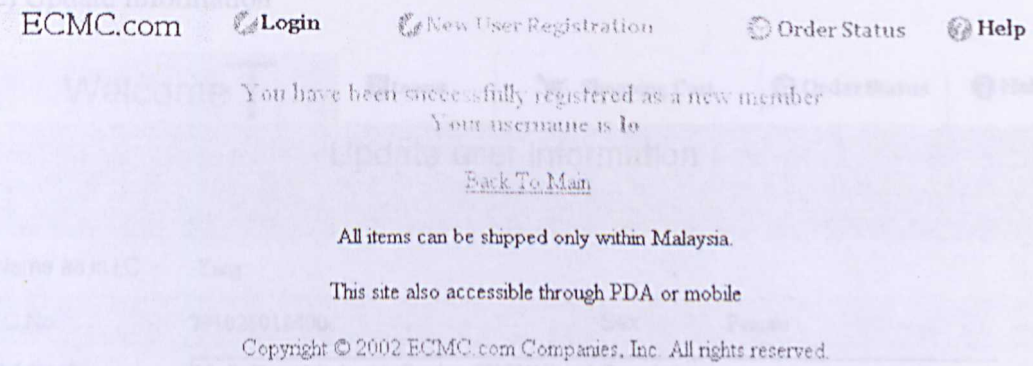

Figure 8.8: Registration Outcome

If the user name entered by the user is already being used by another user, the system will request the user to reenter another user name. The registration will not be accepted until the user name entered is not yet being used by another user.

e) Update Information

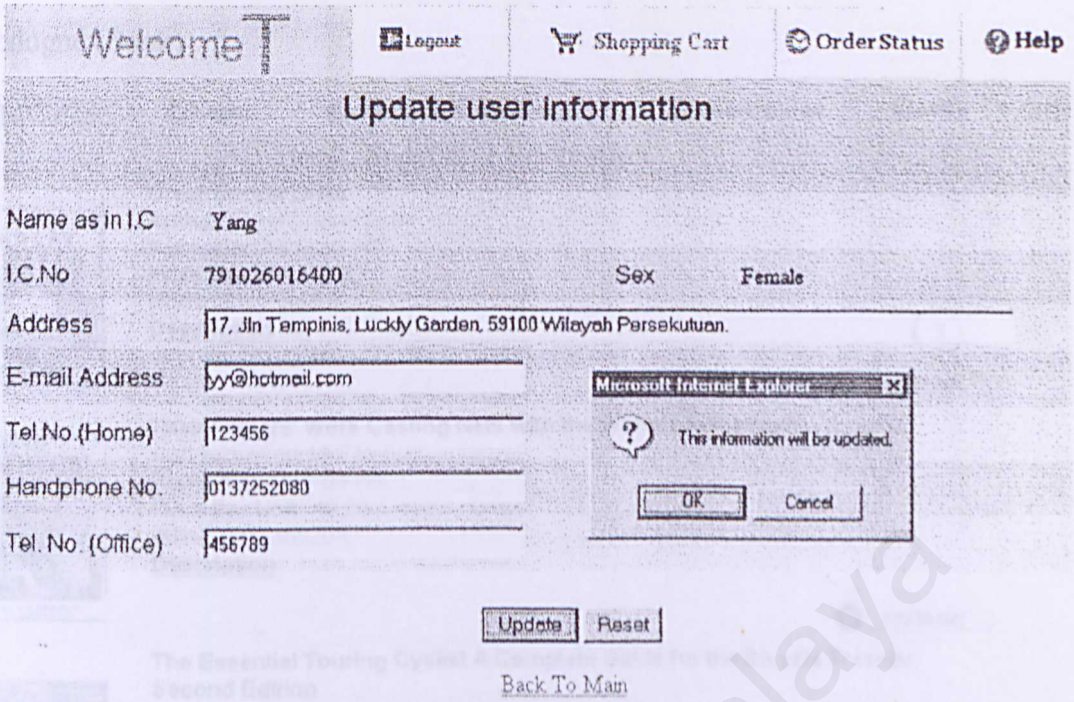

Figure 8.9 : Update Information (http://localhost/eMain/infochange1.php)

This page enables users to make changes to their personal information. When the UPDATE button is clicked, a confirm box appears and the user needs to clicks OK to proceed with the updating process. Then, the updated information will be displayed in the next page.

f) Catalogue (Book)

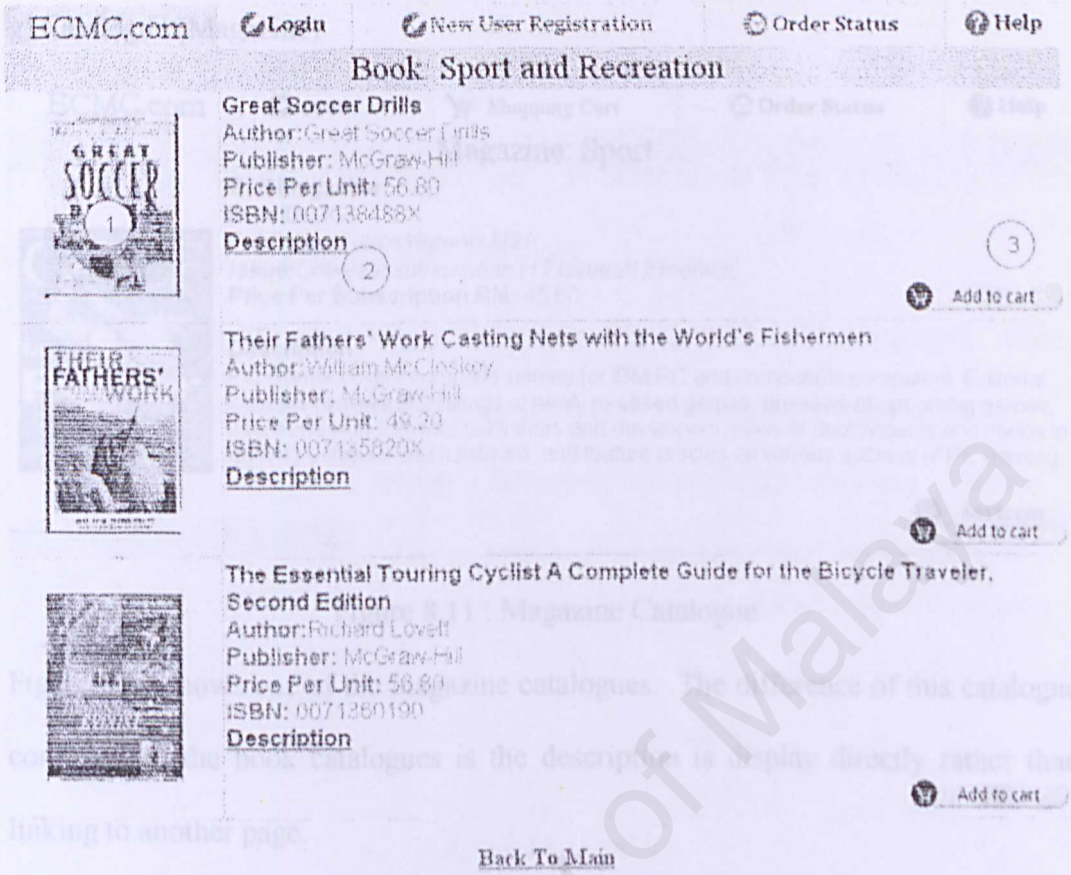

Figure 8.10 : Book Catalogue

Users are able to choose any book, magazine or newspaper according to the reading material list as it is shown in Figure 8.10. If a user clicks

i) the image shown in option 1 – a larger image will be displayed.

ii) the 'Description'(hyperlink) shown in option 2 – A page with detail description of the particular book will be displayed.

iii) The 'Add to cart' image in option 3 – the particular item will be added into the shopping cart. Anyway, if the user has not yet login, then a popup login box appears and the login is necessary.

g) Catalogue (Magazine)

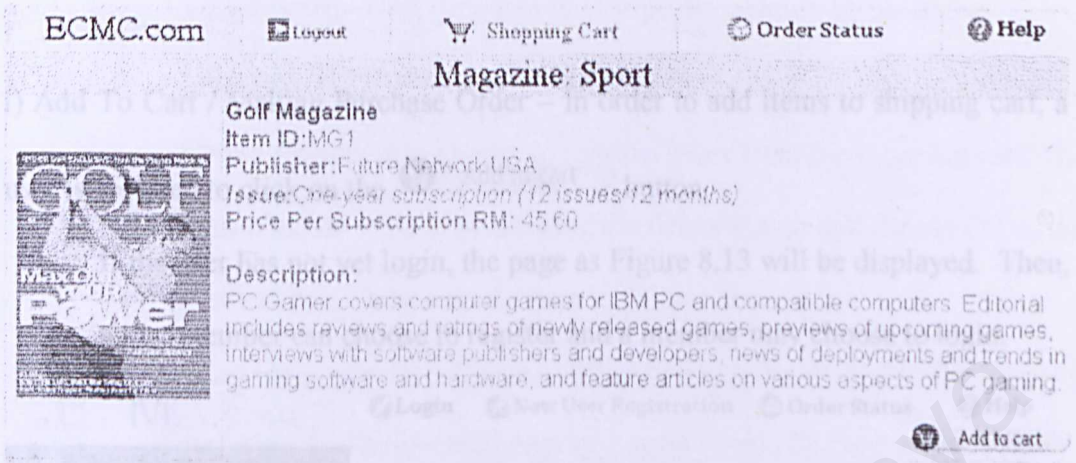

Figure 8.11 : Magazine Catalogue

Figure 8.11 shows one of the magazine catalogues. The difference of this catalogue compares to the book catalogues is the description is display directly rather than linking to another page.

h) Catalogue (Newspaper)

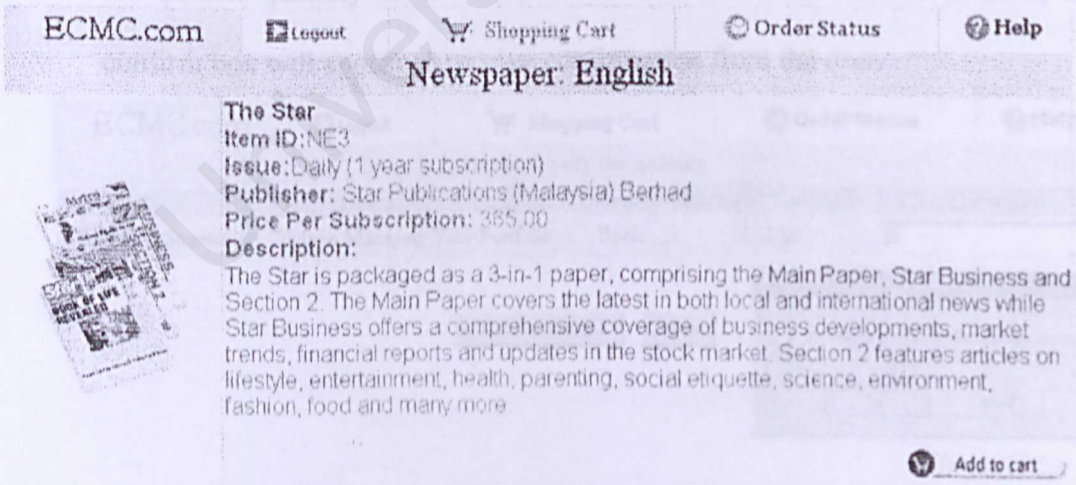

Figure 8.12 : Book Catalogue

Figure 8.12 shows one of the magazine catalogues. Its design is similar with the magazine catalogue.

i) Add To Cart / Making Purchase Order – In order to add items to shipping cart, a user is required to click on the Add to cart button.

- If the user has not yet login, the page as Figure 8.13 will be displayed. Then, a non-member can choose to register and a member may choose to login.

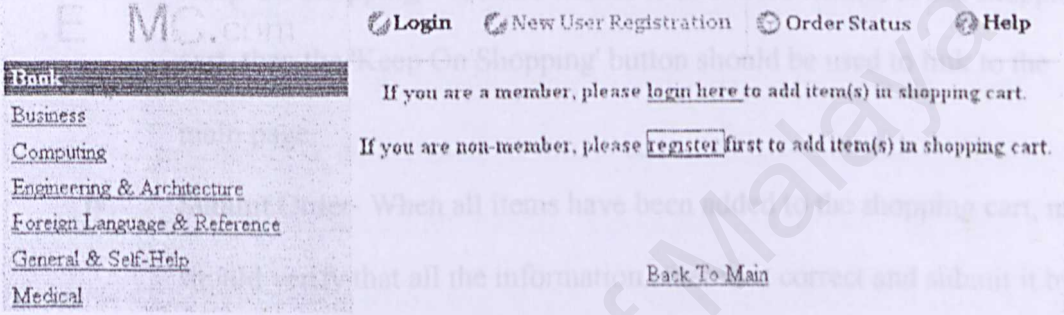

Figure 8.13 : Options

- If the user has already login, Figure 8.14 requires the user to edit the quantity, the default quantity is 1. Then, when 'Confirm Order' button is click, a confirm box will appear to receive confirmation from the user.

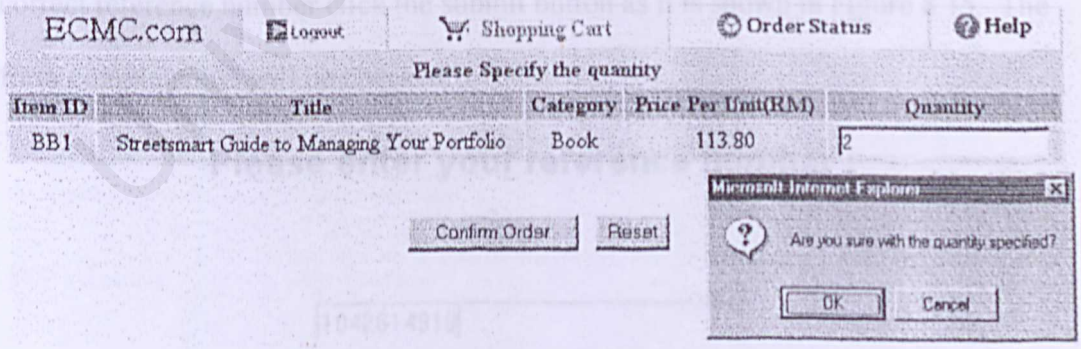

Figure 8.14 : Quantity

When the user click OK button to confirm the quantity, the page as in Figure 8.15 displays the item(s) in the shopping cart. In this page the user is able to perform the following tasks

i. Edit quantity- Users are able to change the quantity by using the hyperlink 'Edit' and submit changes.

ii. Delete – Users may choose to remove items from the shopping cart. The item removal is done by clicking the delete button and choose OK in the confirm box. Only a single item is deleted once.

iii. Keep On Shopping – If users wishes to add more item(s) to the shopping cart, then the 'Keep On Shopping' button should be used to link to the main page.

iv. Submit Order- When all items have been added to the shopping cart, users should verify that all the information entered is correct and submit it by clicking 'I Agree'. Consequently, a unique reference number is generated for the purchase order.

j) Checking Order Status – In order to view the order status, users must type in the correct reference number click the submit button as it is shown in Figure 8.15. The form completeness will be checked.

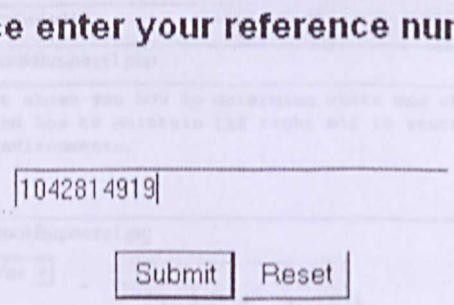

Figure 8.15 Checking Order Status (http://localhost/eMain/CheckStatus1.php)

Then, if the reference number is correct, the order status, definition and all items in the purchase order is displayed. Figure 8.16 shows the example.

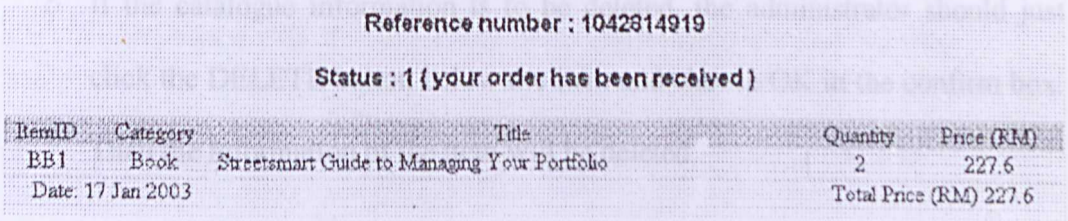

Figure 8.16 : Order Status

k) Update Catalogue –First of all, the administrator to login to access this function needs. Then, the administrator should select a subcategory under the books, magazines or newspapers in which the catalogue information belongs. Consequently, the catalogue information is displayed one by one. The figure 8.17 shows the form for updating one of the catalogues information. It provides an easy way to update, reset or delete information.

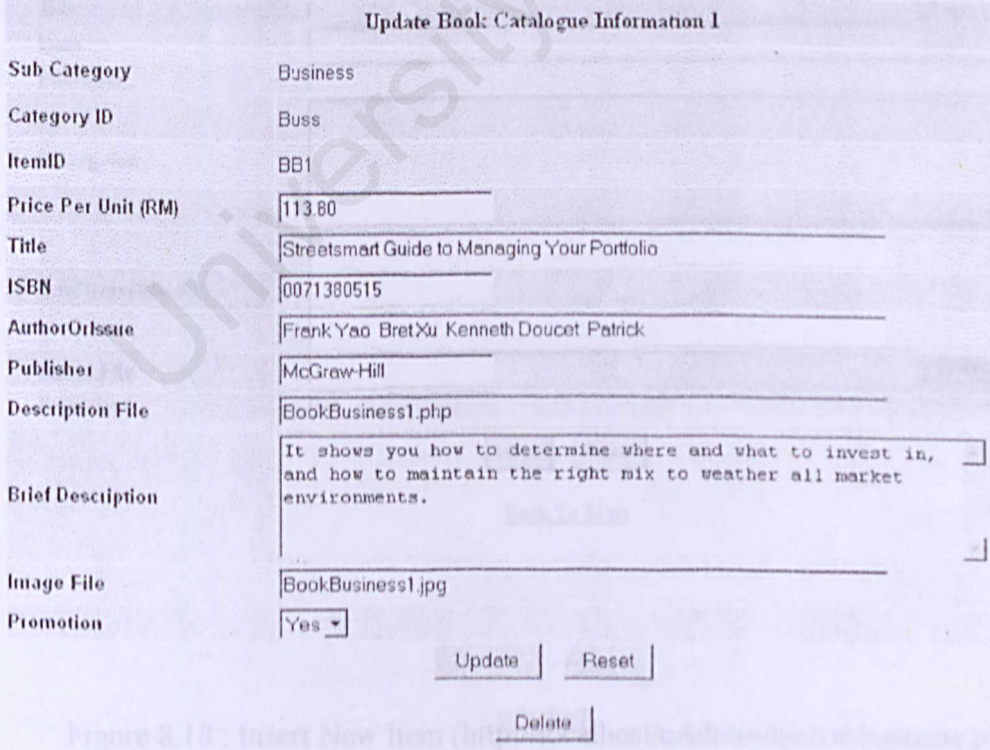

Figure 8.17 : Updating Catalogue Information

- If the catalogue information is to be updated, the administrator should make changes in the form and clicks the UPDATE button below the item. Then the updated information will be displayed.
- If the catalogue information is to be deleted, the administrator should just click the DELETE button below the item and choose OK in the confirm box. Then the information of the item will be deleted.

l). Insert New Catalogue Item – Firstly, the administrator needs to click on books, magazines or newspapers for insertion. Figure 8.18 shows the new the magazine insertion. The administrator must make sure that all information are filled up correctly before choose to click the INSERT button and choose OK in the confirm box. Then, the inserted information will be displayed on the new page.

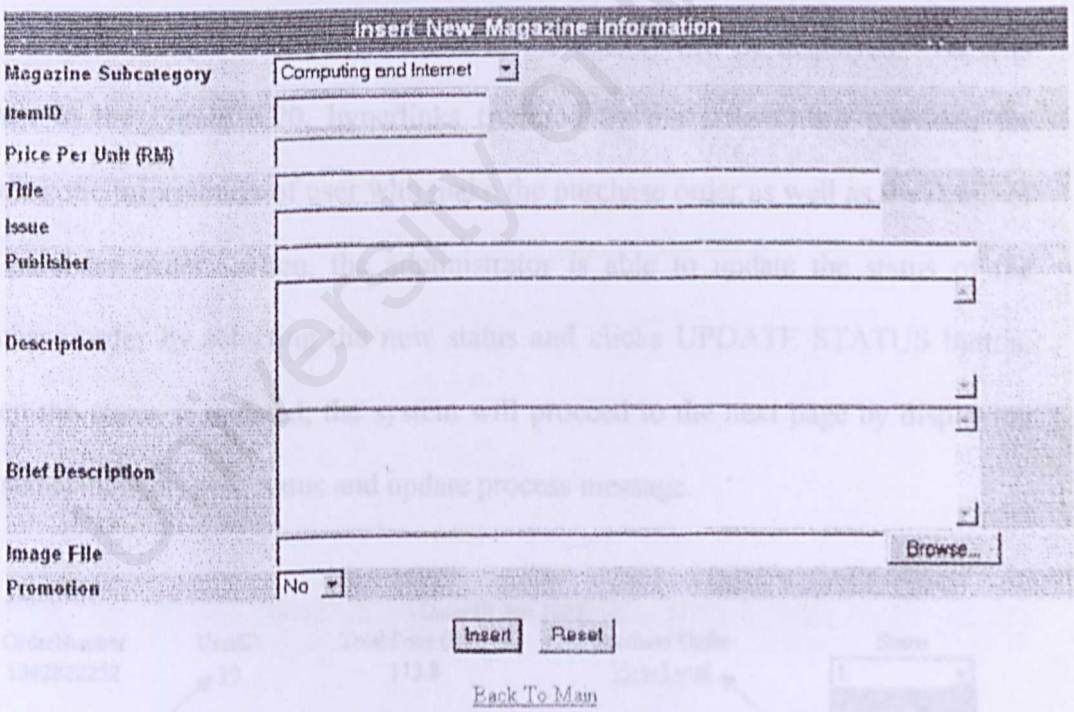

Figure 8.18 : Insert New Item (http://localhost/eAdmin/insertMagazine.php)

m) Updating Order Status – According the Figure 8.18, the administrator needs to fill in the date and clicks the SUBMIT button.

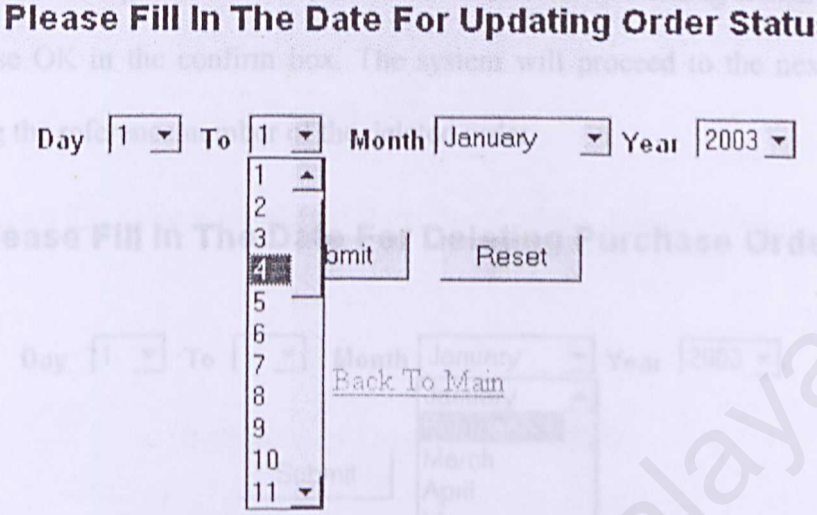

Figure 8.19 : Updating Order Status 1 (http://localhost/eAdmin/insertMagazine.php)

Next, the purchase orders made in the date(s) will be displayed. As it is shown in the Figure 8.20, hyperlinks (pointed by the arrows) are provided for viewing the information of user who make the purchase order as well as the detail of the purchase order. Then, the administrator is able to update the status of the purchase order by selecting the new status and clicks UPDATE STATUS button. When the status is updated, the system will proceed to the next page by displaying the status number, new status and update process message.

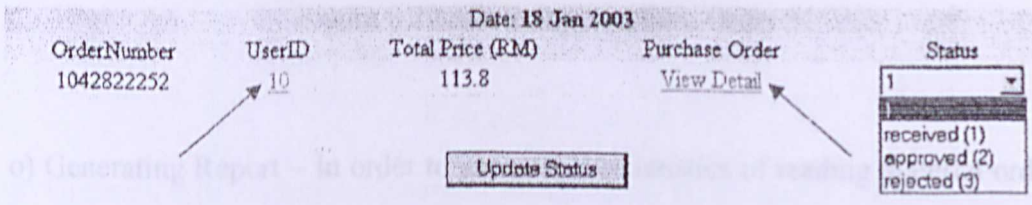

Figure 8.20 : Updating Purchase Order 2

n) Delete Purchase Order – First of all, the administrator needs to fill in the form as it is shown in Figure 8.21 and clicks SUBMIT button. Next, the purchase order make on the date(s) will be displayed as it is shown in Figure 8.22. Then the administrator may decide which purchase order(s) should be deleted by clicking DELETE button and choose OK in the confirm box. The system will proceed to the next page by displaying the reference number of the deleted order.

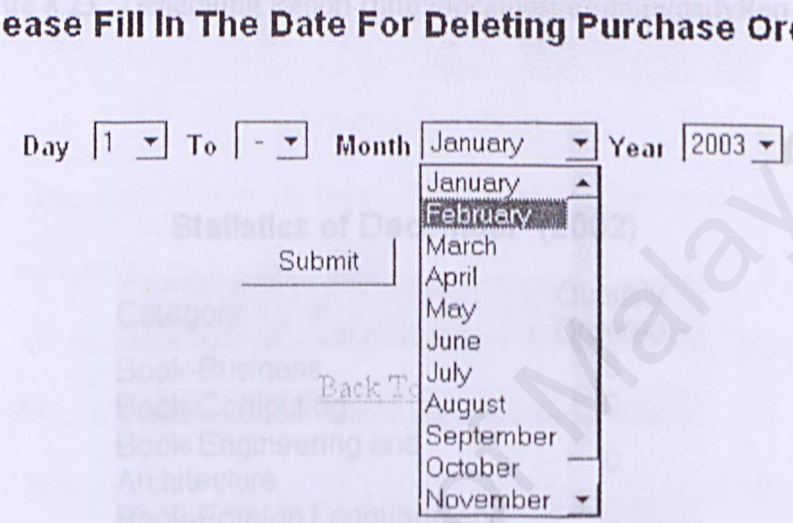

Figure 8.21 : Deleting Purchase Order 1 (http://localhost/eAdmin/DeleteOrder1.php)

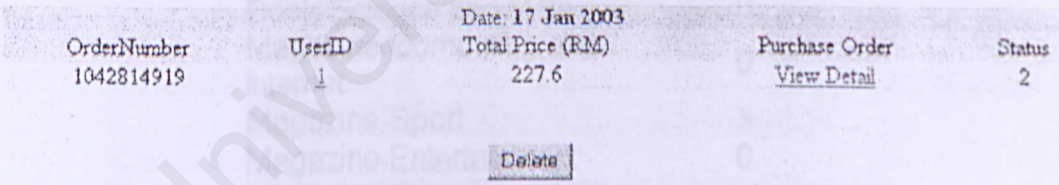

Figure 8.22 : Deleting Purchase Order 2

o) Generating Report – In order to generate the statistics of reading material ordered within a period, the administrator must specify and fill in the period as it is shown in Figure 8.23 before clicking the SUBMIT button. Next, the sample report is displayed in Figure 8.24.

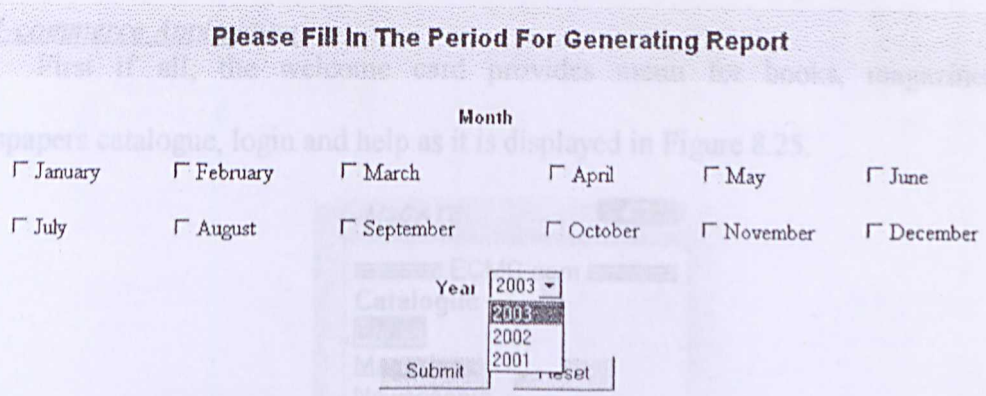

Figure 8.23 : Generating Report (http://localhost/eAdmin/dailyRep1.php)

Statistics of December (2002)

Category	Quantity Ordered
Book-Business	8
Book-Computing	0
Book-Engineering and Architecture	0
Book-Foreign Language and Reference	0
Book-General and Self-Help	0
Book-Sport and Recreation	1
Book-Medical	0
Book-Science and Math	0
Magazine-Computing and Internet	0
Magazine-Sport	3
Magazine-Entertainment	0
Magazine-Science and Technology	3
Newspaper-Malay	0
Newspaper-Mandarin	1
Newspaper-English	3

Figure 8.24 : Report

p) Update administator's information- Please refers to the update information in part e.

o) View database – It enables the administrator to link to the database.

B. *M-commerce Application*

First if all, the welcome card provides menu for books, magazines, newspapers catalogue, login and help as it is displayed in Figure 8.25.

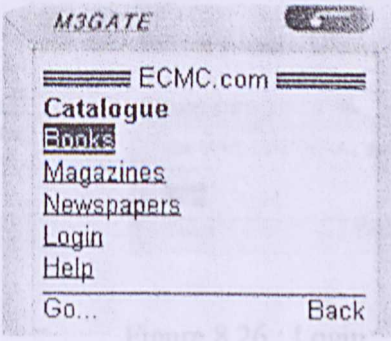

Figure 8.25 : Home

- **Login** -The steps shown in figure 8.26 elaborate the login process. The following explains each step.

  1. When the user sees the first screen in figure 8.26, he/she should pick/click on the 'Options' by pressing the soft key.

  2. Then, screen 2 appears. In order to enter the user name value the user should select the Edit and move to the next screen.

  3. The user should enter the user name and pick OK to proceed or Clear to cancel the input. Then, the screen similar to screen 1 appears and again the user should move the cursor down to the password and pick 'Options'. Consequently, screen 4 appears.

  4. Now, the user should enter the password and pick OK to proceed or Clear to cancel the input.

  5. If the user picks OK, the screen 5 automatically appears and the user should move the cursor to 'Login' and press the left soft key to chose SELECT.

  6. The login result will be displayed to inform the user whether the login is successful or not.

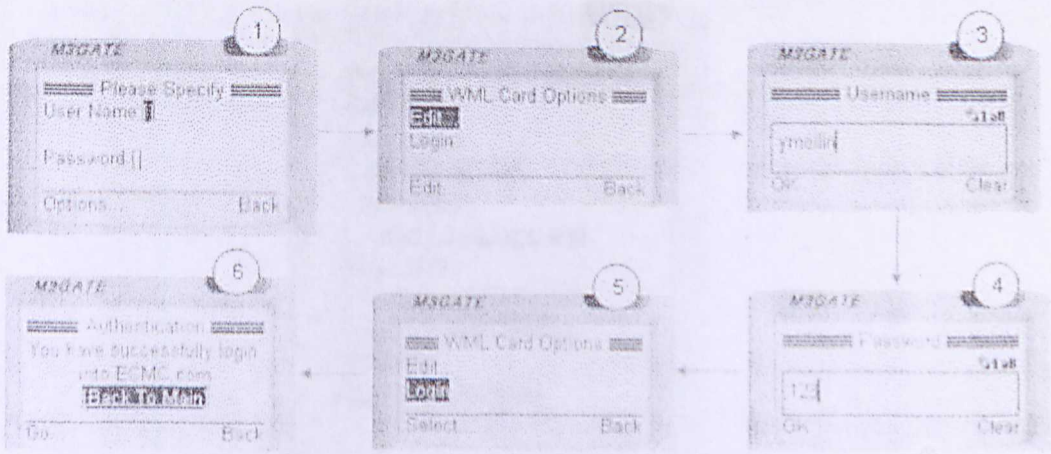

Figure 8.26 : Login

When the login is successful, the user will be able to access the extra function such as add item(s) to shopping cart, check status, change password and logout. The menu appears after the login successful is shown in the figure 8.27.

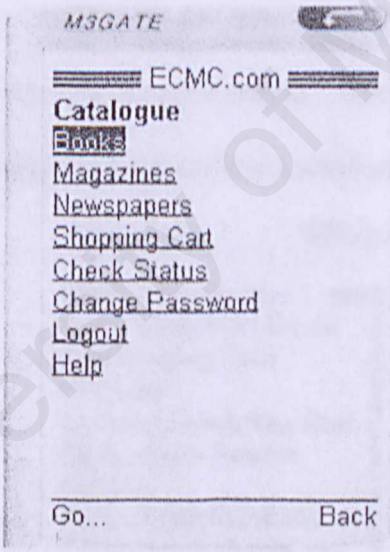

Figure 8.27 : Complete Menu

- **View Catalogue** –The user may choose any subcategory of reading material by selecting the hyperlink of books, magazines or newspapers. For an instance, if the user selects books, the screen will display the subcategories of books as shown in the figure 8.28.

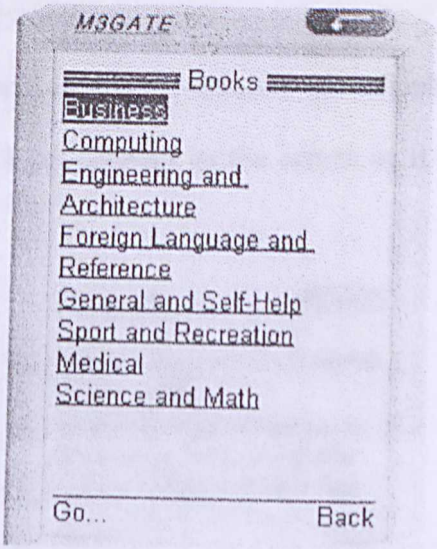

Figure 8.28 : Subcategories of Books

Next, if the users select 'Business' the catalogue of all books which are having the subcategory 'Business' will be display in sequence. The figure 8.29 shows the catalogue. In this catalogue, the user may choose to add in items to shopping cart or view the next item catalogue. The layouts of magazines and newspapers catalogues are the same as books catalogue.

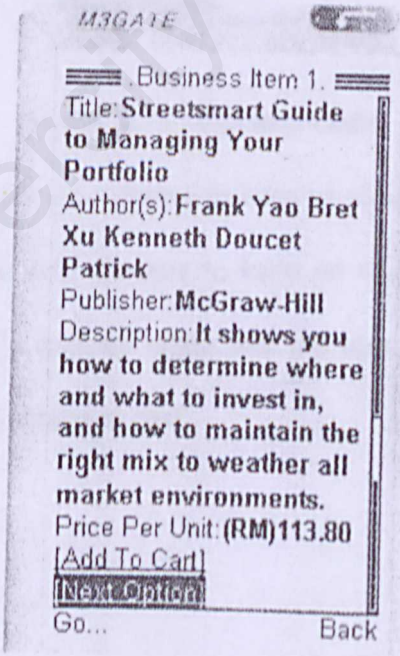

Figure 8.29 : Catalogue (Books)

- **Making purchase order –**

i. In order to add an item to cart, the user should choose the 'Add To Cart' and edit the quantity in the screen as it is displayed in figure 8.30.

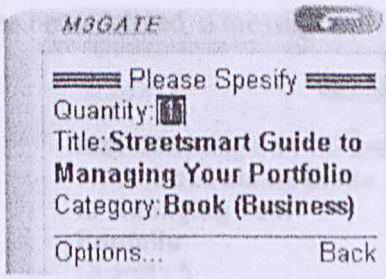

Figure 8.30 : Edit Quantity

ii. When the user has edited the quantity, the following page as figure 8.31 will be displayed. The user should choose 'Confirm Order' so that the item(s) will be added into the shopping cart.

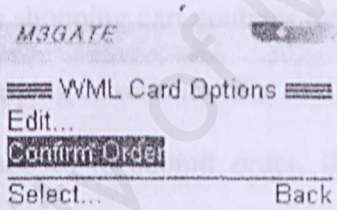

Figure 8.31 : Confirm Order

iii. Next, the user may choose to keep on shopping or view the shopping cart. If the user chooses to keep on shopping, the complete menu (figure 8.27) appears again and the user may choose to add more items to the shopping cart.

iv. If the user picks the shopping cart, the page as figure 8.32 will be displayed. The arrow below shows the number of item per total item(s). In this screen, the user is able to view the next item(s) in the shopping cart or choose to delete the item by just pick the link. Next, if the item has been deleted, a message will be displayed.

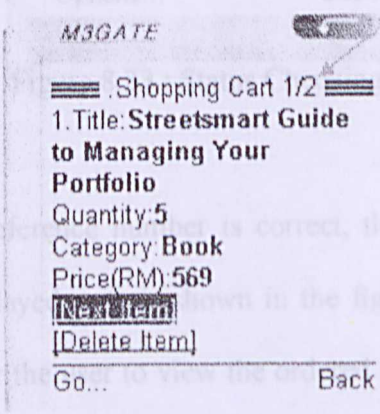

Figure 8.32 : Shopping Cart

The end of the shopping cart contains total item(s) and provides links to keep on shopping or submit order.

v. If the user chooses to submit order, then the page will display a confirmation message where the user must pick the 'I Agree' in order to confirm the purchase order.

vi. If the user has picked 'I Agree' a unique reference number and the total price will be displayed.

vii. Next the user may choose to logout or go back to main screen.

- **Status Checking** – by having the reference number, the user is able to perform status checking. Firstly, the user should select the 'Check Status' function in the complete menu and the screen as figure 8.33 will be displayed. Then, the user needs to press the soft key on the left to choose

for 'Options' followed by 'Edit'. Then a text box appears and the user need to key in the reference number.

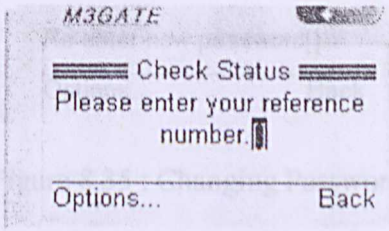

Figure 8.33 : Status Checking

Next, if the reference number is correct, the reference number and status will be displayed as it is shown in the figure 8.34. Furthermore, a link is provided for the user to view the ordered item as it is shown in the figure 8.34. Otherwise, if the reference number is incorrect, an error message will be displayed.

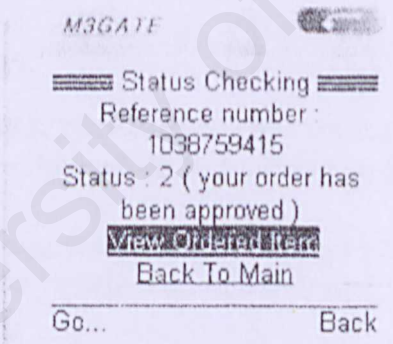

Figure 8.34 : Status Result

- **Change Password** – In order to change the password, a user needs to enter new passwords from the page shown in figure 8.35. Consequently, if both of the passwords entered the same, the changing password successful message will be displayed.

Figure 8.35 : Changing Password

Appendix D

Apache Configuration for PHP and WML

Download Apache

To download the Apache server for Windows, go to http://www.apache.org/dist and click on **Windows Installer**. Download the file onto your hard drive in the directory **c:\download\apache**

Install Apache

In your Windows Explorer, go to **c:\download\apache** and double click on the .exe file which was downloaded, e.g. **apache_1_3_12_win32.exe**. Keep clicking on the NEXT and YES buttons. After you click on the FINISH button, Apache wil be installed.

Configure Apache

1. The Apache server will not work until you configure it. Configuring Apache is very easy: you simply have to change one line in a text file called **httpd.conf**. You will find this file under **c:/Program Files/Apache Group/Apache/Conf**. You can edit it with any text editor, e.g. NotePad.
2. Open the file **C:\Programme\Apache Group\Apache\conf\httpd.conf** in a text editor. Then search for the line

   #ServerName new.host.name

   and replace it with

   ServerName localhost

   Then save the text file.

Test Apache

To start the Apache server, click on **START, PROGRAMS, APACHE WEB SERVER, START APACHE**. You should then see a DOS window which states that Apache is running.

Now, open up your browser and type in **http://localhost**. If you see a screen which reads something like "The Apache server is now installed on this web site", then you have successfully installed the Apache server!

Download PHP4

To download the PHP4, go to www.php.net/downloads.php and under "Windows 32 Binaries" click on **PHP 4.0.2** or whatever the latest version is. When you are asked to save the file, make a new directory called **c:\download\php4** and save it there.

Install PHP4

Go to **c:\download\php4** and double click on the .zip file which you just downloaded. Extract the files into a new sub-directory called **c:\php4win**.

After unzipping, to check if you were successful, look in **c:\php4win**. If you see about 18 files in it, most of them beginning with "php", then you have installed PHP4 successfully!

Configure PHP4

- Create a sub-directory called **c:\phpweb**. This is where your PHP files will reside.
- Rename the file **c:\php4win\php.ini-dist** to **php.ini**.
- Open this **php.ini** file with a text editor and change the **doc_root** and **extension_dir** lines so that they read as follows:

```
;;;;;;;;;;;;;;;;;;;;;;;
; Paths and Directories ;
;;;;;;;;;;;;;;;;;;;;;;;
include_path    =                       ; UNIX: "/
doc_root        =       "c:\phpweb"     ; the
user_dir        =
;upload_tmp_dir =                       ; temp
upload_max_filesize = 2097152           ; 2 Meg de
extension_dir   =       "c:\php4win"    ; dire
enable_dl       =  On
```

- Then move the two files **php.ini** and **php4ts.dll** to **c:\windows**.
- If you haven't already, make sure you delete the **php.ini** file from **c:\php4win** as otherwise it may cause conflicts later.

After you have copied these two files, PHP4 is configured.

Configure Apache for PHP4

Find and open the file **C:\Programme\Apache Group\Apache\conf\httpd.conf** in a text editor again. Then search for the **DocumentRoot** and **<Directory>** lines and change them so they read as follows:

```
# symbolic links and aliases
#
#DocumentRoot "C:/Programme/

DocumentRoot "C:/phpweb"

#
# Each
# to wh
# direc
#
# This should be changed to
#
#<Directory "C:/Programme/Ap

<Directory "C:/phpweb">

#
# This may also be "None", "
# "Includes", "FollowSymLink
```

Then under the line **AddType application/x-tar .tgz** add the following lines:

```
# For example, the PHP3 module (not part of the
# will typically use:
#
#AddType application/x-httpd-php3 .phtml
#AddType application/x-httpd-php3-source .phps
AddType application/x-tar .tgz

ScriptAlias /php4/ "c:/php4win/"
AddType application/x-httpd-php .php
AddType application/x-httpd-php .php3
AddType application/x-httpd-php .php4
Action application/x-httpd-php "/php4/php.exe"
```

Check closely for any typos, then save your changes.

Notice that in the **http.conf** file when referring to paths, Apache uses forward slashes ("/") instead of the more standard Window's backslashes ("\").

Notice also that a pound sign ("#") in front of a line comments it out so that it is not interpreted.

Notice also that the text **/php4/** in the above code does not refer a directory **c:\php4** (which should not exist) but is a variable which we define to refer to the PHP directory **c:\php4win**.

In case you need to know later at some point, there are two ways to configure Apache for PHP4, as a CGI module or an Apache module. In this workshop, we have installed the **Apache module**.

Add the following lines so that all files with *.php*, *.php3*, *.php4*, and *.phtml* extensions will be redirected to the PHP4 Apache module.

AddType application/x-httpd-php .php .php3 .php4 .phtml
AddType application/x-httpd-php-source .phps

Configure WML

AddType text/vnd.wap.wml wml
AddType application/vnd.wap.wmlc wmlc
AddType text/vnd.wap.wmlscript wmls
AddType application/vnd.wap.wmlscriptc wmlsc
AddType image/vnd.wap.wbmp wbmp
AddType application/x-httpd-php .wml

Test PHP4

To stop and start the Apache server, click on START, PROGRAMS, APACHE WEB SERVER, STOP APACHE, then start it again with START, PROGRAMS, APACHE

WEB SERVER, START APACHE.

Then create a one-line test PHP file called "c:\phpweb\test.php" with the following contents:

Today is <? print strftime("%m/%d/%Y"); ?>

Then open your browser and go to: **http://localhost/test.php**

If you see the words "Today is" followed by the actual date, then you have successfully installed PHP4!

Download MySQL

1. Go to **http://www.mysql.com/downloads/os-win32.html**
2. Click on **mysql-shareware-3.22.34-win.zip**
3. Save this file to **d:\download\mysql**
4. In **c:\download\mysql**, double-click on **setup.exe**.
5. Keep clicking **Next** and **Yes** during the installation process until it MySQL is installed.

Start MySQL

To start MySQL, go to **c:\mysql\bin\"** and double click on **mysqld-shareware.exe**. If a MS-DOS window opens for a second and then closes, you did it correctly! MySQL has been started.

Test MySQL

Create the file **c:\phpweb\testmysql.php** with the following content:

```
<pre>
<h3>Press RELOAD to add a record to the MySQL database:</h3>
<?
//establish user connection
mysql_connect("localhost");
//open up database
mysql_create_db("testdatabase");
mysql_select_db("testdatabase");
//create table
mysql_query("CREATE TABLE newone(firstName VARCHAR(25), lastName
VARCHAR(25))");
mysql_query ("INSERT INTO newone (firstName, lastName) VALUES ('John',
'Tester')");
//display the information
$result = mysql_query ("SELECT * FROM newone");
while($row = mysql_fetch_array($result))
```

```
{
print ("Added record: " . $row["firstName"]." ".$row["lastName"]."<br>\n");
}
//close user connection
mysql_close();
?>
</pre>
```

Each time you click on the RELOAD button, you will see that another record has been added to the database.