FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

ONLINE MUSIC STORE (OMS)

by

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ABSTRACT

The Online Music Store (OMS) is an internet/intranet-based electronic commerce system, which enables users to view, order and make transaction online. It is an application that makes use of the web's multi-tier client server architecture.

The Online Music Store (OMS) can be divided into three modules, which are the customer module, administrator module and the general module. The customer module would allow customers to browse through the various CDs, which will be displayed on the online catalogue. It would provide useful tools that would enable the customers to make comparisons on the prices and features of each product. The administrator module will enable the administrator to manage the system in a more effective and systematic way. This module would enable the administrator to view, maintain and analyze the database and also update the content of the web site. The general module would enable the business to check their stock inventory before the customers confirm their order. This module would also require customers to follow certain software and hardware requirements in order to perform their transaction online.

The system architecture of the Online Music Store (OMS) can be divided into client, web server and database server. The client which is the web browser can access information by connecting to the web server. Whenever, the client wants to retrieve information, it has to submit the request to the web server that will interact with the database server. The database server processes the request and the result is sent back to the web server and finally to the client.

The Online Music Store (OMS) is developed using Active Server Pages (ASP) technology on the Windows NT Server platform, utilizing database created by Microsoft Access. Since current client server based database system will be transforming to web-based database system, thus the system of this nature will become essential to everyone in the future.

ACKNOWLEDGEMENT

This project would not have been possible without the help of many people who had been very kind in giving their valuable advice and encouragement. First and foremost, I would like to say a big thank you to my supervisor, Pn. Fazidah Othman for her support, encouragement, advice and not to forget, patience throughout the entire project. Her excellent supervision is one of the main reasons for the success of the Online Music Store (OMS).

Special appreciation and thanks also goes to my moderator, Ms. Rafidah Md. Noor for spending her precious time to moderate me. I would also like to thank all the lecturers and staffs of FSKTM for their help and encouragement.

Last but not least, I would like to take this opportunity to thank my beloved family and friends for their encouragement and help that was so meaningful to me throughout this project. I would like to thank my Dad, Mum and my beloved sister for all their support. A very big thank you also goes to Rathi Devi, Ruben, Thinegan, all of my housemates, coursemates and members of the Second Residential College, University Malaya.

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TABLES OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 PROJECT OVERVIEW

The Internet has become extremely significant in a person's life in today's world that almost everyone have at least heard about it if not used it. With the advancement of the world wide network called the Internet, we now have a new way of conducting business transactions or what we call as electronic commerce. What do we understand by the term *electronic commerce*? Electronic commerce or in short, e-commerce is transactions that take place by telecommunication networks. It is a process of buying and selling products, services and information over computer networks by using the Internet as a medium of data transmission. With e-commerce, the old era of conducting business activities manually [Figure 1.1] is taken over by a new method such as ordering, invoicing and payment using electronic media as a form of transaction [Figure 1.2].

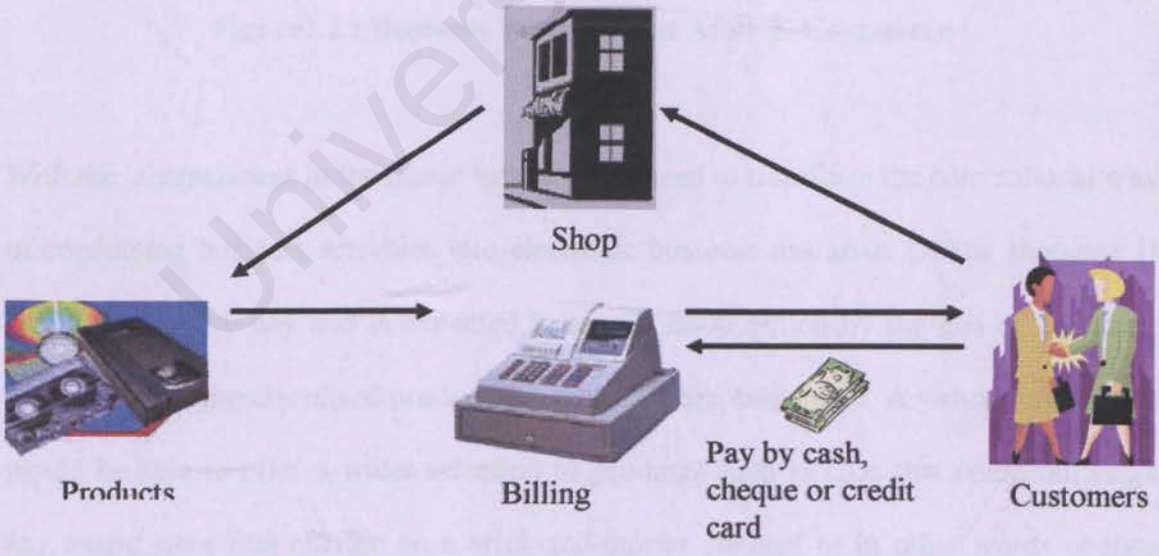


Figure 1.1 : Business Transactions Before E-Commerce

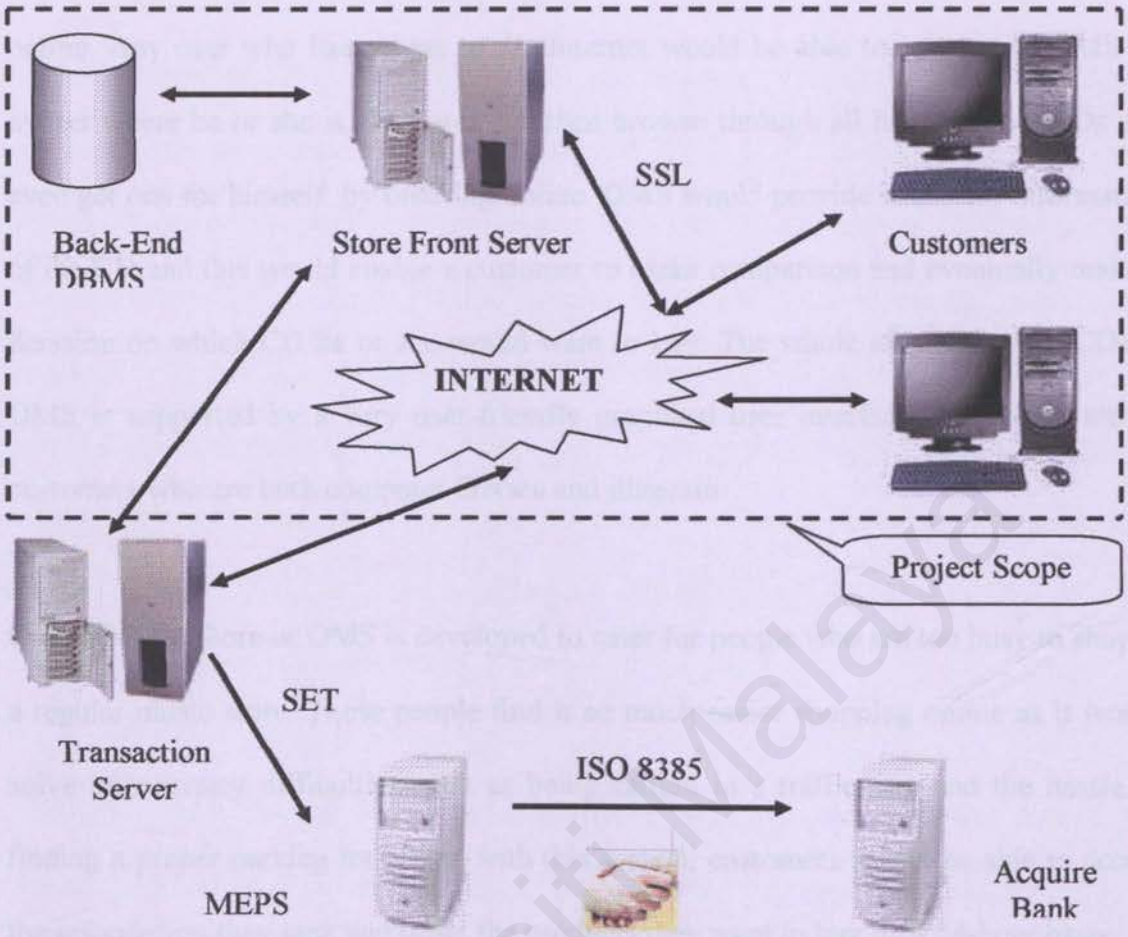


Figure1.2 : Business Transactions After E-Commerce

With the advancement in the music industry, the need to transform the conventional way of conducting business activities into electronic business has arise. Online shopping is increasing day by day and is expected to exceed $800 billion by the end of this year, hence branded merchandised products such as CDs are easily sold. A virtual music store would be able to offer a wider selection of products such as CDs that could outweigh any music store that operate on a brick-and-mortar concept or in other words operate using a physical presence.

Online Music Store or in short, OMS is system that would allow people to order CDs online. Any user who has access to the Internet would be able to connect to OMS no matter where he or she is. The user can then browse through all his favourite CDs and even get one for himself by ordering online. OMS would provide sufficient information of the CD and this would enable a customer to make comparison and eventually make a decision on which CD he or she would want to buy. The whole idea of buying CDs at OMS is supported by a very user-friendly graphical user interface that would attract customers who are both computer literate and illiterate.

Online Music Store or OMS is developed to cater for people who are too busy to shop at a regular music store. These people find it so much easier shopping online as it would solve unnecessary difficulties such as being caught in a traffic jam and the hassle of finding a proper parking lot. Thus, with this system, customers would be able to access the information they seek and order the products they want to buy on a 24-hour basis.

All in all, this project would concentrate on the methods where data will be stored and retrieved from the database system. During data retrieval, the data will be matched with the data stored in the database system before it can be retrieved from the database. In addition, the flow of the inventory control system will be carefully planned and developed so that the system would adapt to the real market. As a conclusion, the development of OMS would mark a smart business solution for a company.

1.2 PROJECT DEFINITON

Online Music Store is an internet/intranet-based system, where the system enables users to view, order and make transaction on-line. OMS is a virtual music store that offers variety of music CDs which can be bought online. With OMS, anyone who has access to the Internet would be able to browse through his or her favourite music CDs from the online catalogue and order their favourite CDs once they decide which one to buy. The online catalogue would provide sufficient information for a particular CD such as the album title, artist name, price, and a short description. When a customer decides to buy a CD, he or she would have to use the shopping cart technology provided by the system by adding the product to his or her cart.

OMS uses the latest web technologies and tools to develop an online business for the current physical music stores. It provides a solution for businesses that are ready and brave enough to take on the e-commerce challenge. These businesses would then be able to explore a wider market and thus become more competitive to their rivals. The whole system in OMS is divided into three main modules which are: -

- Customer module
- Administrator module
- General module

The customer module would allow customers to browse through the various CDs which will be displayed on the online catalogue. It would provide useful tools that would enable the customers to make comparisons on the prices and features of each product.

Besides that, customers can register to become a member of the OMS which will enable them to order CDs online and also access various information such as latest news or events in the music world, artist information and song chart. This module also provides secure on-line payment and transmission of data.

The administrator module will enable the administrator to manage the system in a more effective and systematic way. This module would enable the administrator to view, maintain and analyze the database and also change the content of the web site so that customers are always updated with the latest information on the products that are offered.

The general module would enable the business operators or rather the merchants to check their stock inventory before the customers confirm their order. Customers will be able to get updated information about the availability of the products before they purchase it. Customers are also required to follow certain software and hardware requirements in order to perform their transaction online.

1.3 PROJECT MOTIVATION

The Internet in recent years has turn out to be a global market in the business world. A few years back, everyone was so afraid to buy anything on the Internet but what we have now is the total opposite of it. In recent days, the term e-commerce has become a norm in the society. Almost everyone walking in the street would have at least heard about it if not used it or rather purchased something online. In time to come, e-commerce would grow so big that it would be able to match or may even beat physical business operations.

Online Music Store or the OMS is a virtual music store that offers a variety of music CDs on a 24-hour basis. In other words, anyone who has access to the Internet would be able to get his or her favourite CD at any time of the day by using credit card or money order payment method. Once the OMS is fully operational, it would provide a better solution for people to shop. It would solve so many unnecessary difficulties such as being caught in a traffic jam and the hassle of finding a proper parking lot that would limit a person's shopping needs. Besides that, it would also solve other problems in the administration of a music store in terms of accounts and the store's management. This is because with an online system, the chances of having an error in the administration of a music store is very minimal or none at all. Thus, we would have a music store that is operated in a very systematic and effective way. All in all, the development of the Online Music Store would enhance the Malaysian music industry which is growing rapidly.

1.4 PROJECT OBJECTIVES

1.4.1 PROBLEMS IN TRADITIONAL BUSINESS METHODS

Traditional business methods are known to have a lot of problems such as inefficiency, inaccuracy, insecurity, delay and much more. For example, if a businessman running a traditional music store wanted to check his stocks, he would have to count the stocks manually in order to know how many products are sold and how many are still available. There is a big chance that this would lead to inaccuracy, as it is normal for human being to make mistakes. In another case, if the businessman wanted to keep records of his customers, he would have to enter all the details of his customers into a customer record form manually and update it when a customer notifies him of a change. This would definitely waste a lot of money and time as the businessman has to do all the record keeping manually.

Another problem in a traditional business is the limited coverage area. For example, if a traditional music store were situated in a certain area, its customers would mainly come from the area itself and very rarely from other areas. Thus, the store would loose its customers especially those that are situated in non-prime areas, and eventually lead to a loss to the business. Shopping in a traditional music store is a hassle for shoppers as it would costs a lot of time being spent. In conclusion, the development of the Online Music Store would definitely mark a smart solution to overcome the problems faced by both businessman and the customers in a traditional business

1.4.2 OBJECTIVES

Online Music Store or OMS is developed in order to overcome the problems faced by merchants and customers as stated above. The objectives of OMS are :-

1. Provide a reliable Online Music Store to sell latest products to any Internet user.
2. Maintain a business transaction in a more efficient and easier way.
3. Provide a broader market for a business.
4. Convenience.
5. User-friendly interface.
6. Many user useful tools to satisfy the bugging needs and make a real shopping experience.
7. Conduct a business in a paperless environment.

1.5 PROJECT SCOPE

1.5.1 TARGET USERS

The Online Music Store is targeted for all Internet users around the world.

1.5.2 MODULES

The project scope of the Online Music Store is divided to three main modules that is the customer module, administrator module and the general module.

CUSTOMER MODULE

The customer module includes: -

i. An online CD catalogue for shoppers to view

ii. An order form for shoppers who want to place an order

iii. Facility that would enable customers to view their accounts

iv. Shopping cart

v. Information on the latest development in the music world

ADMINISTRATOR MODULE

The administrator module includes: -

i. Maintaining and updating all the information stored in the database

ii. Keeping track on customers' information.

iii. Managing customer orders.

iv. Maintaining employee information

GENERAL MODULE

The general module includes: -

i. Makes sure a secure transaction is carried out

ii. Company credibility

iii. Agreement document

iv. Web site reusable functionality

1.5.3 SYSTEM SECURITY

Realizing the needs for a secure medium of transmission for the Online Music Store (OMS), a level of security would be implemented in this system since it involves large and confidential databases. There would be mainly two types of security features that

would be implemented that is restriction by username and password and encryption using cryptography.

Restriction by username or password

Users who wish to access the system will be needed to provide a username and password recognized by the system. Therefore, users need to register with the system in order for the system to recognize their username and password.

Encryption using cryptography

This technique will be used for password and also credit card numbers. Usage of cryptography will encrypt both the request for a particular information and the information itself in such a way that it cannot be read by anyone but the intended recipient. Cryptography will also be used for reliable user verification.

1.6 SOFTWARE AND HARDWARE REQUIREMENTS

Online Music Store is a client-server system. Therefore, the hardware requirements for this system are divided into two categories that are hardware requirements for the server computer and the hardware requirements for the client computer.

Hardware requirements for the server computer are:-

1. A server with at least Pentium 166MHz MMX processor.
2. At least 64MB RAM.
3. Network Interface Card (NIC) and network connection with recommended bandwidth at 10Mbps.

4. Standard computer peripherals.

The client computer hardware requirements are:

1. Any compatible PC with recommended at least Pentium MMX processor and 32MB RAM.

The software tools that I plan to use are:-

1. PLATFORM :- Windows NT Server 4.0
2. AUTHORING TOOLS :- Macromedia Dreamweaver MX
3. PROGRAMMING LANGUAGES :- HTML, Vbscript, JavaScript
4. DATABASE :- Microsoft Access
5. WEB TECHNOLOGY :- Active Server Pages (ASP)

1.7 RESEARCH PLAN

1. Secure online credit card transaction :- Various security features for credit card transaction via the Internet are being studied so that it can be implemented on the Online Music Store.
2. Interviews conducted with current music store operators around Klang Valley.
3. Survey on what software to be used in developing the system.

1.8 DEVELOPMENT STRATEGY

When developing a system, it is important to first of all identify what kind of software process model that would suite the development of the system. In my system, the software process model that I have planned to use is 'Waterfall Model with Prototyping'. One of the main reasons why I chose this model is because the 'Waterfall Model with Prototyping' enables the development of the system to be carried out step-by-step or in stages. This would enhance the system, as it would be more systematic and order

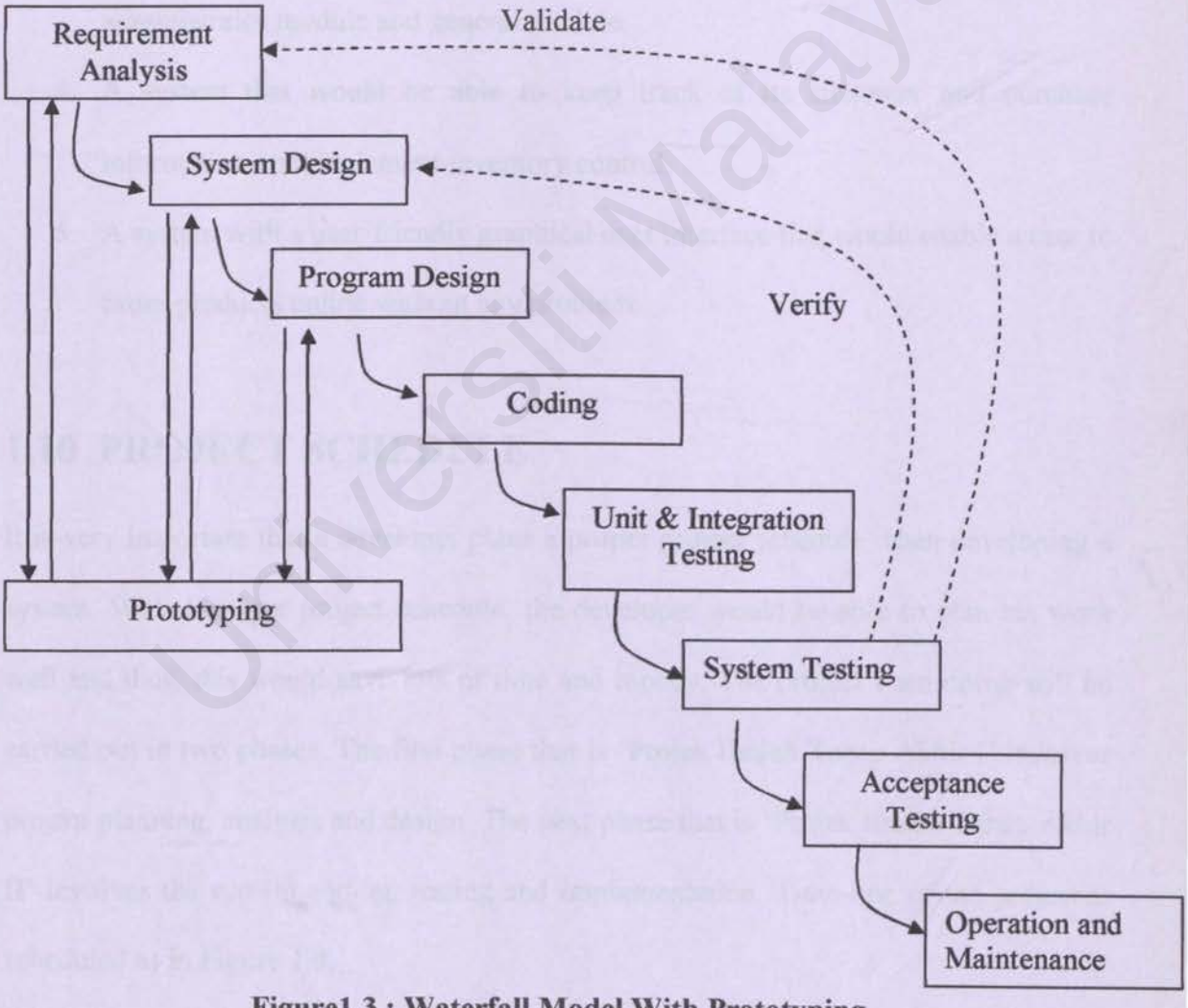


Figure1.3 : Waterfall Model With Prototyping

1.9 EXPECTED OUTCOME

The Online Music Store or OMS is developed in order to achieve the following outcome:-

1. A system that would be able to attract and convince Internet users and capture the market in the music business.
2. A system built with current security features in order to conduct a secure transaction over the web.
3. A system that consists of three main modules, which are the customer module, administrator module and general module.
4. A system that would be able to keep track of its customer and purchase information and implement inventory control.
5. A system with a user-friendly graphical user interface that would enable a user to order products online without any problem.

1.10 PROJECT SCHEDULE

It is very important that a developer plans a proper project schedule when developing a system. With a proper project schedule, the developer would be able to plan his work well and thus, this would save lots of time and money. The project I am doing will be carried out in two phases. The first phase that is 'Projek Ilmiah Tahap Akhir I' involves project planning, analysis and design. The next phase that is 'Projek Ilmiah Tahap Akhir II' involves the system coding, testing and implementation. Time-line of the project is scheduled as in Figure 1.4.

Figure 1.4 : Project Schedule For Online Music Store
(March 2003 - September 2003)

ID		Task Name	Mar		Apr		May		Jun		Jul		Aug		Sep	
			-3	-1	2	4	6	8	10	12	14	16	18	20	22	24	26
1		Literature Review															
2		System Analysis															
3		System Design															
4		Implementation															
5		Integration and Testing															
6		Maintenance/Enhancement															
7		Documentation															

1.11 CONCLUSSION

Electronic commerce has become a new trend in the business world. In Malaysia, a lot of companies have taken the e-commerce challenge and are already running their businesses via the Internet. With Online Music Store, shoppers can now get their favourite CDs without facing all the hassle that they have to put up with when shopping at a physical music store. As a conclusion, the development of the Online Music Store would further enhance the music industry and lead the business industry in Malaysia into a global market.

LITERATURE REVIEW

CHAPTER 2 : LITERATURE REVIEW

Literature review is an important chapter in this project as it is a research study of the system that is going to be developed. The studies include the current e-commerce business, evaluation of e-commerce client server architecture and the future of e-commerce. In addition, literature review will also review the strengths weaknesses in the existing systems. A comparison will be done between existing systems and the Online Music Store. Through this study, the developer would be able to gain more knowledge and understanding in developing a new system. As a result, the developer would be able to improve the weaknesses and integrate the existing strengths with the latest web technology in order to produce a better system.

2.1 WHAT IS LITERATURE REVIEW

A literature review summarizes, interprets and evaluates existing "literature" (or published material) in order to establish current knowledge of a subject. The purpose for doing so relates to ongoing research to develop the knowledge. The literature review may resolve a controversy, establish the need for additional research and /or define a topic of injury.

2.2 PURPOSE OF LITERATURE REVIEW

The purpose of a literature review is to establish current knowledge on an issue that relates to the topic of research. Literature review is an important process in a system development. Literature review provides the necessary background and information and thus acts as a base to start off a research with. In this stage, findings, summary, analysis and synthesis of the system will be done. This is to ensure the full understanding of the system and that the most suitable software and tools are used.

2.3 APPROACHES IN GATHERING INFORMATION

A system is a collection of objects and activities, plus a description of a relationship that tie the objects and activities together. Typically, a system definition includes, for each activity, a list of inputs required, actions taken, and outputs produced. A system can be developed in different ways. Before developing a system, information about the characteristics and purpose of the system to be developed, the procedures involved to develop the system, and the methodologies used to develop the system need to be gathered. There are many sources, where these valuable information can be obtained.

Each source will provide different information and facts depending on the keyword or phrases used to obtain the information. Information can be obtained from system users through survey and questionnaires, the Internet, books, review of existing systems, and so on. For the gathering of information to develop the Online Music Store (OMS), the

resources include electronic media, printed media, survey and questionnaires, and guidance from the lecturer.

The Internet, one of the main electronic media today, provided a lot information regarding methodologies for the system development, information about the most suitable hardware and software to use, and development tools, Besides that, many other online music store sites were reviewed in order to specify the necessary requirements for the Online Music Store. Various search engines were used in the process of gathering the information namely Google, Yahoo, Altavista, and MSN search. The specific keywords used for the search would depend on the type of information that I'm looking for.

As for the printed media, books were used to get the details about the development models, authoring tools, and the process of capturing requirements to develop a system.

A survey was carried out to gather information from the end-users. The survey was done in front of the University Malaya Main Library involving 50 students. The result from the survey was analyzed and will be taken into consideration when developing the system.

Besides all of the above sources, precious information were also gathered from the guidance of my supervisor, Ms. Fazidah Othman and also my moderator, Ms. Rafidah Md. Noor.

2.4 THE INTERNET

The Internet plays a major role in various aspects such as education, science and technology, economy and much more in today's world. With the Internet, the word 'modernization' has become more meaningful but how many of us know where did it all start from or how did it start ?

In 1973, the U.S. Defense Advanced Research Projects Agency (DARPA) initiated a research program to investigate techniques and technologies for interlinking packet networks of various kinds. The objective was to develop communication protocols, which would allow networked computers to communicate transparently across multiple, linked packet networks. This was called the Internetting project and the system of networks, which emerged from the research, was known as the "Internet." The system of protocols, which was developed over the course of this research effort, became known as the TCP/IP Protocol Suite, after the two initial protocols developed that is Transmission Control Protocol (TCP) and Internet Protocol (IP).

In 1986, the U.S. National Science Foundation (NSF) initiated the development of the NSFNET, which today, provides a major backbone communication service for the Internet. With its 45 megabit per second facilities, the NSFNET carries on the order of 12 billion packets per month between the networks it links. The National Aeronautics and Space Administration (NASA) and the U.S Department of Energy contributed additional backbone facilities in the form of the NSINET and ESNET respectively. In Europe, major international backbones such as NORDUNET and others provide

connectivity to over one hundred thousand computers on a large number of networks. Commercial network providers in the U.S. and Europe are beginning to offer Internet backbone and access support on a competitive basis to any interested parties.

Various consortium networks provide "Regional" support for the Internet and "local" support is provided through each of the research and educational institutions. Within the United States, much of this support has come from the federal and state governments, but a considerable contribution has been made by industry. In Europe and elsewhere, support arises from cooperative international efforts and through national research organizations. During the course of its evolution, particularly after 1989, the Internet system began to integrate support for other protocol suites into its basic networking fabric. The present emphasis in the system is on multiprotocol interworking, and in particular, with the integration of the Open Systems Interconnection (OSI) protocols into the architecture.

Both public domain and commercial implementations of the roughly 100 protocols of TCP/IP protocol suite became available in the 1980's. During the early 1990's, OSI protocol implementations also became available and, by the end of 1991, the Internet has grown to include some 5,000 networks in over three dozen countries, serving over 700,000 host computers used by over 4,000,000 people. During the late 1980's, however, the population of Internet users and network constituents expanded internationally and began to include commercial facilities. Indeed, the bulk of the system today is made up of private networking facilities in educational and research institutions, businesses and in government organizations across the globe.

2.5 E-COMMERCE

When it comes to e-commerce, the first thing that pops into people's mind is, it is another typical activity of buying and selling goods via an online system. However, e-commerce includes a wider scope. Simply explained, e-commerce covers all transactions conducted online, including the transaction of service. So combining the concept of an online music store with the capabilities of e-commerce, it is evident why an in-depth study should be done before developing the Online Music Store. [1]

2.5.1 E-COMMERCE : A GENERAL PREVIEW

Electronic commerce, or "e-commerce," is one of the biggest buzzwords in today's business world. In its simplest form, e-commerce just means taking things that a company is already doing in person, through the mail, or over the telephone, and doing those things in a new place that is on the Internet. It may seem special now, but in a few short years it'll be just another part of how every company does business. In fact, we are rapidly headed for a time when businesses that aren't on the Internet will be as far out of the mainstream as a business without a telephone number is today.

Businesses can do things with e-commerce that would be prohibitively expensive or logistically difficult to do through older channels of commerce. A web site is naturally a 24-hour-a-day operation, unlike a traditional 9-to-5 company. It is much easier to keep a web site up to date with all the company and product information than it is to do the same thing with print materials. And the interactivity and completeness of an e-commerce web site can engage customers more directly, giving them a feeling of

empowerment and control that is difficult to duplicate through other methods of doing business.

2.5.2 ADVANTAGES AND DISADVANTAGES OF E-COMMERCE

2.5.2.1 ADVANTAGES

When we talk about the advantages of e-commerce, we have to take into account the advantages that would affect two parties that is the merchant and the customer. There are many benefits that these two parties would gain by taking on the e-commerce challenge. Merchants may benefit from :-

Increased Sales

- Offer a larger range of products and services with little increase in cost.
- Implement price changes, introduce new products, implement short-term promotions quickly and easily.
- Enable customers to buy products or services over the Internet.
- Access customers that were once inaccessible due to geographic location.

Reduced Costs

- Reduce order management costs by receiving a correct order from your customers the first time.
- Reduce selling and marketing costs - electronic catalogues diminish the need to print and distribute paper catalogues.
- Take advantage of new business opportunities such as sharing inventory or delivery charges with other suppliers who service the same customer.

Improved Customer Service

- Each customer is an individual with customer specific pricing.
- Customers can keep track of their orders online.

Customers may benefit from :-

Greater Convenience

- Search on-line catalogues with current product information from selected suppliers at any time from anywhere.
- Order goods according to your individual trading terms and conditions.
- Lock in your purchasing deals for company wide consistency.

Time Saving

- Remove out of date supplier catalogues.
- Order from multiple suppliers using a single form.
- Save forms for reoccurring purchases.

Better Business Communication

- Negotiate prices with suppliers online.
- Keep track of your order online.
- All orders and transactions are traceable & secure making your audit process more comprehensive.

2.5.2.2 DISADVANTAGES

In developing an e-commerce application, several drawbacks must be considered. Security is the major concern when conducting business online. Online business are vulnerable to threats such as hackers, data losses and other network threats.

Privacy poses another problem for e-commerce. Customers are always sensitive and unwilling to reveal their personal information on the Internet. Some might be turned off when they are required to fill in forms containing the identification card number and other personal information while some might give false information.

2.5.3 E-COMMERCE ISSUES

2.5.3.1 SECURITY

Recognizing that security is a top concern for many web shoppers, merchants should make reasonable efforts to ensure that security of consumers' transaction information. Furthermore, these measures should be consistent with current industry standards and should include the use of password, protected access, encryption or similar technologies to protect information about the customer and the transaction. Besides that, merchants should adopt policies that are consistent with existing industry standards and legal requirements.

Security risk can include theft of data, distortion of data or broadcasting of data. All these cost money in forms of data recovery and goodwill recovery. [Alex Gutsman, 2001].

Generally the concern on the web security is unfounded. Most web store owners offer Secure Socket Layer (SSL) servers so that information cannot be interpreted by cyber-hackers. Another security protocol, Secure Electronic Transaction (SET) is also commonly used throughout the world. In fact, the Secure Socket Layer (SSL) and the Secure Electronic Transaction (SET) are two widely known security protocols each providing a secure way to make payment over the web, thus enhancing security on the Internet.

2.5.3.1.1 SECURE ELECTRONIC TRANSACTION (SET)

Secure Electronic Transaction (SET) is a system for ensuring the security of financial transactions on the Internet. It was supported initially by Mastercard, Visa, Microsoft, Netscape, and others. With SET, a user is given an electronic wallet and a transaction is conducted and verified using a combination of digital certificates and digital signatures among the purchaser, a merchant, and the purchaser's bank in a way that ensures privacy and confidentiality. SET makes use of Netscape's Secure Sockets Layer (SSL), Microsoft's Secure Transaction Technology (STT), and Terisa System's Secure Hypertext Transfer Protocol (S-HTTP). SET uses some but not all aspects of a public key infrastructure (PKI). [13]

How does SET work?

Assume that a customer has a SET-enabled browser such as Netscape or Microsoft's Internet Explorer and that the transaction provider (bank, store, etc.) has a SET-enabled server.

1. The customer opens a Mastercard or Visa bank account. Any issuer of a credit card is some kind of bank.
2. The customer receives a digital certificate. This electronic file functions as a credit card for online purchases or other transactions. It includes a public key with an expiration date. It has been through a digital switch to the bank to ensure its validity.
3. Third-party merchants also receive certificates from the bank. These certificates include the merchant's public key and the bank's public key.
4. The customer places an order over a web page, by phone, or some other means.
5. The customer's browser receives and confirms from the merchant's certificate that the merchant is valid.
6. The browser sends the order information. This message is encrypted with the merchant's public key, the payment information, which is encrypted with the bank's public key (which can't be read by the merchant), and information that ensures the payment can only be used with this particular order.
7. The merchant verifies the customer by checking the digital signature on the customer's certificate. This may be done by referring the certificate to the bank or to a third-party verifier.

8. The merchant sends the order message along to the bank. This includes the bank's public key, the customer's payment information, which the merchant can't decode, and the merchant's certificate.
9. The bank verifies the merchant and the message. The bank uses the digital signature on the certificate with the message and verifies the payment part of the message.
10. The bank digitally signs and sends authorization to the merchant, who can then fill the order.

2.5.3.1.2 SECURE SOCKET LAYER (SSL)

The Secure Sockets Layer (SSL) is a commonly used protocol for managing the security of a message transmission on the Internet. SSL has recently been succeeded by Transport Layer Security (TLS), which is based on SSL. SSL uses a program layer located between the Internet's Hypertext Transfer Protocol (HTTP) and Transport Control Protocol (TCP) layers. SSL is included as part of both the Microsoft and Netscape browsers and most Web server products. Developed by Netscape, SSL also gained the support of Microsoft and other Internet client server developers as well and became the de facto standard until evolving into Transport Layer Security. The "sockets" part of the term refers to the sockets method of passing data back and forth between a client and a server program in a network or between program layers in the same computer. SSL uses the public-and-private key encryption system from RSA, which also includes the use of a digital certificate.

TLS and SSL are an integral part of most web browsers and web servers. If a web site is on a server that supports SSL, SSL can be enabled and specific web pages can be identified as requiring SSL access. Any web server can be enabled by using Netscape's SSLRef program library which can be downloaded for noncommercial use or licensed for commercial use.

TLS and SSL are not interoperable. However, a client that handles SSL but not TLS can handle a message sent with TLS. [5]

2.5.3.1.3 ENCRYPTION

Computer based encryption using personal computer is capable of becoming sufficiently secure to prevent unauthorized access. However, the ability to encrypt messages is presently restricted by the requirements of nation states to have access to all written communications. Any company establishing systems, which cannot be broken by nations security services, is therefore subject to prosecution. This inevitably limits the efficiency of encryption.

Encryption has become a key element in discussions concerning commerce on the Internet. Public-key cryptography, for example, makes it possible to sign documents so that two recipients can assure that source of the message is authentic, as well as to seal a document, ensuring that no one except for the recipient can open it. Encryption facilitates services that require privacy, such as home banking and electronic money transfer between businesses.

2.5.3.2 PAYMENT METHOD

The payment method for an online transaction can be divided into two type that is electronic payment and non-electronic payment.

2.5.3.2.1 ELECTRONIC PAYMENT

Generally there are three main systems, which are electronic check, payments based on diverse protocols and payment cards and last but not least, electronic money.

Electronic check is a concept that links the idea of the traditional check with electronic payment systems. Electronic checks are used just like paper checks. Generally, the only thing that is different is the dematerialization of the payment instrument which is passed on via computer networks like Internet.. An example of the electronic check is eCheck.

During the transmission of the card number over open networks like Internet the following problems can occur :-

- eavesdropping which means possibility of intercepting card numbers since it has very particular structure and, additionally, data pass through different computers before reaching final receiver
- tampering which means intercepting original data and introducing changes without sender knowledge
- impersonating of someone which means that knowing payment card details it is simply to pretend to be someone else and place orders with e-shops to do shopping.

To prevent these frauds several protocols were designed and are still developing. There are generally two types of protocols which secure "payment data" during transmission through open network that is secure communication protocols such as Secure Socket Layers (SSL) and secure payment methods such as Secure Electronic Transaction (SET).

Electronic money is broadly defined as an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings other than the issuer without necessarily involving bank accounts in the transaction, but acting as a prepaid bearer instrument. (European Central Bank).

Summing up one can state that e-money is not an access product like checks, bank transfers, payment cards and much more. It creates a new sub-category of money. It constitutes, at the same time, payment instrument, monetary value and account units, thus it operates just like cash.

Based on these definitions and the real money nature one can describe e-money characteristic:

- they are dematerialized
- payment should not require intermediary
- payment should be final
- they have to be a multi-purpose they are stocked on a smart card or on the computer hard disk
- real virtual money offers full anonymity
- they are likely to circulate outside the banking sector

- they ensure the exact denomination;
- in most cases they are prepaid but it is not a rule;
- they are designed to provide small value payment

Examples of electronic money would be Digital Cash and Ecoins.

2.5.3.2.2 NON-ELECTRONIC PAYMENT

Non-electronic payments are payments made to a more physical extent. Examples of non-electronic payment method are Certificate of Delivery, cash, bank transfers, checks and much more. However, two of the famous ways of handling payment transactions are checks and bank transfers.

2.5.4 CLIENT SERVER ARCHITECTURE

2.5.4.1 A BRIEF INTRODUCTION TO CLIENT SERVER COMPUTING

The term "client-server computing" has meant many things to many people. In the mainframe or minicomputer environment, it has been used to refer to the relationship between the host computer and its associated terminals. In traditional local area networking terminology, it has also described the association between a personal computer acting as a "server" of data and applications files and the "client" PCs that request those files via a network operating system over LAN cabling.

In the newly emerging distributed network environments, however, client-server computing takes on a more specific definition: It refers to a relationship in which the server plays a more sophisticated role on the network, performing much of the processing formerly handled by its client computers while still retaining its requester-server (i.e., data storage) responsibilities.

2.5.4.2 CLIENT SERVER ARCHITECTURE

The client server architecture emerged as a result of the limitations of file sharing architectures. 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. There are many types of client server architectures that are being used nowadays such as the two tier architecture and the three tier architecture.

2.5.4.2.1 Two Tier Architecture

Two tier architecture consist of three components distributed in two layers that is the client (requester of services) and server (provider of services). The three components are:-

- User System Interface - includes session, text input, dialog, and display management services
- Processing Management - includes process development, process enactment, process monitoring, and process resource services
- Database Management – includes data and file services

The two tier design allocates the user system interface exclusively to the client. It places database management on the server and splits the processing management between client and server, creating two layers. In general, the user system interface client invokes services from the database management server. In many two tier architectures, most of the application portion of processing is in the client environment. The database management server usually provides the portion of the processing related to accessing. Clients commonly communicate with the server through SQL statements or a call-level

interface. It should be noted that connectivity between tiers could be dynamically changed depending upon the user's request for data and services.

As compared to the file server software architecture, the two tier architecture improves flexibility and scalability by allocating the two tiers over the computer network. The two tier improves usability because it makes it easier to provide a customized user system interface.

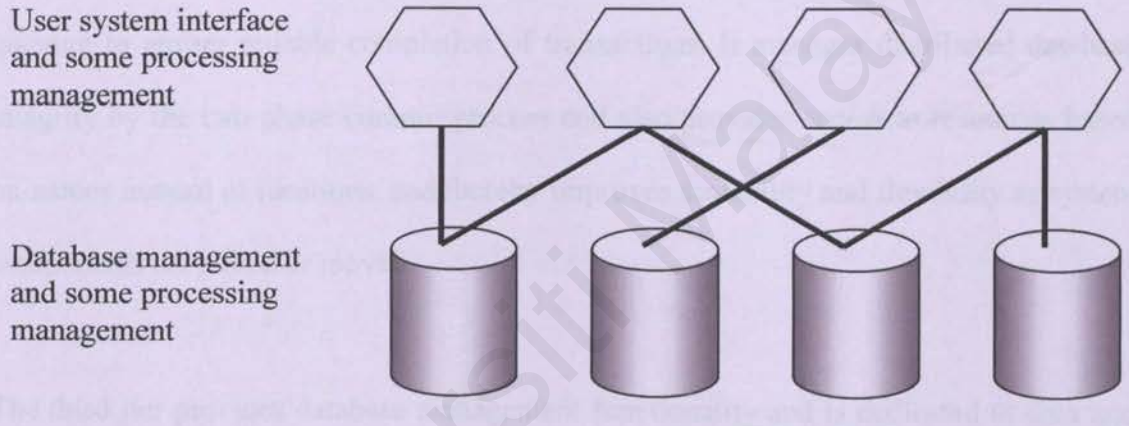


Figure 2.1 : Two Tier Client Server Architecture Design

2.5.4.2.2 Three Tier Architecture

A three tier client server architecture consists of the same there components as the two tier client server architecture that is the user system interface, processing management and database management. However, in a three tier architecture, these three components are distributed independently in three layers. The first tier consist of the user system interface where user services such as session, text input, dialog, and display management reside.

The middle tier provides process management services such as process development, process enactment, process monitoring, and process resourcing that are shared by multiple applications. The middle tier server which is also referred to as the application server improves performance, flexibility, maintainability, reusability, and scalability by centralizing process logic. Centralized process logic makes administration and change management easier by localizing system functionality so that changes must only be written once and placed on the middle tier server to be available throughout the systems.

The middle process management tier also controls transactions and asynchronous queuing to ensure reliable completion of transactions. It manages distributed database integrity by the two phase commit process and also provides access to resources based on names instead of locations, and thereby improves scalability and flexibility as system components are added or moved.

The third tier provides database management functionality and is dedicated to data and file services that can be optimized without using any proprietary database management system languages. The data management component ensures that the data is consistent throughout the distributed environment through the use of features such as data locking, consistency, and replication. It should be noted that connectivity between tiers can be dynamically changed depending upon the user's request for data and services.

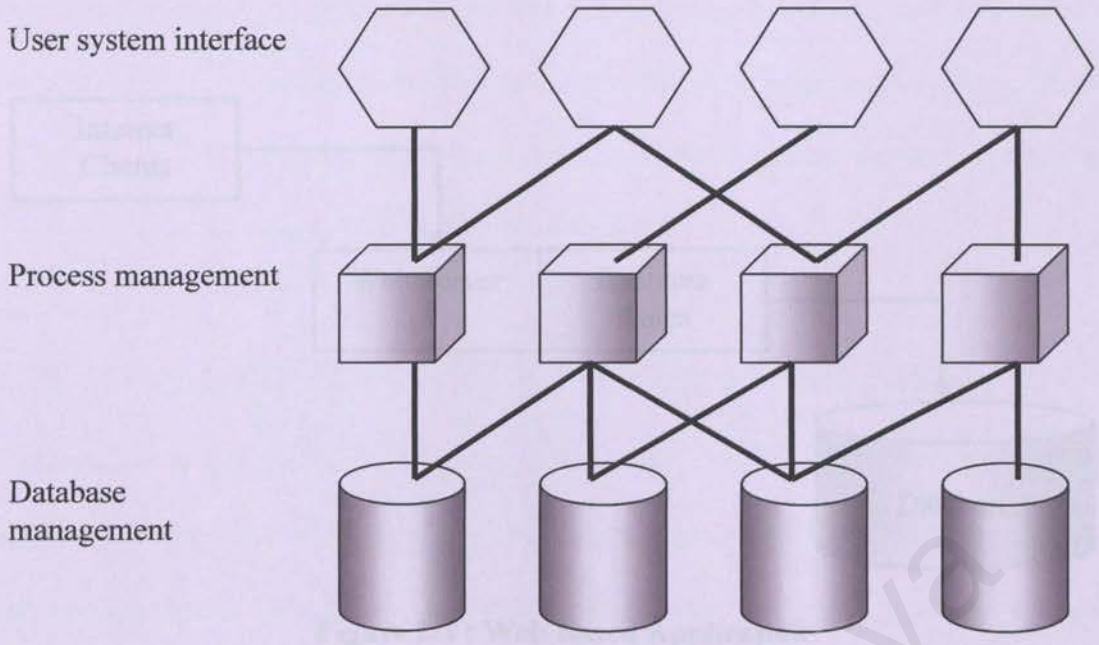


Figure 2.2 : Three Tier Client Server Architecture Design

2.5.4.3 IMPLEMENTING CLIENT SERVER ARCHITECTURE IN A WEB BASED SYSTEM

Both client server architecture and the web based architecture represent the current state of the art in software technology. The significant differences among these two are how they adapt to the rapid change in the industry and its trends. Implementing the client server architecture on a web based system has become common nowadays in an aim to meet the demands for a better system via the Internet. The implementation of the client server architecture in a web based system has been very successful to the extent that it matches the traditional implementation of a client server architecture.

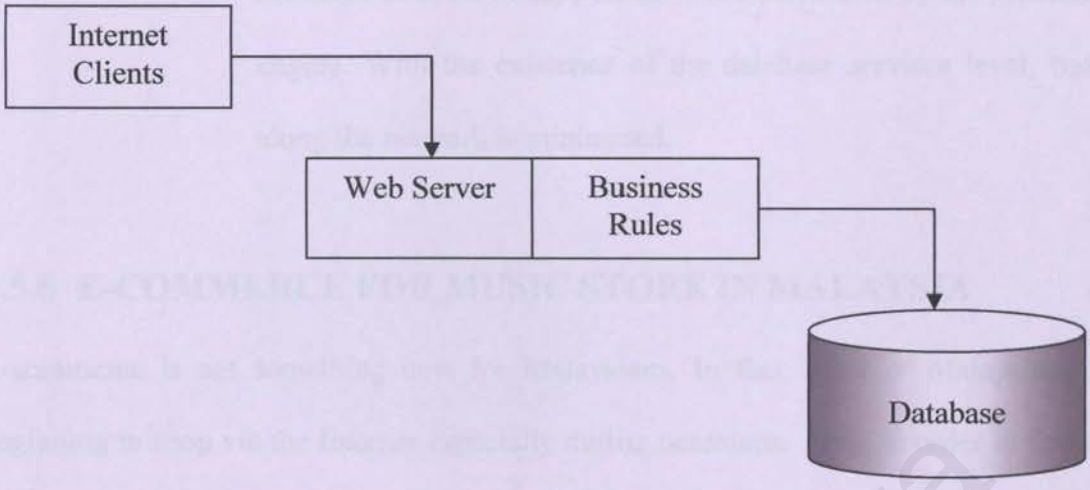


Figure 2.3 : Web Based Application

2.5.5 ONLINE MUSIC STORE ARCHITECTURE

The Online Music Store will be based on a web-based client server architecture, which would be divided into user services, business services and database services.

User Services – At this level, users would be able to input data, which would then be analysed. HTML forms would be used for the data input and also to show the results for analysis.

Business Services – A processing engine is used in this level whereby the whole level would reside on the machine running Internet Information Server (IIS), which would also be the web server. All request and response would be controlled by written codes specifying its business rules. By separating the business services level from the user services level and the database services level, it would be much easier to upgrade and maintain the Online Music Store.

Database Services – At this level, all data stored in the Microsoft Access database is available in order to support the work performed by the processing engine. With the existence of the database services level, traffic along the network is minimized.

2.5.6 E-COMMERCE FOR MUSIC STORE IN MALAYSIA

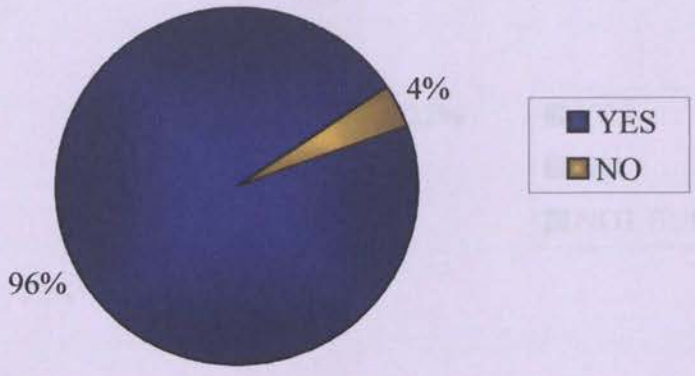
E-commerce is not something new for Malaysians. In fact, a lot of Malaysians are beginning to shop via the Internet especially during occasions. Thus, in order to find out the appropriateness and effectiveness of an online music store, I did a survey in front of the University Malaya Main Library. This survey involved 50 students that were picked randomly. The survey needed the students to answer a few questions regarding e-commerce and the practicality of an online music store in Malaysia. The results of this survey would be taken into consideration when developing the system. The results of the survey are as follows :-

2.5.6.1 STATISTICAL RESULTS ON KNOWING E-COMMERCE

Have you heard about e-commerce ?	Number (x/50)	Percentage (%)
YES	48	96
NO	2	4

Table 2.1 : Statistical Results On Knowing E-commerce

Figure 2.4 : Statistical Results On Knowing E-commerce



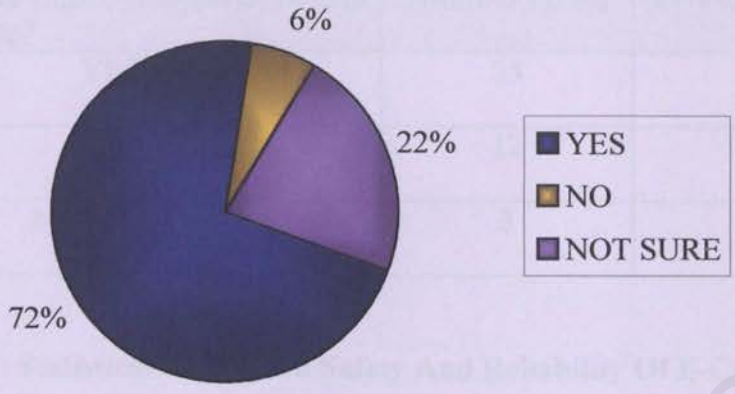
The survey above shows that e-commerce is not something new among Malaysian as 48 persons out of the total number of persons interviewed or 96% of the interviewees said that they have heard about e-commerce before this. Only a minor 4 % or 2 persons said that they haven't come across e-commerce before.

2.5.6.2 STATISTICAL RESULTS OF THE EFFECTIVENESS AND SUITABLILITY OF E-COMMERCE

Do you feel that the e-commerce is an effective and suitable way of conducting a business?	Number (x/50)	Percentage (%)
YES	36	72
NO	3	6
NOT SURE	11	22

Table 2.2 : Statistical Results On The Effectiveness And Suitability Of E-commerce

Figure 2.5 : Statistical Results On The Effectiveness And Suitability Of E-Commerce



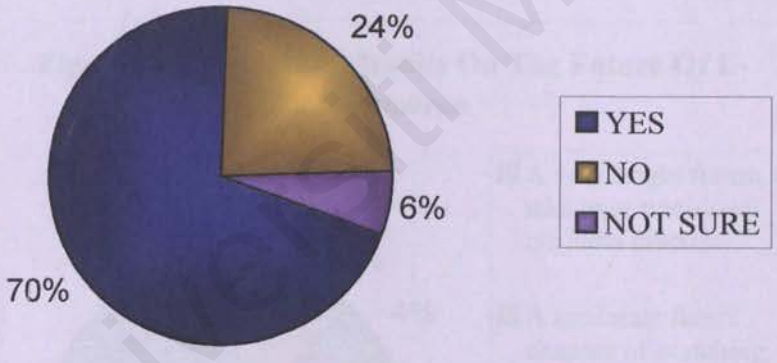
The survey above shows that 72% of the total number of interviewees or 36 persons feel that e-commerce is an effective and suitable way of conducting business. However there were a few which made up of 6% of the total interviewees who disagreed with the question. There was also a moderate number of persons or 22% of the interviewees who said that they were not sure whether e-commerce would be effective and suitable in conducting a business.

2.5.6.3 STATISTICAL RESULTS ON SAFETY AND RELIABILITY OF E-COMMERCE

Do you feel that e-commerce is safe and reliable?	Number (x/50)	Percentage (%)
YES	35	70
NO	12	24
NOT SURE	3	6

Table 2.3 : Statistical Results On Safety And Reliability Of E-Commerce

Figure 2.6 : Statistical Results On Safety And Reliability Of E-Commerce



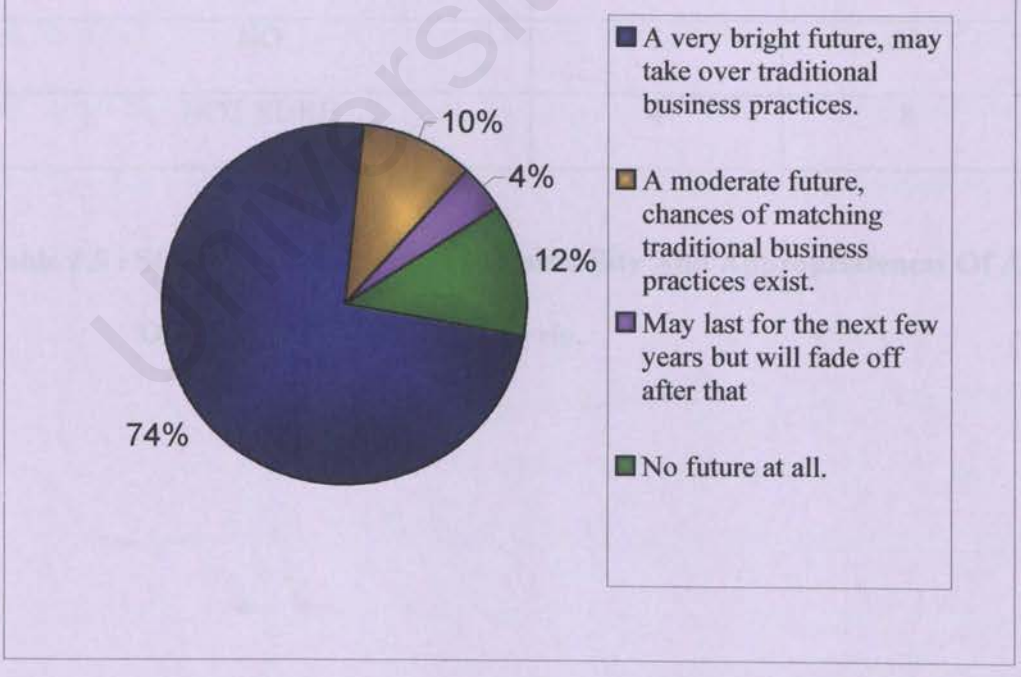
The survey above shows that the majority of the interviewees feel that e-commerce is safe and reliable. This amount made up 70% of the total interviewees, which is 35 persons. Around 12 persons or 24% of the interviewees however feel that e-commerce is not that all safe and reliable. There were also some who were on the fence as they were not sure whether e-commerce is actually safe and reliable. This people made up 6% of the total number of interviewees.

2.5.6.4 STATISTICAL RESULT ON THE FUTURE OF E-COMMERCE

What is your opinion on the future of e-commerce?	Number (x/50)	Percentage (%)
A very bright future, may take over traditional business practices.	37	74
A moderate future, chances of matching traditional business practices exist.	5	10
May last for the next few years but will fade off after that	2	4
No future at all.	6	12

Table 2.4 : Statistical Results On The Future Of E-Commerce

Figure 2.7 : Statistical Results On The Future Of E-Commerce



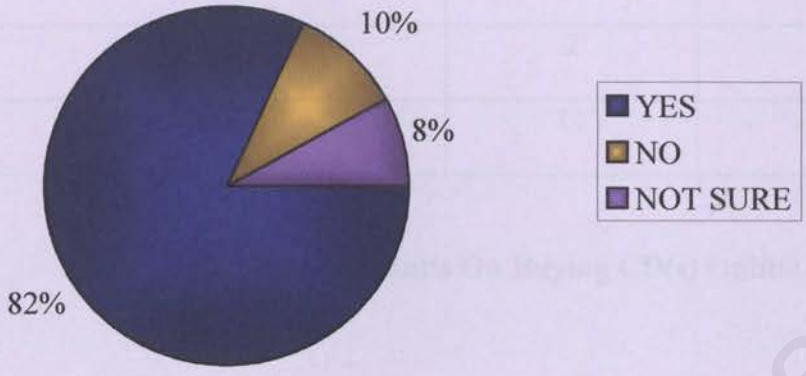
The survey above shows that the 70% of the total number of persons interviewed feel that e-commerce has a very bright future and may take over traditional business practices. Another 10% or 5 persons out of the total of 50 persons interviewed feel that e-commerce has a moderate future and the chance of it matching traditional business practices exists. A few of them which made up 4% of the survey said that e-commerce may last for the next few years but its impact would fade off after that. Last but not least, the rest of the interviewees or 12% of the total 50 persons interviewed said that e-commerce has no future at all.

2.5.6.5 STATISTICAL RESULTS ON THE SUITABILITY AND APPROPRIATENESS OF AN ONLINE MUSIC STORE IN MALAYSIA

Do you feel that an online music store would be suitable and appropriate in Malaysia?	Number (x/50)	Percentage (%)
YES	41	82
NO	5	10
NOT SURE	4	8

Table 2.5 : Statistical Results On The Suitability And Appropriateness Of An Online Music Store In Malaysia.

Figure 2.8 : Statistical Results On The Suitability And Appropriateness Of An Online Music Store In Malaysia



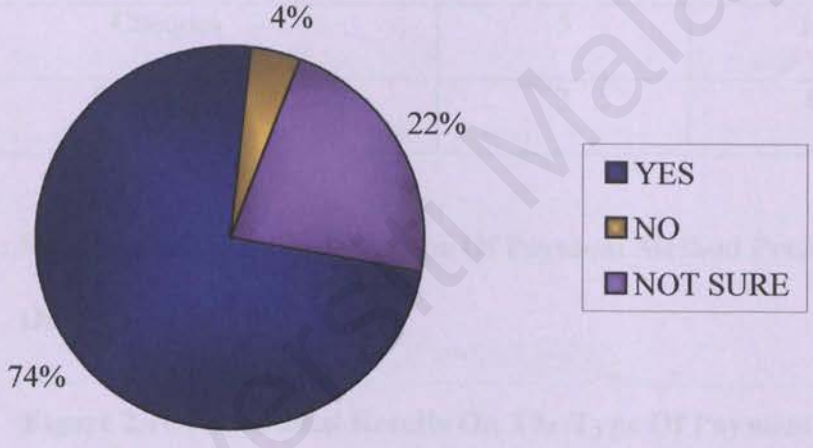
The survey above shows that most of the persons interviewed feel that it is suitable and appropriate to establish an online music store in Malaysia. The number of people who agreed to this motion made up 82% of the total number of interviewees or in other words, 41 persons out of the total 50 persons interviewed. However they were some who did not agree and these people made up 10% of the total survey or 5 persons. Another 8% or 4 persons decided to be on the fence as they were not sure whether an online music store would be suitable and appropriate in Malaysia.

2.5.6.6 STATISTICAL RESULTS ON BUYING CD(s) ONLINE

Would you buy CD(s) online?	Number (x/50)	Percentage (%)
YES	37	74
NO	2	4
NOT SURE	11	22

Table 2.6 : Statistical Results On Buying CD(s) Online

Figure 2.9 : Statistical Results On Buying CD(s) Online



The survey above shows that the 37 persons out of the total 50 persons interviewed said they would buy CDs via the Internet. Some also added that the reason why they prefer doing so is because this would save a lot of time and would ease all the hassle they have to go through when they shop at a physical music store. A very minor percentage of those interviewed, who made up 4% of the survey said that they would not buy CDs

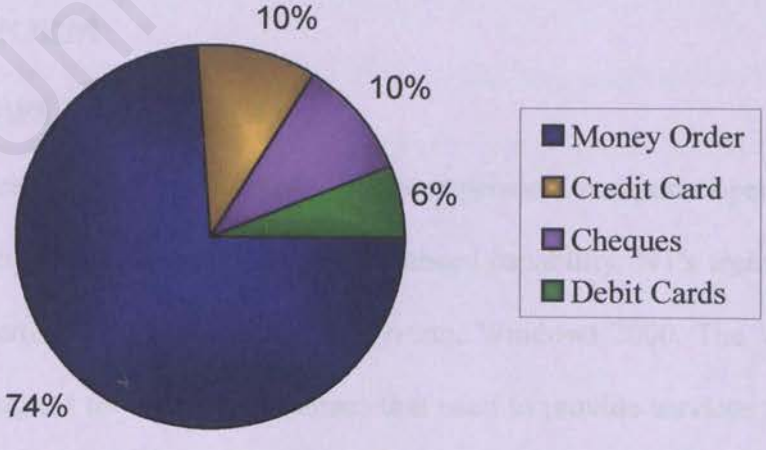
online. Some however said they are not very sure about buying CDs online. They said this is due to uncertainty on the security of the transaction that would take place.. This category of people made up 22% of the total number of persons interviewed.

2.5.6.7 STATISTICAL RESULTS THE TYPE OF PAYMENT METHOD PREFERRED IN AN ONLINE TRANSACTION

What type of payment method would you prefer using in an online transaction?	Number (x/50)	Percentage (%)
Money Order	37	74
Credit Card	5	10
Cheques	5	10
Debit Cards	3	6

Table 2.7 : Statistical Results On The Type Of Payment Method Preferred In An Online Transaction

Figure 2.10 : Statistical Results On The Type Of Payment Method Preferred In An Online Transaction



The survey above shows that out of the 4 different types of payment method listed, most of the interviewees prefer using money order in an online transaction. This category of people made up 74% of the total survey or 37 persons. This may be because a lot of them are not eligible to be credit card holders yet. 10% of the total interviewees prefer using credit card and another 10% said that they would rather use cheques in an online transaction. A small group of them however said they would prefer using debit cards as their choice of payment method. This group made up 6% of the total number of persons interviewed.

2.5.6.8 CONCLUSSION

The survey on e-commerce, which was done in front of the University Malaya Main Library gave a clear picture on the perceptions and opinions of the public and thus it would be very handy when developing the Online Music Store.

2.6 SOFTWARE AND TECHNOLOGIES

2.6.1 PLATFORM

2.6.1.1 WINDOWS NT SERVER 4.0

Windows NT Server 4.0 is a Microsoft Windows personal computer operating system designed for users and businesses needing advanced capability. NT's technology is the base for the Microsoft successor operating system, Windows 2000. The Windows NT Server 4.0 is designed for business machines that need to provide services for network -

attached computers. It is required, together with an Internet server such as Microsoft's Internet Information Server (IIS), for a Windows system that plans to serve web pages.

2.6.2 MARKUP LANGUAGE

2.6.2.1 HYPERTEXT MARKUP LANGUAGE (HTML)

Hyper-Text Mark-up Language or HTML in short is the language used to specify the construction of Web pages. Web pages are a form of hypertext that includes text, graphics and links to other HTML documents. [6]

Web pages are stored as standard ASCII (American Standard Code for Information Interchange) files. Web pages may be viewed by a variety of different web browsing tools, each of which may have different abilities. However, since web pages are text files, each web browser can read it and format the document in accordance with its abilities.

HTML is a standard, which enables you to request a web browser to format and display your web page in a particular way. HTML allows you to mark areas of your document that would become titles, new paragraphs, italic text and much more. Since the web page is specified as an ASCII file, the codes or elements, as they are known, have also got to be in ASCII format.

The elements can broadly be divided into two main categories, that is those that describe the format of the web document, for example, what it looks like, and those that define information about the document, for example, its title.

2.6.3 RELATIONAL AUTHORING TOOLS

2.6.3.1 MACROMEDIA DREAMVEAWER

Macromedia Dreamweaver or in short Dreanveawer is the professional visual design solution for creating groundbreaking Web sites. Dreamweaver's powerful features allow users to automate production and enhance team efficiency. Dreamweaver facilitates workflow through integration with other web applications, Microsoft Office, and leading e-commerce and application servers. Moreover, Dreamweaver can be customized using HTML, JavaScript, and XML for advanced web site development. Dreamweaver builds better web sites faster.

A working knowledge of HTML is very helpful when using Dreamweaver. However, many developers use Dreamweaver as a tool for learning HTML. Users can design pages in the Document window and then view the HTML code that Dreamweaver writes in the HTML Source inspector.

Dreamweaver provides direct access to the HTML code through the HTML Source inspector. In the HTML Source inspector, users can directly hand code HTML and see the code rendered in the visual Document window. With the new Quick Tag Editor, users have direct access to the code without leaving the visual Document window.

Dreamweaver writes a subset of HTML 4.0 (for DHTML) and HTML 3.2 for maximum compatibility. Dreamweaver writes JavaScript, which ranges from 1 to 1.2, using the most widely compatible code. Dreamweaver Templates allow developers to better manage the overall design of their sites by separating page content from page design. By defining editable areas on a page, developers can restrict changes that can be made to the layout of a particular HTML page. Content contributors can then add and edit content in these editable regions without compromising the site's design. Moreover, changes can be made to the overall design of the site quickly by revising the template file directly.

Dreamweaver Library items allow users to save sections of HTML code from an existing page for later use. These Library items can be added to pages in the site from the Library palette with drag and drop ease. Libraries also make it easier than ever to update code across many pages, as edits to a Library item will be reflected in all pages that reference it throughout the site.

Authoring pages in Latin-based languages is possible providing that the fonts of that language are available on the system. Macromedia Dreamweaver on the Macintosh can create pages that use double-byte fonts, such as Japanese and Chinese characters, when the appropriate language kit is installed on the system. Dreamweaver on a Windows system can create pages that use double-byte fonts, provided the user is working on the localized operating system for the desired language. On a Windows system, the user must also have the appropriate localized version of Dreamweaver.

While Dreamweaver is primarily an HTML authoring tool, it allows for editing pages with non-HTML markup languages. Support for ASP, JSP, and CFML is included with built-in data translators. Extended support can be added for editing any non-HTML markup language through extensibility. Dreamweaver permits disabling automatic HTML correction when working on pages which contain non-HTML markup language. Users may wish to consider Dreamweaver UltraDev when working with ASP, JSP, or CFML.

2.6.4 SCRIPTING LANGUAGES

2.6.4.1 JAVASCRIPT

JavaScript is a general-purpose programming language designed to let programmers of all skill levels control the behavior of software objects. The language is used most widely today in web browsers whose software objects tend to represent a variety of HTML elements in a document and the document itself. But the language can be and is used with other kinds of objects in other environments. For example, Adobe Acrobat Forms uses JavaScript as its underlying scripting language to glue together objects that are unique to the forms generated by Adobe Acrobat. Therefore, it is important to distinguish JavaScript, the language, from the objects it can communicate with in any particular environment. When used for web documents, the scripts go directly inside the HTML documents and are downloaded to the browser with the rest of the HTML tags and content.

2.6.4.1.1 How is JavaScript different from Java?

JavaScript was developed by Brendan Eich of Netscape where else Java was developed at Sun Microsystems. While the two languages share some common syntax, they were developed independently of each other and for different audiences. Java is a full-fledged programming language tailored for network computing. It includes hundreds of its own objects, including objects for creating user interfaces that appear in Java applets in web browsers or standalone Java applications. In contrast, JavaScript relies on whatever environment it is operating in for the user interface, such as a web document's form elements.

JavaScript was initially called LiveScript at Netscape while it was under development. A licensing deal between Netscape and Sun at the last minute let Netscape plug the "Java" name into the name of its scripting language. Programmers use entirely different tools for Java and JavaScript. It is also not uncommon for a programmer of one language to be ignorant of the other. The two languages don't rely on each other and are intended for different purposes. In some ways, the "Java" name on JavaScript has confused the world's understanding of the differences between the two. On the other hand, JavaScript is much easier to learn than Java and can offer a gentle introduction for newcomers who want to graduate to Java and the kinds of applications you can develop with it.

2.6.4.2 VBSCRIPT

When the World Wide Web first became popular, HTML was the only language programmers could use to create Web pages. They soon learned that HTML was quite limited in what it could do. It presented the user with a "page" of information, but the

web page and the user had a limited amount of interaction; it was like reading the front page of a newspaper on a computer monitor. Now most computer users, whether they use Windows, Macintosh, UNIX, or a combination of the three, are accustomed to graphical applications that provide interaction. They are used to clicking buttons, entering values into text boxes, and choosing from menus. The only way to get useful work done with a computer is to interact with it. The first generation of web pages provided information to the users, but the users could not interact with the web the way they could with their word processors. The interaction available to them required that they send the data to the server, where all the "smarts" were provided. The results were then sent back to the web page. This interaction required a great deal of extra time, effort, and overhead, and the interface presented to the user was very constrained compared to the applications they were accustomed to using.

Fortunately, the builders of the Internet and the World Wide Web could see these limitations. They soon realized that if the user were denied the capability to interact with the web page, it would become little more than a collection of information, much like a library of books. Although that collection is very useful, users demand more from their computers than what they could get elsewhere.

These demands have resulted in a continued improvement of HTML, the emergence of browsers such as Internet Explorer that tap into the power of HTML, and the advent of scripting languages such as VBScript. VBScript lets the user interact with a web page rather than simply view it. There are many possible scenarios for this interaction. For

instance, this capability to interact makes it possible for web pages to ask questions and respond to how the user answers them. VBScript can then take input from the user and check the data to make sure it is valid or meets certain criteria. Then, it can put an Internet server to work either by actually storing the data or causing some action to take place on the server based on the information given.

VBScript can also perform calculations on data, such as computing the cost of an item after taking into account the sales tax. Often, calculations on a web page are useful in providing the user a way of figuring out what he or she wants to do, or perhaps giving the user some sort of result he or she is seeking. In this way, the web page enables the user to walk away with more than a mere presentation of fixed information.

By utilizing other technologies such as CGI, VBScript code can even initiate order placement for an item in the computer of a company that is selling the item. If the script determines all criteria for a valid order are met, it can place the order. Otherwise, it can generate an error message

2.6.5 TECHNOLOGIES

2.6.5.1 ACTIVE SERVER PAGES (ASP)

Microsoft Active Server Pages (ASP) is the server-side execution environment in Microsoft Internet Information Server (IIS) 3.0 that enables you to run ActiveX scripts and ActiveX server components on the server. By combining the scripts and

components, developers can create dynamic content and powerful web-based applications easily.

Web pages that are customized for each user on the fly, based upon their actions or requests. For example, new visitors to your site can be shown a different welcome page than returning users see, or pages in an online catalog can be queries to a database so customers always see the most current information and availability.

Organizations will use the Active Server Pages technology to put a web front end on existing business solutions, or to create entirely new web-based applications. Since ASP provides a very open development environment, with support for both Microsoft Visual Basic, Scripting Edition (VBScript) and Jscript, organizations can leverage the investments they already have in these scripting languages. [8]

2.6.5.2 PERSONAL HOME PAGE (PHP)

PHP is a script language and interpreted in web programming, which is similar to JavaScript and Microsoft's VBScript. PHP got its initials from the earliest version of the program that is called Personal Home Page. It is actually a cross platform alternative of Microsoft's ASP technology. Just like ASP, the former is also embedded within a web page along with its HTML. That is how it basically works. Beginning with the user's request, the server will call PHP to interpret and perform operations called for by the PHP script, before the page is finally sent to the user. Since content will vary based on the results of interpreting the script, PHP can be thought as "dynamic" HTML pages. [9]

2.6.5.3 COMMON GATEWAY INTERFACE (CGI)

Common Gateway Interface (CGI) is a standard way for sending and receiving a user's request between application programs. Whenever there is a request for a web page, the server will be responsible for sending back the requested page. However, in cases where fill-in-forms are used, a small application program will be needed to process the data and then send back a confirmation message if needed. This convention of passing data to and fro between the server and the application is none other than the Common Gateway Interface (CGI).

CGI is the answer to a consistent way of passing the user's request between the application program and the user. Thus, the person writing the application program can be ensured that his or her program gets used no matter which operating system the server uses. And because the interface is consistent, a programmer can have the choice of writing CGI applications in different languages. However, the more popular languages chosen are C, C++, Java and PERL. [7]

2.6.6 DATABASE MANAGEMENT SYSTEM

2.6.6.1 MICROSOFT ACCESS 2000

Microsoft Access 2000 is a database platform, which makes it possible to develop database-integrated ASP web sites. Because all the information in an Access database is contained in a single file, it is easy to upload or download the entire database over FTP or the web.

Access allows the user to link together data stored in more than one file. It stores information in an easily retrievable form. It can store information such as text, numbers, dates, currency, pictures, and sounds. As well as being able to store data, it allows information to be selected easily and quickly. The summaries of the information selected can also be printed. [10]

These are the important things that should be considered when setting up a database:

- type of information that needs to be stored
- type of information that needs to be retrieved
- who the data is intended for and how other users will use it
- whether certain parts of the data is restricted to certain users only
- who is allowed to change or add data
- if the data refers to actual people, it may need to be registered under the Data Protection Act

2.6.6.2 MICROSOFT SQL SERVER 7.0

Microsoft SQL Server (MS SQL) is a database management system developed by Microsoft Corporation. It is a client server relationship system (RDBMS) that is highly integrated with the NT operating system. By using MS SQL Server, modern applications can be developed by separating the client application and the database services. SQL Server Transact-SQL, supports the ANSI SQL-92 Standard and provide extension to the SQL language.

Microsoft SQL Server supports a set of features that result in the following benefits :-

- Ease of installation or deployment and use.
- MS SQL Server includes a set of administrative and development tools that improve the ability to install, manage and use the MS SQL Server across several sites.
- Scalability.
- The same database engine can be used across platform ranging from laptop computer to large, multiprocessor servers running MS Windows NT Edition and Windows 2000.
- Data warehousing
- MS SQL Server includes tools for extracting and analyzing summary data for online analytical processing (OLAP). MS SQL also includes tools for visually designing databases and analyzing data using English based questions.
- System integrations with other server software.
- SQL Server integrates with e-mail, the Internet and Windows.

MS SQL Server 7.0 runs on the NT 4.0 or Windows 2000. SQL Server 7.0. Enterprise Edition builds on the established strengths and broad functionality of SQL Server, extending its already extensive scalability, interoperatability, availability and manageability. Enterprise Edition provides the means for building and deploying large scale distributed applications, making it the best platform for the largest and most mission-crucial support and can expand to use to 3GB of memory. SQL Server 7.0

Enterprise Edition runs on Windows NT 4.0 Enterprise or Windows 2000 Advance Server.

With the vest of breed data warehousing solutions, SQL Server includes OLAP Services, Data Transmission Services and English Query and works with over 45 independent software vendors (ISV) that form the Data Warehousing Alliances. MS SQL Server is also the first database to scale from the laptop to the enterprise using the same code base, offering code compatibility. By using Windows 2000, MS SQL Server scored as the fastest database for SAP, based on the SAP Retail benchmark.

2.6.7 WEB BROWSER

2.6.7.1 MICROSOFT INTERNET EXPLORER 5.5

Microsoft Internet Explorer 5.5 (or commonly known as IE 5.5) has been called the Cadillac of Browsers and is now capturing over 70 percent of the market. The Outlook Express comes with Microsoft's instant messaging tool, MSN Messenger which enables communications with friends anywhere and anytime via the Internet, while a click on the toolbar opens up FrontPage Express. FrontPage Express makes creating web sites a breeze with its WYSIWYG feature. The additional support of dynamic HTML and cascading style sheet allows developers to add in more animation and interactive creations. Web designers are also able to apply style sheets to the whole site with just a few lines of codes.

2.6.7.2 NETSCAPE NAVIGATOR

Netscape Navigator is the other web browser that is considered as the most popular browser. Netscape Navigator is a product by Netscape Communications, now owned by America Online. Currently, almost all Internet users use either Netscape's browser or Microsoft's Internet Explorer browser and many users use both. Although Netscape Navigator was the first initial predominant product in terms of usability and number of users, Microsoft's browser quickly gained its momentum and is now considered the more superior product in terms of usability and number of users. Hence, its now taking a shift lead in usage.

Netscape's browser is called Navigator and is packaged in suite of software called Communicator. Netscape was developed in 1995 by a team led by Mare Andreessen who created graphical user interface, at the University of Illinois's National Center for Supercomputing Applications (NCSA) in 1993.

With consideration to scripting languages, it is important to take note that Netscape Navigator supports JavaScript but it does not support VBScript, which is the scripting language developed by its main browser rival, Microsoft Corporation.

2.6.8 WEB SERVER

2.6.8.1 INTERNET INFORMATION SERVER (IIS)

As the Internet becomes more woven into mainstream businesses, so grows the need to have web services interwoven with mainstream business computing. Internet Information Server 5.0 (IIS 5.0) runs as an enterprise service within Windows 2000. This version improves the web server's reliability, performance, management, security and application services. With Internet Information Server 4.0 (IIS 4.0), Microsoft focused on security, administration, programmability and support for Internet Standards. Internet Information Server 5.0 (IIS 5.0) builds on the features and capabilities needed to deliver web sites required in an increasingly Internet-centric business environment and it makes it even easier to use the technologies given in earlier versions. [12] In particular Internet Information Server 5.0 (IIS 5.0) features improvements in the following four major areas :-

Realiability and Performance

A number of features make Internet Information Server (IIS) more reliable and better performing. To make it faster and easier to restart, Internet Information Server 5.0 (IIS 5.0) allows the administrator to restart web services without rebooting the computer. To improve reliability, Application Protection provides the ability to run applications ina pool, separate from the web services. The new CPU Trotting and Socket Pooling features in Internet Information Server 5.0 (IIS 5.0) can also improve reliability. For application developers, web site performance can be improved through new features

such as script less Microsoft Active Server Pages (ASP) processing, ASP self-tuning and performance enhanced ASP objects.

Management

Internet Information Server 5.0 (IIS 5.0) is easier to install and maintain. A number of features support this increased ease-of-maintenance, including a simplified installation process, new security task wizards, the ability to account for time used by process, more flexible remote administration and the ability to create custom error message.

Security

Internet Information Server (IIS 5.0) adds support for important industry-standard security protocols, including Digest Authentication, Server Gated Cryptography, Karberos V5 authentication protocol, Transport Layer Security and Fortezza. In addition, three new task wizards make it easier for administrator to manage a site's security setting.

Application Environment

Developers will find that Internet Information Server 5.0 (IIS 5.0) expands the web server's application development environment by building on new technologies included in Windows 2000 Server. These include Active Directory and the expanded Component Object Model (COM+). In addition, enhancements to Internet Information Server (IIS) Active Server Pages such as script less ASP processing, as well as improved flow control and error handling, let developers write more efficient web-centric applications.

2.7 SYSTEM COMPARISON

2.7.1 ABBEYMUSIC

Figure 2.11 : http://www.abbeymusic.com

2.7.1.1 MODULES AND FUNCTIONS

MODULES	FUNCTIONS
Search and Browse	This module enables users to search and browse for their favourite CDs.
New Releases	The module lists all CDs and records according to its categories. Users can view the product catalogue according to what type of music they want.

Participate	Consists of feedback forms, chatroom and links to other websites.
Info	Consists of information regarding the company's policies, email, contact information, customers' service section and much more.
MusicEzine	Links to online music magazines.
Abbey Records	Links to vinyl records and used CDs.
Resources	Links to other resources and currency converter.

Table 2.8 : Modules and functions of www.abbeymusic.com

2.7.1.2 STRENGTHS

Covers various categories of music

The website offers CDs and vinyl records from various categories of music such as rock and pop, dance, rap, hip hop,reggae and much more.

Covers music from different seasons or years

The website offers CDs and vinyl records from various years or seasons such as the nineties, eighties, seventies and so on.

Many links to other websites

The website also offers links to other website that would make it easier for a music lover to enhance his or her knowledge of music.

2.7.1.3 WEAKNESSES

Unattractive layout

The layout for the webpage looks very complicated and may cause consumers to be confused. The interface of the web page is not spread out evenly.

Too much write-ups

Too much of writings on the webpage may cause customers to divert to other websites, as they have no time to read all the information provided and want to finish their shopping fast.

No sufficient information on how the transaction is to be carried out

The website failed to provide sufficient information regarding the process involved in buying the products available.

2.7.2 CD UNIVERSE

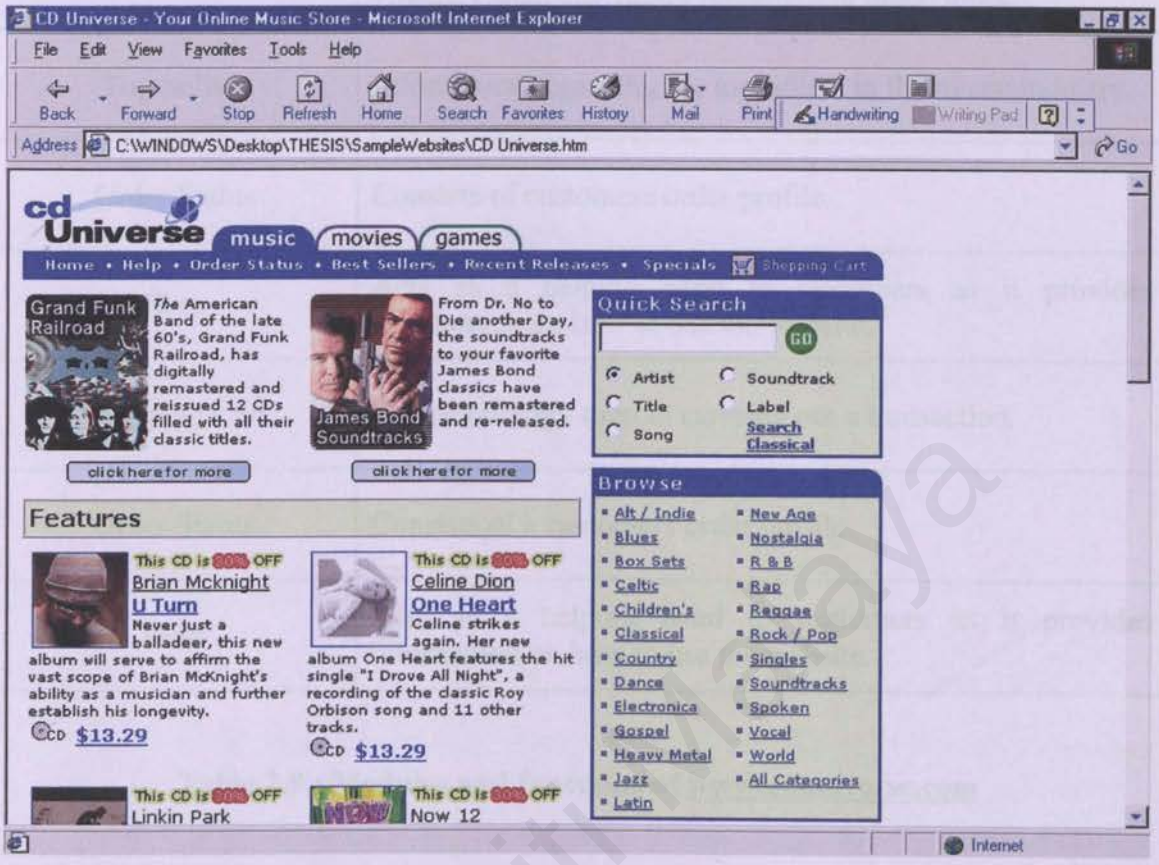


Figure 2.12 : http://www.cduniverse.com

2.7.2.1 MODULES AND FUNCTIONS

MODULES	FUNCTIONS
Features	Provides information to the customers about the main best sellers of the site and hot releases.
Quick Search	Enables customers to search and for their favourite CDs according to its artist, song name, soundtrack, album title or label.
Browse	Enables customers to browse for their favourite CDs according to its categories.

Departments	Consists of information regarding music charts, music videos, recent and future releases and much more.
Top Sellers	Information regarding the top sellers in the music industry.
Order Status	Consists of customers order profile.
Help	Acts as a helping hand to customers as it provides information on how to use the website.
Shopping Cart	The technology used in carrying out a transaction.
Order Status	Consists of a customers order profile.
Help	Acts as a helping hand to customers as it provides information on how to use the website.

Table 2.9 : Modules and functions of www.cduniverse.com

2.7.2.2 STRENGTHS

Attractive interface

The website has a very attractive and systematic interface. The developer has given a lot of thought to the interface design because the webpage layout looks very simple and neat and would not make a customer confused.

Attractive discounts

The main page of the website offers attractive discounts on some bestsellers that would catch the eyes of the customers.

Offers CDs of various categories in the music industry

The website offers CDs from various categories in the music industry such as jazz, blues, R & B, rap, reggae and much more.

Help and Favourite Answer and Questions (FAQ) link

The website is provided with a help menu and Favourite Answers and Questions (FAQ) link that would make it so much easier for customers in completing a transaction successfully.

2.7.2.3 WEAKNESSES

Not focused

The website is not focused to selling music CDs only but also sells movies and games CDs.

2.7.3 PLAYCENTRIC

Figure 2.13 : http://www.playcentric.com

2.7.3.1 MODULES AND FUNCTIONS

MODULES	FUNCTIONS
Browse	Enables customers to browse for their favourite music CDs, DVDs, video and games according to its categories.
Pre-Orders	Enables customers to order products that are featured for that week using shopping cart technology.
New Releases	Lists of latest products that are updated frequently. Also states the availability of the product.
Best Sellers	Lists top 20 best sellers for the week for all products, that is CDs, DVDs, video and games.

Gift Center	Acts as an online gift shop whereby a customer can order gifts that are featured at the site.
Bargain Basement	Consist of list of products that are discounted.
Specials	Contains extra services or incentives for the customers.
Order Status	Enables customers to view their previous order information.

Table 2.10 : Modules and functions of www.playcentric.com

2.7.3.2 STRENGTHS

Proper layout

The interface of the website is laid out systematically. Any customer would feel easy using the system as it is very straightforward and easy to navigate.

Attractive discounts.

The main page of the website offers attractive discounts on some bestsellers that may attract customers' attention.

Different currency view

When customers decide to buy a product, they can check the price of the product based on some of the main currencies. With this feature, we can expect the business to grow globally.

2.7.3.3 WEAKNESSES

Not focused

The website is not focused to selling music CDs only but also sells DVDs, videos and games.

2.7.4 CDWORLD

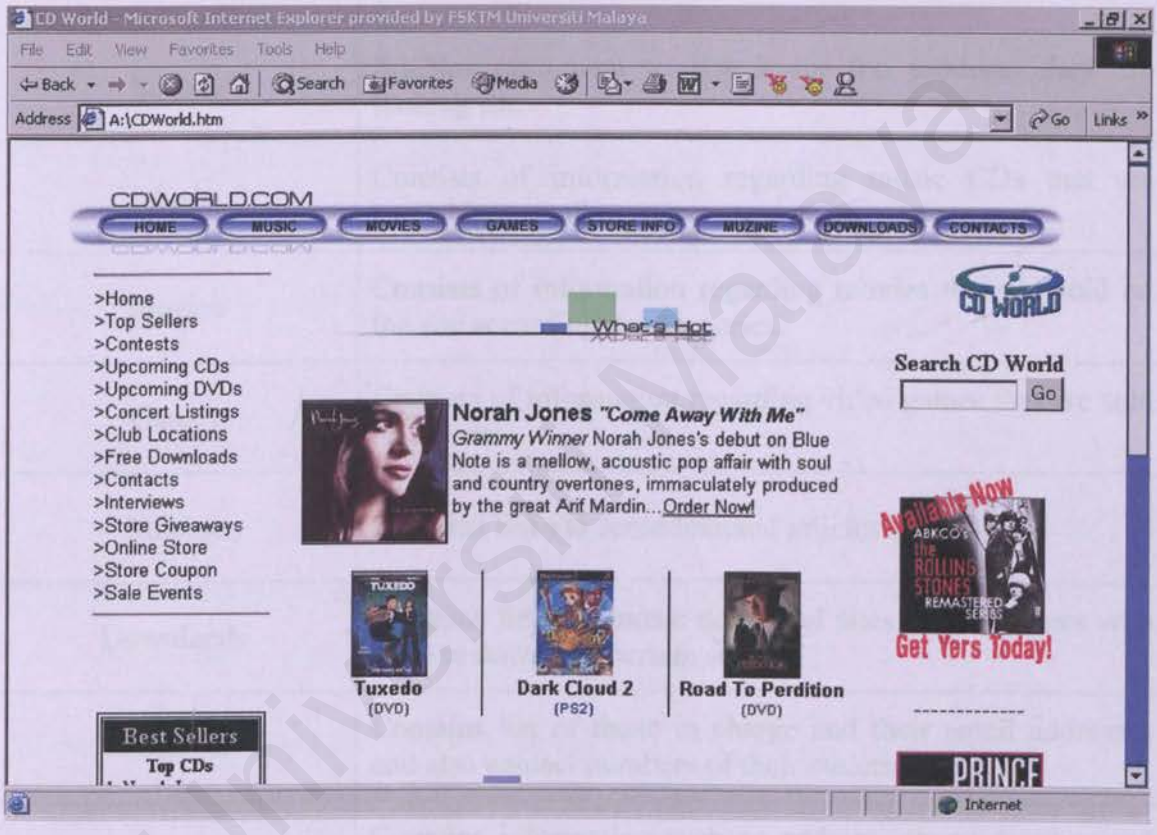


Figure 2.14 : http://www.cdworld.com

2.7.4.1 MODULES AND FUNCTIONS

MODULES	FUNCTIONS
Top Sellers	Information regarding the best sellers in the music industry
Contests	Contains various contests for customers to participate.
Search	Enables customers to search for the products they are looking for.
Music	Consists of information regarding music CDs that are available according to its categories.
Movies	Consists of information regarding movies that are sold on the site according its categories.
Games	Consists of information regarding video games that are sold on the site.
Muzine	Contains links to some featured articles and reviews.
Downloads	Contains links to music download sites for customers who want to download certain songs.
Contacts	Contains list of those in charge and their email addresses and also contact numbers of their outlets.
Store Info	Contains information such as address, phone number and fax number for the store's various outlets.

Table 2.11 : Modules and functions of www.cdworld.com

2.7.4.2 STRENGTHS

Added information for customers.

The website provides customers with extra information regarding the music and film industry such as upcoming CDs, upcoming DVDs, concert listings and interviews with various artists.

2.7.4.3 WEAKNESSES

Plain interface

The interface of the website looks too plain and simple. The website did not make full use of the space in the page as there are a lot of empty spaces. The colour used for the webpage gives a very dull look.

Search function not categorized.

The search function provided does not allow customers to search according to the categories of products sold in the site such as music, video and games.

Important information not on the main page

There are some information or highlights such as the pick of the week for music, books and movies that are not highlighted on the main page. This may cause the customers to think that there is nothing new in the store.

2.7.5 CDNOW

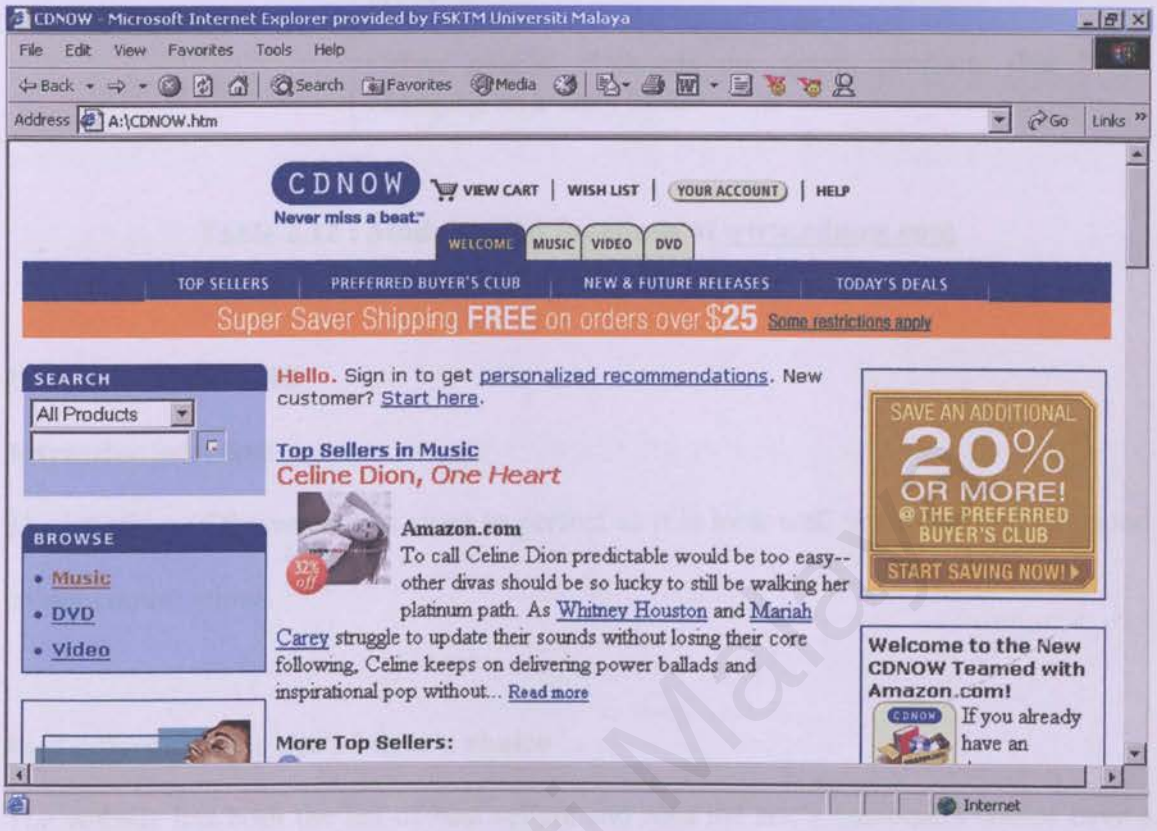


Figure 2.15 : http://www.cdnow.com

2.7.5.1 MODULES AND FUNCTIONS

MODULES	FUNCTIONS
Search	Enables customers to search for the products that they want.
Browse	Enables customers to browse for their favourites according to its categories such as music, DVD and video.
Top Sellers	List all the best sellers according to its categories, which are alternative rock, blues, classical, classical rock and much more.
Preferred Buyer's Club	Consists of information regarding the customers choice of products and products that have been hot on the site.

New and Future Releases	Consists of information regarding new and future releases of products.
Today's Deal	Offers special discounts on certain products that keeps changing on a daily basis.

Table 2.12 : Modules and functions of www.cdnow.com

2.7.5.2 STRENGTHS

Attractive interface

The interface of the website is close to perfect as it is look well organized and has good colour combinations.

Best sellers and the site's buyer's choice

The website has both the list of best sellers and also the site's customers choice over a period of time. This would enable the customers to make a better choice as it would be a double confirmation if a product is actually as good as it sounds.

Lots of discounts on items

There are many items with special discounts and this would be a major factor that would attract customers.

2.7.5.3 WEAKNESSES

Too many categories of music

There are too many categories of music on the site. Thus, it difficult for a person who lack knowledge on music to actually find a product that he or she likes as there are too many categories to cover.

2.7.6 SPUN

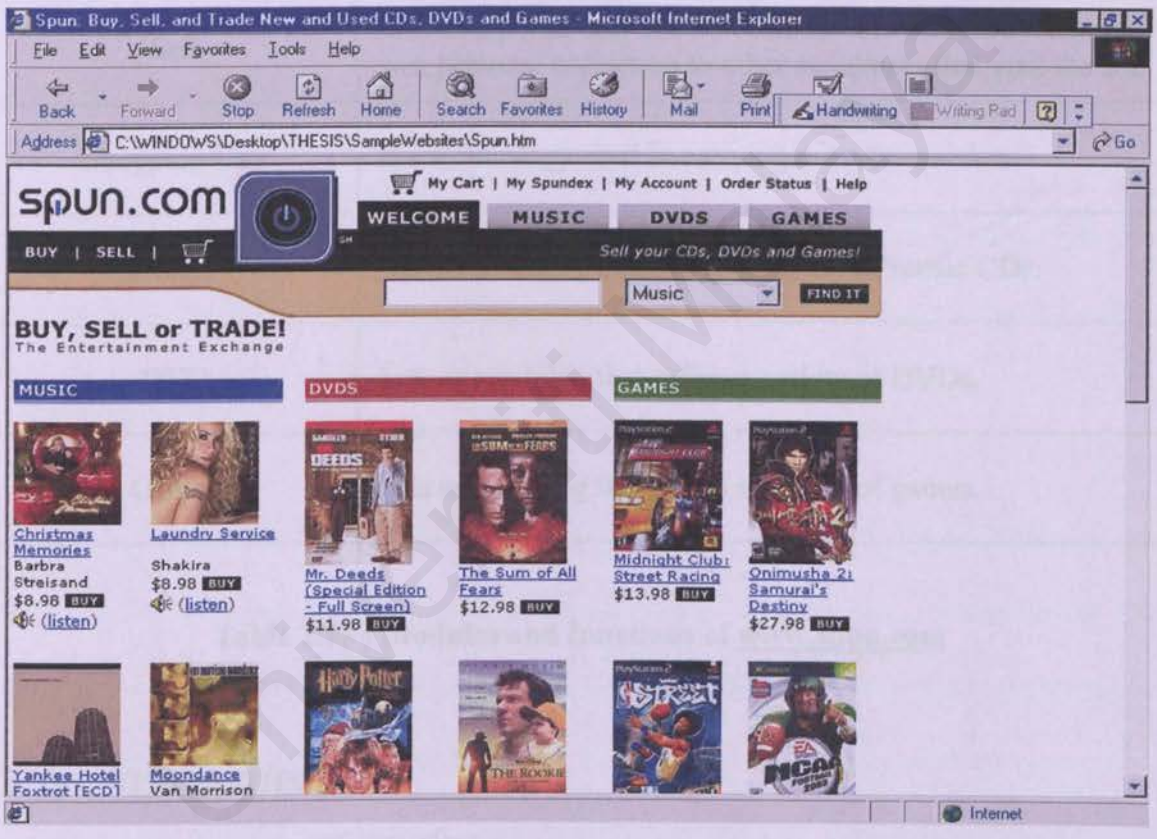


Figure 2.16 : http://www.spun.com

2.7.6.1 MODULES AND FUNCTIONS

MODULES	FUNCTIONS
Find It	Enables customers to search for the products that they want.
Browse	Enables customers to browse for their favourites according to its categories such as music, DVD and games.
Buy	Enables customers to buy products from the site.
Sell	Acts as a portal that allows customers to sell CDs from their own personal collection to other customers that visit the site.
Shopping Cart	The technology used in carrying out a transaction.
Music	Acts as a catalog that offers a variety of music CDs.
DVD	Acts as a catalog that offers a variety of DVDs.
Games	Acts as a catalog that offers a variety of games.

Table 2.13 : Modules and functions of www.spun.com

2.7.6.2 STRENGTHS

Allows customers to sell and trade their products with other customers

This sort of service is very rare among online music stores, giving it a upper hand over the other stores. With this feature, customers could sell and exchange their own CDs with other customers.

Attractive thumbnail pictures of the featured products

The thumbnail pictures of the featured products that are displayed on the main page is an eye catcher and could attract a lot of customers.

Able to listen to a particular song in an album before buying it.

A customers could listen to a particular song in an album by clicking the "listen" link. This would help the customer in making a decision on which CD to buy.

2.7.6.3 WEAKNESSES

Did not make full use of the interface area.

Even though the interface is attractive, with remarkable thumbnail pictures but the layout of the interface does not seem to be very systematically planned are there is still a lot of empty space.

2.7.7 CURRENT CONVENTIONAL MUSIC STORE SYSTEM

Existing conventional business methods would require shoppers to go personally to the physical music outlets in order to get themselves their favourite CDs. At the music store, they would have to spend a lot of time in chossing the CD they want and comparing the prices. After making a selection, they would then need to proceed to the payment counter to make the payment. If there is a case in which they want to compare prices at other music outlet, they would have to go personally to other music outlets in various locations and then do the comparison.

As we all know, going from one place to another in Malaysia is a big hassle nowadays especially in major cities in the country such as Kuala Lumpur, Penang, Ipoh and Johor Bharu. If we want to go to a physical music store, we have to go through all the routine problems before that such as getting caught in a traffic jam, the hassle in looking for a proper car park and many more. At the music outlet, shoppers have to spend a great deal of time in making a selection of the CD and comparing its prices. A great deal of time is also spent at the payment counter as the shoppers have to queue up in order to make their payment. If the shoppers want to make price comparison, they would then need to go from one music store to another that may be situated in various locations. This may be very tiresome for the shoppers and the whole process would just waste a shoppers' time and money.

In addition, we cannot expect the shoppers to know all the music stores in the city or state they live in. Thus, if a shopper want to go to a music outlet, he or she would need to drive around and look for it first and this would waste a lot of money and time.

2.8 CONCLUSSION

Literature review is very important in developing a system. By doing literature review, one would know the problems faced by other systems and how they have implemented their systems to meet customers' needs. Thus, the developer would be prepared to face the problems and this would give a chance to develop a system that has overcome all the problems as discussed above.

In this chapter, I have covered various aspects in building a successful Online Music Store. I started by discussing the propose of literature review and the approaches used in gathering information. Then, I proceeded to e-commerce and its definition. This section on e-commerce also covered many other aspects of an online business such as the advantages and disadvantages of e-commerce to both merchants as well as the customers, e-commerce issues such as security and payment methods, the client-server architecture and Online Music Store architecture and a survey on e-commerce and online music store.

The next section I covered in this chapter is software and technologies. This section discussed existing software and technologies from used in developing a system. The areas covered are the platform, markup languages, relational authoring tools, scripting languages, technologies, database management system, web browser and web server.

Last but not least, I also did a system comparison with a few of the existing online music stores and the current conventional music store system. This section discussed the

modules and its function for each existing online music stores its strengths and also its weaknesses.

METHODOLOGY & SYSTEM ANALYSIS

CHAPTER 3 : METHODOLOGY AND SYSTEM ANALYSIS

System analysis is the most critical phase in a software development life cycle (SDLC). It is a process of defining a problem, gathering pertinent information, developing alternative solutions and choosing the best solution to develop the system. A system is a collection of objects and activities plus a description of the relationships that tie the objects and activities together. [3].

A good system development practice starts with a good system analysis. Before developing a system, the objectives of the system must be understood thoroughly and the functional and non-functional requirements of the system must be elicited. The system analysis phase involves all the activities that are necessary in determining the system requirements. These activities include choosing the appropriate system development model, information gathering techniques and system development tools to develop a good system.

3.1 METHODOLOGY

System development methodology is a collection of techniques used in building a model that is applied across the system lifecycle. A model is a process of system development used by software engineers or system developers to describe their approach in producing a system. Typically, a life cycle model addresses the following phases of a software

development project - requirement phase, design phase, implementation, integration, testing, operations and maintenance.

The development method that I intend to use for the Online Music Store (OMS) system is the "Waterfall Model with Prototyping". It offered a means of making the development process more visible. A system prototype can be developed to give end-users a concrete impression of the system capabilities. [2]

3.1.1 THE WATERFALL MODEL

The waterfall model is a model for the development of "something" – not necessarily an entire system. It may be used for the development of a subsystem or in the case of evolutionary delivery, of a delivery. However, the product, whatever it is, only emerges at the end of the process. Thus, when an entire system is being developed, the customer and users do not have the opportunity to test or use it until it is complete. [4]

The model of the system development reflects this natural order of events. The horizontal spacing of stages along an imaginary time axis suggests that one stage should begin until the previous one is completed. Thus, the output of one stage cascades down to be the specification of the next, leading to the title by which it is known – the waterfall model.

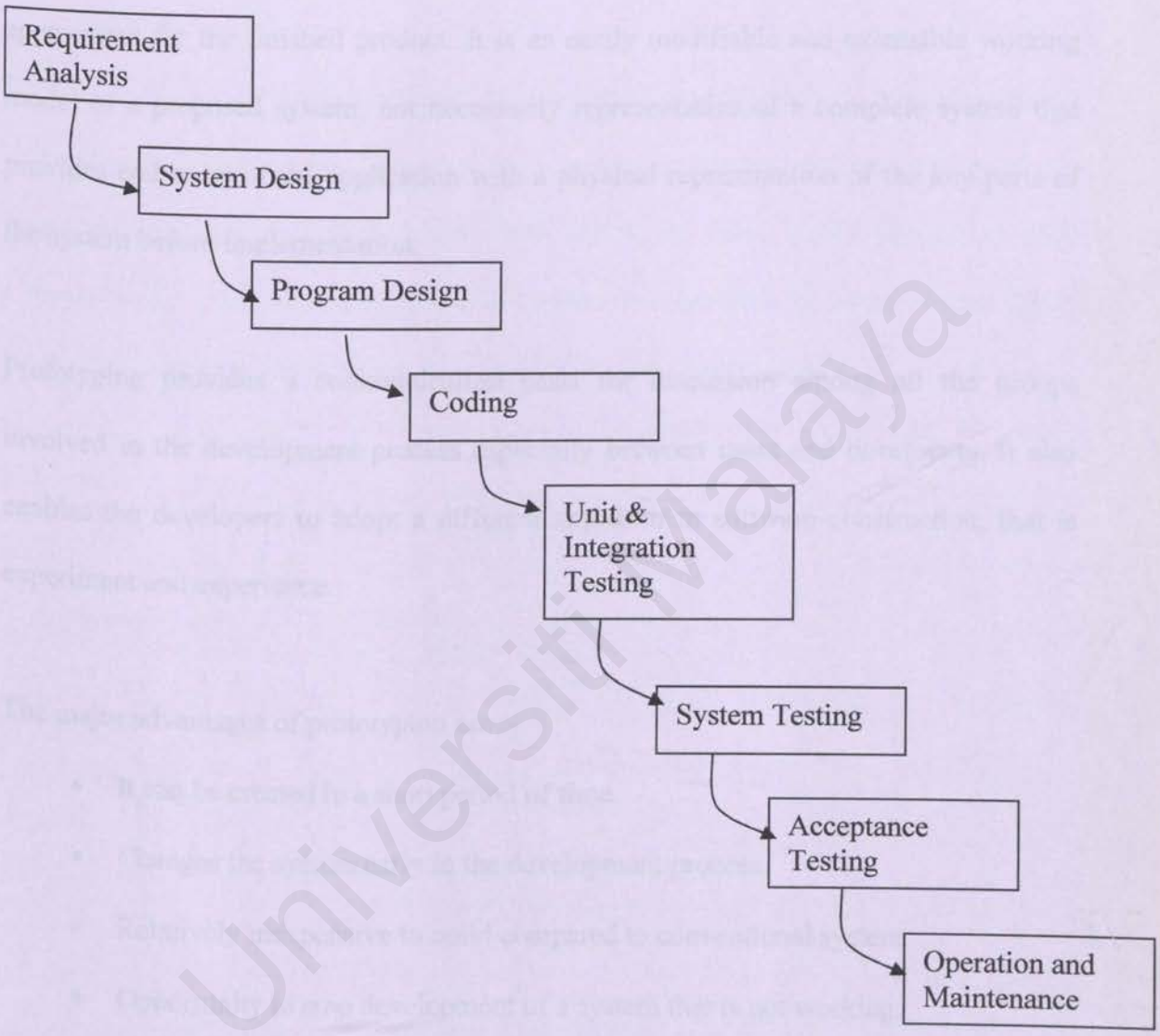


Figure 3.1 : Waterfall Model

3.1.2 THE PROTOTYPING MODEL

Prototyping means creating a partially developed product that enables customers and developers to examine some aspects of the proposed system and decide if it is suitable or appropriate for the finished product. It is an easily modifiable and extensible working model of a proposed system, not necessarily representative of a complete system that provides end users of the application with a physical representation of the key parts of the system before implementation.

Prototyping provides a communication basis for discussion among all the groups involved in the development process especially between users and developers. It also enables the developers to adopt a different approach in software construction, that is experiment and experience.

The major advantages of prototyping are :-

- It can be created in a short period of time.
- Changes the system early in the development process.
- Relatively inexpensive to build compared to conventional system.
- Opportunity to stop development of a system that is not working.
- Can determine beforehand appropriateness of design application, the efficiency of computer algorithms, adoptability of operating system and platform in which the system is based.
- Serves as a risk reduction technique by determining if all aspects of the system are feasible before actual development.

- Increases the likelihood that the trial product would satisfy the needs of end users because through interaction, the development stage are performed many times.

In addition, the prototype model would only incorporate some essential functions since it is not the complete system. However, the developers should envision and build the prototype just like the actual system, with which the users would interact. It must incorporate the essential functions so that users understand how the actual system would work. The following figure shows the diagram of a prototyping model.

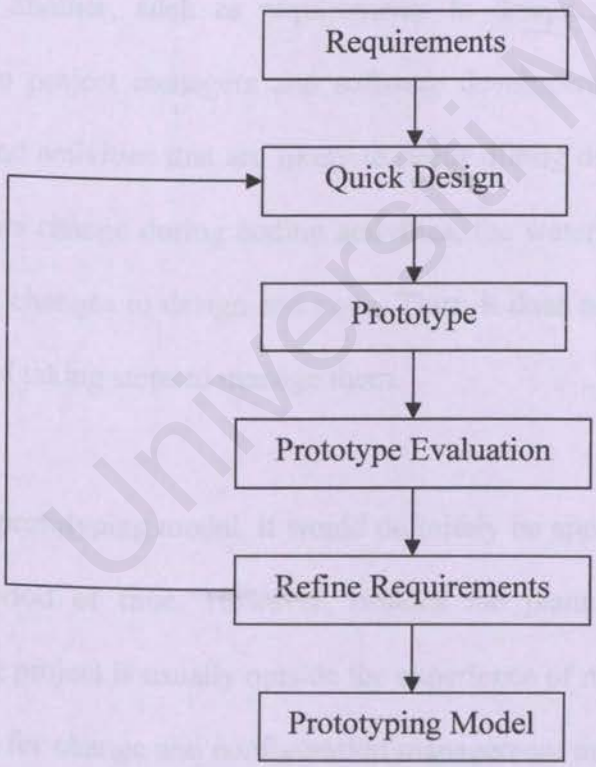


Figure 3.2 : Prototyping Model

3.1.3 WHY CHOOSE "WATERFALL MODEL WITH PROTOTYPING" ?

The combination between Prototyping Model and Waterfall Module will give a better solution for the problems that occur on their own.

The main problem of the waterfall model is it cannot be tested or triad until the end of project. In addition to that, it does not reflect the way codes are really developed. Except for very well understood problems, softwares are usually developed with a great deal of iteration. Besides that, there is also no insight into how each activity transforms one artifact to another, such as requirements to design. Thus, the model provides no guidance to project managers and software developers on how to handle changes to products and activities that are likely to occur during development. For instance, when requirements change during coding activities, the waterfall model does not address the subsequent changes to design and code. Thus, it does not make provision for assessing changes and taking steps to manage them.

As for the prototyping model, it would definitely be appealing as it can be developed in a short period of time. However, besides the planning costing and estimating, a prototyping project is usually outside the experience of much software project managers. Procedures for change and configuration management may be unsuitable for controlling the rapid change inherent in prototyping. Managers may exert pressure on the prototype evaluation to reach swift conclusions about the prototype.

To resolve the problems of Waterfall Module and prototyping Module, the Waterfall Module with Prototyping is chosen to develop the online Music Store (OMS) system.

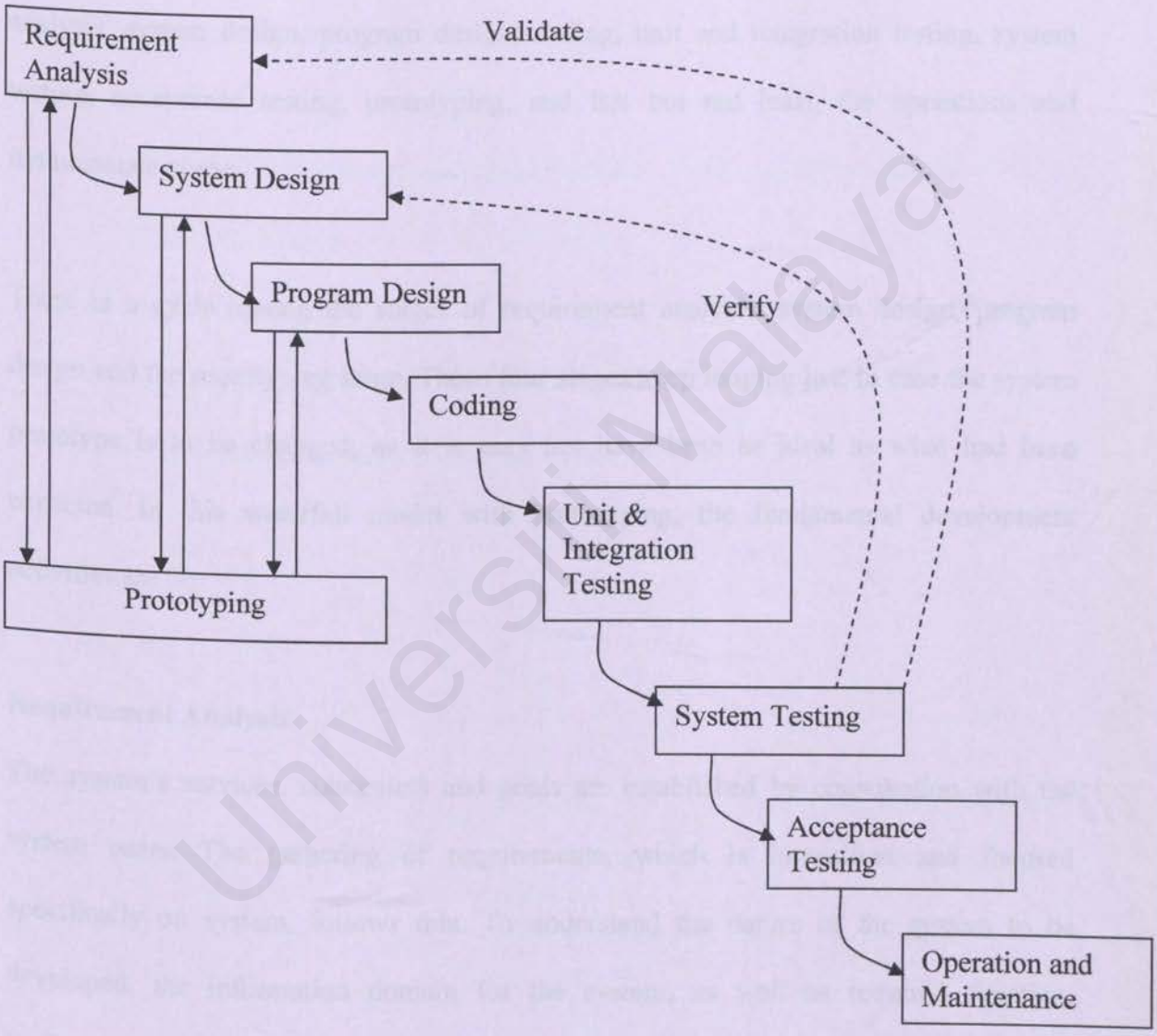


Figure 3.3 : Waterfall Model With Prototyping

The figure above shows the 'Waterfall model with Prototyping' model. The waterfall with prototyping approach was used because the Online Music Store (OMS) system consists of separate phrases, which cascade from one phase to another, except for the prototyping stage. The system consists of the following phases that are requirement analysis, system design, program design, coding, unit and integration testing, system testing, acceptance testing, prototyping, and last but not least, the operations and maintenance phase.

There is a cycle among the stages of requirement analysis, system design, program design and the prototyping stage. These four stages keep looping just in case the system prototype is to be changed, as it is may not have been as ideal as what had been expected. In this waterfall model with prototyping, the fundamental development activities are :-

Requirement Analysis

The system's services, constraints and goals are established by consultation with the system users. The gathering of requirements, which is intensified and focused specifically on system, follows this. To understand the nature of the system to be developed, the information domain for the system, as well as required function, performance and interfacing must be first determined. Both users and the development staffs define them in a manner, which is understandable.

System Design

The system design process partitions the requirements to either hardware or software systems. It establishes an overall system architecture. Software design involves representation of the software system functions in the form that maybe transform in to one or more executable programs. During this phase, formal requirements will be translated in the configuration of the software.

Basically it is a multi-step process that focuses on four distinct attributes that is :-

- Database structure
- Software architecture
- Functional details
- User interface characterization (as shown below)

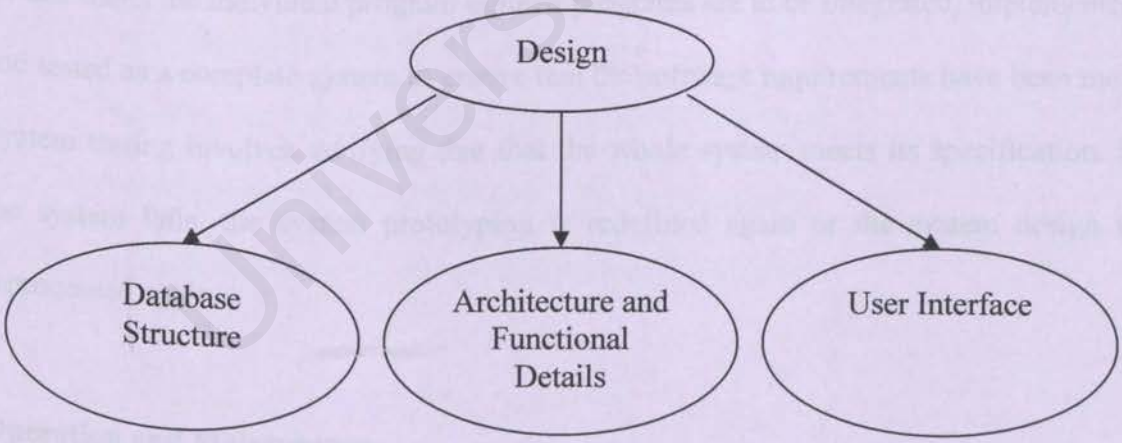


Figure 3.4 : Design Architecture

Coding

This phase transforms algorithms defined during the detailed design stage in to computer-understandable language.

Prototyping

The prototyping stage is where all or part of a system is to be constructed quickly to understand or clarify issues. The requirements or design require repeated investigation to ensure that the developer, user and customer have a common understanding of both what is needed and what is proposed. The initial reactions from the users are sought in an aim to seek the effectiveness of the prototype, possibly innovate it so that it would function better and also determine which part of the system need to be developed first.

System Testing

At this stage, the individual program units or programs are to be integrated, implemented and tested as a complete system to ensure that the software requirements have been met. System testing involves verifying that that the whole system meets its specification. If the system fails, the system prototyping is redefined again or the system design is reprocessed again.

Operation and Maintenance

Normally this is the longest life cycle phase. The planned system is installed and put into practical use. Maintenance involves correcting errors that were not discovered in earlier stages of the life cycle, improving the implementation of system and enhancing the system's services as new requirements are discovered.

3.2 SYSTEM REQUIREMENTS

Before developing a system, it is very important to capture all the necessary requirements. A requirement is a feature of the system or a description of something the system is capable of doing in order to fulfill the system's purpose. As for this project, the requirements were gathered through research on the Internet and books, analyzing on the results from the survey conducted, and review of the existing systems. The requirements for the Online Music Store can be divided into two that is functional requirements and non-functional requirements.

3.2.1 REQUIREMENTS ELICITATION

Requirements elicitation is an especially critical part of the process. A variety of techniques must be used to determine the user's needs and what they really want in the system. Requirements can be separated into three categories that is :-

- requirements that absolutely must be met
- requirements that are highly desirable but not necessary
- requirements that are possible but could be eliminated

The figure below shows the process of determining requirements.

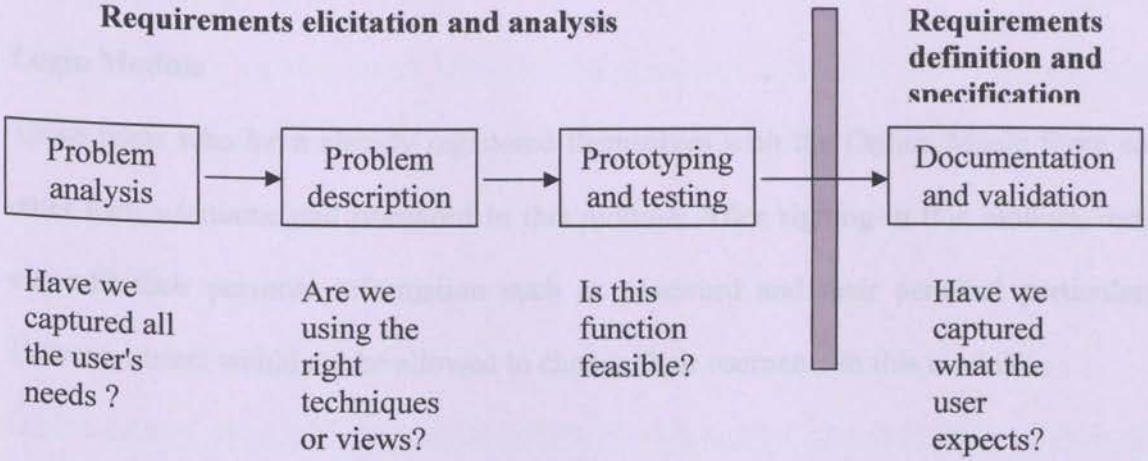


Figure 3.5 : The process of determining requirements

3.2.2 FUNCTIONAL REQUIREMENTS

Functional requirements are the functions or activities that the system must perform. It is derived directly from the capabilities identified in the requirement analysis and specification phase. The functional requirements for the Online Music Store can be divided into three main modules that is the customer module, administrator module and the general module.

3.2.2.1 CUSTOMER MODULE

Sign Up Module

This module will enable users to register with the Online Music Store in order to purchase the CDs.

Login Module

These users who have already registered themselves with the Online Music Store can enter their username and password in this module. After signing-in this module, users can edit their personal information such as password and their personal particulars. However, users would not be allowed to change their username in this module.

My Music Module

In this module, the music catalogue is displayed to the user. In the music catalogue, information about the CDs such as album's image preview, album title, artist's name, and price of the CDs are displayed. There are a few sections in this module, which are the new release, hot items and special offer sections.

Shopping Cart Module

The shopping cart module comprises two sections, which are :-

- **Shopping Cart**

The shopping cart will include information about the user's CD selection before proceeding to the checkout section. In this section, users will be able to edit and delete their CD selection. For instance, users can edit the quantity of CDs in the shopping cart and even delete the CD that had been selected earlier. Besides that, in the shopping cart section, users are able to view the CD information such as album title, price and total amount of all the CDs that had been selected previously.

- **Checkout**

In the checkout section, users will have to place the order and fill in the shipping information. Users will also be needed to select the method of payment to the Online Music Store.

News and Events Module

In this module, the Online Music Store (OMS) will also provide information about the ongoing events in Malaysia as well as around the globe such as the upcoming concerts, artists visits to Malaysia, contest and other relevant entertainment information. Besides that, Online Music Store will also provide news about the artists around the world in order to provide the latest entertainment news to the visitors. There would also be a section on the latest song charts so that Online Music Store visitors are always updated about the current favorites in Malaysia and around the globe.

About Us Module

This module will provide information about the Online Music Store. This would include its contact information, policies and procedure and also feedback and suggestions.

Help module

The help module will provide instruction and information about the purchasing procedures. Besides that, it would also provide information regarding the functions in the Online Music Store (OMS).

3.2.2.2 ADMINISTRATOR MODULE

Login Module

In this module, the administrator is required to provide his or her username and password in order to gain access to the administrator page.

Customer Order Records Module

All of the customers' records would be stored in this module. Relevant information such as customer's shipping particulars, ordered CDs information and stocks of the order would be displayed in this module. The administrator would be able to view and edit the order information such as the order status or cancel a particular order. Besides that, the administrator would also be able to view if the number of CDs in the stock is sufficient to fulfill the customer orders.

Database Maintenance Module

This module would enable the administrator to manipulate all records in the Online Music Store database system. The administrator can create, delete and update any data in the database. The records that can be manipulated by the administrator consist of :-

- **Customers' information**

Administrator can blacklist customers who have black records such as making orders on the Online Music Store (OMS) frequently without submitting the payment.

- **CD Information**

CD Information such as the album title, artist's name, price, quantity available and other relevant information are entered into the database. This module would allow the administrator to control which product information should be available to the users. In addition, the availability of the products can be controlled using this module.

- **Administrator Information**

Every administrator would be able to update their personal particulars once they login to the system. There are some functions, which can only be carried out by the Super Administrator. The functions are adding new administrator, viewing and deleting other administrator's information.

Information Board Update Module

Information that would be posted in the Online Music Store (OMS) website will be manipulated in this module. The information that would be displayed in the information board are promotional items such as special offers, hot items and new releases, artists' information, artists' news, events that are taking place and song charts. In addition, feedback and suggestion from website visitors will be collected and tabulated.

3.2.2.3 GENERAL MODULE

In the general module, users are required to have specific hardware and software that will suit their need to perform their transaction on-line. Among the main functions of this module are:-

- Makes sure a secure transaction is carried out
- Agreement documentation
- Company credibility
- Web site reusable functionality

3.2.3 NON-FUNCTIONAL REQUIREMENTS

A nonfunctional requirement or constraint describes a restriction on the system that limits our choices for constructing a solution to the problem. These constraints usually narrow our selection of platform, or implementation techniques or tools. However, the selection is made at the design stage, after the requirements have been specified. Below are the nonfunctional requirements for the Online Music Store.

3.2.3.1 USER FRIENDLY INTERFACE

It is important to make sure that users are comfortable and do not encounter difficulties while using a system. The Online Music Store (OMS) will have a very user-friendly interface in order to enable the users to interact with the system comfortably and easily. With its graphical user interface, users can point-and-click their way around easily. Meaningful caption and menu options will simplify user interaction with the system. Besides that, the system would also provide online help to assist users while using the system.

3.2.3.2 EFFICIENCY

The Online Music Store will be efficient in processing the data requested. The system would have a fast response time and a high throughput rate. Server scripting language such as ASP will be used instead of CG1 in order to increase the file processing speed.

3.2.3.3 MODULARITY

The Online Music Store (OMS) will be developed in a modular approach to ease maintenance and scalability of any modules in the system. The system would be divided into three modules, which are the customer module, administrator module and the general module.

3.2.3.4 ACCURACY

The Online Music Store (OMS) will be able to produce the data and information in an accurate manner. The system would not make any mistakes in calculation, retrieving the right data and much more.

3.2.3.5 MAINTAINABILITY

The system will be able to perform maintenance on the data stored in the Online Music Store (OMS) database. The maintenance of the data will include inserting, updating and deleting data stored in the database.

3.2.3.6 RELIABILITY AND AVAILABILITY

The Online Music Store (OMS) system would be reliable at every second. It would perform file processing without any flaw. The data requested will always be available. The administrator will be able to backup the database from time to time.

3.2.3.7 RESPONSE TIME

The response time to retrieve information such as product information can be considered within a reasonable interval time. This means that all desirable information will be available to the users at any point of time. The requirement for up-to-date information is also a necessity.

3.3 CONSIDERATION OF SOFTWARE

3.3.1 CONSIDERATION OF OPERATING SYSTEM

Microsoft Windows NT Server 4.0

Microsoft Windows NT Server 4.0 was chosen as the operating system of choice due to several advantages that are distinct when compared to other operating systems. One of the main reasons for choosing Windows NT Server 4.0 is because Windows currently holds a dominant position as the preferred network operating system compared to other operating systems. In the consumer market, Microsoft's Windows enjoys a penetration rate of almost 90% of the overall market, which makes it almost the 'de facto choice' for operating systems.

Another reason why the Windows NT Server 4.0 was chosen is because it would be needed to provide services for LAN–attached computers. Besides that, the Windows NT Server 4.0 is also expected to serve web pages, together with an Internet server such as the Internet Information Server (IIS).

Moreover, The Windows NT Server 4.0 is also a network operating system designed to help developers build and deploy business application. Faster that ever before, new management tools in Windows NT Server 4.0 includes help to set up web sites, simplify access to resources, manage contents and analyze usage patterns. Windows NT Server 4.0 supports innovative web publishing features and customized tools the new technology wizards make. In conclusion, it can be said that Windows NT Server 4.0 would be the best platform available to publish information over the Internet especially in the case of the Online Music Store (OMS).

3.3.2 CONSIDERATION OF WEB APPLICATION LANGUAGE

Hyper Text Markup Language (HTML)

Without HTML, THE World Wide Web would not exist. HTML allows the individual elements on the web to be brought together and presented as a collection. HTML is not the only way to present information on the web, but it is the glue that holds everything together. In addition to being a mark-up language for displaying text, images and multimedia, HTML provides instructions to web browsers in order to control how documents are viewed and how they relate to each other.

The users can add many functions inside HTML. They can add their own VBScript and also JavaScript inside HTML in order to make it become a dynamic HTML. Besides displaying information, the HTML can also show database records in the Internet and get response from other users.

However, HTML is a static web page where the content will never change. This is because the author of the page determines the exact content of the page unless if any content updating is done. Why bother? Normally, HTML files are interpreted on the client side (in a user's web browser).

3.3.3 CONSIDERATION OF WEB TECHNOLOGY

Active Server Pages (ASP)

Active Server Pages (ASP) is a programming environment that provides the ability to combine HTML, scripting languages and other components to create powerful Internet applications that run on servers. If a user creates a web site that combines HTML, scripting languages and other components, Active Server Pages (ASP) can be used to glue these items together. Users can create a HTML interface for an application by adding script commands to the HTML page and encapsulate it for business logic into reusable components. These components can be called from the scripts or other components.

An Active Server Pages application can integrate with any ODBC-compliant databases including Microsoft SQL Server, Oracle, Sybase, Informix, and DB2 databases. Any

OLE 2 application, such as Lotus Notes or Microsoft Excel, can also be scripted to access or process information. You can also write components to access online data feeds and legacy mainframes.

Following are the reasons why I chose Active Server Pages (ASP) as the web technology that would be used in developing the Online Music Store :-

- ASP combines HTML with other scripts in the same file for better application flow.
- The user does not need to worry about the browser's script capabilities as the scripts are processed on the server.
- ASP supports VBScript and JavaScript.
- Creating ASP requires only standard knowledge of HTML, or in other words, a person who knows HTML will find ASP easy to learn.
- ASP development is compile free.
- ASP protects proprietary business algorithm and information.
- ASP supplies client server programming, which can be used to build client server applications.
- It is suitable for building multi-tier Internet and intranet applications.

3.3.4 CONSIDERATION OF SCRIPTING LANGUAGES

VBScript

Visual Basic Script or VBScript enables us to embed commands into a HTML document and it has been designed to make it easier to develop client side web applications that run on a web browser. When an Internet Explorer user downloads a page, the VBScript

commands are loaded by the web browser along with the rest of the document and are run in response to any of a series of events. VBScript is an interpreted language just like JavaScript. Internet Explorer interprets the VBScript command when they are loaded and run. They do not need to be compiled into executable form by the web author who uses them. Following are the reasons why I chose VBScript as the client side scripting language that would be used in developing the Online Music Store (OMS) :-

- VBScript is powerful and can be used to develop highly interactive web pages that respond to the user input in an intelligent manner. In the case of a server side application, VBScript can be used to process data submitted by user with the aid of ActiveX controls specially designed for Microsoft Active Server Pages (ASP).
- VBScript codes are lightweight, fast and have been optimized to transmit via the Internet.
- VBScript is easier to use because it is based on the easy-to-learn BASIC (Beginner's All Purpose Symbolic Instruction Code) language.
- VBScript is very compatible to the technology that would used in this system, that is, Active Server Pages (ASP).

JavaScript

JavaScript's greatest potential gift to a web site is that scripts can make the page more immediately interactive, that is, interactive without having to submit every little thing to the server for a server program to re-render the page and send it back to the client. For example, consider a top-level navigation panel that has, say, six primary image map

links into subsections of the Web site. With only a little bit of scripting, each map area can be instructed to pop up a more detailed list of links to the contents within a subsection whenever the user rolls the cursor atop a map area. With the help of that popup list of links, the user with a scriptable browser can bypass one intermediate menu page. The user without a scriptable browser (or who has disabled JavaScript) will have to drill down through a more traditional and time-consuming path to the desired content.

On their own, web pages tend to be lifeless and flat unless animated images are added or more bandwidth-intensive content such as Java applets or other content requiring plug-ins are operated. Embedding JavaScript into an HTML page can bring the page to life in any number of ways. Perhaps the most visible features built into pages recently with the help of JavaScript are the so-called image rollovers. An example to that would be rolling the cursor atop a graphic image which would change the image into a highlighted version as a feedback mechanism to let users know precisely what they are about to click on. But there are less visible yet more powerful enhancements to pages that JavaScript offers.

Interactive forms validation is an extremely useful application of JavaScript. While a user is entering data into form fields, scripts can examine the validity of the data. Without scripting, the user has to submit the form and let a server program check the field entry and then report back to the user. This is usually done in a batch mode and the extra transactions take a lot of time and server processing power. Interactive validation scripts can check each form field immediately after the user has entered the data, while the information is fresh in the mind.

JavaScript allows a web page to perform "if-then" kinds of decisions based on browser version, operating system, user input, and, in more recent browsers, details about the screen size in which the browser is running. While a server CGI program can make some of those same kinds of decisions, not everyone has access to or the expertise to create CGI programs. For example, an experienced CGI programmer can examine information about the browser whenever a request for a page is made, thus a server so equipped might serve up one page for Navigator users and a different page for Internet Explorer users. Beyond browser and operating system version, a CGI program cannot know more about the environment. But a JavaScript-enhanced page can instruct the browser to render only certain content based on the browser, operating system, and even the screen size.

Scripting can even go further if the page author desires. For example, the author may include a preference screen that lets the user determine the desired background and text color combination. A script can save this information on the client in a well-regulated local file called a cookie. The next time the user comes to the site, scripts in its pages look to the cookie info and render the page in the color combination selected previously. The server is none the wiser, nor does it have to store any visitor-specific information.

3.3.5 CONSIDERATION OF WEB AUTHORING TOOL

Macromedia Dreamveawer MX

The reason why I chose Macromedia Dreamveawer MX as the web-authoring tool for developing the Online Music Store (OMS) is because it has a few qualities that make it different to other high-end web site tools. The qualities that I am talking about are :

- Roundtrip HTML
- Customizing options and page layout power
- Cross-browser compatibility
- Site management features.

Roundtrip HTML

Most traditional web page tools are either tag based, which have good control, but difficult to use or have a WYSIWYG interface. Tools with a WYSIWYG interface usually create their own "brand" of HTML that doesn't always conform to the World Wide Web Consortium's HTML standards. So WYSIWYG tools, which shield users from hand editing tags, are convenient and quick to use. HTML purists do not like the HTML these tools produce. Another problem is that if more than one editor is used or the pages are worked on by several people using different editors, the source from one falls to bits or is reformatted when it is opened with another. Dreamweaver's Roundtrip HTML preserves the formatting you set, no matter which source editor you use.

Customizing options and page layout power

With Dreamweaver, many things can be customized such as the look of your workspace, your choice of HTML source editor and even the way your HTML source is displayed.

Launcher - Launcher can be used to open and close Dreamweaver's pallets and inspectors. There's a mini launcher at the bottom right edge of the document window. It has the same icons as the launcher, but no labels. Once you get used to the icons, you can dispense with the launcher, freeing valuable desktop workspace for other items.

Object Pallet - This pallet reproduces selections within the Insert menu. It is used to insert page elements. The default groupings for page elements are, Common, Forms and Invisibles. Groupings can be customized in almost any way, from which elements appear in which group to which order groups or elements within a group appear. New objects can be created and added to any group. Objects can be almost any HTML element, such as images, tables, layers, rules, applets, plug-ins, forms, scripts, comments, to snippets of code. Once a new object is created and added to the object pallet, it can be added to any page.

Property Inspector - The context sensitive Property Inspector switches dynamically to display the properties of the HTML element that's being worked on. Although it might not be immediately obvious, this is an extremely useful feature. When the user is working on an image, the Image Property Inspector is displayed. If the user wants to edit an image, it can be done visually, using the mouse to select and drag the image dimensions or change image dimensions by entering new height or width values in the

inspector window. When the user is working on text, they can change the font or style by selecting it with the mouse and applying the code they want, they can use the HTML Inspector to edit tags, or call up a preferred external editor with a single click, and change the tags there. Whichever way the change is being made, the document is updated automatically in the other views.

Cross-browser compatibility

There are only two main protagonists in the browser wars, but the range of versions, each with its own feature set, makes designing for cross-browser compatibility a nightmare. Dreamweaver has several features to make this essential task easier. A target browser, or browsers can be selected. Check a document against the target(s) and a list of tags or attributes that are not supported by the target browsers will be displayed. Predefined profiles for Netscape Navigator 2.0, 3.0, and 4.0 and Microsoft Internet Explorer 2.0, 3.0, and 4.0, or any combination of these can be checked.

Site management features

Creating a single page is one thing, maintaining a site is another. There are links to check, HTML to tweak, and styles to update. Good sites are internally consistent. Consistency helps visitors orient themselves within the site. Changing the way lists are displayed or changing the navigation bar on every page is a pain. Dreamweaver's Target Browser Check and CSE HTML Validator help you control and manage your HTML. The Check Link Feature checks links for a single document or the entire site.

Library Elements - Library Elements can be bullets, backgrounds, logos, addresses, etc, and all their attributes. The elements are dragged or inserted into the page. Within Dreamweaver, Library Elements are displayed differently from ordinary page elements, but they appear normally in the browser. If a library item is changed, a decision decide whether to have Dreamweaver update all pages right then or later must be made When the site is updated all references to the library item are changed in all pages that contain the item. So it's easy to maintain consistency across the site even when a common style is changed, frequently used e-mail address, or any page element that's being set up as a Library Element.

An individual instance of a Library Element can also be edited. Users will first be reminded that it is a Library Element and asked they want to edit the element or this instance. When editing a single instance, only that instance changes. That item will no longer be linked for automatic updates when the library element is changed.

File Check In/Out - It is useful to be able to identify which files have been checked in/out and by whom, especially if there are problems with data loss and version control, two common hazards when more than one person works on a site.

Layers - If the design is for version 4 browsers, layers can be used to position graphics, text and other HTML objects at specific pixel coordinates. Layer properties can also be modified, including its size, shape, position, visibility, color and position within a group of layers.

Style Sheets - Styles within a page can be set and controlled by using individual custom styles or style sheets or across pages using Library Elements or style sheets. Style sheets can be individual internal styles, placed within the <Head> element of each page, or stand-alone. Stand-alone style sheets are external to individual pages, but linked to the pages to which they apply. Styles are created with the Style Definition Menu and applied to any text in a document. Browsers that do not support styles simply ignore style tags.

JavaScript behaviours - A number of preset behaviours, which include events, for example onClick, onMouseOut, and onMouseOver and actions, for example, show layer, hide layer, and play sound are built-in to Dreamweaver. Behaviour can be applied to a link, image, form element, layer and almost any HTML element.

Animation - Very impressive animations can be created by manipulating and combining layers with JavaScript behaviours along a time line. This is one example of what is called Dynamic HTML, or DHTML. Dreamweaver's time-line interface makes it easy to manipulate layers and behaviours, along a time line or time curve. Images can be swapped, sounds added, layer properties changed, even go to another URL within the animation.

3.3.6 CONSIDERATION OF DATABASE MANAGEMENT SYSTEM

Microsoft Access 2000

Microsoft Access 2000 is a relational database that was developed by Microsoft. It currently has 10 million users worldwide and is considered one of the best-selling

relational database packages for Windows in the market. Microsoft Access 2000 provides relational database powers to give the information users need in order to make better decisions. Together with the ODBC driver, data can be retrieved from the database in a client server based system. Microsoft Access 2000 is suitable for information processing. The reasons why I chose Microsoft Access 2000 as the database management system that would be used in the Online Music Store (OMS) are :-

- It integrates data from spreadsheets and other databases, and is the easy way to find answers and share information over intranets and the Internet.
- Microsoft Access 2000 allows generating, analyzing and creating reports fast. It integrates ease of use from the data entry point to printing in HTML.
- This relational database tool can be integrated easily with Macromedia Dreamveawer MX.
- Many simple and user-friendly features in building tables, queries, forms and reports that can be customized to suit project needs.
- It is very compatible to the technology that would be used in developing the Online Music Store (OMS), that is, Active Server Pages (ASP).
- Provides concurrent help by assisting users in answering their questions.

3.3.7 CONSIDERATION OF WEB BROWSER

Microsoft Internet Explorer 5.5

Microsoft Internet Explorer 5.5 is chosen as the preferred web browser because it is the current favourite web browser among Internet users.

3.3.8 CONSIDERATION OF WEB SERVER

Internet Information Server 4.0

Several web servers from different vendors were available at the time of analysis. However, after analyzing all of them, the Internet Information Server 4.0 was chosen as the web server that would be used for the Online Music Store (OMS). The Internet Information Server (IIS) is the larger of the two web servers available from Microsoft and it is the only World Wide Web server that is tightly integrated with Microsoft Windows NT Server operating system. [11]

The Internet Information Server (IIS) provides the ability to provide web services not only for web pages, but also for ftp sites (ability to transfer whole files from one site to another), nntp services (newsgroup services) and video and audio services.

One of the most important areas of focus for the Internet Information Server (IIS) is providing powerful access control functionality for web access to files and application on the server. It includes a built-in search engine, streaming multimedia capabilities, and rich log file and analysis tools.

The Internet Information Server (IIS) includes security features and promises that are easy to install. It works closely with the Microsoft Transaction Server to access database and provide control at transaction level. It also works with Microsoft's NetShow in the delivery of streaming audio and video, delayed or alive.

3.4 CONSIDERATION OF HARDWARE

The hardware requirements for the Online Music Store (OMS) can be divided into two that is the server computers hardware requirements and the client computer hardware requirements. Below are the requirements for both the client and server computers :-

3.4.1 SERVER COMPUTER HARDWARE REQUIREMENTS

1. A server with at least Pentium 166MHz MMX processor.
2. At least 64MB RAM.
3. Network Interface Card (NIC) and network connection with recommended bandwidth at 10Mbps.
4. Others standard computer peripherals.

3.4.2 CLIENT COMPUTER HARDWARE REQUIREMENTS

1. Any compatible PC with recommended at least Pentium MMX processor and 32MB RAM.

3.5 CONCLUSSION

In this chapter, a study has been carried out on the proposed Online Music Store (OMS) to find out the suitable methodology to be used and the "Waterfall model with Prototyping" has been chosen. Besides that, system requirements such as functional and non-functional requirements have been investigated and analyzed thoroughly.

The tools and techniques to be used have been rectified as well. As a result, Windows NT Server 4.0 has been chosen as the system platform, Active Server Pages (ASP) as the web technology, Internet Information Server 4.0 as the web server, Microsoft Internet Explorer 5.5 as the web browser, Macromedia Dreamveawer MX as the web-authoring tool, HTML as the web application language, VBScript and JavaScript as the scripting languages and Microsoft Access 2000 as the database management system.

SYSTEM DESIGN

CHAPTER 4 : SYSTEM DESIGN

4.1 INTRODUCTION

After capturing the requirements analysis and definitions, the system design phase is implemented. The information collected earlier is used to accomplish the design of the system. Design is essential in the development of a system. It is the interaction between users and the system. The system design phase includes the design of the program, the user interface and the database.

The program design involves designing the modules that exist in the Online Music Store (OMS). Every module is designed in detail. The data flow for a module is presented in the designing phase. Related diagrams are used in presenting the data flow.

The database design is the most important component in any information system. A well organized database can enhance the management of the system. The database schema is used to present the organization of the database.

Finally, the user interface design is the most essential part in attracting users to visit the Online Music Store (OMS). The site layout design is presented in this phase.

4.2 APPLICATION PROCESSING

The Online Music Store (OMS) will be delivered with the ASP Server. When a browser requests a page in an ASP application, the server processes the active server pages, interacts with backend systems, and dynamically generates a web page that is returned to the browser.

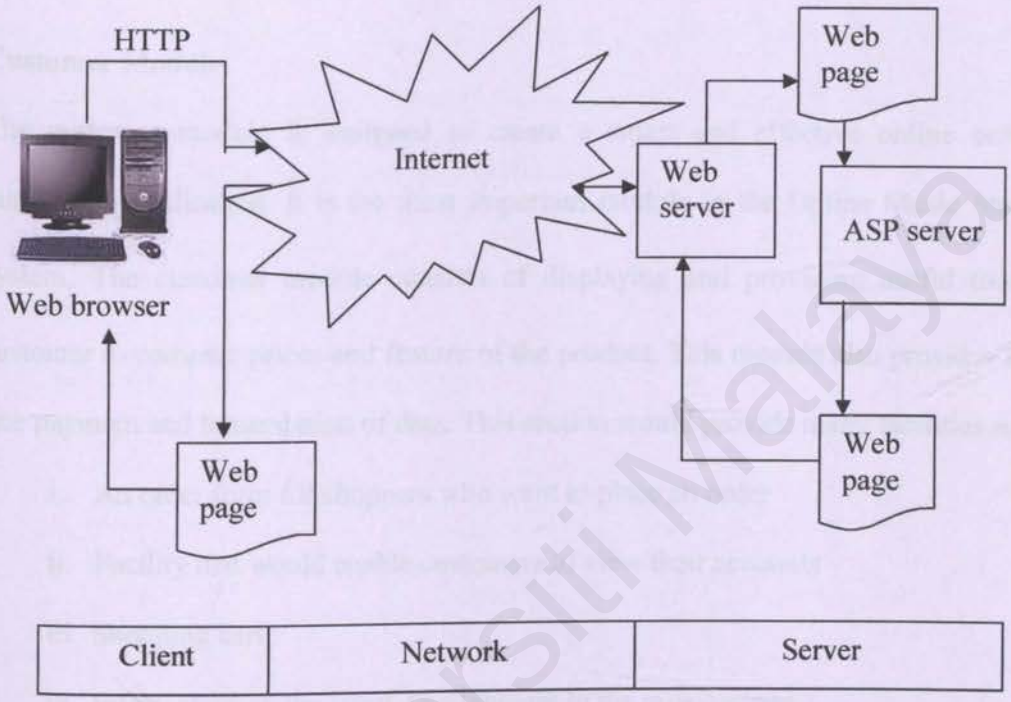


Figure 4.1: The Online Music Store (OMS) Application Processing

4.3 ARCHITECTURAL DESIGN FOR SYSTEM MODULES

The Online Music Store (OMS) is divided into three modules that would perform all the store's functions. The three modules are the customer module, administrator module and the general module.

Customer Module

The customer module is designed to create a smart and effective online ordering and purchasing application. It is the most important module in the Online Music Store (OMS) system. The customer module consists of displaying and providing useful tools for the customer to compare prices and feature of the product. This module also provides secure on-line payment and transmission of data. This section would provide many facilities such as: -

i. An order form for shoppers who want to place an order
ii. Facility that would enable customers to view their accounts
iii. Shopping cart
iv. Information on the latest development in the music world

Administrator Module

The administrator module will enable the administrator to manage the system in a more effective and systematic way. This module would enable the administrator to view, maintain and analyze the database and also change the content of the web site so that customers are always updated with the latest information on the products that are offered. The functions of the administrator module are :-

i. Maintaining and updating all the information stored in the database
ii. Keeping track on customers' information.

iii. Managing customer orders.

iv. Maintaining employee information

General Module

The general module allows the merchant to check their stock inventory before the customer or users confirm their order. Users will be able to get updated information about every spice available before they purchase it. This section would provide many facilities such as: -

i. Makes sure a secure transaction is carried out

ii. Company credibility

iii. Agreement document

iv. Web site reusable functionality

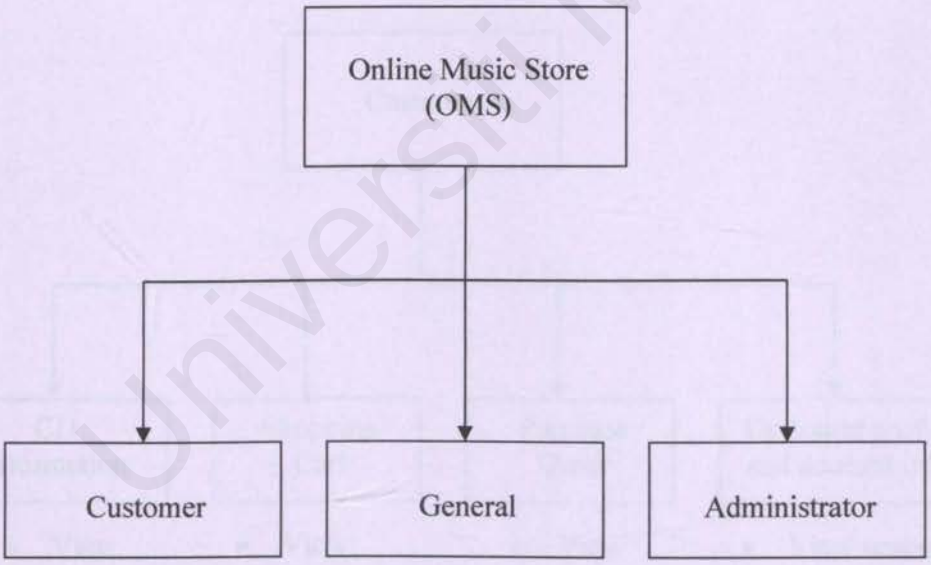


Figure 4.2: System Architecture For The Online Music Store (OMS)

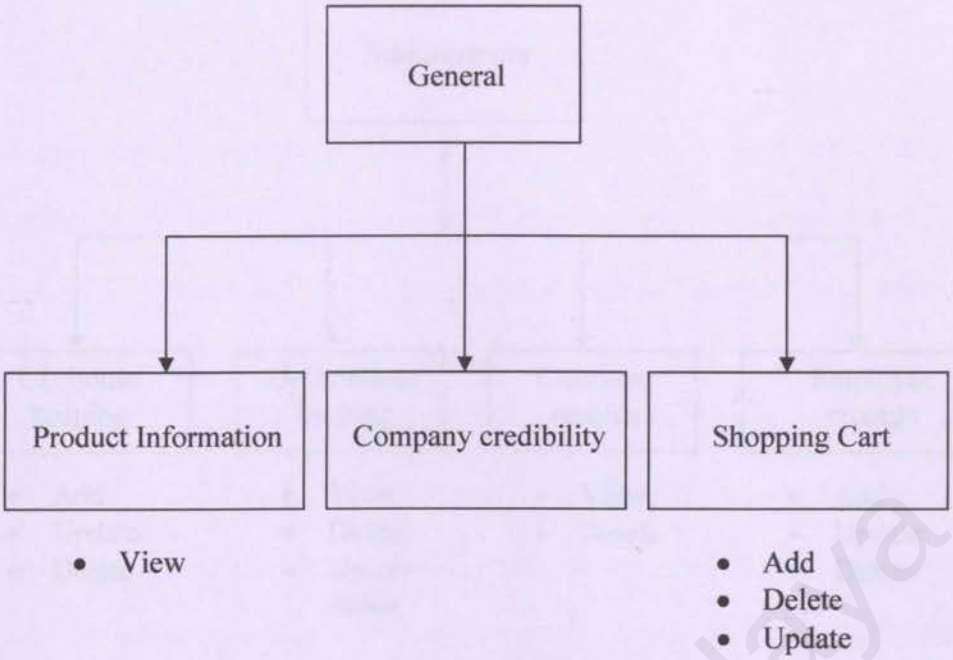


Figure 4.3: System Architecture for General Module

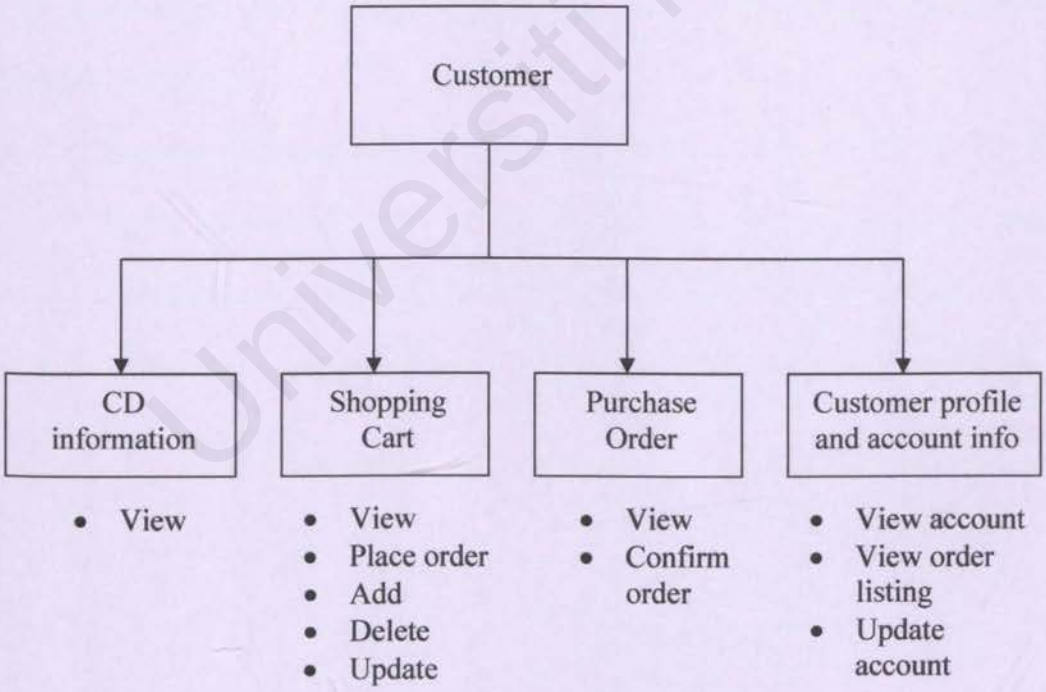


Figure 4.4: System Architecture for Customer Module

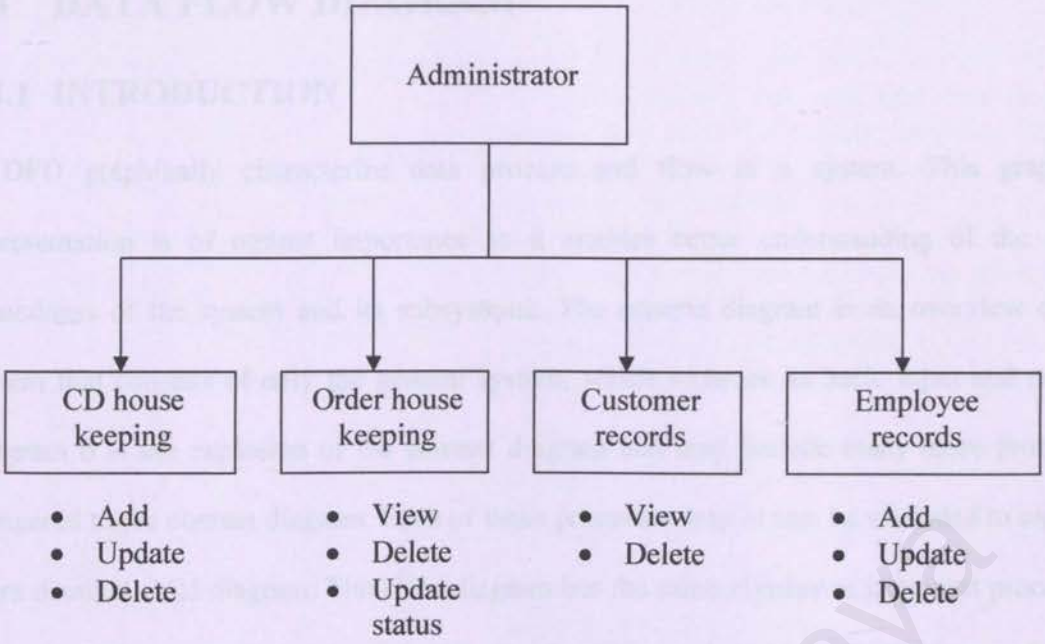


Figure 4.5: System Architecture for Administrator Module

4.4 DATA FLOW DIAGRAM

4.4.1 INTRODUCTION

A DFD graphically characterize data process and flow in a system. This graphical representation is of utmost importance as it enables better understanding of the inter-relatedness of the system and its subsystems. The context diagram is an overview of the system that consists of only the general system, which includes its basic input and output. Diagram 0 is the explosion of the context diagram and may include many more processes compared to the context diagram. Each of these processes may in turn be exploded to create a more detailed child diagram. The child diagram has the same number as its parent process in Diagram 0. For example, process 9 in Diagram 0 will be exploded into Child Diagram 9.

The Data Flow Diagram (DFD) is used as the graphical representation of the system design due to its advantage over narrative explanations on how data moves in the system. The advantages of DFD are :-

- Freedom from committing to the technical implementation of the system too early.
- Further understanding of the interrelatedness of the system and its subsystems.
- Communicating knowledge of current systems to users through DFDs.
- Analysis of a proposed system to determine if the necessary data and processes have been defines.

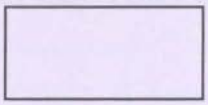
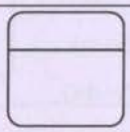
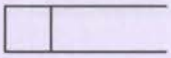
SYMBOLS	NAME	DESCRIPTION
	Entity	An external entity that can send data to or receive data from the system. Interacts with the system but considered as outside of the boundaries of the system.
	Data Flow	Used to show the movement of data from an origin to a destination with the head of arrow pointing towards the destination.
	Process	It represents the transformation or processing of information within a system.
	Data Store	Shows a depository for data that allows addition or retrieval of data.

Table 4.1 : Data Flow Diagram Model Symbols

4.4.2 ONLINE MUSIC STORE (OMS) DATA FLOW DIAGRAM

4.4.2.1 CONTEXT DATA FLOW DIAGRAM FOR OMS

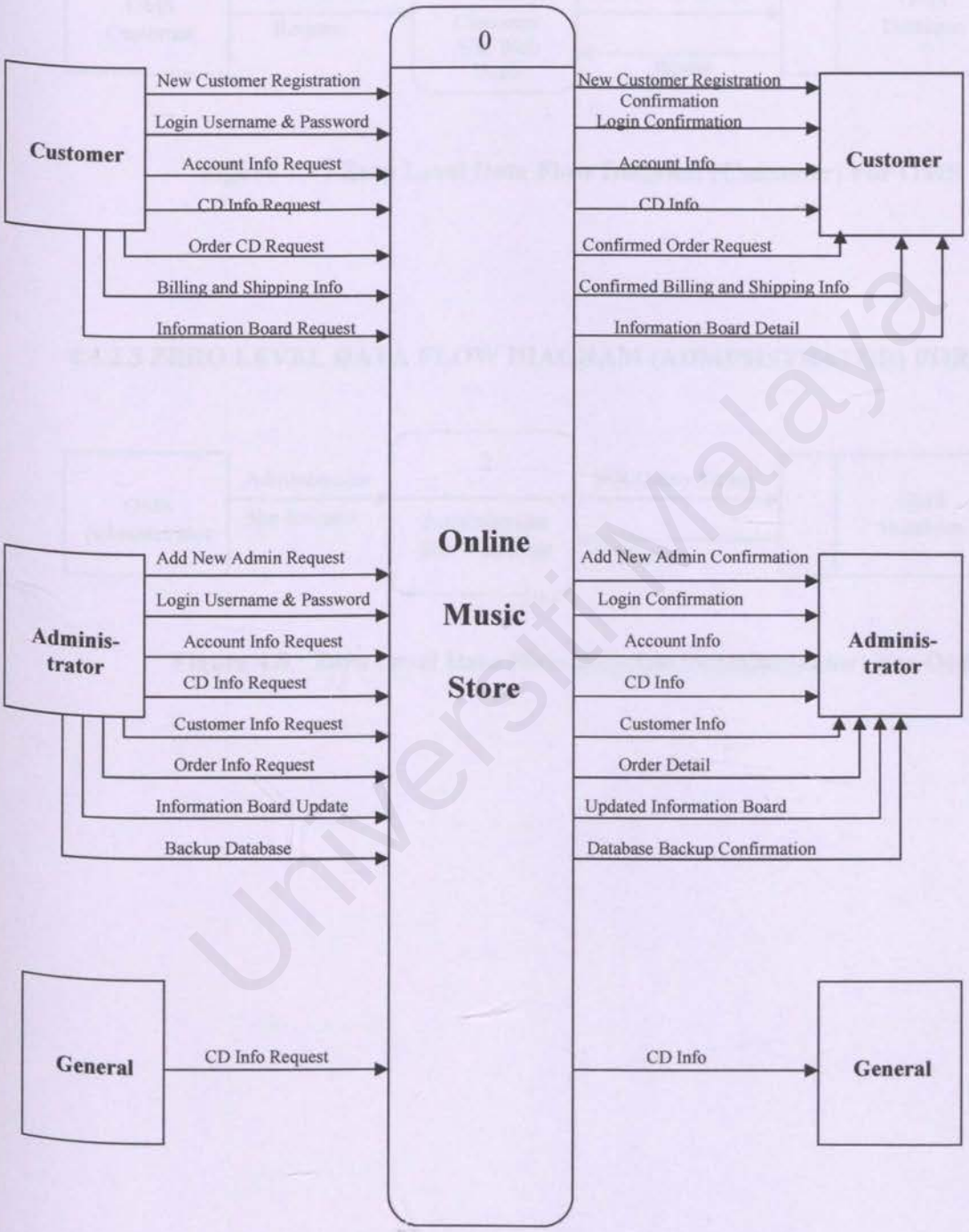


Figure 4.6 : OMS Context Data Flow Diagram

4.4.2.2 ZERO LEVEL DATA FLOW DIAGRAM (CUSTOMER) FOR OMS

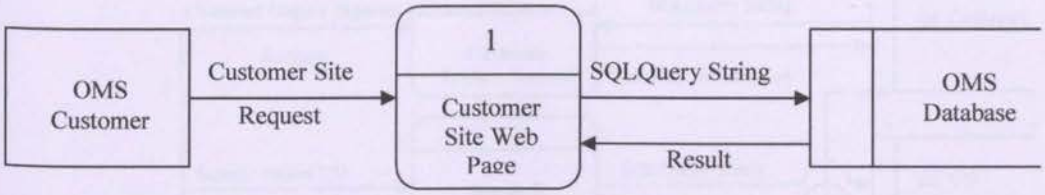


Figure 4.7 : Zero Level Data Flow Diagram (Customer) For OMS

4.4.2.3 ZERO LEVEL DATA FLOW DIAGRAM (ADMINISTRATOR) FOR OMS

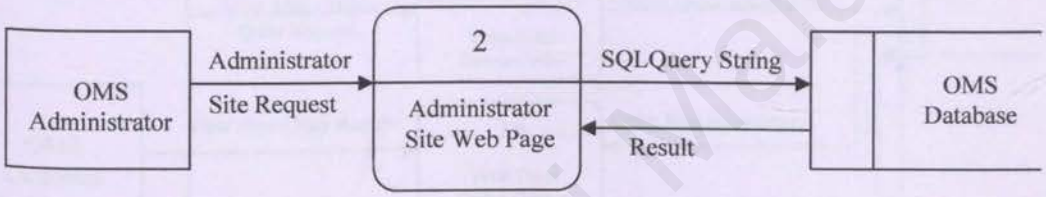
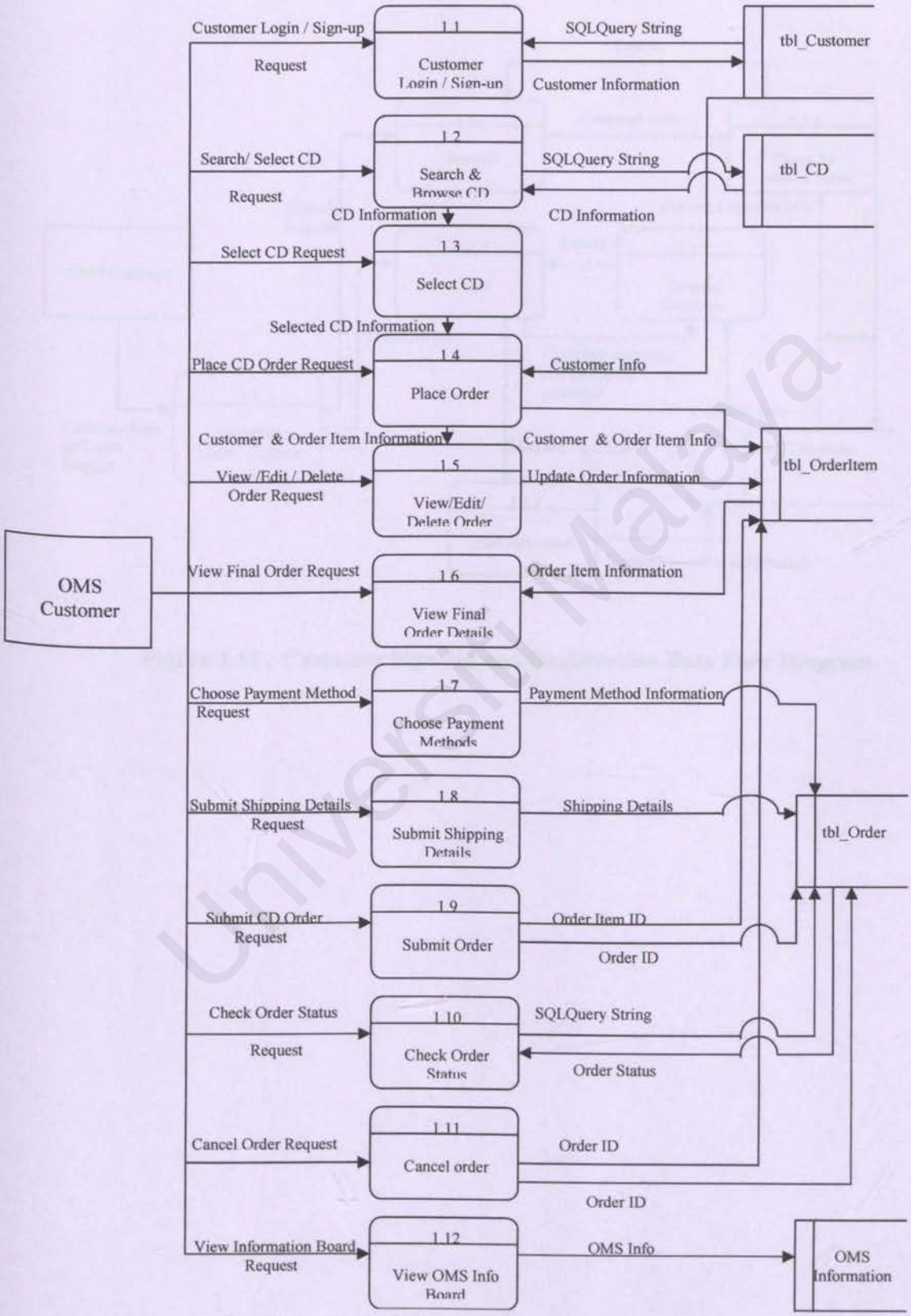


Figure 4.8 : Zero Level Data Flow Diagram (Administrator) For OMS

4.4.2.4 CHILD DATA FLOW DIAGRAM (CUSTOMER) FOR OMS



Child Data Flow Diagram (Customer) For OMS

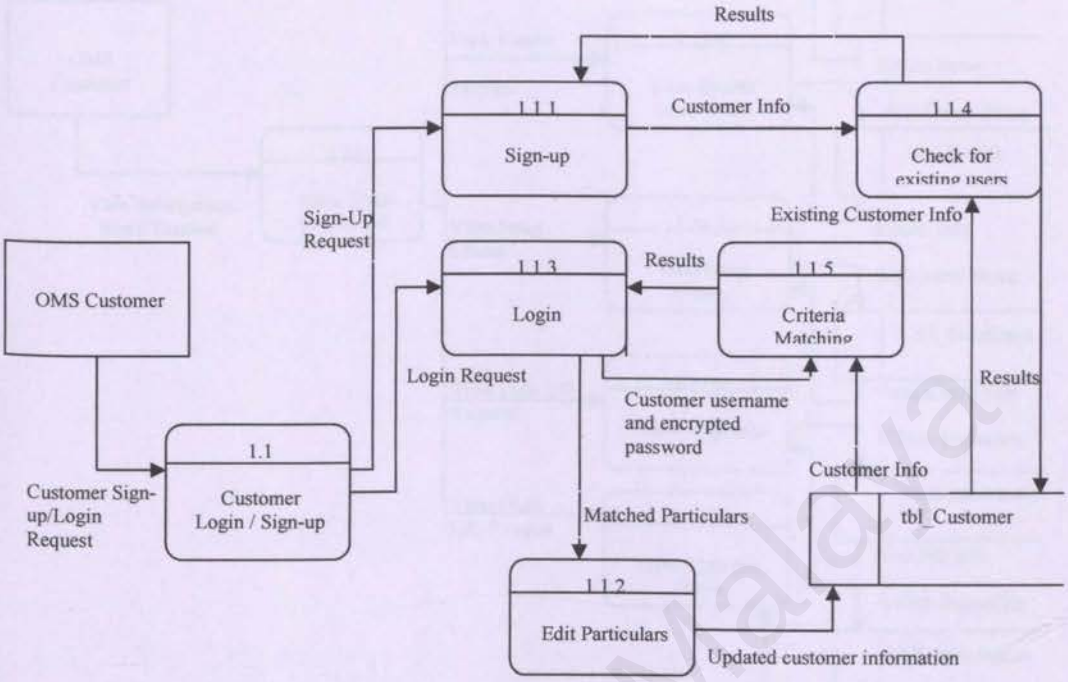


Figure 4.10 : Customer Sign-Up and Registration Data Flow Diagram

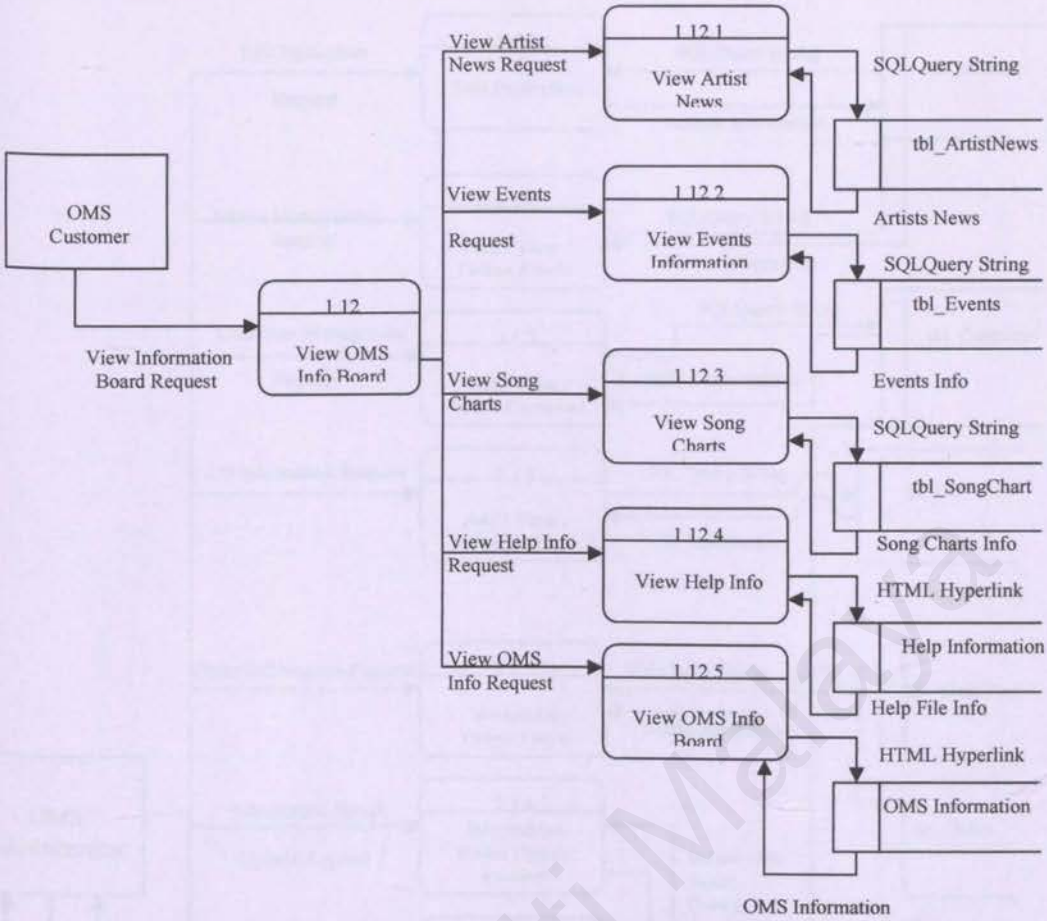


Figure 4.11 : Customer Information Board Data Flow Diagram

4.3.2.5 CHILD DATA FLOW DIAGRAM (ADMINISTRATOR) FOR OMS

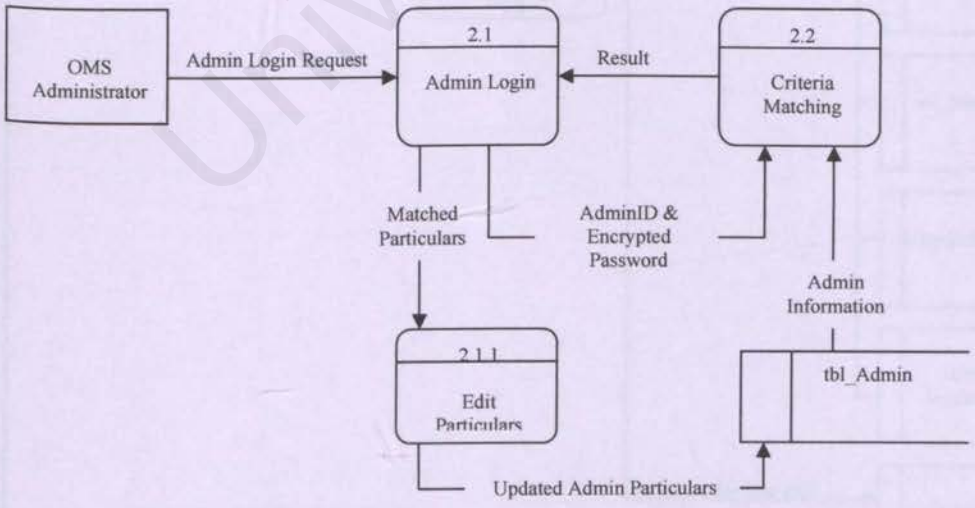


Figure 4.12 : Child Data Flow Diagram for Admin Login in OMS

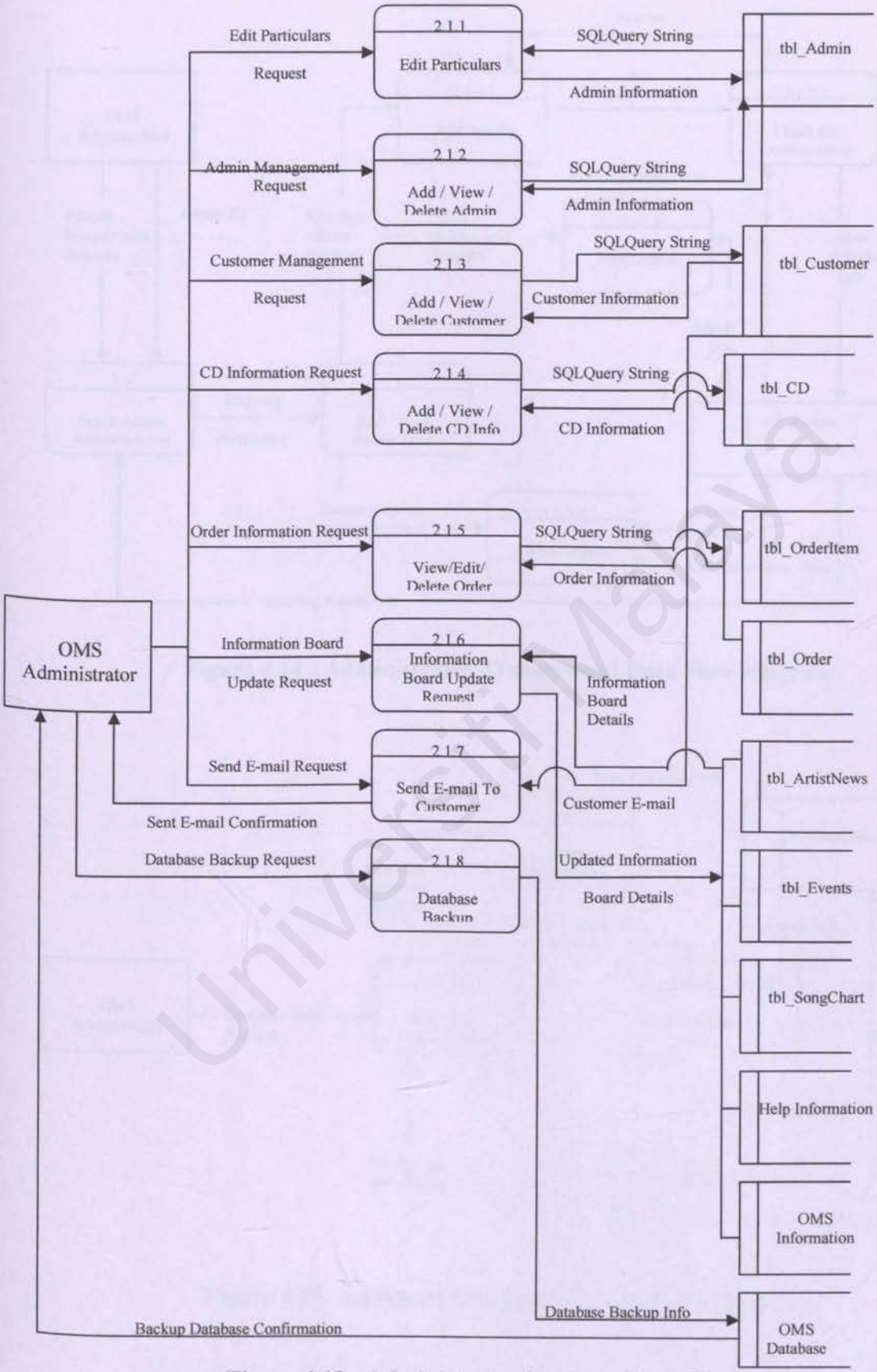


Figure 4.13 : Administrator Site Data Flow Diagram

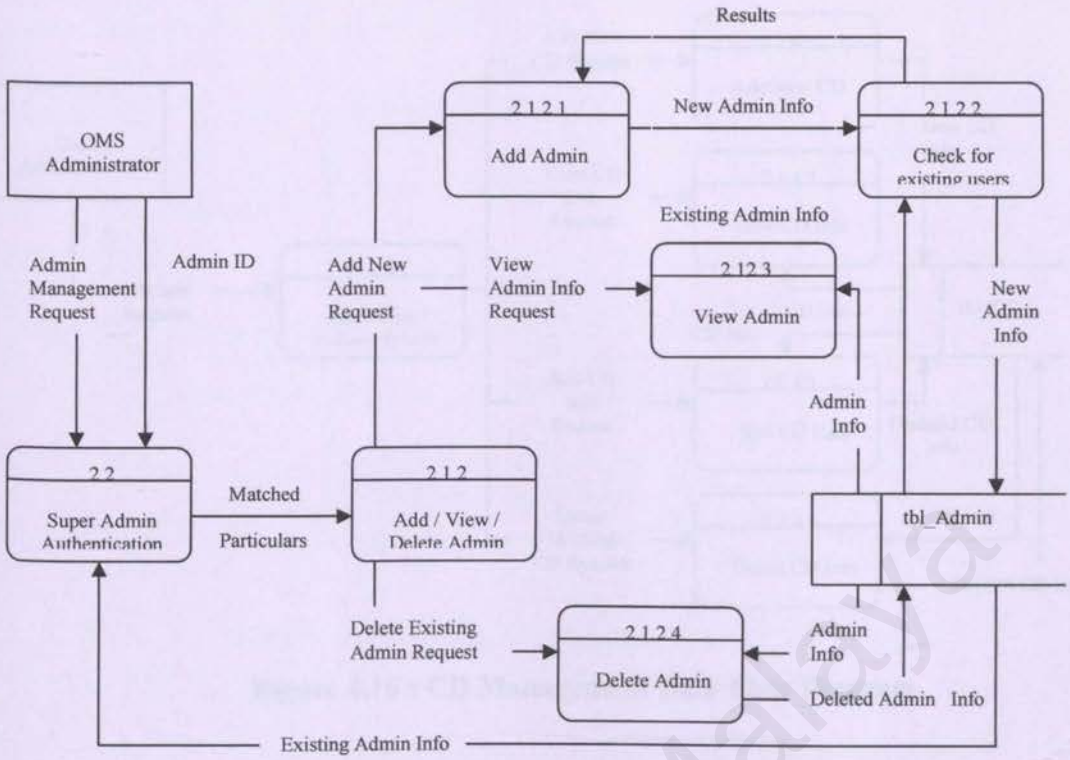


Figure 4.14 : Administrator Management Data Flow Diagram

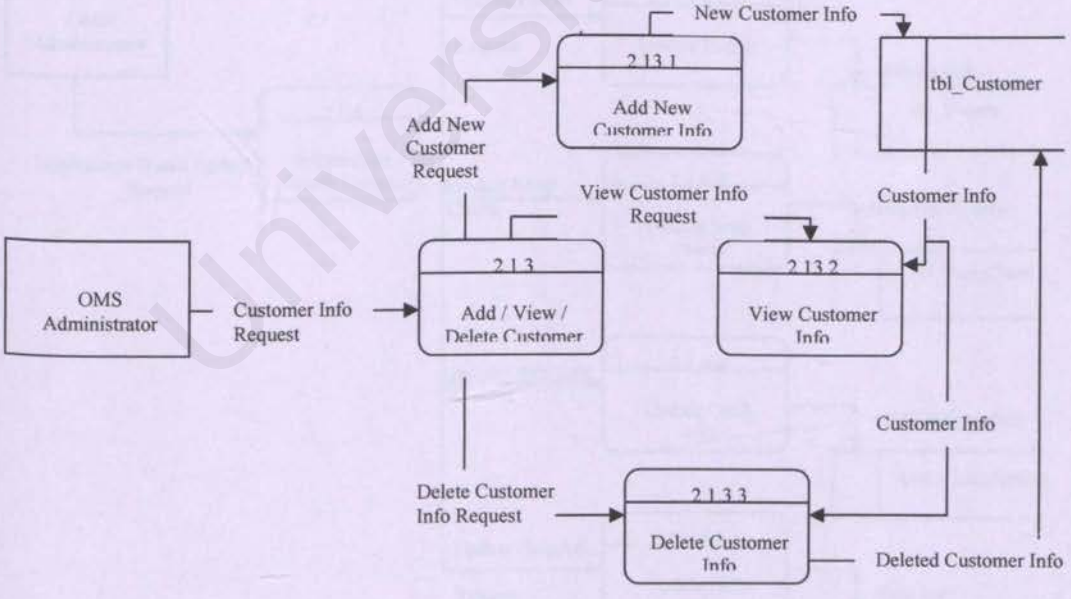


Figure 4.15 : Customer Management Data Flow Diagram

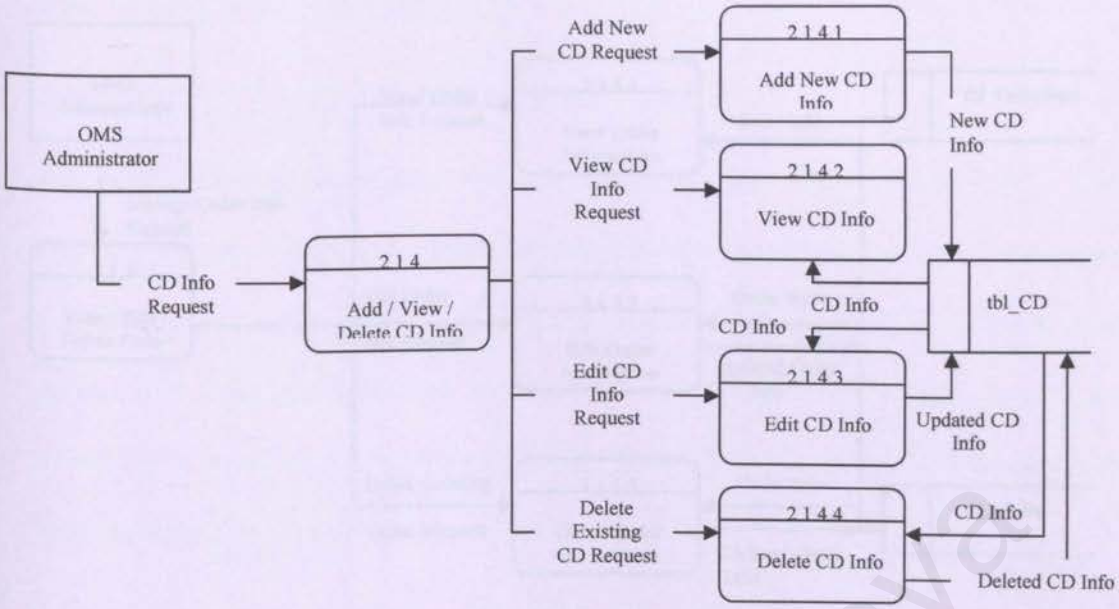


Figure 4.16 : CD Management Data Flow Diagram

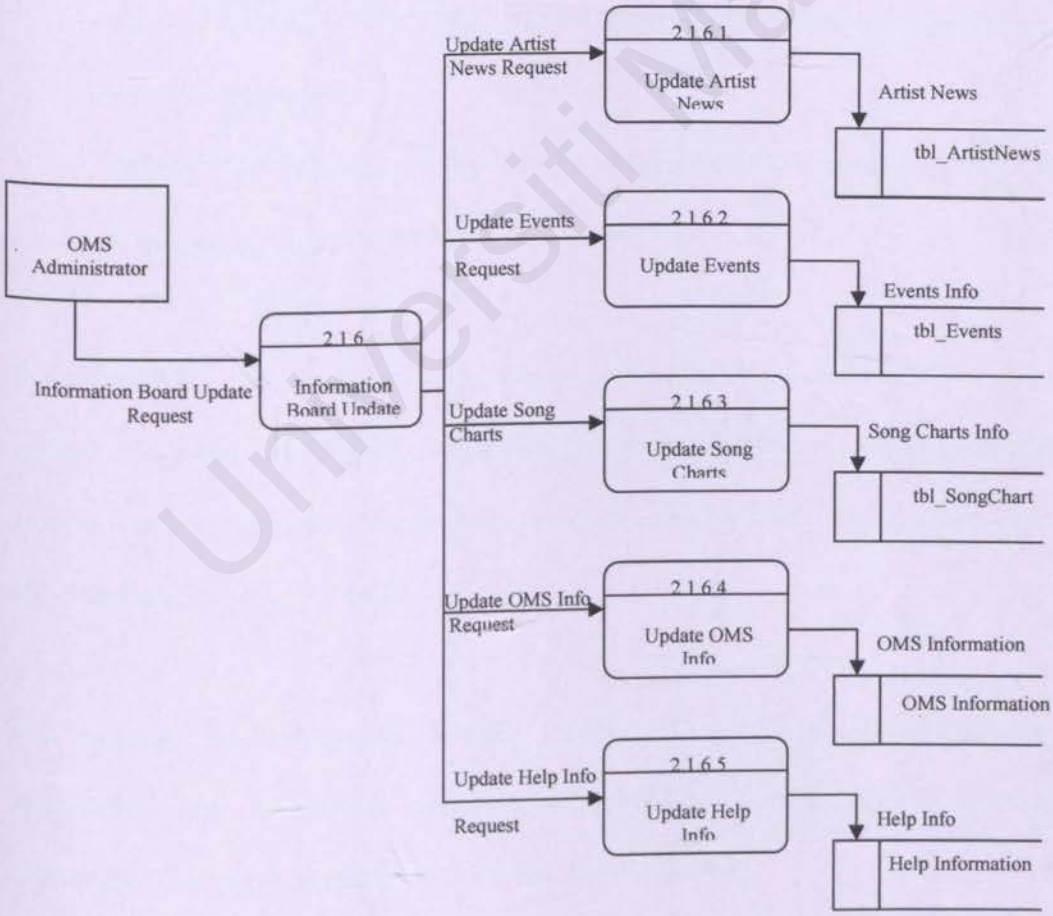


Figure 4.17 : Information Board Management Data Flow Diagram

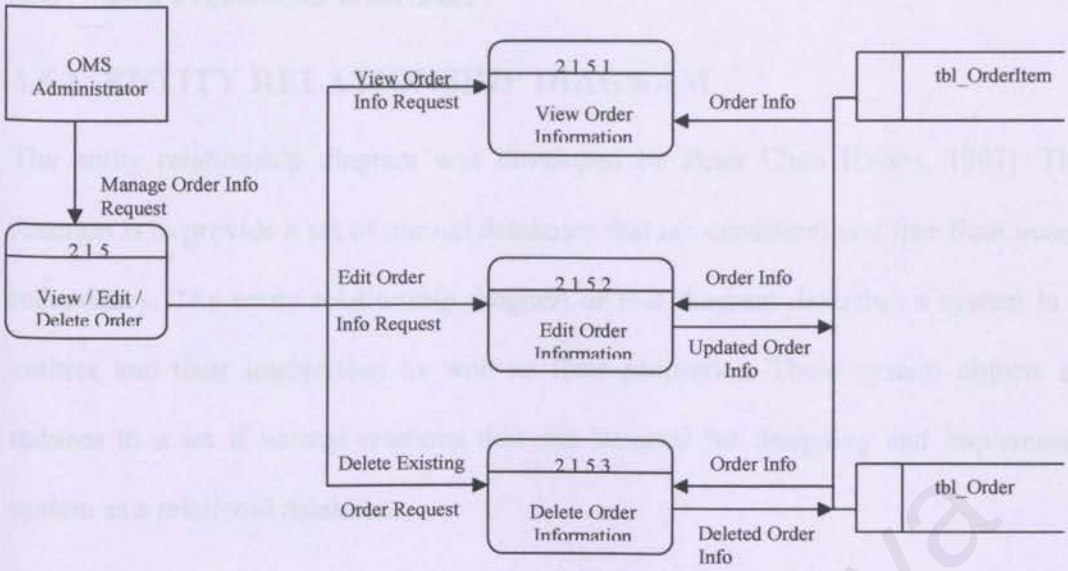


Figure 4.18 : Order Management Data Flow Diagram

4.5 DATABASE DESIGN

4.5.1 ENTITY RELATIONSHIP DIAGRAM

The entity relationship diagram was developed by Peter Chen [Davis, 1993]. The main function is to provide a set of normal databases that are consistent and free from unnecessary redundancy. The entity relationship diagram or E-R diagram describes a system in term of entities and their interactions as well as their properties. These system objects are then reduces to a set if normal relations that can be used for designing and implementing the system as a relational database.

The E-R diagram is commonly used for :-

- translate different views of data among managers, users and programmers to fit into a common framework
- define data processing and requirement constraints to help meet different views.
- help implement the database

Entities that are identifiable things of importance to users are defines with this model. All entities of a given type form an entity class. A particular entity is called an instance. In the entities, there are attributes that describe the characteristics of the entities. In addition, one or more attributes identify an entity.

Relationships are associations among entities. The E-R diagram explicitly defines relationship; each relationship has a name; and there are relationship classes as well as relationship instances. Relationship may also have attributes.

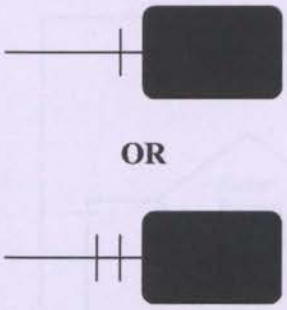
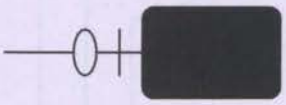
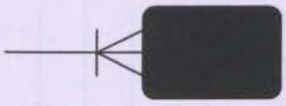
GRAPHICAL NOTATION	CARDINALITY INTERPRETATION	MAXIMUM INSTANCES	MINIMUM INSTANCES
 OR	Exactly one (One and only one)	1	1
	Zero to one	1	0
	One or more	Many (>1)	1
	Zero, one or more	Many (>1)	0
	More than one	>1	>1

Table 4.2 : Cardinality Notations

4.5.1.2 THE ONLINE MUSIC STORE (OMS) ENTITY RELATIONSHIP DIAGRAM

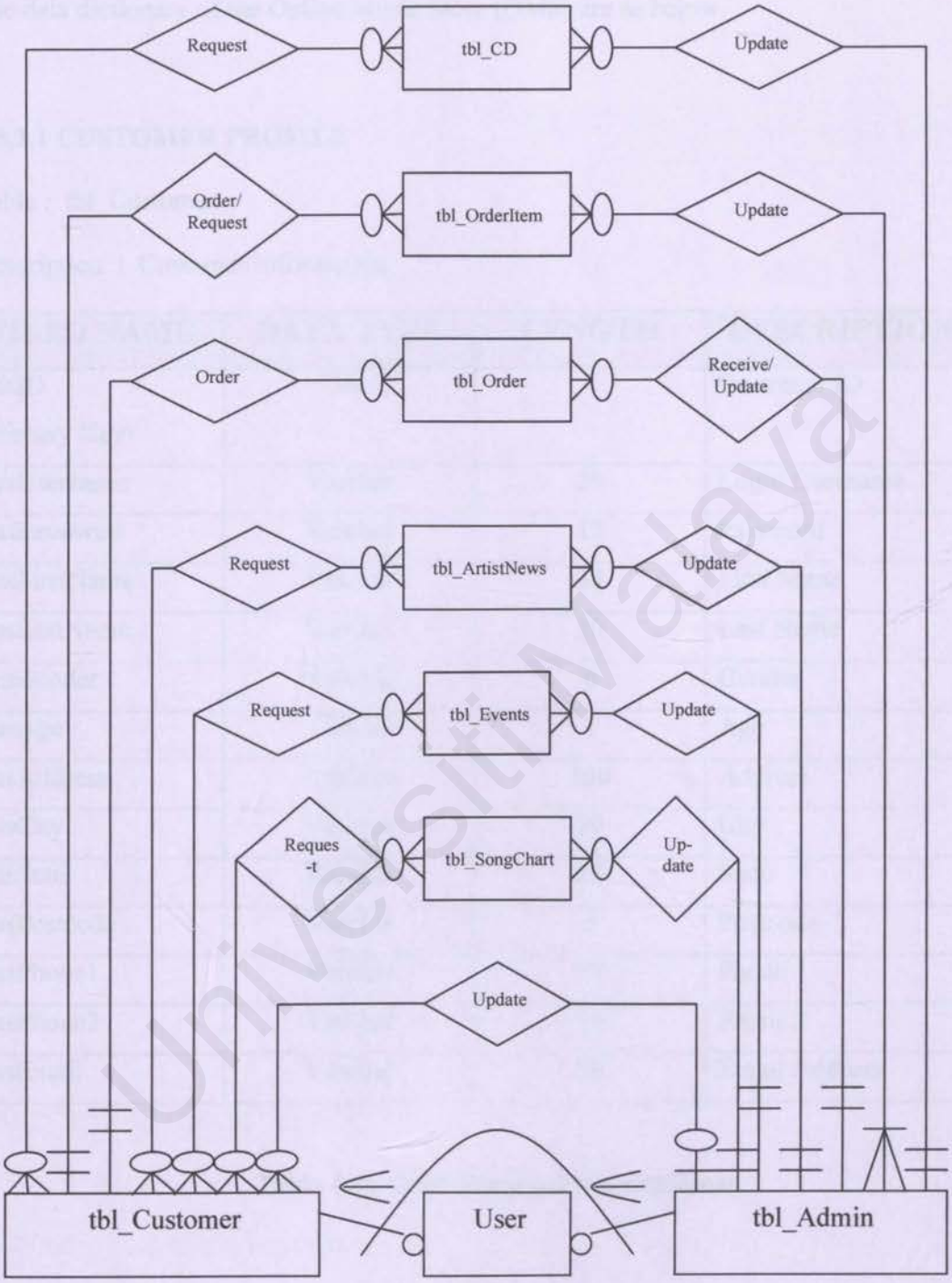


Figure 4.19 : The Online Music Store (OMS) Entity Relationship Diagram

4.5.2 DATA DICTIONARY

The data dictionary of the Online Music Store (OMS) are as below.

4.5.2.1 CUSTOMER PROFILE

Table : tbl_Customer

Description : Customer Information

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
CusID (Primary Key)	Int	4	Customer ID
CusUsername	Varchar	20	Login Username
CusPassword	Varchar	12	Password
CusFirstName	Varchar	30	First Name
CusLastName	Varchar	30	Last Name
CusGender	Varchar	6	Gender
CusAge	TinyInt	1	Age
CusAddress	Varchar	100	Address
CusCity	Varchar	20	City
CusState	Varchar	20	State
CusPostcode	Varchar	5	Postcode
CusPhone1	Varchar	15	Phone 1
CusPhone2	Varchar	15	Phone 2
CusEmail	Varchar	50	Email Address

Table 4.3 : OMS Database tbl_Customer

4.5.2.2 CD INFORMATION

Table : tbl_CD

Description : CD Information

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
CDID (Primary Key)	Int	7	CD ID
Category	Varchar	50	CD Category ID
Genre	Varchar	2	CD Genre
Album Title	Varchar	100	Album Title
Artist Name	Varchar	100	Artist Name
Language	Varchar	20	Album Language
Image Name	Varchar	50	Image Filename
Distributor Price	Money	8	Price from Distributor
Sell Price	Money	8	Selling Price
Discount	TinyInt	1	CD Discount
Quantity	Int	4	Quantity Available in Stock
Description	Varchar	2000	Description of CD

Table 4.4 : OMS Database tbl_CD

4.5.2.3 ORDER INFORMATION

Table : tbl_OrderItem

Description : Order Item Information

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
OrderItemID (Primary Key)	Int	4	Order Item ID
Order_ID	Int	4	Order reference ID

Order CDID	Varchar	7	Product ID
CDSoldPrice	Money	8	Selling Price of CD
CDDistPrice	Int	8	Distributor Price of CD
OrderQuantity	SmallInt	2	Quantity of Order

Table 4.5 : OMS Database tbl_Order Item

Table : tbl_Order

Description : Order Information

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
OrderID (Primary Key)	Int	4	Order ID
CustID	Int	4	Customer ID
ODate	Smalldatetime	4	Date 0f Order
OShipAdd	Varchar	100	Shipping Destination Address
OShipCity	Varchar	20	Shipping Destination City
OShipState	Varchar	20	Shipping Destination State
OShipPostcode	Varchar	10	Postcode
OShipTimeFr	Smalldatetime	4	Preferred Shipping Time From
OShipTimeTo	Smalldatetime	4	Preferred Shipping Time To
OPaymethod	Varchar	30	Payment method
OShipComm	Varchar	500	Customer comments
Payment Date	Smalldatetime	4	Received Payment Date

Shipped Date	Smalldatetime	4	Product Delivery Date
AdComm	Varchar	1000	Admin Comment

Table 4.6 : OMS Database tbl_Order

4.5.2.4 ADMINISTRATOR INFORMATION

Table : tbl_Admin

Description : Administrator Information

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
AdminID (Primary Key)	TinyInt	1	Administator ID
AdUsername	Varchar	20	Login Username
AdPassword	Varchar	12	Password
AdFirstName	Varchar	30	First Name
AdLastName	Varchar	30	Last Name
AdGender	Varchar	6	Gender
AdAge	TinyInt	1	Age
AdAddress	Varchar	100	Address
AdCity	Varchar	20	City
AdState	Varchar	20	State
AdPostcode	Varchar	5	Postcode
AdPhone1	Varchar	15	Phone 1
AdPhone2	Varchar	15	Phone 2
AdEmail	Varchar	50	Email Address

Table 4.7 : OMS Database tbl_Admin

4.5.2.5 INFORMATION BOARD UPDATE

Table : tbl_Events

Description : Information of events happening around the globe

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
EventID (Primary Key)	Int	4	Event ID
EventTitle	Varchar	50	Event Title
EventDate	Smalldatetime	4	Date of Event
EventVenue	Varchar	50	Event Venue
EventDesc	Varchar	500	Event Description

Table 4.8 : OMS Database tbl_Events

Table : tbl_MusicNews

Description : Information news on artists

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
ArNewsID (Primary Key)	Int	4	Artist News ID
ArNewsTitle	Varchar	80	Artist News Date
ArNewsDate	Smalldatetime	8	Artist News File
ArNewsFile	Varchar	20	Artist News File

Table 4.9 : OMS Database tbl_MusicNews

Table : tbl_SongChart

Description : List of songs that top the charts

FILED NAME	DATA TYPE	LENGTH	DESCRIPTION
SongID	Int	4	Song ID
SongTitle	Varchar	80	Song Title
SongArtist	Varchar	100	Artist Name
SongAlbum	Varchar	100	Album Title

Table 4.10 : OMS Database tbl_SongChart

4.6 USER INTERFACE DESIGN

4.6.1 INTRODUCTION

The interface is the system for most users. However well or poorly designed, it stands as a representation of the system and reflects the competence of the developer. Types of interfaces include natural-language interfaces, question-and-answer interfaces, menus, form-fill interfaces, command-language interfaces, and graphical user interfaces (GUIs) and the Web (World Wide Web). The user interface has two main components, that are, presentation language, which is the computer-to-human part of the transaction, and action language, which characterizes the human-to-computer portion. Together, both concepts cover the form and content of the term user interface.

As the Online Music Store (OMS) is a web-based system developed for all users, the interface would be designed to be informative and attractive. The interface design will be designed to be user friendly, attractive, and easy to navigate. Graphics that will be included would be at a reasonable amount to ensure that the download time for the site is not too slow.

4.6.2 ONLINE MUSIC STORE USER INTERFACE DESIGN

Figure 4.20 : The Online Music Store (OMS) User Interface Design

SYSTEM IMPLEMENTATION

CHAPTER 5 : SYSTEM IMPLEMENTATION

5.1 INTRODUCTION

System implementation in software development is a process to convert system requirements into program codes. This phase always involves some modifications to the previous design due to the limitations of the programming language used. The initial stage of system implementation involves setting up the development environment. This includes setting up development tools to facilitate the system implementation.

5.2 DEVELOPMENT ENVIRONMENT

5.2.1 IMPLEMENTATION REQUIREMENTS

The server computer hardware requirements are :-

1. A server with at least Pentium 166MHz MMX processor.
2. At least 64MB RAM.
3. Network Interface Card (NIC) and network connection with recommended bandwidth at 10Mbps.
4. Others standard computer peripherals.

The client computer hardware requirements are :-

1. Any compatible PC with recommended at least Pentium MMX processor and 32MB RAM.

The software requirements are :-

1. Windows NT or Windows 2000 as the client Operating System
2. Internet Explorer 5.0 or above is recommended as the web browser
3. Internet Information Server 4.0 as the web server
4. Macromedia Dreamweaver MX as the web authoring tool

5.2.2 IMPLEMENTATION TOOLS

The tools used to develop the Online Music Store are:

- Macromedia DreamWeaver MX
- Active Server Pages
- Internet Information Server (IIS)
- Microsoft Access 2000
- VBScript
- JavaScript

5.2.2.1 MACROMEDIA DREAMWEAVER MX

In order to design the desired user interface for the Online Music Store, Dreamweaver has been used as it is easy to use and provides a wide range of interface design features.

5.2.2.2 ACTIVE SERVER PAGES

Active Server Pages (ASP) is a programming environment that provides the ability to combine HTML, scripting languages and other components to create powerful Internet applications that run on servers. ASP is also a server-generated page that can call other

programs to access databases and serve different pages to different browsers. 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 builds or customizes the page on the fly before sending it to the requestor. ASP is as efficient as writing code directly to server's application program interface.

5.2.2.3 INTERNET INFORMATION SERVER (IIS)

In this system, the Internet Information Server or IIS is an important tool that serves as a powerful access control functionality for web access to files and application on the server. The Internet services are run and managed by using the Internet Service Manager, which is the administration feature provided by the IIS. Properties such as virtual directories, virtual servers and access permissions are configured.

5.2.2.4 MICROSOFT ACCESS 2000

MS Access is used to develop the database for the Online Music Store. It is an easy to use tool where all the important data concerning the Online Music Store are stored in a database developed using it.

5.2.2.5 VBSCRIPT

VBScript played an important role in the development of the Online Music Store as it can put an Internet server to work either by actually storing the data or causing some action to take place on the server based on the information given. VBScript validates data, pricing, initiating data storage and provides impressive multimedia feedback.

5.2.2.6 JAVASCRIPT

JavaScript is used in the development of the Online Music Store in order to automatically change a formatted date on a web page and also cause a linked-to page to appear in popup window. It also serves as a good tool for validation.

5.3 PROGRAM DEVELOPMENT

Program development involves several stages in order to create the programs needed to satisfy the system process requirements. There are 5 stages involved in program development which are review the program documents, design of the program, code the program, test the program and last but not least, completion of the program documentation. Figure 5.1 shows the stages of the program development.

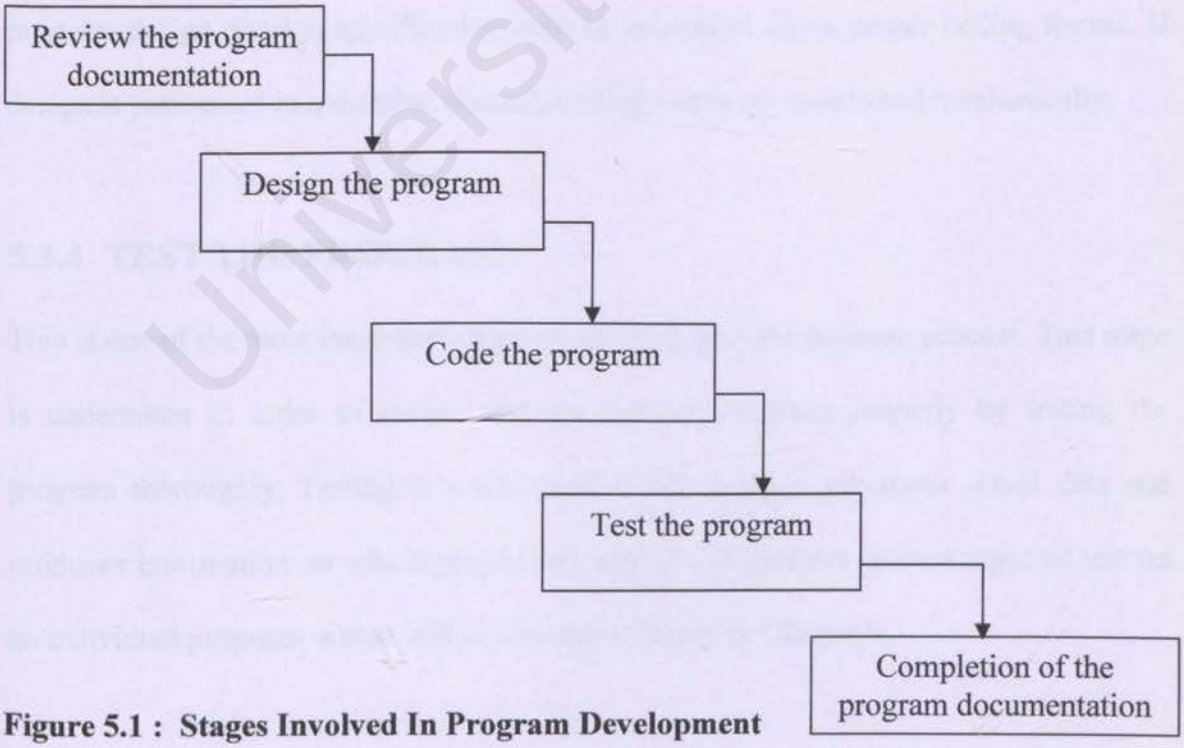


Figure 5.1 : Stages Involved In Program Development

5.3.1 REVIEW THE PROGRAM DOCUMENTATION

The initial step of the program development is to review the previous program documentation. The program documentation of the Online Music Store consists of system description, system requirements and database design. Thus, this makes it more easy for me to understand the task that has to be converted during this coding phase.

5.3.2 DESIGN THE PROGRAM

In this stage, I have decided how the program can accomplish the system requirements by developing a logical solution for the programming problems.

5.3.3 CODE THE PROGRAM

This stage involves the process of writing the program instruction that implements the program design. Design specification must be translated into a proper coding format. If design is performed in a detailed manner, coding can be accomplished mechanically.

5.3.4 TEST THE PROGRAM

This is one of the most important stages in the program development process. This stage is undertaken in order to ensure that the system functions properly by testing the program thoroughly. Testing is a must before the program processes actual data and produces information on which people will rely. I will perform several types of test on an individual program, which will be discussed further in Chaper 6.

5.4 SYSTEM CODING

5.4.1 CODING METHODOLOGY

In the coding phase, two approaches have been used, which are the top-down and the bottom-up approach. Both of these approaches were used to maximize its advantages in developing the Online Music Store.

5.4.1.1 TOP-DOWN APPROACH

Top-down approach is chosen to break the big modules of the Online Music Store into functions and procedures. All these small modules or functions are built and developed separately. Top-Down approach allows the higher-level modules to be coded first before the lower level modules.

5.4.1.2 BOTTOM-UP APPROACH

In contrast with the top-down approach, the bottom-up approach starts coding at the lower level modules before the higher-level modules. The higher-level module acts as an empty shell that calls these lower level modules. The completed lower level module will then be integrated with the newly completed higher-level module.

5.4.2 ASP CODING

ASP coding was used widely whereby files were saved as .asp. ASP coding was used to connect database by using the server map function and full directory path.

```
<% set objConn=Server.CreateObject("ADODB.Connection")
  objconn.Open "Driver={Microsoft Access Driver (*.mdb)};DBQ="&Server.MapPath("OMS.mdb")

      nilai=Request.QueryString("title")
      set objRS= server.CreateObject("ADODB.Recordset")

      objconn.Execute "DELETE * FROM latestrelease where title='"&nilai&"'", objConn

  Response.Redirect"viewrelease1.asp"
  objconn.close
%>
```

Table 5.1 Server Map ASP Coding

```
<%
name = session ("name")
pass = session ("pass")
Dim objConn
Set objConn = Server.CreateObject("ADODB.Connection")
      objConn.ConnectionString = " DRIVER={Microsoft Access Driver (*.mdb)};" & _
"DBQ=c:\inetpub\wwwroot\sample\html\OMS.mdb "
objConn.Open
Dim objRS
set objRS = Server.CreateObject("ADODB.Recordset")
objRS.Open "latestrelease", objConn, , , adCmdTable
%>
```

Table 5.2 Full Directory Path ASP Coding

ASP is also used to send or get information from a page to another by using the post method functions.

```
<form method="post" name="form1" action="registerp.asp" onSubmit="return check()">
    <tr >
        <td align="right">User  ID </td>
        <td align="left"><input type="text" name="username"></td>
    </tr>
    <tr >
        <td align="right"> Password </td>
        <td align="left"><input type="text" name="pass" value=""></td>
    </tr>
    <tr >
        <td align="right"> Confirm Password </td>
        <td align="left"><input type="text" name="pass1" value=""></td>
    </tr>
    <tr >
        <td align="right"> Name</td>
         <td align="left"><input type="text"name=" name onKeyUp="getme()"></td>
    </tr>
<tr >
        <td align="right"> Postal Code </td>
        <td align="left"><input type="text" name="postcode" value=""></td>
    </tr>
```

```
<tr >
    <td align="right"> State </td>
    <td align="left"><input type="text" name="state" value=""></td>
</tr>
<tr >
    <td align="right"> Country </td>
    <td align="left"><input type="text" name="country" value=""></td>
</tr>
<tr >
    <td align="right"> Telephone No </td>
    <td align="left"><input type="text" name="tel" value=""></td>
</tr>
<tr >
    <td align="right"> Mobile No </td>
    <td align="left"><input type="text" name="mobile" value=""></td>
</tr>
<tr >
    <td align="right"> E-mail </td>
    <td align="left"><input type="text" name="email" value=""></td>
</tr>
<tr>
    <td align="center" colspan="2"><input type="reset" value="Clear">
      <input type="submit" value="Register"></td>
</tr>
```

Table 5.3 Post Method Function ASP Coding

Beside that session object was used to store user name and password so that any page can trace the current user using the system. The session object is used to enhance secure surfing. Once a current user completes surfing, he would have to logout so that his profile would not appear again (session abandon).

```
<%
name = session ("name")
pass = session ("pass")
if ((name="")or(pass=""))then
response.Redirect("index4.asp")
else
Dim objConn
Set objConn = Server.CreateObject("ADODB.Connection")
objConn.ConnectionString = "DSN=OMS.dsn"
objConn.Open
Dim objRS
set objRS = Server.CreateObject("ADODB.Recordset")
objRS.Open "OMS", objConn, ,adlockOptimistic, adCmdTable
bol = False
do until objrs.eof or bol
if (strcomp(objrs("username"), name, vbtextcompare) =0) then
bol=true
else
objrs.movenext
end if %>
```

Table 5.4 Retrieve Session Object ASP Coding

```
<%
name = session ("name")
pass = session ("pass")
%>
<%
session.abandon
response.Redirect("index4.asp")
%>
```

Table 5.5 Session Abandon ASP Coding

Besides that, ASP is also used in adding,updating and deleting records

```
<%
objRS.AddNew
 objRS("title") = request.Form("title")
 objRS("artist") = request.Form("artist")
 objRS("releasedate") = request.Form("releasedate")
 objRS("price") = request.Form("price")
 objRS("image1") = request.Form("image1")
 objRS("image2") = request.Form("image2")
 objRS("detail") = request.Form("detail")
 objRS.Update
 objRS.Close
 Set objRS = Nothing
 objConn.Close
 Set objConn = Nothing
%>
```

Table 5.6 Add New Details ASP Coding

```
<script language="javascript">
<!--
function check() {
var v1,v2,v3,v4,v5,v6,v7;
v1=document.form1.username.value ;
v2=document.form1.pass.value;
v3=document.form1.pass1.value;
v4=document.form1.name.value;
v5=document.form1.address1.value;
v6=document.form1.postcode.value;
v7=document.form1.state.value;
if (v1=="" || v2=="" || v3=="" || v4=="" || v5=="" || v6=="" || v7=="" )
{   alert ("WARNING \n Enter values in all fields") ;
return false   }
else if(v2 != v3)
{
alert("Both Passwords Does't Match")
return false   }
else
{
document.forms[0].submit();
}
}
//-->
</script>
```

Table 5.7 JavaScript Validation Check Coding

```
<script language=vbscript>
sub getme()
result=window.event.keycode
result=chr(result)
if(isnumeric(result) or result=" ")then
msgbox "Enter Only Alphabets",,"Warning"
document.form1.name.value =""
end if
end sub
</script>
```

Table 5.8 : VBScript Validation Coding

5.5 THE FLOW OF THE ONLINE MUSIC STORE

Shown below is the basic flow of the Online Music Store that has been implemented :-

Figure 5.2 : Online Music Store Main Page

This page potrays recent and popular CDs and users can proceed to other modules from here.

Figure 5.3 : CD Catalogue Page

This page lists all the CDs that are sold in the Online Music Store.

Figure 5.4 : Music News Page

This figure above shows some latest news in the music industry.

Figure 5.5 : Weekly Charts Page

The figure above shows the weekly top 10 charts .

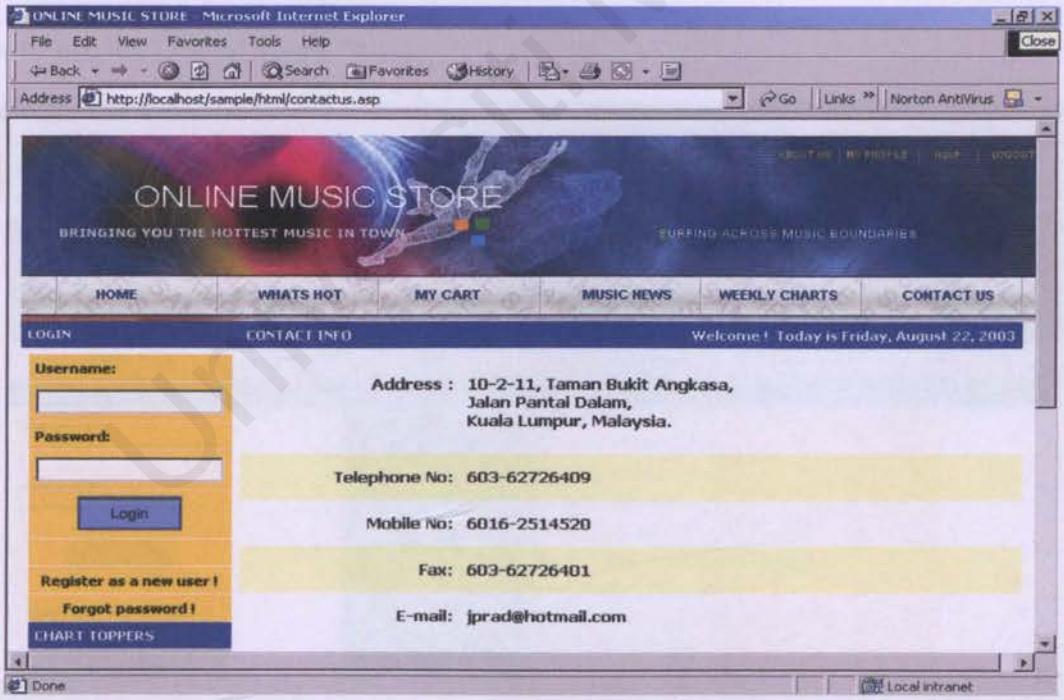


Figure 5.6 : Contact Information Page

Figure 5.6 shows the contact information page in order to enable users to contact the management of the Online Music Store.

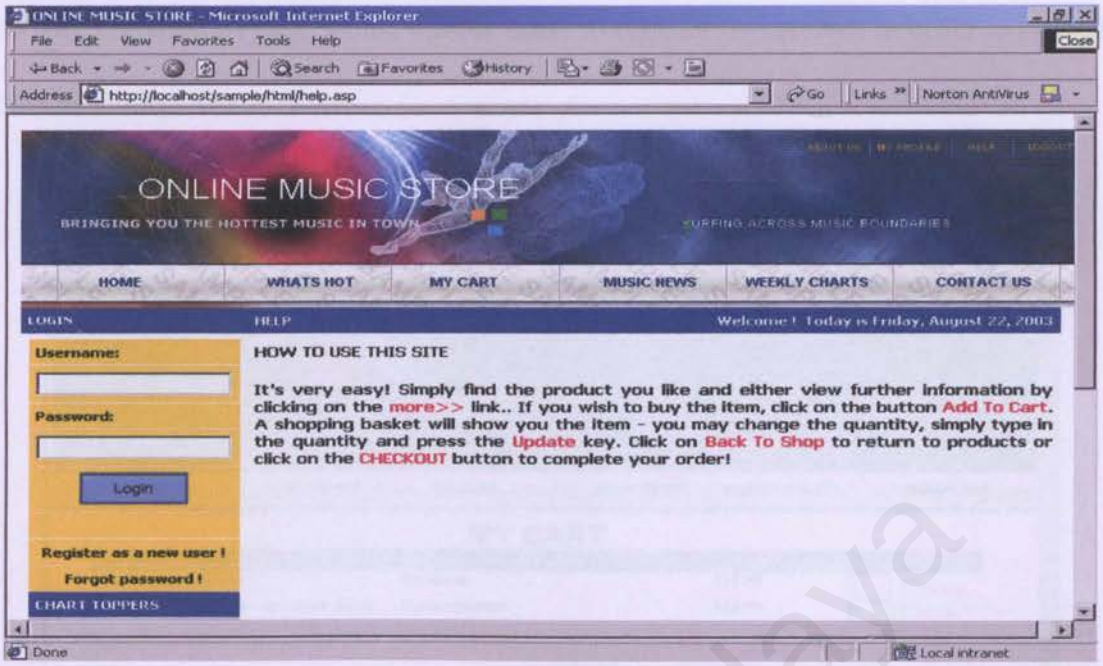


Figure 5.7 : Help Page

Figure 5.7 shows the help page that would provide sufficient information to a user on how to use the Online Music Store.

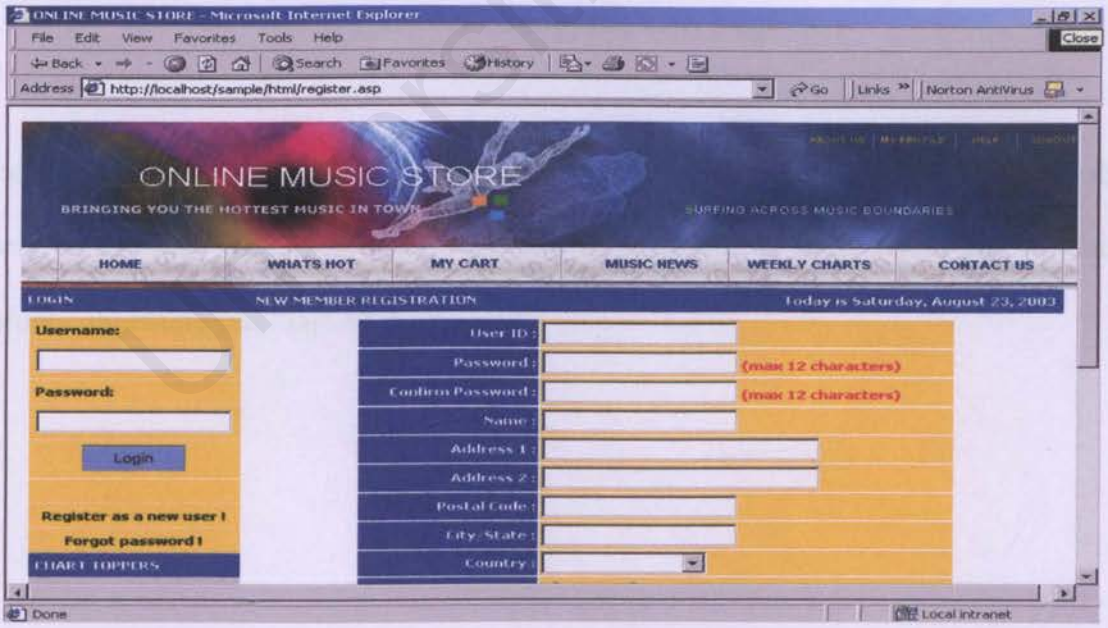


Figure 5.8 : User Registration Page

The user registration page would enable users to register themselves in order to buy CDs from the Online Music Store.

Figure 5.9 : Shopping Cart Page

The shopping cart page is provided in the Online Music Store system in order to enable users to add any product to their shopping cart, update or even delete any products before confirming their purchase.

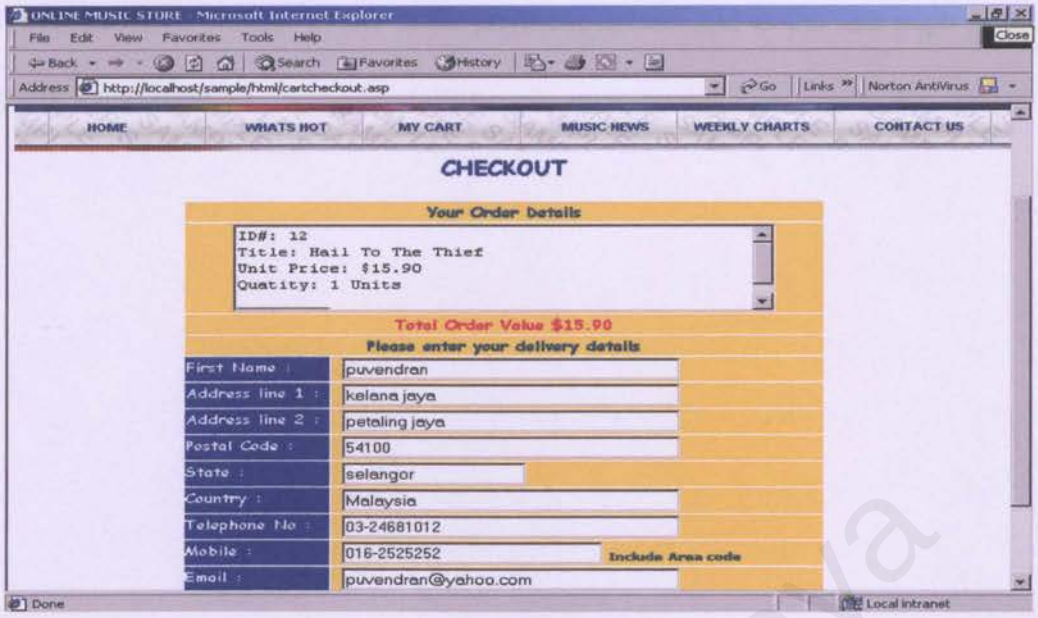


Figure 5.10 : Checkout Page

The checkout page would enable users to fill in their shipping address after deciding on which product they want to buy.

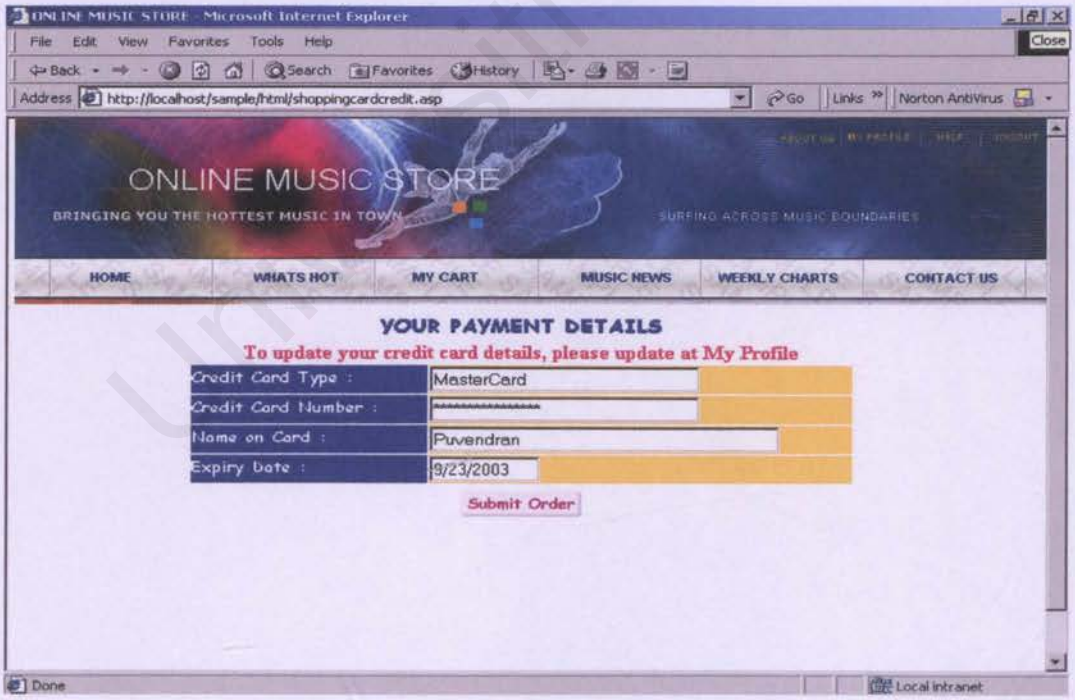


Figure 5.11 : Payment Page

The payment page consist of the users payment details and is the last page in order to complete a purchase.

SYSTEM TESTING

CHAPTER 6 : SYSTEM TESTING

6.1 INTRODUCTION

One of the main functions of testing is to establish the presence of defect in a program. Another reason would be to judge whether or not the program is usable in practice. Nevertheless, testing can only demonstrate the presence of error and It cannot show that there is no error in the program. Therefore, suitable approach must be chosen to reduce the possibility or error in a program. Among the rules that serve well as program testing objectives are :-

- Testing is a process of program execution with explicit intents to find errors and run-time program bugs.
- A successful test is also not one that uncovers only few expected error, but it is which constantly provides new challenges to its programmers over time.
- An effective test case is one that contains unexpected testing record sets with high probability of detecting undiscovered errors during the program design and development phase.

The tester is usually not the system designer himself. A number of users are given the opportunity to try the system so as to trace any unforeseen errors or misunderstanding before the system is implemented. The tester has to ensure each module is running smoothly and each function is performed perfectly. Therefore asking the tester to try out the system will test the usability of the user interface, whether the interface is self-explanatory or not, or whether the tester know what should be the steps taken to run the system. If the tester feels uneasy or confused

while testing out the system, the user interface should be revised and improved. Advice that is asked from the tester is to improve the usability of the interface.

The difference between testing modules during the development phase and testing them during software integration is that error can be fixed as they are found, the integration phase must be recorded and the bugged module must be returned to its development team or programmers for further correction based on its errors logs. The Online Music Store or OMS has gone through three stages of testing before it is completed. These three stages are the component testing, integration testing and acceptance testing.

6.2 THE TESTING PROCESS

In general, the testing process of the Online Music Store can be modeled as below.

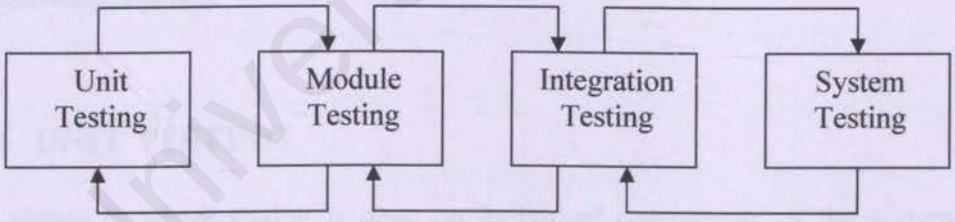


Figure 6.1 : Testing Process

The testing procedure usually starts from component testing. This is to ensure that the codes implemented in the system will properly fit the system requirements. This is followed by the integration testing, which is tested for the overall functionality and performance of a few modules that are integrated together. Last but not least, the users are required to test the system very carefully to ensure that the implemented

system will function according to its requirements. If any mistake or defects are discovered at any stage, the previous stages may have to be repeated for correction and modification.

6.3 TESTING APPROACH

The testing approach adopted in the Online Music Store or OMS is the bottom-up approach. Using this approach, each of the modules at the lowest level of the system hierarchy are tested individually. The following module to be tested is the module that calls the previously tested module. This approach is followed repeatedly until all modules have been tested.

6.4 COMPONENT TESTING

The details of how each stage takes place in the Online Music Store are described in the following sections.

6.4.1 UNIT TESTING

Unit testing is where testing is done on individual components of the system to ensure that they operate correctly. Each component of the system is tested independently, without other system components. Unit test is very time-consuming and labor intensive stage of any software development. Several techniques have been used in the unit testing for the Online Music Store :-

6.4.1.1 CODE DIFFER IN COLOUR

By using the Macromedia Dreamweaver MX, the code will be in different color. For instance, JavaScript codes will be in red color and ASP codes will be in grey. If the code contains errors, it will appears in bright yellow.

6.4.1.2 CODE REVIEW

Before the function is run in the browser, codes are reviewed line by line to discover any syntax error as well as semantic error. If errors are discovered, they are corrected immediately.

6.4.2 MODULE TESTING

Module testing is implemented after the unit testing stage to uncover error in each unit. A module is a collection of dependent components. During this stage, all the related units or functions will be integrated and tested in the module level. In performing module test, different test cases are applied to the module and the test results are recorded. If errors occur in this level, each unit will be retested till there is a solution to the problem. This is done because although each sub module performs its task correctly, the end result produced may be incorrect when all the sub modules work together.

6.4.3 INTEGRATION TESTING

6.4.3.1 SUB-SYSTEM TESTING

The sub-system testing is done after the module testing whereby the entire module would be integrated and tested further. The sub-system testing is done to check the

functionality of the integrated modules. The most common problems that arise when modules are integrated together are module interface mismatch. Therefore, the main concern in integration test is to exercise the interface repeated to defect any interface mismatch problem. Several important aspects are checked to reduce the possibility of interface problem as listed below:

- The necessity to perform a checking that redirects the user to the correct module
- Whether the type of parameter tallies with the type of parameter received
- Whether information passed is sufficient for the receiving module to perform its task
- The necessity of the type conversion.

6.4.4 SYSTEM TESTING

The system testing process is concerned with finding errors, which result from anticipated interactions between sub-systems and system components. It is also concerned with validating that the system fulfills the functional and non-functional requirements. System testing can be categorized into a few types :-

6.4.4.1 STRESS TESTING

This is to determine that the program fulfills the requirements defined for it. It is equally important to ensure that the program works as it should under extreme conditions. In order to perform stress testing, execute the system in a manner that demands resources in abnormal quantity, frequency, or volume.

6.4.4.2 PERFORMANCE TESTING

For real-time and embedded systems, software that provides required function but does not conform to performance requirements is unacceptable. Performance testing is designed to test the run-time performance of a software within the context of an integrated system. Performance testing occurs throughout all steps in the testing process.

6.4.5 ACCEPTENCE TESTING (USER TESTING)

Acceptence testing or user testing is the final testing procedure in the Online Music Store or OMS whereby users will be actively involved in testing system to ensure that the system meets their requirements. The main purpose of this testing is to verify whether the system has fulfilled the user's requirements. Besides that, the functionality of the system is demonstrated to the end users and the users are given the chance to experience and explore the system themselves.

6.5 CONCLUSSION

At the end of the testing phase, the system should be able to perform the task required and free of most errors. The user should use the system. However, there are still some critical problems and errors which would occur only after using the system for some time. Therefore, work of testing should not just end in this phase but have to done every now and then to make sure the system functions well.

SYSTEM EVALUATION

CHAPTER 7 : SYSTEM EVALUATION

7.1 INTRODUCTION

In general, there were quite a number of technical and non-technical problem encountered during the development stage of the Online Music Store. However, most of the problem were detected and resolved eventually. In this phase, the Online Music Store will be evaluated to identify its total strengths and limitations. Evaluation is related to user environment, attitudes, information priorities and several other concerns that are to be considered carefully before effectiveness can be concluded Changes and current enhancement will be stated as a reference. Besides that, proper recommendations and proposal would enhance system's performance and functionality in the future after being implemented.

7.2 PROBLEMS ENCOUNTERED AND SOLUTIONS

7.2.1 WEB PAGE CODING

Problem

Generally the problem in web page coding revolved around the programming languages that were chosen to develop the Online Music Store that is ASP, HTML coding, VBScript and JavaScript programming. The difficult part was however to understand Active Server Pages which was very crucial in developing the system. However, most of the coding and scripting problem was encountered in the early stage of the project development. This is due to the ambiguity and lack of understanding in the early stage.

Solution

The solution to overcome is to adopt a divide-and-conquer approach by first concentrating and understanding the basic concepts of the programming languages chosen. This was done by reading books and resources from the Internet and also applying it, encountering errors and eventually overcoming those errors. As the development of the project went on, the understanding gradually built up and most of the problems encountered in the earlier stage were overcome easily.

7.2.2 TOOLS AND LANGUAGE SELECTION

Problem

E-commerce is very new in this cyber world and is developing everyday. The question that aroused at the beginning stage of developing the Online Music Store was are the tools chosen appropriate. Thus it was quite a problem in determining which tools and programming languages would best fit in developing the system because each of them would have its strengths and also weaknesses.

Solution

To overcome this problem, an in-depth study and research on the programming languages and tools were conducted in the early stage of the development. The studies and research activities include Internet surfing, reference books and reviewing the current systems in the market.

7.2.3 DETERMINING SYSTEM SCOPE

Problem

Without experience in web-based development, it is difficult to define the scope of the system in the early stage of developing the system. Due to the insufficient knowledge and time constraint, it is quite impossible to build a full-scale complete system within the given time frame.

Solution

In order to overcome this problem, reference and analysis on current web sites had been conducted in order to understand the system design of each web site and try to adopt some of the ideas into the system design of the Online Music Store.

7.2.4 CREDIT CARD VALIDATION

Problem

This was quite a problem when developing the Online Music Store because credit card validation needs bank approval in order to check if that credit card actually exist and is valid.

Solution

As a solution to this, I came up with another strategy to enhance credit card validation that is by using a ASP enabled credit card validation.

7.3 SYSTEM STRENGTHS

7.3.1 GRAPHICAL USER INTERFACE SIMPLICITY

The interface of the Online Music Store is designed to enable users to explore the site with ease. The Online Music Store which is enhanced with a graphical user interface can be said to be a very easy to use system. Users are assisted by proper guidelines and instructions. Links and buttons are named appropriately with simple words so that users will not have problems understanding it The Online Music Store is further enhanced by enabling minimal input by users so that it wouldn't burden them. Considering the fact that a lot of users might just be at a beginner or intermediate stage in web literacy, the Online Music Store has been designed with simple and user friendly navigation.

7.3.2 INSTANT ERROR MESSAGING

The Online Music Store is designed in such a way that if a user inputs incorrectly, an error message would appear instantly. This would enable the user to identify his/her mistakes and make the appropriate corrections to it.

7.3.3 EASY TO USE SHOPPING METHOD

The Online Music Store uses shopping cart technology to enhance its product ordering system. By applying this technology to the system, users will find it very easy to buy the product they want. Shopping cart ease users by maintaining products they have ordered

while surfing around to make more orders. Users are also able to modify the content of lists such as the quantity or remove a certain product from the shopping cart.

7.3.4 ADMINISTRATOR SITE EFFICIENCY

A module for the system administration was developed in order to enhance the administration of the site. With this module, the administrator can easily add new records, update and delete existing records. The administrator site is a user-friendly and can be used with ease.

7.4 EVALUATION BY END USERS

As the Online Music Store or OMS is proposed to make the purchase of CDs easier and more effective, the final stage of system development which is system testing focused on receiving feedback from users in order to judge the correctness of these functionalities, precise data flow as well as enhance interface of the system.

Considering the fact that the scope of the Online Music Store is large, development was carried out with the objective to cover the scope briefly, or in other words the whole system was developed quickly to have the overall structure and potential of the system but the system was not refined to show its full efficiency.

The overall feedback from the end users is good and the Online Music Store is expected to serve the targeted group well after refining.

7.4.1 HOW THE ONLINE MUSIC STORE WAS TESTED

There are 3 main criteria of testing by the user:

- Functionality (50%)

  Basic function of a e-commerce site which includes product catalog, product information, ordering system, shopping cart technology and others. Others supporting features are currency converter, and lots of information in that particular field that is music.

- Usability (30%)

  A good e-commerce site is one that bundles comprehensive functionality while managing to maintain a simple graphical interface. For brisk operation on a slow connection, the interface should not be overloaded with graphics. Moreover, navigation should be enhanced by clearly displayed input options.

- Accessibility (20%)

  Compared to conventional stores, the system which is web based should be able to be accessed at anytime of the day. Accessibility also covers part of the security features that have been included in order to make sure that all orders valid. This would include user registration and login functions.

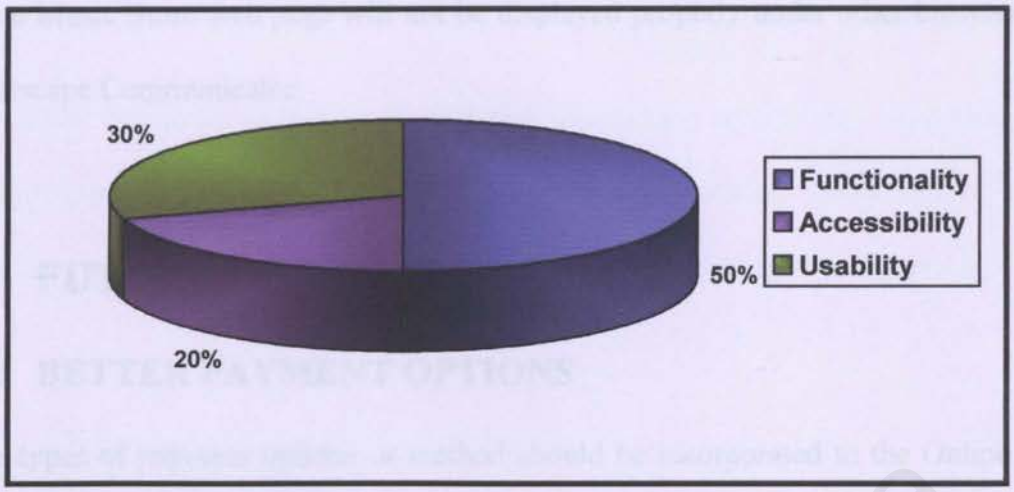


Figure 7.1 User Evaluations

7.5 SYSTEM CONSTRAINTS

7.5.1 LACK OF SECURITY FEATURES

The online payment method is not supported by banking approval, thus the credit card numbers are not supported by payment protocols such as Secure Socket Layers (SSL) or Secure Electronic Transaction (SET). Due to the time constraints, the data encryption of the credit card number was not included in the payment module.

7.5.2 PLATFORM AND BROWSER LIMITATIONS

The Online Music Store or OMS is developed based on Microsoft technology, thus the implementation is totally dependent on Windows as the operating system and Internet Explorer as the web browser. Due to the time constraint and technical knowledge, they system cannot perform properly under other operating systems, such as Linux. The

Online Music Store web page will not be displayed properly under other browsers such as Netscape Communicator.

7.6 FUTURE ENHANCEMENTS

7.6.1 BETTER PAYMENT OPTIONS

More types of payment options or method should be incorporated to the Online Music Store system. By doing this, customers would have a wider choice of payment method. Another advantage to this would be the possibility of users who do not own credit cards to be able to purchase via the Internet.

7.6.2 BETTER SECURITY FEATURES

Better security features should be incorporated in the payment module in order to make sure that customers feel safe and satisfied when ordering items at the Online Music Store. The payment module should be enhanced with proper payment protocols, just like PayPal and VeriSign which incorporates payment protocols such as Secure Socket Layers (SSL) and Secure Electronic Transaction (SET).

7.6.3 GENERATE REPORTS FOR MANAGEMENT PURPOSES

The Online Music Store (OMS) should also incorporate reports that are generated for management purposes. The reports would include monthly sales report, income statement and so on. Reports should be printable for record keeping purposes.

7.6.4 ADVERTISEMENT SERVICES

Advertisement services should be included in the site in order to obtain more income. Advertisements should be part of the Online Music Store web site, just like what we see in other websites nowadays.

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REFERENCE

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