Virtual eStore – VeS.com

Web Based Agent for
Promotion of Mercantile -
Company Management

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A thesis presented to the Faculty of Computer Science and Information Technology
of University of Malaya as Partial Requirements for the Degree of

BACHELOR OF COMPUTER SCIENCE
UNIVERSITY OF MALAYA

2000/2001

Acknowledgement

It would be impossible to more than scratch the surface in the form of acknowledgements to the many individuals who have helped a lot through out the project.

Heading the list is my supervisor, Assoc. Professor Dr. Ow Siew Hock for her interest and support in my project. Her unlimited support, guidance and advice through out the project are so valuable to me.

Secondly, special thank express to Mr. The Kah Hai for his guidance in conducting literature reviews.

Many thanks also to my moderator, Assoc. Professor Dr. Sellappan for his valuable advice in VIVA session.

Not expected is to my project partner, Mr. Yan Wee Jing for his helping through out the project.

Last but not least, I would like to show my appreciation to technical staff of Faculty of Computer Science and Information Technology for their technical advice throughout the project.

Abstract

This is an e-commerce project that suitable for medium-scaled company. It allows companies to register as retailer and sell their product online. Customer can choose and compare products' price from different retailer in this system and pay for their products online using credit cards.

Before developing this system, surveys on several development tools are carried on. After the literature surveys, appropriate software tools are chosen. Besides, some existing Malaysia e-commerce website also investigated and their weaknesses are identified. Strength of foreign e-commerce is reviewed, hopes that it will help in developing the system.

Furthermore, correct methodology of the project is chosen and project planning and scheduling will follow the methodology that was chosen. Then, data flow diagram of the system is prepared. Database system and user interface is design from data flow diagram.

At the next step, at the development stage, the system is start coding. Finally, the system is tested and evaluated.

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List of Abbreviations

ANSI	-	America National Standard Institute
ASP	-	Active Server Page
API	-	Application Programming Interfaces
CGI	-	Common Gateway Interface
COBRA	-	Common Object Request Broker Architecture
COM	-	Component Object Model
DBMS	-	Database Management System
GNOME	-	GNU Network Object Model Environment
GPL	-	General Public License
GUI	-	Graphic User Interface
HTML	-	Hyper Text Markup Language
HTTP	-	Hyper Text Transfer Protocol
IEEE	-	Institute of Electrical and Electronic Engineering
IIS	-	Internet Information Server
ISAP	-	Internet Server Application Programming Interface
KDE	-	'K' Desktop Environment
LDAP	-	Lightweight Directory Access Protocol
NNTP	-	Network News Transfer Protocol
Perl	-	Practical Extraction and Report Language
POSIX	-	Portable Operating System Interface

POP 3	-	Post Office Protocol 3
SET	-	Secure Electronic Transaction
SSL	-	Secure Socket Layer
SMP	-	Symmetric Multiprocessing
SMTP	-	Simple Mail Transfer Protocol
SQL	-	Structured Query Language

Glossary of Terms

Browser

A program that access and display files on the World Wide Web

Database API

It defines how to write an application to connect to a database and pass commands to the database.

GUI

Interface that having windows, graphical symbols, pop-down menus and etc that manipulate with a mouse pointer.

HTML

A standardized system of tagging text for formatting, locating images and other non text files, and placing links or references to other documents.

HTTP

A standardized means of using TCP/IP for communicating HTML documents over network

Internet

A World Wide, public network of computers that communicates using TCP/IP

NNTP

It is the predominant protocol used by computers (client/server) for managing the notes posted on Usenet newsgroup.

POP3

It is the most recent version of a standard protocol for receiving e-mail. POP3 is a client/server protocol in which e-mail is received and held for the Internet server.

POSIX

It is clear, consistent, and unambiguous set of standard develop by IEEE. However, it is on Linux, NT, VMS, MPE/iX, and CTOS environments.

Retailer

In the report it represents the company that register to the system and selling the products

SMTP

It is a protocol for transferring e-mail across the Internet.

SQL

A language for defining the structure and processing of a relational database

Introduction

Chapter 1
Introduction

1.1 Project Introduction

This project is developed to fulfil the requirements of the fast growing of e-commerce in the worldwide and Malaysia especially. Before e-commerce, consumers have to travel to the shops buying the products that they needed (Figure 1.1). After e-commerce, there are no travelling needs for consumers (Figure 1.2). Consumers can search and order their products online through Internet. The products are then deliver to the consumers within a period of times.

In particular, this system is an e-commerce web application for computer peripherals. It is specially design for medium-scale companies that interest to involve in e-commerce. More than one company is allowed to register as a retailer in this e-commerce web application. Basically, this project is divided into a few main modules, administrator, retailer, search, registration and authentications.

Figure 1.1 Process Flow Before E-Commerce

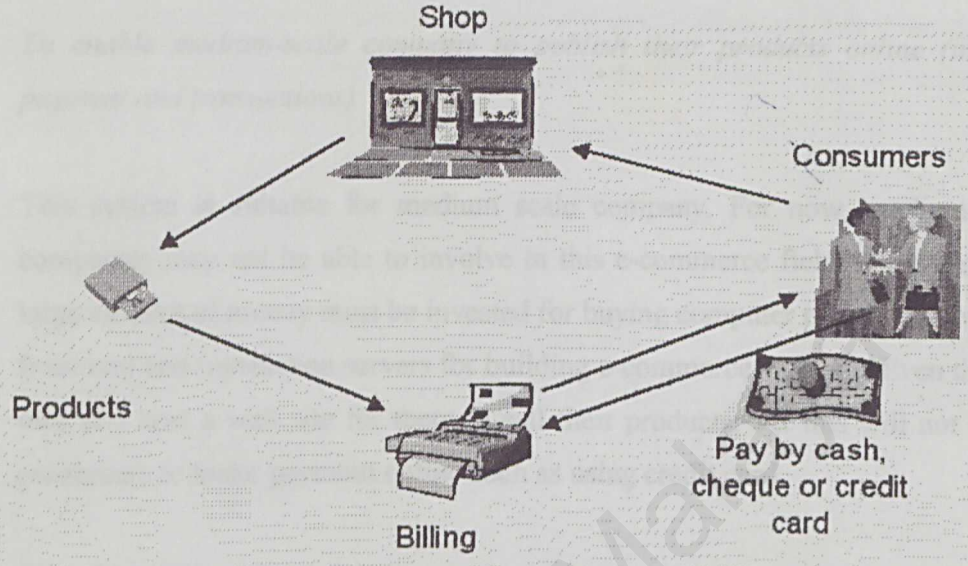
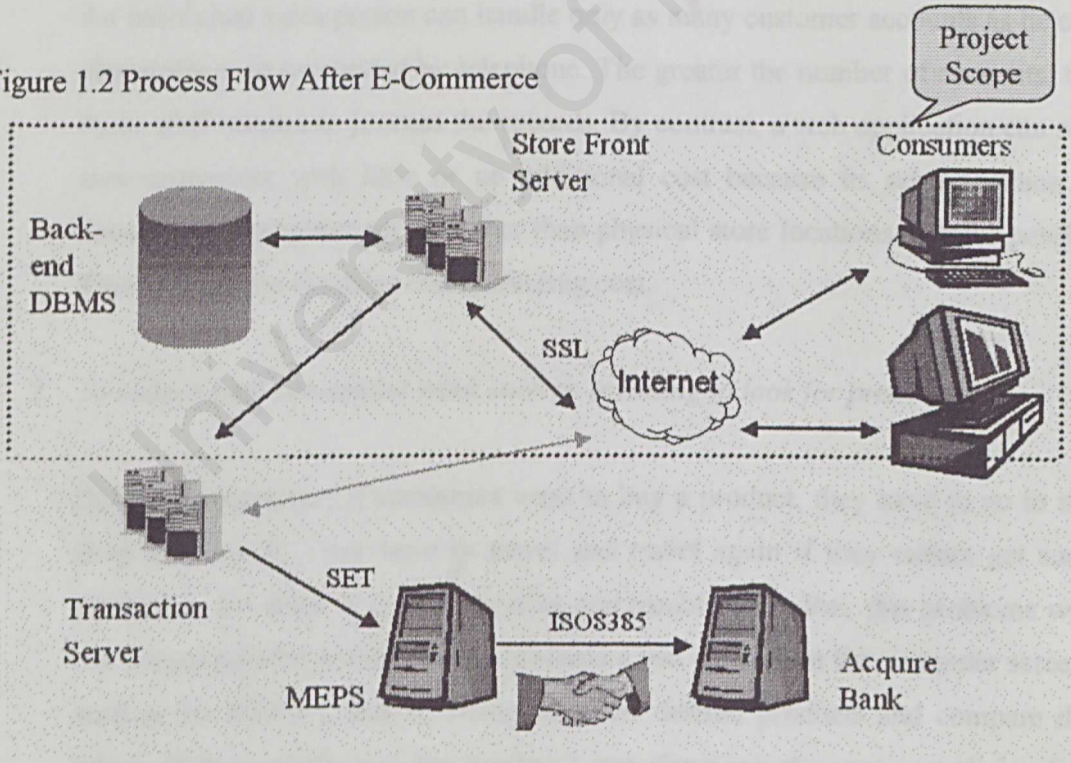


Figure 1.2 Process Flow After E-Commerce



1.2 Objectives

1. *To enable medium-scale company to publish their products online (include payment and transactions)*

   This system is suitable for medium scale company. For now, medium-scale companies may not be able to involve in this e-commerce field. It is because a large amount of money must be invested for buying computer peripherals such as front-end and transaction servers for building e-commerce web site. Even though they can host a web site for them to sell their products, but this will not allow consumers to make payment online such as using credit card.

2. *To reduce sales and marketing cost*

   An individual sales person can handle only as many customer accounts as he can physically visit or contact by telephone. The greater the number of accounts, the more staff needed to process the records. By contrast, a web application can add new customers with little or no additional cost because its sales function is housed in a computer server rather than physical store locations or sales people. This will reduce the sales and marketing cost.

3. *To reduce time consuming work such as traveling to look for products*

   Before e-commerce, if customers want to buy a product, they have to go to the shop and buy it. They have to travel and travel again if they cannot get such product in the shop. It is wasting time and troublesome. But, this problems will not happened after e-commerce. Consumers just sit in front the computer screen, surfing the Internet, and browsing for their desired products and compare the prices. If they satisfy with the product's specifications, they can just click a few buttons to buy it. It is convenient and save a lots of times.

4. *To provide more convenient way in comparisons of the products*

   This system will provide function to show product details so that customer can easily compare the product features as well as the prices. The information is obtained from different retailers.

5. *To provide more secure transaction*

   Online Payment must be secure so that it can protect the customers who desire to buy products online. This can be achieving by using SSL (Secure Socket Layer) and SET (Secure Electronic Transaction).

1.3 Project Scopes

1. This system is specially designed from the point of view of Malaysia's e-commerce. So, only local companies are allowed to register as retailer. Customers are targeted to Malaysia's citizens.

2. Basically, this system is more suitable for medium-scale companies.

3. Consumers that desire to buy product through e-payment must posses a credit card.

4. Products that are publishing online are restricted to computer peripherals.

1.4 Summary

This chapter will describe overview of the project. Besides, the differences before and after e-commerce are showed in the figures. Furthermore, Objectives and scopes of the project are specified clearly. The objectives are:

- *To enable medium-scale company to publish their products online (include payment and transactions)*
- *To reduce sales and marketing cost*
- *To reduce time consuming work such as travelling to look for products*
- *To provide more convenient way in comparisons of the products*
- *To provide more secure transaction*

Literature Review

Chapter 2
Literature Review

2.1 Approach

A system is a compilations of few components or modules which its components will interact among each other [Silver, 1989]. Therefore, a system can be developed in different ways by using appropriate tools. To develop a system, a lot of information about the system needed to be gathered about the system itself, the features of related software tools, database management system, programming language, hardware requirements, and the methodologies used develop the system. Basically, all this information can be obtained from various sources and methods:

Sources	Method Using
▪ Interview's result	▪ Conducting interviews
▪ Magazines ▪ Newspaper ▪ Books	- Select appropriate articles - Reading articles - Making summary
▪ Web site	▪ Searching in several Internet search engine
▪ Library	▪ Searching materials via OPAC System
▪ Pass year thesis	▪ Finding in "Bilik Dokumen"

Table 2.1 Sources and related method using to find materials

Interview

Information-gathering interview is a directed conversation with a specific purpose that uses a question-and-answer format. [Kendall, 1999] Opinions of the interviewee and his or her feeling about the system are gathered from the interview. During the first stage of the project, an interview is conducted with staff and managing director of Erasoft System (company that are cooperated for the project). Before the interview is conducted, several things need to be prepared. It is [Kendall, 1999]:

- Read background material about the interviewees and their organizations
- Use the background information to decide the interview objectives
- Prepare the questions for interviews
- Making appointments with the interviewees by calling ahead or sending e-mails

In addition, the questions for the interview must be prepare carefully. Leading and double-barrelled questions are avoided. Leading questions will tend to lead the interviewee into a response that interviewer seem to want [Kendall, 1999]. The double-barrelled question is question that use only one question mark but actually have two separate questions. These two types of questions will confuse the interviewee and process of interview will consider not effective.

Magazines

Magazines contain a lot of useful information. Those magazines are computer-related magazines such as PCWeek, PCMagazine, Computimes Shopper and etc. Normally, these magazines have technical reports on certain software tools and comparison of operating systems or database systems. These articles are helpful in choosing for appropriate software to develop the system.

Newspaper

Reading newspaper is the traditional way to gather information. Normally, it contains a lot of articles of different categories. Some of the categories are useful to provide information for the project such as:

- The Star - INTECH
- New Straits Times – Computimes
- New Straits Times – Business Computing

Newspaper is chosen as a source to gather information due to several reasons:

- Information is updated frequently – It is update daily or once a week.
- Cheap in price – This is the cheapest way to get information, just RM 1 for each newspaper and can easily buy elsewhere.
- Convenient – It is very convenient to bring and read newspaper, at school, or even travelling in bus.

Although newspaper provides many types of information, but there are two types of information are most useful. It is software advertisements and articles on coming out of new software. Software price that obtain from software advertisements is an important factor that must be considered to choose for a suitable software tools [Kendall, 1999].

Books

Reading books are another way to get information. This is the place where the features of some software tools and programming language are found. For example, feature on ASP (Active Server Page) can be found from *Professional ASP Technique for Webmasters* written by *Alex Homer*. This is important because features of certain software must be considered first before decided to use it.

Internet

Internet is a "biggest library" that contains many kinds of information. However, searching on the Internet is a time-consuming work. Through my literature survey, I used two methods to find information in Internet.

- Directly to the related website
- Search Engine

1. *Directly to the related web site*: This method will save a lots of searching time, but may not be effective. With this method, it is assumed that there are already have a web site with combination of the keyword want to search for, with the extension such as .com, .net, or .org. For example, keyword to search for is *OS*, then *http://www.OS.com* is typed on the address bar and search for it. This method is useful to search for some software product's company such as Oracle, MySQL, Informix and etc.

2. *Using Search Engine*: Relatively, this method can get more information rather than the previous method but it is a time consuming. Firstly, I specify a few search engines will be used to search. The search engines that are used to search for the information are:
   - NorthernLight (http://www.northernlight.com)
   - Yahoo (http://www.yahoo.com)
   - Direct hits (http://www.directhit.com)
   - Lycos (http://www.lycos.com)
   - Hotbot (http://www.hotbot.com)
   - Netscape (http://www.home.netscape.com)
   - MSN Malaysia (http://www.msn.com.my)
   - Catcha (http://www.catcha.com)
   - Cari Malaysia (http://www.cari.com.my)
   - Asiadragons (http://www.asiadragons.com)

After that, keywords that are used to search are specified. The keywords will be a single word or a few words that related to the topic that search. For example, "E-commerce", "DBMS Comparison", "E-Commerce in Malaysia", "ASP", "Visual Interdev", "Operating System" and etc. To narrow the search result, the search engine's category is filtered first before starting to search. For example, from a yahoo search, option "Malaysia" is selected before starting to search for the related information on e-commerce in Malaysia.

Library

Library has collections of books, journals, magazines, and newspaper. Library is visited and related information can be search through OPAC system. It can also be access at home via the Telnet. The host name for OPAC in UM library is ***202.185.96.1***.

Pass Year Thesis

Pass year thesis can get from "Bilik Dokumen" in Faculty of Computer Science and Information Technology. Pass year thesis is useful because the strengths and weaknesses of their works are notified and refinement can be done in this project.

Conclusion

In this section, source of the literature review and survey's method are explained in detail. The literature review sources are interview's result, magazines, newspaper, books, web sites, and pass year thesis. Different methods have been carried out when finding for the materials to determine that related materials are selected more easily.

2.2 E-Commerce Review

2.2.1 Introduction

To develop an e-commerce web application, definitely, we must be very clear about what is "e-commerce" and how this type of application is build. In this section, we review on e-commerce definitions, terms of e-commerce, benefits of e-commerce, e-commerce objectives, and etc

2.2.2 E-Commerce Definitions

E-commerce can be defined in several ways:

- Define it by separate the word "e-commerce" into "e" and "commerce":
  Merriam-Webster's Collegiate Dictionary [Webster, 1989] defines commerce as follows:
  com.merce n [MF, fr. L commercium, fr. com- + merc-, merx merchandise]
  1: social intercourse: interchange of ideas, opinions, or sentiments
  2: the exchange or buying and selling of commodities on a large scale involving transportation from place to place
  3: sexual intercourse

  By the above definition, what we tended to be interested is the second definition. As a result, commerce is "the exchange of goods and services, usually for money".

  "E", first part of the word e-commerce, represents "electronic". It means that "the used of information technology such as telecommunication and computer technology".

Combination of the above two definitions, "e-commerce" is ***"the used of information technology such as telecommunication and computer technology for exchange or buying and selling of commodities and services".*** In specific, it can be defined as ***"Businesses that implement sales and marketing channels through the use of the WWW (World Wide Web) "***

- According to Automotive Industry Action Group in North America E-Commerce means **"The application of advanced information technology to increase the effectiveness of the business relationships between Trading Partners."**
- According to EC Innovation Centre E-Commerce means **"the enablement of a business vision supported by advanced information technology to improve efficiency and effectiveness within the trading process".**

2.2.3 Categories of E-Commerce [Various Categories of E-Commerce, 2000]

Electronic commerce can be divided into four distinct categories:

- **Business-Business (B2B)**
- **Business-Consumer (B2C)**
- **Business-Government (B2G)**
- **Consumer-Government (C2G)**

Business to Business

An example in the *business-business* category would be a company that uses a network for ordering from its suppliers, receiving invoices and making payments. This category of electronic commerce has been well established for several years, particularly using Electronic Data Interchange (EDI) over private or value-added networks.

Business to Consumer

The *business-consumer* category largely equates to electronic retailing. This category has expanded greatly with the advent of the World Wide Web. There are now shopping malls all over the Internet offering all manner of consumer goods, from cakes and wine to computers and motorcars.

Business to Government

The *business-government* category covers all transactions between companies and government organisations. Currently this category is in its infancy, but it could expand quite rapidly as governments use their own operations to promote awareness and growth of electronic commerce. In addition to public procurement, governments may also offer the option of electronic interchange for such transactions as VAT returns and the payment of corporate taxes.

Consumer to Government

The *consumer-government* category has not yet emerged. However, in the wake of a growth of both the *business-consumer* and *business-government* categories, governments may extend electronic interaction to such areas as welfare payments and self-assessed tax returns.

2.2.4 Elements of E-Commerce

E-commerce can be described by a few elements. It is:

- *E-Marketing*

  Advertising on the Internet.

  Promoting products on the Internet.

- *E-Tailing*

  Selling products or services on Web store.

  Provide web storefront for product exhibition.

  Online ordering.

- *E-Payment Processing*

  Collect and process payment over the Internet.

  Web-based payment methods: Credit card, Smart card, eCash,

  CyberCoin and etc

  Shopper's account payment support: credit card.

- *E-Service*

  Web-based Technical supports,

  Web-based Product supports,

  Web-based customer service,

  Web-based order and shipping tracking

2.2.5 Online Payments

This is a crucial issue in e-commerce. Below are some types of online payments with their features and advantages,

Methods	Descriptions
Credit card	It is a most common payment method though the internet. It is easy to used because there are a lots of people posses a credit cards
E-Cash and CyberCoin	It is another way to pay online, especially for small cash items. Small amount of money is not suitable for paying through credit cards. But this type of business will not make more profits and thus not gain more acceptances.
Smart Cards	It is secure, paperless and fast. But it still not is being used widely in some country It is because credit card has already widely used and accepted, additional card will become a burden.

Table 2.2 Types of online payments

2.2.6 Benefits of E-Commerce [E-Commerce: An Introduction, 1999]

- **Improved competitiveness and quality of service**

  Electronic commerce enables suppliers to improve competitiveness by becoming "closer to the customer". As a simple example, many companies are employing electronic commerce technology to offer improved levels of pre-and post-sales support, with increased levels of product information, guidance on product use, and rapid response to customer enquiries. The corresponding customer benefit is improved quality of service.

- **Mass customisation, personalised products and services**

  With electronic interaction, suppliers are able to gather detailed information on the needs of each individual customer, products and services to those individual needs. This results in customised products comparable to those offered by specialised suppliers but at mass market prices. One simple example is an on-line magazine that is customized for the individual reader. Each access to the magazine will emphasise on articles that interested and exclude articles that have already been read.

- **Substantial cost savings and price reductions**

  One of the major contributions of electronic commerce is a reduction in transaction costs. While the cost of a business transaction that involves human interaction might be measured in "Ringgit Malaysia", the cost of conducting a similar transaction electronically might be a few cents or less. Therefore, any business process involving "routine" interactions between people offers the potential for substantial cost savings, which can in turn be translated into substantial price reductions for customers

- **New products and services maintenance**

  In addition to re-defining the markets for existing products and services, electronic commerce also provides the opportunity for entirely new products and services. Examples include network supply and support services, directory services, contact services (for example, establishing initial contact between potential customers and potential suppliers), and many kinds of on-line information services.

2.2.7 E-Commerce in Malaysia

Below table shows types of e-commerce in Malaysia that supports online payment:

Fields	Examples
Mega Malls (Virtual Mall)	▪ 1800-Mall.com (http://www.1800-mall.com/) ▪ Parkson Online (http://www.parkson.com.my/) ▪ Mall of Malaysia (http://www.mom.com.my/)
Computer and Electronics	▪ Taji.com (http://www.computer.com.my/) ▪ CyberComputer (http://plazaputra.kubsistem.com/cgi-bin/cybercomp.storefront/)
Gift and Florist	▪ Blooming.com.my (http://www.blooming.com.my/) ▪ Royal Selangor (http://www.royalselangor.com/rsmainshop.html)
Books	▪ Berita Book Centre (http://www.bbc.com.my/cgi-bin/bbc) ▪ AuthursBooks.com.my (http://www.arthursbooks.com.my/)
Educations	▪ Pintar Media (http://www.pintarmedia.com/) ▪ XenShop.com (http://www.xenshop.com/)
Entertainment	▪ Imaginative Illusions Homepage (http://www.imaginative.com.my/)
Travel	▪ Asiatravelmart (http://asiatravelmart.com/)
Auctions	▪ AuctionDirect (http://www.auctiondirect.com.my/) ▪ Lelong.com.my (http://www.lelong.com.my/)

Table 2.3 E-Commerce in Malaysia

2.2.8 Features of E-Commerce

There are some features that must be included in an e-commerce site, even though it may change slightly for different e-commerce web site:

- Products
- Place to sell the product - for e-commerce, web site displays the products and acts as the place
- Way for people to come to the web site
- Way to accept orders - normally it is an on-line form of some sort
- Way to accept money - normally it is a merchant account handling credit card payments. This piece requires a secure ordering page and a connection to a bank. More traditional billing techniques either on-line or through the mail can also be used.
- Facilities to ship products to customers (often outsource-able). In the case of software and information, it can occur over the Internet through a file download mechanism.
- Way to accept returns
- Way to handle warrantee claims if necessary
- Way to provide customer service - often through email, on-line forms, and Frequently Asked Question (FAQs), etc.

2.3 E-Commerce Analysis

2.3.1 Local E-commerce

Several local company that involve in e-commerce that I have been review are

MTEC Computer (M) Sdn. Bhd. *(http://mtec-comp.com/)*
CyberComputer *(http://plazaputra.kubsistem.com/cgi-bin/cybercomp.storefront/)*
Alpha Advance Computer *(http://www.aac.com.my/)*
Taji.com Sdn. Bhd. *(http://www.computer.com.my)*

MTEC

This is a simple local e-commerce web site owned by MTEC Computer (M) Sdn. Bhd. There are no any graphics or pictures on the web site. Generally, this web site is dull and have no attractive to the visitor. It also provides limited functions such as product search, viewing product list, viewing buying baskets, and registration. Online payments are not allowed here. If customers buy products, they are required to key in personnel information including their e-mail address. The purchase order form will send to their e-mail address. Money is collected after the products have been received.

There are some weaknesses on this e-commerce:

1. *Lack of online help.*
   The customer will find hard in using the web application because there are no any shopping guides provided.

2. *User-unfriendly.*
   It is not a user-friendly e-commerce web site. For example, the search function in this e-commerce application only has a text field and a button without any description. Users will confuse when using this function.

3. *Lack of technical support.*
   There are no online technical supports provided. Technical supports include providing information to help customer to configure the hardware.
4. *Not support online payment.*
   Customer cannot pay for the product they buy via credit card.

CyberComputer

This e-commerce owned by KUB Sistem Sdn. Bhd (a MSC status company). This e-commerce web site provides selling computer peripherals only. Functions that provided are product search, shopping carts, price calculator, and help through the email. Online payments are enabling through credit card.

Weaknesses of this e-commerce web site are:

1. *Interface design.*
   Although the interface design is better than MTEC, but it still need some improvements. For example, contents of the "User guide" are over crowded until it becomes difficult for customers to read.

2. *Technical supports.*
   There are no technical supports provided to the customers about the products they buy.

3. *Error or prompt message.*

   The error message does not prompt if errors are occurring. For example, if I do not fill in the required field (for example shipping address) and just submit the form, prompt message does not display to inform me but just only stop at that page and does not continue.

Alpha Advance Computer

This site is conducted by Alfa Advanced Computer, which is situated in Skudai, Johor Bahru. The products that sell in this e-commerce web site are computer peripherals. Besides, whole set of computer system also available here. There are four main functions provided in this e-commerce web site such as buying computer with KWSP (Kumpulan Wang Simpanan Pekerja), Do-It-Yourself (DIY) for own customization and buying laptops and, desktop computer packages.

The weaknesses of local E-Commerce can be found on this site:

1. *Unattractive interface*

   Although this is an E-Commerce site that sells computer products but it did not provide any picture about the particular product. The customer cannot preview the image of the particular product that they decided to buy. This will decreases customers' enthusiasm to buy products from this site. Furthermore, Most of the customers are not willing to buy the product before looking at the appearance of such product.

2. *Lack of online payment methods*

   There are no online payment services provided in this e-commerce web site.

   Customers cannot pay using credit cards, smart cart or e-wallets. Customers have to pay when the products is delivered to them.

3. *Lack of online help*

   The customers will find it hard to get online help or any other shopping guide because the company does not provide any guidelines for the customers to seek help.

Taji.com Sdn. Bhd.

This site maintained by Taji.com Technology Sdn. Bhd. It is previously known as TAJI Enterprise. Varieties of computer accessories are sold here. This web site also provides short descriptions and images about the products they sell. Functions that provided are shopping cart, search, and viewing product description.

The weaknesses are it does not provide any kinds of online payment service and lack of information provided. After the customers had selected the product to purchase, they cannot pay using online payment. Instead, they have to pay cash when the product is delivered to them. Besides, online help such as shopping guide are also not provided.

In addition, the loading time of this e-commerce application is slow. This will not attract the customers to visit this web site again because the customers have to wait for a long periods of time to view a product

2.3.2 Foreign E-Commerce

Foreign e-commerce that I reviewed is:

Dell *(http://www.ap.dell.com/ap/my/en/gen/default.htm/)*
Gateway *(http://www.gateway.com.my/)*

Dell

This e-commerce web site owned by Dell Corporation. It is mainly sells the whole set of computer system. But it also has selling computer peripherals. It is a good example of web application that using Windows NT, SQL server, and ASP technology [Fast Fact, 2000]. This web application provides functions that may not found in local e-commerce web application. These functions are computer package customisation, many types of search, online technical supports, software driver download, computer peripheral comparisons, and system compatibility check. Furthermore, customer can choose to pay through various types of paying method such as credit cards, cheque, and etc.

Gateway

This E-Commerce site is owned by Gateway Corporation. It sells the whole set of the computer system and computer peripherals.

This web application provides a variety of functions that may not found in local e-commerce web application. The strengths about this E-Commerce are:

1. *Easy to use*

   This is really an easy to use e-commerce web site. Several categories are listed at the main page such as home or home office, home & student learning, growing business, corporation, education and government. Customers can choose the appropriate category to purchase the products.

2. *Excellent technical support*

   This e-commerce web application provides an excellent technical support to help user solve hardware problem.

3. *Provide various types of payment method*

   There are various types of payment method available on this e-commerce web site. Customers can choose to pay through credit card, cheque e-wallets, and etc. Besides that, the payment procedure is easy and fast.

4. *Attractive user interface*

   All the products are provided with picture, price and its specifications. The good combination of colour and other images will attract the customers to visit this again

Conclusion

The existing e-commerce in Malaysia has some weaknesses that have to overcome. These weaknesses can be classified as:

- *User Interface not attractive*
- *Lack of online help and technical support*
- *Not provide online payment*
- *Only owned by a single company (customer difficult to make comparison from one company to another)*

In contrast foreign e-commerce have strength that must be consider:

- *Excellent technical support*
- *Various types of payment method*
- *Better interface design*

2.4 Tools Review

To build a good e-commerce web application, appropriate tool must be used. According to *System Analysis and Design* a software tool is choose due to several guidelines [Kendall, 1999]:

- Performance effectiveness
- Performance efficiency
- Ease of use
- Flexibility
- Quality of documentations
- Manufacture support

In this subchapter, surveys is carried on to some of the software tools and it is presented into a few categories:

- Server platform
- Web server
- Database Management System (DBMS)
- Development tools
- Programming Language

2.4.1 Server Platform

Windows NT 4.0 SP-4

- It is Microsoft's high-end operating system that bundled with Web server (Internet Information server 4.0)
- *Portability* [Bahanan, 2000]. Windows NT will run not only on Intel x86 microprocessors but also on RISC chips, such as the DEC Alpha AXP, the MIPS R4400, and Motorola PowerPC. Part of the key to Windows NT's portability is the hardware abstraction layer (HAL), which hides the difference in actual hardware from the higher-level operating system software. The HAL makes all hardware look essentially identical to the rest of Windows NT.
- *Robustness* [Bahanan, 2000]. Microsoft claims that Windows NT is a "crash protection". This will accomplishes by using two specific features. First, all application execute in its own address space (with exception of 16-bit Windows applications). Second, all the operating system components are *protected-mode components*. Windows NT does not rely on real mode components. Real-mode components can access any memory or I/O location that can lead to system crash as in Windows 3.x.
- *Security* [Garms, 1998]. Windows NT Server 4.0 features user authorization via username and password and configured by the system administrator. Permissions can be granted to the user level. In addition, Windows NT Server 4.0 includes an integrated certificate server for issuing X.509 digital certificates, which can be mapped to user accounts. Additionally, 128-bit encryption is supported.
- *Scalability - Symmetric multiprocessing (SMP)*. Windows NT's internal design uses a symmetric processing model that means all processor can access system resources (for example, interrupts, memory, and so on) and that any process can execute on any processor. This will make more efficient use of processor resources.

- *Multithreading* [Bahanan, 2000]. Difference between thread and process is that process is the container for an address space but thread execute within that address space. The unique of thread is that a single process can have more than one thread of execution. Multithreaded application can have one thread for user input (keyboard, mouse), another for printing and another for file access. For example, when user prints a file, this threads run in the background and user thread in the foreground.
- *Compatibility* [Bahanan, 2000]. Although there is no DOS, Windows NT is still able to run the vast majority of DOS programs as long as they don't try to directly access the hardware or require special device drivers. It also capable to execute recompiled POSIX 1003.1 compliant application. Each of this application executes in a different environmental subsystem.
- *Reliability Through Protected Memory Model* [Garms, 1998]. In Windows NT's memory model, all processes get their own 32-bit address space. This 4GB space is divided in half, and the application can only really use the lower 2GB of space. The upper 2GB is for interfacing with other parts of the system. Every process effectively thinks it is the only thing running. There is no way for a process to read or write outside of its own memory space, either accidentally, or intentionally. This can prevents the system crashes and it provides security for each process.
- *Integratable* [Garms, 1998]. Users do not have to remove existing network when working with Windows NT Server. Windows NT can coexist with existing UNIX, Novell, Bayan, and LAN Manager if desire. It also includes capability to migrate existing Novell and LAN Manager network to Windows NT networks.
- Support java through Microsoft's Java 1.1 Virtual Machine (VM)
- Highly support COM component. Microsoft preferred COM rather than COBRA.
- Pros: Include IIS 4.0, tight integration with other Microsoft Web development tools, Load balancing available in Enterprise Edition
- Cons: Reasonable price

Red Hat Linux 6.2

- Run on Intel, Alpha and SPARC platform
- Based on the Linux kernel released by Linus Torvalds
- *Multitasking* [Goncalves, 1999; Bahanan, 2000]. Linux is a real multitasking system that allows multiple users to run many programs on the same system at once
- *Linux is Free* [Bahanan, 2000]. Linux licence is known as GPL. User can download free of charge through the Internet. It can also be freely installed on unlimited number of machine.
- *Flexibility* [Goncalves, 1999; Bahanan, 2000]. Users are allowed to modify Linux to suit their requirements. Unlike most commercial software, Linux source code is readily available. It makes user physically possible to modify and recompile it. GNU General Public License assigned permits to anyone to modify and redistribute the software.
- *Stability* [Goncalves, 1999; Bahanan, 2000]. Linux has always separated system objects from user objects. The directory structures and file permissions of Linux system are designed to protect the operating system from the action of ordinary user and their applications. This will increase the stability of system.
- *Portability* [Goncalves, 1999]. Linux is compatible with the IEEE POSIX.1 standard. Linux has been developed with software portability in mind, thus supporting many important features of other UNIX standards
- *The X Window System* [Goncalves, 1999]. The X Window System is a very powerful graphics interface, supporting many applications. A complete version of the X Window System, known as XFree86, is available for Linux. This means Linux is moving into the GUI world in the future
- *User-Unfriendliness* [Bahanan, 2000]. There are two popular graphical desktop environments for Linux, KDE ('K' Desktop Environment) and GNOME (GNU Network Object Model Environment). But Linux still relies on Command Line

Interface (CML). For example, detecting display card and monitor resolution in Red Hat Linux can only do in command line (in this case *Xconfigurator*).

- *Ease of use* [Bahanan, 2000]. Since Linux still relies on command line, it will increase the difficulty of using this software. It is not easy for new user to remember such command in order to use it.
- *Installing Problem* [Bahanan, 2000]. To install Linux, users have to know disk partitioning and mounting file system concept. It is relatively advanced concept, especially those already familiar with simple drive letter in Windows.
- *Security Concern* [Bahanan, 2000]. Linux is open source software. Encryption algorithms, for example, are publicly known. So there are no privacy at all and it may easily let hacker to hack into the system.

UNIX

- Unix was developing by AT&T Bell Laboratories. They shared their source with the University of California at Berkeley.
- It is a *multitasking* operating system that originally intended for minicomputer but implemented on wide range of machine from powerful microcomputer to supercomputer
- *Application Portability*: Application portability is the ability of a single application to be executed on various types of computer hardware without being modified. UNIX's layered design insulates the application from the different types of hardware. This allows the software developer to support the single application on multiple hardware types with minimal effort.

- *Memory management*: UNIX can address large amount of memory. There are two types memory management scheme, paging system and *kernel memory allocator.*

- *Ease of use*: Relative to Windows NT, it is not an easy to use operating system. UNIX emphasis on Command Line Interface (CLI) means that, users need to key in special command in order to run UNIX system.
- *Maintainability*: It is difficult to maintain the UNIX system. Maintaining UNIX system needs strong knowledge of Command Line Interface (CLI). So, UNIX system maintenance can only done by special technician.

Conclusion

Server platform is conclude as below:

	Red Hat Linux 6.2	Unix	Windows NT 4.0
Installation Issue	Need concept on disk partitioning and mounting file system	Need concept on disk partitioning and mounting file system	Easy to install using interface wizard
Ease of use	No, Need to known Command Line Language (CLI)	No, Need to known Command Line Language (CLI)	Yes, Its interface is similar to Windows 9x
Security	Low, Open source decrease its security	Good	Good, meet NSA's C2-level criteria
Price	Freeware	Expensive	Reasonable
Scalability	Support multitasking	Support multitasking	Support symmetric multiprocessing (SMP).
Stability	Stable	Stable	Sometimes unstable -Due to system DLL and registry problem

Table 2.4 Server Platform comparisons

2.4.2 Web Server

Before we go deeper to survey on some web server, let us look at the popularity of some famous web server as overall.

Definition: A computer that provides Web services and pages to intranet and Internet users. Internet Information Server is installed on your Web server, and server-side business objects are typically instantiated here.

WEB SERVER	JUNE 2000	PERCENT (%)	JULY 2000	PERCENT (%)	CHANGES (%)
Apache	10704306	62.53	11412233	62.81	0.28
Microsoft IIS	3485995	20.36	3608415	19.86	-0.50
Netscape-Enterprise	1154558	6.74	1255085	6.91	0.17
RapidSite	294193	1.72	293957	1.62	-0.10
WebLogic	204733	1.20	291067	1.60	0.40
Zeus	220395	1.29	227043	1.25	-0.04
Thttpd	218989	1.28	220937	1.22	-0.06
WebsitePro	100113	0.58	101174	0.56	-0.02
Stronghold	91417	0.53	91556	0.50	-0.03
WebSTAR	87311	0.51	88653	0.49	-0.02

Table 2.5 Survey on Web Server software usage on Internet [Netcraft, 2000]

Apache 1.3.12 [Apache, 2000]

- It is a high-end enterprise-level server for Unix and Windows 95/98/NT platforms
- It is a freeware
- It is still the most popular web server that used around the world intense efforts by Microsoft and Netscape to gain dominance in the market
- Apache runs on Windows (95/98/NT), OS/2, and all the major variants of Unix. This server is fully compliant with HTTP/1.1 and supports API and ISAPI (NT)
- Most notable features for apache are its cross-platform support, protocol support (HTTP/1.1), modularity (API), security, logging, and overall performance and robustness
- Apache's security are unquestionable since their popular usage around the world
- Public distribution of the source code results in patches for the software being distributed quickly, and allows public to help to ensure that security holes in the software are caught and reported. As a result, this cause the developers to create a package that is extremely stable and secure.
- Setup and maintenance of the server are accomplished through command-line scripting tools
- Apache does not provide browser-based maintenance capabilities any Graphic User Interface (GUI) configuration and administration tools. This will increase the maintenance cost if the site administrator unfamiliar with the fundamental of server.
- Technical support via newsgroups may cause ineffectiveness. However there are other third parties that provide complete commercial support but it cost money.
- Apache's robust design and extensibility, with its freeware status and the availability of its source code to the public, make Apache a good choice for enterprise-level Web sites and for individuals and workgroups that use UNIX or a combination of UNIX and NT platforms.

- *Pros*: freeware, Performance and robustness, reliability, security, support for the HTTP 1.1 protocol, extensibility, Quick technical support via Usenet newsgroup, streamlined interface
- *Cons*: No Macintosh version available, NT version is in its infancy (still lacks a number of the UNIX versions' performance enhancements), lack of GUI interface wizards and graphical administration tools for configuration and administration tasks, more extensive technical support requires the purchase of a third-party support contract that cost money

Microsoft Internet Information Server 4.0 (IIS) [IIS 4.0, 2000]

- It is high-ended enterprise-level for Windows NT platform
- Run on Windows NT Server Intel/Alpha
- It is free download but require Internet Explorer 4.01 or later
- IIS is just as powerful and much easier to set up and maintain than many of its UNIX-based competitors
- IIS brings together the integration of its own Web services with the Windows NT core system. Integrating IIS with Window NT Directory Services make it easier to develop and integrate web based application
- ActiveX is the development platform of choice in both IIS and Windows NT, it allow developer to combine HTML code, scripts, and reusable ActiveX server components to create Web-based applications. IIS also supports Transactional Active Server Pages (ASP), which link together scripts and components to perform multiple actions.

- IIS integrates with other Microsoft tools: FrontPage, Microsoft Transaction Server, Microsoft Message Queue, Visual InterDev, various back-end tools, and Site Server
- Including as parts of IIS is Crystal Reports. It is a visual reporting tool for creating reports that can also be integrated into database and Web applications.
- Varieties of tools in IIS includes a Transaction Server (for building distributed applications), Index Server (indexing of HTML pages and Microsoft Office documents), Certificate Server (managing digital certificates), Site Analyst (site management and usage), Internet Connection Services for Microsoft Remote Access Service (creation of Virtual Private Networks), Mail Server, and NNTP News Server
- NNTP News Server that provided is not good as well. It support only works for internal newsgroups; Usenet news feeds are unsupported. However, SMTP support for IIS enables developer to build applications that send and receive messages but IIS not support for POP3.
- IIS features include crash protection for reliability, transactional Active Server pages, support for Java (accomplished with Microsoft's Java Virtual Machine), script debugging, support for multiple Web sites, integrated search engine capabilities (create custom search forms with Active Server pages, ActiveX Data Objects, and SQL queries), content management and site analysis tools, automated management support, integrated message queuing, full standards compliance (including HTTP 1.1 for increased Internet performance), and an integrated certificate server (with special security enhancements for international banks using 128-bit encryption Server Gated Crypto technology)
- Site administration for IIS is performed using the Microsoft Management Console (MMC). This interface let developer to manage access security restrictions at the site, directory and file level.

- For virtual sites, administrator can specify the estimated daily traffic for each site (which controls how much memory IIS allocates for each Web site) and limit the amount of server bandwidth that a particular site can use.
- All product documentation, technical help, product features can be easily found online through MSDN library.
- *Pros*: free download, Superior administration control, HTTP 1.1 support, Virtual Server support, Indexing tool also handles Microsoft Office documents, excellent support for distributed application development, excellent collection of server tools
- *Cons*: No UNIX version, NNTP support doesn't support USENET feeds, SMTP support doesn't support POP3 mailboxes, only runs on Server edition of Windows NT, complicated to configure

Netscape Enterprise Server 4.1/3.6 SP3 [Netscape Enterprise Server, 2000]

- An enterprise-strength Web server from the Sun-Netscape Alliance
- Runs on HPUX 11.0, Solaris 2.6/7.0, IBM AIX 4.2.1, Compaq Tru64 Unix 4.0d, SGI IRIX 6.5, and NT 4 SP4
- It is free 60 day evaluation
- It provides support for HTTP1.1 protocol, a built-in search engine with document attributes and custom views, advanced content publishing and management for end users through an approach called "*Netshare*" and Java integration with support for Java Beans, JDBC, and servlets.
- *Netshare* is an approach that allows end users to manage their own web content. *Netshare* facilitates group collaboration as multiple users may publish pages to a server; edit, share, or collaborate on creating a document; and control access to their documents, all without needing a system administrator to intervene.
- It also includes SSL 3.0 support with client-side certificate authentication, an integrated search engine, SNMP support for monitoring, and native database drivers.

- LDAP and NT User Synchronization facilitates users management across multiple server
- Pros: Widespread platform support, end-user publishing capabilities, centralized server management, integrated search engine, SMTP support
- Cons: Price (60 days evaluation), complexity, complicated to configure

Conclusion:

From the above point of view, each web server can be conclude as:

	Apache	Internet Information Server (IIS)	Netscape Enterprise Server
Strength	Freeware, Good Performance, reliability, support for the HTTP 1.1 protocol, Quick technical support via Usenet newsgroup	Free download, Superior administration control, HTTP 1.1 support, Virtual Server support, excellent combination with Windows NT	Support many platforms, end-user publishing capabilities, integrated search engine Price: (60 day evaluation)
Weaknesses	NT version is in its infancy, lack of graphical administration tools for configuration and administration tasks	NNTP does not support USENET feeds, SMTP does not support POP 3 mailboxes	Complex, complicated to configure

Table 2.6 Strength and weaknesses of several web server

2.4.3 Relational Database Management System (RDBMS)

A *relational database* is a collection of data organized in two-dimensional tables. It consists of named columns and (usually unique) rows. Each table represents the mathematical concept of a relation as defined in set theory. In set theory, columns are known as *attributes* and rows are known as *tuples*. The operations that may be performed on tables are similarly based on manipulation of relations to produce new relations, usually referred to as *queries* or *views*.

SQL Server 7.0

SQL Server is tightly integrated with the Windows 32-bit platform. Particularly, it is designed to take advantage of the features of the Windows NT operating system for large-scale organization and enterprise databases.

Security [Vieira, 1999]: SQL Server provides numerous levels of security. At the outermost layer, its logon security is integrated directly with Windows NT security. It allows a Windows NT server to authenticate users. With this *Windows NT authentication* in place, SQL Server can take advantage of the security features of Windows NT, such as password encryption, password aging, and maximum length restrictions on passwords.

Multiprocessor support [Soukup, 1999]: SQL Server supports the symmetric multiprocessing (SMP) capabilities of Windows NT. SQL Server automatically takes advantage of any additional processors that are added to the server computer.

Work with Microsoft Cluster Server (MSCS) – Availability [Soukup, 1999]: It is a feature of Microsoft Windows NT Server Enterprise Edition, supports the connection of two servers, or nodes, into a cluster for higher availability and better manageability of data and applications. SQL Server works in conjunction with MSCS to switch automatically to the secondary node if the primary node fails.

Scalability [Soukup, 1999]: The on-disk format and the storage subsystem can provide storage that is scalable from the very small database (fits on a floppy) to very large databases (VLDB). It can support up to terabyte-size databases.

Growing Database [Vieira, 1999]: The ability to grow the database automatically within limits. The database administrator can set a maximum, but no longer has to pre-allocate space and manage extents.

More efficiency space management [Vieira, 1999]: It includes increasing page size from 2 KB to 8 KB, 64-KB I/O, rows that span pages, lifting of the column limit, variable length character fields up to 8 KB, and the ability to add and delete columns from existing tables without unloading or reloading the data.

Tightly Integrate with Windows NT platform [Soukup, 1999]: SQL Server well integrated with Windows product such as Microsoft Index Server, Microsoft Event Viewer, Windows NT Performance Monitor, and Microsoft BackOffice.

Oracle 8

Oracle is a relational database management system that can support much of the platform. It is well support Java Servlets and Java Database Connectivity (JDBC). Oracle8i also include some feature that maintain high availability such as automate standby database (improved standby feature from previous version), fast-start fault recovery feature (a new data recovery feature) and online index builds or rebuilds (allowing users to update and query the base table while creating the index)

Scalability [Ensor, 1998]: Oracle can support up to ten times of data if compares to previous version. Individual tables can now have up to 1000 columns. In addition database can now support for very large objects, known as LOB. A single occurrence of LOB can hold up to four gigabytes of data. It also includes server-based queuing technology that allows updates to be stored for later delivery. It also has messaging

facilities within the server that can be used to take on the tasks that were traditionally achieved by middleware.

Reliability [Ensor, 1998]: Oracle's reliability is built with the technology such as Oracle Parallel Server product, disk mirroring, fast and simple recovery mechanisms. Enhancements in Parallel Server support allow Oracle to recover from one of the servers without requiring any manual intervention and with a minimum disruption to service. New GUI wizard driven interface for failure recovery process will reduces the chance of human making errors. This wizard is part of *Recovery Manager* that make the whole task of managing backup and recovery a lot simpler than it was in the past.

Security [Ensor, 1998]: Improvements of the security feature also a benefit. Password management has been greatly improved within Oracle8. Some useful features are account disablement after a specified number of fail attempts, password expiration and forced password changes, password history maintenance to prevent users from reusing previous passwords, and complex password environment that forces user to choose password which cannot be easily guessed by potential intruders.

Price: It is an expensive but powerful database system.

Microsoft Access 2000

Microsoft Access was designed to be a relational database management system (RDBMS), not a web database tool. But due to rapid growth of Internet, it quickly added features to its popular database tool to take advantage of the Internet.

Web Interoperability [Dobson, 1999]: Access 2000 comes with a new feature - Data Access Page. Data access pages are like Access forms and reports on the Web. Developers can design Web pages that bind directly to Jet or SQL Server data sources.

With pages that act like forms, users can edit, add, and delete records graphically from a page.

Ease of Learning [Dobson, 1999]*:* It provides *Web application wizards* that create the code for using Microsoft Internet Database Connector (IDC) or Active Server Page (ASP) technology. *Web converter* is another tool that produce HTML output using conventional Access tools.

Security [Dobson, 1999]*:* Access 2000 Web databases use the native security options of the web server and the database to control access to data. Access can handle simple password security or more complex user-level security, which grants different privileges to different users.

Scalability [Dobson, 1999]*:* Access also really not allow for storage of graphical data and very large database. It can only store up to a few millions of records. It is only enough for a small company to publish product.

Flexibility [Dobson, 1999]: Although Access is only support a few millions of records, but it can easily *upsize* to SQL Server that can support Very Large Database (VLDB).

Price: It is bundled with Microsoft Office 2000.

MySQL

MySQL is a very fast, multithreaded, multi-user and cross platform database. It is also open source software. This means that anybody can study the source code and change it (in certain condition) to fit their needs. It can be download for free with non-commercial purpose only. But to embed MySQL into a commercial application they must buy a commercially licensed version with a very cheap price. MySQL is also available in both Windows and Linux platform. And now there are also Graphical User Interface add-ons

for MySQL to make live easier for administration to control the database. Furthermore, a lot of language bindings now available such as Perl, PHP, Java (connects the databases through JDBC), C/C++, Eiffel, Python and Tcl. But the increasingly popular combination for MySQL is PHP [Perdue, 2000].

Ease of learning [Yarger, 1999]: It is really an easy learning tool. New user can easily catch up applying database in their application. The MySQL commands are easy to learn and understand.

Scalability [Yarger, 1999]: MySQL does not really allow for storage of graphical data. MySQL also not be able to store very large databases (**VLDB**) such as up to multi-terabyte. It is only support around 50,000,000 records. Besides that MySQL also not support database partitioning and LDAP. But the most advantage of MySQL is very fast, reliable and easy to use. This is the main goals for MySQL and is suitable for small and medium size of application

Price: It is free for academic use only. Commercial use of MySQL will cost a cheap price.

Conclusion:

	SQL Server 7.0	Oracle 8	Access 2000	MySQL
Ease of use	Better	More difficult	Good	Good
Database storage	Support very large database	Support very large database	Support very large database	A few millions of records
Compatibility	Tightly integrated with Microsoft products	More support java and JDBC	Tightly integrated with Microsoft products	Can support many platform
Scalability	Good	Good	Reasonable	Reasonable
Price	Cheaper	More expensive	Cheaper	Freeware

Table 2.7 Comparison on several DBMS

More technical comparison on several DBMS system can be generated from MySQL homepage as: ***http://www.mysql.com/information/crash-me.php***

2.3.4 Development tools

Microsoft Visual InterDev [Tuner, 1998]

- It is a development tool for building a dynamic and data-driven Web site
- Visual InterDev offers a user interface similar to those for Visual Basic, Visual J++. This interface is importance since that every aspect of client-server application development can now be accomplished visually, rather than through hand-coding projects in a simple text editor.
- It contain WYSIWYG (What You See Is What You Get) page editor that allows developers to create and edit static HTML content visually in "design view". This editor also allows users to write VBScript and JScript code in "source view" and then visually test that code in "quick view." These different views are fully integrated with each other.
- It is support for visual design-time controls that allow developers to create data-driven web pages in a simple drag-and-drop manner. Visual InterDev includes data-access support for large client-server database systems, including Microsoft SQL Server and Oracle. Website is accessed to almost any database using Microsoft's Universal Data Access, including Active X Data Objects, Open Database Connectivity (ODBC), and OLE DB.
- It has a powerful integrated debugger that can step through script code from the client side to the server side and back again. In addition, server-side code running on a Windows NT system can be debugged from a remote computer.
- It also includes IntelliSense scripting assistance. This will provides developers with the names and properties of objects as they are typed. This feature can help eliminate syntax errors as well as the need for external reference materials while coding.
- Visual InterDev also support major object-based technology such as Microsoft ActiveX control and Java Applet. It also supports third party ActiveX control where users are allowed to integrate custom ActiveX control.

- Local Web Server enabled developers to work on their own copy of project without interfering the team. Developers can also deploy changes to the shared Master Web Server after finishing their tasks. This function is good for a website development team which they are work together.

Macromedia Drumbeat 2000 [Drumbeat 2000, 2000]

- Able to run on Windows9x or Windows NT
- It is a collection of Macromedia. There are three versions, with ASP (Active Server Page) edition, JSP (Java Server Page) edition and e-commerce edition.
- The main strength is that it has database publishing capability and very good web development package. It is specialize in connectivity to ODBC databases such as Microsoft Access. Complete sites and e-commerce solutions (with an optional module) can be built in a complete drag-and-drop environment.
- Web pages are built using a WYSIWYG page editor. For example, selecting an element such as a navigation control, and linking it to the desired page to which you want to navigate, enables navigation between the pages. Drumbeat also be able to create some special effects such as button rollovers, DHTML effects and so on
- Drumbeat is complex software. The interface of Drumbeat 2000 is a little on the quirky side, and this is definitely not a product that you can pick up without going through the tutorials.

Microsoft FrontPage 2000 [Frontpage 2000, 2000]

- A WYSIWYG page editor that come with Microsoft Office Professional 2000
- FrontPage is a robust and feature-packed application that will suit many people. As part of the Office 2000 Professional suite, it has been closely integrated with the other applications.
- It also provide a function for easily creating cascading style sheet (CSS)
- It also has ability to create dynamic HTML effect, button rollover, hover button, marquee and hit counter.
- It is not an ideal tool for database connections. So, FrontPage is not suitable for developing web application such as e-commerce.

Conclusion:

	Visual InterDev	Drumbeat 2000	FrontPage 2000
Features	WYSIWYG page editor, can visually set database connections, and a SQL query builder	WYSIWYG page editor, visually set database connection	WYSIWYG page editor
Database connectivity	Yes	Yes	No
Server-side debugging	Yes	No	No
Other	Local mode and Master mode	Directly modify to the web application	Not suitable to manage a web application

Table 2.8: Comparison for the software development tools

2.5 Programming Language and Technology

ASP (Active Server Page)

ASP is a Microsoft-developed technology for building dynamic web content. ASP communicates between clients and web servers via the HTTP protocol of the World Wide Web. When client sends an HTTP request to the server, the server receives the request and directs it to be processed by appropriate Active Server Page. The Active Server Page does its processing (including interacting with the database), then returns its result to the client [Deitel, 2000]. It is normally in the form of a HTML document to display in the browser. It can be other format such as images and binary data. There are several programming languages that can be used to program ASP, but VBScript and JavaScript used are often used [Deitel, 2000]. Normally, ASP will differentiate between client-side scripting and server-side scripting. Client-side scripting is browser dependent. So, browser or scripting host must support the scripting language that used. Server-side scripting resides the server. So, programmers have greater flexibility especially with the database access.

ASP is also integrated tightly with other Microsoft products such as Microsoft Back Office. Typically, ASP application must be running on Internet Information Server (IIS) with Windows NT platform or Personnel Web Server with Windows9x platform. However, ChiliSoft has been introducing a *ChiliSoft ASP Server* that can run ASP application on other platform such as Unix, Solaris, OS/2, and Linux. This will increase portability of ASP [Chili!Soft: Introduction, 2000].

ASP includes the following technologies [Homer, 1998]:

- *ADO* (ActiveX Database Objects) is server-side components that dynamically connect data in a database to web pages. These objects can be used to both client and server information for building dynamic content web

pages. The server takes the database data (such as a query) and integrates it into a web page template, which produces a custom-generated HTML page. This page will be display in the client 's browser.

- *ADC* (Advanced Data Connector) provides client-side database access. This means that the entire set of database data (such as query results) is send to the browser, which the user can then continue to manipulate. This will reduces the amount of traffic on the network connection and also the load on the server. A simple example of a client-side database task is sorting a set of data with some criteria If the results of the query are already in the web browser, it seems wasteful to contact the server to re-sort the results by phone number instead of last name when all of that information is already *in* the browser.
- *VBScript.* The glue that binds ADO and ADC into the Active Server Pages model is VBScript. This web scripting language is subset of Microsoft Visual Basic programming language. It applies Event-driven technique that makes it easy to learn and implement in the project. VBScript is comparable to server-side JavaScript implementations like Netscape LiveWire. Unfortunately, some browser such as Netscape does not support VBScript unless installing some kind of plugins.

CGI (Common Gateway Interface)

CGI is a standard for interfacing application with web server. CGI will let HTTP client to interact with programs across network through a web server. The CGI application can be written in many different programming languages. The most common language used is Perl (describe below). Permission granted by a web master to allow specific programs can be executed on the web server. Normally, CGI applications reside in the directory ***/cgi-bin***.

A web server takes information from a user (usually by means of an HTML form) and sent it to web server using HTTP. A server-side CGI program is then executed. The required information is retrieved and then sent back to the client. [Deitel, 2000] CGI is an interface, so there must be a script or executed program to interact with it. Figure 2.1 shows how CGI works.

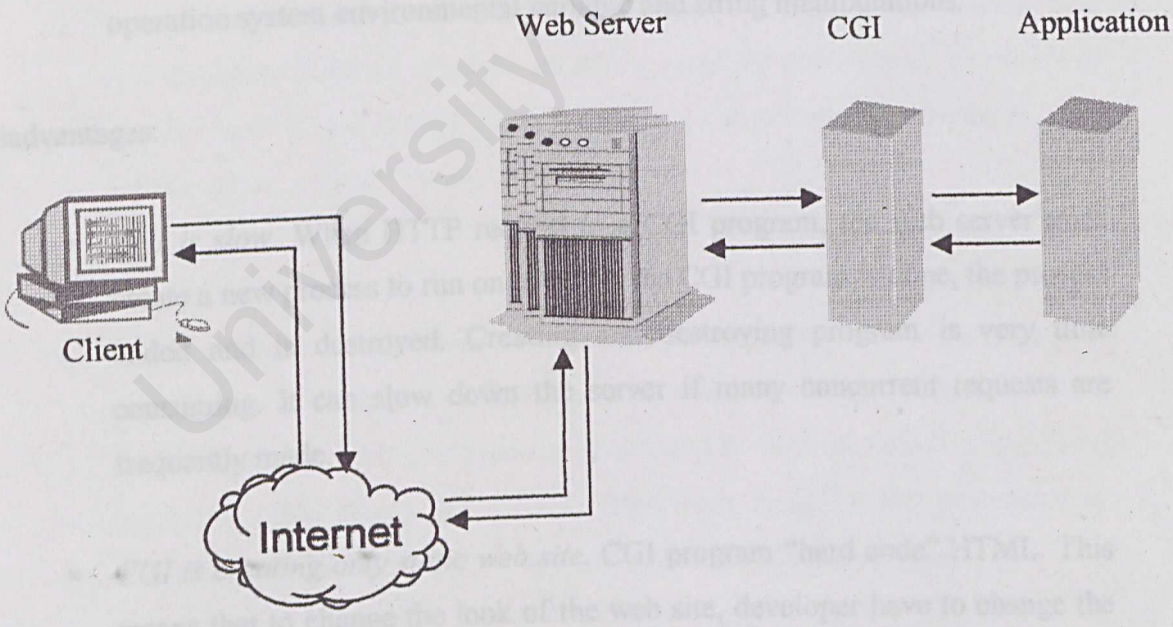


Figure2.1 Data path of a typical CGI application [Deitel, 2000]

There are advantages and disadvantages using CGI. [Thomas, 2000]

Advantages:

- *CGI is language independent*. CGI program can be written in nearly any language. This includes those are compiled and interpreted scripting language. In early stage, CGI is written in UNIX shell command language such as *csh* and *ksh*. Nowadays, most of the CGIScripts are write using Perl. "CGIScript" means any programs that can support CGI even it is a compiled program.

- *CGI is almost universally supported*. Most of the server can support CGI.

- *CGI is easy*. To work with CGI, programmers have to familiar with a set of operation system environmental variable and string manipulations.

Disadvantages:

- *CGI is slow*. When HTTP request to a CGI program, the web server must create a new process to run on it. When the CGI program is done, the process ended and is destroyed. Creating and destroying program is very time consuming. It can slow down the server if many concurrent requests are frequently made.

- *CGI is creating only static web site*. CGI program "hard code" HTML. This means that to change the look of the web site, developer have to change the program. For a compiled CGI program, recompiling the executable program is needed.

Perl (Practical Extraction and Report Language)

Perl (*Practical Extraction and Report Language*) is initially designed as a glue language for the UNIX operating system. Perl can also run on numerous other systems, including MS-DOS, VMS, OS/2, Plan9, Macintosh, and Windows [Practical Extraction and Report Language, 2000]. There are some features that make Perl famous until today:

- It has good portability [Wall, 1996; Schwartz, 1997]. For instance, to make C program portable, developer have to put in all those strange *#ifdef* marking for different operating system. So, developers have to remember the syntax for each operating system's version of each command to let a program portable. But, Perl avoids this problem. Perl script is portable between most of the platform.

- Perl is free. Perl is distributed under GNU public license, which sounds, "*you can distribute binaries of Perl only if you make the source code available at no cost, and if you modify Perl, you have to distribute the source to your modifications as well*" [Wall, 1996].

- Perl is a simple [Wall, 1996]. Developers do not have to know many special incantations to compile a Perl program. Developers can just execute it like a shell script. The type and structure that used by Perl are easy to used and understand. Perl syntax are borrows from other language that programmers may already familiar with such as C, *awk*, *sed*, English, and Greek.

Java Servlets

Java Servlets are Java application that enhances the functionality of World Wide Web server. Primarily, Servlet technology is designed to use with HTTP protocol of the World Wide Web. Servlets are also effective for developing web-based solutions; interact with client through JDBC (Java Database Connectivity) and dynamically generate custom HTML document to be display by the browser [Deitel, 2000].

Java Servlets can run completely on the server and good thing is, nothing is downloaded to the browser, which indeed saves loading times. [Hunter, 2000] Java Servlets are not embedded in the HTML like CGI. The client and server side programs are totally on a different side. For Servets, HTML content have to be created within code, but it may cause problem because programmers have to call an *"out.println()"* every HTML line[Hunter, 2000]. This is a time consuming task for long HTML pages.

PHP

PHP is a programming language being used on the server to create dynamic web pages. This technology is quite similar to Allaire's ColdFusion, the Mod_Perl, Sun's JSP (Java Server Pages), or Microsoft's ASP (Active Server Pages). PHP scripts are often embedded in the HTML code of page, and then get parsed on the server-side. This would only allow the browser sees plain HTML only. PHP is actually the most popular module for the Apache Web server, according to Netcraft survey [Netcraft 2000]. Anyway, studies have found that PHP is only in use on over 6% of all web domains in the world [Netcraft, 2000]. That means its market competitiveness is still very low compared to other web programming languages. The knowledge of C programming language (with the complexity such as memory management, pointers, and strong typing taken out) is essential for the coding of PHP. Besides that, PHP is now available as an

Open Source in the current market. Open Source software in general means a number of significant advantages for the corporate IT infrastructure because the full source code is available with them. The source codes now can be inspected in thorough security audits. If third parties find security issues, they are usually fixed immediately. If no one is going to do it, the manager can assign their own personnel to it, with the full code in hands and they are no longer dependent on external software manufacturers. In the aspect of performance, a dynamic web page written using PHP could only execute in an intermediate speed as all the logic the application are integrated into the HTML. This makes web pages quite large in its size and takes some time to load and needs optimisers to enhance the speed. PHP developed applications are portable in the condition of using PHP 4.0 and above. The previous versions of PHP could only be integrated into the Apache web server or runs as a separated CGI program [Ratschiller, 2000].

Conclusion:

	ASP	CGI	Java Servlet	PHP
Performance	Fast	Slow	Fast	Average
Portability	Mostly Microsoft products	Yes, Almost all platforms	Yes	Only in PHP4.0
Knowledge of programming language	VBScript, JavaScript	Mostly Perl	Java	C programming
Ease in programming	Event-driven in VBScript and JavaScript	Handling of environmental variable and string manipulation	More difficult to learn	Yes
Others	Create dynamic content web application	Only static web application	Good in network programming	Not fully developed

Table 2.9 Programming language comparison

2.6 Web Architectures

2.6.1 Client/Server Computing

Client/Server involves breaking up system functionality into layers so that it can be independently developed. It is then deploy across multiple machines and uses a communication mechanisms to allow different layers to co-operate.

Client/server involves the following independent layers [Thomas, 2000]:

Presentation Logics – This layer will handle how users interact with the application. It is implemented by providing graphical user interface (GUI)

Business Logic – This layer will handle business rules of the applications. It is the functional core of the application that all data validation and processing should be handled here. As a middle tier, it will communicates with both Presentation Logic and Data Access Logic

Data Access Logic – This layer will handle the storage and retrieval of data. It will communicate with the database.

Two Tier Client/Server

There are two type of two-tier architecture [Vieira, 1999]: Client-Centric and Server-Centric. For Client-Centric, only data service logic are performed in the server. Presentation and Business Logic are performed on the client side. For Server-Centric, only presentation service are distributed to the client while business and data service logic are remain in the server. There are some limitations with two-tier client/server architecture [Thomas, 2000];

- The database request can generate large result set; when an optimum number of users are exceeded, networking bottleneck may occur.
- Each workstation session required a separate database connection. This can drain resources on the database server.
- Installation are time consuming and difficult to coordinate. New version of software may need to install into multiple machines and it take times.
- Client applications are usually deployed on desktop PCs with limited memory and disk space. So, as client-server applications and the PC operating systems become larger and more complex, the cost for equipping every client PC becomes very expensive

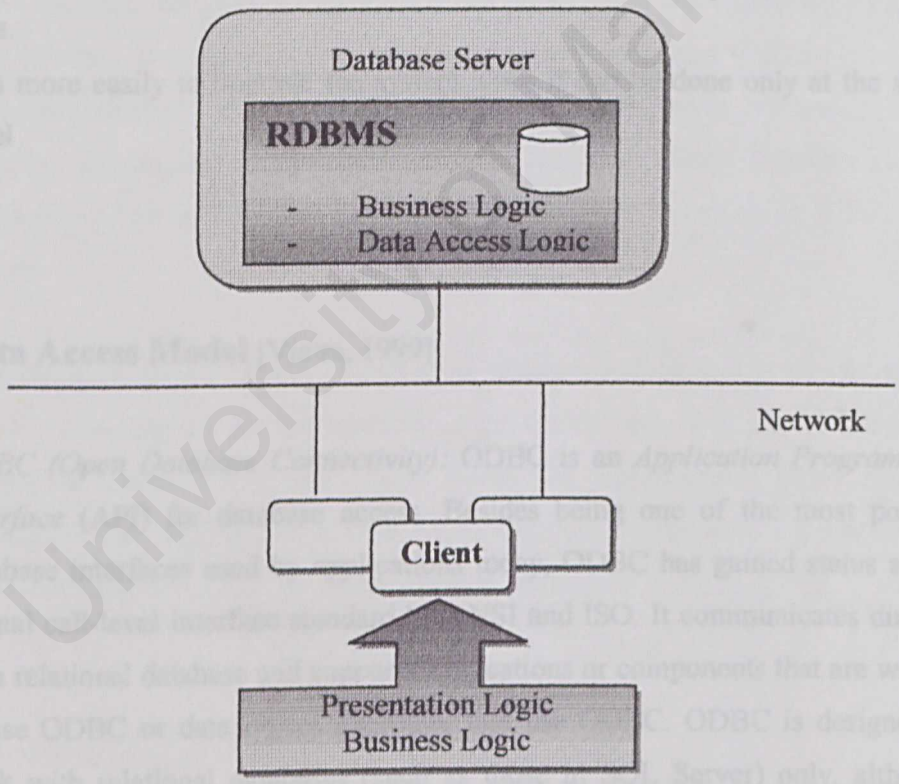


Figure 2.2 Two-Tier Client Server applications

N-Tier Client Server [Thomas, 2000; Vieira, 1999]

The multi-tier architecture, called the three-tier model, extends the standard of the client-server architecture by placing a multithreaded *application* between the client and the DBMS. In these solutions, the business logic is partitioned and distributed over several machines. As requirements change during system's lifetime, this partitioning and deployment can be reviewed and changes with minimal impact. There are some advantages using this architecture.

- Each layer in the three-tier model can be developed concurrently by different programmers which can increase reusability
- Each layer of programs can also be coded in different languages from the other tiers.
- It is more easily to upgrade the system since it can be done only at the server level

2.6.2 Data Access Model [Vieira, 1999]

1. *ODBC (Open Database Connectivity):* ODBC is an *Application Programming Interface* (API) for database access. Besides being one of the most popular database interfaces used by applications today, ODBC has gained status as the formal call-level interface standard by ANSI and ISO. It communicates directly with relational database and supports applications or components that are written to use ODBC or data object interfaces that use ODBC. ODBC is designed to work with relational databases (such as those in SQL Server) only, although there are limited ODBC drivers available for some non-relational data sources.

2. *OLE DB:* Microsoft first released OLE DB in 1996 to provide a *Component Object Model* (COM) interface to any tabular data source, that is, data that can be represented with rows and columns. This includes data in spreadsheets, and even text files. OLE DB can be viewed as an object version of ODBC but is more powerful in that it can access data from data sources beyond those that ODBC can access. Unlike other object interfaces to the relational database, OLE DB does not make programming a call-level interface. In addition, because OLE DB uses pointer data types extensively, it is only accessible from C and C++.

3. *ADO (ActiveX Data Objects):* ADO is a higher-level object interface on top of OLE DB that provides much of the same functionality and performance. Because ADO does not use pointer data type, it can be accessed from scripting languages like JScript, development software like Visual Basic, and C and C++. ADO supports interface for Internet applications written using Microsoft Visual InterDev development tool. Applications written with Visual InterDev can call ADO from Active Server Pages (ASP) and the code is written in VBScript or Jscript

4. *Remote Data Object (RDO):* RDO is an object interface that is closely tied to ODBC, exposing all the functionality in the ODBC driver. It can be used from Microsoft Visual Basic and Visual Basic for Applications. RDO supports building visual controls tied directly to the database. It will reduce the amount of code that must be written to display data on the screen.

2.7 Development Models

2.7.1 Waterfall Model

This is the first explicit model of software development process that was derived from other engineering process. It is call waterfall because it characterizes a series of software engineering stages (figure 3.1). This approach takes all the software development activities and represents them in separate processes. These phases include requirement definition, system and software design, implementation and unit testing, integration and system testing, and operational and maintenance. The development process goes from one stage to another.

There are a few advantages of using this is the process. The first one is visibility of this software processes [Sommerville, 1995]. The software engineer can very clear in mind that at what stage the software process is currently in. This will let them easily manage the software process.

The second advantages are the system are well structured [Sommerville, 1995]. As what we know, the software processes are designed at the beginning of the software development. What they needs to then are developed the system step by step according to the structure the outlined.

Finally, the last advantages are no special skills are required in this approach [Sommerville, 1995]. This is because all the outline of the system is drafted out. What the developer needs to do then is done according to what was already structured out.

2.7.2 Evolutionary development

Evolutionary model will involve creating a partially developed product. It will then enable user or customer to comment and refining through many versions until an appropriate system has been developed. For this model there are no separate specification, development and validation activities. All these activities are carried out concurrently with rapid feedback to the activities.

There are two types of evolutionary model [Sommerville, 1995]:

1. *Exploratory programming*: The objective is to work with customers and evolve a final system from initial outline specifications. The well understood parts of the system could be starting to work with first. New features may be proposed to the user.

2. *Throw-away prototyping*: The objective is to system requirements. Prototypes are concentrating on creating experimental parts of the system that are poorly understood.

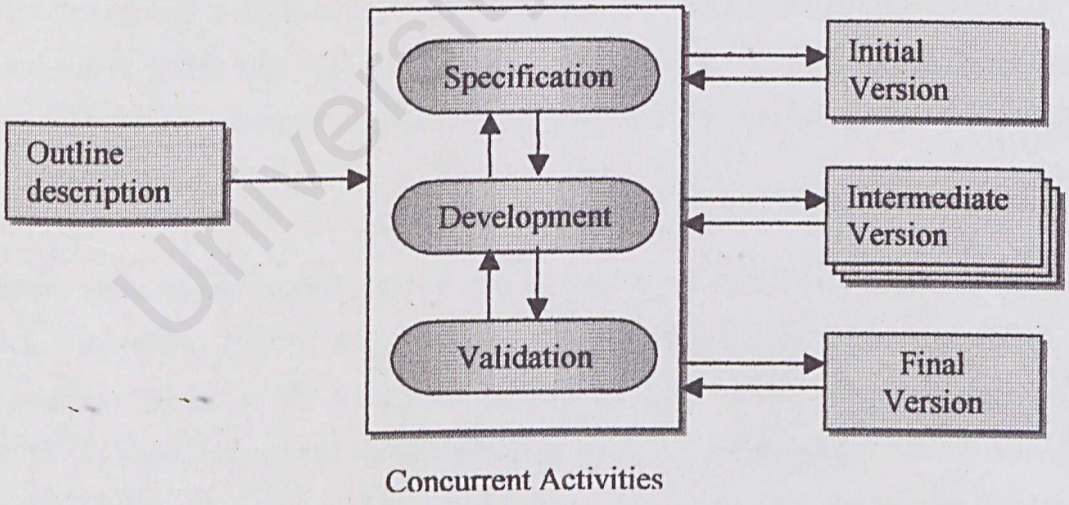


Figure 2.3 Evolutionary Models

This approach is usually more effective then waterfall model because it caters the immediate needs of the customers. However, there are a few disadvantages compare to waterfall model which is the evolutionary development strategy usually lack of visibility, poorly structured and special skill required in developing software.

Therefore, evolutionary development approach usually only suitable for developing a relatively small system or a small system or system prototype that parts of a complicated system. Besides that, it also can be used to develop a system with a short lifetime such as a system that developed specifically for launch of a new product.

2.8 Summary

In this chapter, reports are based on surveys that are carried out to the e-commerce field, software tools, programming language, web architecture, and development models.

In the first part of this chapter, methods on how to find material for literature review are explained. Sources that I used for finding materials are interview's result, magazines, newspaper, books, website, and pass year thesis. Some methods have to carry out to ensure that the desire material can be obtained accurately.

In the e-commerce review, e-commerce is defined clearly. Four categories of e-commerce are B2B, B2C, B2G, and C2G. Generally, e-commerce can be describe into four elements such as e-marketing, e-tailing, e-payment processing, and e-services. Benefits of involving e-commerce also explained in this section. Besides, there are several types of e-commerce already existing in Malaysia and it is stated in Table 2.3.

The next section will analyse strength and weaknesses of local and foreign e-commerce. Analysed result shows that local e-commerce have several weaknesses that must be overcome. In contrast, foreign e-commerce has strengths that can be used as guidelines to develop the system.

In software tools review section, surveys are carried out to several tools such as server platform, web server, DBMS, and development tools. Based on the survey result on server platform, Windows NT is the most suitable platform for this project. As for web server, IIS is choose because of its features have excellent combination with Windows NT. For the DBMS, SQL Server is chosen because it has most of the feature that needed and the price is cheap. Visual InterDev have features that are provided by other development tools. This is the reason to choose Visual InterDev as the software development tool.

Proceed to the next section, details on related programming language are explained. Programming language is observed in various points of view such as performance, portability, ease in programming and etc. The results of survey conclude that ASP technology is used with VBScript as server side scripting language and JavaScript as client side scripting language.

For the web architecture section, client-server computing architecture is discussed in details. Three layers that involved are presentation logic, business logic, and data access logic. Furthermore, survey is carried on to search for suitable data access model that will be used in the project development stage later. Data access models that explained here are ODBC, OLE DB, ADO and RDO.

Finally, the last section will explain on two development models, waterfall model and evolutionary model. Advantages and disadvantages of each model are explained. Justification on the development model is in Chapter 3.

Methodology

Chapter 3
Methodology

3.1 Project Planning and Scheduling

Project Planning

The purpose of project planning is to ensure the project completed and delivered on time. A well and effective project planning not only enable the whole system delivered on time but also developed in a more managed way. It also enables the developer to solve any expected or unexpected or problem in between development time in more confidence and effective approach.

Project Scheduling

This project is planned start from determining the objectives and fact fining until finish develop the whole system and it's implementation. The whole development process is broken down into small task and scheduled with a limit of time to finish the require task. 0The detail of each tasks are describe in the Gantt chart in Appendix A

3.2 Project Description

3.2.1 Project Definition

This project should provide some functions that will overcome some weaknesses that mentioned in Chapter 2. First, this system must have more attractive user interface. Furthermore, the interface is design so that can be easily understood and use by customers.

More than one company is allowed to register as a retailer in this e-commerce system. After accepted as a retailer, they can start adding their product record to the database. These product records will be use to publish on the web storefront. Besides, retailer can edit or delete the existing products record from the database. Reports on monthly items

selling can also be generated from the system. They can view on quantities of the products that have been sold out on the specified month and the profit they earned from the products.

As an administrator, they must have authorization for the database maintenance. For example, they are allowed to add, edit, or delete a record from the product database. Administrators can also creating a new retailer to the system or editing an existing retailer's profile. If a retailer decided to sign out from the system, their information must be removed from the database and this can be do by administrator. Furthermore, administrator can delete a customer from the system when they are inactive for a period of time.

Normally, a customer is different from a visitor. A customer is those who buy products from retailer while a visitor is just a user that browse to the e-commerce web site and not tend to buy any product yet. Users who tend to buy a product must be register to the system. In the system, customer's information is recorded in the database through customer registration procedure. Customers have to login to the database while they desire to buy a product. They can search for a particular product by using search function that provided.

3.3 Approach

Waterfall Model

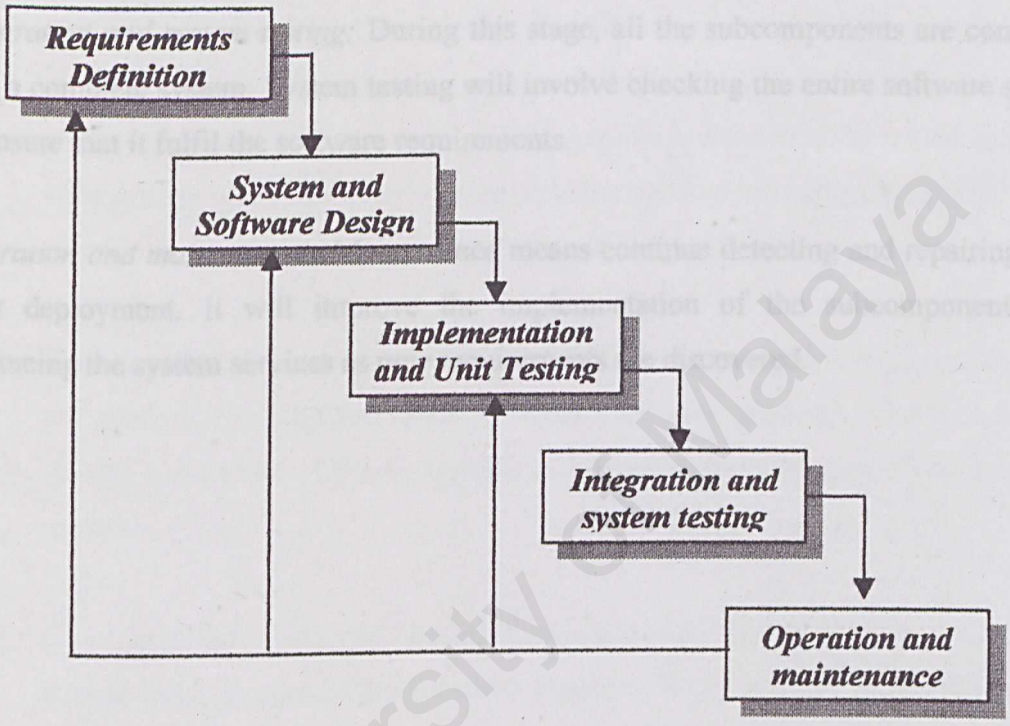


Figure 3.1 Waterfall model

Requirements and definitions: The requirement includes analyzing the software problems. Complete specifications of the desire external behavior of the software system are built in this stage.

System and software design: In this stage, software systems are split into actual components. It is then decomposes into smaller and smaller subcomponents until it can be divided to the developers. Software design involves representing the software system function in a form that may be transforms into one or more programs [Sommerville, 1995]

Implementation and unit Testing: In this stage each subcomponents or program units are implemented in real time. Unit testing involves checked each coded module for the presence of bugs. This stage will ensure that each subcomponent behave according to the specifications as stated before.

Integration and system testing: During this stage, all the subcomponents are combined into a complete system. System testing will involve checking the entire software system to ensure that it fulfil the software requirements.

Operation and maintenance: Maintenance means continue detecting and repairing bugs after deployment. It will improve the implementation of the subcomponents and enhancing the system services as new requirements are discovered.

3.4 Justification

After reviewing of the above two models, the methodology that applied to develop the system is ***Waterfall model***. It is due to the reasons below [Sommerville, 1995]:

1. *The process visibility of the model:* Evolutionary is not visible while waterfall model is good visibility. For a relatively big system (in this case e-commerce web application), documentation of the project is important. It can be used as a reference in the future. But, rapid development of evolutionary model is not suitable or even cost-effective to produce documents.

2. *Evolutionary are more suitable for short lifetime system:* Short lifetime systems are such as systems that used for launch of new products. The e-commerce system is not a short lifetime system, so it is not suitable to use with evolutionary model.

3. *Good structure of waterfall model:* Evolutionary are poorly structured. Continual change tends to corrupt the software structure. So, it is likely to be difficult and costly in the system developments.

4. *Predictable:* Waterfall model is more emphasize on planning rather than rapid development. For this purpose, it is easier to estimate the cost needed to develop the system.

3.5 Development Strategies

Definition:

Webster's Ninth New Collegiate Dictionary [Webster, 1989] defines a requirement, as "something requires; something wanted or needed"

IEEE Standard 729 [IEEE, 1983] defines it as " (1) a condition or capability needed by user to solve a problem or achieve an objective; (2) a condition or capability that must be met or possessed by a system to satisfy a contract, standard, specification, or other formally imposed document."

3.5.1 Functional Requirements

Functional requirement describe an interaction between the system and its environment [Pfleeger, 1998]. Functional requirements of the system have been divided into a few sub-modules:

- **Administration**
- **Registration**
- **Stock Control**
- **Search**
- **Interface Design**
- **Customer Feedback**

Administration

Database maintenance (updating database):

This system should provide a function for authorized admin users to retrieve or add new information from product databases. They can edit and delete to the product's record.

House keeping:

This sub-module provides functions for the companies and users maintenance, which allows them to edit the companies and users profiles. Admin staff can also create new retailer if they fulfil the requirements as well as cancel the retailer's qualifications.

Feedback:

This function is provided to serve the customer's complains or feedbacks. Admin user can delete the unused feedback. Besides, the authorize user or admin staff will reply to the feedback to the consumers if necessary.

Registration

Login:

This function will let the user, retailer or admin user to login to the appropriate parts. After login, they are assigned to viewing, editing to the suitable area of the web site.

Logout:

After user, retailer or admin area finishing viewing or editing the appropriate area, this function provides them to logout.

Stock Control

Updating product information:

Once the company is accepted as a retailer in the web site, they can post their product information to the DBMS. This function will provides the retailers to add new records, delete the records and edit existing records.

Search:

The system should provide function for user to find for the products that they needs. Users can search for the products that they needed by using some criteria such as product name and company name. Search by products will let users to look for the required products by input a keyword. Users can narrow the search by selecting category of the products. User can also search products that sell by a specific company by selecting it from the list.

Interface Design:

Good interface design is important to attract customers and visitors to revisit the web site again. The user interface of the system will implements Graphic User Interface (GUI). The interfaces have to achieve user friendly and ease of use in non-functional requirements.

Customer Feedback

The system provides this function for customers to post their feedbacks. If customers are unsatisfied with the services, they can post complains using this function.

3.5.2 Non-Functional Requirements

Non-functional requirements are the other factors that must be taken into consideration in the systems development cycle [Sommerville, 1995]. These requirements are very subjective but they play important roles to ensure the system robustness and successful

User friendly and ease of use

This e-commerce system will implements Graphical User Interface (GUI). The usage of meaningful icons will help ensure that users use the system with more confidence and avoid mistakes made by user unintentionally. The language that I used in the system must be simple, easily understand and meaningful. The system will also display confirmation message for some special process such as delete a record and data updating. Appropriate prompts and instruction will be shown to guide the user along the operation of the system

Site Performance

Increasing the site performance means that reducing the loading time. Visitors will feel boring just to wait a page to load. Usually, Java Applet, animations, pictures and OLE object will take lots of times to load in a web site. So, in the system, I will reduce the loading time by decreasing the use of animations and other objects on the e-commerce web site. However, good appearance of a website also important. So, my system will only include a few pictures with combination of colours as background.

Maintainability

The system coding and design will be implemented by using the modular approach so that it can be easily enhanced in the future. The procedure, subroutine and methods in the program are written in the modular. It makes the program easier to understand in the later time. This will allows reusability of some common procedures or functions. This will save a lot of development time and prevent the code redundancy. Later maintenance to the system can save a lot of efforts.

Consistency

The universal commands such as <Save>, <Exit>, <Load>, <Edit>, <Previous>, <Next>, and <Delete> were designed to have the same function throughout all the modules that involve these keywords. This strategy used to prevent the possible of the function confusion to these keywords when shifting among difference modules. It can also enhance the simplicity of the system.

Security

Security is another important requirement that must be considered to protect the privacy of the data from intruders. For this purpose, firewall is needed. Firewall is a set of related programs (located at a network gateway server), which protects the resources of a private network from users from other networks.

3.6 Proposed Tools

3.6.1 Hardware Requirements

Hardware requirement are divided into two types, design time requirement and run time requirements.

Design time Requirements

It is requirements that are used to setup the server and server side system to run on

Processor

Intel Pentium II 233 MHz or greater and other compatible processors like AMD and Cyrix are being used

Random Access Memory (RAM)

Minimum 64 RAM is required (Recommended 128 RAM). Higher memory is being recommended when the database is to be put into production for running multiple services

Hard disk

Minimums of 4.5GB are required. For installing Windows NT, it takes 125MB. In addition, SQL Server Enterprise Edition needs 180MB for full install. Another 200MB is used for installing the developing tools such as Microsoft InterDev, MSDN Library and etc. An additional 100MB is reserved for project's source code. About 3.9GB hard disk space left will be used for storing testing database data.

Others

Other computer peripherals being used are such as keyboard, mouse, monitor, SVGA card, sound card, network cards etc.

Run Time Requirements

It is for client side user to run the program

Processor.

Intel Pentium 100 MHz or greater and other compatible processors like AMD, Cyrix etc.

Random Access Memory (RAM)

A minimum of 32MB is required.

Hard disk

Minimum of 50MB disk space is required to installing web browser like Netscape Communicator or Internet Explorer.

Others

Modem with 33.6 kbps or above, keyboard, mouse, and display card

3.6.2 Software Requirements

As a conclusion of literature survey doing in Chapter 2, I list out software requirement of our system.

- *Operating system*
  Microsoft NT Server 4.0

- *Database Management System*
  Microsoft SQL Server 7.0

- *Web server*
  Microsoft Internet Information Server 4.0

- *Web browsers*
  Netscape Communicator 4.0 (or above) and Internet Explorer 4.0 (or above) are used. Other compatible web browsers such as Mosaic, Arena can also be used as an alternative. Various web browsers are needed for the purpose of testing the web application.

- *Development tools*
  Microsoft Visual InterDev 6.0,

- *Programming Language*
  Develop using Active Server page (ASP) technology. Server site scripting using VBScript and client site with JavaScript

System Design

Chapter 4
System Design

4.1 System Architecture

This system is divided into a few modules as below:

- **Administrator**
- **Retailer**
- **Search**
- **Registration and Authentication**

Administrator

Administrator module is divided into three sub-modules, database maintenance, house keeping, and feedback maintenance. For a database maintenance, add, delete and modify database record function must be provided. For a housekeeping sub-module, the system should provide admin staff, retailer and customer maintenance function. In a feedback maintenance sub-module, it must provide function for admin user to view the feedback and delete an unused feedback.

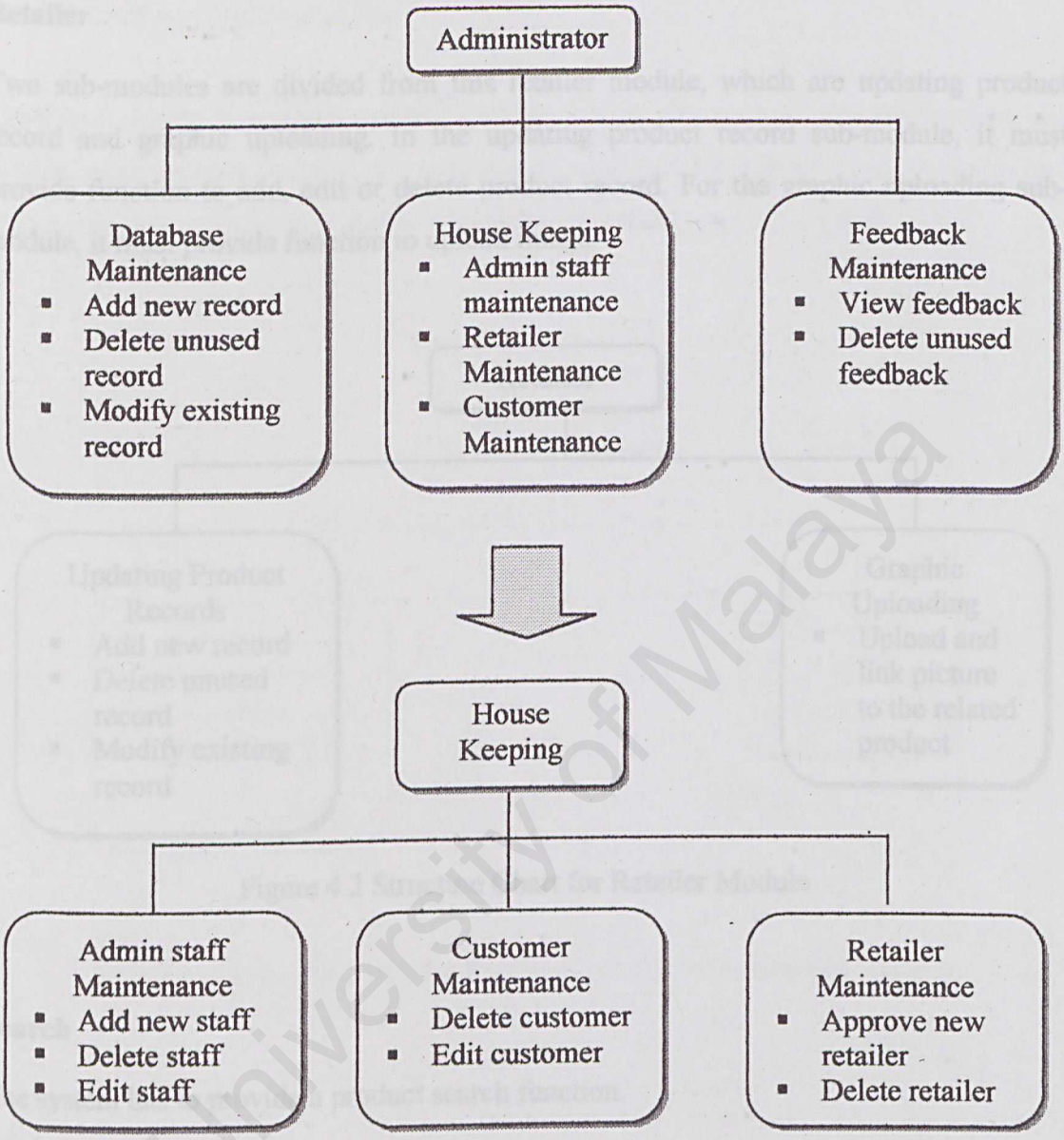


Figure 4.1 Structure Chart for Administrator Module

Retailer

Two sub-modules are divided from this retailer module, which are updating product record and graphic uploading. In the updating product record sub-module, it must provide function to add, edit or delete product record. For the graphic uploading sub-module, it must provide function to upload image.

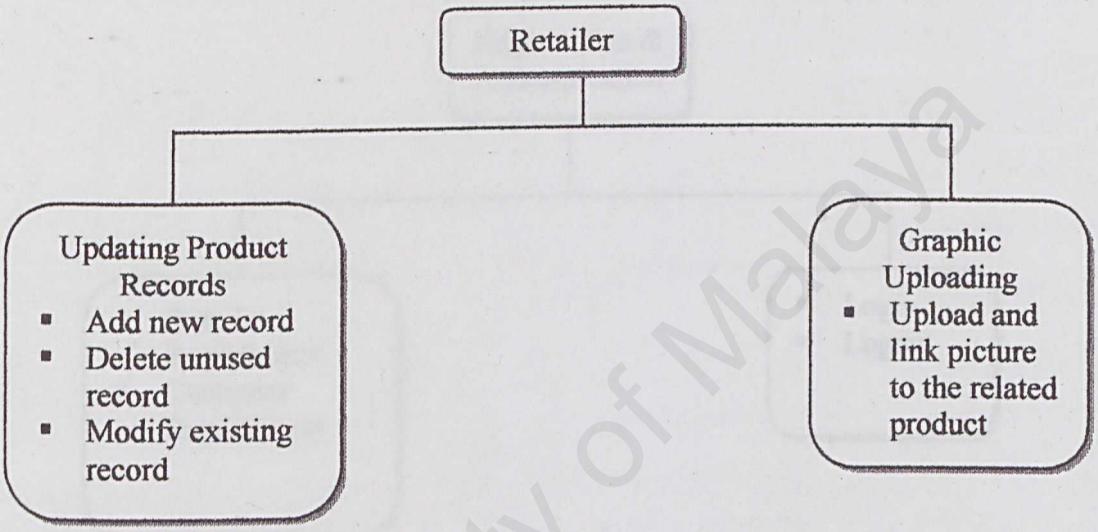


Figure 4.2 Structure Chart for Retailer Module

Search

The system has to provide a product search function.

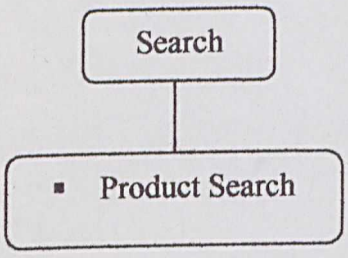


Figure 4.3 Structure Chart for Search Module

Registration and Authentication

There are several function must be provided in this sub-module. For registration, the system must provide function for retailer and customer to register. Besides, login and logout function must be provided to the customer, retailer and admin staff.

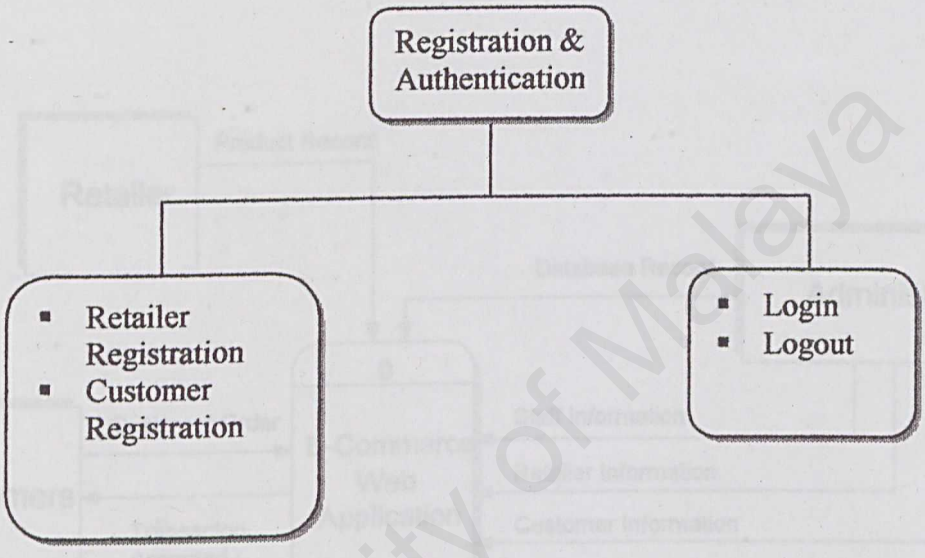


Figure 4.4 Structure Chart for Registration and Authentication Module

4.2 Data Flow Diagram

A system model is documented through a variety of design diagrams. A design diagram is a graphic or visual representation of a structure. Design diagrams include data flow diagram (DFD), structured charts, decision trees, and other items [Silver, 1989]. Below are data flow diagrams of the system:

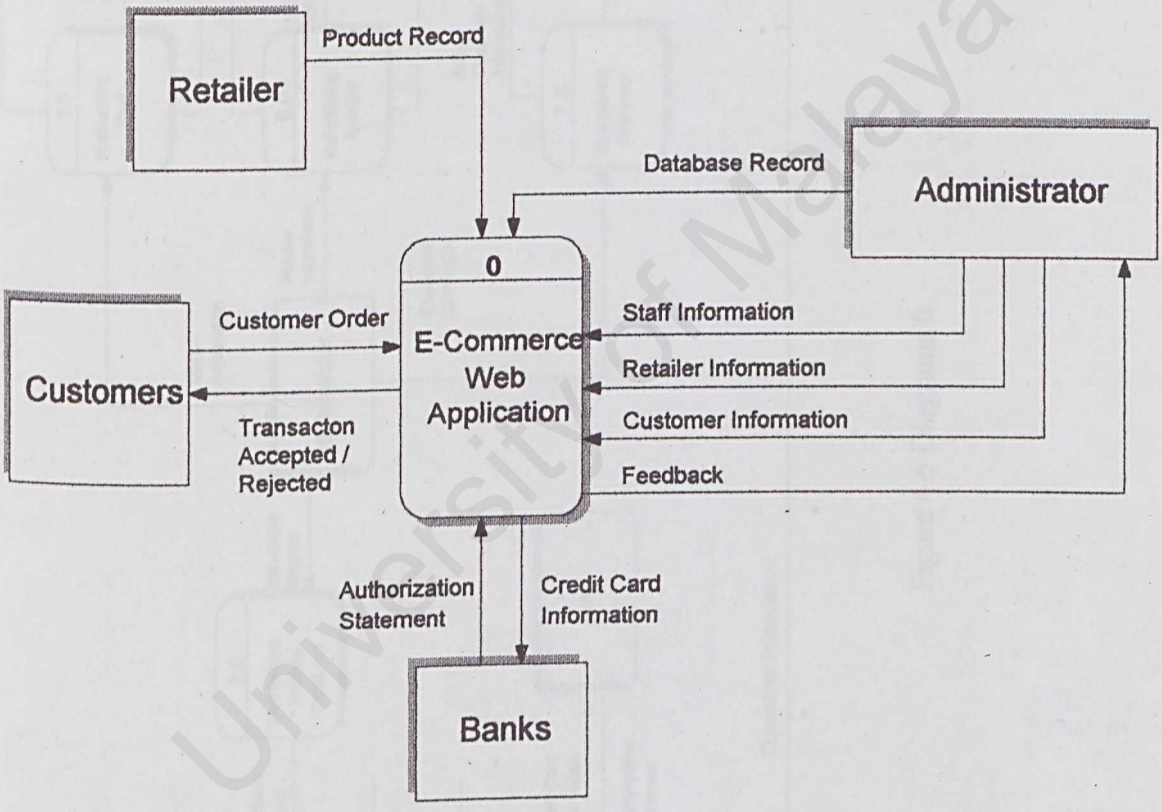


Figure 4.5 Context Diagram

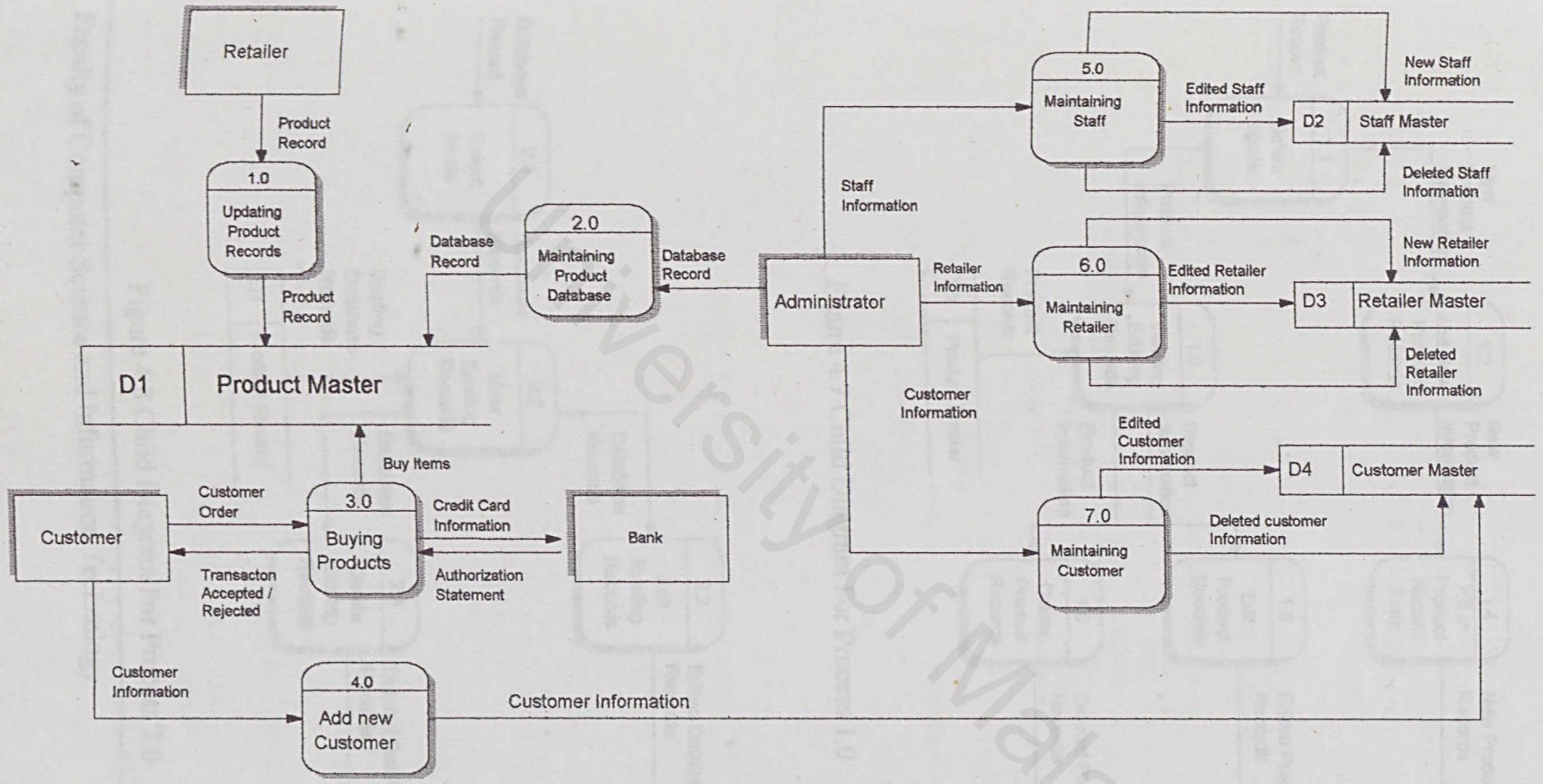


Figure 4.6 Diagrams 0

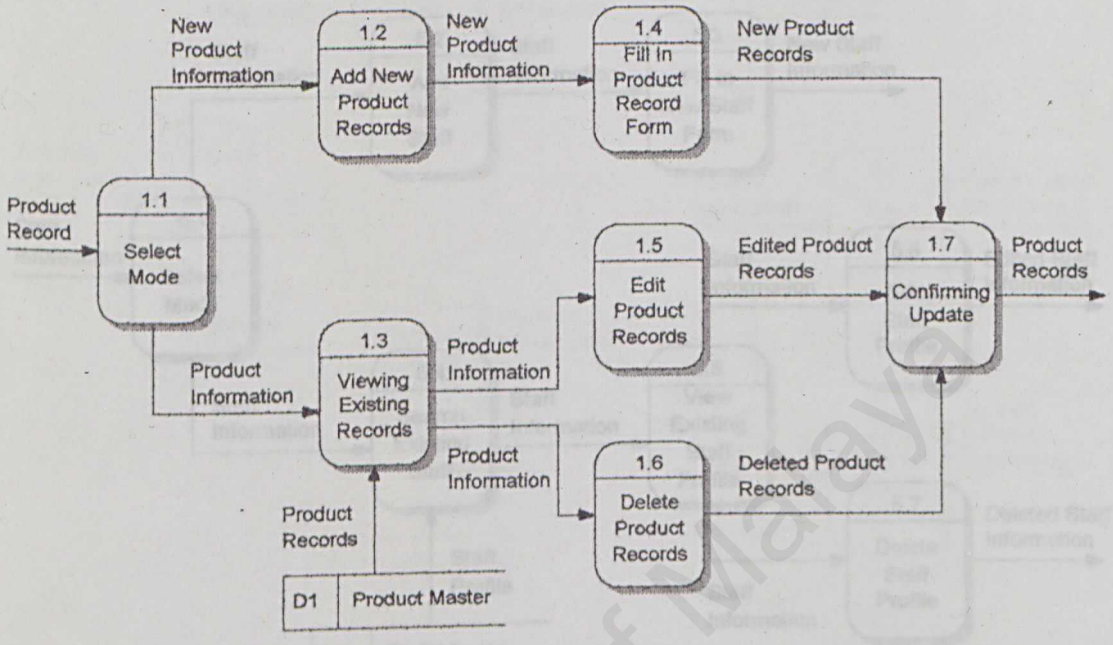


Figure 4.7 Child Diagram For Process 1.0

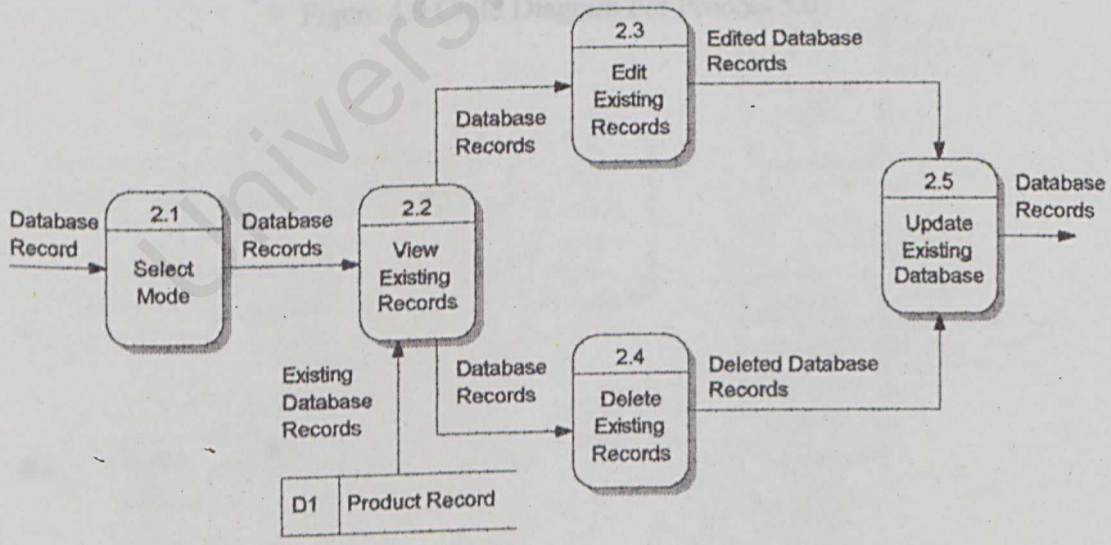


Figure 4.8 Child Diagram For Process 2.0

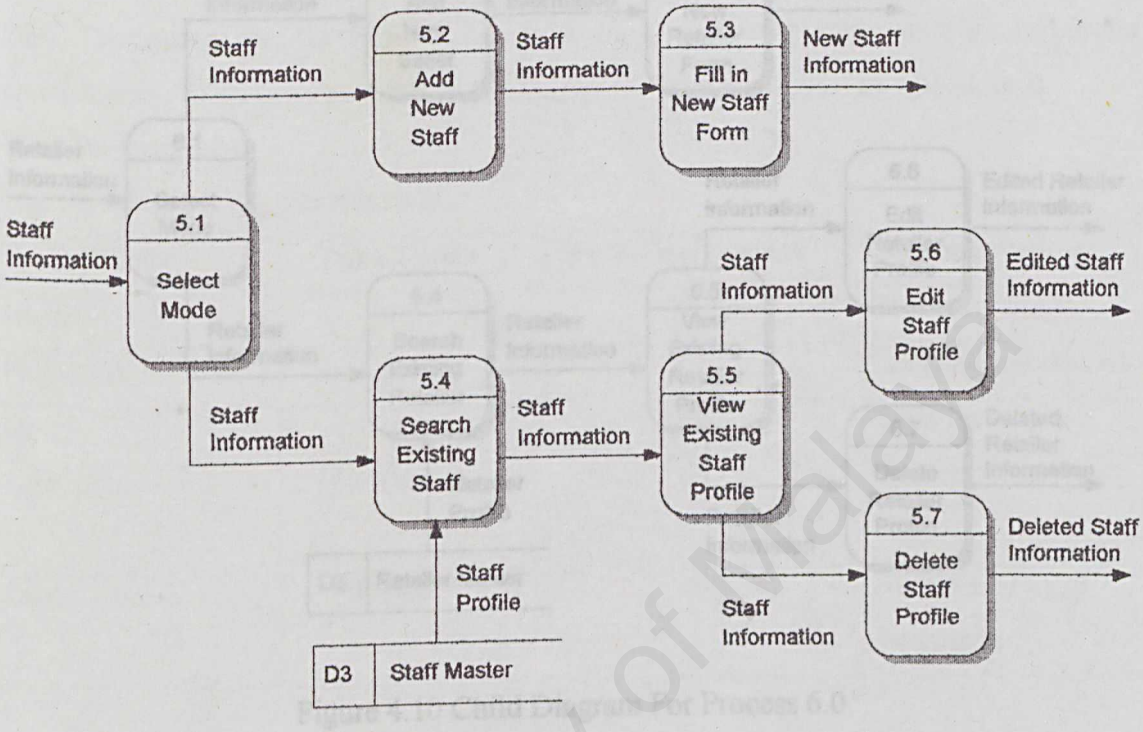


Figure 4.9 Child Diagram For Process 5.0

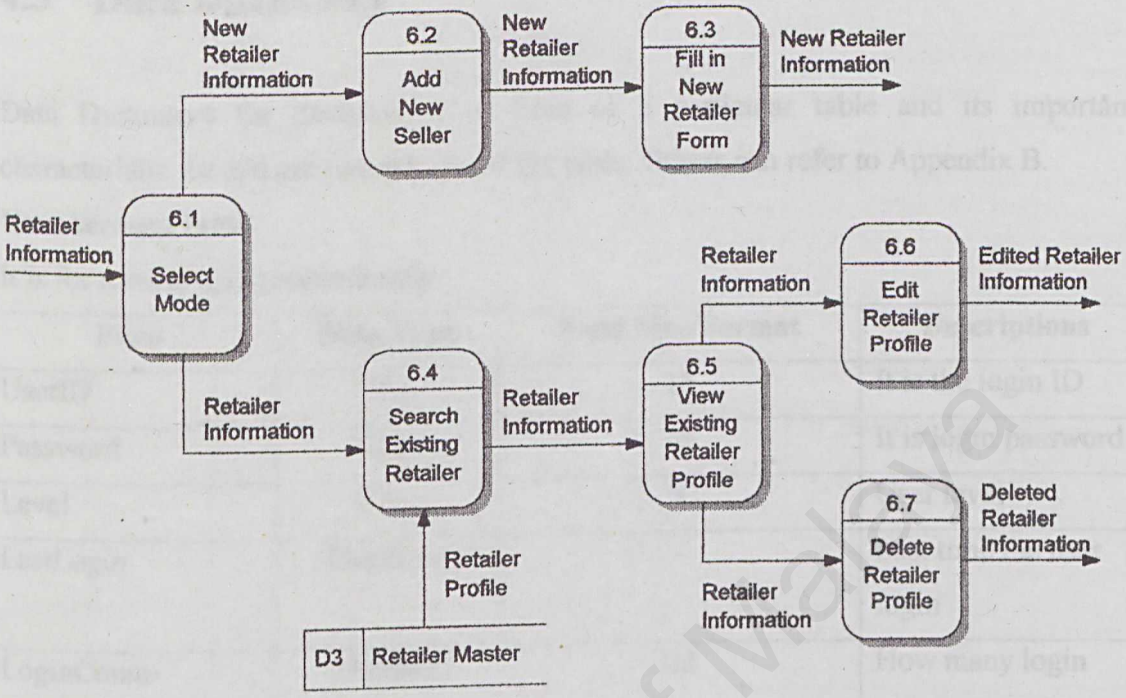


Figure 4.10 Child Diagram For Process 6.0

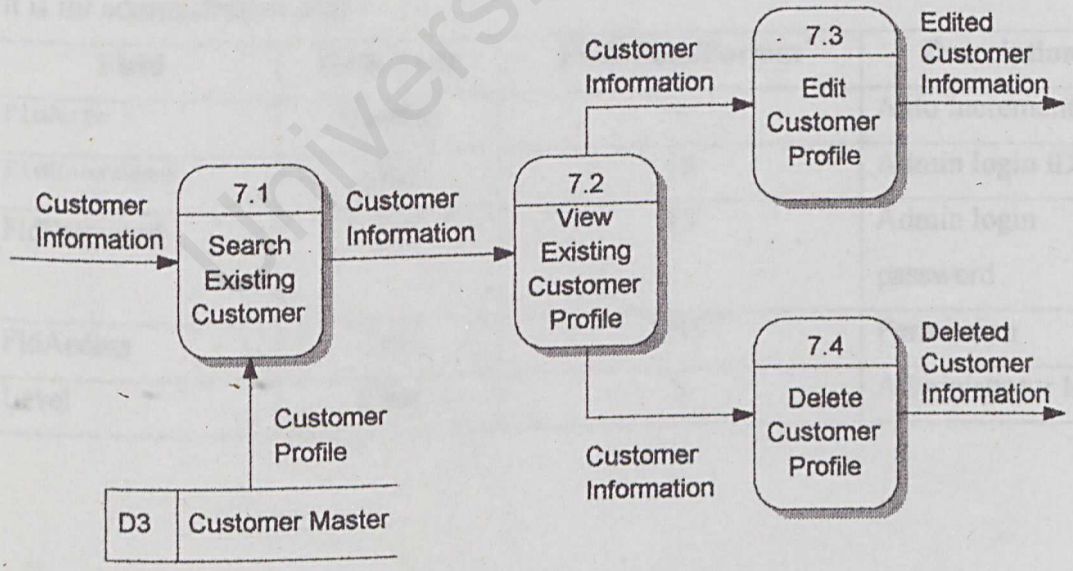


Figure 4.11 Child Diagram For Process 7.0

4.3 Data Dictionary

Data Dictionary for database is to field of a particular table and its important characteristic. Below are two sample of the table. Others can refer to Appendix B.

UserAccount table

It is for retailer and customer only

Field	Data Type	Field Size/Format	Descriptions
UserID	Char	15	It is the login ID
Password	Char	15	It is login password
Level	Char	3	User level
LastLogin	Datetime	-	Last time the user login
LoginCount	Number	Int	How many login had made

TblUser table

It is for administrators only

Field	Data Type	Field Size/Format	Descriptions
FldAuto	Number	-	Auto Increment
FldUserName	Char	15	Admin login ID
FldPassword	Char	15	Admin login password
FldAccess	Text	255	Permission
Level	Char	3	Administrator level

Product Table

Field	Data Type	Field Size/Format	Descriptions
ItemID	Number	-	Auto Increment
ItemProductNumber	Char	12	The Product ID
ItemRetailerID	Char	15	The Retailer ID
ItemCategory	Char	3	The Category ID
ItemStatus	Number	Int	The product status
ItemName	Char	255	The product name
ItemDescriptions	Text	1000	Description of product
ItemSpecifications	Text	1000	Detail specification
ItemPictureFile	Char	255	Image file name
ItemSalesPrice	Float	10	Price to sale
ItemCostPrice	Float	10	Price of stock
StockQuantity	Number	Int	Quantity available
Spotlight	Number	Int	Shows spotlight flag
Frontpage	Char	3	Shows front page flag
QtySales	Number	Int	Total quantity saled

4.4 Interface Design

This section will show interface design of the system. Below are two example of the program design

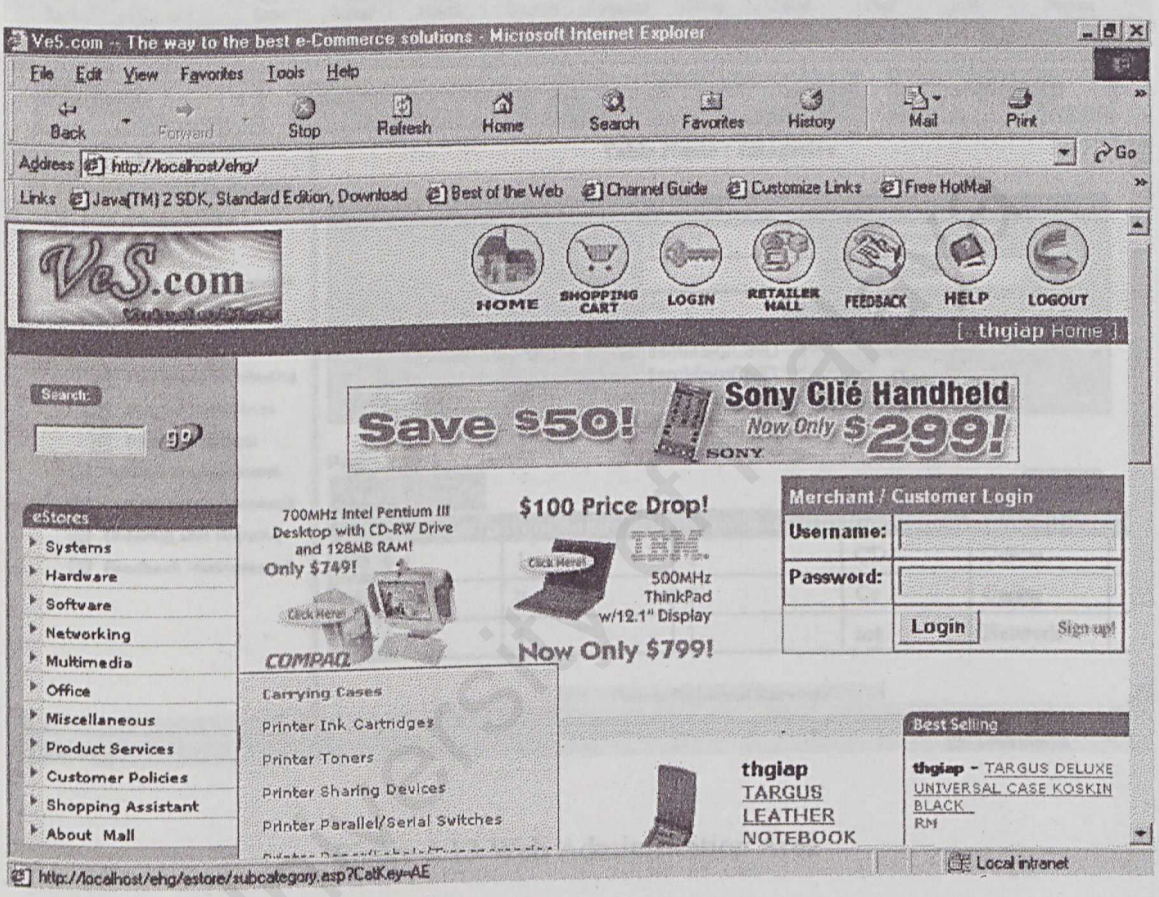


Figure 4.12 Interface Design: Main Page

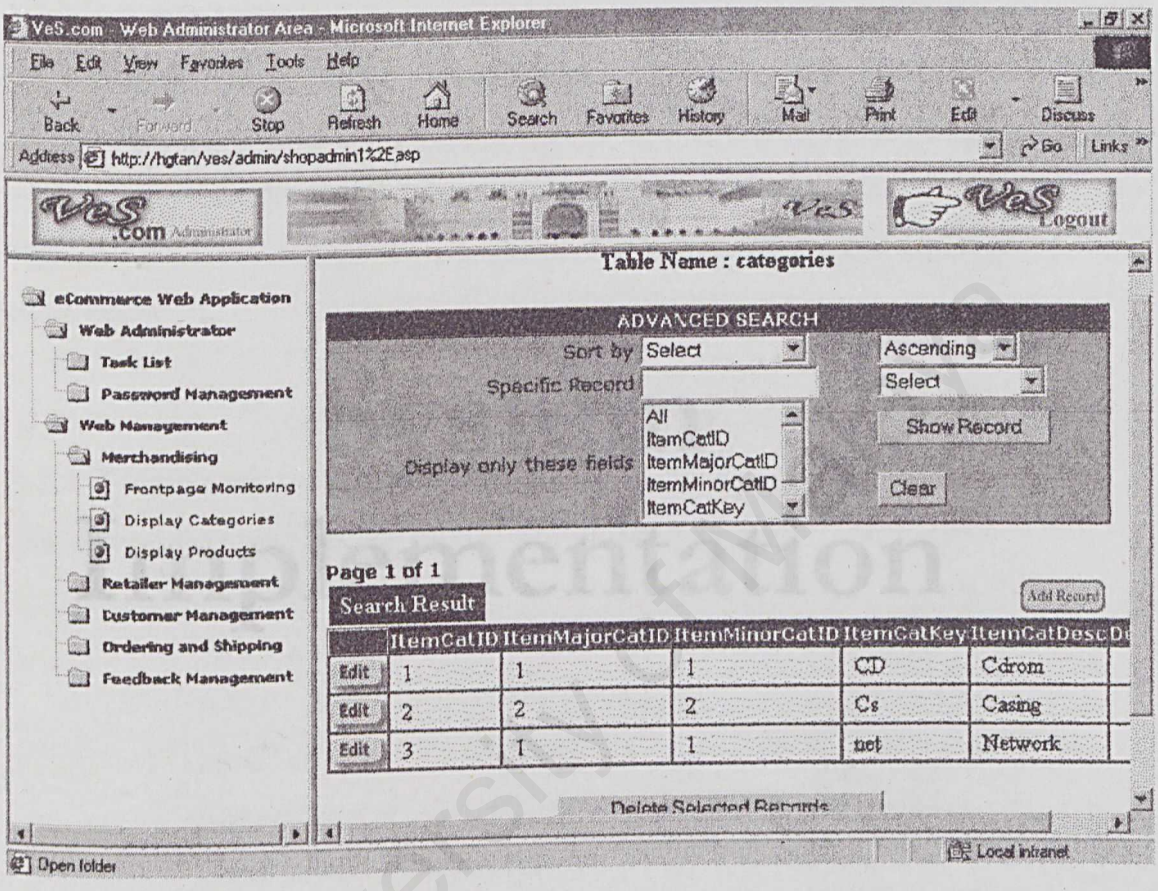


Figure 4.13 Web Administration Area

System Implementation

Chapter 5
System Implementation

5.1 Development Environment

Development environment has certain impact on the development. Using the suitable hardware and software will not only help to speed up the system development but also determine the success of the project. The hardware tools that used to develop the system are as below:

5.1.1 Hardware Requirements

The hardware components that used to develop the system are:

Processor	:	233MHz Pentium II Processor
RAM	:	64MB SDRAM
Hard Disk	:	4.5 GB
Resolution	:	800 x 600 16 bit High Color , and
Other standard components		

5.2 Web Site Coding and Development

Primarily, this web application is developed using Active Server Page (ASP) technology. Languages that used to develop an ASP page are VBScript and JavaScript (or Jscript). VBScript is used for coding in server side scripting while JavaScript is used for client side scripting.

5.2.1 JavaScript

In the project, JavaScript is used in several ways:

- *Form validation:* JavaScript is used to check the value input from the user to a form (such as registration form and product input form).
- *Date convention:* For example 28 or 29 days in February. JavaScript is used to create a valid value in combo box (or dropdown menu) so that user can choose a correct day, month and year.
- *Special effect:* It is used to special effect such as tree view and rollover button. The advantages of using JavaScript rather than Active-X is it can be view in both Netscape and Internet Explorer. While Active-X is not support by Netscape.

JavaScript that used in the project is mostly client side scripting. The purpose of using client side scripting is it reduces the server burden and the loading time is faster.

5.2.2 VBScript

In the project, VBScript is mainly used in coding with ASP server side scripting. VBScript is choosing because it is much easy to learn and implement rather than other language such as JavaScript (or Jscript).

5.2.3 Hypertext Markup Language (HTML)

HTML is the main part of web page coding. In the project, HTML is used to create web page object such as table, form, button, image, marquee, and links.

5.3 Web Site Designing

5.3.1 Graphics Design

Graphics are important for a web page. For this project, some of the graphic is download from the Internet such as product image, background, banner and some buttons. But, most of graphics such as button is creating using special graphic tools such as Macromedia Fireworks.

5.3.2 Interface Design

Attractive interface is important to attract customers. For the project, interface is created using combination of the graphic and HTML.

5.4 Implementing Tools

5.4.1 Platform and Web Server

For earlier stage of the conducting this project, Windows 98 and Personal Web Server are used to develop the project. After the Window NT 4.0 is setup and IIS is configured, the project development shifts to use it as a platform.

5.4.2 Database System

The database for this project is initially created using Microsoft Access 2000 and is later migrated to the Microsoft SQL Server 7.0 using Access upsizing wizard. By using Microsoft Access 2000, creating and modifying the tables and their relationships is made easy.

5.4.3 Coding Tools

Microsoft Visual InterDev 6.0 is used as the main development tool for this project. This tool enables easy performance of the many complex programming and database tasks required in the creation of a web site, as well as the incorporation of HTML formatting and layouts, graphics and other multimedia components.

When working on a web project with Visual InterDev 6.0, it perform task like adding files to the site or editing any of the existing files, this tool creates a second copy of the files on the local computer. This is called working copy. When these working copies are saved, Visual InterDev 6.0 updates the file on the web server as well.

5.4.4 Graphic Tools

Macromedia Fireworks 3.0 is the main graphic tool that used. Most of the buttons, graphic and banner in the project are created with this tool. Macromedia Fireworks is used to design editable Web graphics and animations. It combines both bitmap and vector editing tools. In Fireworks, everything is editable and unused graphics can be modifying to be a useful graphics. Workflow can be automated to meet the demands of edits, updates, and changes.

For the project, graphics are modified and exported to be a .gif or .jpg format. It is to reduce the size of the graphic and this will increase the web site loading time.

Another graphic tool that used through out the project is Unlead Cool 3D 2.5. This is a good tool in creating 3D graphic with special effects such as fire effects. It has step-by-step guide to make this tool easy to use. The 3D graphics that created can also be exported become animated GIF format.

5.5 Database Connection

For this project, routine used to access the database is using OLEDB. It is faster and easier to used than ODBC.

ActiveX Data object (ADO) is the friendly face of OLEDB. It hides the complexity of OLEDB and is used to store and retrieve data from a database.

5.6 Summary

Classification	Software Tools	Purpose	Description
Platform	Microsoft Windows NT Server 4.0 (Service Pack 4)	System Requirement	[Final Stage]
	Microsoft Windows 98	System Requirement	[Earlier Stage]
Web Server	Internet Information Server 4.0	System Requirement	[Final Stage]
	Personal Web Server	System Requirement	[Earlier Stage]
Database System	Microsoft SQL Server 7.0	System Development	[Final Stage]
	Microsoft Access 2000	System Development	[Earlier Stage]
Coding Tools	Microsoft Visual InterDev 6.0	System Development	Coding and designing the store front and other administration web page
Graphics Tools	Macromedia Fireworks 3.0	System Development	Designing and modifying the graphics
	Unlead Cool System 3D	System Development	Designing the graphics with 3D effects
Documentation Tools	Visio Professional 2000	System Design	Creation diagram such as DFD diagram and ER diagram
	Microsoft Word 2000	System Design	Documenting the project requirements and user manual
Web Browser	Microsoft Internet Explorer	System Development	Running and testing the web application
	Netscape Communicator 4.72	System Development	Running and testing the web application

Table 5.1: Summary of different tools that used during system development

System Testing

Chapter 6:
System Testing

Testing is performed to ensure that the program are executed correctly and conforms to the requirements specified that are performed to detect the existence of errors. It provides a method to correct logic error and for testing system reliability.

6.1 Testing Process

The most widely used testing process consists of five stages as shown in figure:

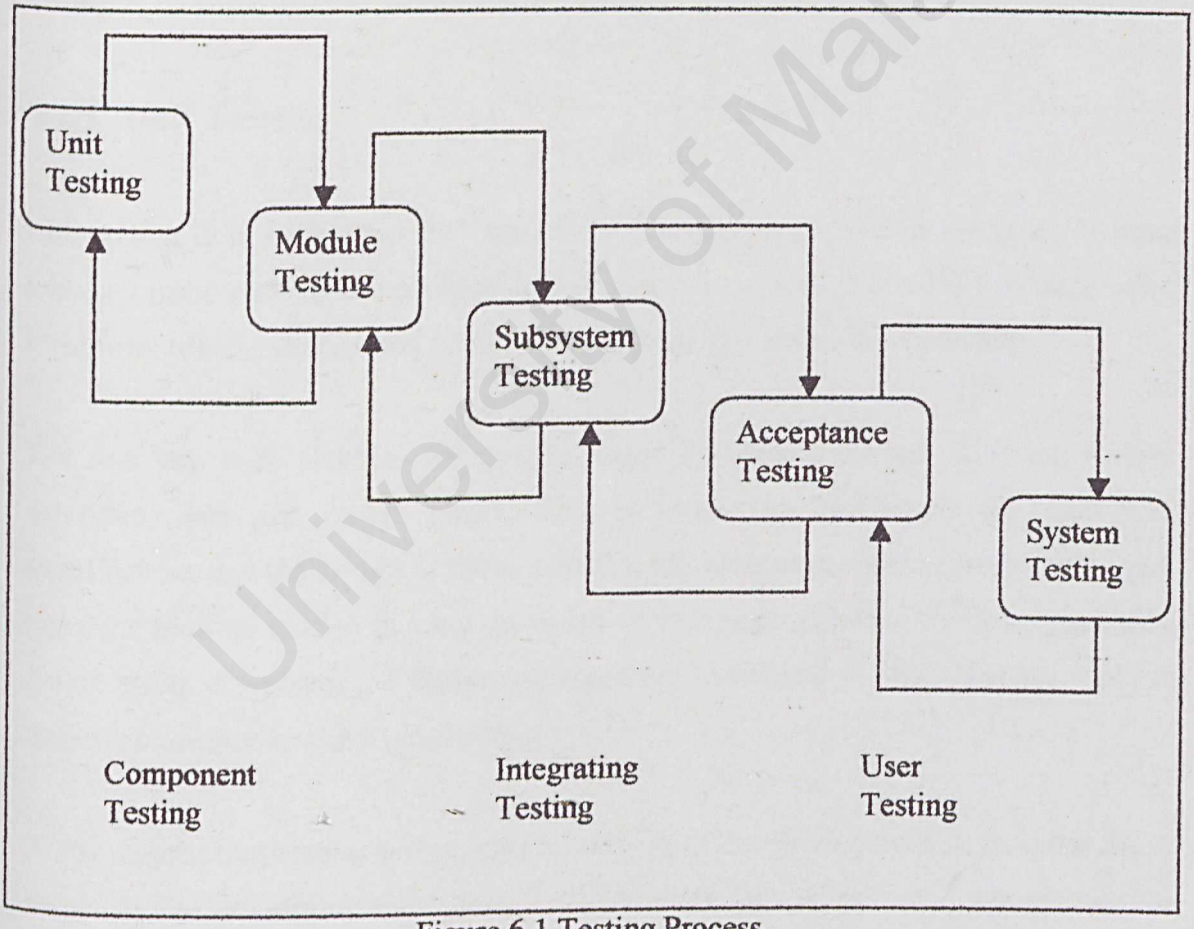


Figure 6.1 Testing Process

The sequence of testing activities is component testing, integration testing then user testing. As defect are discovered at any stage, program modification are required to correct them and this may require other stages in the testing process to be repeated. The process is therefore an iterative one with information being feedback from later stages to earlier parts of the process.

In figure 6.1, the arrow from the top of the boxes indicates the normal sequence of testing. The arrows returning to the previous box indicate that previous testing stages may have to be repeated.

6.2 VeS.com System Testing

For each module in the project, they have been tested separately and were later being integrated together. After integration, the system as a whole is tested again. Each module contains function and procedures that can be checked and tested carefully. The sub function may call other sub function and tests are carried to ensure all possible paths are tested.

3 stages of testing are carried out, that is unit testing, integration testing and system testing.

6.2.1 Unit Testing

Unit testing is to verify that the component function properly with the types of input expected from studying the component's design. The project is divided into three units, *storefront*, *retailer section* and *admin section*. Each unit are tested separately.

The first step is to examine the program code by reading through it, trying to spot algorithm, data and syntax errors. This is follow by comparing the code with specifications and the design to make sure that all relevant cases have been considered. Next, the browser is used to view the result of web page and then eliminate remaining syntax errors if necessary. Finally, test cases are developed to show that the input is properly converted to the desired output.

In this project, unit testing is done concurrently with the development stage. After finish designing the storefront, each form, sub, function, loops, is tested for errors. For example, in registration form, each text field is tested for error by running the JavaScript form validation function. Furthermore, each of this function are reviewed and checked separately.

6.2.2 Integration Testing

When the individual component are working correctly and meet the objectives, these components are combined into a working system. In other words, integrating testing is the process of verifying that the system components work together as described in the system and program design specifications. This integration is planned and co-ordinated so that errors or bugs caused by the integration of components can be detected [Pfleeger, 1998].

One popular approach for merging components to test the larger system is called 'Bottom-up testing'. When this method is used, each component at the lowest level of the system hierarchy is tested individually first. Then, the next components to be tested are those that call the previously tested ones. This approach is followed repeatedly until all components are included in the testing [Pfleeger, 1998].

In this project, a bottom up approach has been used. Each form or module at the lowest level of the system hierarchy is tested individually. Then the next modules to be tested are those called previous tested module. This approach is followed repeatedly until all modules are included in the testing interfacing errors will be uncovered and fixed along the way.

6.2.3 System Testing

The last testing procedure done is system testing. It is different from unit and integration testing. The objective of unit and integration testing is to ensure that the code implemented the design properly. In other word, the code is written to do what the design specifications intended. In system testing, a very different objective is to be achieved, to ensure that the system does what the consumer wants to do.

6.3 Result of Testing

This section shows the testing done and their respective problem and comments in terms of functional and non-functional requirement.

6.3.1 Results of Unit Testing

Incompatible data type

This problem is not occurring in ASP code but in SQL.

For example,

*strSQL = "SELECT * FROM PRODUCT WHERE ItemProductNumber = " & itemNo*

is different from

*strSQL = "SELECT * FROM PRODUCT WHERE ItemProductNumber = ' " & itemNo & " ' "*

The first line shows that the data type in the database is a number, but the second statement shows that *ItemProductNumber* in database is text.

Text field blank

Text field blank may cause error when trying to save the empty value to the database. So, system should check for an empty field and inform the user.

Invalid text field value

The system should check for the correctness of input value. For example, the "stock quantity" field should not have a character. The email field should have at least one "@" sign.

Invalid date

For example, February should return 28 or 29 days only depends on the leap year. January, March, May, July, August, October, and December should have 31 days while others have 30 days. This problem is solving by using JavaScript date validation.

6.3.2 Result of System Testing

System testing was done by Mr. Yan Wee Jing (my partner), and some of my friends. They gave invaluable ideas and comments about the system. Overall, they were impressing with the system produced.

6.4 Summary

This chapter presents testing process that carried out through out the system development stage. Three stage of testing is carried out. The first stage is unit testing. It is followed by integrating testing and finally system testing. The objective of unit and integration testing is to ensure that the code implemented the design properly. In other word, the code is written to do what the design specifications intended. For system testing, it is to ensure that the system does what the consumer wants to do. It evaluated by a few other peoples (in this case my friends) and obtains the feedbacks.

System Evaluation and Conclusions

Chapter 7
System Evaluation and Conclusions

7.1 Problems Encountered and Their Solutions

The following are some of the major problems encountered from the beginning to the completion of the system development.

Difficulties in choosing a development technology, programming language and tools

There are many software tools available to develop a web-based system. Choosing a suitable technology and tool was critical process as all tools have their strengths and weaknesses. In addition, the availability of the required tool for development was also a major consideration. A tough decision was needed to choose from Cold Fusion, Active Server Page (ASP), CGI, Java Servlet, and Java Server Page (JSP).

In order to solve this problem, seeking advices and views from project supervisor, course mates, and even seniors engaging in similar project were carried out. Furthermore, reading computer magazines (for example, PC Magazine Malaysia), surfing Internet and visiting the library help to clarify some doubts.

Platform installation and configuration

The platform that required is Windows NT 4.0. The in installing preinstalled Windows NT 4.0 was corrupted and cause many problems. Lack of experience in installing and configuring a server was caused this problem. Searching suitable driver for VGA card, SCSI hard disk, network card is needed in installing a new operating system. For this server, the required driver can be downloaded from Internet. Two web sites that are used to download the driver are:

- *http://www.acer.com*
- *http://www.driverzone.com*

Executing SQL statement within ASP

Executing SQL statements with an ASP requires the *Execute* method. This method has two forms: one form is used when retrieving results from the database and the other form is used when no results are returned. It was a bit confusing at first. When executing a SQL statement where no results are returned, the Execute method does not use parentheses. For example:

MyConn.Execute "INSERT INTO MyTable (MyColumn) VALUES ('Hello')"

However, the *Execute()* method can be used to return the results from SQL SELECT query and parentheses must be included or else will get the error *Expected end of statement*. For example:

*Set Rs = MyConn.Execute "SELECT * FROM MyTable (MyColumn)"*

7.2 System Strength

Friendly User Interface

The language that I used in the system was simple, easily understand and meaningful. The system will display confirmation message for some special process such as delete a record and data updating. Appropriate help is associated to guide users from using the system.

Site Performance

Animation is reduced from the system to increase the loading time. However good appearance of a website also important. So, the system will only include a few pictures with combination of colours as background. The size of images button that used is only a few kilobytes. For example, the image buttons at the main page heading will not more than 2 kilobytes each.

Maintainability

This project is developed using *dynamic content*. It means that all the web site is binds to database. Editing a page is easily since it just needs to add records to the database and without modifying the web site coding. For example, to change the products that appears at the front page, the web administrator just needed to edit the records by using the form that is provided at the web administration area. It is easier rather than changing each web page only to add a product to a main page.

Furthermore, the system coding and design will be implemented by using the modular approach so that it can be easily enhanced in the future. It makes the program easier to understand in the later time and allows reusability of some common procedures or functions. This will save a lot of development time and prevent the code redundancy. For example, to create a product subcategory menu in the storefront menu bar, administrator just needs to a line of code at the page:

CreateSubMenu objConn, "1", "SystemsMnu", "./estore/subcategory.asp"

This code will call a sub (*CreateSubMenu*) in *ShopDB.asp*. It was bind to a database and search for related subcategories.

Encrypted Password

The user registration password is encrypted before saving into the database. It reduces the possibility for the hacker to directly access the database to get the password.

Web Administrator Permission Control

In the administration area, the web administrator has rights to disable certain staff from being access to certain page. This increased the security and flexibility because this can prevent unauthorized staff from accessing sensitive part of the system such as user information and password.

Staff Logging

Each time the staff entering the web administration area, their information is logged into database. It is importance to get know who is entering this restricted area.

Data Consistency

Transaction is used in this system because there is a need to update information in more than one table but not update with one table fail while the others success. The BeginTrans and CommitTrans method are used to mark the beginning and end of a transaction. After the BeginTrans method call, if anything goes wrong before CommitTrans is called, the tables are not updated. If the system down after the first table is updated, the change is automatically rolled back. The purposed here is to ensure data consistency in the database.

7.3 System Limitation

Browser Capability

This system is best view in Internet Explorer 4.0 and above with screen resolution 700 x 600. Although it can also run in Netscape, but the appearance is not as good as in Internet Explorer. It is because style is not recognized in Netscape such as the coloured button.

Product Information Printing

Customers are not allowed to print related product information. They can just view on the web storefront.

Multi-Language Support

This project is only support for English Language. It does not support for other language such as Chinese or Malay.

7.4 Future Enhancement

Database Encryption

Password encryption that provided is not enough since the hacker can also other tables. So, future enhancement for this feature is to enable database encryption.

Browser Capability

The future enhancement for this limitation is to develop two interfaces, one is for Internet Explorer and the others are for Netscape. This is important because Netscape user can also have better look on the storefront.

More Administration Task

Administration task can be further enhanced to include more features to ease the maintenance process. Among the features that may be included: report generating, analytical tools, and database backup.

Language Support

Future enhancement for the Internet system will include language support. This will enable information to be displayed in other language such as Chinese, Malay and Tamil.

Currency Control

This function is important because foreign visitor that visit our country may need to known the product price conversion with difference currency.

Customisable Storefront

The future enhancement on this feature is to enable the customers to customize themselves the web storefront. They can modify the appearance web storefront according to their favourite.

7.5 Conclusions

Overall, This project has achieved and fulfilled the objectives and requirements as enable medium-scale companies selling their product online and support multi-retailers.

The birth of this system means that there are a place for medium-scaled company publishing their product online easily sharing on a same database. The retailer does not needs wasting times preparing their database or setting up their server. They can just registering as a retailer through the system and starting updating their product information online after they approved as web retailer.

A lot of knowledge was gained throughout the development of the system. These include knowledge in setting up and configuring the Windows NT Server, E-commerce knowledge, programming concept as well as SQL Server. Programming in ASP, HTML, VBScript, and JavaScript proved to be a valuable experience. ASP provides very powerful features enabling one to create highly interactive and dynamic web pages. The core of the ASP technology lies in the implementation of object-oriented technology. As such, the object-oriented programming skill has improved tremendously. The tedious and difficult business rules is a challenge where help to improve patient and increase the level of logical thinking.

Finally, the entire problem faced and experiences gained during the system development should be useful in the future endeavours. This is because the era is moving towards Internet technology that requires decent knowledge in Internet programming including knowledge in deploying the network systems and functionality.

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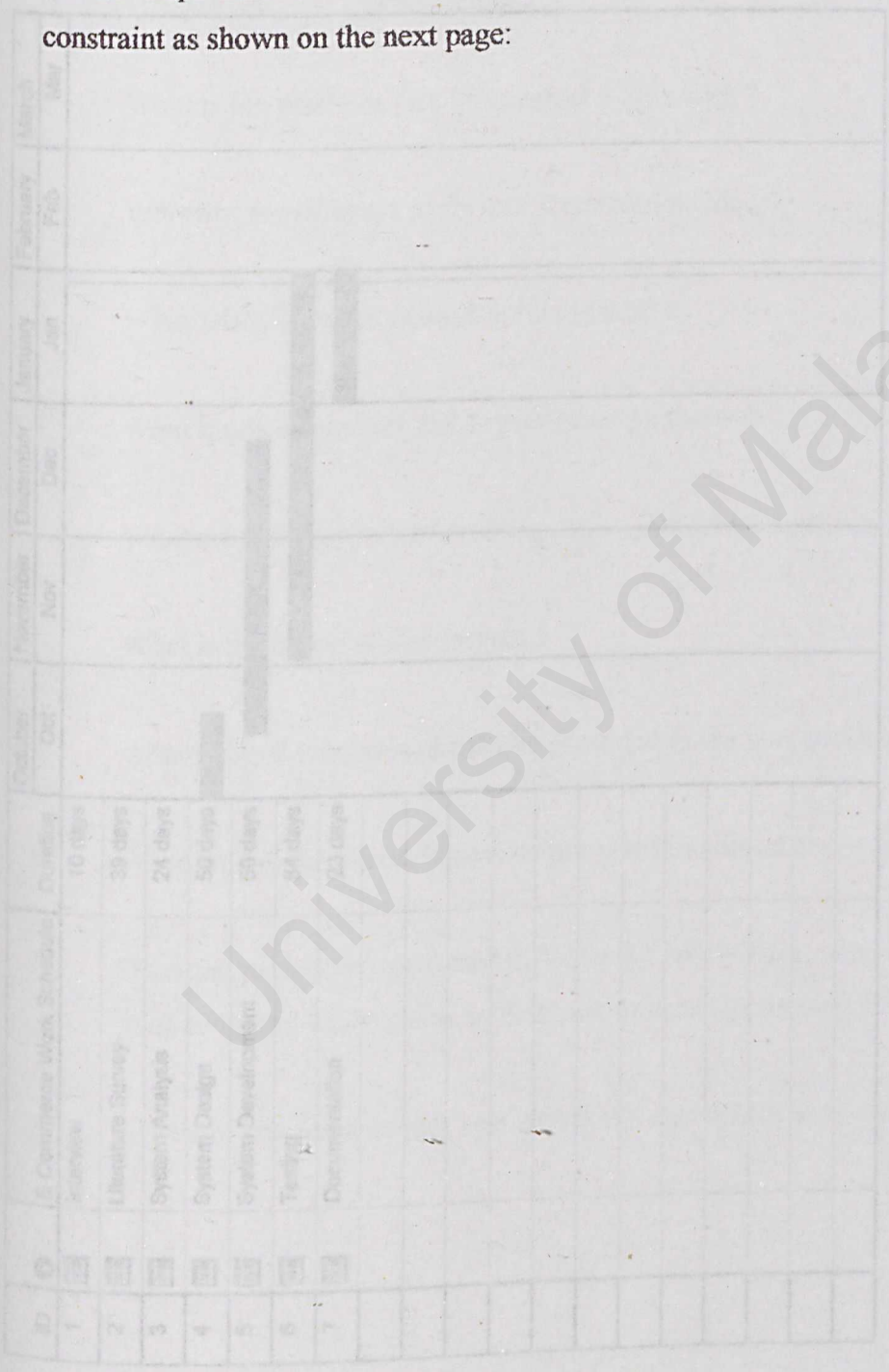
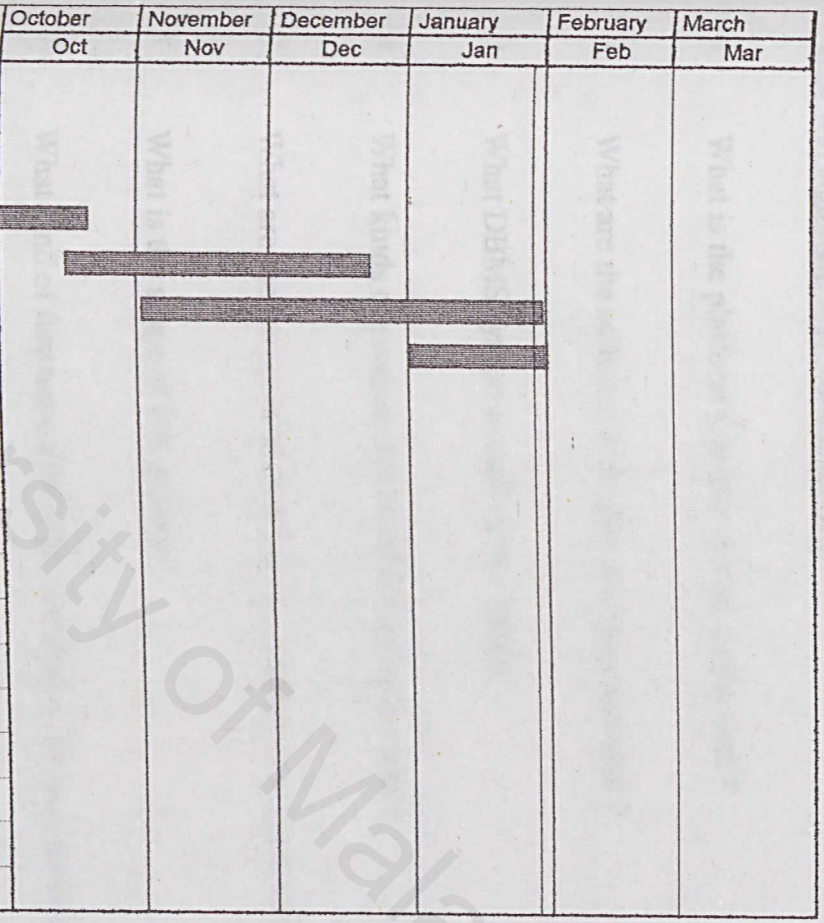
Appendix

Appendix A: Project Schedule

All the steps described in the development strategy have to be completed within a time constraint as shown on the next page:



ID		E-Commerce Work Schedule	Duration
1		Interview	10 days
2		Literature Survey	39 days
3		System Analysis	24 days
4		System Design	50 days
5		System Development	50 days
6		Testing	64 days
7		Documentation	23 days



Appendix B: Interview Questions

Web Development and Management :

1. What is the platform that this project works with ?
2. What are the software tools that are recommended ?
3. What DBMS system is used in this system ?
4. What kinds of product that is published on the web ?
5. What are the purposes of creating this e-commerce application ?
6. What is the scope of this project ?
7. What kind of functions should be provided in the user section of this web site ?
8. What kind of functions should be provided in administrator section of this site ?
9. Does the consumers restricted in Malaysia only? If not, what kind of prime currency your company will provide in this e-commerce application ?
10. Are there any features that will attract the consumers to re-visit the web site ?

Online Payment and Security :

1. What are the basic requirements for online payment and security aspect when developing an e-commerce application ?

2. What are the limitations and problems regarding the online payment ?

3. What are the limitations and problems faced when implementing the security system for e-commerce application ?

4. What are the most common and effective security protocols used for implementing online payment in an e-commerce application ?

5. What kind of payment methods are provided ?

6. What are the development tools used for developing an e-commerce web site ?

7. Please describe the work flow for the online payment and the functions of each element or party involved in the process.

8. What kind of encryption is used to encrypt the data such as customer information and credit card information ?

9. What are the procedures and requirements needed to get the approval from the bank in order to set the network connection and make transaction to the bank ?

10. Please describe how the security system works in the e-commerce application ?

Appendix C Source Code

Here is the source code for the ***default.asp***

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">

<HTML><HEAD>
<!--#include file="./include/adovbs.inc"-->
<!--#include file="ShopDB.asp"-->
<!--#include file="./estore/spotlight.asp"-->
<!--#include file="./estore/eStoreProc.asp"-->
<SCRIPT language=JavaScript src="menu.js"></SCRIPT>
<SCRIPT language=JavaScript>

function chooseReg()
{

window.open('regChoose.asp','newVeS','top=150px,left=150px,width=450px,height=150px,toolbar=no,menu
bar=no,location=no,Resize=no,status=no,dependence=yes,directories=no,scrollbars=no')
 return false;
}

function checkCriteria()
{
 if (frmSearch.txtSearch.value==""){
    alert("Please type the string to search");
    return false;  }
 else

    return true;
}
</SCRIPT>
</HEAD>

<TITLE>VeS.com -- The way to the best e-Commerce solutions </TITLE>

<META http-equiv=Content-Type content="text/html; charset=windows-1252">


<STYLE id=default type=text/css>
.menupA {
        TEXT-DECORATION: none
}
.menupA:hover {
        TEXT-DECORATION: none
}
#a {
        COLOR: #114477
}
#a:hover {
        COLOR: blue
}
```

```
.menu {
        POSITION: absolute
}
A.ViewRegular {
        TEXT-DECORATION: none
}
A.ViewRegular:visited {
        COLOR: #114477
}
A.ViewRegular:link {
        COLOR: #114477
}
A.ViewRegular:hover {
        FONT-WEIGHT: bold
}

A.dl:hover{ color:red;font-weight:BOLD; TEXT-DECORATION: none }

</STYLE>


<!--A.dl:hover { BACKGROUND: #aabbdd; TEXT-DECORATION: none } -->

<BODY bottomMargin=0 bgColor=#ffffff leftMargin=0 topMargin=0 rightMargin=0 marginwidth="0"
marginheight="0" >

<%
ConnectDB objConn
CreateSubMenu  objConn, "1", "SystemsMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "2", "HardwareMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "3", "SoftwareMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "4", "NetworkingMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "5", "MultimediaMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "6", "OfficeMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "7", "MicMnu", "./estore/subcategory.asp"

%>

<!--#include file="./include/header.asp"--><!--#include file="./include/MenuBar.asp"-->

<TABLE cellSpacing=0 cellPadding=0 width="100%" border=0>
 <TBODY>
 <TR>
  <TD>

  <TABLE cellSpacing=0 cellPadding=0 width="100%" border=0>
    <TBODY>
    <TR>
     <TD vAlign=top width=1 bgColor=#aabbdd colSpan=4><IMG height=1
      src="images/spacer_1x1.gif" width=1 border=0></TD>
     <TD width="100%" bgColor=#ffffff><IMG height=1
      src="images/spacer_1x1.gif" width=1 border=0></TD></TR>
    <TR>
     <TD vAlign=top width=159 bgColor=#aabbdd colSpan=3> </TD>
```

```
        <TD width=1 bgColor=#114477></TD>
        <TD vAlign=top width="100%"></TD></TR>
       <TR>
        <TD style="HEIGHT: 20px" vAlign=top align=middle width=159
       bgColor=#aabbdd height=20>
         <FORM action="./search/prodSearch.asp" method=post id=frmSearch name=frmSearch>

         <TABLE cellSpacing=1 cellPadding=1 width="75%" border=0>
          <TBODY>
           <TR><font face=verdana size=2 color=white><b><FONT
           color=lightcyan></FONT></b></font><IMG alt=Search
           src="./images/search.gif" > 
           <TD><INPUT style="WIDTH: 79px; HEIGHT: 22px" size=11 id=txtSearch
name=txtSearch></TD>
           <TD>
           <INPUT type="image" id=cmdSearch name=cmdSearch src="images/Go.gif" alt="Click to start
search" onclick="checkCriteria()">
                    </TD>
          </TR>
         </TBODY>
        </TABLE>
        </FORM>
        <TABLE cellSpacing=0 cellPadding=0 width=159 bgColor=#aabbdd
        border=0>
         <TBODY>
         <TR>
          <TD bgColor=#aabbdd><IMG height=7
           src="images/spacer_1x1.gif" width=159 border=0></TD></TR>
         <TR>
          <TD><IMG height=17 src="images/estores_159x17.gif"
           width=159 border=0></TD></TR>
         <TR>
          <TD align=right><!--#include file="./include/estore.asp"-->

          </TD>
         </TR>
         <TR>
          <TD bgColor=#aabbdd><IMG height=7
           src="images/spacer_1x1.gif" width=159 border=0></TD></TR>
         <TR>
          <TD bgColor=#aabbdd><IMG height=7
           src="images/spacer_1x1.gif" width=159 border=0></TD></TR>
         <TR>
          <TD><IMG height=17 src="images/retailer_list_159x17.gif"
           width=159 border=0></TD></TR>
         <TR>
          <TD align=right><!--#include file="./include/RetailerList.asp"-->

          </TD>
         </TR>
       <TR>
       <TD><IMG height=7 src="images/spacer_1x1.gif" width=159
          border=0></TD></TR></TBODY></TABLE> </TD>
      <TD vAlign=top align=middle width=159 bgColor=#aabbdd></TD>
```

```
<TD vAlign=center align=middle width=159 bgColor=#aabbdd></TD>

<TD width=1 bgColor=#114477><IMG height=1
 src="images/spacer_1x1.gif" width=1 border=0></TD>

<TD vAlign=top width="100%">
 <TABLE width="100%" id=TABLE1>
  <TBODY>


 <TR><TD vAlign=top width="100%" align=middle colspan=4>

 <A href="http://www.sony.com"><IMG id=IMG1 height=60 alt="GREAT GIFTS FOR THE
WHOLE FAMILY!" src="./images/banner/sonyclie_468x60.gif" width=468 border=0 ></A>

</TD></TR>

 <TR width="100%">
  <TD width="5%">   </TD>
  <TD width=300><IMG id=IMG1 alt="" src="./images/frontpage/compaq_150x125.gif"></TD>
  <TD width=300><IMG alt="" src="./images/frontpage/ibm_150x125.gif" ></TD>

<TD width="20%" ><!--Login table-->
   <FORM name=LoginForm action=login.asp method=post>
   <TABLE cellSpacing=0 borderColorDark=#333399 cellPadding=3
   width="30%" align=center borderColorLight=#666699 border=1>

    <TR>
     <TD vAlign=top align=left bgColor=#0080c0
      colSpan=2><FONT
      face="Trebuchet MS, Arial, Helvetica"><FONT
      face="Arial, Arial, Helvetica"><FONT face=Arial
      color=white size=2><B>Merchant / Customer
      Login</B></FONT> </FONT></FONT></TD></TR>
    <TR>
     <TD vAlign=top align=left width="15%"><FONT
      face="Trebuchet MS, Arial, Helvetica"><FONT
      face="Arial, Arial, Helvetica"><FONT face=Arial
      size=2><B>Username:</B></FONT></FONT></FONT></TD>
     <TD vAlign=top align=left><FONT
      face="Trebuchet MS, Arial, Helvetica"><FONT
      face="Arial, Arial, Helvetica"><INPUT
      name=UserName></FONT></FONT></TD></TR>
    <TR>
     <TD vAlign=top align=left width=50><FONT
      face="Trebuchet MS, Arial, Helvetica"><FONT
      face="Arial, Arial, Helvetica"><FONT face=Arial
      size=2><B>Password:</B></FONT></FONT></FONT></TD>
     <TD vAlign=top align=left><FONT
      face="Trebuchet MS, Arial, Helvetica"><FONT
      face="Arial, Arial, Helvetica"><INPUT type=password
      name=Password></FONT></FONT></TD>
    <TR>
     <TD></TD>
```

```
            <TD><FONT face="Trebuchet MS, Arial, Helvetica"><INPUT type=submit value="Login"
name=Submit style="FONT-WEIGHT: bold; CURSOR: hand; COLOR: darkblue; BACKGROUND-
COLOR: #caf2ff">           
              <input type="image" src="./images/signup.gif" onclick="return chooseReg()">
            </FONT></FONT></TD></TR></TABLE> </FORM><!-- Login table-->


                        </TD>
                        </TR>

                        </TBODY></TABLE><!--start spotlight/frontpage display-->

  <TABLE cellSpacing=0 cellPadding=0 width="100%" border=0 id=TABLE1>
    <TBODY>
    <TR> <TD>
                         
    </TD></TR>
    <TR>
     <TD width=159><IMG id=IMG1 height=17 src="./images/frontpage_159x17.gif" width=159 border=0
></TD>
     <TD width="100%" bgColor=#ddeeff><IMG height=17 src="./images/spacer_1x1.gif"
      width=1 border=0></TD>
     <TD width=159 colSpan=2><IMG height=17 src="./images/best_sellers_159x17.gif"
      width=159 border=0></TD></TR></TR></TBODY></TABLE>

   <TABLE cellSpacing=0 cellPadding=0 width="100%" border=0>
    <TBODY>
    <TR>
     <TD width=159><IMG height=1
      src="./images/spacer_1x1.gif"
      width=1 border=0></TD>
     <TD width="100%"><IMG height=1
      src="./images/spacer_1x1.gif"
      width=1 border=0></TD>
     <TD width=159 colSpan=2><IMG height=1
      src="./images/spacer_1x1.gif"
      width=1 border=0></TD></TR>
    <TR>
     <TD vAlign=top colSpan=2><!-- DISPLAY Frontpage products -->

     <%DisplayFrontpage%>



     </TD>
     <TD bgColor=#114477><IMG height=1
      src="./images/spacer_1x1.gif"
      width=1 border=0></TD>
     <TD vAlign=top width=157><!-- DISPLAY Best Sellers side bar --><!--#include
file="./estore/bestSeller.asp"--></TD>
                        </TR></TBODY></TABLE></TD></TR></TBODY></TABLE>
      </TD></TR></TBODY></TABLE>
  <TABLE cellSpacing=0 cellPadding=2 width="100%" border=0>
   <TBODY>
```

```
    <TR>
     <TD align=middle bgColor=#114477>
       <!--#include file="./include/Trailer.asp"-->
     </TD>
    </TR>
    </TBODY>
  </TABLE>

</BODY></HTML>
```

```
        FONT-WEIGHT: bold
}
A.dl:hover{ color:red;font-weight:BOLD; TEXT-DECORATION: none }
</STYLE>



<BODY bottomMargin=0 bgColor=#ffffff leftMargin=0 topMargin=0 rightMargin=0 marginwidth="0"
marginheight="0" >

<%
ConnectDB objConn
CreateSubMenu  objConn, "1", "SystemsMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "2", "HardwareMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "3", "SoftwareMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "4", "NetworkingMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "5", "MultimediaMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "6", "OfficeMnu", "./estore/subcategory.asp"
CreateSubMenu  objConn, "7", "MicMnu", "./estore/subcategory.asp"

%>

<!--#include file="../include/header.asp"--><!--#include file="../include/MenuBar.asp"-->

<TABLE cellSpacing=0 cellPadding=0 width="100%" border=0>
 <TBODY>
 <TR>
  <TD>
  <TABLE cellSpacing=0 cellPadding=0 width="100%" border=0>
    <TBODY>
    <TR>
     <TD vAlign=top width=1 bgColor=#aabbdd colSpan=4><IMG height=1
      src="../images/spacer_1x1.gif" width=1 border=0></TD>
     <TD width="100%" bgColor=#ffffff><IMG height=1
      src="../images/spacer_1x1.gif" width=1 border=0></TD></TR>
    <TR>
     <TD vAlign=top width=159 bgColor=#aabbdd colSpan=3> </TD>
     <TD width=1 bgColor=#114477></TD>
     <TD vAlign=top width="100%"></TD></TR>
    <TR>
     <TD style="HEIGHT: 20px" vAlign=top align=middle width=159
     bgColor=#aabbdd height=20>
                    <FORM action="./prodsearch.asp" method=POST id=frmSearch
name=frmSearch>

      <TABLE cellSpacing=1 cellPadding=1 width="75%" border=0>
       <TBODY>
       <TR>
        <TD><INPUT style="WIDTH: 79px; HEIGHT: 22px" size=11 id=txtSearch
name=txtSearch></TD>
        <TD>
         <INPUT type="image" id=cmdSearch name=cmdSearch src="../images/Go.gif" alt="Click to start
search">
```

```
        </TD>
       </TR>
      </TBODY>
     </TABLE>
     </FORM>
     <TABLE cellSpacing=0 cellPadding=0 width=159 bgColor=#aabbdd
     border=0>
      <TBODY>
      <TR>
       <TD bgColor=#aabbdd><IMG height=7
        src="../images/spacer_1x1.gif" width=159 border=0></TD></TR>
      <TR>
       <TD><IMG height=17 src="../images/estores_159x17.gif"
        width=159 border=0></TD></TR>
      <TR>
       <TD align=right><!--#include file="../include/estore.asp"-->

       </TD>
      </TR>
      <TR>
       <TD bgColor=#aabbdd><IMG height=7
        src="../images/spacer_1x1.gif" width=159 border=0></TD></TR>
      <TR>
       <TD bgColor=#aabbdd><IMG height=7
        src="../images/spacer_1x1.gif" width=159 border=0></TD></TR>
      <TR>
       <TD><IMG height=17 src="../images/retailer_list_159x17.gif"
        width=159 border=0></TD></TR>
      <TR>
       <TD align=right><!--#include file="../include/RetailerList.asp"-->

       </TD>
      </TR>
      <TR>
       <TD><IMG height=7 src="images/spacer_1x1.gif" width=159
        border=0></TD></TR></TBODY></TABLE> </TD>
    <TD vAlign=top align=middle width=159 bgColor=#aabbdd></TD>
    <TD vAlign=center align=middle width=159 bgColor=#aabbdd></TD>
    <TD width=1 bgColor=#114477><IMG height=1
     src="../images/spacer_1x1.gif" width=1 border=0></TD>
    <TD vAlign=top width="100%">

     <TABLE width="100%" id=TABLE1>
      <TBODY>
      <TR width="100%">


       <TD>
<!-- Starting Product Searching -->
<TABLE align=center><TR>
 <TD align=center width="100%" colspan=2><A href="http:///"><IMG height=60
       alt="PROMATION FOR FAMILY!" src="../images/banner/upto1000_promo_468x60.gif"
      width=468 border=0></A></TD>
```

```
</TR></TABLE>
<div align=center>

<br><font face="Verdana,Arial" color="#114477" size="-1">
<% if Request.QueryString("sSearch")<>"" then key=Request.QueryString("sSearch") else
key=Request.form("txtSearch")End if%>
<b>Related product(s) that match the criteria
"<% = key%>" in their names and descriptions.</b>


<br><br>
<%

 ConnectDB dbMain

 Set rsProducts = Server.CreateObject("ADODB.Recordset")
 if Request.QueryString("scroll")="" then
   sSearch = RemoveQuotes(Request.Form("txtSearch"))
 else
   sSearch = Request.QueryString("sSearch")
 End if

 sSQL = "SELECT * FROM products WHERE ItemProductNumber LIKE '%" & _
   sSearch & "%' OR ItemName LIKE '%" & _
   sSearch & "%' OR ItemDescriptions LIKE '%" & _
   sSearch & "%'"

 rsProducts.open sSQL, dbMain, adopenstatic, adlockpessimistic, adcmdtext
%>
<Table border=0 width=100% >
 <TR>
  <TD noWrap align=middle bgColor=#114477 width=30%><FONT
    face="verdana, arial, helvetica" color=#ffffff
    size=-1><B>Search Results</B></FONT></TD>
  <TD width=70%></TD>

</TR>
<TR><TD colspan=2>
<%if rsproducts.eof then
  response.write "No products matching that criteria were found."
  response.write vbcrlf
 else
  'response.write "<table width='75%' border='1' align='center'>"%>
  <TABLE cellSpacing=0 cellPadding=0 width="100%" bgColor=#114477 border=0>
        <TBODY>
        <TR>
              <TD align=middle bgColor=#114477><FONT face="verdana, arial, helvetica"
              color=#ffffff size=-1><B>Product Listing</B></FONT>
              </TD></TR>
        <TR>
              <TD>
              <TABLE cellSpacing=1 cellPadding=3 width="100%" border=0><!-- DISPLAY product
list heading -->
              <TBODY>
```

```
                <TR bgColor=#aabbdd>
                <TD width="100%"><FONT face="verdana, arial, helvetica" color=#000000 size=-
2><B>Product Description</B></FONT></TD>
                <TD vAlign=top noWrap align=middle><FONT face="verdana, arial, helvetica"
color=#000000 size=-2><B>Price </B></FONT></TD>
                <TD vAlign=top noWrap align=middle><FONT face="verdana, arial, helvetica"
color=#000000 size=-2><B>Availability</B></FONT></TD>
                </TR>


  <%response.write vbcrlf


  rsProducts.PageSize = 15          'each page holds 15 records
  strScroll = Request.QueryString("Scroll")  'set the page number,
  If Len(strScroll) > 0 Then
   intPage = Request.QueryString("scroll")'  Mid(strScroll, 5)
   If intPage < 1 Then intPage = 1
  Else
   intPage = 1
  End If
  rsProducts.AbsolutePage  = intPage

  intRowCount = rsProducts.PageSize
  for intRec=1 to rsproducts.PageSize
                if not rsproducts.EOF then
  %>
  <TD bgColor=#ffffff><FONT face="verdana, arial, helvetica" color=#000000 size=-1><B>Retailer:
<%=rsProducts("itemRetailerID") %></B></FONT><BR>
        <A href="../estore/detail.asp?id=<%=rsProducts("ItemID")%>">
        <FONT face="verdana, arial, helvetica" color=#114477 size=-
1><B><%=rsProducts("itemName")%></B></FONT></A>  <BR>

<TD vAlign=center align=middle bgColor=#ffffff><FONT
        face="verdana, arial, helvetica" color=#cc0000
        size=-1><B>RM <%=rsProducts("itemSalesPrice")%></B></FONT><BR><FONT face="verdana,
arial, helvetica"
        color=#000000 size=-2><BR><%=rsProducts("itemProductnumber")%></FONT> </TD>

<TD vAlign=center noWrap align=middle bgColor=#ffffff>
        <!--stock Quantity-->
        <IMG height=15 alt="Same Day" src="/images/ship_status1_30x15.gif" width=30
border=0></A><BR>
        <A href="cart_item.asp?action=add&amp;dpno=849616">
        <FONT face="verdana, arial, helvetica" color=#114477 size=-2><B>Buy Now!</B></FONT></A>
</TD></TR>

   <%
    intRowCount = intRowCount - 1
    rsProducts.movenext
    End if
   Next
```

```
%>
 </TD></TR></TBODY></TABLE>
 <TR>
                <TD align=middle bgColor=#114477> </TD></TR>
</TD></TR>

<Table>
<TR colspan=2 align=left width=100% VALIGN=TOP><TD width=25%>
<FONT FACE=Verdana size=2 color=darkblue><b> Page <%=intpage %> of
<%=rsProducts.PageCount%></b></FONT>
   </TD>
<TD width=75%>
        <%for i =1 to rsproducts.PageCount
                if i=intPage then
                        Response.Write "<FONT face=Verdana size=2><b> " & i & "</b></Font>"
                Else
                        Response.Write "<FONT face=Verdana size=2><b> [<a Href="" " &
Request.ServerVariables("SCRIPT_NAME") & "?scroll=" & i & "&sSearch=" & ssearch & """>" & i &
"</a>] </b></Font>"
                End if
          Next
        %>
</TD> </TR></Table>


</TBODY></TABLE>

 <% end if
    rsproducts.close %>
</TD></TR>
</Table>
</div>
</TD>
</TR></TBODY></TABLE>
</TD></TR></TBODY>
</TABLE>
</TD></TR></TBODY>
</TABLE>

  <TABLE cellSpacing=0 cellPadding=2 width="100%" border=0>
   <TBODY>
   <TR>
    <TD align=middle bgColor=#114477>
                        <!--#include file="./include/Trailer.asp"-->
                </TD></TR></TBODY>
        </TABLE>

</BODY></HTML>
```

Appendix D User Manual

The following pages have the project user manual.

CONTENT

Chapter 1
Introduction

1.1 About this manual

The purpose of writing this manual is to guide administrators, retailers, and users in using the system. It is divided into five chapters.

Chapter one is the introduction. It describe about this document and the systems as an overall. Chapter two is technical explanations about the system. This chapter explains how to maintain the system and how the system is setting up.

Chapter three, four and five explain the administrator section, retailer section and web storefront section. These chapters guide the users toward using the system.

1.2 VeS.com System Overview

VeS.com is an e-commerce web application that allows customers purchase their products and make their payments online.

This system is divided into three sections: storefront section, retailer sections, and administrator section. In the storefront section, customers can purchase products and search related products information. In the retailer section, the retailers can store their products information, configure how their products display in the storefront and uploading the products picture to the web server. In the administrator section, the *super user* administrator can give the permissions to the other low level administrators to access which area of the administrator section. The administrators can also determine how the products is displaying in the storefront front page and editing the records in the database.

In short, this system is a typical type of business-to-consumer e-commerce web application with additional functionalities. That is, it behaves like an agent and allows multiple retailers to register and publish their product online easily.

Chapter 2
VeS.com Technical Explanations

2.1 Hardware and Software Requirements

Hardware Requirements

Processor

Intel Pentium II 233 MHz or greater and other compatible processors like AMD and Cyrix are being used

Random Access Memory (RAM)

Minimum 64 RAM is required (Recommended 128 RAM). Higher memory is being recommended when the database is to be put into production for running multiple services

Hard disk

Minimums of 4.5GB are required. For installing Windows NT, it takes 125MB. In addition, SQL Server Enterprise Edition needs 180MB for full install. Another 200MB is used for installing the developing tools such as Microsoft InterDev, MSDN Library and etc. An additional 100MB is reserved for project's source code. About 3.9GB hard disk space left will be used for storing testing database data.

Others

Other computer peripherals being used are such as keyboard, mouse, monitor, SVGA card, sound card, network cards etc.

Software Requirements

Web Browser - Internet Explorer 4.0 or above, Netscape 4.0 and above

2.2 Image Folder

Image folder contains graphics that used in the project, banners and product pictures. The product pictures are resides in the each retailer's folder. The retailer's folder is auto created after a registered retailer has been approved

2.3 Setting up the database

All the database connection string is at the ***application-level variable***. The provider for this project is ***SQLOLEDB.*** To connect to the database, just call the sub procedure in shopDB.asp:

```
<%Sub ConnectDB (ByRef con)
dim DB_CONNECTIONSTRING
        Set Con = server.CreateObject("ADODB.Connection")
        DB_CONNECTIONSTRING = Application("strConn")
Con.Open DB_CONNECTIONSTRING
End Sub %>
```

2.4 Setting up Front page

Front page is created using dynamic content concept. It consists of a few Server Side Include (SSI) files. The table below shows the important include files and the description:

Include Files	Descriptions
Header.asp	Header of every storefront page. It shows the image buttons.
Trailer.asp	Footer of every storefront page.
ShopDB.asp	Function to connect to the database. Create category sub menu
Spotlight.asp	Generate the spotlight product
EstoreProc.asp	Contains sub or function that required to set up the left menu, best selling product, and retailer list
Menubar.asp	Display the user login ID at the top after the page header.
Estore.asp	Display category sub menu
RetailerList.asp	Display retailer list menu
Menu.js	JavaScript file that used to show or hide the left side category menu.
Adovbs.inc	Contain all constants that required connecting to the database.

2.5 Setting Up the Category Menu

To dynamically include category menu at the page

- Include the file estore.asp

To create a category sub-menu, at the front page, add code like the following:

CreateSubMenu objConn, "1", "SystemsMnu", "./estore/subcategory.asp"
CreateSubMenu objConn, "2", "HardwareMnu", "./estore/subcategory.asp"
CreateSubMenu objConn, "3", "SoftwareMnu", "./estore/subcategory.asp"
CreateSubMenu objConn, "4", "NetworkingMnu", "./estore/subcategory.asp"
CreateSubMenu objConn, "5", "MultimediaMnu", "./estore/subcategory.asp"
CreateSubMenu objConn, "6", "OfficeMnu", "./estore/subcategory.asp"
CreateSubMenu objConn, "7", "MicMnu", "./estore/subcategory.asp"

The sub procedure (CreateSubMenu) are in file shopDB.asp. Arguments that needed are:

Sub CreateSubMenu(Byref conn, subCat, id, href)

2.6 Setting Up the Category Menu

To dynamically include retailer list at the page

- Include the file RetailerList.asp

2.7 User Level Convention

There are four types of user in VeS.com. There are:

1	--	Customer
2	--	Retailers
3	--	Low level administrator or management staff
99	--	Super User Administrator

There is only one Super User Administrator in VeS.com. He can access all the function that available in the system. He is the only one who can access the Staff Permission Control function in web administration section.

2.8 Solving the SSL path problem

Calling the SSL files at the different subfolder will encounter the path problem. For example, the *header.asp* that is added to files in the subfolder *./estore* and *./search* will encounter problem that the image paths inside *header.asp* are wrong. This will be solve by adding the following code to the *header.asp*

```
<%path= server.mappath(Request.ServerVariables("PATH_INFO"))
   if instr(1,path,"estore") OR instr(1,path,"search")then
         folderPath="../estore"
         graphicPath="../images"
   else
         folderPath="./estore"
         graphicPath="./images"
   End if   %>
```

The *folderPath* and *graphicPath* will be used as path to call any picture.

Chapter 3
Administrator Section

3.1 Administrator Login

There are no any links at the store front for the administrator to enter this section. Administrators have to type the following path at the address bar:

http://localhost/ves/admin

After that, the following login screen will appear.

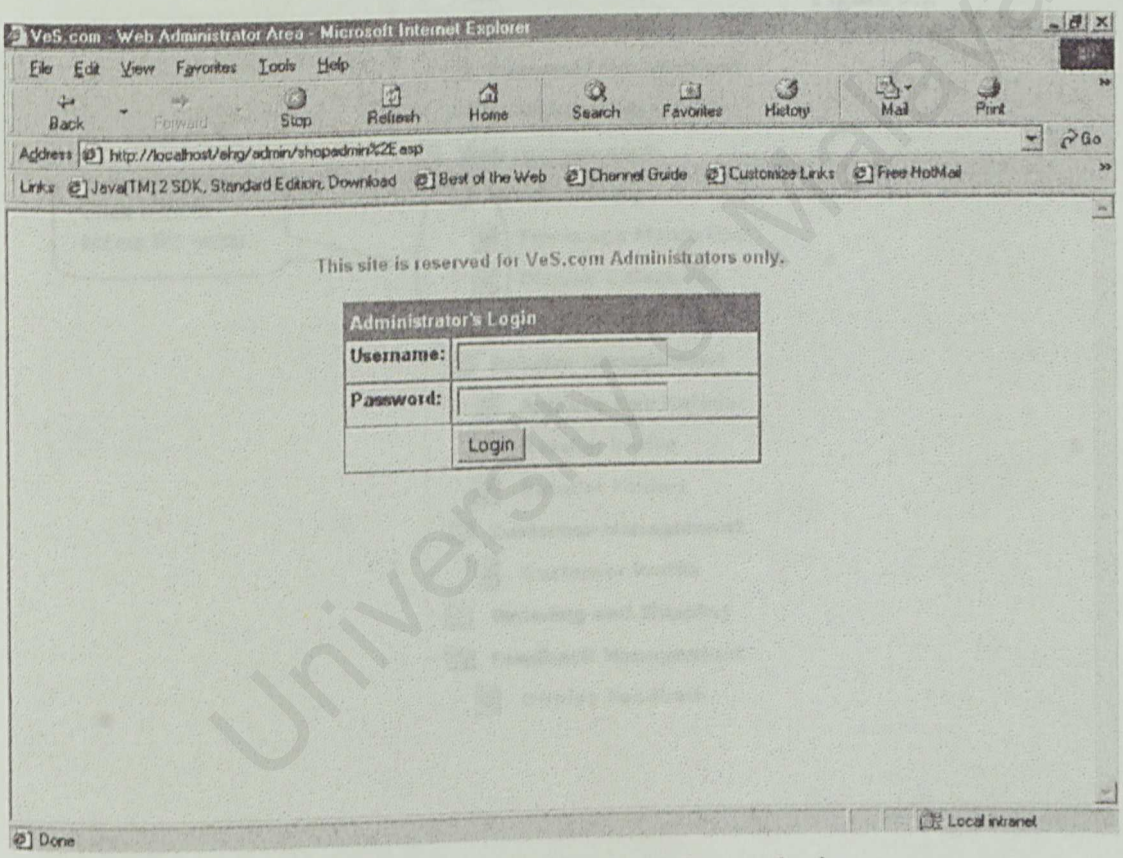


Figure 3.1 VeS.com web administrator login

3.2 Site Description

This section is consists of 3 frames. That is upper, left and right frame. Upper frame shows the web administration site header (Figure 3.2). Left frame is administrator menu in tree view (Figure 3.3) for administrator to access. The result from the header will be show in the right frame.

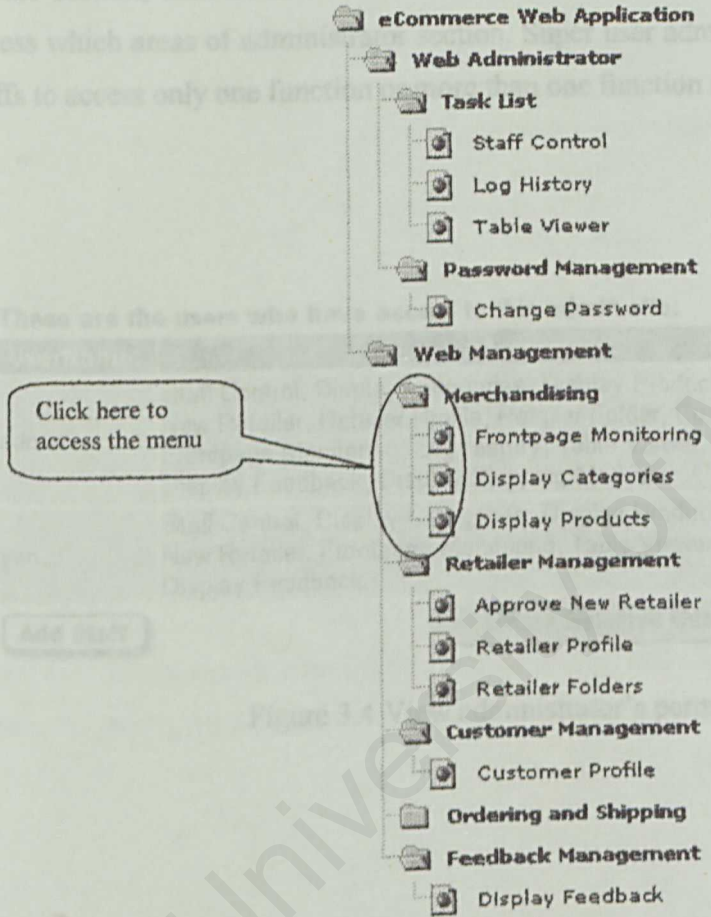


Figure 3.2
Administrator menus

Figure 3.3 Web Administration section page headers

3.3 Web Administrator

3.3.1 Task List

There are three actions that can be done in task list.

3.3.1.1 Staff Control

This section can only access by administrator with *super user* (highest level) access level. In this section, administrator will determine other low-level administrators or staffs to access which areas of administrator section. Super user administrator will can give other staffs to access only one function or more than one function in administration section.

These are the users who have access to this admin site:

UserName:	Access:	Edit:	Delete:
admin	Staff Control, Display Categories, Display Products, Approve New Retailer, Retailer Profile, Retailer Folder, Customer Profile, Frontpage Monitoring, Log History, Table Viewer, Menu Control, Display Feedback, Display Shipping Methods	Edit	☐
yan	Staff Control, Display Categories, Display Products, Approve New Retailer, Frontpage Monitoring, Table Viewer, Menu Control, Display Feedback	Edit	☐

Add Staff | Delete Selected User

Figure 3.4 View administrator's permission

Update Staff Permission

To edit the permission, administrator will click at "Edit" link. The following screen appeared:

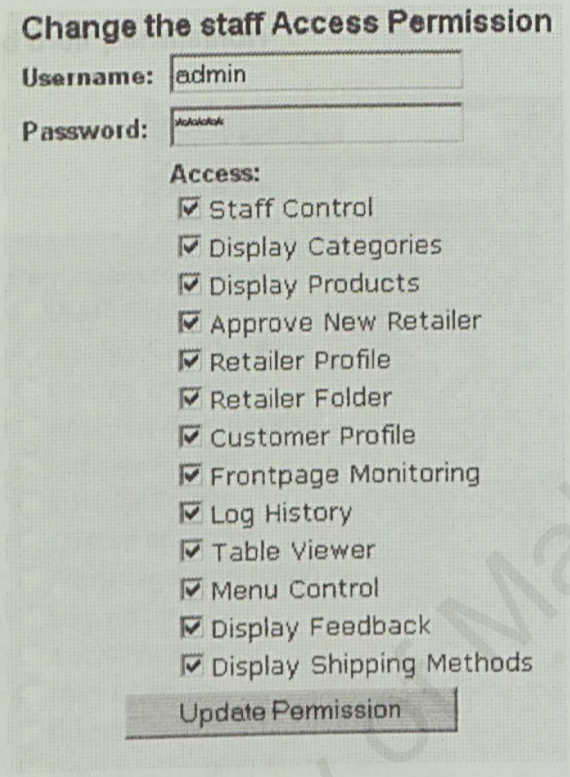


Figure 3.5 Edit staff permission

Super user administrator chooses from the checkbox and click at "Update Permission" to update the staff's permission.

Add Staff Permission

To add new staff, from Figure 3.4, super user administrator click at "Add Staff" button. The following screen appear:

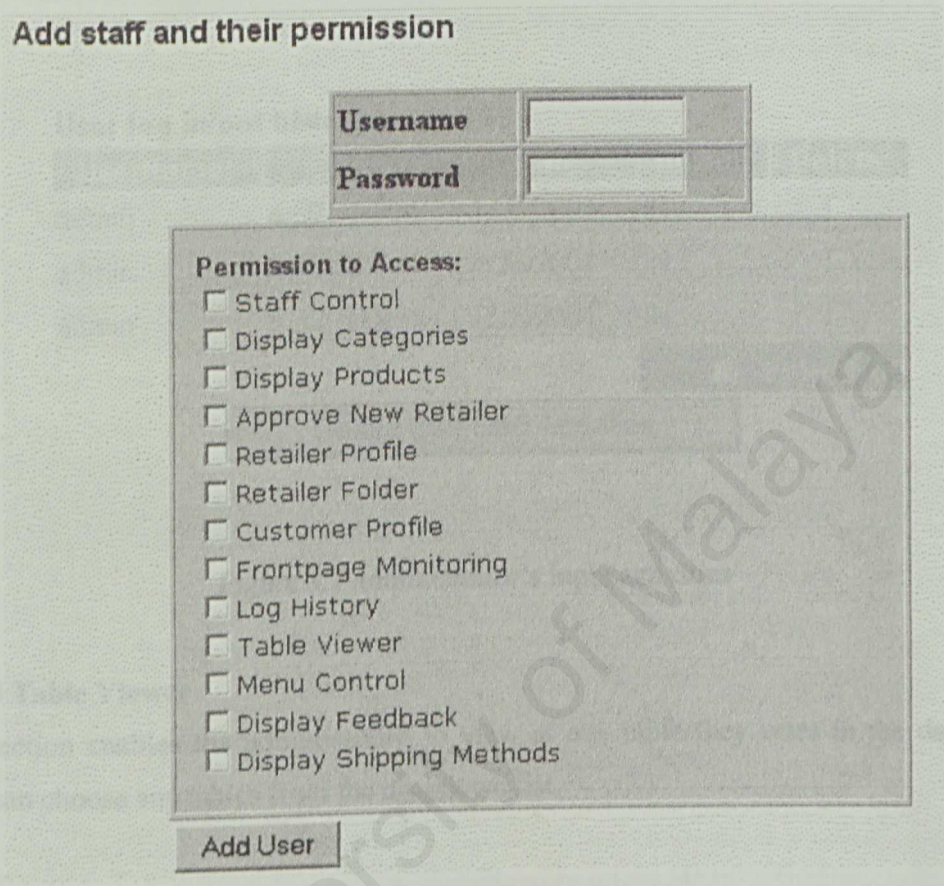


Figure 3.6 Create new staff permission

Super user administrator will give the new staff a login ID, temporary password and choose the permissions that the new staff can access.

3.3.1.2 Log History

This section will track all the administrators or staff login activities. The administrator can delete unwanted activities by select the check box and click the delete button.

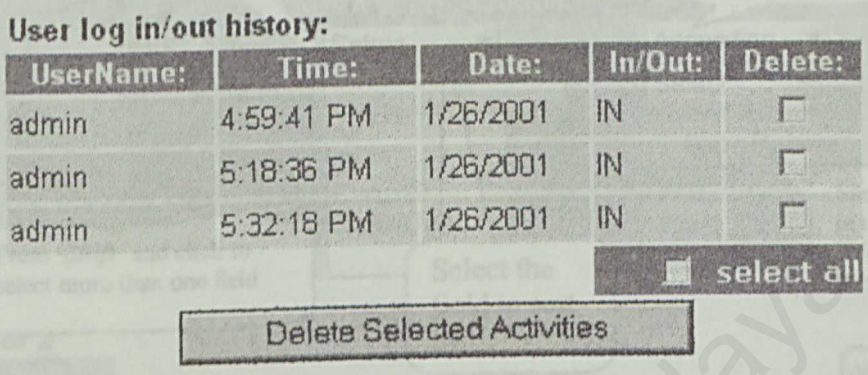


Figure 3.7 administrator's login activities

3.3.1.3 Table Viewer

This section enables the administrator to view at any table they want in the database. They can choose any tables from the dropdown list.

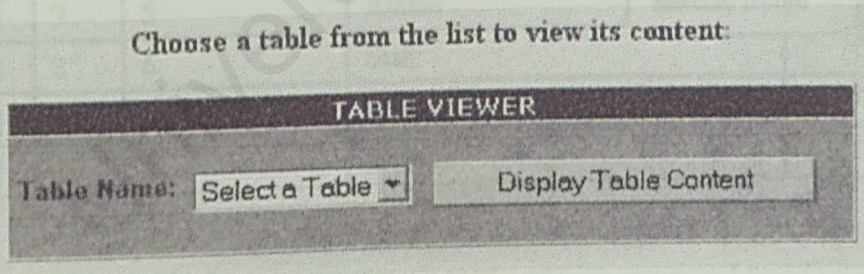
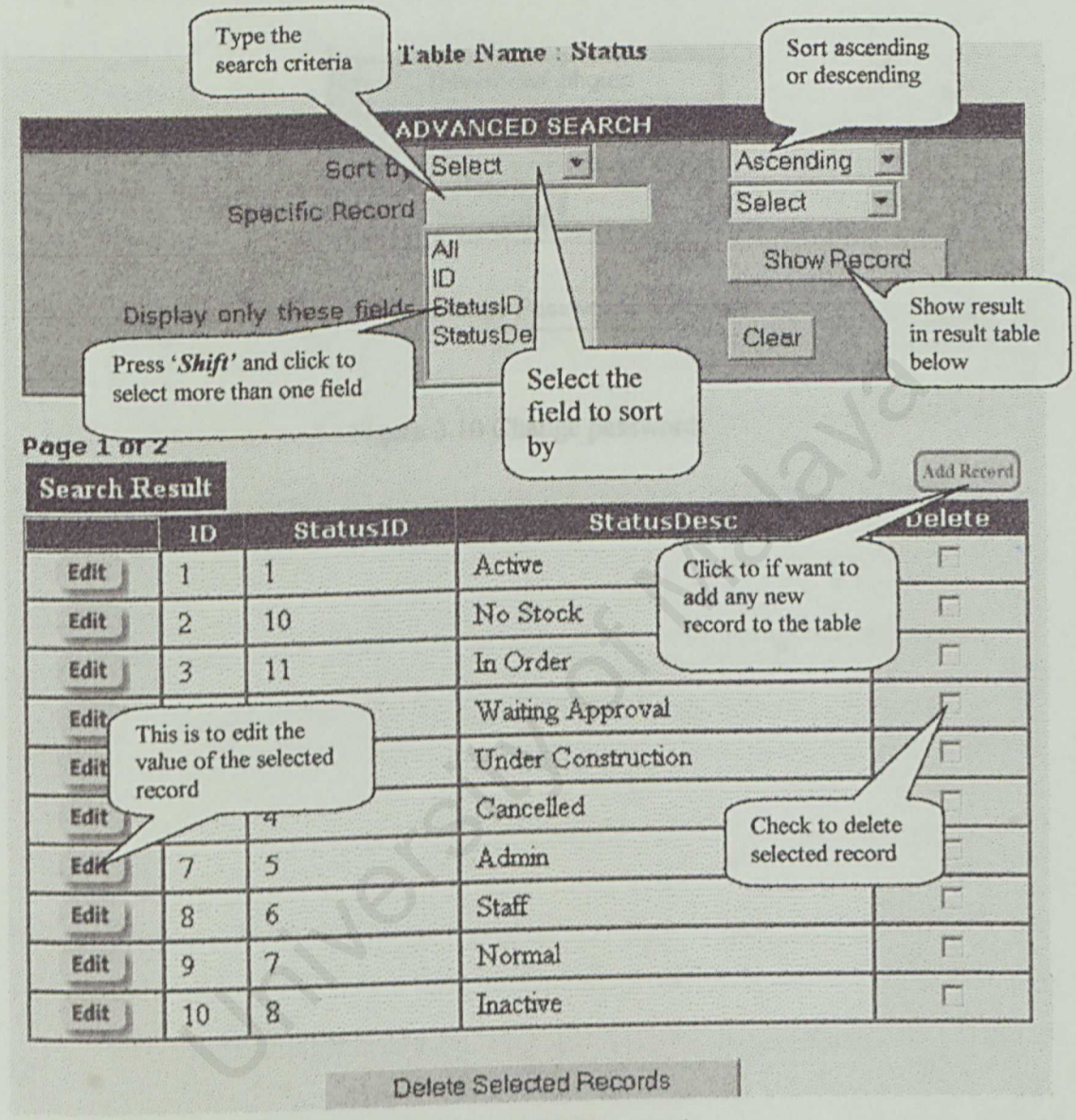


Figure 3.8 Table viewers

3.3.1.4 Advanced Search

After choosing the table, the following screen display:



	ID	StatusID	StatusDesc	Delete
Edit	1	1	Active	
Edit	2	10	No Stock	
Edit	3	11	In Order	
Edit			Waiting Approval	
Edit			Under Construction	
Edit		4	Cancelled	
Edit	7	5	Admin	
Edit	8	6	Staff	
Edit	9	7	Normal	
Edit	10	8	Inactive	

Figure 3.9 Advanced Search

Notes: This advanced search also applied in merchandising, retailer management, and customer management.

3.3.2 Password Management

This section allows the staff or administrator to change their password.

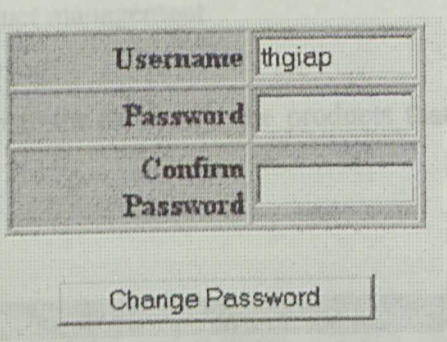


Figure 3.10 Change password

3.4 Web Management

3.4.1 Merchandising

This part will more on product management

3.4.1.1 FrontPage Monitoring

This section allows administrator to change the products that display at the storefront main page.

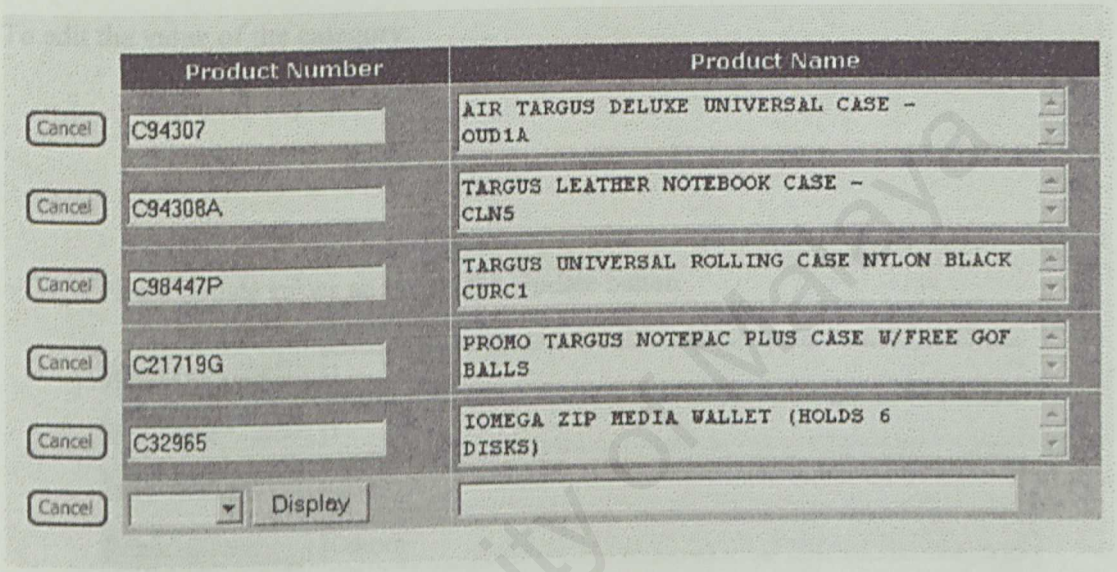


Figure 3.11 FrontPage monitoring

To add a product to the storefront front page:

- Select the desire product from the drop down menu
- Click on display button

To delete a product from the storefront front page:

- Click on "*Cancel*" button and the product is cancelled.

3.4.1.2 Product Category Management

This section enabled the administrator to value of the product categories.

After selection, the system will prompt to search for related record in the advanced search function (for details, refers to section 3.3.1.4).

To add a category:

- Click on the "Add Record" button, the system will bring to a product entry form (Figure 3.11)

To edit the value of the category:

- Click on the "Edit" button, the system will bring to a product entry form (Figure 3.11)

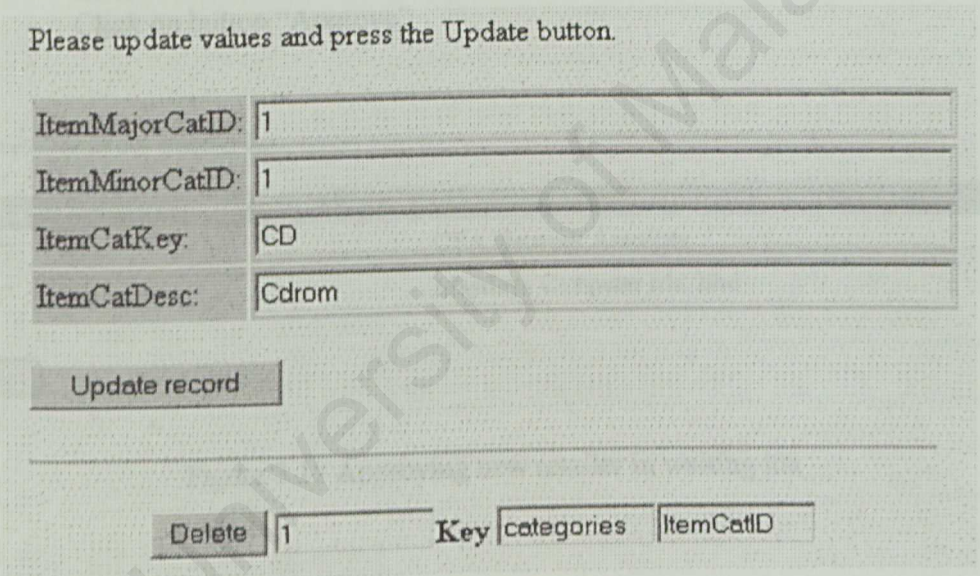


Figure 3.12 Add or edit category form

3.4.1.3 Product Detail Management

This section allows administrators to make modification, adding new record or deleting a specified record to the product table.

It function similar to section 3.4.1.2. For details, please refer to that section.

3.4.2 Retailer Management

3.4.2.1 Approve New Retailers

In this section, the administrator will accept registered company as new VeS.com web retailer.

To approved a new retailer:

- Checked on the retailers that want to approve
- Click on button "Approve"
-

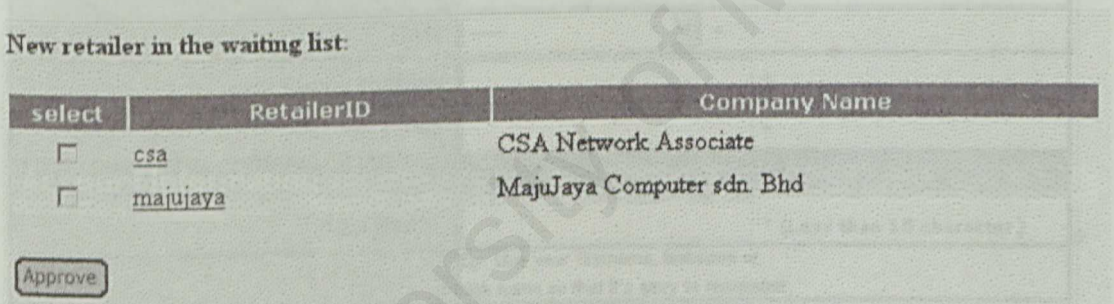


Figure 3.13 Approving new retailer in waiting list

3.4.2.2 Retailer Profile Management

In this section, the administrator can add, delete or edit the retailers. Similarly, administrator has to search for the required retailer from advanced search form.

To edit a retailer's profile:

- Click on the "Edit" button
- The selected retailer's profile will be display in the form as in Figure 3.12
- Modification can be made and click on "Update" button to update the record.

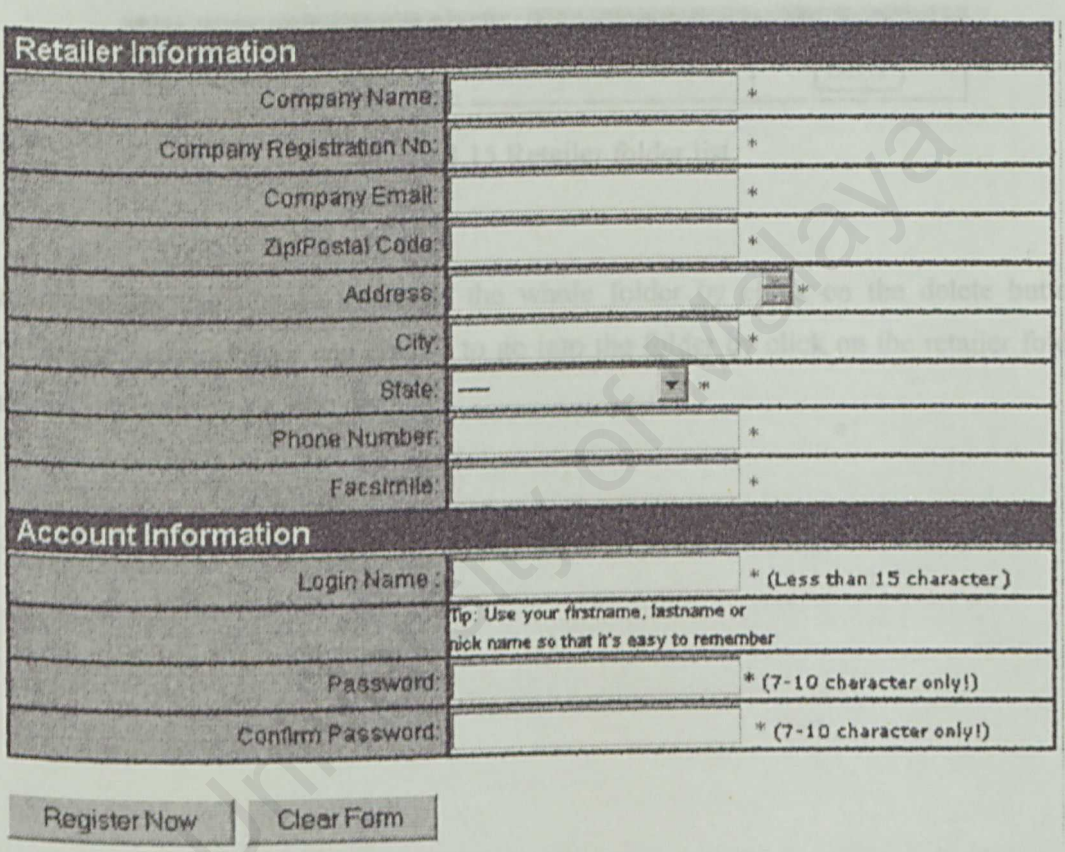


Figure 3.14 Retailer information form

3.4.2.3 Retailer Folder Management

Approved retailers have a folder to keep their product image. This section will allow the administrator to manage on those folders. The system will show a list of retailers that available in the directory as in figure 3.13

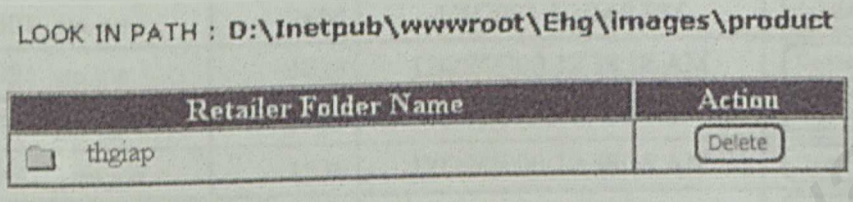


Figure 3.15 Retailer folder list

Administrator can choose to delete the whole folder by clock on the delete button. Otherwise, administrator can choose to go into the folder by click on the retailer folder name. The following screen display:

LOOK IN PATH : D:\Inetpub\wwwroot\Ehg\Images\product\thgiap

File Name	File Size	Last Modified	Action
848673_sm.jpe	2141	1/4/2001 5:09:56 PM	Delete
45590_lg.jpe	6627	1/12/2001 9:09:02 PM	Delete
57323_sm.jpe	2545	1/4/2001 5:12:04 PM	Delete
57460_sm.jpe	2240	1/12/2001 9:04:20 PM	Delete
58301_sm.jpe	2694	1/4/2001 5:10:48 PM	Delete
72091_sm.jpe	1828	12/28/2000 12:38:18 AM	Delete
814450_sm.jpe	3280	1/4/2001 5:09:56 PM	Delete
839751_sm.jpe	1536	12/28/2000 12:38:16 AM	Delete
844458_sm.jpe	1532	1/4/2001 5:09:56 PM	Delete
37242_sm.jpe	1664	12/28/2000 12:58:16 AM	Delete
950032_sm.jpe	2961	12/28/2000 12:58:16 AM	Delete
950143_sm.jpe	5654	1/12/2001 9:04:22 PM	Delete
951318_sm.jpe	5325	12/28/2000 12:40:34 AM	Delete
951597_sm.jpe	2630	1/4/2001 5:12:08 PM	Delete
951949_sm.jpe	1496	12/28/2000 12:58:16 AM	Delete
952107_sm.jpe	2420	1/4/2001 5:12:06 PM	Delete
953199_sm.jpe	1305	12/28/2000 12:58:20 AM	Delete
953772_sm.jpe	3451	12/28/2000 12:40:30 AM	Delete

Figure 3.16 Product picture in selected retailer folder

From the product image list, administrator can delete a image file directly or preview it by clicking on the file name.

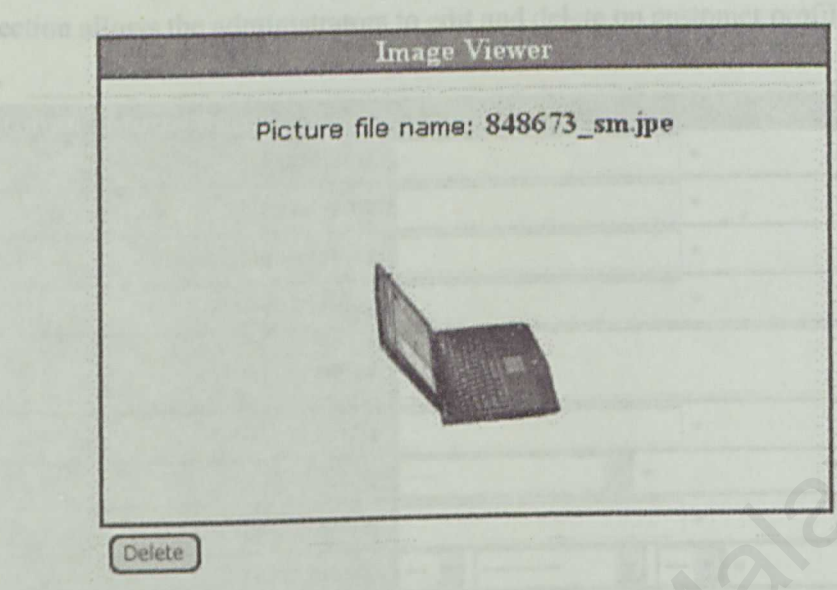


Figure 3.17 Previewing an product image

In previewing the picture, administrator still can choose to delete the picture file.

3.4.3 Customer Management

This section allows the administrators to edit and delete on customer profile.

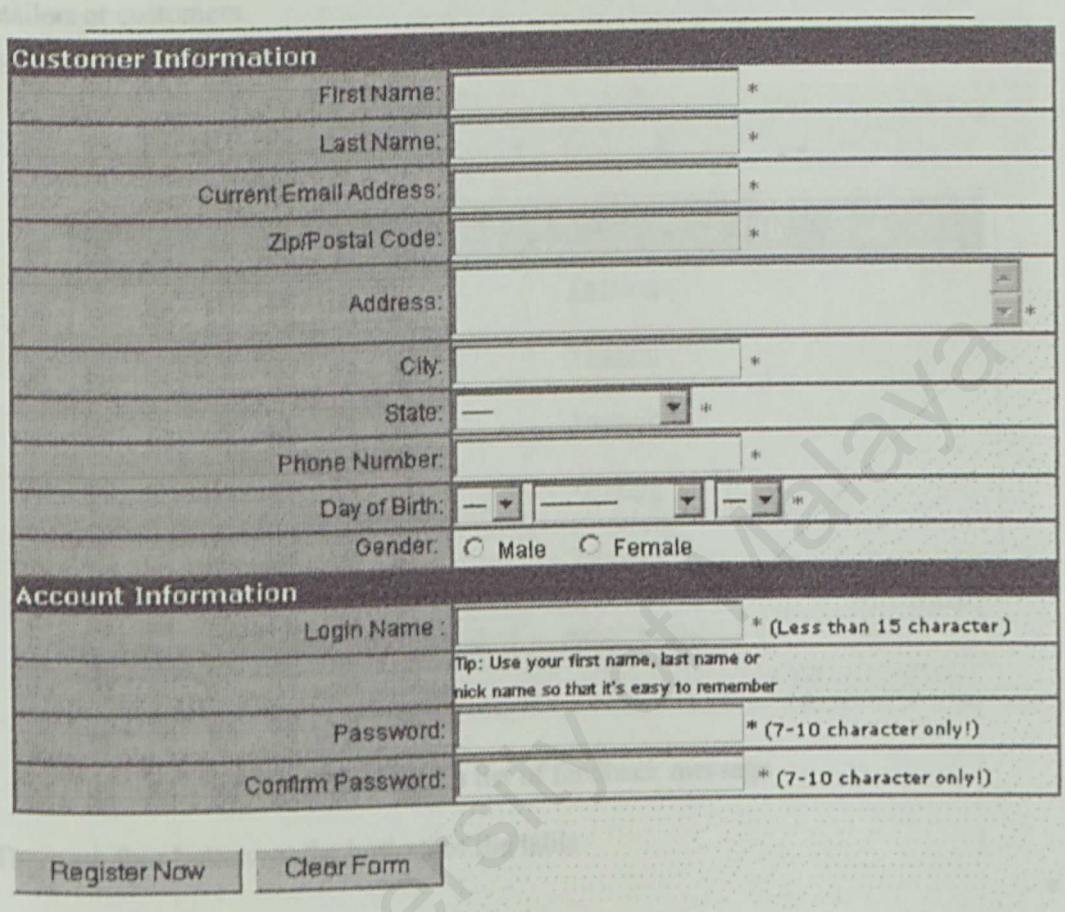


Figure 3.18 Customer information form

To modify the selected customer profile, just make modification on the form and click on the "Update Record" button

To add a new customer profile, fill in the form and click on the "Add Record" button.

3.4.4 Feedback Management

This section allows administrators to view, and delete on the feedbacks send by the retailers or customers.

The following screen displays the list of feedback message.

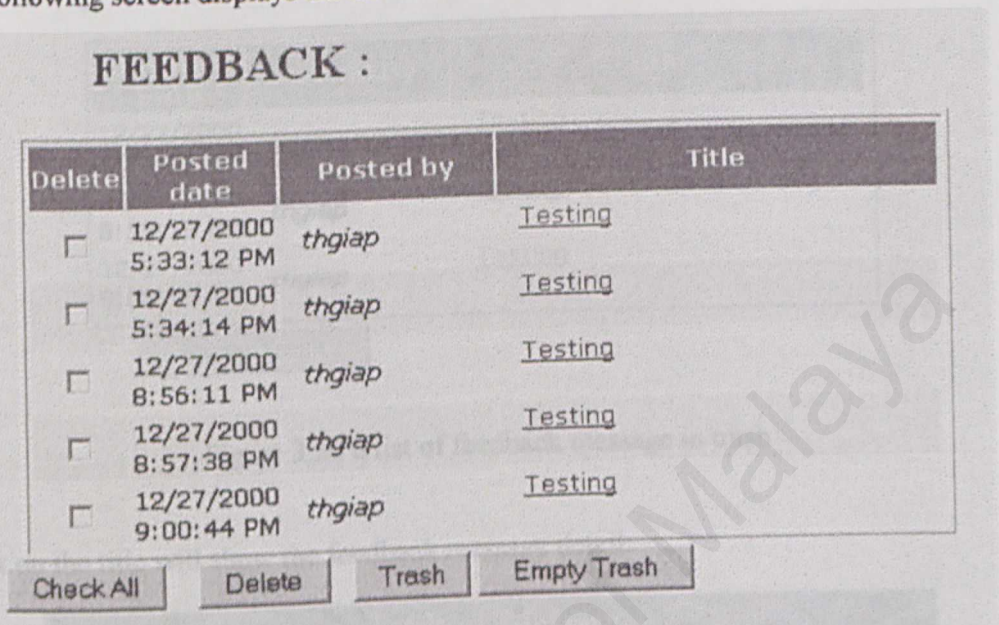


Figure 3.19 a list of feedback message

There are four buttons at the bottom of the table:

"***Check All***" / "***Unchecked All***"	-- Checked or Unchecked on the check box
"***Delete***"	-- Delete the selected message, send to trash
"***Trash***"	-- Open the trash feedback form
"***Empty Trash***"	-- Empty the feedback trash

Click on the trash button will show the following trash form:

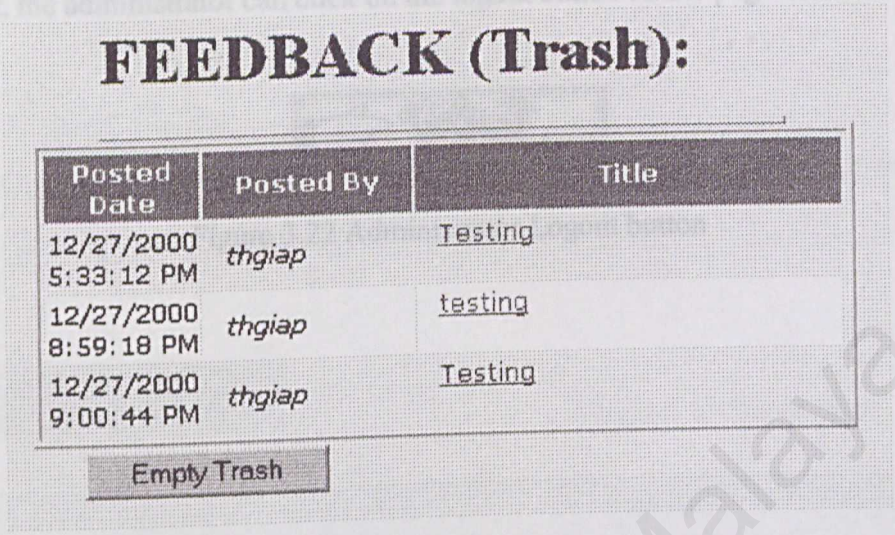


Figure 3.20 a list of feedback message in trash

Click on the title will show the feedback message detail:

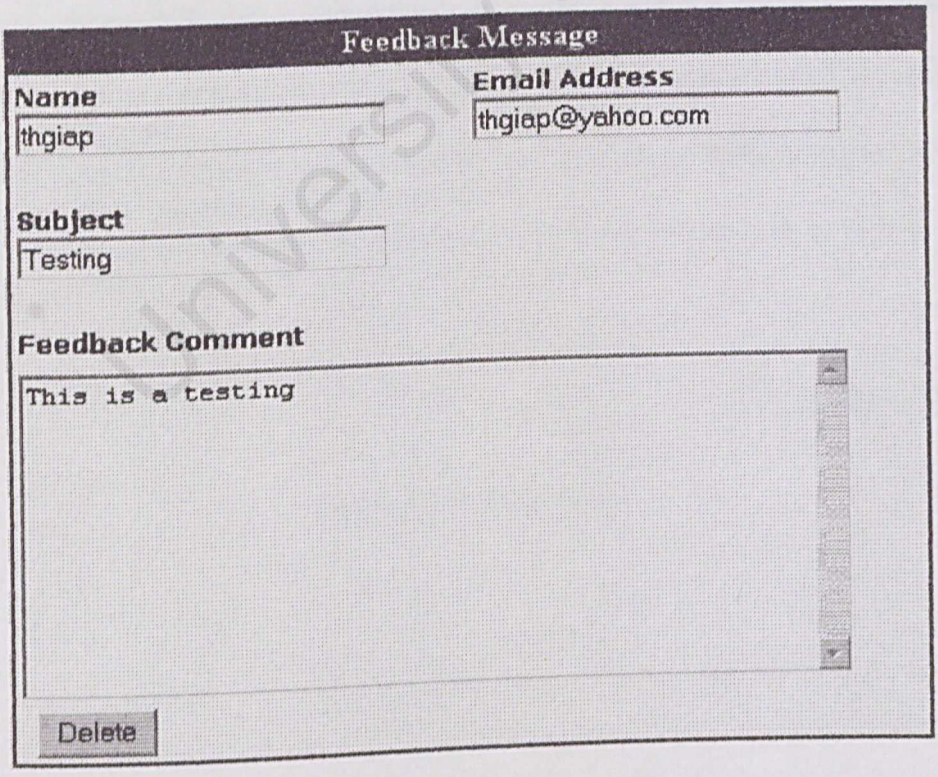


Figure 3.21 Sample of feedback message

Click on the trash button will show the following trash form:

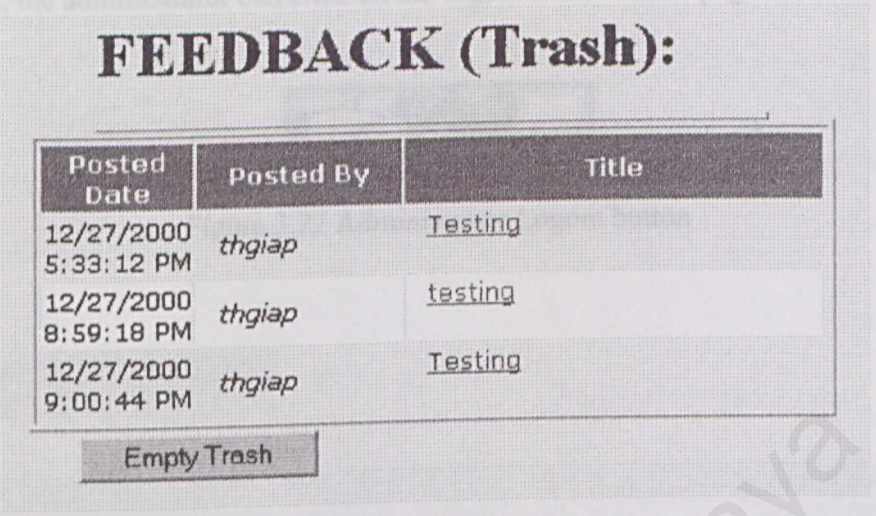


Figure 3.20 a list of feedback message in trash

Click on the title will show the feedback message detail:

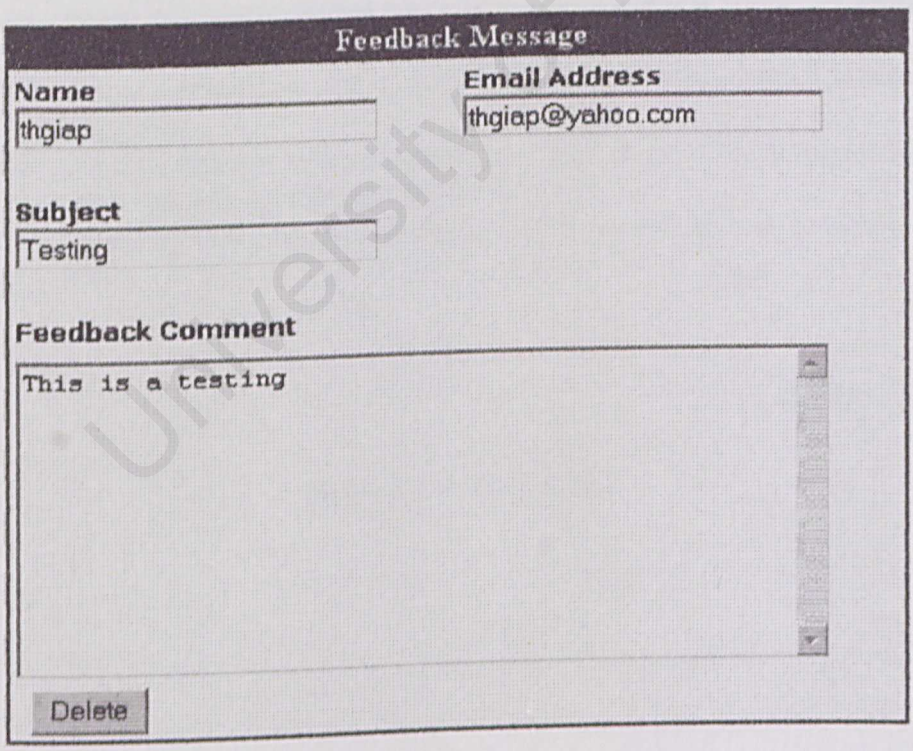


Figure 3.21 Sample of feedback message

3.5 Administrator Logout

To logout, the administrator can click on the logout button on the page header as follow:

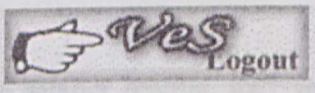


Figure 3.22 Administrator Logout button

Chapter 4
Retailer Section

4.1 Retailer Rules

Before the retailers entering the retailer section, they were asked to accept the retailer rules (Figure 4.1).

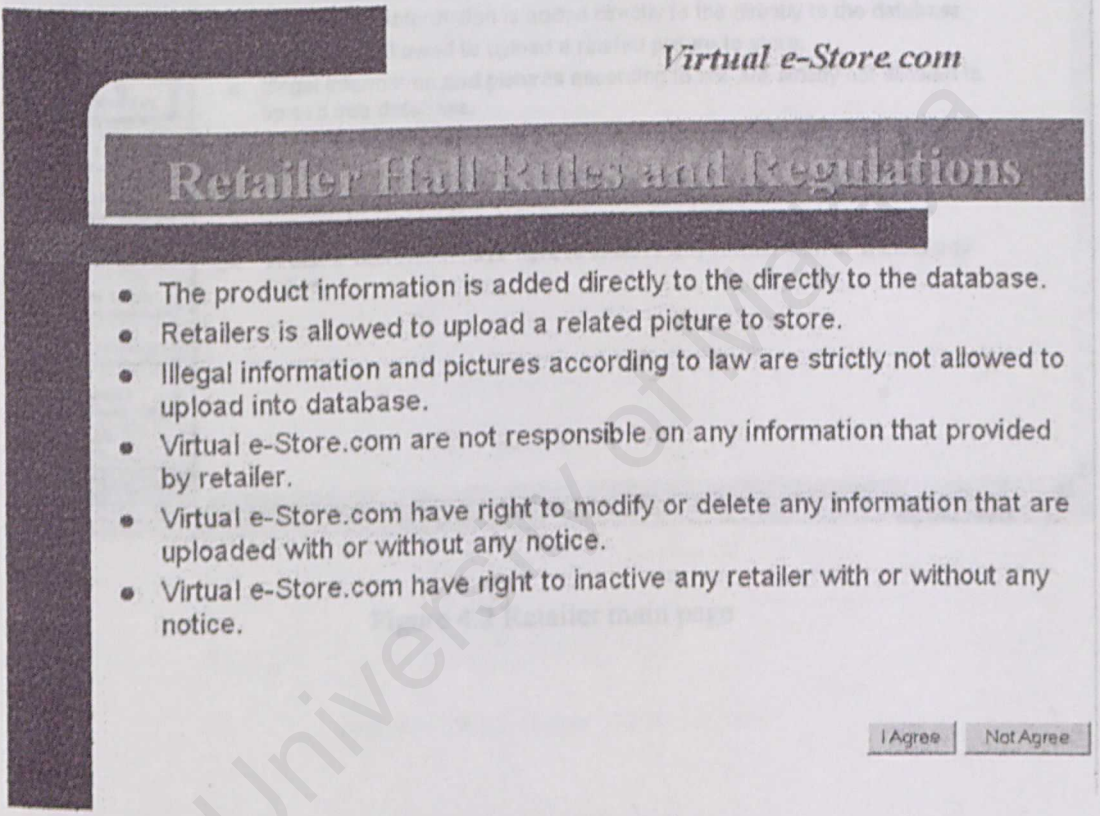


Figure 4.1 Retailer Rules

If they not agree, they were not allowed to enter the retailer hall. After enter the retailer hall the following screen appeared.

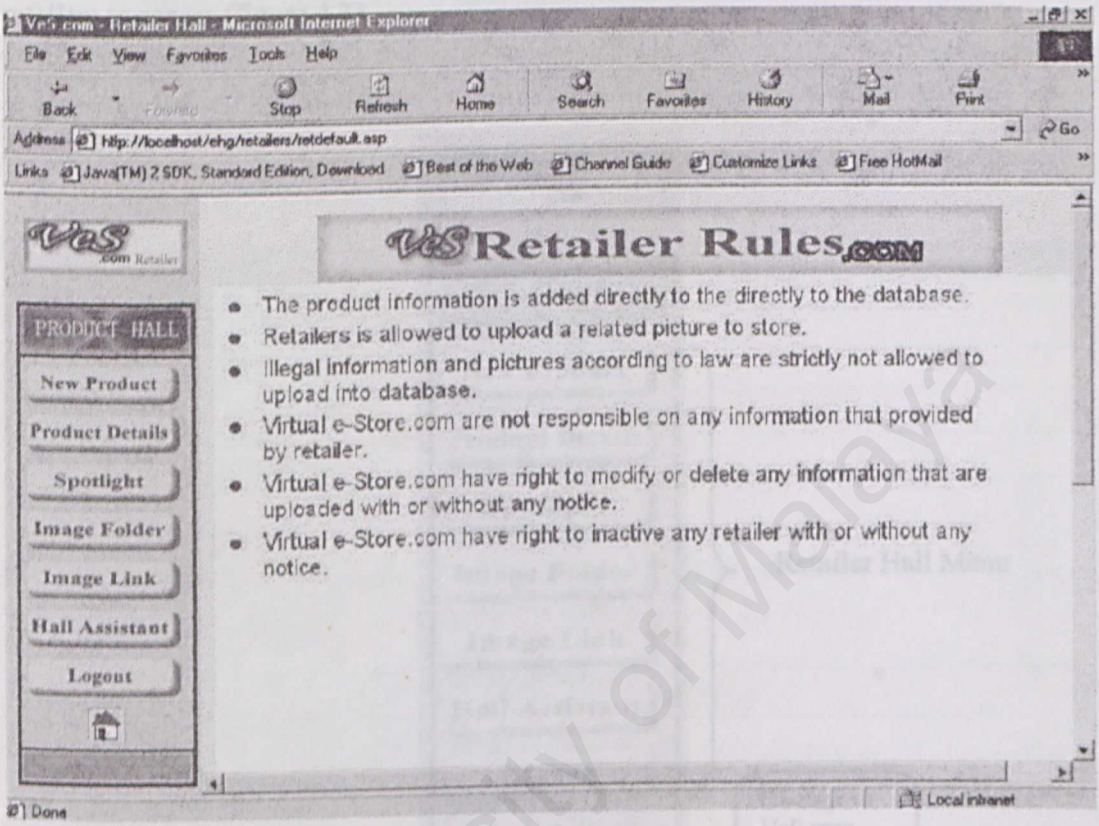


Figure 4.2 Retailer main page

4.2 Site Description

This site consists of two frame, left and right. The left frame shows all the buttons for the retailers to access (figure 4.3).

Figure 4.3Left menu in retailer hall

To return to VeS.com storefront, just click at the house button.

4.3 Adding Product Information

To add a product information

- Click at "New Record" at the left frame menu
- Fill in the Product information form (figure 4.4)
- Click on the "Add Record" button to add information to database

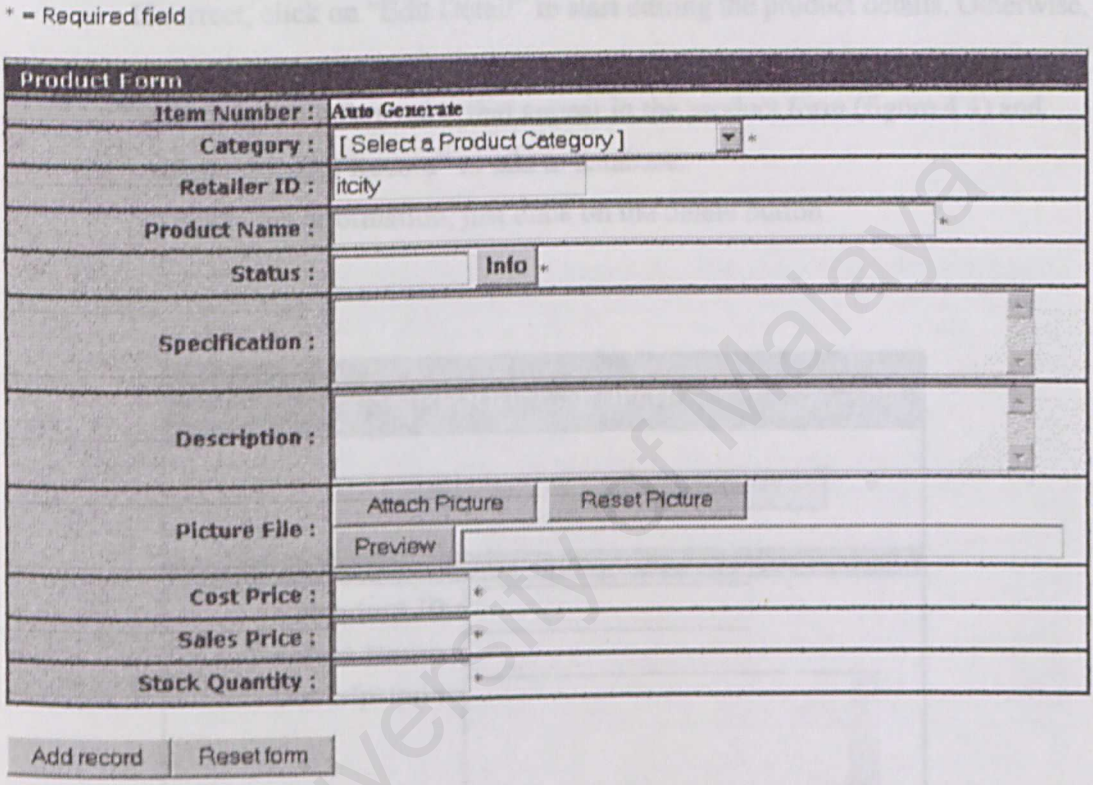


Figure 4.4 Adding record form

4.4 Modifying Existing Product Information

To modify an existing product, retailer has to search for the correct product by using the search a table (figure 4.5)

- Click on "Product Detail" at the left frame menu, the search table appear
- Select product number, and click "Display Product" to show related product information
- If correct, click on "Edit Detail" to start editing the product details. Otherwise, repeat the process to select again
- Modifying the information that appear in the product form (figure 4.4) and click on "Update Record" to add to database.
- To delete the information, just click on the delete button

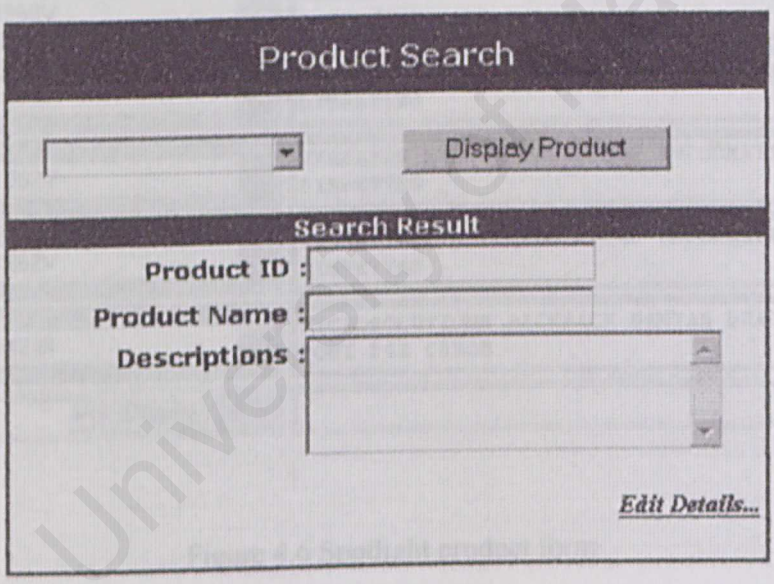


Figure 4.5 Product Search Table

4.5 Displaying Spotlight Product

"Spotlight product" is product that appears at the retailer's main page in the storefront.

To add a spotlight product,

- Select the product number from the drop down menu and click on the "display" button (figure 4.6)
- The product will show.

To delete a spotlight product,

- Click on the cancel button

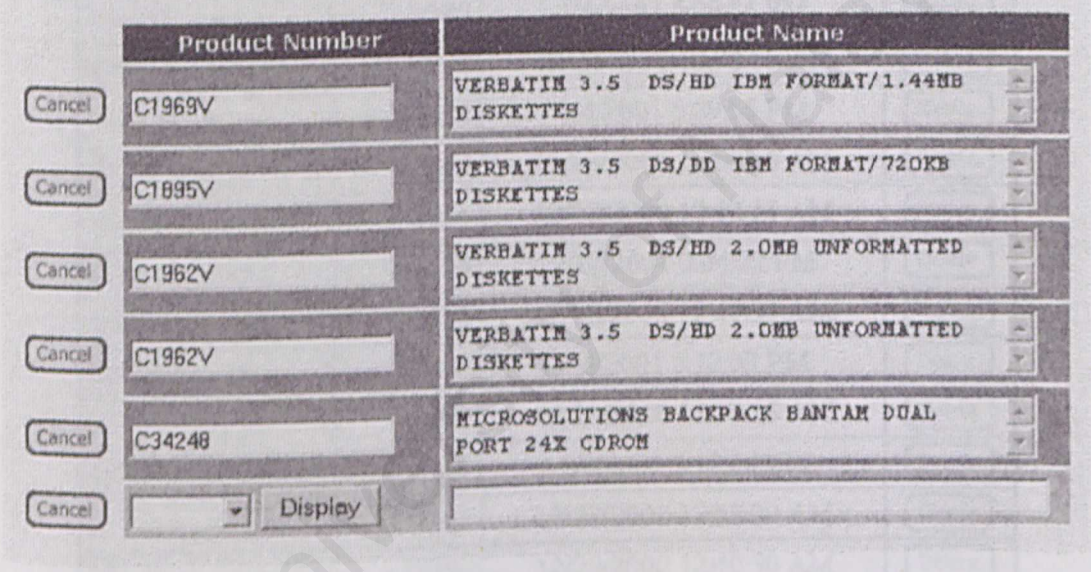


Figure 4.6 Spotlight product form

4.6 Image Folder

This function allows the retailer to maintain their uploaded image folder. The screen will show all the pictures that are already in the folder (figure 4.7).

File Name	File Size	Last Modified	Action
848673_sm.jpe	2141	1/4/2001 5:09:56 PM	Delete
45590_lg.jpe	6627	1/12/2001 9:09:02 PM	Delete
57323_sm.jpe	2545	1/4/2001 5:12:04 PM	Delete
57460_sm.jpe	2240	1/12/2001 9:04:20 PM	Delete
58301_sm.jpe	2694	1/4/2001 5:10:48 PM	Delete
72091_sm.jpe	1828	12/28/2000 12:38:18 AM	Delete
814450_sm.jpe	3280	1/4/2001 5:09:56 PM	Delete
839751_sm.jpe	1536	12/28/2000 12:38:16 AM	Delete
844458_sm.jpe	1532	1/4/2001 5:09:56 PM	Delete
37242_sm.jpe	1664	12/28/2000 12:58:16 AM	Delete
950032_sm.jpe	2961	12/28/2000 12:58:16 AM	Delete
950143_sm.jpe	5654	1/12/2001 9:04:22 PM	Delete
951318_sm.jpe	5325	12/28/2000 12:40:34 AM	Delete
951597_sm.jpe	2630	1/4/2001 5:12:08 PM	Delete
951949_sm.jpe	1496	12/28/2000 12:58:16 AM	Delete
952107_sm.jpe	2420	1/4/2001 5:12:06 PM	Delete
953199_sm.jpe	1305	12/28/2000 12:58:20 AM	Delete
953772_sm.jpe	3451	12/28/2000 12:40:30 AM	Delete
953970_sm.jpe	3494	12/28/2000 12:40:40 AM	Delete
954021_sm.jpe	2946	12/28/2000 12:38:20 AM	Delete

Figure 4.7 Retailer Image Folder

To delete on the product image, retailer just click on the delete button.

To view on selected image, click on the image file name. An image viewer table will show:

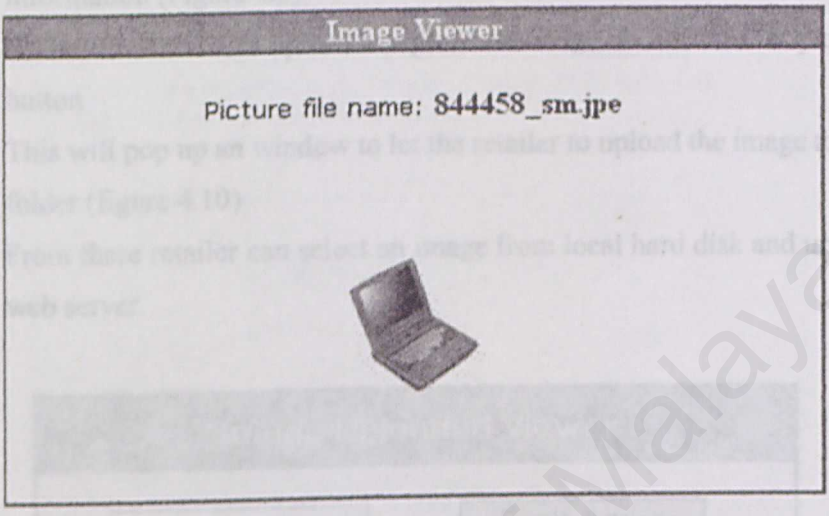


Figure 4.8 Product Image Viewer

4.7 Linking Product Picture

This function allow retailer to upload their product's image to the image folder.

To upload the image to the selected product,

- Select the product number from the drop down list and click to display the information (Figure 4.9)
- If retailer decided to upload to upload an image click on the "Upload Image" button
- This will pop up an window to let the retailer to upload the image to the image folder (figure 4.10)
- From there retailer can select an image from local hard disk and upload to the web server.

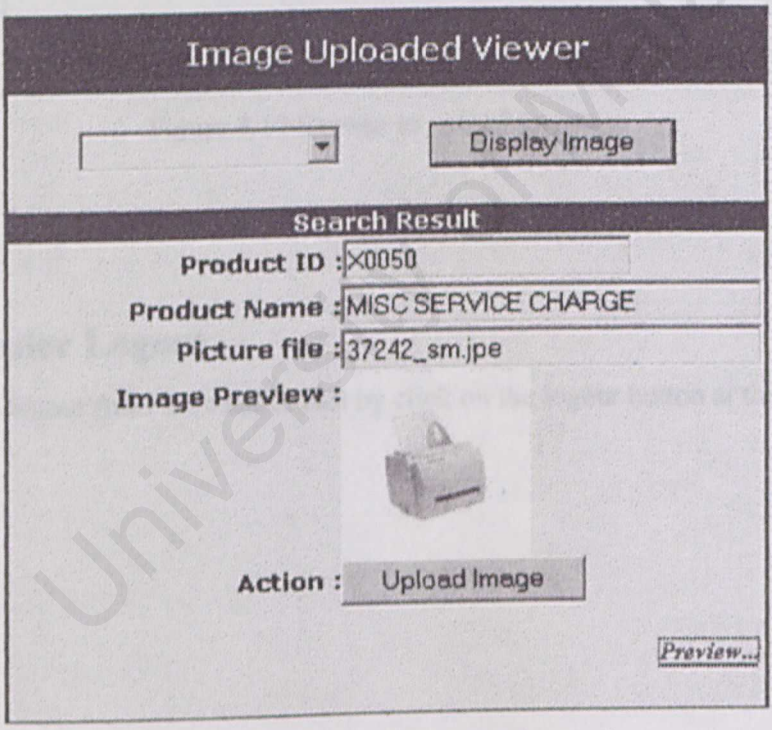


Figure 4.9 Linking an image to the product

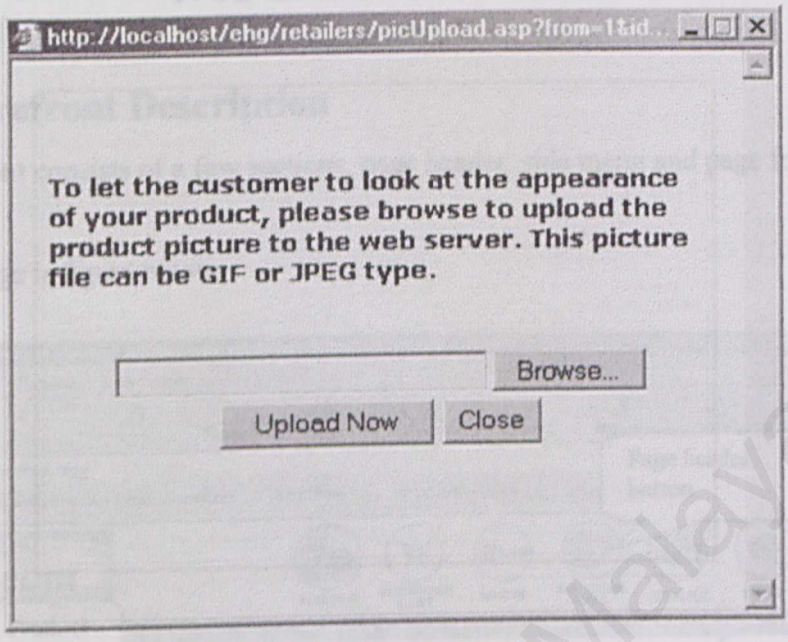


Figure 4.10 Browse to upload an image

4.8 Retailer Logout

Retailers can logout from the retailer hall by click on the logout button at the left frame

Chapter 5
Web Storefront Section

5.1 Storefront Description

This storefront consists of a few sections, page header, side menu and page footer.

The front page is figure below:

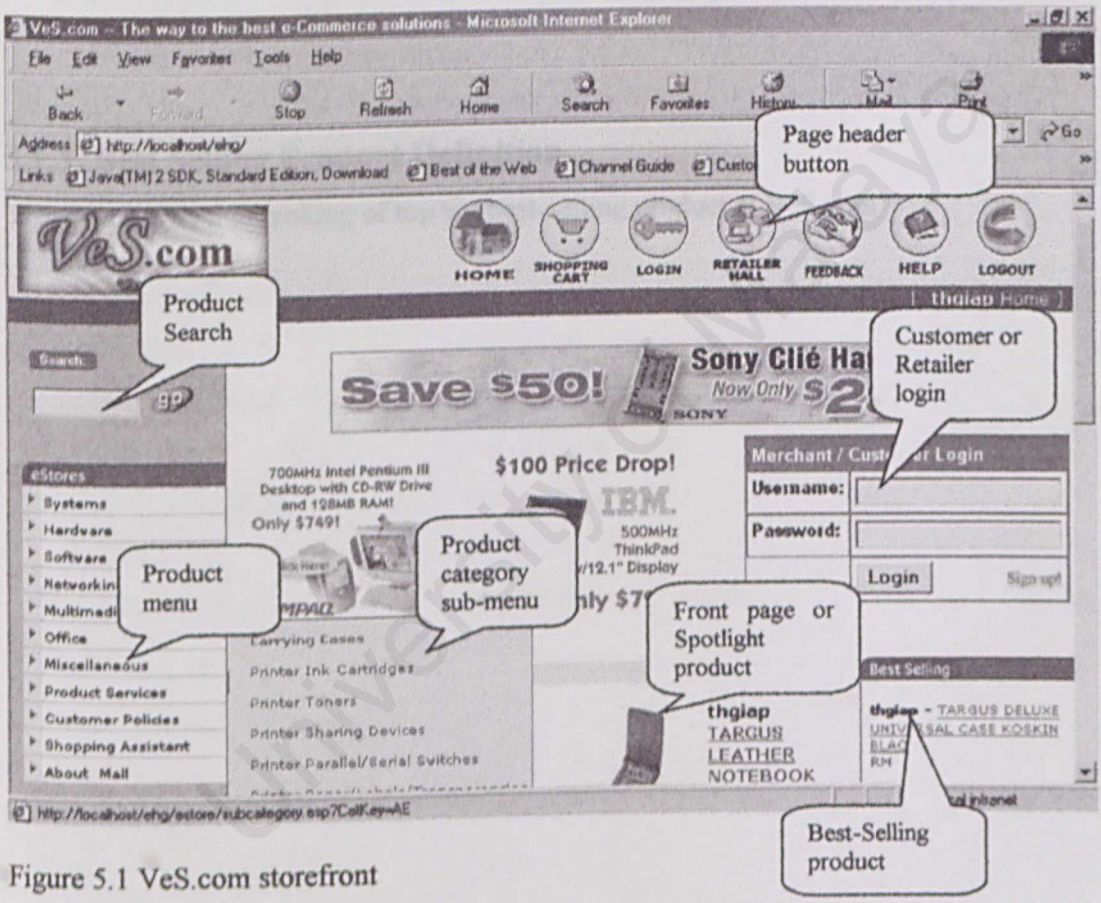


Figure 5.1 VeS.com storefront

5.1.1 Front-page Products Definition

Front-page products are products that show only at the main page of VeS.com storefront. It is determine by the web administrator or staff

5.1.2 Spotlight Product Definition

Spotlight products are products that appear at the main page of the category, sub-category, and retailer.

5.1.3 Best Selling Product Definition

This area shows that ranking of top ten best-selling product at VeS.com.

5.2 Storefront Navigation

5.2.1 Page Header Button Navigation

Page header provide easy to access image button (figure 5.2).

Figure 5.2 Page header navigation button

Each button description is:

HOME	-	Go to web main page
SHOPPING CART	-	Go to shopping cart area
LOGIN	-	Go to Login page
RETAILER HALL	-	Go to retailer hall
HELP	-	Open help file
LOGOUT	-	Logout from the session

5.2.2 Sorting Product by Category

To sort product by category click menu at the left side of the page (figure 5.3)

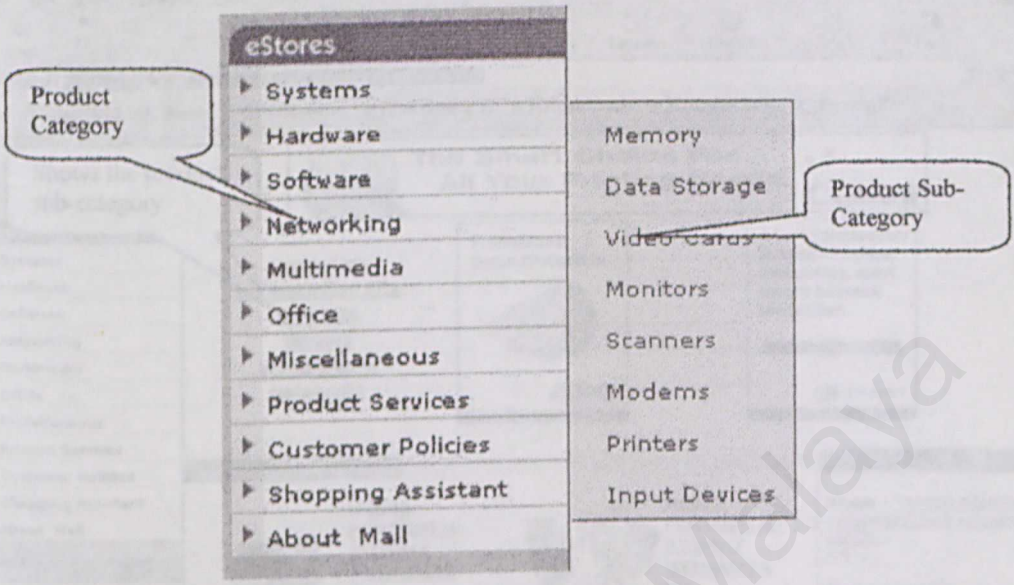


Figure 5.3 Product category and sub-category

There are seven categories are provided:

- Systems
- Hardware
- Software
- Networking
- Multimedia
- Office Equipment
- Miscellaneous

Click on these will go to the categories main page. For example, figure 5.4 shows that category main page of the system product.

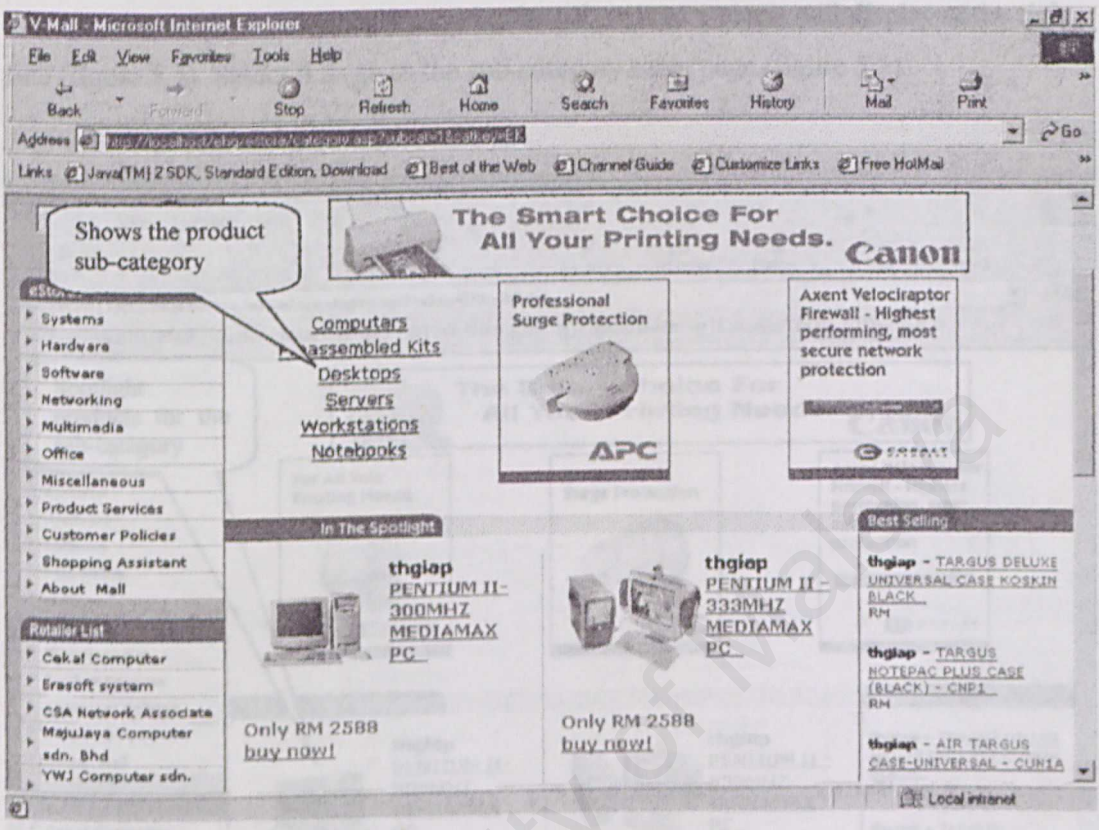


Figure 5.4 The category main page

5.2.3 Sorting Product by Sub-Category

When mouse over on the category menu, the sub-category menu will display at the right side (figure 5.3). Select it to go to the sub-category main page (figure 5.5).

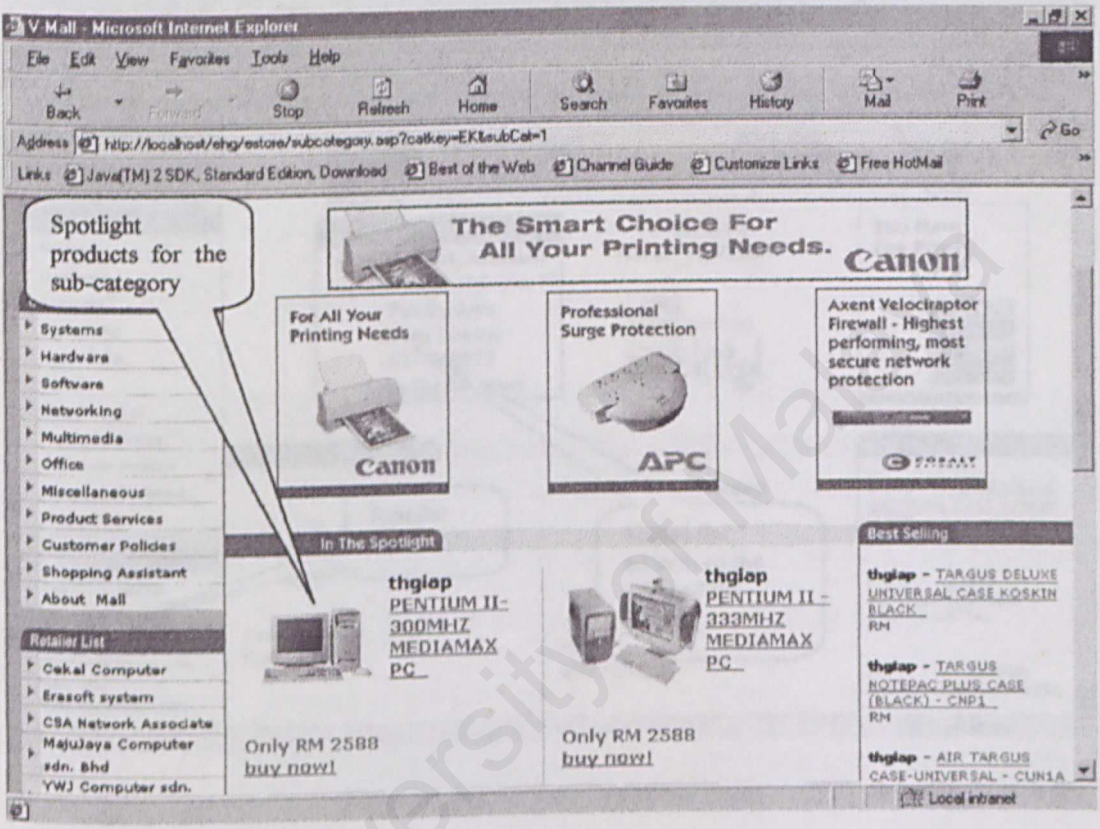


Figure 5.5 The sub-category main page

5.2.4 Sort Product by Retailer

From the retailer list, click at it will bring customer to the retailer main page (figure 5.6)

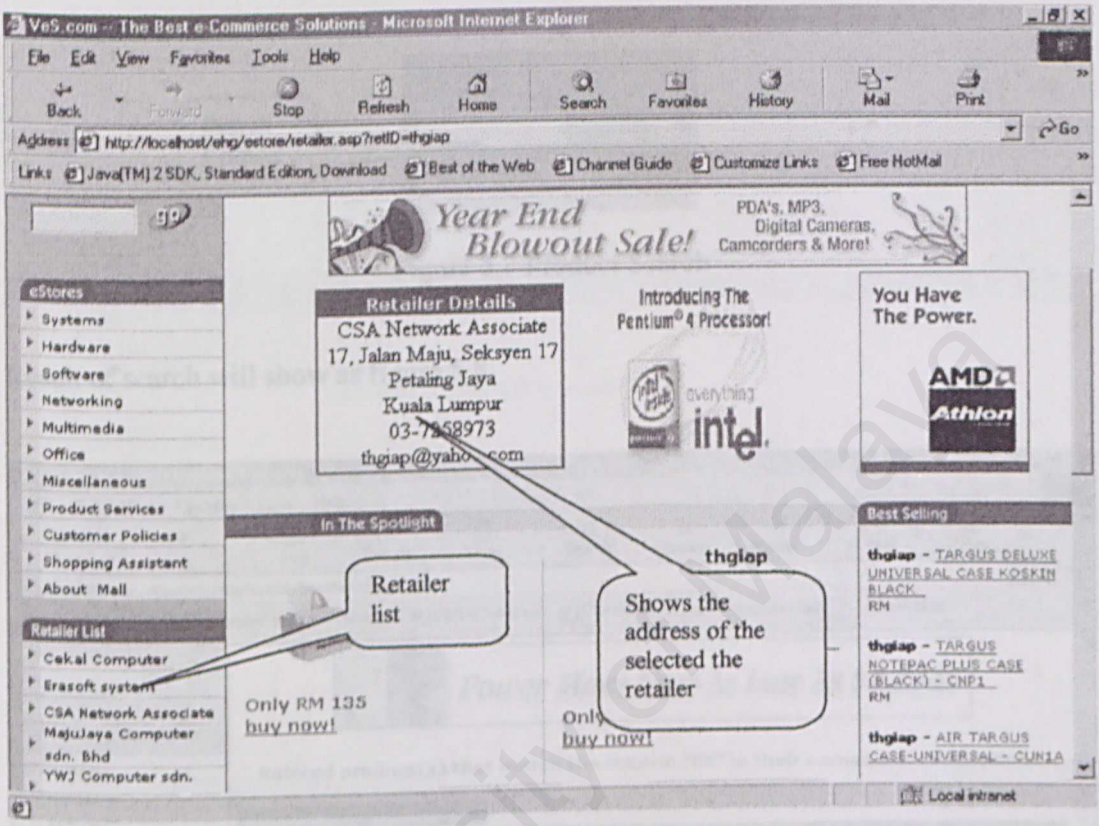


Figure 5.6 The Retailer main page

5.3 Product Search

This allows the customers to search for the related product.

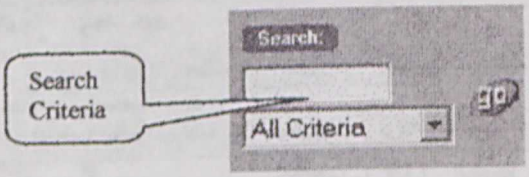


Figure 5.7 Product Search

Result of search will show as figure 5.8

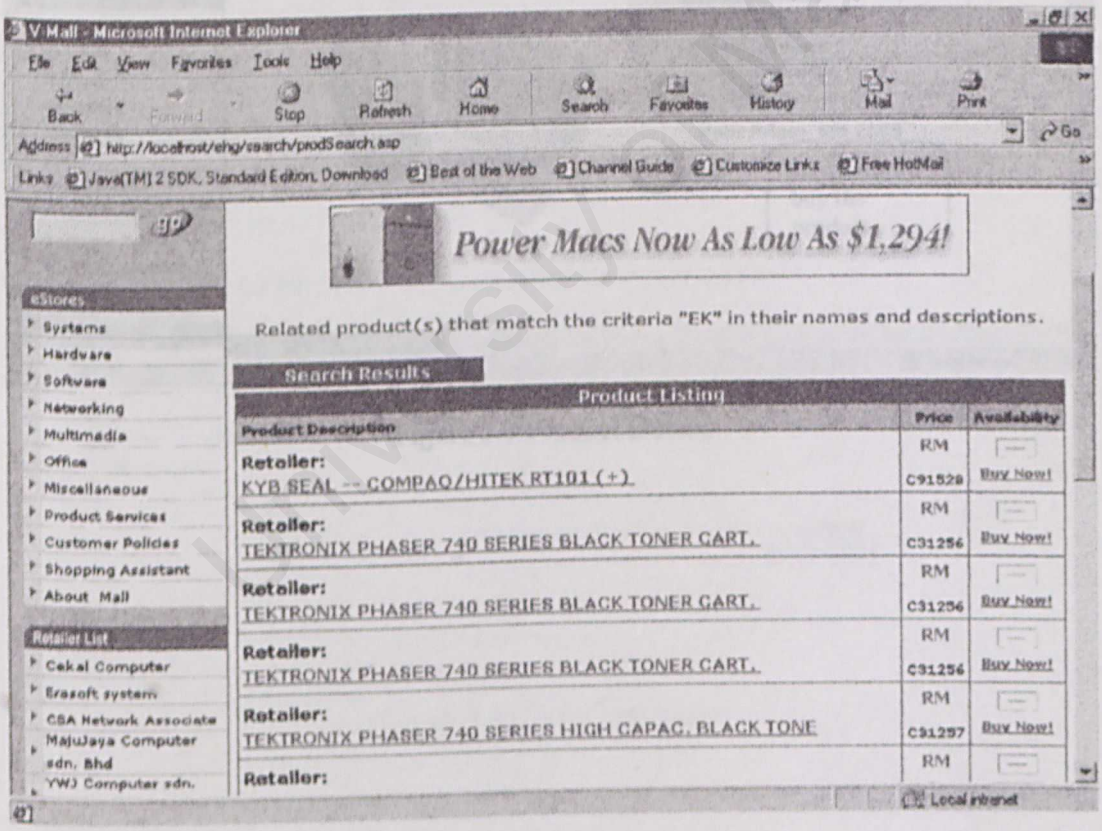


Figure 5.8 Search Result

Clicking at the product name will show the details of the product (figure 5.9).

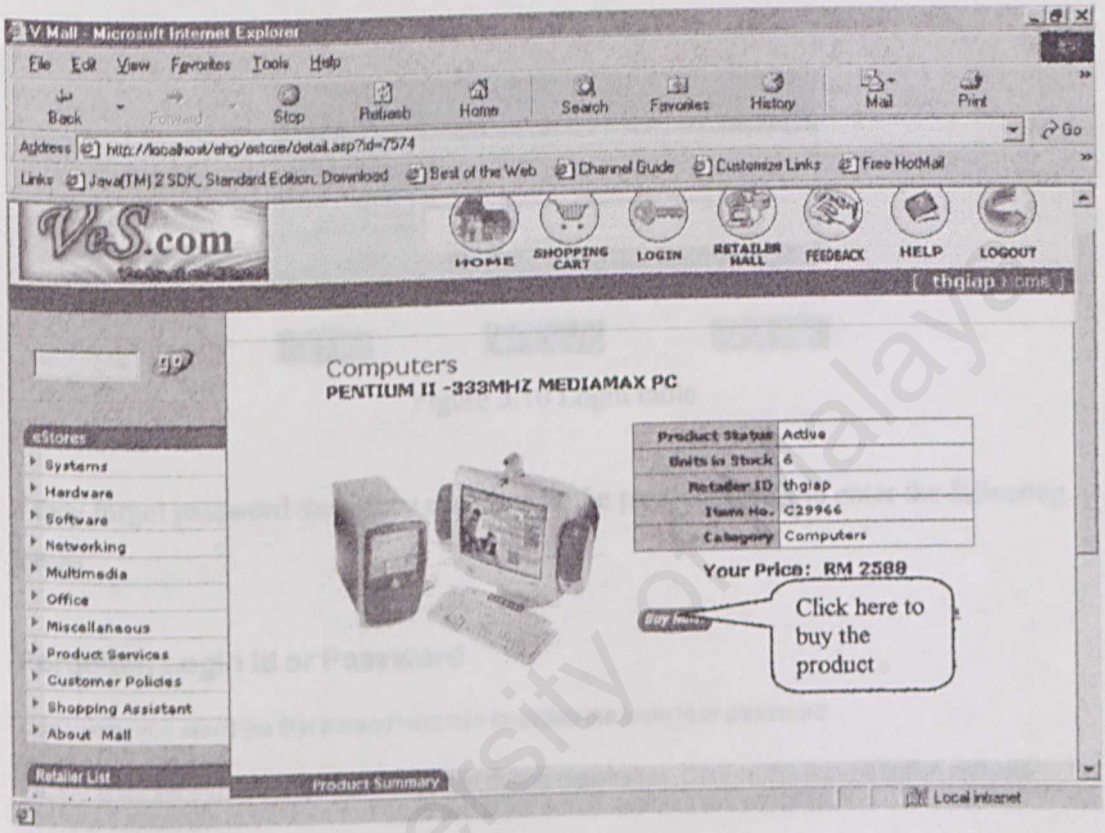


Figure 5.9 Product Details

5.4 Customers or Retailers Login

To login, use the login screen as at the following screen (figure 5.10).

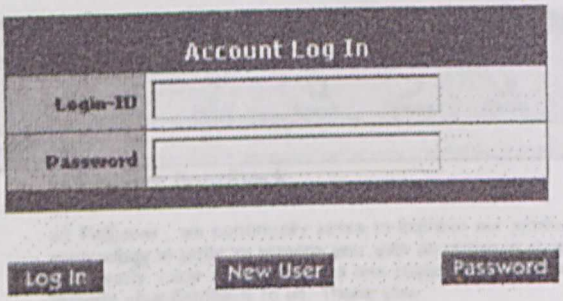


Figure 5.10 Login table

If they forgot password then, they can click at the password field to enter the following screen.

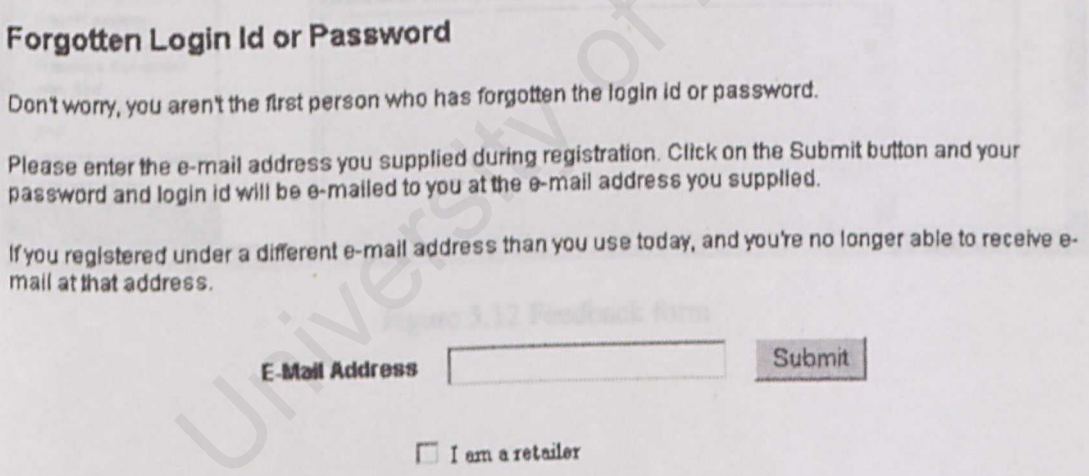


Figure 5.11 Forgot password

After typing the email address, the forgotten password will be decrypted and send to the customer or retailer.

5.5 Sending Feedback

To send feedback, click at the image feedback button at the page header. The page will show feedback form (figure 5.12).

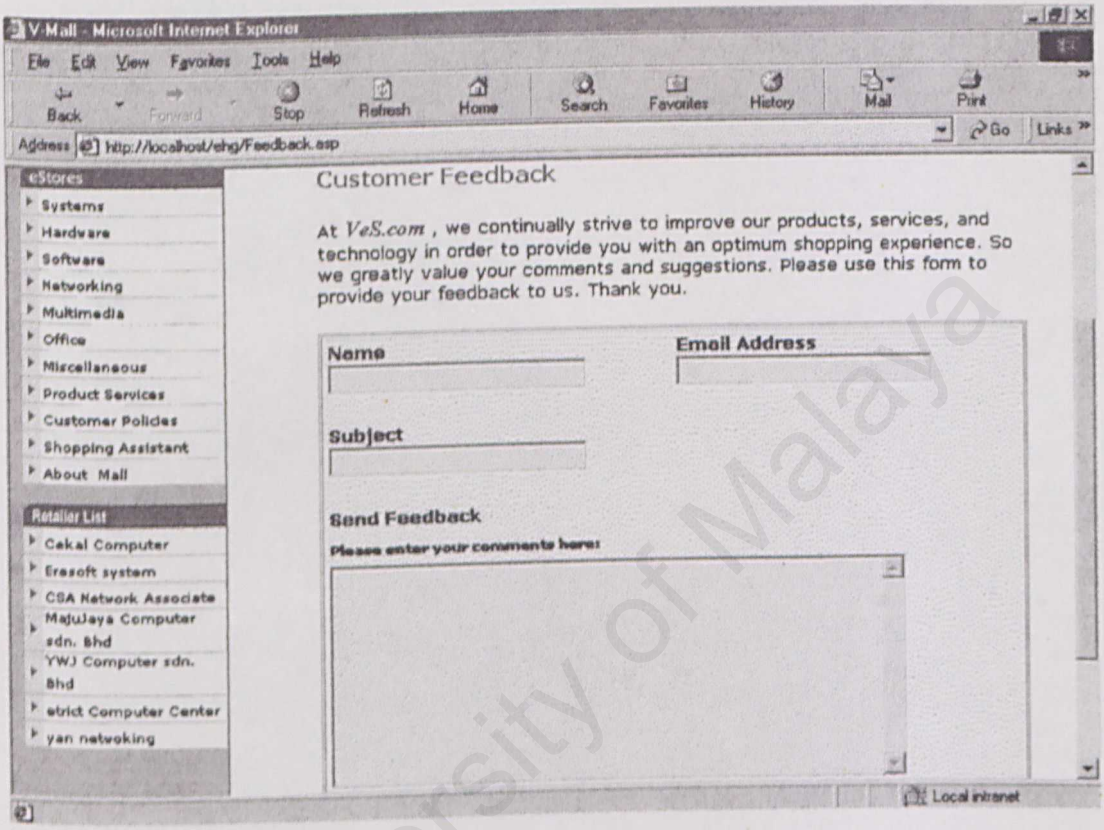


Figure 5.12 Feedback form