

Projek Ilmiah Tahap Akhir (II)

WXES 3182

Online Payment System

- Electronic Payment System -

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ABSTRACT

Online Payment System is a web based online transaction system for E-commerce. *Online Payment System* is designed to be easy to use, yet provide all the functionality and secrecy needed to efficiently conduct an online transaction. It enables customer to conduct the transaction efficiently and safely by encrypting all processes in the website. A shopping cart function will provide users more convenient, where they can check the item in their shopping cart and finalized the item before they checked out and make payment. The system will also provide a link to customer account where they can check their account in the provided website. *Online Payment System* was developed using Visual Basic script, Microsoft SQL server and Actives Server Pages. The system basically consists of two main modules – Shop module for selling products purposes and Bank module for conducting transaction purposes. The general specifications and features of shop module are cataloguing, member registration, shopping cart, payment and customer feedback. The bank module contains functions including update user information, view account, print transaction history and authentication. There will a smaller but important module, Shop administrator module. It provide administrator to update the website and keep track off the sale of the website.

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1.1 Project Overview

Multimedia Super Corridor drives Malaysia to the information technology decade. Therefore, the importance of Internet in everyday life is increasing. With the number of people logging into Internet increase, it is so clear that there will be more online transaction done.

There are a lot of shops and banks in Malaysia that allow users to make their transactions online. Banking agency such as Maybank allows its' user to conduct their transaction online. Other companies like molibe88.com (selling mobile phone online), eBay.com and Amazon.com which sell various kind of products are promoting the culture of online trading.

Such online shops and banks save user from all kind of troubles compared to those that do it without using online system. This avoid user from having parking problem, they no longer need to queue up in order to buy something or make some payment. They also save up a lot of time and money by accessing the company website and do it online.

This project will allow users to do all the transaction online. They only need an account in the bank and the rest of transaction will be done online. The system also enables those who don't have credit cards to conduct their transaction online.

1.2 Project Motivation

Online community in Malaysia has risen from 6% to 9 % and there is a lot of potential growth in the future. From this statistic, we can conclude that demand for online transaction is growing and it has a lot of potential.

Online transaction such as *Online Payment System* need to be introduce to every citizens in this nation and it must not only restricted to Visa card and Master card holders.

1.3 Project Objectives

The *Online Payment System* is a online banking system that allow online transaction between users and online shops. It is a simple system that requires minimal time to learn and can be easily understand by users. The objectives of the system are:

- (a) Adaptable to company of any size and type, number of users that is going to use the system, volume of products involved and ability of the users;
- (b) Provide online account information such as account summary, online transaction history, payment done and online shopping;
- (c) Enable user to make online transaction;
- (d) To improve current online payment system that is restricted to Visa and Master card holders only. This system will allow any users with an account in the bank to make online payment;

- (e) Be tailored to meet varying ability levels and specific skill deficiencies; and
- (f) To enable user to understand and operate the system easily without extensive assistance.

1.4 Project Limitation

Although this system greatly ease some of the problem that normally user faced such as limitation of credit card holders. It cannot support the payment by multi-currency. It only allows the payment conduct in the same currency.

Since this system does not sent the payment through a gateway to the bank. So, it does not support multiple banks. Users and the Shops need to register themselves to the same bank in order to conduct any transactions. Both of them need to have an account in the same bank.

1.5 Project Scope

The *Online Payment System* is specially designed to suit on-line based transaction.

The general specifications and features of this system are divided into 2 parts, online banking and online shopping:

Online Banking:

Security

Password is required to access certain modules of the system and only the authorized person is allowed to change the password. Besides that, the backup feature safeguards the data by allowing administrator to backup the account database. Backup Data should be compact to reduce the size of the database.

Member Registration:

This system requires registration of members. All user accounts will be associated with a login ID. All users need to fill in an online form and they will choose their own login ID and password.

Circulation:

The user can do payment, buying, credit transfer and all transaction daily routines easily. The circulation records will be stored in the database.

Reports:

An account summary reports includes online transaction history can be viewed.

Feedback:

Users can send any suggestions and recommendations to the administrator anytime.

Online shopping:Cataloguing:

The system will show all the products available in the shop by category. User can view the products and make their shopping on-line.

Shopping cart

It allow user to add the product they want to buy in the cart just like real world shopping. They have the option to remove the product from the cart before they make up their mind.

Report

Users can view the report of product in their shopping cart and they can make changes before finalizing the transaction.

1.6 Expected Outcome

This system will be of great help in daily transaction routine, saving both time and money. It allows all users to make their payment online when they have an account in the bank. It will be a real time system that enabled user to checked their account by 24 X 7 a weeks. This system will abolish the limitation of which only Visa and Master card holders can make online transaction.

1.7 Project Development life cycle

ID	Task Name	Duration	Start	Finish	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan
1	Problem Definition	6 days	20/6/01	26/6/01	■							
2	User Requirement Study	14 days	23/6/01	7/7/01	■	■						
3	Existing Information Analysis and Documentation	30 days	20/6/01	20/7/01	■	■	■					
4	System Requirement Determination	10 days	15/7/01	24/7/01		■						
5	System Analysis	18 days	25/7/01	11/8/01		■	■					
6	System Design	27 days	12/8/01	7/9/01			■	■				
7	Prototyping	10 days	12/8/01	21/8/01			■					
8	Modules Design	5 days	22/8/01	26/8/01			■					
9	User Interface Design	8 days	27/8/01	3/9/01			■					
10	Database Design	4 days	4/9/01	7/9/01				■				
11	System Implementation	120 days	8/9/01	5/1/02				■	■	■	■	■
12	Development of System - Coding	114 days	8/9/01	31/12/01				■	■	■	■	■
13	Testing	5 days	1/1/02	5/1/02								■
14	Documentation	211 days	14/6/01	10/1/02	■	■	■	■	■	■	■	■

Figure 1.1 Project Development Life Cycle

Project Scheduling plays an important role in planning and developing the system. It specifies all the activities involve in system development and the duration of time for each activity to successfully implement the project.

Problem Definition:

- ⊗ Recognize the need for the system and the current problem encountered by the

Online payment system

- ⊗ Research on the historical development of *Online payment system*
- ⊗ Develop a project planning schedule

User Requirement Study:

- ⊗ Analysis of users' capabilities and thinking as well as their behavior
- ⊗ Research on the online transaction requirements

Existing Systems Analysis and Documentation:

- ⊗ A study of current existing E-commerce site and E-banking system to include all the good features in the new system

System Requirement Determination:

- ⊗ Determine the functional and non-functional requirement as well as the system scope
- ⊗ State the innovations that need to occur for the system to be adapted to the Online banking system

System Analysis:

- ⊗ Obtain information through research and surveys on the current online payment system
- ⊗ Research through the Internet
- ⊗ Analysis on the developing tools used by the various systems

System Design

- ⊗ Include the prototyping, module design, user interface design and database design
- ⊗ Figure out an overall picture of the new system working process by using the entity-relationship diagrams, data flow diagrams and data dictionaries
- ⊗ Specify the system's outcome

System Implementation:

⊗ Development of system

- Design the program using the structure charts, flowchart and pseudo-code
- Translate all the algorithm into specific program language instructions
- Testing and debug the program to eliminate all errors

⊗ Testing

- Application testing by individual
- Acceptance testing that involves users to evaluate the system to see whether the system meet their needs and functions correctly

Documentation:

⊗ Record all the information pertinent to the project

- Include the online help and sample

2.1 Important of literature review

Literature review is a crucial part in a system development cycle. Literature review of a project is important as it places the project in the context of others. Which might have similar characteristics. It helps the developer to know some of the existing features offered by a similar system.

Through that, I manage to gather many ideas, information and knowledge for me to develop the *Online Payment System*. I get a better understanding on which development tools and development methodologies are suitable for developing *Online Payment System*.

Besides that, I also do comparison on the past-developed projects and study the strength and also weakness of them. These have given me an overview of how to improve the weakness and fulfill the requirements needed.

2.2 What is Electronic Business?

E-Business is the complex fusion of business processes, enterprise applications and organizational structure necessary to create a high performance business model. It refers to the use of digital technologies to transform both the internal processes as well as an organization's interactions with external parties.

E-Business is what happens when you combine the resources of traditional information systems with the vast reach of the Web and connect critical business systems directly to critical business constituencies - customers, employees, partners and suppliers using Intranets, Extranets and the World Wide Web.

E-business can be divided into three main areas: It can be within the organization using the so-called Intranet. The Intranet uses Internet standards for electronic communication. People on the Intranet are able to see organization-specific web sites. These web sites are separated from the rest of the world by firewalls and other security measures. People from outside of the organization are not able to see these private pieces of information.

The second area is the business-to-business (B2B) deals that are done over the Extranet. The Extranet consists of two Intranets connected via the Internet, whereby two organizations are allowed to see confidential data of the other. Normally only small parts of information are made available to the partner, just enough to enable the business. Business-to-business networks have existed long

before the Internet. Many organizations have had private networks to talk to their partners and customers. But maintaining them was very expensive. Through the usage of the Internet the costs have been cut dramatically. In order to keep the business transactions private virtual private networks (VPNs) are used in most cases.

Thirdly there is the business-to-consumer (B2C) area. Traditionally this is what most people know as e-commerce, selling products on the web. Also to keep in mind is the consumer-to-consumer area, also known as peer-to-peer commerce, such as auction sites or digital exchanges like Napster.

No matter in which of the three areas a company wishes to do business, they must ask the right questions before going online. Just having a web page or the infrastructure for the Intranet, Extranet or Internet is no help. They need to decide on your target group and think hard about the processes that need to be done electronically. Technically there is no difference between the Intranet, the Extranet and the Internet. The Extranet and Intranet are subsets of the Internet, which can be viewed only by certain groups.

2.3 Why Electronic Business?

In a few short years, e-business has gone from concept to undeniable reality. For good reasons, it works for everyone: consumers, businesses and governments. The primary values of e-business--cost savings, revenue growth, and customer's satisfaction are proving to be just the tip of the iceberg. Having realized the benefit of Web-enabling individual business processes, many companies are now seeking further ROI by integrating new and existing e-business applications and technologies (two billion Internet-ready devices like smart phones, PDAs and other pervasive computing applications are expected to be in consumers' hands in the next two years). These devices and applications are prime candidates to better serve customers and improve efficiency. The key to success is finding a way to give customers what they want without the expense of traditional business operations.

2.4 What is Electronic Payment System and why is it so important now?

Implementation of electronic payment systems is in its infancy and still evolving. The technical, economic, cultural and its legal components of electronic payment systems are not fully understood. As a result, there are a number of competing proposals and implementations of electronic payment systems. One thing is clear to everyone involved in electronic payments: Electronic payments are far cheaper than using the dead tree method of mailing out paper invoices and then later processing received payments.

There are currently three basic ways to pay for your purchases: cash, check, or credit card. Electronic cash distribution and payment can be handled by wallets, smart cards, or through proprietary, limited-use scrip. *Scrip* is digital cash minted by a small number of third-party organizations. Electronic checks represent a small but growing percentage of online payment transactions. Credit and Debit card are by far the most popular form of electronic payment. A recent survey indicates that over 80 percent of Internet purchases are paid for with credit (debit) cards. Debit cards, which draw directly from your bank account in the same way checks do, also are used for online transaction processing.

There are four technologies currently in the market. They are electronic cash, software wallets, smart cards, credit / debit cards. Each has unique properties, costs, advantages, and disadvantages. Some represent solution that are already popular and widely accepted, while others are only now catching on and the have a future that is unclear. Still others do not appear to hold the promise of wide acceptance that they did only three years ago.

2.5 System Reviews

2.5.1 Reviews on existing system

Maybank

Malaysian's premier online banking agency. It had moved the real bank and put it in the Internet. It provides online payment systems that allow user that have an account in the bank to pay their bills online. Users do not need to have Visa or Master card to pay their bills. It will automatically deduct from user bank account after user make any payment. When a user wants to conduct an online payment, he/she just needs a user ID and a password to log in to the system. Then he/she just needed to choose the payee that he/she wants to pay the bill and also the reference number in the bill. After the transaction had been successfully made, it will generate a transaction code. User also can trace back their transaction history for last 60 days. It also provides others banking features such as Loans, Insurance, Online share market and transfer of money between account in Maybank. The limitation is user only can make their payment to those companies that registered themselves to Maybank. User might find it is inconvenient for them to buy product from those shops that don't allow online payment by Maybank.

CyberCash

CyberCash, Inc. is the world's leading provider of Internet payment services and electronic payment software. The Company provides service solutions to more than 25,000 Internet merchants and has shipped more than 145,000 copies of its software products. In addition to enabling Internet payments, CyberCash offers

merchants state-of-the-art risk management capabilities through its FraudPatrol™ Internet fraud detection service, and the opportunity to generate additional sales leads through an affiliate marketing program. CyberCash offers the broadest reach in the payment industry with a comprehensive distribution network focusing on both direct and indirect channels, which include marketing partnerships with financial institutions, Internet service providers, application service providers, storefront solution providers, and leading independent software vendors.

Amazon.Com

Amazon.com is the most successful online bookshop in the Internet. It starts with selling books and now it has expanded into an online mega shop that sell all kind of merchandise including computer, kitchenware, DVD and others. It's interactive interface and update daily web page make it interesting to user. It also designed as a user-friendly web site and user needs minimal time to learn how to use it. Amazon.com also act as a portal for user to sell their goods online in Amazon.com e-commerce web site. This will make more interaction between the user and Amazon.com. It kept its customer by keeping the record of the customer such as what is customer favorite and its will inform the customer whenever there is a new product.

eBay.com

eBay.com is one of the successful online stores that sell various kinds of goods. Similar with Amazon.com, eBay also provide online shopping tools such as shopping cart, payment via credit card, Bidding on the item and also auction services. Its user-friendly web site and interesting interface has attracted millions of people all over the world to use this e-commerce site. It divided its goods into many categories so that the user can easily find what ever they needed. It is not only just a online shop but it had expanded into an online marketplace that you can get almost everything that u need in eBay.com.

2.5.1.1 Research on existing Online Shop

The tremendous growth of the Internet particularly the World Wide Web (WWW) has led to a critical mass of consumers and businesses particularly in a global online marketplace. The rapid adoption of the Internet as a Commercial medium has caused the business to find new ways to expand their opportunities. Today Internet has become a new marketplace in which the E-Commerce be conducted. Basically there are various E-Commerce sites that sell product online. Some of the successful E-Commerce sites currently on the net are as below:

- Amazon.com (www.amazon.com)
- Ebay.com (www.ebay.com)
- Megabuy.com (www.megabuy.com.my)
- Mall of Malaysia (www.mom.com.my)
- Lelong.com (www.lelong.com.my)

2.5.1.2 Research on existing Online Banking Agency

There are some online banking agency that provide online transaction (*Online Payment System*)

- Maybank (www.maybank2u.com)
- United Overseas Bank Singapore (www.uob.com.sg)
- Cybercash (www.cybercash.com)

From the findings of the above websites, I may conclude that there are basically five main pre-requisite for effective E-Commerce rise. The entry – level requirements are:

- A stable and supportive institutional environment.
- Fulfillment system and logistic
- Good bandwidth of connection medium
- Efficient and trusted payment method
- User friendly, highly interactive and affordable access devices and user interfaces.

2.5.2 Security Issues

Security issue on Internet is very important because data transfer through Internet is meant that data is exposed to everywhere. Once the data being expose, then it might have chance that the data will be stolen or modify by some one else. For example a company network is connected to Internet, all Internet user can access

to their network. If they do not have any kind of security application then everybody can access their network without any permission and data might be exposed to public. This is very dangerous and in order to prevent this to happen, security issues must be concerned.

Besides that, data transfer security is also another type of security that needs to be mentioned about. In most of the time, people think that making payment online is not safe because they don't know how exactly the security work on the Internet and they do not know the safety measurement in data transfer between one computer to another computer. They prefer to make their payment manually and but not online.

In order to know on security issues, I have list down a few issues that needs to concern about. It is a need to when setting up an online payment system.

Type of security

- System Security

This type of security is built into a personal computer or just a system only. System security is used to control access to resources such as files, programs databases and others, which located on a server or back end system. In order to access to these resource, people need ID, which like a key to access to those resources. Based on ID system administrator can assign the resources to these people. This will make the system more secure because not all people can

access all the resources. Office employees can base on their ID to have access to designated services that provided by the system.

- Network security

Network security provides protection against attackers who try to access information or gain control over machines or resource within a private network. The most common way to protect private networks that connected to Internet from attackers is using firewalls. Firewalls are single point of connection that link up private and public networks. It allows communication between them to monitored and secured. Firewall varies in their implementation and the degree of protection they offer.

- Transaction security

Transaction security refers to the security of data transfer through the Internet to conduct a transaction privately and with authentication. It required the transaction could be secure with digital signature. Digital signature refers to the messages that send through and received y the receiver must be proved by the sender to say that it is the correct messages that send by him.

Security Elements

There are several elements that used on the security purpose. Without these elements, the online securing would not be succeeded be implemented. Some elements are:

- Authentication

It is a process that verifying the identity of the party at the other end of the Internet connection. Server authentication allows the client to verify that they are communicating directly with bank and not others third party. Client authentication is the process where server (bank) verifies the identity of the client. In order to proceeds authentication Certification Authority is being used. Which is possible to identify the identity of both parties.

- Encryption

Encryption is the transformation of data into a format that can be safely transmitted, without certain key or rules on one can easily intercepting and reading the messages. Once the data encrypted, data must be decrypted using the decryption key. The keys used for encryption and decryption is usually kept secret to further ensure privacy.

- SSL (Secure Socket Layer)

SSL serves two functions: Authenticating Web server and/or client and encrypting the communication channel. To accomplish these two functions, SSL use two different encryption technologies: *Public key (asymmetric)* and *Private key (symmetric) encryption*. SSL allows important information such as credit card number to be transferred securely. By incorporating SSL into the website, customer will feel more secure when they conduct any online payment. Below are the picture of what is Public Key encryption, Private Key encryption and also how SSL work.

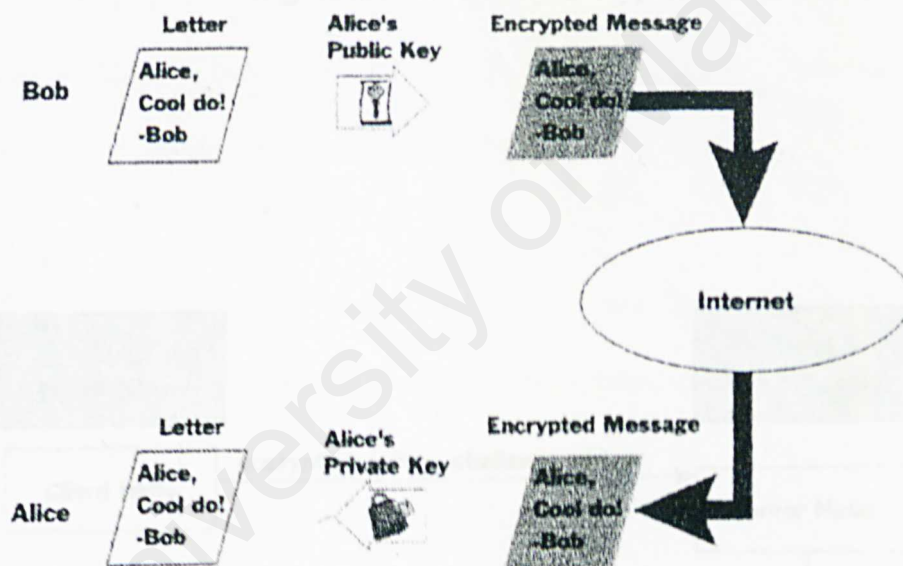


Figure 2.1 Public Key Encryption

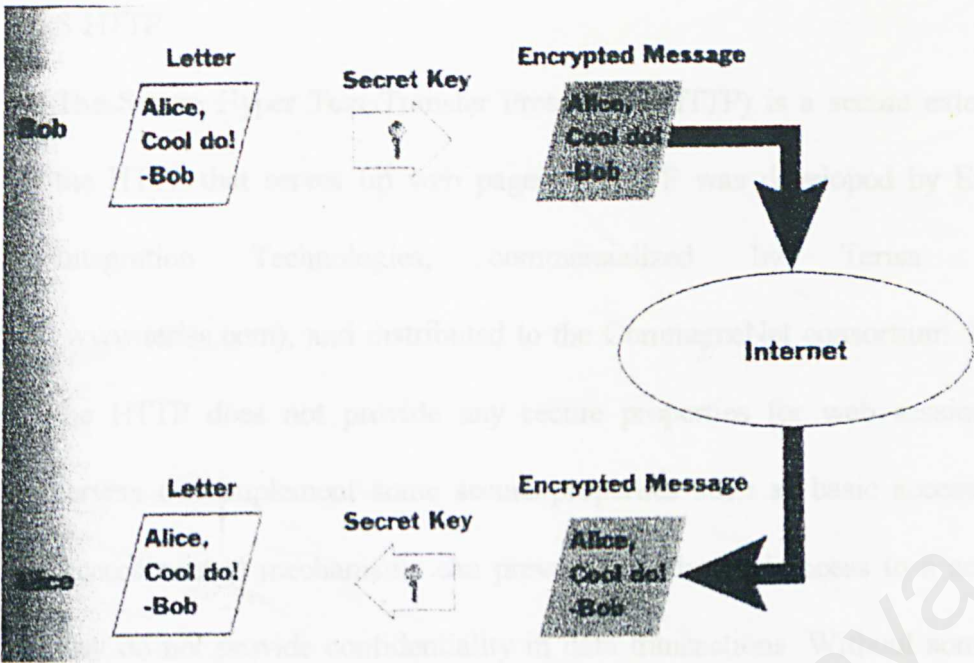


Figure 2.2 Private Key Encryption

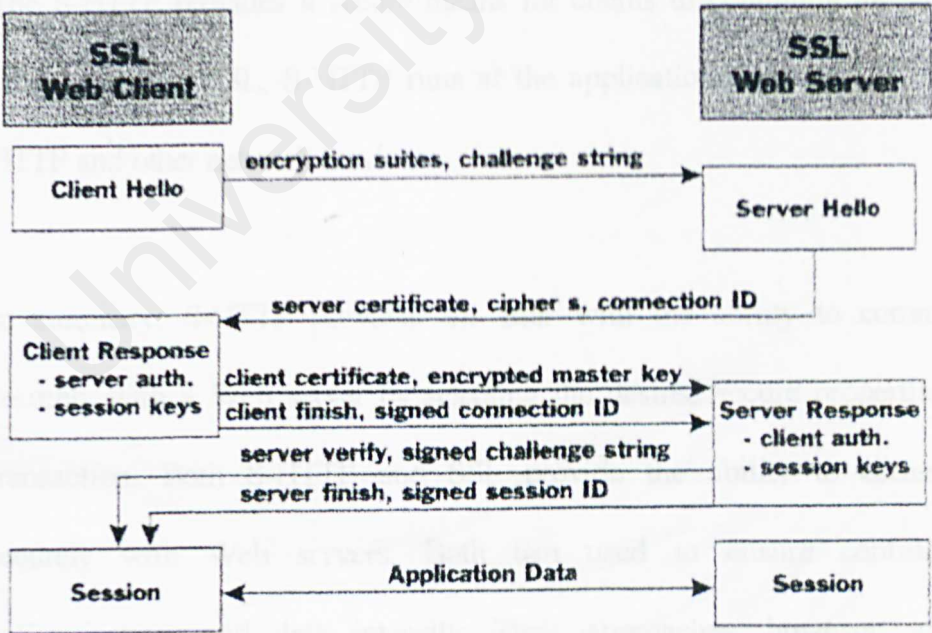


Figure 2.3 Setting up an SSL session.

- S-HTTP

The Secure Hyper Text Transfer Protocol (S-HTTP) is a secure extension of the HTTP that serves up web pages. S-HTTP was developed by Enterprise Integration Technologies, commercialized by Terisa Systems (www.terisa.com), and distributed to the CommerceNet consortium. By itself, the HTTP does not provide any secure properties for web sessions. Web servers can implement some secure properties such as basic access control. Access control mechanisms can prevent unauthorized access to a server, but they do not provide confidentiality in data transactions. Without some means for protecting the data transaction, passwords used to access secure portions of a server may be captured in plain text by third parties and subsequently used to grab confidential data.

The S-HTTP provides a secure means for clients to communicate with Web servers. Unlike SSL, S-HTTP runs at the application layer parallel with the HTTP and other network services.

In summary, S-HTTP provides the user with the ability to communicate securely with a Web server by selecting the desired secure properties of the transaction. Both S-HTTP and SSL provide the ability to communicate securely with Web servers. Both can be used to ensure confidentiality, authentication, and data integrity. Their approaches, however, are quite different. Because SSL encrypts the entire Internet session at a lower-level

protocol layer. S-HTTP supports a vast array of options for enforcing the secure properties. The options that are supported make S-HTTP flexible but more difficult to configure for the Web site developer. Although SSL has a number of options for enforcing the secure properties, the options are pre-configured in the browser and servers, making SSL easier to use. Finally, the prevalence of Netscape's servers and browser in the marketplace today makes SSL the dominant technology for securing Web sessions.

- Secure Electronic Transaction

The Secure Electronic Transaction (SET) is an emerging standard for secure credit card payment over the Internet. The open standard specifies the mechanisms for securely processing Internet-Based credit card orders but does not specify the implementation. SET can be applied in a real-time environment such as a Web session or in a store-and-forward manner such as electronic mail. This flexibility accommodates merchants that prefer either the online POS transactions that are performed in real time and those that prefer a batch more in its origin than in its current implementations. SET is an industry-backed standard that was created by the two most significant credit card associations: MasterCard and Visa. SET was also developed in cooperation with GTE, IBM, Microsoft, Netscape, SAIC, Terisa System, and Verisign. The fact that the standard is backed by these highly recognized names bodes well for the future of credit card transactions on the Internet. Consumers tend to place more faith in name brands they have trusted for years

than in the obscure cryptography techniques that underlie the payment protocols.

SET does not specify the shopping or ordering process for Internet goods, the payment method selection, and the platform or security procedures necessary for securing SET client and host machines. This means that a SET transaction can be conducted through the Web or through e-mail. It also means that process of selecting or negotiating a product between merchant and buyer is not restricted to Web-based access. SET does specify that the following security assurances be provided:

1. Confidentiality
2. Data integrity
3. Client Authentication
4. Merchant Authentication

2.5.3 Technologies Reviews

Operating System

Linux

Linux is a complete operating system that is similar, but not identical to UNIX. It supports both 32 and 64 bit hardware and provides a stable multi-user Internet ready operating system. It was initially created by a young student, Linux Torvalds, at the University of Helsinki in Finland as a hobby. Originally the term Linux referred strictly to the kernel (the core of the operating system), but the phrase itself refers nowadays to a collection of configured software that runs on the top of the Linux kernel.

The source code for Linux is freely available for everyone. Freely available in this context means the source code for the kernel and most software cannot be withheld. This however, does not mean that Linux and its assorted distributions are free. Companies and developers may charge money for it as long as the source code remains available. Among the companies involved in the distribution of Linux are Red Hat, Caldera, S.U.S.E., and Stampede. These companies do not just compile and configure the software. Caldera, Red Hat and others have added their own proprietary software to their distribution.

Linux is used for a wide variety of purposes including networking, software development, and as an end-user platform. Linux is often considered as an excellent low cost alternative to other more expensive operating system. It is stable in the sense that, crashes of applications in Linux are much less likely to bring down the entire operating

system as compared to Windows. Linux servers are also reliable, as they are often up for hundreds of days before requiring any reboots.

Linux uses Internet and industry standard components and protocols giving a system with complete network integration. The operating system can act as a server for most major file serving protocols, and provide all the major Internet applications. The X window system provides a networked and platform independent graphical interface that (unlike proprietary user interfaces) allows one desktop to access applications running on multiple machines across local and wide area networks.

Windows 98

One of the products in Microsoft's evolution of the Windows operating system for personal computer is Windows 98. An important of the user interface of Windows 98 is the Web technology and it was released with its tightly integrated browser. Microsoft Internet Explorer is an integral part of the operating system in the Windows 98. Users can view and access desktop objects that reside on the World Wide Web as well as local files and application using the Active Desktop of Windows 98. In fact, Windows 98 desktop is a Web page with HTML links and features that exploit Microsoft's ActiveX controls.

It also provides a 32-bit file allocation table (FAT32) that allowing a single-partition disk drive larger than 2Gbytes. The other features in Windows 98 includes supports for Universal Serial Bus (USB), which make it easy to plug in new devices support for Digital Versatile Disc (DVD), support for a new industry standard form of power management called Advanced Configuration and Power Interface (ACPI).

Windows 98 enables the news and other content to be set up and pushed to the user from specified Web sites. When using it as Web server, Personal Web Server (PWS) need to be installed in order for the Windows system to serve Web pages through Internet.

Windows NT

Windows NT is the operating system for personal computer created for users and business requiring advanced capability. It is actually comprise of two products: Microsoft NT Workstation and Microsoft NT Server. The workstation is safer than Windows 98 and Windows 95. It is designed for users especially business users, who need faster performance. The server is designed for business machines that need to provide services for LAN-attached computers. Together with an Internet server such as Microsoft's Internet Information Server (IIS), it is required for a Windows system that plans to serve Web pages. The latest version, the Windows NT Server version 5.0 is now available, called Windows 2000.

Just like its desktop siblings (windows 95/98), Windows NT is easy to use, fairly quick to learn, and has some great software bundled with it. It also comes with a colorful interface, with plenty of icons to assist users in navigating themselves through the system. There is no need for users to memorize difficult commands, as almost everything or anything on the Windows NT is done by simple clicks of the mouse. The, by far, makes Windows NT (also Windows 95/98) the most user - friendly operating system available in the world today.

Windows NT is also preferred above many others operating system because of its ability to inter-operate with a variety of enterprise level software available in the market today. In other words, there are much more software designed to run specifically on the Windows platform as compared to any other operating system in the world today. NT's improved system architecture also makes it far more superior than its desktop siblings, Windows 95/98, which makes it a better choice for business applications.

Windows 2000

The latest version of Microsoft's evolving Windows operating system is Windows 2000. Before that, it is called Windows NT 5.0. Microsoft emphasizes that Windows 2000 is evolutionary and is built on NT technology. Most users of Windows 98 and Windows NT will in time move to Windows 2000. It is designed to appeal to small business and professional users as well as to more technical and larger business market for which the NT was designed.

The Windows 2000 product line consists of four products:

- **Windows 2000 Professional**, aimed at individuals and businesses of all sizes. It includes security and mobile use enhancements. It is the most economical choice.
- **Windows 2000 Server**, aimed at small-to-medium size businesses. It can function as a Web server and/or a workgroup (or branch office) server. It can be part of a two-way symmetric multiprocessing system. NT 4.0 servers can be upgraded to this server.

- **Windows 2000 Advanced Server**, aimed at being a network operating system server and/or an application server, including those involving large databases. This server facilitates *clustering* and *load balancing*. NT 4.0 servers with up to eight-way SMP can upgrade to this product.
- **Windows 2000 Datacenter Server**, designed for large data warehouses, online transaction processing (OLTP), econometric analysis, and other applications requiring high-speed computation and large databases. The Datacenter Server supports up to 16-way SMP and up to 64 gigabytes of physical memory.

It was reported in earlier reviews that Windows 2000 is more stable than Windows 98/NT systems. It is less likely to crash. A significant new feature is Microsoft's Active Directory, that enables virtual private networks to be set up by a company, data locally or on the network to be encrypted, and to give users access to the shared files in a consistent way any network computer.

The other features of the Windows 2000 are it has a fully customizable administrative console that can be based on tasks rather than files, applications, or users. Also Dynamic Domain Name Server (DNS), which replicates changes in the network using the Active Directory Services, the Dynamic Host Configuration Protocol (DHCP), and the Windows Internet Naming Service (WINS) whenever a client is reconfigured.

Besides that, it also has the ability to create, extend, or mirror a disk volume without having to shut down the system and to back up data to a variety of magnetic and optical

storage media. In addition, it also has close integration with and supports for Microsoft's Message Queue Server, Transaction Server, and Internet Information Server (IIS).

Conclusion Of Operating System

It is undeniable that Linux is considerably less expensive to run as compared to Windows Operating System. Most of the software available for Linux is free, not to mention Linux itself is also free, which makes it suitable for low-cost projects. Linux is much more reliable than Windows Operating System and hence is the better education when running mission critical operations.

However, Windows Operating System still has a lead over Linux when it comes to ease-of-use. Linux is relatively difficult to configure, and learning up its UNIX-based commands may take up a lot of precious time. In other words, Windows Operating System has a shorter learning curve as compared to Linux. Furthermore, Windows Operating System has much more enterprise level software available for it as compared to Linux, which may prove to be essential in developments that required the usage of other software. Windows Operating System also makes administration tasks easier with its easy-to-use wizards and its complete set of help files.

As such, Windows 2000 will be chosen as the platform to develop *Online Payment System* due to familiarity of use, ease-to-use, and its compatibility with other software. Windows 2000 is more stable than Windows 98/NT systems. It is less likely to clash. Besides, there are so many new features included with Windows 2000 that will be a

significant consumer release and will prove to be a better upgrade than Windows 98/NT was. Also on the upside, Windows 2000 seems to be more Y2K compliant than its predecessors.

Web Server

Apache Server

The Apache server is a powerful, flexible, HTTP 1.1 compliant Web Server. It is highly configurable and extensible with third-party modules. It provides full source code and comes with an unrestrictive license. It runs on Windows NT/9x, OS/2 and most version of Unix, as well as several other operating systems. Apache has a built-in search engine and HTML authoring tools and supports File Transfer Protocol (FTP). Apache is actively being developed and encourages user feedback through new ideas, bug reports and patches.

The Apache server allows administrators to easily set up password-protected pages with enormous numbers of authorized users, without slowing down the server. It also permits administrators to set up customized files, or even CGI scripts, which are returned by the server in response to errors and problems. This allows the administrator to perform on-the-fly diagnostics for both users and administrator.

Apache is also flexible enough to perform multiple Directory Index directives, where administrators can instruct the server to either send back index .html or run index .cgi when a directory URL is requested, which ever it finds in the directory. Those come

running Apache servers will also find that it has unlimited flexible URL rewriting and aliasing. Apache has no fixed limit on the numbers of Aliases and Redirects that may be declared in its configuration files. In addition, a powerful rewriting engine can be used to solve most URL manipulation problems.

Today the Apache server is the most widely implemented Web server on the Internet. It offers a powerful and customizable approach for any Unix-based server. It has been shown to be substantially faster, more stable and more feature-full than many other Web servers, including IIS. Apache is run on sites that get millions of hits per day and they have yet experienced any performance difficulties.

Internet Information Server

Internet Information Server (IIS) is a group of Internet servers (including a Web or Hypertext Transfer Protocol server and a File Transfer Protocol server) with additional capabilities for Microsoft's Windows NT and Windows 2000 Server operating systems. IIS is Microsoft's entry to compete in the Internet server market that is also addressed by Apache, Sun Microsystems, O'Reilly, and others.

IIS comes with three default services: WWW, FTP and Gopher. Its Internet Service Manager (ISM) application controls these services on this or any other IIS server on the network. ISM is run from the Window NT Server or from a Windows NT or Windows 95/98 workstation. For remote administration, ISM can be run from any browsers using on HTML version. IIS supports FTP, allowing users to download files and data from the IIS server site with the FTP protocol.

With IIS, Microsoft includes a set of programs for building and administering Web sites, a search engine that allows users to create custom search forms with a variety of tools, including ASP, ActiveX Data Objects, and SQL database queries, reporting tools from Crystal reports. (Crystal Reports is a visual reporting tool that lets you create presentation-quality reports and integrate them into database applications.), and support for writing Web-based applications that access databases. Microsoft points out that IIS is tightly integrated with the Windows NT and 2000 Servers in a number of ways, resulting in faster Web page serving.

A typical company that buys IIS can create pages for Web sites using Microsoft's Front Page product (with its WYSIWYG user interface). Web developers can use Microsoft's Active Server Page (ASP) technology, which means that applications - including ActiveX controls - can be imbedded in Web pages that modify the content sent back to users. Developers can also write programs that filter requests and get the correct Web pages for different users by using Microsoft's Internet Server Application Program Interface (ISAPI) interface.

To tap into the power of ASP and server-side scripting, IIS includes native scripting engines for VBScript and JScript. Server plug-ins are available for other scripting languages such as Perl, TCL, and REXX. You can even use several different scripting languages within a single ASP document.

Database access has also been extended in IIS. ActiveX Data Objects (ADO), an ASP component, let developers access and control data in any ODBC- or OLEDB-compliant database using any ActiveX scripting language. Developers can put a Web front end on almost any legacy database without arcane CGI programming.

IIS includes security features and promises that it is easy to install. It works closely with the Microsoft Transaction Server to access databases and provide control at the transaction level. It also works with Microsoft's Netshow in the delivery of streaming audio and video, delayed or live.

Conclusion Of Web Server

Although Apache is proven to be the more powerful Web server here, it is still not as user friendly as IIS. Furthermore, Apache servers are known for their difficulty in installation and configuration. As such, it will take considerable time and effort to configure and manage the Apache server, thus making it unsuitable for the development of this project.

Since Windows 2000 will be used as the platform for the development of *Online Payment System*, IIS would seem to be a better choice here. Furthermore, IIS is a robust and capable Web server program that is suitable for small sites right up to enterprise-class sites doing high transaction volumes.

Web Authoring Tools

Microsoft Visual Interdev 6.0

Visual Interdev is an integrated development environment (IDE) for creating dynamic web sites. It is part of the Microsoft Visual Studio family, which consists of Visual Basic, Visual C++, Visual FoxPro, and Visual J++. Visual Interdev combines a number of tools into a single package to simplify development chores. There is support for project management; syntax highlighting of different types of web files such as ASP or HTML, automatic synchronization of local files with web server files, and integrated databases access.

With Visual Interdev, a developer can assemble pages that use Microsoft's ActiveX technologies and other similar COM technologies. Data driven web applications can also be developed using Microsoft's Universal Data Access, which includes ADO (ActiveX Data Objects), ODBC (Open Database Connectivity), and OLEDB. Visual Interdev also provides a robust development environment with a Scripting Object Model, design time control (DCTs), and a extensible toolbox for the purpose of rapid design, testing, and debugging of web pages. Web teams can now develop pages in isolation and maintain ready access to a master version. In short, Visual Interdev is an excellent all-rounder IDE, both for programmers and non-programmers.

Microsoft FrontPage 2000

FrontPage 2000 is part of the Microsoft Office 2000 family. It runs on the Windows 95/98/NT/2000 operating system, and is one of the simplest and least complex HTML editors available in the market today. Because FrontPage 2000 is integrated into the Office 2000 package, it interacts easily with other components of Office 2000, such as Word, Excel, Access and Power Point.

FrontPage 2000 is aimed at letting non-programmers build no-nonsense pages for their web sites quickly and easily. It features built-in tools to facilitate the creation of forms, tables, banners, Java Applets, and much more. Developers, writers and designers may also work on the same web project by using Microsoft FrontPage and Microsoft Visual Interdev in conjunction. In this case, Visual Interdev provides developers with a robust set of tools for developing web applications, while FrontPage provides a WYSIWYG environment for editing pages that does not require any programming knowledge.

Allaire Cold Fusion 4.0

Cold Fusion is a complete development and deployment environment ideally suited for building today's web-based e-commerce, content management, and business-automation initiatives. It is an ideal choice for workgroup, departmental and extranet applications, in which fast deployment times are critical, often with the work done by less-experienced developers.

Cold Fusion applications are essentially collections of pages. As with static web pages, Cold Fusion pages can contain HTML and other client technologies, such as JScript or PerlScript. Unlike static pages, Cold Fusion application pages are denoted by a specific “.cfm” extension, which is the default Cold Fusion file extension. Cold Fusion pages also contain an additional language, called the Cold Fusion Markup Language (CFML). CFML encompasses the Web’s Hypertext Markup Language HTML and Extensible Markup Language (XML).

The Cold Fusion development platform consists of two basic components:

(i) Cold Fusion Server

The Cold Fusion Server is a high-performance web application server for deploying browser-based applications. It offers all the runtime services for delivering e-business applications built on a highly scalable and open architecture. Because CFML is processed on the server, and because web servers only know how to pass pages to browsers, the Cold Fusion Server must be installed on a web server to provide support for Cold Fusion applications. When the Cold Fusion Server is installed on a web server and a client requests a page with a “.cfm” extension, the following steps take place:

1. The web server passes files to Cold Fusion Server
2. Cold Fusion Server scans the page and processes all CFML tags.
3. Cold Fusion Server returns only HTML and other client-side technologies to the web server and, in turn, the browser.

(ii) Cold Fusion Studio

Cold Fusion Studio is an integrated development environment (IDE) that includes a variety of tools for building web applications. It provides a full suite of advanced editing tools including colors coding, web application wizards, and two way visual programming. Cold Fusion Studio also includes visual database tools, and interactive debugger, full integration with source control systems, and support for remote and team development using the Cold Fusion Server.

Using the Cold Fusion development platform, developers can build web applications that connect to a wide range of existing business systems, such as RDBMS, messaging servers, file repositories, directory servers, and distributed object middleware. All the above make Cold Fusion an excellent tool for heavy-duty web development.

Conclusion Of Web Authoring Tools

Visual InterDev 6.0 provides an ideal environment for developers to visually construct sophisticated HTML and ASP pages. InterDev is also easier to use than Allaire Cold Fusion 4.0 in the sense that most Web developers are already familiar with Visual InterDev and ASP. Furthermore, there are more resources on Visual InterDev and ASP in books and on the Internet in contrast with Cold Fusion.

Cold Fusion 4.0, on the other hand, uses a special, relatively new scripting language called CFML. CFML files require a special server, called the Cold Fusion Server, to be installed on the server first before they can process. The Cold Fusion Server in turn needs to be configured, and this leads to wastage of precious time. As such, Cold Fusion 4.0 will not be feasible for the development of small projects like *Online Payment System*.

Microsoft FrontPage 2000 is a simple to use HTML editor that churns out simple Web pages in a short period of time. However, the development of E-Marketing will also require more dynamic Web pages, with live animations. Thus, Microsoft FrontPage 2000 is not suitable for the development of this project.

Since *Online Payment System* will be written using ASP, therefore Microsoft Visual InterDev 6.0 will be chosen as the authoring tool to be used for the development of *Online Payment System*.

Scripting Language

VBScript

VBScript, or by its full name, the Microsoft Visual Basic Scripting Edition Language, is a simplified version of the Visual Basic and Visual Basic for Applications family of programming languages. It is closely related to the BASIC programming language. While it does not offer the functionality of Visual Basic, it does provide a powerful, easy to learn tool that can be used to add interaction to Web pages.

VBScript is a scripting language, or more precisely a scripting environment, which can enhance HTML Web pages by making them active, as compared to a simple static display. It is the default language of ASP and is event-driven. VBScript provides a small but sufficient set of error handling capabilities. Handling multi-dimensional arrays in VBScript is also a breeze. VBScript arrays can easily be dimensioned and re-dimensioned, as required by the developer.

VBScript talks to host applications using ActiveX Scripting. With ActiveX Scripting, browsers and other host applications don't require special integration code for each scripting component. ActiveX Scripting enables a host to compile scripts, obtain and call entry points, and manage the namespace available to the developer. With ActiveX Scripting, language vendors can create standard language run times for scripting. Microsoft will provide run-time support for VBScript. Microsoft is working with various Internet groups to define the ActiveX Scripting standard so that scripting engines can be interchangeable.

Specifically, VBScript was created by Microsoft to use either as a client-side scripting language for the Microsoft Internet Explorer (version 3.0 and later), or as a server-side scripting language with the Microsoft Internet Information Server (version 3.0 and later). However, VBScript is more often used as a server-side scripting language because of its potent processing capabilities on the server-side.

JavaScript

JScript is a platform-independent, event-driven, interpreted programming language developed by the Netscape Communications Corporation and Sun Microsystems. Originally called Live Script (and still called Live Wire by Netscape). JScript is affiliated with Sun's object-oriented programming language Java primarily as a marketing convenience. They interoperate well but are technically, functionally and behaviorally very different. A popular misconception about JScript is that many people believe that JScript is Java because of their similar names. This is definitely not true as JScript is not Java.

User can develop server applications or client applications with Java Script. The term "server" is referring to the computer where the Web page resides. The term "client" is referring to the browser application that loads and displays Web page. Java Script is an extension to HTML that lets users create more sophisticated Web pages than they ever could with HTML alone.

The Netscape Navigator 2.01 and its later releases supported Java Script. There are several version of Java Script supported by certain browsers and browser version. Unfortunately, this can often lead to confusion in compatibilities. Since Netscape originally introduced Java Script, Java Script 1.0 was the language specification supported in Netscape Navigator 2.0. Subsequently, Navigator 3.0 supported new enhancements, which comprised Java Script 1.1. At present, Navigator 4.0 support Java Script 1.2.

Java Script offers much more expressive power than HTML alone. Java Script can do things such as create multipart documents, build dynamic documents that take users through a Web site from one document to another, and generate documents that interact with the user.

Perl / PerlScript

Perl (Practical Extraction and Reporting Language) is a script programming language that is similar in syntax to the C language and that includes a number of popular UNIX facilities such as sed, awk, and tr. Perl is an interpreted language that can optionally be compiled just before execution into either C code or cross-platform bytecode. When compiled, a Perl program is almost (but not quite) as fast as a fully precompiled C language program. Perl is regarded as a good choice for developing common gateway interface (CGI) programs because it has good text manipulation facilities (although it also handles binary files). Larry Wall invented it.

In general, Perl is easier to learn and faster to code in than the more structured C and C++ languages. Perl programs can, however, be quite sophisticated. Perl tends to have devoted adherents.

Plug-ins can be installed for some servers (Apache, for example) so that Perl is loaded permanently in memory, thus reducing compile time and resulting in faster execution of CGI Perl scripts.

CFML

CFML or Cold Fusion Markup Language is a set of special tags that are typically placed inside HTML pages and interpreted by the Cold Fusion Server. The tags perform such tasks as database connectivity and conditional logic, but they also handler other needs of the Web developer.

This server-side scripting language contains more than 70 tags for database connectivity, conditional logic, input and output, and integration with other Internet and file services. Over 200 additional functions handle items such as date and time, mathematical functions, and string manipulations. For database connectivity, SQL statements are embedded into Web pages by using CFML shortcuts, such as CFFORM and CFTABLE, which add functionality to HTML forms and simplify HTML tables, respectively. Additionally, CFML is extensible and it seamlessly integrates with major distributed objects standards such as COM and COBRA.

CFML files must be processed on the Cold Fusion server each time an application page is requested. As such, Web server will need to be installed with the Cold Fusion Server first before any CFML files could be processed. Despite the limitations, CFML still provides a dynamic application environment that is powerful and easy to use.

Conclusion Of Scripting Language

Since the development of *Online Payment System* will require the use of ASP, it is vital that VBScript be utilized as the server-side scripting language, and JScript as the client-side scripting language. If you already know Visual Basic or Visual Basic for Applications, VBScript will be very familiar. Even if you don't know Visual Basic, once you learn VBScript, you're on your way to programming with the whole family of Visual Basic languages.

Using Java Script, even less-experienced developers will be able to direct response from a variety of events, objects and actions. It provides anyone who can compose HTML with the ability to change image and play different sounds in response to specified events, such as a users' mouse click or screen exit and entry. JScript is a loosely typed language. That means you do not have to declare the data types of variables explicitly. Moreover, in many cases JScript performs conversions automatically when they are needed. For instance, if you try to add a number to an item that consists of text (a string), the number is converted to text.

Besides, VBScript and JScript are implemented as a Windows Script engine. This means that they can be "plugged in" to any application that supports Windows Script, such as Internet Explorer, Active Server Pages, and Windows Script Host. Furthermore, there are a lot of resources about VBScript and JScript in books and on the Internet, which facilitates the development of this project.

PerlScript, on the other hand, users the old fashion Perl programming language. This is not in accordance with the objective of this project, which is to make use of the latest Web advancements to set up an e-commerce Web site. Hence, PerlScript will not be used for this project.

The usage of CFML will each require the setting up of the Cold Fusion Server on the server. This will only lead to additional configuration works, which may take up a lot of precious time. Not to mention the time taken up just to learn up theses two relatively new scripting language. As such, CFML will not be considered to be feasible for this project.

Database

Microsoft Access 2000

Microsoft Access 2000 is a Window-based database management system. It is a member of the Microsoft Office 2000 family and it runs under the Windows 95/98/NT/2000 operating system. Due to the fact that Access is part of the Office 2000 suite, it interoperates well with the other components of the Office 2000 family.

Access is easily the world's most popular relational database management software (RDBMS). Access 2000 brings not only the traditional broad range of easy data management tools but also adds increased integration with the Web for easier sharing of data across a variety of platforms and user levels and additional ease-of-use enhancements to assist with personal productivity. With Access, the database administrator can design and use databases very quickly, as it has a very user-friendly

interface. Also, Stat/Transfer can be used to convert data between Microsoft Access and your favorite spreadsheet, database or statistical package. Besides that, data in Microsoft Access can be migrated to the Microsoft SQL Server.

Access 2000 continues to offer an easy-to-use tool for easily finding information that provides consistency and integration with the other applications in the office suite. It also allows easily sharing information via the corporate Intranet and the ability to easily host a database within the browser. This combines the power of a desktop database with the power of the Web. Furthermore, tables, forms, queries, and reports can be generated just at a snap of a finger, just by using the set of wizards that come with this software. All this makes Access an excellent all-in-one database tool for creating standalone database applications.

Microsoft SQL Server 2000

Microsoft SQL Server 2000 is a modern, full-featured SQL database designed for small or midsize organizations. Its complete set of tools, high-end engine features, and robust analysis capabilities provide most of what other corporations could offer only in their Enterprise Edition databases, all at a reasonable price. In addition, SQL Server 2000 is an amazingly easy to use, yet still powerful enough to crank through hundreds of complex transactions per second without choking. Customer needs and requirements have driven significant product innovations in ease of use, reliability and scalability and data warehousing. SQL Server 2000 runs on Windows NT 4.0 or Windows 2000.

Many engine settings in SQL Server 2000 are self-tuning. Developers need not assign memory to the data cache or store procedure cache separately. SQL Server dynamically balances memory between the two. SQL Server expands or contracts the amount of memory it is using as a whole. It can automatically make room in memory for other applications when they are running, expand again to fill extra memory when the applications are closed down.

Automatic memory tuning is not especially important on a dedicated database server machine. But on a server that has to run other applications like a mail server and Web server at the same time as a database, dynamic memory sizing makes a huge difference to system usability. SQL server's unmatched auto-tuning features also mean that it is extremely suitable for organizations that do not have database administrators on staff. With SQL Server 2000, a part time or beginner administrator is all it takes to manage the database effectively.

SQL Server is a client/server relational database management system (RDBMS) that is highly integrated with the Windows NT operating system. By using SQL Server, modern application can be developed that separate the client application and the database service. SQL Server Transact-SQL supports the ANSI-92 standard and provides extensions to the SQL language.

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

- **Ease of installation, deployment and use**

SQL Server includes a set of administrative and development tools that improve your ability to install, deploy, manage and use SQL Server across several sites.

- **Scalability**

The same database engine can be used across platforms ranging from laptop computers running Microsoft Windows 95/98 to large, multiprocessor server running Microsoft Windows NT, Enterprise Editor.

- **Data warehousing**

SQL Server includes tools for extracting and analyzing summary data for Online Analytical Processing (OLAP). SQL Server also includes tools for visually designing database and analyzing data using English-based questions.

- **System integration with other server software**

SQL Server integrates with e-mail, the Internet and Windows.

Database is the choice for e-commerce sites and best of breed data warehousing solutions. SQL Server includes OLAP Services, Data Transformation Services and English Query, and works with over 45 ISVs that form Data Warehousing Alliance. SQL Server is the first database to scale from the laptop to the enterprise using the same code base, offering 100% code compatibility. By using Windows 2000, fastest database for SAP, based on the SAP Retail benchmark.

Conclusion Of Database

Access 2000 and SQL Server 2000 are excellent database management software from Microsoft. Both of them are easy to use and are efficient at handling databases. As such, both of them are worthy of consideration for this project.

Access 2000 is suitable for use with small to medium-sized database. However, the size of a database may grow rather huge at times, and this is when Access 2000 starts to reveal its deficiencies. Access 2000 has the tendency of slowing down when the tables in a database gets too huge. This may not be practical for e-commerce Web sites running huge databases, as the opportunity costs arising from the slowing down of the database may be significant. As such, Access 2000 is unsuitable for the management of huge databases.

SQL Server 2000, on the other hand, works well with databases of any size. It contains all the user-friendly features of Access 2000, yet it works so many times more efficiently than Access 2000. It has the ability of handling hundreds of transactions simultaneously without affecting performance.

SQL Server 2000 will therefore be chosen to act as the database management software for the development of *Online Payment System*.

3.2 Concept of Methodology

Scientifically speaking a methodology is a "method or philosophy" that deals with the whole of method or procedure. It is a systematic way of doing things that is applied in research. This research is part of a methodology, a way of thinking, but more than a way of thinking. It provides the tool box to tackle problems using your methodology.

A method therefore enables one to follow a certain line, which is based on a fixed theory or hypothesis. The way a problem is approached. Following a line rather than being forced to follow that line, as system development is a creative process that ultimately cannot be fixed into rules and procedures without affecting the quality of the system. The reason is quite simple. There is no method that perfectly suits the needs of a system development project.

3.1 Introduction

A system development methodology is a very formal and precise system development process that defines a set of activities, methods, best practices, deliverables, and automated tools for system developers to develop and maintain most or all information systems and software. This part of the deliverables is concerned with a review of the methodology to be used in system design part of the *online payment system* project. Methodology ensures that a consistent reproducible approach is applied to online payment system. It reduces the risk associated with shortcuts and mistake. And it also produces complete and consistent documentation.

3.2 Concept of Methodology

Scientifically speaking a methodology is a “branch of philosophy” that deals with the science of method or procedure; or to put it differently a system of methods and rules applied in science. This reveals that a method is part of a methodology: a way of thinking, but more than a way of doing. It provides the tool how to tackle problems using what techniques.

A method therefore enables one to follow a certain line, where its basis is laid down in the way a problem is encountered. Following a line rather than being forced to follow that line, as system development is a creative process that ultimately cannot be forced into rules and procedures without affecting the quality of the system. The reason is quite simple: there is no method that perfectly suits the needs of a system development project.

3.3 Methodology of Online Payment System

In general a method must fulfill two basic requirements.

1. *Effective support of design process*

- An immediate consequence of the previous requirement is that the method should support stepwise refinement in the design process. The concept of decomposition of a total system into subsystems is required in order to reduce complexity.
- The method must provide the means to identify the different steps in the development. This is many times referred as the why-what-how chain: “why do we need what and how will we achieve it” or in other words from system logic reasoning, semantic modeling towards syntax specification.
- The method should provide the means to set boundaries to system environment. It is required to set boundaries and only to take relevant aspects into consideration.

2. *Efficient control of project*

- Method should provide tools to an efficient control of a project. Most of the times a method uses the well-known concepts of activity planning, deliverable and milestone definition in the different stages of a system development project, no matter it applies to the design phase or the implementation phase.

3.3 Methodology of Online Payment System

For *Online Payment System* development, an iterative rapid application development (RAD) method is used to ensure that development is based on solid requirement and design, followed by user feedback and rigorous testing.

To catch potential problems early in the development life cycle, both the process and architecture are structured to allow for independent testing, apart from ongoing development and integration efforts. Testing is done on each functional unit, then on the unit as it is integrated into the complete system. This is done again after all units are integrated and after deployment. This architecture ties directly into supporting the iterative rapid application development (RAD) process.

Web/Internet environments lend themselves to a specific development model, commonly referred to as Joint Application Development/Rapid Application Development (JAD/RAD). The fundamental principle of JAD development is to ensure the cooperatively work on defining the requirements for the project, setting priorities for development, examining and balancing options and quickly making decisions that meet the user's needs and are technically optimal. This minimizes the time necessary to develop the detailed requirement for any project, and more importantly, improves understanding, and tends to reduce rework, confusion, and other downstream problems that traditionally cause development cost overruns.

Then the RAD process is implemented, where a rough prototype of the product is created to validate that it works expected and delivers the desired functionality. When the prototype is approved, then the development is refined to create a robust, fully functional system.

3.4 Rapid Application Development - Development Methodology (RAD)

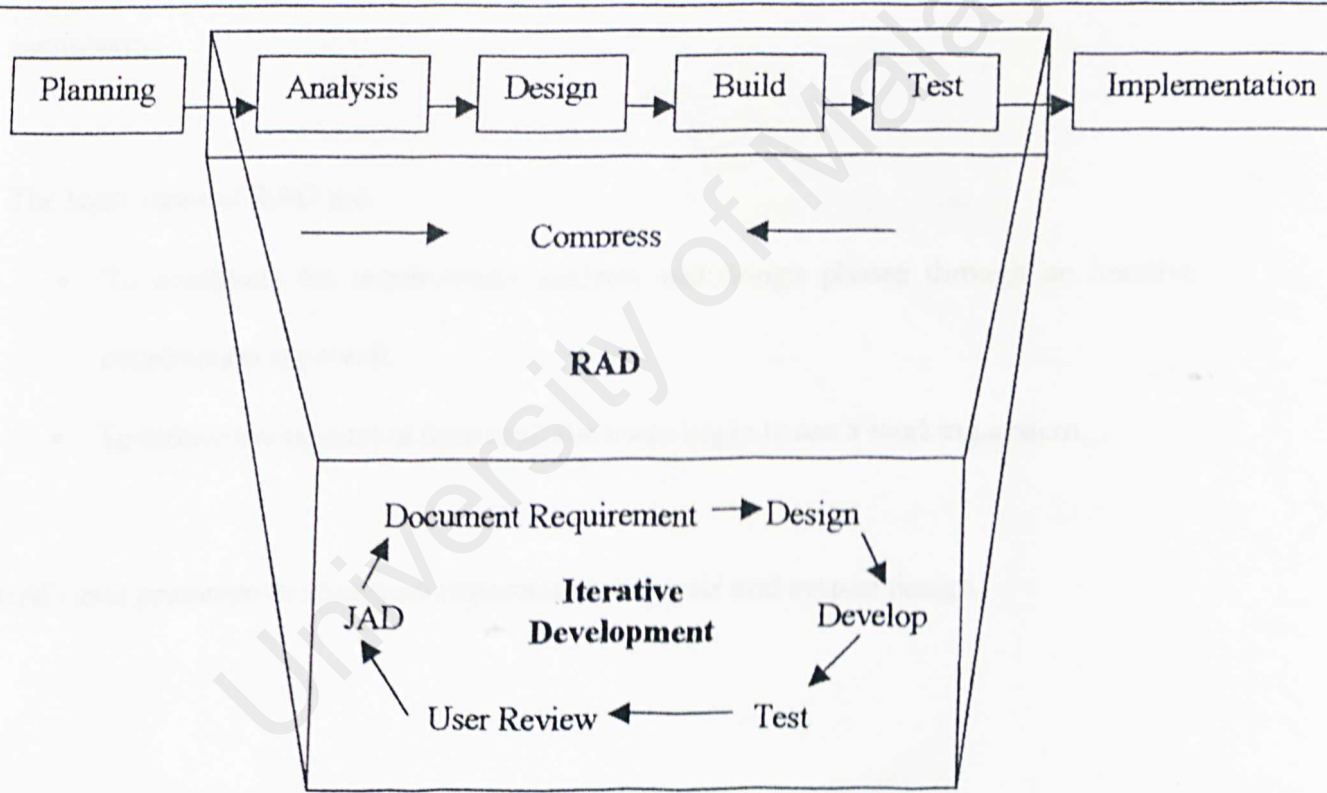


Figure 3.1 Rapid Application Development (RAD)

Iteration allows for effectiveness and self-correction. Studies have shown that human beings almost never perform a complex task correctly the first time. However, people are extremely good at making an adequate beginning and then making many small refinements and improvements.

RAD methodology emphasizes extensive user involvement in the rapid and evolutionary construction of working prototypes of a system to accelerate the system development process. RAD is some times called a spiral approach because of the repeatedly spiral through the phases to develop a system in various degrees of completeness and complexity.

The basic ideas of RAD are:

- To accelerate the requirements analysis and design phases through an iterative construction approach.
- To reduce the amount of time until the users begin to see a working system.

RAD uses prototype to accelerate requirements analysis and system design.

3.4.1 Prototype

A prototype is a smaller-scale, representative or working model of the users' requirements or a proposed design for an information system.

It is a process of iterative design and implementation of (a part of) the system with the objective to identify quickly its insecurities. It can deal with unstable specifications because the primary goal is not to implement a full-blown operational system but to identify and clarify problem areas, which were insecure when the project started. It can reveal a (partly) working system in a fairly fast time, so that feedback can be given at the soonest point in time. The chances to involve final acceptance of the system – increase because users will obtain already early a “look and feel” opportunity. Experience of users can be used and dealt with within the course of system development and implementation.

It reveals also the opportunity to manage the complexity of the system. Applying stepwise refinement reduces complexity and improves quick feedback because even early versions of tiny elements of the system can be released for that goal once the framework is implemented (first prototype of the system). And it does not hinder the implementation of the concept of modularity.

It will be the vehicle for developing the full requirement for the system, and its definition will be the preliminary requirements for the system. Just as you do not need to develop the full requirements before you build the prototype, you also should not attempt to build the prototype without some kind of a definition of it.

Defining the prototype before building it helps users think through the basic functions of the system. It is a valuable thing to do, even if the prototype may change considerably when the user actually begins to see its outputs.

3.5 Stages in the RAD Methodology

The stages in the RAD methodology are planning, analysis, build, test and implementation.

3.5.1 Planning

In the planning phase, the current problem will be identified, the need of the system will be recognized and the system objectives will be set. This planning phase is established by the survey phase in terms of scope, development strategy, schedule, and resource requirements. The big picture, not details is concerned. Furthermore, whether resource will be committed to the project is determined.

3.5.2 Analysis

The analysis phase involves the processes of analyzing the existing systems and determining the new system's requirements as well as the developing tools. It will identified the solutions, analyzes those solutions, and recommends the *Online Payment System* that is designed, built, and implemented.

3.5.3 Design

The design phase concerns on the system architecture, database design, user interface design as well as the outcome of the reports and screens. It defined as those task that focus on the specifications of a detailed real time solution for the *Online Payment System*.

Design phase, focuses on the technical or implementation concerns of the Online Payment System. There a few strategies or techniques for performing system design, such as Information Engineering (IE), Prototyping, Modern Structure Design, Joint Application Development (JAD), Rapid Application Design (RAD), and Object-Oriented Design (OOD). For *Online Payment System* design, prototyping and RAD are the techniques that been used.

3.5.4 Build/Coding

After designing the system, it comes to the build/coding phase. It is normally known as development stage. This stage will carried out a few activities such as build/coding, installation, and testing of the system components. It develops and tests the functional system, which fulfills the design requirements and implements the interfaces for *Online Payment System*. The tasks that are included in this phase are building and testing database, install and test the software packages, and write and test the programs.

3.5.5 Test

In the test phase of *Online Payment System* development process, three levels of testing need to be done, which are:

i. System testing

It ensures that all application program written and tested individually can be integrated into *Online Payment System*.

ii. Unit or program testing

It is a test that been carried out to ensures every events and modules that had been coded are tested as an integrated unit; It is testing of an entire program of the *Online Payment System*.

iii. Stub testing

In this stage, all tests are carried out on isolated subset of a program.

3.5.6 Implementation

Lastly, implementation stage will deliver Online Payment System into day-to-day operation. This phase will lead to system test and preparing conversion plan.

The system test is done using the system test data that was developed earlier. As with previous tests that were performed, the system test may result in required modifications to programs, thus, once again prompting the return to a construction phase task. This iteration would continue until a successful system test was conducted.

After a successful system test has been completed, the *Online Payment System* is prepared to be placed into operation. By using the design specifications for the Online Payment System, a thorough conversion plan is deployed. This plan identifies database to be installed and documentation that need to be developed.

The conversion plan includes a system acceptance test plan. It is the final system test performed by end-users using real data and real time. It is an extensive test that addresses three levels of acceptance testing, which are: Verification testing, Validation testing and Audit testing.

4.1 Introduction

System design is a process through which requirements are translated into a model or presentation as the software that can be assessed for quality before coding begins. For this stage, the requirement which are identified earlier are translates into system features and characteristic.

The following design issues have been considered:

- System architecture design
- System functionality design
- User interface design
- Database design

4.2 System Architecture Design

Online Payment System had used the architecture design show in figure 4.1. This means Internet users can access to the web-based application using the browser. However, the administrative team can access to the system using the visual basic application.

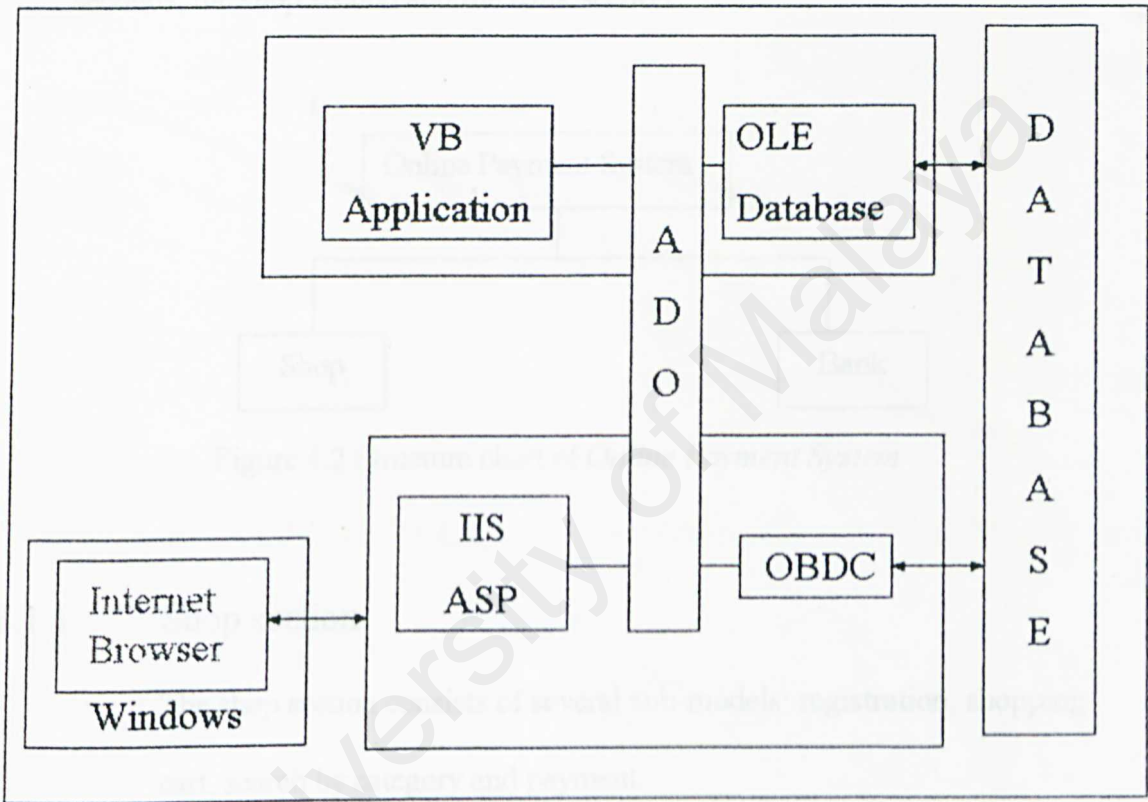


Figure 4.1 The System Architecture Design

4.3 System functionality design

The system functionality focuses more on the function of the entire system that is the system structure design and data flow diagram.

4.3.1 System structure chart

AS shown in figure below online payment system is divided into two main sections, the shop section and the bank section.

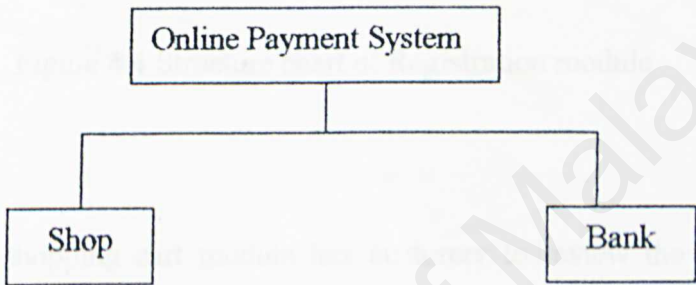


Figure 4.2 Structure chart of *Online Payment System*

4.3.1.1 Shop section

The shop section consists of several sub-models: registration, shopping cart, search by category and payment.

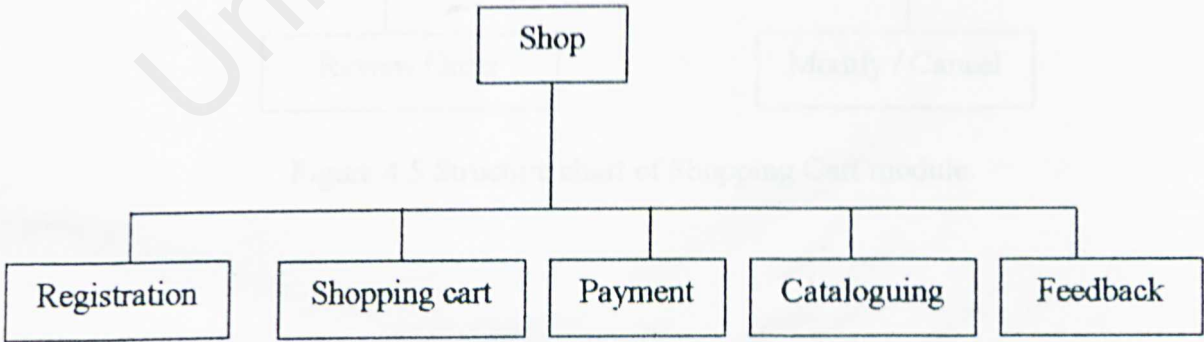


Figure 4.3 Structure chart of Shop section.

The registration module lets the existing user to logon to the system or new user to register to the system. Modification of customer data is also done here.

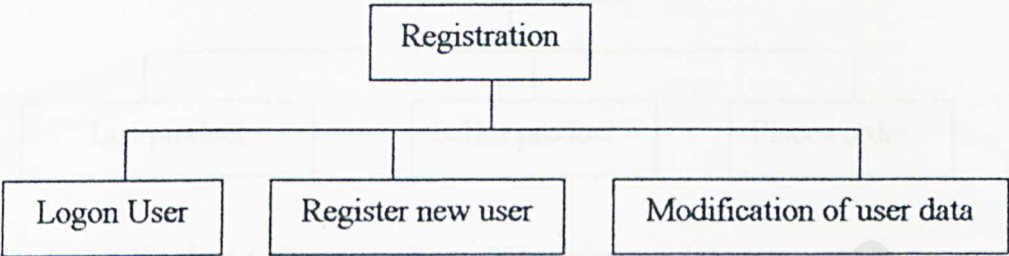


Figure 4.4 Structure chart of Registration module

The shopping cart module lets customer to review the orders (shopping goods), the quantity of the purchased items can be modify in this section or cancel the purchasing process. Customer may also proceed to next stage with is payment.

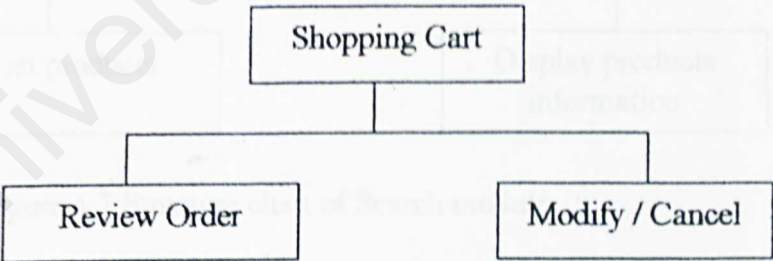


Figure 4.5 Structure chart of Shopping Cart module.

The shopping module list all the products by category, lets customer select products by category, add products to shopping cart and places order.

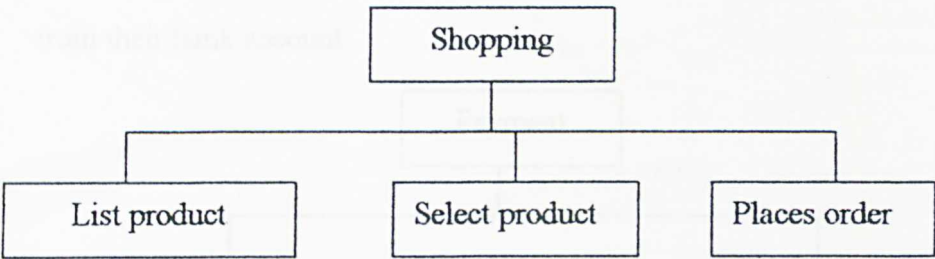


Figure 4.6 Structure chart of Shopping module.

The Search by category module will list out the product available in the shop according to the categories. It will also list out all the details information about the product.

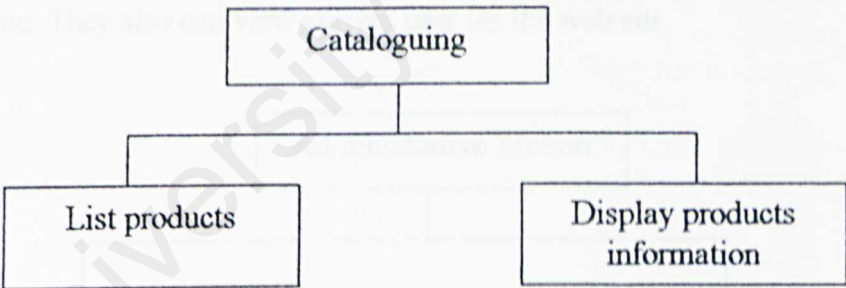


Figure 4.7 Structure chart of Search module.

The payment module allows the customer to do their payment online.

They just need an account in the bank and the money will be deducted from their bank account.

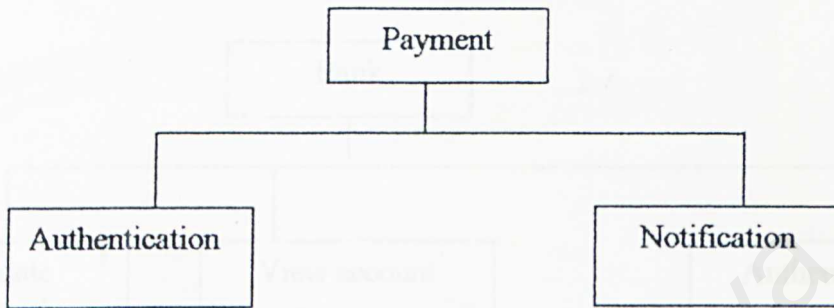


Figure 4.8 Structure chart of Payment module.

4.3.1.2 Administrative section

Under administrative section, administrator can update the information in the web site. They also can view current user for the web site.

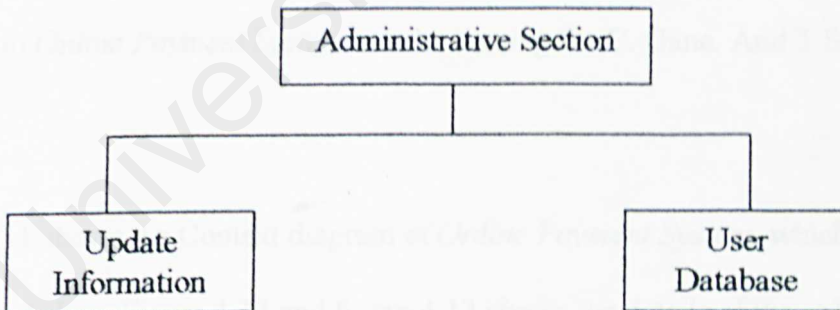


Figure 4.9 Structure chart of Administrative section

4.3.1.3 Bank section

Bank section will be a separated web site that allows users to login and check their account. Customers also can print their transaction history. They are able to update their particular in he bank.

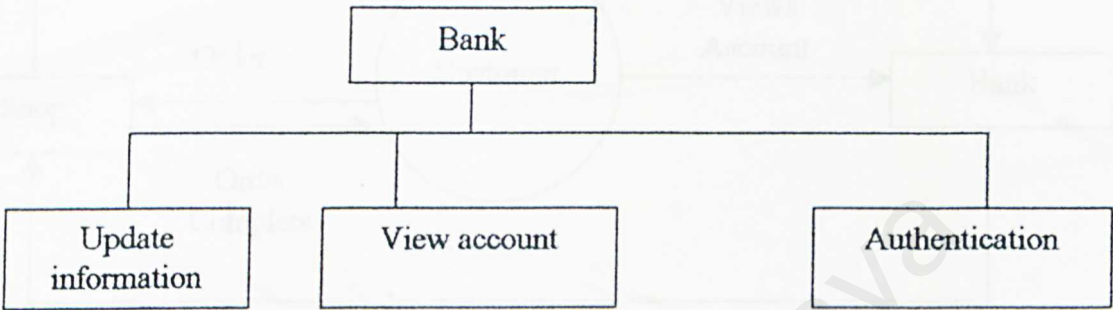


Figure 4.10 Structure chart of Bank section

4.3.2 Data Flow Diagram (DFD)

The DFD depicts the broadest possible overview of the system inputs, process and output, which corresponded to data movement through the system. Data flow diagram in *Online Payment System* are show using the C. Gane. And T Sarson notation.

Figure 4.11 shows the Context diagram of *Online Payment System*, which consists of bank and shop. Figure 4.12 and figure 4.13 shows the details of the online shop and the bank respectively.

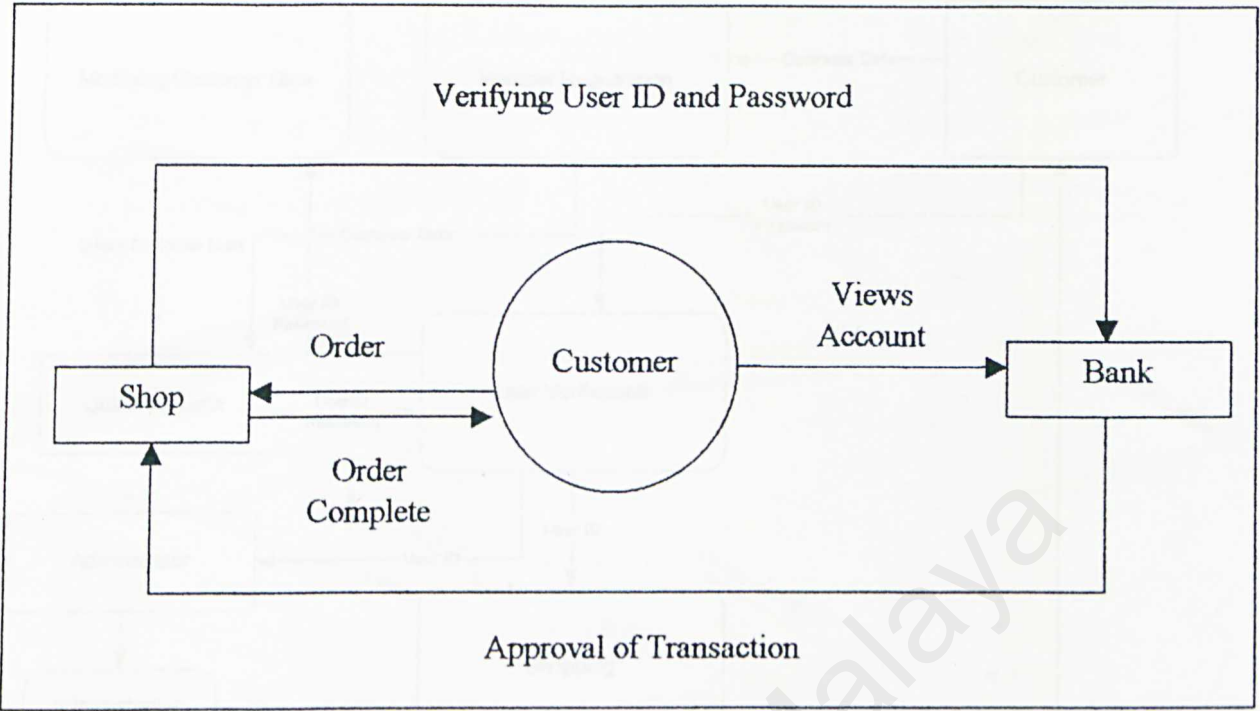


Figure 4.11 Context Diagram for *Online Payment System*

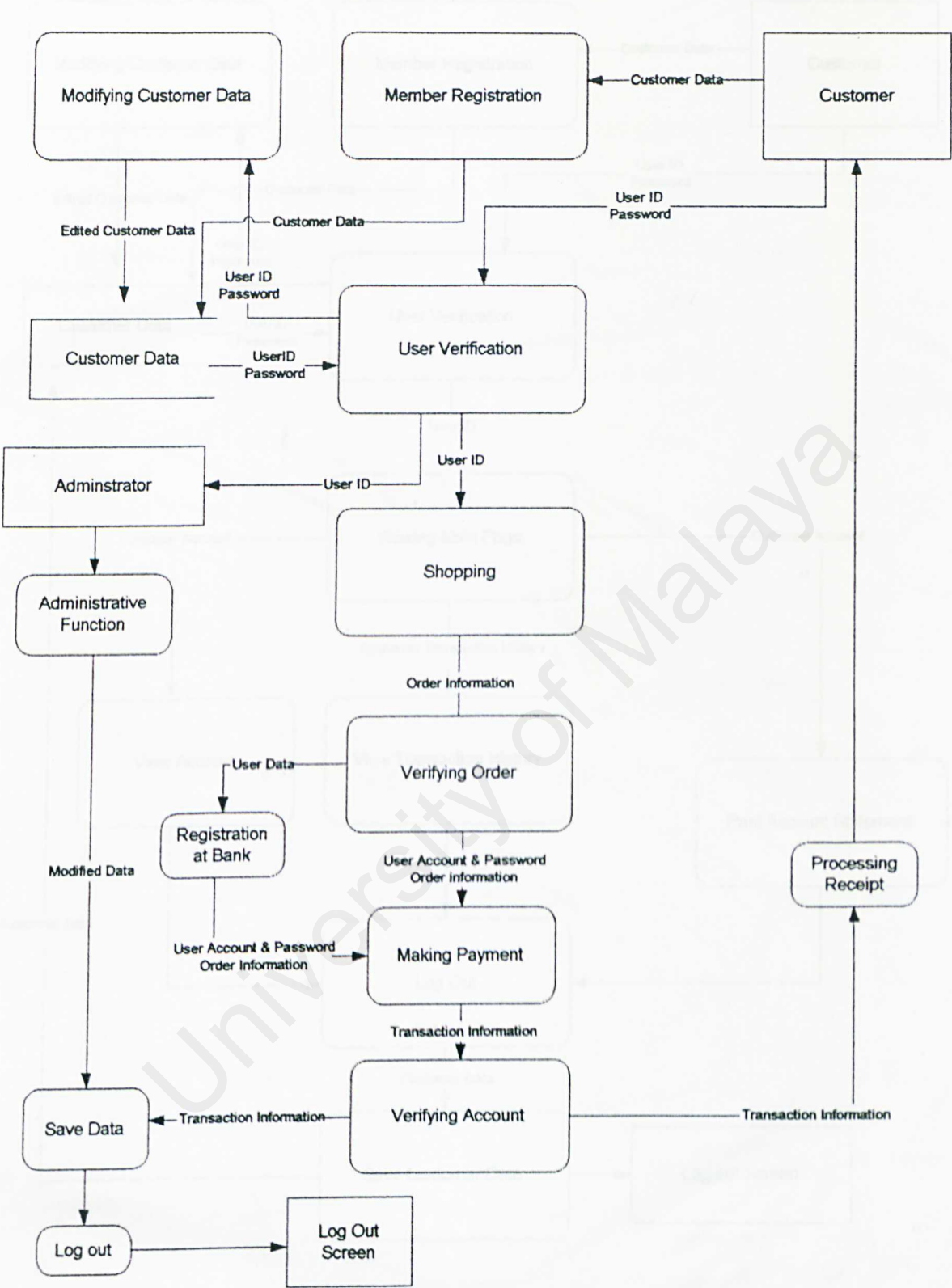


Figure 4.12 Data Flow Diagram of online shop.

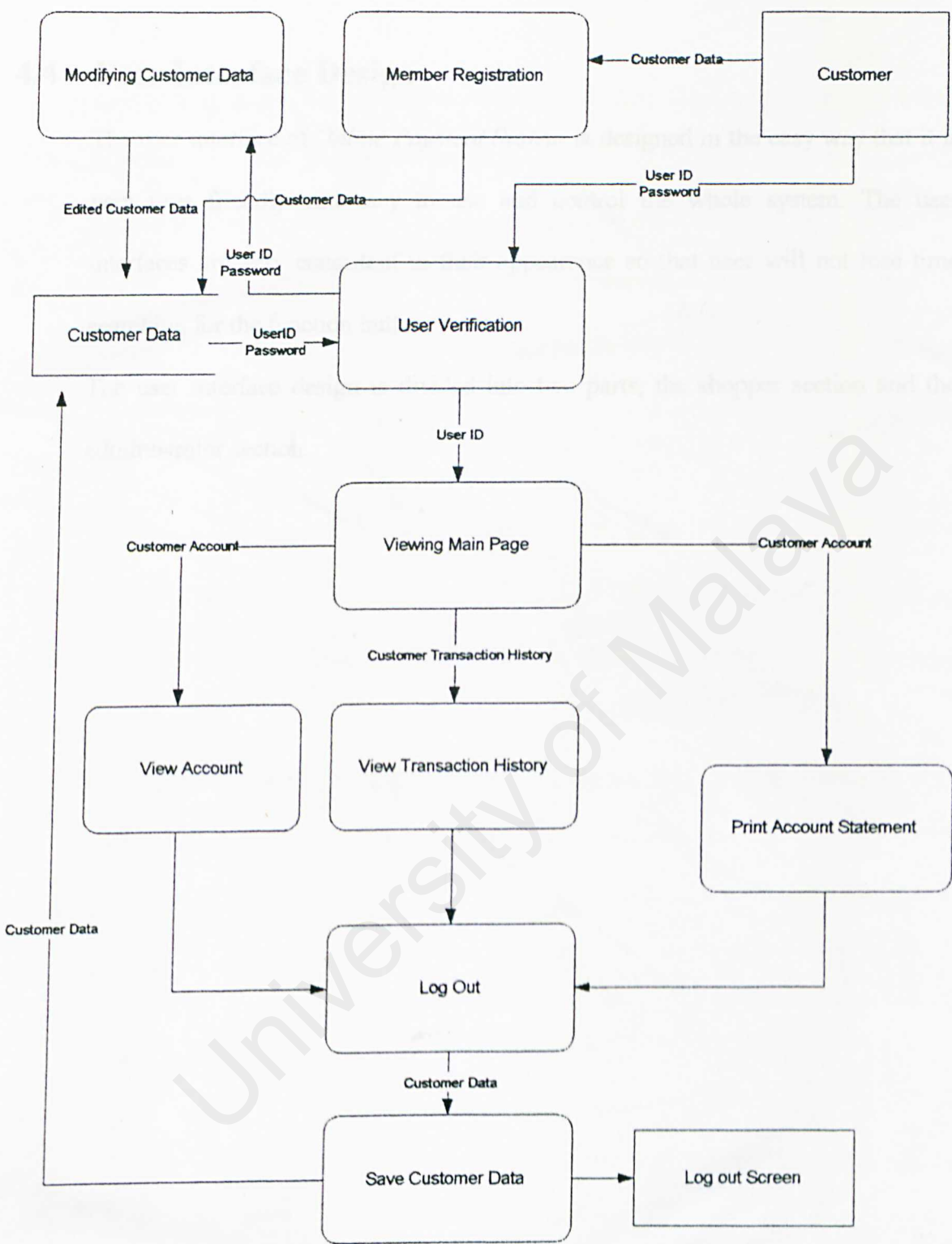


Figure 4.13 Data Flow Diagram of online bank.

4.4 User Interface Design

The user interface of *Online Payment System* is designed in the easy way that it is very user friendly and easy to use and control the whole system. The user interfaces are very consistent in their appearance so that user will not lose time searching for the function button.

The user interface design is divided into two parts, the shopper section and the administrator section.



Figure 4.14 User Interface of Online Shop

4.4.1 Shop section

In the main page, it will publish the some banner of advertisements to attract customer. The top (header) bar in the page is the navigation bar. It provided the hyperlink to the appropriate web pages. It also consists of a member column that will allow member to login or new member to register. It allows users to login or register as a new user. Users will be lead to the main age if the login or registration is successful.

The left (side) bar of the main page consists of a few buttons that shows categories of products that sell be the shop. This button will directly bring user to the page where they want to view the items they are interested in.

The appearances will be similar through out the whole shopping process. It is to keep the interface consistent and user - friendly to the user.

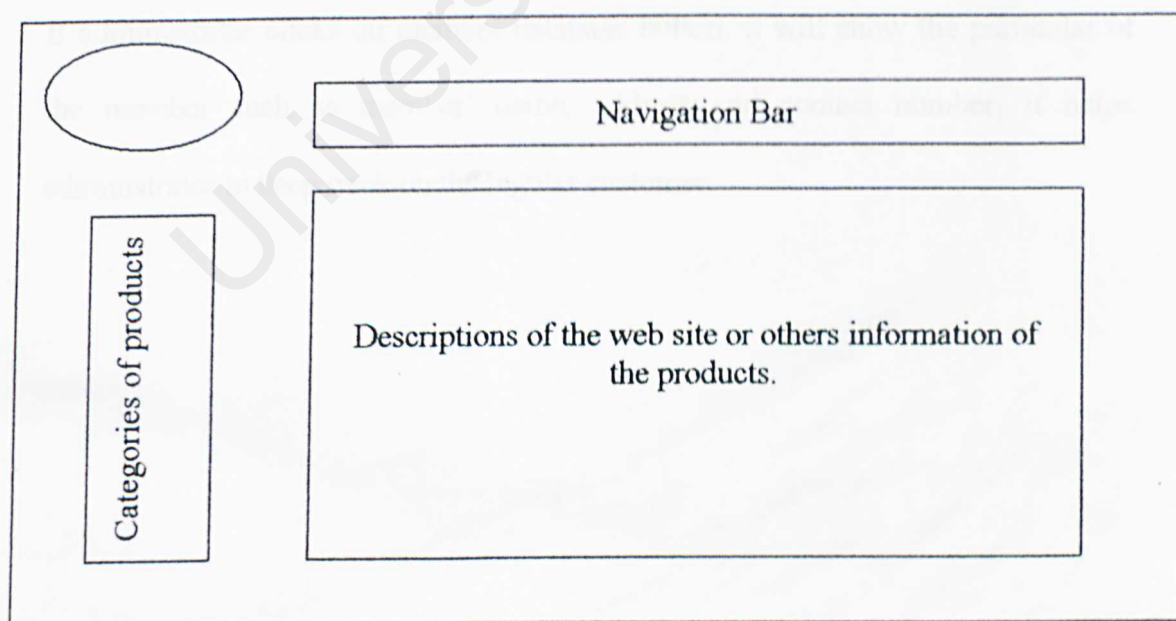


Figure 4.14 User Interface of Online Shop.

4.4.2 Administrator section

This first page of the administrator web site is also a login page. The user will be lead to the main menu. It has four buttons on the side navigation bar: Update web site, Sales report, Member database and Exit.

When the administrator clicks on Update web site, he/she can do some modification on the product sale on the web site. The administrator can update the latest product and the promotion that will be carried out.

When Sales report button is clicked, a sales report will be generated. Administrator can choose whether it is a daily, weekly or a monthly report. Administrator can analyze the sales and come out with a more proper strategy to increase the sales.

If administrator clicks on member database button, it will show the particular of the member such as member' name, address and contact number. It helps administrator to keep track on the regular customer.

4.4 Bank Section

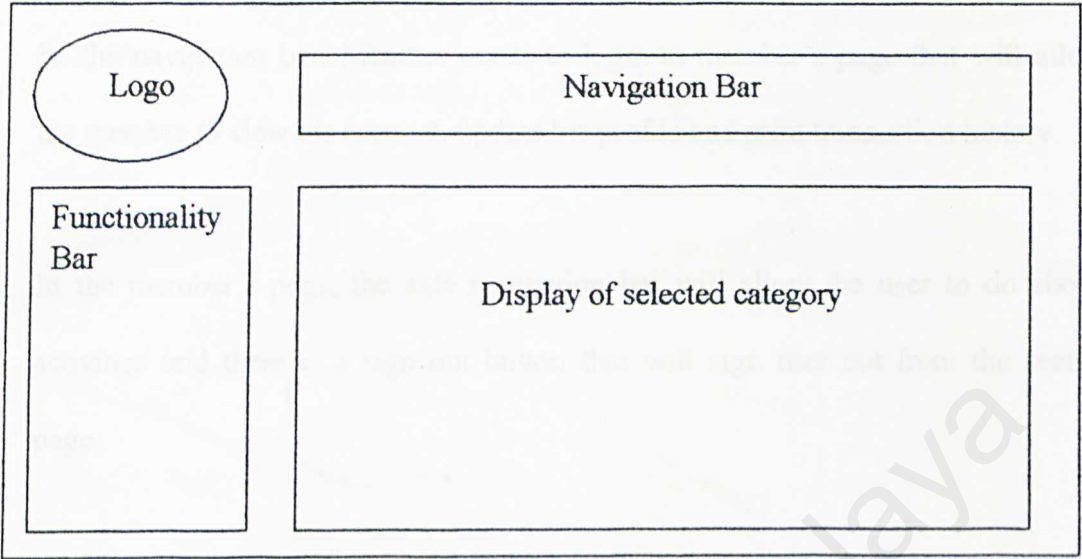


Figure 4.15 User Interface of Administrative Section



Figure 4.16 User Interface of Bank Section

4.4.3 Bank section

In the main page, there will some advertisements. At the left hand side, there will be the navigation bar. Member needs to login to member's page that will allow the member to view his account, update his profile and print transaction history.

In the member's page, the side navigation bar will allow the user to do above activities and there is a sign out button that will sign user out from the secure page.

At the main page, new member will lead to a registration page for new registration.

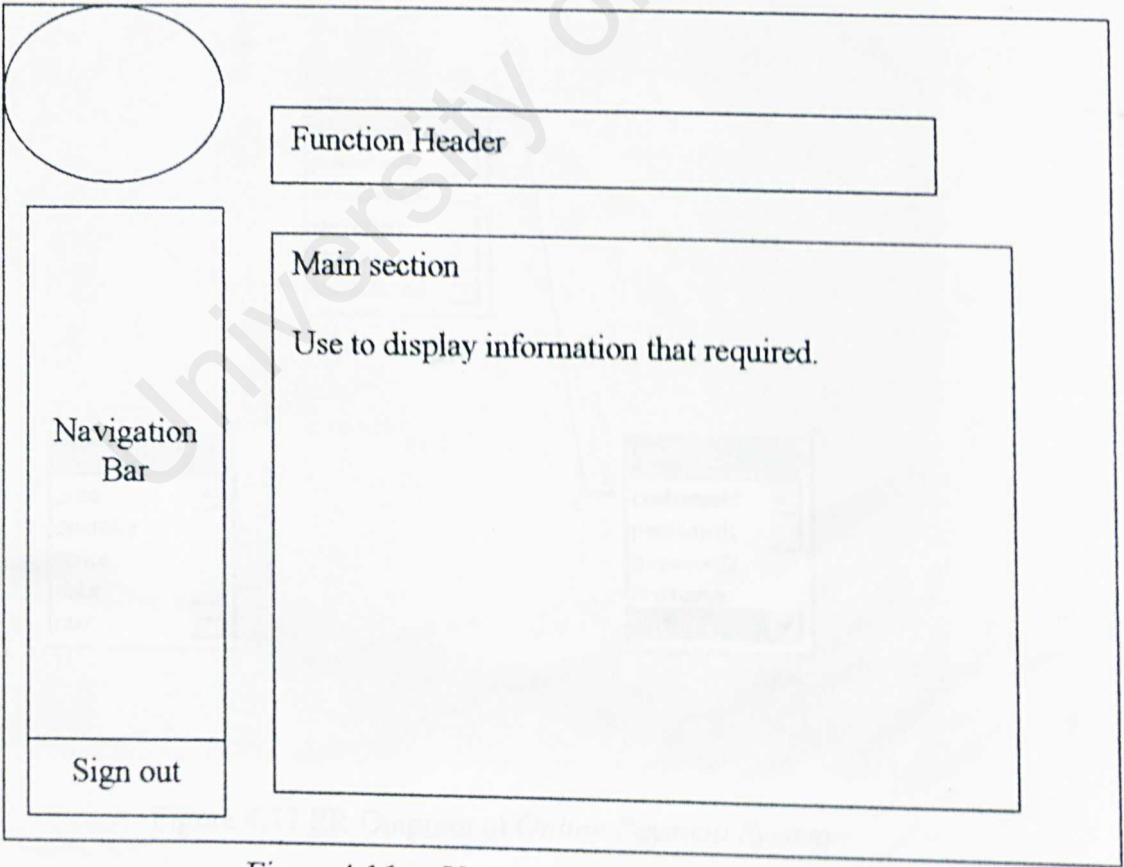


Figure 4.16 User Interface of Bank Section

4.5 Database Design

The system used the relational database model. A relational database is perceived to be a collection of tables on which data are stored.

The areas covered for the database design are:

1. The entity Relationship (ER) Diagram for the entire database.
2. The database table.

4.5.1 Entity Relationship (ER) diagram

The entity relationship diagram is shown as below, where it depicts the relationship between each entity on the system.

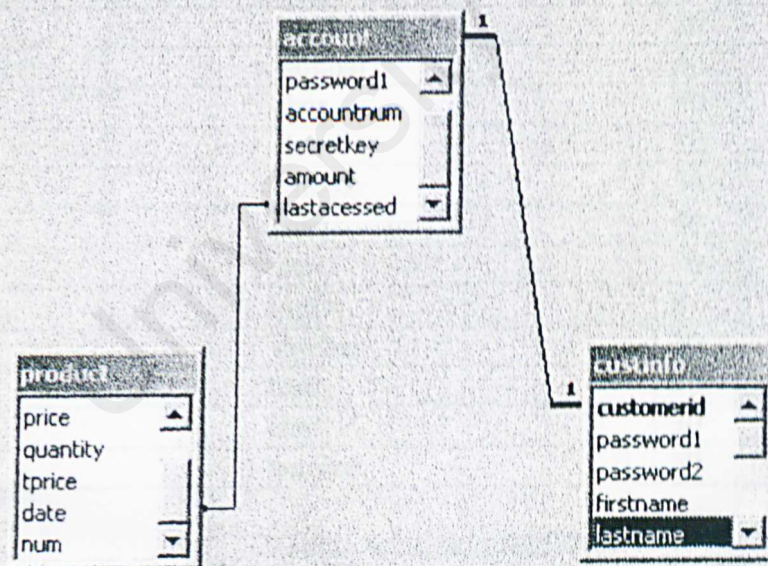


Figure 4.17 ER Diagram of Online Payment System

4.5.2 Database Tables

The database is divided into four main areas:

- 1. User Data
- 2. Sale Data
- 3. Account Data

4.5.2.1 User Data

The user data is what is used to identify the particular user that is searching the product database, order database and account database in the system.

To support the user data needs in the application. Database will contains a CUSTOMERS table. All primary keys are underlined.

Field Name	Data Type	Field Size
customerid	varchar	20
password 1	varchar	20
password2	varchar	20
firstname	char	30
lastname	char	30
street	varchar	50
city	char	50
state	char	50
zipcode	bigint	8
country	varchar	30
phone1	char	30
phone2	char	30
Email	varchar	20

Table 4.1 Customer Table

* The Customerid is used to log into the system.

4.5.2.2 Sale Data

The 2nd major part is Sale data that will help the system to keep track of the item purchased by the user and also calculate the total amount that the user need to pay.

Field Name	Data Type	Size
category	varchar	50
productname	varchar	50
price	money	8
quantity	Varchar	50
tprice	money	8
date	datetime	8
num	int	4

Table 4.2 Product Table.

4.5.2.3 Account Data

The last area of the database is Account data of customer. It will keep all the needed information of the user account to perform online payment.

Field Name	Data Type	Size
customerid	varchar	50
password1	varchar	50
accountnum	numeric	9(18,0)
secretkey	numeric	9(18,0)
amount	money	8
lastacessed	datetime	8

Table 4.3 Account Table.

5.0 Introduction

System implementation is the acquisition and integration of the physical and conceptual resources that produce a working system (Meyer, Baber and Pfaffenberger, 1999). It is the physical realization of the database and application designs (Connolly and Begg, 1998). There are two main tasks in the system implementation phase that is system development and system testing.

5.1 System Development

5.1.1 Database development

The first step in the system development is to develop the system database based on the logical data model for Online Payment System created during the system design phase.

Creating an empty database called OPS starts the database development. All the tables are then created by specify all the fields for each table and the field properties. A primary key is allocated for each table in the database. After all tables being created, relationships between the tables is established to enforce referential integrity. The referential integrity is an important constraint on a relationship that ensures consistency between related tables.

5.1.2 Application development

Application development involves code generation that translates all the algorithms into ASP program language instructions. Several programming principles have been employed in writing the program to ensure system consistency, maintainability and readability. All the programming principles are as following:

- a) Choosing meaningful variable names, procedure names and parameter variable names helps a program to be “self-documenting” without excessive use of comments
- b) All declarations are placed at the beginning of procedure and declarations are separated from the executable statements in that procedure with a blank line to make the declarations stand out and contribute to program readability
- c) When calling a sub command, use keyword *cmd_submit* and enclose arguments being passed in parentheses to improve program readability
- d) Insert comments to document the programs and improve program readability

Figure 5.1 & Figure 5.2 show the sample of coding for sending feedback from patron. All the programming principles have been followed when writing the code.

```

<HTML>
<% @ Language=VBScript %>

<HEAD>
</HEAD>
<BODY>
<TABLE border=0 cellPadding=1 cellSpacing=1 style="WIDTH: 90%" width="90%">
  <TR>
    <TD><!-- #include file ="include/topbanner.asp"--></TD></TR></TABLE>

  <TABLE border=0 cellPadding=1 cellSpacing=1 style="WIDTH: 90%" width="90%">
    <TR>
      <BR>
      <TD Valign ="baseline"><!-- #include file ="include/sidenav.asp"--></TD>
      <TD Valign ="top" ><FONT size=3><FONT color=orangered
        style="VERTICAL-ALIGN: top" >
    <TABLE border=0 cellPadding=2 cellSpacing=2 style="WIDTH: 60%" width="60%" >
      <TR>
        <TD Valign ="top"><FONT face=Arial><FONT color=orangered>
          <FONT color=paleturquoise>

          <P align=left><FONT size=4><FONT color=orangered><FONT
            color=powderblue>Leaf</FONT> <FONT color=skyblue>Financial</FONT>
            <FONT color=deepskyblue>Institute</FONT>
            </FONT></FONT></FONT></FONT>is a new establish field of Leaf financial institute.
            This is the website site that link to your own account in Leaf Financial Institute.
            You can also check your account balance online and view the latest online transaction
            payment. </FONT></P>

          <P align=justify><FONT face=Arial size=3>
            You can buy the product that sell in online shopping mall that linked from this page.
            you just need to register your account and key in your user_ID and password then leave
            the rest to us. It is very simple to use.</FONT></P>

          <P align=justify><FONT face=Arial>Use this new application now and
            you will enjoy 20% off of any product in our online shoppingmall.</FONT></P>
        </TD>
      </TR>
    </TABLE></TD></TR></TABLE>
  <TABLE align=left border=0 cellPadding=1 cellSpacing=1 width="90%">
    <TR>
      <TD><!-- #include file ="include/bottomnav.asp"--></TD></TR></TABLE>
</BODY>
</HTML>

```

```
<script language=vbs>
sub cmd_submit()

    if form1.customerid.value = "" and form1.password1.value = "" then
        alert("Please Login Here.") 'check both login name & password box
        form1.customerid.focus 'filled and alert if not?
    elseif (form1.customerid.value = "") then
        alert("Please enter a login name.") 'check login name box filled and alert if not?
        form1.customerid.focus
    elseif (form1.password1.value = "") then
        alert("Please enter a Password.") 'check password box filled and alert if not?
        form1.password1.focus
    else

        form1.action = "chkpwd.asp" 'send data to check password
        form1.submit
    end if
end sub
</script>
```

Figure 5.2 Sample Code of Online Payment System

6.0 Introduction

System testing is a verification and validation process. A successful testing will uncover errors in the software and demonstrates that system functions appear to be working according to specification (Pressman, 2001). Glen Myers (1979) states a number of rules that can serve well as testing objectives:

- a) Testing is a process of executing a program with the intent of finding an error
- b) A good test case is one that has a high probability of finding an as-yet-undiscovered error
- c) A successful test is one that uncovers an as-yet-undiscovered error

6.1 Testing principles

There is a set of testing principles that should understand to guide the system testing. Several testing principles suggested by Davis (1995) have been followed in testing the Virtual Basic including:

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

6.2 Testing strategies

There are various testing strategies available to assess completeness and correctness of a system. The newly developed Online Payment System is tested thoroughly using different testing strategies that involve a series of test strategies including unit testing, integration testing and error handling and debugging. The test also involves some IT literate and non-IT literate user. Feedback forms were distributed and their opinions will be used to review the system and also for future system enhancement.

6.2.1 Unit testing

Unit testing focuses verification effort on the smallest unit of software design that is system module. During this step, all important control paths are tested to uncover errors within the boundary of the module by using the component-level design description as a guide (Pressman, 2001).

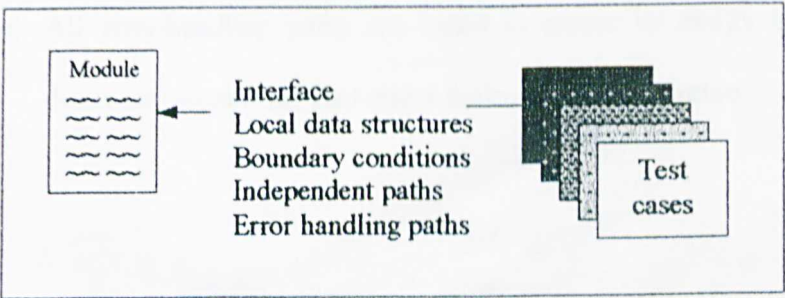


Figure 6.1 Unit Test

Generally, the unit tests involves five test cases as shown in figure 5.3 and the purpose of each test case is stated below (Pressman, 2001):

- a) Module interface is tested to ensure that information properly flows into and out of the program unit under test.
- b) Local data structure is examined to ensure that data store temporarily maintains its integrity during all steps in an algorithm's execution and the local impact on global data should be ascertained during unit testing
- c) Boundary conditions are tested to ensure that the module operates properly at boundaries established to limit or restrict processing
- d) All the independent paths through the program structure are excised to ensure that all statements in a module have been executed at least once
- e) All error-handling paths are tested to ensure its ability to detect and recover all fatal errors during system execution

6.2.2 *Integration testing*

Integration testing is a systematic technique for constructing the program structure while at the same time conducting tests to uncover errors associated with the interfacing. Its objective is to take unit tested components and build a program structure that has been dictated by design (Pressman, 2001).

The integration testing was conducted incrementally where the system is constructed and tested in small increments to isolate and correct the errors easier and the interfaces are more likely to be tested completely (Pressman, 2001).

There are a number of different incremental integration strategies available including top-down integration, bottom-up integration, regression testing and smoke testing. Based on the system characteristics and project schedule, a combined approach that uses top-down tests for upper levels of the program structure, coupled with bottom-up tests for subordinate levels was selected as Online Payment System's system integration testing.

Top-down integration beginning with the main control module as a test driver and stubs are substituted for all components where modules are integrated moving downward through the control hierarchy. Tests are conducted as each component is

integrated. Top-down integration enables the detection of design error early in the testing phase and avoiding extensive redesign or re-implementation (Connolly and Begg, 1998).

Bottom-up integration begins construction and testing with atomic modules where low-level components are combined into cluster to perform a specific system subfunction and tested. Bottom-down integration is an easier test case design because processing required for component subordinate to a given level is always available and thus the need for stubs is eliminated.

6.2.3 Error handling and debugging

Error handling enables the development of clearer, more robust and more fault-tolerant programs. Error handling provides the ability to attempt to recover from infrequent fatal errors rather than letting them occur and suffering the consequences (Deitel, 1999). In Online Payment System, error-handling codes only applied at place where errors are likely to occur because it will make the code more difficult to understand and maintain.

Debugging is the process of finding and correcting errors or bugs in the source code of computer program (Meyer, Baber and Pfaffenberger, 1999). There are a number of debugging tools being used in performing the system debugging, including Toggle Breakpoint, script debugger, Add Watch and so on. When debugging the system, the Locals window and immediate window are used to check the value of variables.

7.0 Introduction

This chapter includes problem encountered and its solution, strengths of the system and the overall conclusion.

7.1 Problems encountered and it's Solution

There are several problems encountered throughout the development of *Online Payment System* including:

a) **Unsupported features between programming tools and operating system**

There are several features in IIS 5.0 that are not supported by the Windows 2000 Professional. The problem occurs because some of the protocol in IIS 5.0 that do not supported by Microsoft Windows 2000 Professional. For example the Secure Socket Layer (SSL) using port 443 was disabled because Microsoft Windows 2000 Professional do not have the Certificate Services. Without the certificate, there will be no encryption between two parties when conducting a transaction. Finally, it is decided to use Microsoft Windows 2000 Server as the Operating system because it can create the certificate that will be used by IIS 5.0 to run SSL protocol..

b) Programming problems

Lack of ASP, SQL2000 Server, VBScript and JavaScript programming skills cause a lot of problems during the system coding state. However, all the problems had been solved finally by reading a lot of references and explore the Internet.

c) Lack of latest references

This is the main problem faced when finding references for the literature review and finding programming reference books. This problem had solved by visiting to online resource such as Microsoft's MSDN and TechNet, ASP programming language website, some online banking agency and online shop.

d) Lack of payment transaction flow knowledge

Limited knowledge in transaction flow cause the difficulty of developing an appropriate procedures, designing the database and the system transactions. Guidance from supervisor and information from several IT consultants from my last attached company providing a clearer and better understanding of online payment process and procedures.

7.2 Strengths of The System

a) Attractive and Simple Graphic User Interface

The Online Payment System interface is attractive and simple where it relies heavily on browsing and pointing especially for the user. The catalogue's colorful point and click graphical interface brings fun and success to the information retrieval process.

b) Cataloguing system

The online shop is cataloging the items by categories and it is displayed in the form that very easy to view and browse. This will save a lot of user's time when they are trying to search for a particular item.

c) System security

User name and password are required to login in to the system and the authorized person is allowed to change the password and particulars anytime. Besides that, the connections between two parties are encrypted with Secure Socket Layer (SSL). This will prevent others from tapping the information while conducting a transaction.

d) Frequently asked question

The system provides a section called frequently asked question that help to answer user doubt about the online payment system

e) Clear instruction

All instruction that given in the website is direct and clear. It is meant to be user- friendly and combination with graphics makes it simpler for the user to get ready to use the system.

f) Fast response time

The website is minimizing its usage of graphics and animation icon to reduce the response time. The users do not need to wait for a long time just to download the information they looking for.

7.3 Limitation of The System

Due to the time constraints, some functions that have been planed didn't work out. The history function that allow user to check their transaction history has been drop from this online payment system.

Administrator's section that plan to have the abilities to update data on the website and also view the report of the transaction also been left out due to time constraints.

For future enhancement, this system can be integrated with the inventory system. It will also help the administrator to keep track of the sale and inventory.

7.4 Conclusion

Online Payment System has been successfully achieved and fulfilled its objectives as a secure and reliable online transaction system that requires the minimum of time to study and use by users.

A lot of valuable knowledge has been gained throughout the development of *Online Payment System* including knowledge of the transaction flow, programming knowledge, database designing and the understanding of latest technologies and protocol used to secure a transaction over the internet.

The project has been a good practical testing on undergraduates' capabilities in handling and developing a project. It provides the opportunity for them to apply all gained knowledge to a real world environment.

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1. Anup K. Ghosh. E-Commerce Security. USA. John Wiley & sons Inc. 1998
2. Gary P. Schneider, James T. Perry. Electronic Commerce. Canada. Course Technology, 2000
3. Chris Ullman, David Buser, Jon Duckett, Brian Francis, John Kauffman, Juan T. Llibre, David Sussman. Beginning ASP 3.0. United State. Wrox Press Ltd. 2000
4. H.M. Deitel, P.J. Deitel, T. R. Nieto. Visual Basic 6 How To Program. United State. Prentice Hall. 1999
5. IT Professional. SQL Server 7.0 Database Implementation Training Kit. United States. Microsoft Press. 1999
6. Jonathan Gennick. Oracle SQL Plus. United State. O'Reilly & Associates. 1999
7. David M. Kroenke. Database Processing. 7th Edition. United Stated. Prentice Hall. 2000
8. Jeffrey L. Whitten, Lonnie D. Bentley, Kevin C. Dittman. System Analysis And Design Methods. 5th Edition. United State. McGraw-Hill. 2000

Referenced Web Sites

1. Cybercash www.cybercash.com

It responsible for on-line payment systems cybercash sips and cybercash.

2. Terisa Systems www.terisa.com

The primary advocates of the S-HTTP protocol.

3. Maybank www.maybank2u.com

Malaysian's premier online banking agency. It provides online payment without using Visa or Master card.

4. UOB Singapore www.uob.com.sg

Singapore's bank that provide online banking system.

5. Amazon.com www.amazon.com

1st online books store ad now has expanded into an online market place. It is one of the most successful online shops.

6. eBay.com www.ebay.com

eBay.com is an online store that sells various kinds of products. It also provides auction facilities to user that register themselves as member of the web site.

7. Microsoft.com www.microsoft.com

Microsoft is the world's largest software company. It provides all technical help to system engineer and developer.

8. Sun Micro System <http://java.sun.com/products/jsp/index.html>

It provides technical help and example for java script and also some others programming language.

9. ASPFree.com www.aspfree.com

This web site provides many source codes on ASP and also many examples were shown in the web site.

10. <http://www.lse.ac.uk/decomat/docs/task24.htm>

11. <http://www.creativedata.com/research/rad.html>

12. <http://www.domaintech.com/corporate/solutions/methodology.cfm>

Online Payment System (OPS)
Final Year Project (WXES3181/2)
Faculty of Computer Science & Information Technology

System Evaluation Form

1. How do you find the performance of the system?
☐ Excellent ☐ Good ☐ Fair
2. Do you think the system is useful?
☐ Yes ☐ No
3. Would you use this system, if it has been rolled out?
☐ Yes ☐ No
4. How does the links in the system facilitate your navigation?
☐ Excellent ☐ Good ☐ Fair
5. Is the system interface user-friendly?
☐ Yes ☐ Not Quite ☐ No
6. Are the system instructions clear?
☐ Yes ☐ No
7. Is the system response time acceptable?
☐ Fast ☐ Acceptable ☐ Not So Fast
8. Are you satisfied with the system security features?
☐ Yes ☐ No
9. Do you intend to introduce the system to your friends?
☐ Yes ☐ No
10. In your opinion, what is the future enhancements needed for the system?

📖📖📖📖📖 THANK YOU 📖📖📖📖📖

Name : _____

Signature : _____

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4.4 Product confirmation

4.5 Viewing shopping cart

4.6 Making payment using OPS

4.7 Transaction completed



This is the main page of Online Payment System.

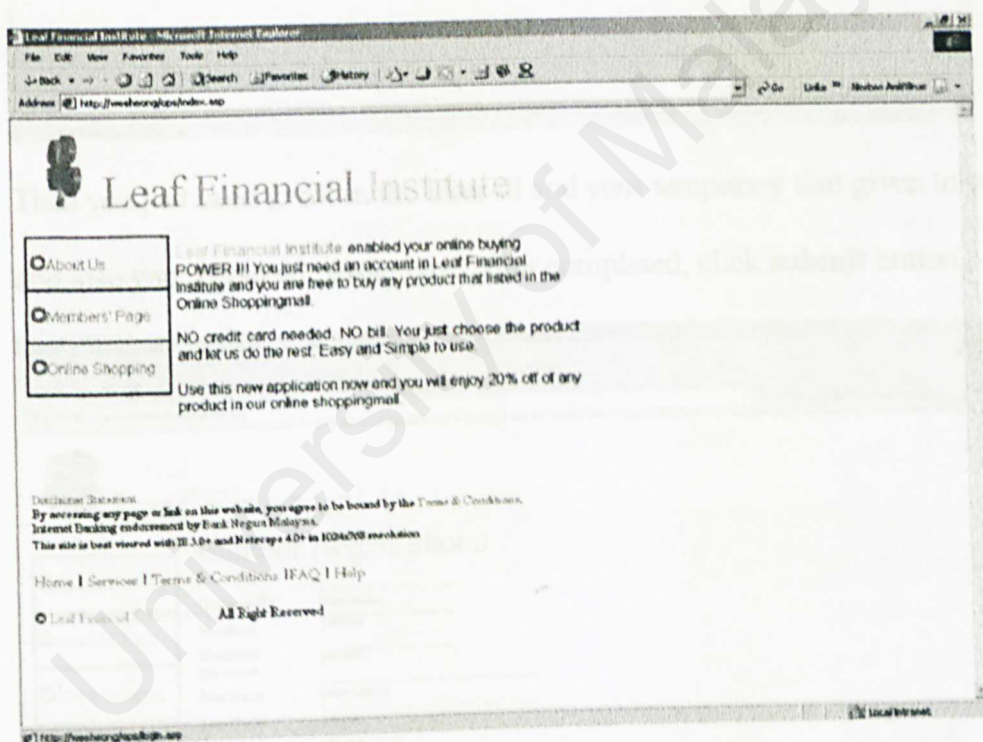
1.0 Getting started with Online Payment System

1.1 Register yourself to OPS

You have to be a user before you can use the *online payment system*; you required two things that are your User ID and password. You can get your user id and temporary password at any of our branches.

1.2 Register your account number to your user ID

After you have your user id and temporary password, you just need to go to our web site to register as an online user. Just follow the following steps:



This is the main page of *Online Payment System*.

a) Click **Member's Page**, and then click on the **Sign Up!!**

LFI Members' Page

● About Us
● **Members' Page**
● Online Shopping

User ID:
Password:

Submit

Not yet a member ? signup !!

Address: http://weebecg/eps/login.asp

Then you just need to fill in the User id and your temporary that given to you and also your personal particulars. After completed, click **submit** button.

Leaf Financial Institute
Member Registrations

● About Us
● **Members' Page**
● Online Shopping

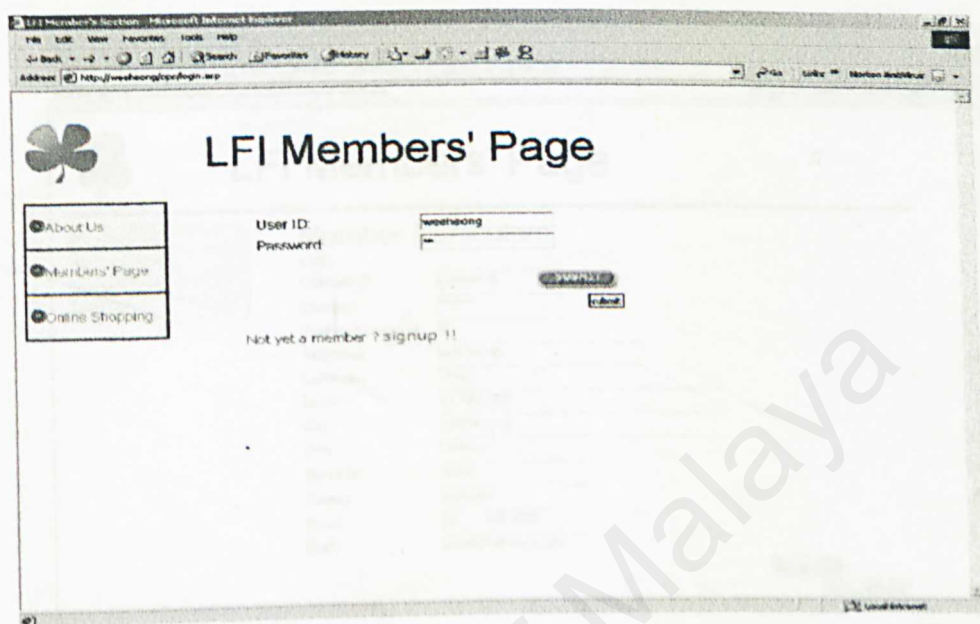
Customer ID: weebecg
Password:
Confirmed Password:
First Name: woo heong
Last Name: chueh
Street: 61, Jalan 5/69
City: Petaling Jaya
State: Selangor
Zip Code: 46000
Country: Malaysia
Phone: 03 - 7781 4578
Email: chueh78@yahoo.com

Submit

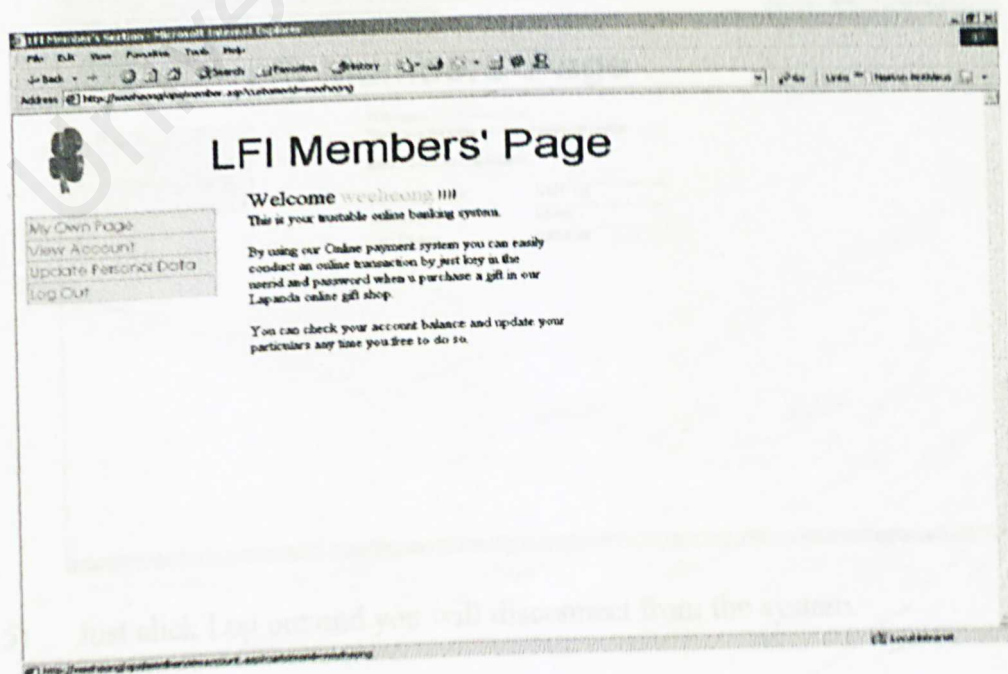
Address: http://weebecg/eps/register.asp

2.0 Member's Function

- 2.1 So now you are ready to log in. Type your User id and password on the respective area and click **submit**.



- 2.2 If you login successfully, then you will enter your own page. At there you can view your account balance and also update your personal particular which you need to change your password immediately after you log in to the system.



- 2.3) You need to change your password by going to Update Personal Data, at there you just have to retype the password you choose and click submit.

The screenshot shows a web browser window titled "LFI Members' Page". On the left, there is a sidebar with a four-leaf clover logo and a menu with the following items: "My Own Page", "View Account", "Update Personal Data", and "Log Out". The main content area is titled "Member Particulars" and contains a form with the following fields and values:

<TR>	
Customer ID:	weehpong
Password:	weehpong
Confirmed Password:	weehpong
First Name:	weehpong
Last Name:	chunh
Street:	61 jalan 5/69
City:	petaling jaya
State:	selangor
Zip Code:	46000
Country:	malaysia
Phone:	03 - 77814578
Email:	chunh78@yahoo.com

At the bottom right of the form, there is a button labeled "Update particulars".

- 2.4) You can also view your own account balance in you bank account by clicking View account.

The screenshot shows the same "LFI Members' Page" web browser window. The sidebar menu remains the same. The main content area now displays a welcome message and account balance information:

Welcome ... weehpong
Thank you for using our online payment system.

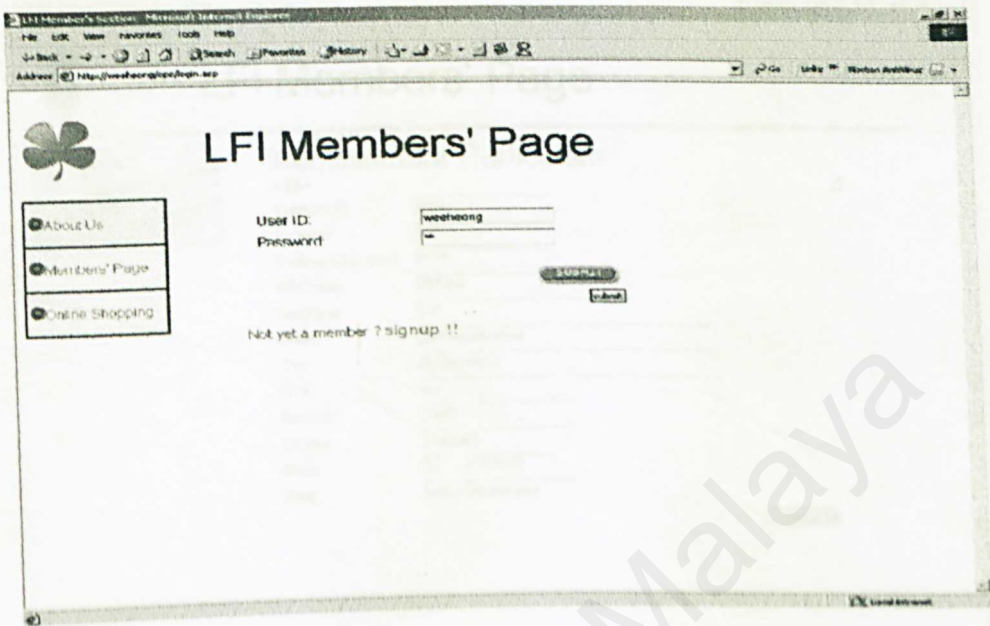
Here is your account balance:

Account Number:	11111112
Account RM:	12000
Last Update:	1/21/2002

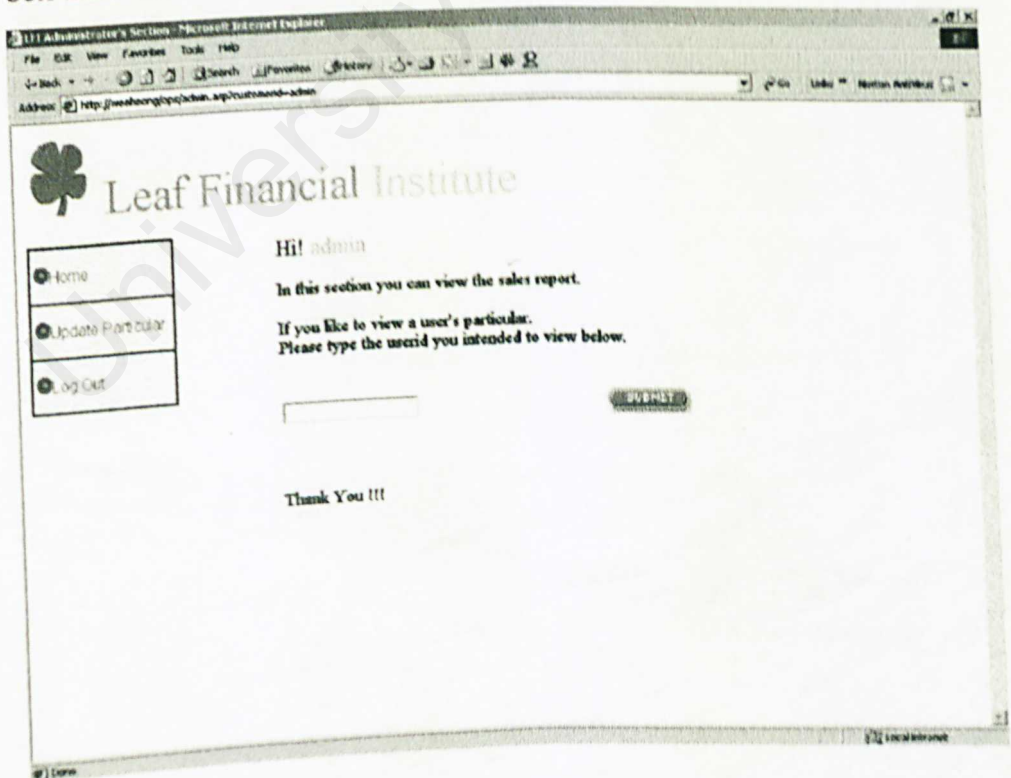
- 2.5) Just click Log out and you will disconnect from the system.

3.0 Administrator

- 3.1 Type your User id as “admin” and password on the respective area and click submit.



- 3.2 After Login in to the administrator's page, you can check the user data from the user database by enter the user id you intended to view in the text box then click submit.



- 3.3 Administrator can also advise to update their own particulars such as Password regularly to prevent people to hack in the system

The screenshot shows a web browser window titled "LFI Administrator's Section - Microsoft Internet Explorer". The address bar shows "http://www.hongkong.com/updateuser.asp?username=admin". The page is titled "LFI Members' Page" and features a sidebar with links: "My Own Page", "View Account", "Update Personal Data", and "Log Out". The main content area is titled "Administrator Particulars" and contains a form with the following fields:

< TB >	
Customer ID:	admin
Password:	
Confirmed Password:	
First Name:	PSKTM
Last Name:	ULM
Street:	University Malaysia
City:	Kuala Lumpur
State:	no
Zip Code:	50603
Country:	Malaysia
Phone:	03 - 79655555
Email:	admin@pskdm.com

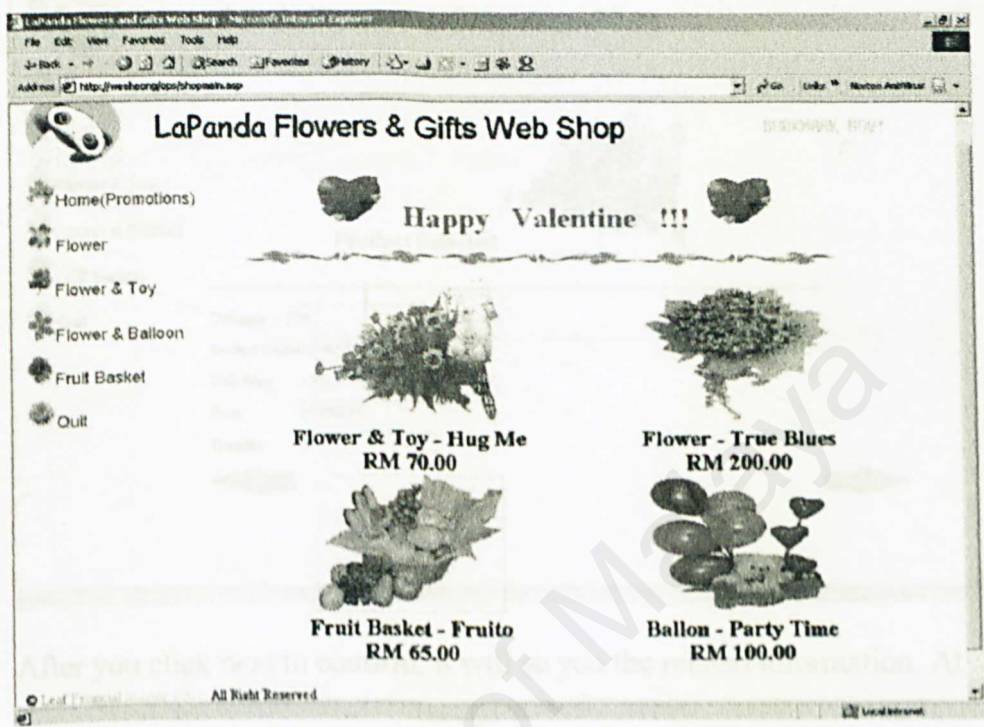
A "Log Out" button is located at the bottom right of the form.

- 3.4 Just click on the Log out link on your side navigation bar and you will disconnect from the system.



4.0 Shop function

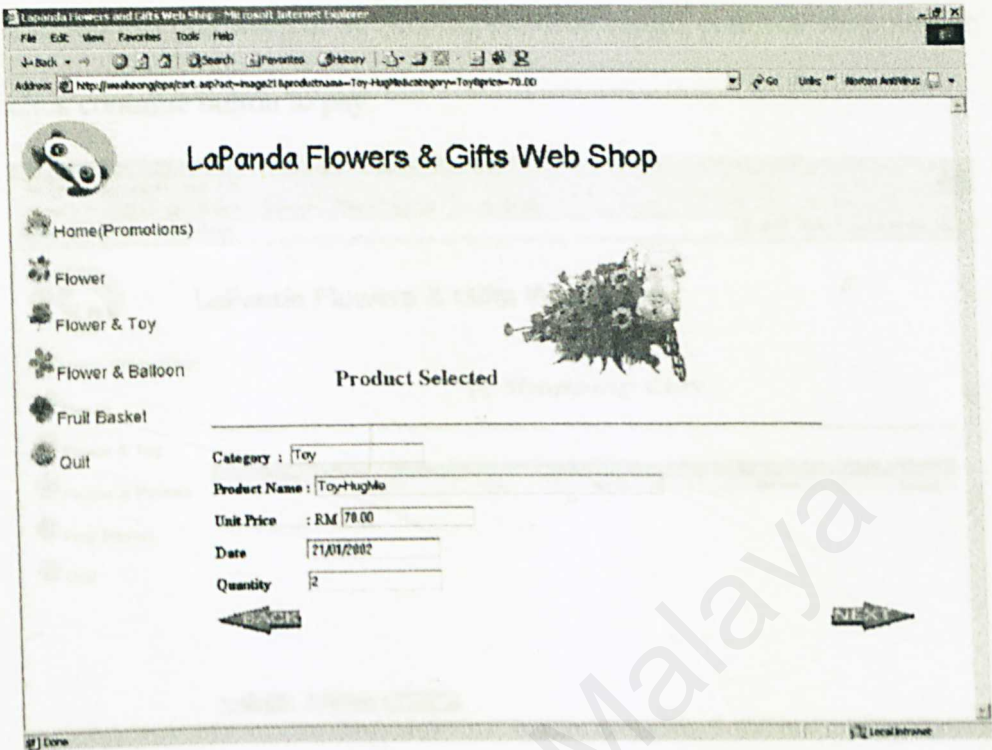
4.1 Cataloging (Select by categories) this function enable user to browse the website more easily and faster.



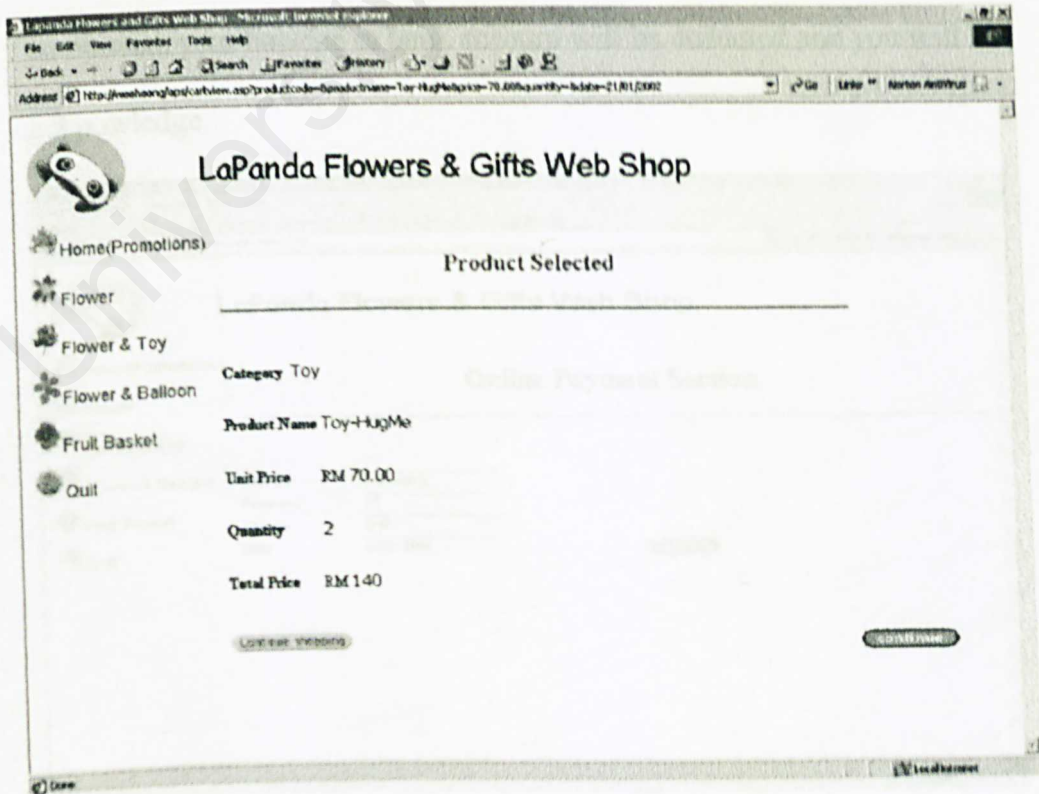
4.2 To add item you choose in to your shopping just click on the shopping cart image.



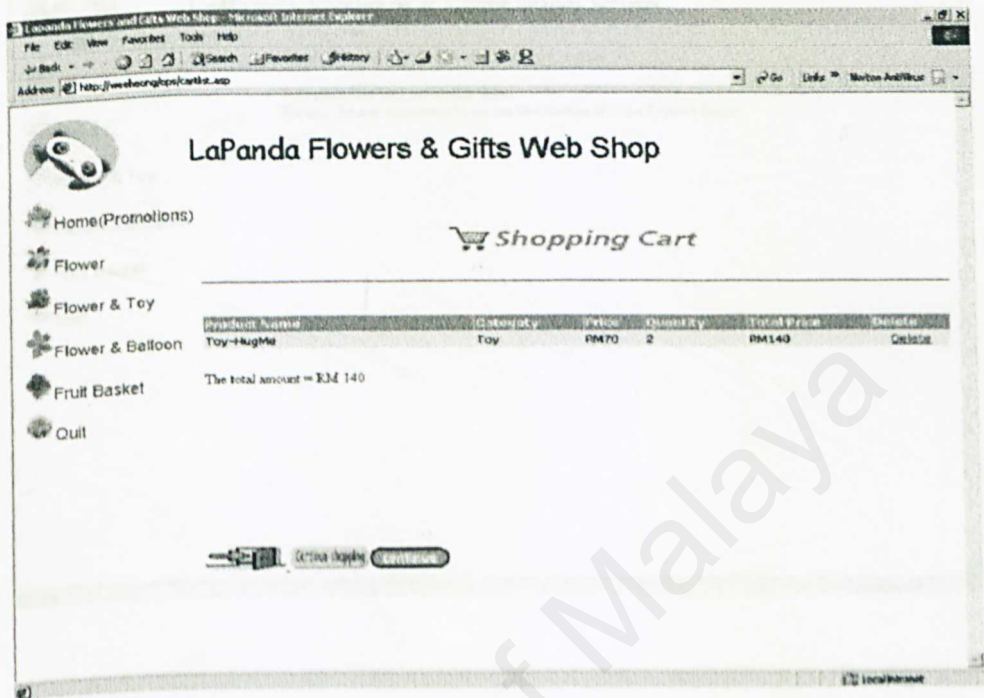
4.3 After adding the item, you need to input the quantity you like to purchase.



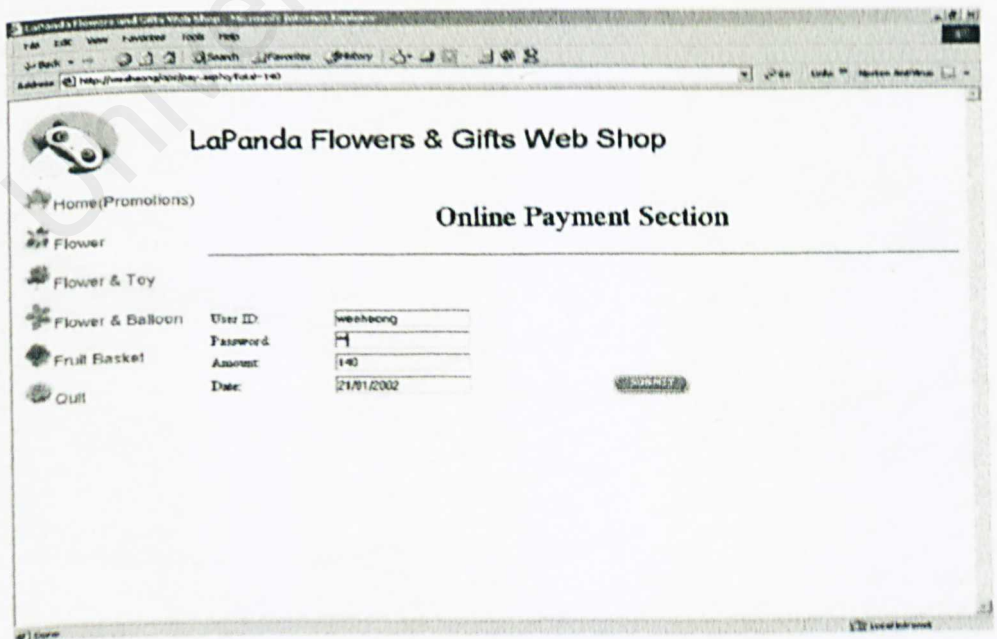
4.4 After you click next to confirm, it will so you the related information. At this page you can choose to continue shopping or continue and pay.



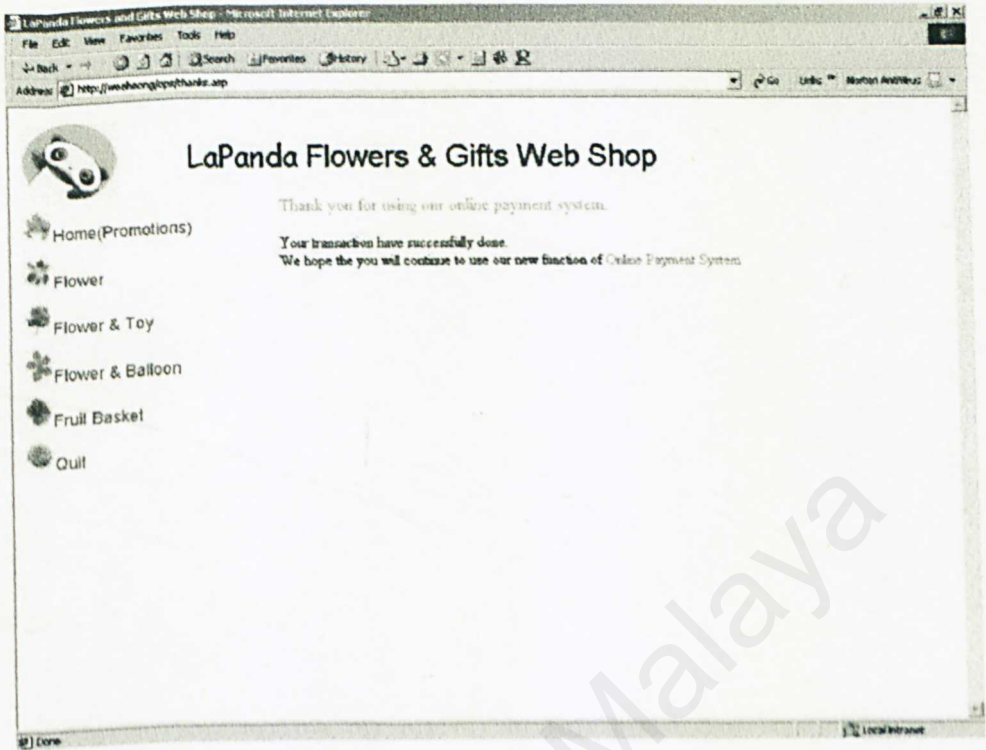
- 4.5 If you click continue at the previous page then u will come to this page, at this you can quit without by clicking the door image, continue shopping or click continue button to pay.



- 4.6 Key in your user id and password and click pay. When the transaction is completed, your balance in bank account will be deducted and you will be acknowledge.



4.7 After your transaction successfully completed. You will see this page.



Thank you for reading this user manual for *Online Payment System*, we hope that you find it useful and enjoy using this system.