USING SMART CARD TO PURCHASE TEXT INFORMATION FROM DIGITAL LIBRARY

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ABSTRACT

In middle of 1990s, World Wide Web (WWW) had transformed the online world tremendously. Therefore, digital library is a kind of modern library that been implemented in order to provide a better services and convenience to the users especially Internet users.

The title for this project is "***Using smart card to purchase text information from Digital Library***". This project is developed for the users in order to use a smart card to purchase text information in a digital library via Internet. Usually, users are allowed to browse, read the information and retrieve information in a digital library. Therefore, smart card is used as electronic cash or purse to replace the real monetary for dealing transaction. Here, the text information is the electronic journals (e-journals). What about the payment system? The smart card payment system is using the concept that is quite similar to prepaid card payment system. In other words, users can top up the value of electronic cash that stored inside smart card by paying the equivalent monetary value.

The integration of advanced features such as the smart card payment system and information retrieval in digital library, newsletter, e-mail and etc further enhanced this system by allowing more sophisticated and interactive online tasks to be executed among users and the administrator.

The development tools for this system are mainly, Microsoft Frontpage 2000, Microsoft Interdev 6.0, Active Server Page (ASP), VbScript and utilizing Microsoft SQL Server on Microsoft Window 2000 NT Server platform,

ACKNOWLEDGEMENT

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Besides, I would like to express my thankful and appreciation to all the great folks and course mates for their terrific support and help – especially Mr. Lum Kok Sheong and Mr. Lim Yang Chi.

Finally, the accomplishment of this report depends largely on the resources available through the Internet, reference books, and past year thesis reports.

1.0 INTRODUCTION

1.1 Overview of Text

First of all, what is the text? Usually texts refer to words, sentences and paragraphs. For example, this report consists of text. Typically, the term texts refer to text stored as ASCII codes (that is without any formatting). Object that are not text include graphics, numbers (if they are not stored as ASCII characters), and program code. Text processing refers to the ability to manipulate words, lines and pages. In this project, text information is electronic journals.

Journal means a periodical dealing especially with of current interests or a daily newspaper such as magazine, daily press and etc. while, electronic journals are those journals, magazine or daily press that stored in electronic form.

The emergence of Digital Library as a modern library that might replace the traditional library in future caught the world, and Internet user community, by surprise. Digital libraries can be used to store several kind of information such as text, image, audio and etc.

In my opinion, text information is the core information that stored in digital library.

1.2 Overview of Smart Card

A smart card is basically a plastic card that contains an integrated circuit used for processing transactions or information. The smart card contains a microprocessor or memory chip embedded in it. The memory chip is use to stores electronic data and programs that are protected by advanced security features. The terminal to read the card in the store or vending machine, often called as smart card reader, takes the information from the stored-value card and stores it in computer memory. As coupled with a smart card reader, it has the processing power to serve many different applications or functions. As an access-control device, smart cards make personal and business data available only to the appropriate or legalized users. Furthermore it provides users with the ability to conduct a purchase, transaction or exchange value. Moreover, smart cards provide data portability, security and convenience.

The birth of smart card could be traced back as early as 1983, where the General Telecommunication Agency in France introduced the "Telecarte", a prepaid memory card for the telephone, as a solution to prevent public phones. Since then important progress has been achieved. New applications are being explored for smart cards on a daily basis. Some of the current smart card applications are electronic purse, subscriber identity module (SIM) for cellular phones, credit card, welfare, health care, access control, mass transit etc. Smart cards have the ability to combine many applications together into one card.

Recently, the varieties of smart cards are memory cards and microprocessor cards. Microprocessor card can add, delete and manipulate information in its memory on the card. On the other hand, memory cards simply store data and can be viewed as a small floppy disk with optional security.

1.3 Overview of Digital Library

A digital library is not merely a collection of electronic information. It is an organized and digitized system of that can serve as a rich resource for it s user community.
(Donald *J. Waters)*

"A digital library is a machine readable representation of materials which might be found in a university library together with organizing information intended to help users find specific information. A digital library service is an assemblage of digital computing, storage, and communicate machinery together with the software needed to reprise, emulate, and extend the services provided by conventional libraries based on paper and other material means of collecting, storing, cataloging, finding, and disseminating information."
(*Edward A. Fox, editor, Source Book on Digital Libraries, 1993, pg. 65*)

"Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use a by a defined community or set of communities."
(*Digital Library Federation*)

"The new digital libraries will have features not possible in traditional libraries, thereby extending the concept of library far beyond physical boundaries. They will provide innovative resources and services. One example is the ability to interact with information: rather than presenting a reader with a table of numbers, digital libraries allow users to choose from a variety of ways to view and work with the numbers, including graphical representations that they can explore. With the extensive use of hypertext links to interconnect information,

digital libraries enable users to find related digital materials on a particular topic."
(*2001 PITAC Report, "Digital Libraries: Universal Access to Human Knowledge", p. 3*)

"Digital libraries are a set of electronic resources and associated technical capabilities for creating, searching, and using information. In this sense they are an extension and enhancement of information storage and retrieval systems that manipulate digital data in any medium (text, images, sounds; static or dynamic images) and exist in distributed networks. The content of digital libraries includes data, metadata that describe various aspects of the data (e.g., representation, creator, owner, reproduction rights), and metadata that consist of links or relationships to other data or metadata, whether internal or external to the digital library.
(*1996 UCLA-NSF Social Aspects of Digital Libraries Workshop*)

1.4 Problem Definition

"The information infrastructure of the 21st century will enable all human being to access information and communicate with each other easily, reliably, securely, and cost effectively in any medium: voice, data, image or video, anytime, anywhere. This capability will enhance the productivity of work and lead to dramatic improvement in social services, education and entertainment."

Recently, modern libraries have transformed to a way for people all around the world to share their ideas and information, which is called digital library. All the information is stored in electronically form in digital library.

In University of Malaya, our libraries are not yet to be transformed to the form of digital library. Recently, Faculty of Computer Science and Information Technology, University of Malaya has developed a digital library, which is used to store electronic journals. Therefore, this project is developed as a prototype for future in order to integrate the smart card payment system into the current existing digital library system. The main purpose is to provide service that allows subscribers to purchase the e-journals using smart card.

As the conclusion, in this project, we are dealing with three main problems: information retrieval in digital library and smart card payment system.

1.5 Project Objectives

a. Cashless payment application

The smart card payment system is targeted at reducing the costs associated with small value transactions by converting physical monetary value into electrical tokens. Smart card bearer will have to top up the electronic cash value by paying the equivalent monetary value to vendor such as bookshop; vending machine and specified smart card top up center.

b. Transaction control application

Transaction Control Application is an application that utilizes the unique of smart card where it controls the access of member via the security handshaking process. When the member (student or lecturer) wishes to get text information, they need to just slot their smart card into smart card reader. Once go though, they have to login their account with username and password. Then, they are allowed to purchase the text information in digital library. For payment system, it is similar to pre-paid card concept.

1.6 Project Scope

This project is divided into two major modules, which are the user module and the administrator module. User module is accessible by the users (Campus students or lecturers) and the administrator module is only accessible by the authorized administrator or user.

a. User Module

- The user module consists a series of pages that can be accessed by any users on the Internet especially those who want to get information about digital library or buy a text information (e-journals) from digital library. Besides that, users are allowed to request to system administrator through the email if material in this digital library is not enough. In this module, users are given choices to browse and select the pages they wish to access through the features and functions that link from one page to another.

- A smart card bearer must be a member of this digital library; they will have their own password, user ID, Card Number and Card PIN to perform the transaction.

b. Administrator Module

- This module is only accessible by the administrator. Only the authorized administrator is allowed to access and perform the maintenance of database.

1.7 Project Limitation

Due to the time limitation, I will not doing the research on text compression and the architecture of building a digital library. It is because both of them need be research thoroughly in order to get the true picture about it. For this project, a so-called prototype digital library will be developed to perform the tasks.

For the moment, the scopes of this project are limited to the campus students and lecturers. This is due to the cost and lack of expertise. However, the scope of this existing digital library system can be expanded and enhanced according to the needs and demands from user community in future.

For the moment, this digital library only provides text information that is electronic journals. This is due to insufficient time, cost and lack of expertise. This is the pioneer project that will give a lot of benefits in future.

One of the major limitations is subscribers need to have both smart card and card reader in order to complete the purchasing transaction. It will create a lot of inconvenience to the subscribers and will limit the availability of this system.

1.8 Project Schedule

Project schedule is important to ensure the completion of this project. Besides, having this project schedule is to provide a time frame for each development of tasks. Please refer the below Gantt chart for the project schedule of this project.

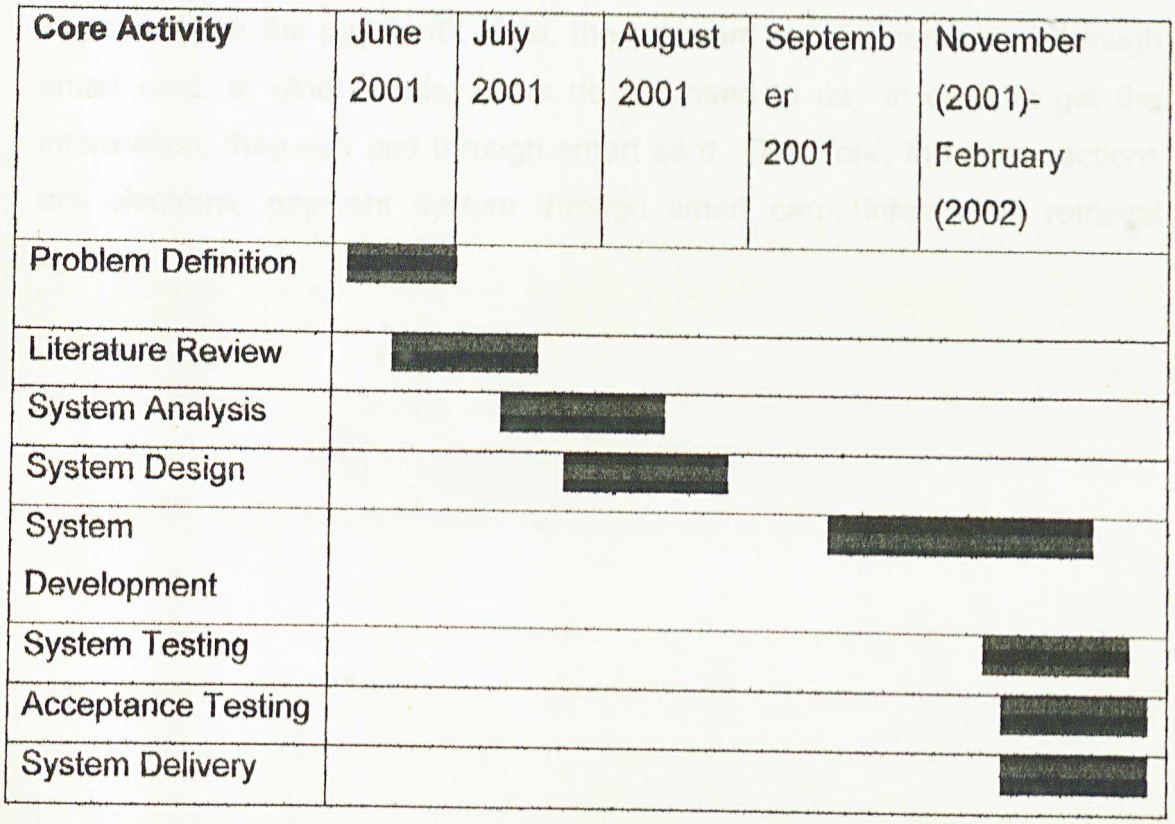


Figure 1.0: Gantt chart showing the Period of Each Core Activities

1.9 Summary

The development and implementation of this system is using smart card to purchase the electronic journals that are stored electronically inside the digital library. Electronic journals are the only text information that been stored inside this digital library. Therefore, users are allowed to purchase the text information that stored inside digital library via Internet. How are users going to accomplish the payment? Here, the payment can be conducted through smart card. In other words, users do not need to pay in cash to get the information; they can pay through smart card. Therefore, the core sections are electronic payment system through smart card, information retrieval system.

2.0 LITERATURE REVIEW

2.1 Purpose of Literature Study

For your information, Literature Review is used as a background to study and research about the information and knowledge gained in developing this project. The main purpose for having this literature review is to have a better understanding about the development tools used to develop this system and also the background of some 4GL programming language such as Visual Basic Script and Active Server Pages (ASP). Furthermore, having this literature review can help to obtain a better skill on the development methodologies used to develop a project system. Besides that, literature review can give a clear picture of the whole system that is going to develop.

Moreover, literature review is important. In order to provide a better understanding of step for information gathering before proceed to others phase such as the system design, analysis, and system implementation.

Furthermore, the developers are able to make comparison and study on the past-developed projects about the strength, advantages and disadvantages of their projects. This indirectly can help the developers to study the weakness of their projects, get to know on how to improve the weakness and fulfill the requirements needed.

2.2 Finding

To have a better understanding about the concepts of digital library, electronic payment system through smart card, and information retrieval through digital library.

2.2.1 Roles of Digital Library

From a database or information retrieval perspective, digital libraries may be seen as a form of federated databases. From a hypertext perspective, digital libraries could seem like a particular application of hypertext technology. From a wide-area information service perspective, digital libraries could appear to be one use of the World Wide Web. From a library science perspective, digital libraries might be seen as a continuing trend toward library automation.

Digital libraries were viewed as systems providing a community of users with coherent access to a large, organized repository of information and knowledge. The ability of the user to access, reorganize, and utilize this repository is enriched by the capabilities of digital technology.
(Clifford Lynch & Hecter Garcia-Malina, 1995)

In fact, digital libraries would, for the foreseeable future needs to span both print and digital materials and that the central issue was to provide a coherent view of a very large collection of information. Therefore, the objective is to develop information systems providing access to a coherent collection of material, more and more of which will be in digital format as time goes on, and to fully exploit the opportunities that are offered by the materials that are in digital formats. Additionally, the comprehensiveness and value of the collection accessible through a digital library system can be strengthened by the ability to integrate materials in digital formats that have not been well represented, easy to access, or effectively usable in traditional library

collections, such as multimedia, geospatial data, or numerical datasets. In reality, there is a very strong continuity between traditional library roles and missions and the objectives of digital library systems. Digital libraries will be a component in the broader range of future library services, and librarians will play a central role in developing and managing digital libraries.
(Clifford Lynch & Hecter Garcia-Malina, 1995)

A digital library system should provide a coherent, consistent view of as many of these repositories as possible. From the user's perspective, there should appear to be a single digital library system. Users increasingly have access to various types of digital collections and information systems: personal information resources, workgroup and organizational information collections and collaboration environments, and more public digital libraries. Defining the boundaries and characteristics of these information spaces and exploring ways in which they can be fused into a coherent whole is a central problem that cuts across all aspects of the research agenda. From the user's perspective, the digital library system needs to extend smoothly from personal information resources, workgroup and organizational systems, and out to personal views of the content of more public digital libraries.

It is clear that the development of digital libraries is closely linked to the changes that are occurring in modes of scientific and scholarly communication; the extent to which the digital library should actively embrace -- and perhaps even drive -- these changes remains to be fully explored.

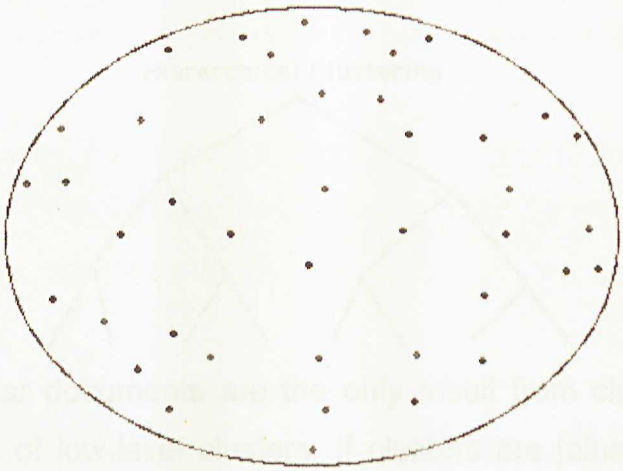
2.2.2 Digital Library – Information Retrieval System

The field of Information Storage and Retrieval deals with the study of all aspects of information, and so provides a foundation for building digital libraries, as well as key technologies for networked information. There are various models allow developers to build information systems and users to have a conceptual framework for searching, browsing, and other operations.

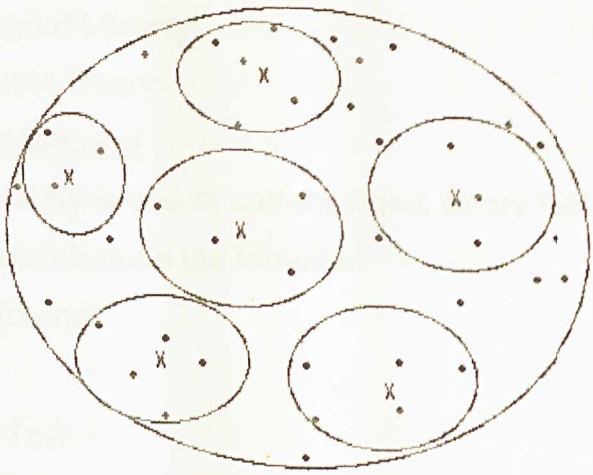
a. Model Clustering

In large collections, it is natural to group similar items into *clusters*. This can be done based on citation links, or more commonly, as a result of pair wise similarity computation. Users often will browse inside a cluster, and disk performance is better if items that are used together are stored together.

Clustering is the process of determining which items should be grouped together. It can be easily understood through illustrations.

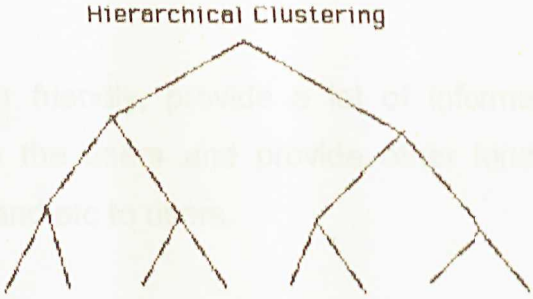


In the multidimensional space of documents that are represented by vectors, each document can be shown as a point.



Clusters and Cluster Centroids

Groups of similar documents can be formed, and are called *clusters*. Each cluster can be represented by its average, or centroid. See the "x" in the approximate center of each cluster for the location of its centroid.



If groups of similar documents are the only result from clustering, then we have a collection of low-level clusters. If clusters are joined to form super-clusters, etc., then we have hierarchical clustering.

(*www.askjeeves answer digital library overview clustering*)

2.2.2.1 Sites on Digital Library

a. California Digital Library

URL: http://www.cdlib.org/

California Digital Library is one of current digital library that exist in the world. The digital information include the format of:

- Electronic Journal
- Databases
- Reference Text

Besides, it also provide services which are:

- Searching for information sources.
- Locating Print Resources
- Mailing, printing, downloading and updating
- Customizing the use of resources

Advantages:

- It provides a proper explanation on how to retrieve information to the users.
- It is very user friendly, provide a lot of information especially text information to the users and provide other functions such printing, downloading and etc to users.

Disadvantages:

- No diversity of information because most of the digital information are in text information. It does not provide other types of information such as images and audio.

Information Retrieval System in California Digital Library

As, for information retrieval system, users need to browse from the main topics such as journal, database and monograph. Users are allowed to choose one of main topic out of the three. Then, it will proceed to subtopics of main topics such as science & technology, education, computer and etc. after that, users might be able to find the relevant information by using keyword, title and author. Next, the system will show a brief description and price about the relevant information. Some of the infomation is free to be downloaded and vice versa. The data flow diagram for information retrieval system is shown in below.

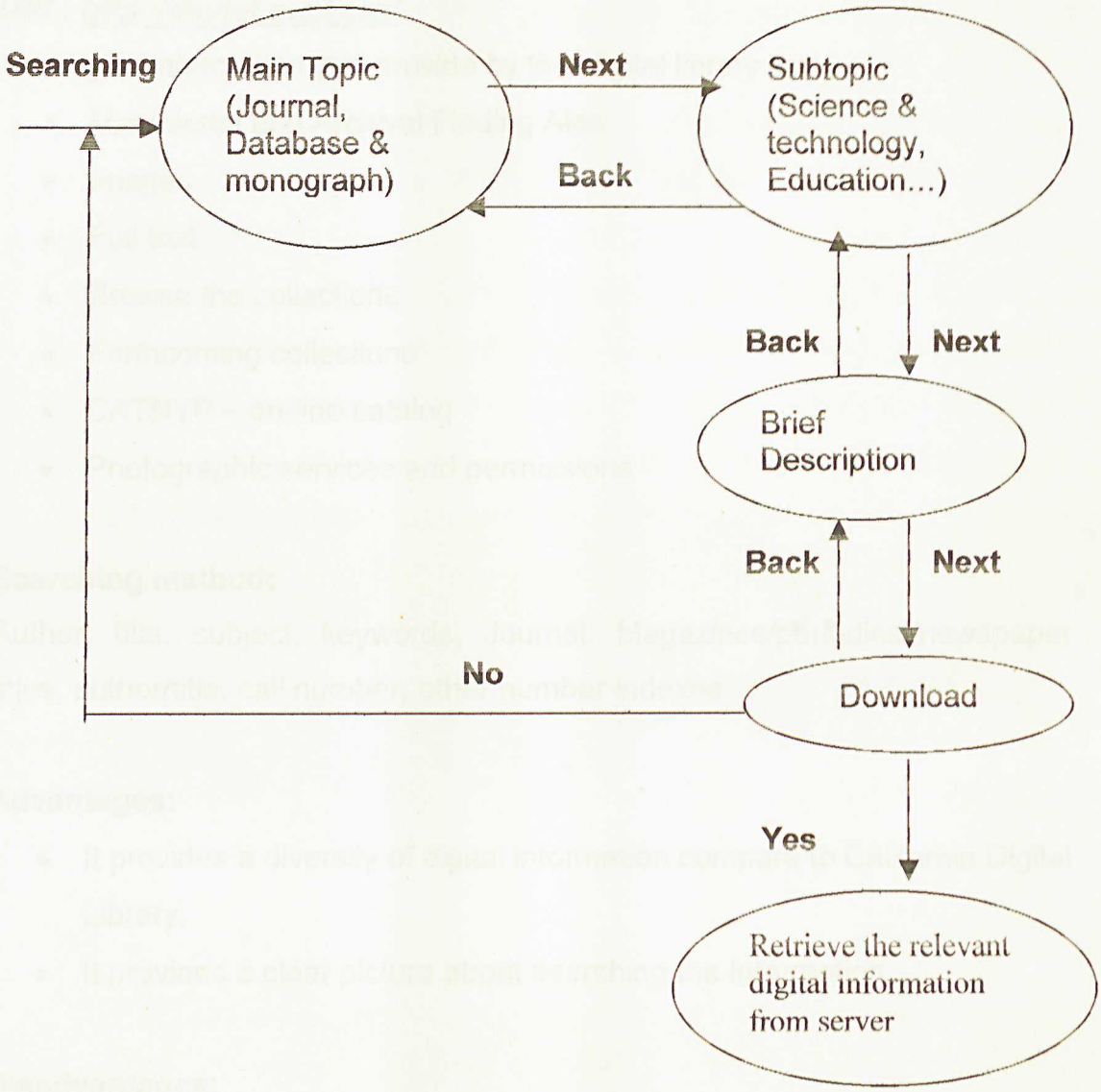


Figure 2.1 shows the DFD of Information Retrieval System

b. The New York Public Library (Digital Library Collection)

URL: http://digital.nypl.org/

The digital information that provide by this digital library are:

- Manuscript and Archival Finding Aids
- Images
- Full text
- Browse the collections
- Forthcoming collections
- CATNYP – on-line catalog
- Photographic services and permissions

Searching method:

Author, title, subject, keywords, Journal. Magazines/periodical/newspaper titles, author/title, call number, other number indexes

Advantages:

- It provides a diversity of digital information compare to California Digital Library.
- It provides a clear picture about searching the information.

Disadvantages:

- The digital information is not categorized and arranged in the proper way.
- It is hard to find the suitable information.

URL: http://collection.nlc-bnc.ca/e-coll-e/index-e.htm/

Here I would to point out the way of search the electronic collection in this digital library:

- Title – Browse the titles sequentially, alphabetically or by keyword.
- Subject – Browse the titles using the first three Dewey Decimal Classification numbers.
- Full text search – Search the text of on-line publications archived in the following format such as ASCII, HTML, Text Word and Word Perfect.
- AMICUS Web – Search the National Library's online catalogue by title, author, subject, ISSN, ISBN, publisher, AMICUS number and much more. The Advanced Search Function permits to limit the search to web documents, has a Boolean search capability as well as the ability to limit searches by language. A hypertext link in the bibliographic record provides direct access to the online publication.

2.2.3 Overview of Smart Card Payment System

For the information, many products and services will soon be (or are already being) sold over the Internet or other networks. Paying for these with standard methods of payments, such as cash, checks, credit card, or debit card, may be ineffective or inefficient. For such cases, electronic card payment systems are more appropriate.

Several things need to be considered when investigating electronic card payment system options, including; customer needs and benefits, developmental and operational cost, corporate benefits, continually changing technologies, critical mass of customers, security, standards of payment systems, and customer perception and comfort with new technologies.

There are over a dozen proposals for electronic payment systems on the Internet. To briefly understand these systems, let's examine a few issues by trying to pay a bill via Internet with a smart card or credit card. In comparison to using cash in the real world, transmitting a smart card numbers (password) over the Internet might lead to the following difficulties.

Firstly, there is the entire question of security. Unauthorized individual may view smart card numbers due to personal carelessness; there are a number of means to minimize fraud. A customer using a smart card will usually opt to carry out transactions at trustworthy or familiar facilities, stores and markets.

Secondly, smart card can be used only at authorized stores. Unauthorized small businesses or individuals generally cannot carry out transaction with smart card. In other words, smart card cannot be used for peer-to-peer payment. While, cash encourage peer-to-peer payments.

Thirdly, smart card consist a certain of value that is used to replace cash. Once the users purchase a smart card with certain value, that mean they have to spend all the money within certain before expiry date. Most of the vendors do not allow users to claim their unspent money.

Electronic payment systems, more or less, try to cope with above issues. According to the extent to which these systems cope with these problems (*http://www.gemplus.com/basic/what.htm*)

2.2.3.1 Advantages of Smart Card Payment System

a. **Cashless payment**

   The payment occurs in internal system, and using the smart card only does the transaction process.

b. **Easy to use**

   Without doubt, smart cards are secure, paperless and fast. It is fairly easy to be used in real and cyber stores

c. **Most acceptable payment device and system in future**

   It is a new payment technology, and very famous at developed country such as United State in order to reduce the problem of cash transaction. Most merchants accept this type of payment system and technology.

2.2.3.2 Disadvantages of Smart Card Payment System

a. **High cost investigator**

   Without doubt, smart card payment system need high cost in research and development, activity to prepare micro controller which a lot of high memory and smaller chip resources needed.

b. **Security problem**

   One of the security features provided by most of the smart card operating systems is the cryptographic facility. They provide encryption and

decryption of data for the card; some of them can even be used to generate cryptographic keys.

The secret of the cryptographic algorithm, the keys stored, and the access controls inside the smart card become the targets of attackers. Some of them perform logical non-invasive attacks; some of them attack the card physically while others just prove their success by mathematical theorems.

We will review the first two briefly and examine how the attacks are achieved. For the third one, since their attacks are theoretical and relate to a lot of complicated mathematical calculations and formulas that are outside the scope of this paper, it is not discussed here.

2.3 Software Development Tools

Below are the software development tools that used in developing this project.

2.3.1 Microsoft Visual Interdev 6.0

Microsoft Visual Basic is a development environment for building web sites. At its most basic level, it's a very fancy text editor that allows us to create and modify web pages on remote or local server. Users can use Visual Interdev to write both Active Server Pages and normal HTML pages.

Visual Interdev is tightly integrated with Microsoft SQL Server. Users can use Visual Interdev to design and modify database tables and create stored procedures. Visual Interdev works with any ODBC or OLE DB compliant database.

Users do not need Visual Interdev to create an ASP page. Users can create Active Server Pages using any standard text editor. Notepad, the text editor included with all versions of the windows operating system, works perfectly well. However, Visual InterDev makes it much easier to manage the pages of a large web site. Visual InterDev also includes several debugging tools. (*Stephen Walther, Janathan Levine, E-Commerce Progamming with ASP in 21 Days, 2000*)

I. ***Rapid end-to-end application development***

- It used the integrated WYSIWYG page editor to visually construct sophisticated HTML and ASP pages. Therefore, it is easily to switch between multiple page views—including preview, WYSIWYG, and Source, --while preserving source code formatting.

- It makes the Web application development more efficient. Furthermore, it help to debug the code with step-through debugging of client- and server-side scripts for Microsoft Visual Basic® Scripting Edition (VBScript) and Jscript® at any point in the development cycle.
- It helped to build cross-platform applications that target any HTML 3.2 browser, on any platform. Or, optimize for Dynamic HTML, cascading style sheets, and other powerful Microsoft Internet Explorer features.
- It helped to build the enterprise-ready, scalable Web applications using Microsoft Transaction Server (included) and reusable COM-based components built with tools such as Microsoft Visual Basic.
- It increased coding speed with IntelliSense®-enabled script development--Statement Completion and Quick Tips support both VBScript and JScript.
- Developer can design the structure and flow of the Web site visually while Visual InterDev automatically creates the actual file structure and navigation bars.

II. Powerful, integrated database tools

- It can connect to data from any ODBC-compliant database with open support for enterprise data sources. Therefore, Visual InterDev works with Oracle, Microsoft SQL ServerTM, Sybase, Informix, DB/2, Microsoft Access, Microsoft Visual FoxPro®, dBase, Paradox, and most other major database systems.
- It can help to visually design and modify database schemas, create stored procedures and other database objects for Microsoft SQL Server 6.5+ and Oracle 7.3.3+ databases using Visual Database Tools. Attach to and browse the data in tables and views, and

visually create SQL queries for any ODBC- or OLE DB-compliant database.

- Drag and drop from the Data Environment to quickly create sophisticated, database-driven HTML forms, and reports.
- It helped to build desktop and shared solutions that are fully compatible with Microsoft SQL Server and can migrate directly to SQL Server without changing a single line of code.
- It can access host and mainframe data using tight integration with Microsoft SNA Server (available separately).

III. Full-featured, standards-based team development

- New Local Mode allows a developer to work and test parts of a system against a local Web server without interrupting team development, then synchronize and deploy the changes to the shared master Web server.
- Build with integrated support for the latest W3C approved standards, including HTML 4.0, HTML Document Object Model, and more.
- Create dynamic Web pages using Microsoft FrontPage® 98 client included in Visual InterDev 6.0.

(http://www.aspdeveloper.net/vInterDev/)

2.3.2 Active Server Pages (ASP)

What exactly is an ASP? ASP stands for Active Server Pages. It is a server side scripting language, which is used to display dynamic content on the web pages. Recently, ASP is becoming more popular day by day as the favourites server side scripting language. Actually, ASP in itself isn't a language; instead it uses VBScript or JScript to display dynamic content. ASP is more as a technology used by VBScript / JScript on the server side.

As you request or asking for an Active Server Page from a Web server, the server will perform all the scripting tasks itself before delivering the resulting or requesting Web page to the client and this is so called server side scripting.

However, this cannot take over from JavaScript tasks like image rollovers. Anyway, it can produce dynamic Web pages that depend on variables. This could all be done with client-side JavaScript, but with ASP only the relevant HTML is delivered to the browser and it is compatible with any browser.

Furthermore, an ASP can include another file, such as a menu bar, so we only need to amend or alter one file to make site-wide changes. Besides, an ASP can perform verification functions on the data before either calling up routines to mail it from the server, or returning to the form if insufficient data has been submitted.

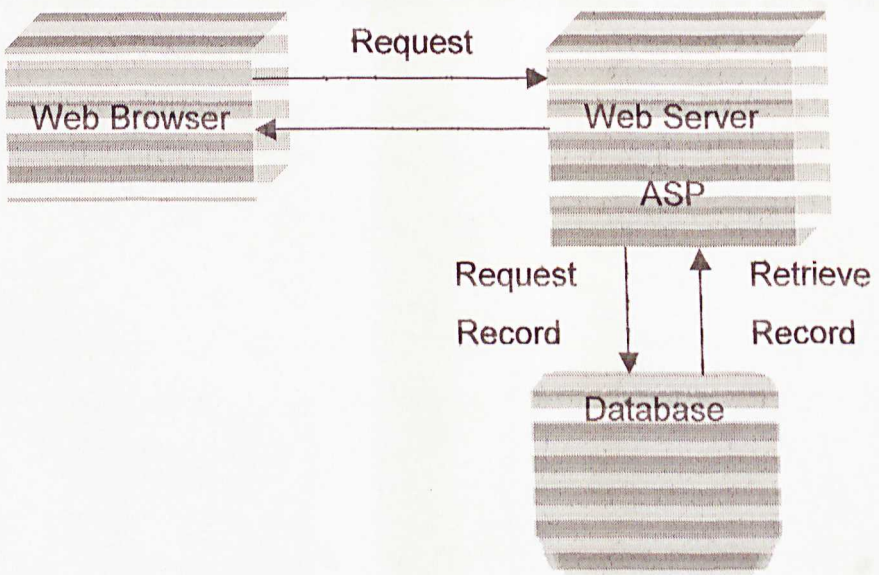


Figure 2.2 shows how ASP fits in Web Application Development

Benefits of ASP

- Complements server side scripting
- Easy to learn
- Leverage Existing investments
- Compile free development
- Protects proprietary business algorithms and information

Active Server Pages and Database Access

There is a special set of objects are embedded with Active Server Pages that deserve to be discussed in a section of their own: the ActiveX Data Objects (ADO will go through detail next discussion) enable to access a database from an ASP page.

Normally, ActiveX Data Objects (ADO) is used to insert, update and delete rows in a database table. Furthermore, it allows us to retrieve a set of record from a database query, and represent these records in an ASP page. For your information, ActiveX Data Objects (ADO) is the components that allow us interact with data stores.

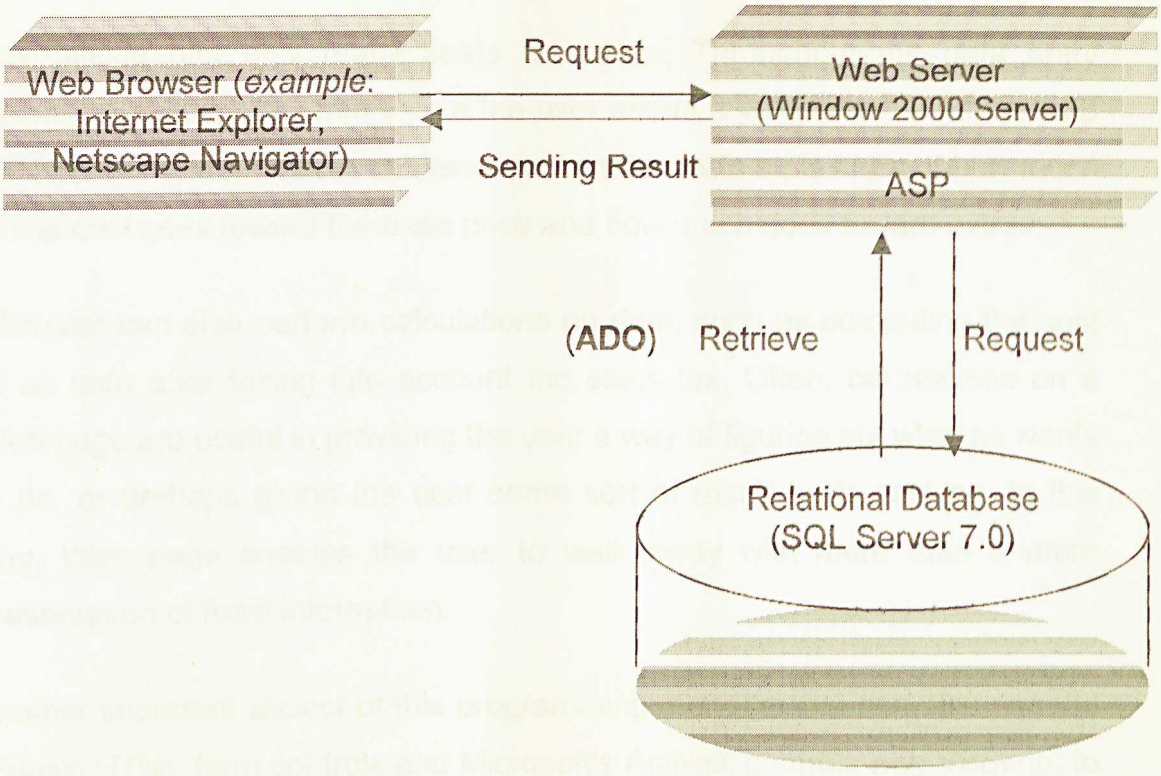


Figure 2.3 shows how ASP fits in Web Application Development

2.3.3 VBScript

VBScript lets the user interact with a Web page rather than simply view it. There are many possible scenarios for this interaction. For instance, this capability to interact makes it possible for Web pages to ask questions and respond to how the user answers them. VBScript can then take input from the user and check the data to make sure it is valid or meets certain criteria. Then, it can put an Internet server to work either by actually storing the data or causing some action to take place on the server based on the information given.

VBScript can play an important role in many ways, including validating data, pricing, providing impressive multimedia feedback, and initiating data storage. VBScript can use to sequence the questions based on responses. For example, if a user indicates he wants a van, VBScript can generate an input

box asking him how many seats he wants. Throughout the data entry process, VBScript can make sure the user enters a valid order, address, and method of payment, and it can even present him with a pie chart of how much of the cost goes toward the base price and how much goes toward extras.

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

Another important aspect of this programming model is that can also use the intrinsic HTML form controls and Microsoft's ActiveX controls with VBScript to give Web pages an attractive look and feel. Intrinsic HTML form controls, "Intrinsic HTML Form Controls," and, "More Intrinsic HTML Form Controls," provide the Web page developer with a standard set of controls similar to those used in the Windows environment. ActiveX controls, "An Introduction to Objects and ActiveX Controls," and "More ActiveX Controls," consist of useful controls such as graphs and charts, labels that can be rotated 360 degrees, a timer control that enables to time events on Web pages, a pre-load control that lets load bitmaps and other time-consuming parts of a Web page before it gets displayed, and so on. These controls further enhance Web pages to give them a professional, polished look. They also provide pages with smarter interactive response because a VBScript program can control the control characteristics dynamically. For example, code can generate a new graph based on the user's input on a page.

a. Client-Side and Server-Side Script:

Scripting languages (VBScript, JavaScript, PerlScript, etc.) can be divided up into core script, client-side script and server-side script. The core script defines the rules, grammar, syntax, core objects, etc. of the language in question.

i. Client-Side Script

Client-side browser executes this script. Normally the tag will be:

<Script Language="">

</script>

ii. Server-Side Script

The script is executed on the server and invisible for the browser. Normally, it will be:

<%

ASP content...

%>

2.3.4 Relational Database - SQL Server 7.0

SQL Server 7.0 makes giant strides in performance, reliability, and scalability, giving organization many opportunities to create intelligent, real-world business solutions. By voicing a need for more simplified and cost-saving features, organizations inspired the following innovations in SQL Server 7.0:

- Scalable from laptop to multiprocessor cluster
- Dynamic row-level locking
- Dynamic Self-Management
- Wide array of replication options
- SQL Server Desktop
- Integrated OLAP Services
- Data Transformation Services
- Microsoft English Query
- Microsoft Repository
- Integration with Microsoft Office 2000

These innovations, plus many more changes, make SQL Server 7.0 highly scalable and excellent for data warehousing. In addition, organizations that also run Office 2000 can take advantages of new ways that Office and SQL Server work together.

(*http://www/wsbtech.com/mssql.htm/*)

2.4 Analysis Development Model

2.4.1 Waterfall Model

The waterfall model is an engineering model that designed to be applied to the software development. There are different stages of development and the outputs of the first stage "flow" into the second stage and these outputs "flow" into the third stage and so on. Figure 2.5 Show each step of waterfall model works.

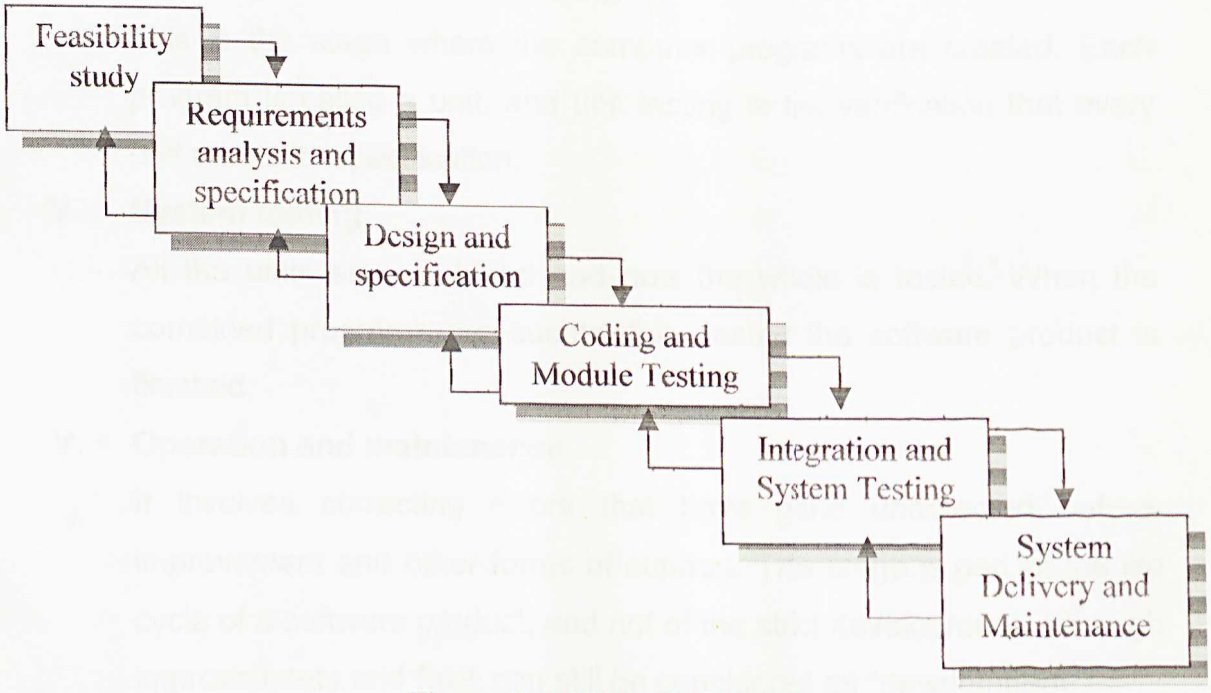


Figure 2.4: Waterfall Model

Usually, it involved five stages of software development in this model:

I. **Requirements analysis and definition**

In this stage the requirements of the "to be developed software" are established. These are usually the services it will provide, its constraints and the goals of the software. Once these are established they have to be defined in such a way that they are usable in the next

stage. This stage is often precluded by a feasibility study is included in this stage.

II. **System and software design**

In this stage the established requirements, flowing from the first stage, are identified as software or hardware requirements. The software requirements are then translated in such a way that they can be readily transformed into computer programs.

III. **Implementation and unit testing**

This is the stage where the computer programs are created. Each program is called a unit, and unit testing is the verification that every unit meets its specification.

IV. **System testing**

All the units are combined and now the whole is tested. When the combined programs are successfully tested the software product is finished.

V. **Operation and maintenance**

It involves correcting errors that have gone undetected before, improvement and other forms of support. This stage is part of the life cycle of a software product, and not of the strict development, although improvements and fixes can still be considered as "development".

These steps are the main stages. There are also sub-stages, within each stage, but they differ from project to project. For example for management purposes the requirements stage is divided in a feasibility study, an outline requirements definition, a design study and a requirements specification stage.

It is also possible that certain software projects require the adding of an extra stage all together, or the splitting of one in two stages. However all the different waterfall models have the same underlying idea; the idea that one stage provides outputs which can be used as the input for the next stage. There is a linear flow amongst the stages. The progress of the software development, using the waterfall model, is thus easy to find out. A common way to look at the outputs of a certain stage and see whether or not they are finished in time, thus seeing how far the overall progress is.

There are also activities that are performed at every stage of the software development. These are documentation, verification and management. Documentation is intrinsic to the Waterfall model for it is document driven, as most of the outputs are documents. Verification, not only is a part of implementation & unit testing and system testing, but it is also part of all the other stages in the form of walk through, reviews and the like.

Finally it has to be noted that the software development process is not as linear as it seems. When errors exist in later stages are found, they are often fed back to a previous stage and the development is set back to that stage again.
(*http://www.students.cs.ruu.nl/~ahurk/scriptie/waterfall.htm*)

2.4.1.1 Problem with Waterfall Model

From the customers point of view the waterfall model has three major distinct problems. First, the customer has no idea what the product will look like until the end. When building a house the architect constructs blue prints and/or scale models to help the customer visualize the final product, but with software development products data-flow and control-flow architectures are only readable by technical people, which usually are not the customer.

Customers have no idea the amount of progress towards completion of the product, because the software engineer has no accurate method of making such an estimate. Each step in the waterfall model takes a different amount of effort in the ideal situation (and becomes worse when problems arise).

There is an inherit all-or-nothing mentality within the waterfall model. It has no mechanism for delivering a partially working product. Many times products are discovered to be impossible to implement after much effort has been utilized and the software engineers then have nothing to deliver to the their customer.
(*http://cs1.mcm.edu/~tmiller/UTA/cse-6324/paper/*)

2.4.2 Waterfall Model with Prototyping

The software development help to control thrashing by including activities and subprocesses that enhance understanding. For understanding, prototyping is such a subprocess. A *prototype* is partially developed product that enables customer and developer to examine some aspect of the proposed system and decide if it is suitable or appropriate for the finished product. Usually, part of the design may be prototyped, as shown in Figure 2.6 Design prototyping helps developer asses alternative design strategies and decide which is best way for particular project. The designers may address the requirements with several radically different designs to see which has the best property.

Often, the user interface is built and tested as a prototype, so the users understand what the new system will be, and the designer get better sense of how the users like to interact with system. Thus, major kinks in the requirements are addressed and fixed well before the requirements are officially validated during system testing. *Validation* ensures that the system has implemented all of the requirements, so that each system can be traced back to a particular requirement in specification. System testing also verifies the requirements; *verification* ensures that each function works correctly. That is, validation makes sure that the developer is building the right product, and verification checks the quality of implementation. Prototyping is useful for verification and validation.

(Shari Lawrence Pfleeger, Software Engineering Second Edition, 2001, Prentice Hall)

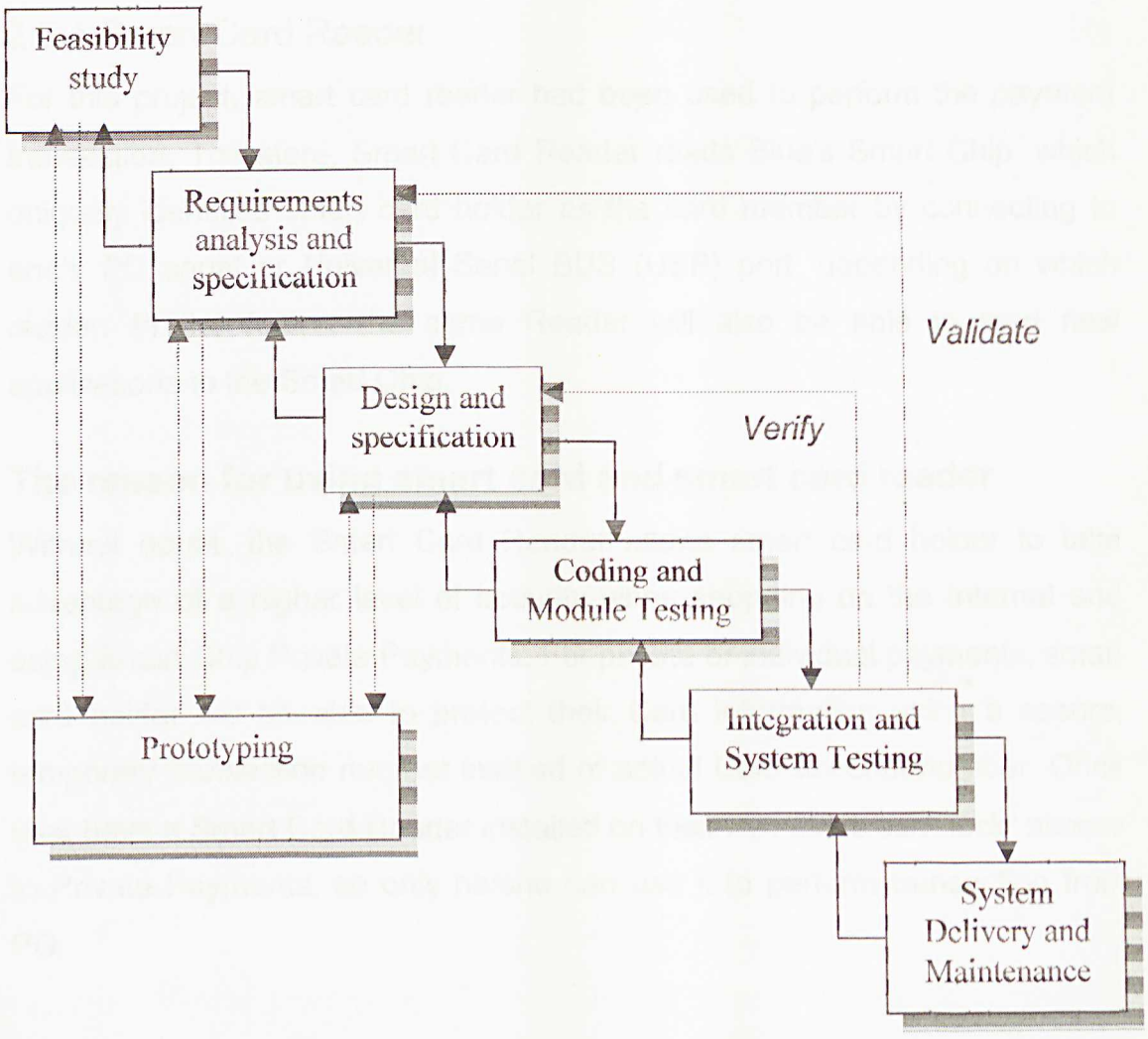


Figure 2.5 Waterfall Model with Prototyping

2.5 Hardware Survey

2.5.1 Smart Card Reader

For this project, smart card reader had been used to perform the payment transaction. Therefore, Smart Card Reader reads Blue's Smart Chip, which uniquely identifies smart card holder as the card member by connecting to one's PC serial or Universal Serial BUS (USB) port, depending on which reader. In the future, the same Reader will also be able to load new applications to the Smart Chip.

The reason for using smart card and smart card reader

Without doubt, the Smart Card Reader allows smart card holder to take advantage of a higher level of security when shopping on the Internet and using Smart Chip Private Payments. For private or individual payments, smart card holder will be able to protect their Card information using a secure, temporary transaction number instead of actual Card account number. Once user have a Smart Card Reader installed on their PC, users can "lock" access to Private Payments, so only he/she can use it to perform transaction from PC.

2.6 Summary

The literature review is done to have knowledge and information about the system development in this project. Basically, it will cover the smart card payment system and information retrieval, system development software and system development methodologies.

In this literature review, I had survey on the advantages and disadvantages of payment through smart card. However, smart card is the suitable payment system for this system because it is more secure than credit card. While for information retrieval system, it will be mentioned on chapter four.

While, for the development methodologies, approaches have been done on two-development models, which are the waterfall model and the prototype model. Each of the models has their own strength and weakness thus different from each other. The development model that was chosen in developing this project is the prototype model that will be mentioned in the next chapter.

For the software development tools, all the information was obtained from the Internet and reference books. Several software development tools were studied and the software that will be chosen to develop this project.

For the relational database, information was obtained from relevant books and also through Internet. The relational database that was chosen for this project was Microsoft SQL 7 server. Besides, I had done the research on smart card reader.
Research that has been done on several digital libraries has given me an idea of how to develop this system.

3.0 ANALYSIS AND METHODOLOGY

3.1 Project Description

This system is developed in order to give students and lecturers in campus to use smart card to purchase the digital information especially text information through Internet from a digital library. This system contains information retrieval system from digital library, smart card payment system that used to purchase text information (articles).

3.2 Approach

Usually, a lot of information needs to be gathered before developing or designing a computer system. Information needs to be gathered in order to get the true picture about procedure and methodologies used in developing a computer system.

There are several of sources that can be used in order to gather the relevant information and basically different sources will yield different kind of information and facts. For example, information obtain from books or journals are different from the information obtain from the Internet. If Internet is used to find an information, the keywords or phrases that are being used to search information will yield various sites and some of the sites are totally different from each other and some are not related to the information that are being search at all. Besides that, it is also depends on how the research that been carried out. The sources that can be used to obtain information are from the computer programs, system users, procedure manuals and report, documents and forms.

Information gather from the system users can be divided into a number of ways. One of the most popular ways is through the usage of questionnaires.

Interview is another way to obtain useful information while the third way is through observation of users activities and behaviors. Computer programmers are use to obtain information about the details and flows of data structures or processes.

Procedure manuals are used to specify user activities in a business process while forms and documents are very useful sources to gather information such as system data flows and transactions. Reports are used to indicate the kind of output needed by users.
Anyway, for this project, a lot of researches have been made through the Internet to study about information retrieval in digital library, smart card, payment system and etc.

Besides that, the Internet has been used to gather information about system development. Moreover, some researches have been done on some 4GL programming languages that are going to be used in system development.

3.3 System Analysis and Methodology

System analysis is the most important phase in software development life cycle. It is the process of defining a problem, gathering pertinent information, developing alternative solution and choosing among those solutions. This phase involves all the activities necessary to determine and gain the requirement of the system.

This system is developed in order to let users/subscribers (students and lecturers) in campus to purchase the text information especially electronic journals from an on-line digital library through smart card payment system. Here, smart card is the tool or device to perform the dealing transaction. In other words, subscribers are allowed to use smart card which is contain with certain value of electronic cash to purchase electronic journals that stored in an on-line digital library.

A system developer must be able to perform system analysis and choosing the suitable method in order to develop a powerful computer system. As I mentioned earlier in literature review, waterfall software development models had been studied and researched thoroughly. After analyzing the advantages and disadvantages or weaknesses of this models thoroughly, waterfall software development model had been chosen to develop this system.

There several benefit for choosing waterfall model, they are:

- Its paradigm provides a systematic, sequential approach to software development that begins at analysis phases and progress through design, implementation and testing.
- From the historical point of view, it is widely adopted. Its practically and efficiently have been fully proven.

- The waterfall model presents a very high-level view of what goes on during development, it suggests to developers the sequence of events they should expect to encounter.
- The waterfall model is the most basic model of software process model. This makes it very easy to learn and use. Besides, more complex models are really just embellishments of the waterfall model, incorporating feedback loops and extra activities.

It involved 5 stages of software development:

I. **Requirement analysis and definition**

In this stage, the requirements of the system are identified. Usually, those are services it will provide, its limitations and benefits of the system. Before perform requirement analysis, the problems must be identified. Therefore, requirements analysis can serve as solution to the existing problem of this system. For example, the existing current digital library does not allowed subscribers to purchase its electronic journals. Even though, with real cash, subscribers are not allowed to purchase the items. In order to solve the existing problem, payment through smart card had been introduced to complete the transaction and replace the real monetary payment.

However, subscribers need to have a smart card and smart card reader to perform the transaction. In my opinion, this is the major limitation that existing in this system and creates a lot of inconveniences to the users.

The purposes to determine the requirement of the software-based system are:

- Enable the system engineer to specify software elements, establishes design constraint that the software must meet.
- A complete understanding of software requirements is essential to the success of a software development effort.
- To tell the designers what functionality and characteristics the resultant system is to have.

II. System Design

Regarding this stage, it will be discussed thoroughly in the following chapter (Chapter 4). In this stage, the identified and established requirements following from the first stage are identified as software and hardware requirements. Therefore, the software requirements are then translated into a way that can be readily transformed into computer programs. Here, I will be more concentrate on smart card payment system that is going to be integrated with the existing digital library' system.

III. Implementation and testing

In this stage, computer programs are created. Each program is called a unit or module. Each module will be tested to verify that each module meet the requirement and specification.

IV. System testing

In this stage, the entire module will be combined and the whole is tested. If the whole system is successfully tested, the software product is considered completely tested.

V. Operation and maintenance

It involves correcting errors that have gone undetected in the system testing stage. This is the part of the life cycle of software product. And this project can be expanded, enhanced and improved in future.

3.4 System Development Technology

3.4.1 Microsoft Visual Interdev 6.0

Microsoft Visual InterDev provides a rapid, visual development environment for building ASP. Visual InterDev also can easily integrate ActiveX server components written in Visual J++, VB, Visual FoxPro and Visual C++. Using Visual InterDev with ActiveX server component, a developer can easily create multi-tier web applications. ActiveX server components provide a convenient and effective way to tight integrate a web application with existing Internet system.

The reasons of choosing Visual InterDev 6.0 are:

- Provides a rapid and visual development environment for building ASP.
- Can easily integrate with ActiveX server component.
- Include a variety of development features for integrating client-server and web technologies.

3.4.2 Active Server Pages

In order to complete system development, Active Server pages (ASP) and Visual Basic programming languages will be used. ASP is a server side scripting languages, which is used to display dynamic content on the web pages. Server side scripting means the server will perform all scripting tasks itself before delivery the resulting or requesting web page to the clients.

Here, I would like to show the benefits of ASP:

- Easy to learn and use
- Leverage existing investments
- Complements server side scripting

- Compile free development
- Protects proprietary business algorithms and information

3.4.3 Internet Information Server (IIS)

IIS defines a basic functionality that user can use to build Web applications. Active Server Pages (ASP) and other Microsoft technologies have extended this basic functionality to create a rich environment for application development. The basic server functionality is exposed through the Internet Server Application Programmer Interface (ISAPI).

The core functions, which IIS provides, include:

- Establishing and maintaining HTTP connections.
- Reading HTTP requests and writing HTTP responses.
- Modifying HTTP headers.
- Obtaining client certificate information.
- Mapping Uniform Resource Locators (URLs) to physical paths.
- Managing and running applications.
- Transmitting files.

Compatibility between ASP and IIS

ASP extends this functionality by providing a link to the COM architecture and thus the other participants in Windows DNA. Similarly, user can extend the IIS architecture by defining a custom set of functions using ISAPI. The relationship between the IIS core functionality, ASP, and extended architectures is depicted in the following figure:

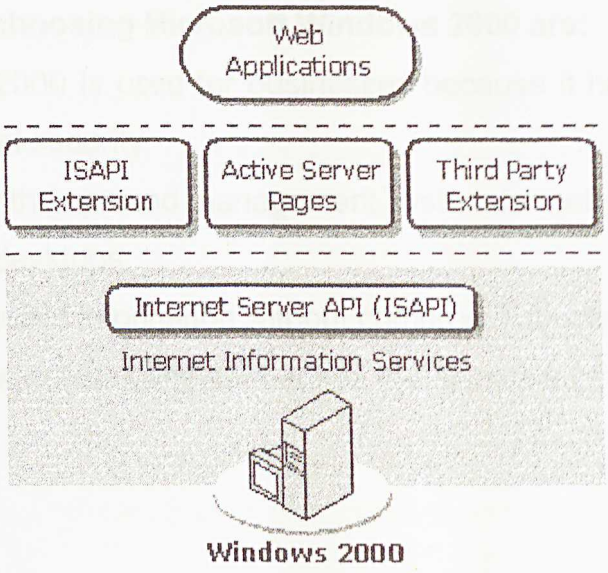


Figure 3.*1 shows the relation between ASP and IIS*

3.4.4 Microsoft SQL Server

Microsoft SQL server (MSSQL) is multi-user relational database management system (DBMS) that runs on the Microsoft Windows NT operating system. The SQL server driver enables application to access data in Microsoft SQL server databases through the open database connectivity (ODBC) interface.

The reasons of choosing SQL 7.0 are:

- Ease of installation, deployment and use
- Scalability and supported by Microsoft Windows 95/98 to large
- System integration with other server software. For instance, email, Internet and Windows

3.4.5 Microsoft Advanced Server

Windows 2000 Server is a multipurpose, entry-level server operating system that can used to provide the network users with file, print, application, or web services. Windows 2000 Server provides a well-integrated package containing the application development environment, security, and scalability.

The reasons of choosing Microsoft Windows 2000 are:

- Windows 2000 is used for businesses because it has a high level of stability and security.
- Cut cost with improved management system for networks, servers and Windows desktops.
- Share selected information without compromising confidential data.
- Expand the network environment as the application needs evolve.

3.5 System Requirements

Fundamentally, the system requirements for this project are divided into four categories, which are functional requirements, non-functional requirements, hardware requirements and software requirements. Each of system requirements is describe below:

3.5.1 Functional Requirements

Basically, functional requirements describe an interaction between the system and its environment. The functional requirements in this project are:

- User module
- Administrator module

The description for these two modules has been discussed at the next chapter

3.5.2 Non-Functional Requirements

Basically, non-functional requirements describe the restriction on the system. These restrictions limit the choices for constructing a solution to the problem. The non-functional requirements for this project are as follow:

I. **Accuracy**

- Refers to the precision of price evaluation on text information in the digital library. Besides, it is important to make sure that users retrieve the relevant information.

II. **Attractive interface**

- Attractive interface will encourage users to browse the contents in digital library. It can increase the hit rates to this digital library.

III. **Security**

- Security is the important issue in this project. Therefore, only the authorized administrators are allowed to access and perform the database maintenance, setup event and newsletter, exception handling and analysis report. Similarly, only the authorized users that are given login ID and password are able to access the database to update their details. For the smart card holders, they should impose the login number and password to other people.

IV. User friendly

- This criterion enables users to browse and navigate the site without any problem. Furthermore, this will provide a user-friendly environment for users to retrieve the relevant text information and a secure smart card payment system.

V. Interactive

- It provides a better communication between users and administrators.

VI. Efficiency and availability

- It enables users to retrieve the relevant text information within a reasonable time. Besides, the speed of downloading must be reasonable and consistence in order to save the time and cost. And the availability of text information in digital library must be maintained in a high degree.

3.6 Hardware Requirements

There are two important issues that should be considered when discussing about the hardware requirements, which are the development environment and runtime environment. Below are the hardware specifications that have been used to develop this project.

3.6.1 The Development Environment:

These are the specifications that have been used in the development environment.

- Processor - Intel Pentium III 550MHz
- Memory - 394M RAM
- Graphic Card – Riva TNT 2 16M
- Space - 20 GB Hard disk.
- Smart Card Reader & Smart Card
- Mouse
- Keyboard
- Modem

3.6.2 The Runtime Environment:

Below are the specifications that required for the runtime environment.

- Processor - A 486 processor or above
- Modem - NIC/Modem to connect to the Web Server
- Memory - 16 MB RAM
- A SVGA Graphic Adapter
- Mouse
- Smart Card Reader & Smart Card
- Keyboard

3.7 Software Requirements

Here is the section that describes the software requirements for this project. Basically, software requirements are divided into development environment and runtime environment.

3.7.1 Software Development Environment:

- Visual Interdev 6.0
- MSDN Library 6.0
- Microsoft Window 2000 Server
- Microsoft SQL Server 7.0

3.7.2 The Runtime Environment:

- Windows 9X, Windows Me, Windows NT and Windows 2000.
- Internet Explorer.

3.8 Summary

This chapter consists methodology, which is used to develop the system. Therefore, waterfall software development model had been chosen to develop this system.

Furthermore, several approaches had been used to gather the relevant information in the stages of system analysis and methodology. Those approaches included information obtain from books, journal and Internet.

Besides, system requirement is divided into functional and non-functional requirement. Functional requirement included user and administrator module. Non-functional requirements included accuracy, attractive interface, security, user friendly, interactive, efficiency and availability.

Finally, hardware and software requirements had been mentioned in this chapter.

4.0 SYSTEM DESIGN

4.1 Overview of System Design

System design is a very important step in the system development because it determines the success of a system. Design is the process of transforming the problem into a solution and the description of the solution. Requirements that are found in analysis stage are the one actually translated into design specification.

4.2 System Modeling

For our information, system modeling is used to create a conceptual of a system, which is a very high level view of the system. This includes identify major user services and document their relationship.

A system is a representation of an in-place or proposed system that describes the data flow throughout the structure. The model describes the points where data or information enters a system and the places where it will be processed, as well as action taken and the points where data will be output.

A system model is documented through a variety of design diagrams. A design diagram is a graphic or visual representation of a structure. Design diagrams include data flow diagrams (DFD), structure charts, decision trees and other items. For this project, DFD was chosen to represent the system. The DFD is used as a system-modeling tool because of its great utility. A DFD is a graphic illustration that shows the flow of data and logic within a system. DFD are composed of four basic symbols.

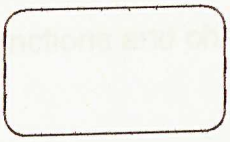
Symbol	Name	Description
	Processes	It represents the transformation or processing of information within a system.
	Data store	It is used for showing the data storage or referenced by a process.
	Data flow	It is used to show movement of data from an origin to a destination with the head of arrow pointing towards the destination.
	Entity	

Table 4.1 Symbols using Gane and Sarson Method

4.2.1 Project Modules

As I said before, this system is divided into two modules, which are so-called user module and administrator module. These modules will have the different functions and characteristics that show at below.

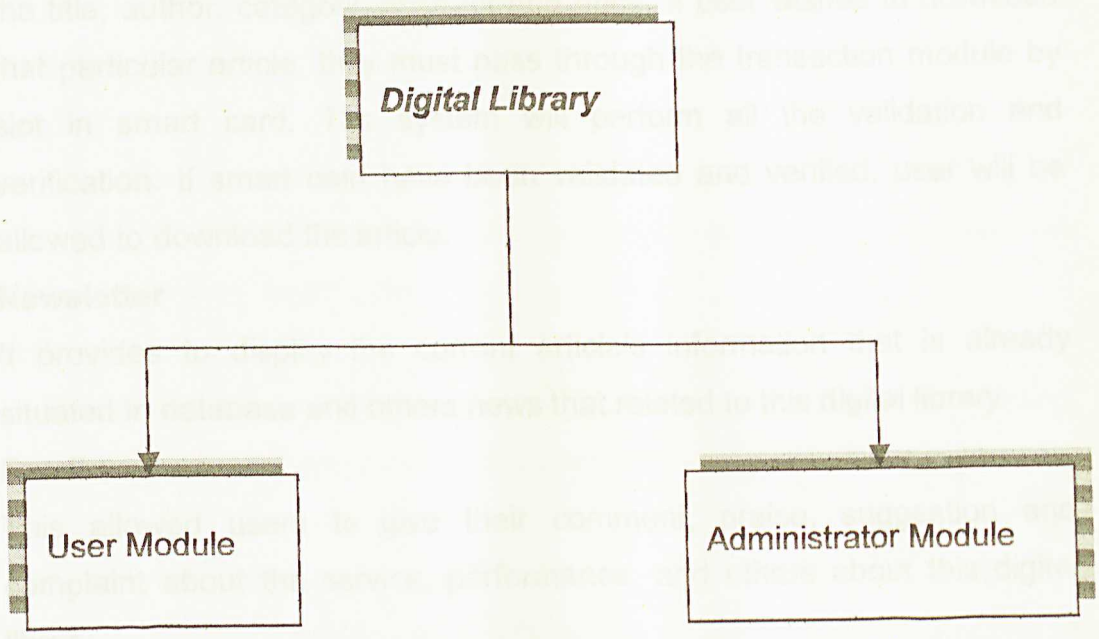


Figure 4.1: Project module for digital library

4.2.1.1 User Module

This module is provide for user to perform member registration, uploading, reload, purchasing, change pin number, create lost report and create feedback. Therefore, user module consists the following features:

a. **Home**

   It is the main page for user module. It contains Newsletter, event, what news and links. It is a trigger for user to browse to other page such member registration, uploading product and so on.

b. **Product**

It contains category and author for users to search the articles. In others word, it serves as a search engine for user to view the brief information of those articles which are available in database. Both of the category and author can be used to search for the relevant articles. After that, the system will list out all the relevant articles. It will contain information about the title, author, category, abstract and price. If user wishes to download that particular article, they must pass through the transaction module by slot in smart card. The system will perform all the validation and verification. If smart card have been validated and verified, user will be allowed to download the article.

c. **Newsletter**

It provides to display the current article's information that is already situated in database and others news that related to this digital library.

d. **Feedback**

This allowed users to give their comment, praise, suggestion and complaint about the service, performance, and others about this digital library.

e. **Event**

It will display a list of events that are going to hold in this digital library.

f. **Links**

Mostly, this "links" will link users to some famous search engine such Yahoo, AltaVista, Google and other digital libraries if we can get the permissions from corresponding parties.

g. **Change PIN**

This function allows users to change their Login ID, PIN number.

h. **Lost Report**

It is provided for users to create lost report if they had lost their smart card. After that, Administrator will terminate the account; no transactions will be

carried out until a new card is issued to user. This to ensure that value store in smart card is secure, even though the smart card is lost.

i. **Reload**

Reload function allowed user to top up the smart card's value. Smart card holder need to key in their new card number and active code. Then, the system will generate a new PIN number for that smart card and verify the top up process.

j. **Registration**

This function allowed user to perform member registration. By register as a member of this digital library, user will allow to purchase the product via Internet with their smart card.

k. **Uploading**

Users can submit their articles into this digital library by fill in the uploading form. System Administrators will have the right to approved and denied it.

l. **Purchase**

This allowed users to purchase the relevant article from digital library. Before users are permitted to purchase the article, users are requiring to key in the "Login ID" and "Card PIN". After the validation, it will pop up a download box for user to download the article. Then, the payment transaction is performed through smart card.

m. **Help**

It contains the information about how to use the function in this module. In others word, it contains all of the information about the function of this module.

User Module

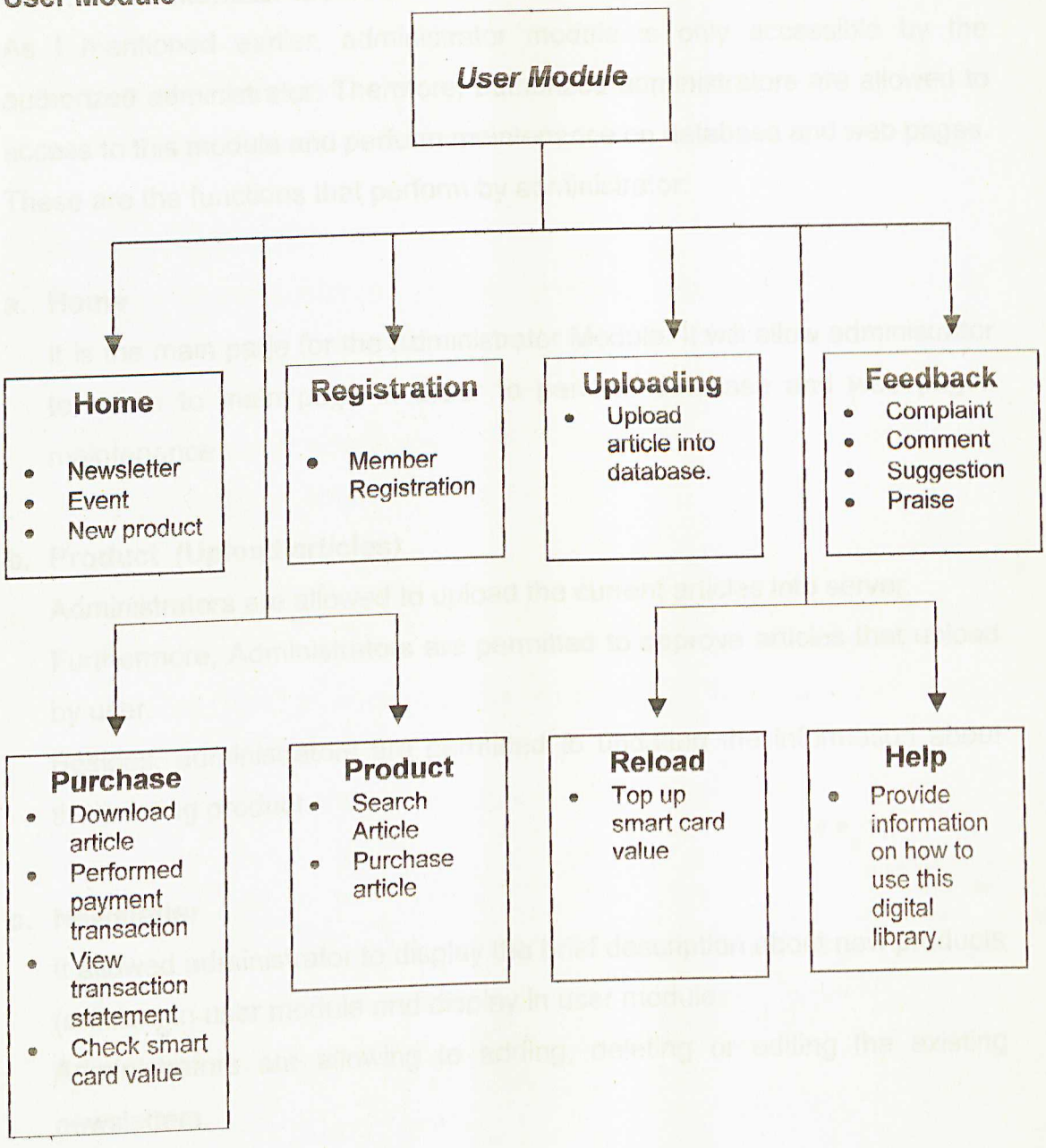


Figure 4.2 shows the user module of digital library

4.2.1.2 Administrator Module

As I mentioned earlier, administrator module is only accessible by the authorized administrator. Therefore, authorized administrators are allowed to access to this module and perform maintenance on database and web pages. These are the functions that perform by administrator:

a. **Home**

It is the main page for the Administrator Module. It will allow administrator to return to main page in order to perform database and web pages maintenance.

b. **Product (Upload articles)**

Administrators are allowed to upload the current articles into server. Furthermore, Administrators are permitted to approve articles that upload by user.

Besides, administrators are permitted to updating the information about the existing product.

c. **Newsletter**

It allowed administrator to display the brief description about new products (articles) in user module and display in user module.

Administrators are allowing to adding, deleting or editing the existing newsletters.

d. **Events**

Administrators will display the events that going to hold in this digital library such as reading competition, new arrival articles into user module. Besides that, administrator is allowed to add, delete or edit the existing events.

e. **Lost Report**

As the smart card holder create the lost report and send to administrator, administrator will terminate the smart card holder's account. In others word, transaction will be performed until a new smart is issues to user.

f. **Member Registration**

It allows administrator to perform member registration. Furthermore, administrator will allow editing the members' information. Moreover, administrator will have the right to enable and disable the membership of a member. Besides, administrator will have the authority to terminate the membership of a registered member.

g. **Administrator Registration**

It will allow chief administrator to perform administrator registration. It others word, chief administrator will have the right to invite others people to become the administrator for this module. Besides, chief administrator is allowed to editing and updating administrator's information.

h. **Setup**

It allows administrator to setup the product category and author so that it is easy to categorize the product (article). Therefore, products can be categorized according to its category or author.

i. **Log Out**

It is provide for administrator to log out from Admin Module.

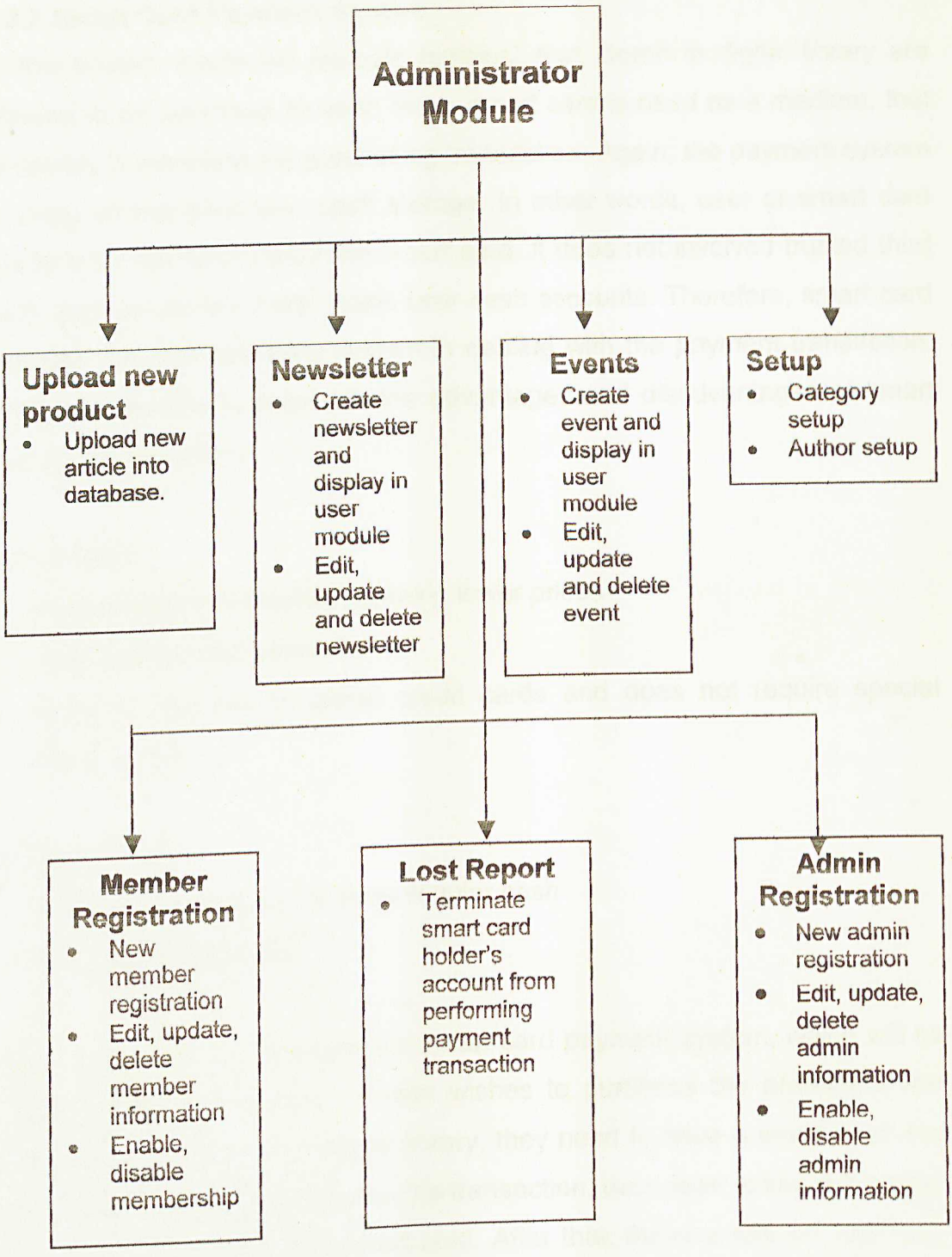


Figure 4.3 shows the administrator module.

4.2.2 Smart Card Payment System

In this project, electronic journals (articles) that stored in digital library are allowed to be purchase by user. Here, smart card is used as a medium, tool or device to complete the purchasing transaction. Again, the payment system is using off-line electronic cash storage. In other words, user or smart card holder hold the cash inside the smart card. It does not involved trusted third party such as on-line bank, holds user cash accounts. Therefore, smart card replaces the real monetary system in dealing with the payment transaction. Here, I would like to point out the advantages and disadvantages of smart card payment system:

Advantages

- More efficient, eventually meaning lower prices
- Lower transaction costs
- Anybody can use it, unlike credit cards and does not require special authorization

Disadvantages

- Tax trail non-existent, such as regular cash
- Susceptible to forgery

Now, I would like to introduce the smart card payment system, which will be integrated into this system. If user wishes to purchase the preferable text information (articles) from digital library, they need to have a smart card and card reader. In order to complete the transaction, user need to key in the login ID and PIN number of that smart card. After that, those password and login name will be checking and verifying by the system. To increase the security and reliability of this payment system, user will only be given three chances to input their login ID and PIN number. If they fail to do it, system will deny the

transaction. Otherwise, the following process will proceed. Then, the system will determine the amount of electronic cash that been stored on smart card. This is purposely to ensure that value of electronic cash stored on smart card is affordable to purchase the desired article. Definitely, subscribers are allowed to purchase the desired article if the value of electronic cash stored in smart card more than the value of e-journal. Otherwise, the system will prompt out a message to show that amount of electronic cash in not enough to purchase the desired item. The system will allow user to top up the value. Meanwhile, after the purchasing transaction completed, the amount of electronic cash that store on smart card will be deducted. User can check their previous transaction statement and also check the smart card value.

The data flow diagram (DFD) for smart card payment system is shown in below.

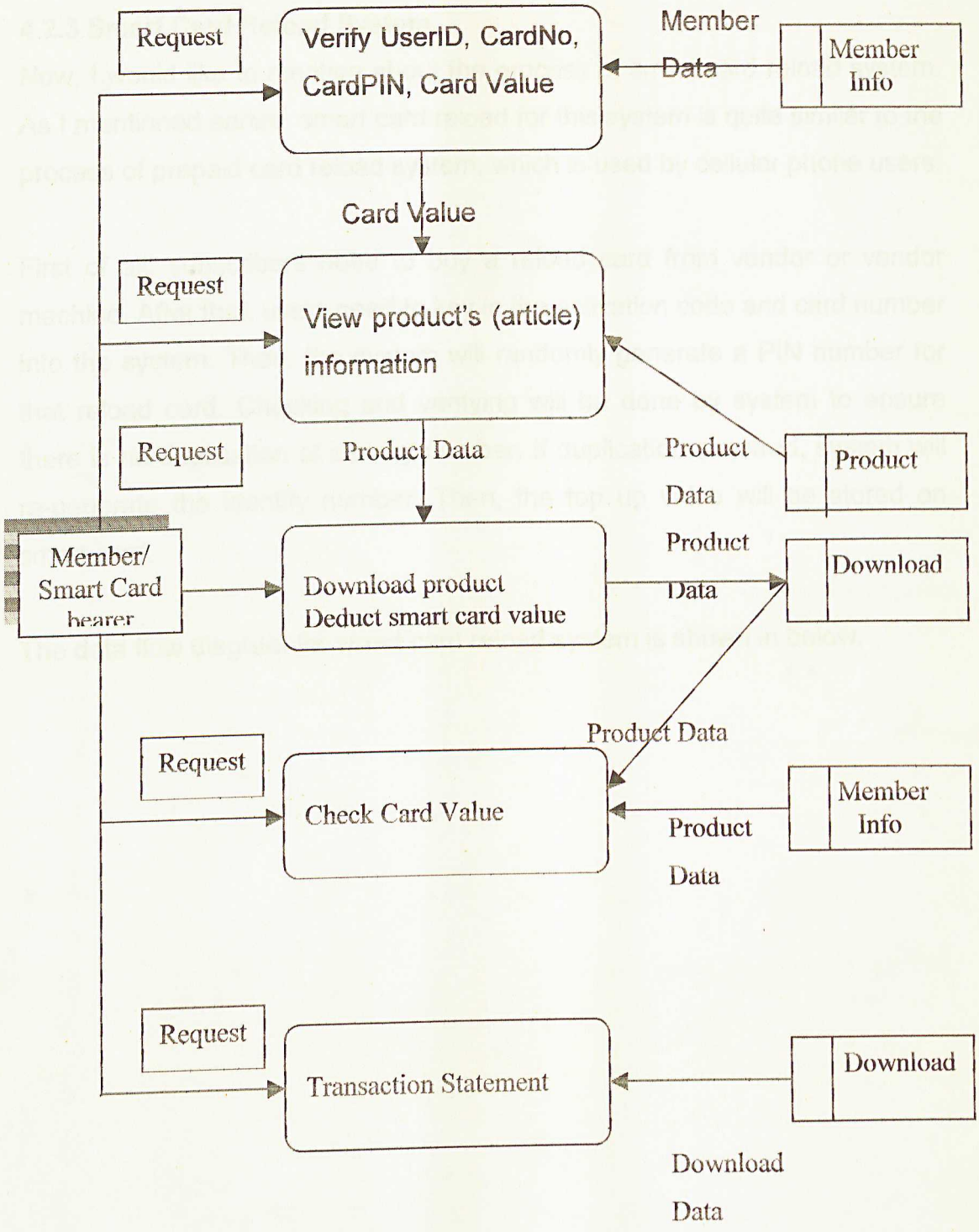


Figure 4.4 shows the DFD of Smart Card Payment System

4.2.3 Smart Card Reload System

Now, I would like to mention about the process of smart card reload system. As I mentioned earlier, smart card reload for this system is quite similar to the process of prepaid card reload system, which is used by cellular phone users.

First of all, subscribers need to buy a reload card from vendor or vendor machine. After that, users need to key in the activation code and card number into the system. Then, the system will randomly generate a PIN number for that reload card. Checking and verifying will be done by system to ensure there is no duplication of identity number. If duplication occurred, system will re-generate the identity number. Then, the top up value will be stored on smart card.

The data flow diagram for smart card reload system is shown in below.

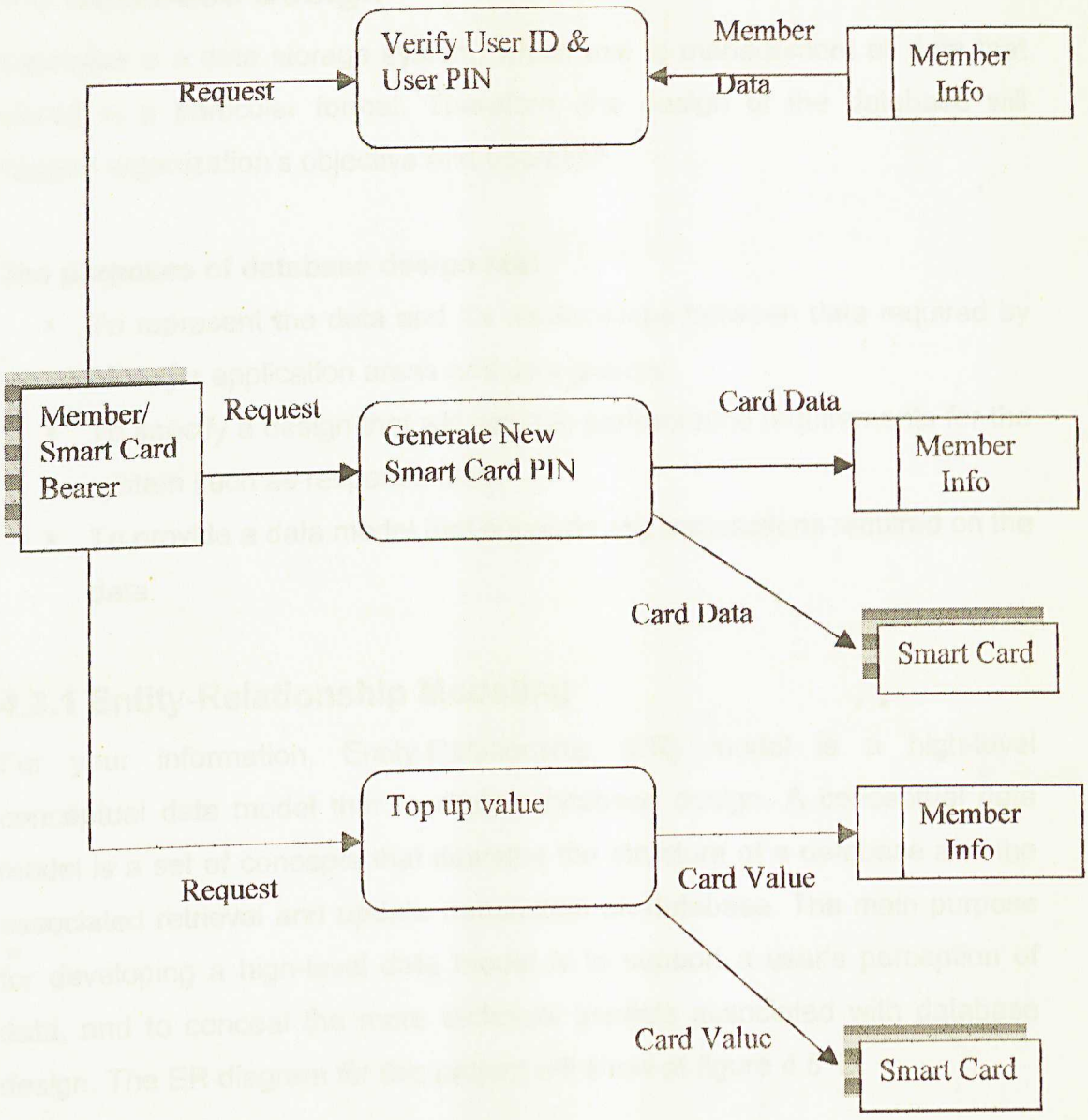


Figure 4.5 show the DFD of Reload Card System

4.3 Database Design

Database is a data storage system, which use to management all data that stored in a particular format. Therefore, the design of the database will support organization's objective and operation.

The purposes of database design are:

- To represent the data and it's relationships between data required by all major application areas and user groups;
- To specify a design that will achieve performance requirements for the system such as response time.
- To provide a data model that supports any transactions required on the data.

4.3.1 Entity-Relationship Modeling

For your information, Entity-Relationship (ER) model is a high-level conceptual data model that facilitates database design. A conceptual data model is a set of concepts that describe the structure of a database and the associated retrieval and update transaction on database. The main purpose for developing a high-level data model is to support a user's perception of data, and to conceal the more technical aspects associated with database design. The ER diagram for this project will show at figure 4.5.1.

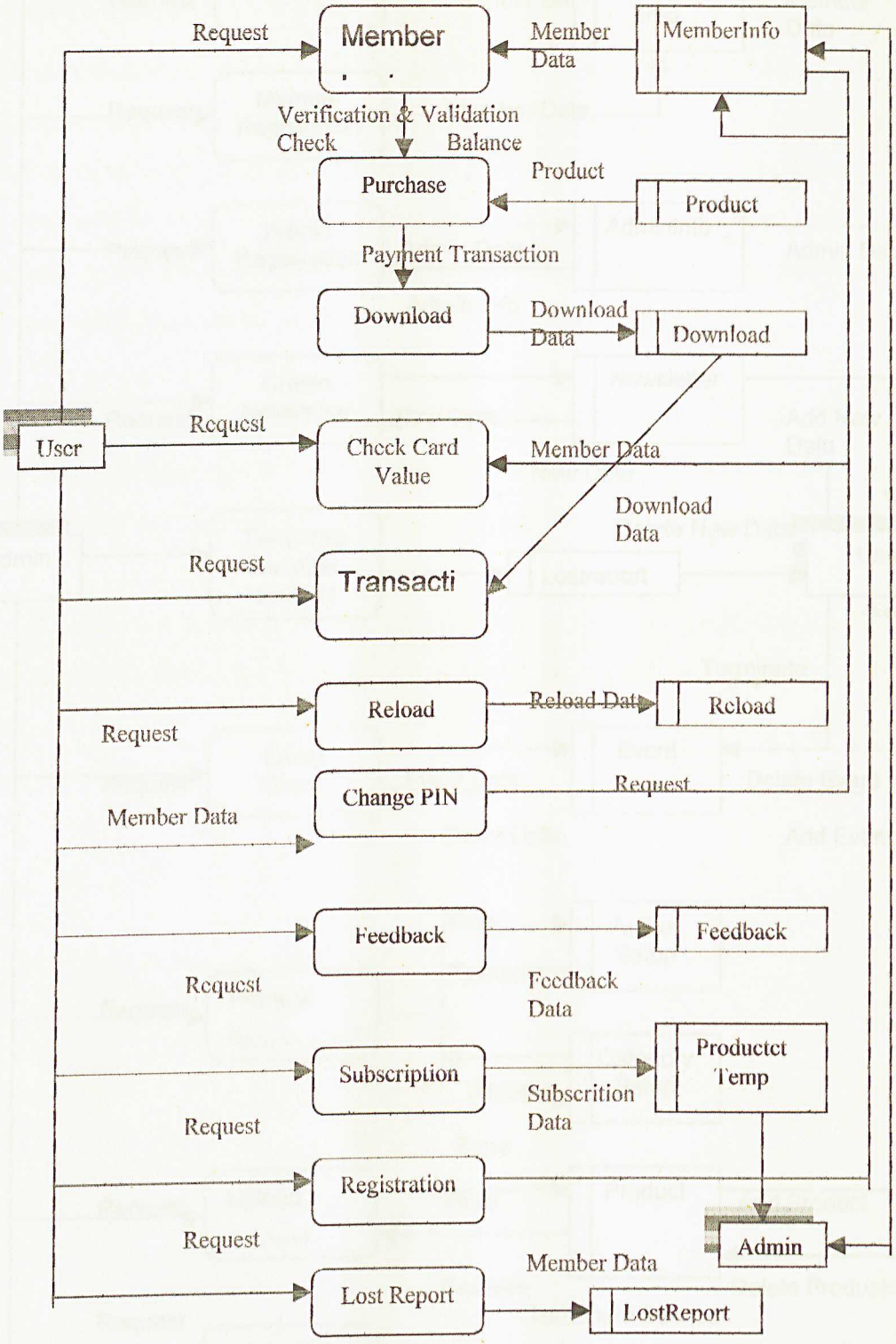


Figure 4.6: DFD for User's Module

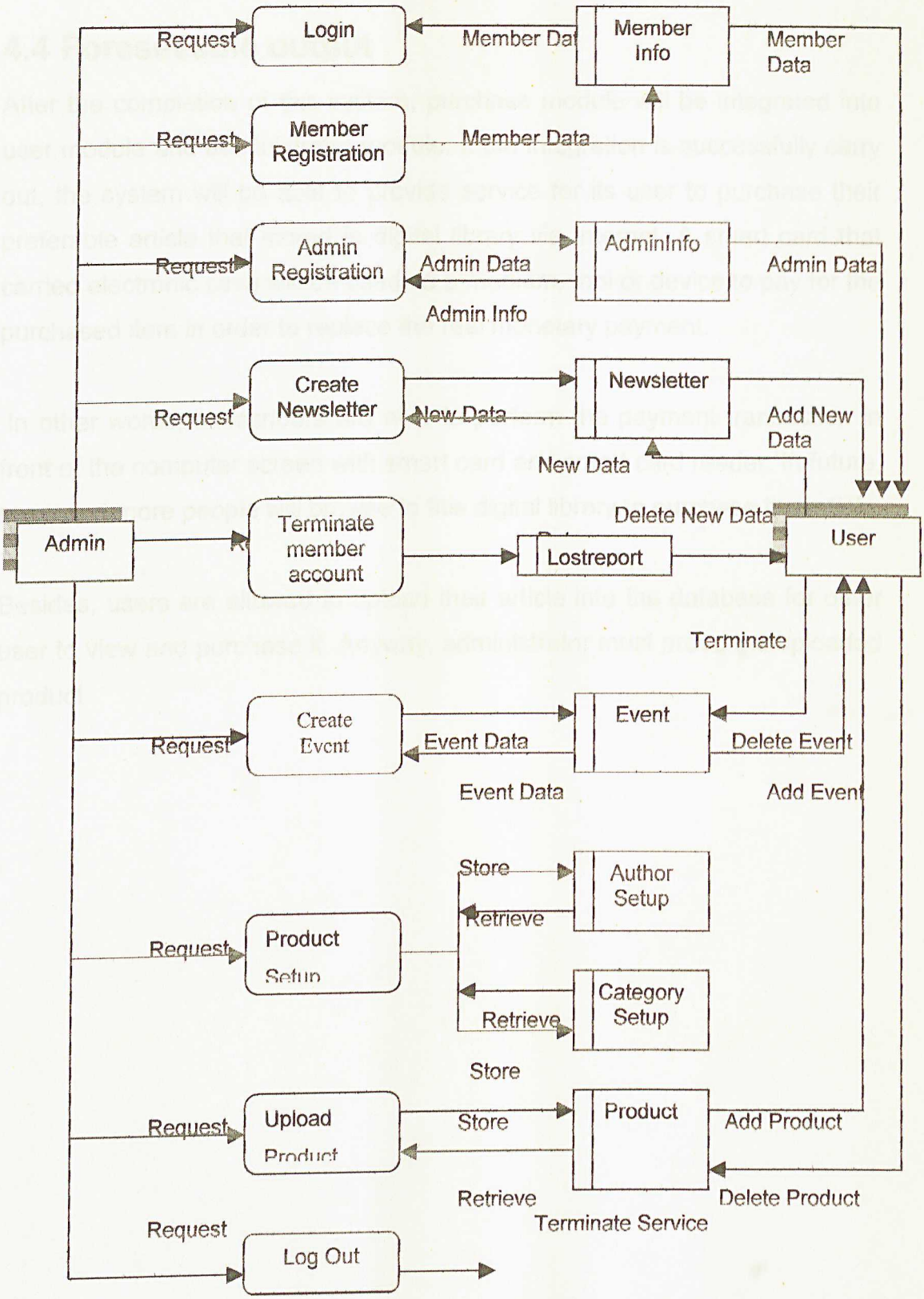


Figure 4.7: DFD for Administrator Module

4.4 Foreseeable output

After the completion of this system, purchase module will be integrated into user module and administrator module. If the integration is successfully carry out, the system will be able to provide service for its user to purchase their preferable article that stored in digital library via Internet. A smart card that carried electronic cash will be used as a medium, tool or device to pay for the purchased item in order to replace the real monetary payment.

In other words, subscribers are able to perform the payment transaction in front of the computer screen with smart card and smart card reader. In future, more and more people will browse to this digital library to purchase the article.

Besides, users are allowed to upload their article into the database for other user to view and purchase it. Anyway, administrator must prove the uploaded product.

4.4 Summary

System design is the crucial part in the process of software development. It is important to transform the problem into a solution; requirements that identified in analysis stage are translated into design specification.

Here, I will be more emphasized on smart card payment system. How to integrate the smart card payment system into the digital library system? Smart card payment system is purposely developed to replace the real monetary system. Smart card payment is more reliable than credit card, master card and etc.

5.0 SYSTEM IMPLEMENTATION

5.1 Introduction

System implementation is a phase of integrating the designed modules or functions in order to develop a web based system based on the given requirement. Nearly, all of the presented system design in previous chapter is directed toward a final objective, which aim to translate the representation of system design into a form that can be understood by the computer and be able to fulfill the given requirement. In other words, system implementation is a process of transforms the system design into a programming language. Appropriate tools and programming languages are needed to perform system implementation successfully. Dynamic and suitable hardware and software will help to accelerate the construction of this system. Furthermore, system implementation will produce a simple, clear source code with internal documentation that will facilitate the processes of system validation, verification, debugging, testing, and modification and future enhancement.

5.2 Development Tools

Here are the tools that been used to develop this system:

a. Operating system: Window 2000 Advanced Server
b. Web server: Internet Information Server
c. Database development: Microsoft SQL 7
d. Programming language: Server Script – Active Server Pages
e. Client Script – VBScript
f. Browser: Internet Explorer 5.0
g. Web application development tool: Microsoft Frontpage and Microsoft Visual Interdev 6.0

a. Operating System

For this project, I am using Window 2000 Advanced Server as an operating system to develop the system. Window 2000 Advances Server was purposely designed for web server operating system and it contains Internet Information Server (IIS) to serve as web server. Therefore, system is easier to be tested using this special build-in function.

b. Web Server

Internet Information Server (IIS) is used as the web server for me to browse the system through Internet Explorer 5.0. It is necessary especially during the phase of system development in order to test the result of programming coding. Besides, IIS is needed during system implementation in order to ensure the system is performing well and fulfill the given requirements.

c. Database Development

Microsoft SQL 7 had been chosen as data storage for the entire system. It is due to the high data storage capacity and ease to use. For the entire

system, 13 tables had been created to store the data. It is accomplished by creating an empty database, which so called "nht". All the created tables are store into this database. Each table will contain data fields for storing data. A primary key is allocated to each table. Relationship between the tables is established to enforce referential integrity. The referential integrity is an important constraint on relationship that ensures the consistency between related tables.

d. Web Browser

This system is best through Internet Explorer 5.0.

e. Web Application Development Tool

For the entire system development, both Microsoft Visual Interdev 6.0 and Microsoft FrontPage 2000 were used as web application development tools. Most of the time, Microsoft Visual Interdev 6.0 was used to differentiate ASP codes and normal HTML codes. Besides, it was used to integrate the ASP codes into HTML. Meanwhile, Microsoft FrontPage 2000 was used to design the interfaces for the entire system and to integrate VBScript into the system.

5.3 System Coding

5.3.1 Coding Approach

This system was developed modularly with techniques called top-down, stepwise refinement and an approach that is essential to the development of well-structured program. Therefore, it enables programmer to easily understand the specified algorithm.

a. Coding for database connection

For this project three types of database connection string between SQL server and ActiveX Data Object (ADO) had been used. In order to facilitate the changes of database setting in future, no ODBC connection was created. Whereas, the variables for database connection string is shown below:

Application ("database")="Driver={SQL Server}; Server={local}; Database=nht; uid=wek990047; pwd=fsktm;"

The database connection string contains Driver (SQL Server); Server (local); Database (Name of Database="nht"); uid (user id="wek990047") and pwd (password="fsktm")

After create the database connection string, developer only need to create the ADO objects in order to connect to the database. Normally, developer will use CreateObject in ADO objects to create "connection and recordset". The source code is shown below:

```
<%
' Declare connection and recordset variables
Dim rs
```

```
Dim con

' Create ADO objects for connection and recordset
Set con=Server. CreateObject ("ADODB. Connection")
Set rs=Server. CreateObject ("ADODB. Recordset")

' Open database connection string
Con. Open Application (""database")

'Other executing command
.....
.....
.....

' Close connection objects
rs. Close
con. Close
Set rs=Nothing
Set con=Nothing
%>
```

b. Coding for open a table in a database

After successfully connecting the database, a table in database need to be opened before someone can retrieve or store data. Therefore, Recordset object is used to store the data captured from data store. The open method is used to create a recordset. The syntax for open method is shown below:

Recordset. Open Source

Here, source refers to a table's name. Below is an example of showing the Open method;

```
<%
Dim rs
Dim con

Set con=Server. CreateObject ("ADODB. Connection")
Set con=Server. CreateObject ("ADODB. Recordset")

' Used Open Method to create recordset
con. Open Application ("database")
.....
.....
.....
%>
```

c. Coding for getting form results.

After user had submitted the form, the data from submitted form must be processed and inserted into database. The method for retrieve the submitted data from form is shown below;

StrUserName=Request. Form ("username")

Request. Form is used to retrieve data from form field which name is "username". After that, the value is assigned to a variable called "StrUserName".

d. Coding for using session object

Session object are used to store information that can be accessed by client. Session can be used to trace user and to ensure user is only permitted to access certain page. For this system, session object had been used to ensure that Administrator must login before they are allowed to perform task. In others word, Administrator must login before they can browse Administrator Module. Below is showing how administrator must login before he/she is permitted to perform task;

```
<%
if session("AccessStatus") <> "1" then
        Response.Redirect("/wek990047/Admin/adminlogin.asp")
end if
%>
```

e. Coding for inserting data into Table of a database

For inserting the data into table, SQL statement had been used to perform the task. Below is the syntax for inserting data into a table;

Syntax

Sql="INSERT INTO Table's Name (Table Field's Name) Values ("Form' Data") "

con. Execute (Sql)

Example:

```
<%
set rs = Server.CreateObject("ADODB.Recordset")
```

```
sql = "Insert into AdminInfo(AdName, AdLoginID) values
('"&trim(Request.Form
("AdName"))&"','"&trim(Request.Form("AdTel"))&"')"

con.Execute (sql)
%>
```

f. Coding for Updating data into Table of a database

As a dynamic system, users or administrators are allowed to update the data store in table. Here, I am using sql statement to updating the data into database (table).

Syntax

```
Sql="UPDATE INTO Table's Name SET Table Field Name='"&Form
Data&"') "
con. Execute (Sql)

<%
set rs= Server. CreateObject ("ADODB. Recordset")

sql="UPDATE Event SET EvtName='"&EvtEntryName&"' where
EvtName='" &rs.Fields ("EvtName")&"' "

con. Execute (sql)
%>
```

g. Coding for deleting data store inside database's table

Again, I am using sql statement for deleting data that store inside a table in a database.

Syntax

Sql="DELETE Table's Name Where Table Field Name='"&Form Data&"') "

con. Execute (Sql)

```
<%
Set rs=Server. CreateObject ("ADODB. Connection")

sql="Delete Event where EvtName = '"&rs.Fields ("EvtName")&"'"

con. Execute (sql)
%>
```

5.3.2 Coding Style

a. Include files

Practicing "include file" is similar to using procedures. Normally, it is used as certain part of programming source codes are often repeated. With "include file", developer can save time by type a row of command to call the "include file" instead of typing many repeated source codes. Moreover, using "include file" will ease the messy work of correcting all ASP files as changes might happen accidentally. For this system, "include files" are used to established database connection string, to verify Login Status for administrator and uploading file.

Here, are examples of how to declare include file in ASP pages;

```
<!--#INCLUDE FILE="/wek990047/admin/inc/hanteck.inc"-->

<!--#INCLUDE FILE="/wek990047/admin/inc/teckstatus.inc"-->
```

```
<!--#INCLUDE FILE="/wek990047/admin/inc/uploadfile.asp"-->
```

b. Indent Codes

It might not be necessary to indent code so that the code will work properly and correctly. However, it will make easy to read and detect coding error. Furthermore, it is most useful to read and debug for codes, which contains many control structure such as For-loop, do-while and select case.

Source code example;

```
<%
If usereg. Loginid. Value="" then
    Elseif usereg. Pin1.value="" then          ' indent codes
        Elseif usereg.Pin2.value="" then       'indent codes
            Window.alert "Please key in information!"
End if
%>
```

c. Comment Codes

For your information, commenting the source codes will make it easier for others people to understand the code. Sometimes, it can serve as a reminder for developers to recall what they had been wrote few weeks ago. For ASP, the single quotation mark is used to indicate the comment.

```
<%
' Open Database connection and Recordset  (comment )
Set con = Server. CreateObject ("ADODB. Connection")
Set rs = Server. CreateObject ("ADODB. Recordset")
%>
```

d. Use Subprocedures

A subprocedure is very useful to optimize the code. During system development, more and more codes are written and many are repeated codes. Therefore, repeated codes can be put into subprocedure and call that subprocedure when it is needed.

6.0 SYSTEM TESTING

6.1 Introduction

For your information, system testing is the major quality control measure during system prototyping. Therefore, system testing is performed to ensure that the programs are executed correctly and to ensure the given requirements are fulfilled. It provides a method to uncover logic errors, run-time error in order to ensure the system integrity and reliability. In other words, system testing is a critical phase in determining the quality control and assurance.

The main objectives of system testing are stated below;

- Testing is a process of program execution with clear intents to find program errors and run-time program bugs.
- To have an effective system testing, one should contain an unexpected testing record sets with high probability of detecting undiscovered errors during program design and development.
- A successful system testing is one that could be able to uncover a yet undiscovered error.

6.2 Test case design

A method should be chosen before performing system testing. This method will provide a systematic and yet thorough approach for performing system testing. Moreover, this method provide a mechanism which able to ensure the completeness of system testing and provide the highest likelihood for uncovering errors in system.

For this system, two types of test case design had been used which are white box testing and black testing.

a. White box testing

For your information, white box testing is so-called glass box testing. It is a test case design method that used the control structure of procedural design to derive test cases. Therefore, developer will be able to derive test cases by;

- Guarantee that all the independent paths within a module have been exercised at least once.
- Exercise all the logical decision on their true and false sides.
- Execute all logical loop at their boundaries and within their operational bounds.
- Exercise internal data structures to ensure their validity.

This testing case design was carried out at the early stages of the system testing process in order to ensure that the internal operation of a system will perform according given requirements.

b. Black box testing

Black box testing is so-called behavioral testing. It focuses on the functional requirements of a system. Therefore, black box testing will enable developer to derive a set of input condition that will fully exercise all program functional requirements. Meanwhile, black box testing is not an alternative of white box testing. However, it is a complementary approach that is likely to uncover a different class of errors, which are not uncovered by white box testing.

Black box testing attempts to find errors in the following categories;

- Incorrect or missing function
- Interface error
- Error in data structure or external database access
- Behavior of performance errors
- Initialization and terminating errors

6.3 Phase of System Testing

Testing is a critical measure for system quality control and assurance. Therefore, system testing represents the completeness, extensive review and challenge on application design, requirement and program coding. For this system, it will undergo three stages of testing which are unit testing, integrating testing and system testing. Below is a figure showing three phases of system testing.

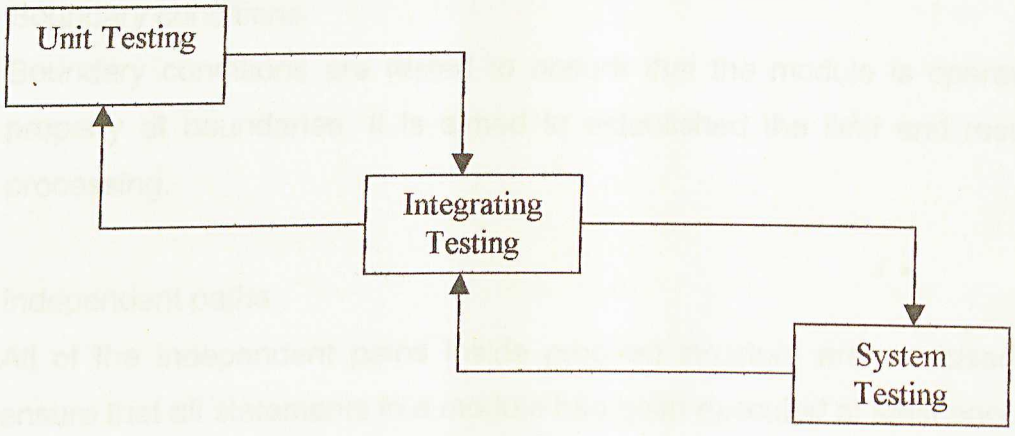


Figure 6.1: Phases of System Testing

6.3.1 Unit Testing

Unit testing is focuses on effort of smallest program unit verification. In this step, all of the embedded control structures inside the program are tested to disclose the existing errors within the boundary of the module by using the component level design description as guide.

There are five important test cases involved in unit testing;

- Interface

Module interface is tested to ensure the flow of information within the program.

- Local data structures

  Local data structures are tested in order to ensure that data store temporarily maintain its integrity during the entire steps of algorithm execution. Meanwhile, the impact on global data should be ascertained during unit testing.

- Boundary conditions

  Boundary conditions are tested to ensure that the module is operating properly at boundaries. It is aimed to established the limit and restrict processing.

- Independent paths

  All of the independent paths inside program structure are exercised to ensure that all statements in a module had been executed at least once.

- Error handling paths

  All of the errors handling paths are tested to ensure it ability to detect and recover fatal errors during execution.

6.3.2 Integration Testing

Integrating testing a specific feature together with other newly developed features. In other words, when the individual components are working correctly and meet the objectives, these components are combined into a working system.

There are a number of different integration strategies available including top-down integration, bottom-up integration, regression testing and smoke testing. According to the system requirements 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 system integration testing for this project.

First, top-down integration beginning with 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 in the early testing phase and avoiding extensive redesign or re-implementation.

Then, bottom-up integration begins construction and testing with atomic module where low-level components are combined into cluster to perform a specific system sub function 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 the need for stubs is eliminated.

6.3.4 System Testing

For your information, system testing is last procedure of testing phase. However, system testing is different with unit testing and integration testing. System testing is designed to find out bugs that cannot be attributed to individual component and interaction among components and other objects. System testing can test an issue and behaviors that can only be exposed by testing the entire integrated system or major part of it. System testing will

ensure system functioning properly and all design and development objective are met.

There are several steps had been used to test this system. It includes function testing, performance testing and acceptance testing.

a. **Function Testing**

Function testing will be a first step of system testing. It focuses on system functionalities. These functions may involve the whole system, sub module and individual module. The effective function tests will perform high probabilities to detect system fault. Those function tests are:

- High fault detection probabilities.
- Test all valid and invalid input data type.
- Include stopping criteria.

b. **Performance Testing**

Performance testing is assigned to test non-functional requirements. System performance is ensuring the performance of system reach objective set by potential users as highlighted in the non-function requirement section guidelines.

c. **Acceptance Testing**

After completing function testing and performance testing, the final testing will involved its potential users. Users will lead acceptance testing and define their own real-time business data sets to be used to test cases. This will allow users to determine the functionality of the system.

7.0 SYSTEM EVALUATION

7.1 Introduction

System evaluation is a process of evaluating the developed system, identifying the system strengths, identifying system limitations and identifying future enhancements. Furthermore, gained knowledge and encountered problems during system development will be highlighted. End users evaluation will help to identify and detect some errors and system limitations.

7.2 System Strength

a. **Payment transaction through smart card**

Members are allowed to purchase the article that store in digital library with smart card. Payment through smart card will increase the transaction security. This due to payment transaction is performing inside the smart card but not through Internet. This is an approach to encourage cashless payment environment in future.

b. **Smart Card value top up**

Smart card holders are allowed to top up their electronic cash value. It is convenient for smart card holder to increase the card value by paying the same amount of money. System will automatically generate a new PIN number.

c. **Attractive and User Friendly Interface**

The system interface is attractive and user friendly especially for non computer literate user. It emphasize on browsing and pointing to special menu. Therefore, user-friendly interface will ease the information retrieval.

d. **Allow member to create Lost Report**

Smart card holders are allowed to lodge a lost report whenever they lost their smart card. After lodged the report, system will notify the administrator. Then, administrator will terminate the services of that smart card holder. That mean, no payment transaction will be carried out until a new smart is issued. Besides that, the value will still maintain even though the smart card was lost. Anyway, smart card bearer needed to lodge the lost report.

e. **Download service**

System will allow smart card holder (member) to download the article after the payment transaction had been carried out completely. In other words, article is permitted to be download if payment transaction is performing successfully.

f. **Transaction statement**

Smart card holders are permitted to view their transaction statement, which contains all of their previous purchased articles. Besides, transaction statement will allow member to check card value.

g. **Check Balance**

Smart card holder can check their card value even though they are not interested to purchase any item at that moment.

h. **Effective newsletter and Event**

The event and newsletter is board at first page of user page. These newsletter and event will automatically expired after 30 day.

i. **Custom Administrator Password Validation**

This system is creating a custom password authentication system to prevent unauthorized administrator from accessing admin pages. Unauthorized users are prohibited from accessing database that store user's data.

j. **Effective Search and group by category and author**

Members are allowed to search the article according to category or author. It is a faster way to view the articles according to their category or title. Besides, members are allowed to view the abstract of each article.

k. **Administrator and member can upload article into database**

Usually, administrator will upload the articles into user page so that member can view or purchase that article. Member can upload their article into database, but administrator will filter that article before uploading into user page.

7.3 System Limitation

However, nothing is perfect, there are still some limitations in this system due to lack of time, facilities constraints and lack of knowledge about programming skill. Those limitations are listed below;

a. **Only one type of smart card is accessible**

   This system only provide accessible for only one type of smart card. This will limited the system boundary and its usage.

b. **Smart card reader is needed**

   In order to perform the payment transaction, a smart card reader in compulsory needed. Furthermore, smart card reader is not cheap. This weaknesses will limited the system boundary.

c. **No other delivery alternatives**

   The purchased item can only be download from the server. This system is not allowed the purchased items to be delivered through mail or shipping services. Therefore, there are no other alternatives for user to get the purchased item through mail or delivery services.

d. **Lack of contingency plan for download failure**

   The system fail to deal with downloads failure. System is unable to trace the download failure. If download failure, member had perform the transaction again, the card will again be deducted. Therefore, it is unfair to the user.

e. **Purchasing cannot be done simultaneously**

Currently, system does not allowed user to purchase the article simultaneously. In other words, only one article can be purchase at one time. It is not convenient and user friendly for the user.

f. Send mail function

This system is created without send mail function, which is so important in real time environment. Send mail is very important so that it will increase the system functionality.

g. Difficulty in coding ASP script

In the early stages of system development, there are a lot of problems arise. It is because I am not familiar with the ASP script. Without doubt, some basic knowledge of visual basic is acquired to facilitate the system development using ASP script.

7.4 Future Enhancement

There are some functions that can further enhance in order to increase the system functionality. The following enhancements are;

a. **Upgrade the system interface**

   Actually, system interface must be enhanced in order to attract more user and the interface must be user friendly. For example, add some animation and graphic.

b. **Integrate with the real digital library**

   The payment transaction module can be integrated into the real digital library in order to make system become more practical but not merely a prototype. Therefore, this system will become a real system that can carried out the payment transaction through smart card.

c. **Integrate with Credit Card and Master Card**

   This is a partial E-Commerce, it involved the transaction of money whether via Internet or vice versa. By integrating payment system with credit card and Master Card, it will increase the diversity of users. In others word, it will encourage more users to purchase the articles since there are alternatives for performing payment transaction.

d. **Add function of re-download**

   User must be allowed to perform the download process again if he/she is unable to download the article. Furthermore, the system must able to recognize the download failure. If re-download is performing, card value must be deducted again.

e. **Allow user to purchase more than one item simultaneously**

For the future, system is able to allow user to purchase more one articles simultaneously. Currently, system only user to purchase one article at one time. Therefore, this limitation must be overcome in future.

f. Add search engine for user to search the article

A search engine must create in order to facilitate the process of product searching. Therefore, it is convenient for user to search for the desired product.

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p. Problems with the Waterfall Model
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USER MANUAL

Main Page

a. This is the main page for user module. It contains all the system functions for user module. User are allowed to browse the main page of user module through "userpage.asp". It contains function such as Member Registration, Subscription, Change PIN, Lost Report, Feedback, Product, Reload and Help".

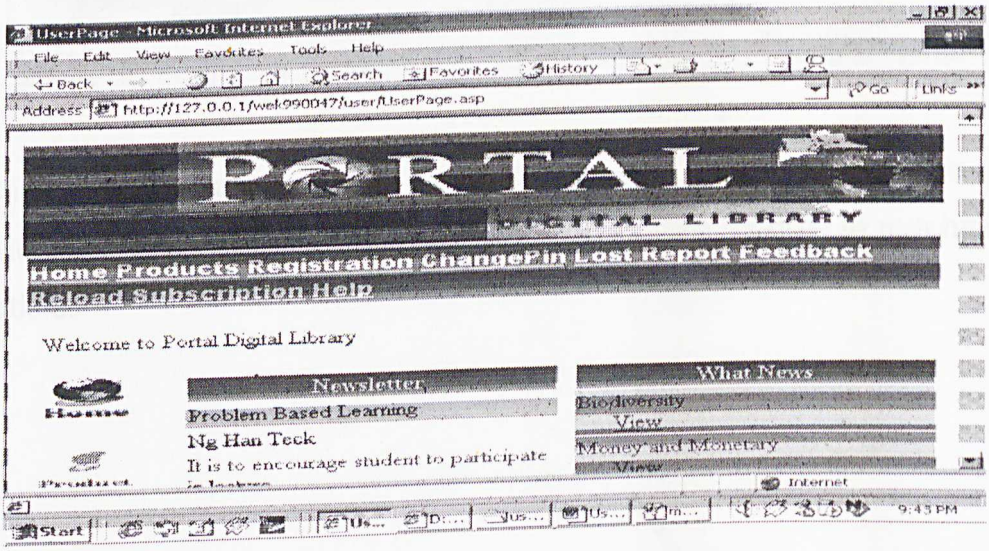
b. It contains event, newsletter, and new product for user to view about it.

c. Events are records about current activities for this digital library.

d. Newsletters are records about current news about this digital library.

e. New Product is a record about new articles for member to purchase.

f. Below is showing the main page of user module.



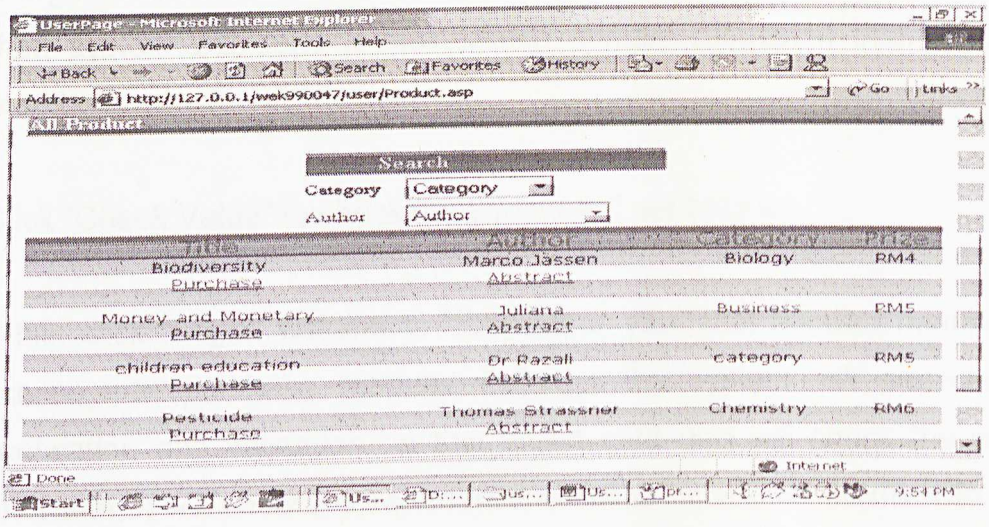
Product

a. It is the page about all articles that store in this digital library. Articles are store according to category and author.

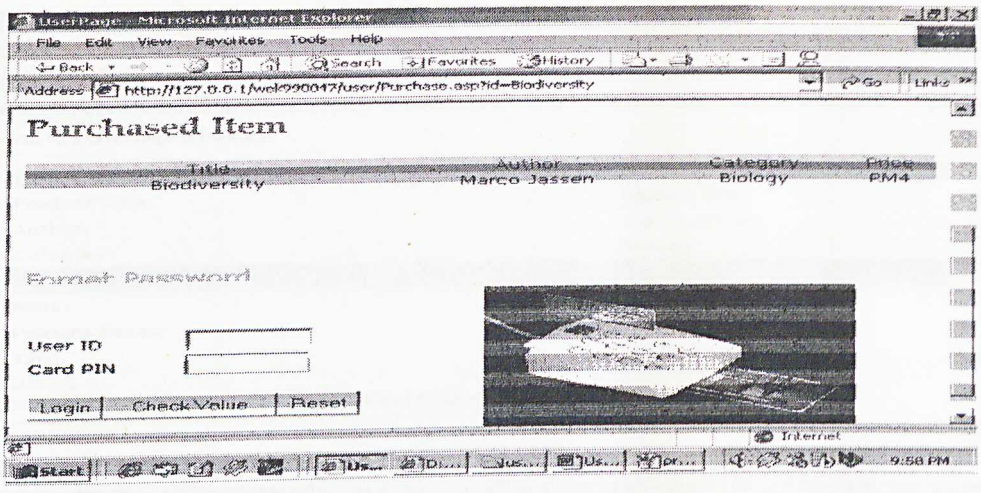
b. Click on "Product" button will link to "product.asp" in order to view the records of each article.

c. Members will allow browsing this page in order to find their suitable articles.

d. Members can view the abstract of that particular article by click the hyperlink "abstract".



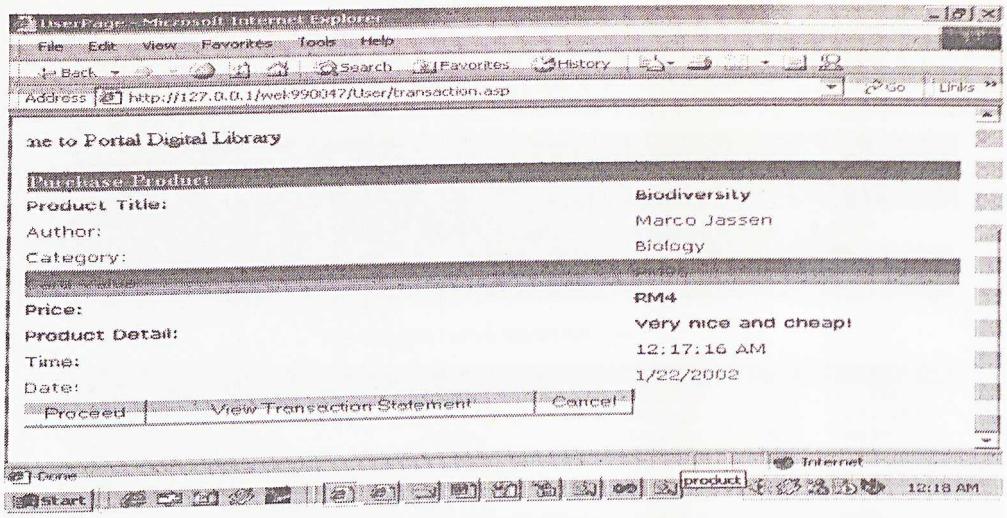
d. Click on "Purchase" will link to "purchase.asp". It is a page where smart card had to be slot in before proceed to purchase module to purchase an article.



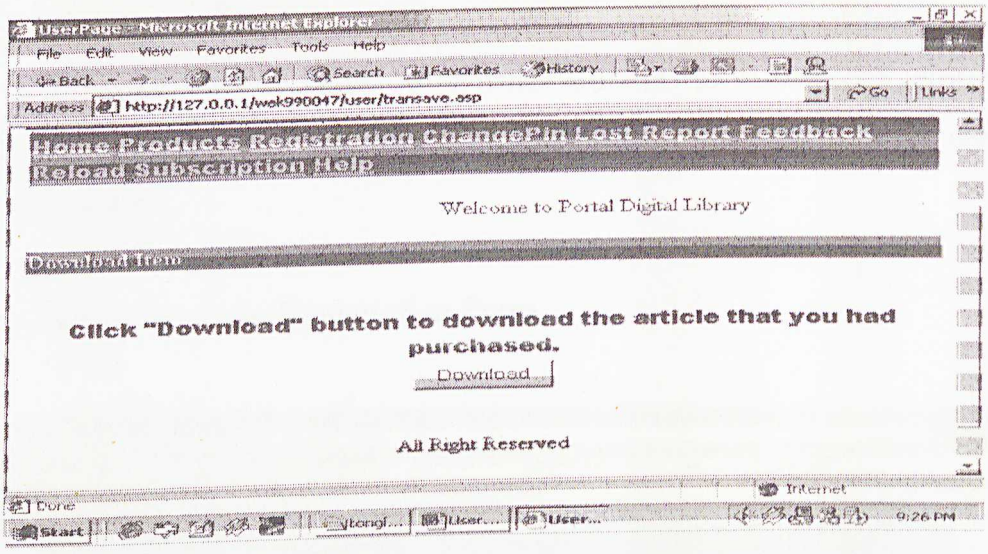
e. If member forget about the smart card PIN number, he/she can click on "Forgot Password" in order to get their PIN number through mail. After that, system will send a mail, which contain requested information to member.

f. Click "Check Value" to check the smart card net balance.

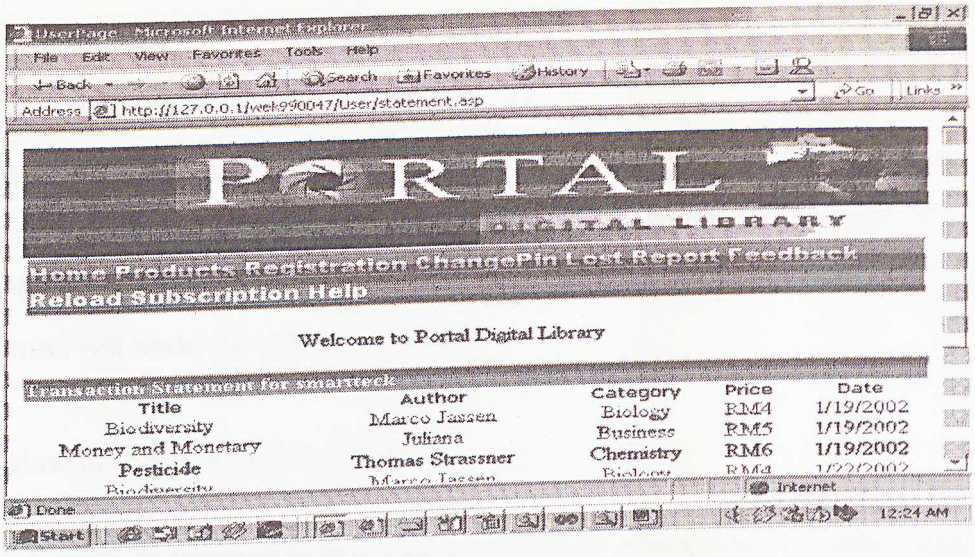
g. While click "Login" will link to "transaction.asp" that allowed member to access into purchase module. Anyway, the system will perform the verification and validation on that smart card and will check the value. After that, it will show the information about an article for member to view about it.



h. Click "Proceed" to proceed into "download.asp", a message box will pop up for member to download that article which is showed in below.



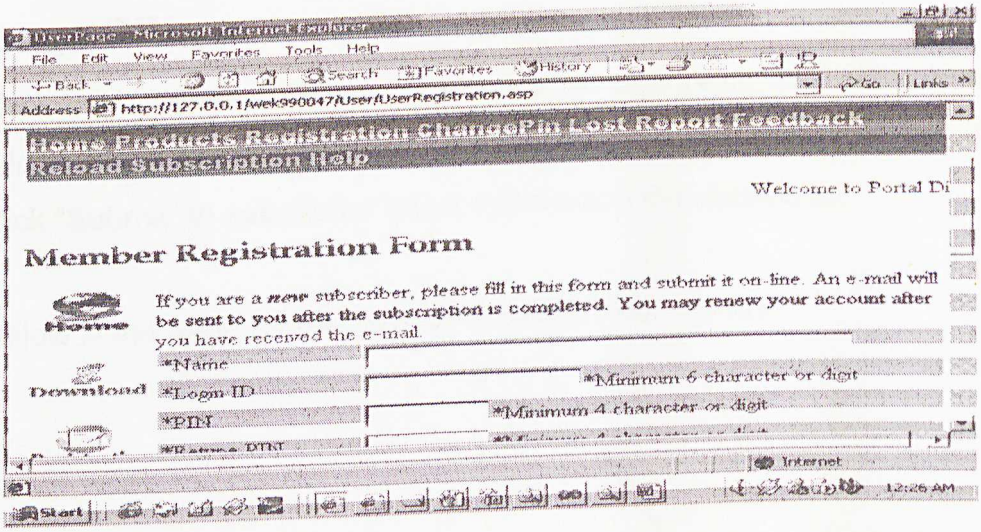
i. Members are allowed to view their previous transaction statement by click on "View Transaction Statement". Below is an example of transaction statement.



Registration

a. Click on "Registration" button will link to "userregistration.asp". Users can apply to become a member for this digital library by completely fills in the member registration form. After click "Submit" to submit the information into Administrator. A mail will be send if administrator had approved the application.

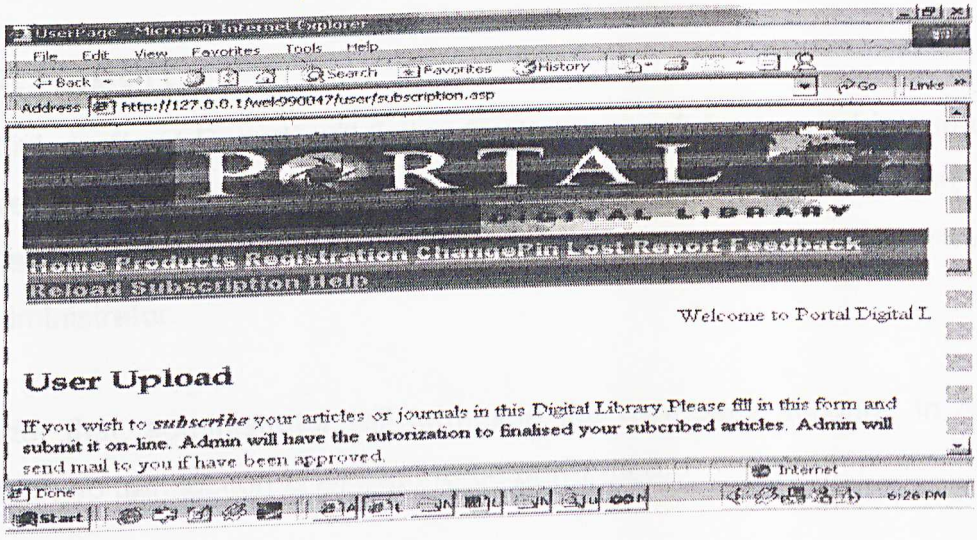
b. Below is a Member Registration Form.



User Upload

a. Click on "User Upload" button will link to "Subscription.asp". Members are allowed to subscribe their articles into this digital library by fill in the subscription form. After, administrator had approved the user subscription, a mail will send to notify subscriber.

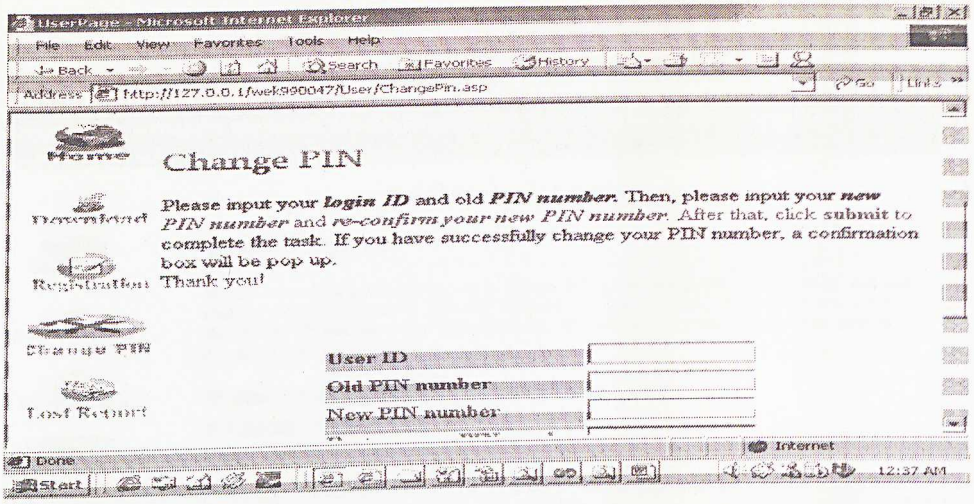
b. Below is a Subscription Form.



Change PIN

a. Click on "Change PIN" button will link to "changepin.asp". Members are allowed to change their login PIN number by click on "Change PIN". Then, click "Submit" to submit the latest information into database.

b. Below is the page for performing "Change PIN" function.

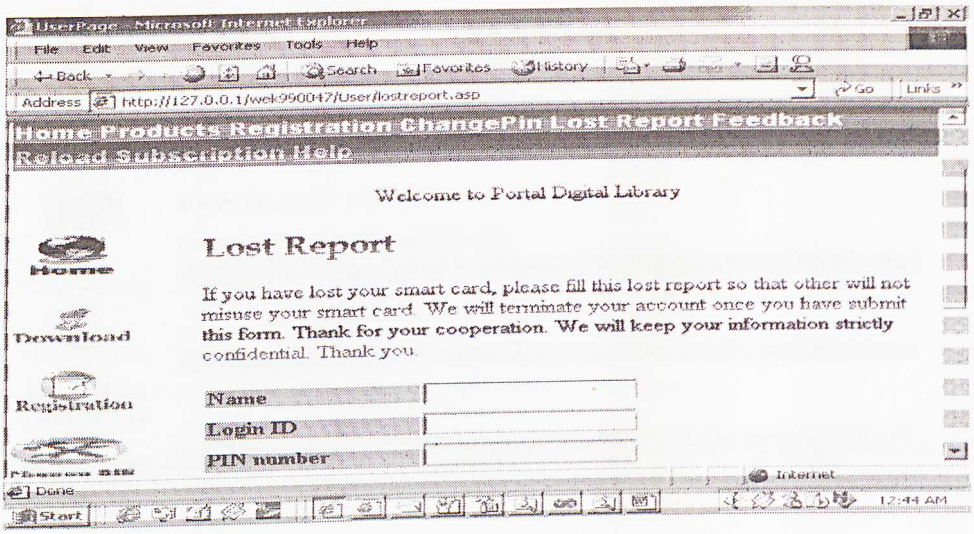


Lost Report

a. Click on "Lost Report" will link to "lostreport.asp". Lost report is purposely created for member to lodge a report when he/she lost its smart card. Member has to fill in a form and the report will be submitted to administrator.

b. After that, administrator will terminate the member's account. In others word, no transaction is allowed to be performed.

c. Below is a page of Lost Report.

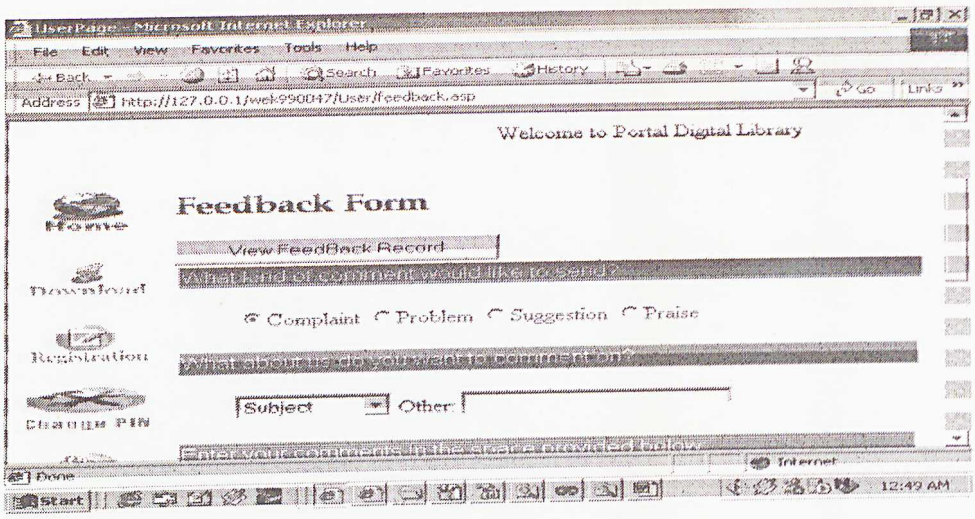


Feedback

a. Click on "feedback" button will link to "feedback.asp". Members are allowed to given their own comment about this system through Feedback form.

b. Members need to fill in the feedback form in order to give their comment, praise, and suggestion regarding this system by click on "Feedback" button.

c. Besides, members may have the chances to view the comment from other members by click on "View Feedback Record".



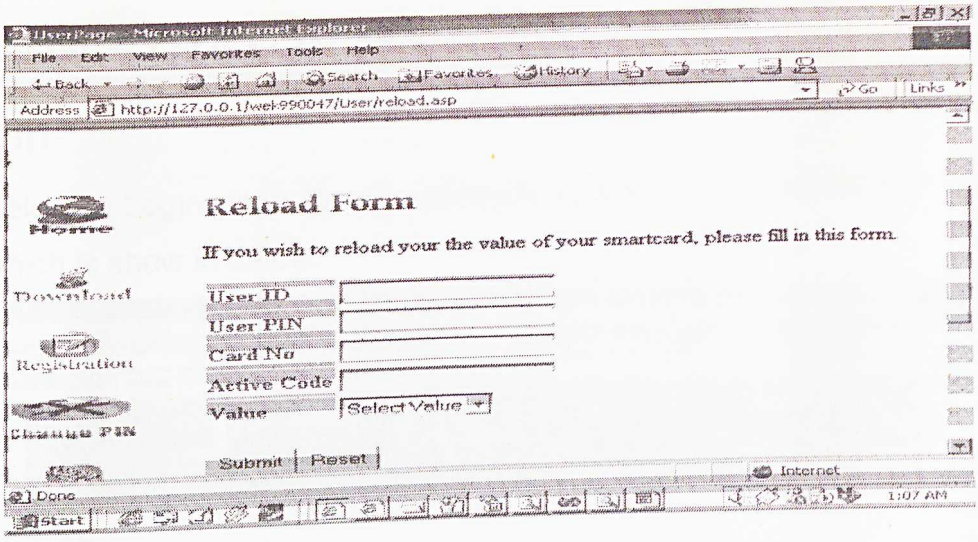
Reload

a. Smart card holder or member can top up their card value by click on "Reload" button.

b. Then, fill in the User ID, User PIN, new card number and its active code and click "Submit" to send the data into database.

c. After the verification and validation, system will auto generate a new smart card PIN number.

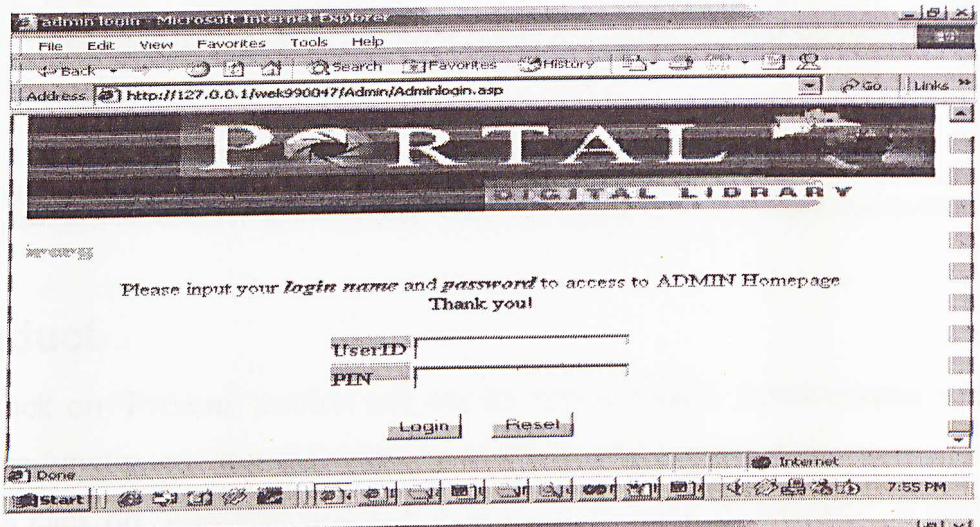
d. Below is the page for performing reload function.

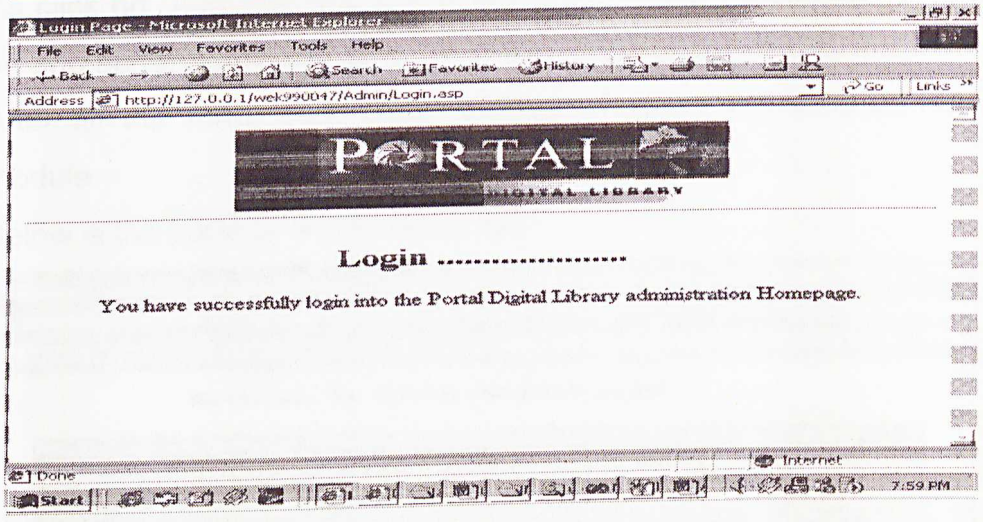

UserPage - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History Go Links
Address http://127.0.0.1/wek990047/User/reload.asp
Home
Download
Registration
Change PIN
Reload Form
If you wish to reload your the value of your smartcard, please fill in this form.
User ID
User PIN
Card No
Active Code
Value
Select Value
Submit
Reset
Done
Internet
Start
1:07 AM

ADMINISTRATOR MANUAL

Login

a. Below is Login page for administrator to login into administrator module which is show in below.



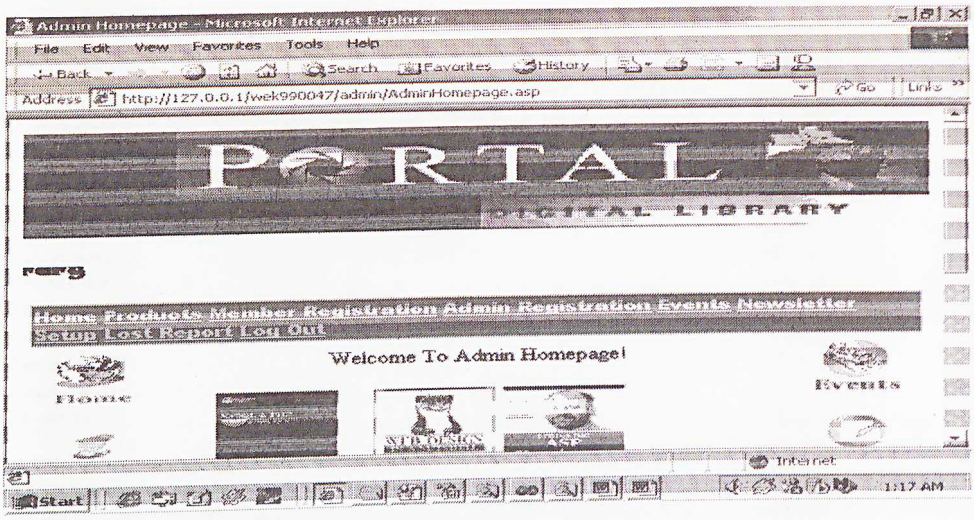


Main Page

a. It is the main page that all administrators must pass through after he/she had login into administrator module.

b. It contains all of the function that can perform by administrators.

c. Main page of administrator module is shown below.



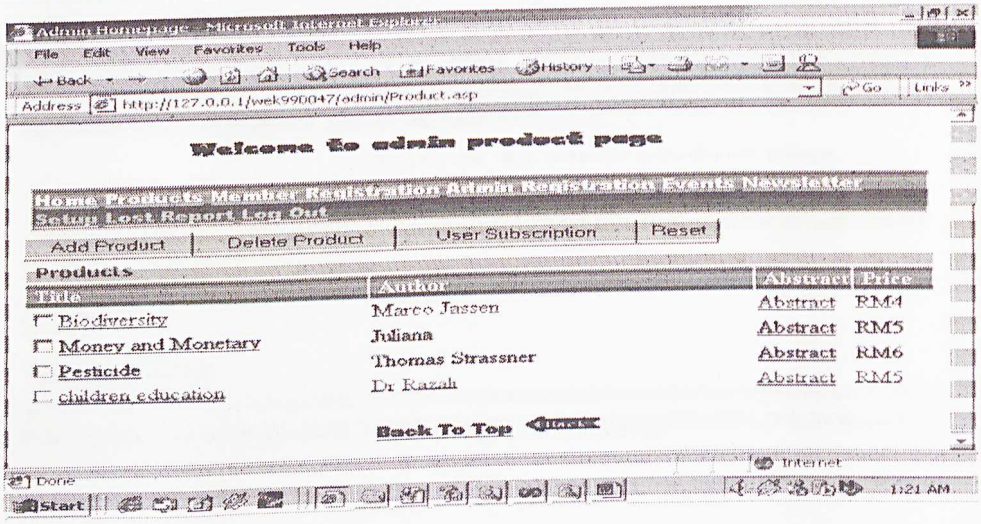
Product

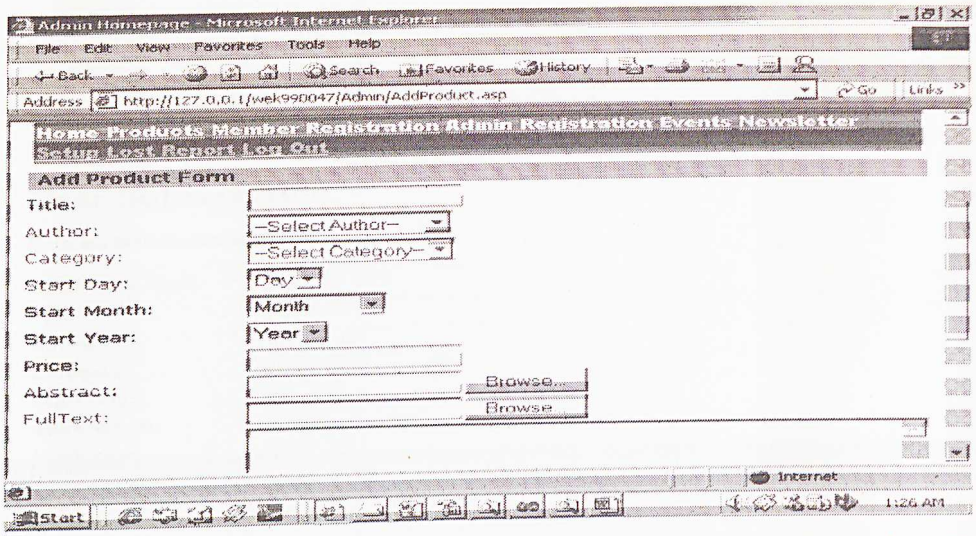
a. Click on "Product" button will link to "product.asp". Administrator will use this function to upload the product (article) into user module.

b. As click on "Add Product" button will link to "AddProduct.asp", a form will be pop up for administrator to fill in the details about the product.

c. After fill the form, click "Add" button to upload the product into user module.

d. Below is the page of "AddProduct.asp".

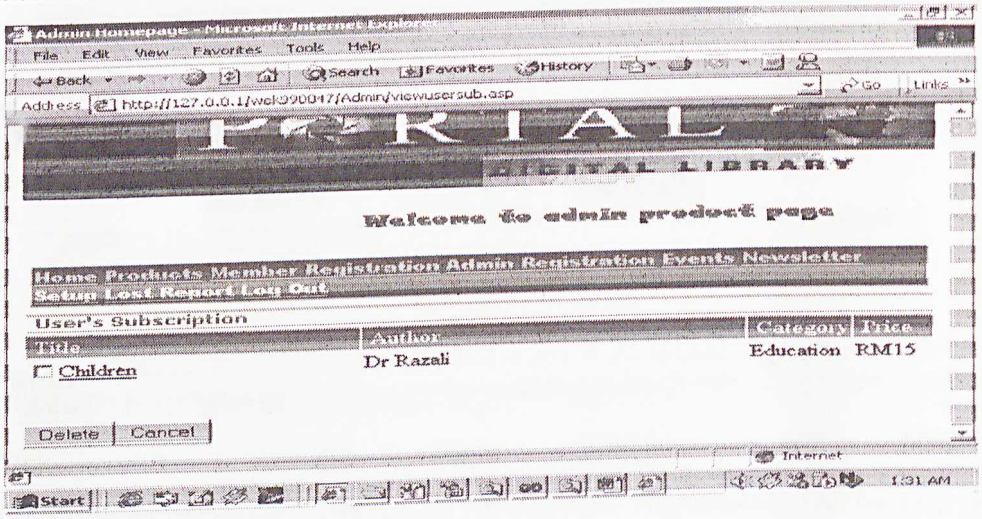


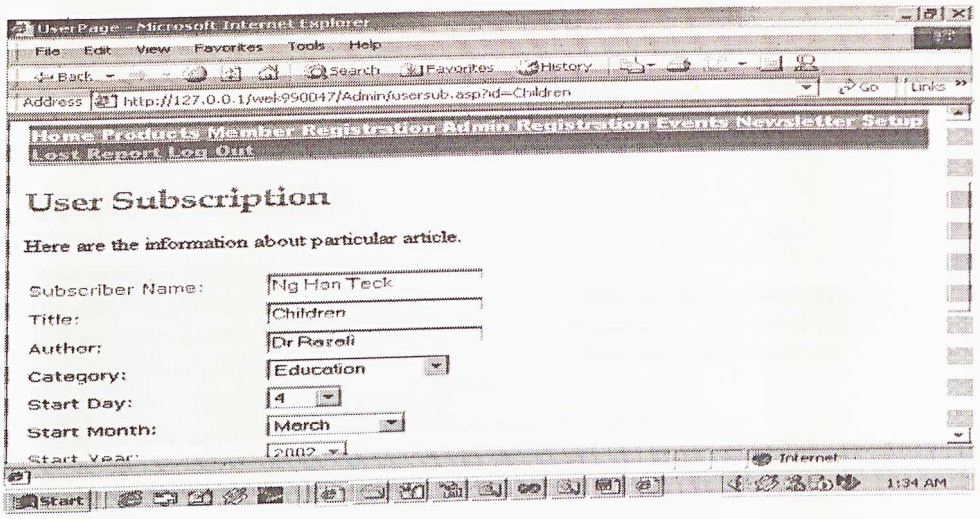


e. Administrator is allowed to delete the product from database by click on "Delete Product" button.

f. Click on "User Upload" will allow administrator to view the user's subscription. Then, administrator can view the full record of the product by click on hyperlink.

g. Administrator will has the right to approve the user subscription by click on "Approve" button. After that, the approved product will upload into database.

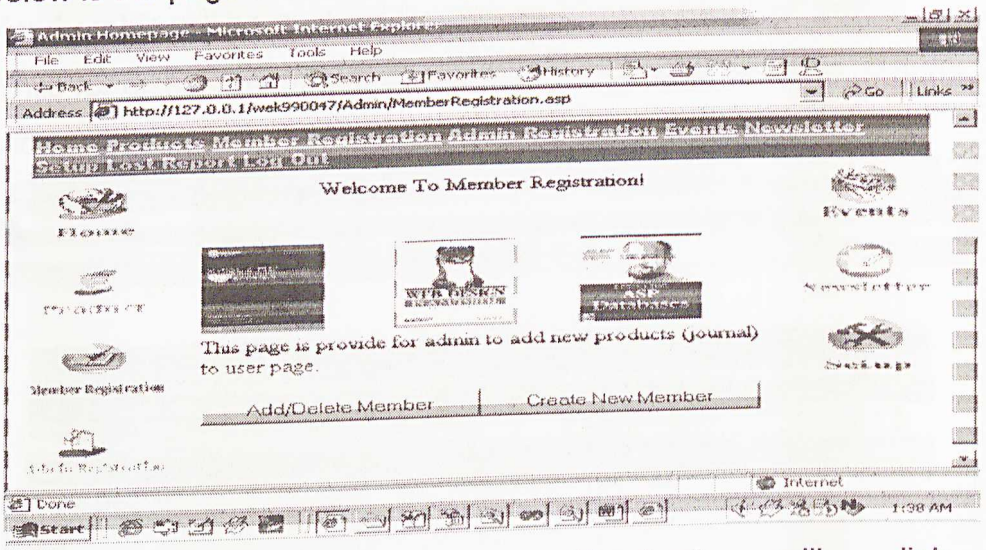




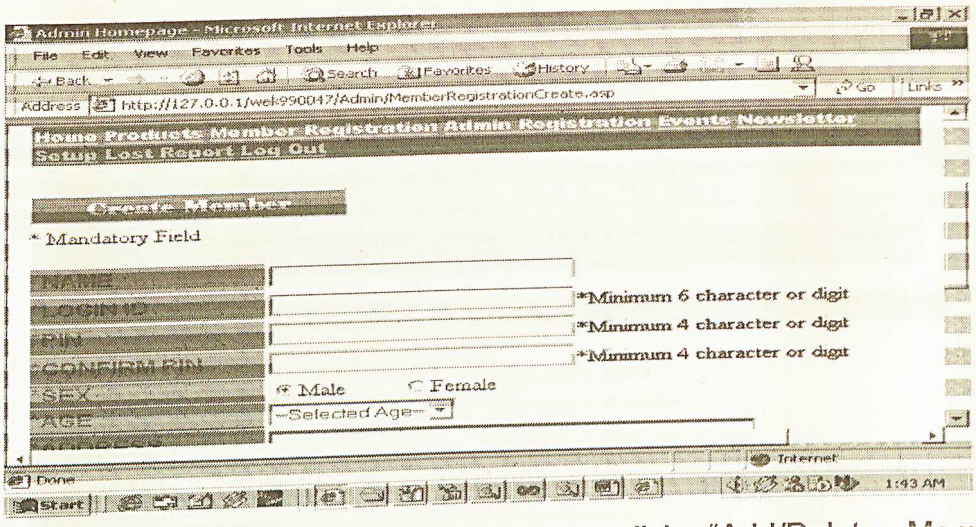
Member Registration

a. Click on "Member Registration" button will link to "MemberRegistration.asp". Then, administrator will perform the process of member registration.

b. Below is the page of "MemberRegistration.asp"



c. Click on "Create New Member" will link to "MemberRegistrationCreate.asp", a member registration will be pop out for administrator to fill in the member details. Then, the information will be inserted into database.



d. While move back to previous page, click "Add/Delete Member", administrator will have the chances to view the records of member registration.

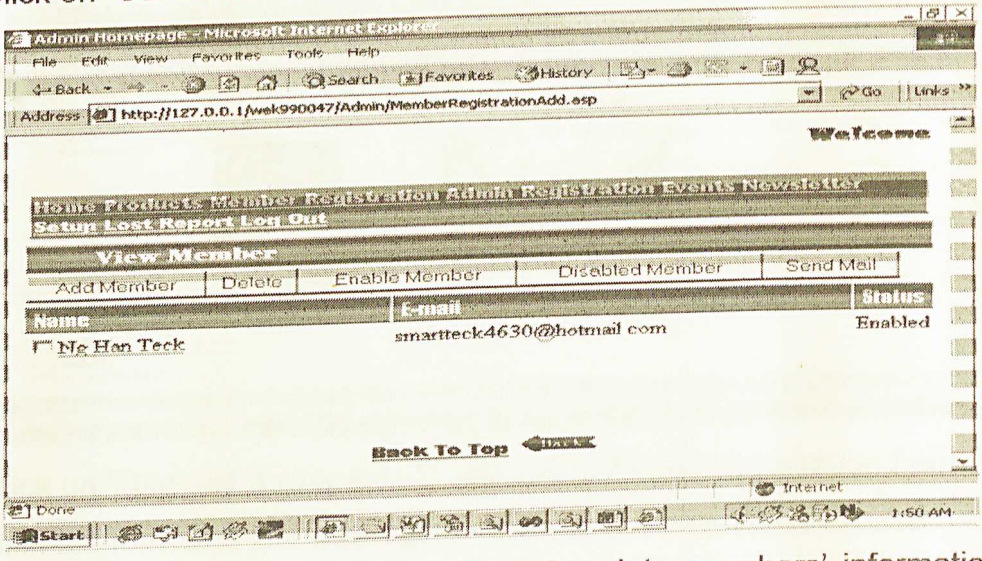
e. Click on "Add Member" button will link to Member Registration Form.

f. Click on "Delete" button will delete the whole particular member information from database.

g. Membership will be enabled by click on "Enable Member" button.

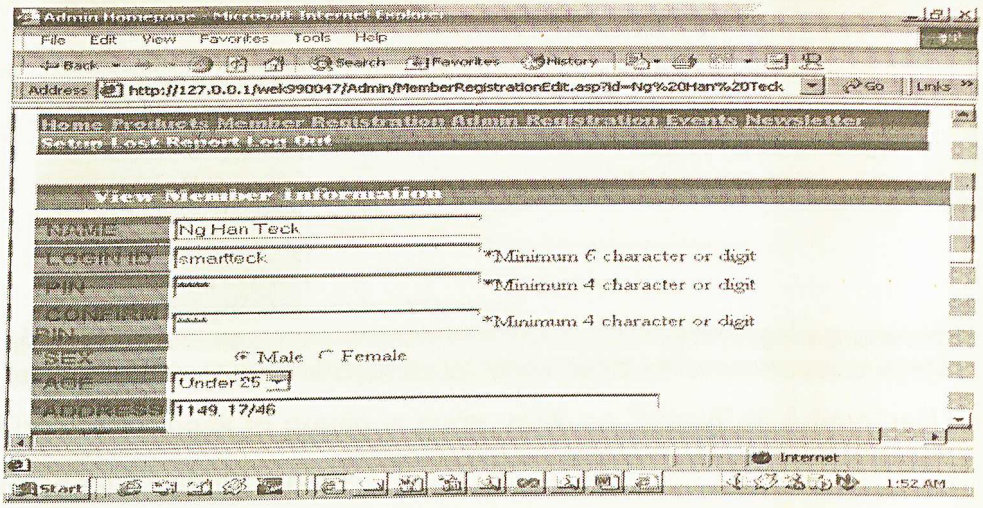
h. While for disable membership just click on "Disable Member" button.

i. Click on "Send Mail" button to send mail to member.



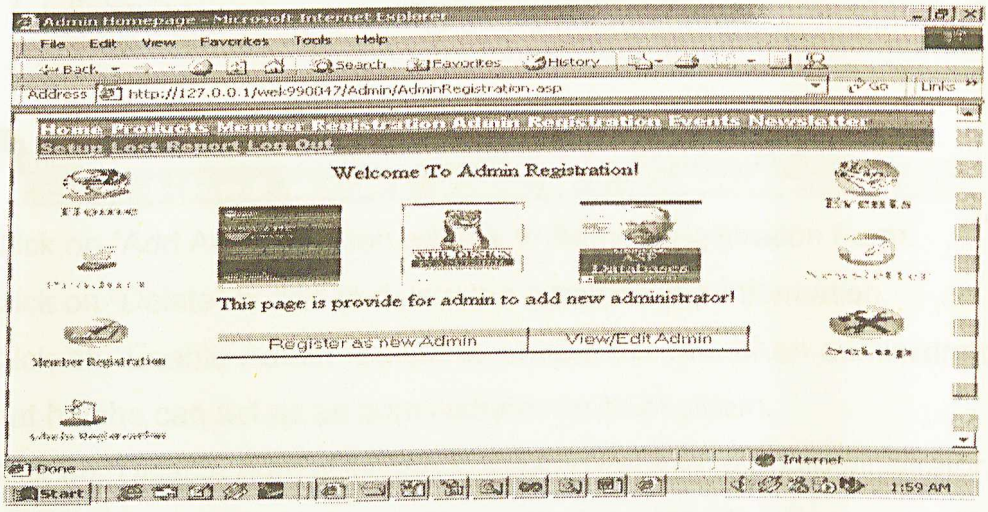
j. Administrators are allowed to edit and update members' information by click on hyperlink in order to link the required information.

k. Click on "Update" button in order to update the member's information or "cancel" button to cancel the updating process.

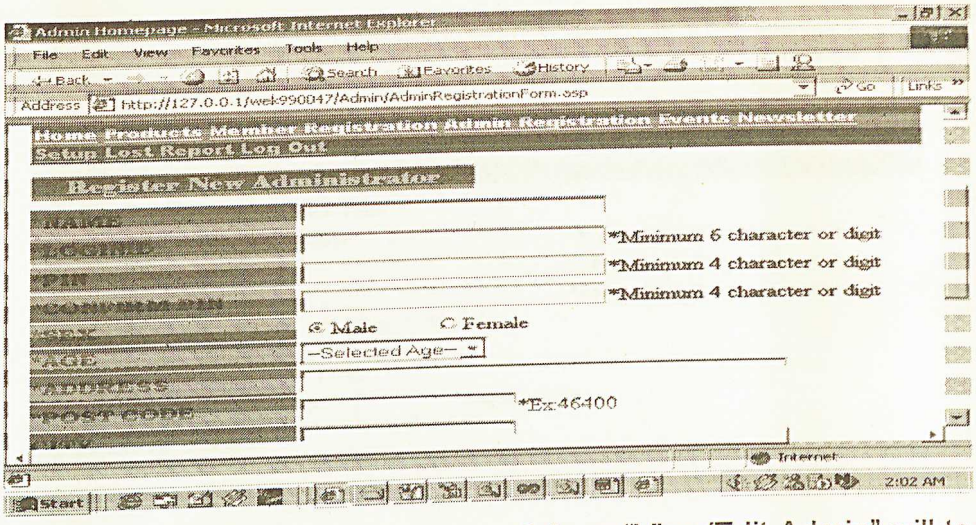


Admin Registration

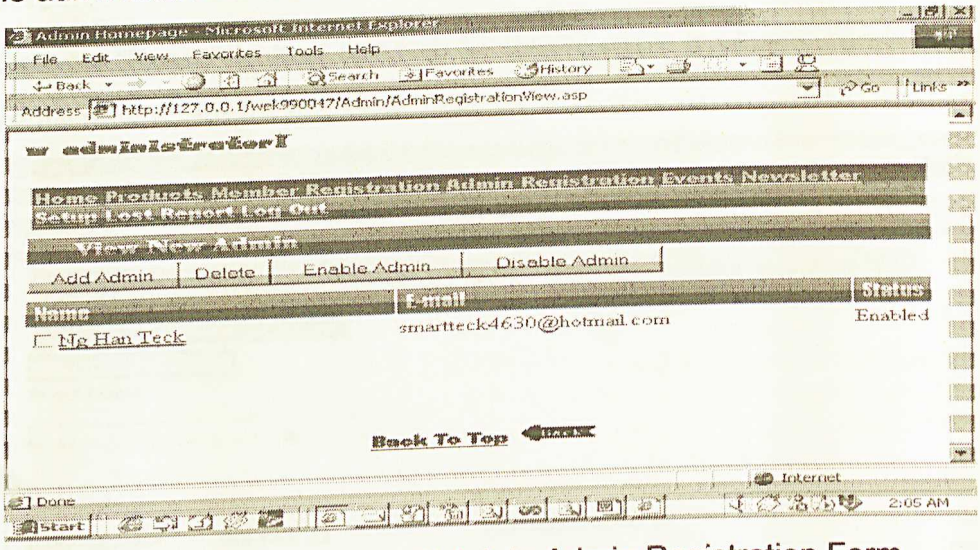
a. Click on "Admin Registration" button will link to "AdminRegistration.asp". Similarly, admin registration is purposely created for register a new administrator.



b. Click on "Register a new Admin" will link to Admin Registration Form. After fill in the form and just click submit to send the data into database.



c. While move back to previous page, click on "View/Edit Admin" will to view the administrator's record.



d. Click on "Add Admin" button will link to Admin Registration Form.

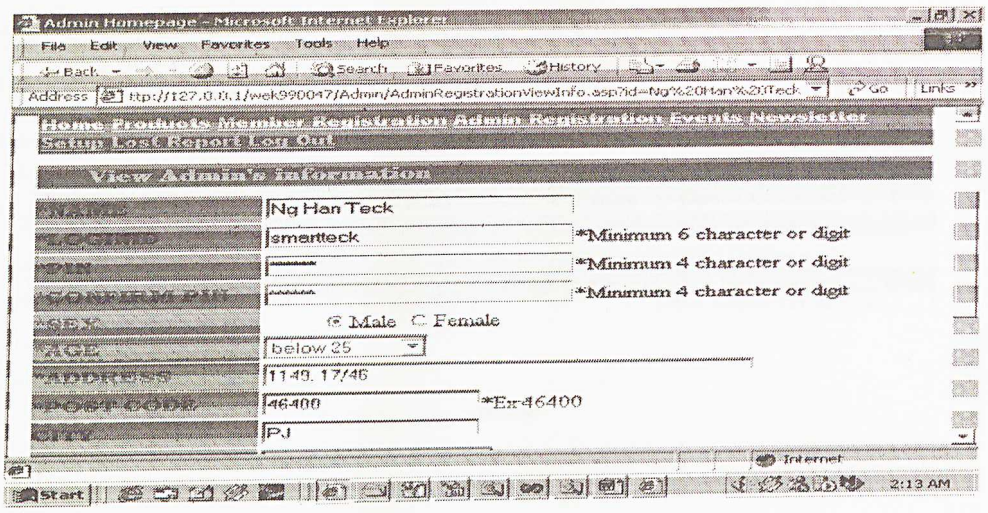
e. Click on "Delete" button to delete the administrator information.

f. Click on "Enable Admin" button to enable the role of an administrator so that he/she can act as an administrator for this system.

g. Click on "Disable Admin" button to disable the role of an administrator.

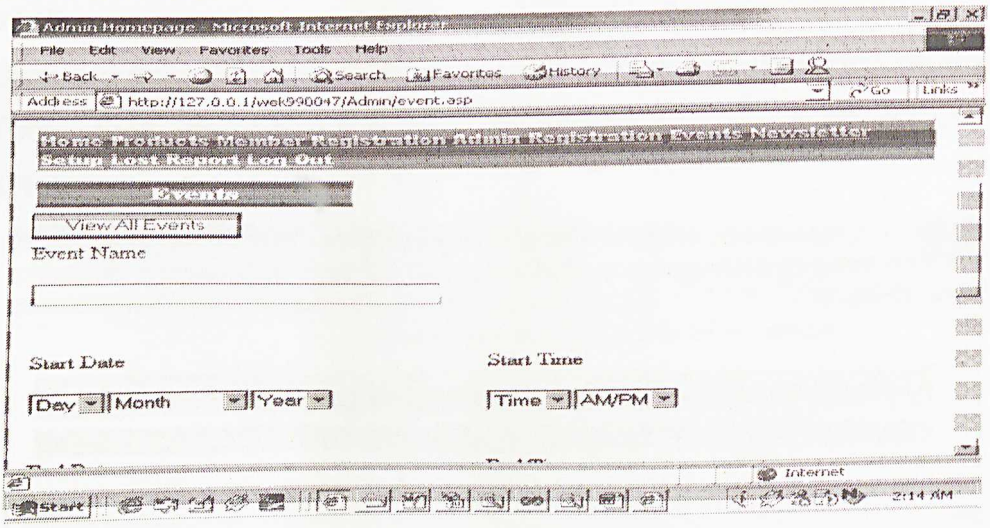
h. Click on the name's hyperlink will link the to view or edit the administrator's information.

i. Click "Update" button to submit the updated information into database.



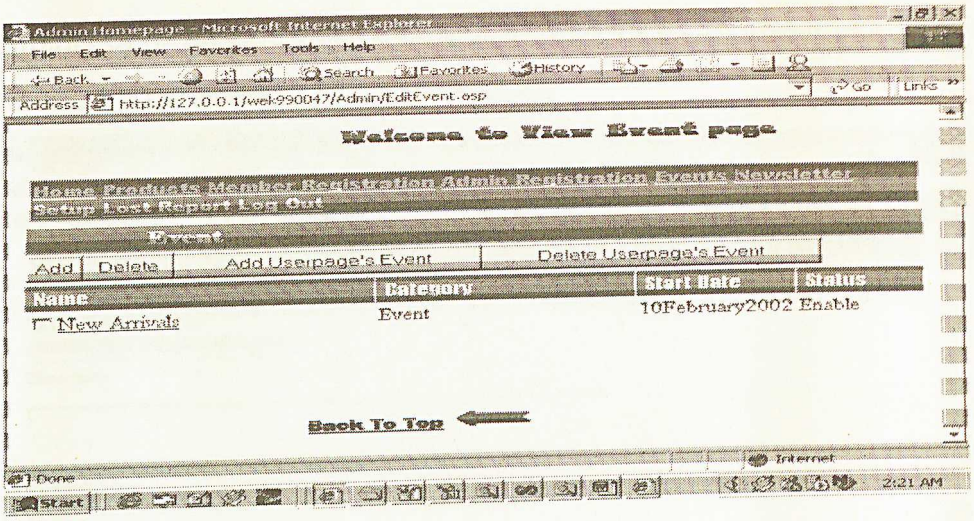
Event

a. Click on "Event" button will link to "event.asp". It allows administrator to create new event for this web site.



b. An event form will pop out for administrator to create an event for this system. Click on "Add Event" in order to submit the event information into database or just click on "Cancel Event" to cancel it.

c. Click on "View All Event" button to all the event's records.



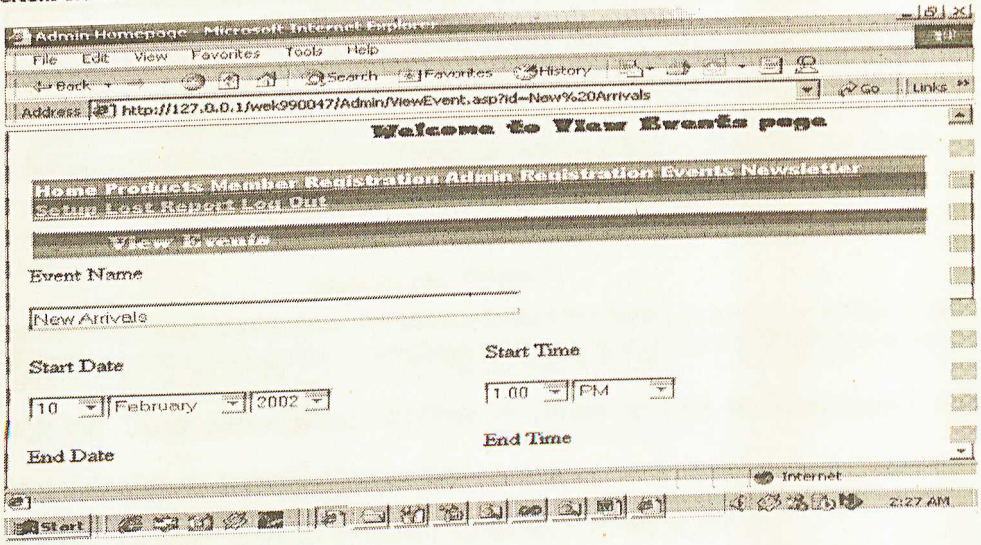
d. Click on "Add" button to add the new event.

e. Click on "Delete" button to delete the event.

f. Click on "Add Userpage's Event" button to add event into user page.

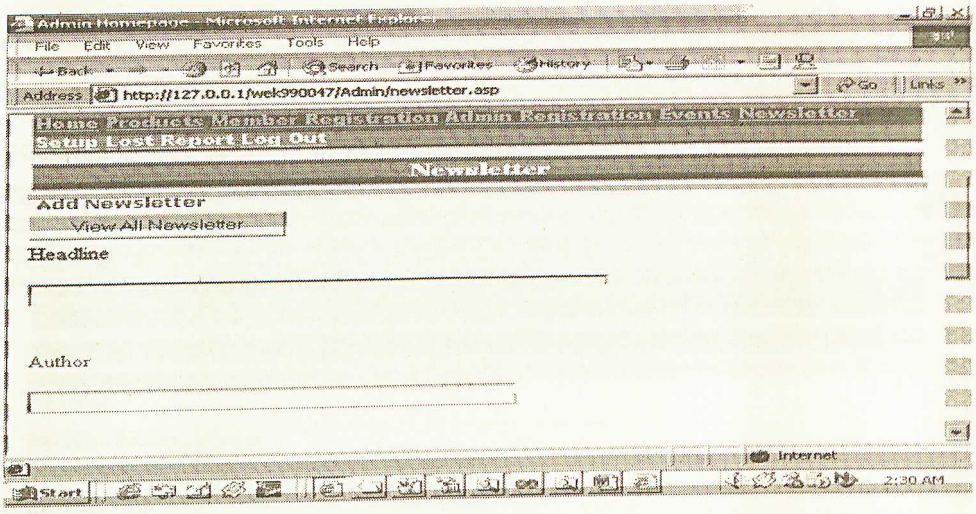
g. Click on "Delete Userpage's Event" button to delete the event from user page.

h. Click on "name" hyperlink to link to view or update the event's information. Then, click on "Update Event" to update the event information into database.



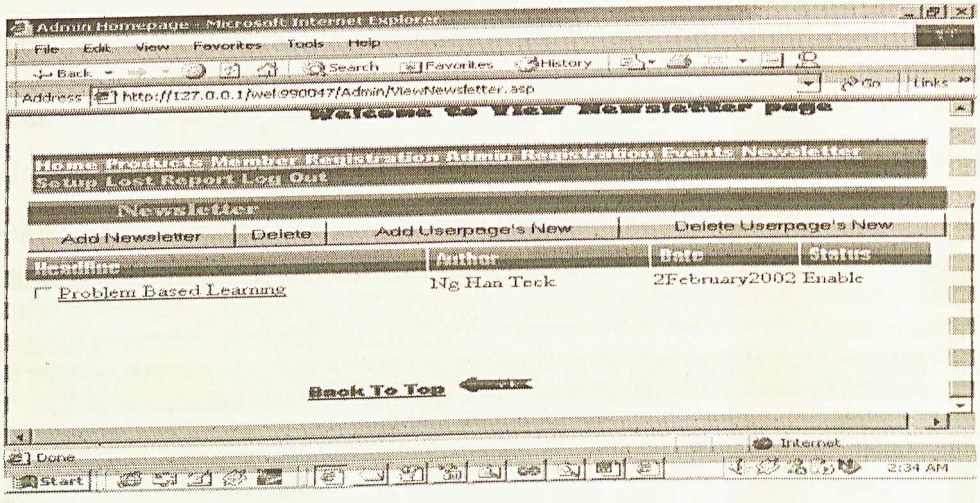
Newsletter

a. Administrator is allowed to create a newsletter for user and admin to view the current news about this digital library.



b. A newsletter will be pop out for administrator to create newsletter and click on "Add Newsletter" to submit the information into database.

c. Click on "View All Newsletter" button to view and edit the current records for newsletter.



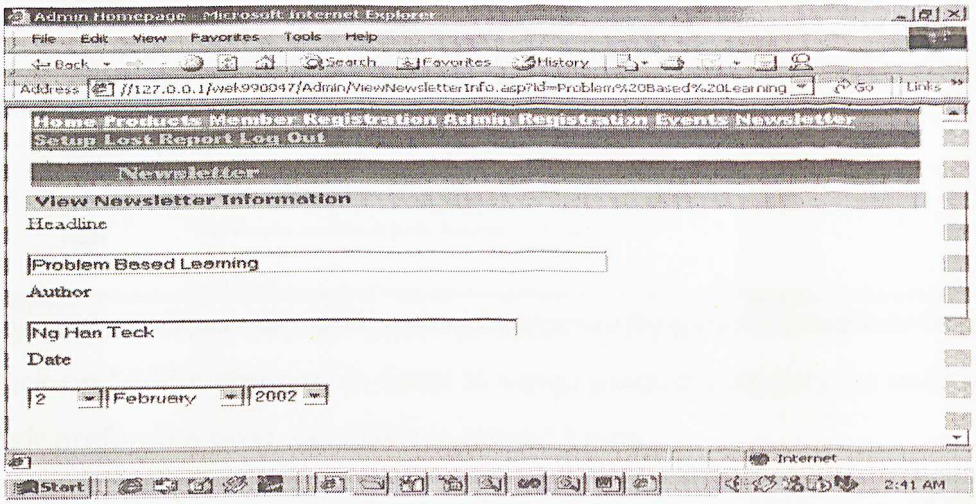
d. Click on "Add Newsletter" button in order to link to newsletter form for administrator to create newsletter.

e. Click on "Delete" button in order to delete newsletter.

f. Click on "Add Userpage's New " button to add the newsletter into user page.

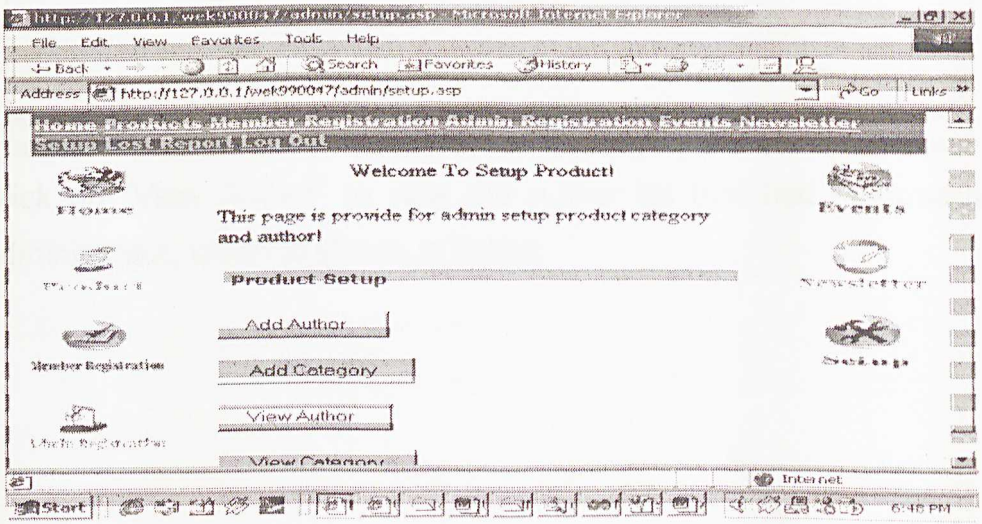
g. Click on "Delete Userpage's New" button to delete the newsletter from user page.

h. Click headline hyperlink in order to view or update newsletter information. Click on "Update Newsletter" button to update information cancel the updating process by click on "Cancel" button.

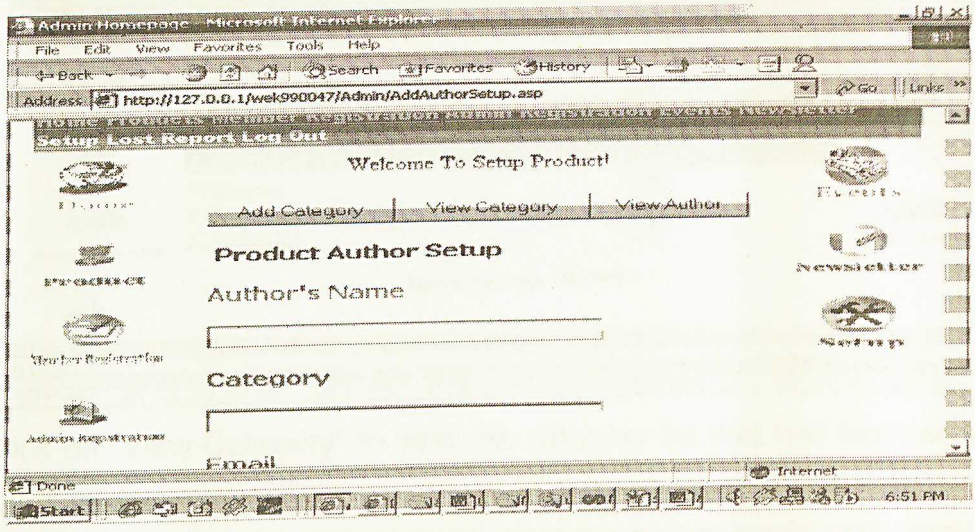


Setup

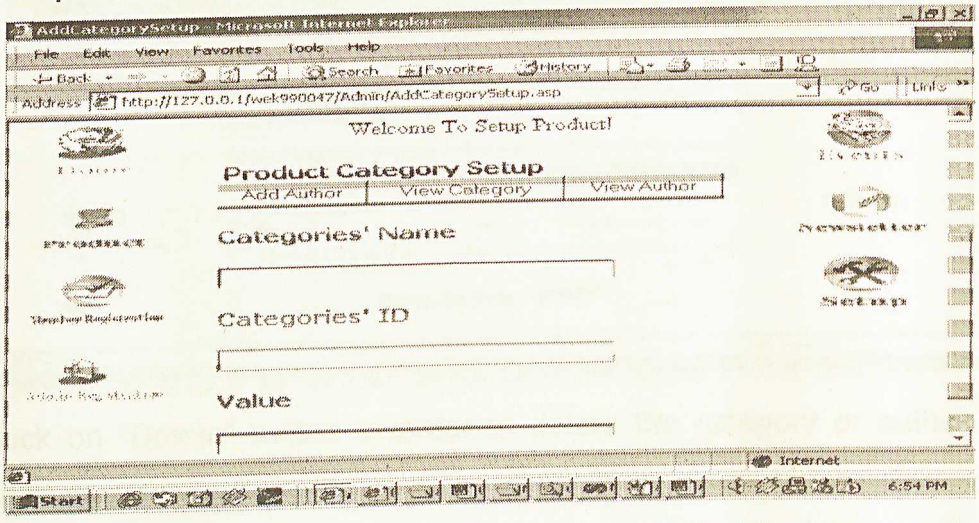
a. Click on "Setup" button will link to "setup.asp". It is provide for administrator to setup product category and author which is show in below.



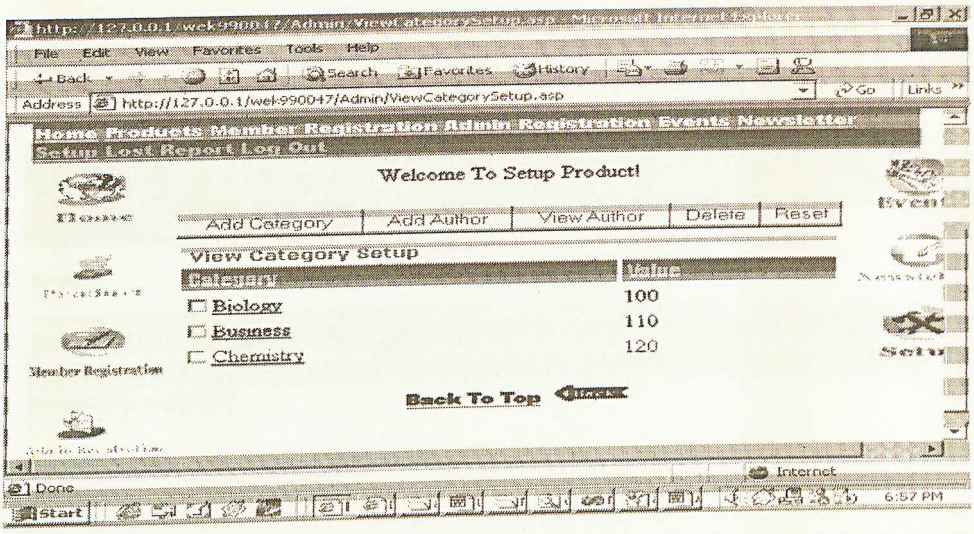
b. Click on "Add Author" to add "author" into database for user to select their preferable author, which is shown in below.



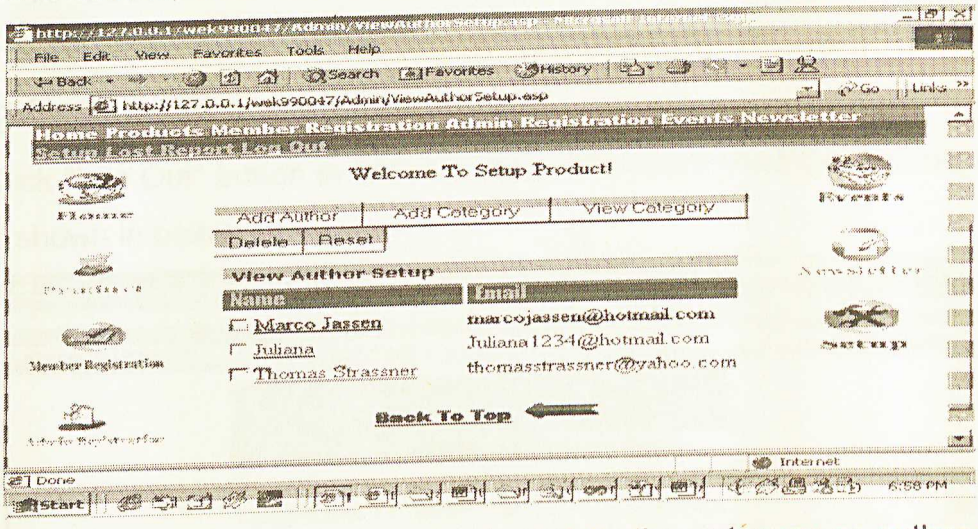
c. Click on "Add Category" in order to setup product category for user select their preferable product, which is shown below.



d. Click on "View Author" to view the author list that had been setup by administrator, which is shown in below.



e. Click on "View Category" to view the category list that had been setup by administrator, which is shown in below.

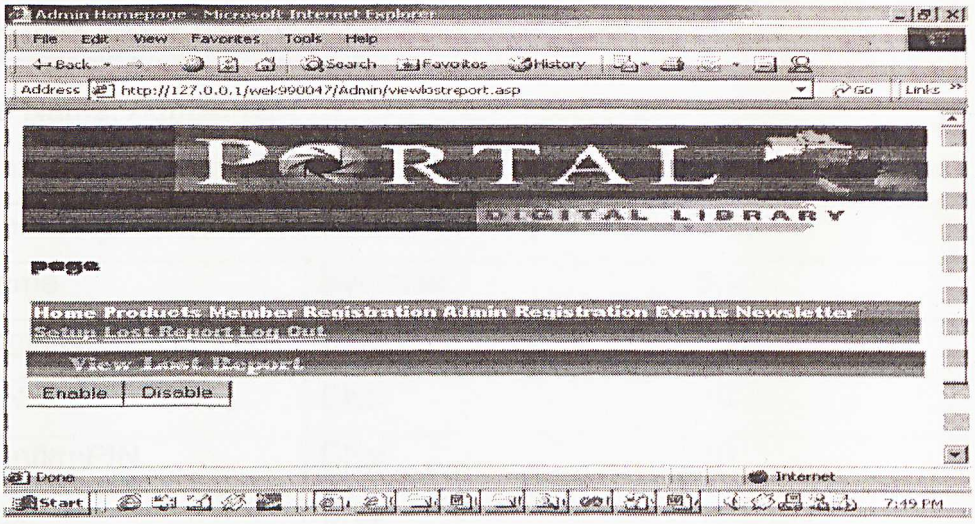


f. Click on "Delete" button in order to delete the category or author from database.

Lost Report

a. Click on "Lost Report" button will link to "lostreport.asp". It is provide for administrator to terminate the smart card holder account who lodge the lost report.

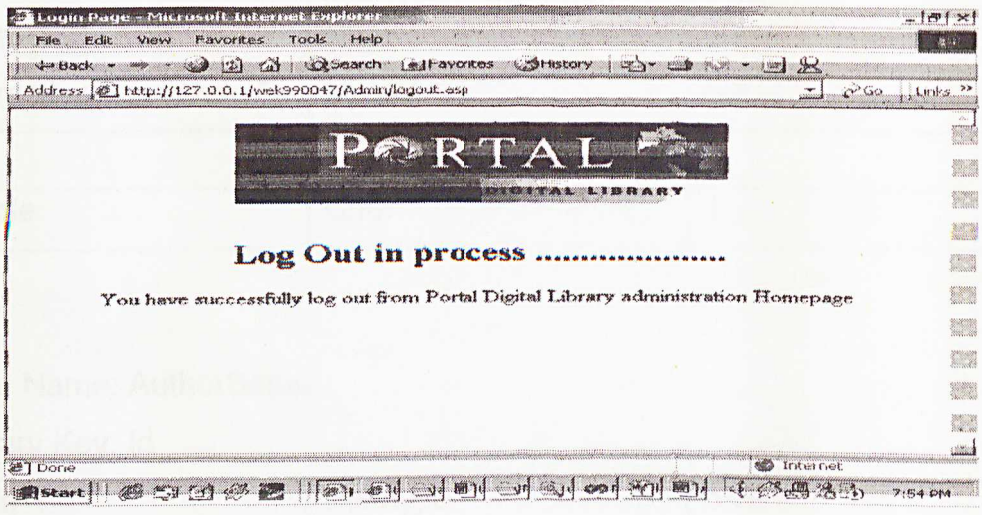
b. The page of "lostreport.asp" is shown in below.



c. Click on "Disable" button in order to disable or terminate the smart card holder's account.

Log Out

a. Click "Log Out" button in order to log out from administrator module whicj is shown in below.



Tables Of Database

Table Name: AdminInfo

Primary Key:AdLoginID+AdPIN

Name	Datatype	Size
AdName	Nvarchar	50
AdLoginID	Char	10
AdPIN	Char	10
AdConfirmPIN	Char	10
AdSex	Char	10
AdAge	Char	10
AdAddress	Nvarchar	50
AdPostCode	Char	10
AdCity	Nvarchar	50
AdState	Nvarchar	50
AdCountry	Nvarchar	50
AdTel	Char	10
AdEmail	Nvarchar	50
Id	int	4
Enable	Char	1

Table Name: AuthorSetup

Primary Key: Id

Name	Datatype	Size
AuthorName	Nvarchar	50
Category	Nvarchar	50
Email	Nvarchar	50
Buy	Numeric	9

Id	Int	4

Table Name: CategorySetup

Primary Key: Id

Name	Datatype	Size
Category	Nvarchar	50
CategoryID	Nvarchar	50
Value	Numeric	9
Buy	Numeric	9
Id	Int	4

Table Name: Download

Primary Key:Id

Name	Datatype	Size
UserID	Nvarchar	50
Title	Nvarchar	50
Author	Nvarchar	50
Category	Char	10
Price	Float	8
Value	Float	8
Day	Char	10
Id	Int	4

Table Name: Event

Primary Key:EvtName

Name	Datatype	Size

EvtName	Nvarchar	50
StartDay	Char	10
StartMonth	Nvarchar	50
StartYear	Char	10
StartTime	Nvarchar	50
StartAMPM	Char	10
EndDay	Char	10
EndMonth	Nvarchar	50
EndYear	Char	10
EndTime	Nvarchar	50
EndAMPM	Char	10
Category	Char	10
Description	Text	16
Id	Int	4
Enable	Char	1

Table Name: FeedBack

Primary Key:FeedType

Name	Datatype	Size
FeedType	Char	50
FeedSubject	Char	10
FeedSubjectOther	Nvarchar	50
FeedComment	Text	16
FeedName	Nvarchar	50
FeedEmail	Nvarchar	10
FeedTel	Char	10
FeedFax	Nvarchar	50

Id	Char	10

Table Name: Lost Report

Primary Key:LoginID

Name	Datatype	Size
Name	Char	20
LoginID	Char	20
PIN1	Char	10
PIN2	Char	10
Allowaccess	Char	10
Id	Int	4

Table Name: AdminInfo

Primary Key:MemLoginID+MemPIN

Name	Datatype	Size
MemName	Nvarchar	50
MemLoginID	Char	10
MemPIN	Char	10
MemConfirmPIN	Char	10
MemSex	Char	10
MemAge	Nvarchar	50
MemAddress	Nvarchar	50
MemPostCode	Char	10
MemCity	Nvarchar	50
MemState	Nvarchar	50
MemCountry	Nvarchar	50
MemEmail	Nvarchar	50

MemTel	Char	10
MemFax	Char	10
MemID	Int	4
Enable	Char	1
CardNo	Char	20
CardPIN	Char	20
AcCode	Char	20
Value	Float	8

Table Name: Newsletter

Primary Key:NewID

Name	Datatype	Size
NewHealine	Nvarchar	50
NewAuthor	Nvarchar	50
NewEndDay	Char	10
NewEndMonth	Nvarchar	50
NewEndYear	Char	10
NewFulltext	Text	16
NewID	Int	4
Enable	Char	1

Table Name: Product

Primary Key:Title

Name	Datatype	Size
Title	Nvarchar	50
Author	Nvarchar	50
Category	Nvarchar	50

StartDay	Int	4
StartMonth	Char	10
StartYear	Int	4
Price	Char	10
Abstract	Text	16
FullText	Text	16
Detail	Text	16
Id	Int	4
Enable	Char	1

Table Name: ProductTemp

Primary Key:Title

Name	Datatype	Size
Name	Nvarchar	50
Title	Nvarchar	50
Author	Nvarchar	50
Category	Nvarchar	50
StartDay	Int	4
StartMonth	Char	10
StartYear	Int	4
Price	Char	10
Abstract	Text	16
Destination	Text	16
Email	Nvarchar	50
Id	Int	4

Table Name: Reload

Primary Key:CDNO

Name	Datatype	Size
CDNO	Char	**20**
CardPIN	Char	20
ActiveCode	Char	20
Value	Char	20
Id	Int	4

Table Name: Setup

Primary Key:SetupID

Name	Datatype	Size
Category	Nvarchar	**50**
Author	Nvarchar	50
SetupID	Int	4