UTP E-Library System

by

Nurul Aini binti Ariffin

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Information Technology)

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the
Information System Programme
Universiti Teknologi PETRONAS
in partial fulfillment of the requirements for the
BACHELOR OF TECHNOLOGY (Hons)
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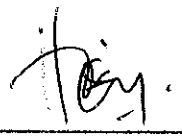
Approved by,



(Ms. Michelle H.C. Beh)

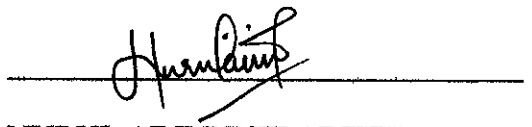
UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

December 2004

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgments, and that the original work contained herein have not been undertaken or done by unspecified sources or person.



NURUL AINI BINTI ARIFFIN

ABSTRACT

The Internet's rapid growth has motivated many companies to develop or use the web-based application to gain competitive advantage against rising competitors. The web-based application was designed as an information space, with the goal that it should be useful not only for human but also those machines would be able to participate and help. One of the major obstacles to this has been the fact that most information on the web is designed for human consumption, and even if it was derived from a database with well defined meanings for its columns, that the structure of the data is not evident to a robot browsing the web. At beginning library was just a store house of books and other document. General people were not allowed to use those documents. After long time library started document delivery service and circulation came into picture. The objective and scope of this study is to present the benefits, challenges and evolutions of having web-based E-Library system. To narrow down the scope further, this study or research will be focusing on the online reservation and due dates notifications. This project will focus on the functionalities of the E-Library system which are reservation or booking books in advance and notification on due date and overdue return. The users may be able to reserve the unavailable book on-line through the system. Besides that, the users may check their loan and reservation current status. Moreover, users will also be provided with automatic due date alert and overdue reminders. The system interface will be created using various tools such as HTML, Dreamweaver, Adobe Photoshop and PHP. These tools are selected on the basis that the users may access the system from anywhere at anytime, through the use of a web browser. Using the Hybrid Methodology, which is a combination of Spiral Model and Prototyping Model, UTP E-Library System aims to propose a feasible, yet and efficient library system that is web-based.

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A bunch of thanks to the UTP Librarians and the management that had been giving the author a good cooperation in gathering the information about the current library system. Besides that, the technologist, Mr. Azzubayani bin Abu Bakar had also assists the author in part of findings and researches regarding to the library system.

Lastly but not least, the author wants to express her thankfulness towards her family especially to her beloved father, Mr. Ariffin bin Abd. Ghani and her friends for the hospitality. They have lavished unconditional love and full support to keep the author going for this project.

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ABBREVIATIONS AND NOMENCLATURES

ALAM	Akademi Laut Malaysia
DFD	Data Flow Diagram
ERD	Entity Relational Diagram
E-Library	Electronic Library
GUI	Graphic User Interfaces
HTML	Hypertext markup Language
IT	Information Technology
IRC	Information Resource Centre
INSTEP	Institute Teknologi Petroleum PETRONAS
OPAC	Online Public Access Catalog
OPU	Other PETRONAS Unit
PERMATA	PETRONAS Management Training Services
PSR	PETRONAS Resource Centre
PRSS	PETRONAS Research Scientific Services
SQL	Structured Query Language
UTP	Universiti Teknologi PETRONAS
WAN	Wide Area Network
WWW	World Wide Web

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The web was designed as an information space, with the goal that it should be useful not only for human communication, but also those machines would be able to participate and help. One of the major obstacles to this has been the fact that most information on the web is designed for human consumption, and even if it was derived forms a database with well defined meanings for its columns, that the structure of the data is not evident to a robot browsing the web.

The question is doing the library users happy with the online approach? Yes most of the web based library service provider is getting a lot of feedback from their effective users. So libraries also introducing more and more services on the web, a tremendous amount of content and the system has had some continuity over time.

1.1.1 Identifying library services

Library services refer to facilities, which are provided by a library for the use of books and dissemination of information for the need and meet the users' requirement. The well known existing library services are cataloguing, classification, circulation services, reservation, renewal, new arrivals, current contents, current awareness service, selective dissemination of information, indexing and abstracting, reference service, document delivery, inter library loan, externally purchased database, CD-ROM databases, access to other library catalogues, access to online databases, internally published newsletter, reports and journals, bibliographic services, and so on. All these services have changed its mode to en extend with web environment.

1.1.2 Defining Web-based

Web-based is popularly used as the synonymous term of World Wide Web (WWW) or Internet or Online. The Internet and its "publishing arm" the WWW are important components in the communication process. The web-based is a client or server system used to access all kinds of information to anyone on the net. The information can be in the form of regular text, hypertext, pictures, sounds, Usenet newsgroups and other types of data. To access this information, use a client program called browser. Within the web-based, the information is stored in pages. Each page can hold not only information but links to other pages. In each page a particular word or sequence of words highlighted item and the other information related to that words in some other pages. This means that there is a link between the highlighted item and the other information, the service is called hypertext. When anyone wants to follow a link, the browser will find out where it is and connect the web server at that location, request the new page and then display it on the screen. The WWW may represent an intermediate form between recorded and unrecorded communication and information transfer. Because it is a new medium the author has not yet fully identified the dynamics of its behavior. Keeping in mind today's tremendous increase in information and changing users behavior the author can say that the web is an ideal media for providing information.

1.2 PROBLEM STATEMENT

1.2.1 Problem Identification

"I can't browse the library system from my room'. It was found that UTP's current library system is a web-based application but it is only accessible in the library. Therefore, users unable to browse it at anywhere and anytime they want. In fact, the current library system is just available for the librarians and their management. Users may only use the Online Public Access Catalog (OPAC) system provided in the library. This is one of the system constraints and it brings a problem to the user whose location is far from the library. For instance, there is no point to go to the library if the reference book needed is unavailable. It is time consuming and therefore, a web-based system is needed to overcome this problem.

"I want to reserve the book which is unavailable". The second problem arises when the book needed by the user is on loan. The user has to go to the library to search the book by using the OP AC system. If the book is unavailable or on loan, the user has to reserve it manually by filling a form However, there is probability of losing the form since there is no system for the reservation. Therefore, the proposed system should allow the user to make a reservation or booking in advance. Indirectly, users may join waiting lists for books which are currently unavailable. The users must alert with the queue position for them to collect the book at the counter.

"I forgot the due date of my book". The late return also contributes a problem. Users always unaware about the date return for the books borrowed. Different books may have a different due date and it may confuse the user. Therefore, it must have an alternative to notify or alert them about the due dates for each of the books borrowed. To make it more effective users may receive due date and overdue reminders automatically.

1.2.2 Significant of the Project

This study is dedicated to the development of web-based library system. By having this web-based system, user may access it anywhere at anytime. This ***UTP E-Library*** system may allow users to view the status of the book either it is on loan or on shelf through the OPAC. The system may link to the PETRONAS Internet OPAC. Besides that, users may reserve the book in advance if the book is on loan or unavailable. Users must alert with the queue position to know their own reservation status. This reservation will hold the book for a week for the users to collect it from the counter.

Users may look at their own status either for book loan of book reservation. Different users may have a different profile. For instance, undergraduate students can only borrow six books at a time. They may check how many books have they loaned and how many books more that they can borrow.

This ***UTP E-Library*** system will alert the borrowers the due dates of books borrowed and enable them to receive a notification. The notification will be sent to the borrowers through email.

1.3 OBJECTIVES AND SCOPE OF STUDY

The objective of this project is to reengineer the common manual library services into one of an automated system as part of the E-Library system. The scope of this study and its related researches is the development of the online reservation and due date notification. This E-Library system may consist of the following functionalities:

- A **web-based E-library system**, which enable users to browse anywhere at anytime.
- A **reservation form**, which allows users to reserve a book in advance or to join waiting lists for books currently unavailable.
- A **status module**, which allows the borrowers to check the quantity of books borrowed and the queue position for the reservation.
- A **notification** that alerts the borrowers the due dates of books borrowed and enable them to receive automatic due date alert and overdue notification.

This study focuses on how the web-based application can improve the function of the current library system. For ease and also to fit the project timeline, the research will only focus more on how the student may be assessing to the library system through the Internet or Intranet. The research will also focus on how the library database will be integrated to the web-based system. PHP is a programming paradigm that will be considered. The resolution is to build a front-end system using PHP or HTML. The front-end system provides more intuitive GUI interface.

CHAPTER 2

LITERATURE REVIEW AND / OR THEORY

2.1 INTRODUCTION

Libraries are as integral a part of successful distance education programs as they are in traditional education environments. Today accreditation agencies stress the need for library services in higher education, and are becoming more specific in their standards concerning these services for distance education students. During implementation, ongoing management and assessment of distance education programs, the library must be a partner in institutional discussions.

Libraries acknowledge that members of the academic community need timely access to the information, as well as the skills to effectively find and evaluate this information, in order to be successful with their personal and professional endeavors. To reach these goals while serving distance education students, libraries must work collaboratively with distance education faculty, academic departments within the institution, and libraries and associations external to the institution. Thus, Universiti Teknologi Petronas (UTP) also needs a library system that satisfied the users' needs.

Crucial library services for distance education users are namely reference, instruction, reserves, electronic collections, interlibrary loan and document delivery, and user authentication.

To effectively provide the resources to distance education students, library services must be accessible outside of the physical library. Today most academic libraries use the Web as the preferred delivery medium. However, other familiar methods such as a toll free telephone number should not be overlooked [1].

The Association of College and Research Libraries (ACRL) Guidelines for Distance Learning Library Services is currently the best articulation of basic standards. Two philosophical precepts from these guidelines are highlighted below:

- Access to adequate library services and resources is essential for the attainment of superior academic skills in post-secondary education, regardless of where students, faculty, and programs are located. Members of the distance learning community are entitled to library services and resources equivalent to those provided for students and faculty in traditional campus settings.
- The originating institution is responsible for involving the library administration and other personnel in the detailed analysis of planning, developing, evaluating, and adding or changing of the distance learning program from the earliest stages onward [2].

As an international university, UTP should have a library system that satisfy users' needs and requirements for management, access, storage, and manipulation of the variety of information stored in the collection of material that represent the property of the library.

2.2 WEB-BASED LIBRARY APPROACHES

Web-based library services offer benefits for students, staff, and the institution. Foremost, those interested in the quality of education provided will find that there is no replacement for students having access to materials for related course readings, self-directed personal exploration, and required research projects. Providing these materials, and the related services to help student access and select the most appropriate resources, is essential. Providing these materials electronically is a natural compliment for those programs that are also provided online.

Convenience and coherence are two incentives for providing library resources and services over the Web. Students, whether off campus for the day or taking all classes

from a distance, are able to access materials from any location and any time through a medium with which they are likely to be familiar. Online services can be designed to logically connect to the other educational materials and programs the students need for their coursework. Some institutions may choose to personalize services for specific students to remind them of materials due, suggest relevant research sites based on their current course schedule, or simply offer contact information for a librarian who can assist them throughout their career. The research and critical thinking skills students can learn and hone, because library resources and services are available to them, will be useful throughout their academic lives and professional careers.

2.3 LIBRARIES CHALLENGES IN MALAYSIA

The developments of electronic libraries in institutes of higher learning as well as in public libraries make information and education more accessible to all. All these development certainly have impact to information seeking pattern of the Malaysian society.

According to Dixon (2000)

> We have entered the Knowledge Age and the new currency is learning. Knowledge is the result of learning, and is ephemeral, constantly needing to be revised and updating. Learning is sense making, it is the process leading to knowledge.

Dixon highlighted that in this new globalization, education is the most important thing and it is valuable. In order to have the knowledge, there must be a medium to achieve it. Thus, an updated library is needed to help people to acquire more knowledge and help them in learning process.

According to Tengku Azzman Shariffaddeen (2000)

> The advent of information technology has resulted in global transformation from Industrial Age to Information Age .In this Age; being an Information

society is not enough. We need to become a knowledge society, where people are able to internalize information and knowledge for their daily activities.

These are the challenges that librarians face today to make libraries as centers for life long independent learning.

In order to meet the future challenges to support the nation's aspiration to develop as a digital nation, Malaysia needs a National Agenda for the development of nation-wide digital library and information services. All libraries in Malaysia, may it be academic, special, public or school libraries must take initiative to introduce Information Technology (IT) products and services as an integral part of library services. Some of the strategies for the development of digital library information services are following:

a. Ensure that all libraries in the country attain minimum standard of services with provision to provide multimedia IT products and services. Libraries should redefine their roles to function as one-stop information centers, which have accessed to local and global information resources available through the Internet. Libraries should make its services available online so that its users can interact with libraries from any locations at any time. Librarians should be able to harness the richness of the global information resources and develop metadata of relevant websites that are of interest to their users. This is a challenge for librarians to master new skills to be able to act as webmasters as well as multimedia content developer.
b. As a Center of Excellent, special library should act as a depository center for all publications produced by its parent organization. It should function as the memory of its parent organizations by collecting, documenting, and preserving the intellectual heritage produced by members of its parent organization and community. It should develop its own specialized information systems, either by developing its own information resources or have linkages with relevant information resources.

c. Develop a plan of action to digitize important publications produced by its own organizations, thereby building up a repository of digital collection of its own organization. Digitizations of local publications are another means of enriching of local contents. Digitization projects can also be done on cooperative basis in order to eliminate duplication of digitizing similar titles. Digitization program requires libraries to have digital equipment and those librarians to have necessary skills to document systematically those digital publications for easy retrieval. Provision of digital services should also include provision of online digital document delivery service when requested. The library should also compile and maintain copyright owners of digital publications.

d. Libraries should provide IT facilities for users to learn and access Internet. Systematic User Education Programs should be planned in order to train and guide users the proper way information handling and information seeking so that they can fully utilize information services offered by the library. Libraries should develop as acculturation center for IT and knowledge where library users can acquire information handling skills; learn independently or as group effective way of using IT and accessing the net.

e. Online library services should include among others: online membership registration, online reference inquiries, reservation and extension loan, online document delivery services, online selected dissemination of services and current awareness services, online consultation of advisory services. Online processing includes online ordering, online copy cataloguing and self-service loan. Libraries should also develop special forum by establishing list serves among reference officers, acquisition officers, microfilming and digitization groups [3].

2.4 BENEFITS OF WEB-BASED LIBRARY

The main benefit of implementing web-based E-Library system is to allow the users to access the system at anywhere and at anytime. This web-based E-Library system is useful for an institution like UTP in order to help the students in their learning process. The following are the benefits from the web-based Library in learning process:

- allows time for information gathering and reflection which in turn promotes deep learning (MacFarlane, 1992)
- encourages learning on a topic through interaction with multiple resources (Kulthau, 1985)
- encourages in-depth focus on a topic which drives students to seek more relevant information and produce a product of higher quality (Kulthau, 1993)
- undertaking research projects enables the construction of meaning through active participation with information resources (Kulthau, 1993)
- promotes acquisition of effective information skills through conceptual awareness of the nature of information and its diversity (Cleaver, 1986)
- promotes the development of thinking skills such as problem solving, reasoning, and critical evaluation through information handling and independent research (Resnick, 1987; Todd & McNicholas, 1994/95)
- allows for information gathering as a continuous process rather than unconnected tasks thereby encouraging the construction of knowledge at every subsequent phase (Moore, 1995)
- improves attitudes towards the library, librarian, and reading (Schon, Hopkins, Everett, & Hopkins, 1984)
- improves student and teacher attitudes towards course content and academic achievement (Cull, 1991)
- connects information handling and use with subject matter which is essential for learning to take place (Pitts, 1994)
- encourages information skills development though self-directed learning and reflection as opposed to teacher-directed skills instruction which may actually hinder the learning (Irving, 1986; Webb, 1988)
- allows for the active construction of personal understanding using reflection and self assessment so information is given a context, mental model, or framework (Stripling, 1995)
- discusses search strategy explicitly thereby increasing the likelihood that it will be transferred to future problem-solving situations (Pressley, Snyder, & Cariglia-Bull, 1987)
- increases academic achievement through ongoing experience (Breivik, 1977)

- promotes student access to and use of resources by linking cognitive search strategy to course-integrated instruction (Kohl & Wilson, 1986)
- improves research skills and fosters self-confidence in finding information by integrating library skills as part of subject curriculum (Nolan, 1989)
- increases academic achievement in subject content, attitudes, and critical thinking through use of a variety of resources in learning (Barrilleaux, 1965)
- improves work study skills and vocabulary in the case of multimedia programmes (DeBlauw, 1973)

CHAPTER 3

METHODOLOGY / PROJECT WORKS

3.1 PROCEDURE IDENTIFICATION

The result of the **'Implementation of the UTP E-Library System'** is a web-based system that users can access from anywhere at anytime, on condition that they are connected to the Internet and use any browser. One of the methodologies followed to ensure that the desired result to be achieved is the Software Development.

3.1.1 Software Process

This project requires frequent user interaction. For that reason, **'Prototype Model'** is the first choice for the management process. However, it may have doubts about the prototype model, and therefore it is concluded to use the **'Spiral Model'**. Figure 3.1 shows that risk-based approach of the Spiral Model is significant to the development of this prototype.

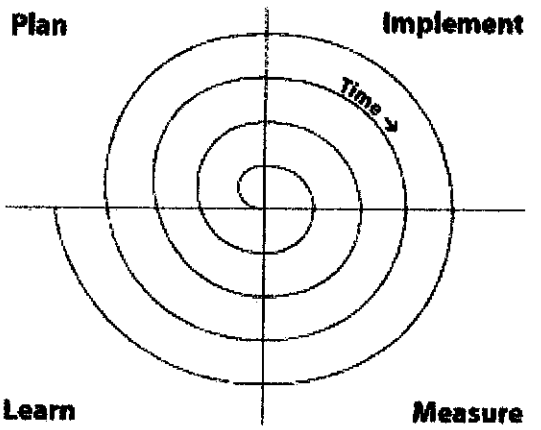

Figure 3.1 – Spiral iterative development cycle

- Plan

  In this phase, the author is trying to understand the users and their needs, as well as how the author addresses those needs. The author will conduct a few interview sessions with users in gathering the data and information.

- Implement

  During implementation stage, a prototype of the system is built to test the solutions that have been developed during the planning phase.

- Measure

  Now it's time to see how users react. How long does it take them to understand the solution? How long does it take them to do their work? What problems do they encounter? It is important to understand that measurements must be both objective and subjective; time on task is important, but if a user takes more time because the tools enable him or her to do a superior job, then it must be able to weigh improved quality of work against increased time on task.

- Learn

  This is the analysis phase to decide which parts of prototype are doing well, and which parts are not.

After regular reviews, it was decided that the best approach was to use a **'Hybrid Model'** that would implement the risk management of the spiral model along with the incremental model, which is a mixture of the prototype model and the linear sequential model. Figure 3.2 show the life cycle for the development process as well as entry and exit criteria for the different phases of the project.

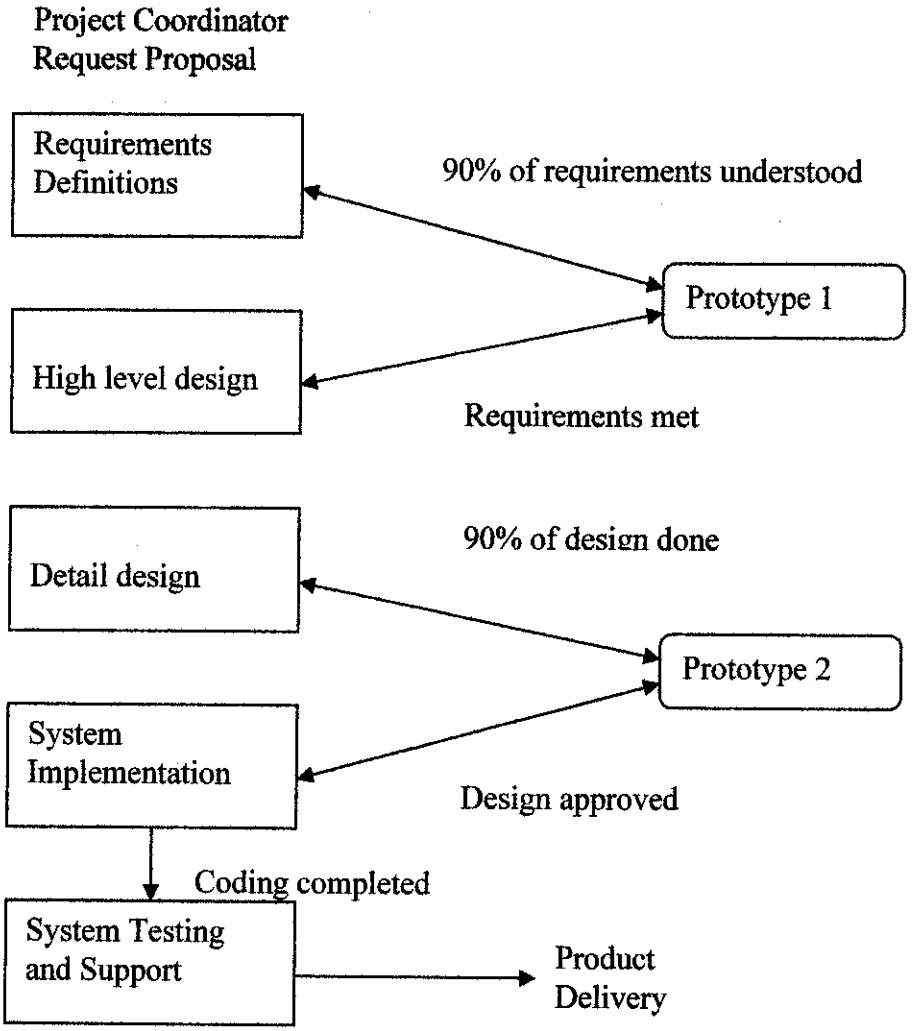

Figure 3.2 – Project Life Cycle

3.2 PRELIMINARY ANALYSIS AND STUDY

This sub-component is the fact finding works conducted by the author in order to learn more on the topic or E-Library and web-based library. Among the methods used in this components are as listed below.

- **Reading or Studies**

  The result of the studies can be seen in Chapter 1: Introduction and Chapter 2: Literature Review and or Theory of this dissertation. Among the sources used to conduct the preliminary analysis and study of this project are articles, white papers and journals regarding the topics on E-

Library, Digital Library and web-based library. Detailed list of the references used in this study can be found at the References section at the end of this dissertation.

- **Interviewing UTP Librarians**

  The plan to conduct an interview with UTP librarians to learn more on their current library system and the problems they are facing in using the system. The author interviewed the Library's Technologist whose named is Mr. Azzubayani bin Abu Bakar. He explained current UTP's Library structure and the OPAC usage to the author.

3.3 ARCHITECTURE DESIGN AND STORY BOARD DEVELOPMENT

3.3.1 Overall Module Architecture

For the development of this project, Figure 3.3 below shows the overall architecture for the proposed E-Library system from the user's point of view. First and foremost, when the users decide to access the system or service, they must login into the system through the Internet. They have to inter their own User ID and password for authentication. The web server (Apache) transfers the user's request or transaction to the application server (PHP) which then is directed to the library's database (Oracle) for data saving purpose. For the purpose of this project, the scope had been narrowed down specifically on the study and development of the online reservation and due dates notifications.

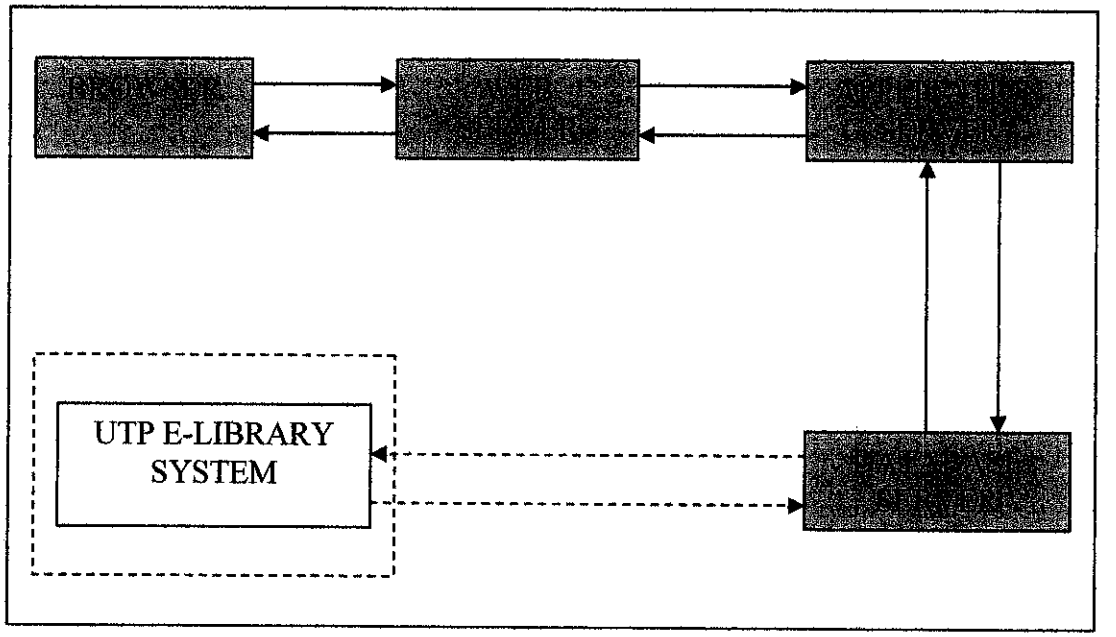

Figure 3.3 Overall Architecture of an E-Library System

3.3.2 Proposed Module Story Board Development

Before the actual development and construction of the module can take place, the story board is first drawn. The story board shows how the interface of the module will look like (buttons, banners, text-boxes, etc), the flow between the interfaces and serve as a guideline for the construction of the module itself.

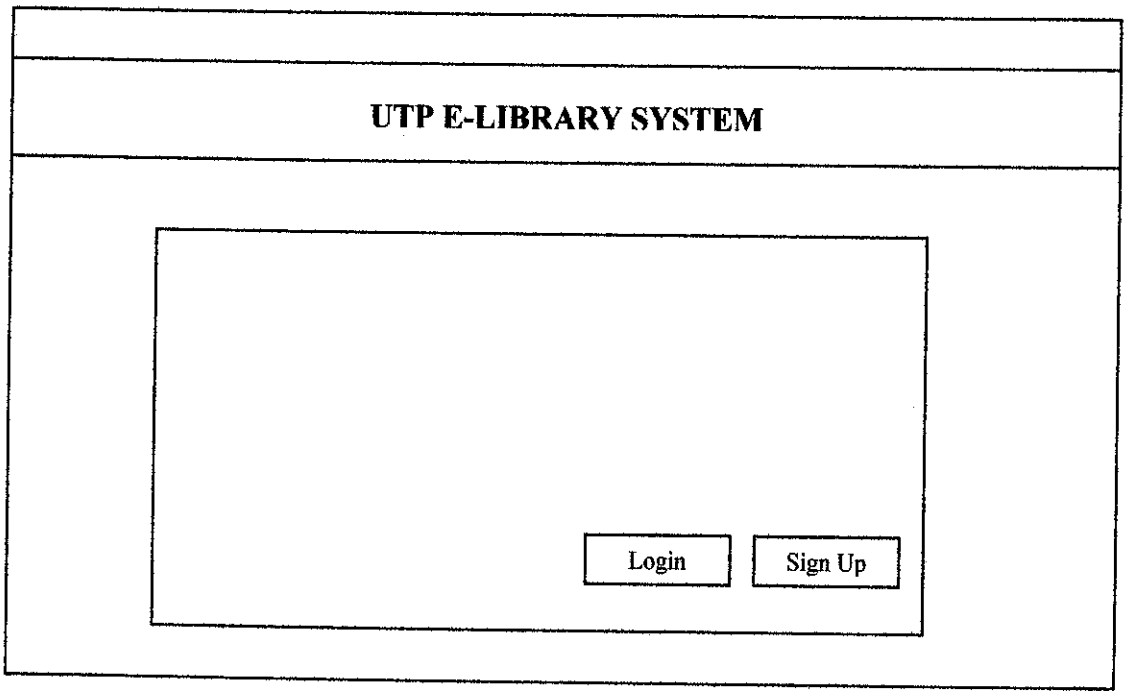

Figure 3.4– Main page module

The first page of this system is its main page. There are a few pictures of the UTP library located in this page. As an introduction to the users, there is a brief background or description of the UTP library. At the bottom of the page, there are two buttons which are Login and Sign up buttons. If the users have registered, they may go into the login page directly. Meanwhile for those who are not registered yet, they have to go the sign up form for new registration.

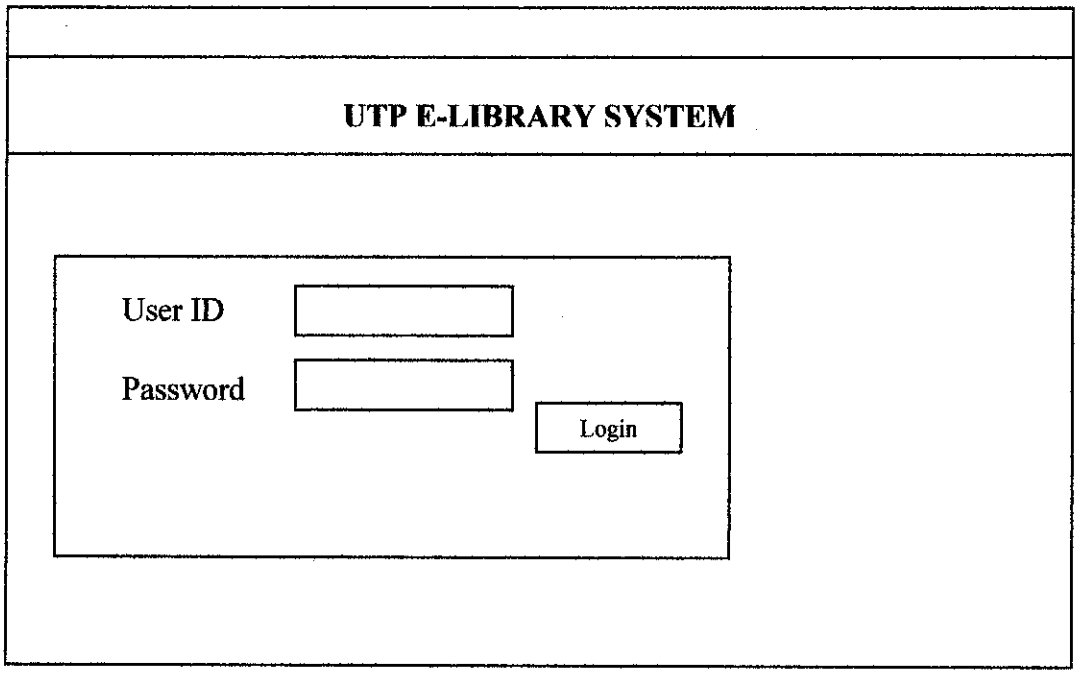

Figure 3.6 – Authorization module

When users enter the Login button in the main page, they will get into the authorization module as illustrated in Figure 3.6. They have to insert the username and the password. The user ID is actually a unique ID which own by each user. When the user enters the Login button, the system will authenticate the password and user ID from the database. If the authentication is successful, the system will invoke the status module which shows the user details and loan or reserve status.

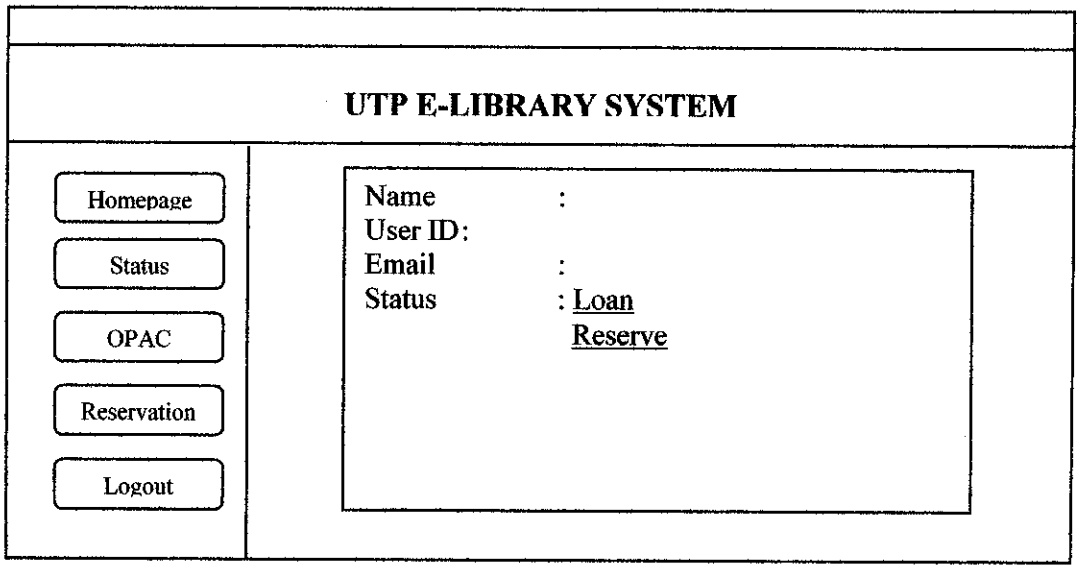

Figure 3.7 – User's status module

The status module will invoke when the authentication is successful. This status module will display user details and provide links to the loan and reserve modules. The users may click on the loan link and the loan module will invoke. The same thing goes to the reserve link. By having this status module, users may check the quantity of books that they have borrowed and the reserved books as well.

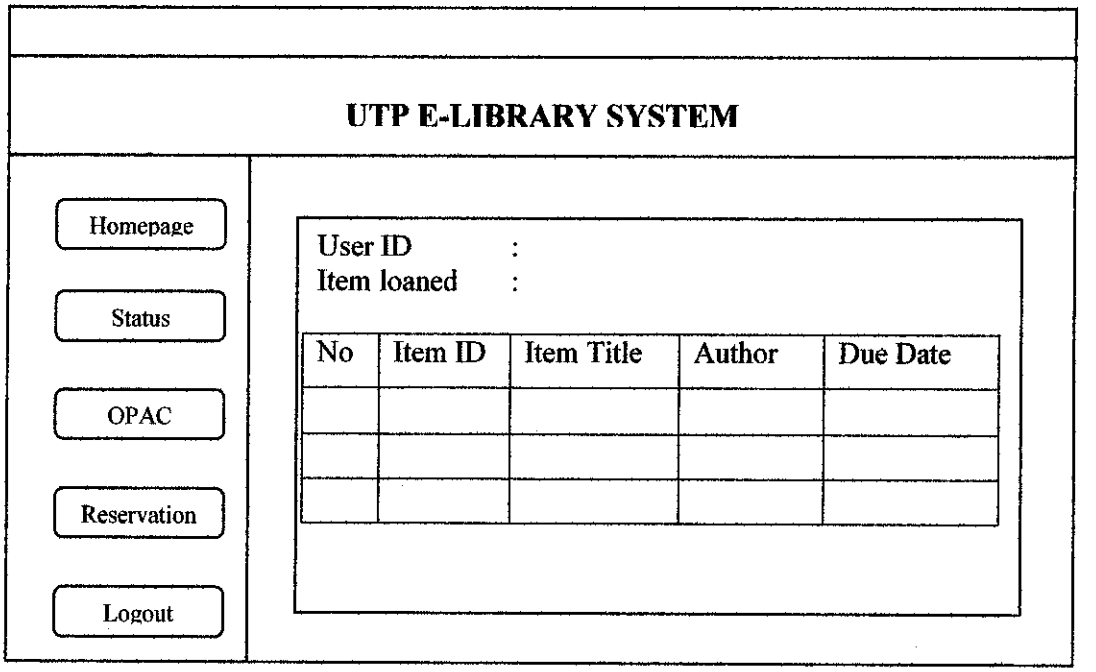

Figure 3.8 – Loaned module

This loan module will list down all the books or items borrowed by the users. The system will list the item ID, item title, the author name and the due date of each book. The main purpose of having this loan module is to let the users view their own status. The users may know the quantity of the books they have borrowed and number of books they can borrow. Besides that, the users may alert with the due dates of each book.

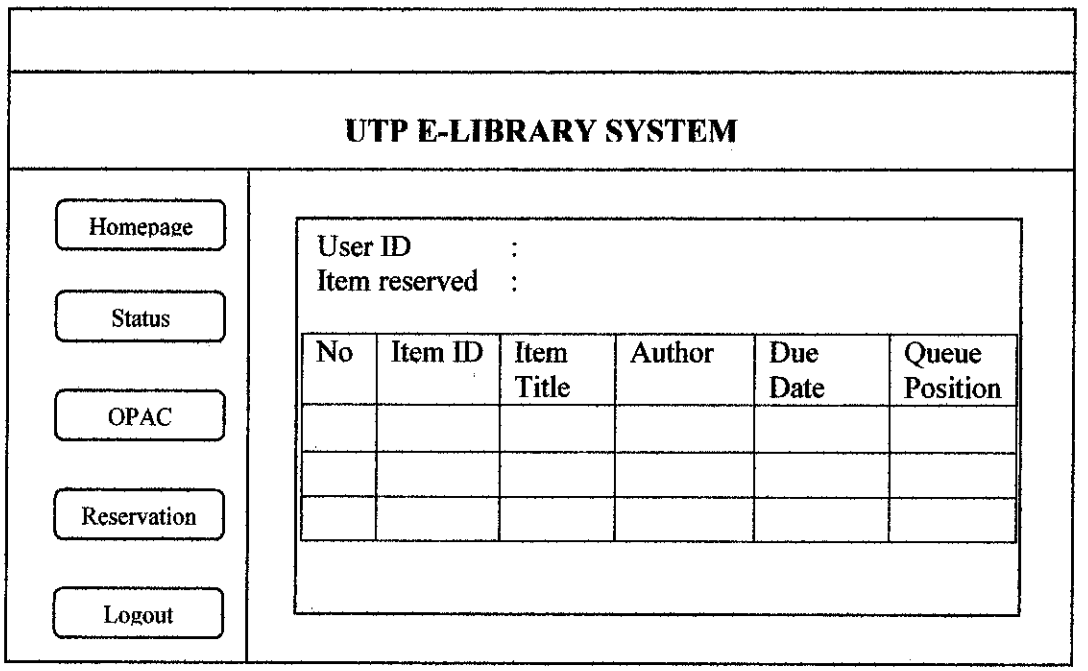

Figure 3.9 – Reserved module

This reserved module functions the same with the loan module. It will list down all the reserved books. The system will list the item ID, item title, the author name, the hold period and the queue position. The module provides the queue position to inform the users the availability if the reserved book. The book is available to collect at the counter if the queue position is '1'. The main purpose of having this reserved module is to let the users view their reserve status.

If the users wish to search for any books or items, they may enter the OPAC button. This OPAC button will link to the Internet OPAC. The OPAC website will invoke in a different window. The OPAC system will provide the book or item ID as a reference for the user. The users need to insert the book or item ID when doing the reservation.

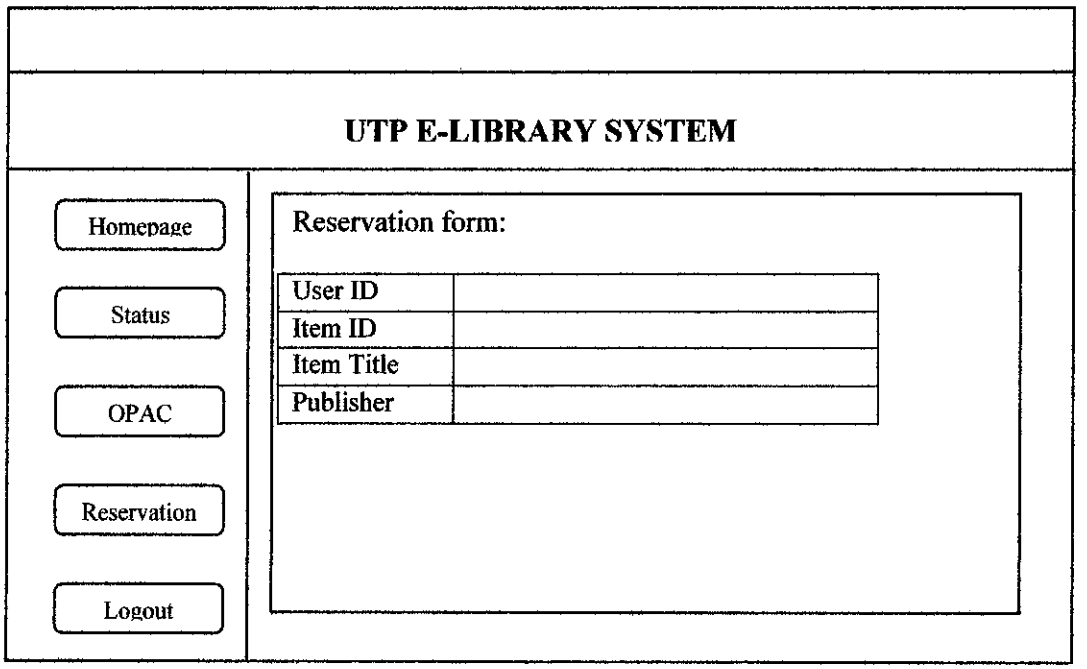

Figure 3.10 – Reservation form module

The reservation form allows users to reserve books in advance or to join waiting lists for books currently unavailable. The book to reserve must depend on the nearest date due. When the users enter the place reservation button, the system will confirm the reservation and update the records in the database. The reserved module will automatically refresh the reserve status.

3.4 EVALUATION AND CLARIFICATION SUB-COMPONENT CONSTRUCTION

4.1 Development Tools

For the development and construction of the UTP E-Library System the following set of hardware and software had been used.

1. Managerial / Documentation Purpose Tools
   - Microsoft Project
     - Used for the preparation of project works schedule (Gant Chart), resource allocation and project tasks identification.

   - Microsoft Visio
     - Used to generate professional module diagrams such as the data flow diagram (DFD), entity relationship diagram (ERD), class diagram and other that are used in the initial designing of the proposed module.

   - Microsoft Word and Excel
     - Used in the preparation of the log book, weekly report, project's documentation and the final dissertation of this study.

   - Microsoft PowerPoint
     - Used in the preparation of the slides for the presentation of the study and the proposed module to the internal and external examiners.

2. Module Development & Construction Tools

- Macromedia Dreamweaver
  - For web development and HTML editing

- MySQL
  - Used to create the databases necessary for the module. It is very fast, robust, relational database management system. Enable to efficiently store, search, sort, and retrieve data.

- PHP
  - Server-side scripting language designed used for the web system. It is an Open Source product.

- Development & Construction Hardware
  - The hardware that is used in the development and construction of the proposed system is the personal computer. The specifications of the notebook are as listed below.

Module:

Microsoft Windows XP Professional
Version 2004
Service Pack 2

Computer:

Intel 4 2.40 GHz ®
256 MB of Ram

CHAPTER 4

RESULT AND DISCUSSIONS

This chapter shall be discussing the result of the study that had been conducted and the development of the ***UTP E-Library System***. The aims of this chapter are to create a link between the study being done and the final product in terms of the objectives during the development of the module design and followed by a discussion on the finished module's functionalities and limitations. With this discussion, it is hoped that more data and information regarding the development of an E-Library system can be put into light. The discussion will also be focusing on whether the developed module had managed to fulfill the four scopes of project or objectives as had been proposed earlier.

4.1 FINDINGS

In the requirements and analysis phase, a series of interviews has been conducted to gather all the information. As a developer, the author needs to get the opinions of the interviewee (user) and his or her feelings about the current state of the library system. Open-ended questions have been used for the interview because this type of questions allows the respondent with options for responding. The outcome of these was positive and the general sentiment amongst all those interviewed is that the project is relevant and will prove beneficial to the students and other user if it were to be implemented.

UTP Information Resource Centre (IRC) promotes information-sharing among 27 of PETRONAS group libraries nationwide, in an effort to provide up-to-date information especially for technical references and research and development.

The facilities are searchable on-line (through OPAC) to facilitate fast information access from various locations such as PETRONAS Resource Centre at KLCC, PETRONAS Management Training Services (PERMATA) and PETRONAS Research Scientific Services (PRSS) at Bangi, Institut Teknologi Petroleum ^ PETRONAS (INSTEP) at Batu Rakit and other branches throughout Malaysia. The comprehensive collections available in the library are mostly related to engineering, science and technology, management, and languages.

The interviewee said that the current library system used the BasicTechlib (Open Text) for storing all the data. There are four core components in the library systems which are *Acquisition, Cataloging, Serial and Circulation.*

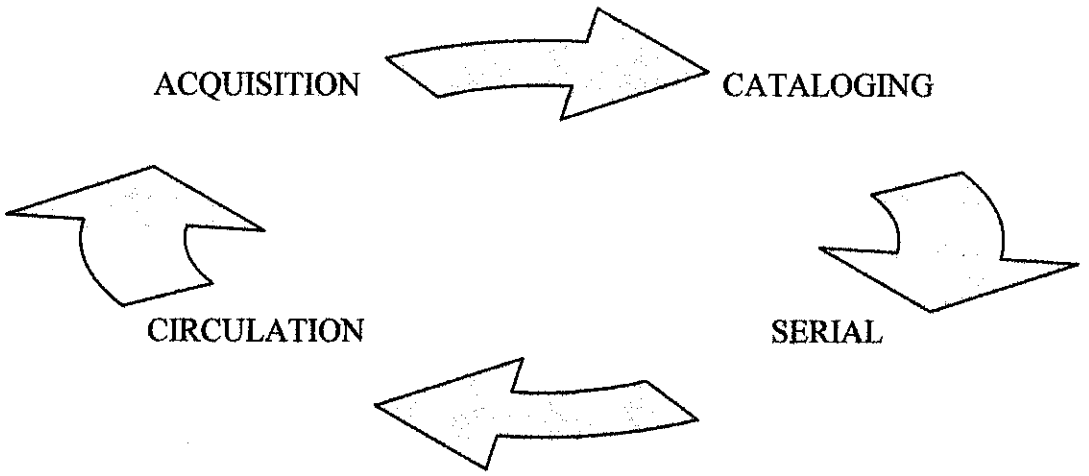

Figure 4.1 – UTP Library data structure

Once the librarian has done with the cataloging, all the data inserted will be stored in the database server which is located at PETRONAS Bangi Data Centre (PERMATA). As illustrated in Figure 4.2, database server and web server for PETRONAS branches are centralized at the PERMATA. These two servers will connect to the Wide Area Network (WAN) and distributed the system to the entire PETRONAS branches. For instance, UTP Information Resource Centre (IRC) and Akademi Laut Melaka (ALAM).

The borrowing process is done manually whereby the user has to go to the counter to borrow a book. User has to give the ID number and the system will verify the user ID and the item ID (barcode). If the user ID is not in the system, it needs to be registered. Then the material can only be checked out for the user.

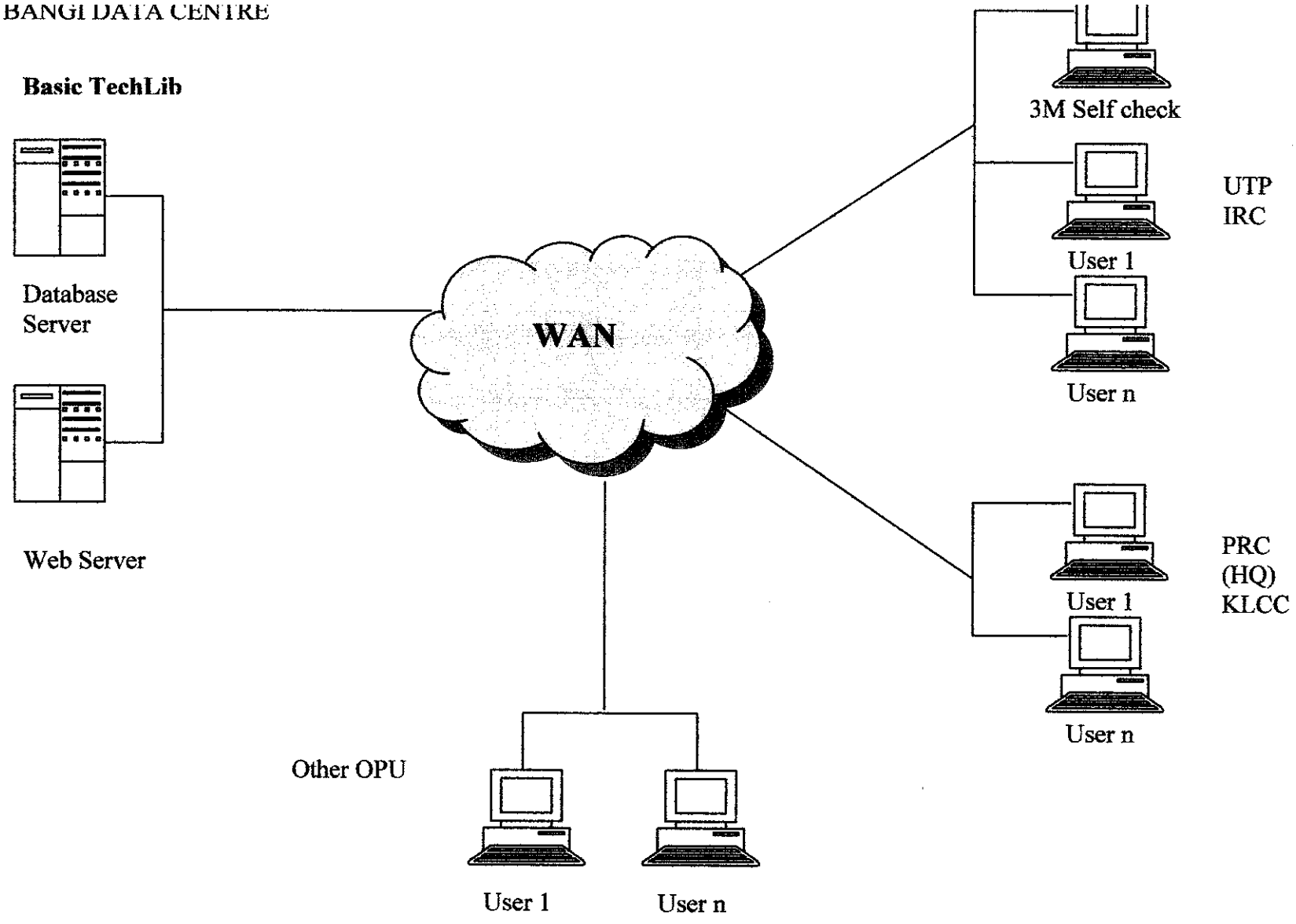

Figure 4.2 – Library System Structure at UTP

As shown in Figure 4.3 and Figure 4.4, there are two types of OP AC available in UTP library; the Internet OPAC and the Intranet OPAC. The OPAC system is integrated with other PETRONAS libraries where a user may be able to search materials from all those libraries. However, user may also choose to search from a particular source only. This OPAC system is able to show the status of the materials either it is on shelf or loan.

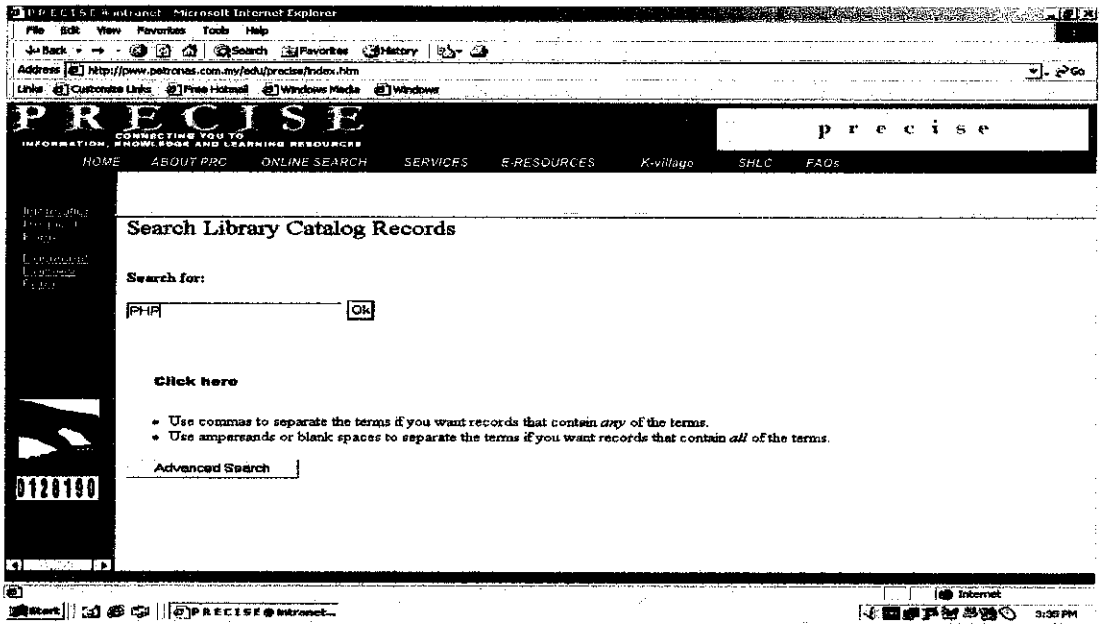

Figure 4.3 - Search system using the Intranet OPAC

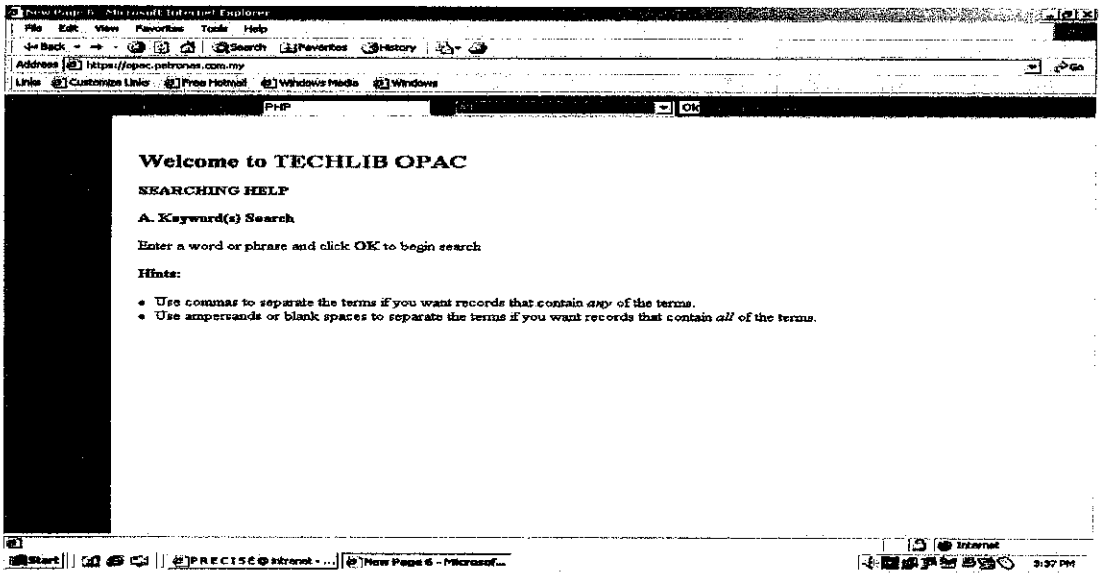

Figure 4.4 - Search system using the Internet OPAC

The major difference between the Internet OP AC and the Intranet OP AC is that the Internet OP AC is not full text while the Intranet does as shown in Figure 4.5 and Figure 4.6.

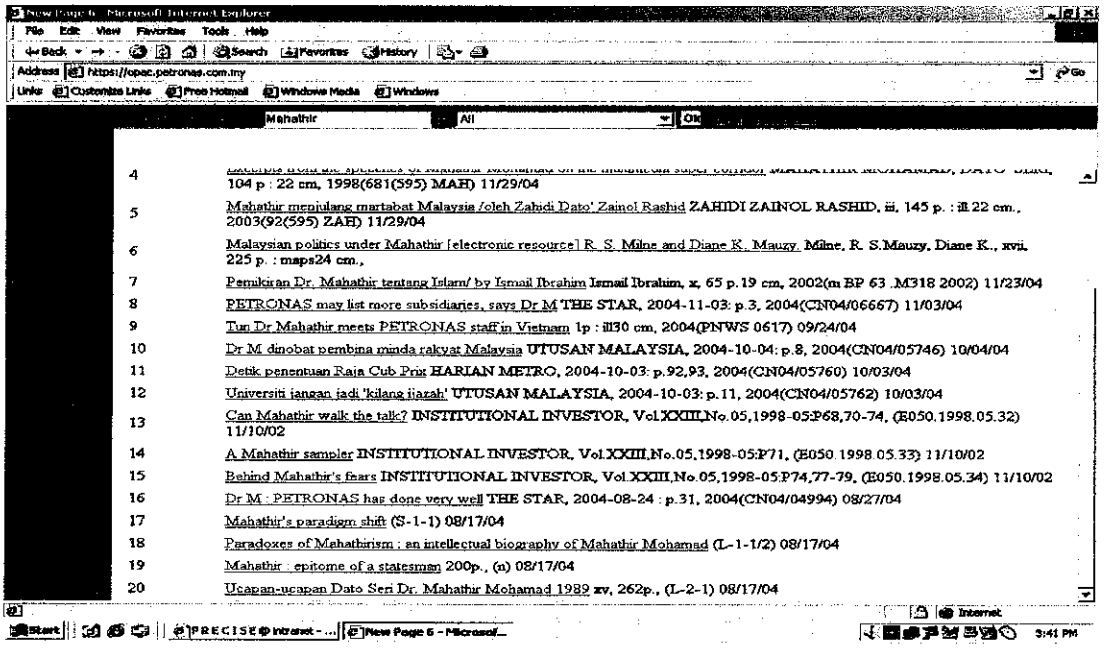

Figure 4.5 - The search output of MAHATHIR by using the Internet OPAC

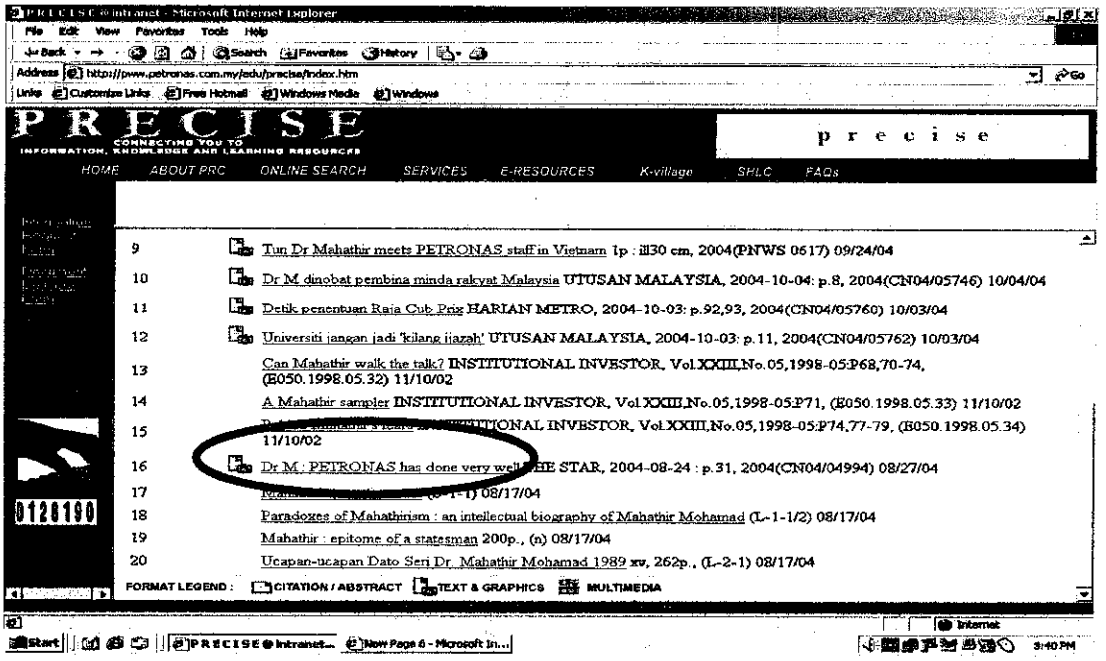

Figure 4.6 - The search output of MAHATHIR by using the Intranet OPAC

The full text means that the system may be able to show the source directly from the website itself. An example of the full text produced from the above search output is as shown in Figure 4.7.

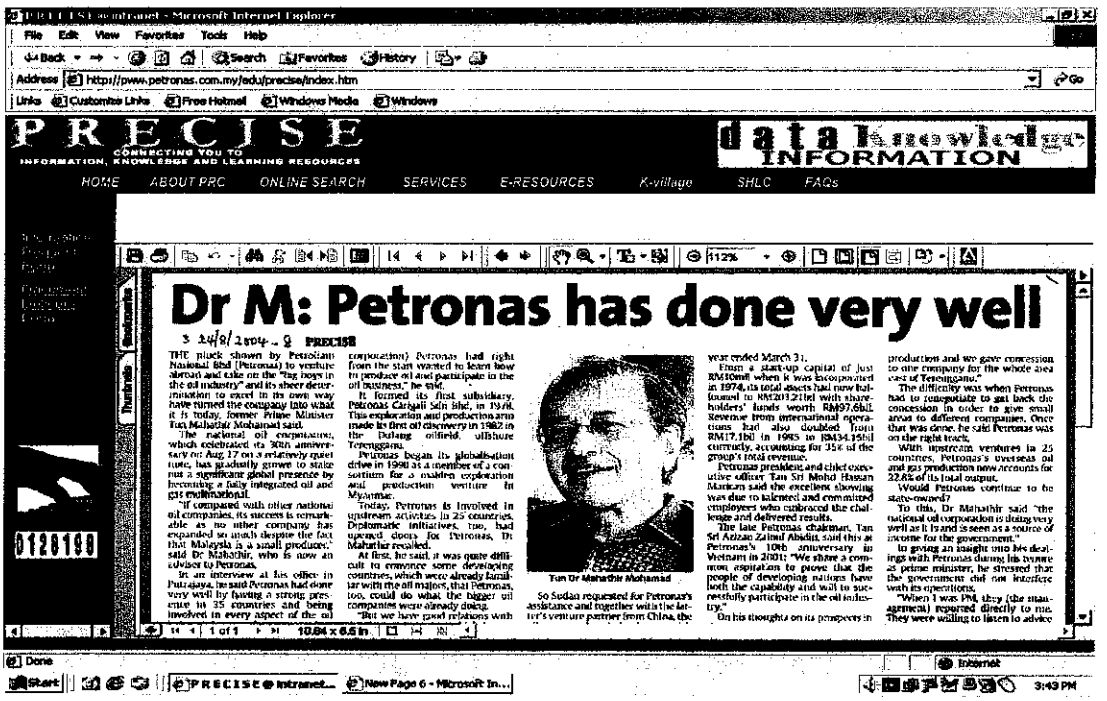

Figure 4.7 - A full text from a document entitle 'Dr M: PETRONAS has done very well' that browsed from the Intranet OPAC.

However, this OPAC service is only available in the UTP library and can only be fully access by lecturers and staff. By having this E-Library system, users may be linked to the Internet OPAC and they will be able to search the materials online through the system.

The current system is unable to produce the report automatically and therefore the third party software called Crystal Report is used to generate the reports. The reports are used for the management to investigate the library performance.

Users may only do the book reservation manually. They have to come to the counter to request for reservation and the librarians will set the books 'ON HOLD' in the

system. This reservation can only be made twice per book and there is no proper system for the due date alert or overdue notification.

As stated in the earlier chapter, there are four types of user or profile and they have different privileges such as quantity of books can be borrowed and the durations.

Profile	Quantity	Duration
Undergraduate	6	2 weeks
Postgraduate/ Academic/Executive	10	4 weeks
Non-Executive/Technicians	6	2 weeks
Part timer/Others	4	2 weeks

Table 4.1 - UTP library's user or profile privileges

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION OF STUDY CONDUCTED

Overall, the study conducted and the module developed represents only a small margin of the total E-Library system development. However, it is hoped that with this study, more efforts will be taken by other parties (industry expert, information system's expert, programmer) in conducting further and in-depth research on the design, development and implementation of the E-Library system to ensure that Malaysian' libraries are not being left out in the race towards technology implementation in the near future.

Services are the heart of any kind of library. A web-based library service is a trend Libraries are taking full advantages of internet and web facilities. They are remarkable changing their mode of provision of services. Users are also very happy by getting the library services through web. They can save their time and harassment from not getting the information. The western countries have gone far miles than developing and underdeveloped countries. This new mode of service is highly effective in special libraries rather than academic libraries. In our country we are far backward in this matter. Though we are thinking a lot but in practical it is very difficult to apply. Our national policy is there but there is no intention of implementation. Here is no infrastructure at all to implement web based library services. Government policy of restricted employment opportunity compelled not to take professional manpower as many as required. Various networking system in our country is simply failed due to the lack of good will, effort and ego problem of big libraries. But still the author hope that we will enable to overcome all these problem and though initially the installation cost is high but when a library will enable to provide web-based service it will popular and if the library and information center is being a professional about their services then in near future it can become a money making self earning organization.

3. RECOMMENDATIONS FOR FUTURE ENHANCEMENT

Table 5.1 below shows some of the future enhancements that are recommended for the UTP E-Library System. These enhancements are not absolute and are to be modified as more information regarding the scopes, performances, functionalities and practicability of the prototype module are received from the end-users.

Future system enhancements	Scope: • Customized the module so that it would better serve the end-users. • Connecting the module to a higher-level database so that tables-joining can be performed between the module's tables in order to provide the end-users with better data and information. Functionalities: • More full-text electronic journals. Eventually, indexes that do not now include full text will begin to do so, or link to external resources. Electronic Collections Online may mature as such a service. • More Web forms for user feedback, and perhaps a virtual librarian who interacts in real time chat or video conferencing. While there's nothing like a simple phone call, the virtual librarian wouldn't have to be in the library. Provide own Search system that allows the librarians to insert the updated data easily the users will get the exact results of their findings. Produce a system for the other items available in the library for instance, CD-ROMs, video tapes, journals, and exams paper.

Table 5.1- UTP E-Library System future enhancements

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APPENDICES

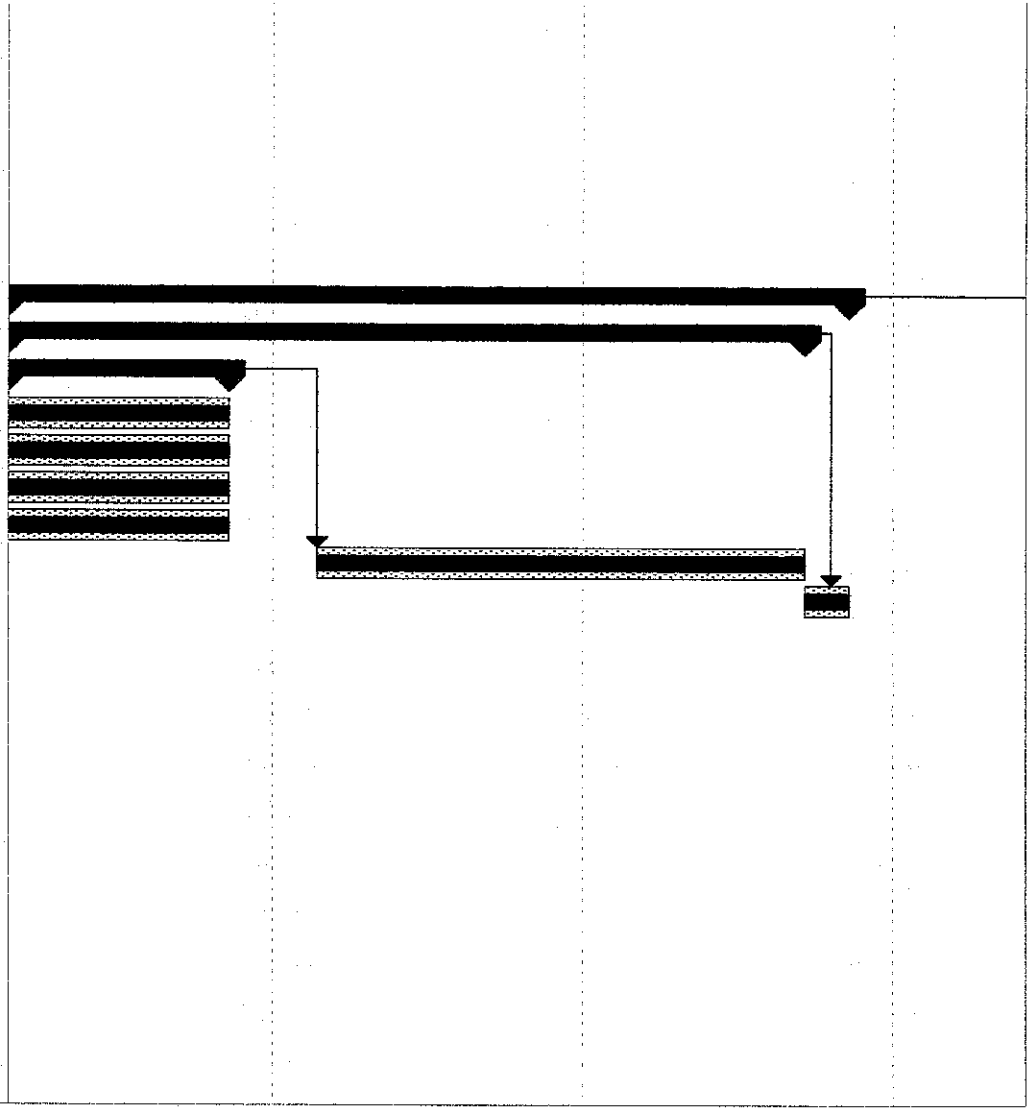
Appendix I : Gantt Chart

Appendix II : Questionnaire for Interview Session

Appendix III : System Interface

Appendix IV : System Data Flow Diagram

4	✓	Problem statements	Wed 7/21/04	Thu 7/22/04
5	✓	Objectives & Scope of study	Wed 7/21/04	Fri 7/23/04
6	✓	**Chapter 2 - Literature Review**	**Mon 7/19/04**	**Fri 7/23/04**
7	✓	Study on E-procurement & Automated Procuremen	Mon 7/19/04	Fri 7/23/04
8	✓	References	Fri 7/23/04	Fri 7/23/04
9		Submit Preliminary Report to the supervisor	Mon 7/26/04	Mon 7/26/04
10				
11	✓	**Progress Report**	**Mon 8/2/04**	**Fri 8/20/04**
12	✓	**Chapter 3 - Methodology & Project Work**	**Mon 8/2/04**	**Thu 8/19/04**
13	✓	**Develop methodology for the project**	**Mon 8/2/04**	**Fri 8/6/04**
14	✓	Analysis	Mon 8/2/04	Fri 8/6/04
15	✓	Plan & Design	Mon 8/2/04	Fri 8/6/04
16	✓	Develop	Mon 8/2/04	Fri 8/6/04
17	✓	Test & Debug	Mon 8/2/04	Fri 8/6/04
18	✓	Create story board for the module	Mon 8/9/04	Thu 8/19/04
19	✓	Submit Progress Report to the supervisor	Fri 8/20/04	Fri 8/20/04
20				
21	✓	**Interim Report**	**Mon 10/4/04**	**Fri 10/15/04**
22	✓	**Chapter 4 - Results & Discussion**	**Mon 10/4/04**	**Thu 10/14/04**
23	✓	Write the results of the project and study conducte	Mon 10/4/04	Fri 10/8/04
24	✓	Discuss overall achievements and challenges of th	Mon 10/11/04	Thu 10/14/04
25	✓	Submit Interim Report to the supervisor	Fri 10/15/04	Fri 10/15/04
26				
27	✓	**Dissertation**	**Fri 10/29/04**	**Fri 12/10/04**
28	✓	Oral presentation & Project exhibition	Fri 10/29/04	Wed 11/3/04
29	✓	**Chapter 5 - Conclusion & Recommendation**	**Mon 11/8/04**	**Thu 12/9/04**
30	✓	Conclude the study's findings	Mon 11/8/04	Thu 12/9/04
31	✓	Recommend future evolution for the study & projec	Mon 11/22/04	Thu 12/9/04
32	✓	Submit Project Dissertation to the supervisor	Fri 12/10/04	Fri 12/10/04



Project: FYP Project Work Schedule
Date: Wed 12/15/04

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

UTP E-Library System

4	✓	Problem statements	Wed 7/21/04
5	✓	Objectives & Scope of study	Wed 7/21/04
6	✓	**Chapter 2 - Literature Review**	**Mon 7/19/04**
7	✓	Study on E-procurement & Automated Procuremen	Mon 7/19/04
8	✓	References	Fri 7/23/04
9		Submit Preliminary Report to the supervisor	Mon 7/26/04
10			
11	✓	**Progress Report**	**Mon 8/2/04**
12	✓	**Chapter 3 - Methodology & Project Work**	**Mon 8/2/04**
13	✓	**Develop methodology for the project**	**Mon 8/2/04**
14	✓	Analysis	Mon 8/2/04
15	✓	Plan & Design	Mon 8/2/04
16	✓	Develop	Mon 8/2/04
17	✓	Test & Debug	Mon 8/2/04
18	✓	Create story board for the module	Mon 8/9/04
19	✓	Submit Progress Report to the supervisor	Fri 8/20/04
20			
21	✓	**Interim Report**	**Mon 10/4/04**
22	✓	**Chapter 4 - Results & Discussion**	**Mon 10/4/04**
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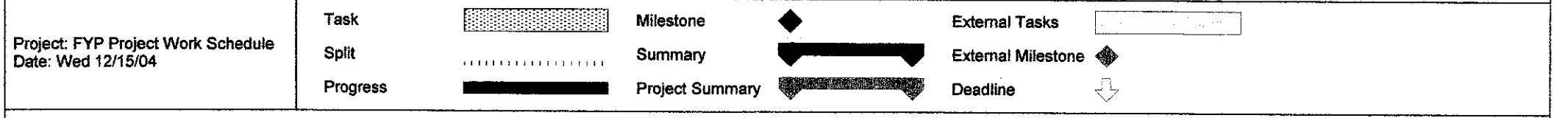
24	✓	Discuss overall achievements and challenges of th	Mon 10/11/04
25	✓	Submit Interim Report to the supervisor	Fri 10/15/04
26			
27	✓	**Dissertation**	**Fri 10/29/04**
28	✓	Oral presentation & Project exhibition	Fri 10/29/04
29	✓	**Chapter 5 - Conclusion & Recommendation**	**Mon 11/8/04**
30	✓	Conclude the study's findings	Mon 11/8/04
31	✓	Recommend future evolution for the study & projec	Mon 11/22/04
32	✓	Submit Project Dissertation to the supervisor	Fri 12/10/04



4	✓	Problem statements	Wed 7/21/04
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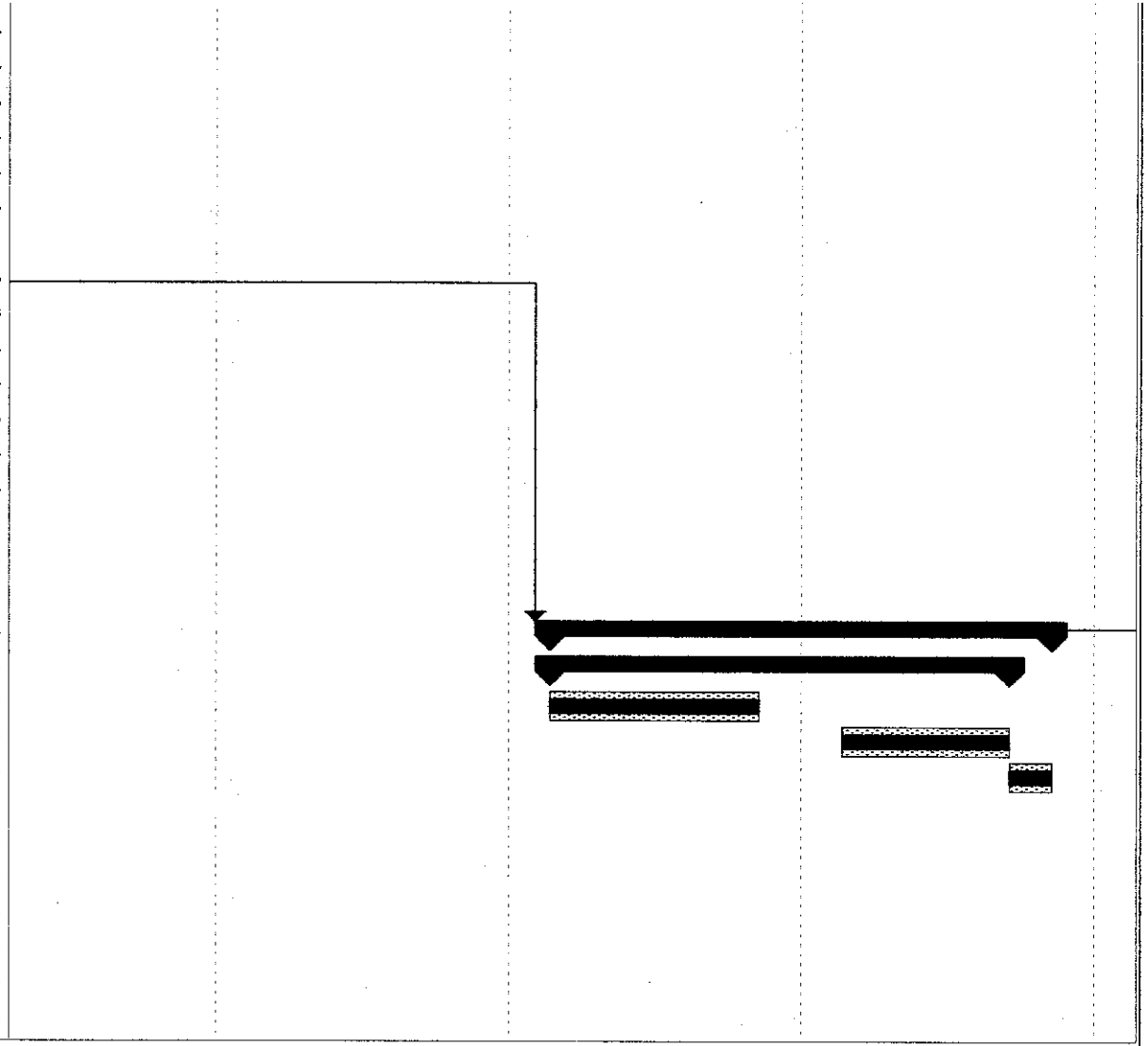

Project: FYP Project Work Schedule
Date: Wed 12/15/04

Task | Milestone | External Tasks
Split | Summary | External Milestone
Progress | Project Summary | Deadline

4	✓	Problem statements	Wed 7/21/04
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8	✓	References	Fri 7/23/04
9		Submit Preliminary Report to the supervisor	Mon 7/26/04
10			
11	✓	**Progress Report**	**Mon 8/2/04**
12	✓	**Chapter 3 - Methodology & Project Work**	**Mon 8/2/04**
13	✓	**Develop methodology for the project**	**Mon 8/2/04**
14	✓	Analysis	Mon 8/2/04
15	✓	Plan & Design	Mon 8/2/04
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19	✓	Submit Progress Report to the supervisor	Fri 8/20/04
20			
21	✓	**Interim Report**	**Mon 10/4/04**
22	✓	**Chapter 4 - Results & Discussion**	**Mon 10/4/04**
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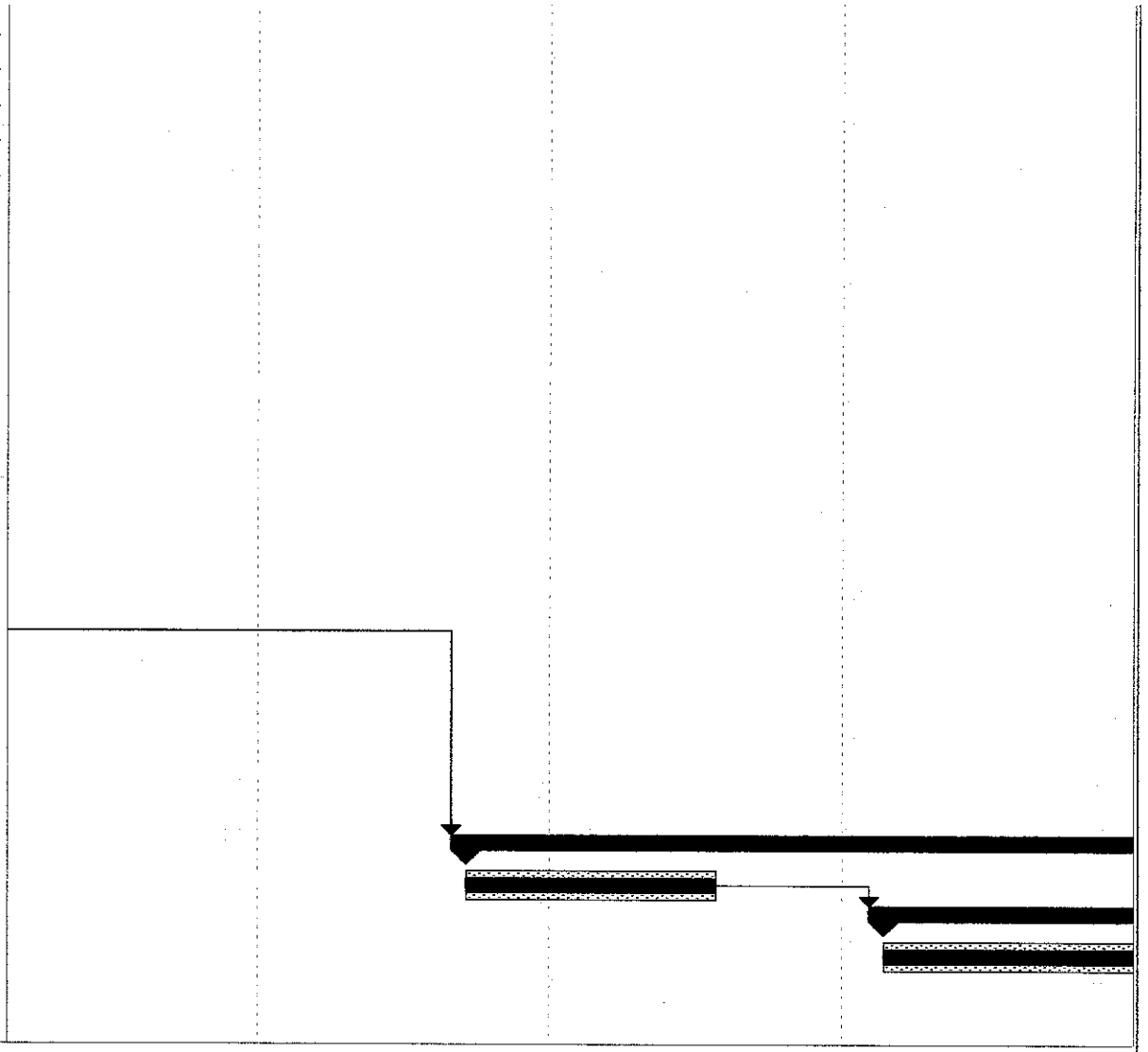
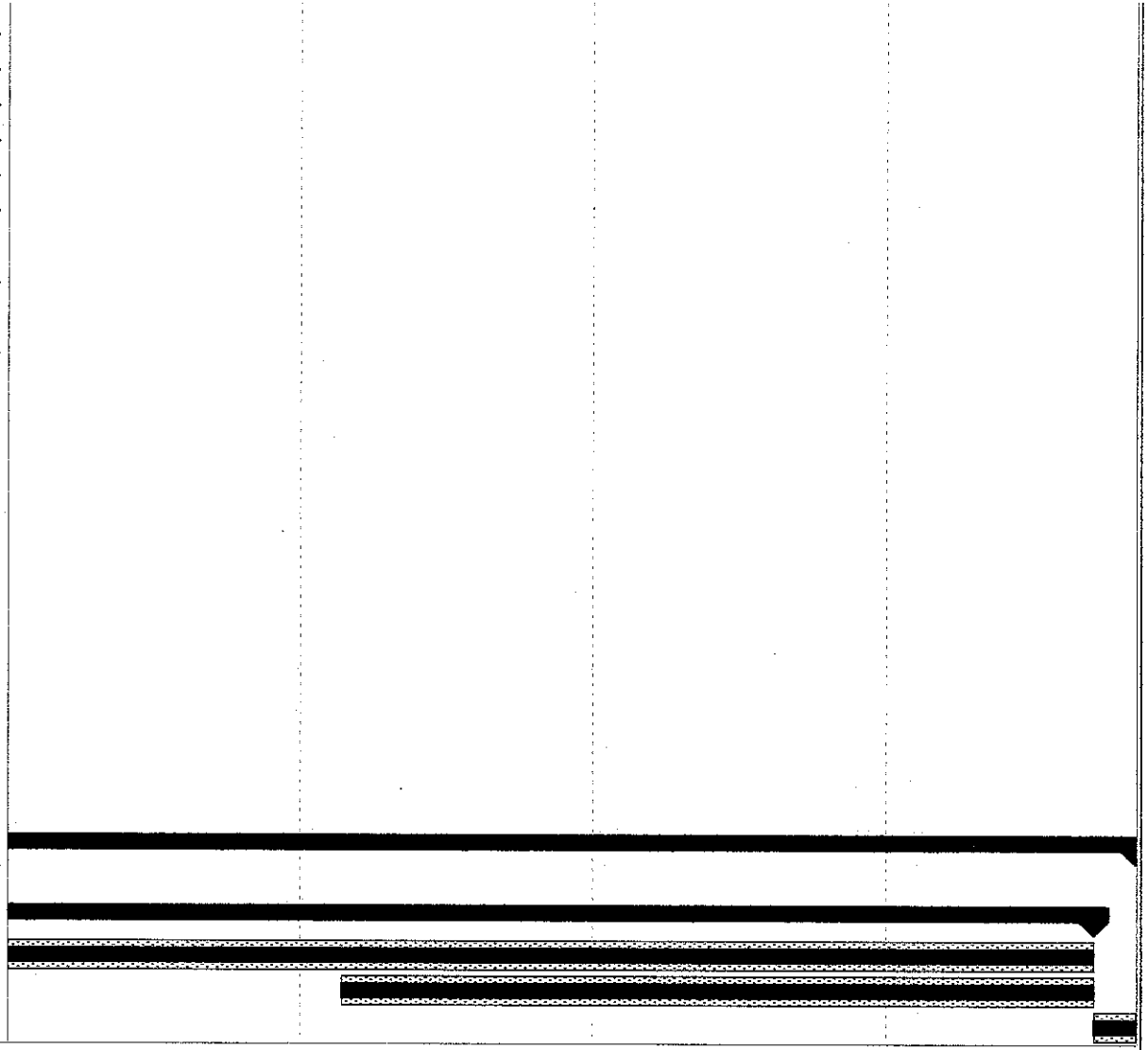
31	✓	Recommend future evolution for the study & projec	Mon 11/22/04
32	✓	Submit Project Dissertation to the supervisor	Fri 12/10/04



Project: FYP Project Work Schedule
Date: Wed 12/15/04

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

4	✓	Problem statements	Wed 7/21/04
5	✓	Objectives & Scope of study	Wed 7/21/04
6	✓	**Chapter 2 - Literature Review**	**Mon 7/19/04**
7	✓	Study on E-procurement & Automated Procuremen	Mon 7/19/04
8	✓	References	Fri 7/23/04
9		Submit Preliminary Report to the supervisor	Mon 7/26/04
10			
11	✓	**Progress Report**	**Mon 8/2/04**
12	✓	**Chapter 3 - Methodology & Project Work**	**Mon 8/2/04**
13	✓	**Develop methodology for the project**	**Mon 8/2/04**
14	✓	Analysis	Mon 8/2/04
15	✓	Plan & Design	Mon 8/2/04
16	✓	Develop	Mon 8/2/04
17	✓	Test & Debug	Mon 8/2/04
18	✓	Create story board for the module	Mon 8/9/04
19	✓	Submit Progress Report to the supervisor	Fri 8/20/04
20			
21	✓	**Interim Report**	**Mon 10/4/04**
22	✓	**Chapter 4 - Results & Discussion**	**Mon 10/4/04**
23	✓	Write the results of the project and study conducte	Mon 10/4/04
24	✓	Discuss overall achievements and challenges of th	Mon 10/11/04
25	✓	Submit Interim Report to the supervisor	Fri 10/15/04
26			
27	✓	**Dissertation**	**Fri 10/29/04**
28	✓	Oral presentation & Project exhibition	Fri 10/29/04
29	✓	**Chapter 5 - Conclusion & Recommendation**	**Mon 11/8/04**
30	✓	Conclude the study's findings	Mon 11/8/04
31	✓	Recommend future evolution for the study & projec	Mon 11/22/04
32	✓	Submit Project Dissertation to the supervisor	Fri 12/10/04



Project: FYP Project Work Schedule
Date: Wed 12/15/04

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Interviewee: Mr. Azzubayani bin Abu Bakar **Date:** 27th August 2004

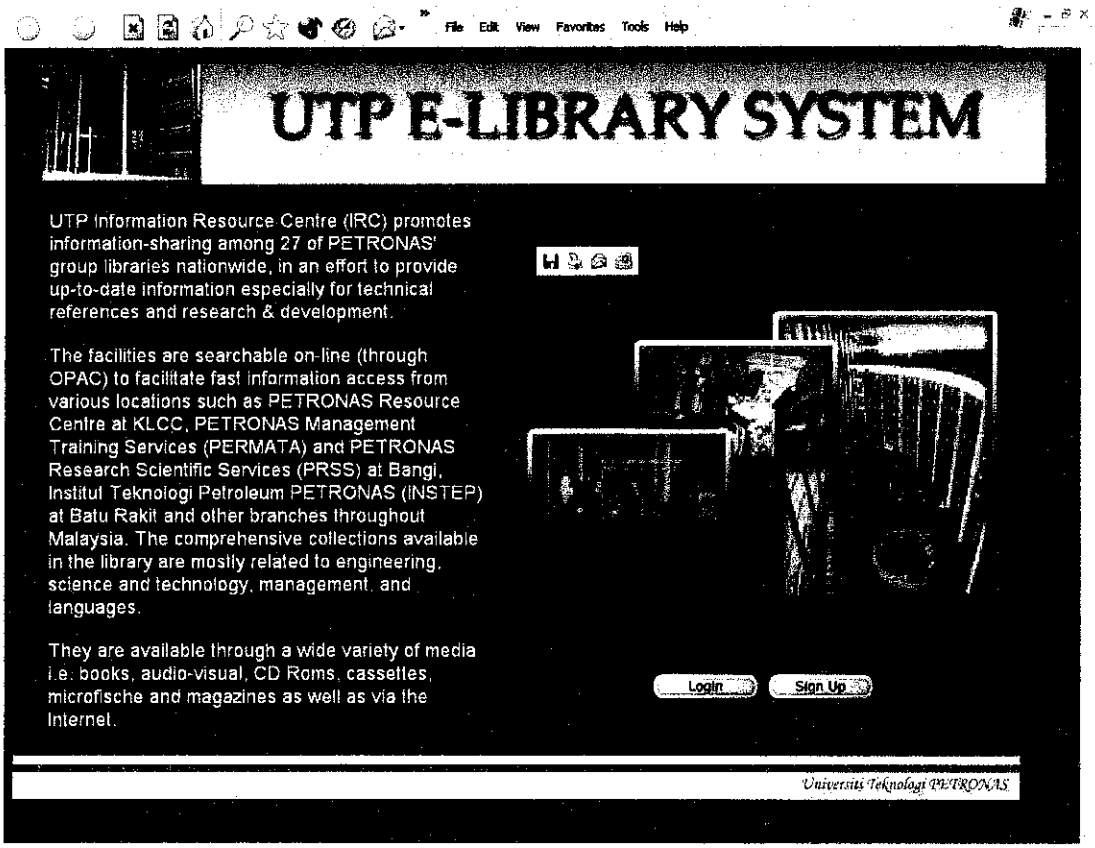
Interviewer: Miss Nurul Aini binti Ariffin **Subject:** E-Library System

Objectives of the interview:

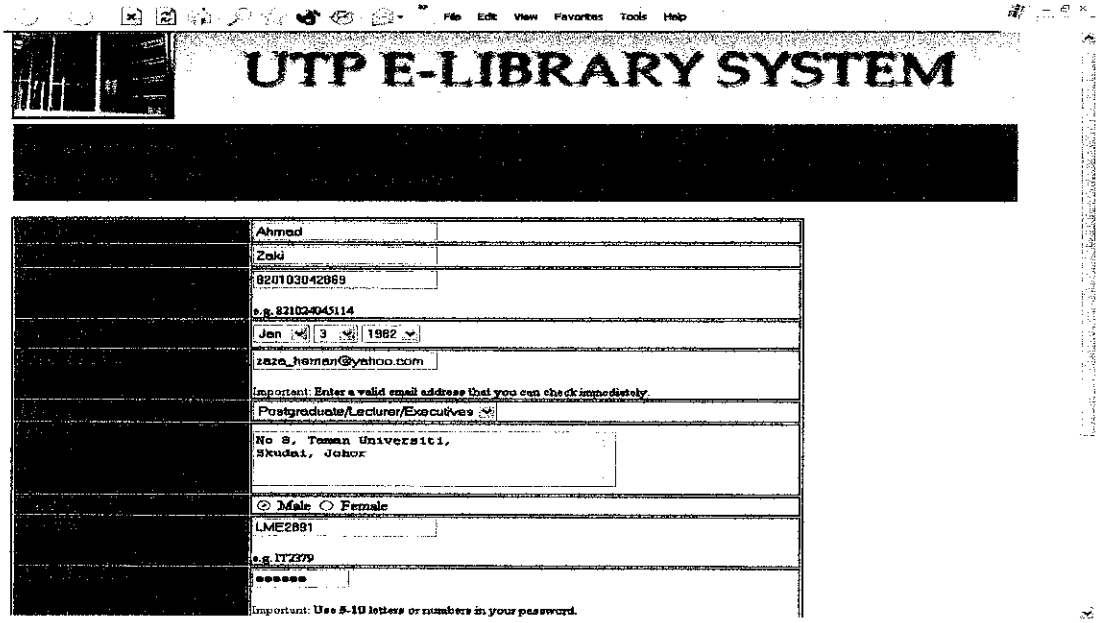
- find out the current state of UTP library system
- to understand the operating of OPAC system
- find out opinion of newly proposed system

1. Could you please explain to me how does the current system work?
   - Data stored
   - Borrowing process
   - OPAC
2. How does the OPAC system in the library work?
   - Does the OPAC covers only UTP's library records or it integrates with other libraries?
   - How does the management update the records for the OPAC system?
   - Does the OPAC able to generate a status of the book either it is on loan or on shelf?
3. There are a few websites that link to the library and OPAC system. However, there are not fully accessible by students. Why? Who has the privilege to browse it? Where can the user browse it?
   - http://pww.utpnet.petronas.my
   - http://170.38.127.38/Intranet
4. How does the registration process work?
   - Who provide the user ID?
5. What is the difference between OPAC and Intranet OPAC?
6. For the management purpose, is the current system able to give the summary of the operating library? For instance, the reports of quantity books check out and returned in that particular month.
7. Who control the database for the library?
   - What is the software used for it? Oracle or MySQL?
8. Can a student reserves or requests the book in advance with the current system? If yes, how does it work?
9. Is there any notification given to the borrower if the book he/she borrowed is over the due date?
10. If there is, how does it work? Can I know the rules and terms for borrower?
11. What are the different services given to a different group of user? For instance, between student and lecturer.

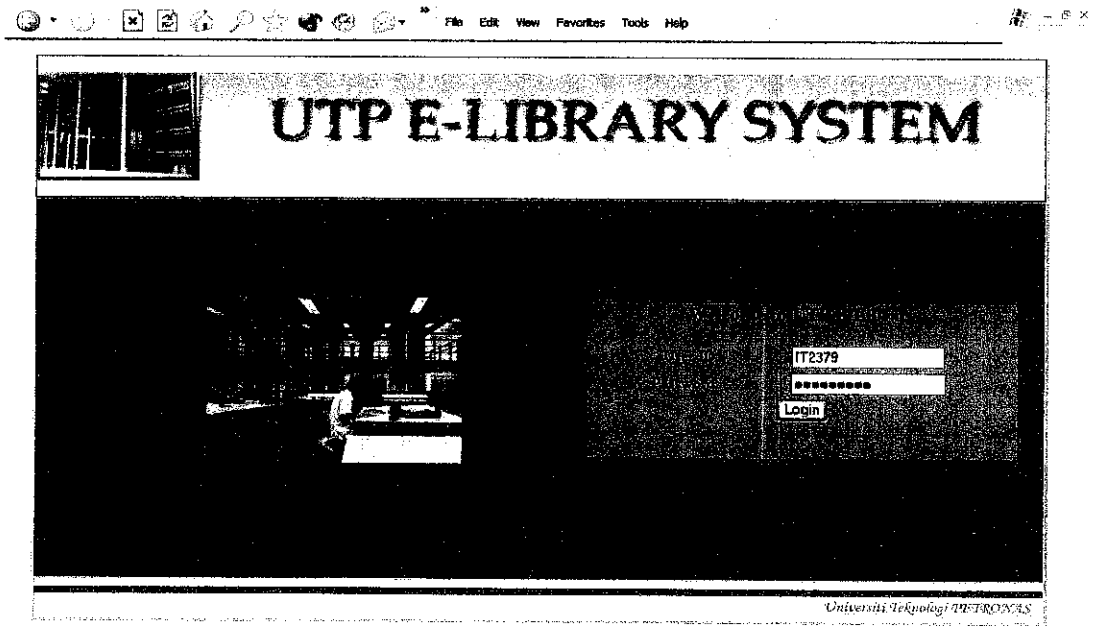
SYSTEM INTERFACE



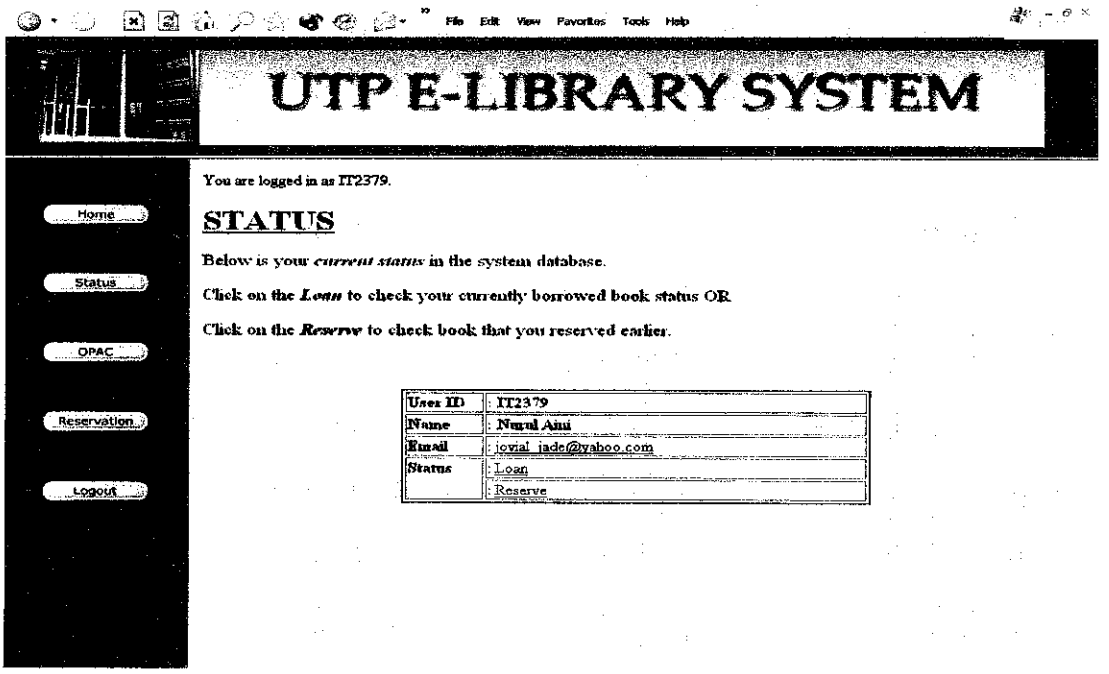
Appendix Figure 1 – System Main page



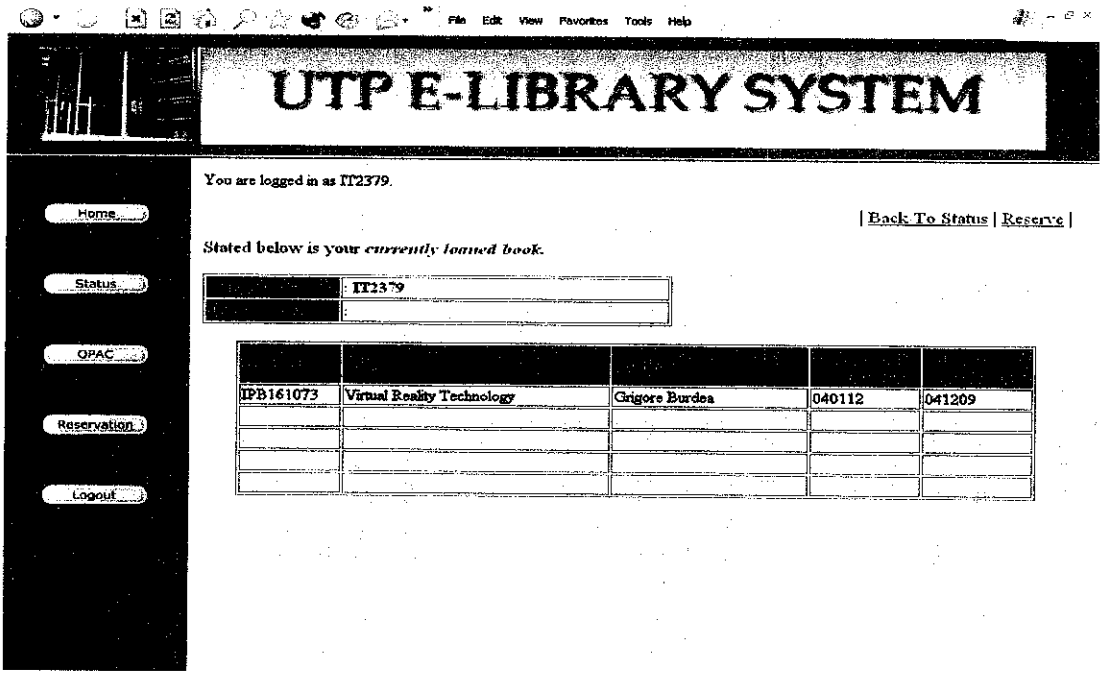
Appendix Figure 2 – Sample user fill up sign up form



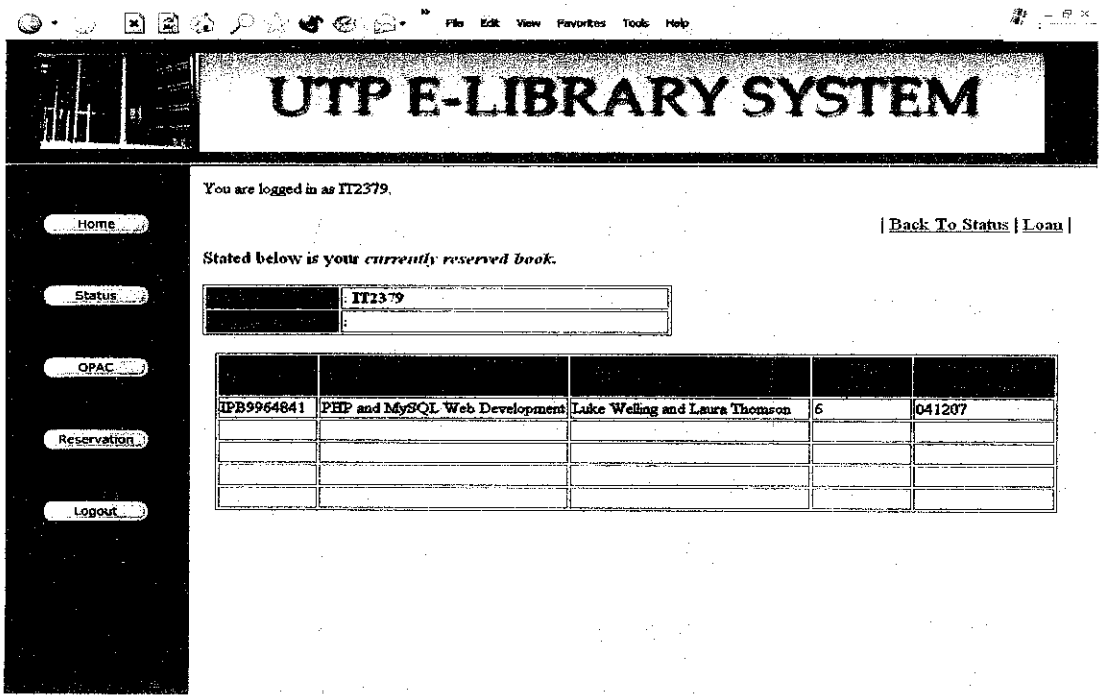
Appendix Figure 3 – Sample user login into the system



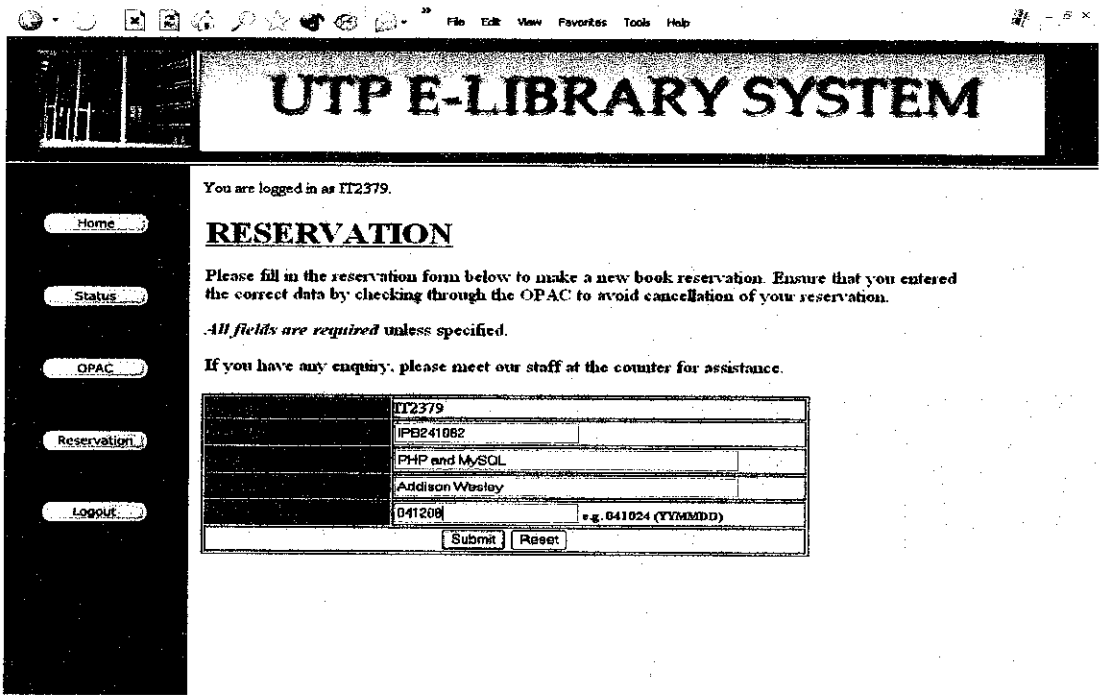
Appendix Figure 4 – User's status module



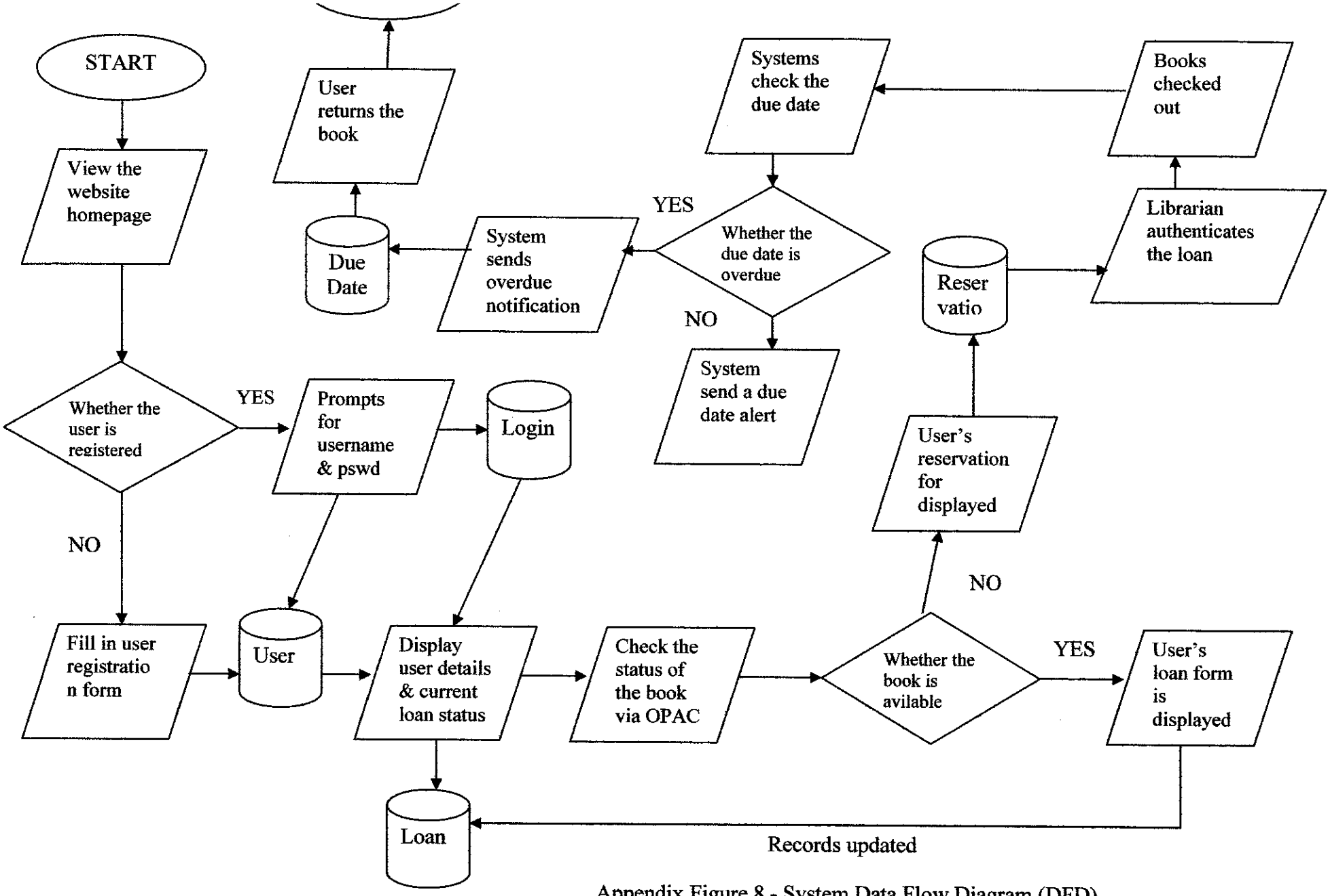
Appendix Figure 5 – User's currently loan status module



Appendix Figure 6 – User's reserved status module



Appendix Figure 7 – Sample user make an online reservation



Appendix Figure 8 - System Data Flow Diagram (DFD)