



**ONLINE DIRECTORY OF LIBRARIES AND INFORMATION
CENTERS IN MALAYSIA
(ODLICM)**

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ABSTRACT

Online Directory of Libraries and Information Centers in Malaysia (ODLICM) is a web-based system that can provide useful information on libraries and information in Malaysia. This site provides an interactive search capability, thus enhancing faster access to pertinent information. The system would provide information of libraries and information centers, for instance, the library's basic information and the director's information. Administrators of this site are able to add record to the database of this site.

As most of the online directory of libraries and information centers sites encompass information for North American region, this ODLICM is a directory of libraries and information centers only in Malaysia.

This report begins with the introduction part. The introduction part consists of the project definition, background to project, project overview, objective, scope, limitation, and project schedule. Next, literature review was discussed which comprises the role of literature review, approaches to literature review, and findings. Then, the methodology used to develop this system was described. The system analysis and design part consists of the system's functional and non-functional requirements, the system's architectural design, database design, program design, process design and the user interface design. The following part is the system implementation. The development environment, the program coding method and the database development was described. The system testing part followed next. It consists of unit testing, module testing and integration testing. Next is the system evaluation and conclusion. The system's strength and limitation are evaluated. Future enhancement is suggested and knowledge gained is stated. Problems encountered and the solutions are described as well. Next is the questionnaire form

and the survey results. Finally, the user manual describe to the users on how to use the system.

In the analysis phase, a survey was conducted on 40 random samples in two towns to determine the requirements of the system. The findings of the survey indicate preference for an interactive system complemented with a search module. In Reviewing the tools to fulfill such requirements, Active Server Pages.Net (ASP.Net), Hypertext Markup Language (HTML), Java Scripting and VB Scripting are deemed most appropriate to program the system.

ODLICM has five modules organized to login, add record, submit record, give feedback, and keyword search.

With ODLICM, online searching are conducted in real time and the results are available almost immediately. Furthermore, this site is also an interactivity and easy to search and retrieval for information. Finally, online directory provides remote access, which means that the searcher and the files of documents do not have to be geographically adjacent.

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Mrs. Kiran Kaur Gurmit Singh, my moderator in this thesis, was an invaluable addition to the committee. Without her input, this project could not have been completed. Her ability to convey concepts and illustrate the problems provided the basis by which this research was possible.

Lastly, and most importantly, my family deserves credit. The guidance I receive from them helps me chose the best path to take when the road leads in many different directions. Thank you.

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University of Malaya

Online Directory of Libraries and Information Centers in Malaysia

Chapter 1 Introduction

1.0 INTRODUCTION

1.1 DEFINITIONS

Online directory differs from other system in its functionality. Online directory are designed is a way that a search is conducted online, and progresses in an interactive, conventional fashion, making it more akin to the manual search.

Library is a place in which literary, musical, artistic, or reference materials (as books, manuscripts, recordings, or films) are kept for use but not for sale. It is a collection of such materials.

Information center is a place that provides information, assistance and services to users. These will typically include searchable subject guide organized by topical subject or geographical region that have been reviewed and compiled by human editors.

1.2 BACKGROUND TO PROJECT

Online searches are conducted in real time and the results are available almost immediately. Online directory provides remote access, which means that the searcher and the files of documents do not have to be geographically adjacent. The user and the search system are linked by telecommunication network.

Library is a place in which literary, musical, artistic, or reference materials (as books, manuscripts, recordings, or films) are kept for use but not for sale. It is clear that school libraries can make a real contribution to teaching and learning. Libraries can help build independence in learning, foster study and information-handling (problem solving) skills, help motivate pupils to learn, offer conditions that encourage absorption in the task and promote self-esteem.

With information center, users will be able to devote their time to primary job instead of searching for needed information. The information supplied by their information center helped users avoid wasting their own time and other people's time. Besides, information center exist to eliminate questions of accuracy.

As we realize the importance of the library and information center, the Internet users might want to browse the library and information center's detail online before they visit to the library. Sometimes, there is a problem for a user to find a specific library due to some irrelevant results and context problems. With the current scale and growth of the World Wide Web, the importance of being able to search for and locate Web pages effectively and accurately is of prime importance. Currently, the only feasible way a searcher can locate a particular Web-based source is by using an online directory. However, there are some limitations with the existing online directory.

1.2.1 Limitations

i. Information Limitations

Web information on online directory is still very limited. Most of the information on online directory caters for the North American region only.

Insufficient information and not up-to-date information are displayed. Some of the information given through the online sites is not recent, as the sites are not been updated regularly.

There are only few specific web sites that cater for online directory of libraries and information center. The web sites found in the Internet

rarely provide library and information center's detail, specifically for Malaysians.

ii. Design Limitations

The methods of searching and retrieving of information are very rigid.

This tends to give too many and irrelevant search results.

Most of the online web sites cannot be considered as a one-stop center for information because the information limitation.

1.3 PROJECT OVERVIEW

This project is to develop an Online Directory of Libraries and Information Centers in Malaysia (ODLICM). This web-based information system will be used by the Internet browser to search for libraries and information centers in Malaysia according to their location. The libraries and information center's detail will be available in this web site such as its location, manager, web site, quantity of books collection, or contact number. Users are able to browse these details through the web site. The project includes the implementation of a dynamic user interface that is user-friendly and user-intuitive. Development of a database system to keep all the records pertaining to the system is emphasized as well. It provides a database maintenance features for the web site by the authorized person. A password protected administrators interface will be included for security purposes.

1.4 OBJECTIVES

The objectives of the proposed objectives are in the form of measurable as it is clearly stated what the system to be developed should be able to do in terms of its task and functionality. The proposed project hopes to achieve the following objectives:

General objectives:

- Enhance information dispersion in the community
- Provide easy access and retrieval of information from the site. Searching of information will be eased. Information would be able to be spread quickly and effectively overcoming geographic barriers.
- Provide up-to-date information to be shared publicly. Up-to-date information will be added to ensure that the information to users is current, accurate and trustworthy.
- Work as a centralized the storage of information on online directory of libraries and information centers in Malaysia. This web site functions as a data storage center. This site will store data for libraries and information centers in Malaysia.
- Distribute information that caters for all levels of society. The information contained in this site will cater for the layman.

Project aims:

- Provide an effective storage center for information. This will enable the storage of online directory of libraries and information centers in Malaysia and links to other sites.

- Support a friendly and interactive user interface. To provide a comfortable environment for users. Equipped with sufficient error detection and friendly confirmation messages.
- Provide an interactivity and easy search and retrieval for information. A system with efficient search and interactive features to ensure an easy method of search and retrieval of information will be encompassed.
- Support an electronic environment and database that ease the administrators to manage the online directory of libraries and information center in Malaysia.
- Provide a local space for users to search for libraries and information center in Malaysia.

1.5 PROJECT SCOPE

The online directory of libraries and information centers is still rare among the Internet users, especially in Malaysia environment. However, there are some of these web site, which can be found in foreign country.

As most of the online directory of libraries and information centers sites encompass information for North American region, this ODLICM is a directory of libraries and information centers only in Malaysia.

The ODLICM is a site targeted mainly for any of the online user. Hence, the information in this site will be catering for the layman. The major goal of the ODLICM is to provide an effective and time-efficient web application in handling the online directory.

A simple and an interactive user interface will be adopted whenever users need to browse and search information from the web site.

With a pragmatic design, adequate and accurate information the ODLICM site can be considered as a one-stop center for people who search for libraries and information centers online.

The ODLICM comprises three main modules, administrator, librarians, and public user. The basic features for the ODLICM are listed below:

- Search function
- Users feedback
- Add record

Search function

A search function in the ODLICM provides the libraries and information centers searching service to the users of the site. With the help of the search function, users can easily find the libraries and information centers they are looking for. The internal search engine that does the search work and returns the related results from database supports the search function.

The advantage of search engine is that it saves user's time in searching. Instead of browsing the site to find a particular libraries and information centers, users can use the search engine and therefore get the results in a short while.

Users' feedback

Users are able to send the error message to the web site administrator. Besides, users can give their comments on the web site and send to the web site administrator as well.

Add record

For administrator, they can add record of library or information center to the database. For public user, they are not allowed to add a new record of library or information center to the database due to security issue. Public user can only submit a new record to librarian. Librarian will verify whether the information submitted by public user is real. If the information is real, then only the librarian will add the record to the database.

1.6 PROJECT LIMITATION

The limitations of ODLICM are listed as below:

- Only administrator or librarian is allowed to add new record to the database.
- The search area is within Malaysia only.
- Users are not allowed to add or delete record from the database.

1.7 IMPORTANCE OF THE PROJECT

i. Quick dissemination of information

The Internet offers a way to disseminate information quickly. It overcomes geographical barriers by allow users to reach out for the latest information irrespective of the physical locations. With this technology elevation, information can be easily shared through out the world.

ii. Save users' time

Time is usually wasted in browsing for the relevant information, and therefore it takes longer time to make decision and take action. This

project aims to help the users to deal with these problems by just visit this web site. Users are then able to gain information, make comparison and make decision in shorter time.

1.8 PROJECT SCHEDULE

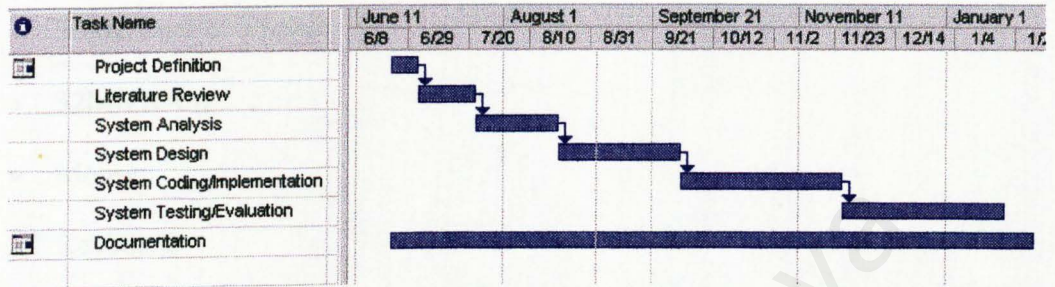


Figure 1.1: Gantt chart for the project of ODLICM.

It visually shows the duration of the activities and the time overlap of activities within the project.

1.9 SOFTWARE AND HARDWARE REQUIREMENTS

The software required to develop ODLICM are:

- Microsoft XP – operating system
- Microsoft Visual Studio.Net 2003 – system coding
- Microsoft FrontPage – web page editor
- Microsoft SQL Server – database system
- Internet Information Server (IIS) – web server
- Internet Explorer 5 (IE5) – web browser
- Adobe PhotoShop – graphic editor
- Macromedia Flash – animation, video editor

- Microsoft Word – documentation
- Visio 2000 – documentation

The hardware required for running ODLICM comprises:

- System equipped with SVGA graphic adapter
- 30MB hard disk space
- 32MB RAM
- Mouse
- Keyboard
- Modem / Network card

1.10 CHAPTER OVERVIEW

This documentation consist of seven chapters:

Chapter 1 Introduction

Gives a brief introduction of the project definition, background, objectives and its features, summary of the scope of the project, project schedule and technical requirements.

Chapter 2 Literature Review

Gives a brief explanation to each research area based on the requirements of the project. Summary of the reviews and research in similar project are discussed here.

Chapter 3 Methodology

This chapter emphasis on the system development strategies. This includes the analysis and methodology used to develop the system.

Chapter 4 System analysis and design

Describes the results of the area and the functional and non-functional requirements. Discuss the design issues in building the projects.

Chapter 5 System Implementation

Describes the development of ODLICM and the implementation of each module.

Chapter 6 System Testing

Presents the type of testing involved and the results achieved.

Chapter 7 System Evaluation and Conclusion

Summary of the project's strength and weaknesses, problems encountered and state suggestions for future enhancements. Overall conclusion of the whole thesis.

2.1 LITERATURE REVIEW

2.1.1 PURPOSE OF LITERATURE REVIEW

The purpose of why the literature review has been conducted is:

- To establish what is known or what is about the area of research.
- To place the study in the context of what has already been done. Show how the study connects to and builds on previous research.

Online Directory of Libraries and Information Centers in Malaysia

Chapter 2 Literature Review

To learn from others.

To carry on from where others have stopped.

To avoid duplication.

To identify others who are working in the same area.

To identify others that may influence the problem.

To find solutions.

11.17.1 TECHNIQUES TO LITERATURE REVIEW

The research was carried out by searching and gathering relevant, relevant, adequate and comprehensive information. To achieve this, gathering was done by using a number of methods such as through internet, books, articles, journals, thesis and other relevant material.

2.0 LITERATURE REVIEW

2.1 ROLE OF LITERATURE REVIEW

The purpose of why the literature review has been conducted is:

- To evaluate what is known or unknown about the area of research.
- To place the study in the context of what has already been done. Show how this study connects to and builds on previous research.
- Justify the need for this study. Identify the gap that the research will fill and show why this research is important and needs to be done.
- Establish the theoretical framework methodological focus of the study. Justify why the approach that have been chosen is likely to be the most fruitful.
- To learn from others.
- To carry on from where others have reached.
- To avoid duplication.
- To identify other people working in the same area.
- To identify variables that may influence the problem.
- To limit the problem.

2.2 APPROACHES TO LITERATURE REVIEW

The research was done in order to obtain and gather reliable, relevant, adequate and comprehensive information. This information gathering was done by using a number of methods such as through Internet, book, articles, journals, thesis and other relevant materials.

2.2.1 Internet

Internet surfing in today's world is a very efficient way of gathering information. There are many web sites available that provide useful and expertise information, which is needed in this system. Some web sites have provided very useful software samples that can serve as guidelines in determining system requirements. The information is in the form of linked pages that reside at various sites around the Internet.

2.2.2 Online directory and related sites

During this era of technology enhancement, web or online sites are expected to be a source of information guidance for the community. Evaluating Internet information is an obligatory function to all information seekers. One cannot accept information without examining the information and it would be unwise to presume that information on the web sites would be accurate and complete.

The web poses a unique analytical challenge because of its characteristics. The evaluation can be divided into several categories. One can appraise a source by first examining the bibliographic citation. A bibliographic citation is a written description of a book, journal article, essay, or some other published materials.

Some evaluation criteria include :

i. Scope

Scope of the web content includes the items that are included in the resource such as subject area, formats or material covered. Aspects of the scope include breadth, which covers the completeness of the subject covered, depth of subject covered, time limitation and format.

ii. Content

The content concerns of specific aspects relate to the accuracy, authority, currency and uniqueness of the resource. The information must be checked against other reliable or authoritative resources. The source of the information must be stated and the information must be verifiable. The frequency or currency of the resource updated should be taken into consideration. The dates of the updates should be taken into consideration. The dates of the update should also correspond to the information in the resource. Links to appropriate resources should be kept up-to-date.

iii. Purpose

The purpose of the web site should be stated clearly. The resource should fulfill the stated purpose. The audience concerns the need for the resources to cater to the need of the intended audience.

iv. Reviews

The review on the web sites can determine the strength and weaknesses of the range of the Internet resources.

v. Workability

The resource should be both convenient and beneficial to use. Workability includes user friendliness as the special commands should be clear with help information available, user interface issues addressed, the required computing environment should be flexible, searching

information in the resource should be easy. The resource should be organized in a logical manner. There should be a good search engine that is intuitive and provides an index to the information content. The connectivity of the resource should be accessible with standard networking equipment and software.

2.2.3 System study

Study on the relevant library system developed by previous University of Malaya, FCSIT undergraduates are carried out to further understand of the development of this project.

2.3 FINDINGS

2.3.1 Online directory of libraries and related sites

Libweb

Quick search function for libraries is available in Libweb according to location, library type, name or other information. The page is also linked to other related sites. Users are able to add in new library record to the database. However, there are not much graphical designs at Libweb.

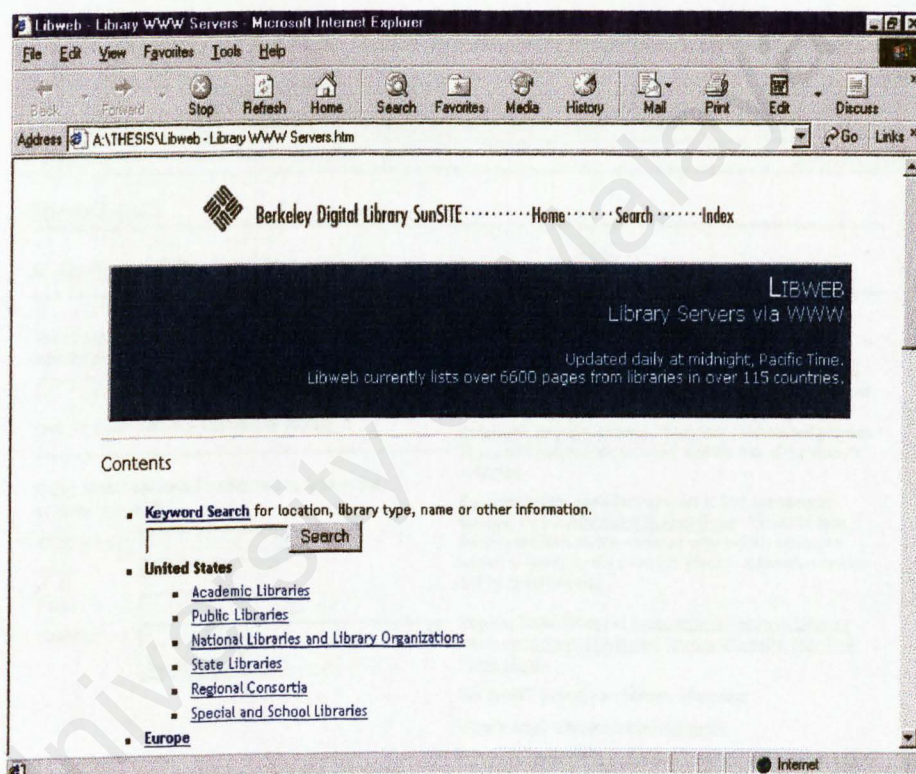


Figure 2.1: Screenshots of Libweb

lib-web-cats

lib-web-cats is one of the largest directories of libraries on the web that allows users to search for a library according to name of the institution associated with the library, library type, city, state or country. This site conveys much information that relevant to users. The sites review is available as well. This site is also linked to other related links. Users are able to add new library record to the site Users can view the latest record of libraries added to the site. The site editor's information is also available.

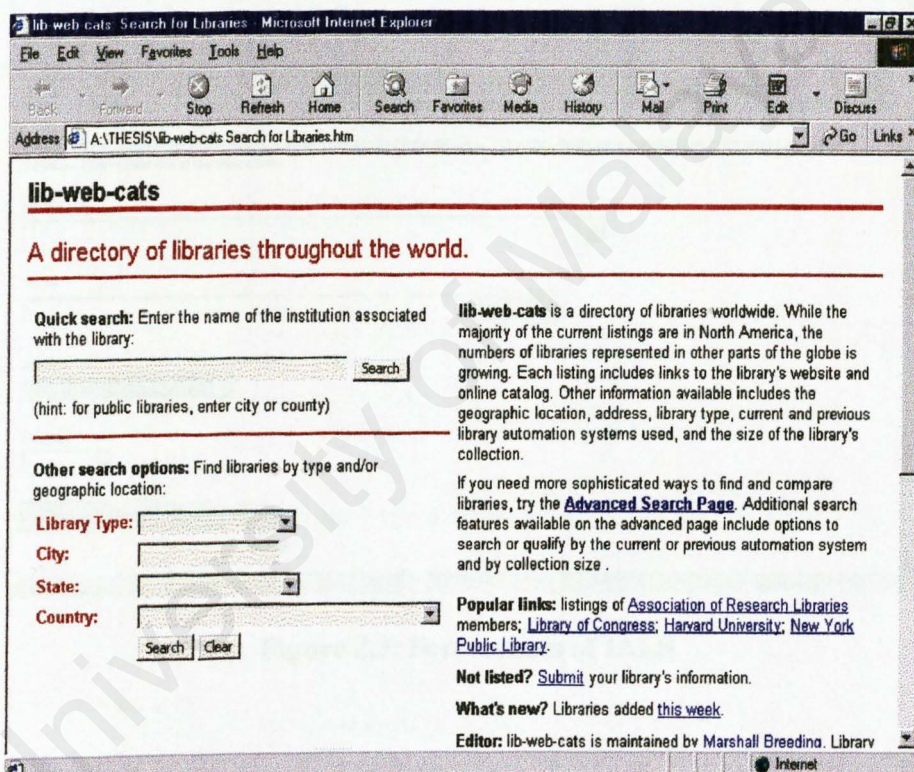


Figure 2.2: Screenshots of lib-web-cats

IALS

IALS is a web site that allows users to search for a library's information online according to library's name, town, region and country. Users are not allowed to add new library record to the database. Moreover, site reviews, site editor's information is not available at this site. In addition, there are not much graphical designs at this site.

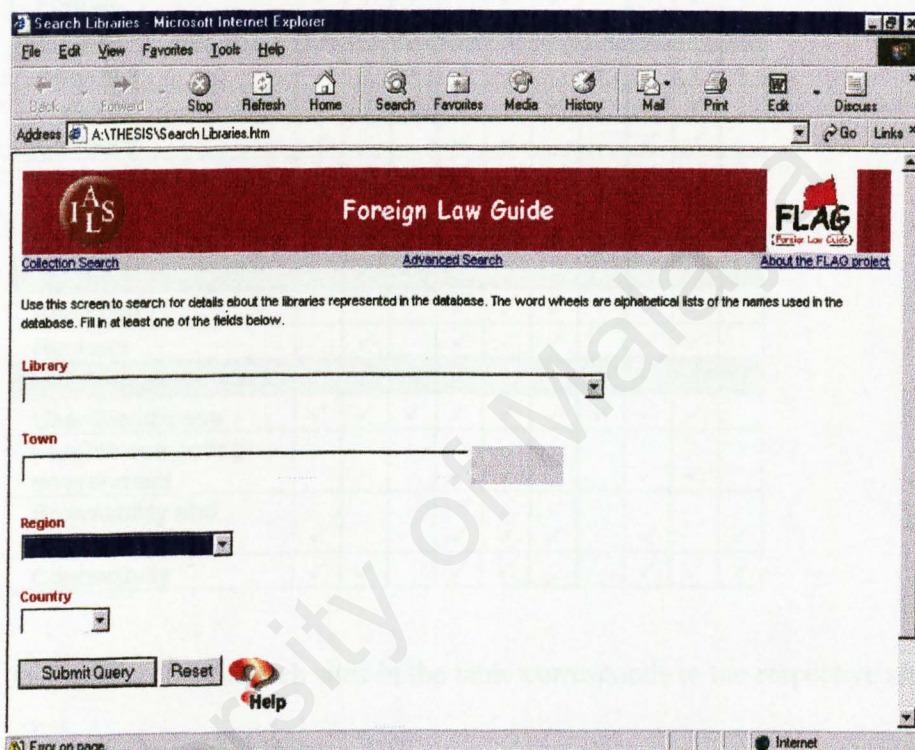


Figure 2.3: Screenshots of IALS

Summary of the Web Evaluation

A summary of the web sites evaluated is been tabulated.

Table 2.1: Summary of web evaluation

Evaluation Criteria	Sites Evaluated									
	1	2	3	4	5	6	7	8	9	10
Scope										
Breadth	✓	✓		✓	✓		✓	✓	✓	✓
Depth		✓			✓			✓		
Format	✓	✓	✓		✓	✓			✓	
Content										
Accuracy		✓	✓	✓			✓	✓	✓	✓
Authority		✓			✓	✓			✓	
Currency	✓			✓	✓			✓	✓	
Uniqueness		✓			✓	✓		✓		
Links to other Resources	✓	✓	✓	✓	✓	✓	✓		✓	
Purpose										
Audience				✓	✓	✓		✓		
Reviews		✓		✓	✓	✓		✓	✓	
Workability										
User friendliness	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Flexible computing environment				✓	✓			✓	✓	
Browsability and organization	✓			✓	✓	✓		✓		✓
Connectivity	✓	✓		✓	✓			✓	✓	✓

The number for the web sites in the table corresponds to the respective site shown in the list below:

1. Libweb. Retrieved July 3, 2003 from the World Wide Web:
<http://sunsite.berkeley.edu/Libweb/>
2. lib-web-cats. Retrieved July 3, 2003 from the World Wide Web:
<http://www.librarytechnology.org/libwebcats/>
3. IALS. Retrieved July 3, 2003 from the World Wide Web:
<http://193.62.18.223/dbtw-wpd/textbase/libsearch.htm>
4. LIBDEX. Retrieved July 3, 2003 from the World Wide Web:
<http://www.libdex.com>

5. California State Library. Retrieved July 3, 2003 from the World Wide Web: <http://www.library.ca.gov/html/main.cfm>
6. Libraries-The University of Iowa. Retrieved July 3, 2003 from the World Wide Web: <http://www.lib.uiowa.edu>
7. The WWW Library Directory. Retrieved July 3, 2003 from the World Wide Web: <http://www.webpan.com/msauers/libdir/>
8. Federal Depository Library Directory. Retrieved July 3, 2003 from the World Wide Web:
http://www.access.gpo.gov/su_docs/fdlp/tools/ldirect.htm
9. Tennessee Public Library Directory. Retrieved July 3, 2003 from the World Wide Web:
<http://www.ja.state.tn.us/sos/libarcliela/publip.jsp>
10. Kansas Library Directory. Retrieved July 3, 2003 from the World Wide Web: <http://skyways2.lib.ks.us/kld/>

2.3.2 System study

There are two systems developed by University of Malaya, FCSIT undergraduate that have been studied :

Koh Yun Sing.(2000). Online Pediatrician. Thesis, University Malaya, Kuala Lumpur.

Online Pediatrician is a web-based multimedia system that can provide useful information on the health care of children for parents. This site also provides an interactive search capability, thus enhancing faster access to pertinent information. The system would provide answers to common

general and specific questions regarding the upbringing and general health of children from age up to 5 years.

Chan Mei Ying.(2002). Online university used book center. Thesis, University Malaya, Kuala Lumpur.

Online university used book center is an web-based application to provide undergraduate, graduate student and public in Malaysia environment to buy and search the university used books online. Next, it enables administrators to coordinate the task and manage the database online. The main objective of this system is to sell and search the university used books in order to increase work efficiency.

2.3.3 Technical Requirements

In this section, the software and scripting requirements will be reviewed. The results of this review would be used later in choosing the most advantageous software combination. Every software product has it own functions and development procedures. Hence, an authoring tool review is required to allow the developer to choose an appropriate development tool that is most suited for a certain project.

2.3.3.1 Comparison of Multimedia Software

Web Authoring Tools	Pros	Cons
Adobe PageMill	Provide basic functionality. Excellent interface for creating frame layouts.	PageMill is a basic HTML editor. More dynamic features are not supported.
Cool Page	Drag and drop text, images, animations,	Provides basic features.

	sound, effects, anywhere on the web page.	Not suitable for advance usage.
Edit Pad	Change between the open files by clicking on their tabs. Reads UNIX and Mac text files and can export files to both formats	Not WYSIWYG. Complete scripting used.
Fusion 2.02	Easy to use. Allows rapid creation and editing of design intensive web site. Hide HTML for the user. Pixel-level accuracy. Import existing local or remote web sites.	No way to rearrange layers. Layout created with Fusion Tends to look incorrect when a different screen size is used. Poor import of existing HTML page layouts. When spaces are inserted, table colours are not preserved. No CSS or TrueDoc Support.
Macromedia Dreamweaver	Standard authoring tool. Provides shortcut in producing CSS, Java Script and DHTML functions.	Difficult to learn. The features integrated makes the users feel overwhelmed.
Macromedia Fieworks 3.0	Improved text handling, scaling and import/export features. Added workflow and automation features.	Find and replace still needs work, as do Styles.
Microsoft Front Page	Excellent support for managing multi-author websites. Contain features to produce Java Scripting and DHTML coding.	Difficult to learn to use with caution since a mini Web server must be active on the computer to access some functions.
Microsoft Internet Assistants	Good for creating basic layout without having to deal with HTML tags. Uses Microsoft Word styles conventions, so it is an excellent choice for fluent Microsoft Word users.	Not WYSIWYG. May be problems installing with non-US English version of Word.
Microsoft Publisher 97	Provides extensive support for the automated creation of visually sophisticated	The HTML created is rather quickly, so Microsoft Publisher's pages can be difficult

	web sites.	to edit with other products.
Netscape Composer	Composer is available for PC and Mac platforms.	There are no direct import features. Instead, users must open multiple windows and cut/paste items from one window to the other.
Spider Writer 4	Generates clean HTML; helpful resource window that includes browser support information; configurable files types and syntax colour-coding for different languages such as XML and ColdFusion.	Rigid toolbars, little integration with its style sheet editor and no built-in HTML validation.

Graphic Tools	Pros	Cons
Adobe PhotoShop 5.0 Beta	Adobe has added some features that will ease the web work, such as a much larger range of record able actions and better support for batch-processing large numbers of images.	Steep learning Curve.
Canvas 7.0	Have ample tools, has complete graphics package, supports many graphics formats, faster drawing engine, improved vector tools, great print documentation.	The interface can be overwhelming for many web designers; the learning curve will not be worth it. Online documentation is confusing.
Macromedia Flash 5.0	Radically improved scripting capabilities, integration with Macromedia product suite; customizable workspace and objects. Added MP3 import. XML data support.	Unwieldy new panel-focused editing approach, limited additional animation tools and possible backward compatibility issue.
NetStudio 2000	A simple wizard for building headlines, buttons, banners.	Poor integration with HTML editors, confusing user interface.

2.3.3.2 Comparison of web servers

Web Server	Pros	Cons
NetScape Enterprise Server	Support for both NetWave Directory and Services (NDS) and Lightweight Directory Access Protocol (LDAP). Web Publisher makes it easy for non-technical users to publish information. Support for other management tools via Simple Network Management Protocol (SNMP)	No support at this time for a Java Virtual Machine. Requires other products for e-mail and messaging functionality.
Internet Information Server v4.0	Free download. Superior administration control. HTTP 1.1 supports Virtual Server support, indexing tool also handles Microsoft Office documents. Excellent support for distributed application development. Excellent collection of server tools.	No UNIX version, NNTP support doesn't support USENET feeds, SMTP support doesn't support pop mailboxes, only runs on server edition of Windows NT. Restricted to stripped-down Personal Web Server on Windows 95 or NT Workstation sites, Mediocre documentation. Complicated to configure; slower than IIS3.0
Internet Information Server v5.0	Indexing performance and security enhancements. Well-integrated server administration tools. Easy to configure.	No UNIX version. Documentation lacking on newest features, only runs on server edition of Windows 2000.
Personal Web Server	Freeware. Easy to setup and use. ASP support. Excellent for serving small web sites and personal home pages. Includes many of the same features found in IIS.	No UNIX version. Lacks some of the more advanced features included with IIS. Only runs on Windows 95/Windows NT Workstation. Slower than IIS.
Microsoft Site Server	Includes InterDev and FrontPage (available in	No UNIX version available. Optimized

	the retail package but not in the evaluation release). Secure online transactions. Manages banner rotation and marketing. Intelligent CrossSell for advanced targeted sales.	for Microsoft Internet Information Server. Ties users closely to Microsoft products.
Netscape Enterprise Server	Widespread platform support. End-user publishing capabilities centralized server management. Integrated search engine. SMTP support.	Price (especially relative to Microsoft IIS). Complexity. Technical support.
Website	Excellent set of features, one of the better entry-level. Web servers on the market.	Price is quite high especially with freeware alternatives available and is somewhat outdated.

Programming and Scripting Languages

The review on the programming and scripting languages assist developers in choosing a type of scripting used.

2.3.3.3 Comparison of Server-side Scripting

i. Active Server Pages (ASP)

ASP can be written in VBScript that uses syntax similar to Visual Basics, Jscript, which is syntactically similar to Java Script, Perl, and Python. ASP driven web site can be easily maintained. ASP pages require a Personal Web Server (PWS) or IIS, Microsoft's Web server. Other than using web servers, there are a number of third-party products, such as Chilisoft and Halcyon Software that let us run ASP pages on non-IIS web servers.

ii. Java Server Pages (JSP)

JSP technology allows web developer and designers to rapidly develop and easily maintain information-rich, dynamic web pages that leverage existing business systems. JSP technology enables rapid development of web-based applications that are platform independent. JSP technology separates the user interface from content generation enabling designers to change the overall page layout without altering the underlying dynamic content. JSP create a dynamic scripting language where variable content, often retrieved from a database, can be embedded within HTML. It is conceptually similar to ASP. JSP technology provide an attractive alternative to other types of dynamic web scripting or programming that offers platform independence, enhanced performance, separation of logic from display, ease of administrator, and most importantly, ease of use. JSP makes it tempting to put Java code in the web page, even though that is considered bad design. Looping is overly difficult in JSP, and JSP pages produce useless error messages. JSP requires a compiler to be used with the web server. It consumes extra hard drive space and extra memory space.

iii. PHP

PHP borrows its language style and syntax from a number of other resources, including C, Java, Perl, and others. PHP has open source model. PHP is a database-centric language and has dynamic

graphics generation. PHP can support Sybase, Oracle, Informix, Solid, Postgres and MSSQL. Additionally, PHP will run on most Unix operating system. PHP is cross-platform but there are some features that do not work on the Win32 version. PHP lacks of session handling.

iv. Perl

Perl is powerful and full-featured, and is very high level and easy to program. Its learning curve is quite manageable. Perl is unparalleled for text processing. Developers can build programs or whole systems quickly. Perl is often used for web programming. Perl gives loads of modules that can handle any sort of circumstance that might crop up. Perl is open source. It gives freedom and security. Many people find Perl more difficult to learn than a little too top-heavy for most web apps.

2.4 SUMMARY

From the summary of the web evaluation, it is noted that 56.67% of the web sites have the required scope of information. 56.00% have the needed information content. 50.00% of the web site stated the purpose clearly and only 65.00% of the web site is workability.

The summary of the scripting language is an analytical review on the most suitable vehicle used to produce that project.

Microsoft FrontPage, Adobe Photoshop, HTML, ASP.Net, Java Script and VB Script would be the best combination for this project.

Microsoft FrontPage is easy to use, J script, VB script and Java Applet compatible. Adobe Photoshop is suitable graphic processing editor because it is flexible allows image layering and supports different types of image formats. ASP.Net is chosen because it is easy to be maintained. ASP.Net is suitable to be used in this project because it is powerful, full-featured and easy to program.

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Chapter 3 Methodology

3.0 METHODOLOGY

A methodology is a systematic way of accomplishing certain tasks and may be defined as a collection of procedures, techniques, tools and documentation aids. The procedures, techniques, tools and documentation aids help the software developer to speed up and simplify the software development process.

The objectives of a methodology include:

- ❖ Records accurately the requirements for the system
- ❖ Provides a systematic method of development so that progress can be monitored.
- ❖ Produces a system that is well documented and easy to maintain.
- ❖ Provides an indication of needed changes as early as possible in the development process.
- ❖ Provides a system that is user friendly.

3.1 PROJECT OBJECTIVE

The objectives of the proposed objectives are in the form of measurable as it is clearly stated what the system to be developed should be able to do in terms of its task and functionality. The proposed project hopes to achieve the following objectives:

General objectives :

- Enhance information dispersion in the community
- Provide easy access and retrieval of information from the site. Searching of information will be eased. Information would be able to be spread quickly and effectively overcoming geographic barriers.

- Provide up-to-date information to be shared publicly. Up-to-date information will be added to ensure that the information to users is current, accurate and trustworthy.
- Work as a centralized the storage of information on online directory of libraries and information centers in Malaysia. This web site functions as a data storage center. This site will store data for libraries and information centers in Malaysia.
- Distribute information that caters for all levels of society. The information contained in this site will cater for the layman.

Project aims:

- Provide an effective storage center for information. This will enable the storage of online directory of libraries and information centers in Malaysia and links to other sites.
- Support a friendly and interactive user interface. To provide a comfortable environment for users. Equipped with sufficient error detection and friendly confirmation messages.
- Provide an interactivity and easy search and retrieval for information. A system with efficient search and interactive features to ensure and easy method of search and retrieval of information will be encompassed.
- Support a local space for users to search for libraries and information center in Malaysia.

3.2 FACT FINDING TECHNIQUES

In order to understand and obtain what information users need to perform their job effectively, several retrieving methods have been chosen, such as through reading materials, survey and Internet surfing. All the information of requirements retrieved from the various sources were processed and analyzed to get a precise picture on how the proposed project should look like and perform.

3.2.1 Internet Browsing and Material Reading

The “information superhighway” or Internet is a dynamic tool that assists researchers in completing research work. The Internet can provides access to a vast collection of database that includes books, articles, essays, reports, statistical information and government documents.

To define the system requirements and definitions, the Internet is chosen to get the information about the related topics, such as the electronic payment system and the World Wide Web.

Material reading is another method chosen to get information regarding related topics. The materials read including books, articles from magazines, newspaper and the existing examples of thesis.

For example, ODLICM is a web-based application. Books referencing is done to understand these terms. By understanding the related items, it helps the researchers to have a precise planning of the project and get to track the required phases that needed to undergo in bringing out this project with the basic understanding about the project, proceeding to other stages of the project is easier.

3.2.2 Survey and Questionnaire

In order to identify the users' reaction towards the ODLICM, a survey is conducted. A set of questionnaire is prepared to be answered by the respondent. Group of respondent from different status (undergraduates students, graduate students or working people) are selected so that different opinions from different users level can be obtained.

The questionnaire method was chosen as it was considered the most feasible way to obtain sufficient information needed. The questionnaire consists of 20 questions and is divided into 4 subparts that elicits information on participant's background information, internet usage, information contents, and web design.

The drawback of this survey is that the respondents selected might not be able to represents all the categories of users in Malaysia. Therefore, the data might not be representative enough.

3.2.3 Observation and Current System Analysis

To understand and find out how an ODLICM functions, the analysis and observation of current existing system is done. Eight of the existing web site are selected to do the analysis, regarding their features, value added services, and the interfaces.

The criteria considered while selecting the site including the functionalities exist in the site, and the interface design. This is because those two criteria are important for an e-commerce site in order to attract users to visit to the site. After selecting the sites, the functionalities exists in the sites, such as the searching wizard is observed.

3.3 DEVELOPMENT METHODOLOGY

The development model use to develop this project is Waterfall model with prototyping. This model suggests a systematic, sequential approach to software development that begins at the system level and progresses through analysis, design, coding, testing and implementation.

Prototyping, in the other hand, is a partially developed product that enables users and developers to examine some aspect of the proposed system and decide if it is suitable or appropriate for the finished product.

The Waterfall model with prototyping is chosen because the strength of each can be achieved on a single project. Besides that, this model can reduce the risk in development by clarifying requirements for the system design before coding. The model is actually the classic waterfall model combined with the prototyping approach in its early stages.

The model presents a very high-level view of what event goes on during development. Besides, it also gives suggestion to developers the sequence of event they should expect to encounter. Prototyping incorporated in certain portion of some key requirements are consistent, feasible and practical. If they are not, revisions are made at the requirements stage. Prototyping will be involved in the early stages of the waterfall model where there is need for experimentation before commitment of any resources to develop the full-scale system. Prototyping will not be involved in the later stages of the development because its major drawback in increasing the opportunity to produce negative effects on structural factors such as performance, design quality and maintainability if not carry out properly.

The waterfall with prototyping that will be adopted in the proposal project encompasses the activities of the system analysis, system design, coding, testing and implementation.

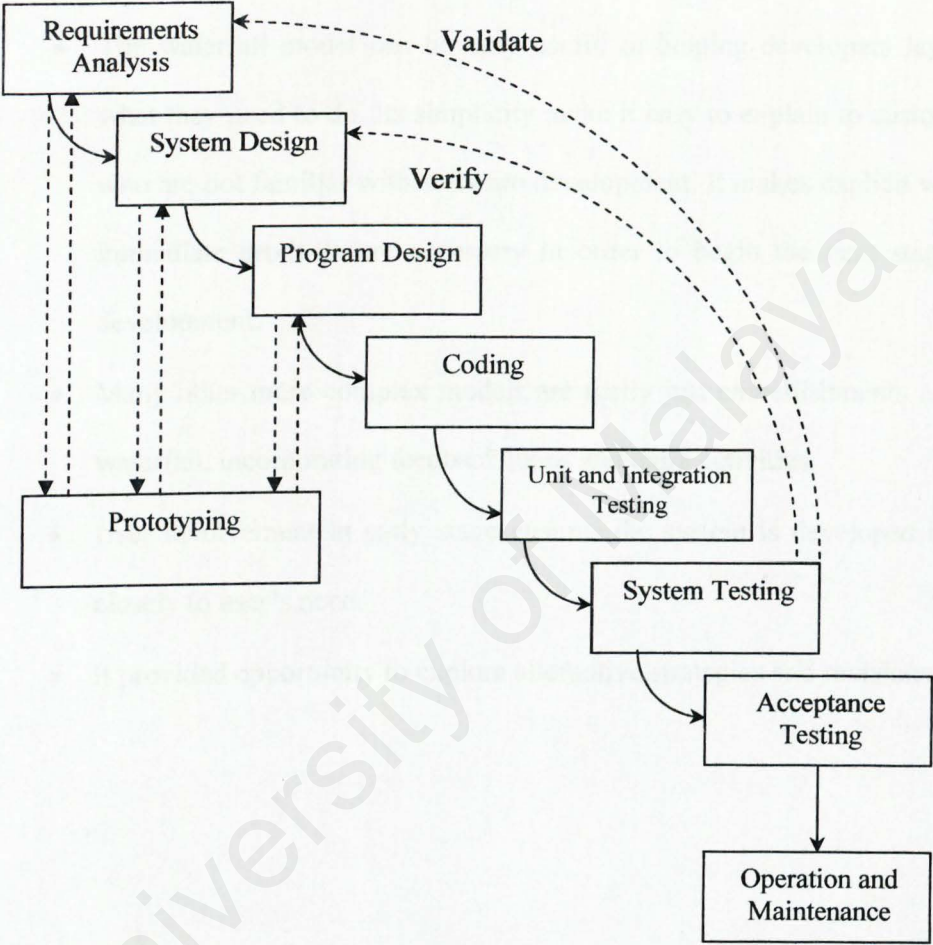


Figure 3.1: Waterfall model with Prototyping

3.4 RATIONALE FOR PROPOSED METHODOLOGY

Advantage of Waterfall Model with Prototyping :

- Waterfall model allow project managers to use the model to gauge how close the project was to completion at a given point in line because associated with each process actually were milestone and deliverable.
- The waterfall model can be very useful in helping developers lay out what they need to do. Its simplicity make it easy to explain to customers who are not familiar with software development. It makes explicit which immediate products are necessary in order to begin the next stage of development.
- Many other more complex models are really just embellishments of the waterfall, incorporating feedback loops and extra activities.
- User involvement in early stage ensures the system is developed more closely to user's need.
- It provided opportunity to explore alternative strategies and revisions.

Online Directory of Libraries and Information Centers in Malaysia

Chapter 4 System Analysis & System Design

4.0 SYSTEM ANALYSIS AND SYSTEM DESIGN

4.1 SYSTEM ANALYSIS

The goal to system analysis is to understand the proposed system to establish system requirements. The system analysis phase is concerned with data gathering and data analysis. During this phase, the system's services, constrained and goals are established by consultation with system users. They are then defined in a manner, which is understandable by both users and development staff. Data will be gathered from sources such as written material, article, interview and Internet as well as observation and examination of other library system. The iterative process of prototyping revision will be used to elicit some portion of the requirements to ensure that they are feasible and practical.

The most important outcome from this phase will be an accurate system requirements specification.

The main purposes of these phases are:

- ❖ Research on methodology for developing the project
- ❖ To gain an overall understanding of the system functional and non-functional requirements.
- ❖ Research on how this system can be developed using correct emerging system.
- ❖ To identify the software and hardware requirements for development as well as reside the system.

4.2 USER REQUIREMENTS

After we have gone through the results of Internet browsing based on the findings in Chapter 2, it is believed that it is not yet fully applied in online ODLIC in most of the country, especially in Malaysia. Therefore the proposed ODLICM will be built by using the latest technology, with easy-to-use interfaces, and all standard, expected and existing features. After few survey in the Internet and library, a thorough understanding toward the features provided by the ODLICM to be developed were obtained and classified as functional and no-functional requirements of the proposed system.

4.2.1 Functional Requirements Analysis

The ODLICM comprises two main modules which are Administrator and Public user.

Administrator module

The Administrator module allows assistant registrars who are responsible for handling ODLICM web site. This module provides templates for assistant registrars to perform the maintenance task in the site and managing the database efficiently. The proposed main features of this modules are as follows :

(a) Login sub-module

The Login sub-module will handle the validation of the administrator through ID name and password. It will authenticate whether the user is an administrator and display the login page again if the login failed.

(b) User management sub-module

This module will create templates for the administrator to perform the management of the ODLICM. Administrator can add a new record of library or information center. At the mean time, the administrator can view, edit or delete record from the database. Since users are not allowed to add a new record, they will submit the information of a new record to the librarian. The librarian will then verify whether the information is real. If the information is real, then only the librarian will add the new record to the database.

(c) Response to users' feedback

Administrators can view the comments and error messages sent by the users. They can then response accordingly to the users' feedback.

(d) Web page maintenance sub-module

Administrators are allowed to amend the web site. They can modify the web site anytime due to changing requirements.

Public user module

The public user module enables the users to browse and search a record through the web site.

(a) Submit new library sub-module

Users can submit the information of new record of library or information center to the librarian.

(b) Search sub-module

Search sub-module allows searching of requested libraries or information centers. It will process users' request and get the relevant information from the database. Hence this sub-module saves users' time and effort in browsing the web site.

(c) Users feedback sub-module

Users are able to send the error message to the web site administrator. Besides, users can give their comments on the web site and send to the web site administrator as well.

4.2.2 Non-functional Requirements Analysis

Non-functional specifications are the constraints under which a system must operate and the standards which must be met by the delivered system. The ODLICM must ensure certain web application qualities like user-friendliness, correctness, functionality, reliability, flexibility, efficiency as well as maintainability.

(a) User friendliness

User interface designs create an effective communication medium between a human and a computer. Therefore, it is very important to make sure that the interfaces fulfill user-friendliness so that it would not cause trouble to users. The Giden Rules contains three rules :

- Place the user in control

This will define the interaction made in a way that does not force a user into unnecessary or undesired actions. Besides, it also provides flexible interaction for different users for instance via mouse movement and keyboard commands.

- Reduce the user's memory load

One of the principles that enable an interface to reduce the user's memory load is by reducing demand on short-term memory. The interface should be designed to reduce the requirements to remember past actions and results.

- Make the interface consistent

The interface design should apply to consistent fashion where all visual information must be organized according to a design standard that is maintained throughout all screen displays. Apart from that, input mechanisms are constrained to a limited set that are used consistently throughout the application. Lastly, mechanisms for navigating from task to task are consistently defined and implemented.

(b) Correctness

A program or system must operate correctly or it provides little value to its users. Correctness is the degree to which the software performs its required function. To ensure this application quality, lots of testing and trial-and-errors will be carried out.

(c) Functionality

The functionalities stressed here are the searching and retrieving capability, which is very important in any web application that deal with data retrieval from existing database. Besides, navigation and browsing features as well as application domain-related features will be taken into account.

(d) Reliability

Reliability is the extent to which a program can be expected to perform its intended function with required precision. It is closely related to correct link processing, error recovery and user input validation and recovery.

(e) Robustness

The system must be able to retain operating in the occurrence of failures or unexpected errors. For instance, the user errors can be detect by validating the data input from user before it is send to the server for processing.

(f) Efficiency

Undeniable, efficiency is the key for implementing the ODLICM web site. Efficiency is understood as the ability of a process procedure to be called or accessed unlimitedly to produce similar performance outcomes at an acceptable or credible speed. Efficiency is measured

based on response time performance, page generation speed and graphics generation speed.

(g) Maintainability

The maintenance work of the ODLICM site should take place from time to time. This is to ensure that the site always provide up-to-date information to users. The administrator modules are designed to accomplish this task, in which authorized administrator are allowed to maintain the database of ODLICM.

(h) Security

The ODLICM will have the security access to each page in the site. Different level of users will have different accessibility to different pages. The security access prohibits unauthorized users access to pages in the web site.

4.2.3 Technical Requirements Analysis

This section comprises the programming scripting requirement, software requirements, and hardware requirements.

4.2.3.1 Program Scripting Requirements

i. Hypertext Markup Language (HTML)

The standard markup language is used for presenting documents on the World Wide Web. The HTML language uses tags to indicate how web browsers should display page elements such as text and

graphics, and how web browsers should respond to user actions such as hyperlink activation when pressing a key or clicking the mouse. Most of the web browsers recognize HTML tags beyond those included in the present standard.

ii. **Java Script**

Basic online applications and functions can be added to web pages with J Script, but the number and complexity of available application programming interface functions are fewer than those available with Java. JavaScript code, which is included in a web page along with the HTML code, is generally considered easier to write than Java. A JavaScript-compliant web browser, such as Microsoft Internet Explorer or NetScape Navigator, is required to interpret JavaScript code.

iii. **VB Script**

This is a subset of the Visual Basic for Applications programming language but optimized for web-related programming. Code for the Visual Basic Scripting is embedded in HTML documents.

iv. **Active Server Pages.Net (ASP.Net)**

ASP.Net is used as the server side script to develop this system because it allows the use of different scripting languages, VB Script and Java Script with ASP.Net, the developer can connect a web site

to databases such as SQL Server, Access, Oracle, or Informix, allowing user to dynamically insert data into the web pages.

4.2.3.2 Software Requirements

The software required for building ODLICM comprises:

i. **Windows NT operating system**

Windows NT is chosen as the platform to develop the system because Internet Information Server 4.0 only runs it.

ii. **Microsoft FrontPage**

Microsoft FrontPage is a web page editor. Microsoft FrontPage is easy to use, flexible, and compatible with Java Script, VB Script, Active X, ASP.Net, CSS, DHTML and Java.

iii. **Microsoft SQL Server**

SQL Server is a high-performance relational database system that is tightly integrated with the Windows NT, Windows 95 and Windows 98 operating systems. This arrangement allows SQL Server to take advantage of the features provided by the operating system. Hence, SQL Server is an excellent choice for meeting the challenging needs of complex client/server systems.

iv. **Internet Information Sever (IIS)**

To enable ASP scripting, developers must be using Microsoft Web Servers (Personal Server of Internet Information Server). Hence,

IIS is chosen because it has excellent support for distributed application development and excellent collection of server tools.

v. Internet Explorer 5 (IE5)

Internet Explorer 5 is a web browser with the capability of supporting Java Scripting, VB Scripting and Java.

vi. Adobe PhotoShop

Adobe PhotoShop is a graphic editor. It has reliable functionality such as prevention of colour shift and its multi type of saving modes.

vii. Macromedia Flash

Macromedia Flash is an animation and video editor. Flash gives users the ability to create full screen animation and interactive graphics at small file sizes. It also has the advantage of streaming technology and is also scriptable.

4.2.3.3 Hardware Requirements

The hardware required for running ODLICM comprises :

- System equipped with SVGA graphic adapter
- 30MB hard disk space
- 32MB RAM
- Keyboard, Mouse
- Modem/Network card

4.3 SYSTEM DESIGN

System design is a process which requirements are translated into a model or a representation of the web site that can be evaluated for quality.

4.3.1 Overview of System Design

There are many ways of carry out the design phase. The structured design approach was used for this project. The entire phase was divided into several sub sections focused that focus on the system design and the interface design. This structured approach ensured that the user requirements extracted from the previous phase were completely understood and projected in the well-mannered way. The design phase is aimed at presenting information and instructions in an acceptable and effective form.

Apart from the system physical and logical design, it is also vital to fulfill the ergonomic designs. All data, coding, structure and documentation has to be confirmed to a particular standard.

The requirements obtained from the analysis method are the input in this phase.

The database design of the required system was also carried out. The database is used to store data, allow editing of data, and to provide for data retrieval.

The data flow diagram (DFD) was used to map the requirements specified by both the users and the system. It represents the system in different level of abstraction, which isolate different focuses. This was eventually used in the development stages. The man-machine interface was studied and

applied in the design phase. The human perception, and the styles of the human-computer interaction were examined, and these were incorporated into the interface.

The system design for ODLICM is divided into the following stages :

- Architectural design
- Database design
- Process design
- Program design
- User interface design

4.3.2 Architectural Design

The primary objective of architectural design is to develop a modular program structure and represent the control relationship between modules. In addition, architectural design melds program structure and data structure defining interfaces that enables data flow throughout the diagram. ODLICM architectural design is divided into two modules which are administrator mode and public user mode.

Administrator mode

This system information and designs are capable of be updated from time to time. There is also a login password in the database for the administrator to login to access the data in the database.

Public user mode

The public user mode identifies functions for users, which are retrieving information from the database with the browsing method, the keyword search method and the navigation side toolbar method.

4.3.3 Database Design

The database design transforms the information domain model created during analysis into the data structure that will be required to implement the software.

ODLICM is a web site where, entries are made in the data dictionary representing the information and important details. The database will be built using Microsoft SQL Server 7.0. The database is used to create the tables to be connected to the front-end program which requires only specific record from the tables. Hence, there are no joined tables. Each of the databases contains different tables connecting to different pages in the web site. The database is then linked to the web pages to store data, allow editing of data and to provide data retrieval.

4.3.3.1 Data Dictionary

The data dictionary collects and coordinates specific data terms and it confirms what each term means to other people in the organizations.

i. Table Structure of Library Information

Table 4.1: Table Structure of Library Information

Column Name	Data Type	Length	Description
lib_name	varchar	50	Institution name
contact_no	varchar	50	Institution contact number
address	varchar	100	Institution address
postcode	varchar	50	Institution postcode
city	varchar	50	Institution city
state	varchar	50	Institution state
collection_size	varchar	50	Institution's size of collection
website	varchar	50	Institution website
director_name	varchar	50	Director's name
director_email	varchar	50	Director's email address

ii. Table Structure of Administrator List

Table 4.2: Table Structure of Administrator List

Column Name	Data Type	Length	Description
admin_id	Integer	4	Identification of the administrator
admin_username	varchar	50	Administrator's username
admin_password	varchar	50	Administrator's password

iii. Table Structure Users' Comments

Table 4.3: Table Structure of Users' Comments

Column Name	Data Type	Length	Description
comments_id	Integer	4	Identification of the users' comments
user_name	varchar	50	User's name
Email	varchar	50	User's email address
Comments	varchar	100	User's comments
sent_date	datetime	8	Date and time when comments sent

iv. Table Structure of Error Reports

Table 4.4: Table Structure of Error Reports

Column Name	Data Type	Length	Description
error_id	Integer	4	Identification of the errors sent
name	varchar	50	User's name who sent the errors
email	varchar	50	User's email address who sent the errors
errors	varchar	300	Errors description
URL	varchar	100	URL or page where errors occur
send_date	datetime	8	Date and time when errors reported

4.3.4 System Process Design

System Process design are pictorial representations that denote the system's functionality and modular structures.

4.3.4.1 Data Flow Diagram

Data Flow Diagram (DFD) is description of how data flows from one logical processing unit to another. These diagrams document how data input is transformed to output, with each stage in the diagram representing a distinct transformation. They represent one way of describing a system and have the advantage that they are intuitive and readily understood without special training. The advantages of DFD are that they show transformations without making assumption about how these transformations are implemented. The Context Diagrams can be viewed as Figure 4.1-4.5.

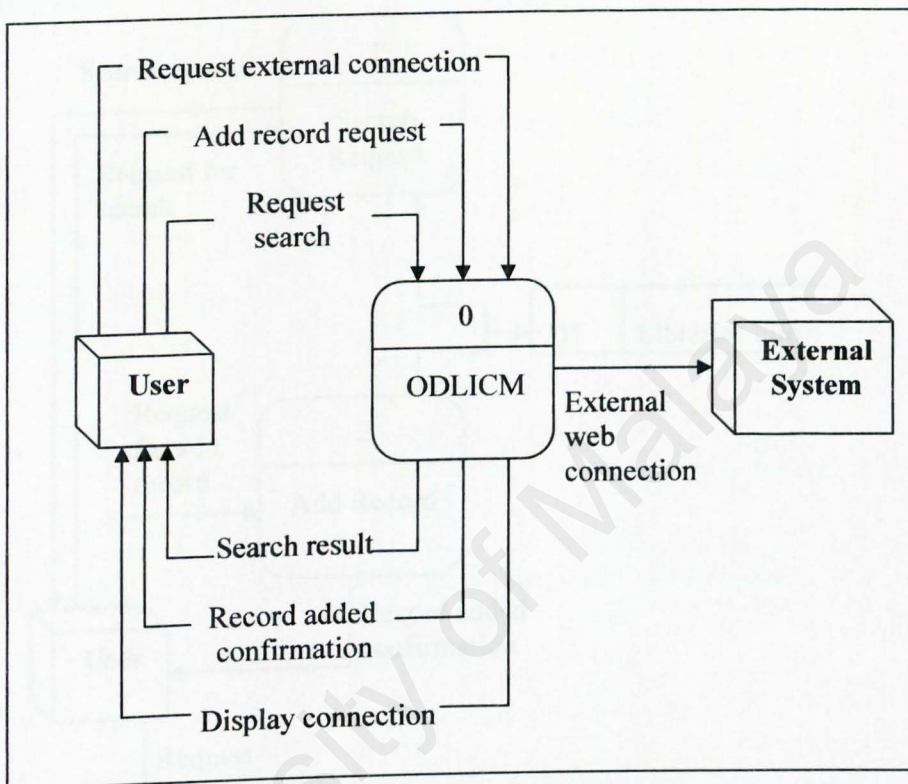


Figure 4.1: Context Diagram

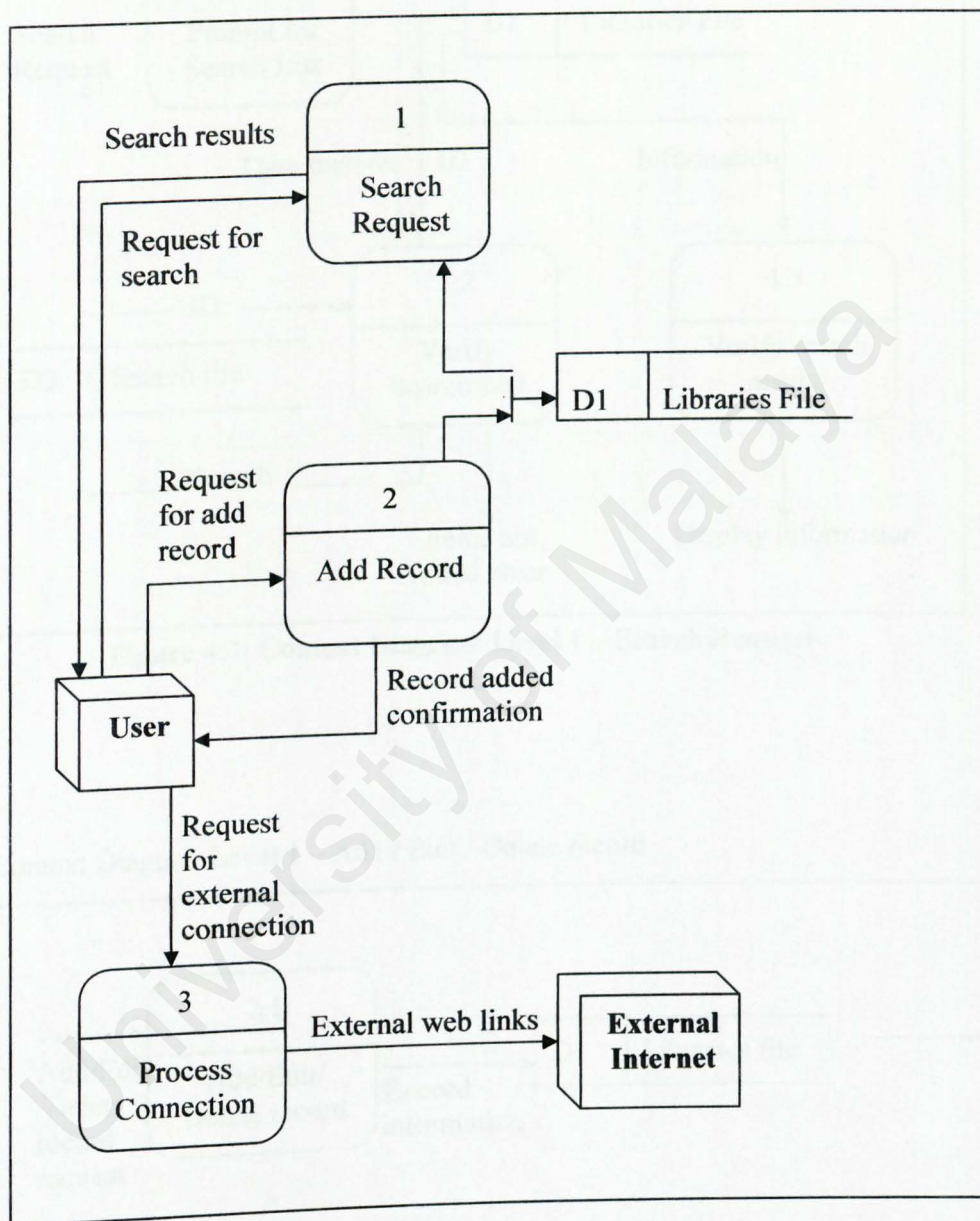


Figure 4.2: Context Diagram Level 0

Context Diagram Level 1 – Search Request

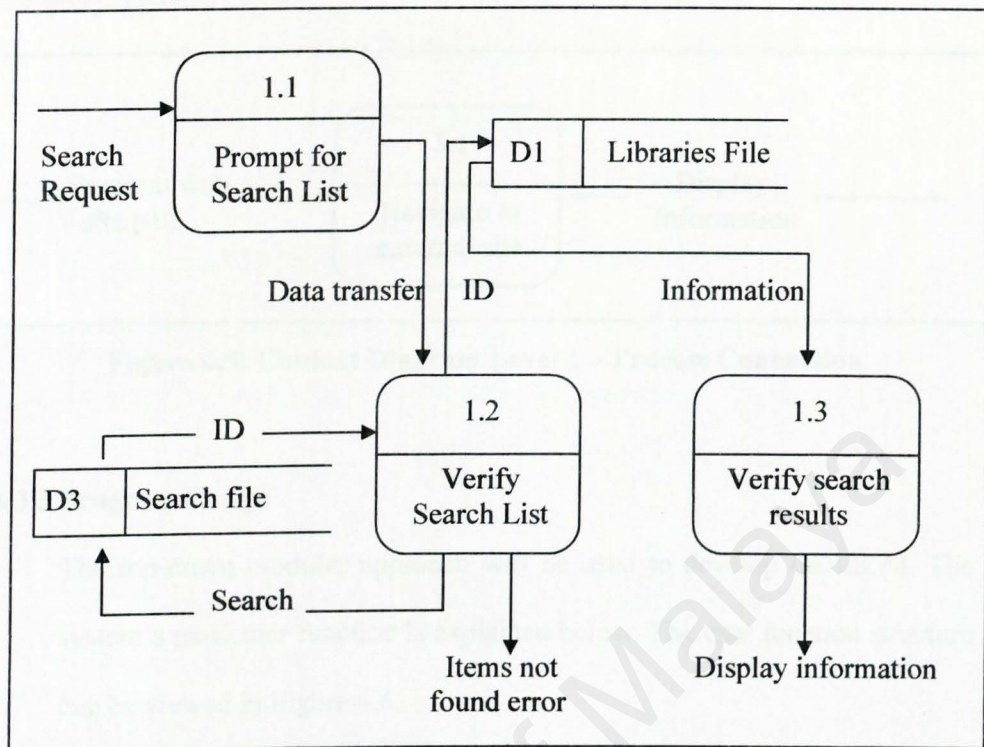


Figure 4.3: Context Diagram Level 1 – Search Request

Context Diagram Level 1 – Add / Edit / Delete record

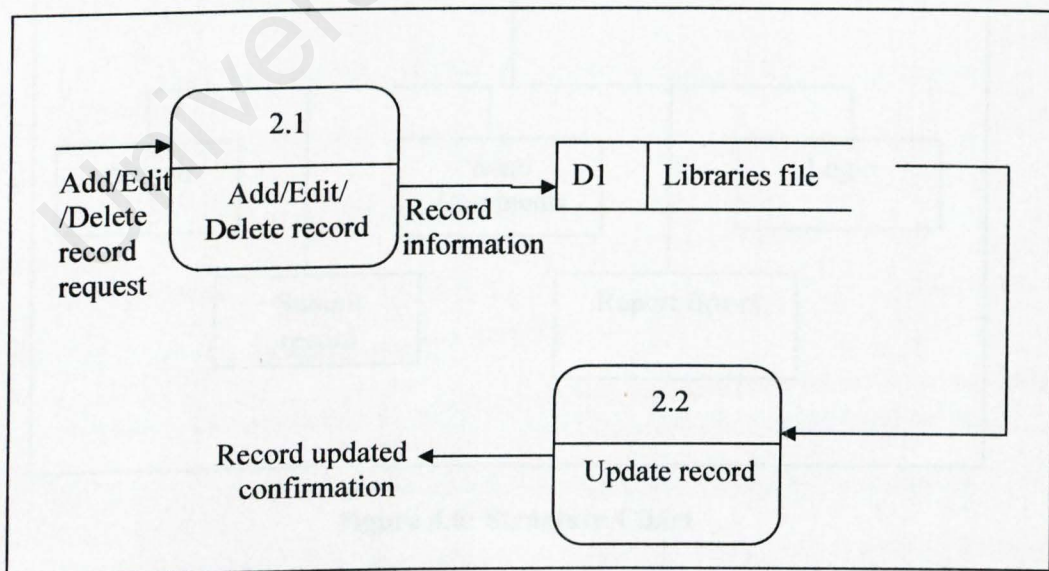


Figure 4.4: Context Diagram Level 1 – Add/Edit/Delete record

Context Diagram Level 1 – Process Connection

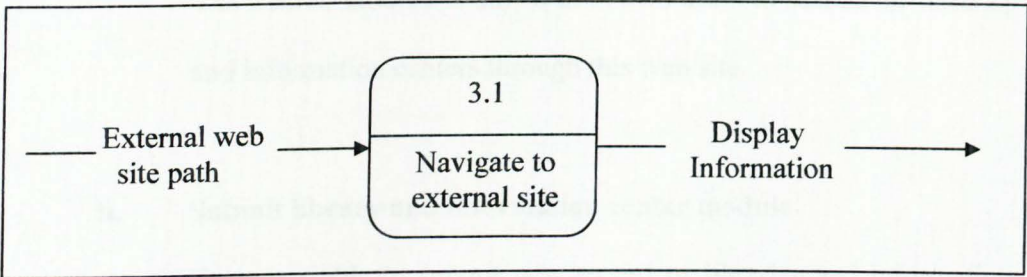


Figure 4.5: Context Diagram Level 1 – Process Connection

4.3.5 Program Design

The top-down modular approach will be used to develop ODLICM. The system’s particular function is explained below. The user function structure can be viewed in Figure 4.6.

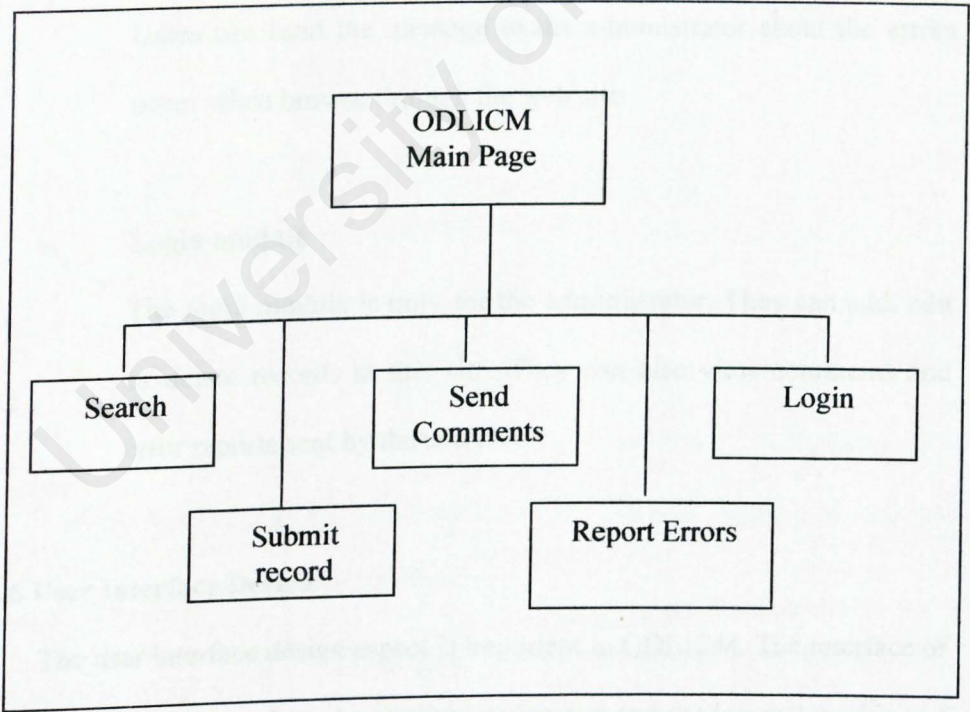


Figure 4.6: Structure Chart

i. Search module

The Search module is aimed at allows users to search for libraries and information centers through this web site.

ii. Submit library and information center module

Users are able to submit new record of libraries and information center to the librarian through this module.

iii. Send comments module

Users are encourage to send their comments on the web site as well.

iv. Report errors module

Users can send the message to the administrator about the errors occur when browse through the web site.

v. Login module

The login module is only for the administrator. They can add, edit or delete records at this site. They can also view comments and error reports sent by the users.

4.3.6 User Interface Design

The user interface design aspect is important in ODLICM. The interface of the system will be the only mechanism for user and the internal working of the system to communicate.

The goal of designing desirable interfaces is to get information across these two elements by addressing the following objectives:

- ✓ Consideration of suitable graphical representations and providing appropriate feedback to users from the system.
- ✓ Efficiency as demonstrated through the interface, which increases speed of data entry and reduces error rates.
- ✓ Consideration of human visual perception. Information needed must be represented in a way that makes it unambiguous to perceive and understand.
- ✓ Clear and concise interaction methods.

4.3.6.1 Aspects of User Interface

The perceptual and cognitive issue affects the way information is projected on the screen, and provides the control mechanisms to the user.

- **Visual perception**

The visual system plays an important role in perception.

The information presented through the interface should be clear and evident. It focuses onto understanding what is being carried out, as the user perceives. For instance, the navigation buttons should be obvious enough to indicate where it is steering a user.

- **Graphical representation at the interface**

The display designs must abide by the rules of graphical representations. Certain images are created to produce a

three-dimensional model, and some would be two-dimensional models. The interface was also designed to include aspects of colour-coding, which results in pleasant and enjoyable interfaces for the users. Excessive use of high-saturated colours was avoided.

- **Interaction methods and devices**

Navigational bar is used as the interaction method. The navigational bar is a drop-down bar. The navigation bar opens the sub-menus on clicking the navigation focus point.

4.3.6.2 User Interface Screenshots

Below are a few of the major design of the user interface screens
(Figure 4.7-4.10)

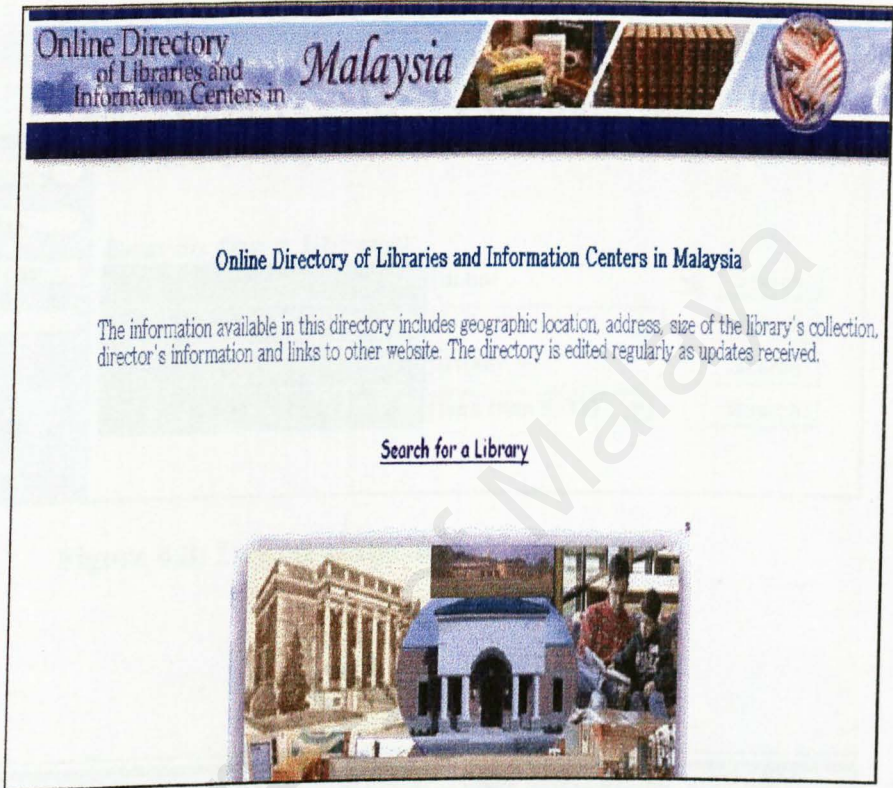


Figure 4.7: Layout of the Main Page screen

Online Directory of Libraries and Information Centers in *Malaysia*

Welcome to the Online Directory of Libraries and Information Centers in Malaysia. The online directory contains the most up to date information. We have for approximately 100 libraries and library related organizations. To find a library, please use the pull down menu below.

Search for a library:

Select State:	Johor	Search
Select City:	Ipoh	Search
Select Postcode:	01000	Search
Select size of collection:	less than 5,000	Search

Home
Search
Submit Record
Comments
Report Error
Login

Links to other online directory of libraries:

Figure 4.8: Layout of the Search page screen

Online Directory of Libraries and Information Centers in *Malaysia*

Submit Record

Submit a New Record

Institution Name: _____

Phone: _____

Address: _____

Postcode: _____

City: _____

State: Johor

Collection size: less than 5,000

Website: _____

Email Address: _____

Director's name: _____

Submit Record Reset

Home
Search
Submit Record
Comments
Report Error
Login

Links to other online directory of libraries:

- LIEDEX
- Libweb
- lib-web-cats

Online Directory of Libraries and Information Centers in Malaysia

Figure 4.9: Layout of the Submit record page screen

Home

Search

Submit Record

Comments

Report Error

Login

Links to other online directory of libraries:

- [LIBDEX](#)
- [Libweb](#)
- [hb-web-cats](#)

Comments

Do you have suggestions for improving this directory? Please provide your feedback below.

Your Name :

Your Email Address :

Comments :

Online
Directory
of
Library
and
Information
Centers
Malaysia

Figure 4.10: Layout of the Comments page screen

Home

Search

Submit Record

Comments

Report Error

Login

Links to other online directory of libraries:

- [LIBDEX](#)
- [Libweb](#)
- [hb-web-cats](#)

Administrator Login To ODLCM

Username

Password

Online
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and
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Centers
Malaysia

Figure 4.11: Layout of the Login page screen

Online Directory of Libraries and Information Centers in <i>Malaysia</i>									
Home	Updating Record								
Add Record		Institution Name	Phone	Address	Postcode	City	State	Size of Collection	
Update Record	Delete Edit	Ministry of Environment and Public Health Library	085-285297	Jalan Kuda Kepang	88376	Lewas	Sarawak	less than 5,000	http://srk10
User Submitted Record	Delete Edit	Miri Public Library	085-286976	Jalan Emas	89766	Miri	Sarawak	less than 5,000	http://srk10
User's Comments	Delete Edit	National Library of Malaysia	09-26871700	232 Jalan Tun Razak	50572	Kuala Lumpur	Wilayah Persekutuan	100,001 and over	http://www
Error Reports	Delete Edit	Perbadanan Perpustakaan Awam Kelantan	09-6892385	Jalan Mek Yang	23101	Kota Bharu	Kelantan	less than 5,000	http://www
Logout	Delete Edit	Perbadanan Perpustakaan Awam Melaka	06-2824859	242-1 Jalan Bukit Baru	75150	Malaka	Melaka	5,001-10,000	http://www
Links to other									

Figure 4.12: Layout of the Update page screen

Error Reports

Date Sent	Error	URL	Your Name	Email Address
2/11/2004 10:42:50 PM	Linking problem	Search page	Seow Ching	hsc1981@hotmail.com
2/11/2004 10:43:23 PM	Search result not displayed	Search Page	-	jasen@yahoo.com
2/11/2004 10:44:05 PM	Graphic not showed	Main page	CK Chuah	ckseang1981@hotmail.com

[Home](#)

[Add Record](#)

[Update Record](#)

[User Submitted Record](#)

[User's Comments](#)

[Error Reports](#)

[Logout](#)

Links to other online
directory of
libraries:

[Online](#)

[Directory](#)

[of](#)

[Libraries](#)

[and](#)

[Informa](#)

[Centers](#)

Figure 4.13: Layout of the Error Report page screen

4.4 EXPECTED OUTCOME

The ODLICM is an online system that serves local users for online directory of libraries and information centers. From the system design, it is expected that the sites will do the following:

- ✓ Login-authentication
- ✓ Keyword search
- ✓ Add, edit, delete record
- ✓ User feedback

The processes of each stated above are shown in the previous sections, It is expected that each of the modules will work according to the requirements that shown in the child diagram.

Besides, the sites should also be able to differentiate different level of users who access to the ODLICM and therefore allow accessing to pages that is only allowed for those specific users. For instance, the administrators will have the right to access to administrators pages to maintain and update the site, the librarians are allowed to add or delete record from the database, whereas the public users are only allowed to search record, submit record, and give feedback.

The system will also have a set of database that is well organized to manage various type of information needed by the sites. The process of updating the database will be done by the administrators, in which they will login to the ODLICM administrator's page to update the site.

Finally, ODLICM will has a user-friendly interface that ease the users who are using the site. The system will also provide a security transaction to customers, and fulfill the non-functional requirements in the requirements specifications.

5.0 SYSTEM IMPLEMENTATION

System implementation involves the knowledge of the software requirements produced by the design phase into a computer-readable form. System implementation is a process that converts the system requirements into a computer program.

5.1 DEVELOPMENT ENVIRONMENT

5.1.1 Hardware Configuration

Online Directory of Libraries and Information Centers in Malaysia

Chapter 5 System Implementation

- 16 MB RAM
- 1-MB Hard Disk
- 1-MB floppy Drive
- VGA Graphics Adapter
- Keyboard and mouse device

5.1.2 Software Tools

5.1.2.1 Software for System Design and Report Writing

The software tools used in the software development are listed in Table 5.1.

Table 5.1: Software Tools for System Design and Report Writing

Software	Description
Microsoft Word XP	Report Writing
SPSS Version 9.0	Analysis and Test Results

5.0 SYSTEM IMPLEMENTATION

System Implementation involves the translation of the software representation produced by the design phase into a computer-readable form. System Implementation is a process that converts the system requirements and designs into program codes.

5.1 DEVELOPMENT ENVIRONMENT

5.1.1 Hardware Configuration

The hardware specifications for the development of ODLICM are:

- 266 MHz Pentium Processor
- 128 MB RAM
- 10GB Hard Disk
- 32X CD-ROM Drive
- 1.44MB Floppy Drive
- SVGA Graphics Adapter
- Keyboard and mouse as input device

5.1.2 Software Tools

5.1.2.1 Tools for System Design and Report Writing

The software tools used in the early development of ODLICM are stated in Table 5.1.

Table 5.1: Software Tools for System Design and Report Writing

Software	Description
Microsoft Word XP	Report Writing
SPSS Version 9.0	Analyzing data from the survey

5.1.2.2 Tools for System Development

The software tools of the ODLICM used during the development phase are in Table 5.2.

Table 5.2: Software Tools for System Development

Software	Description
Microsoft Windows XP	Operating system
Microsoft Internet Information Services	Web server host
ODBC 32 bit Driver	Connect database with web server
Microsoft Visual Studio.Net 2003	System coding
Microsoft SQL Server 2003	Database server
Internet Explorer 5.0 and above	View web page developed
Microsoft FrontPage XP	Web page layout design
Macromedia Flash 5.0	Flash and movie editor
Adobe Photoshop 5.0	Image design and manipulation

5.2 PROGRAM CODING

Coding is the process that translates the detailed design representation of the software into a programming language realization. The translation process continues when a computer accepts source code as input and produces machine code.

5.2.1 Coding Approach

Coding performs task, which translates design into a machine-readable form. If the design is performed in a detailed manner, code generation can be accomplished in a detailed manner, and can be accomplished mechanistically.

Coding is performed in a structured manner to produce was done using Active Server Pages.Net (ASP.Net) with both Java Scripting and Visual Basic Coding in conjunction with Hypertext Markup Language (HTML).

ASP.Net is a server-side scripting. With simple HTML pages, the client requests a web page from a server. The server just sends the files to the client, and the page is shown on the clients browser.

The advantages of using ASP.Net scripting compared to other web scripts:

- **Dynamic** – Dynamically produced from information stored in a database. Each time the database is updated, the web site will be updated.
- **Combination** – ASP.Net programming modules combine the HTML code in an existing site with ASP.Net programming to create an online interface to update the web site.
- **Flexibility** – Allows programmers to mix HTML in-line scripting using Java Script or VBScript and is fully compatible with Microsoft's ActiveX controls and components.
- **Server Side Scripting** – Supports framework for server-side scripting. It only provides the environment that processed the script.

5.2.1.1 Coding Principal

Good programming skills will produce a reliable and maintainable system with easy housekeeping. A good coding style always requires:

i. Readability

Readability is important for code documentation.

Code documentation begins with the selection of identifier (variable and labels) names, continues with the composition of commenting and ends with the organization of the program.

ii. Good naming techniques

Named variables, controls and modules with regularity for easy identification.

Naming convention provides easy identification for the programmer.

The naming convention is created with coding consistency and standardization in mind.

iii. Internal documentation

Internal documentation is important for a clearer understanding.

Comments provide a clear guide to understanding during the maintenance phase of software development. They also

provide the developer with a means of communication with other readers of the source code. A statement of purpose indicates the function of the module and descriptive comments are embedded within the body of source code, to describe processing functions.

iv. Modularity

Reduces complexity, facilitates change and thus, results in easier implementation by encouraging parallel development of different parts of a system. It is measured using two qualitative criteria which are cohesion and coupling. Software with effective modularity is easier to develop because function may be compartmentalized and interfaces and simplified. Independent modules are easier to maintain because secondary effects caused by design or code modification are limited, error propagation is reduced, and reusable modules are possible.

- Cohesion

Cohesion refers to the internal “glue” with which a module is constructed. The more cohesive a module, the more related is the internal parts of the module to each other and the functionality of the module. In other words, a module is cohesive if all elements of the module are directed towards and essential for performing the same function. A cohesive module

performs a single task within a software procedure, requiring little transaction with procedures being performed in other parts of a program stated simply, a cohesive module should accomplish a single task.

- **Coupling**

Coupling is the measure of interconnection among modules in a program structure or the relative interdependence among modules. Loosely coupled modules have some dependence, but the interconnections among them are weak. Coupling depends on the references made from one module to another and the amount of control in module has over the other.

5.2.1.2 Coding styles

Coding styles is an important attribute of the source codes and it determines the intelligibility of a program. An easy-to-read source code makes the system easier to be maintained and enhance. The elements of styles include internal documentation, methods for data declaration and approach to statement construction. The following lists some of the styles used during coding styles possible to a verbal description of the substantive hypothesis the variable will be used to test.

- Errors in code should be corrected where they occur and the code rerun.

- Each program should perform only one task.
- Try to write code that is as simple as possible.
- Each section of a program should perform only one task.
- Use a consistent style regarding lower and upper case letters.
- Use variable names that have substantive meaning.
- Use variable names that indicate direction where possible.
- Use appropriate white space in programs in a consistent fashion to make them easy to read.
- Include comments before each block of code describing the purpose of the code.
- Include comments for any line of code of the meaning of the line will not be unambiguous.
- Rewrite any code that is not clear.
- Verify that missing data is handled correctly on any recode or creation of a new variable.

5.3 DATABASE DEVELOPMENT

The database for ODLICM is created using Microsoft SQL Server 2000 with the import feature in the SQL Server. By utilizing Microsoft SQL Server 2000, creation and modification of the tables and their relationship is easy.

6.0 SYSTEM TESTING

An effective test design enables the test team to focus its efforts on where there are most clearly needed. If system testing is conducted thoroughly, it will uncover errors in the software. Ideally, it will demonstrate the working system capability and whether the system is working according to specifications and performance requirements.

Overall, there are three types of testing that are performed. The testing types used

Online Directory of Libraries and Information Centers in Malaysia

Chapter 6 System Testing

6.1 UNIT TESTING

Unit testing is a way of testing the software code produced separately and correctly according to detailed design. Unit testing focuses on verifying or errors for the new unit of the system design, which includes software or functions. Unit testing is usually a white box testing which means that it is conducted in parallel for multiple modules. The testing is conducted when a module with high cohesion is designed where a module performs only one function. The number of errors can be more easily predicted and minimized.

6.0 SYSTEM TESTING

An effective test design enables the test team to focus its efforts where there are most clearly needed. If system testing is conducted thoroughly, it will uncover errors in the software. Indirectly it will demonstrate the working system capability and whether the system is working according to specifications and performance requirements.

Overall, there are three types of testing that are performed. The techniques used are part of the white box testing techniques.

Test procedures with the white box approach make use of the control structure of the procedural design. They provide several services, including the following:

- i. All independent paths within a module have been exercised at least once.
- ii. All logical decisions have been exercised on their true and false sides.
- iii. All loops have been executed at their boundaries and within their operational bounds.
- iv. Internal data structures have been exercised to ensure their validity.

6.1 UNIT TESTING

Unit testing is used to verify that software code performs adequately and correctly implements detailed design. Unit testing focuses in verification efforts for the smallest unit of the system design, which includes subroutines or functions. Unit testing is usually a white box testing which enables them to be conducted in parallel for multiple modules. This testing is simplified when a module with high cohesion is designed where a module addresses only one function the number of errors can be more easily predicted and uncovered.

Errors documented as a result of unit testing can include logic, overload or overflow of range, timing and memory leakage detection errors.

Using this process, error detection for the coding and logical mistakes within the boundary of the module can be easily detected.

6.2 MODULE TESTING

Module testing involves the examination of a related group of modules that constitute a software function. It ensures sufficient testing of a system component. It determines whether modules work successfully to form a cohesive unit and whether the software unit produces accurate and consistent results.

Module testing is performed after completion of each system module. Module testing is needed to ensure that a module demonstrates and works according to the specification of the system. In the module testing, each module is treated as an independent component. In this case the black box approach was used where its characteristics are evaluated through a study of the correlation between the inputs and the outputs.

6.3 INTEGRATION TESTING

Integration testing is a systematic techniques for constructing the program structure while conducting test to uncover errors associated with interfacing. The objective is to take unit tested modules and build a program structure that has been dedicated by design. Data may be lost across an interface, one module can have an inadvertent, adverse side effect on another, subroutines and functions when combined may not produce the desires function; individual acceptance

may be magnified to unacceptable levels; global data structure can present a problem.

6.4 SUMMARY

The following steps summarize the whole approach used during the integration testing:

- i. The content model for the ODLICM is reviewed to uncover errors.
- ii. The design model for the ODLICM is reviewed to uncover navigation errors.
- iii. Select processing components and ODLICM is unit tested.
- iv. The architecture is constructed and integration tests are conducted.
- v. The assemble ODLICM is tested for the overall functionality and content delivery.
- vi. The ODLICM is implemented in a variety of different environmental configuration and is tested for compatibility with each configuration.

Online Directory of Libraries and Information Centers in Malaysia

Chapter 7 System Evaluation & Conclusion

7.0 SYSTEM EVALUATION AND CONCLUSION

System evaluation is the process of identifying a system's strength and limitation, thus, allowing illustration of possible enhancement of ODLICM. This is important to allow precise changes to be made to the system. System evaluation highlights on the knowledge gained and the problems faces while developing the system and the steps taken to overcome them.

7.1 SYSTEM STRENGTH

The following list the strength of ODLICM:

i. User friendly interface

ODLICM, being an online web site, has to have a graphical-friendly and attractive interface to attract users. ODLICM contains a good graphical layout almost similar to allow users familiarity. It also has menu, drop down list, text box, which make the system easy to use.

ii. Input data validation

ODLICM performs validation on the user input such as validation on the format of the data entered. This increases the robustness and reliability of the system.

iii. No keyboard skill required

The browse and the index module eliminate the need to have typing skills when search for a module. This will ease the searching process.

iv. **Compatible with different browsers**

ODLICM is compatible with both Internet Explorer and Netscape Navigator. Most of the modules are workable with both of the users.

v. **Attractive graphical representation**

ODLICM has a range of attractive graphical images that are intended to be catchy and interesting. ODLICM has a good colour scheme, which is soothing and appealing to users. It enhances the whole layout schemes.

vi. **Search module**

ODLICM has easy search modules to allow users to search for information with ease.

vii. **Password protected for database**

The database is password-protected. The administrator will be added in the database and only they are allowed to access to the database. The unauthorized users are prohibited from accessing the records stored in the database. This is to ensure that the system is secure and also prevents intruders from causing damages to the system.

viii. **Effective error recovery**

Users can send error reports to administrator if there's any error occurs while they browse through the web site. The administrator will view the problem, resolve the problem, and send email to the users to notify them that the errors has been recovered.

ix. Fast response

Each web page is designed to be lightweight. This page load in a reasonable amount of time to save users and clients time to view the pages. Heavy graphic is omitted.

x. Easy accessibility

The ODLICM is a web-based application and can be accessed easily using the web browser.

7.2 SYSTEM LIMITATION

The following list the limitation of ODLICM:

i. Limitation of design layout

Limitation of design layout in displaying information from the database because the pages seem to be stagnant in its design. This was, however deliberately done to present to the users some consistency as they navigate and browse the system.

ii. Certain Java Scripts may not be compatible with every type of the web browsers

Certain browsers may not be able to read Java Scripts. Thus, the users cannot use the ODLICM site to its fullest potential.

iii. Registering of Administrator must be done in the database

Any registering of administrator must be done in the database and this makes the process rather difficult.

- iv. Only administrator is allowed to add new record to the database
- v. Users are not allowed to add or delete record from the database
Users cannot add or delete record from the database. They can only submit a record which will then review by the administrator.
- vi. The search area is within Malaysia only
The libraries and information centers' information in this site is limited to Malaysia only.

7.3 FUTURE ENHANCEMENT

This system needs further enhancements to enable better web page to be produces. Those are:

- i. Ensuring Java Scripts used are compatible with every type of web browser
Ensuring scripts used can be displayed with every type of browser to enhance the usage of the web site.
- ii. Allowing administrator to be registered without accessing the database
A module allowing the administrator to be registered without accessing the database should be included.
- iii. Extent the ability of browser
In future, the system can be turned to fulfill other browser requirements such as Netscape Navigator for execution.

iv. Attractive homepage

ODLICM will become better publicized if its homepage is enhanced to be more attractive and interactive by adding more user-friendly images, 3D images, animation images and sounds.

v. More modules and functions

Adding more modules and functions for instance, Forum and Chatting Services can enhance ODLICM. It will make the system more interactive and practical.

7.4 PROBLEMS AND SOLUTIONS

i. Inadequate knowledge in web based programming

As there is no prior knowledge in programming in a web-based environment, a lot of studies need to be performed in order to familiarize with the concept of web programming. Additional reading was required before development of the project was carried out.

ii. Lack of knowledge in database server

ODLICM uses Microsoft SQL Server 2000 as its database management system. However, there was no prior exposure to a client-server based management system. Hence, studies need to be performed to understand the concept of database server before system development.

7.5 KNOWLEDGE GAINED

Some of the knowledge gained after the development of ODLICM are:

- Learnt additional software tools.
- Learnt techniques to plan and develop a system.
- Understand and gain more knowledge on web designing.
- Acquired a more articulate skill for problem solving.
- Learnt to work independently
- Cultivated skills in writing documentations and reports.
- Enhanced time management skills.
- Developed skills in information and facts gathering.

7.6 CONCLUSION

ODLICM is a system with strength and limitation of its own. Overall the system has achieved its objectives. ODLICM distinguish itself from other web sites because it contains information targeted for online searchers. It has a search function allowing easy search of libraries and information centers information. In summary, ODLICM is an informative web site, which is easy to use, with attractive features and interesting content. ODLICM contributes in dispersion of information as information is easily available.

ODLICM has several modules, which were developed to cater for conventional searching behavior. It also has searching modules to enable the information to be searched in an orderly manner.

ODLICM has its limitations as stated in the section above. However, future enhancement is necessary to make further improvement and continued

development of the system. This is to make it a truly, good and flexible system to fulfill all of its objectives.

University of Malaya

QUESTIONNAIRE

ONLINE DIRECTORY OF LIBRARIES AND INFORMATION CENTERS IN MALAYSIA

This survey is intended to gather data on the requirements to build an online directory of libraries and information centers in Malaysia. It is in the form of a questionnaire and is to be filled out by the respondent.

Instructions

Online Directory of Libraries and Information Centers in Malaysia

Appendix A Questionnaire

APPENDIX A

QUESTIONNAIRE

QUESTIONNAIRE – USER REQUIREMENTS QUESTIONNAIRE

This survey is intended to gather data on user requirements to build an online directory of libraries and information centers in Malaysia. It seeks to find out the nature of the web site to be built and the information content required.

Instructions:

Answer the questions below by checking the appropriate boxes. Tick only one box per questions, unless indicated otherwise.

Part I : Participant's Background Information

1. Gender :
 - ☐ Female
 - ☐ Male
2. Ethnic group:
 - ☐ Malay
 - ☐ Chinese
 - ☐ Indian
 - ☐ Others, please specify _____
3. State the locality of residence:
 - ☐ Urban (city, town)
 - ☐ Rural (small rural, village)
4. Level of education:
 - ☐ Primary
 - ☐ Secondary
 - ☐ Diploma
 - ☐ Degree
5. How often do you go to library?
 - ☐ Very frequent (daily or more than 10 times per month)
 - ☐ Frequent (5-10 times per month)
 - ☐ Sometimes (average of once a week)
 - ☐ Seldom (once a month)
 - ☐ Rarely (less than 3 times a year)
6. Do you facing problem of finding information about a library?
 - ☐ Yes
 - ☐ No

Part II Internet Usage

7. Do you use Internet?

- ☐ Yes
- ☐ No

If the answer for **question 7** is **No**, proceed to **question 12**.

8. How often do you use the Internet to search for information?

- ☐ Very frequent (daily or more than 10 times per month)
- ☐ Frequent (5-10 times per month)
- ☐ Sometimes (average of once a week)
- ☐ Seldom (once a month)
- ☐ Rarely (less than 3 times a year)

9. Have you ever visited online directory of libraries and information centers site(s)?

- ☐ Yes
- ☐ No

10. How do you rate the site(s) you have visited?

- ☐ Not helpful at all
- ☐ Of some help
- ☐ Helpful
- ☐ Very helpful
- ☐ Absolutely indispensable
- ☐ Not applicable

11. How would you look up for required information on the Internet?

- ☐ Type in keywords
- ☐ Navigate for broad category listing
- ☐ Use addresses already known
- ☐ Other ways, please specify _____

Part III Information Content

12. Where do you refer to for information on libraries and information centers? (Tick more than 1 box, if necessary.)

- ☐ Internet sites
- ☐ Books, magazines, articles, or newspapers
- ☐ Family or friends
- ☐ Others, please specify _____

13. What type of library's information do you normally need? (Tick more than 1 box, if necessary.)

- ☐ Location
- ☐ Web page URL
- ☐ Size of collection
- ☐ Director's information

- ☐ Contact information
- ☐ Others, please specify _____

14. Do you think a web site that offers information on libraries and information centers is useful?

- ☐ Yes
- ☐ No

15. Do you know of a web site that has information on libraries and information centers?

- ☐ Yes, please specify _____
- ☐ No

If the answer for **question 15** is **No**, proceed to **question 17**.

16. Do you think the web site that offers information on libraries and information centers is sufficient?

- ☐ Yes
- ☐ No

Part IV Web Design

17. Do you think the online directory of libraries and information centers should be interactive? (enable users to input and allows feedback.)

- ☐ Yes
- ☐ No

18. Do you think the online directory of libraries and information centers should allow users to submit new record?

- ☐ Yes
- ☐ No

19. Is a search engine or a search module required?

- ☐ Yes
- ☐ No

20. Are there any suggestions that you would like to make to enhance the current online directory of libraries and information centers sites?

Thank you for your cooperation.

Online Directory of Libraries and Information Centers in Malaysia

Appendix B Complete Survey Results

APPENDIX B

COMPLETE SURVEY RESULTS

i. Participant's Background Results

Table A1: Gender distribution of respondents

	Frequency	Percent
Valid Male	17	42.5
Female	23	57.5
Total	40	100.0

Table A2: Ethnic distribution of respondents

	Frequency	Percent
Valid Malay	17	42.5
Chinese	11	27.5
Indian	7	17.5
Others	5	12.5
Total	40	100.0

Table A3: Local of residence distribution of respondents

	Frequency	Percent
Valid Urban	29	72.5
Rural	11	27.5
Total	40	100.0

Table A4: Level of education distribution of respondents

	Frequency	Percent
Valid Primary	3	7.5
Secondary	9	22.5
Diploma	18	45.0
Degree	10	25.0
Total	40	100.0

Table A5: Regularity of visit to library

	Frequency	Percent
Valid		
Very Frequent	6	15.0
Frequent	8	20.0
Sometimes	12	30.0
Seldom	9	22.5
Rarely	5	12.5
Total	40	100.0

Table A6: Frequency of facing problem to find library's information

	Frequency	Percent
Valid Yes	27	67.5
No	13	32.5
Total	40	100.0

ii. **Internet Usage Results**

Table A7: Frequency of Internet usage for respondents

	Frequency	Percent
Valid Yes	36	90.0
No	4	10.0
Total	40	100.0

Table A8: Regularity of searching information using Internet

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
Very Frequent	8	20.0	22.2	22.2
Frequent	15	37.5	41.7	63.9
Sometimes	7	17.5	19.4	83.3
Seldom	4	10.0	11.1	94.4
Rarely	2	5.0	5.6	100.0
Total	36	90.0	100.0	
N/A System	4	10.0		
Total	40	100.0		

**Table A9: Frequency of respondents ever visited to Online
Directory of Libraries and Information Centers
(ODLIC) site**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	12	30.0	33.3	33.3
No	24	60.0	66.7	100.0
Total	36	90.0	100.0	
N/A System	4	10.0		
Total	40	100.0		

Table A10: Respondents' rating of existing ODLIC sites

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
Not helpful at all	2	5.0	5.6	5.6
Of some help	19	47.5	52.8	58.4
Helpful	6	15.0	16.7	75.1
Very Helpful	4	10.0	11.1	86.2
Absolutely	2	5.0	5.6	91.8
Indispensable				
Not applicable	3	7.5	8.3	100.0
Total	36	90.0	100.0	
N/A System	4	10.0		
Total	40	100.0		

Table A11: Respondents preference of searching information online

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
Keywords	19	47.5	52.8	52.8
Navigation	10	25.0	27.8	80.6
URL	4	10.0	11.1	91.7
Others	3	7.5	8.3	100.0
Total	36	90.0	100.0	
N/A System	4	10.0		
Total	40	100.0		

iii. Information Content Results

Table A12: Respondents' resources of libraries and information centers' details

	Frequency	Percent
Valid		
Internet sites	31	77.5
Publications	6	15.0
Family/Friends	4	10.0
Others	2	5.0

Table A13: Types of library's information needed

	Frequency	Percent
Valid		
Location	38	95.0
Web page URL	24	60.0
Size of collection	9	22.5
Director's information	11	27.5
Contact information	18	45.0
Others	15	37.5

Table A14: Frequency of respondents agree on ODLIC usefulness

	Frequency	Percent
Valid		
Yes	33	82.5
No	7	17.5
Total	40	100.0

Table A15: Frequency of respondents know of existing ODLIC

	Frequency	Percent
Valid		
Yes	22	55.0
No	18	45.0
Total	40	100.0

Table A16: Frequency of respondents satisfied with existing ODLIC

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	7	17.5	31.8	31.8
No	15	37.5	68.2	100.0
Total	22	55.0	100.0	
N/A System	18	45.0		
Total	40	100.0		

iv. Web Design Results

Table A17: Frequency of respondents prefer interactive ODLIC

	Frequency	Percent
Valid Yes	33	82.5
No	7	17.5
Total	40	100.0

Table A18: Frequency of respondents prefer to submit record in ODLIC

	Frequency	Percent
Valid Yes	33	82.5
No	7	17.5
Total	40	100.0

Table A19: Frequency of respondents prefer search function in ODLIC

	Frequency	Percent
Valid Yes	37	92.5
No	3	7.5
Total	40	100.0

Bar Chart for Survey Results

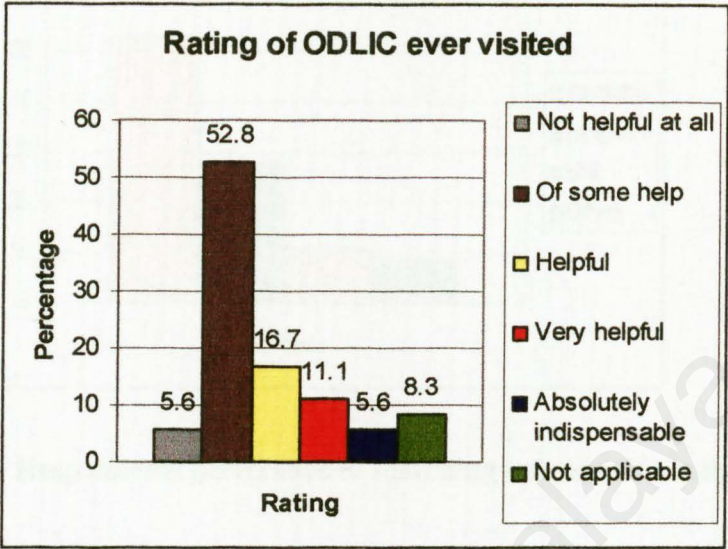


Figure A1 Respondents Rating of ODLIC ever visited

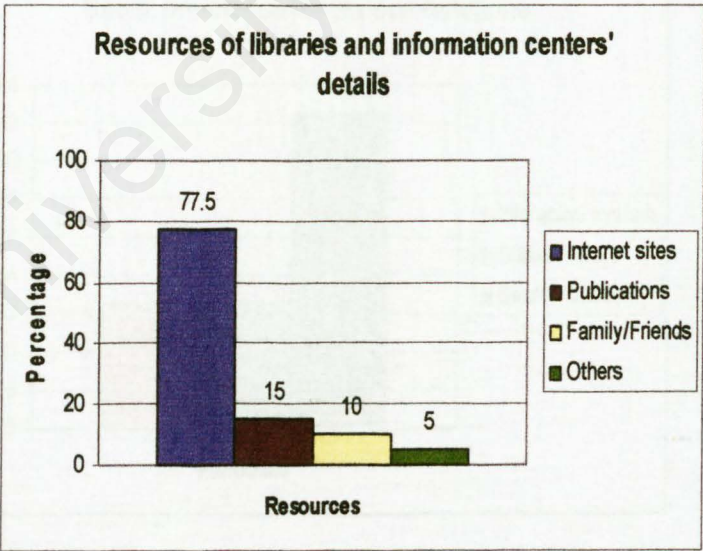


Figure A2 Respondents resources of libraries of information centers' details

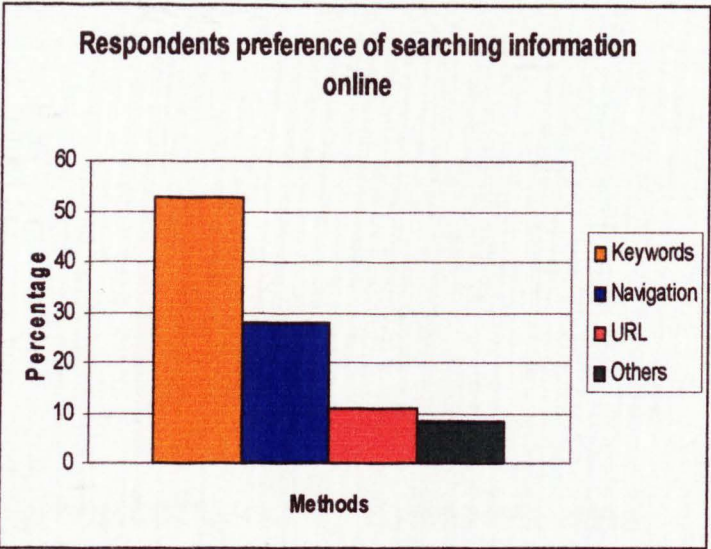


Figure A3 Respondents preference of searching information online

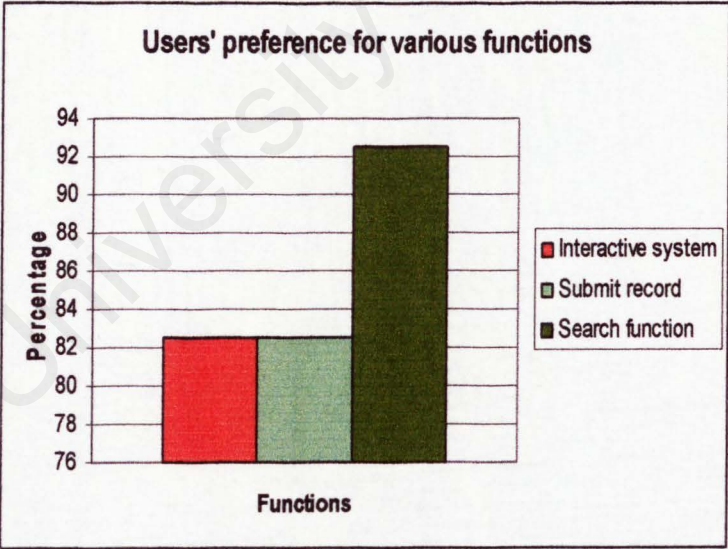


Figure A4 Respondents preference for various functions of ODLIC

Online Directory of Libraries and Information Centers in Malaysia

Appendix C User Manual

APPENDIX C

USER MANUAL

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1.0 INTRODUCTION

ODLICM is a web-based system that provides useful information on libraries and information centers in Malaysia. This site also provides search capability, thus enhancing faster access to pertinent information.

The ODLICM is a web site designed to act as an effective online storage center for information.

1.1 RUN TIME REQUIREMENT

The software run time environment for ODLICM includes:

- i. Microsoft Windows 95 and above
- ii. Internet Explorer 5.5 and above or
- iii. Netscape Communicator 4.7

The hardware run time environment for ODLICM includes:

- i. Processor minimum 480 CPU
- ii. Memory 32MB RAM
- iii. SVGA Graphic Adapter
- iv. Modem (minimum 4.4kbps) or network connection through existing network configuration

1.2 USER MANUAL OVERVIEW

There are 3 chapters in the user manual

Chapter 1 Introduction

Gives a general description of ODLICM. The hardware and software requirements of the ODLICM are also stated.

Chapter 2 Public user module

This chapter highlights the main function for the public user module.

Chapter 3 Administrator module

This chapter emphasizes the main function for the administrator module.

2.0 PUBLIC USER MODULE

The public user module consists of several sub-modules, which includes search, submit record, report errors, and comments.

2.1 NAVIGATION BAR

There are 6 links on the left of each page except of the main page.

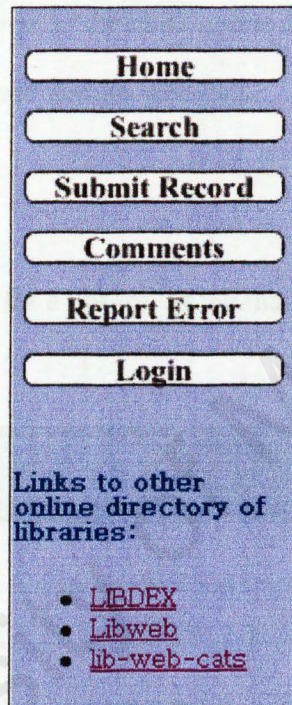


Figure 2.1: Public User's Navigation bar

Description:

1. Home – Allow users to browse to the ODLICM main page.
2. Search – Allow users to browse to the ODLICM search page. User can search for the information of libraries at this page.
3. Submit Record – Allow users to browse to the ODLICM submit record page.

At this page, user can submit a new record which will then review by the administrator.

4. Comments – Allow users to browse to the ODLICM comments page. At this page, user can send their comments and recommendations of this site to the administrator.
5. Report Error – Allow users to browse to the ODLICM report error page. User can send the description of errors occurs while they browse through the ODLICM site.
6. Links – Allow users to browse to the other online directory of libraries. There are LIBDEX, Libweb and lib-web-cats.

2.2 SEARCH SUB-MODULE

To begin, users click “Search for a library” at the main page.

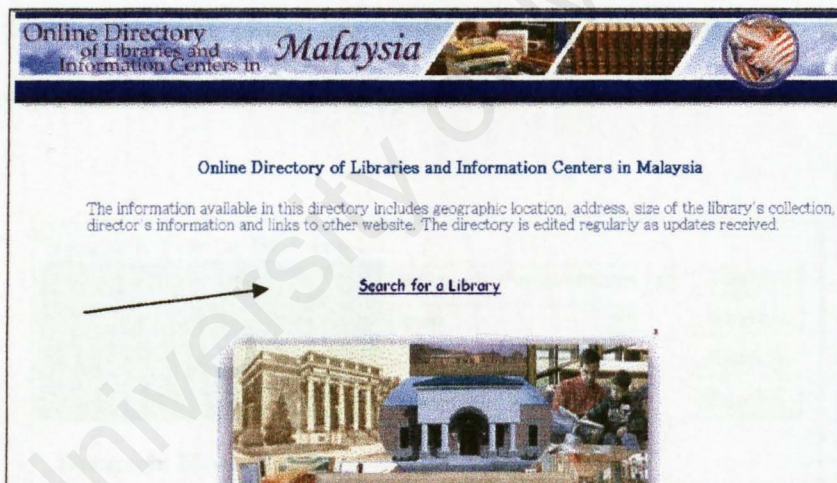


Figure 2.2: Main page

Users will then directed to the Search page. Users can start to search for a library at the Search page. The library can be searched by state, city, postcode or size of collection.

Welcome to the Online Directory of Libraries and Information Centers in Malaysia. The online directory contains the most up to date information. We have for approximately 100 libraries and library related organizations. To find a library, please use the pull down menu below.

Home
Search
Submit Record
Comments
Report Error
Login

Links to other online directory of libraries:

- [LIBDEX](#)
- [Libweb](#)
- [lib-web-cats](#)

Search for a library:

Select State:	Johor	Search
Select City:	Johor	Search
Select Postcode:	Kedah	Search
Select size of collection:	Kelantan	Search
	Melaka	
	Negeri Sembilan	
	Pahang	
	Penang	
	Perak	
	Perlis	
	Sabah	
	Sarawak	
	Selangor	
	Terengganu	
	Wilayah Persekutuan	

Figure 2.3: Search page

For example, if the user selects “Wilayah Persekutuan” from the “Select State” drop down menu and clicks the “Search” button, the libraries in the state “Wilayah Persekutuan” will be displayed as follow:

Search for a library:

Select State:	Wilayah Persekutuan	Search
Select City:	Ipoh	Search
Select Postcode:	01000	Search
Select size of collection:	less than 5,000	Search

Search Result(s)

Institution Name: [National Library of Malaysia](#)
Website: <http://www.pnm.my/>

Institution Name: [PETRONAS PETROLEUM RESOURCE CENTRE \(PRC\)](#)
Website: <http://www.petronas.com/internet/corp/centralrep2>

Institution Name: [University of Malaya Library](#)
Website: <http://www.umlib.um.edu.my/>

Figure 2.4: Search Results screen

The search results above only displayed the Institution name and website. If they want to logon to the institution’s web site, they can just click at the web site’s link. If user wants to view the details of the institution, they can click at the name of the institution. For example, if user clicks at the “University of Malaya Library” link, the results will be as follow:

Search for a library:

Select State:

Wilayah Persekutuan

Search

Select City:

Ipoh

Search

Select Postcode:

01000

Search

Select size of collection:

less than 5,000

Search

Search Result(s)

Institution Name: National Library of Malaysia

Website: <http://www.nlm.my/>

Institution Name: PETRONAS PETROLEUM RESOURCE CENTRE (PRC)

Website: <http://www.petronas.com/internet/corp/centralrep2>

Institution Name: University of Malaya Library

Website: <http://www.umlib.um.edu.my/>

University of Malaya Library

University of Malaya Library, Lembah Pantai,
50603 Kuala Lumpur,
Wilayah Persekutuan.
03-79567800

Size of collection: 100,001 and over

Website: <http://www.umlib.um.edu.my/>

Email Address: ketua_pustakawan@um.edu.my

Director's Name: Mrs. Noriyah Md. Nor

Figure 2.5: Search Results Details screen

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2.2 SUBMIT RECORD SUB-MODULE



User can submit a record to the administrator if they found that an existing library is not in the ODLICM. They can do this by click at the “Submit Record” button at the left navigation bar, and the submit record page will be display as follow. User must fill in all of the required field. If they attempt to leave the required field as blank, for instance, “Institution Name”, the record will not be submitted until they fill in the required field. When they are ready to submit the record, they can just click at the “Submit Record” button at the bottom.

The screenshot shows a web form titled "Submit Record" under the header "Online Directory of Libraries and Information Centers in Malaysia". On the left is a navigation menu with buttons: Home, Search, Submit Record (highlighted), Comments, Report Error, and Login. Below the menu are links to other online directories: LIBDEX, Libweb, and lib-web-cats. The main form area is titled "Submit a New Record:" and contains the following fields: Institution Name (text), Phone (text), Address (text), Postcode (text), City (text), State (dropdown menu with "Johor" selected), Collection size (dropdown menu with "less than 5,000" selected), Website (text), Email Address (text), and Director's name (text). At the bottom of the form are two buttons: "Submit Record" (pointed to by an arrow) and "Reset". On the right side of the page is a vertical banner with the text "Online Directory of Libraries and Information Centers in Malaysia" and a small image of the Malaysian flag.

Figure 2.6: Submit Record page

2.3 COMMENTS SUB-MODULE

User can send their comments and recommendations on this site to the administrator by clicks at the “Comments” button at the navigation bar. The comments page will then be displayed. The “Name” and “Email address” field is optional as some of the users might don’t want to show their identity. However, the “Comments” field is required and if it left blank, the comments cannot be submitted. When the user ready to submit the comments, they can just click at the “Submit” button at the bottom.

Home		Comments
Search		<small>Do you have suggestions for improving this directory? Please provide your feedback below:</small>
Submit Record		Your Name : <input type="text"/>
Comments		Your Email Address : <input type="text"/>
Report Error		Comments : <input type="text"/>
Login		<input type="submit" value="Submit"/>

Links to other online directory of libraries:

- [LIBDEX](#)
- [Libweb](#)
- [lib-web-cats](#)

Figure 2.7: Comments page

2.4 REPORT ERRORS SUB-MODULE

Users can send the description of errors which occurs when they browse this site. They can click at the “Report Error” button at the navigation bar. The report error page will then be displayed. The “Name” and “Email address” field is optional as some of the users might don’t want to show their identity. However, the “Error description” field and the “URL” field are required and if it left blank, the error report cannot be submitted. When the user ready to submit the error report, they can just click at the “Submit” button at the bottom.

Report System Error
If you receive an error message full of technical jargon or are otherwise having problems using the directory, please help us resolve the problem by doing the following:

Your Name :

Email Address :

Submit the exact error message or describe the problem :

Note the URL(web address) or the title of the page you were on when you received the error :

Links to other online directory of libraries:

- [LJEDX](#)
- [Libweb](#)
- [lib-web-cats](#)

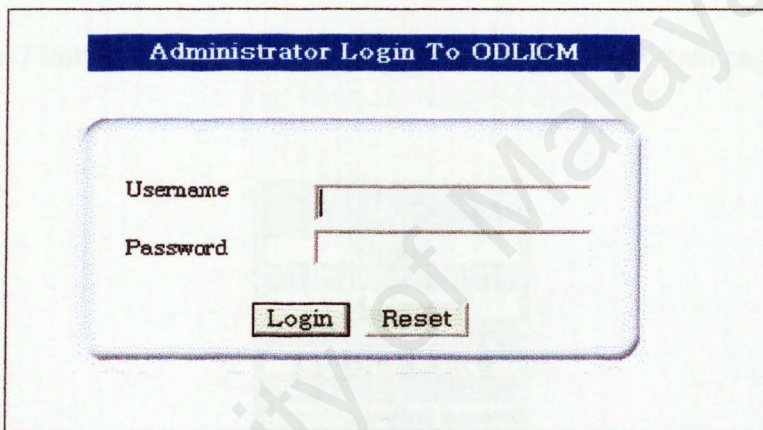
Figure 2.8: Report Error page

3.0 ADMINISTRATOR MODULE

The administrator module consists of several sub-modules, which includes login, add record, update report, update users submitted report, view comments and view error reports.

3.1 LOGIN SUB-MODULE

To begin, the administrator should click at the “Login” button at the public users’ navigation bar. The login page will then be displayed as follows:



Administrator Login To ODLICM

Username

Password

Figure 3.1: Login page

Administrator will then enter their “Username” and “Password”. If their username and password are valid, they will then be directed to the administrator menu. Otherwise, if the username and password are invalid, the error message will then be displayed as screenshot below and administrator will be required to enter their username and password again and again until the username and password is valid. After the administrator fill in the “Username” and “Password” field and ready to login, they can just click the “Login” button at the bottom. If they want to clear the input field, they can click at the “Reset” button.

Invalid Username/Password

Administrator Login To ODLICM

Username: jason

Password:

Login Reset

Figure 3.2: Login page – Error message

3.2 NAVIGATION BAR

There are 7 link buttons on the left of each page except of the main page.

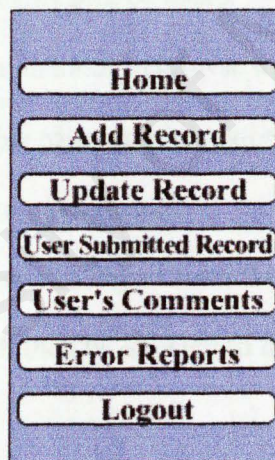


Figure 3.3: Administrator's Navigation Bar

Description:

1. Home – Allow administrator to browse to the ODLICM main page.
2. Add Record – Allow administrator to browse to the ODLICM add record page. Administrator can add record to the database in this page.

3. Update Record – Allow administrator to browse to the ODLICM update record page. At this page, administrator can edit or delete the records in database.
4. User Submitted Record – Allow administrator to browse to the ODLICM user submitted record page. This page display all the records submitted by the users. The administrator will review the records. If the record is real, then the administrator will add it to the database. If not, the record will be deleted.
5. User's Comments – Allow administrator to browse to the ODLICM comments page. At this page, administrator can view all the comments sent by users.
6. Report Error – Allow administrator to browse to the ODLICM error report page. At this page, administrator can view all the errors description sent by users.
7. Logout – Allow administrator to logout from the administrator menu. The administrator will then be directed to the main page.

3.3 ADD RECORD SUB-MODULE

Administrator can add a record to the database. They can do this by click at the “Add Record” button at the left navigation bar, and the add record page will be display as follow. Administrator must fill in all of the required field. If they attempt to leave the required field as blank, for instance, “Institution Name”, the record will not be added until they fill in the required field. When they are ready to add the record, they can just click at the “Add Record” button at the bottom.

Figure 3.4: Add Record page

If the administrator attempt to add a record which is already exists in the database with the same institution name, an error message will be display as follow. A record with same institution name cannot be added to the database.

Figure 3.5: Add Record page – Error message

If the administrator wants to clear the input field, they can click at the “Reset” button at the bottom.

3.4 UPDATE RECORD SUB-MODULE

Administrator can update record in the database. They can do this by click at the “Update Record” button at the left navigation bar, and the update record page will be display as follow.

Online Directory of Libraries and Information Centers in *Malaysia*



Home

Add Record

Update Record

User Submitted Record

User's Comments

Error Reports

Logout

Updating Record

		Institution Name	Phone	Address	Postcode	Libr.	State	Books (approx.)	URL
Delete	Edit	Ministry of Environment and Public Health Library	085-285297	Jalan Kuda Kepang	88976	Lawas	Sarawak	less than 5000	http://srkll
Delete	Edit	Miri Public Library	085-288976	Jalan Emas	89766	Miri	Sarawak	less than 5000	http://srkll
Delete	Edit	National Library of Malaysia	03-26871700	232 Jalan Tun Razak	50572	Kuala Lumpur	Wilayah Persekutuan	100001 and over	http://www
Delete	Edit	Perbadanan Perpustakaan Awam Kelantan	09-6692385	Jalan Mak Yong	23101	Kota Bharu	Kelantan	less than 5000	http://www
Delete	Edit	Perbadanan Perpustakaan Awam Melaka	06-2824859	242-1 Jalan Bukit Baru	75150	Melaka	Melaka	5001-10000	http://www

Links to other

Figure 3.6: Update Record page

If the administrator wants to edit a record, they can click at the “Edit” link button corresponds to the record. The record will then be edited in the table as follow:

Updating Record									
Delete	Edit		Ministry of Environment and Public Health Library	085-285297	Jalan Kuda Kepang	88976	Lawas	Sarawak	less than 5000
Delete	Edit		Miri Public Library	085-288976	Jalan Emas	89766	Miri	Sarawak	less than 5000
Delete	Update	Cancel	National Library of Malaysia	03-26871700	232, Jalan Tun Razak	50572	Kuala Lumpur	Wilayah Persekutuan	100001 and over
Delete	Edit		Perbadanan Perpustakaan Awam Kelantan	09-6692385	Jalan Mak Yong	23101	Kota Bharu	Kelantan	less than 5000
Delete	Edit		Perbadanan Perpustakaan Awam Melaka	06-2824859	242-1, Jalan Bukit Baru	75150	Melaka	Melaka	5001-10000
Delete	Edit		Perbadanan Perpustakaan Awam N. Sembilan	06-6917391	Jalan Batu 2	80171	Seremban	Negeri Sembilan	less than 5000
Delete	Edit		Perbadanan Perpustakaan Awam Negeri Perak	05-5596177	Jalan Pahlawan	30120	Ipoh	Perak	less than 5000
Delete	Edit		Perbadanan Perpustakaan Awam Pahang	09-5553411	Jalan Gambut	25000	Kuantan	Pahang	less than 5000
Delete	Edit		Perbadanan Perpustakaan Awam Perlis	04-9764436	Jalan Poniara	01000	Kaung	Perlis	less than 5000
Delete	Edit		Perpustakaan Sultan Abdul Samad	03-89488842	University Putra Malaysia	43400	Serdang	Selangor	less than 5000
1 2									

Figure 3.7: Editing Record screen

The administrator can edit and update every field except of the “Institution Name”. Each column can be sort ascending or descending by click at each of the column name. If the administrator clicks once and the data is sorted ascending, then when the column name is clicked again, the data will be sorted descending, and vice versa. When every field of data is edited and ready to be updated, the administrator can clicked at the “Update” link button. The updated record will be automatically loaded into the database. The administrator can clicked at the “Cancel” link button to cancel the update process.

If the administrator wants to delete a record, he can click at the “Delete” link button corresponds to the record, a message box will then pop up as follow. If the administrator clicks “OK” at the message box, the record will be deleted. Else, the record will remain in the database.

Updating Record									
		Institution Name	Phone	Address	Postcode	City	State	Book Collection	Website
Delete	Edit	Ministry of Environment and Public Health Library	065-285297	Jalan Kuda Kawang	88976	Larut	Sarawak	less than 5,000	http://arklib.edunoi/index.html
Delete	Edit	Miri Public Library	085-288976	Jalan Emas	88786	Miri	Sarawak	less than 5,000	http://arklib.edunoi/-miri
Delete	Edit	National Library of Malaysia	03-28671700	232 Jalan Tun Razak	50572	Kuala Lumpur	Wilayah Persekutuan	100 001 and over	http://www.nam.gov
Delete	Edit	Perbadanan Perpustakaan Awam Kelantan	09-6666666	Jalan Melayu	75000	Kuala Kelantan	Kelantan	less than 5,000	http://www.kel.lib.edunoi/
Delete	Edit	Perbadanan Perpustakaan Awam Melaka	06-2866666	Jalan Melayu	75000	Kuala Melaka	Melaka	5,001- 10,000	http://www.perpustakaan.gov
Delete	Edit	Perbadanan Perpustakaan Awam R. Sembilan	06-2866666	Jalan Melayu	75000	Kuala Sembilan	Sembilan	less than 5,000	http://sp1sum.gov/-ns
Delete	Edit	Perbadanan Perpustakaan Awam Negeri Perak	05-5596177	Jalan Pahlawan	30120	Ipoh	Perak	less than 5,000	http://perak.gov.gov
Delete	Edit	Perbadanan Perpustakaan Awam Pahang	09-5553411	Jalan Gambut	25000	Kuantan	Pahang	less than 5,000	http://www.pahang.gov.gov
Delete	Edit	Perbadanan Perpustakaan Awam Perlis	04-9764436	Jalan Pahlawan	01000	Kangar	Perlis	less than 5,000	http://www.lib-perlis.org
Delete	Edit	Perpustakaan Sultan Abdul Samad	03-8948842	University Putra Malaysia	43400	Serdang	Johor	10,001- 20,000	http://www.lib.upm.edu

Figure 3.8: Deleting Record screen

3.5 UPDATE USER SUBMITTED RECORD

Users are allowed to submit a new record to the administrator. The administrator will then review the records submitted by the users. They can do this by click at the “User Submitted Record” button at the left navigation bar, and the user submitted record page will be display as follow.

State	Size of Collection	Website	Email Address	Director's Name	Save to Database
Sarawak	less than 5,000	http://srk.lib.edu.my/index	web@srk.lib.edu.my	Mr. Chris Santana	<input checked="" type="checkbox"/>

Figure 3.9: Edit User Submitted Record screen

If the record exists and needs to be edited, the administrator can click at the “Edit” link button corresponds to the record. The record will then be edited in the table as above.

The administrator can edit and update every field except of the “Institution Name”. Each column can be sort ascending or descending by click at each of the column name. If the administrator clicks once and the data is sorted ascending, then when the column name is clicked again, the data will be sorted descending, and vice versa.

When every field of data is edited and ready to be updated, the administrator must check the checkbox at the last column before they clicked at the “Update” link button. The record is added automatically into the database only if the checkbox is checked. The administrator can clicked at the “Cancel” link button to cancel the update process.

If the administrator attempts to add a user submitted record, which is already exists in the database, the error message will be displayed as follow:

ERROR: A record already exists with the same Institution name! Record not added to database.										
Updating Submitted Record										
		Institution Name	Phone	Address	Postcode	City	State	Age of Librarian	Website	Email Address
Delete	Edit	Ministry of Environment and Public Health Library	085-285297	Jalan Kuda Kencana	98976	Lawas	Sarawak	less than 5000	http://srklb.edu.my/index.html	web@srklb.edu.my
1										

Figure 3.10: Update User Submitted Record – Error message

If the record doesn't exist, the administrator can delete the record as shown in Figure 3.8.

3.6 USERS' COMMENTS SUB-MODULE

Administrator can view the recommendations and comments sent by the users. They can do this by click at the "User's Comments" button at the left navigation bar, and the user's comments page will be display as follow.

Users Comments and Recommendations			
Date Sent	Comments	User's Name	Email Address
2/14/2004 12:16:08 AM	needs to be improved..	-	-
2/14/2004 12:16:40 AM	add more animation in future	seow ching	hsc1981@hotmail.com
2/14/2004 12:17:04 AM	add more library information	-	cheanhci@hotmail.com
2/14/2004 12:17:28 AM	pls update the page regularly	Choon Yee	cychang@yahoo.com
2/14/2004 12:17:54 AM	pls show the last updated date	Alex Tan	alextan@intel.com

Figure 3.11: Users' Comments page

3.7 ERROR REPORTS SUB-MODULE

Administrator can view the error report sent by the users. They can do this by click at the “Error Reports” button at the left navigation bar, and the error reports page will be display as follow.

Error Reports				
Date Sent	Errors	URL	Your Name	Email Address
2/11/2004 10:42:50 PM	Linking problem	Search page	Seow Ching	hsc1981@hotmail.com
2/11/2004 10:43:23 PM	Search result not displayed	Search Page	-	jasan@yahoo.com
2/11/2004 10:44:05 PM	Graphic not showed	Main page	CK Chuah	ckeang1981@hotmail.com
2/14/2004 12:18:36 AM	linking problem from main page to search page	Main page	Sally	sally@um.edu.my
2/14/2004 12:18:55 AM	no results displayed	search page	-	-
2/14/2004 12:19:24 AM	graphic not displayed	Main page	-	jasan@yahoo.com
2/14/2004 12:19:56 AM	banner not displayed	every page	Andy Tang	tangandy@agilent.com

Figure 3.12: Error Reports page

3.8 LOGOUT SUB-MODULE

When the administrator wants to logout from the administrator menu, they can just click at the “Error Reports” button at the left navigation bar. They will then directed to the main page.

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References

- Ballou, Rose. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/
- Brinkley, Stephen J. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/
- Carroll, Charles. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/
- Carroll, Charles. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/
- David, Michael. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/
- Ellis, David. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/
- Ellis, David. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/
- Ellis, David. 1997. *Library of Congress Catalog of Books*.
http://www.loc.gov/

REFERENCES

- Adobe GoLive 4.0. 2000. Retrieved July 3, 2003 from the World Wide Web:
<http://www.builder.com/Reviews/040999/ss01.html>
- Allison and Stroud. 2000. *Internet Information Server v4.0*. Retrieved July 24, 2003 from the World Wide Web: <http://serverwatch.internet.com/reviews/web-msiis.html>
- Allison and Stroud. 2000. *Netscape Enterprise Server*. August 15, 2003 from the World Wide Web: <http://serverwatch.internet.com/reviews/web-nsenter.html>
- Arrants, Steve. 2000. *Canvas 7.0*. Retrieved July 18, 2003 from the World Wide Web: <http://www.builder.com/Reviews/Canvas7/ss01.html>
- Baldow, Rex. 2000. *NetStudio 2000*. Retrieved July 22, 2003 from the World Wide Web: <http://www.builder.com/Reviews/NetStudio2000/ss01.html>
- Boettcher, Sue and Lerner, Doug. 2000. *Server-side Scripting. An Introduction to Server-side Scscripting*. August 10, 2003 from the World Wide Web: <http://www.webcrossing.com/Images/Guide/pages/sss-01-intro.html>
- Caston, Casey. 1998. *Photoshop 5.0 beta*. Retrieved July 18, 2003 from the World Wide Web:
<http://coverage.cnet.com/Content/Reviews/Justin/Items/0,118,391,00.html>
- Conen, Amy. 2000. *Spider Writer 4*. Retrieved July 22, 2003 from the World Wide Web: <http://www.builder.com/Reviews/SpiderWriter4/ss01.html>
- David M.Kroenke. 2000. *Database Processing*. 7th ed. California: Prentice Hall Inc.
- Dice, Richard. 2000. *Server-side Scripting Shootout Page 5 Perl*. August 9, 2003 from the World Wide Web:
http://hotwired.lycos.com/webmonkey/99/46/index1a_page5.html?tw=programming
- Dustin, Rashka and Payl. 1998. *Automated Software Testing*. Massachusetts: Addison Wesley.

Edit Pad. 1998 Retrieved July 24, 2003 from the World Wide Web:
<http://www.jgsoft.com/editpad.shtml>

Englewood Cliffs, N.J. 1999. *Structured Systems Analysis & Design Tools and Techniques*. California: Prentice Hall Inc.

Garnigus, Scott R. 1999. *Macromedia Fireworks 3.0*. Retrieved July 19, 2003 from the World Wide Web: <http://www.builder.com/Reviews/Fireworks3/ss01.html>

Hunter, Jason. 2000. *The Pub with JSP*. August 22, 2003 from the World Wide Web: <http://www.servlets.com/soapbox/problems-jsp.html>

Java Server Pages. 2000. August 22, 2003 from the World Wide Web:
<http://java.sun.com/products/jsp1>

Kendall, Kenneth E. and Kendall, Julie E. 1996. *System Analysis and Design*. 4th ed. California: Prentice Hall.

Laudon C.K. and Laudon P.J. 1998. *Management Introduction System: Organization and Technology in the Networked Enterprise*. New Jersey: Prentice Hall.

Mandel, T. 1997. *The Elements of User Interface Design*. Wiley.

Mendelson, Edward. 1998. *Web Authoring Tools Adobe PageMill 2.0*. Retrieved July 16, 2003 from the World Wide Web: <http://www.Idnet.com/pcmag/features/htmlauthor/rev1.htm>

Mendelson, Edward. 1998. *Web Authoring Tools Microsoft FrontPage 98*. Retrieved July 30, 2003 from the World Wide Web:
<http://www.zdnet.com/pcmag/features/htmlauthor/rev11.htm>

Merrall, Graeme. 2000. *Server-side Scripting Shootout Page 6 PHP*. August 9, 2003 from the World Wide Web:
http://hotwired.lycos.com/webmonkey/99/46/index1a_page6.html?tw=programming

- Mitchell, Scott. 2000. *Server-side Scripting Shootout Page and ASP*. August 9, 2003 from the World Wide Web:
http://hotwired.lycos.com/webmonkey/99/46/index1a_page2.html?tw=programming
- Mundher, G. 1994. *The Design of the User Interface for an Information System Information and Software Technology*. Volume 36(12): 773-742.
- Niederst, Jennifer. 1999. *Web Design in a Nutshell*. California: O'Reilly Associates, Inc.
- Olsen, Gary. 1997. *Getting Started in Multimedia Design*. Ohio: North Light Books.
- Pressman, R.S. 1992. *Software Engineering: A Practitioner's Approach*. New York: McGraw Hill.
- Product Review*. Retrieved July 22, 2003 from the World Wide Web:
<http://www.cnet.com/webbuilding/0-7255.html?st.bl.bl-ros.bs.gp>
- Reichard, Kevin. 1998. *Microsoft Site Server*. August 15, 2003 from the World Wide Web: <http://serverwatch.internet.com/reviews/web-siteserver.html>
- Reichard, Kevin. 1998. *Netscape Enterprise Server for NetWare*. Retrieved July 28, 2003 from the World Wide Web: <http://serverwatch.internet.com/reviews/web-senterwave.html>
- Sellappan, P. 2000. *Software Engineering: Management and Methods*. Petaling Jaya: Secjana Publishing.
- Shari Lawrence Pleegeer. 2001. *Software Engineering*. 2nd ed. California: Prentice Hall.
- Smith, Alastair. 1997. *Evaluation of Information Sources*. Retrieved July 4, 2003 from the World Wide Web: <http://www.vuw.ac.nz/~agsmith/evaln/>
- Sommerville, I. 1995. *Software Engineering*. 5th ed. London: Addison-Wesley Publishing Company.

Strom, David. 2000. *Internet Information Server v5.0*. Retrieved August 15, 2003 from the World Wide Web: <http://serverwatch.internet.com/reviews/web-msiisv5.html>

Stroud and Forrest. 1998. *Website*. August 15, 2003 from the World Wide Web: <http://serverwatch.internet.com/reviews/web-website.html>

Stroud, Forrest. 2000. *Personal Web Server*. August 15, 2003 from the World Wide Web: <http://serverwatch.internet.com/reviews/web-mspws.html>

Utter, Andrew and Pandith, Sharmilla. 2000. *Server-side Scripting Shootout Page 4 JSP*. August 9, 2003 from the World Wide Web: http://hotwired.lycos.com/webmonkey/99/46/index1a_page4.html?tw=progarmming

Vaughan, Tay. 1996. *Multi Media: Making It Work*. 3rd ed. Berkeley : Prentice Hall.