DESIGN AND DEVELOPMENT OF A DIGITAL LIBRARY

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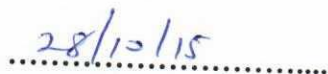## (B.Sc) IN COMPUTER SCIENCE

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CERTIFICATION

This is to certify that this project report titled "Design and development of a digital library was carried out by me Okunola Damilola Oyinkansola with Matric number CSC/11/0280 in the Department of Computer Science, Faculty of Science, Federal University Oye-Ekiti, Ekiti State in partial fulfillment for the award degree of bachelor of science (B.Sc) in computer science.

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DEDICATION

This research work is firstly dedicated to God Almighty, for his loving kindness that will never stop flourishing my life. All glory and honor be to him alone.

I also dedicated this research work to my loving parent Pastor and Deaconess Okunola for not making me regret I came to this world through them. Their labor of love cannot be quantified; they have contributed immensely towards the successful completion of my degree program. They are truly a great parent to behold.

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ABSTRACT

This project work is to develop a digital library system to register and search for books that are to be borrowed by library users. It also shows the shortcomings of the traditional library system thereby providing a more suitable platform in which these shortcomings can be averted through the development of a digital library system. The project work intends to compare the efficiency of the digital library system with the traditional library system.

The research work is designed to acquire research materials for the department and then publish it to users in their remote areas. The design parameters are PHP and HTML; Database type: MYSQL. It is designed as an interactive and content management system. The content management system deals with data entry, validation and updating while the interactive system deals with system interaction with the users, with all this materials a digital library is designed and implemented.

This project work is aimed at making the departmental library available to students at a click of mouse in respective areas of choice. It enables students to have access to latest learning facilities such as, articles, journals, textbooks, thesis, projects, newspapers, etc. with their computer systems without going through the rigorous steps and routine in the conventional institution libraries.

CHAPTER ONE

INTRODUCTION

In this first chapter, the background of the study is presented focusing on the concepts digital libraries. Moreover, I define the problem statement; describe the general and specific objectives of this project work, its significance and the methodology that will be used to address the problem.

1.1. BACKGROUND OF STUDY

One of the crucial advances in the field of information technology and library systems is digital library (DL) technology. It is a relatively new field in computer science, but there are many dynamics and continuous innovations in this area to improve the way information is accessed, collected and accumulated.

A digital library is a software system, mostly based on web-technology, which is used for storing and retrieving electronic documents giving access to the original documents, which in turn could be digital representations of artifacts of any nature or format, such as manuscripts, object images or native electronic documents e.g. website. These electronic documents can be stored in a wide variety of formats such as PDF, word-processor documents, XML, HTML, and multimedia materials (de Smet, 2011).

Digital library stores information as digital objects. These objects represent content of a digital library and associated data which are called metadata. Due to this fact, digital objects are the building blocks of a digital library. In order to represent useful information, contents must have associated types such as text, image, audio, etc. In addition, each object in a digital library must have a unique identifier and it may also contain some additional information such as rights

associated with digital object, access methods and properties which indicates whether the digital object is mutable or not. For instance, if the object is mutable then it means the object can be changed after it is stored in a repository; also digital objects may have a digital signature which evaluates whether object has been changed or not (Arms, 2001).

The digital library concept follows principle of "what you store is not what you get". This means, the digital contents available in the world are organized in many different ways and have to be accessed through a variety of mechanisms such as executing simple and complex programs on these objects. As a result, the underlying architecture must distinguish carefully digital objects created by the original creator, stored in a repository and digital objects as disseminated to the end user (Arms, 2001; Vijayakumar & Jeevan, 2001).

The digital library development process is quite an expensive task and it requires a lot of resources. Due to this fact, it will be important to consider some principles which should be followed in design, implementation and maintenance stage of any digital library. The digital library which is designed with those principles in mind will benefit as it will be more usable and easily adaptable in a long term changes. The principles are mentioned as follows:

a. knowing the content;

b. involving right people;

c. designing usable systems;

d. ensuring open access;

e. be aware of data rights;

f. automating whenever possible;

g. adopting and adhering to standards;

h. ensuring quality;

i. concerning about persistence

(McCray and Gallagher, 2001).

According to Candela *et al*. (2007), digital libraries represent a multidisciplinary field, including data management, information retrieval, library science, document management, information systems, the web, image processing, artificial intelligence, human-computer interaction, and digital curation. The evolution of digital library as a system provides an opportunity to digitized books and other text documents. Lee *et al*. (2005) summarized the following major advantages of digital libraries over traditional libraries:

i. digital libraries bring the libraries closer to the users;

ii. computer technology is used for searching and browsing;

iii. information can be shared;

iv. information is always available;

v. new forms of information become possible.

The scope of digital libraries has expanded from basic storage and retrieval of information functions into much wider applications such as facilitation of communication, collaboration, and other forms of dynamic interaction among scientists, researchers, or general public on themes that are related to information stored in digital library. Moreover, capabilities of digital libraries are getting being advanced, serving from handling mostly centrally located text to synthesizing distributed multimedia document collections, sensor data, mobile information, and pervasive computing services (Candela *et al*, 2007).

Digital libraries can be considered as a complex concept, reaching from digitally accessible classic document collections to interactive collaborative information resources, bringing libraries fully into the modern computer age.

Reasons libraries prefer digital collections are the following:

i. Digital journals can be linked from and to indexing and abstracting databases;

ii. Access can be from the user's home, office, or dormitory whether or not the physical library is open;

iii. The library can get usage statistics that are not available for print collections; and

iv. Digital collections save space and are relatively easy to maintain;

v. When total processing and space costs are taken into account, electronic collections may also result in some overall reductions in library costs (Tenopir, 2003).

Whereas the best known digital libraries, such as Europeana (http://www.europeana.eu/portal/) and Google Books (http://books.google.com/), are huge projects, in this project we focus on the technology for local smaller digital library applications.

1.2. PROBLEM STATEMENT

Having gotten proper view of the existing system, problems like loss of data, time wastage, error proximity, tedious routine and processing speed hinders the proper use of the traditional library system which makes it difficult for library users to have access to research data and valuable materials.

policies such as paying fine when borrowed books are returned late to the library have been put in place to facilitate quick and proper access to books between library users . Also, improved filing system have also been adopted to prevent data loss.

Imposing fines on late return on borrowed books can also prompt users not to return the books and the filing system is also opened to access by unauthorized personnel.

This research work which involve the development of a digital library system overwrite all the shortcomings of the traditional library system.

1.3. PURPOSE OF STUDY

The purpose of this study is to discourage the manual and time wasted in the process of going through bookshelves in search of books or information or data(s) in the library and also to make research material available at a point.

1.4. MOTIVATION

This project aim at presenting a simple and clear indefatigable method of running a library which administers every activities of the library in simple and best alternatives. It serves to administer the system in plain and simple method of report generation needed for all the administrative task by the library staff.

1.5. AIM AND OBJECTIVES

The aim of the Project is to implement and design a digital library, providing full access to a collection of serial titles, a collection of issues from individual serial titles, as well as to the full text of articles. To achieve this aim, the general objective is to;

i. develop a digital library system to register library users.

ii. develop algorithm for collection and returning of books.

iii. Implement the system for 400 level computer science students in (i).

iv. test the system.

1.6.   SCOPE OF STUDY

The project is for development of a Digital Library which will automate major library operations. It is about getting information (search and get books) in the library i.e, name, authors, ISBN. The first subsystem is registration of users (staff and students) to the system to keep track of authorized users. The second subsystem is the registration of new books into the library management system to know when new books are brought into library. The third subsystem is a borrower and return of books which is the major area needed by the user. These three subsystems' functionality will be described in detail in chapter 3 – Description of proposed system.

There are three end users for Library Management System. The end users are the library staff, school staff and student.

This project also looks into necessary items and information which schools need especially computer science students of various level.

1.7.   LIMITATION OF THE STUDY

A lot of factors posed as problem to the development of this study:

i. Time: Because the project must be completed within a specified date, the researchers do not have enough time to get all required.

ii. This project is limited to only computer textbooks and some news journals and magazines.

iii. Resources: Lack of resources also contributed to the limitations of the project to this extends. Everybody knows the financial state of the country now.

1.8. ORGANISATION OF THE STUDY

This project is segmented into five distinct chapters. Chapter one describes the introduction, aims and objectives, significance of the study, research methodology, scope and limitation as well as the organization of the report. The second chapter talks about the literature review, historical background, Definitions, Acronyms, Abbreviation and review of related project. The third chapter deals with analysis of existing system, problems of existing system, description and advantages of proposed system. The second to the last chapter deals with design of the system which entails output, Input, database and procedure design of the system, implementation comprises of hardware and software support while documentation comprises of how to use system and system maintenance. The last chapter deals with summary of experienced gained, conclusion and recommendation.

1.9. DEFINITION, ACRONYMS AND ABBREVIATION

1. **Archive(s):** Collection(s) of permanently valuable historical records documenting a particular subject or activity or transaction. Also the repository where such a collection is kept.

2. **Bibliography:** A list of resources used in writing a research paper or other document that appears at the end of the document. See also: Citation, Reference.

3. **CaMS:** Cataloging and Metadata Services. Part of Technical Services.

4. **Circulation:** The circulation desk is the place in the library where you check out, renew, and return library materials. You may also place a hold, or report an item missing from the shelves.

5. **Citation:** A reference or footnote to a book, a magazine or journal article, or another source. It contains all the information necessary to identify and locate the work, including author, title(s), publisher, date, volume, issue number, and pages.

6. **DCRM(B):** Descriptive Cataloging of Rare Materials (Books), the updated "successor" to DCRB (Descriptive Cataloging of Books), meant to update the older guide and bring it into accord with international standards; also the first in an ongoing series of cataloging guides for special collection items covering maps, serials, graphic materials, and other special collections items beyond books alone.

7. **Entry:** Refers to the data in a catalog record by which it is retrieved, for example, an author entry. Also called a "heading." Standardized forms of author names and subjects are used in catalog records to facilitate sorting and retrieval.

8. **ISBN:** International Standard Book Number. The ISBN is a unique machine-readable identification number, which marks any book unmistakably. First implemented in the U.K. in 1967, the ISBN is now used in 159 countries and territories.

9. **ISSN:** International Standard Serial Number. Eight-digit number which identifies periodical publications, including electronic serials. Created in the 1970's, the ISSN Network has assigned more than one million ISSN numbers. There are 75 national ISSN centers coordinated by an international center based in Paris; the U.S. center is managed by the National Serials Data Program at the Library of Congress.

CHAPTER TWO

LITERATURE REVIEW

2.1. HISTORICAL BACKGROUND

Before the advent of computer in modern age there are different methods of keeping records in library. Records are kept in the library on shelves and each shelf are labeled in an alphabetical or numerical order, in which the categories of books available are arranged on different position on the shelves and as well are recorded on the library manuscript and when any book is to be referenced manuscript is being referred to, to know the position of such required book by any person that request for the book.

After invention of computer different researchers carried out various approach on an automated library management system.

In this chapter, a brief discussion on some technical requirements of digital library technology will be presented.

2.2 DIGITAL LIBRARY REQUIREMENTS

To be specific, discussion will focus on web-based retrieval, the diversity of document formats, diversity of metadata formats, full-text indexing and ranking, Unicode support, and additional desired features: OAI-PMH and interactivity.

2.2.1 WWW-based Retrievals

One of the technical requirements of digital libraries is web-based retrieval of digital library resources. This makes digital libraries more interactive and accessible. As a result, users

of digital libraries can interact with system efficiently and access system at anytime from anywhere.

"Information Retrieval (IR) is an area of study concerned with searching for documents, for information within documents, and for metadata about documents, as well as of searching databases in WWW. There is overlap in usage of terms regarding data retrieval, document retrieval, information retrieval, and text retrieval, but each also has its own body of literature, theory, praxis, and technologies" (Wikipedia, 2011).

Internet analogy of public libraries i.e. reliable, high-quality community services have only recently begun to appear. This is because digital libraries are expensive to create and maintain. A serious obstacle to their creation is the provision of appropriate cataloguing information. Without a database of titles, authors and subjects, it is hard to offer the searching and browsing facilities normally available in physical libraries. Full-text retrieval provides a way of approximating these services without a concomitant investment of human resources Witten *et al.*, (2002). According to de Smet, (2011), the web-based environment has enabled full-text retrieval of documents as a standard feature. A digital library software, therefore, will not only offer the resulting descriptive data (the meta-data records) from a search, but also the full documents themselves from which search keys might also have been used for retrieval. This full-text retrieval feature of digital library software offers major advantages to physical libraries (and their software) which are mostly only indexed by their bibliographic (or meta-data descriptive data).

2.2.2 Diversity of Document Formats

The term [electronic] document is used to denote any information bearing a message in electronically recorded form. In a digital library, a document is a particular electronic encoding in library science (Witten *et al.,* 2002).

Hansen, (2005), assume that an electronic document is a digital representation of ideas or creative or intellectual works which are logically complete and can exist on their own as an independent unit of work. Generally, electronic document formats can be grouped into three types: text based formats, image formats, and audio and video (multimedia) formats. The usability of electronic documents depends on several factors, e.g. document format and related mark-up codes (procedural mark-up, presentational mark-up or descriptive mark-up). Document formats have many characteristics that need to be considered when deciding on suitability of any format. Electronic documents consist of a combination of text and images. Text is encoded using a variety of conventions, now converging towards the Unicode system. Witten *et al.,* (2002) summarized the four principal styles of format in which electronic documents are expressed as follows:

i. The first comprises in web oriented formats such as HTML, XHTML and XML document manifestations such as the Text Encoding Initiative and Open eBook format. The principal difficulty here is that such documents are not always self contained: they frequently include explicit links to other resources such as images or other documents.

ii. The second style of expression comprises word-processor formats such as Microsoft Word or RTF ("rich text format"). RTF is designed to allow word processor documents to be transferred between applications, and uses ASCII text to describe page-based

documents that contain a mixture of formatted text and graphics. In contrast, the native Word format is intended for use by a single word processor. Strictly speaking, it is inappropriate to use this format to convey documents to digital libraries; nevertheless, users often want to do that.

iii. The third style of expression for documents comprises page description languages like PostScript and PDF. These combine text and graphics by treating the glyphs that express text as little pictures in their own right, and allowing them to be described, denoted, and placed on an electronic "page" alongside conventional illustrations. They portray finished documents, ones that are not intended to be edited, and are therefore more akin to traditional library documents than word processor formats. Most of the time digital libraries can treat documents in these languages by processing them using standard "black boxes": generate this report in a particular page description language, display it here, transfer it there, and print. However, to build coherent collections out of the documents, it is beneficial to be able to extract the text for indexing purposes and some elements of document structure for browsing purposes, and these are challenging problems.

iv. The fourth style of expression is media-rich documents such as sound, picturesand video. When accompanied by textual descriptions (the view taken here), theirtreatment becomes one of associating metadata with documents. This provides a baseline approach that unifies the different media types and permits all the metadata methods discussed below for the general case to be applied.

2.2.3   Diversity of Metadata Formats

The term 'metadata' is used to represent structured data that describes a resource in collection of a library, manages rights about resources, identify and discover resource in a collection and also it provides preservation of a digital resource. In addition, use of metadata standards in a digital library enhances interoperability (Singh, 2003).

Metadata is very important to ensure that resources will survive and continue to be accessible into the feature. It also facilitates an easy way of searching and retrieving of resources. For instance: it provide data about data, time and date of creation, creator or author of data, placement on a computer network where data was created, and standards used (Niso, 2001).

Digital libraries describe all documents in a collection using a set of standardized attributes i.e. metadata. Digital libraries are more than just information systems, due to their efforts to create added-value (like normal libraries do) by describing documents in collections with more or less standardized sets of attributes ('fields'), called 'meta-data', which are in fact indeed very similar to bibliographic structures of the classic library approach (De Smet, 2010).

The best-known standard for metadata is Dublin Core (see http://dublincore.org), suggesting only a core set of crucial fields to describe a very wide variety of information objects. Many other standards are based on this or derived from it, but all follow same idea, i.e.: characterizing collection objects by content, creation, responsibility but e.g. also, and interestingly, by management aspects like technical requirements for access and preservation.

The capability to deal with different metadata formats, or 'metadata openness', is a very important technical requirement for digital libraries. Openness in metadata definition implies that

there can be different data structure specifications to be used based on the need of the application going to use the metadata, without imposing a fixed structure on the real-world objects.

2.2.4. Full-text Search and Ranking

Another crucial technical requirement for digital libraries is capability to allow resources retrieval based on full-text of document, meaning not only added meta-data act as entry-points for searching and retrieval, but all words within text-documents also are indexed and act as search keys. The internet-world dominated by Google has made such things obvious and enabled such functions easily while such functions were uncommon until recently (de Smet, 2010).

Full-text Search (FTS) is a search for the documents, which satisfy a query statement specifying a word to be present in the document and, optionally, return them in some order. It finds the documents containing all query terms and returns them in order of their similarity to the query. This is the most usual case of FTS functions. These notions of query and similarity are very flexible and depend on specific applications. The simplest search machine consider query as a set of words and similarity - e.g. how frequent are query words in the document (Bartunov and Sigaev, 2007).

According to de Smet (2010), the full-text retrieval feature of digital library software offers a major advantage to physical libraries (and their software) which mostly is only indexed by their bibliographic (or meta-data) descriptive data. Thus, a digital library software offers not only the resulting descriptive data (the meta-data records) from a search, but also the full documents themselves from which search keys might also have been used for retrieval. Moreover, Bartunov and Sigaev (2007) stressed the fact that modern information systems are all

database-driven and there is a need in IR-style full-text search inside databases with full conformance to the database principles ACID (Atomicity, Consistency, Isolation, Durability). That's why many databases have built-in full-text search engines, which allow combining text searching and additional metadata, stored in various tables and available through powerful and the classic SQL language.

Ranking is a method of presenting search results with most relevant documents first, which can only be offered in digital libraries, not classical libraries, because there is control of full-text. e.g. page ranking of Google adds 'social usage' parameters (number of times users have followed a link to document) to statistical parameters simply counting frequency of words occurrence. Especially in large collections where typically many results are given. ranking is a useful feature.

2.2.5 Interactivity

Another technical requirement that has been identified as relevant for digital libraries is interactivity. This technical requirement has been ignored in previous works whereas it is a quite interesting phenomena and benefit as it creates an open space for discussion, giving feedback on resources and improving content quality of resources of a digital library.

Implementing interactivity operation on digital libraries enables users to build knowledge on top of others' knowledge by sharing their knowledge. In this case, users will not be only readers of the resources published by someone but also can be publisher (e.g. giving a comment on available resource). As a result, users will have a power of participation on contribution of their knowledge to content of existing resource. In traditional libraries 'reader evenings' are organized to discuss readers opinions about a specific book or topic and share views: library

becomes also a social agent in knowledge sharing and creation. In the digital library this role could be performed by the interactivity feature of the system.

Another digital Library Management System is Capital's library software with following benefits increase support available for staff and users in any modern library service , Integrated, innovative system saves your library time, Improves the user experience. The setback of this library management system is the cost of purchase and information generated from the software can not be easily exported to be used in another system in case there is a system failure. (http://www.capita-softwareandmanagedservices.co.uk)

The set of researcher to be reviewed on an automated library system is a project carried out by Bhupendra, Singh Baghela, Shraddha Panwar, Vijay Vaishnav during as a partial fulfillment of the requirement for System Design Project of Masters of Computer Application IV Semester, of the Rajasthan Technical University, Kota. The purpose of application is for automation of library management.

2.3   DIGITAL LIBRARY USERS

The system comprises of two sets of users an operator and admin

Operator: Can enter details related to a particular book, Can provide membership to members.

Administrator: Can read and write information about any member. Can update, create, delete record of membership as per requirement and implementation plants.

Scope: The different areas where we can use this application are; any education institute can make use of it for providing information about author, content of available books. It can be used

in offices and modifications can be easily done according to requirements. Technology used:

Front End: Servlets, HTML, Java script. Back End: MS Access, Apache Tomcat server.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

The library is a major means of data gathering and as well a case study for proposed system. In line with this major method of information gathering for system is library and observation method via observing staff and operation of the library.

3.1   ANALYSIS OF THE EXISTING SYSTEM

The existing system of library management system involves lots and lots of paper work. The system involves that all library user details will be taken on a white and black method. To borrow book from a library, a borrower ticket is issued to every registered user and collected from each user when a borrower is made by such user to be collected back when returning of book is completed. A ticket is only allowed to be used for one transaction (borrowing book) only.

3.2   PROBLEMS OF THE EXISTING SYSTEM

Having gotten the overview knowledge of existing system, the following are its problem

1. **Loss of data**: a lot of paper works are needed for safe keeping of details of books borrowed by a registered user.

2. **Time wasting**: user time are wasted as a result of searching for a booked that has been borrowed by a user whose record can not be traced on the paper records.

3. **Error prone**: the existing system of operation is prone to error.

4. **Tedious**: it is tedious because it must take a routine

5. **Processing speed**: the processing speed is very low resulting into low output.

3.3 DESCRIPTION OF THE PROPOSED SYSTEM

The library management system is a desktop based application system used by an administrator (Librarian) as an alternative means of record keeping of the books stored in the library. It has the following features.

1. The administrator registers applicant with their name as username and give a system generated code to each individual.

2. An applicant is allowed to log into system with his name and generated password which is given at point of registration, if information supplied is incorrect for three attempts the user is directed to contact administrator to log in.

3. The administrator goes into report to view the details of a particular user.

4. The question of system can be added or remove from the system before commencement of the test.

5. It consists of stipulated timing per courses treated.

6. The scores of each course can be viewed by applicant immediately after answering question and administrator can view overall result.

3.4 ADVANTAGES OF PROPOSED SYSTEM

Certain merits have been associated with proposed system which enhances the design of system. Some of which are stated below:

1. It eliminates presence of audience or fellow colleague who can whisper the result to their friends.

2. It is free from biasness (all users are served equally).

3. It provides an immediate form of response to every user.

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4. It facilitates easy learning.

3.5 DESIGN AND IMPLEMENTATION SPECIFICATIONS

The design methodology used in proposed system is parallel as a result of the fact that parallel methods support the use of the proposed system side by side with the existing system in order to test for the system efficiency. Top down approach is used as well in the design because it allows the analysis of the system to be carried out one after the other.

3.5.1 Design Specifications

In the design of this digital library management system, specifications are necessary. The system is built using PHP as the scripting language and will be managed by the administration in the department. Digital Library, along with designated representatives from selected collection providers (e.g., a staff member from the department) will have maintenance privileges, and the database will otherwise be publicly inaccessible. The system will use annotated URLs to provide authorization data to the browser. Users will be able to use a password and user identity specific to be generated by this system; additionally, new users must create an account so that they can login.

In addition, the user inputs query of the required search into the "search and browse" input interface, the system performs the operation, and generates an output with respect to the input query. The user sends in a query to the digital Library database, then the query is being decoded, processed and the required output/result is being sent to the users interface for his digestion. This enables the user or client to have an easy access to all the research, materials available in the institutions web-based digital library management system.

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3.5.2   Web Access Subsystem of digital library

The main purpose of this system is to allow users to upload and view research material and other library resources via the Internet. This web interface will provide the users with a facility to view the library materials located in the remote storage. Users will be provided with facilities to upload acquired research material (admin), search for particular books in the collection (students). They will provide some textual description that will be matched with the description of each book and the matching books will be displayed. The users will be able to access the information with using the Internet browser. If the information contains the map data, the information will be PDF format, TXT etc.

3.5.3   Database of a digital library

This is where information and data are being stored. It is classified into two: the collection and user database.

i.   Collection Database: The collection database will contain all discretely accessible Web based digital library management system collections, entered and maintained by admin staff. The collection database will contain all relevant information about the collection for the purposes of this application, including Collection identifier (locally invented, but perhaps derived from cataloging information), Collection name (as cataloged or as supplied by publisher), Collection source (i.e., frequently publisher, but including any contributors), Collection "class" and so on.

ii. User database: The user database will contain all relevant information about the user for the purposes of this application, the information includes: User name (in discrete fields

for last name, first name, etc.), E-mail address, Institutional affiliation (if applicable) and so on.

3.5.4 Dataflow diagram of a digital library

This shows how data flows in and out in digital library. It describes how information flows from the client to admin, and other components that make up the digital library management system. The diagram is as shown below:
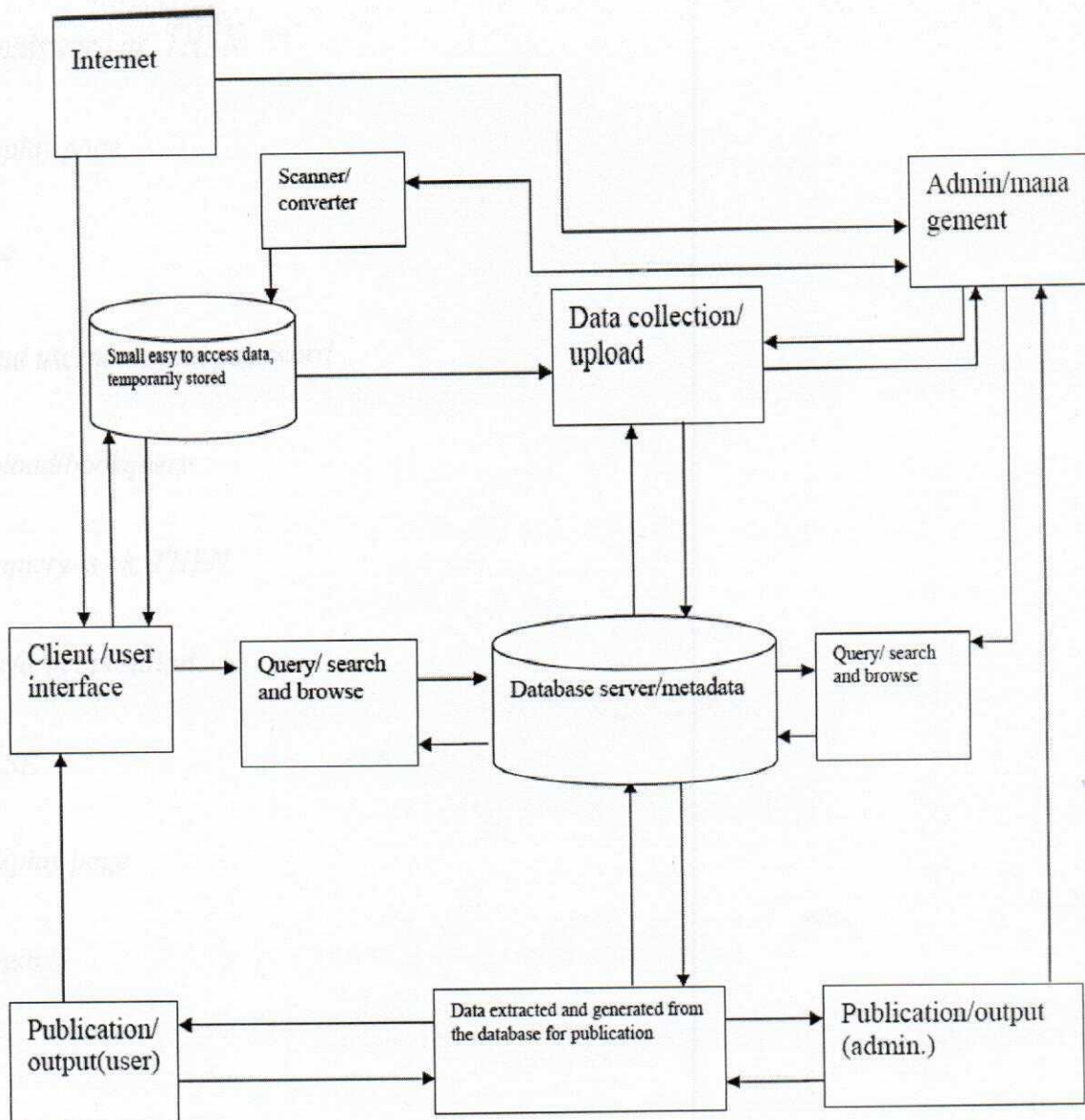

Figure 3.1: The dataflow diagram of a digital library
Anoop *et al*., (2004).

3.5.5 Algorithm of a digital library

Start

(initialize the computer system)

Input username and password

IF password ok, THEN

Display page

Else

Input username and password

Upload/bookquery

IF query is ok, THEN

Perform operation

ELSE

Display page

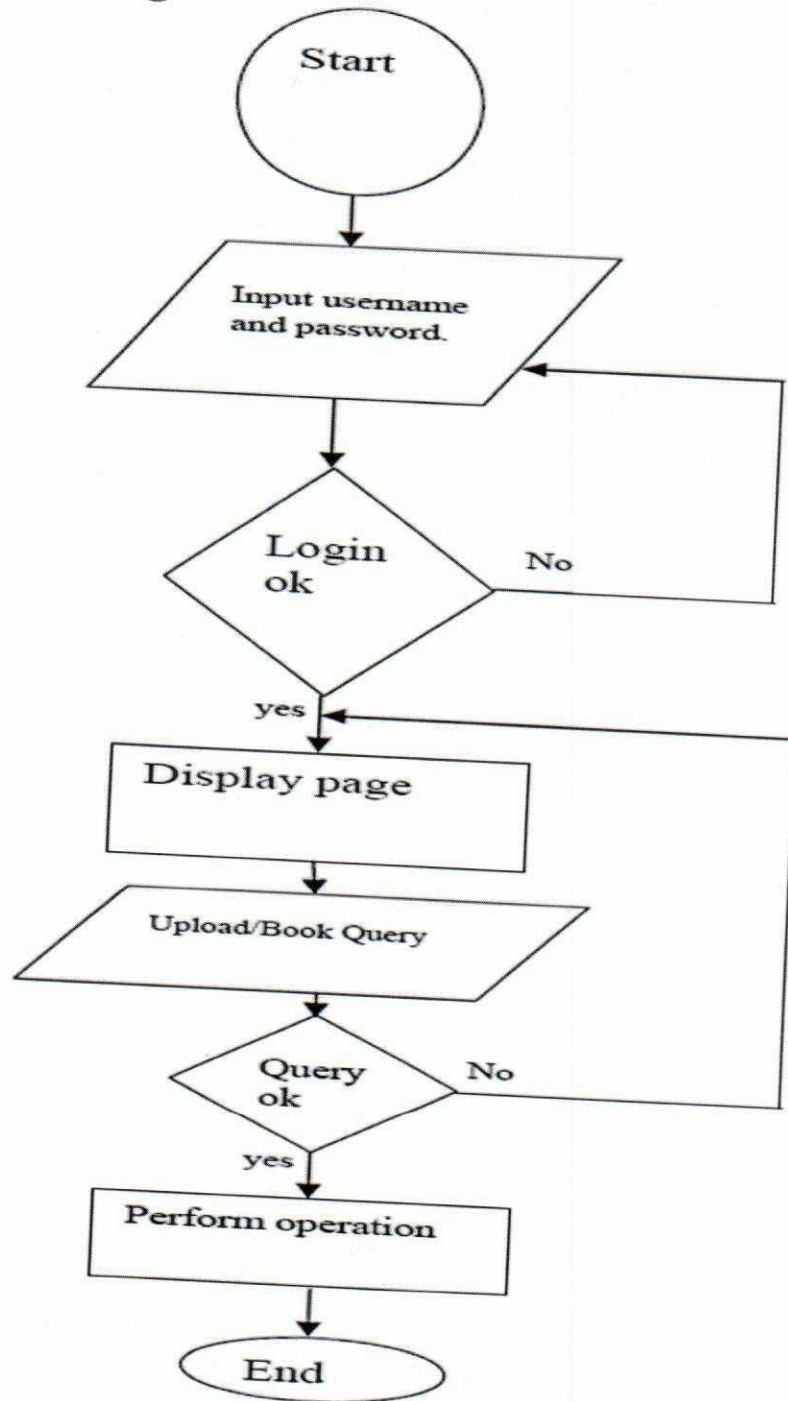*Login*

3.5.6 SYSTEM FLOWCHART

Figure 3.2: The flowchart of a digital library.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1 DESIGN OF THE SYSTEM

The proposed system was designed in modules with each modules working together to perform library management system in order to enhance performance of the existing system as earlier discussed in chapter three. The ability to analyze and give focus to system is explained in following formats which are output design, input design, database design and procedure design.

4.1.1   OUTPUT DESIGN

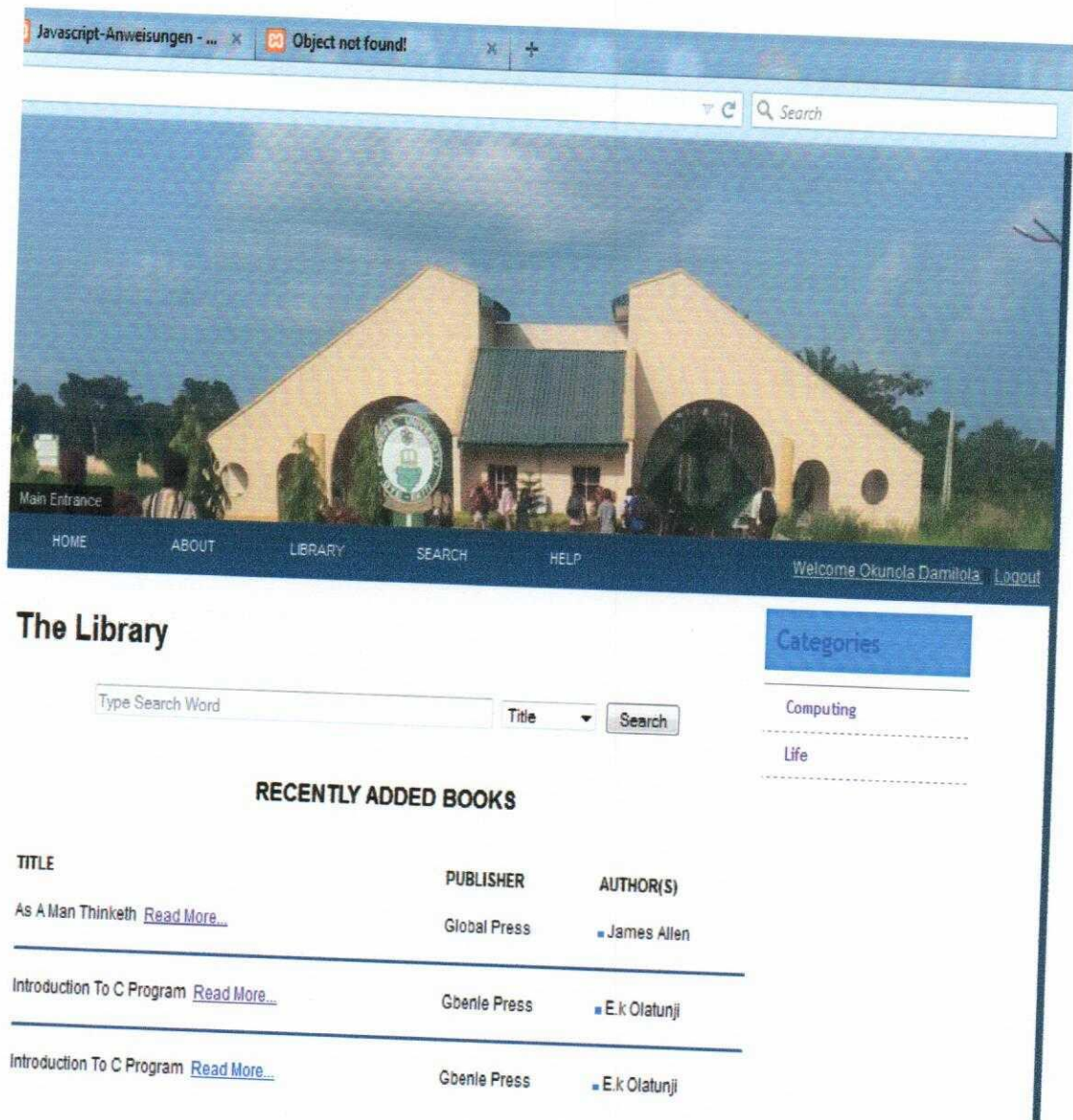The output to be extracted from proposed system are as shown below:
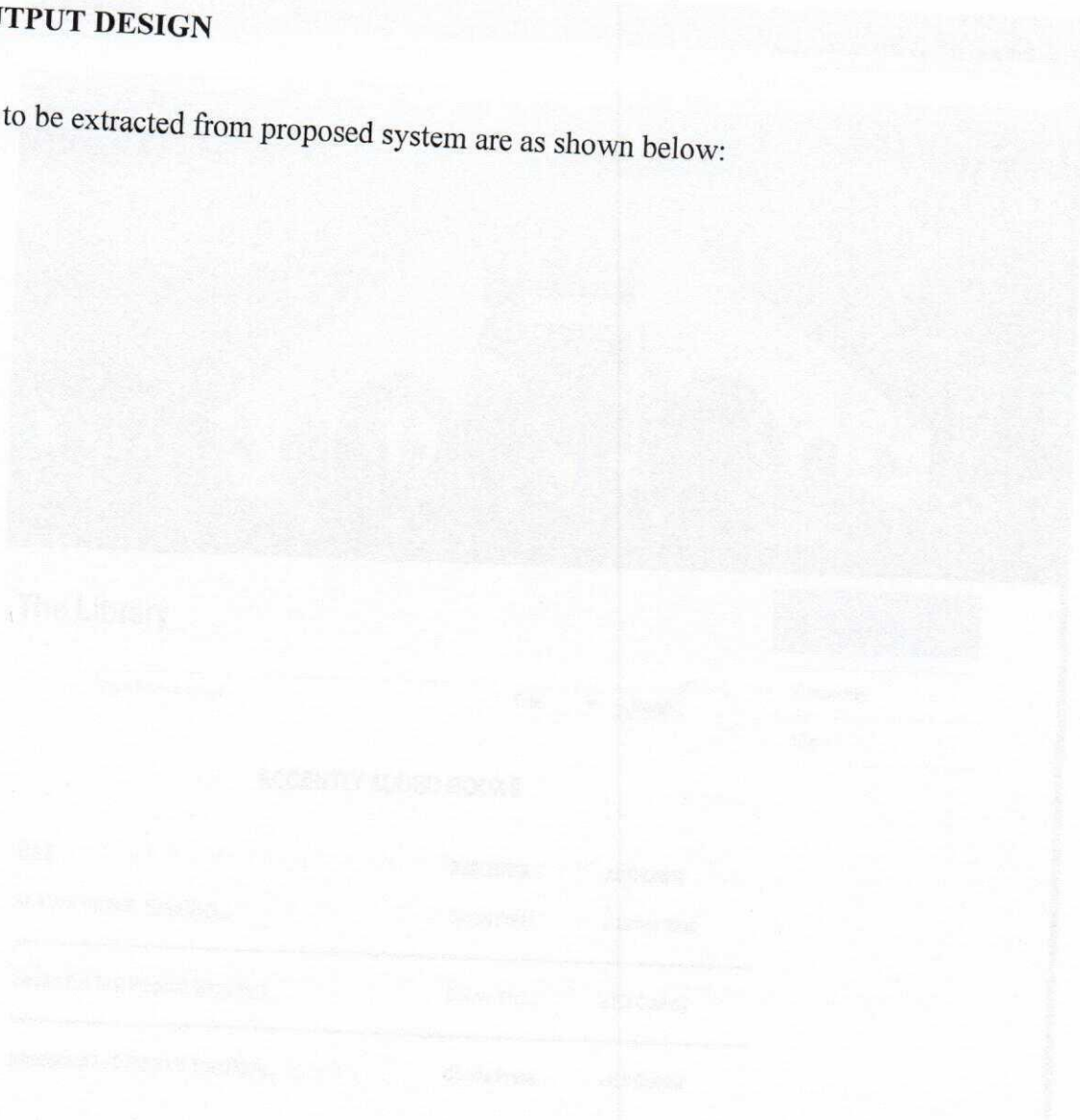
Figure 4.1: Digital library homepage

The home page is the key aspect of the project, because it gives the basic user interface stand for a web based digital library management system. It comprises of; Project title, the header, background Study, Vision , Mission , Login interface.

Login Interface: This is another important feature displayed in the homepage. It is where authorization is being managed. It grants the user access to the page. All these mentioned above is being controlled by programming codes which are in turn transformed into real features.
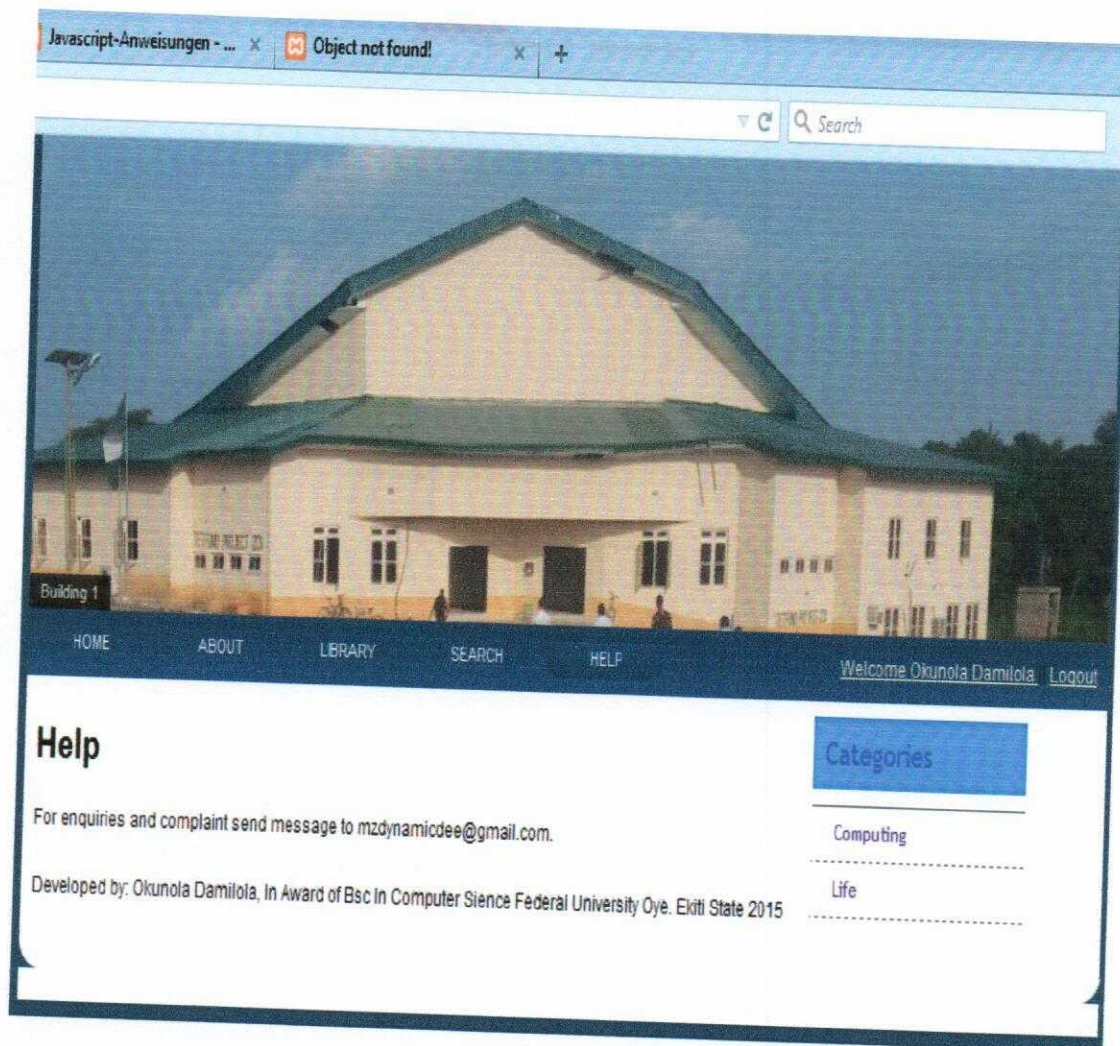
Figure 4.2: Digital library help page

This is a web page that provides assistance to users, whereby any enquiry or complain is easily lodged and guided.
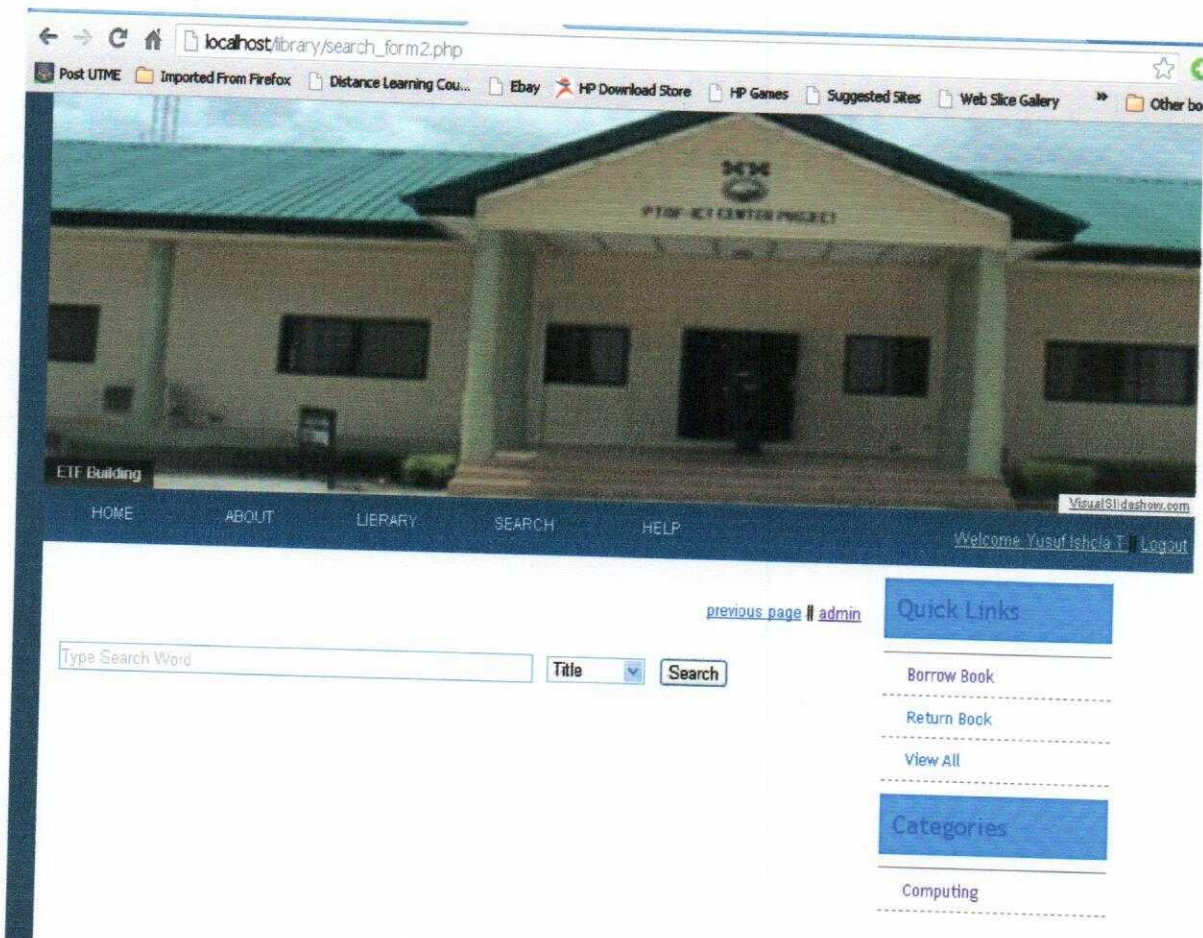
Figure 4.3: Search page of the digital library

This page searches and identifies document for specified keywords and returns a list of matching documents.

4.1.2 INPUT DESIGN

The input to be extracted from the proposed system is as shown below

Figure 4.4: Add user page

This screen enables first timers to register on the library portal so as to allow them gain access to materials and the services provided by the digital library.
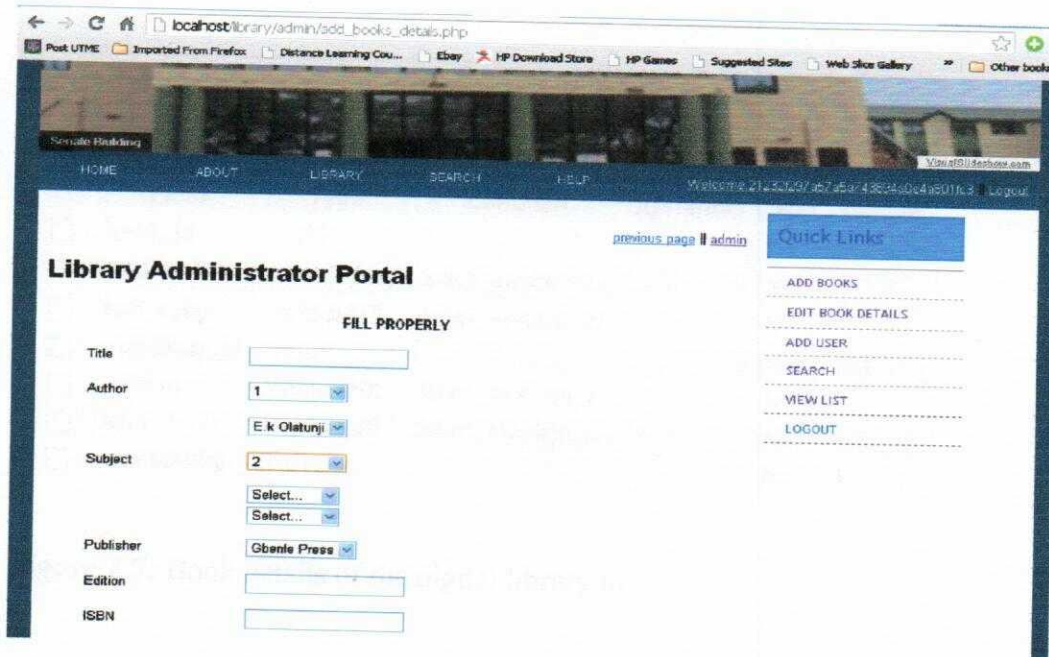
Figure 4.5: Add book page

This screen shows how books are added to the digital library according to their title, author, subject, publisher, edition and ISBN.

4.1.3 DATABASE DESIGN

This refers to tables used in proposed system. The database design for proposed system is as shown below

	Field	Type	Collation	Attributes	Null	Default
☐	**id**	int(11)			No	
☐	**username**	varchar(40)	latin1_swedish_ci		No	
☐	**password**	varchar(40)	latin1_swedish_ci		No	

↑__ Check All / Uncheck All With *selected*: 🗒 ✏ ✕ 🗝 🔠

Figure 4.6: Admin table

This is a screenshot of the "admin table" in database showing the admin login details.

Browse Structure SQL Search Insert Export Imp

	Field	Type	Collation	Attributes	Null	Default
☐	book_id	int(11)			No	
☐	title	varchar(200)	latin1_swedish_ci		No	
☐	soft_copy	varchar(50)	latin1_swedish_ci		No	
☐	publisher_id	int(20)			No	351
☐	edition	varchar(50)	latin1_swedish_ci		No	
☐	isbn	varchar(30)	latin1_swedish_ci		No	
☐	availability	int(11)			No	1

Figure 4.7: Book details of the digital library in

Browse Structure SQL Search Insert Export

	Field	Type	Collation	Attributes	Null	Def
☐	id	int(11)			No	
☐	name	varchar(50)	latin1_swedish_ci		No	
☐	address	text	latin1_swedish_ci		No	
☐	phone	varchar(11)	latin1_swedish_ci		No	
☐	status	varchar(20)	latin1_swedish_ci		No	
☐	password	varchar(40)	latin1_swedish_ci		No	

↑ Check All / Uncheck All *With selected:*

Figure 4.8: database design of 'user details" in digital library

4.1.4 PROCEDURE DESIGN

This refers to the step by step method of using the proposed system. The proposed system comprises of Administrator and general user environment. The steps to use proposed system are as follows

1. On address bar of browser type http://localhost/e-library/index.php

2. You will be prompted to supply username and password to verify a registered user and has privileged to use e-library system otherwise you can only view books without inability to read document or download any material.

3. If the username and password supplied are correct homepage will be with list of available document which you can read and download based on choice.

4. The username and password are in two formats as an administrator as well as a user.

5. As an administrator you are to type http://localhost/e-library/admin/index.php on the address bar.

6. As an administrator you are prompted with administrator page where back end of e-library exercise is carried out.

4.2 IMPLEMENTATION OF THE SYSTEM

System implementation is an important phase in software development life cycle. Digital library is implemented on Windows operating systems. System implementation encompasses

series of stages and each of these stages are essential to the successful implementation of any system.

The implementation stage is carried out in the following aspects:

iii. Home page interface implementation.

iv. Input/login interface implementation.

v. Acquisition/Upload interface implementation.

vi. Repository interface implementation.

4.2.1 HARDWARE SUPPORT

The hardware requirement for successful completion of this project include monitor, CPU, keyboard, mouse, printer and an uninterrupted power supply (UPS).

4.2.2 SOFTWARE SUPPORT

The software support for design of proposed system involves operating system, Macromedia dreamweaver, XAMP server and an internet access as well as an anti virus software which prevents system from being infected by virus.

4.3   DOCUMENTATION OF THE SYSTEM

4.3.1   PROGRAM DOCUMENTATION

In order for the proposed system to be used on any computer system it takes the following ways

    I. Boot system

    II. Copy folder to www inside wamp folder of drive C: after WAMP server is installed onto system.

    III. Open any browser on system (Microsoft internet Explorer, Mozilla Firefox, Netscape Navigator, Opera, Flock, Safari e.t.c)

    IV. Type http://localhost/e-library/index.php on address bar and press return key or enter key.

4.3.2   OPERATING THE SYSTEM

In order for proposed system to be used on any computer system it takes following ways

    I. Boot system

    II. Copy folder to www inside wamp folder of drive C: after WAMP server is installed onto system.

    III. Open any browser on system (Microsoft internet Explorer, Mozilla Firefox, Netscape Navigator, Opera, Flock, Safari e.t.c)

    IV. Type http://localhost/elibrary/index.php on address bar and press the return key or enter key.

4.3.3 SYSTEM MAINTENANCE

The system is flexible enough to entertain any future amendment which might be required when need arise.

CHAPTER FIVE

CONCLUSION AND FURTHER STUDY

5.1 CONCLUSION

In this study, an digital library system was developed towards online usage with help of macromedia dreamweaver as a text editor, PHP is used as scripting language and MYSQL is used as the backend database.

Based on finding it was concluded that: online mathematical library can easily be developed

ii   This system that was developed will automatically save cost

iii   It will serve as an alternative to an expert usage

iv   It can serve as individual teaching at any time

This project work is aimed at making the departmental library available to students at a click of mouse in respective areas of choice. It enables students to have access to latest learning facilities such as, articles, journals, textbooks, thesis, projects, newspapers, etc. with their computer systems without going through the rigorous steps and routine in the conventional institution libraries.

5.2   FURTHER STUDY

For further research work to be carried out, I hereby suggest the following

i   Online library should be developed that can work on any platform.

ii   Diagramatic representation as a teaching aid should be included in an online mathematical library.

iii   Online library teaching should also be extended to other field of study such as chemistry, English Biology Agricultural science and many others.

Iv   Digital Library should be developed to support audio, video and a diagrammatic aid to learning.

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   Available: http://saweb.csus.edu/students/departments.aspx

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PROGRAM CODE

HOME PAGE

```php
<?php session_start();?>
```

```html
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<html xmlns="http://www.w3.org/1999/xhtml">

<head>

<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />

<title>Library Management System</title>

<script language="javascript" type="text/javascript" src="include/calendar.js"></script>

<script language="javascript" type="text/javascript" src="include/config.js"></script>

<script language="javascript" type="text/javascript" src="include/submit.js"></script>

<script language="javascript" type="text/javascript" src="include/nav_functions.js"></script>

<script src="include/urchin.js" type="text/javascript"></script>

<script type="text/javascript" src="include/jquery-1.3.2.min.js"></script>

<script type="text/javascript" src="include/jquery.tools.js"></script>

<script type="text/javascript" src="include/jquery.custom.js"></script>
```

```html
<link rel="stylesheet" type="text/css" href="style.css" />

</head>



<body>

<div class="wrapper">

<?php include("top.php");?>

<!-- Main wrapper div starts here-->

<div class="main_wrapper">



<!-- Content wrapper div starts here-->

<div class="content_wrapper">

<h1>About</h1>

<p>This library system is designed for the implementation of library functions. <br/> Books can be uploaded by the admin, which then can be downloaded by students. The search algorithm enable users to search for books either by title, category, writer or publisher.

</p>
```

```html
<p>Developed by: <span style="font-size: 24px; color:brown; font-weight:bold;">Okunola Damilola</span> In Award of Bs.c In Computer Science, Federal University, Oye. Ekiti State. 2015</p>

<p> </p>

<p> </p>

<p> </p>

</div>

    <!-- Content wrapper div ends here-->


    <!-- Right wrapper div starts here-->

    <div id="side_bar">

      <?php //include('sidelinks.php'); ?>

    </div>

  <!-- Right wrapper div ends here-->

        <div class="clr"></div>

    <div><img src="images/edge_bottom.jpg" border="0" /></div>

</div>

<p>
```

```html
<!-- Main wrapper div ends here-->

</div>

</body>


</html>



<?php session_start();?>

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<html xmlns="http://www.w3.org/1999/xhtml">

<head>

<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />

<title>Library Management System</title>

<link rel="stylesheet" type="text/css" href="style.css" />

</head>


<body>
```

```php
<div class="wrapper">

<?php include("top.php");?>



<!-- Main wrapper div starts here-->

<div class="main_wrapper">



<!-- Content wrapper div starts here-->

<div class="content_wrapper">

<h1>The Library</h1>

<?php include ("index2.php") ?>

</div>

<!-- Content wrapper div ends here-->



<!-- Right wrapper div starts here-->

<div id="side_bar">

<?php include('index_subject.php'); ?>

</div>
```

```html
<!-- Right wrapper div ends here-->

        <div class="clr"></div>

    <div><img src="images/edge_bottom.jpg" border="0" /></div>

</div>

<p>

<!-- Main wrapper div ends here-->

</div>

</body>

</html>

<?php session_start();?>

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<html xmlns="http://www.w3.org/1999/xhtml">

<head>

<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
```

```
<title>Library Management System</title>

<link rel="stylesheet" type="text/css" href="style.css" />

<script type="text/javascript">

function MM_validateForm() { //v4.0

  if (document.getElementById){

    var i,p,q,nm,test,num,min,max,errors='',args=MM_validateForm.arguments;

    for (i=0; i<(args.length-2); i+=3) { test=args[i+2]; val=document.getElementById(args[i]);

      if (val) { nm=val.name; if ((val=val.value)!="") {

        if (test.indexOf('isEmail')!=-1) { p=val.indexOf('@');

          if (p<1 || p==(val.length-1)) errors+='- '+nm+' must contain an e-mail address.\n';

        } else if (test!='R') { num = parseFloat(val);

          if (isNaN(val)) errors+='- '+nm+' must contain a number.\n';

          if (test.indexOf('inRange') != -1) { p=test.indexOf(':');

            min=test.substring(8,p); max=test.substring(p+1);

            if (num<min || max<num) errors+='- '+nm+' must contain a number between '+min+' and
'+max+'.\n';

    } } } else if (test.charAt(0) == 'R') errors += '- '+nm+' is required.\n'; }

  } if (errors) alert('The following error(s) occurred:\n'+errors);
```

```
document.MM_returnValue = (errors == ");

} }

</script>

</head>


<body>

<div class="wrapper">

<?php include("top.php");?>

  <!-- Main wrapper div starts here-->

  <div class="main_wrapper">


  <!-- Content wrapper div starts here-->

  <div class="content_wrapper">

    <h1>Library User Login</h1>

    <form     action="login_process.php"     method="post"     name="form1"     id="form1"

onsubmit="MM_validateForm('username',",'R','password',",'R');return

document.MM_returnValue">

      <table width="438" align="center" cellpadding="5" cellspacing="0">
```

```html
<tr>

  <td width="186">Username</td>

  <td width="402"><label>

   <input name="username" type="text" id="username" />

   </label></td>

 </tr>

 <tr>

  <td>Password</td>

  <td><label>

   <input name="password" type="password" id="password" />

   </label></td>

 </tr>

 <tr>

  <td> </td>

  <td><input type="submit" name="Submit" value="Login" /></td>

 </tr>

</table>
```

```html
<p> </p>

<p> </p>

<p> </p>

</form>

</div>

<!-- Content wrapper div ends here-->



<!-- Right wrapper div starts here-->

<div id="side_bar">

</div>

<!-- Right wrapper div ends here-->

        <div class="clr"></div>

    <div><img src="images/edge_bottom.jpg" border="0" /></div>

</div>

<p>

<!-- Main wrapper div ends here-->

</div>
```

```
</body>

</html>
```

LOGOUT PAGE

```php
<?php

session_start();

//unset session variable

unset($_SESSION['user_log']);

//end session

session_destroy();

header("location:index.php");

?>
```