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Digital Library Management System for Sustainable Development

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Abstract

The analogue library cataloging system must be redesigned for sustainability. The library's information must be available whenever the patron wants it, which is frequently not the case with traditional libraries. The goal of a digital library management system is to create a computerize system that will handle all the library's everyday operations. It contains a lot of capabilities that are typically absent from traditional library management systems, like the ability for teachers and users to log in. Additionally, it offers an admin login feature that allows the administrator to keep an eye on the entire system. Additionally, it provides a platform that allows students to view a list of books that have been issued along with the dates of issue and return after logging into their accounts. This paper outlines the steps needed in creating a digital library management system that can assist library personnel and students in maintaining the library as effectively as possible while also lowering the amount of human labor required. This system offers a green technology that attempts to reduce waste and laborious paperwork for library maintenance, in keeping with Nigeria's Vision 20:2020. Additionally, it offers improved security and convenient access to library resources. At Zirve University in Turkey, the system was successfully designed and tested, yielding satisfactory results.

Keywords: Sustainability, System, Management, Library, Digital Library, Library Management.

Introduction

According to (Rathee et al., 2020), digital libraries significantly contribute to user convenience through digital services at no cost. Free digital library systems effectively meet the information and educational needs of users promptly and efficiently. Digital libraries play a crucial role in safeguarding the intellectual assets of educational institutions. The long-term preservation of library materials is guaranteed through the implementation of digital library systems (Abu Sirhan et al., 2019). The digital library management system (DLMS) reduces storage costs. The field of modern librarianship cannot be considered complete without a digital management system, especially in higher education libraries, where information professionals are required to deliver unconventional services due to ongoing technological advancements (Hazarika et al., 2020). The challenges of the contemporary era cannot be addressed without the establishment of digital libraries within universities (Koch et al., 2019). Digital repositories improve the operational efficiency and visibility of libraries within their communities. Universities worldwide are increasingly adopting digital library management systems to better serve their users and to enhance the objectives of their respective organizations (Kampa and Patra, 2020). Digital libraries are instrumental in the development and management of institutional repositories, providing users with access to institutional resources (Gurikar and Hadagali, 2021), and are exceptionally beneficial for the storage and preservation of rare materials for future generations (Rafique et al., 2021; Barrueco and Termens, 2022). Wu et al. (2021) also highlighted the importance of security, privacy, and reliability features of the DLMS in their research. They concluded that DLMS must ensure the protection of readers' privacy when accessing digital content.

A significant aspect of the DLMS allows library professionals to enhance the online visibility of digital collections globally, ensuring that interested users have remote access to bibliographic and full-text content. The web-based capability is a crucial feature that should be present in any DLMS, as it enables library staff to monitor and manage the system from any location. These modules assist librarians in managing the library more conveniently and efficiently compared to non-computerized library systems.

Methodology

The methodology adapted is the bottom–up approach to develop an application that can manage all the transactions in a library. The requirements are categorized as follows:

A. **System Requirements**

(i) **Non-Functional Requirements**

- ✓ **Efficiency Requirement**

  The system must ensure that after implementation, the librarian and user can easily access library facilities such as searching and book transaction at very a faster rate.

- ✓ **Reliability Requirement**

  The system should accurately perform member registration, member validation, report generation, book transaction and search.

- ✓ **Usability Requirement**

The system should be designed based on a user-friendly environment so that student and staff of the library can perform the various tasks easily and in an effective way.

- ✓ **Organizational/Implementation Requirement**

  In implementing the whole system, utilization of html in frontend with php as server-side scripting language which will be used for database connectivity and the backend ie the database part is developed using MySQL

(ii) **Functional Requirements**

- ✓ **Normal User Login**

This feature is used by the user to login into the system. It requires a password before they are allowed to enter the system. The user ID and password will be verified and if it is an invalid ID, the user is denied access into the system. It is characterized of the following:

- ❖ User ID is provided when they register.
- ❖ The system must only allow user with valid ID and password to enter the system.
- ❖ The system performs authorization process which decides what user level can access to.
- ❖ The user must be able to logout after they finished using system.

- ✓ **Register New User**

This feature can be performed by all users to register new user to create account. It is characterized of the following:

- ❖ System must be able to verify information.
- ❖ System must be able to delete information if information is wrong.

- ✓ **Register New Book**

This feature allows to add new books to the library. It is characterized of the following:

- ❖ System must be able to verify information.
- ❖ System must be able to enter number of copies into table.
- ❖ System must be able to not allow two books having same book ID.

- ✓ **Search Book**

This feature is found in book maintenance part. One can search book based on book ID, book name, publication or by author name. It is characterized of the following:

- ❖ System must be able to search the database based on select search type.
- ❖ System must be able to filter book based on keyword entered.
- ❖ System must be able to show the filtered book in table view.

- ✓ **Issue Books and Return Books**

This feature allows to issue and return books and view reports of book issued.

- ❖ System must be able to enter issue information in database.
- ❖ System must be able to update number of books.

- ❖ System must be able to search if book is available or not before issuing System should be able to enter issue and return date information

B Software and Hardware Requirements

(i) **Software Requirements**

- ✓ Operation System -OSX Mac operation systems.
- ✓ Database MYSQL-MYSQL is used as database as it easy to maintain and retrieve records by simple queries which are in English language which are easy to understand and easy to write.
- ✓ Development tools and Programming language- HTML is used to write the whole code and develop webpages with css, java script for styling work and php for sever side scripting.

(ii) **Hardware Requirements**

A personal computer with core 2 dual processor, 1GB of hard disk Space and 4GB of memory (RAM) is ideal for hosting the website in Local Host in order to have adequate speed by the users.

C System Blocks

There are three blocks which were modularized as follows:

(i) **Admin Module**

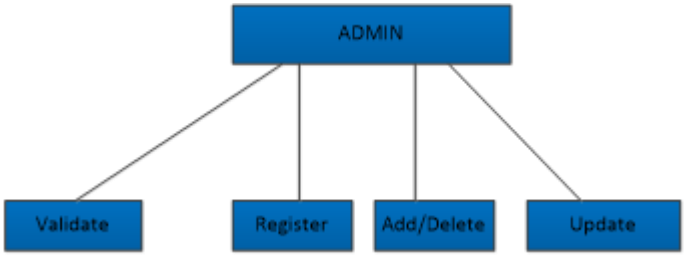


Figure 1: Block Diagram of the Admin Module

(ii) **Student Module**

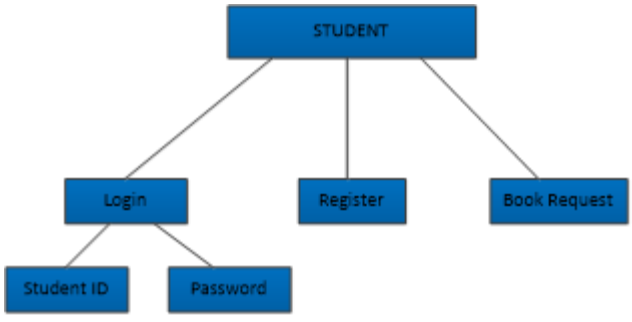


Figure 2: Block Diagram of the Student Module

(iii) **Book Transaction Module**

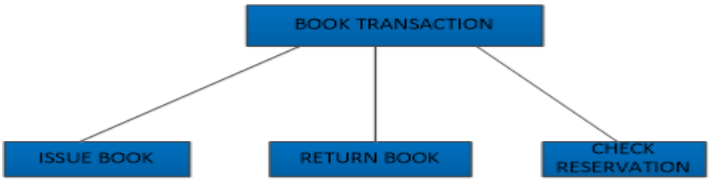


Figure 3: Block Diagram of the Book Transaction Module

Data Flow Diagrams

(i) **Data Flow Diagram for Teacher Login**

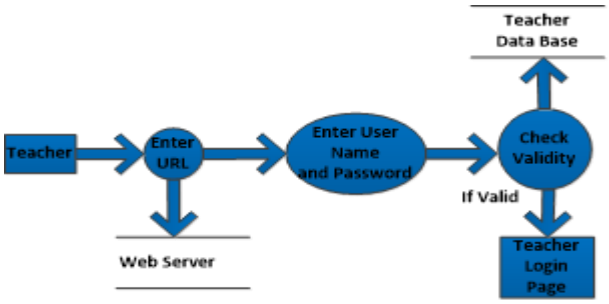


Figure 4: Teacher Login Data Flow Diagram

(ii) **Data Flow Diagram for Student Login**

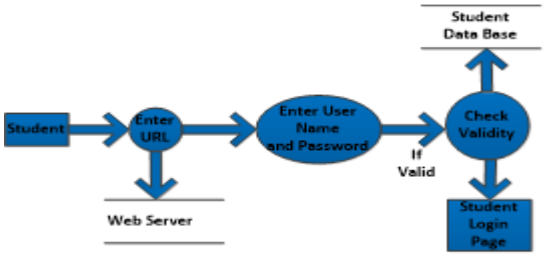


Figure 5: Student Login Data Flow Diagram

(iii) **Data Flow Diagram for Book Issue**

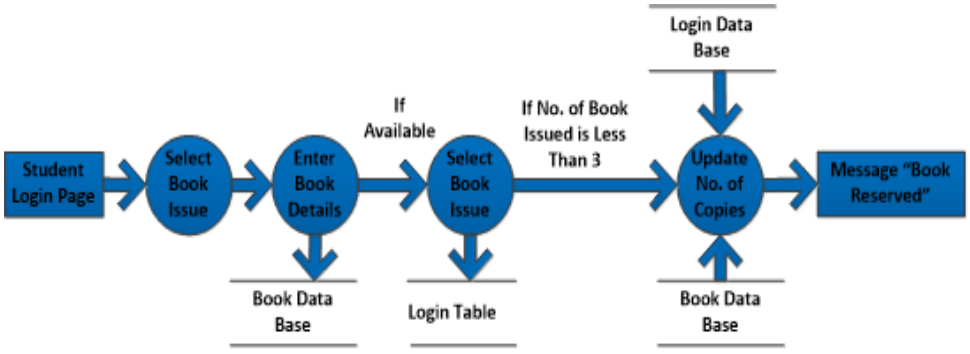


Figure 6: Book Issue Data Flow Diagram

(iv) **Data Flow Diagram for Book Search**

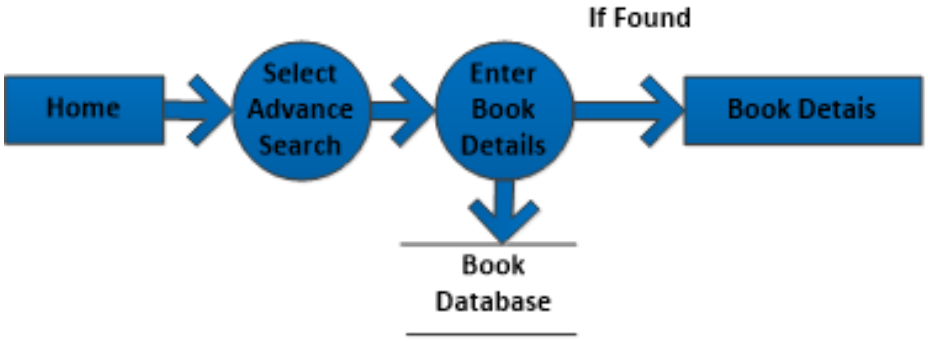


Figure 7: Book Search Data Flow Diagram

(v) **Data Flow Diagram for Account Creation**

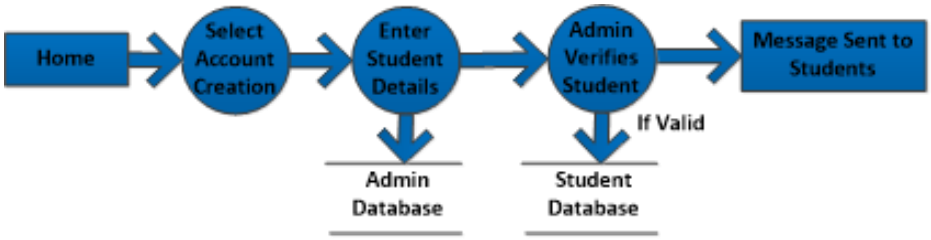


Figure 8: Teacher Login Data Flow Diagram

Results

i) **Screenshot for homepage**

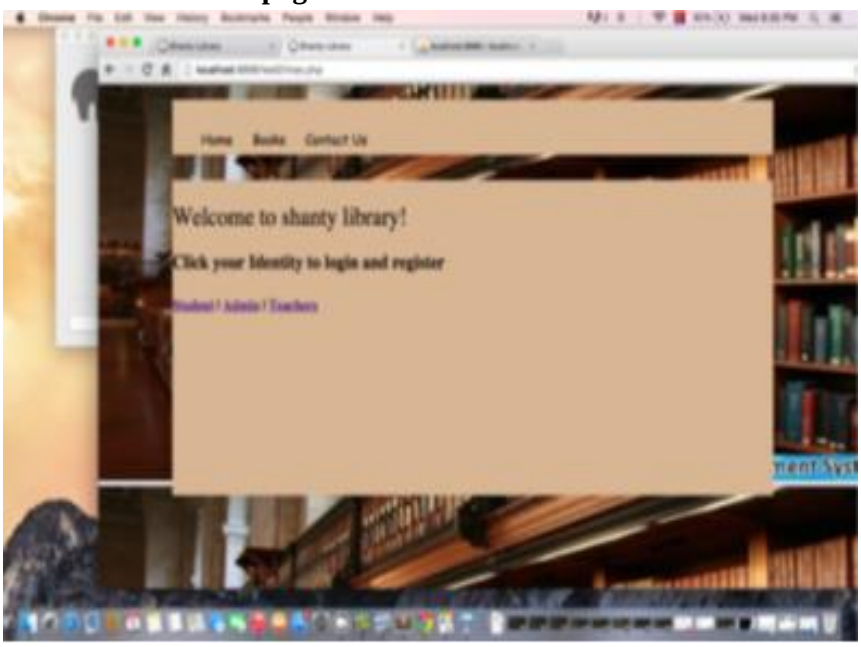


Figure 9: Homepage Screenshot

ii) **Admin Id and Password**

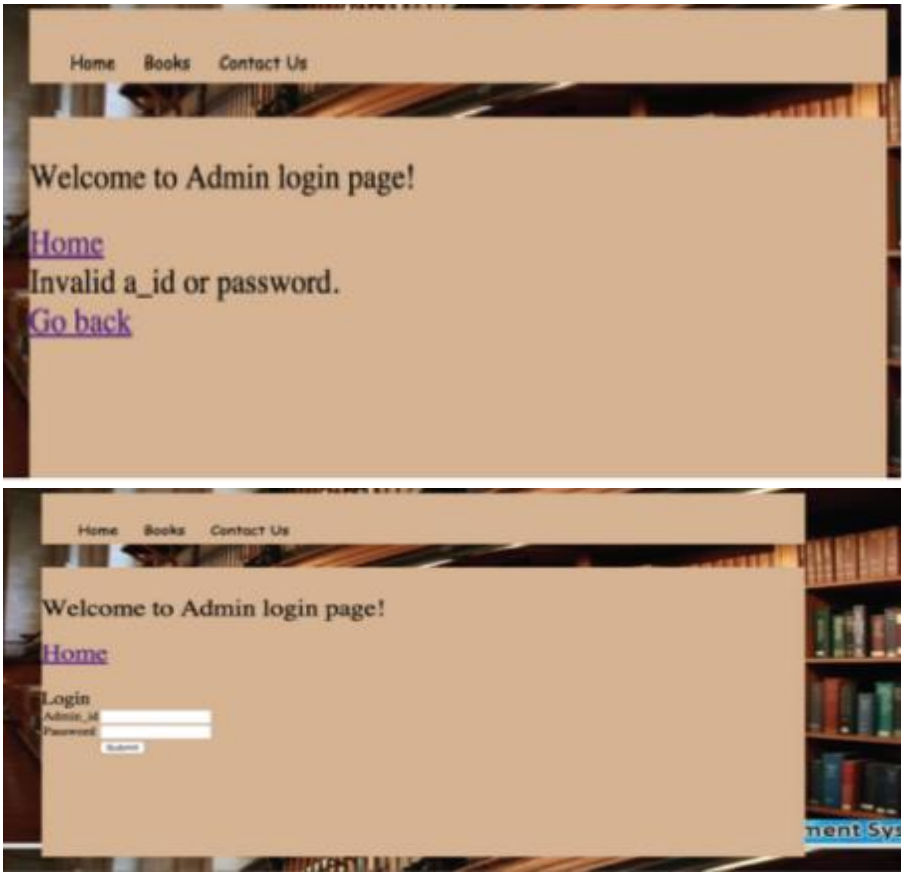


Figure 10: Admin Login Screenshot

iii) **Registration Screenshot**

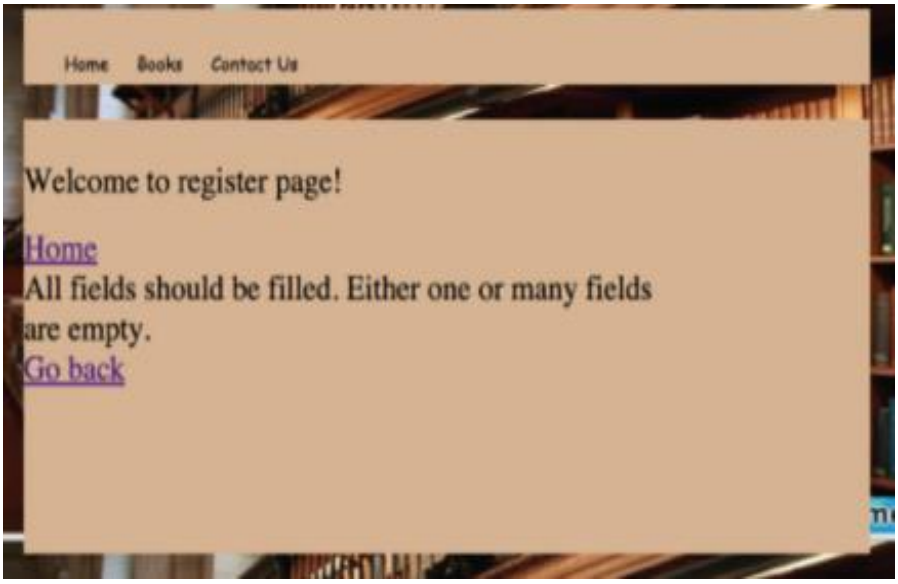


Figure 11: Account Registration Screenshot

iv) **Book Addition**

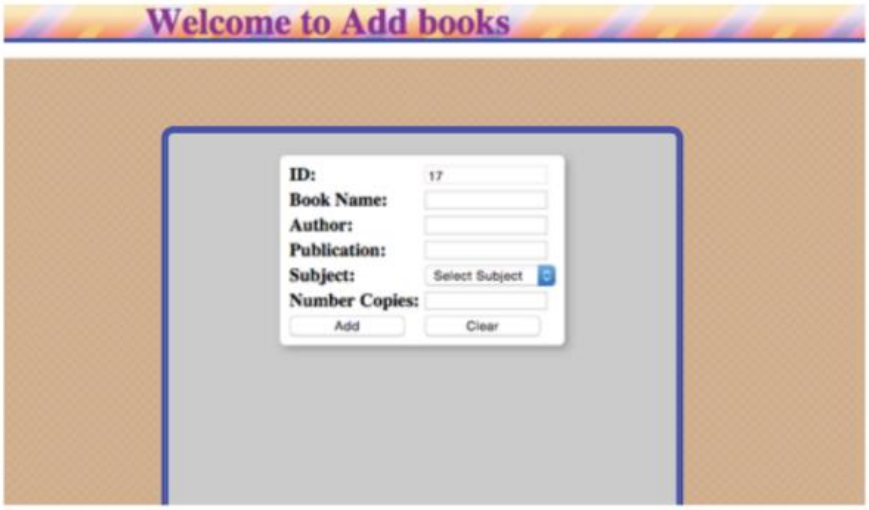


Figure 12: Book Addition Screenshoot

v) **Student Profile**

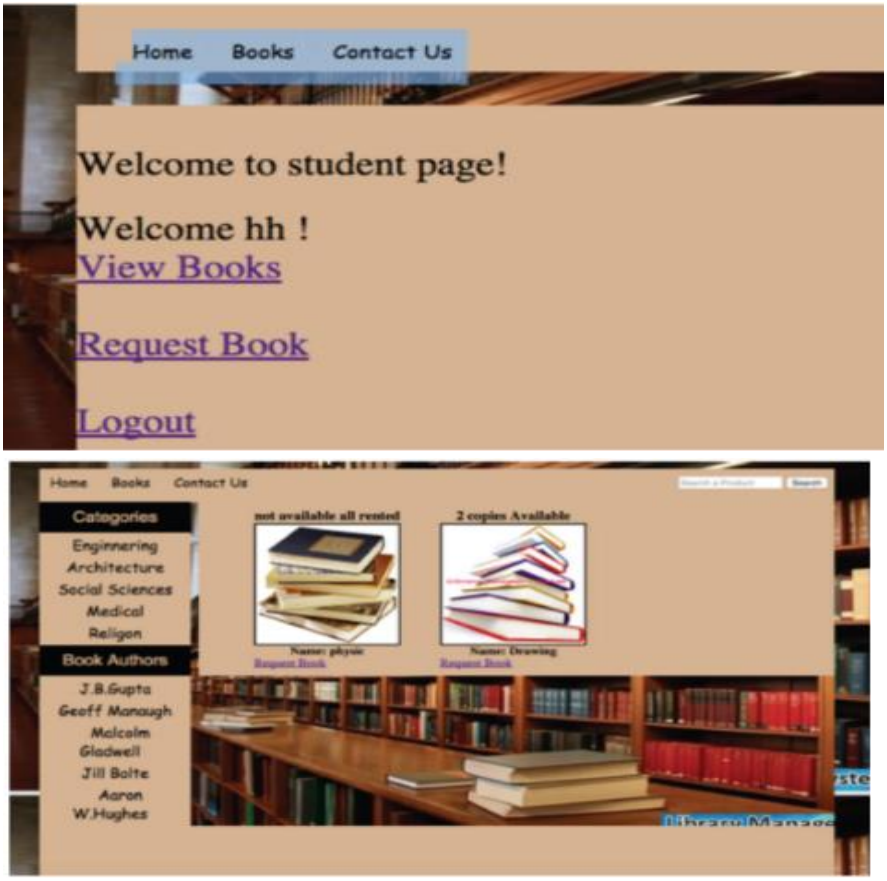


Figure 13: Student Profile Screenshot

Conclusion

A digital library automation model was presented in this paper. The hardware required for the system as prevented in the paper is a computer system with a minimum of 1GB Ram and Dual Core processor and 4GB RAM. Additionally, the software required are an Operating system and Database MYSQL. The approach employed in the system design was building the database in modules (Modular approach). Three different modules on were built and harmonized to form the digital library management system. The system was tested and based on the results presented it can be concluded the work was a success. Based on this, this paper recommends institutions like Federal Polytechnic Damaturu, to think towards adopting such a model for automation of its Library to save cost as well play along with the current trend happening globally.

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