

A Web-Based Online Library Management System for Efficient Library Resource Management

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ABSTRACT

The online Library Management System is a application designed to manage library system paperless and secure. It's Core Purpose is to solve problems like the manual issue and returns of the books, managing books in the library, maintaining records of the students, online fine calculation and improves overall efficiency in the work. This system has a main feature which makes library management more enthusiastic and stand out from others which is the holiday feature and recommendation of books by teachers of different branches to students of different branches. The Online Library management helps reduce paper work, improves accuracy in work and saves time of both librarian and students.

Keywords—Library Management System, CSS, SQL, Recommendation

1. INTRODUCTION

A Library Management System Online is a web-based software application designed to manage and automate the daily operations of a library. It helps librarians handle books, members, transactions, and records through a centralized digital platform accessible through the internet. A web-based Library Management System is needed in this modern world to make library operations and services faster, more accessible, and more efficient. Traditional libraries use manual record-keeping methods, which are time-consuming, prone to errors, and difficult to manage as the number of books and members increases. This application solves these problems by storing all data digitally and allowing real-time access from anywhere through the internet. Librarians can easily manage book records, issue and return transactions, calculate fines automatically, and generate reports without paperwork.

For users, a web-based system provides convenience. Members can search for books, check availability, and view their borrowing history online without visiting the library physically. It also ensures better data security, reduces duplication of records, and improves overall transparency. Therefore, the need for a Library Management System Online makes the demand for efficiency, accuracy, remote accessibility, and better management in modern libraries. Work gets easier in a web-based library management system because most tasks are automated and handled digitally instead of manually. First, manual record keeping is eliminated. Instead of writing details in registers, all information about books, members, and transactions is stored in a database. This reduces paperwork and saves time. Second, searching becomes faster. A librarian or user can find a book instantly by typing the title or author, instead of checking shelves or records manually.

Third, issue and return processes are simplified. The system automatically records the issue date, return date, and updates book availability. This avoids confusion and mistakes. Fourth, fine calculation is automatic. If a book is returned late, the system calculates the fine instantly, reducing manual errors. Fifth, report generation is quick. Librarians can generate reports about issued books, overdue books, or total books with just a few clicks. Finally, online access improves convenience. Members can check book availability and manage their accounts from anywhere, without visiting the library. Because of automation, speed, accuracy, and online access, work becomes much easier and more efficient.

2. RELATED WORK

Several researchers have proposed different approaches to improve the efficiency and automation of library management systems using modern technologies. In [1], the authors presented a web service-based library management system that enables efficient management of library resources through distributed services and improved accessibility for users and

administrators. The system emphasizes interoperability and remote access to library data. An integrated library management system focusing on efficient book search and placement tasks was introduced in [2]. The proposed system simplifies the process of locating books within the library and improves overall resource organization through an integrated database and search mechanism.

With the advancement of Internet of Things (IoT) technologies, smart library solutions have also been explored. The work in [3] proposed an IoT-based library management system that enables real-time monitoring and automation of various library operations, enhancing the overall management efficiency. Radio Frequency Identification (RFID) technology has been widely adopted for library automation. In [4], the authors developed an RFID-based library management system integrated with an Android mobile application to facilitate book tracking, issue-return processes, and user access through mobile devices. Similarly, the study in [5] presented an intelligent RFID-based system designed to automate book identification and circulation processes, thereby reducing manual workload and improving operational accuracy.

Recent advancements in artificial intelligence have also been incorporated into library management. The work presented in [6] proposed an automated system utilizing face recognition and Optical Character Recognition (OCR) techniques to manage user identification and book information extraction, enhancing both security and efficiency. Furthermore, emerging technologies such as blockchain have been explored for secure library data management. In [7], the authors proposed a smart book management system based on a blockchain platform to ensure data integrity, transparency, and secure record management within library environments.

These studies highlight the growing integration of web services, IoT, RFID, artificial intelligence, and blockchain technologies in modern library management systems to improve automation, security, and accessibility. Design and Implementation of a Library Management System Based on the Web Service [1]. An Integrated Library Management System for Book Search and Placement Tasks [2]. Smart IoT Based Library Management [3]. RFID-Based Library Management System with Android Mobile Access Application [4]. Intelligent RFID Based Library Management System [5]. Automated Library Management System using Face Recognition and OCR [6]. A Smart Book Management System Based on Blockchain Platform [7]. html5 and css3 all-in-one for dummies – by andy harris [8]. PHP MySQL: Server-side Web Development by Jon Duckett [9]

3. PROPOSED SYSTEM

The proposed system is a Web-Based Library Management System designed to automate and simplify all library operations. This system will replace the traditional manual method of managing books and records with a computerized and online platform.

The system will allow librarians (admin) to manage book records, member details, issue and return transactions, and generate reports efficiently. It will also allow members/students to search for books, check availability, view issued books, and track due dates through an online interface.

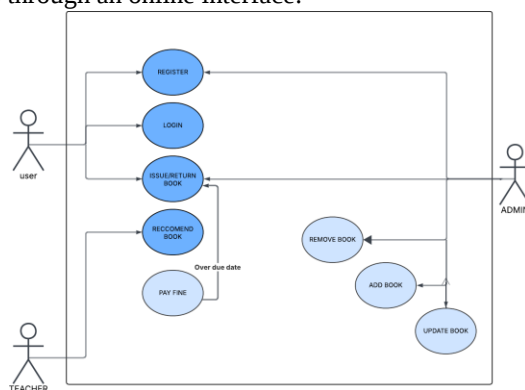


Fig. 1: Block diagram

The proposed Online Library Management System will provide a secure, reliable, and user-friendly solution for managing library activities. It will enhance productivity, accuracy, and service quality in modern libraries.

The system is developed using web technologies such as HTML, CSS, JavaScript, and a database management system to store and manage information about books, users, and transactions. Through the website, administrators can add, update, and delete book records, manage user accounts, and keep track of issued and returned books. At the same time, users can register, log in, search for books, and check their availability online.

A. Requirement Analysis

In this phase, the requirements of the library are collected and analyzed. Information about book management, member registration, issue and return process, and report generation is gathered. The problems in the existing manual system are identified.

B. System Design

- Database structure (tables for books, members, transactions)
- User interface design (login page, dashboard, forms)
- System modules (book management, member management, etc.)

C. Development

In this phase, the actual coding of the system is done using suitable programming languages and technologies. The front-end is developed for user interaction, and the back-end is developed for database handling and business logic.

D. Testing

The system is tested to ensure it works properly without errors.

- Unit Testing – Testing individual modules
- Integration Testing – Testing combined modules
- System Testing – Testing the complete system Errors and bugs are identified and corrected.

4. IMPLEMENTATION

User Interface Implementation

A simple and user-friendly interface is designed so that users can easily navigate through the website. The homepage provides options for user registration, login, and book search. The interface ensures that users can quickly find the required information.

1. Admin Module

The administrator module allows the librarian to manage the entire system. The admin can:

Add new books to the library database Update or delete book records

Manage user accounts

Monitor issued and returned books

2. User Module

The user module allows registered users to access library services online. Users can:

Register and log in to the system

Search for books by title, author, or category Check the availability of books

View issued books and return dates After successful testing, the system is deployed in the library environment. Users are trained to operate the system effectively.

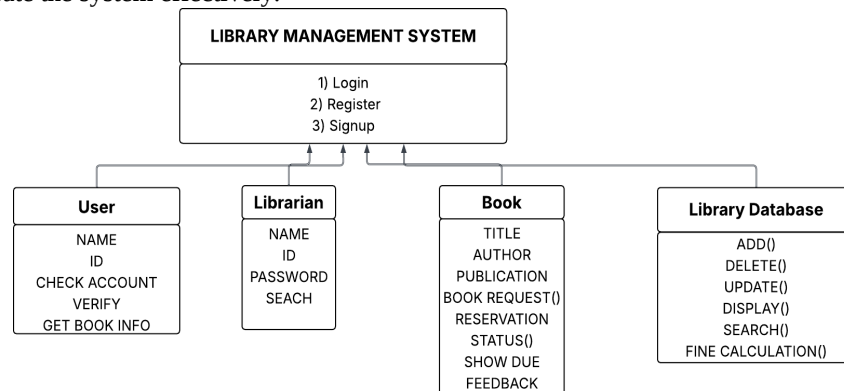


Fig. 2: Methodology

5. EXPERIMENTAL WORK

A. Experimental Setup

The system was developed using a client-server architecture consisting of:

- Client Side
- Web browser interface

- User-friendly forms for login, registration, and book search
- Server Side
- Business logic implementation
- Authentication and validation
- Database
- Stores book details, member records, and issue trans- actions

B. Experimental Procedure

- Designed system requirements.
- Created ER diagram and database schema.
- Implemented database using SQL.
- Developed frontend web pages.
- Connected frontend with backend using server-side scripting.
- Implemented CRUD operations.
- Tested each module.
- Debugged and optimized the system.

The experimental implementation of the Online Library Management System successfully automated library operations. The system ensures efficient data management, improved accessibility, and reduced manual workload. It can be further enhanced with features such as barcode scanning, SMS/email notifications, and cloud deployment.

6. RESULTS AND DISCUSSION

The Fig. 3 (Home Page) The Home page of LMS(Library management system) consists of 3 Logins

- Student Login
- Teacher Login
- Admin Login

The Fig. 4(b) It Displays 3 Sections

- Total Books
- Total Students
- Holidays

This page also shows the recent book issued where it displays

- Student Name
- Book Name
- Issue Date
- Return Date
- Status of the book

The Fig. 4 (c) It gives the whole data of Number of Books, Recommended Books Total Students Here Operations Like Searching the book, Recommendation of different semester books to different branch of students further recommendation can be updated too.

The Fig. 4 (d) The dashboard includes the Recommendation of Books where he can view the books recommended by is particular branch Teacher. We can Issue book through this portal login.

This is the key feature of our website which ensures that the book is given on a period of seven days and also includes that if a particular student has to return a book on his due date but unfortunately that day is declared as holiday so the next working date is issued to that student automatically.

The Online Library Management System was successfully designed and implemented to automate the major operations of a library. The system provides an easy-to-use interface for both administrators and users. After testing the system with sample data, the following results were observed:

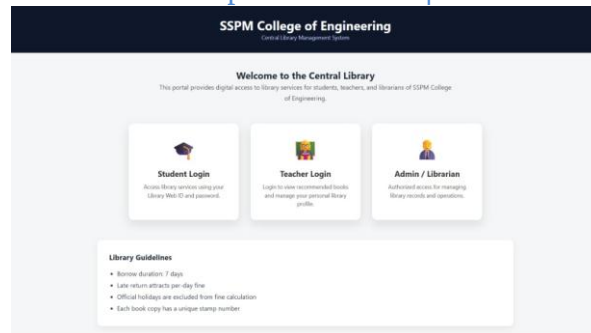
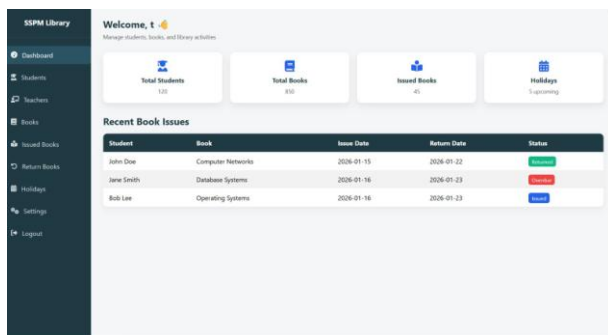
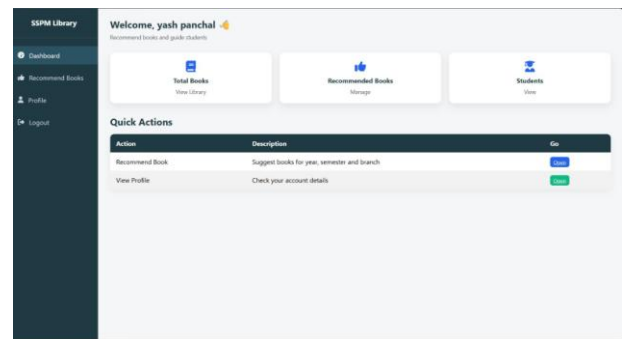


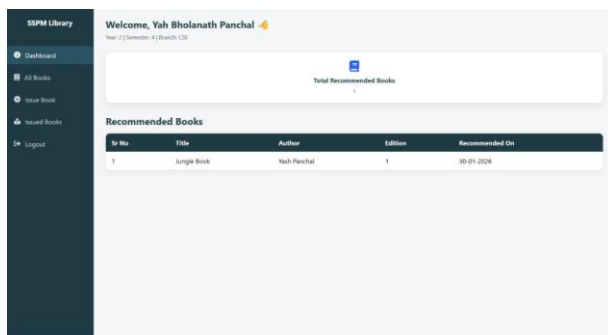
Fig. 3: Home Page



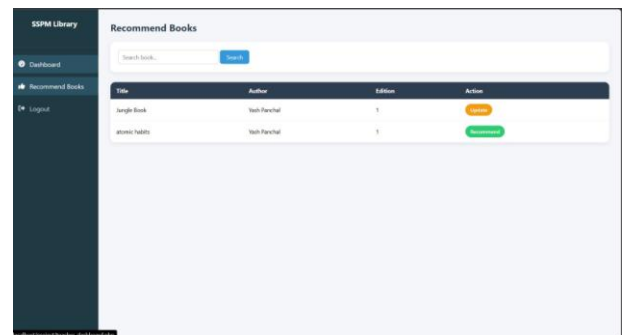
(a)



(b)



(c)



(d)

Fig. 4: Screenshots depicting the performance of the proposed system: (a) Home Page, (b) Admin Page, (c) Teacher Login Page, (d) Students Dashboard

- Efficient Book Management**
 The system allows the administrator to easily add, update, delete, and manage book records in the database. This reduces manual work and improves accuracy.
- User Registration and Management**
 Users can register and log in to the system to access library services. The administrator can also manage user accounts efficiently.
- Book Search and Availability**
 Users can quickly search for books by title, author, or category. The system displays the availability status of each book.
- Book Issue and Return Management**
 The system tracks issued books and their return dates, making it easier to manage borrowing activities and avoid record loss.
- Reduced Paperwork**
 Since records are stored digitally, the need for manual record keeping and paperwork is significantly reduced.

7. CONCLUSION

The Online Library Management System provides an efficient and reliable solution for managing library operations digitally. It simplifies tasks such as book management, user management, and book issuing and returning. By automating these processes, the system reduces manual errors, saves time, and improves overall efficiency in the work.

The project demonstrates how information technology can enhance library services and provide better accessibility for users. In the future, additional features such as online book reservations, fine calculation, and integration with digital libraries can be added to further improve the system.

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