Report

CSE311 Project Final Report

Library Management System (LMS)

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1. Introduction

Modern libraries need a library management system (LMS) to effectively organize and administer their resources. It assists librarians in managing patron accounts, issuing and returning goods, and handling late fees in addition to keeping track of the books, magazines, journals, and other materials in their collection.

Our effort to create a web-based library management system intends to give librarians an easy-to-use platform to run their daily business and give users online access to library materials. A variety of features will be available on the system, such as a search tool that will make it simple for users to locate goods in the library, a self-checkout system, and an online reservation system for popular items.

Additionally, the LMS will enable librarians to manage library finances, compile reports on circulation figures, and examine client borrowing habits. With the help of this project, we seek to increase libraries' effectiveness and usability, making it simpler for users to get the materials they require and for librarians to manage their collections of objects. https://en.wikipedia.org/wiki/Library_management

1.1 Background and Motivation

Background: Intuitive user interfaces and effective workflows are frequently missing from current library management systems. By offering a better user experience and more straightforward procedures, our initiative seeks to correct these flaws. Users can easily engage with the library's resources by creating a web-based application, and administrators have more control over book management.

This project was inspired by the requirement for a more user-friendly and effective library administration system. We want to close the gap between current user expectations and traditional library procedures by utilizing contemporary technologies. Our objective is to provide a solution that not only improves the user experience at the library but also makes administrative activities more efficient.

2. Resources/Technologies

2.1 Front-End

React JS Popular front-end library ReactJS is well-known for its quickness, adaptability, and simplicity of usage. Developers may create dynamic, interactive user interfaces with ReactJS that offer users a seamless experience. ReactJS is a great option for creating sophisticated web applications because it also enables simple integration with other technologies.

2.2 Back-End

Node JS A strong server-side framework called Node.js enables programmers to create scalable, fast online apps. Developers can create quick, lightweight, and effective applications with Node.js that can support numerous concurrent users. Also, a variety of capabilities and tools provided by Node.js make it simple to develop and deploy apps rapidly and effectively.

2.3 Database

Mysql Several organizations utilize the well-liked open-source relational database management system MySQL to store and manage their data. Many systems are supported by MySQL, along with high-performance indexing and sophisticated security features. Using MySQL, programmers can create dependable, scalable database-driven systems that can manage massive amounts of data and offer quick, effective information access.

2.4 External Resources

To learn and gain proficiency in React JS and JavaScript, external resources were utilized. Online tutorials, documentation,Chat GPT ,and interactive coding platforms were instrumental in understanding the fundamentals and best practices of React JS development. Additionally, the current course on SQL provided the necessary knowledge to work with the MySQL database.

By leveraging these resources and technologies, the development of the LMS application was made possible, enabling the implementation of key features such as user registration, book management, and borrowing functionalities.

3. Project Design

3.1 Client's Perspective

On the client side of the Web Site, There Are 3 Different Accessibility and View For The User

- Admin
- Registered User
- Guest User

3.2 Admin View

Admin Can,

- Add/Update New Book
- Delete Book
- Manage the Users
- Handle Book Request

3.3 Registered User View

Registered User Can,

- Update Their Profile Information
- Explore Available Books
- Borrow Books (Maximum 2 at a time)
- Request for new Books

3.4 Guest User View

Guest User Can,

- Register to LMS
- Search For Books
- Watch the Trending Books

4. Database Design

4.1 Entities

- User (UserID, Username, Password, Email, FirstName, LastName, Address, PhoneNumber, Admin)
- Book (BookID, Title, ISBN, PublicationDate, NumberOfPages, AvailableCopies, CoverImage, PublisherID)
- Borrowing (BorrowingID, UserID, BookID, BorrowingDate, DueDate, ReturnDate)
- eLibrary (BookID, Title, Edition, NumberOfPages, CoverImage, PDFFile)
- Publisher (PublisherID, Name)
- BookCategory (BookID, CategoryID)
- Category (CategoryID, Name)

4.2 Relationships

- User (1) - Borrowed - Borrowing (M)
- Borrowing (1) - Borrows - Book (1)
- Book (1) - Published By - Publisher (1)
- Book (1) - Categorized As - BookCategory (M)
- Book (1) - Is Part Of - eLibrary (1)
- Book (1) - Belongs To - Category (M)

4.3 ER Diagram

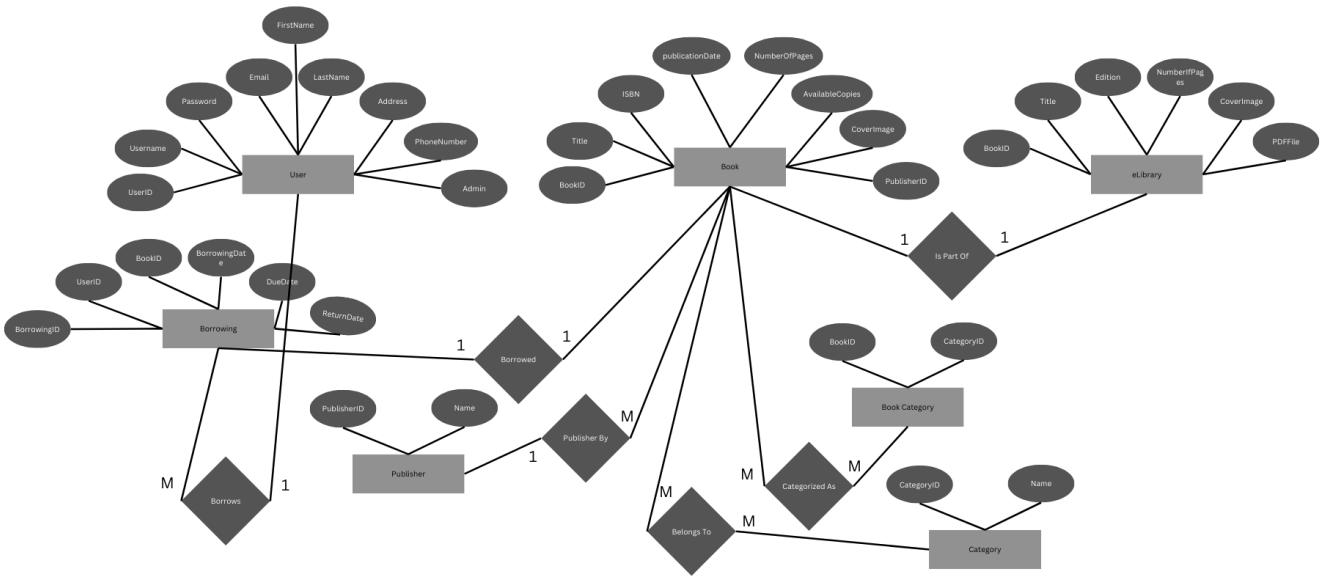


Figure 1: Database ER Diagram

5. Project WorkFlow

The workflow for the Library Management System (LMS) project involved the following steps:

Technology Selection: The project involved using Node.js, Express.js, React JS, and MySQL as the core technologies. These were chosen for their suitability in building a scalable and efficient web application.

Database Integration: The first step was connecting MySQL with Express.js to establish a database connection. This involved configuring the necessary settings to ensure smooth communication between the backend and the database.

Backend Deployment: After successful integration, the Express.js server was deployed on port 3001. This allowed the server to listen for incoming requests and handle CRUD (Create, Read, Update, Delete) operations using server-side APIs.

Frontend Launch: The React JS part of the application was launched on port 3000. This enabled users to access the LMS application through a web browser. The frontend was responsible for displaying the user interface and interacting with the server-side APIs.

API Communication: Axios, a popular HTTP client library, was used in React JS to execute API calls. It facilitated the communication between the frontend and backend, allowing the application to fetch data, submit forms, and perform other necessary operations.

Local Deployment: Due to the absence of an official deployment, the application was deployed locally on localhost. The backend server was deployed on port 3001, and the frontend React JS application was launched on port 3000. Users could access the LMS application by navigating to the appropriate URL.

Development and Testing: During the development phase, thorough testing and debugging were conducted to ensure the proper functioning of the application. This included testing CRUD operations, handling errors, and optimizing performance.

6. SiteMap

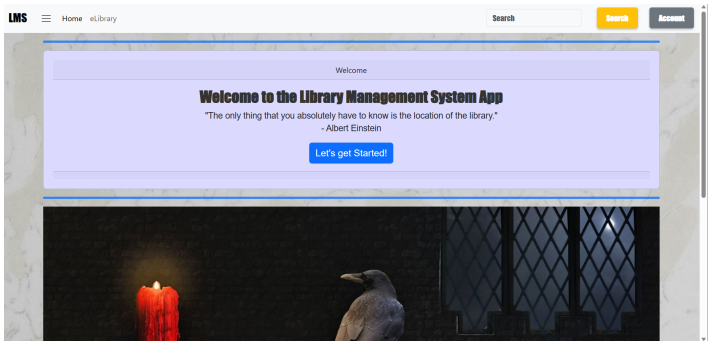


Figure 2: Home Page

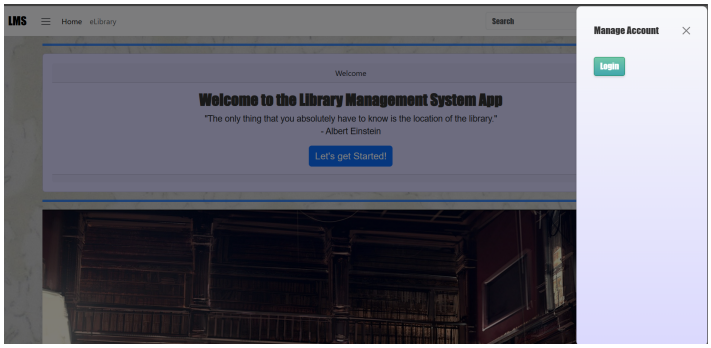


Figure 3: Account SideBar

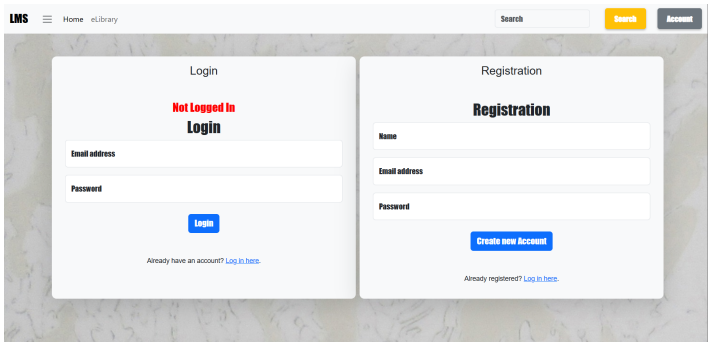


Figure 4: Authentication

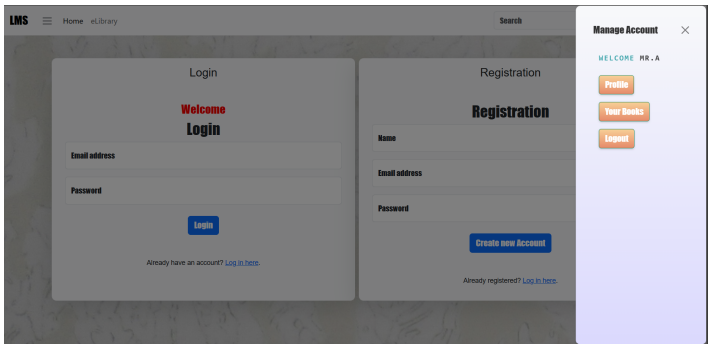


Figure 5: User Logged In

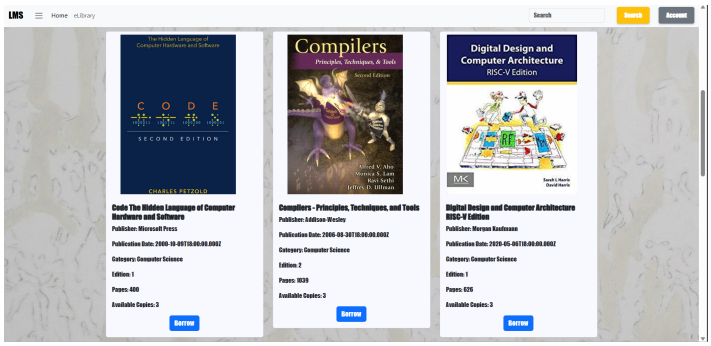


Figure 6: Explore the Books

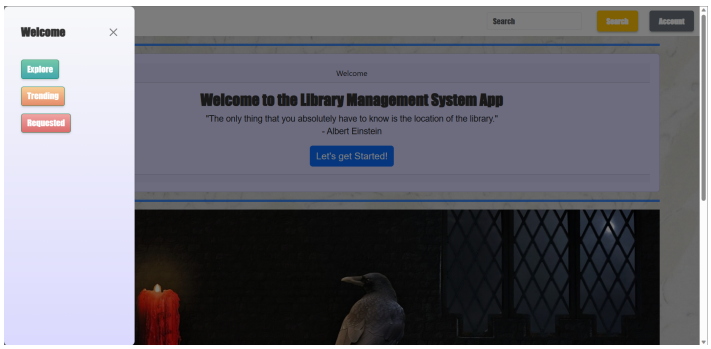


Figure 7: Left Side Bar

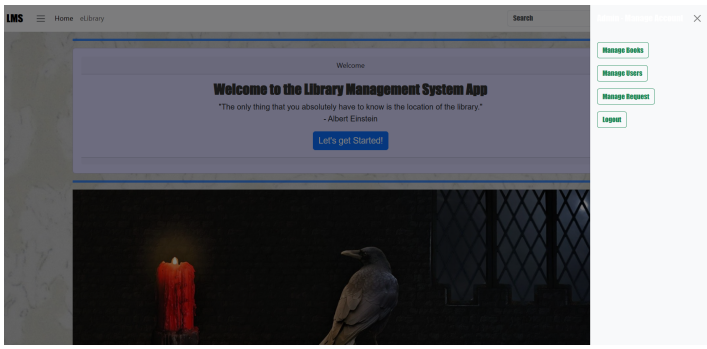
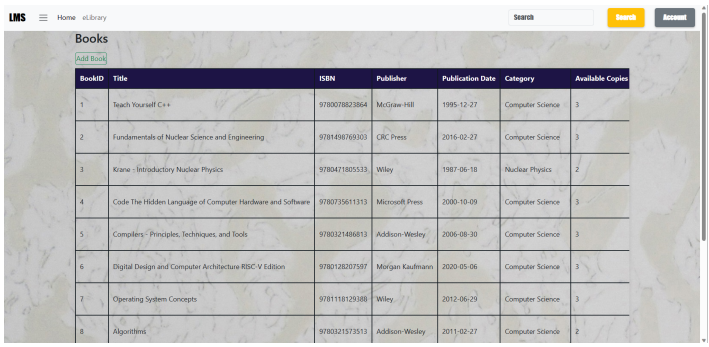


Figure 8: Admin Panel



BookID	Title	ISBN	Publisher	Publication Date	Category	Available Copies
1	Teach Yourself C++	9780078823864	McGraw-Hill	1995-12-27	Computer Science	3
2	Fundamentals of Nuclear Science and Engineering	9781498769303	CRC Press	2016-02-27	Computer Science	3
3	Krane - Introductory Nuclear Physics	9780471805533	Wiley	1987-06-18	Nuclear Physics	2
4	Code The Hidden Language of Computer Hardware and Software	9780735611313	Microsoft Press	2000-10-09	Computer Science	3
5	Compilers - Principles, Techniques, and Tools	9780321486813	Addison-Wesley	2006-08-30	Computer Science	3
6	Digital Design and Computer Architecture RISC-V Edition	9780128207597	Morgan Kaufmann	2020-05-06	Computer Science	3
7	Operating System Concepts	9781118129388	Wiley	2012-06-29	Computer Science	3
8	Algorithms	9780321573513	Addison-Wesley	2011-02-27	Computer Science	2

Figure 9: Manage Books

7. Conclusion

The Library Management System (LMS) application has successfully addressed the need for an efficient and user-friendly solution for libraries. It offers an intuitive user interface, streamlined workflows, and robust administrative features. The project has the potential to greatly impact library operations by improving accessibility and reducing manual tasks.

In the future, the web application can be further improved by implementing additional features such as advanced search functionalities, personalized book recommendations, and integration with external library systems. User feedback and continuous testing can help identify areas for refinement, ensuring a more compact and polished application.

8. Contributions

This project was developed by Tanvir Ahmed Khan (2131491) as a solo endeavor. Tanvir Ahmed Khan handled all aspects of the project, including design, development, testing, and deployment.