LIBRARY MANAGEMENT SYSTEM

INTRODUCTION

This project aims to develop a web-based Library Management System (LMS) to streamline book issuing and returning processes. It provides students with an easy-to-use platform to interact with library resources and helps librarians manage operations more efficiently. The system replaces traditional manual methods with a responsive, automated solution, enhancing both user experience and operational accuracy.

OBJECTIVES

- To build an interactive web application for browsing, issuing, and returning books.
- To implement secure login and user-specific dashboards.
- To ensure ease of use and accessibility across different devices.
- To allow users to view their profile details (ID, username, email) dynamically fetched from the database.
- To enhance digital efficiency and reduce manual effort in library tasks.

TECHNOLOGIES USED

FRONTEND:

- HTML
- CSS
- JavaScript
- EJS for templating
- Bootstrap for responsive design

BACKEND:

- Node.js with Express.js framework
- MySQL for data storage
- Express-session for session management

TOOLS:

- VS Code
- XAMPP
- Figma (for UI prototyping)

SYSTEM ARCHITECTURE

The application follows a client-server model:

- The frontend is rendered using EJS templates.
- The backend server, built with Express.js, handles routes and logic.
- MySQL manages all persistent data related to users, books, and issues.
- Session data is managed using express-session to maintain login states.

DATABASE DESIGN

The database handles the following data:

- users (user_id, username, email, password)
- books (book_id, title, author, publisher, published_year, cover_image)
- issued_books (issue_id, user_id, book_id, issue_date, due_date)

FEATURES

- Secure Login and Signup
- Personalized dashboard
- Dynamic profile display
- Book search and browse (with pagination)
- Book borrowing with auto-calculated due date
- View and return issued books with confirmation
- User action validation for security

IMPLEMENTATION HIGHLIGHTS

- EJS used for dynamic content rendering
- SQL LIKE queries used for search with pagination
- Issue and return functionalities validate user-book pairing
- Modal popups for displaying profile details
- JavaScript used for due date calculations

CHALLENGES FACED

- Maintaining user sessions across routes
- Designing mobile-friendly UI
- Efficiently handling large datasets
- Debugging async MySQL queries
- Real-time data updates in modal views
- Ensuring accurate return processes

FUTURE SCOPE

- Admin panel for managing books
- Mobile optimization
- Email reminders
- Book ratings and recommendations
- QR code integration
- Profile editing and picture uploads

CONCLUSION

The Library Management System project successfully digitizes traditional library operations. It simplifies the user experience, making it easier for students to manage their borrowed books, and enables librarians to oversee transactions effectively.

Through this project, we learned:

- Practical application of full-stack development
- Integration of frontend and backend logic
- Session handling and data validation
- SQL query optimization

This project strengthened our understanding of real-world web development and team collaboration, providing a solid base for future projects.

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