### ****Library Management System – Project Report****

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**Project Title**: Library Management System

**Date**: 1-9-2024

## ****1. Introduction****

The Library Management System (LMS) is a web-based application built using **HTML, CSS, and Bootstrap** for the frontend and **PHP** and **JavaScript** for the backend. The system aims to facilitate the management of library resources such as books, users, and borrowing transactions, providing both users and librarians with an easy-to-use interface for accessing library services.

This report details the full development process, covering planning, design, development, testing, and deployment phases.

## ****2. Project Scope and Objectives****

### ****Scope****:

The scope of the Library Management System includes:

1. **Book Management**: Administrators can add, edit, and delete book records.
2. **User Management**: Users can register, log in, and manage their borrowing history.
3. **Borrowing**: Users can borrowz books via their accounts.
4. **Inventory Management**: Librarians can manage the book inventory and track overdue books.
5. **Fine Management**: Fines are calculated automatically for overdue returns.
6. **Ban Users** : Administrators have the ability to ban users from accessing the system for policy violations or other reasons.

### ****Objectives****:

1. Simplify the borrowing process for users.
2. Streamline the management of book inventories and user accounts for librarians.
3. Automate overdue notifications and fine calculations.
4. Ensure the system is accessible and responsive across different devices.
5. Enable administrators to manage user access by banning accounts as necessary.

## ****3. User Requirements****

### ****General Users****:

* **Registration/Login**: Users can create an account or log in to access their borrowing history and borrow books.
* **Book Search**: Users can search books by title, author, or genre.
* **Borrow Books**: Users can view book availability and borrow books them online.
* **Notifications**: Users receive alerts for overdue books or upcoming due dates.

### ****Librarians/Admins****:

* **Book Management**: Admins can add, update, and delete book records.
* **User Management**: Admins can monitor and manage user accounts, including fines and borrowing restrictions.
* **Inventory Management**: Admins can track books in inventory and manage overdue items.
* **Reports**: Generate reports on borrowing trends, overdue books, and fines.

## ****4. Project Timeline****

| **Week** | **Task** |
| --- | --- |
| Week 1 | Project planning, requirements gathering |
| Week 2 | UI design with HTML/CSS/Bootstrap |
| Week 3 | Backend architecture with PHP |
| Week 4-5 | Database setup (MySQL), API development |
| Week 6-7 | Frontend-backend integration |
| Week 8 | Testing (unit and integration testing) |
| Week 9 | User Acceptance Testing (UAT) |
| Week 10 | Deployment and final project review |

## ****5. System Architecture****

### ****Frontend****:

* The frontend is built using **HTML, CSS**, and **Bootstrap** for creating responsive layouts and styling. Bootstrap components were used for forms, tables, navigation bars, and buttons.
* **JavaScript** was employed to enhance interactivity and handle client-side operations, such as dynamic book search and form validation.

### ****Backend****:

* The backend is powered by **PHP**, which handles all server-side operations such as user registration, authentication, book borrowing, and returning.
* **JavaScript** was used in conjunction with PHP to handle AJAX requests, providing seamless interaction between the frontend and backend without reloading the page.
* **Database**: We used **MySQL** to store book records, user data, borrowing history, and fine details.

### ****Security****:

* **User Authentication**: PHP sessions were used for managing user login and session data securely.
* **Encryption**: Passwords are hashed using **PHP's bcrypt** before being stored in the database.
* **Cross-Site Scripting (XSS) Protection**: Input validation and sanitization techniques were implemented to ensure secure data handling.

## ****6. UI Design****

The user interface was designed to be clean and responsive using **Bootstrap**. The design focuses on usability for both users and admins, ensuring quick access to important features.

Key UI elements include:

* **Home Page**: Displays a search bar and featured books.
* **Login/Registration Page**: Simple forms with client-side validation.
* **Book List Page**: A paginated list of books with filter and search options.
* **User Profile Page**: Displays user details, borrowing history, and current loans.
* **Admin Dashboard**: Provides an overview of book inventories and user activities.

## ****7. System Features****

### ****User Features****:

* **Search Functionality**: Users can search for books by title, author, or genre, with real-time suggestions.
* **Borrow Books**: Users can borrow available books, and they will receive notifications if a book is overdue.
* **Borrowing History**: Users can view a history of their borrowed and returned books, with due dates and fines calculated automatically.
* **Responsive Design**: The user interface is fully responsive and adapts to mobile, tablet, and desktop views.

### ****Admin Features****:

* **Book Management**: Admins can add, update, or remove books from the system.
* **User Management**: Admins can manage user accounts, including borrowing privileges, fines, and overdue books.
* **Report Generation**: Admins can generate reports on most borrowed books, overdue items, and total fines collected.
* **Fine Management**: Fines are calculated and managed automatically based on the due date of borrowed books.

## ****8. Testing and Debugging****

### ****Testing****:

* **Unit Testing**: All PHP functions were tested independently to ensure correctness.
* **Integration Testing**: Tested communication between frontend and backend using AJAX to ensure smooth data retrieval and submission.
* **User Acceptance Testing (UAT)**: A group of testers simulated real users, testing the system for usability and functionality.

### ****Debugging****:

* Common issues such as session handling in PHP and form validation errors were resolved by implementing proper error logging and exception handling.

## ****9. Deployment****

The system was deployed on a **shared hosting platform** that supports **PHP and MySQL**. The project files were uploaded via FTP, and the database was configured using phpMyAdmin.

### ****Deployment Steps****:

1. Uploaded frontend files (HTML, CSS, JS) and backend PHP files to the server.
2. Set up the MySQL database and imported the schema using phpMyAdmin.
3. Configured PHP to connect to the database using environment variables to secure credentials.

## ****10. Future Enhancements****

1. **E-book Support**: Implement support for digital books that users can borrow and read online.
2. **Mobile App**: Develop a mobile app version of the system using **React Native** or **Flutter** to enhance accessibility.
3. **Recommendation System**: Add a recommendation engine that suggests books based on user preferences and borrowing history.

## ****11. Conclusion****

The Library Management System was successfully developed using **Bootstrap, HTML, CSS** for the frontend and **PHP, JavaScript** for the backend. The project has met its goals of providing a user-friendly platform for users to borrow and return books while giving admins control over library resources. Future improvements, such as adding e-books and a mobile app, will further enhance the system's usability.