SIMATS SCHOOL OF ENGINEERING

SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES

CHENNAI-602105

LIBRARY MANAGEMENT SYSTEM

A CAPSTONE PROJECT REPORT

Submitted in the partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

Submitted by

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Under the Supervision of

Dr. VIVEK BALAJI

DECLARATION

I, S.PRAKUL AND SOLOMON RAJA D, students of **'Bachelor of Engineering in Computer Science and Engineering**, Department of Computer Science and Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, hereby declare that the work presented in this Capstone Project Work entitled **LIBRARY MANAGEMENT SYSTEMS** the outcome of our own Bonafede work and is correct to the best of our knowledge and this work has been undertaken taking care of Engineering Ethics.

S.PRAKUL (192210073)
D.SOLOMON RAJA(192210053)

Date:

Place:

CERTIFICATE

This is to certify that the project entitled **"LIBRARY MANAGEMENT SYSTEM"** submitted by S.PRAKUL and SOLOMON RAJA D has been carried out under our supervision. The project has been submitted as per the requirements in the current semester of B.E, Computer Science and Engineering.

Teacher-in-charge

Dr.VIVEK BALAJI

Abstract:

The **Library Management System** website is a comprehensive platform designed to simplify and enhance library operations. It offers an easy-to-use interface that allows users, such as students and patrons, to search for books, view detailed information, and manage their borrowing history. In addition, users can check fines, update personal information, and download academic materials organized by year and semester. This system provides a seamless experience by offering real-time access to library resources, making it easier for users to track their borrowed items and find the materials they need efficiently.

For administrators, the platform includes a powerful dashboard for managing library inventory. Librarians can add, update, or delete books, track issued and returned books, and organize academic materials for specific semesters and years. The system also automates fine calculation for overdue books, reducing manual work and ensuring accurate penalty management. With a focus on improving the day-to-day functions of the library, the system streamlines operations, allowing administrators to keep track of book availability and user activity with ease.

This Library Management System not only boosts efficiency but also promotes accountability and transparency. By automating tasks like fine calculation and book issuance, it minimizes human error and ensures that all records are up-to-date. The platform's scalable design also leaves room for future enhancements, such as mobile integration and AI-driven book recommendations, ensuring that the system can grow alongside the needs of the library. Overall, this system provides an essential tool for modern libraries, improving both user satisfaction and administrative productivity.

Introduction:

A **Library Management System** (LMS) is an essential tool designed to manage the intricate processes of a modern library efficiently. In an educational or institutional setting, where thousands of books, academic materials, and other resources are circulated regularly, a streamlined system is vital to ensure that library operations run smoothly. This platform simplifies key tasks such as cataloging, book issuance, return management, and fine calculation, thus reducing the manual workload for librarians and ensuring users have quick and easy access to library resources.

The **Library Management System** enhances user experience by providing features like book search, borrowing history, fine management, and academic material downloads. It enables users to log into personalized accounts where they can view their borrowed items, due dates, and manage their profiles. Administrators, on the other hand, benefit from tools that allow them to manage book inventory, track issued and returned books, and handle overdue fines efficiently. The system serves as a bridge between users and library staff, promoting transparency and accountability in every transaction.

This system is designed to not only improve day-to-day library functions but also to create a responsive, user-friendly environment that enhances the overall accessibility of library resources. As libraries continue to evolve with technology, an LMS ensures that they are equipped to handle the growing demands of both users and administrators, making it an indispensable tool in academic and public libraries alike.

Problem Description:

Managing the operations of a library, especially in educational institutions, can be a complex and time-consuming task. Traditional methods of maintaining book inventories, tracking issued and returned books, and calculating fines for overdue items are often prone to human error, inefficiencies, and delays. Libraries with large collections of books and academic materials require constant supervision to ensure resources are organized, available, and properly managed. Moreover, without an automated system, both users and administrators face challenges in efficiently accessing or managing library resources.

For students and patrons, searching for specific books or academic materials can be difficult if there is no centralized system to track availability. Manually checking borrowing histories, managing fines, and accessing academic resources such as notes or textbooks becomes cumbersome without digital tools. This lack of a streamlined process leads to confusion, delays, and dissatisfaction among library users.

For library staff, managing inventory manually is labor-intensive and error-prone. Tracking the issuance and return of books requires consistent updating, and calculating fines for overdue books becomes a tedious task, especially as the volume of users increases. Additionally, maintaining and organizing academic materials based on semester or year without a structured system complicates the management process. Hence, there is a need for a digital **Library Management System** to automate and optimize these processes, ensuring accuracy, efficiency, and a better user experience.

Tool Description:

The Library Management System (LMS) is built using a combination of web development and database management tools to provide a fully functional and efficient platform for both users and administrators. The following are the key technologies and tools used:

HTML5/CSS3: These technologies are used to create the structure and design of the website. HTML5 provides the foundation for the user interface, while CSS3 ensures that the platform is responsive, visually appealing, and compatible across different devices. These tools enable easy navigation for users, whether they are searching for books, managing their borrowing history, or accessing academic materials.

Bootstrap: This popular front-end framework is utilized to enhance the website's responsiveness and ensure consistent layout across various screen sizes. Bootstrap's grid system and pre-designed components such as navigation bars, buttons, and form elements make the user interface intuitive and user-friendly for both library patrons and administrators.

JavaScript: JavaScript is employed to add interactivity to the platform, handling dynamic content updates, form validations, and real-time book searches. It ensures a smooth user experience by providing instant feedback and responses to user queries without the need to refresh the page.

PHP/Node.js: These server-side scripting languages manage the backend processes of the system, such as handling book inventory, user account management, issuing/returning books, and fine calculations. PHP or Node.js ensures that requests made by users and administrators are processed efficiently, allowing real-time updates and data handling.

MySQL/MongoDB: The LMS utilizes a database management system, such as MySQL or MongoDB, to store and manage large volumes of data, including book information, user details, borrowing history, and academic materials. The database ensures that all data is organized, secure, and easily retrievable, supporting the core functionalities of the system.

Version Control (Git/GitHub): Git and GitHub are employed to track changes during the development of the Library Management System. This ensures that the development process is well-documented, and team collaboration is efficient, with the ability to track code changes, manage issues, and implement new features seamlessly.

Testing Frameworks: Various testing tools are used to ensure the functionality, security, and performance of the LMS. These tools help identify bugs, ensure cross-browser compatibility, and validate that the system meets the users' needs effectively.

Approach:

Requirement Analysis

The primary objective of the **Library Management System** is to provide a centralized platform for managing library operations, including cataloging books, managing users, issuing and returning books, and calculating fines. The system is aimed at two key audiences: students/library patrons and librarians/administrators. For users, the system needs to offer intuitive search functionality, access to academic materials, and the ability to track their borrowing history and fines. For administrators, the system should simplify inventory management, streamline the issuance and return process, and automate fine calculations. Understanding the distinct needs of these user groups is crucial to designing a system that meets both administrative and user-centric goals efficiently.

Design

Designing the **Library Management System** involves creating a clean, user-friendly layout that caters to both students and library staff. For the user interface, the design should prioritize simplicity and ease of navigation. Search bars, borrowing history, and material download options should be easily accessible to users. For the admin interface, the design should focus on efficiency, allowing administrators to add, update, or delete books with minimal effort. The use of neutral colors, clear typography, and organized layouts will enhance usability. The design should also be responsive, ensuring the platform functions seamlessly across different devices such as desktops, tablets, and smartphones.

API Integration

Integrating APIs into the **Library Management System** can significantly enhance functionality by enabling external services such as real-time updates and user notifications. For instance, integrating a calendar or notification API can automatically remind users of book return dates or overdue fines. This automation can improve user interaction with the system and reduce manual tasks for administrators. Additionally, integration with academic databases can allow users to search for and download academic materials directly from the system.

Development

Developing the **Library Management System** requires a strategic and methodical approach. The first step is a thorough analysis of the specific needs of the library and its users. This is followed by backend development using technologies like PHP/Node.js to manage server-side operations such as book inventory, user authentication, and fine calculation. The front-end will be developed using HTML, CSS, and JavaScript

to provide an interactive and intuitive interface. Secure web hosting and a reliable domain name will be crucial to ensure the system can handle the volume of users and provide uninterrupted access to library resources.

Testing

Testing the **Library Management System** is essential to ensure it operates smoothly for both users and administrators. This includes testing for functionality, security, and performance across various devices. Usability testing will assess how easily users can navigate the system, search for books, check fines, and download materials. Similarly, the admin panel will be tested to ensure that book management and fine calculations are error-free. Special attention will be given to mobile responsiveness, ensuring that both the user and admin interfaces function seamlessly on smartphones and tablets.

Deployment

Deploying the **Library Management System** involves moving the platform from the development environment to a live server, making it accessible to users and administrators. The deployment process includes choosing a reliable hosting service that can handle the expected traffic, especially during peak times like the start of a semester. Whether opting for shared hosting or dedicated servers, the focus should be on ensuring that the system can manage multimedia-rich academic materials and multiple concurrent users. The domain name will be connected to the hosting server, making the website accessible to the library's user base.

Feedback and Iteration

After the system is deployed, gathering feedback from both users and administrators is crucial for continuous improvement. Feedback can be collected through various channels, including direct surveys, in-system feedback forms, and email queries. This data will provide insights into areas where the system can be improved, such as search functionality, user interface design, or notification services. Iterative updates based on user feedback will ensure that the system evolves to meet the library's growing needs and adapts to emerging technologies, ensuring it remains a valuable resource for both users and library staff.

IMPLEMENTATION

HTML CODE

```
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>Library Management System</title>
   <style>
      body {
         font-family: Arial, sans-serif;
         background-color: #f8f9fa;
         margin: 0;
         padding: 0;
      }
      header {
```

```
    background-color: #343a40;
    color: #fff;
    padding: 10px 0;
    text-align: center;
}
nav ul {
    list-style-type: none;
    padding: 0;
    text-align: center;
    background-color: #495057;
}
nav ul li {
    display: inline-block;
    margin-right: 15px;
}
nav ul li a {
    color: #fff;
    text-decoration: none;
    padding: 10px;
    display: block;
}
nav ul li a:hover {
    background-color: #6c757d;
}
.container {
    margin: 20px;
}
form {
    margin-bottom: 20px;
}
form label {
    display: block;
    margin-bottom: 5px;
}
form input, form select, form textarea {
    width: 100%;
    padding: 10px;
    margin-bottom: 15px;
}
form button {
    padding: 10px 15px;
    background-color: #343a40;
    color: white;
    border: none;
    cursor: pointer;
}
.admin-section, .user-section {
    margin-top: 30px;
}
h2 {
```

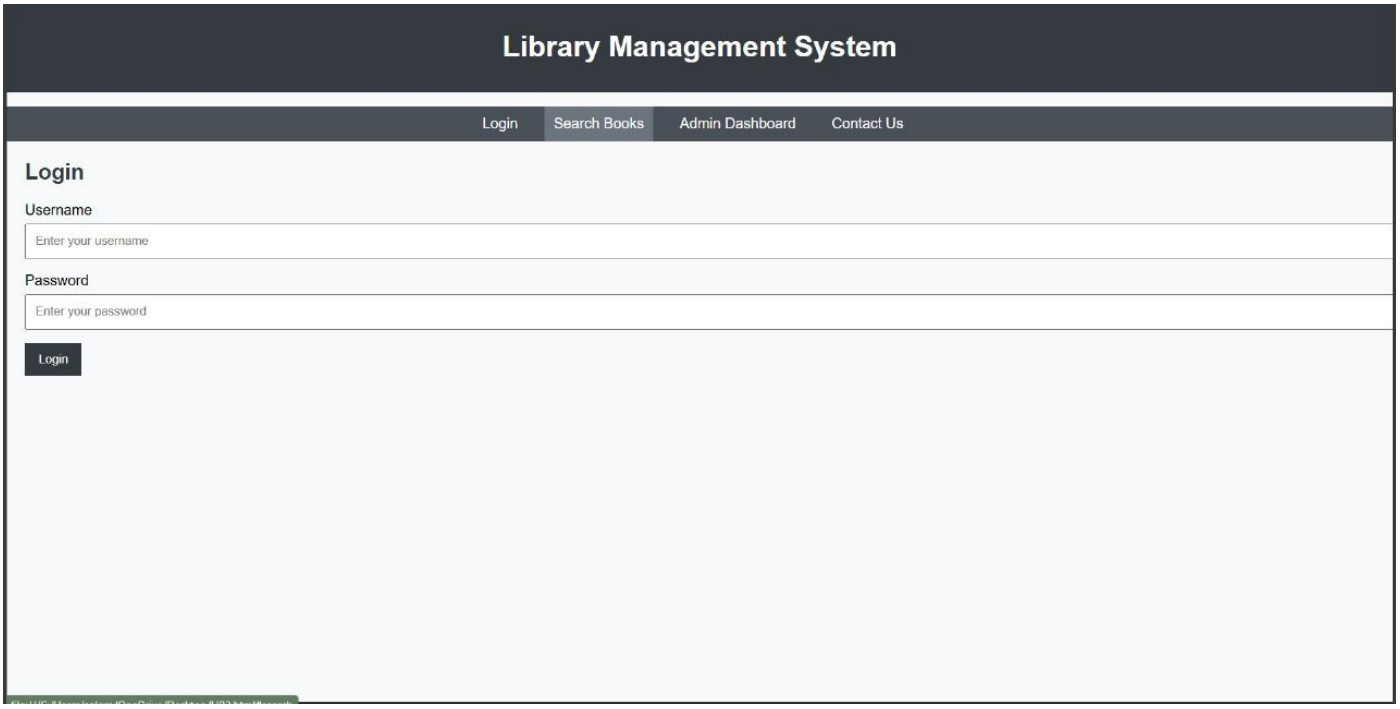
```
            color: #343a40;
        }
        .hidden {
            display: none;
        }
    </style>
</head>
<body>

    <header>
        <h1>Library Management System</h1>
    </header>

    <nav>
        <ul>
            <li><a href="#login">Login</a></li>
            <li><a href="#search">Search Books</a></li>
            <li><a href="#admin">Admin Dashboard</a></li>
            <li><a href="#contact">Contact Us</a></li>
        </ul>
    </nav>

    <!-- Login Section -->
    <div id="login" class="container">
        <h2>Login</h2>
        <form id="loginForm">
            <label for="username">Username</label>
            <input type="text" id="username" placeholder="Enter your username" required>
            <label for="password">Password</label>
            <input type="password" id="password" placeholder="Enter your password" required>
            <button type="submit">Login</button>
        </form>
    </div>

    <!-- Book Search Section -->
    <div id="search" class="container hidden">
        <h2>Search Books</h2>
        <form id="searchForm">
            <label for="search">Search by Title, Author, ISBN:</label>
            <input type="text" id="search" placeholder="Search...">
            <button type="submit">Search</button>
        </form>

        <div id="bookResults">
            <h3>Book Results</h3>
            <ul>
                <li>Book 1 - Available</li>
                <li>Book 2 - Not Available</li>
            </ul>
        </div>
```

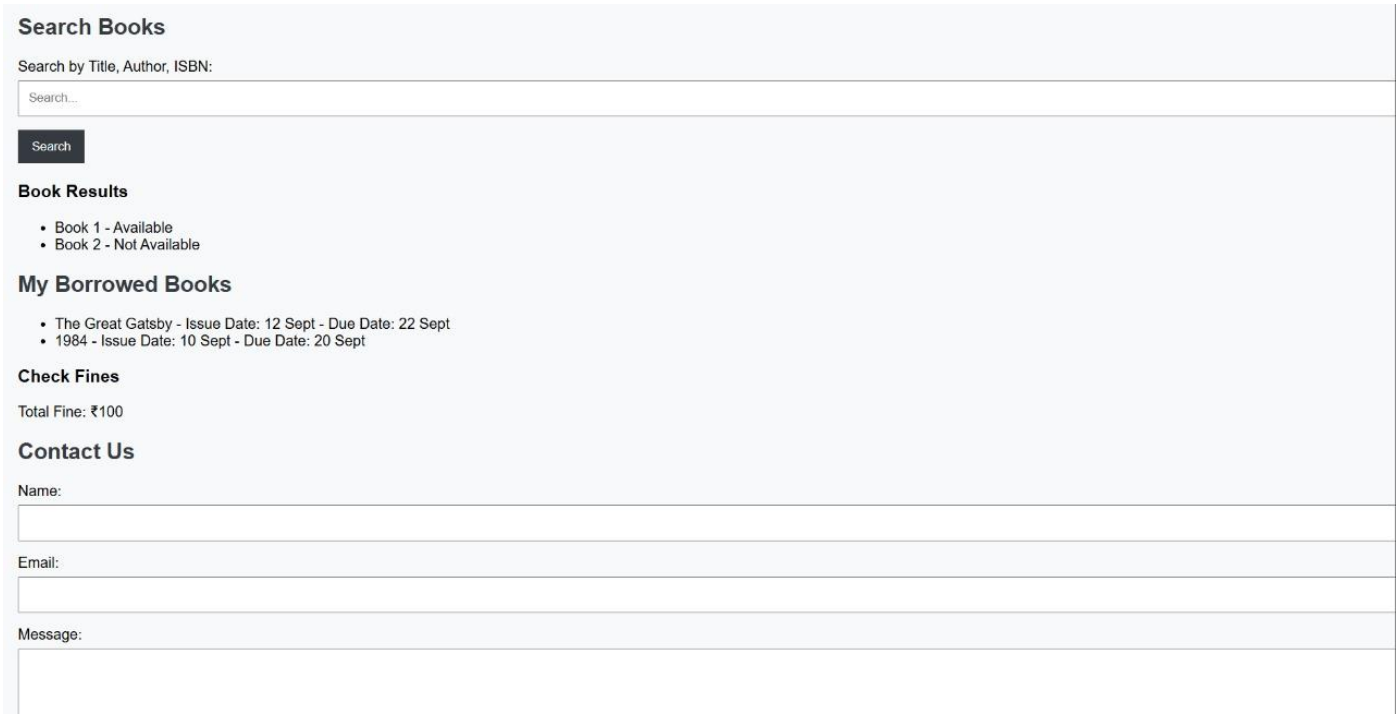
```
</div>

<!-- User Section -->
<div id="userSection" class="container hidden">
    <h2>My Borrowed Books</h2>
    <ul>
        <li>The Great Gatsby - Issue Date: 12 Sept - Due Date: 22 Sept</li>
        <li>1984 - Issue Date: 10 Sept - Due Date: 20 Sept</li>
    </ul>
    <h3>Check Fines</h3>
    <p>Total Fine: ₹100</p>
</div>

<!-- Admin Section -->
<div id="admin" class="container hidden">
    <h2>Admin Dashboard</h2>

    <div class="admin-section">
        <h3>Add Book</h3>
        <form id="addBookForm">
            <label for="bookTitle">Book Title:</label>
            <input type="text" id="bookTitle" required>
            <label for="bookAuthor">Book Author:</label>
            <input type="text" id="bookAuthor" required>
            <button type="submit">Add Book</button>
        </form>
    </div>

    <div class="admin-section">
        <h3>Issue Book</h3>
        <form id="issueBookForm">
            <label for="studentName">Student Name:</label>
            <input type="text" id="studentName" required>
            <label for="bookId">Book ID:</label>
            <input type="text" id="bookId" required>
            <button type="submit">Issue Book</button>
        </form>
    </div>

    <div class="admin-section">
        <h3>Return Book</h3>
        <form id="returnBookForm">
            <label for="returnBookId">Book ID:</label>
            <input type="text" id="returnBookId" required>
            <button type="submit">Return Book</button>
        </form>
    </div>

    <div class="admin-section">
        <h3>Calculate Fines</h3>
```

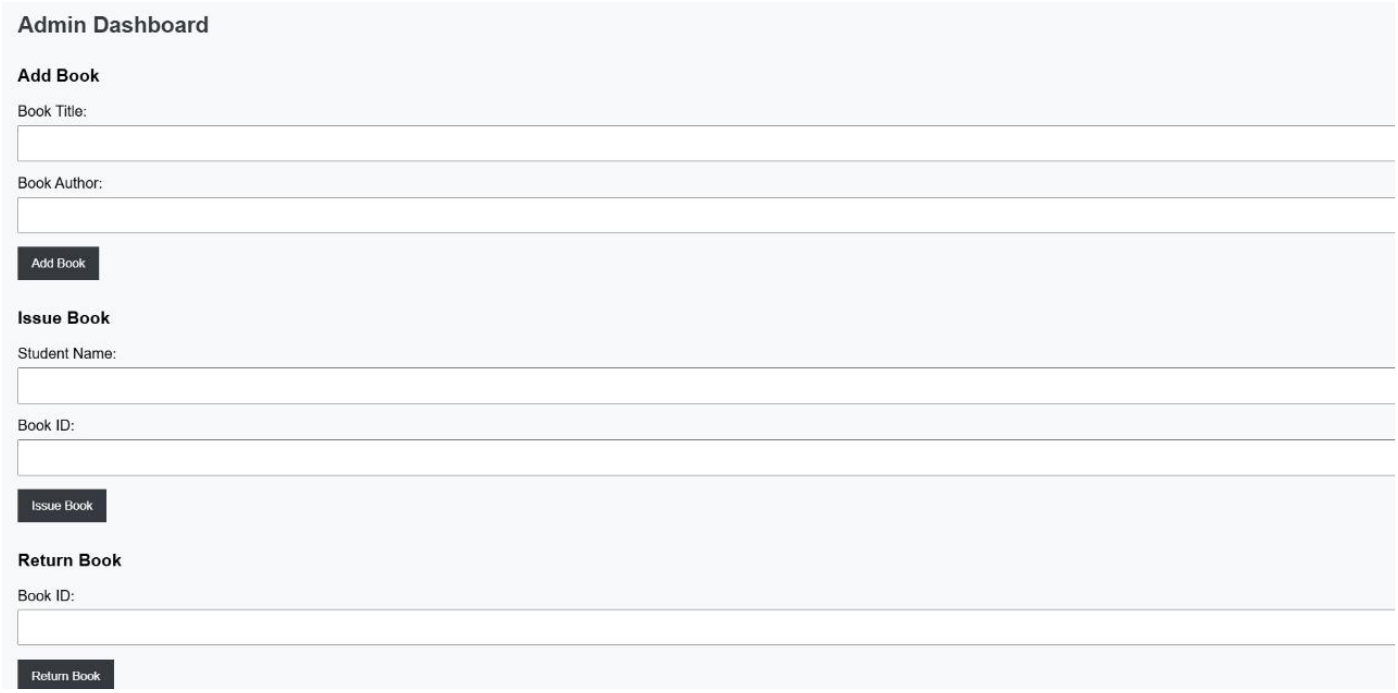
```
            <form id="fineForm">
                <label for="fineStudent">Student Name:</label>
                <input type="text" id="fineStudent" required>
                <button type="submit">Calculate Fine</button>
            </form>
        </div>
    </div>

    <!-- Contact Section -->
    <div id="contact" class="container hidden">
        <h2>Contact Us</h2>
        <form id="contactForm">
            <label for="contactName">Name:</label>
            <input type="text" id="contactName" required>
            <label for="contactEmail">Email:</label>
            <input type="email" id="contactEmail" required>
            <label for="contactMessage">Message:</label>
            <textarea id="contactMessage" rows="5" required></textarea>
            <button type="submit">Send Message</button>
        </form>
    </div>

    <script>
        // Handle login functionality
        const loginForm = document.getElementById('loginForm');
        const searchSection = document.getElementById('search');
        const adminSection = document.getElementById('admin');
        const userSection = document.getElementById('userSection');
        const contactSection = document.getElementById('contact');

        loginForm.addEventListener('submit', function(e) {
            e.preventDefault();
            const username = document.getElementById('username').value;
            const password = document.getElementById('password').value;

            // Dummy login functionality
            if (username === 'admin' && password === 'admin') {
                adminSection.classList.remove('hidden');
                searchSection.classList.add('hidden');
                userSection.classList.add('hidden');
                contactSection.classList.add('hidden');
            } else {
                userSection.classList.remove('hidden');
                adminSection.classList.add('hidden');
                searchSection.classList.remove('hidden');
                contactSection.classList.remove('hidden');
            }
        });
    </script>
</body>
```

</html>

Output :


Library Management System
Login
Search Books
Admin Dashboard
Contact Us
Login
Username
Enter your username
Password
Enter your password
Login


Search Books
Search by Title, Author, ISBN:
Search...
Search
Book Results
Book 1 - Available
Book 2 - Not Available
My Borrowed Books
The Great Gatsby - Issue Date: 12 Sept - Due Date: 22 Sept
1984 - Issue Date: 10 Sept - Due Date: 20 Sept
Check Fines
Total Fine: ₹100
Contact Us
Name:
Email:
Message:



Conclusion:

Project Description

The Library Management System is a comprehensive platform designed to streamline library operations and enhance the user experience for both library patrons and administrators. It serves as a valuable resource for students, educators, and library staff by providing access to a catalog of books, academic materials, and real-time information on borrowing status. The website features functionalities like book searches, detailed book descriptions, borrowing history, and fine management, allowing users to efficiently manage their library interactions. Administrators can manage inventory, issue and return books, calculate fines, and organize academic materials based on semesters and years. This system fosters a more organized and accessible library environment, making it easier for users to find the resources they need while enabling staff to oversee and maintain library operations effectively. By integrating user and admin functionalities, the platform creates a seamless experience that benefits all stakeholders involved in the library system.Practical Application

Practical Application

The Library Management System offers several practical applications that significantly improve both user convenience and operational efficiency. For students and other users, the system provides an intuitive interface to search for books, check borrowing history, and download academic materials. It also simplifies fine management by allowing users to check and pay overdue fines. For administrators, the platform streamlines inventory management, making it easy to add, update, or remove books, track issued and returned materials, and automate fine calculations. A content management system (CMS) enables staff to update academic materials, ensuring they remain current and organized by year and semester. This system reduces manual workload for librarians, minimizes human error, and offers real-time data tracking, making it an essential tool for any educational institution.

Future Improvements

Future improvements to the **Library Management System** can significantly enhance user experience and keep pace with advancing technologies. A promising enhancement is the integration of artificial intelligence (AI) and machine learning to provide personalized book recommendations based on users' borrowing histories and preferences. Additionally, AI can automate the process of categorizing academic materials and offer predictive analytics to manage book inventory more efficiently. Other potential upgrades include the introduction of a mobile app for easy access to library resources on the go, and integration with digital payment systems to streamline fine collection. These improvements will ensure that the system remains adaptable, scalable, and user-centric, meeting the evolving needs of both users and library administrators.