**A**

**Minor Project Report**

**On**

**Library Management System**

**Submitted in partial fulfillment of the requirements**

**For the award of the degree of**

**Bachelor of Technology**

**In**

**Computer Science and Engineering with**

**Data Science**

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**IILM University**

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# CERTIFICATE

This is to certify that the minor project report entitled “**LIBRARY MANAGEMENT SYSTEM”** submitted by Mr. Shubham kumar [CS-23411362]  **,** Mr. Tanuj Kuma Rai [CS-23411444]**,** Mr. Subham Das [CS-23411069]to the IILM University, Greater Noida, Utter Pradesh in partial fulfillment for the award of Degree of Bachelor of Technology in Computer Science & Engineering with **Data Science** is a bonafide record of the minor project work carried out by them under my supervision during the year 2023-2024.

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| --- | --- |
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# ACKNOWLEDGEMENT

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SHUBHAM KUMAR

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SUBHAM DAS

# ABSTRACT

This project report presents the development and implementation of a Library Management System (LMS) for IILM University, designed to streamline and enhance the efficiency of library operations. The LMS aims to automate the essential functions of a library, including cataloging, circulation, and inventory management, while providing an intuitive and user-friendly interface for both library staff and patrons.

The system was developed using a modular approach, incorporating a robust database backend with a web-based frontend application. Key features of the LMS include a comprehensive search and retrieval system, user account management, book issue and return tracking, fine calculation, and detailed reporting capabilities. The integration of RFID technology for book tracking and user authentication further enhances the security and accuracy of library transactions.

User feedback and iterative testing were pivotal in refining the system to meet the specific needs of IILM University's library. The implementation phase included rigorous testing for performance, security, and usability, ensuring a seamless transition from the legacy system to the new LMS.

The LMS significantly reduces the manual workload of library staff, minimizes human errors, and provides real-time data on library usage and inventory. This facilitates better resource management and improves user satisfaction by providing quicker access to library resources.

**Keywords:** Library Management System, LMS, IILM University, library automation, cataloging, circulation, RFID technology, user interface, inventory management, library operations.

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**INTRODUCTION**

In the modern academic environment, libraries play a pivotal role in providing access to a vast array of informational resources, essential for research, learning, and teaching. However, managing a large library collection, along with the increasing number of users, poses significant challenges. Traditional manual methods of library management are often inefficient, error-prone, and time-consuming, leading to decreased productivity and user satisfaction. To address these challenges, a comprehensive and automated Library Management System (LMS) is crucial.

This project report documents the design, development, and implementation of a Library Management System tailored for IILM University. The primary objective of the LMS is to automate and streamline all major library functions, thereby improving operational efficiency and enhancing the user experience. The system aims to provide an integrated platform that handles cataloging, circulation, inventory management, and user account administration with ease and accuracy.

The LMS for IILM University has been developed using a modular architecture that includes a robust database management system (DBMS) and a user-friendly web interface. Key functionalities of the system encompass book acquisition, cataloging, classification, issue and return processing, fine calculation, and report generation. Additionally, advanced features such as RFID technology for book tracking and secure user authentication have been incorporated to enhance the overall functionality and security of the system.

This report is structured to provide a comprehensive overview of the project. It includes an analysis of the current challenges faced by the library, a detailed description of the system requirements, the design and development process, testing methodologies, implementation strategies, and a discussion on the system's impact on library operations. Through this project, we aim to demonstrate how technology can be leveraged to transform traditional library management practices, thereby fostering a more efficient and user-centric library environment at IILM University.

**LITERATURE REVIEW**

The evolution of library management systems (LMS) has been shaped by the increasing need to handle large volumes of information efficiently and to provide enhanced services to library users. This literature review explores the development, functionalities, and technological advancements in library management systems, with a focus on the transition from traditional manual methods to automated systems.

**Historical Context and Evolution**

The traditional library management approach involved manual processes such as card catalogs for indexing and paper-based systems for book lending and return tracking. These methods, though effective in their time, were labor-intensive and prone to errors (Rao, 1999). With the advent of computers in the late 20th century, libraries began adopting computerized systems to streamline their operations (Rao, 1999).

**Emergence of Automated Systems**

Early library automation systems were primarily focused on cataloging and circulation. Integrated Library Systems (ILS) emerged as comprehensive solutions that combined various library functions into a single platform. According to Breeding (2015), ILS integrated modules for acquisitions, cataloging, circulation, and serials management, significantly improving library efficiency and user service.

**Technological Advancements**

With the rapid advancement in technology, modern LMS have incorporated sophisticated features such as digital resource management, online public access catalogs (OPACs), and mobile access. RFID technology has become increasingly popular for book tracking and security, providing real-time inventory management and reducing manual errors (Bhattacharjee et al., 2014).

**User-Centric Design**

The shift towards user-centric design in LMS is evident in recent literature. An LMS must not only meet the operational needs of the library staff but also provide a seamless experience for the users. Features such as personalized user accounts, automated notifications for due dates, and easy access to e-resources are now standard (Buckland, 1992).

**Case Studies and Implementations**

Several case studies highlight the successful implementation of LMS in various academic institutions. For instance, a study by Oduntan and Adenike (2016) on the implementation of an LMS in Nigerian universities showed significant improvements in library management efficiency and user satisfaction. Similarly, Bhattacharjee et al. (2014) discussed the positive impact of RFID-based systems in Indian libraries, noting increased accuracy in inventory management and reduced loss of materials.

**Challenges and Future Directions**

Despite the advancements, challenges remain in the implementation and maintenance of LMS. Issues such as data migration from legacy systems, training of library staff, and ensuring system security are critical considerations (Madhusudhan, 2010). Future directions in LMS research include the integration of artificial intelligence for predictive analytics, enhanced user interfaces, and greater support for digital and multimedia resources (Breeding, 2015).

**Conclusion**

The literature reveals a clear trajectory towards more sophisticated, efficient, and user-friendly library management systems. The implementation of an LMS at IILM University aims to leverage these advancements to create a robust platform that addresses both current operational challenges and future needs, ensuring an enhanced library experience for all stakeholders.

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**PROBLEM STATEMENT**

The existing Library Management System (LMS) at IILM University is facing several critical issues that hinder its efficiency and user experience. These problems need to be addressed to ensure the library operates smoothly and meets the needs of both the staff and the students. The key issues identified are as follows:

1. **Date-Time Error and Grace Period Calculation:**

- The current LMS exhibits date-time errors, leading to incorrect tracking of book issue and return dates.

- There is no provision for a grace period after the book issue date, causing inconvenience to users who return books shortly after the due date.

2. **Outdated User Interface:**

- The LMS interface appears old and dull, negatively impacting user engagement and ease of use.

- A more modern, intuitive, and visually appealing interface is required to enhance user experience.

3. **Limited Access for Students:**

- The LMS does not provide direct access for students, limiting their ability to independently manage their library transactions.

- Students need a platform where they can search for books, check availability, and manage their accounts without staff intervention.

4. **Fixed Issue Period:**

- The current system has a rigid issue period of 14 days, which may not be flexible enough to accommodate the diverse needs of students and faculty.

- There should be options to adjust the issue period based on specific requirements or user categories.

5. **Penalty Management:**

- The LMS lacks an automated system for calculating penalties for overdue books, requiring manual calculations by the staff.

- There is no facility for users to pay penalties online, necessitating in-person payments, which can be inconvenient and time-consuming.

**PROPOSED SYSTEM**

**Objectives:**

To address these problems, the project aims to:

- Fix the date-time error and implement a configurable grace period feature.

- Redesign the LMS user interface to be modern and user-friendly.

- Provide students with direct access to the LMS for independent management of their library activities.

- Introduce flexible book issue periods tailored to different user needs.

- Develop an automated penalty calculation system and enable online payment options for penalties.

By solving these issues, the project will enhance the overall efficiency and user satisfaction of the IILM University Library Management System, making it a more effective tool for both staff and students.

The proposed Library Management System (LMS) for IILM University aims to address the current issues and enhance the overall efficiency and user experience. The new system will incorporate several key features and improvements designed to resolve the identified problems:

**1. Date-Time Error Fix and Grace Period Implementation:**

- **Date-Time Error Fix:** Implement accurate date-time tracking mechanisms to ensure correct logging of book issue and return dates.

- **Grace Period Feature:** Introduce a configurable grace period that allows users a buffer period after the due date before penalties are applied. This grace period can be customized based on library policies.

**2. Modern User Interface (UI):**

- **UI Redesign:** Develop a modern, intuitive, and visually appealing user interface. The new design will focus on ease of navigation, accessibility, and user engagement.

- **Responsive Design:** Ensure the UI is responsive and compatible with various devices, including desktops, tablets, and smartphones.

**3. Student Access:**

- **User Accounts for Students:** Provide individual user accounts for students, allowing them to log in, search for books, check availability, reserve books, and manage their borrowings independently.

- **Self-Service Features:** Enable students to renew books online, check due dates, and view their borrowing history.

**4. Flexible Issue Periods:**

**- Customizable Issue Periods:** Introduce flexibility in the book issue period, allowing different durations based on user categories (e.g., undergraduate students, graduate students, faculty) and specific needs.

- **Automated Reminders:** Send automated notifications to users about approaching due dates, renewal options, and penalties.

**5. Automated Penalty Management and Online Payment:**

- **Automated Penalty Calculation:** Implement a system that automatically calculates penalties for overdue books based on library policies, including considerations for the grace period.

- **Online Payment Integration:** Enable online payment of penalties directly through the LMS, integrating with the university's payment gateway for secure transactions.

**System Architecture:**

**1. Backend:**

- **Database Management System (DBMS**): Use a robust and scalable DBMS (e.g., MySQL, PostgreSQL) to manage the library’s data, including book inventories, user accounts, transaction logs, and penalties.

- **Server-Side Scripting:** Utilize server-side technologies (e.g., Node.js, Python, Java) to handle business logic, date-time calculations, penalty management, and integration with the payment gateway.

**2. Frontend:**

- Web Technologies: Develop the user interface using modern web technologies such as HTML5, CSS3, JavaScript, and frontend frameworks (e.g., React, Angular) to ensure a dynamic and responsive user experience.

- Mobile-Friendly Design: Ensure the design is mobile-friendly to facilitate access from various devices.

**3. Security:**

- **User Authentication**: Implement secure user authentication and authorization mechanisms to protect user data and ensure that only authorized users can access specific functionalities.

- **Data Encryption:** Use encryption techniques to protect sensitive data, particularly for online transactions and user information.

**4.** **Integration:**

**Payment Gateway**: Integrate with the university’s existing payment gateway to facilitate seamless online penalty payments.

**Notification System:** Implement an email/SMS notification system to send alerts and reminders to users about their account activities and due dates.

**Implementation Plan:**

**1. Requirement Analysis:**

- Conduct detailed discussions with library staff and students to gather specific requirements and preferences.

**2. System Design:**

- Create detailed design documents, including UI mockups, database schemas, and system architecture diagrams.

**3. Development:**

- Develop the backend and frontend components in parallel, ensuring consistent communication and integration.

**4. Testing:**

- Perform comprehensive testing, including unit testing, integration testing, and user acceptance testing (UAT), to ensure the system meets all requirements and functions correctly.

**5.** **Deployment:**

- Deploy the system in a phased manner, starting with a pilot run to gather feedback and make necessary adjustments before a full-scale rollout.

**6.** **Training and Support:**

- Provide training sessions for library staff and students on using the new system. Offer ongoing technical support to address any issues that arise post-deployment.

By implementing this proposed system, IILM University Library will be able to address current inefficiencies, enhance user satisfaction, and streamline library operations, ultimately providing a more robust and user-friendly library management experience.

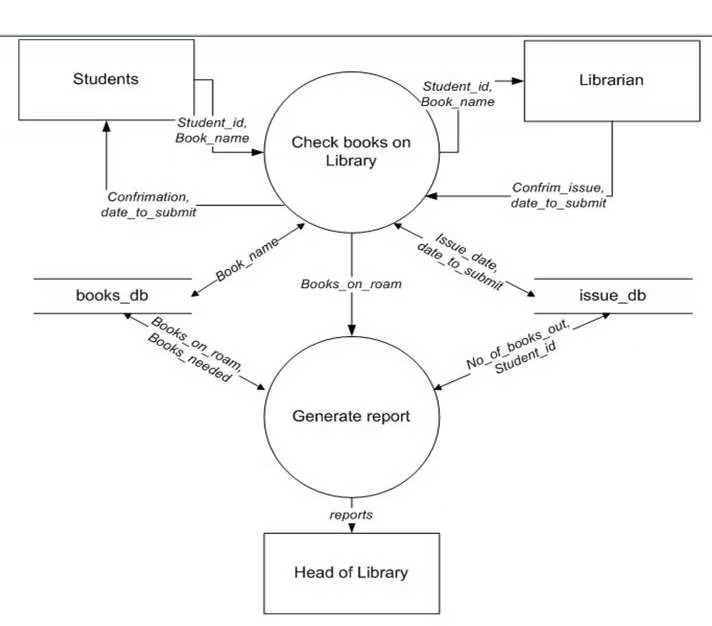
**SYSTEM DESIGN**

**FLOWCHART:-**

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**DATA FLOW DIAGRAM(DFD):-**

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**ENTITY RELATION DIAGRAM(ERD):-**

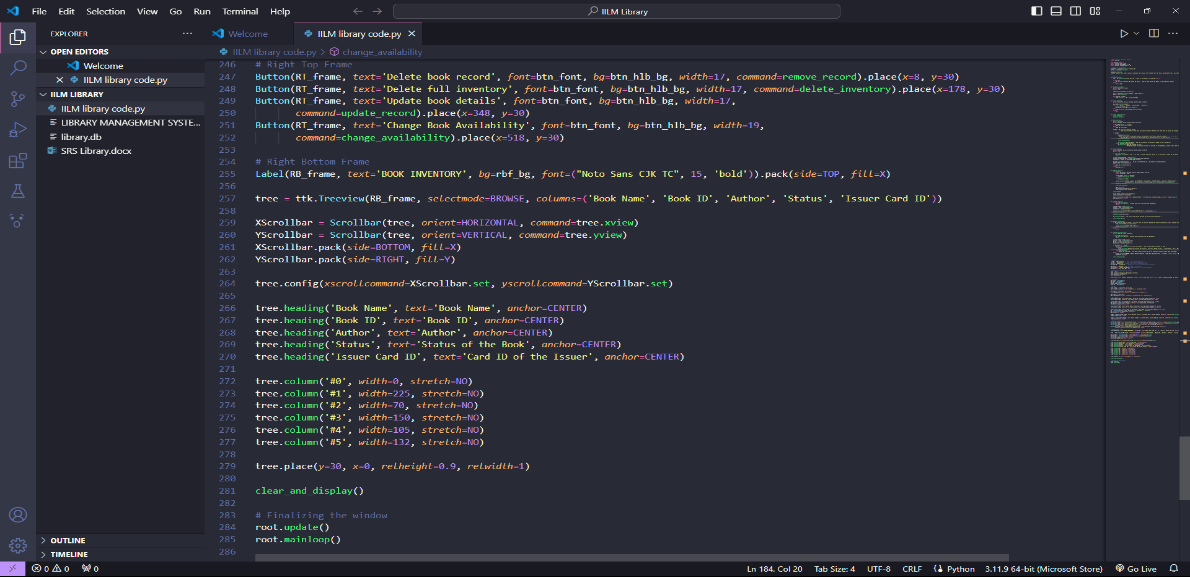
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**USE CASE DIAGRAM:-**

**A diagram of a book

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**IMPLEMENTATION**

**A screen shot of a computer

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**A screenshot of a computer

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**CONCLUSION,LIMITATION AND FUTURE SCOPE**

The development and implementation of the new Library Management System (LMS) at IILM University aim to address the critical issues identified in the existing system and enhance the overall efficiency and user experience. By fixing date-time errors, incorporating a grace period feature, redesigning the user interface, providing student access, introducing flexible issue periods, and automating penalty management with online payment capabilities, the proposed LMS offers a comprehensive solution to streamline library operations. This project not only improves the functionality and usability of the library system but also fosters a more engaging and user-centric environment for both staff and students.

**Limitations:-**

Despite the significant improvements, the proposed LMS has certain limitations that need to be acknowledged:

**1. Initial Cost and Time Investment:**

- The development and implementation of the new LMS require a considerable initial investment in terms of time and resources, including software development, training, and infrastructure upgrades.

**2. User Adaptation:**

- There may be a learning curve for both staff and students as they adapt to the new system. Comprehensive training and support will be essential to ensure a smooth transition.

**3. Integration with Existing Systems:**

- Integrating the new LMS with existing university systems (such as the payment gateway and user authentication systems) may present technical challenges and require additional customization.

**4. Maintenance and Updates:**

- Ongoing maintenance and regular updates will be necessary to keep the system secure, address bugs, and incorporate new features, which will require dedicated IT support.

**Future Scope:-**

The proposed LMS lays a solid foundation for further enhancements and innovations. The future scope of the project includes:

**1. Artificial Intelligence and Machine Learning:**

- Implement AI and machine learning algorithms to provide personalized recommendations to users based on their borrowing history and preferences, and to optimize library operations through predictive analytics.

**2. Mobile Application:**

- Develop a dedicated mobile application to complement the web-based LMS, providing users with on-the-go access to library services and notifications.

**3. Enhanced Digital Resource Management:**

- Integrate advanced digital resource management capabilities, including support for multimedia resources, e-books, and online journals, to cater to the evolving needs of academic research and learning.

**4. Advanced Analytics and Reporting:**

- Incorporate advanced analytics and reporting tools to provide deeper insights into library usage patterns, user behavior, and resource utilization, aiding in data-driven decision-making.

**5. Community and Collaboration Features:**

- Introduce community and collaboration features such as discussion forums, book reviews, and reading groups to foster a collaborative learning environment within the library.

**6. Blockchain Technology for Security:**

- Explore the use of blockchain technology to enhance the security and integrity of library transactions and user data, ensuring a tamper-proof system.

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**Other Sources:**

Discussions with library staff and students at IILM University provided valuable insights and user requirements for the proposed LMS.

Technical documentation and user manuals of existing LMS platforms were reviewed to understand current capabilities and limitations.

Internal reports and data from IILM University Library on current system performance and user feedback.