

LIBRARY MANAGEMENT SYSTEM

SOFTWARE REQUIREMENT SPECIFICATIONS



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## 1.Description of proposed software product

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The Library Management System (LMS) is a desktop application designed to automate and streamline the manual processes of library management. It serves as a one-stop solution for managing the complete workflow of a library, improving efficiency, reducing human effort, and enhancing the user experience for both staff and students.

Beyond traditional library operations, the LMS also includes a dedicated study section and an AI-assisted doubt-solving module, enabling students to strengthen their learning and critical thinking.

**🔑Major Features of our Software:**

1. Automate the process of issue, return and tracking of books.
2. Allows digital reservation of books for students.
3. Maintains history of user’s activity.
4. Keeps track of fine collection.
5. Search specific book for easy access.
6. Book recommendation to users based on their taste.
7. Notification for Fine, due dates, new books arrival via email or phone.

**🔮Future Enhancements:**

1. QR-Code or Barcode Support to easily add new books.
2. Mobile application support.
3. Integration of payment gateway to pay fine directly.

**🏆Benefits:**

1. Saves time and manpower.
2. Enhance user experience for students.
3. Maintains transparency for fine collection.
4. Provides features for study beyond just a library.

Library Management System (LMS) will be able to automate all of these task and improve the efficiency of this system and provide digital learning with AI assisted power.

## 2. Major Inputs of the system

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**1.** 📲 **Sign In Details :**

There will be different sign in pages for Faculties, Scholars, Students and Librarian (Admin) . So, the software will have different features and functionality for different role of users.

|  |  |
| --- | --- |
| Field | Inputs |
| Role | Librarian (Admin) , Student , Scholar , Faculty |
| User ID | Email id through which the account was created |
| Password | Password of user |

**2. 👥 Member Details :**

When a member creates a new account, based on his/her role has to fill the following credentials to create an account. The passwords will not be stored directly as a string rather encrypted through an encryption algorithm and stored.

|  |  |  |  |
| --- | --- | --- | --- |
| Student Details | Faculty Details | Research Scholar | Librarian |
| Student Id | Faculty Id | Scholar Id | Librarian Id |
| Name | Name | Name | Name |
| Department | Department | Topic | Email Id |
| Email Id | Email Id | Email | Phone no. |
| Phone no. | Phone no. | Phone no. |  |
| Year | Password | Password |  |
| Password |  |  |  |

**3.** **📚 Book Details :**

This information will be added in the Books table of our database. Collected at the time of addition of a new book to the library by the librarian.

1. Book Id
2. Title
3. Author
4. Edition
5. Availability
6. Category

**4. 💵 Transaction Details :**

This information will be added to the Transactions table of our database when a book is issued or returned.

1. Transaction Id
2. User id (Id of the person issuing or returning the book)
3. Issue Date
4. Return Date
5. Fine amount ( if applicable )

**5. 🔍 Search Queries :**

User can search books by the following fields:

1. Title
2. Author
3. Category

**6.** 💬 **Help and Support Queries :**

You can ask our built in AI assistant to help you with your queries related to studies or troubles facing to operate the software.

**7. 🙋 Raise a Doubt :**

You can ask a doubt in our doubt section and other students , faculties , scholars will be able to see your doubt. So, your doubt can get clarified by them.

**8. 🛠️User Utilities :**

Some basic utilities that a user can ask for through input are :

1. Re-issue Book
2. Reserve Book
3. Add Book to Favourites
4. Upload personal notes to keep them organised
5. Donate Book
6. Request for new book

## 3. Major Outputs of the system

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**📖 Book availability status:**

* Every book contains a property named copies available. Whenever a book is issued or reserved, copies available will go down by 1 and increase by 1 or more if a book is received or new books are added.

1. User will only be able to issue a book if copies available > 0
2. If copies available = 0, user can still reserve a book and whenever that book is available, the user will be notified.

**🧾 Issue/Return receipts:**

* These receipts will be sent to the users via Email or phone number and similar receipt will be generated when a book is re-issued or reserved.
* A person can only issue 4 books at a time and reserve 2 books at a time.
* In case of pending fines, no book can be issued, re-issued or reserved.

**Example of Issue Receipt:**

Borrower ID: 123cs0024

Name: Deepanshu Malakar

Book ID: B1001

Title: Harry Potter Author: J.K. Rowlings

Edition: 1

Issue Date: 18 – 08 – 2025

Book successfully issued and is to be returned on or before 18-09-2025. A fine of Rs.1 per day will be imposed on failure to return the book before the due date.

**Example of Return Receipt:**

Borrower ID: 123cs0024

Name: Deepanshu Malakar

Book ID: B1001

Title: Harry Potter

Author: J.K. Rowlings

Edition: 1

Issue Date: 18 – 08 – 2025 Return Date: 11 – 09 - 2025

Book successfully returned, no fines due.

**⚠️ Overdue fine calculations:**

* If user fails to return a book before the due date, then a fine will be imposed as Rs 1 per day.
* User will not be allowed to issue, re-issue or reserve a book until and unless they pay the fines imposed on them.
* Ignoring to pay fines for long period may lead to suspension or in rare cases blacklisting of user’s account.

**📊 Reports**

* A feature only available for Librarian (Admin).
* This will allow the admin to generate a summary of any student in a form of report.
* This report contains information regarding the total no of books issued by student, total fine paid, no of times he is late to return a book etc.
* This will be generated in the form of a pdf or excel file.

**💵 Daily transactions**

* These will be visible to the librarian (Admin).
* A table will be generate containing all the issues and returns made on a particular day.

**📝 Overdue books list**

* Books which are overdue generate remainders for the users to return them and pay the fine or account may get suspended.
* A table will also be generated for the librarian to view which books are overdue. So that the librarian may take the necessary action.

**⏳Member borrowing history**

* User himself will be able to see the list of all the books he has issued in the past.
* The list will be sorted according to most recently issued to issued long ago.
* This makes it easy for user to find the book if he wants to issue the same book again in the future.

## Major Processing Functionality

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**📖 Book Management:**

* Our S/W will offer an easy interface to the users (Librarians) to add new books to the Library, Update the information about a book or the book itself and to search a book in the system.

**👥 Member Management:**

* Members can register themselves on our software and use the functionality of issuing, reissuing, reserving a book or requesting for a book which is not available.
* Apart from this if a student has a fine imposed on him/her then he/she won’t be in a state to reserve/issue/reissue a book unless the fine is paid.
* In the case of failure to pay the fine for a long-time without a valid reason or some other action of indiscipline his/her membership shall remain suspended and required to be reactivated.
* Furthermore, in the case of multiple suspensions (3) of an account within 6 months, his/her account will be **BLACKLISTED** from the Server and will be reactivated in the next session and with the permission of the librarian only.

**💵 Transaction Handling:**

* This feature will handle the fine collection from students and act as an authenticator if the fine is paid or not and it’ll keep the UTR No. for future reference.

**📝 Issue Books:**

* Students can issue Books (Max 4 Books at a time) and can reissue any number of the books before the Deadline.
* Research Scholars can issue any number of Books w/o any restrictions but only with the permission of their respective supervisor faculty under which they are doing the research.

**📝 Return Books:**

* Students will have to return/reissue the issued Books within a specific period of time (30 Days).
* If failed a fine of Rs.1 / day will be imposed on the student and some of the functionalities will be suspended until the fine is paid.
* Further Delay w/o any valid reason(s) may lead to unwanted consequences.

**📊 Report Generation:**

* S/W will have an option to generate a report of any student considering the book issued, no. of times of suspension, amount of fine paid etc. and convert it into a PDF.

**🧑‍🎓Study Section:**

We will be providing a dedicated Study Section to students, designed to be their personalized space for managing all study-related content in one place. This section will have three main tabs, each focusing on a unique aspect of the student's learning process.

1. **My Notes:**

This tab will serve as a personal notebook for students. It will display all the notes that the student has previously created or saved, making it easy to revise or update them anytime.

Features:

1. Create edit or delete notes.
2. Organize your notes in categories for easy access.
3. Download the notes in pdf format or txt format.
4. **Uploaded Pdf’s/E-Books:**

This tab will act as a digital bookshelf where students can upload and manage their PDF files, eBooks, scanned study material, and other relevant documents.

Features:

1. Upload pdf (<20mb) of any book.
2. Clean layout for easy access.
3. Category based organization of pdfs.
4. **Study progress remainders**:

This tab is designed to help students stay consistent and motivated by tracking their study habits and setting reminders.

1. Display’s how much percent of book is read.
2. Set daily and weekly remainders to read a book.
3. **AI powered Learning:**

An Ai assistant is there to solve users’ queries related to studies. Just ask whatever you want to ask and assistant will generate content for you like an instructor.

This Ai will focus on student’s deep thinking. Means whenever student asks a question instead of directly giving the answer it will ask the student some question that will lead him to deduce the correct answer by himself.

## Modules of the proposed system

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1. **🧑‍💼 Admin Module**

* Manage users (Librarian, Student, Admin)
* System settings (fine rules, due days)

1. **📖 Book Management Module**

* Add/edit/delete books
* Search by title/author/category

1. **👥 Member Management Module**

* New member registration
* Membership renewal/blacklisting

1. **💵 Transaction Module**

* Book issue/return/reserve/re-issue
* Fine calculation
* Receipt generation

1. **📊 Reports Module**

* Generate transaction history
* Export reports

## Business constraints & Technical Constraints

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**💰Business Constraints:**

* Only registered members can borrow books.
* Maximum 4 books at a time can be issued.
* Maximum 2 books at a time can be reserved in advance.
* Overdue fine: Rs 1 per day

**💻 Technical Constraints:**

* Platform: Windows/Linux OS
* Database: MySQL
* Backend: Python
* Frontend: Python Tkinter, Custom-Tkinter, pywinstyles and pillow.
* Network: Wi-Fi support

## User Characteristics

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* There are 4 types users which can access the app. They are namely Librarian ( Admin ) , Faculty , Research scholars , Students.
* The following is the way different users are going to interact with the system.

|  |  |
| --- | --- |
| Librarian | Student / Faculty / Research Scholar |
| Add new books. | Explore various books. |
| Update information of books. | Reserve a book to issue it in 1 week. |
| Remove books which are not available now. | Donate a book. |
| Generate reports of issue, return and fines collected for a student. | Get notifications and remainders about fine payment, return date and new books added. |
| Suspend, Blacklist and re-activate account of students | Keep track of borrow history. |
| Approve fine payment by student | Use AI integrated study section for enhanced learning. |
| Generate report about library stock | Request for new books to be added to library. |
|  | Raise a doubt in doubt section. |
|  | Solve another student’s doubt in doubt section. |

## Data Model and Description

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Entity Relationship Models:**

**📦Entities:**

* Books
* Members ( Student / Faculty / Research Scholars )
* Admin ( Librarian )
* Transaction

**🤝Relations:**

* Borrow and Return
* Involves
* Manage

**🌐Representation of Entities and Relations:**

* [Member] ---- <Borrow or Return> --- [Books]
* [Admin] --- <Manages> --- [Books]
* [Transaction] --<Involves> --- [Books]

## Masters Information

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **📚Book Masters :**

|  |  |  |
| --- | --- | --- |
| Field | Datatype | Description |
| Book Id | Varchar(10) | Primary Key |
| Title | Varchar(100) | Title of book |
| Author | Varchar(50) | Author name |
| Edition | Int | The edition printed |

* **🧑‍🎓Students Masters :**

|  |  |  |
| --- | --- | --- |
| Field | Datatype | Description |
| Student Id | Varchar(10) | Primary Key |
| Name | Varchar(100) | Name of Student |
| Department | Varchar(50) | Department in which student is enrolled |
| Email Id | Varchar(100) | College email id of student |
| Phone no. | Int(10) | Phone number of students |
| Year | Int(1) | Academic Year of student |
| Password | Varchar(100) | Encrypted password |

* **👨‍🏫Faculty Masters :**

|  |  |  |
| --- | --- | --- |
| Field | Datatype | Description |
| Faculty Id | Varchar(10) | Primary Key |
| Name | Varchar(100) | Name of Faculty |
| Department | Varchar(50) | Department of Faculty |
| Email Id | Varchar(100) | College email id of Faculty |
| Phone no. | Int(10) | Phone number of Faculty |
| Password | Varchar(100) | Encrypted password |

* **🎓Research Scholars Masters :**

|  |  |  |
| --- | --- | --- |
| Field | Datatype | Description |
| Scholar Id | Varchar(10) | Primary Key |
| Name | Varchar(100) | Name of Scholar |
| Department | Varchar(50) | Department of Scholar |
| Email Id | Varchar(100) | College email id of Scholar |
| Phone no. | Int(10) | Phone number of Scholar |
| Password | Varchar(100) | Encrypted password |

## 10. Transaction Information

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**📕BOOK ISSUE PROCESS**

1. User will select a book that he/she wants to issue.
2. System will check if the user is eligible to issue a Book.
3. The System will check if that particular book is available in the library or not.
4. **If Available**
5. Change the Book status to Issued.
6. Decrease the number of copies available.
7. Record the Transaction in the Database.
8. Calculate the Deadline and generate the Receipt.
9. Send the receipt to the User.
10. **Not Available**
11. Give option to the User to Reserve it so whenever it’ll be next available in the library, the user will be notified and can access the book on a priority basis.

**🔄BOOK RETURN PROCESS**

1. Member returns the book to the library.
2. The System checks
3. **If the book is** **overdue**,
4. Calculate the fine (₹1 per day late).
5. Add fine to user's account or prompt for immediate payment.
6. **If the book is not overdue,**
7. No fine is applied.
8. Update the Book status to **“Available”**.
9. Increase the number of copies available.
10. Record the return transaction in the database.
11. Update user's borrowing history.
12. Send return confirmation and fine (if any) details to the user.

**🔄BOOK RE-ISSUE PROCESS**

1. User will select a book that he/she wants to Reissue.
2. System will check if the user is eligible to issue a Book.
3. **If Eligible**
4. Extend the Due Date by One Month.
5. Calculate the New Deadline and generate the Receipt.
6. Send the receipt to the User.
7. **If Not Eligible**
8. Give the user the relevant reason(s) and advice to rectify the same.

**📌BOOK RESERVE PROCESS**

1. User will select a book that he/she wants to Reserve.
2. System will check if the user is eligible to reserve a Book.
3. The System will check if that particular book is available in the library or not.
4. **If Available**
5. Change the Book status to Reserved.
6. Decrease the number of copies available.
7. Record the Transaction in the Database.
8. Calculate the Deadline (3 Days) and generate the Receipt.
9. Send the receipt to the User.
10. **Not Available**
11. Give option to the User to Reserve it so whenever it’ll be next available in the library, the user will be notified and can access the book on a priority basis.

|  |
| --- |
| NOTE : IF THE USER DON’T ISSUE THE REESERVED BOOK WITHIN THE DEADLINE THEN THE BOOK WILL BECOME “AVAILABLE” AGAIN AND THE USER WILL BE NOTIFIED. |

## Data Flow Diagrams

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* **Level 0 DFD:**

Shows the main system interacting with Members and Librarians.

* **Level 1 DFD:**

Breaks the system into modules — Book Management, Member Management, Transaction Management, and Report Generation — with their data stores and flows.

* **Level 2 DFDs:**

Here are the Level 2 DFDs for each module in your Library Management System:

1. **Book Management**

– Covers adding, updating, deleting, and searching books.

1. **User Management**

– Covers registering, updating, and deactivating members.

1. **Transaction Management**

– Covers issuing books, returning books, and calculating fines.

1. **Report Generation**

– Covers usage and inventory reports.

## 12.Specific Requirements

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| 12.1 | User Interface Requirements |

* **Login Screen :**

1. Contains 3 fields username ,password and role.
2. In case user is a new user, there is an option to sign up.
3. Forget password option will also be provided in case user is unable to remember his/her password.

Username:

Password:

Role:

Student

Sign In

* **Dashboard ( Role = User ):**
  1. Home screen with all the books present to explore.
  2. Search button to search for new books.
  3. Side bar which contains options to:

1. Home page
2. View Favourite books
3. View Issue History
4. Enter study section
5. View Reserved Books
   1. A navbar containing buttons to
6. View user’s profile
7. Change settings of app
8. View notifications
9. Explore , Donate book , Help and Support and Doubt Section.
   1. Finally, a status bar which contains information about
10. Total books issued by user
11. Total books reserved by user
12. Outstanding fines
13. Due books
    1. Category bar present just below the navbar containing buttons that will filter the users explore content based on the category selected.

|  |
| --- |
| * Below is A Representation of User Interface Design |

* **Book Search:**

1. A search bar is present just under the navbar at the right.
2. You can search a book by its name , author or category

* **Book Icon:**

1. The icon or the visual representation of book contains the cover image of the book at left.
2. The right side of book logo contains the book title, author, edition, copies available.
3. Downside there are 2 buttons to reserve book and add book to favourites.

|  |  |
| --- | --- |
| 12.2 | Hardware and System Software Requirements |

* Processor: Intel i3 or higher
* RAM: 4GB minimum
* OS: Windows 10/11, Linux
* Database: MySQL 8.0+

|  |  |
| --- | --- |
| 12.3 | Network and Communication Interface |

* LAN/Wi-Fi support for multi-user access

|  |  |
| --- | --- |
| 12.4 | Software Interface Requirement |

* **Front End Technologies:**

1. Python Tkinter
2. Python customtkinter
3. Python pywinstyles
4. HTML
5. CSS
6. React

* **Backend Technologies:**

1. MySQL
2. Django

* **Version Control Technologies:**

1. Git
2. Git Hub

## 13.Performance Requirements

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1. **Fast Searching**

When a user searches for a book, the system should show results in less than 2 seconds.

1. **Quick Login**

Login and password verification should happen instantly without long waiting times.

1. **Smooth Navigation**

Moving between different pages (like search, issue book, return book) should feel fast and responsive.

1. **Many Users at Once**

The system should allow more than 100 students, faculty, and scholars to use it at the same time without slowing down.

1. **Large Book Collection**

The system should be able to store and manage details of more than 500 books.

1. **Stable Uptime**

The software should be available and working 99.9% of the time during library working hours.

1. **Accurate Records**

Transactions like issuing and returning books should be updated in real-time without delays.

1. **Scalability**

If more books or users are added in the future, the system should still work smoothly.

1. **Error Handling**

If something goes wrong (like wrong input or missing data), the system should recover quickly without freezing.

1. **Security with Speed**

Even with password protection, login and authentication should remain fast.

1. **Consistent Performance**

The system should work equally well during peak hours (e.g., semester end when students borrow/return many books).