

Library Management System Project in Java [Comprehensive Guide]

Library Management Systems are a great way to monitor books, add them, update information in it, search for the suitable one, issue it, and return it when needed. This Library Management System Project is developed in Java, to provide all the features that a Library Management System should usually have and overcome the drawbacks of the present system such as:

- Paper-based record keeping.
- Mis-management of data due to manual and paper-based handling.
- A vast amount of time consumption in searching for books and library management.
- Book-thefts from the library.

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Features of the Library Management System Project in Java

This software resolves all the issues of the previous system with its offerings like
Menus: A menu-driven project with various options to select and function.

Reports :

- Proper reports can be generated with the necessary information to view the real-time updates and progress, with a click of a button.
- Friendly user interface: A library management system with functionalities to issue, return, and view the status of books should be user friendly enough so that the person handling it can get the work done efficiently. It is such that people who haven't used software earlier can also work on it efficiently without knowing any technicalities.
- Real-time errors display: A proper provision to display error messages is provided so that the problem with the system can be known and resolved easily.

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Security:

- A secure system for logins and preventing unauthorized ones is provided so that no one uses it without permission.
- Validated entries are permitted: Each form has its validations, so the possibility of wrong entries is minimized.

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Why are we creating the Library Management System Project in Java?

Java is an object-oriented language that is similar to C++ but has more features in it like free access, and it can run on all platforms. Some of the unique features that make it the best choice for such software development are:

Simple language:

- It does not have such problems as operator overloading or pointers that can complicate the process.
- **Object-oriented:** As an [object-oriented program](#), it is considered to have a state and behaviour and give output accordingly.
- **Secure:** It runs the program in the sandbox and converts to bytecode after compilation, to avoid data tampering from untrusted sources.

Library Management System Project in Java

The project created with Java used for controlling and monitoring operations in the library management system has been divided into five main modules:

- **Database module:** This has two functions – Insertion of data and extraction of data with a user-friendly screen.
- **Report module:** For the borrowed books list to display.
- **Available module:** To view the availability of books.
- **Search Module:** search facility for books and members.
- **Payment module:** Payment facility for fine payments.

Users in this system:

- Admin

- Librarian

User functions:

- Admin: Add, view, and delete the librarian.
- Librarian: Add, view, issue books, return books, payment.

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System requirements for Library Management System Project in Java

Coding Language: Java

Database: MS Access

- MySQL JDBC Connector
- MySQL Community Server
- Java
- Eclipse IDE

System Design

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The Input Design

The input design consists of the precise input instructions, which are easy, logical, and devoid of error entries. The source document already consists of the data entry and its format with its allocated space and field sequence. The online data entry into the input-form should be free of errors. It makes use of a processor that accepts commands and the provided data from the user to analyse and then take it further. Depending on whether it's correct or not, the process goes further and then it is either accepted/rejected.

The input stage is not just one stage, but an amalgamation of various stages:

- Data Record
- Data Transcription
- Data Conversion
- Data Verification
- Data Correction
- Data Transmission

The Output Design

The output design works to provide an accurate and effective answer to the query asked in the input by the user. As they are the direct source of information for the provider, they need to have satisfying results that answer the query raised. During the logical design of the program, the particular outputs for the questions are set up with their formats.

The Database design

The database is the place where the interrelated data for the users is stored to provide them with the solution effectively. As the inputs and outputs, database design is one of the essential parts of the process, to make the information accessible and flexible for the users to retrieve.

Some of the features of an accurate database design include:

- Accuracy
- Integrity
- Data Independence
- Less Redundancy
- Performance
- Privacy
- Ease of understanding and retrieval
- Recovery

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Library Management System Project in Java: Coding

Information will be stored in the form of tables for this software program. The various tables that are used in this program are

Table Name: Books

Table Name: Borrow

Table Name: Members/Students

Now, depending on the various functions, you can understand the working of each one of them.

- **Login:**

It is clear with the name what this function is for. It enables the user and admin login. The first login would always be the admin login, and the password remains the same, i.e. admin.

After the admin login, one can perform various activities of the admin such as viewbooks, view issued books, view the students/members, issue book, add member, add book details, return the book, expired/pending book, etc.(the detailed functions are explained in the ‘admin menu section below).

- **Connect to GUI:**

As it says, this function connects the database to the GUI. After connecting the database, the username and password of the database have to be entered to start the function. Next, using the create function, database, tables, and data can be added to the table.

This is done with the help of SQL statements, which helps to connect to the GUI and enable login.

1. **User Menu:** The user menu displays all the books that are issued by the user.
2. **Admin Menu:** The admin has all the permissions in the system and can perform functions like add books and users, delete/edit books, return books, details of users, details of books, create, and reset the database, etc.
3. **Output menu:** The output menu will display the answers to the query. The initial id and password for the first login would be for admin, and the username and password would also be the same, i.e. admin.

After the login, a dialogue box opens with various options as described above in ‘login’.

- **View Books-** When you click this option, the details of the books as stored in the table will be displayed with their name, genre, price, Subject, Author, Copyright, Publisher, Edition Pages, ISBN and other book details if mentioned in the database.
- **View Members/ Students/ Users** – The users in the system are displayed with their details to whom the books would be issued and its present status (issued, returned, pending fine, etc.)

The users will also be able to view the books issued to them with this option. They can also see the books available in the database that can be issued.

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- **Create/reset the database:** You can create and reset a database using this option. You must always be careful before resetting a database as there is a chance of loss of information.
- **Add user** – To add a new user to the program, click on ‘add user’ and select whether it is an admin or user to continue. The details of all users will be displayed in the view users section.
- **Issue a book** – To issue a book to a student/member/user, you need to click on the ‘issue book button’ with the book details like book id, user id, number of days to be issued, date of return, etc. After entering the required information, click on ‘submit’ which completes the process. Depending on the process you need for issuing a book or providing access to users to view the list of books, you can change the logic as desired. If you need to provide access for particular users to view the list of some selected books available in the database, some changes to the logic need to be done.
- **View issued books:** After you issue the book with the process mentioned in the above paragraph, all the issued books with respective details can be viewed with this functionality.

Return Books:

- After selecting the return books option, you need to enter the book id and select the return date from the calendar selection. There are two variations to this: If the book is returned on time, then it will display the message of the book returned. If the book is returned later than the mentioned date, the system will display the message of the fine payment with the amount to be paid. The details of the fine payment can also be viewed in ‘View issued books’.

Add Book:

- Adding the book to the system can be done here with all the details of the book, name, price, genre, etc. It can be viewed in the ‘view books’ section thereafter.

The logic and process flow described here are for a simple **Library Management System Project in Java**. It can always be tweaked as per the logic required.

Know more:

Conclusion

A **Library Management System Project in Java** is one of the various systems developed that has numerous functionalities that meet the current requirements of the present-day library system. To enhance it, you can add features like RFID, SMS to remind users of the return date, and others. Java has many features that can be explored to create such wonderful programs.

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1. Why is there a need for a Library Management System?

The primary need of having a Library Management System is to crop down the costs and effectively operate it without any hassle. The software embedded will cut down manual efforts and hence, will account for fewer errors. Working and managing a library manually could be tedious; adding more to the paperwork. Therefore, when we use a custom-built software, the entire process becomes smooth and efficient.

2. How good of an investment will it be for libraries to opt for a Library Management System?

Having a Library Management System for every school and college is strongly recommended. To begin with, having a system makes it easier to manage your data as you can control and manage your database, descriptive details, catalogs of members, book movements, and books respectively. Additionally, manually entering data is time-consuming and therefore, using a management system software, everything is just a click away. Moreover, universities and schools that function on fixed costs can invest in the library management system for once and can draw fruitful benefits for lifetime. Finally, database management, productivity, real-time communication, etc. are some other contributing factors to having an LMS.

3. What factors determine the cost of building a Library Management System?

To determine the cost of creating a Library Management Software application, there are some aspects that need attention. The first is, the size of the app and the number of features you would integrate into it; depending on the extensive features, the cost will increase significantly. Secondly, platforms also play a major role in deciding the cost of building an app; if you want your app for either Android or iOS, the cost will be less. However, an increase in the number of platforms will partially contribute to increasing the cost.