

GALGOTIAS UNIVERSITY

**PROJECT NAME :- LIBRARY MANAGEMENT
SYSTEM**

TEAM NAME :- BITWISE BROS

TEAM MEMBERS NAME

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Project Report: Library Management System in Java



Project Title:

Library Management System (LMS)



Developed By:

Tushar Saini



Institution / Course:

Galgotias University

Course: B.Tech CSE

Semester: 2nd Semester



Duration:

Start Date: May 01, 2025

End Date: June 10, 2025

1. Introduction

The Library Management System is a Java-based desktop application that helps librarians manage books, track student borrow/return actions, send reminders for due dates via email and SMS, and calculate fines for








late returns. It provides both administrative and student modules, with a user-friendly interface built using Java Swing and backend data stored in a relational database (e.g., MySQL).


2. Objective

The main objectives of the project are:

- Automate book issue and return process.
 - Maintain records of books and users.
 - Send automated email and SMS reminders before due dates.
 - Implement a fine system for overdue returns.
 - Integrate a basic AI-powered chatbot for help and navigation.
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3. Features

Feature	Description
 Book Management	Add, edit, delete, and search books.
 Student Management	View student records and borrowing history.
 Borrow/Return System	Allow students to borrow and return books.
 Reminder System	Sends email & SMS notifications for due dates.
 Fine Calculation	₹2/day fine for overdue books; auto-calculated.
 AI Chatbot (GPT-4)	Uses OpenAI API to assist users in navigation and queries.
 Dashboard	Charts for book stats and usage.

Feature	Description
 Audit Logs	Tracks user actions like login, borrow, return, etc.

4. Technologies Used

Category	Technologies
Programming	Java (JDK 17)
UI Framework	Java Swing
Database	MySQL
API Integration	JavaMail API, SMS API, OpenAI GPT
Libraries	okhttp, okio, json, JDBC
IDE	IntelliJ IDEA / Eclipse

5. System Design

a. Architecture:

- Model-View-Controller (MVC) design pattern for maintainability.
- Separate service classes for core logic like reminders and fines.
- Modular UI components (AddBookUI, BorrowReturnUI, Dashboard, etc.).

b. Class Examples:

- Book.java: Stores book information.
- User.java: Represents a student or admin.
- ReminderService.java: Schedules and sends reminders.

- GPTService.java: Communicates with OpenAI API.
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6. GPT Integration

- Uses OpenAI GPT-4 API for chatbot.
 - Accepts user queries and returns suggestions or help text.
 - Helpful for new users navigating the system.
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7. Email & SMS Reminders

- Email sent via JavaMail with SMTP configuration.
 - SMS sent using integrated 3rd-party SMS API (.jar added).
 - Scheduled using Timer or ScheduledExecutorService.
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8. Fine Management

- Fine = ₹2 per day after the due date.
 - Displayed in student profile and admin panel.
 - Automatically calculated when a book is returned late.
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9. Testing

- Unit tested classes like ReminderService, EmailUtil, and FineCalculator.
 - Manual testing performed on UI features and CRUD operations.
 - Verified API connections (OpenAI, Email, SMS).
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10. Sample Screenshots (Attach in Report)

- Dashboard with Charts
 - Book Management Panel
 - Borrow/Return UI
 - Reminder Email Preview
 - GPT Chatbot Interface
 - Admin Panel with Fine Display
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11. Conclusion

The Library Management System successfully streamlines the traditional library workflow using Java technologies. It is scalable, user-friendly, and enriched with smart features like GPT integration and automated reminders. This system reduces human error and increases productivity in managing a library.

12. Future Enhancements

- Move to a web-based system using Spring Boot.
 - Add facial recognition login for security.
 - Implement role-based access control with OAuth.
 - Enhance chatbot to handle natural voice input.
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13. References

- [OpenAI GPT API Documentation](#)
- JavaMail API Documentation
- OkHttp Library
- [MySQL JDBC Documentation](#)

