

PROJECT SYNOPSIS

Project Title



Library Management System (LMS)

Created By:

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Batch Code: ANP-D2405

Course Code: ITPR

Introduction

A Library Management System (LMS) is used to manage the daily operations of a library such as maintaining book records, managing member information, and tracking issued and returned books. In many small institutions, these tasks are still done manually, which leads to errors, difficulty in searching records, and increased time consumption.

The application allows the admin to add books, manage users, issue and return books, and check availability. Because it is command-line based, it runs smoothly on any system without the need for a graphical interface.

This project demonstrates strong concepts of Java, Object-Oriented Programming, JDBC connectivity, and database design.

Project Objectives

The core objectives define the functional scope and technical goals of the LMS project:

- **Data Persistence:** Implement a stable SQL database structure to manage and retrieve data efficiently.
- **CRUD Functionality:** Achieve full **Create, Read, Update, and Delete** capabilities for core entities: Books and Members.
- **Transaction Tracking:** Accurately record and manage the lifecycle of borrowing transactions, including issuing, returning, and tracking due dates.
- **Stock Synchronization:** Ensure that the physical availability of a book (`available_copies`) is automatically updated and synchronized with the transaction records in real-time.

Project Category

This project belongs to the following categories:

- Application Development
- Database Management System (DBMS)
- Core Java Project
- Command-Line Based Console Application

Analysis

Module Description

The project is structured into four distinct Java packages, promoting maintainability and adherence to the separation of concerns principle.

1. Book Management Module

- Add New Books**
- View All Books**
- Search Books by Title, Author, or Genre**
- Update Book Quantity**
- Maintain book availability**

2. Member Management Module

- Add New Members**
- View Member Details**
- Update Member Information**
- Maintain member contact details**

3. Issue/Return Management Module

- Issue a Book to a Member**
- Check Book Availability**
- Update Book Quantity on Issue**
- Return Book**
- Maintain issue and return history**

4. Admin/Login Module

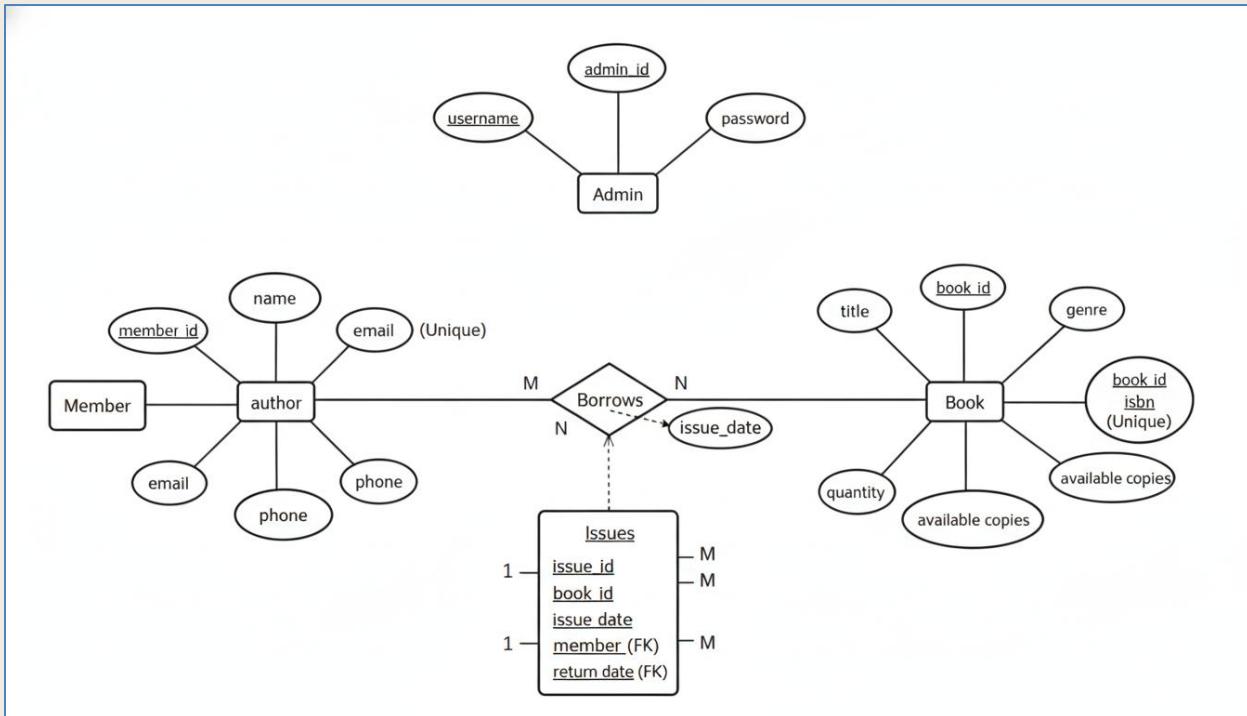
- **Login using username and password**
- **Only admin can operate the system**
- **Secure access**

Database Design

- The database of the Library Management System is designed using four main entities: Books, Members, Issued Books, and Admin. Each entity stores specific information required for smooth functioning of the system.
- The Books entity stores all details of the books available in the library such as the book name, author, category, and the number of copies. It helps in managing book availability.
- The Members entity keeps information about users who can borrow books. It includes their basic details and ensures proper tracking of issued books.
- The Issued Books entity connects books and members. It stores which book is issued to which member, along with the issue date, return date, and the status of the book. This helps in monitoring issued and returned books accurately.

Entity Relationship (ER) Diagram

The diagram illustrates the many-to-many relationship between **Books** and **Members**, resolved through the transactional **Issues** table.

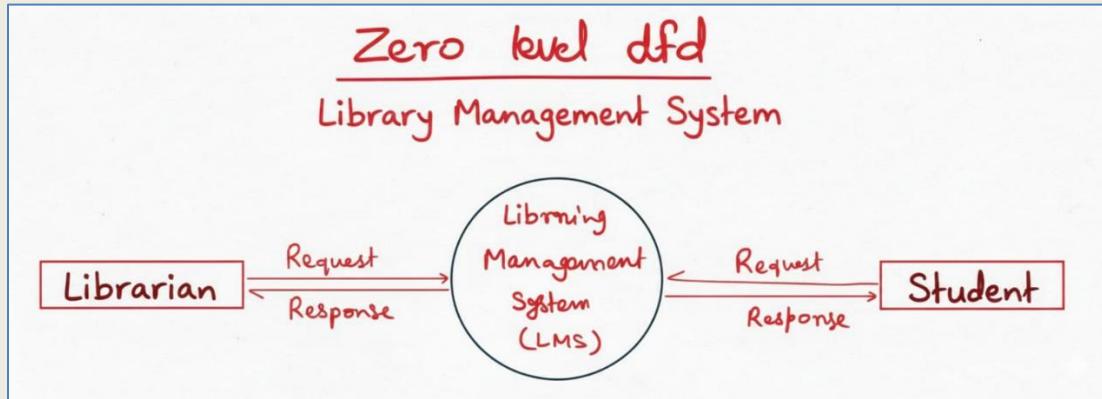


Key Relationships:

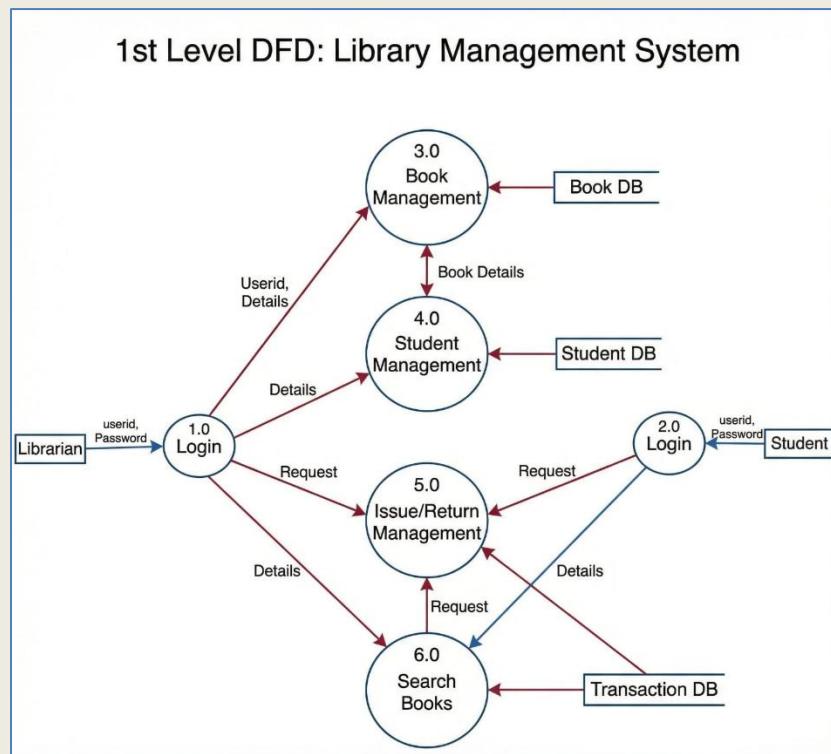
- A **Member** can be associated with Many **Issues**.
- A **Book** can be associated with Many **Issues**.

DFD

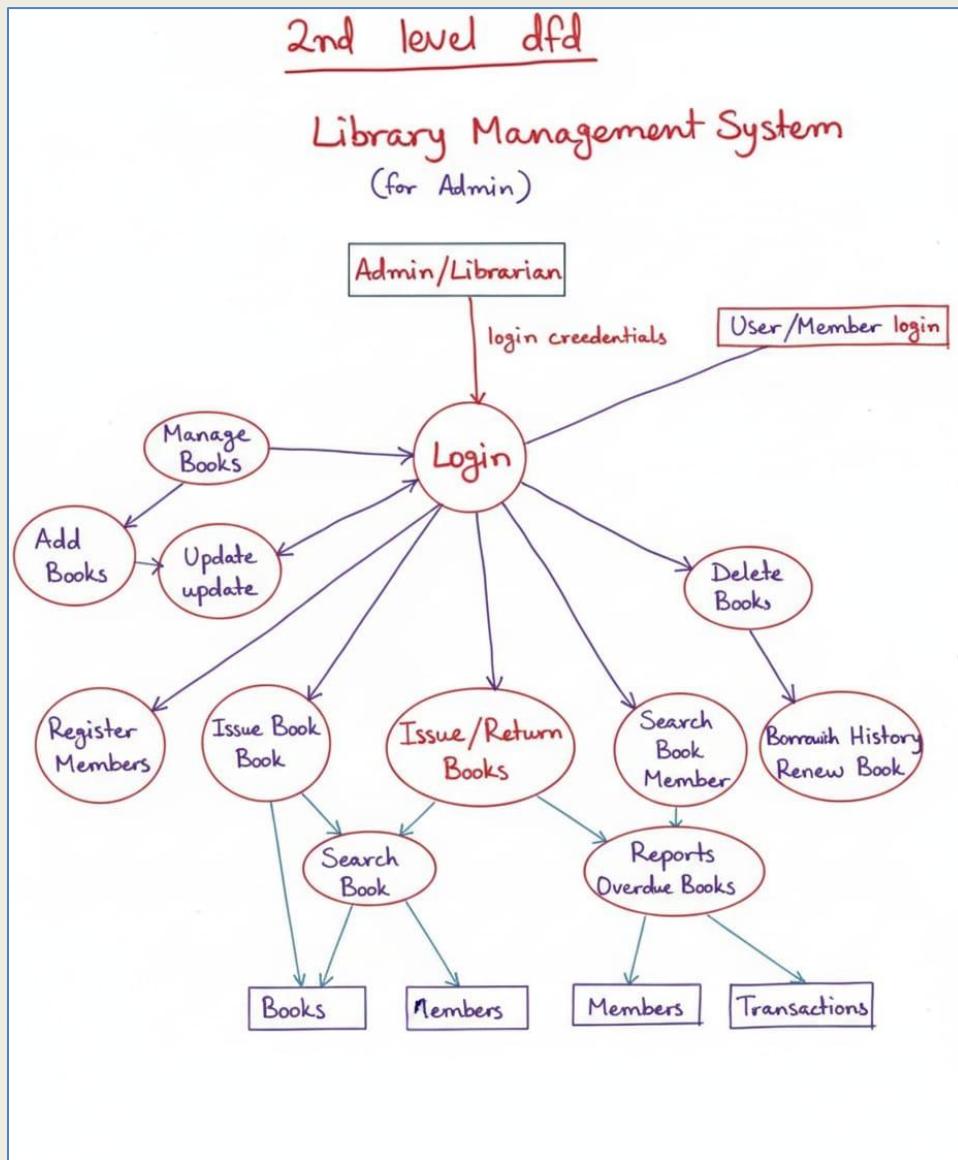
Zero level



First level



Second level



Process Logic Diagram

Start

|

v

Admin Login

|

v

Display Menu

|

|--- Add Book

|--- View Books

|--- Add Member

|--- View Member

|--- Issue Book

|--- Return Book

|

v

Exit System

Platforms Used

Hardware Requirements

- Intel i3 or higher processor
- Minimum 4 GB RAM
- 2 GB free disk space
- Keyboard and monitor
- Laptop/desktop with 32-bit or 64-bit support

Software Requirements

- Windows/Linux operating system
- JDK 8 or above
- Eclipse IDE
- MySQL Server
- JDBC Connector (mysql-connector-j.jar)
- Command Prompt/Terminal
-

Future Scope and Enhancements

For future iterations, the LMS can be significantly enhanced by incorporating advanced features and shifting towards a more user-friendly interface:

- **GUI Development:** Replace the current Command Line Interface (CLI) with a modern Graphical User Interface (GUI) using Java Swing or JavaFX to improve staff usability.
- **User Authentication:** Implement a robust login system for staff with different access roles (e.g., Librarian, Administrator) to enhance security.

- **Fines and Penalties:** Integrate a module to automatically calculate and track fines for overdue books, including reporting features for outstanding payments.
- **Search Optimization:** Implement full-text search capabilities and indexing on the database level for faster and more flexible retrieval of book titles and authors.

Bibliography

The following resources and documentation serve as the foundational references for the planning and technical implementation of the Library Management System project:

1. **Oracle.** Java Documentation (JDBC and SQL Data Types).
Comprehensive guides on using the Java platform, specifically the JDBC API.
2. **MySQL/PostgreSQL Documentation.** Relational Database Design Principles and DDL Syntax. Official documentation providing best practices for database schema design and constraints.
3. **Eclipse Foundation.** Eclipse IDE Documentation. Guides for setting up, compiling, and managing Java projects within the integrated development environment.