Project Proposal

on

Library Management System

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2. Introduction

The library management system (LMS) is a Command line designed to handle all the routine activities of a library in a smart and organized way.

Our Library Management system solves all these problems by converting the entire library process into a digital format. Instead of righting everything on paper or searching registers the librarian can use this computer application to perform all tasks with just a few clicks.

The main Purpose of the project is to remove these manual problems and provide a fast, accurate and digital way of managing a library. Our library management system stores all the information in a computer database, Such as details of books, Student, issued books and retuned books.

The project uses for building a simple and user-friendly desktop interface, **MySQL** for storing the data permanently, and **Maven** to manage the project dependencies. Overall, this system improves the working speed of the library, reduces paperwork, and helps, maintain all records in an organized way.

3. Objectives

1. To automate the process of issuing and returning books in the library.

2. To maintain a digital record of all books, students and issues-return details safely in MySQL.
3. To reduce manual work and human errors by replacing the old paper based-system.
4. To provide fast book search based on book title, author name, or book id.

5. To track book availability in real time and update status automatically.

6. To provide secure login so that only authorized librarians /admin can access the system.

7. To generate reports like issue report, return report, and fine report for better management.

8. To offer a simple and user-friendly cl for easy operation by staff.

4. Project Category

1. Application type: Command line base.
2. Domain: Database management system.
3. Technology used:
    - ✓ Java (Core java + Swing).
    - ✓ MySQL database.
    - ✓ Maven (Build Tool)
    - ✓ JDBC Connectivity

4. Project Level: Mini project

5. Architecture: 3-Tier architecture (UI -> Business logic -> Database)

6. Purpose: Library automation and digital record management

5. Analysis

Modules and Description

1. **Login Module:**

- This module provides secure access to the system.
- Only authorized librarians/admins can log in.
- User credentials are verified using the database.
- Prevents unauthorized access.

2. Book Management Module:

- Adding new books to the library.
- Updating book details (title, author, price, quantity).
- Deleting old/damaged books.
- Searching books by title, author, or book ID.
- Tracking available vs. issued copies.

3. Student Management Module:

•Stores and manages the details of students who borrow books.

Includes:

- Adding new student records
- Updating student information
- Removing students
- Searching students by name, class, roll number, or ID

4. Issue Book Module:

- Handles issuing of books to students.

Features:

- Checks availability of the selected book
- Records issue date, due date, student ID, and book ID
- Reduces the available book quantity
- Prevents issuing if the book is not available

5. Return Book Module: Functions:

- Records the return date
- Updates book availability
- Calculates fine automatically (if overdue)
- Closes the issue transaction

6. Report Module:

- Generates various reports for easy library monitoring.

- Book availability report
- Issued books report
- Returned books report
- Fine report
- Student-wise activity report

Database Design

Database tables include:

Login:

Books:

This table stores all information related to books available in the library.

Field Name	Data type	Description
Book-ID	Int (primary key)	Unique-ID for each book
Title	Varchar	Name of the book
Author	Varchar	Author's name
Category	Varchar	Subject/genre of the book
Quantity	int	Number of copiesavailable

Students Table:

This table stores details of students who are allowed to borrow books.

Field Name	Data Type	Description
Student-ID	INT (Primary Key)	Unique ID for each student
Name	VARCHAR	Student's full name
Course	VARCHAR	Class/Course
Contact	VARCHAR	Contact number

Issue Return Table:

This is the central table that keeps track of book issue and return activities.

Field Name	Data Type	Description
Book-ID	Int (Foreign key)	References Book table

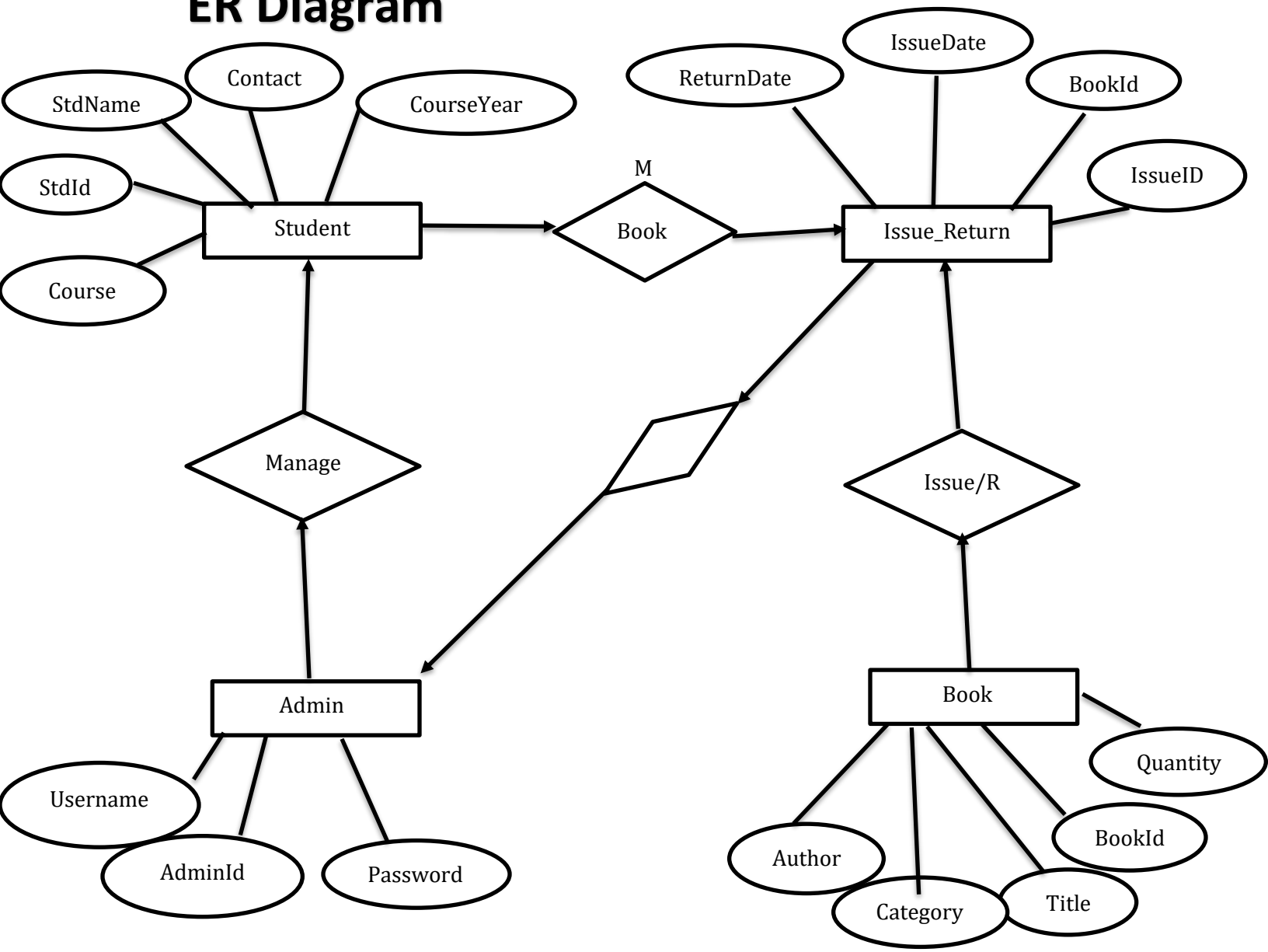
Student-ID	Int (Foreign key)	References Students table
Issue-Date	Date	Date when the book was issued
Return-Date	Date	Date when the book was returned
Fine	Int	Fine amount if any

Admin Table:

This table stores login credentials of the librarian or admin who manages the system.

Field Name	Data Type	Description
AdminID	Int (Primary key)	Unique admin-Id
Username	Varchar	Login username
Password	Varchar	Login password

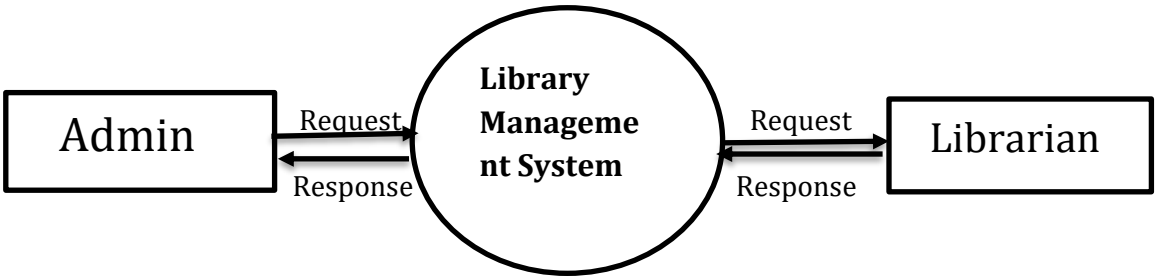
ER Diagram


Contact
StdName
CourseYear
StdId
Student
Course
M
Book
ReturnDate
IssueDate
BookId
IssueID
Issue_Return
Manage
Issue/R
Admin
Username
AdminId
Password
Book
Quantity
BookId
Author
Category
Title

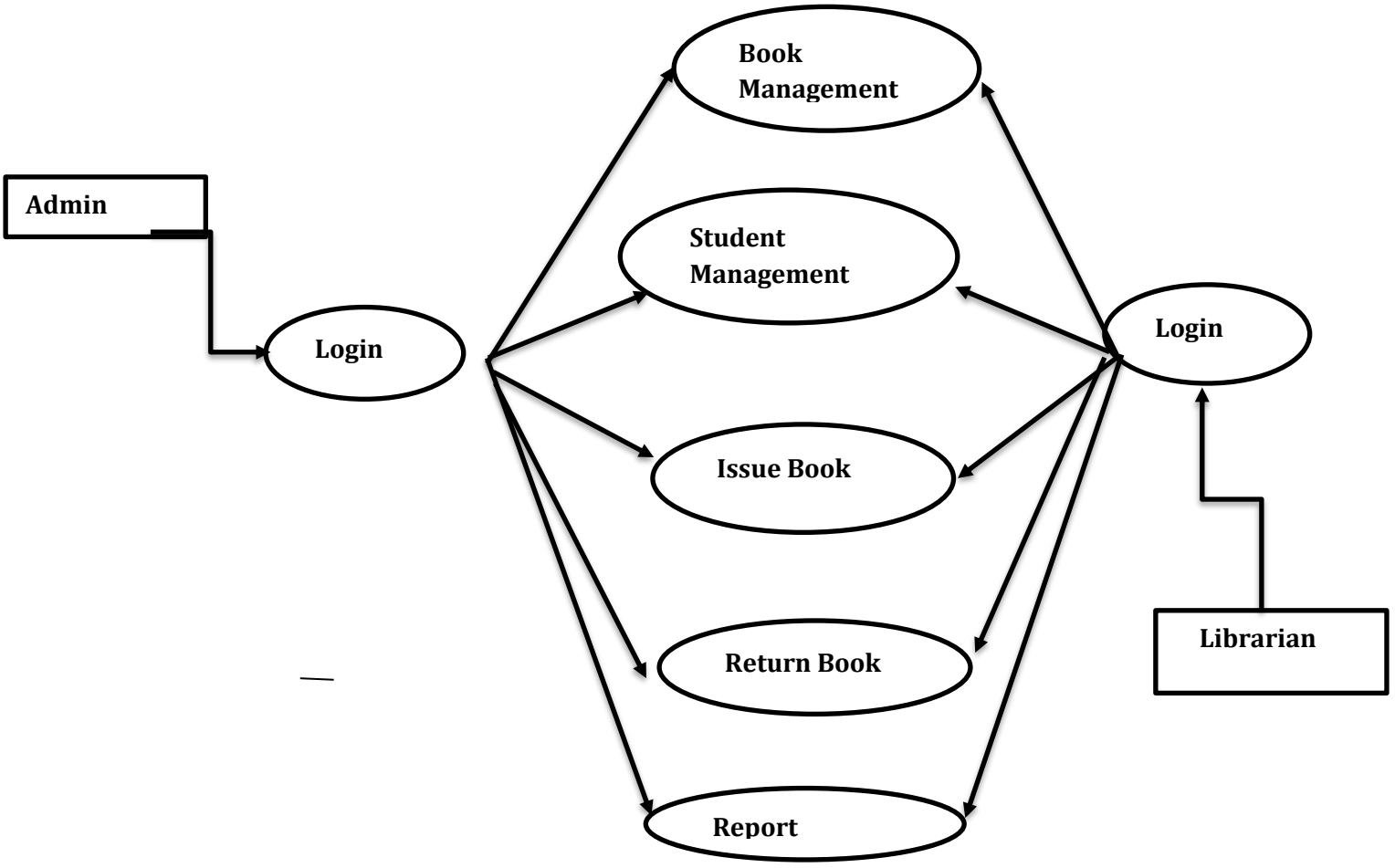
Data Flow Diagram

DFD shows the flow of data from user to system modules such as Login → Dashboard → Book/Student Management → Issue/Return.

DFD at 0 level:

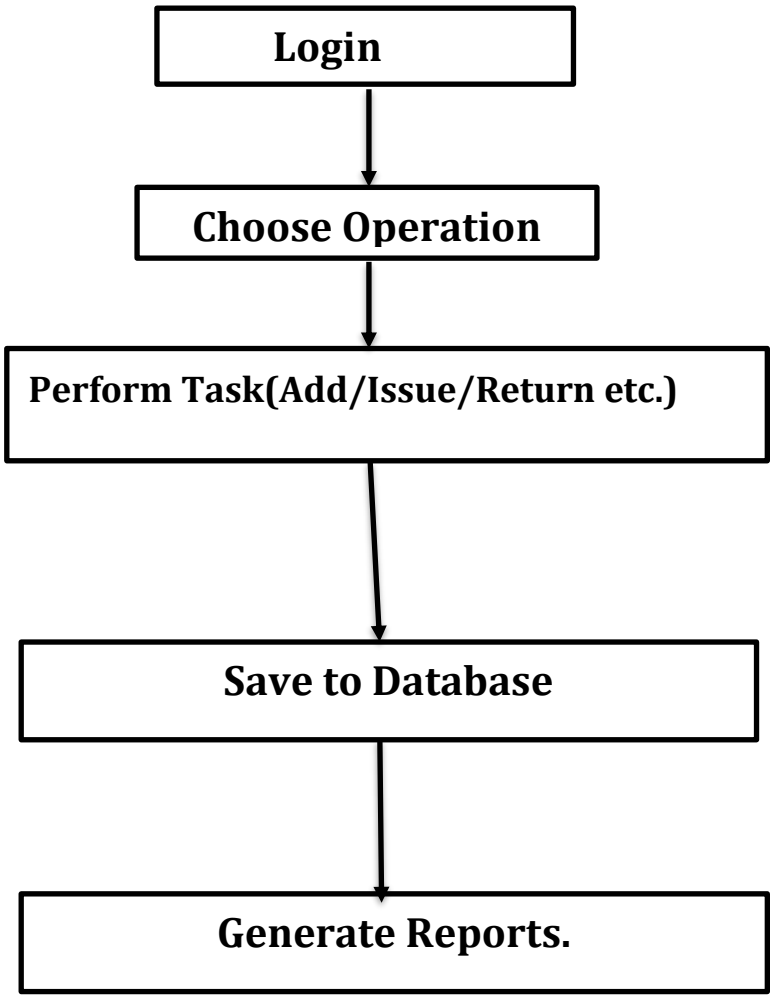


DFD at 1 level:



6. Complete Structure

Process Logical Diagram



7. Platform Used

Hardware Requirements

• Processor: Core i5

• RAM: 16GB

• Storage: Minimum 954GB space

• Operating System: Windows 113

Software Requirements

1. Java Development Kit (JDK)

- The Java Development Kit provides all the tools required to develop and run Java applications.

- It includes the Java compiler (java c), Java Runtime Environment (JRE), and essential libraries.

- In this project, JDK is used to write and execute the backend logic, forms, and functionalities of the Library Management System.

  Why used in this project?

  - ✓ To develop the complete application using Core Java
  - ✓ Provides libraries for OOP-based development

2. Eclipse IDE

- Eclipse IDE is a popular development environment used for writing, editing, and debugging Java code.
- It offers features like auto-completion, error checking, project structure management, and plugin support.

Why used in this project?

- ✓ Makes Java coding easier with syntax support
- ✓ Integrated console and debugging tools
- ✓ Allows well-organized project structure

- ✓ Supports Maven and plugin extensions

3. Maven (Build Automation Tool)

- Maven is a dependency and project management tool.
  It automatically downloads required libraries (like MySQL Connector) and manages project versions and builds.

Why used in this project?

- ✓ Simplifies dependency management
- ✓ Easy project compilation and packaging
- ✓ Reduces manual configuration
- ✓ Creates a clean and structured Java project

4. MySQL Database

- MySQL is a relational database system used for storing all library data permanently.
- It stores books, students, issue records, and return records in tables and allows fast data retrieval.

Why used in this project?

- ✓ Secure and reliable data storage
- ✓ Supports complex queries
- ✓ Easy integration with Java
- ✓ Ensures data consistency and accuracy

5. MySQL Connector/J (JDBC Driver)

- MySQL Connector/J is the official JDBC driver used to connect Java applications to a MySQL database.
- It allows Java programs to execute SQL queries such as insert, update, delete, and fetch operations.

Why used in this project?

- ✓ Enables communication between Java program and MySQL database
- ✓ Sends queries and retrieves results
- ✓ Essential for performing book issue, return, and management operations

8. Future Scope

- Online library access for students.
- Barcode scanner for faster book issue/return.
- Real-time notifications and automated email reminders.
- Add student registration.
- Pre Book reservation.
- Add GUI using java-Swing.

9. Bibliography

I. **Eclipse IDE** – Used for writing, compiling, and running Java code during the development of the Library Management System project.
II. **MySQL Database Server** – Used for creating the database, tables, and storing all the records related to books, students, admin, and issue/return operations.
III. **Google Chrome Browser** – Used for searching programming concepts, syntax clarification, documentation, and online references during project development.
IV. **Trainer Guidance** – Project concepts, database understanding, and coding guidance were provided with the help of the trainer.
V. **ChatGPT (OpenAI)** – Used for additional explanations, code corrections, debugging help, and better understanding of Java, JDBC, and SQL concepts.