# LIBRARY MANAGEMENT SYSTEM

*DBMS PROJECT REPORT*


## GROUP NO:05

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# PROBLEM STATEMENT

The Library Management System is a user-friendly platform facilitating book issuance and exploration. Users can seamlessly browse through a vast array of books categorized by genre, author, or title. Through its intuitive interface, patrons can easily locate and borrow books of interest, streamlining the borrowing process. Overall, the Library Management System revolutionizes book management, fostering a seamless and enjoyable journey for both readers and administrators.

The College Library Management System offers tailored borrowing privileges for teachers and students, assigning unique IDs to books and copies. Users access categorized collections, initiating borrowing transactions with recorded details like issuance date and duration. Teachers enjoy extended borrowing periods compared to students i.e. no. of days for returning for a teacher is more. The system monitors return deadlines i.e. 30 days, imposing fines for overdue books. It maintains comprehensive records, aiding administrators in tracking book movements and generating reports. This efficient platform optimizes resource utilization, enhances user experience, and ensures accountability in book management.

## FRONT-END AND BACK-END TECHNOLOGIES:

- **Frontend Technologies:**

1. Java Swing: Used for creating the graphical user interface (GUI) of the application.
   - Components like JFrame, JPanel, JLabel, JTextField, JButton, etc., were utilized to design various screens and interactive elements.

2.AWT (Abstract Window Toolkit): Used for handling graphics and windowing functions in Java.
   - Components like Graphics, Image, ImageIcon were used for displaying images and customizing UI elements.

- **Backend Technologies:**

1.Java Database Connectivity (JDBC) :
   - Used to interact with the underlying database management system (DBMS) for storing and retrieving data.
   - PreparedStatements were used for executing SQL queries securely.
   - ResultSet and ResultSetMetaData were utilized for processing query results and metadata.

2. MySQL Database :
   - Used as the backend database management system for storing library data.
   - Tables such as 'books', 'charge', etc., were created to organize and manage library-related information.

3. Database Connection Pooling :
   - Techniques such as connection pooling might have been implemented to efficiently manage database connections and improve performance.

- **Additional Technologies and Libraries:**

1. *ImageIO : Used for reading and writing images in various formats.
   - Utilized for displaying background images in the application GUI.

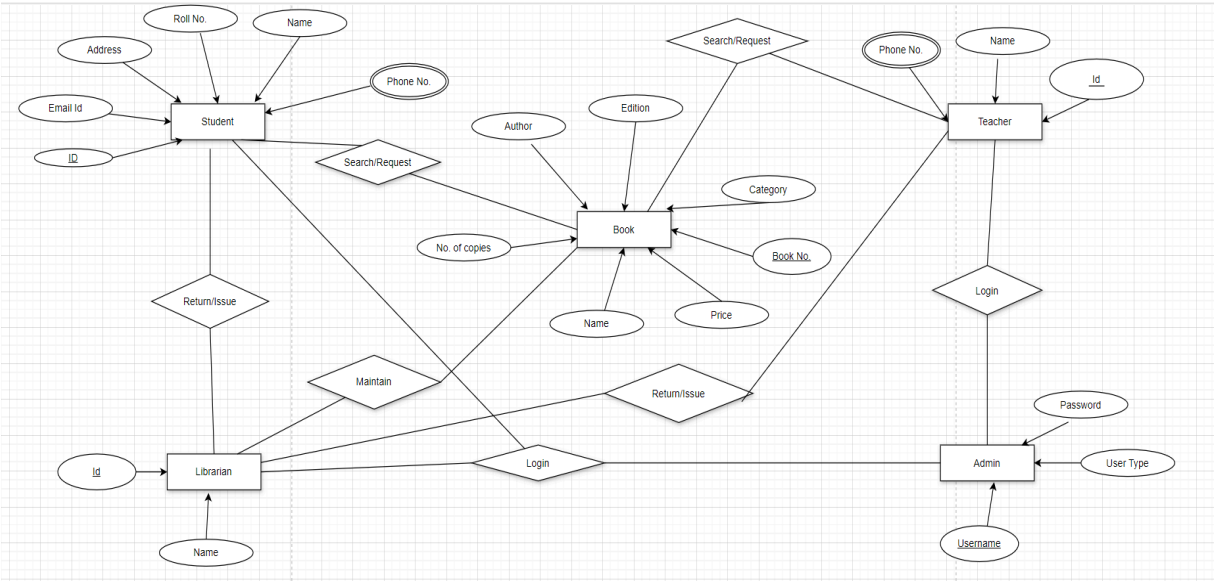
2.Swing Layout Managers :
   - Used for arranging and positioning GUI components within containers, ensuring proper layout and alignment.

3.Java Lambda Expressions :
   - Employed for handling event listeners in a concise and expressive manner.

4. Java Exception Handling :
   - Used to handle runtime errors and exceptions gracefully, ensuring the stability of the application.

5. Java Multithreading (Event Dispatch Thread) :
   - Utilized to ensure responsiveness and smooth execution of GUI operations, especially in long-running tasks.

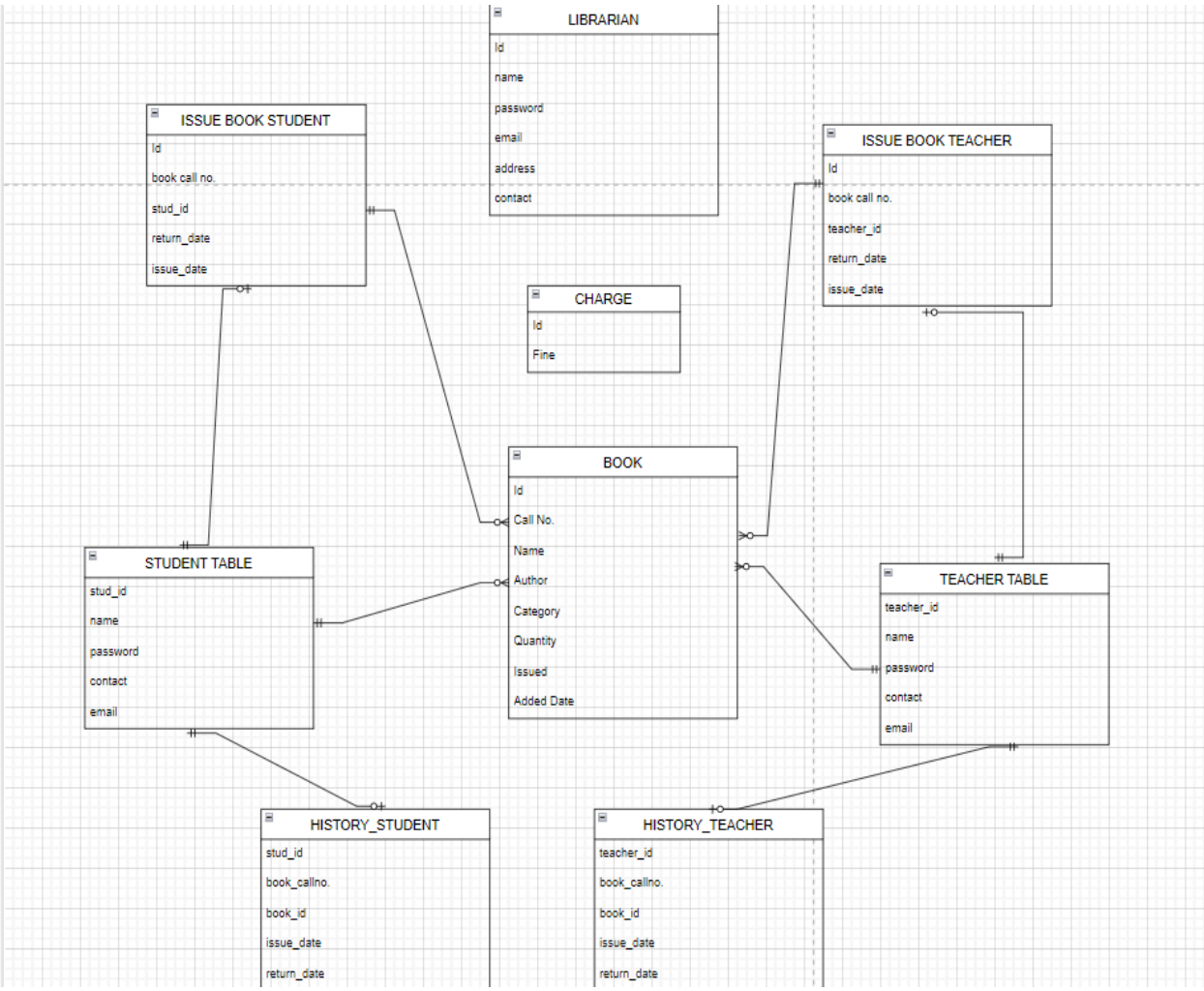
## ENTITY-RELATION(ER) DIAGRAM:




This Library ER diagram illustrates key information about the Library, including entities such as staff, readers, books, publishers, reports, and authentication system.

*Entities and their Attributes* –
Book Entity : It has author , book no.,name,no. Of copies, title, edition, category, price. Book No. is the Primary Key for Book Entity.
Student Entity : It has Id, Email, address, phone no, name,Roll no. Name is composite attribute of firstname and lastname. Phone no is multi valued attribute. Id is the Primary Key for Student entity.
Teacher Entity:It has name,Phone no.,Id.Id is the primary key.
Librarian Entity : It has name and Id with Id as Primary Key.
Admin Entity:It has Username,Password and Usertype.Username is the primary key.

## SCHEMA DIAGRAM:




Source used for diagrams:https://app.diagrams.net/

## KEYS AND CONSTRAINTS:

- **Keys**:
- **Primary Keys**:
- Book,charge,Issuebook_Student,Issuebook_teacher,Perma_teacher,Perma_student,Librarian tables have an id column as their primary key.
- Student table has student_id as a primary key.
- Teacher_table has teacher_id as a primary key.

- **Foreign Keys**:
- In the HistoryStudent table, student_id references id in the Student table.
- In the HistoryStudent table, bookcall_no references call_no in the  Book table
- In the HistoryTeacher table, teacher_id references id in the Teacher table.
- In the HistoryTeacher table, bookcall_no references call_no in the book table.
- In the IssueBookStudent table, student_id references id in the Student table, and book_call_no references call_no in the Book table.
- In the IssueBookTeacher table, teacher_id references id in the Teacher table, and book_call_no references call_no in the Book table.

- **Constraints**:
- **Unique Constraints**:
- Ensure uniqueness where appropriate, such as unique email addresses or usernames, depending on your schema.
- **Check Constraints**:
- You might have check constraints to enforce certain conditions, like ensuring that certain columns cannot be null or that dates fall within a certain range.

## FUNCTIONAL COMPONENTS:

1. *User Registration and Authentication:*
   - Users can register to the app using email verification.
   - Upon registration, users will have a unique username and password.

2. *Book Search:*
   - Users can search for books by typing the book name in the search box.

3. *Book Selection:*
   - Users can select the desired book from the search results.

*4. Book Issue:*
   - Students and teachers can issue books after logging in.
   - Librarians can issue books after logging in.

*5. Book Return:*
   - Students and teachers can return books after logging in.
   - Librarians can view returned books after logging in.

*6. View Issued and Returned Books:*
   - Students and teachers can view their issued and returned books after logging in.
   - Librarians can view all issued and returned books after logging in.

*7. Payment Form:*
   - Students and teachers can make payments if applicable after logging in.

*8. Reminder Emails:*

- A self-regenerated reminder will be sent to the user's email regarding the return of an issued book.
- Reminders are sent periodically, with configurable intervals before the due date.

*9. Librarian Panel:*
- Librarians have their own login portal.
- Librarians can manage book inventory, view issued books, and perform librarian-specific tasks.

*10. Admin Panel:*
- Admins have their own login portal.
- Admins can manage users, generate reports, configure system settings, and perform administrative tasks.

This list includes the functionalities for user registration, email reminders for book returns, and differentiation between librarian and admin panels.


THANK YOU!