Library Management System

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Introduction

The Library Management System is a desktop application designed to manage library records efficiently. It helps organizations store, retrieve, update, and delete library information electronically.

The system replaces manual record-keeping and improves accuracy, security, and accessibility of library data.

This application is developed using:

- Java (Core Java)

- Swing (GUI)

- JDBC

- Oracle Database

Problem Statement

In many organizations, library information is maintained manually using paper records or spreadsheets. This leads to:

- Data redundancy

- Difficulty in searching records

- Time-consuming updates

- Risk of data loss

Therefore, there is a need for an automated system to manage books records efficiently.

Objectives of the Project

The main objectives of the project are:

- To store library books information in a database

- To add new books

- To update/ delete existing admin details.

- To delete or edit existing books

- To display books information in an easy-to-use interface

- To add new staff

- To delete/ edit existing staff details

Scope of the Project

The system can be used in:

- Universities

- Colleges

- Schools

- Private Libraries

The system will allow authorized admin / user to manage library information through a desktop application.

Modules Description

The Library Management system consists following Modules:

1. Admin Management Module

This module manages admin information in the database. It allows the admin to login into his account and can access details of library books, staff . It allows admin to add new books, edit and remove existing books. It performs database operations such as insert, update, delete, and select.

2. Books Management Module

This module manages books information available in library. It stores every books by a ID. It allows user to add new books, delete and edit existing books.

3. Staff Management Module

This module manages all staff members details. I allows admin to add new staff, remove and delete existing staff details.

4. Search Module

This module allows the user to search for books information using Book ID or Author Name or Book Name. It retrieves the required book details from the database and displays them to the user/admin.

5 Database Connectivity Module

This module connects the Apache Netbeans application to the MySQL database using My SQL Connector. It is responsible for establishing database connection, executing SQL queries, retrieving data, and closing the connection.

6. User Interface Module

This module provides the graphical user interface (GUI) using Java Swing. It allows the user to interact with the system by entering admin details, performing operations, and viewing results.

7. Display Module

This module displays books , staff and admin information in a structured format, usually in a table. It retrieves data from the database and presents it clearly for easy understanding.

Database Design

Database design is the process of organizing data into tables, defining relationships between tables, and specifying constraints to ensure data integrity and efficiency. The Library Management System uses a relational database to store and manage admin, books and staff information.

The database is designed using the **Relational Database Model** and implemented using **MySQL Database**.

The main objective of database design is to:

- Store book information efficiently

- Avoid data redundancy

- Maintain data integrity

- Provide fast access to books

Based on system requirements, the following entities are identified:

1. Admin

2. Books

3. Staff

Each entity is represented as a table in the database.

1. Admin Table:

The Admin table stores information about admins who can access library details in the organization.

Column Name	Data Type	Description	Constraint
USER_ID	INTEGER	Unique user ID	Primary Key
NAME	VARCHAR(50)	Name of Admin	Null
PASSWORD	VARCHAR(50)	Password of that admin	Null
CONTACT	VARCHAR(10)	Contact of admin	Null

Primary Key: USER_ID

2. Book Table:

The Book table stores information about books available in library.

Column Name	Data Type	Description	Constraint
BOOK_ID	INT	Unique book ID	Primary Key
CATEGORY	VARCHAR(50)	Category of book	Null
NAME	VARCHAR(50)	Book name	Null
AUTHOR	VARCHAR(50)	Author name	Null
COPIES	INT	Number of copies available	Null

Primary Key: BOOK_ID

3 . Staff Table:

The Staff table stores information about staff member details in library.

Column Name	Data Type	Description	Constraint
STAFF_ID	VARCHAR(50)	Unique staff ID	Primary Key
NAME	VARCHAR(50)	Name of staff	Null
CONTACT	VARCHAR(50)	Contact of staff	Null

Primary key: STAFF_ID

SQL Commands Used to Create Tables:

Create Admin Table:

```
CREATE TABLE admin (USER_ID   INT   PRIMARY KEY,
                    NAME   VARCHAR(50),
                    PASSWORD  VARCHAR(50),
                    CONTACT  VARCHAR(10),
                    );
```

Create Books Table:

```
CREATE TABLE books (BOOK_ID INT  PRIMARY KEY,
                    CATEGORY   VARCHAR(50),
                    NAME  VARCHAR(50),
                    AUTHOR  VARCHAR(50),
                    COPIES   INT);
```
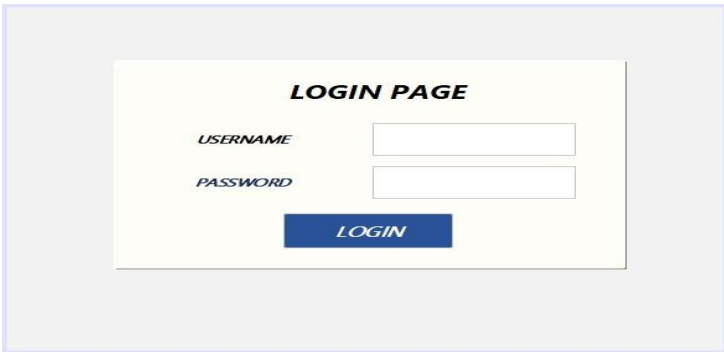
Create staff Table:

```
CREATE TABLE staff (STAFF _ID   VARCHAR(50)   PRIMARY KEY,
                    NAME    VARCHAR(50),
                    CONTACT   VARCHAR(10));
```

User Interface Design

Login window:

This window allows admin to enter their username and password to access the Library Management System.

Dashboard Window:

This window provides navigation options to perform different operations such as adding, updating, deleting, searching, and viewing admin, books and staff records.

Add Books Window:

This window allows the admin to enter and save new book details into the database.

Staff Details Window:

This window enables the user to access the staff details from staff table.

Books Available Window:

This window displays all books records in a tabular format for easy viewing and management.

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Add Staff Window:

This window displays admin to add a new staff member.