# LIBRARY MANAGEMENT SYSTEM

## 1. Introduction:-

The Library Management System is a database project designed to simplify the management of books, authors, library members, and borrowing records. It allows efficient book tracking, member management, overdue notifications, and fine calculation. This system is built using SQL concepts such as relationships, triggers, views, and aggregation queries, making it scalable and reliable for small to medium-sized libraries.

## 2. Abstract :-

This project implements a normalized relational database for library operations. It stores and manages data about books, authors, members, and transactions, with a focus on accuracy and automation. Features include tracking book availability, generating overdue book lists, and calculating fines. Automation is achieved using triggers, while views simplify reporting. The design follows proper database normalization principles, ensuring data integrity and eliminating redundancy.

## 3. Tools Used:-

- **SQLite Studio** – For database creation, testing, and management.
- **SQL (DDL, DML)** – For creating schema, inserting records, and writing queries.
- **dbdiagram.io** – For designing the Entity-Relationship Diagram (ERD).
- **Excel/CSV** – For preparing and importing sample datasets.

## 4.Steps Involved in Building the Project :-

1. **Requirement Analysis & Schema Design:** Identified key entities (Books, Authors, Members, Transactions) and relationships.
2. **ER Diagram Creation:** Designed an ERD to map entity relationships.
3. **Database Creation:** Created normalized tables with primary keys, foreign keys, and constraints.
4. **Data Insertion:** Populated sample data for testing with realistic book, member, and transaction records.
5. **Bridge Table (Transactions):** Implemented a many-to-many relationship between members and books.
6. **Views Creation:** Built views for BorrowedBooks and OverdueBooks for easy reporting.
7. **Triggers:** Added automation for updating book statuses when overdue or returned.

8. **Reports:** Wrote analytical SQL queries for popular books, active loans, and total fines collected.

## 5. Conclusion :-

The Library Management System demonstrates database design best practices and real-world problem-solving using SQL. It streamlines library workflows such as tracking borrowed books, identifying overdue returns, and managing members. This project highlights skills in schema design, triggers, views, and SQL reporting, making it a strong foundation for implementing scalable database solutions in real-world scenarios.