Project Report

Library Management System

Introduction

The Library Management System is a digital solution designed to manage books, members, and loan records efficiently. It eliminates the challenges of manual record-keeping by providing an automated database for tracking book borrowing, returning, overdue alerts, and generating useful reports.

Abstract

The objective of this project is to build a **database-driven library system** where:

- Information about books and authors is stored,
- Member loans are tracked,
- Borrowed and overdue books can be easily monitored,
- Automatic triggers update available copies and generate overdue notifications,
- Reports are produced using aggregation queries and joins.

This system enhances the efficiency of library operations by offering real-time loan tracking and overdue reminders.

Tools Used

- **MySQL Workbench** – for database design, schema creation, and query execution.
- **MySQL Server** – for data storage and management.

Steps Involved

1. **Schema Design**
    - Tables: Books, Authors, Members, Loans
    - Bridge Table: BookAuthors (to manage many-to-many relationship between books and authors)
    - Notifications Table (to store overdue alerts)
2. **Insert Test Data**

- Sample data inserted for authors, books, members, and loans.

3. **Relationship Handling**
    - Many-to-many relationship between books and authors managed through the BookAuthors table.
4. **Views**
    - BorrowedBooks view: shows who borrowed which book, with loan and due dates.
    - OverdueBooks view: shows books that have not been returned beyond their due date.
5. **Triggers**
    - after_loan_insert: automatically decreases AvailableCopies when a loan is inserted.
    - after_loan_update: generates an overdue notification in the Notifications table when the due date is crossed.
6. **Reports (Queries)**
    - Report showing number of books borrowed by each member.
    - Report showing the most borrowed books.

Conclusion

The Library Management System provides a complete digital framework to manage books, members, and loan records effectively. Views simplify the monitoring of borrowed and overdue books, while triggers ensure automatic updates and notifications. Reports generated through aggregation queries and joins provide valuable insights for library staff.

Through this project, key database concepts such as **ER diagrams, schema design, normalization, joins, views, triggers, and aggregation** have been implemented in practice. The system is scalable and can be directly applied in real library environments.