

City Library Management System (SQL Project)

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Project Overview:

This project simulates a City Library Database System used to manage books, members, events, loans, and fines. It involves designing a normalized schema, inserting realistic sample data, and writing SQL queries ranging from basic SELECT statements to complex analytical window functions. The project also includes stored procedures, triggers, indexing strategies, and transaction management demonstrating full database lifecycle skills.

Goals Completed:

Goal	Task	Status
1	Create Database Schema	Completed
2	Insert Sample Data	Completed
3	Basic Queries	Completed
4	Aggregation Queries	Completed
5	Multi-Table Joins	Completed
6	Subqueries & CTEs	Completed
7	Set Operations	Completed
8	Window Functions	Completed
9	Stored Procedures (Bonus)	Completed
10	Triggers (Bonus)	Completed
11	Index Optimization (Bonus)	Completed
12	Transaction Management (Bonus)	Completed

Challenges Faced & Solutions:

- Foreign key dependency errors were resolved by ensuring correct table creation order.
- Trigger creation required correct DELIMITER usage to avoid syntax errors.
- Duplicate member emails were resolved by cleaning and validating data inputs.
- Complex loan and fine logic was handled using structured stored procedures.

What I Learned:

- Relational database schema design and normalization.
- Efficient SQL querying using JOIN, GROUP BY, and HAVING.
- Writing Stored Procedures, Functions, and Triggers for automation.
- Using INDEXES and EXPLAIN for performance optimization.
- Using TRANSACTIONS to maintain ACID properties in multi-step operations.

Conclusion:

This project demonstrates a professional-level understanding of database systems and SQL development. It showcases end-to-end capability in designing, implementing, optimizing, and managing relational databases.