Library Management System

Project Overview

The **Library Management System (LMS)** is a structured database project designed to efficiently manage books, borrowers, and transactions across multiple library branches. The system ensures seamless record-keeping, optimized borrowing and returning processes, and efficient data retrieval using SQL queries.

Key Objectives

1. **Database Design & Structure**
    - Develop relational database tables with appropriate **primary and foreign keys**.
    - Implement **auto-increment constraints** on primary keys for unique identification.
    - Use **CASCADE** constraints on foreign keys to maintain referential integrity.
    - Ensure database schema aligns with the **provided dataset** for smooth data import.
2. **Book & Borrower Management**
    - Maintain records of **books, authors, borrowers, and library branches**.
    - Track **book copies** and their distribution across different branches.
    - Record book transactions, including **loans, due dates, and returns**.
3. **Query Execution & Insights**
    - Execute SQL queries to extract key insights, including:
        - The number of copies of "The Lost Tribe" in the "Sharpstown" branch.
        - The total number of copies of "The Lost Tribe" across all branches.
        - Borrowers who have not checked out any books.
        - Books loaned out from the "Sharpstown" branch due on **02/03/2018**.
        - The total number of books loaned out per library branch.
        - Borrowers who have checked out more than **five books**.
        - Books authored by **Stephen King** and available at the "Central" branch.

Database Implementation

1. **Database Creation**: The project starts by creating the Library_Management database and defining tables for different entities:
    - tbl_publisher: Stores publisher details.
    - tbl_borrower: Maintains borrower information.

- tbl_library_branch: Manages different library branches.
- tbl_book: Stores book details, linked to publishers.
- tbl_book_authors: Tracks authorship of books.
- tbl_book_copies: Records the number of copies per branch.
- tbl_book_loans: Handles book transactions.

2. **Data Integrity & Constraints**:
    - **Auto-increment** for primary keys.
    - **Foreign key constraints with CASCADE** operations for referential integrity.
    - **Data validation** during import to match column names with the dataset.
3. **Query Execution for Reporting & Analysis**:
    - Advanced SQL queries using **JOINs, Common Table Expressions (CTEs), and Aggregation Functions** to generate insights.

Expected Outcome

This project will result in a fully functional **Library Management System** capable of handling book records, borrower transactions, and efficient data retrieval using SQL queries. The system will support libraries in managing books, tracking loans, and generating insightful reports for improved decision-making.