Library Management System (SQL Project)

🎯 Objective

The goal of this project is to design and analyze a **Library Management Database System** using SQL.
This project simulates real-world library operations and answers key **business questions** such as:

- Tracking overdue books and calculating fines.
- Identifying high-performing employees.
- Measuring branch-level performance (books issued, returned, and revenue).
- Understanding customer/member behavior and book rental trends.

🛠 Tools & Technologies Used

- **Database**: PostgreSQL
- **Interface**: pgAdmin 4
- **SQL Concepts Applied**:
    - CRUD Operations (INSERT, UPDATE, DELETE, SELECT)
    - Joins (INNER JOIN, LEFT JOIN)
    - Aggregations (SUM, COUNT, AVG, GROUP BY, HAVING)
    - Date & Interval Functions (CURRENT_DATE, INTERVAL, overdue calculations)
    - Ranking & Ordering (LIMIT, ORDER BY)
- **Visualization & Documentation**:
    - ERD Design: dbdiagram.io / Draw.io
    - GitHub (for project hosting)
    - LinkedIn (for professional sharing)

📂 Dataset & Tables

The project is built on a **sample library database** with the following tables:

- **books** – Book details (ISBN, title, category, rental price, availability).
- **members** – Library members (ID, name, address, registration date).
- **employees** – Staff managing book issues/returns.
- **branch** – Library branches and their managers.

- **issued_status** – Book issue records (who issued, when, by which employee).
- **return_status** – Book return records (return date, fines, etc.).

🚀 **Project Tasks**

1️⃣ **CRUD Operations**

✔️ Insert new book records
✔️ Update member details
✔️ Delete issue records
✔️ Retrieve books issued by a specific employee
✔️ List members with more than one issued book

2️⃣ **Data Analysis & Business Queries**

- Retrieve all books in a specific category
- Calculate total rental income by category
- List members who registered in the last 180 days
- Show employees with their branch manager's name and details
- Retrieve list of books not yet returned

3️⃣ **Advanced Analysis**

- **Overdue Books** → Identify overdue members & calculate fines ($0.50/day).
- **Branch Performance Report** → Books issued, returned, and revenue generated per branch.
- **Top Employees** → Employees who processed the most book issues.

📊 **Key Insights**

🔷 Some members have multiple overdue books, leading to significant fines.
🔷 Branches with higher employee activity show higher revenues.
🔷 Certain categories (e.g., *Science Fiction, Classics*) generate the most rentals.
🔷 Top 3 employees process the majority of book issues, indicating workload concentration.

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💼 Aspiring Data Analyst

📌 Skilled in **SQL | Excel | Power BI | Python**

LinkedIn

Github