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PROJECT ON

Employee Management System

Presented by
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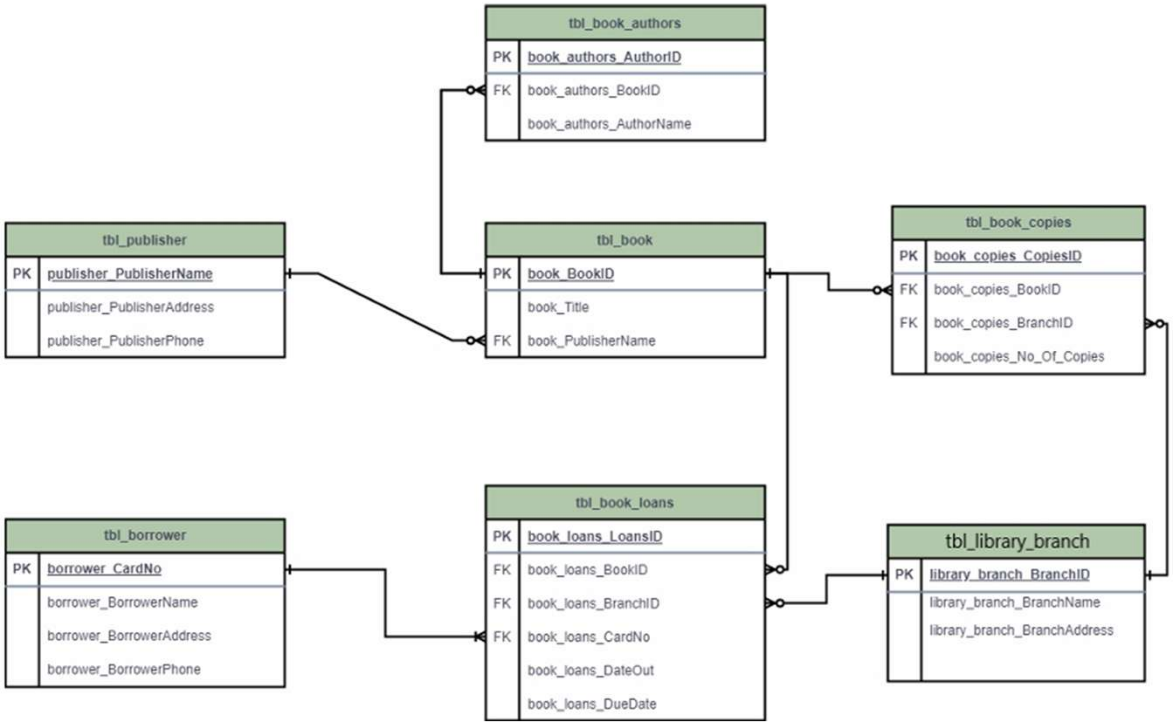
Introduction

This project focuses on designing and analyzing a **Library Database Management System** using SQL. The system models real-world library operations by efficiently managing data related to **books, authors, publishers, library branches, borrowers, and loan transactions**. By creating a structured relational database with appropriate constraints and relationships, the project enables accurate data storage, retrieval, and analysis. The primary objective is to answer business-oriented queries that help libraries track book availability, borrowing activity, and branch-wise performance using SQL queries.

ER Diagram

Data Model:



Publisher Table

publisher_PublisherName	publisher_PublisherAddress	publisher_PublisherPhone
Alfred A. Knopf	1745 Broadway, New York, NY 10019	212-555-0106
Bantam	1745 Broadway, New York, NY 10019	212-555-0115
Bloomsbury	50 Bedford Square, London, UK	44-20-5555-0107
Chalto & Windus	20 Vauxhall Bridge Road, London, UK	44-20-5555-0111
Chilton Books	Radnor, Pennsylvania, USA	610-555-0104
DAW Books	375 Hudson Street, New York, NY 10014	212-555-0101
George Allen & Unwin	83 Alexander Street, Sydney, Australia	61-2-5550-105
Harcourt Brace Jovanovich	525 B Street, San Diego, CA 92101	619-555-0112
Harper and Row	195 Broadway, New York, NY 10007	212-555-0109
Pan Books	20 Vauxhall Bridge Road, London, UK	44-20-5555-0110

Book Table

book_BookID	book_Title	book_PublisherName
1	The Name of the Wind	DAW Books
2	It	Viking
3	The Green Mile	Signet Books
4	Dune	Chilton Books
5	The Hobbit	George Allen & Unwin
6	Eragon	Alfred A. Knopf
7	A Wise Mans Fear	DAW Books
8	Harry Potter and the Philosophers Stone	Bloomsbury
9	Hard Boiled Wonderland and The End of the World	Shinchosa

Library branch Table

library_branch_BranchID	library_branch_BranchName	library_branch_BranchAddres
1	Sharpstown	32 Corner Road
1	Central	491 3rd Street
3	Saline	40 State Street
4	Ann Arbor	101 South University

Book copies Table

book_copies_CopiesID	book_copies_BookID	book_copies_BranchID	book_copies_No_Of_Copies
1	1	1	5
2	2	1	5
3	3	1	5
4	4	1	5
5	5	1	5
6	6	1	5
7	7	1	5

Book_loans Table

book_loans_LoansID	book_loans_BookID	book_loans_BranchID	book_loans_CardNo	book_loans_DateOut	book_loans_DueDate
99	1	1	100	2018-01-01	2018-02-02
100	2	1	100	2018-01-01	2018-02-02
101	3	1	100	2018-01-01	2018-02-02
102	4	1	100	2018-01-01	2018-02-02
103	5	1	102	2018-01-03	2018-02-03
104	6	1	102	2018-01-03	2018-02-03
105	7	1	102	2018-01-03	2018-02-03

Borrower Table

borrower_CardNo	borrower_BorrowerName	borrower_BorrowerAddress	borrower_BorrowerPhone
100	Joe Smith	1321 4th Street, New York, NY 10014	212-312-1234
101	Jane Smith	1321 4th Street, New York, NY 10014	212-931-4124
102	Tom Li	981 Main Street, Ann Arbor, MI 48104	734-902-7455
103	Angela Thompson	2212 Green Avenue, Ann Arbor, MI 48104	313-591-2122
104	Harry Emnace	121 Park Drive, Ann Arbor, MI 48104	412-512-5522
105	Tom Haverford	23 75th Street, New York, NY 10014	212-631-3418
106	Haley Jackson	231 52nd Avenue, New York, NY 10014	212-419-9935

PROBLEM STATEMENT

Libraries manage large volumes of data related to books, authors, publishers, library branches, borrowers, and loan transactions. Traditional or unstructured data management methods often lead to **data redundancy, inconsistency, and difficulty in tracking book availability and borrower activity**. There is a need for a **centralized, well-structured relational database system** that can efficiently store, manage, and retrieve library data while ensuring data integrity and supporting meaningful analytical queries. This project aims to design and implement such a database using SQL to accurately model real-world library operations and answer key operational questions.

1. How many copies of the book titled "The Lost Tribe" are owned by each library branch?

Query

```
SELECT
    lb.library_branch_BranchName AS Branch_Name,
    bc.book_copies_No_Of_Copies AS Number_Of_Copies
FROM tbl_book_copies bc
JOIN tbl_book b
    ON bc.book_copies_BookID = b.book_BookID
JOIN tbl_library_branch lb
    ON bc.book_copies_BranchID = lb.library_branch_BranchID
WHERE b.book_Title = 'The Lost Tribe';
```

Output

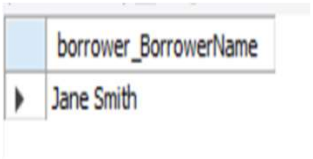
Branch_Name	Number_Of_Copies
Sharpstown	5
Central	5
Saline	5
Ann Arbor	5
Sharpstown	5
Central	5
Saline	5
Ann Arbor	5
Sharpstown	5
Central	5
Saline	5
Ann Arbor	5
Sharpstown	5
Central	5
Saline	5
Ann Arbor	5

2 Retrieve the names of all borrowers who do not have any books checked out.?

Query

```
SELECT borrower_BorrowerName
FROM tbl_borrower
WHERE borrower_CardNo NOT IN (
    SELECT DISTINCT book_loans_CardNo
    FROM tbl_book_loans
);
```

Output



borrower_BorrowerName
Jane Smith

3 For each book that is loaned out from the "Sharpstown" branch and whose Due Date is 2/3/18, retrieve the book title, the borrower's name, and the borrower's address?

Query

```
SELECT
    b.book_Title,
    br.borrower_BorrowerName,
    br.borrower_BorrowerAddress
FROM tbl_book_loans bl
JOIN tbl_book b
    ON bl.book_loans_BookID = b.book_BookID
JOIN tbl_borrower br
    ON bl.book_loans_CardNo = br.borrower_CardNo
JOIN tbl_library_branch lb
    ON bl.book_loans_BranchID = lb.library_branch_BranchID
WHERE lb.library_branch_BranchName = 'Sharpstown'
  AND bl.book_loans_DueDate = '2018-02-03';
```

Output

book_Title	borrower_BorrowerName	borrower_BorrowerAddress
The Hobbit	Tom Li	981 Main Street, Ann Arbor, MI 48104
Eragon	Tom Li	981 Main Street, Ann Arbor, MI 48104
A Wise Mans Fear	Tom Li	981 Main Street, Ann Arbor, MI 48104
Harry Potter and the Philosophers Stone	Tom Li	981 Main Street, Ann Arbor, MI 48104
Hard Boiled Wonderland and The End of the World	Tom Li	981 Main Street, Ann Arbor, MI 48104
The Hitchhikers Guide to the Galaxy	Tom Li	981 Main Street, Ann Arbor, MI 48104
The Hobbit	Tom Li	981 Main Street, Ann Arbor, MI 48104
Eragon	Tom Li	981 Main Street, Ann Arbor, MI 48104
A Wise Mans Fear	Tom Li	981 Main Street, Ann Arbor, MI 48104

For each library branch, retrieve the branch name and the total number of books loaned out from that branch.?

Query

```
SELECT
    lb.library_branch_BranchName AS Branch_Name,
    COUNT(bl.book_loans_BookID) AS Total_Books_Loaned
FROM tbl_library_branch lb
LEFT JOIN tbl_book_loans bl
    ON lb.library_branch_BranchID = bl.book_loans_BranchID
GROUP BY lb.library_branch_BranchName;
```

Output

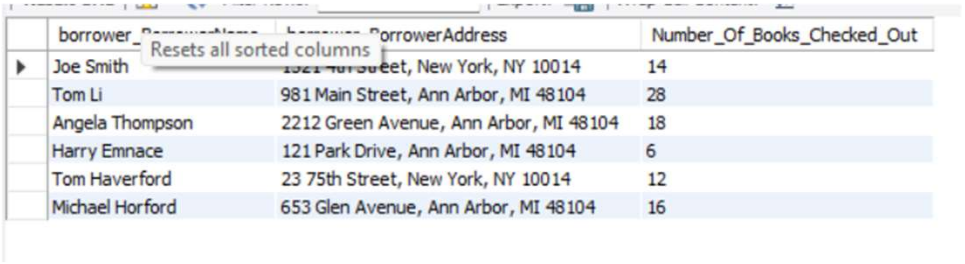
Branch_Name	Total_Books_Loaned
Sharpstown	20
Central	22
Saline	20
Ann Arbor	36

Retrieve the names, addresses, and number of books checked out for all borrowers who have more than five books checked out. ?

Query

```
SELECT
    br.borrower_BorrowerName,
    br.borrower_BorrowerAddress,
    COUNT(bl.book_loans_BookID) AS Number_Of_Books_Checked_Out
FROM tbl_borrower br
JOIN tbl_book_loans bl
    ON br.borrower_CardNo = bl.book_loans_CardNo
GROUP BY
    br.borrower_CardNo,
    br.borrower_BorrowerName,
    br.borrower_BorrowerAddress
HAVING COUNT(bl.book_loans_BookID) > 5;
```

Output



borrower_	BorrowerAddress	Number_Of_Books_Checked_Out
Joe Smith	et, New York, NY 10014	14
Tom Li	981 Main Street, Ann Arbor, MI 48104	28
Angela Thompson	2212 Green Avenue, Ann Arbor, MI 48104	18
Harry Emnace	121 Park Drive, Ann Arbor, MI 48104	6
Tom Haverford	23 75th Street, New York, NY 10014	12
Michael Horford	653 Glen Avenue, Ann Arbor, MI 48104	16

For each book authored by "Stephen King", retrieve the title and the number of copies owned by the library branch whose name is "Central"?

Query

```
SELECT
    b.book_Title,
    bc.book_copies_No_Of_Copies AS Number_Of_Copies
FROM tbl_book b
JOIN tbl_book_authors ba
    ON b.book_BookID = ba.book_authors_BookID
JOIN tbl_book_copies bc
    ON b.book_BookID = bc.book_copies_BookID
JOIN tbl_library_branch lb
    ON bc.book_copies_BranchID = lb.library_branch_BranchID
WHERE ba.book_authors_AuthorName = 'Stephen King'
  AND lb.library_branch_BranchName = 'Central';
```

Output

book_Title	Number_Of_Copies
The Green Mile	5
The Green Mile	5
The Green Mile	5
The Green Mile	5
The Green Mile	5
It	5
It	5
It	5
It	5
It	5
The Green Mile	5
The Green Mile	5
The Green Mile	5
The Green Mile	5
The Green Mile	5
It	5
It	5
It	5
It	5
It	5
The Green Mile	5
The Green Mile	5

THANK YOU