**Article on Central Library of Calgary, Alberta**

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**1) Overview**The goal of this project is to create a comprehensive and well-functioning database system for Calgary's Central Library. The primary goals of the library, which are to enhance book diversity as well as enhance accessibility for all users, are handled by this system. Managing massive book collections, borrower's data, and specific services designed to increase accessibility all require well-planned databases.

**2) Mission: Diversity and Accessibility**A key element of the structure of databases is the library's objective to provide an extensive selection of books in different genres, languages, and cultures. Further essential to preserving diversity are accessibility features like podcasts and publications with large fonts. By offering easy resource management, improving the user experience, and providing quick data access, the design assists in accomplishing these objectives.

**3) Database design:-** The Central Library of Calgary's aim of "diversity of books" and "accessibility" will be the focal point of our database design, thus we **must first identify essential entities, characteristics (fields), and their relationships.** The daily operations and service structure of the library will become transparent and effective as a consequence.The major elements serve as the base for the database's structure: books, authors, genres, borrowing transactions, and accessibility features. For streamlined procedures, these entities are linked collectively.

**4) Database objectives: -**

* **Real-time Inventory and Allocation Tracking**: this database design makes sure that users and staff members can access accurate data on available books, including loans that are now in circulation, books that are currently reserved, and expected return dates.
* **Analytics of Data for Collection Improvement:** Using statistics regarding borrowing trends, demand from consumers, and circulation, provide statistical knowledge to library employees so, they can make effective decisions regarding which books to add, remove, or advertise.
* **Scalability for Continuous Expansion; -** The database must be designed to be scalable so that it can deal with a rise in consumers, additional material, and new features without suffering difficulties with performance.
* **Control of Access and Virtual Content**; - it is helpful to manage user memberships and access limitations while assuring seamless integration of digital material, including eBooks, audiobooks, and digital academic papers.

**5) Table structure; -**

**(4.1) BRANCH (4.2 )EMPLOYEES**

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| Employee id | INT ( primary key ) |
| Name | VARCHAR (200) |
| E mail | VARCHAR (200) |
| Phone number | VARCHAR (20) |
| Position | VARCHAR (20) |
| Branch id | INT ( FOREIGN) |
| Hire date | DATE |
| SALARY | DECIMAL |

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| Branch ID | INT (Primary key) |
| Branch Name | VARCHAR (200) |
| Address | VARCHAR (100) |
| Contact | VARCHAR (20) |

**(4.3)**

**BOOKS DATA (4.4) ISSUE STATUS**

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| Issue ID | INT (Primary) |
| Book id | INT(FOREIGN) |
| Customer id | INT(FOREIGN) |
| Issue Date | DATE |
| Due date | DATE |
| status | VARCHAR |

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| Book ID | INT (primary key) |
| Title | VARCHAR (200) |
| Author | VARCHAR (100) |
| ISBN | VARCHAR (20) |
| Publish Date | Date |
| Branch ID | INT |
| Quantity | INT |

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| RETURN ID | INT (PRIMARY) |
| ISSUE ID | INT(FOREIGN) |
| RETURN DATE | DATE |
| FINE | DECIMAL |

**(4.5) Customer (4.6) Return status**

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| Customer id | INT (primary key) |
| Name | VARCHAR (200) |
| email | VARCHAR (100) |
| phone | VARCHAR (20) |

**(4.7) EVENT AND PROGRAM DATA (4.8) SUPPLIER**

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| EVENT ID | INT (Primary) |
| EVENT Name | VARCHAR (200) |
| BRANCH ID | INT(FOREIGN) |
| DATE | DATE |
| DESCRIPTION | VARCHAR |

|  |  |
| --- | --- |
| **Field** | **Data Type** |
| SUPPLIER id | INT (PRIMARY) |
| Name | VARCHAR (200) |
| email | VARCHAR (100) |
| phone | VARCHAR (20) |

**6) Relationships;-**

|  |  |  |
| --- | --- | --- |
| **Series no;-** | **Entities** | **Relationship type** |
| 1 | Branch to Employee | A One-to-Many Relationship |
| 2 | Branch to Event and Program Data | One-to-Many Relationship |
| 3 | Books to Supplier | Many-to-One Relationship |
| 4 | Customer to Issues Status | One-to-Many Relationship |
| 5 | Issues Status to Books | Many-to-One Relationship |
| 6 | Issues Status to Return Status | One-to-One Relationship |

**7) ER Diagram**

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**(6.1) Importance of ER diagram**

1. **Enhance interaction;-**Since an ER diagram is a basic visual tool, it improves communication among stakeholders like developers, managers of projects, and customers. It serves as a blueprint, ensuring every individual knows the system's structure, data point relationships, and data management techniques.
2. **Visual Presentation of Data;-** ER diagrams provide a clear visual overview of the system's structure by illustrating how entities (such as Books, Customers, and Employees) relate to one another. This makes complex data structures easier to comprehend both for technical teams as well as stakeholders who are unfamiliar with the architecture of databases.
3. **Assists with normalisation;-** ER diagrams facilitate normalisation by arranging data in a way that reduces repetition and dependency. Thus, the database operates more effectively and prevents errors during data entry, deletion, and updating.
4. **Affordable Maintenance and Scalability**;- An ER diagram facilitates long-term database maintenance and expansion. It serves as an overview for understanding the structure of the system when updates or expansions are required, such as the addition of new entities or relationships.

**8) Conclusion; -**The Central Library of Calgary's aim of "diversity of books" and "accessibility" is the focal point of our database design, thus we first identified essential entities, characteristics (fields), and their relationships. The daily operations and service structure of the library will become transparent and effective as a consequence. Hence, This structured and efficient database system supports the library's operations and improves accessibility to a varied collection of materials, eventually contributing to the library's function as an essential community hub.

**9) Appendix:- ( A ) TABLE DETAILS**

|  |  |
| --- | --- |
| Branch | Branch ID (INT, Primary Key), Branch Name (VARCHAR 200), Address (VARCHAR 100), Contact (VARCHAR 20) |
| employees | Employee ID (INT, Primary Key), Name (VARCHAR 200), Role (VARCHAR 100), Branch ID (INT, Foreign Key), Email (VARCHAR 100), Phone (VARCHAR 20), Hire Date (DATE) |
| books | Book ID (INT, Primary Key), Title (VARCHAR 200), Author (VARCHAR 100), ISBN (VARCHAR 20), Publish Date (DATE), Branch ID (INT, Foreign Key), Quantity (INT) |
| Issue status | Issue ID (INT, Primary Key), Book ID (INT, Foreign Key), Customer ID (INT, Foreign Key), Issue Date (DATE), Due Date (DATE), Status (VARCHAR) |
| Return status | Return ID (INT, Primary Key), Issue ID (INT, Foreign Key), Return Date (DATE), Fine (DECIMAL) |
| customer | Customer ID (INT, Primary Key), Name (VARCHAR 200), Email (VARCHAR 100), Phone (VARCHAR 200) |
| Event and program data | Event ID (INT, Primary Key), Event Name (VARCHAR 200), Branch ID (INT, Foreign Key), Date (DATE), Description (VARCHAR) |
| Supplier | Supplier ID (INT, Primary Key), Name (VARCHAR 200), Email (VARCHAR 100), Phone (VARCHAR 20) |

**(B) TEST QUERIES 1) select A screenshot of a computer

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**2) join**

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**Example of Queries**

1. **INSERT** INTO Customers (CustomerID, Name, Email, Phone)

VALUES

(1, 'Alice Cooper', 'alice.cooper@example.com', '4031234567'),

(2, 'Bob Marley', 'bob.marley@example.com', '4037654321'),

(3, 'Charlie Brown', 'charlie.brown@example.com', '4039876543'),

(4, 'Diana Ross', 'diana.ross@example.com', '4036549876'),

(5, 'Ethan Hunt', 'ethan.hunt@example.com', '4036543210');

1. **Select**

SELECT \* FROM Employees;

1. **Group by**

SELECT branchID, COUNT(\*) AS EmployeeCount FROM Employees GROUP BY  branchID;