|  |  |
| --- | --- |
| book\_id | INT (PK) |
| book\_name | VARCHAR(100) |
| author | VARCHAR(100) |
| genres | VARCHAR(50) |
| price | DECIMAL(10) |
| tot\_copies | INT |

E-R DIAGRAM FOR THE PROJECT

**Books TABLE**

|  |  |
| --- | --- |
| member\_id | INT (PK) |
| member\_name | VARCHAR(100) |
| join\_date | DATE |
| num\_of\_books | INT |
| tot\_fine | DECIMAL(10,2) |

|  |  |  |
| --- | --- | --- |
| transaction\_id | | INT (FK) |
| member\_id | INT (FK) | |
| book\_id | INT (FK) | |
| issue\_date | DATE | |
| due\_date | DATE | |
| return\_date | DATE | |
| fine | DECIMAL(10,2) | |

**Transactions TABLE**

**Members TABLE**

|  |  |
| --- | --- |
| transaction\_id | INT (PK) |
| member\_id | INT (FK) |
| book\_id | INT (FK) |
| issue\_date | DATE |
| due\_date | DATE |
| return\_date | DATE |
| renewal\_count | INT |
| fine | DECIMAL(10,2) |
| action | VARCHAR(20) |

**Transactions\_History TABLE**

**KEY FUNCTIONALITIES**

**Member Operations:**

* **Member Registration:** New members can register with the library by providing their details, including name and joining date.
* **Member Validation:** Ensures that registered members are valid users of the library system.
* **Member Profile:** Registered members can view and update their profiles, including personal information.
* **Borrowing Books:** Members can borrow books from the library, subject to availability and borrowing limits.
* **Renewing Books:** Members can renew borrowed books for an additional period, if not exceeding renewal limits.
* **Returning Books:** Members can return borrowed books, and any applicable fines are calculated based on due dates.
* **Fine Tracking:** The system tracks fines accrued by members for overdue books.

**Book Operations:**

* **Add New Books:** Managers can add new books to the library's collection, including details like title, author, genre, price, and total copies.
* **Check Availability:** The system monitors the availability of books to prevent overbooking.
* **Sorting:** Members can search for books filtering through authors and genres.

**Transaction Management and Rules:**

* **Transaction Logging:** All member transactions, including borrowing, renewing, and returning books, are logged.
* **Transaction regulations:** Members have the option to 'Borrow,' 'Renew,' or 'Return' books. The initial due date after borrowing is 14 days, and renewing extends it for an additional 7 days, but only once. Failure to return books on time will result in a fine of Rs 2 per day.
* **Transaction History:** A history of all library transactions is maintained for reference and audit purposes.

**Restrictions and Permissions:**

* **Manager Operations:** Managers have specific days and hours for performing operations like adding and deleting members or inserting new books.

**Automated Actions:**

* **Action Triggers:** Actions like borrowing, renewing, or returning books trigger corresponding procedures and updates.
* **Validation Checks:** The system checks for valid actions, availability, borrowing limits, renewal limits, and overdue fines.
* **Date and Time Restrictions:** Transactions are only allowed during specified hours and days.
* **Error Handling:** The system provides meaningful error messages for invalid actions or operations.

**Security and Access Control:**

* **Role-Based Access:** Role-based access control ensures that only authorized users, such as managers, can perform certain operations.

**Data Management:**

* **Data Integrity:** Procedures and triggers maintain data integrity by updating counts, due dates, and fine calculations accurately.
* **Backup and Recovery:** Regular backup and recovery procedures safeguard library data.