|  |  |
| --- | --- |
| 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) |

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

**Transactions TABLE**

**Transactions\_History 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 |

Library Management System Functionalities:

1. **Member Validation:**
   * Check if the entered member ID is valid and exists in the Members table.
2. **Borrowing Books:**
   * Verify if the requested book is available for borrowing.
   * Ensure that the member has not already borrowed the maximum allowed number of books (2 books at a time).
   * Check for any pending book returns by the member.
   * Verify if the member has reached the renewal limit for borrowed books (maximum 1 time renewal up to 7 days).
   * Calculate any potential fine based on due date and current date.
   * Insert a new transaction record for the borrowed book, including issue date and due date.
   * Update the Transaction\_History table with the borrowed book's record.
3. **Returning Books:**
   * Check if the transaction ID is valid and corresponds to a borrowed book.
   * Calculate fine if the return date is past the due date (INR 2 for each date after due date to return date).
   * Update the transaction record with the return date and any applicable fine.
   * Update the Transaction\_History table with the return date and fine.
   * Decrease the member's total number of borrowed books.
   * Increase the member's total fine if applicable.
4. **Book Availability:**
   * Ensure that the requested book is available (not already borrowed) for issuance.
5. **Renewing Books:**
   * Verify if the member has already reached the renewal limit for borrowed books.
   * If not, extend the due date of the borrowed book by 7 days.
   * Update the Transactions table with the new due date.
6. **Transaction Timing Restrictions:**
   * Restrict book transactions (borrowing, returning, renewing) to occur only on weekdays (Monday to Friday).
   * Transactions are not allowed during weekends.
7. **Manager Permissions:**
   * Create a user role ("library\_manager") with specific permissions (insert, delete on Members table, and insert on Books table).
   * Restrict all manager operations to occur only on weekdays (Monday to Friday) and within working hours (10 AM to 4 PM).