Logical Database Schema

(BOOKed)

Entity-Relationship Mapping

- **Book**: Represents a book in the library's inventory.
- User: Represents any user who can borrow or access the library's services.
- Regular User: A subtype of User, representing a general library member.
- Librarian: A subtype of User, representing a library staff member.
- **Borrowing**: Tracks the borrowing history of books, including the user, book, borrowing date, and return date.
- Reservation: Tracks reservations, including the user, book, and reservation date.
- Review: Represents reviews of books, including review text, rating, and the reviewer.
- Account Management: Tracks user profile updates, including edit dates.

Mapping Approach

One-to-Many (1:N) Relationships

- Book
 → Borrowing: A book can have many borrowing records (multiple users can borrow the same book at different times).
- **Book** ↔ **Reservation**: A book can have many reservations (many users can reserve a book).
- **Book** ↔ **Review**: A book can have multiple reviews from different users.
- User ↔ Borrowing: A user can borrow multiple books.
- **User** ↔ **Reservation**: A user can reserve multiple books.
- User ↔ Review: A user can write multiple reviews for different books

One-to-One (1:1) Relationships

User
 ← Regular User or Librarian: A user is either a regular user or a librarian. This is modeled
by having separate Regular_User and Librarian tables, both referencing User. The relationship is
enforced with foreign key constraints.

Many-to-Many (M:N) Relationships

- User ↔ Book (via Borrowing): A user can borrow multiple books, and a book can be borrowed by multiple users, implemented through the Borrowing table.
- User ↔ Book (via Reservation): A user can reserve multiple books, and a book can be reserved by multiple users, implemented through the Reservation table.

Table Structure

- Book: Stores information about the book, such as title, author, ISBN, and available copies.
- User: Stores user information including name and email, which is unique for each user.
- **Regular User and Librarian:** These tables store subtype-specific information for regular users and librarians respectively, both linked to the User table.
- **Borrowing:** Stores borrowing transactions, including User_ID, Book_ID, borrowing date, and optional return date.
- **Reservation:** Stores information about user reservations, including User_ID, Book_ID, and reservation date.
- Review: Stores reviews of books, with fields for User_ID, Book_ID, review content, rating, and the date of the review.
- Account Management: Stores records of profile edits, such as the date of the last profile update for each user.

Foreign Key Constraints

Used to enforce relationships between the different entities:

- Borrowing Table: User_ID references the User table.
 - Book ID references the Book table.

Reservation Table:

- User ID references the User table.
- Book_ID references the Book table.

Review Table:

- User_ID references the User table.
- Book ID references the Book table.

Account Management Table:

o User ID references the User table.

The **ON DELETE CASCADE** clause ensures that when a user or book is deleted, all related borrowing, reservation, review, and account management records are automatically removed. This helps maintain referential integrity and prevents orphaned records.

- To demonstrate the system's functionality, this is an example of how data is stored and retrieved:

User_ID	Jser_ID Name		Email	1			
1 2	Alice Bob Sn		alice.johnson@example.com bob.smith@example.com				
Book_ID	Book_ID Title		Author		+		Available_Copies
1 The Great Gatsb 2 1984			oy F. Scott Fitzgerald George Orwell		9780743273565 9780451524935 +		5
Borrowing	g_ID U	Jser_ID		Borrow_Date I	Return_Da	ate Sta	atus
	1	1		2024-09-10 2	2024-09-2	20 Bor	rrowed
Reservat:	ion_ID			+ Reservation_[Date St	tatus	
	1	2	2	2024-09-15	Ac	tive	