LibAlpha: A Digital Library

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I. Preliminary Information

Real-World Dataset: "Books Dataset"
Problem / Domain: LibAlpha is a web-based application designed to manage and interact with a large collection of books. It leverages the "Books Dataset" from Kaggle for a full digital library experience. This project aims to streamline book discovery, management, and user engagement in a library setting.
Technologies: We will be using Java, SpringBoot, and Maven
Web Pages: We'll feature a LibAlpha Home Page, Browse Page, Account Page, Book Request Page, and Events page.

II. Entities and Fields

A. Books
ISBN (Primary Key)
Book-Title
Book-Author
Year-Of-Publication
Publisher
Image-URL-S
Image-URL-M
Image-URL-L

B. Users
User-ID (Primary Key)
Location
Age

C. Ratings
User-ID (Foreign Key, part of composite primary key)
ISBN (Foreign Key, part of composite primary key)
Book-Rating

D. Librarians
LibrarianID (Primary Key)
Name
Role

E. Signings
SigningID (Primary Key)

ISBN (Foreign Key)
Date
Time

F. Readings
ReadingID (Primary Key)
ISBN (Foreign Key)
LibrarianID (Foreign Key)
Date
Time

G. Fines
FineID (Primary Key)
UserID (Foreign Key)
ISBN (Foreign Key)
Amount
Status (Paid/Unpaid)
DueDate

H. Requests
RequestID (Primary Key)
UserID (Foreign Key)
BookTitle
RequestDate
Status (Pending/Fulfilled/Declined)

I. Copies
CopyID (Primary Key)
ISBN (Foreign Key)
Status (Available/Reserved/Checked Out)
UserID (Foreign Key, nullable)

J. Reservations
ReservationID (Primary Key)
UserID (Foreign Key)
CopyID (Foreign Key)
ReservationDate
ExpirationDate

III. Relationships

A. Books to Ratings
One-to-Many: Each book (identified by ISBN) can have many ratings, but each rating is associated with one book.

B. Users to Ratings
One-to-Many: Each user can give ratings to many books, but each rating is given by one user.

C. Books to Signings
One-to-Many: A book (identified by ISBN) can have multiple signing events.

D. Books to Readings
One-to-Many: A book (identified by ISBN) can be read in multiple reading events.

E. Librarians to Readings
One-to-Many: A librarian can host multiple reading events, but each reading is hosted by one librarian.

F. Users to Fines
One-to-Many: A user can have multiple fines, but each fine is associated with one user.

G. Books (via ISBN) to Fines
One-to-Many: A book can be associated with multiple fines (through its ISBN), but each fine is associated with one book.

H. Users to Requests
One-to-Many: A user can make multiple book requests, but each request is made by one user.

I. Books (via ISBN) to Copies
One-to-Many: A book can have multiple copies, but each copy is associated with one book.

J. Users to Copies
One-to-Many: A user can have multiple copies checked out or reserved, but each copy is associated with one user (nullable for available copies).

K. Users to Reservations
One-to-Many: A user can make multiple reservations, but each reservation is made by one user.

L. Copies to Reservations
One-to-One: Each copy can be reserved once at a time; this is a one-to-one relationship if only one active reservation is allowed per copy.

IV. Notes

- The **Ratings** table uses a composite primary key consisting of UserID and ISBN, representing the many-to-many relationship between Users and Books.
- The **UserID** field in the **Copies** table is nullable to represent copies that are not currently checked out or reserved.

V. Entity Relationship Diagram