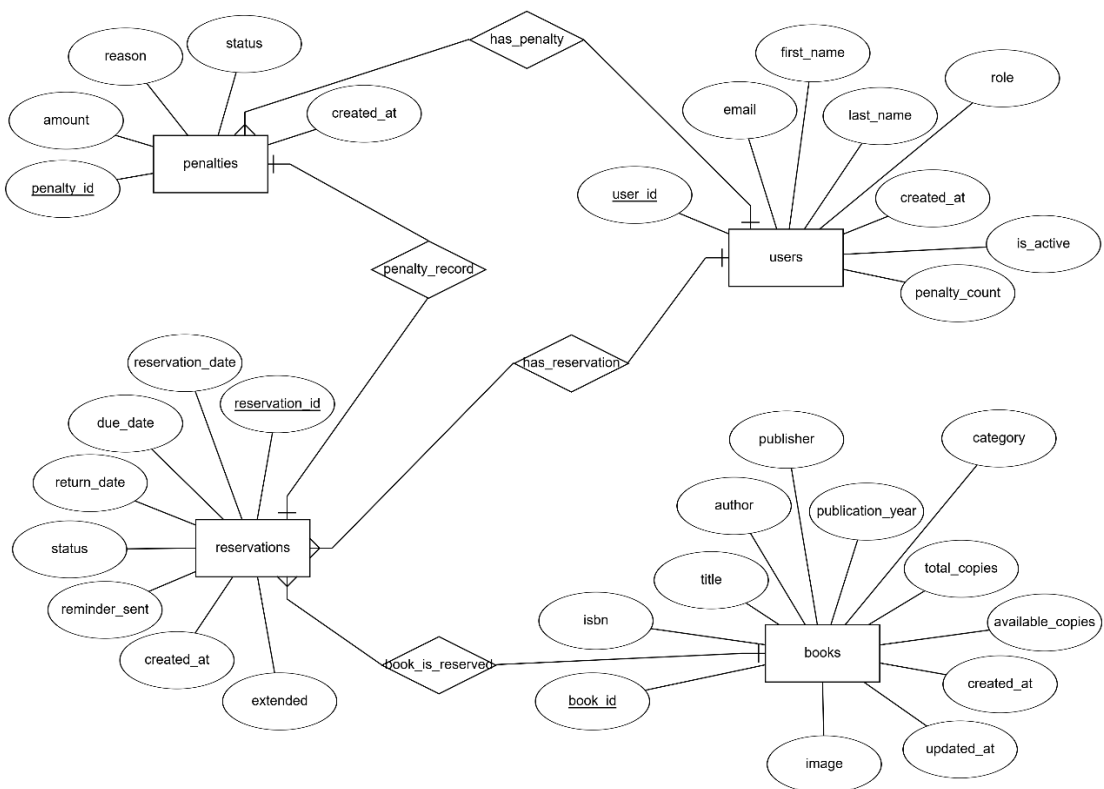


Library Book Reservation System

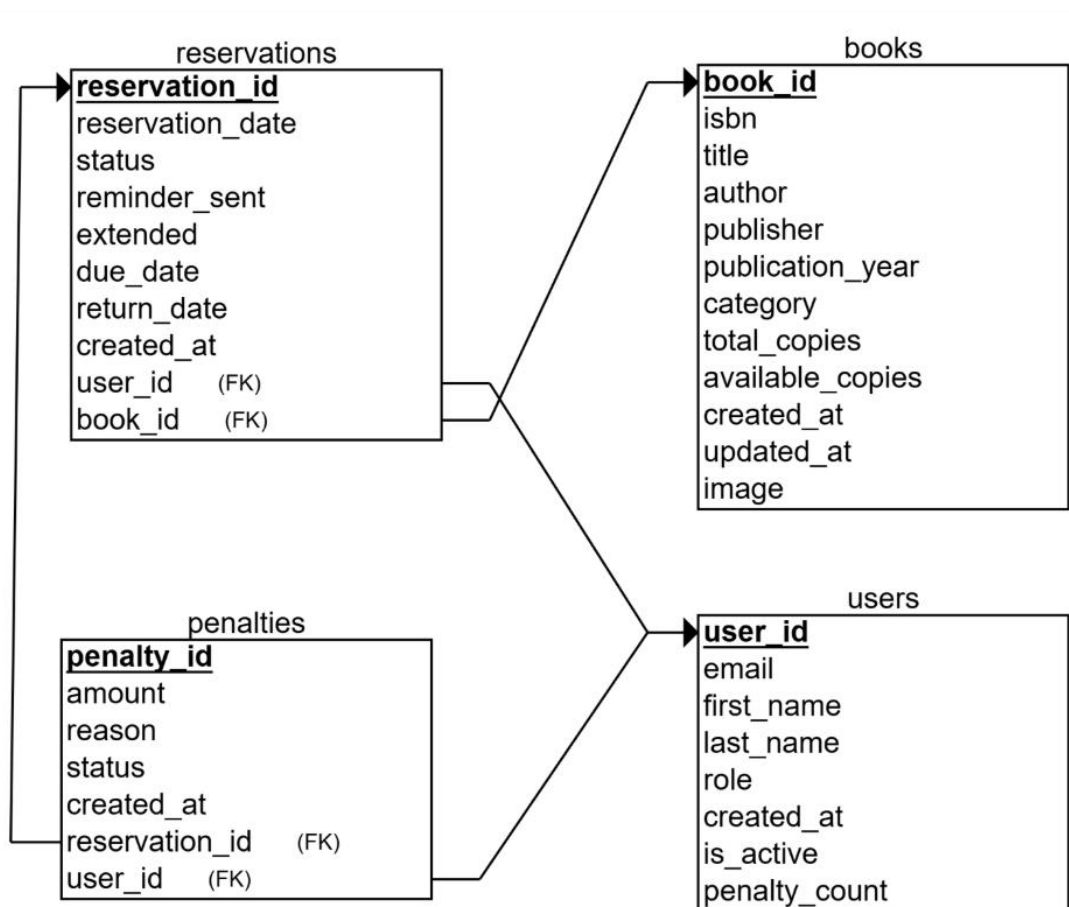
1. Description of the project

Our project aims to develop a modern library management system that digitalizes the library's lending operations. With this system, customers can browse books, make reservations, and manage their borrowed items online. Library staff, on the other hand, can track returns, manage the book collection, and handle overdue returns from customers.

2. ER Diagram



3. Relational database schema



4. Verbal description of each entity type and relationship type in the ER diagram

users

- **Purpose:** Describes a library user
- **Attributes:**
 - user_id (primary key)
 - email – user's email address
 - first_name – user's first name
 - last_name – user's last name
 - role – user's role (enum: customer, librarian)
 - created_at - timestamp
 - is_active - boolean (true, false), indicates whether the user is active
 - penalty_count - number of penalties accumulated
- **Relationships:**
 - has_penalty - (users - penalties) links a user to their penalties (1:M)
 - has_reservation - (users - reservations) links a user to their reservations (1:M)

penalties

- **Purpose:** Describes the user's penalties

- **Attributes:**
 - penalty_id (primary key)
 - amount - total penalty amount in currency
 - reason - name of the book that caused the penalty, explanation
 - status - (enum - pending, paid, waived)
 - created_at - timestamp
 - reservation_id (foreign key)
 - user_id (foreign key)
- **Relationships:**
 - has_penalty - (users - penalties) links a user to their penalties (1:M)
 - penalty_record - (penalties - reservations) links a penalty to a reservation (1:1)

reservations

- **Purpose:** Describes a book loan transaction
- **Attributes:**
 - reservation_id (primary key)
 - reservation_date - timestamp
 - status - (enum - active, returned, overdue, cancelled)
 - remainder_sent - boolean (true, false)
 - extended - boolean (true, false), indicates whether the loan was extended
 - due_date - timestamp, due date for returning the book
 - return_date - timestamp, actual return date of the book, NULL if not returned
 - created_at - timestamp
 - user_id (foreign key)
 - book_id (foreign key)
- **Relationships:**
 - penalty_record - (penalties - reservations) links a penalty to a reservation (1:1)
 - has_reservation - (users - reservations) links a user to their reservations (1:M)
 - book_is_reserved - (books - reservations) links books to reservations (1:M)

books

- **Purpose:** Describes books in the library
- **Attributes:**
 - book_id (primary key)
 - isbn - ISBN code
 - title - book title
 - author - book author
 - publisher - book publisher
 - publication_year - year of publication
 - category - category
 - total_copies - total number of copies
 - available_copies - number of available copies
 - created_at - timestamp
 - updated_at - timestamp, last update date of the book
 - image - URL of the book cover image

- **Relationships:**

- book_is_reserved - (books - reservations) links books to reservations (1:M)