Library Book Reservation System

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1. Description of the project

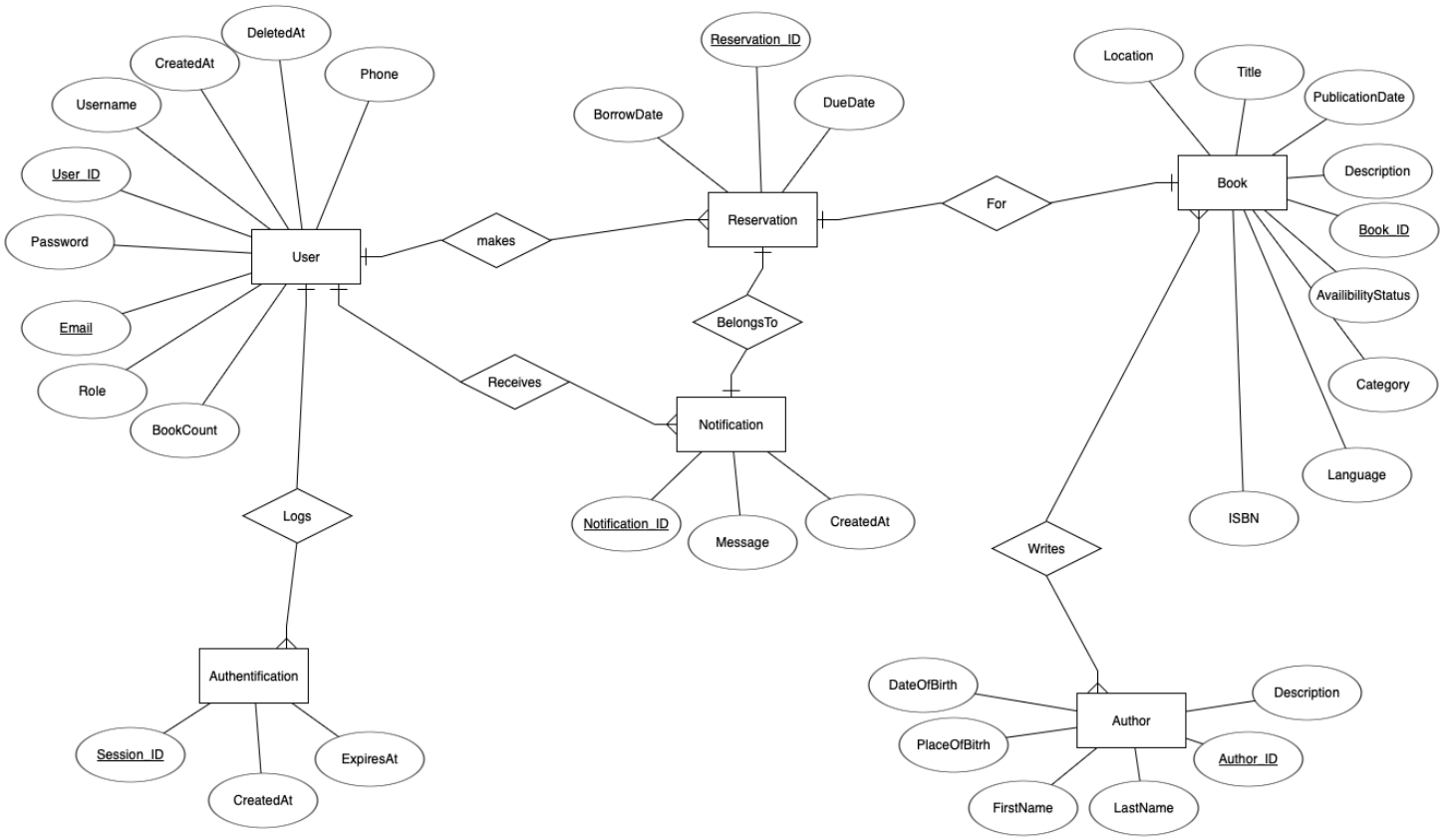
This project aims to create a modern, user-friendly platform that allows seamless browsing, reserving, and managing of library books. By integrating book availability updates, automated reminders, and an intuitive interface, the system ensures that library users can efficiently access and manage resources without unnecessary delays.

The Library Book Reservation System transforms the way users interact with library resources by offering:

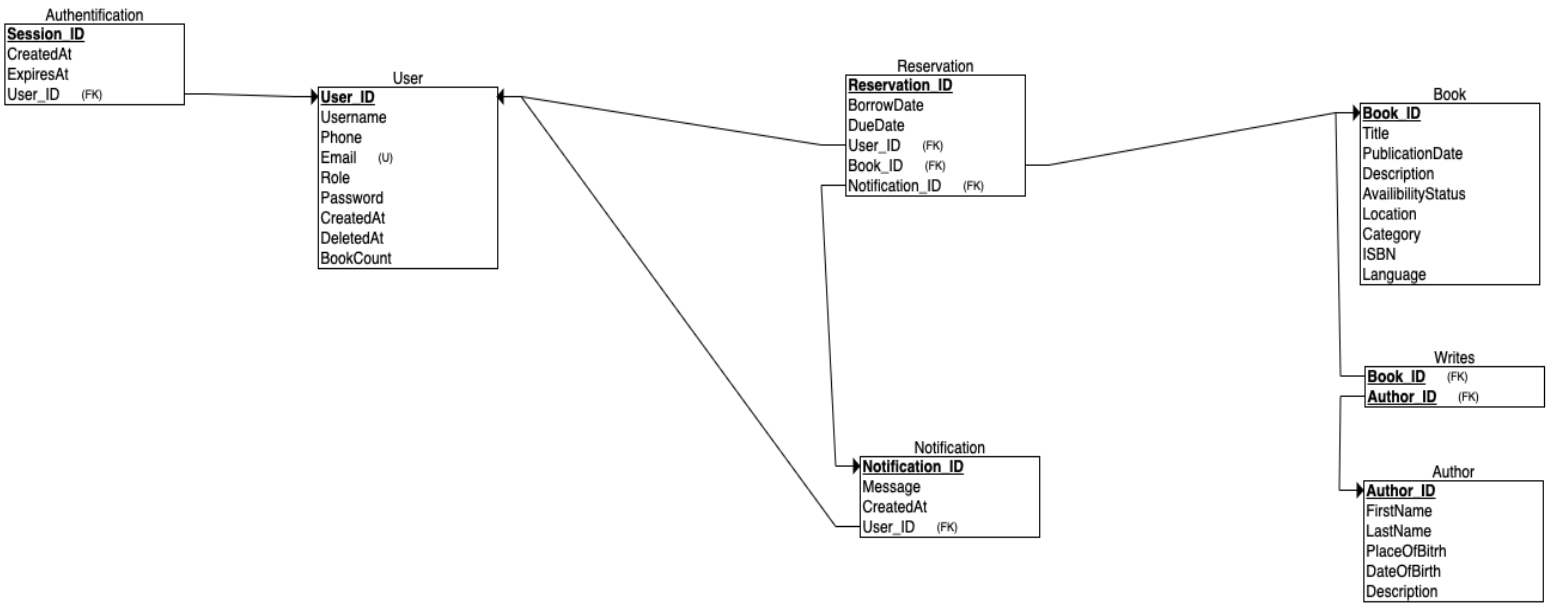
- **Efficient Book Search & Reservation** – Users can quickly find books by title, author, or subject and reserve them in real time.
- **Real-Time Availability Updates** – Ensures users receive up-to-date information, reducing wasted trips and frustration.
- **Automated Notifications & Reminders** – Helps users track due dates and avoid overdue penalties.
- **Improved Library Resource Utilization** – Encourages timely book returns and optimal use of available materials.
- **Seamless User Experience** – A clean, intuitive interface designed for easy navigation across devices.

UI prototype in Figma:
https://www.figma.com/design/X7R1B4GjCMiose5WzugAeH/Luku-Library?node-id=0-1&t=9Eh0xWRXxf3xwzHk-1

2. ER Diagram



3. Relational database schema



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

User - Represents a library user (student or teacher).

Attributes:

- User_ID (Primary Key)
- Username
- Password
- Email (Unique)
- Phone
- Role (e.g., Teacher, Student)
- BookCount (Number of books borrowed)
- CreatedAt
- DeletedAT

Reservation - Represents the process of users borrowing books.

Attributes:

- Reservation_ID (Primary Key)
- User_ID (Foreign Key)
- Book_ID (Foreign Key)
- BorrowDate
- Notification ID (Foreign Key)
- DueDate

Notification - Represents messages sent to users regarding their activities (e.g., due dates, book availability).

Attributes:

- Notification_ID (Primary Key)
- User_ID (Foreign Key)
- Message
- CreatedAt

Book - Represents books available in the library.

Attributes:

- Book_ID (Primary Key)
- Title
- PublicationDate
- Description
- AvailabilityStatus
- Category
- Language
- ISBN
- Location

Author - Represents authors who have written books in the library.

Attributes:

- Author_ID (Primary Key)
- FirstName
- LastName
- Description
- DateOfBirth
- PlaceOfBirth

Writes - Represents the connection between writers and books.

Attributes:

- Book_ID (Foreignt Key)
- Author ID (Foreign Key)

Authentication - Represents session authentication logs for users.

Attributes:

- Session_ID (Primary Key)
- UserID (Foreign Key)
- CreatedAt
- ExpiresAt

Relationships and Their Descriptions

1. User makes Reservation (1-to-Many)

• A user can make multiple reservations, but each reservation is made by only one user.

2. User Receives Notification (1-to-Many)

• A user can receive multiple notifications, but each notification belongs to one user.

3. Reservation is For Book (1-to-1)

• A reservation is made for a specific book.

• One reservation can be made for one book.

4. Notification BelongsTo Reservation (1-to-1)

• A notification is directly linked to a specific reservation.

5. Author Writes Book (Many-to-Many)

• An author can write multiple books.

• One book can be written by several authors

6. User Logs Authentication (1-to-Many)

• A user can have multiple authentication sessions (logins), each tracked separately.

5. Sample Data

User Table

User_ID	Username	Password	Email	Phone	Role	BookCount	CreatedAt	DeletedAt
1	jdoe	hashed_pw1	jdoe@example.com	123-456-7890	Student	2	01.01.2025	NULL
2	asmith	hashed_pw2	asmith@example.com	987-654-3210	Teacher	0	02.01.2025	NULL
3	bjones	hashed_pw3	bjones@example.com	555-123-4567	Student	1	05.01.2025	NULL

Reservation Table

Reservation_ID	User_ID	Book_ID	BorrowDate	DueDate	Notification_ID
101	1	201	10.01.2025	20.01.2025	501
102	3	203	12.01.2025	22.01.2025	502

Notification Table

Notification_ID	User_ID	Message	CreatedAt
501	1	Your book is due tomorrow!	19.01.2025
502	3	Your book is due tomorrow!	21.01.2025

Book Table

Book_ID	Title	PublicationDate	Description	Availability Status	Category	Language	ISBN	Location

201	Database Systems	15.06.2020	Comprehensive guide on DBMS	TRUE	Computer Science	English	978-3-16-148410-0	Shelf A2
202	Operating Systems	10.05.2019	Concepts and design of OS	FALSE	Computer Science	English	978-0-07-246563-1	Shelf B3
203	Introduction to AI	02.07.2021	Fundamentals of AI	TRUE	Artificial Intelligence	English	978-1-23-456789-7	Shelf C1

Author Table

Author_ID	FirstName	LastName	Description	DateOfBirth	PlaceOfBirth
301	John	Doe	Expert in database management systems	12.03.1975	USA
302	Alice	Smith	Renowned professor in OS	22.09.1980	UK

Writes Table

Author_ID	Book_ID
301	201
302	202

Authentication Table

Session_ID	User_ID	CreatedAt	ExpiresAt
901	1	15.01.2015 08:30:00	15.01.2025 18:30:00
902	2	16.01.2025 09:00:00	16.01.2025 19:00:00
903	3	17.01.2025 10:15:00	17.01.2025 20:15:00