Mini Project Synopsis: COEP OPAC (Online Public Access Catalog)

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1. Problem Statement

The current library system at COEP lacks a digital interface for efficient access to the catalogue of available books. Students and staff have to manually check availability and status of books, which leads to delays and inefficiency. The need is to implement an Online Public Access Catalog (OPAC) system that provides digital access to library records, allowing users to search, issue, and reserve books online while providing library administrators tools for managing book inventories and user activity.

2. Objectives

- To design and implement a web-based system for managing library book catalogues.
- To enable users to search books by title, author, genre, or publisher.
- To allow users to digitally issue and reserve books.
- To enable library administrators to manage book data, user records, and issue logs.
- To ensure each book's availability and location can be tracked in real-time.

3. Functional Requirements

The system will include two main actors: Library Users and Library Administrators.

Users can:

- Search books using title, author, genre, publisher, etc.
- View availability status (Available, Issued, Reference).
- Issue books online or join a waiting list if already issued.
- Track issued books and due dates.

Library Administrators can:

- Manage book records, including ISBN, title, and location.
- Add or remove books from the library.
- Track book issuance and returns.
- Update status and availability of books.
- Maintain user issue history and statistics.

4. ER Diagram

Refer to the attached ER Diagram image file.

5. Relational Schemas

ISBN(ISBNID, Title, Author, Genre, Publication, Language, Pages, DocType) Stores the bibliographic details of each book (or document) uniquely identified by its ISBN number. ISBN records attributes common to all copies of a particular book to reduce redundancy.

Library(LibID, Name, Address) Represents different library branches or units in the system. Each library has a unique address to distinguish it from others.

Book(Book_ID, ISBN, LibraryID, Status, DeweyDecLoc) Represents the physical copies of books available in a specific library. *DeweyDecLoc* represents the location of the book (shelf number, etc.) within a library.

User(UID, Name, BooksIssued) Holds the details of users who borrow books.

User Specialization: The User entity further specializes into two roles:

- **Issuer** – can issue books for a fixed period of time.

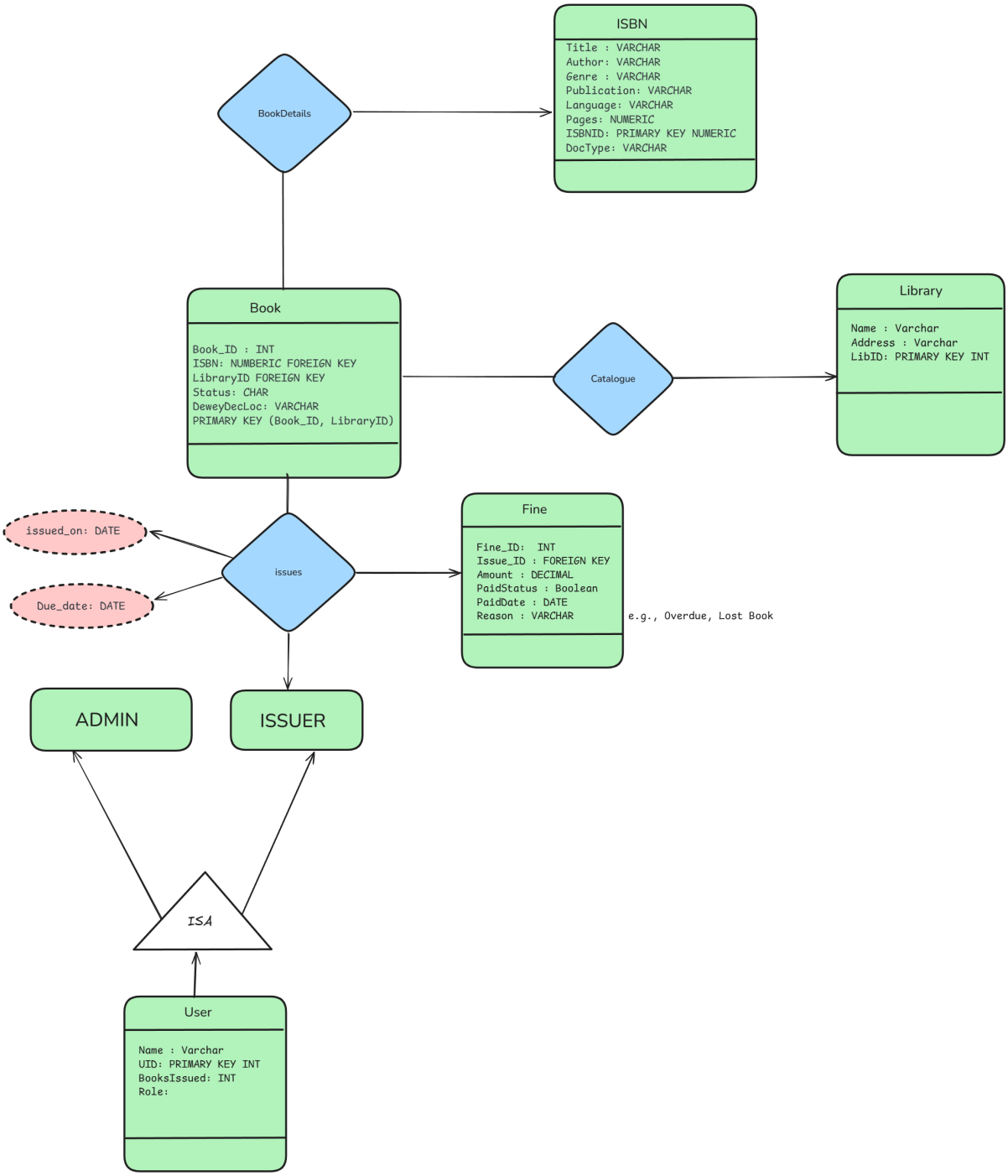

Figure 1: ER Diagram

- **Admin** – has special permissions to add or remove books, update records, and manage other users.

Although no new attributes are introduced, specialization is used to represent different permissions and roles.

Issues(Book_ID, UID, Issued_On, Due_Date) Represents the relationship between User and Book — tracks book borrowing and return dates.

Fine(Fine_ID, Issue_ID, Amount, PaidStatus, PaidDate, Reason) Records fines imposed on users for overdue or lost books.

6. Functional Dependencies

ISBN Table

$$\text{ISBNID} \rightarrow \{\text{Title, Author, Genre, Publication, Language, Pages, DocType}\}$$

Library Table

$$\text{LibID} \rightarrow \{\text{Name, Address}\}$$

Book Table

$$(\text{Book\_ID, LibraryID}) \rightarrow \{\text{ISBN, Status, DeweyDecLoc}\}$$

$$\text{ISBN} \rightarrow \{\text{Title, Author, Genre, Publication, Language, Pages, DocType}\}$$

$$\text{LibraryID} \rightarrow \{\text{Name, Address}\}$$

User Table

$$\text{UID} \rightarrow \{\text{Name, BooksIssued}\}$$

Issues Table

$$(\text{UID, Book\_ID, LibraryID}) \rightarrow \{\text{Issued\_On, Due\_Date}\}$$

$$(\text{Book\_ID, LibraryID}) \rightarrow \{\text{ISBN, Status, DeweyDecLoc}\}$$

$$\text{UID} \rightarrow \{\text{Name, BooksIssued}\}$$

Fine Table

$$\text{Fine\_ID} \rightarrow \{\text{Issue\_ID, Amount, PaidStatus, PaidDate, Reason}\}$$

$$\text{Issue\_ID} \rightarrow \{\text{UID, Book\_ID, LibraryID, Issued\_On, Due\_Date}\}$$

Derived FDs

$$(\text{Book\_ID, LibraryID}) \rightarrow \text{ISBN}$$

$$\text{ISBN} \rightarrow \{\text{Title, Author, Genre, Publication, Language, Pages, DocType}\}$$

$$\text{LibraryID} \rightarrow \{\text{Name, Address}\}$$

7. Normalization (Up to 3NF)

All tables in the schema are normalized up to Third Normal Form (3NF):

1. Each table has a unique primary key.

2. All non-key attributes are fully functionally dependent on the primary key.

3. There are no transitive dependencies between non-key attributes.

This ensures minimal redundancy and optimal data integrity.