Relational Database Schema Overview

Member Entity

- **Description:** Represents users of the Library Database System.
- **Attributes:**
    - `MemberID`: Primary key uniquely identifying each user.
    - `Fname, Lname`: First and last name of the member.
    - `Email`: Email address, restricted to college domain.
    - `MemberType`: Type of member (student or staff).
    - `MaxLoans`: Maximum number of resources a member can borrow based on their type.
    - `AccountStatus`: Derived attribute indicating member's status (`active` or `suspended` based on outstanding fines).

MEMBER (MemberID{PK}, Fname, Lname, Email, MemberType, MaxLoans, AccountStatus)

Resource Entity (Superclass)

- **Description:** General information about library resources (books, videos, DVDs, CDs).
- **Attributes:**
    - `ResourceID`: Primary key uniquely identifying each resource.
    - `Title`: Title of the resource.
    - `FloorNumber, ShelfNumber`: Location of the resource in the library.
    - `ClassNumber, ClassName`: Classification of the resource by subject.
    - `LoanType`: Type of loan period allowed for the resource.
    - `ISBN`: International Standard Book Number for identification.

Book Entity (Subclass of Resource)

- **Attributes:**
    - `Author`: Author of the book.

Video Entity (Subclass of Resource)

- **Attributes:**
    - `Creator`: Creator of the video.

DVD Entity (Subclass of Resource)

- **Attributes:**
    - `Director`: Director of the DVD.

CD Entity (Subclass of Resource)

- **Attributes:**

o `Musician`: Musician of the CD.

BOOK (<u>ResourceID{PK}</u>, Title, FloorNumber, ShelfNumber, ClassNumber, ClassName, LoanType, ISBN, Author)
VIDEO (<u>ResourceID{PK}</u>, Title, FloorNumber, ShelfNumber, ClassNumber, ClassName, LoanType, ISBN, Creator)
DVD (<u>ResourceID{PK}</u>, Title, FloorNumber, ShelfNumber, ClassNumber, ClassName, LoanType, ISBN, Director)
CD (<u>ResourceID{PK}</u>, Title, FloorNumber, ShelfNumber, ClassNumber, ClassName, LoanType, ISBN, Musician)

Copy Entity (Weak Entity)

- **Description:** Copies of resources available for loan.
- **Attributes:**
    - o `ResourceID`, `CopyNumber`: Composite primary key uniquely identifying each copy.
    - o `Availability`: Derived attribute indicating if the copy is available for loan.

COPY ((<u>ResourceID{FK}, CopyNumber){PK}</u>, Availability)

Loan Entity (Associative Entity)

- **Description:** Records loans of resources by members.
- **Attributes:**
    - o `LoanNumber`: Primary key uniquely identifying each loan.
    - o `MemberID`, `ResourceID`, `CopyNumber`: Composite primary key.
    - o `IssueDate`, `ReturnDate`: Dates when the resource was borrowed and returned.
    - o Derived attributes: `DueDate` (calculated based on loan type and issue date), `OverdueDays` (days past due date).

LOAN ((<u>MemberID{FK}, ResourceID{FK}, CopyNumber {FK}, LoanNumber){PK}</u>, IssueDate, ReturnDate)

Reservation Entity (Associative Entity)

- **Description:** Records reservations of resources by members.
- **Attributes:**
    - o `ReservationNumber`: Primary key uniquely identifying each reservation.
    - o `MemberID`, `ResourceID`: Composite primary key.
    - o `ReservationDate`: Date when the reservation was made.
    - o Derived attributes: `ReservationStatus` (pending or failed), `RemainNotifications` (remaining notifications).

RESERVATION ((<u>MemberID{FK}, ResourceID{FK}, ReservationNumber){PK}</u>, ReservationDate, ReservationStatus, RemainNotifications)

Fine Entity (Weak Entity)

- **Description:** Records fines incurred by members for overdue resources.
- **Attributes:**
    - `FineID`: Primary key uniquely identifying each fine.
    - `MemberID`, `LoanNumber`: Composite primary key.
    - `FineAmount`: Derived attribute calculated based on overdue days and daily fine rate.

FINE ((MemberID{FK}, LoanNumber{FK}, FineID){PK})

Payment Entity (Weak Entity)

- **Description:** Records payments made by members.
- **Attributes:**
    - `PaymentID`: Primary key uniquely identifying each payment.
    - `MemberID`: Foreign key linking to the member making the payment.
    - `PaymentDate`, `PaymentAmount`: Date and amount of the payment.

PAYMENT (PaymentID{PK}, MemberID{FK}, PaymentDate, PaymentAmount)

Notification Entity (Weak Entity)

- **Description:** Records notifications sent to members about their reservations.
- **Attributes:**
    - `NotificationNumber`: Primary key uniquely identifying each notification.
    - `MemberID`, `ReservationNumber`: Composite primary key.
    - `NotificationDate`: Date when the notification was sent.

NOTIFICATION ((MemberID{FK}, ReservationNumber{FK}, NotificationNumber){PK}, NotificationDate)