Introduction:

Project Overview: The system will manage a diverse collection of loanable items, track various types of memberships, enforce borrowing rules, and generate meaningful reports.

Scope Statement: From the project overview: This project aims to provide hands-on experience designing, implementing, and managing a relational database system for a small library. The system will manage a diverse collection of loanable items, track various types of memberships, enforce borrowing rules, and generate meaningful reports.

Get Ready for ER Modeling.

Here's a draft of the Data Entities section for our Library Management System project, outlining key entities, attributes, data types, constraints, and relationships:

1. Book
Represents physical books available for loan.

- ItemID ((Primary Key) – INT, Auto-increment: Unique identifier for each book.
- Title – VARCHAR(255): Title of the book.
- Author/Creator – VARCHAR(255): Name of the book's author or creator.
- ISBN – VARCHAR(13): International Standard Book Number, must be unique.
- PublicationYear – YEAR: The year the book was published.
- Genre – VARCHAR(100): The genre of the book (e.g., Fiction, Non-fiction).
- AvailabilityStatus – BOOLEAN: Indicates whether the book is available (TRUE) or loaned out (FALSE).

  Relationships:
  - Loan - A book can be loaned out multiple times
    - Cardinality - One-to-Many
  - Reservation - A book can have multiple reservations by different clients
    - Cardinality - One-to-Many

2. Digital Media
Represents digital media available for loan, such as eBooks or audiobooks.

- ItemID (Primary Key) – INT, Auto-increment: Unique identifier for each digital media item.
- Title – VARCHAR(255): Title of the digital media.
- Author/Creator – VARCHAR(255): The name of the creator or author of the digital media.
- ISBN – VARCHAR(13): Identifier for the media item, where applicable.
- PublicationYear – YEAR: The year the digital media was published or released.
- Genre – VARCHAR(100): The category of digital media.
- AvailabilityStatus – BOOLEAN: Indicates availability (TRUE for available, FALSE for checked out).

Relationships:
- Loan - Digital media can be loaned out multiple times
  - Cardinality - One-to-Many
- Reservation - Digital media can have multiple reservations
  - Cardinality - One-to-Many

3. Magazine
Represents magazines in the library.

- ItemID (Primary Key) – INT, Auto-increment: Unique identifier for each magazine.
- Title – VARCHAR(255): Title of the magazine.
- IssueNumber – VARCHAR(50): Issue number or volume of the magazine.
- PublicationDate – DATE: Date the magazine was published.
- AvailabilityStatus – BOOLEAN: Indicates if the magazine is available for loan (TRUE = available, FALSE = checked out).

Relationships:
- Loan - A magazine can be loaned out multiple times
  - Cardinality - One-to-Many
- Reservation - A magazine can have multiple reservations
  - Cardinality - One-to-Many

4. Client
Represents library users who can borrow items.

- ClientID (Primary Key) – INT, Auto-increment: Unique identifier for each client.

- Name – VARCHAR(255): Full name of the client.
- ContactInformation – VARCHAR(255): Contact information (phone or email).
- MembershipType – VARCHAR(50): Type of membership (e.g., Regular, Student, Senior Citizen).
- AccountStatus – VARCHAR(20): Status of the client account (e.g., Active, Suspended, Closed).

Relationships:
- Loan - A client can have multiple loans
  - Cardinality - One-to-Many
- Reservation - A client can reserve multiple items
  - Cardinality - One-to-Many

5. Loan
Represents the loaning of items from the library to clients.

- LoanID (Primary Key) – INT, Auto-increment: Unique identifier for each loan transaction.
- ClientID (Foreign Key) – INT: Links to the client who is borrowing the item.
- ItemID (Foreign Key) – INT: Links to the item (book, digital media, magazine) being borrowed.
- LoanDate – DATE: The date the item was borrowed.
- DueDate – DATE: The date the item is due to be returned.
- ReturnDate – DATE, Nullable: The actual return date of the item (if returned).
- LateFee – DECIMAL(5,2), Nullable: The fee incurred if the item is returned late.

Relationships:
- Book - Each loan must correspond to one specific book
  - Cardinality - Many-to-One
- Digital Media - Each loan can correspond to one specific digital media item
  - Cardinality - Many-to-One
- Magazine - Each loan can correspond to one specific magazine
  - Cardinality - Many-to-One
- Client - Each loan must be associated with one client
  - Cardinality - Many-to-one

6. Reservation

Represents reservations made by clients for items in the library.

- <u>ReservationID</u> (Primary Key) – INT, Auto-increment: Unique identifier for each reservation.
- ClientID (Foreign Key) – INT: Links to the client making the reservation.
- ItemID (Foreign Key) – INT: Links to the reserved item (book, digital media, magazine).
- ReservationDate – DATE: The date when the reservation was made.
- ReservationDueDate – DATE: The date by which the item must be picked up or the reservation will expire.

Relationships:
- Book - Each reservation must correspond to one specific book
  - Cardinality - Many-to-One
- Digital Media - Each reservation can correspond to one specific digital media item
  - Cardinality - Many-to-One
- Magazine - Each reservation can correspond to one specific magazine
  - Cardinality - Many-to-One
- Client - Each reservation must be associated with one client
  - Cardinality - Many-to-one