Case Scenario - Public Library (Circulation)

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Objective: In this assignment, you will design the logical model of a database based on the case scenario you selected. You will identify the required entities, attributes, keys, relationships, and constraints and represent them in a Logical ER Diagram using Crow's Foot notation.

Case Scenario 2: Public Library (Circulation):
You've been hired by the community library to modernize their outdated card system. The library serves many members who borrow books. Each book title may have one or more authors, and the library owns multiple copies of each title, each with its own unique Barcode. When a member borrows a copy, a loan record is created with a due date. If the book is returned late, the system must record a fine. The library also wants to keep track of its librarians, who manage borrowing and returning. Your job is to build a system that organizes members, authors, titles, title - author links, book copies, loans, fines, and librarians.

The Entity, Descriptions and Attributes		
Entities	**Description**	**Attributes**
1.Member	Represents those who have registered with the library and are eligible to check out books.	Member_ID (Primary Key) First_name Last_name Email Phone Join_Date Status: Active,Suspended or Inactive
2.Librarian	Represents the library employees in charge of overseeing the loan and return procedures.	Librarian_ID(Primary Key) First_name Last_name Email Phone Hire_Date
3.Title	Represents each book title in the library's catalog.	Title_id (PK) Isbn (UNIQUE), Title publisher publication_year genre
4.Title_Author	Represents books of the name that are provided by the author.	Title_id (FK → TITLE) Author_id (FK → AUTHOR) Primary_author (Y/N)

The Entity, Descriptions and Attributes		
5.Author	Representing the person who wrote the book.	Author_ID (Primary Key) First_name Last_name
6.loan	Represents who the members Borrow or rent a book from the library.	Loan_id (PK) Copy_id (FK → BOOK_COPY) Member_id (FK → MEMBER) Checkout_by (FK → LIBRARIAN) Checkin_by (FK → LIBRARIAN, optional)' Checkout_date Due_date Return_date Status
7.Fine	Represents fines for past-due book returns associated with a particular loan.	Fine_ID(Primary Key) Loan_ID(Foreign Key) Fine_amount Assessed_date Paid_date Status, notes
8. Book copy	Represents every book copy for tracking purposes.	Copy_id (PK) Title_id (FK → TITLE) Barcode (UNIQUE) Copy_number Acquired_date Condition_status Shelf_location

Relationships, Key attributes and Constraints		
Relationships & Cardinality	Key Attributes	Constraints
Title to Bookcopy 1 to Many	Title_id Book_copy	One title can have multiple copies.
Title to Author Many to Recursive	Title_ID Author_ID	Use title_Author as an intersection.

Relationships, Key attributes and Constraints		
Member to Loan 1 to many	Loan_id (PK) Member_id (PK)	A member can have multiple loans.
Book copy to Loan 1 to Many	copy_id(pk) loan_id(pk)	Each copy can be loaned multiple times.
Librarian to Loan 1 to many	library_id(PK) Loan_id(PK)	Librarians manage the checkout/check-in process
Loan to Fine 1 to 1	Loan_ID(PK) Fine_ID(PK)	A loan may have zero or one fine

Crow’s Foot notation