**Step 1: Define the Entities and Their Attributes**

**Entities and Attributes:**

1. **Book**:
   * BookID (Primary Key)
   * Title
   * PublicationYear
2. **Author**:
   * AuthorID (Primary Key)
   * Name
3. **LibraryMember**:
   * MemberID (Primary Key)
   * Name
4. **Borrowing**:
   * BorrowingID (Primary Key)
   * DueDate
   * ReturnDate

**Step 2: Define the Relationships**

**Relationships:**

1. **Book - Author**:
   * A book can have one or more authors.
   * An author can write one or more books.
   * This is a many-to-many relationship.
2. **Borrowing - Book**:
   * Each borrowing is associated with one book.
   * A book can be borrowed multiple times.
   * This is a many-to-one relationship from Borrowing to Book.
3. **Borrowing - LibraryMember**:
   * Each borrowing is associated with one library member.
   * A library member can borrow multiple books.
   * This is a many-to-one relationship from Borrowing to LibraryMember.

**Step 3: Design the ERD**

Using the information from Steps 1 and 2, we can now create the ERD. Here’s a textual representation of the ERD:

**Entity Relationship Diagram (ERD):**

1. **Entities**:
   * **Book (BookID, Title, publication year)**
   * **Author (AuthorID, Name)**
   * **LibraryMember (MemberID, Name)**
   * **Borrowing (BorrowingID, DueDate, ReturnDate, BookID, MemberID)**
2. **Relationships**:
   * **Book – Book Author**:
     + Many-to-many relationship.
     + Create an associative entity **BookID**.
   * **Borrowing – Book Author**:
     + Many-to-One relationship.
     + BookID as a foreign key in **Borrowing**.
   * **Borrowing - LibraryMember**:
     + Many-to-One relationship.
     + MemberID as a foreign key in **Borrowing**.
   * Author **– Book Author**:
     + Many-to-One relationship.
     + AuthorID as a foreign key in **BookAuthor**.

|  |
| --- |
| AUTHOR |
| AuthorID(PK) |
| Name |

|  |
| --- |
| BOOK AUTHOR |
| BookID(PK) |
| AuthorID(FK) |

|  |
| --- |
| BOOK |
| BookID(PK) |
| Title |
| PublicationYear |

|  |
| --- |
| BORROWING |
| BorrowingID(PK) |
| DueDate |
| ReturnDate |
| BookID(FK) |
| MemberID(FK) |

|  |
| --- |
| LibraryMember |
| MemberID(PK) |
| Name |