

Business Scenario

Consider an online bookstore. The bookstore wants to manage its data related to books, authors, customers, and orders. Here are the details

Books: Each book has a unique ISBN, title, publication year, genre, and price. Authors: Each author has a unique ID, name, and biography. An author can write multiple books, and each book can have multiple authors.

Customers: Each customer has a unique customer ID, name, email, and address.

Orders: Customers can place multiple orders. Each order has a unique order ID, order date, and total amount.

Order Details: Each order can include multiple books. For each book in the order, it records the quantity and price at the time of order.

Identifying Entities and Relationships

Entities:

- Book
- Author
- Customer
- Order
- OrderDetail (junction entity between Order and Book)

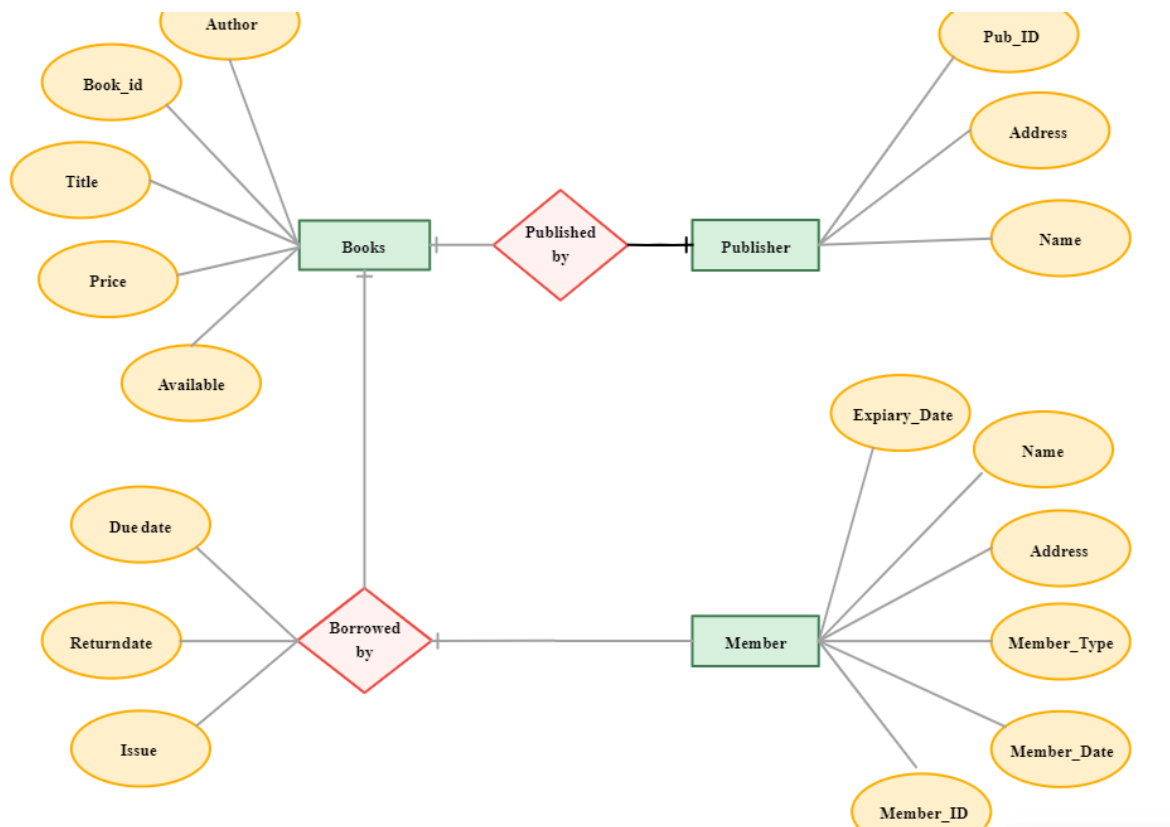
Relationships:

- Book-Author (Many-to-Many)
- Customer-Order (One-to-Many)
- Order-OrderDetail (One-to-Many)
- Book-OrderDetail (One-to-Many)

Attributes

- Book: ISBN (Primary Key), Title, PublicationYear, Genre, Price
- Author: AuthorID (Primary Key), Name, Biography
- Customer: CustomerID (Primary Key), Name, Email, Address
- Order: OrderID (Primary Key), OrderDate, TotalAmount, CustomerID (Foreign Key)
- OrderDetail: OrderDetailID (Primary Key), OrderID (Foreign Key), ISBN (Foreign Key), Quantity, Price

ER Diagram in 3NF



Normalization:

- 1NF: Ensure each column contains atomic values and each record is unique.
- 2NF: Remove partial dependencies (every non-primary key attribute is fully functionally dependent on the primary key).
- 3NF: Remove transitive dependencies (non-primary key attributes are not dependent on other non-primary key attributes).

Cardinality

- **Book-Author:** Many-to-Many (One Book can have multiple Authors, and one Author can write multiple Books).
- **Customer-Order:** One-to-Many (One Customer can place multiple Orders).
- **Order-OrderDetail:** One-to-Many (One Order can have multiple OrderDetails).
- **Book-OrderDetail:** One-to-Many (One Book can appear in multiple OrderDetails).

