ER Diagram — Library/Book Management System

Author entity:
- B_id (FK)
- Name
- A_id (PK)
- Address

Written by (relationship): A

Book entity:
- O_id (PK)
- A_id
- P_id
- B_id (PK)
- ISBN
- Title
- C_id (FK)

Bought by (relationship): 1 ... 1
Written by: 1
Published by: n ... 1
Ordered by: 1 ... n

Customer entity:
- C_id
- C_name
- C_address
- O_id (PK)

Publisher entity:
- year of publishing
- P_id (PK)
- Name
- B_id (FK)

Order entity:
- O_date
- O_id (PK)
- order
- C_id (FK)
- O_time
- B_id (FK)

PK – Foreign key
PK – Primary key
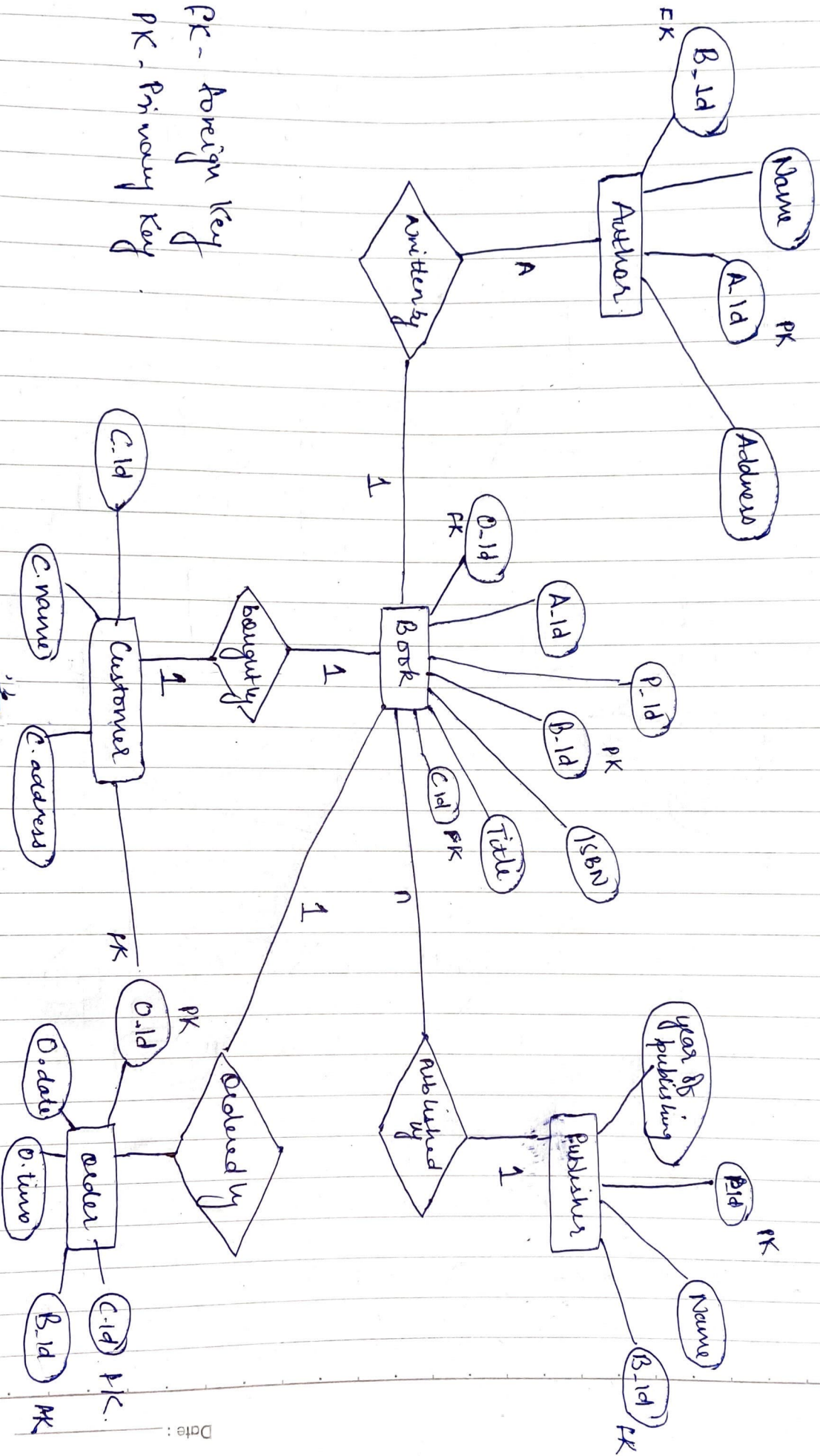
| Book | Author | Publisher | Customer |
|---|---|---|---|
| b_ld → PK | A_ld → PK | P_ld → PK | C_ld → PK |
| P_ld → FK | B_ld → FK | B_ld → FK | C_Name |
| Title | Name | Name | C_Address |
| ISBN | Address | Year of Publishing | O_ld → FK |
| C_ld → FK | | | |
| A_ld → FK | | | |
| O_ld → FK | | | |

**Order**

O_ld → PK
C_ld → FK
B_ld → FK
Order_Date
Order_Time

Customer.    Book    Order Id    Publisher    Author

**1NF**

| Customer | Book | Order Id | Publisher | Author |
|---|---|---|---|---|
| ABC 1 | B1 | 1 | XYZ 1 | S |
| ABC 2 | B2 | 2 | XYZ 2 | D |

**2NF**

| Order Id | Customer | BOOK | Book | Publisher | Author |
|---|---|---|---|---|---|
| 1 | | B1 | B1 | XYZ 1 | S |
| 2 | | B2 | B2 | XYZ 2 | D |

# Initial Scheme (0NF).

**Table: Customer**

C.ID (PK)
Name (Atomic)
Phone-No. (Non atomic- Violates 0NF).

**Table: Book**

BId (PK)
Name (Atomic)
Genre (Atomic)
Price. (Atomic)

## 1.NF

**Table: Customer**

C-id (PK)
Name (Atomic)
Phone No. (Atomic)

**Tables: Order**

O.Id (PK)
BId (FK)
Quantity (Atomic)

**Table: Book.**

B-Id (PK)
Name: (Atomic)
Genre (Atomic)
Price (Atomic)

## 2 NF

### Table: Customer
C-ID (PK)
Name (Atomic)
Phone No (Atomic)

### Table: Order
O_id (PK)
C_id (FK)

### Table: Order_Book
Order_Book_Id (PK)
Order_id (FK)
Book_Id (FK)
Quantity (Atomic)

### Table: Book
Book_Id (PK)
Name (Atomic)
Genre (Atomic)
Price (Atomic)

## 3NF

Table: Customer
    C_id   (PK)
    Name  (Atomic)
    Phone_no (Atomic)


Table: Order (2NF)
    O_id   (PK)
    Other related attributes.


Table: Book (2NF)
    B_id (PK)
    Name (Atomic)
    Genne (Atomic)
    Price (Atomic)


Table: Customer_Order
    Order_id (FK)
    C_id (FK).