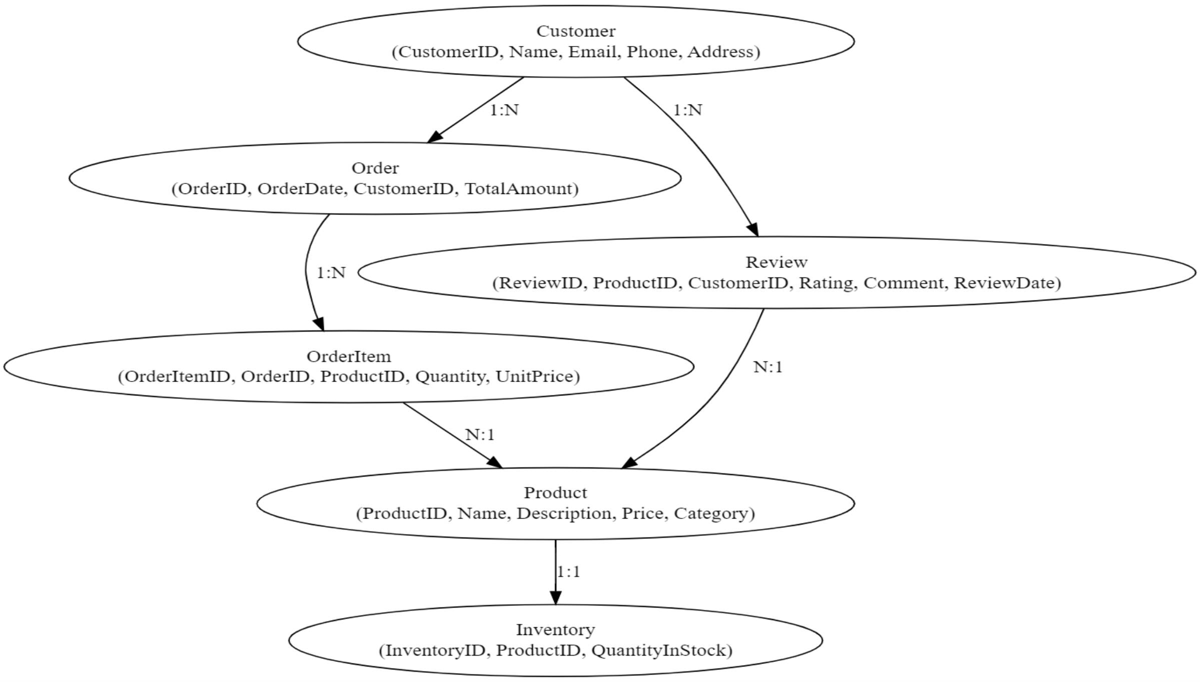
Assignment 1

Q. Analyze a given business scenario and create an ER diagram that includes entities, relationships, attributes, and cardinality. Ensure that the diagram reflects proper normalization up to the third normal form.

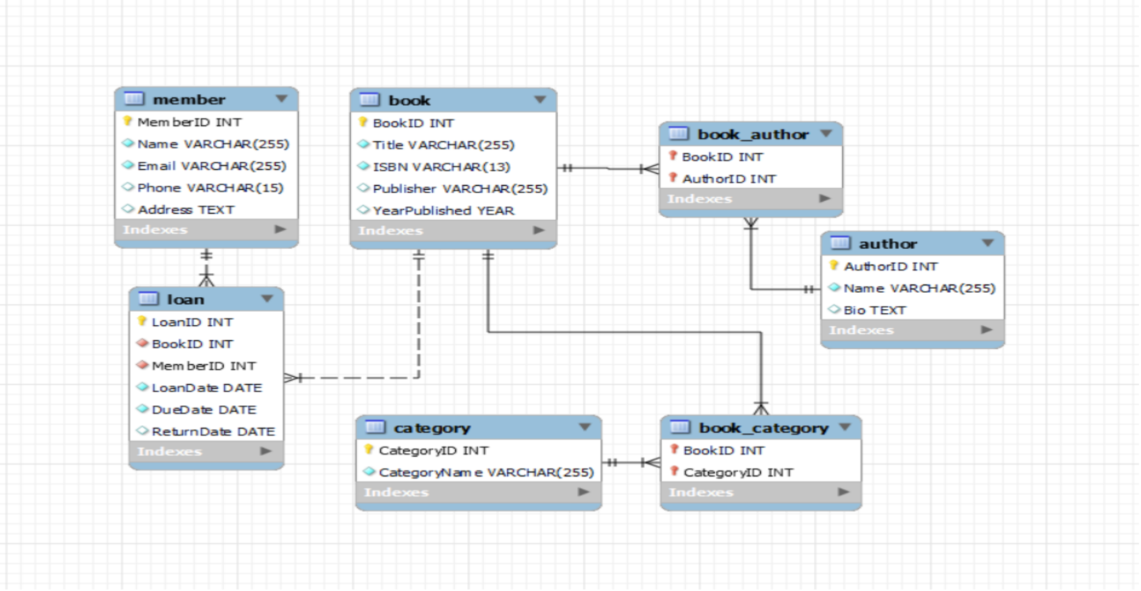
Answer:


Customer
(CustomerID, Name, Email, Phone, Address)
1:N
1:N
Order
(OrderID, OrderDate, CustomerID, TotalAmount)
1:N
Review
(ReviewID, ProductID, CustomerID, Rating, Comment, ReviewDate)
OrderItem
(OrderItemID, OrderID, ProductID, Quantity, UnitPrice)
N:1
N:1
Product
(ProductID, Name, Description, Price, Category)
1:1
Inventory
(InventoryID, ProductID, QuantityInStock)

Assignment 2

Q. Design a database schema for a library system, including tables, fields, and constraints like NOT NULL, UNIQUE, and CHECK. Include primary and foreign keys to establish relationships between tables.

Answer:



member
MemberID INT
Name VARCHAR(255)
Email VARCHAR(255)
Phone VARCHAR(15)
Address TEXT
Indexes

book
BookID INT
Title VARCHAR(255)
ISBN VARCHAR(13)
Publisher VARCHAR(255)
YearPublished YEAR
Indexes

book_author
BookID INT
AuthorID INT
Indexes

author
AuthorID INT
Name VARCHAR(255)
Bio TEXT
Indexes

loan
LoanID INT
BookID INT
MemberID INT
LoanDate DATE
DueDate DATE
ReturnDate DATE
Indexes

category
CategoryID INT
CategoryName VARCHAR(255)
Indexes

book_category
BookID INT
CategoryID INT
Indexes

CODE :

```
CREATE TABLE Book (
   BookID INT PRIMARY KEY,
   Title VARCHAR(255) NOT NULL,
   ISBN VARCHAR(13) UNIQUE NOT NULL,
   Publisher VARCHAR(255),
   YearPublished YEAR CHECK (YearPublished > 0)
);

CREATE TABLE Author (
   AuthorID INT PRIMARY KEY,
   Name VARCHAR(255) NOT NULL,
   Bio TEXT
);

CREATE TABLE Member (
   MemberID INT PRIMARY KEY,
   Name VARCHAR(255) NOT NULL,
   Email VARCHAR(255) UNIQUE NOT NULL,
   Phone VARCHAR(15),
   Address TEXT
);

CREATE TABLE Loan (
   LoanID INT PRIMARY KEY,
   BookID INT NOT NULL,
   MemberID INT NOT NULL,
   LoanDate DATE NOT NULL,
   DueDate DATE NOT NULL,
   ReturnDate DATE,
   FOREIGN KEY (BookID) REFERENCES Book(BookID),
    FOREIGN KEY (MemberID) REFERENCES Member(MemberID)
);

CREATE TABLE Category (
    CategoryID INT PRIMARY KEY,
    CategoryName VARCHAR(255) NOT NULL
);

CREATE TABLE Book_Author (
    BookID INT NOT NULL,
    AuthorID INT NOT NULL,
    PRIMARY KEY (BookID, AuthorID),
    FOREIGN KEY (BookID) REFERENCES Book(BookID),
    FOREIGN KEY (AuthorID) REFERENCES Author(AuthorID)
);

CREATE TABLE Book_Category (
    BookID INT NOT NULL,
    CategoryID INT NOT NULL,
    PRIMARY KEY (BookID, CategoryID),
    FOREIGN KEY (BookID) REFERENCES Book(BookID),
    FOREIGN KEY (CategoryID) REFERENCES Category(CategoryID)
);
```

Assignment 3

Q. Explain the ACID properties of a transaction in your own words. Write SQL statements to simulate a transaction that includes locking and demonstrate different isolation levels to show concurrency control.

ACID Properties:

Atomicity: Ensures that all operations within a transaction are completed; if not, the transaction is aborted.

Consistency: Ensures the database transitions from one valid state to another.

Isolation: Ensures that concurrent execution of transactions leaves the database in the same state that would be obtained if the transactions were executed sequentially.

Durability: Ensures that once a transaction is committed, it remains so, even in the event of a system failure.

CODE :

```
CREATE TABLE Loan (LoanID INT,BookID INT, MemberID INT, LoanDate DATE, DueDate DATE);

START TRANSACTION;


-- Atomicity and Consistency

INSERT INTO Loan (LoanID, BookID, MemberID, LoanDate, DueDate) VALUES (1, 101, 1001, '2024-05-24', '2024-06-24');

UPDATE Book SET YearPublished = 2023 WHERE BookID = 101;


-- Isolation (Setting Isolation Level)

SET TRANSACTION ISOLATION LEVEL SERIALIZABLE;


COMMIT;
```

Assignment 4

Q. Write SQL statements to CREATE a new database and tables that reflect the library schema you designed earlier. Use ALTER statements to modify the table structures and DROP statements to remove a redundant table.

Answer:

```
ALTER TABLE Book ADD COLUMN Edition VARCHAR(50);

DROP TABLE Book_Category;
```

Assignment 5

Q. Demonstrate the creation of an index on a table and discuss how it improves query performance. Use a DROP INDEX statement to remove the index and analyze the impact on query execution.

Answer:

Creating an Index:

```
CREATE INDEX idx_title ON Book (Title);
```

Dropping an Index:

```
DROP INDEX idx_title ON Book;
```

Assignment 6

Q. Create a new database user with specific privileges using the CREATE USER and GRANT commands. Then, write a script to REVOKE certain privileges and DROP the user.

Answer:

Creating a User and Granting Privileges:

```
CREATE USER 'lib_user'@'localhost' IDENTIFIED BY 'password';

GRANT SELECT, INSERT, UPDATE, DELETE ON LibrarySystem.* TO 'lib_user'@'localhost';
```

Revoking Privileges and Dropping User:

```
REVOKE DELETE ON LibrarySystem.* FROM 'lib_user'@'localhost';

DROP USER 'lib_user'@'localhost';
```

Assignment 7

Q. Prepare a series of SQL statements to INSERT new records into the library tables, UPDATE existing records with new information, and DELETE records based on specific criteria. Include BULK INSERT operations to load data from an external source.

Inserting Records:

```
INSERT INTO Member (MemberID, Name, Email, Phone, Address)

VALUES (1001, 'Jane Doe', 'janedoe@example.com', '555-6789', '123 Main St');


INSERT INTO Book (BookID, Title, ISBN, Publisher, YearPublished)

VALUES (101, 'Effective Java', '978-0134685991', 'Addison-Wesley', 2017);
```

Updating Records:

```
UPDATE Book SET YearPublished = 2018 WHERE BookID = 101;
```

Deleting Records:

```
DELETE FROM Loan WHERE LoanID = 1;
```

Bulk Insert:

```
LOAD DATA INFILE '/path/to/books.csv'
INTO TABLE Book
FIELDS TERMINATED BY ','
ENCLOSED BY '"'
LINES TERMINATED BY '\n'
IGNORE 1 ROWS;
```

----END---