Assignment 4:

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.

Solution:

1. Create a New Database

```
CREATE DATABASE LibraryDB;
```

2. Use the New Database

```
USE LibraryDB;
```

3. Create Tables

Create Genres Table

```
CREATE TABLE Genres (
GenreID INT AUTO_INCREMENT PRIMARY KEY,
GenreName VARCHAR(255) UNIQUE NOT NULL
);
```

Create Books Table

```
CREATE TABLE Books (
BookID INT AUTO_INCREMENT PRIMARY KEY,
Title VARCHAR(255) NOT NULL,
ISBN VARCHAR(13) UNIQUE NOT NULL,
Publisher VARCHAR(255) NOT NULL,
YearPublished YEAR NOT NULL CHECK (YearPublished >= 1450 AND YearPublished
<= YEAR(CURDATE())),
GenreID INT NOT NULL,
FOREIGN KEY (GenreID) REFERENCES Genres(GenreID)
);
```

Create Authors Table

```
CREATE TABLE Authors (
AuthorID INT AUTO_INCREMENT PRIMARY KEY,
FirstName VARCHAR(255) NOT NULL,
LastName VARCHAR(255) NOT NULL
);
```

Create Books_Authors **Table (junction table for many-to-many relationship)**

```
CREATE TABLE Books_Authors (
BookID INT NOT NULL,
AuthorID INT NOT NULL,
```

```
PRIMARY KEY (BookID, AuthorID),
FOREIGN KEY (BookID) REFERENCES Books(BookID),
FOREIGN KEY (AuthorID) REFERENCES Authors(AuthorID)
);
```

Create Members Table

```
CREATE TABLE Members (
MemberID INT AUTO_INCREMENT PRIMARY KEY,
FirstName VARCHAR(255) NOT NULL,
LastName VARCHAR(255) NOT NULL,
Email VARCHAR(255) UNIQUE NOT NULL,
Phone VARCHAR(15) NOT NULL,
Address VARCHAR(255) NOT NULL,
MembershipDate DATE NOT NULL
);
```

Create Loans Table

```
CREATE TABLE Loans (
LoanID INT AUTO_INCREMENT PRIMARY KEY,
BookID INT NOT NULL,
MemberID INT NOT NULL,
LoanDate DATE NOT NULL,
ReturnDate DATE NULL,
DueDate DATE NOT NULL,
CHECK (ReturnDate IS NULL OR ReturnDate >= LoanDate),
FOREIGN KEY (BookID) REFERENCES Books(BookID),
FOREIGN KEY (MemberID) REFERENCES Members(MemberID)

);
```

4. ALTER Statements to Modify Table Structures

Example: Add a new column MiddleName to Members **table**

```
ALTER TABLE Members
ADD MiddleName VARCHAR(255);
```

Example: Modify ISBN **to be 17 characters long**

```
ALTER TABLE Books
MODIFY ISBN VARCHAR(17) UNIQUE NOT NULL;
```

5. DROP Statement to Remove a Redundant Table

Example: Drop Books_Authors **table if it is redundant**

```
DROP TABLE Books_Authors;
```

Create the database

```
CREATE DATABASE LibraryDB;
-- Use the new database
USE LibraryDB;
-- Create Genres table
CREATE TABLE Genres (
GenreID INT AUTO_INCREMENT PRIMARY KEY,
GenreName VARCHAR(255) UNIQUE NOT NULL
);
```

Create Books table

```
CREATE TABLE Books (
BookID INT AUTO_INCREMENT PRIMARY KEY,
Title VARCHAR(255) NOT NULL,
ISBN VARCHAR(13) UNIQUE NOT NULL,
Publisher VARCHAR(255) NOT NULL,
YearPublished YEAR NOT NULL CHECK (YearPublished >= 1450 AND YearPublished
<= YEAR(CURDATE())),

GenreID INT NOT NULL,
FOREIGN KEY (GenreID) REFERENCES Genres(GenreID)
);
```

Create Authors table

```
CREATE TABLE Authors (
AuthorID INT AUTO_INCREMENT PRIMARY KEY,
FirstName VARCHAR(255) NOT NULL,
LastName VARCHAR(255) NOT NULL
);
```

Create Books_Authors table

```
CREATE TABLE Books_Authors (
BookID INT NOT NULL,
AuthorID INT NOT NULL,
PRIMARY KEY (BookID, AuthorID),
FOREIGN KEY (BookID) REFERENCES Books(BookID),
FOREIGN KEY (AuthorID) REFERENCES Authors(AuthorID)
);
```

Create Members table

```
CREATE TABLE Members (
MemberID INT AUTO_INCREMENT PRIMARY KEY,
FirstName VARCHAR(255) NOT NULL,
LastName VARCHAR(255) NOT NULL,
Email VARCHAR(255) UNIQUE NOT NULL,
Phone VARCHAR(15) NOT NULL,
Address VARCHAR(255) NOT NULL,
MembershipDate DATE NOT NULL
);
```

Create Loans table

```
CREATE TABLE Loans (
LoanID INT AUTO_INCREMENT PRIMARY KEY,
BookID INT NOT NULL,
MemberID INT NOT NULL,
LoanDate DATE NOT NULL,
ReturnDate DATE NULL,
DueDate DATE NOT NULL,
CHECK (ReturnDate IS NULL OR ReturnDate >= LoanDate),

FOREIGN KEY (BookID) REFERENCES Books(BookID),
FOREIGN KEY (MemberID) REFERENCES Members(MemberID)
);
```

Example ALTER statements

```
ALTER TABLE Members ADD MiddleName VARCHAR(255);
ALTER TABLE Books MODIFY ISBN VARCHAR(17) UNIQUE NOT NULL;
-- Example DROP statement
DROP TABLE Books_Authors;
```