**Assignment 2**

**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.**

**SCHEMA DESIGN**

1. **Books**

CREATE TABLE Books (

book\_id INT PRIMARY KEY AUTO\_INCREMENT,

title VARCHAR(255) NOT NULL,

isbn VARCHAR(13) UNIQUE NOT NULL,

publish\_year INT CHECK (publish\_year > 0),

genre VARCHAR(100),

available\_copies INT NOT NULL CHECK (available\_copies >= 0)

);

1. **Authors**

CREATE TABLE Authors (

author\_id INT PRIMARY KEY AUTO\_INCREMENT,

first\_name VARCHAR(100) NOT NULL,

last\_name VARCHAR(100) NOT NULL,

birth\_date DATE,

UNIQUE (first\_name, last\_name)

);

1. **Members**

CREATE TABLE Members (

member\_id INT PRIMARY KEY AUTO\_INCREMENT,

first\_name VARCHAR(100) NOT NULL,

last\_name VARCHAR(100) NOT NULL,

email VARCHAR(255) UNIQUE NOT NULL,

join\_date DATE NOT NULL,

CHECK (email LIKE '%@%'));

1. BorrowCards

CREATE TABLE BorrowRecords (

borrow\_id INT PRIMARY KEY AUTO\_INCREMENT,

member\_id INT NOT NULL,

book\_id INT NOT NULL,

borrow\_date DATE NOT NULL,

return\_date DATE,

FOREIGN KEY (member\_id) REFERENCES Members(member\_id),

FOREIGN KEY (book\_id) REFERENCES Books(book\_id),

CHECK (borrow\_date <= return\_date OR return\_date IS NULL));

1. BookAuthors

CREATE TABLE BookAuthors (

book\_id INT NOT NULL,

author\_id INT NOT NULL,

PRIMARY KEY (book\_id, author\_id),

FOREIGN KEY (book\_id) REFERENCES Books(book\_id),

FOREIGN KEY (author\_id) REFERENCES Authors(author\_id));

**Explanation of Constraints**

* Primary Key (PRIMARY KEY): Uniquely identifies each record in the table.
* Auto Increment (AUTO\_INCREMENT): Automatically generates a unique identifier for the primary key.
* Not Null (NOT NULL): Ensures that a column cannot have a NULL value.
* Unique (UNIQUE): Ensures that all values in a column are unique across the database.
* Check (CHECK): Ensures that all values in a column satisfy a specific condition.
* Foreign Key (FOREIGN KEY): Ensures referential integrity between tables by linking columns.

**Relationships**

* Books to BorrowRecords: One-to-many relationship (a book can be borrowed multiple times).
* Members to BorrowRecords: One-to-many relationship (a member can borrow multiple books).
* Books to Authors via BookAuthors: Many-to-many relationship (a book can have multiple authors and an author can write multiple books).

This schema provides a solid foundation for a library management system, ensuring data integrity and clear relationships between entities.