 SQL Schema for a Library Database

-- Domain: Library Management System

-- 1. ENTITIES AND RELATIONSHIPS

-- Entities:

--   - Authors: People who write books.

--   - Books: The items available for borrowing.

--   - Patrons: The members of the library who borrow books.

--   - Book\_Authors: A linking table to handle the many-to-many relationship between Books and Authors (a book can have multiple authors, and an author can write multiple books).

--   - Loans: A table to track which books are currently borrowed by which patrons

-- Relationships:

* - An Author can write many Books.
* - A Book can have many Authors.
* - A Patron can borrow many Books.
* - A Book can be on loan to only one Patron at a time.
* --

-- 2. CREATE TABLES

-- Table for Authors

-- Contains information about the authors of the books.

CREATE TABLE Authors (

    author\_id INT PRIMARY KEY,

    first\_name VARCHAR(100),

    last\_name VARCHAR(100),

    birth\_year INT

);

-- Table for Books

-- Contains information about the books in the library.

CREATE TABLE Books (

    book\_id INT PRIMARY KEY,

    title VARCHAR(255) NOT NULL,

    isbn VARCHAR(20) UNIQUE NOT NULL,

    publication\_year INT

);

-- Table for Patrons

-- Contains information about the library's members.

CREATE TABLE Patrons (

    patron\_id INT PRIMARY KEY,

    first\_name VARCHAR(100),

    last\_name VARCHAR(100),

    email VARCHAR(255) UNIQUE NOT NULL

);

3. DEFINE PRIMARY AND FOREIGN KEYS

-- Linking table for the many-to-many relationship between Books and Authors.

-- A composite primary key is used here to ensure a unique entry for each

-- book-author pairing.

CREATE TABLE Book\_Authors (

    book\_id INT,

    author\_id INT,

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

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

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

);

-- Table for Loans

-- Tracks the borrowing of books by patrons.

-- The book\_id and patron\_id are foreign keys linking to their respective tables.

CREATE TABLE Loans (

    loan\_id INT PRIMARY KEY,

    book\_id INT,

    patron\_id INT,

    loan\_date DATE,

    due\_date DATE,

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

    FOREIGN KEY (patron\_id) REFERENCES Patrons(patron\_id)

);