ICT 1st Year OOP Laboratory

Practical 06

Design a program to manage an **Online Library System** that allows maintaining a collection of books, registering users, and handling book borrowing and returning operations.

The program should include a Book class with fields for book ID, title, author, price, and stock quantity, along with a static field to track the total number of books. The Book class should demonstrate constructor chaining and include getter and setter methods for all fields.

Additionally, the system should have a user class with fields for user ID, name, and the count of borrowed books (limited to 5), along with a static field to track the total number of registered users, using constructors and methods for encapsulation.

A Library class should manage fixed-size arrays for storing Book and User objects, providing methods to add books, register users, borrow books (validating stock and user borrowing limits), return books, and display the details of all books and users.

Write a main program that creates three books and two users, simulates borrowing and returning operations while updating stock and user borrowing details, and displays the system's state after each operation.

Task: Implement the following requirements

1. **Create the `Book` class**:
    - Fields: `bookID`, `title`, `author`, `price`, `stockQuantity`.
    - Use a constructor to initialize all fields.
    - Provide getter and setter methods for all fields.
    - Implement a static field `bookCount` to track the total number of books in the system. Increment it in the constructor.

2. **Create the `User` class**:
    - Fields: `userID`, `name`, `borrowedBooksCount`.
    - Use a constructor to initialize `userID` and `name` (default `borrowedBooksCount` to 0).
    - Provide getter and setter methods for all fields.
    - Implement a static field `userCount` to track the total number of registered users. Increment it in the constructor.

3. **Create the `Library` class**:
    - Use fixed-size arrays for books (`Book[] books`) and users (`User[] users`).
    - Provide methods to:
        - Add a book to the library.
        - Add a user to the library.
        - Borrow a book (validate stock and borrowing limit).
        - Return a book (update stock).
        - Display all books and users.

4. **Demonstrate Constructor Chaining**:
    - In the Book class, add a secondary constructor that initializes only bookID and title, and chains to the primary constructor using default values for the other fields.

Deliverables

- Write a main program to:
    - Add 3 books and 2 users using appropriate methods.
    - Display all books and users.
    - Simulate borrowing and returning books, ensuring all rules are enforced.
    - Display updated book stock and user borrowing details after each operation.