upGrad ENTERPRISE

Assignment Case Study: Library Management System

Problem Statement: Library Management System

Objective: Design and implement a C# program to manage books in a library, tracking details such as title, author, ISBN, and availability status, with operations to borrow books and display book information.

Description:

A library requires a system to manage its collection of books. Each book should store details like its title, author, ISBN, and whether it is available for borrowing. The system should allow users to view book details and borrow books, with checks to prevent borrowing unavailable books. The program should demonstrate the use of Object-Oriented Programming (OOP) concepts, specifically Class, Object, Constructor, Properties, and the this keyword.

Requirements:

1. Class: Create a `Book` class to represent a book in the library.

2. Properties:

- `Title`: The title of the book (read-write).

- `Author`: The author of the book (read-write).

- `ISBN`: A unique identifier for the book (read-write).

- `IsAvailable`: A boolean indicating whether the book is available for borrowing (read-write).

3. Constructor: Initialize a book with a title, author, and ISBN. Set the book's availability to true by default.

4. Methods:

- `DisplayInfo`: Display the book's details, including title, author, ISBN, and availability status.

- `BorrowBook`: Allow borrowing a book if it is available, updating its availability status. If the book is not available, display an error message.

5. this Keyword: Use the `this` keyword in the constructor to distinguish between instance properties and constructor parameters.

6. Validation:

- Ensure a book can only be borrowed if it is available.

- Update the availability status to false when a book is borrowed.

7. Main Program: Create multiple instances of the `Book` class and demonstrate their functionality by displaying book details, borrowing books, and attempting to borrow an already borrowed book.

Expected Output:

The program should create book objects and allow the following interactions:

- Display the details of each book.

- Borrow a book and show the updated availability status.

- Attempt to borrow an already borrowed book (should fail).

- Display the updated book details after each operation.

Constraints:

- The ISBN should be a string to accommodate various formats.

- The availability status should be a boolean, initialized to true when a book is created.

- Use C# properties to encapsulate data, allowing controlled access to book attributes.

- Ensure the program handles multiple book instances correctly.

Example Interaction:

- Create a book with title "1984", author "George Orwell", and ISBN "123456789".

- Create another book with title "Pride and Prejudice", author "Jane Austen", and ISBN "987654321".

- Display details of both books.

- Borrow the first book and display its updated status.

- Attempt to borrow the first book again (should fail).

- Display details of both books again.