

January 2023 CSE 108

Online 1

Time: 40 minutes

Subsections A1 & A2

You need to implement a Library Management System (LMS) using basic OOP concepts. The LMS includes books, library members, and a library. Each book will have a single copy in the library.

Tasks

1. Create a class called **Book** with private member variables for the book's title, author, and availability status. For storing strings, you can use the C++ `<string>` library if convenient.
2. Include public member functions to:
 - Set the book details (title, author, availability).
 - Get the book details.
 - Display the book details.
3. Implement the appropriate constructor(s) and destructor for the Book class.
4. Create a class called **LibraryMember** with private member variables for the member's name and library card number.
5. Include public member functions to:
 - Set the member details.
 - Get the member details.
 - Display the member details.
6. Implement the appropriate constructor(s) and destructor for the LibraryMember class.
7. Create a class called **Library** that manages the collection of books and the library members.
 - (a) Include private member variables to store the books and the members [use arrays with a maximum specified size (for example: 100)].
 - (b) Include public member functions to:
 - Add a new book to the library.
 - Register a new library member.
 - Borrow a book for a library member.
 - Return a book from a library member.
 - Display all books in the library.
 - Display all library members.Including the following would be regarded as **Bonus (+20%)**:
 - Remove an existing book from the library. (10%)
 - Remove a library member. (10%)
 - (c) Implement the appropriate constructor(s) and destructor for the Library class.

See the expected outputs below to have a clear understanding.

Sample main()

```
int main() {
    Library library;

    // Adding books
    library.addBook("The Great Gatsby", "F. Scott Fitzgerald");
    library.addBook("To Kill a Mockingbird", "Harper Lee");
    library.addBook("Pride and Prejudice", "Jane Austen");

    // Displaying all books
    library.displayAllBooks();

    // Registering members
    library.registerMember("John Doe", 1234);
    library.registerMember("Jane Smith", 5678);

    // Displaying all members
    library.displayAllMembers();

    // Borrowing books
    library.borrowBook("The Great Gatsby", 1234);
    library.borrowBook("To Kill a Mockingbird", 5678);

    // Displaying all books (after borrowing)
    library.displayAllBooks();

    // Returning a book
    library.returnBook("The Great Gatsby", 1234);

    // Displaying all books (after returning)
    library.displayAllBooks();

    // Removing a book
    library.removeBook("Pride and Prejudice");

    // Displaying all books (after removal)
    library.displayAllBooks();

    // Removing a member
    library.removeMember(5678);

    // Displaying all members (after removal)
    library.displayAllMembers();

    return 0;
}
```

Expected Output

Books in the library:

Title: The Great Gatsby
Author: F. Scott Fitzgerald
Availability: Available

Title: To Kill a Mockingbird
Author: Harper Lee
Availability: Available

Title: Pride and Prejudice
Author: Jane Austen
Availability: Available

Members in the library:

Name: John Doe
Library Card Number: 1234

Name: Jane Smith
Library Card Number: 5678

Book 'The Great Gatsby' has been borrowed by

Name: John Doe
Library Card Number: 1234

Book 'To Kill a Mockingbird' has been borrowed by

Name: Jane Smith
Library Card Number: 5678

Books in the library:

Title: The Great Gatsby
Author: F. Scott Fitzgerald
Availability: Not Available

Title: To Kill a Mockingbird
Author: Harper Lee
Availability: Not Available

Title: Pride and Prejudice
Author: Jane Austen
Availability: Available

Book 'The Great Gatsby' has been returned by

Name: John Doe
Library Card Number: 1234

Books in the library:

Title: The Great Gatsby
Author: F. Scott Fitzgerald
Availability: Available

Title: To Kill a Mockingbird
Author: Harper Lee
Availability: Not Available

Title: Pride and Prejudice
Author: Jane Austen
Availability: Available

Book 'Pride and Prejudice' has been removed from the library.

Books in the library:

Title: The Great Gatsby

Author: F. Scott Fitzgerald

Availability: Available

Title: To Kill a Mockingbird

Author: Harper Lee

Availability: Not Available

Member 'Jane Smith (5678)' has been removed from the library.

Members in the library:

Name: John Doe

Library Card Number: 1234