

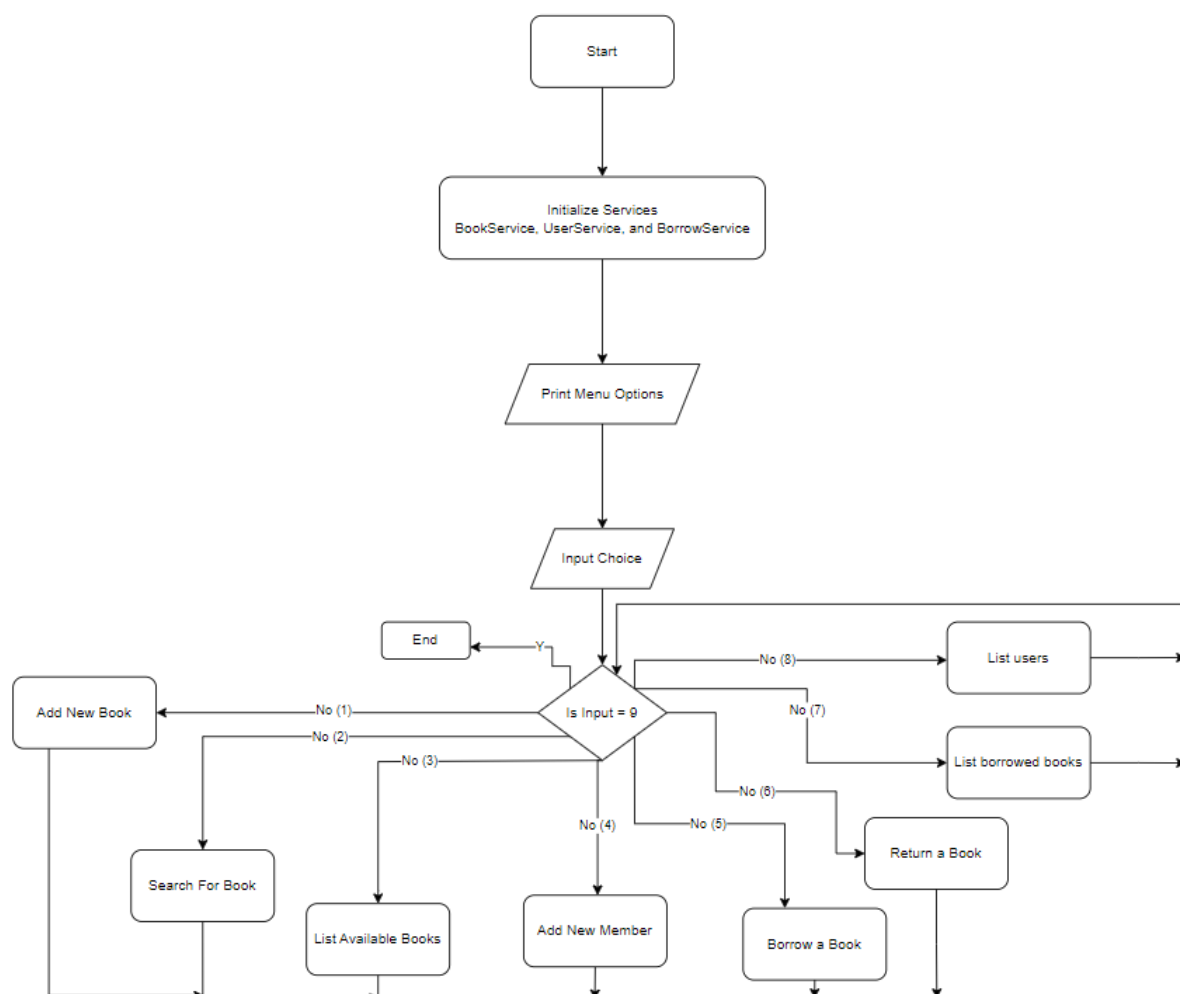
# Library Management System Project Report

## 1. Introduction

This project aims to create a simple library management system for adding, searching, borrowing, and returning books. This system provides a better interface between students and the library with its speed and simplicity.

## 2. Design

The design of this program uses a modular structure with services for books, users, and borrowing operations. Below is the flowchart explaining the overall program structure:



### 3. Challenges

During the development of this project, the following challenges were encountered:

- Managing dynamic array resizing: Initially, arrays had fixed sizes, causing issues when trying to add more books or users. This was resolved by dynamically resizing arrays.
- Handling null references: Ensuring that the program does not crash when accessing null values required careful checks and proper initialization.
- Overdue book handling: Implementing a system to notify users of overdue books requires extra logic to compare dates.

### 4. Testing and Results

The following screenshots demonstrate the functionality of the Library Management System.

```
o → ConsoleApplicationSql git:(main) dotnet run .
Welcome to the Library Management System!
1. Add a new book:
2. Search for book:
3. List available books:
4. Add a new member:
5. Borrow a book:
6. Return a book:
7. List borrowed books:
8. List users:
9. Exit

Enter your choice: █

Enter your choice: 3
-----
Title: Clean Code
Author: Robert C. Martin
ISBN: 978-0132350884
Quantity: 10

-----
Title: Designing Data-Intensive Applications
Author: Martin Kleppmann
ISBN: 978-1491950296
Quantity: 7
```

Enter your choice: 7

-----  
Title: Clean Code  
Author: Robert C. Martin  
ISBN: 978-0132350884  
Quantity of copies: 10

User: John Doe  
Membership ID: 1  
Due Date: 12/10/2024 12:00:00 AM  
Quantity borrowed: 1

-----  
Title: Designing Data-Intensive Applications  
Author: Martin Kleppmann  
ISBN: 978-1491950296  
Quantity of copies: 7

User: Jane Smith  
Membership ID: 2  
Due Date: 12/3/2024 12:00:00 AM  
Quantity borrowed: 2

Enter your choice: 8

-----  
Name: John Doe  
Membership ID: 1

-----  
Name: Jane Smith  
Membership ID: 2

Welcome to the Library Management System!

1. Add a new book:
2. Search for book:
3. List available books:
4. Add a new member:
5. Borrow a book:
6. Return a book:
7. List borrowed books:
8. List users:
9. Exit

Enter your choice: 2

Enter ISBN:

1

No book found with this specific ISBN!

## 5. Source Code

<https://github.com/gustavocaldassouza/FinalProjectAlgorithm>