

Programming Fundamentals (Fall 2024)
Term Project Phase 1

Deadline: November 18, 2024 11:59 PM

University Library & Book Bank Management System

Overview of Project

You are required to develop a University Library & Book Bank Management System. It is like a library management system but has more features than Library Management System such that apart from management of books issuance to students, it also supports the donations of books from the students and then issuing those books to deserving students for the tenure of one semester. Currently only one type of user can login to the system which is librarian. Librarian will have unique user name and password. More than one librarians are also supported for the system.

Phase 1

In the first phase, we are going to setup the software for the library data setup. Librarian can add books to the system. Each book can have multiple copies in the library. Book has the unique book Id and unique copy number. Book is assigned to a category which will also be added by librarian.

Data Validation

- Book Unique ID (First three characters represent category which are strictly digits then there is hyphen(-) next two characters represent language code which can be only from (A to Z followed by hyphen there is book code of five digits)
For example this number 098-EN-98712 is the valid book number.
- Book Copy Number: Book Copy Number is created by appending the copy number in the Book Unique Id.
For example following numbers are sample copy numbers for above book
098-EN-98712#001
098-EN-98712#002
- Book Name (Book name can only contain upper case, lower case characters, color(:), comma(,) and space. (there should be no consecutive spaces, commas and colons)
- Category Name: Book category name is can only contain upper case and lower case characters.
- Category Number: Book category number can only contain digits of size 3 only.
- Edition: Edition of book should be integer from 1-15

Global Constants

All of these constants are of integer data type and should be declared constant

- MAX_BOOK_ID: contains the maximum characters in book Id (Set it to 13)
- DATE_SIZE: set it to 11

- **MAX_COPY_NUMBER**: contains the maximum characters in book copy number (Set it to 17)
- **MAX_BOOKS**: contains the size of array for storage of books. Set it to 200
- **MAX_CATEGORIES**: set it to 30
- **MAX_BOOK_NAME**: Maximum characters in book name. Set it to 60
- **MAX_CATEGORY_NAME**: Maximum characters in category name. Set it to 20
- **MAX_CATEGORY_NUMBER**: Maximum characters in category number. Set it to 4

Functions

You are required to develop following functions. You cannot use changed function names, parameters and return types. Respect the case sensitiveness of the functions. (Otherwise project will NOT BE GRADED)

- **bool isValidBookId**(char bookId[])
- **bool isValidBookName**(char bookName[])
- **bool isValidCopyNumber**(char bookCopy[])
- **bool isValidCategoryName**(char bookCategory[])
- **bool isValidCategoryNumber**(char bookCategory[])

Category Related function: **None of these functions take input using cin**

- **bool AddCategory**(char CategoryNo[][MAX_CATEGORY_NUMBER],char CategoryName[][MAX_CATEGORY_NAME], int ArraySize, char newCategoryId[], char newCategoryName[])
- **bool UpdateCategory**(char CategoryNo[][MAX_CATEGORY_NUMBER],char CategoryName[][MAX_CATEGORY_NAME], int ArraySize, char prevCategoryId[], char newCategoryId[], char newCategoryName[])
- **bool DeleteCategory**(char CategoryNo[][MAX_CATEGORY_NUMBER],char CategoryName[][MAX_CATEGORY_NAME], int ArraySize, char CategoryId[])
- **void PrintCategories**(char CategoryNo[][MAX_CATEGORY_NUMBER],char CategoryName[][MAX_CATEGORY_NAME], int ArraySize)
- **bool SaveCategories**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize, char[] fileName)
- **bool LoadCategories**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize, char[] fileName)

Book Related functions: **None of these functions take input using cin**

- **bool AddBook**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize, char newBookId[], char newBookName[], int edition)
- **bool UpdateBook**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize, char prevBookId[], char newBookId[], char newBookName[], int edition)
- **bool DeleteBook**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize, char BookId[])
- **void PrintBooks**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize)
- **bool SaveBooks**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize, char filename[])
- **bool LoadBooks**(char BookId[][MAX_BOOK_ID],char CategoryName[][MAX_BOOK_NAME], int Editions[], int ArraySize, char filename[])

Book Samples Related functions: **None of these functions take input using cin**

- **bool AddBookSample** (char CopyId[][MAX_COPY_NUMBER],char PulishedDates[][DATE_SIZE], int ArraySize, char newCopyId[], char newPublishDate[])
- **bool UpdateBookSample** (char CopyId[][MAX_COPY_NUMBER],char PulishedDates[][DATE_SIZE], int ArraySize, char prevCopyId[], char newCopyId[], char newPublishDate[])
- **bool DeleteBookSample** (char CopyId[][MAX_COPY_NUMBER],char PulishedDates[][DATE_SIZE], int ArraySize, char CopyId[])

- void **PrintBookSamples** (char CopyId[][MAX_COPY_NUMBER],char PulishedDates[][DATE_SIZE], int ArraySize, char BookId[])
- bool **SaveBookSamples** (char CopyId[][MAX_COPY_NUMBER],char PulishedDates[][DATE_SIZE], int ArraySize, char fileName[])
- bool **LoadBookSamples** (char CopyId[][MAX_COPY_NUMBER],char PulishedDates[][DATE_SIZE], int ArraySize, char fileName[])

Functions related to file Main Menu

- void **printMenu**()
- void TakeMenuInput(int& mainOption, char& subOption)

Sample Output

- Functions will be used to complete the following program

```
** Welcome to University Library Management System **
Choose the following option
1    Category Management(A,E,L,D)
2    Books Management(A,E,L,D)
3    Book Copies Management(A,E,L,D)
0    Exit Program(0E)

Choose the option:
```

- When user enters 1 then category management options will be available.

```
Choose the option: 1A
Enter the details of the category(Id Name) : 098 Fictions
Category has been added successfully
```

```
Choose the option: 1D
Enter the category Id to delete: 098
Category has been deleted successfully
```

```
Choose the option: 1L
      Category Id    Name
      098            Fictions
      056            Technology
```

```
Choose the option: 1E
Enter the Category Id to edit: 056
Enter the new details of the category: 062 Science
Category has been edited successfully
```

- When user enter 2 then Book management options will be available

```
Choose the option: 2A
Enter the details of the book(Id Edition Name) : 098-EN-98712 9 C++ Intro
Book has been added successfully in category 098
```

Choose the option: 2A
Enter the details of the book(Id Edition Name) : 052-EN-98712 9 C++ Intro
Category 052 has not been added, first add the category

Choose the option: 2D
Enter the Book Id to delete: 098-EN-98712
Book has been deleted successfully

Choose the option: 2L

Book Id	Name	Edition	Category
056-EN-98712	C++ Intro	9th	Technology
062-EN-98712	Applied Physics	2nd	Science

Choose the option: 1E
Enter the Book Id to edit: 098-EN-98712
Enter the new details of the Book: 056-UR-98712 9 C++ Intro
Book has been edited successfully

- When user enters 3 then Book Copies management options will be available.

Choose the option: 3A
Enter the details of the sample(Id Date-of-Purchase): 098-EN-98712#001 12-11-2019
Book copy has been added successfully

Choose the option: 1D
Enter the category Id to delete: 098-EN-98712#001
Book copy has been deleted successfully

Choose the option: 1L
Enter the book id for details: 098-EN-98712

Copy Id	Purchase Date
098-EN-98712#001	12-11-2019
098-EN-98712#007	15-12-2019

Choose the option: 1E
Enter the Book copy to edit: 098-EN-98712#001
Enter the new details of the book copy: 098-EN-98712#002 12-11-2019
Book copy has been edited successfully

- When the user will press 0E then program will be closed and all the data will be saved in files. Otherwise program should not be closed, it should display main menu after completion of a task
- On loading the program, all the data should be loaded in the arrays.