Atılım University

CMPE 225 Object Oriented Programming
Fall, 2019-2020
Homework 1
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Due Date: November 29, 2019, 23:59

A library management system is a necessary tool for most of the libraries and book stores. It simplifies the following the events that may be applied on books. There are also similar systems to manage similar contexts. Such as student management systems or hospital management systems.

In this homework, you are supposed to create a simple library management system. The system should be aware of how many books in the library, how many of them borrowed. Your system also work as memory efficient as possible and not leak any memory when terminated.

You should implement the following classes:

1. **Author**

Author is the simplest class. It only encapsulates the authors name. Thus, you may declare the member variable as public.

2. **Book**

Book encapsulates the some basic properties of a book. They are **title**, **author**, **ISBN**, and **edition** of the book. **Title** is a string, **author** is a pointer to the real author, **ISBN** is also a string and **edition** is an integer.

Book class has two constructors. One is initializes all the member variables from the constructor parameters and the other one is (the default constructor) invalidates the created book by initializing author to *NULL* and isbn to *"INVALID"*. You may not touch the remaining member variables.

In addition to that, Book class has two more member functions and a friend function. The first member function (*bool Book::query_isbn(const std::string& isbn)*) checks the given ISBN parameter is matches with the ISBN of the calling instance. If that's the case, returns *true*, otherwise *false*. The second member function (*Book& Book::operator=(const Book& book)*) gets the all member variables of the parameter book and assigns to the caller's member variables. It is an assignment operator overload. Finally, the third friend function just an overload of the left shift operator (<<) to print the details of the book to the console. You can deduct the details of this function from the sample run output.

3. **Library**

Library is the bounding agent for all of the defined classes. It defines the functionality to interact the defined classes with the user (programmer). It has 4 private member variables and 6 member functions (including the constructors and other overloads).

The first member variable is a book pointer to a dynamically allocated array. **The second one** is an integer pointer to a dynamically allocated array. The main roll of this array is to hold the number of borrows for each book according to the index shared with the previously defined book pointer.

The third one is the integer number of books in the library. **The final one** is the maximum book count of the library. Thus, it should also be an integer.

The functions are basically similar to each other. **The first one** is the Library constructor with a parameter of expected number of books that the library will hold. With this information, constructor now can create the dynamically allocated arrays and initializes the other variables. **The second function** is the destructor. You should deduct how to use the destructor with the dynamically allocated variables to not leaking any memory to the operating system (It can handle the leaks but what if not? There are operating systems that cannot handle the leaks (i.e. Pintos, Nachos, etc.)). **The third function** is for adding books to the library (*bool add_book(const Book& book)*). Its name clarifies how this function should behave. As a note, do not forget the array sizes and other stuff to manage. The return value of the function indicates that the operation is successful or not according to the array size. True if the function successfully add the book into the array, otherwise false. **The forth function** is the overload of the += operator and it also adds book to the library. You can call the *add_book* function from the forth one if you want. **The fifth function** is for borrowing books from the library (*const Book& Library::borrow_book(const std::string& isbn)*). It should return the book whose ISBN is indicated in the parameter. ~~Also you should make something with the second defined member variable above.~~ **The sixth function** is for printing the contents of the library to the console. It is the overload of the left shift operator (<<). You can see the example in the sample run.

Your second job is to create a main function that generates an output similar to the sample run by using the written header files. You can create whatever amount of header files. There is no limit.

The grading of the homework will be based on:

1. If you cheat, or high similarity percentage (above 85%), you will get 0.
2. how well your code is running (30)
3. structure of your code (70).
4. In addition, if your code does not compile, your final grade will be over 50% of your total grade.
5. Late submissions will not be graded.

Sample Run:

```
ISBN with 6584-258963258 does not exist.
Mazidi, The 8051 Microcontroller & Embedded Systems,
1234-456789123
Borrowed: 0
=====================================
Elmasri, Fundamentals of Database Systems, 7899-
456456123
Borrowed: 2
=====================================
Nilsson, Electric Circuits, 1478-258963258
Borrowed: 1
=====================================
```