CSE230

HOMEWORK - Spring 2015

HOMEWORK 5 - due Tuesday, May 5th no later than 5:00PM

REMINDER:

- **Make sure you read the warnings about academic dishonesty. *Remember, all work you submit for homework or exams MUST be your own work. Group efforts are not allowed for homework assignments.***

For this assignment you will be required to write a C++ program which accepts a text file containing a list of books that will be stored in an array. The size of the array should be 200 that is stored in a constant named TABLE_SIZE.

Here is the format of the input file, each field entered on a separate line:

Title
Author
Publisher
ISBN

- Title, Author and Publisher are Strings which can contain spaces and are at most 40 characters each in length.
- ISBN is a 10-digit number.
- Each 4 lines in the input file (one for Title, one for Author, and so on) , will contain the information for one book record.
- In the case of a duplicate ISBN in the input file, print an error message, ignore the entry (i.e. ignore all information for this book), and continue processing the file. No other error checking is required for this assignment.

Your program should consist of the following classes:

- **1)** Write a fully documented class called `BookRecord`. It should contain three string member variables, one for the book's Title, one for book's Author and one for book's Publisher. Also, it should contain an integer data member for the ISBN. You should provide a constructor along with accessor and mutator methods for each data member.

- **2)** Write a fully documented class called ListRecords which takes the name of an input file as a parameter to its constructor. The constructor will then create an array of size TABLE_SIZE and will create a record for each of the 4 lines that reads from the input file. The newly created record will be inserted in the array. In order to be able to look for a specific record, you should scan through the array and check each record until the required record is found. In addition, you should provide three member functions called `insertBookInfo()`, `printBookInfo()`, `printListByISBN()` and `printListByTitle()`. The function `insertBookInfo()` takes a parameter of type BookRecord and inserts that record into the array. The function `printBookInfo()` accepts an ISBN number as a parameter and will print all the information about a book with the given ISBN number, if such a BookRecord object exists in the array, or print an error message if there is no book with that ISBN number. The

`printListByISBN()` prints the list soretd by ISBN in incresing order, and `printListByTitle()` prints the list sorted alphabetically by title. You may use `findPositionOfBook()` as a helper function (private) that accepts an ISBN number as a parameter and returns the location in the array of a BookRecord object in the array that has the given ISBN number, if it exists, or -1 if such an object does not exists. Here is a list of the function prototypes:

- `void ListRecords::insertBookInfo(BookRecord record);`
- `void ListRecords::printBookInfo(int bookISBN);`
- `void ListRecords::printListByISBN();`
- `void ListRecords::printListByTitle();`

NOTE: In this assignment, you will not need to deal with removals of items in the array.

- **3)** Write a driver program to test the ListRecords class. Begin by prompting the user for the name of an input file from the keyboard and construct a ListRecords object based on the input. Next, provide the user with the following menu of options:
  - 1) Insert a book record into the list
  - 2) Print information of a book with the given ISBN number
  - 3) Print the list of books sorted by ISBN
  - 4) Print the list of books sorted alphabetically by title.
  - 5) Quit the program

- **4) Extra Credit:** Define two subclasses of the `BookRecord` class called `InfoBookRecord` and `TypeBookRecord`. The `InfoBookRecord` class will contain additional fields for Price and Author's Biography (a double and string, respectively). The `TypeBookRecord` class will contain an additional field for the type of book (Example: "Novel", "Fantasy", "Biography", etc) (a string of 15 characters). For each class, you must either override the `printBookInfo` function or make use of virtual functions so that it will print out the additional appropriate data. If you choose to use virtual functions in doing this, you will receive additional extra credit. It is recommended that you use public inheritance when defining these subclasses. All data read in from the input file is to be considered as the parent class, BookRecord, and will not contain any of this additional information. You must add additional menu options to the driver class for adding these different books to the ListRecords in an appropriate format.

Your program should also follow the following requirements:

- You must prompt the user for the name of the input file, which the user will then enter by using the keyboard
- Your program must be written in C++ to receive any credit. You should only use C++ input/output functions.
- You must use at least the three classes listed above
- Your output should be printed in a neatly formatted fashion (see SAMPLE OUTPUT below)
- If there is an error reading from the file or if any user input is invalid you should inform the user of the situation.
  In the event that the user input is invalid, you must ignore request and present the user with the menu once again.
- Your program should make good use of functions and be well commented
- You must include a "makefile" which correctly compiles your multiple source files

SAMPLE INPUT AND OUTPUT

Note that the input file is in black, comments are in green and the output follows in blue:

```
//Here is the input file, books.txt:


A Book on C
Al Kelly and Ira Pohl
Addison-Wesley, Fifth Edition 1998.
0201183994

C How to Program
Paul Deitel and Harvey Deitel
Prentice Hall Sixth Edition 2010
0136123562

Object Oriented Design and Patterns
Cay Horstmann
Wiley, 3rd Edition 2012
0471744875

Core Java
Horstmann and Cornell
Prentice Hall - 9th Edition, 2012
0131118269


//Here is the program:

Enter a file name: books.txt

Select an option from the following menu:
1)Insert a new book into the list
2)Print the info of a specific book by ISBN number
3)Print the list sorted by ISBN
4)Print the list sorted alphabetically by title
5)Quit the program
Please select an option: 2

Enter an ISBN number:0345325818
The record you requested was not found in the list

Select an option from the following menu:
1)Insert a new book into the list
2)Print the info of a specific book by ISBN number
3)Print the list sorted by ISBN
4)Print the list sorted alphabetically by title
5)Quit the program
Please select an option: 2

Enter an ISBN number: 0201183994
A Book on C
Al Kelly and Ira Pohl
Addison-Wesley, Fifth Edition 1998.
ISBN 0201183994


Select an option from the following menu:
1)Insert a new book into the list
2)Print the info of a specific book by ISBN number
3)Print the list sorted by ISBN
4)Print the list sorted alphabetically by title
5)Quit the program
Please select an option: 1

Enter book's title: The Silmarillon
```

```
Enter author's name: J.R.R Tolkien
Enter book's publisher: Del Rey, Reissue edition (1985)
Enter book's ISBN: 0345325818

The record has been added to the list.

Select an option from the following menu:
1)Insert a new book into the list
2)Print the info of a specific book by ISBN number
3)Print the list sorted by ISBN
4)Print the list sorted alphabetically by title
5)Quit the program
Please select an option: 2

Enter an ISBN number: 0345325818

The Silmarillon
J.R.R Tolkien
Del Rey, Reissue Edition (1985)
0345325818

Select an option from the following menu:
1)Insert a new book into the list
2)Print the info of a specific book by ISBN number
3)Print the list sorted by ISBN
4)Print the list sorted alphabetically by title
5)Quit the program
Please select an option: 3
//The first 22 characters of each field is displayed

        Title                 Author               publisher           ISBN
---------------------- ---------------------- ---------------------- ----------
Core Java              Horstmann and Cornell  Prentice Hall - 9th Ed 0131118269
C How to Program       Paul Deitel and Harvey Prentice Hall Sixth Ed 0136123562
A Book on C            Al Kelly and Ira Pohl  Addison-Wesley, Sixth  0201183994
The Silmarillon        J.R.R Tolkien          Del Rey, Reissue Editi 0345325818
Object Oriented Design Cay Horstmann          Wiley, 3rd Edition 200 0471744875


Select an option from the following menu:
1)Insert a new book into the list
2)Print the info of a specific book by ISBN number
3)Print the list sorted by ISBN
4)Print the list sorted alphabetically by title
5)Quit the program
Please select an option: 4
//The first 22 characters of each field is displayed

        Title                 Author               publisher           ISBN
---------------------- ---------------------- ---------------------- ----------
A Book on C            Al Kelly and Ira Pohl  Addison-Wesley, Fifth  0201183994
C How to Program       Paul Deitel and Harvey Prentice Hall Sixth Ed 0136123562
Core Java              Horstmann and Cornell  Prentice Hall - 9th Ed 0131118269
Object Oriented Design Cay Horstmann          Wiley, 3rd Edition 200 0471744875
The Silmarillon        J.R.R Tolkien          Del Rey, Reissue Editi 0345325818

Select an option from the following menu:
1)Insert a new book into the list
2)Print the info of a specific book by ISBN number
3)Print the list sorted by ISBN
4)Print the list sorted alphabetically by title
5)Quit the program
Please select an option: 5

Program terminating...
```

GRADING KEY

- (5 pts): Proper use of Comments
- (5 pts): Good use of Functions
- (20 pts): Use of all classes specified
- (5 pts): Inclusion of a makefile
- (5 pts): Input file is read correctly from keyboard
- (10 pts): Error message displayed when a problem reading information from a file has been encountered or invalid user information is entered
- (15 pts): Program compiles without error.
- (10 pts): The program successfully prints the information stored in a BookRecord in the ListRecords with the given ISBN number.
- (10 pts): The program successfully prints the list of books sorted by ISBN.
- (10 pts): The program successfully prints the list of books sorted alphabetically by title.
- (5 pts): Information is printed in a neatly formatted fashion
- **(15 pts): Extra Credit- the two subclasses are defined and are used in the ListRecords correctly**
- **(10 pts): Extra Credit- the two subclasses make use of virtual functions**

SUBMISSION INFO

1. **Create the necessary source files and label them accordingly. For example, Main.cpp, BookRecord.cpp, etc.**
2. **As part of a comment at the beginning of each file, include your full name, Stony Brook Solar ID# and your email address. Also, include a brief description of the program.**
3. **Login to your grading account and click "Submit Assignment" to upload and submit all files of your assignment. Note, if you're taking more than one course with me, your username is different for each course.**
