CMPE 180-92
Data Structures and Algorithms in C++
Fall 2017

Instructor: Ron Mak

Assignment #7

Assigned: Saturday, October 12
Due: Thursday, October 19 at 5:30 PM
CodeCheck: http://codecheck.it/files/1710072317eln17edarc25aqtdwg528ocf2
Canvas: Assignment 7. Book Lists
Points: 100

Book Lists

This assignment will give you practice manipulating linked lists. Your program will read text files, each of which contains information about books in a particular category, such as history or science. You will create a <u>linked list of books</u> in each category, and then you will manipulate these lists in various ways. Your program should <u>not</u> make any assumptions about which categories of books, the number of categories, or the number of books. A separate text file will contain the names of the categories.

Implement <u>singly-linked lists</u> for this assignment, where each node of the list has a link to the next node. Do <u>not</u> use the **list** template from the Standard Template Library. We will study templates and the STL later.

Input file `categories.txt`

Input text file **`categories.txt`** will contain the names of the book categories, one name (a single word) per line. Your program should not make any assumptions in advance about which categories and how many of them.

```
science
history
mystery
childrens
```

Category book lists

For each category, such as `history`, there will be a corresponding text file, such as `history.txt`, that contains information about books in that category, one book per line. Each line has the format

$$isbn, last, first, title$$

Create a linked list of books for each book file. Each category book list must be <u>sorted by ISBN</u>, so as you read each book, insert it into the list at the proper position. Do not insert a book if the list already contains the book's ISBN. After you've created each category book list, print the list and include the count of books in the list.

You should overload the **>>** and **<<** operators to read and write a book.

`childrens.txt`

```
978-0439708180,Rowling,J.,Harry Potter and the Sorcerer's Stone
978-0060256654,Silverstein,Shel,The Giving Tree
978-0694003617,Brown,Margaret,Goodnight Moon
```

`history.txt`

```
978-0195144031,Kennedy,David,Freedom from Fear
978-0345476098,Tuchman,Barbara,The Guns of August
978-0671869205,McCullough,David,Truman
978-0345308238,Tuchman,Barbara,The March of Folly: From Troy to Vietnam
978-0345324252,Tuchman,Barbara,The Zimmermann Telegram
978-0743226721,McCullough,David,1776
978-0345308238,Tuchman,Barbara,The March of Folly: From Troy to Vietnam
978-0060854935,Kennedy,John,Profiles in Courage
```

`science.txt`

```
978-1420946338,Einstein,Albert,Relativity: The Special and General Theory
978-1490592152,Newton,Isaac,The Principia
978-0553380163,Hawking,Stephen,A Brief History of Time
978-0471744870,Horstmann,Cay,Object-Oriented Design
978-0130460417,Mak,Ronald,Java Number Cruncher
978-0470383285,Horstmann,Cay,Big C++
978-0470177075,Mak,Ronald,Writing Compilers
978-0134177304,Horstmann,Cay,Core Java Volume I--Fundamentals
978-1490592152,Newton,Isaac,The Principia
```

`mystery.txt`

```
978-1501175466,King,Stephen,It: A Novel
978-9176372265,Doyle,Conon,The Adventures of Sherlock Holmes
978-0307743657,King,Stephen,The Shining
978-0385543026,Grisham,John,Camino Island: A Novel
```

Merged list

Next, merge all the category book lists into a single linked list, sorted by ISBN. Print the merged list and include the count of books in the list.

Author lists

Finally, split the merged list into two new lists, each sorted by ISBN. One list should contain books with authors whose last names start with A – M, and the other list should contain books with authors whose last names start with N – Z. Print each author list and include the count of books in the list.

Expected output

For the given set of input files, CodeCheck will check your output against **booklists.out**:

```
Book list: science

    Book{ISBN=978-0130460417, last=Mak, first=Ronald, title=Java Number Cruncher}
    Book{ISBN=978-0134177304, last=Horstmann, first=Cay, title=Core Java Volume I--Fundamentals}
    Book{ISBN=978-0470177075, last=Mak, first=Ronald, title=Writing Compilers}
    Book{ISBN=978-0470383285, last=Horstmann, first=Cay, title=Big C++}
    Book{ISBN=978-0471744870, last=Horstmann, first=Cay, title=Object-Oriented Design}
    Book{ISBN=978-0553380163, last=Hawking, first=Stephen, title=A Brief History of Time}
    Book{ISBN=978-1420946338, last=Einstein, first=Albert, title=Relativity: The Special and General Theory}
    Book{ISBN=978-1490592152, last=Newton, first=Isaac, title=The Principia}
       (8 books)

Book list: history

    Book{ISBN=978-0060854935, last=Kennedy, first=John, title=Profiles in Courage}
    Book{ISBN=978-0195144031, last=Kennedy, first=David, title=Freedom from Fear}
    Book{ISBN=978-0345308238, last=Tuchman, first=Barbara, title=The March of Folly: From Troy to Vietnam}
    Book{ISBN=978-0345324252, last=Tuchman, first=Barbara, title=The Zimmermann Telegram}
    Book{ISBN=978-0345476098, last=Tuchman, first=Barbara, title=The Guns of August}
    Book{ISBN=978-0671869205, last=McCullough, first=David, title=Truman}
    Book{ISBN=978-0743226721, last=McCullough, first=David, title=1776}
       (7 books)

Book list: mystery

    Book{ISBN=978-0307743657, last=King, first=Stephen, title=The Shining}
    Book{ISBN=978-0385543026, last=Grisham, first=John, title=Camino Island: A Novel}
    Book{ISBN=978-1501175466, last=King, first=Stephen, title=It: A Novel}
    Book{ISBN=978-9176372265, last=Doyle, first=Conon, title=The Adventures of Sherlock Holmes}
       (4 books)

Book list: childrens

    Book{ISBN=978-0060256654, last=Silverstein, first=Shel, title=The Giving Tree}
    Book{ISBN=978-0439708180, last=Rowling, first=J., title=Harry Potter and the Sorcerer's Stone}
    Book{ISBN=978-0694003617, last=Brown, first=Margaret, title=Goodnight Moon}
       (3 books)

Book list: MERGED

    Book{ISBN=978-0060256654, last=Silverstein, first=Shel, title=The Giving Tree}
    Book{ISBN=978-0060854935, last=Kennedy, first=John, title=Profiles in Courage}
    Book{ISBN=978-0130460417, last=Mak, first=Ronald, title=Java Number Cruncher}
    Book{ISBN=978-0134177304, last=Horstmann, first=Cay, title=Core Java Volume I--Fundamentals}
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    Book{ISBN=978-0385543026, last=Grisham, first=John, title=Camino Island: A Novel}
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    Book{ISBN=978-0471744870, last=Horstmann, first=Cay, title=Object-Oriented Design}
    Book{ISBN=978-0553380163, last=Hawking, first=Stephen, title=A Brief History of Time}
    Book{ISBN=978-0671869205, last=McCullough, first=David, title=Truman}
    Book{ISBN=978-0694003617, last=Brown, first=Margaret, title=Goodnight Moon}
    Book{ISBN=978-0743226721, last=McCullough, first=David, title=1776}
    Book{ISBN=978-1420946338, last=Einstein, first=Albert, title=Relativity: The Special and General Theory}
    Book{ISBN=978-1490592152, last=Newton, first=Isaac, title=The Principia}
    Book{ISBN=978-1501175466, last=King, first=Stephen, title=It: A Novel}
    Book{ISBN=978-9176372265, last=Doyle, first=Conon, title=The Adventures of Sherlock Holmes}
       (22 books)

Book list: AUTHORS A-M

    Book{ISBN=978-0060854935, last=Kennedy, first=John, title=Profiles in Courage}
    Book{ISBN=978-0130460417, last=Mak, first=Ronald, title=Java Number Cruncher}
    Book{ISBN=978-0134177304, last=Horstmann, first=Cay, title=Core Java Volume I--Fundamentals}
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    Book{ISBN=978-0470383285, last=Horstmann, first=Cay, title=Big C++}
    Book{ISBN=978-0471744870, last=Horstmann, first=Cay, title=Object-Oriented Design}
    Book{ISBN=978-0553380163, last=Hawking, first=Stephen, title=A Brief History of Time}
    Book{ISBN=978-0671869205, last=McCullough, first=David, title=Truman}
    Book{ISBN=978-0694003617, last=Brown, first=Margaret, title=Goodnight Moon}
    Book{ISBN=978-0743226721, last=McCullough, first=David, title=1776}
    Book{ISBN=978-1420946338, last=Einstein, first=Albert, title=Relativity: The Special and General Theory}
    Book{ISBN=978-1501175466, last=King, first=Stephen, title=It: A Novel}
    Book{ISBN=978-9176372265, last=Doyle, first=Conon, title=The Adventures of Sherlock Holmes}
       (16 books)

Book list: AUTHORS N_Z

    Book{ISBN=978-0060256654, last=Silverstein, first=Shel, title=The Giving Tree}
    Book{ISBN=978-0345308238, last=Tuchman, first=Barbara, title=The March of Folly: From Troy to Vietnam}
    Book{ISBN=978-0345324252, last=Tuchman, first=Barbara, title=The Zimmermann Telegram}
    Book{ISBN=978-0345476098, last=Tuchman, first=Barbara, title=The Guns of August}
    Book{ISBN=978-0439708180, last=Rowling, first=J., title=Harry Potter and the Sorcerer's Stone}
    Book{ISBN=978-1490592152, last=Newton, first=Isaac, title=The Principia}
       (6 books)
```

Submission into Canvas

When you're satisfied with your program in CodeCheck, click the "Download" link at the very bottom of the Report screen to download a signed zip file of your solution. Submit this zip file into Canvas. You can submit as many times as you want until the deadline, and the number of submissions will not affect your score. Only your last submission will be graded.

Submit the signed zip file from CodeCheck into Canvas:
Assignment #7. Book Lists

Note: You must submit the signed zip file that you download from CodeCheck, or your submission will not be graded. Do not rename the zip file.

Rubric

Your program will be graded according to these criteria:

Criteria	Max points
Good program design	**90**
• Class `Book` with public and private members.	• 5
• Class `BookNode` with public and private members.	• 15
• Class `BookList` with public and private members.	• 20
• Main program `BookListsApp`.	• 20
• Category book lists (output checked by CodeCheck)	• 10
• Merged book list (output checked by CodeCheck)	• 10
• Author book lists (output checked by CodeCheck)	• 10
Good program style	**10**
• Descriptive names and meaningful comments.	• 5
• Follow the coding style (formatting, braces, indentation, function declarations before the main, etc.) of the Savitch textbook.	• 5

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