CS214: Data Structures
Assignment-2: Linked List

Instructions

1- Students will form teams of **2** students (**Can be from different groups).**
2- Deadline of submission is **Tuesday, December 13th at 11:55 pm.**
3- Submission will be on google classroom.
4- No late submission is allowed.
5- No submission through e-mails.
6- **Please follow the Submission Notes found below**
7- **In case of Cheating you will get a negative grade whether you give the code to someone, take the code from someone/internet, or even send it to someone for any reason.**
8- You have to write clean code and follow a good coding style including choosing meaningful variable names.

Task: Linked List "FCAI-Reads Application"

Write a doubly linked list which allows the user to add data of books, remove books using author's name or title, sort the list by number of pages, and display books stored in the list using 3 options (all books, certain category, certain author).

Assuming you have a class Book

```
class Book
{
    string title;
    string author;
    string category;
    int numOfPages;

    public:
      Book(string, string, string, int);
      void print();
};
```

- Implement the class constructor, print member function, and setters/getters functions
- Save the class declaration and implementation in a single header file named as Book.h
- Include your Book.h in the main file

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Consider having the following file as a user reading list to use it for filling your double linked list.

```
15
The 7 Habits of Highly Effective People: Powerful Lessons in Personal Change
Stephen R. Covey
Self Help
372
First Things First
Stephen R. Covey
Self Help
384
The 8th Habit: From Effectiveness to Greatness
Stephen R. Covey
Self Help
432
The 3rd Alternative: Solving Life's Most Difficult Problems
Stephen R. Covey
Self Help
456
Becoming
Michelle Obama
Biography
426
Michelle Obama: A Life
Michelle Obama
Biography
432
The Light We Carry: Overcoming in Uncertain Times
Michelle Obama
Biography
336
The Alchemist
Paulo Coelho
Novels
175
The Zahir
Paulo Coelho
Novels
336
Brida
Paulo Coelho
Novels
224
The Kite Runner
Khaled Hosseini
Novels
371
A Thousand Splendid Suns
Khaled Hosseini
Novels
372
The Monk Who Sold His Ferrari
Robin Sharma
Novels
208
The 5 AM Club
Robin Sharma
Self Help
336
```

- Your linked list node consists of “a book object and pointer of previous and next”.
- For each book in the file, create a node and insert to the end of your double linked list.
- After inserting the whole 14 book, show the following options in a menu to the user to choose the desired operation.
  - ➔ Add a book (title, author, category, number of pages)
  - ➔ Remove a book using title name and handle if doesn’t exist (show results if the book is deleted).
  - ➔ Remove a book using author name and handle if it doesn’t exist (show number of books deleted and all titles of these books)
  - ➔ Sort by number of pages (the books list sorted ascendingly by number of pages)
  - ➔ Display all books
  - ➔ Display certain author’s books (take author name from user and handle if not exist)
  - ➔ Display certain category’s books (take category name from user and handle if not exist)

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```
struct Node {
  Book data;
  Node *next;
  Node *prev;
};

class LinkedList
{
    // Head pointer
    Node* head;
    Node* tail;

  public:
```

Implement Linked List class "linkedlist.h":

- Create Node struct (it holds a book and its prev and next pointers)
- Create a head and a tail
- Complete the class 7 functions which implements menu choices or options (1 insert, 2 remove, 1 sort, 3 display)

In main you should:

- Read from books.txt to fill linked list nodes (insert 14 times)
- Instead of showing menu and take user's input, you will make the following scenario in your main.
- Main Test case scenario: (show menu before each step)

  ➔ display all list
  ➔ add a book (Outliers, Malcolm Gladwell, Self Help, 309)
  ➔ sort by page number
  ➔ display all list (Alchemist book should appear first one "least #pages")
  ➔ display "Novels" category (6 books appear)
  ➔ remove by author "Paulo Koelho" (this name doesn't exist)
  ➔ remove by author "Paulo Coelho" (3 books are deleted and show their titles)
  ➔ display category "Novels" (only 3 books will appear)
  ➔ remove by title "Pecoming" (this name doesn't exist)
  ➔ remove by title "Becoming" (the book is deleted)
  ➔ display author "Michelle Obama" (only 2 books will appear)
  ➔ display all (11 books will appear)

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Grading Info:

FCAI-Reads Application	**Book Class**	**5**
	LinkedList Class	**5**
	Reading from file to linked list	**10**
	Add book	**5**
	Remove book	**10**
	Display book	**15**
	Sort books	**5**
	Main test scenarios	**10**
	Separate header file	**5**
	Total	**70**

Submission Notes:

You will have one folder named by your IDs “ID1_ID2” and it includes 3 code files: book.h, linkedlist.h and main.cpp. Then zip this file and the zipped file name will automatically be ID1_ID2.zip (example: **20202020_21212121.zip**).
Only one of the team members should submit on google classroom.