Comp 5421/1-BB | Assignment 2 | Due June 22, 2014

Major part of assignment 1 had to do with low-level details of getting array list and linked list structures in place. This assignment removes that part altogether, allowing you to focus your attention on the task at hand: store a list of words from a specified input text file, keeping track of their frequency count and associated line numbers in that file.

For this assignment, you will reimplement your solution for Assignment 1, but this time your implementation may not use:

- C-style arrays or strings
- The `new` operator
- Any of the STL's associative containers

The goal is for you to leverage a library of well-designed and efficient classes and algorithms to facilitate the services you want to provide. In this assignment, you will delegate the implementation of the array list and linked list abstractions to the C++ standard library class templates[1] `vector` and `list`, respectively. As a result, you will need to implement only two classes: `WordList` and `WordData`.

`WordData`

The objects of this class each store and manage the following data members:

- A `string` object that stores a specified word,
- The frequency count of the word
- A `vector<int>` object that stores a list of line numbers associated with the word

The public interface of the class should include the following operations:

- A constructor that receives a `string` and and an `int` that represent a word and a line number; it sets `this` object's word to the given word, adds the given line number to the end of `this` object's line number list, and sets `this` object's frequency count to 1.
- Add a given number to the end of the line number list, if the given number does not already exist in the list. However, always increment the frequency count by 1.
- Get the value of frequency count for `this` object.
- Get a read-only reference to the word stored by `this` object.
- Get a read-only reference to the line number list for `this` object.
- Determine whether the word stored by `this` object compares equal to, or comes before or after the word stored in a specified `WordData` object. Use case insensitive alphabetical ordering of `string`s when comparing two words.

[1] See chapter 7 and 15 of the course textbook.

- Print a textual representation of this object to a specified ostream object (such as cout or a ofstream), showing the stored word together with its frequency count and list of line numbers.

WordList

This class represents linked lists of WordData objects. A WordList object has only one data member, of type list<WordData>, which stores and manages the actual list of WordData objects. WordList class nests the definition of WordData class as a private member.

The public interface of the class should include the following services:

- A constructor that takes as parameter a string that represents the name of a text file, and loads this object with the words in that file.
- Get the size of the list.
- Print the words in the list that begin with a specified string to a specified ostream object (such as cout or a ofstream). If the specified string is empty, then print all of the words in the list, formatted as in Assignment 1.

To facilitae its internal operations, the class implements the following private operations:

- Load this list with the words in an input text file.
- Reflect a given a word and its corresponding line number into this list as follows: if the given word does not exist in the list then wrap the given word and line number in a WordNode object and insert it into the list at its *sorted* position; otherwise, just append the given number to the list of line numbers of the given word.

Sample Driver Program

```
//wordListDriver.cpp
int main()
{
   WordList wordlist("Seuss.txt"); // Create a WordList object associated with input file ”Seuss.txt”
   // Create an ofstream object associated with output file ”SeussWordList.txt”
   ofstream fout("SeussWordList.txt");
   assert(fout.good()); // Make sure fout is in good state
   wordlist.print(fout); // Print the entire list to fout
   wordlist.print(fout, "wh"); // Print words that begin with “wh” to fout
   wordlist.print(fout, "the"); // Print words that begin with “the” to fout
   fout.close(); // Close fout
return 0; // Return with success
}
```

Deliverables

Create a a new folder that contains the files listed below, and then zip up your folder and *please* submit it exactly *as instructed* in the course outline.

1. Header files: `WordList.h`
2. Implementation files: `WordList.cpp`, `wordListDriver.cpp`.
   Note: since the `WordList` class nests the declaration of the `WordData` class, the implementation file `WordList.cpp` also includes the implementation of the `WordData` class.
3. Input and output files
4. A `README.txt` text file as instructed in the course outline..

Marking scheme

50%	Program correctness
30%	Proper use of STL containers and algorithms, and C++ concepts
10%	Format, clarity, completeness of output
10%	Concise documentation of nontrivial steps in code, choice of variable names, indentation and readability of program

Sample Input File Seuss.txt[2]

```
Top 12 Dr. Seuss Quotes

Dr. Seuss, whose real name was Theodor Seuss Geisel, is famous for
his funny children’s books filled imaginative characters, rhyme, and
use of trisyllabic meter.

He was born in 1904, and began writing children’s books in 1937. He
went on to write over 60 books and also wrote for magazines,
newspapers, and advertising companies.

Some of his most famous works are The Cat in the Hat, Green Eggs and
Ham, and One Fish Two Fish Red Fish Blue Fish.

Listed below are some of Dr. Seuss’ most notable quotes.

1. "Today you are You, that is truer than true. There is no one alive
   who is Youer than You."

2. "The more that you read, the more things you will know. The more
    that you learn, the more places you’ll go."

3. "And will you succeed? Yes indeed, yes indeed! Ninety-eight and
    three-quarters percent guaranteed!"

4. "If you never did you should. These things are fun and fun is good"

5. "My alphabet starts with this letter called yuzz. It’s the letter I
    use to spell yuzz-a-ma-tuzz. You’ll be sort of surprised what
    there is to be found once you go beyond ’Z’ and start poking around!"

6. "I like nonsense, it wakes up the brain cells."

7. "I do not like green eggs and ham I do not like them sam I am."

8. "Today is your day! Your mountain is waiting. So... get on your way."

9. "Unless someone like you cares a whole awful lot, nothing is going
    to get better. It’s not."

10. "Be who you are and say what you feel because those who mind
     don’t matter and those who matter don’t mind."

11. "Don’t cry because it’s over. Smile because it happened."

12. "I have heard there are troubles of more than one kind. Some come
     from ahead and some come from behind. But I’ve bought a big bat.
     I’m all ready you see. Now my troubles are going to have troubles
     with me!"
```

[2] http://timothyjward.hubpages.com/hub/Top-10-Dr-Seuss-Quotes

Output File `SeussWordList.txt`

```
Word List Source File: Seuss.txt
============================
<A>
              a (2) 37 46

    advertising (1) 9

          ahead (1) 46

          alive (1) 16

            all (1) 47

       alphabet (1) 27

           also (1) 8

             am (1) 33

            and (14) 4 7 8 9 11 12 22 25 29 33 40 41 46

            are (7) 11 14 16 25 40 45 47

         around (1) 29

          awful (1) 37

<B>
            bat (1) 46

             be (3) 28 29 40

        because (3) 40 43

          began (1) 7

         behind (1) 46

          below (1) 14

         better (1) 38

         beyond (1) 29

            big (1) 46

           Blue (1) 12

          books (3) 4 7 8

           born (1) 7

         bought (1) 46
```

```
          brain (1) 31
            But (1) 46
<C>
         called (1) 27
          cares (1) 37
            Cat (1) 11
          cells (1) 31
     characters (1) 4
     children’s (2) 4 7
           come (2) 45 46
      companies (1) 9
            cry (1) 43
<D>
            day (1) 35
            did (1) 25
             do (2) 33
          don’t (3) 41 43
             Dr (3) 1 3 14
<E>
           Eggs (2) 11 33
<F>
         famous (2) 3 11
           feel (1) 40
         filled (1) 4
           Fish (4) 12
            for (2) 3 8
          found (1) 29
           from (2) 46
            fun (2) 25
          funny (1) 4
```

```
<G>
         Geisel (1) 3

            get (2) 35 38

             go (2) 20 29

          going (2) 37 47

           good (1) 25

          Green (2) 11 33

     guaranteed (1) 23

<H>
            Ham (2) 12 33

       happened (1) 43

            Hat (1) 11

           have (2) 45 47

             He (2) 7

          heard (1) 45

            his (2) 4 11

<I>
              I (6) 27 31 33 45

            I'm (1) 47

           I've (1) 46

             If (1) 25

    imaginative (1) 4

             in (3) 7 11

         indeed (2) 22

             is (9) 3 16 17 25 29 35 37

             it (2) 31 43

           It's (3) 27 38 43

<J>
<K>
           kind (1) 45
```

```
            on (2) 8 35

          once (1) 29

           One (3) 12 16 45

          over (2) 8 43

<P>
       percent (1) 23

        places (1) 20

        poking (1) 29

<Q>
        Quotes (2) 1 14

<R>
          read (1) 19

         ready (1) 47

          real (1) 3

           Red (1) 12

         rhyme (1) 4

<S>
           sam (1) 33

           say (1) 40

           see (1) 47

         Seuss (4) 1 3 14

        should (1) 25

         Smile (1) 43

            So (1) 35

          Some (4) 11 14 45 46

       someone (1) 37

          sort (1) 28

         spell (1) 28

         start (1) 29

        starts (1) 27
```

```
            was (2) 3 7

            way (1) 35

           went (1) 8

           what (2) 28 40

            who (4) 17 40 41

          whole (1) 37

          whose (1) 3

           will (2) 19 22

           with (2) 27 48

          works (1) 11

          write (1) 8

        writing (1) 7

          wrote (1) 8

<X>
<Y>
            Yes (2) 22

            you (14) 16 17 19 20 22 25 29 37 40 47

         you'll (2) 20 28

          Youer (1) 17

           your (3) 35

           yuzz (1) 27

 yuzz-a-ma-tuzz (1) 28

<Z>
              Z (1) 29

============================
Word List Source File: Seuss.txt
Words that begin with "wh"
============================
           what (2) 28 40

            who (4) 17 40 41

          whole (1) 37

          whose (1) 3
```

```
============================
Word List Source File: Seuss.txt
Words that begin with "the"
============================
            The (8) 11 19 20 27 31

           them (1) 33

        Theodor (1) 3

          There (3) 16 29 45

          These (1) 25

============================
```