

Laboratory Exercise 5 (The STL)

Topics: Class accessor functions
STL (Standard Template Library) vector containers

Goals: Upon successful completion of this lab you should be able to:

1. Declare and implement accessor functions
2. Use accessor functions in an application program
3. Use a vector container in an application program

Related text sections:

Chapter 6
Chapter 7

Laboratory Exercise 5 Instructions

For this lab you will be modifying the class you added to the character counting program in lab 4.

1. Copy the header file Lab4.h to a file called Lab5.h.
2. Add member functions the WordData class in Lab5.h to access the counter values in the WordData class:

```
int GetNumVowels () const;
int GetNumConsonants () const;
int GetNumDigits () const;
int GetNumSpecialChars () const;
```
3. Implement the accessor function: `int GetNumVowels () const;`
Specifications:
 - a. Will return the integer value vowels
4. Implement the accessor function: `int GetNumConsonants () const;`
Specifications:
 - a. Will return the integer value consonants
5. Implement the accessor function: `int GetNumDigits () const;`
Specifications:
 - a. Will return the integer value digits
6. Implement the accessor function: `int GetNumSpecialChars () const;`
Specifications:
 - a. Will return the integer value specialchars
7. Copy the application program Lab4.cpp to a file called Lab5a.cpp. Modify the application program Lab5a.cpp to:
 - a. Include Lab5.h instead of Lab4.h
 - b. Print a line of dashes after the list of individual words.
 - c. Print a totals line with sums of the individual counts at the end of the list of individual words.

Word	Vowels	Const.	Digits	Special
This	1	3	0	0
file	2	2	0	0
contains	3	5	0	0
15	0	0	2	0
words.	1	4	0	1
It	1	1	0	0
has	1	2	0	0
lots	1	3	0	0
of	1	1	0	0
letters	2	5	0	0
and	1	2	0	0
very	1	3	0	0
few	1	2	0	0
special	3	4	0	0
characters!	3	7	0	1

Total	22	44	2	2

8. Drop your modified application program in the ~tiawatts/cs215drop folder as *yourlastnameL5.cpp*.
9. Drop your modified header file in the ~tiawatts/cs215drop folder as *yourlastnameL5.h*.
10. Enter and compile the following C++ program (call the source file Lab5b.cpp and the executable lab5b).

```

// Title: Lab 5 B Driver program
// Author: Dr. Watts
// Description: This program is designed to test the WordData class with a
// vector container

#include <iostream>
#include <iomanip>
#include <fstream>
#include <string>
#include <vector>
#include "Lab5.h"

using namespace std;

int main ()
{
    // Open file for input
    ifstream input ("words.txt");
    string inword;
    // create a vector to hold a collection of WordData objects
    vector <WordData> words;
    // Initialize word counter
    // Read until array filled or end of file
    while (input >> inword)
    {
        // Insert word into a WordData object
        WordData oneword;
        oneword.SetWord(inword);
        // Push oneword onto the end of the words vector
        words.push_back (oneword);
    }
    // Close input file
    input.close();
    // Print report header
    cout << setw (12) << left << "Word";
    cout << setw (8) << right << "Vowels";
    cout << setw (8) << right << "Const.";
    cout << setw (8) << right << "Digits";
    cout << setw (8) << right << "Special";
    cout << endl;
    // Loop through all words in array
    for (int i = 0; i < words.size(); i++)
    {
        // Print data for word
        words[i].WriteData(cout);
        cout << endl;
    }
    return 0;
}

```

11. Execute lab5b; the output from lab5b should be the same as the output from lab 5a before you added the Totals line.
12. Add the totals line facility to Lab5b.cpp.

13. Modify Lab5a.cpp and Lab5b.cpp to read data from a file called “manywords.txt”.
14. Recompile each of the programs.
15. Copy the file manywords.txt from the cs215pickup folder to your folder.
16. Execute lab5a and lab5b. They should not produce identical outputs – how do they differ?
Why do they differ?
17. Enter your answers to the previous questions into a file called Lab5.txt.
18. Drop your text file in the ~tiawatts/cs215drop folder as *yourlastnameL5.txt* and print a copy to bring to class.