

Source File: ~/2336/25/lab25.cpp
Input: under control of main function
Output: under control of main function
Value: 1

The header file shown in Figure 1 is a specification for the template-based `Accumulator` class, which maintains a `total` value for the object. The constructor, which initializes `total`, can use the default constructor for the object type `T` as a default value. The data member is updated by `addValue()` and accessed by `getTotal()`. An overloaded output operator is also available for outputting the data member.

A sample `main` function for testing your implementation is shown in Figure 2, and a sample execution sequence is shown in Figure 3. You will need to add a target of `lab25main` to the definition of `targets1srcfile` in your `Makefile`.

```
1  #ifndef LAB25_H
2  #define LAB25_H
3
4  #include <iostream>
5
6  using namespace std;
7
8  template<typename T>
9  class Accumulator
10 {
11     // overloaded operator << as a friend
12     template<typename U>
13     friend ostream& operator<<(ostream& output, const Accumulator<U>& obj);
14
15     public:
16         Accumulator(const T& value = T());    // constructor
17
18         // access and update functions
19         T getTotal() const;                    // return total
20         void addValue(const T& value);         // add (+) value to total
21
22     private:
23         T total;                             // data stored by the object
24 };
25
26 #include "lab25.cpp"
27
28 #endif
```

Figure 1. /usr/local/2336/include/lab25.h

```
1  #include <iostream>
2  #include <cstdlib>
3  #include <string>
4  #include <lab25.h>
5
6  using namespace std;
7
8  int main()
9  {
10     Accumulator<int> intAcc(5), sum;
11     Accumulator<string> words;
12     Accumulator<char> letter('A');
13     string vowels("aeiou");
14
15     cout << "intAcc = " << intAcc.getTotal() << endl;
16     cout << "sum = " << sum.getTotal() << endl;
17     cout << "words = " << words.getTotal() << endl;
18     cout << "letter = " << letter.getTotal() << endl << endl;
19
20     while (intAcc.getTotal() > 0)
21     {
22         sum.addValue(intAcc.getTotal());
23         intAcc.addValue(-1);
24         words.addValue("b" + vowels.substr(intAcc.getTotal(), 1) + "t");
25         letter.addValue(1);
26         cout << "intAcc = " << intAcc.getTotal() << endl;
27         cout << "sum = " << sum.getTotal() << endl;
28         cout << "words = " << words.getTotal() << endl;
29         cout << "letter = " << letter.getTotal() << endl << endl;
30     }
31
32     return EXIT_SUCCESS;
33 }
```

Figure 2. /usr/local/2336/src/lab25main.C

```

1  newuser@csunix ~> cd 2336
2  newuser@csunix ~/2336> ./getlab.ksh 25
3      * Checking to see if a folder exists for Lab 25. . .No
4      * Creating a folder for Lab 25
5      * Checking to see if Lab 25 has sample input and output files. . .Yes
6      * Copying input and output files for Lab 25
7          from folder /usr/local/2336/data/25 to folder ./25
8      * Checking to see if /usr/local/2336/src/lab25main.C exists. . .Yes
9      * Copying file /usr/local/2336/src/lab25main.C to folder ./25
10     * Checking to see if /usr/local/2336/include/lab25.h exists. . .Yes
11     * Copying file /usr/local/2336/include/lab25.h to folder ./25
12     * Copying file /usr/local/2336/src/Makefile to folder ./25
13     * Adding a target of lab25main to targets1srcfile
14     * Touching file ./25/lab25.cpp
15     * Edit file ./25/lab25.cpp in Notepad++
16  newuser@csunix ~/2336> cd 25
17  newuser@csunix ~/2336/25> ls
18  01.out      Makefile      lab25.cpp      lab25.h      lab25main.C
19  newuser@csunix ~/2336/25> make lab25main
20  g++ -g -Wall -std=c++11 -c lab25main.C -I/usr/local/2336/include -I.
21  g++ -o lab25main lab25main.o -L/usr/local/2336/lib -lm -lbits

```

<pre> 22 newuser@csunix ~/2336/25> ./lab25main 23 intAcc = 5 24 sum = 0 25 words = 26 letter = A 27 28 intAcc = 4 29 sum = 5 30 words = but 31 letter = B 32 33 intAcc = 3 34 sum = 9 35 words = butbot 36 letter = C 37 </pre>	<pre> 38 intAcc = 2 39 sum = 12 40 words = butbotbit 41 letter = D 42 43 intAcc = 1 44 sum = 14 45 words = butbotbitbet 46 letter = E 47 48 intAcc = 0 49 sum = 15 50 words = butbotbitbetbat 51 letter = F 52 </pre>
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```

53  newuser@csunix ~/2336/25> ./lab25main > my.out
54  newuser@csunix ~/2336/25> diff 01.out my.out
55  newuser@csunix ~/2336/25>

```

Figure 3. Commands to Compile, Link, & Run Lab 25