CSCI132 - Spring 24 - Lab 5

Due Mar 1, 11 PM

This lab will mostly be a recap of things that we have covered already.
Log onto Logos, and copy the code for the lab:

```
cp -r  ~csci132/labs/lab5 ~/labs/
cd ~/labs/lab5/
```

Question 1:

Read the code in q1.cpp. Draw a memory diagram showing all the variables, Nodes, and links between the various nodes right before the start of the while loop.

Look at the while loop, what do you expect to happen? Compile and run the code using the following command:

```
clang++ -Wall q1.cpp -o q1
```

Does the output confirm your expectation? Write a brief answer into lab5.txt.

Question 2:

Fill in the removeNegatives function in q2.cpp. The removeNegatives function, given a stack of integers, removes all negative values from the stack and leaves all other (positive or zero) integers in the stack, in the same order as they originally were. The function should return a count of how many values were removed. You will need a second data structure to temporarily hold the values while you are processing the items… pick an appropriate structure for this.

Note, you have to add the following line in the appropriate .h file for Questions 2 and 3.

```
#include<cassert>
```

Then compile and run your code using the following command:

```
clang++ -Wall q2.cpp -o q2
```

Expected output:

```
5 items removed!
5 4 3 2 1 0
```

Even after you implement removeNegatives correctly, the output won't immediately be the same as the expected output. What other change is necessary?

Explain your choice of second data structure and other changes you made in lab5.txt

Question 3:

Copy the files ArrayQueue.h and ArrayQueue.cpp to create the new files SumQueue.h and SumQueue.cpp.

Add an additional member variable to the class that keeps track of the sum of all the members in the Queue and a member function called `getSum()` which returns this sum.

Answer the following questions in lab5.txt.

- Which member functions besides getSum() would you have to update to keep track of the Sum?
- Should the new member variable for Sum be private or public? Why?
- Should the getSum function be const? Why?

Make those changes in SumQueue.cpp. Compile and run q3.cpp using the following command.

```
clang++ -Wall q3.cpp -o q3
```

Expected Output

```
Inserting 1
Current sum is: 1
Inserting 3
Current sum is: 4
Inserting 2
Current sum is: 6
Inserting 4
Current sum is: 10
Inserting 5
Current sum is: 15
Inserting 7
Current sum is: 22
Inserting 8
Current sum is: 30
Inserting 6
Current sum is: 36
--------------------
Current sum is: 36
Removing 1
```

```
Current sum is: 35
Removing 3
Current sum is: 32
Removing 2
Current sum is: 30
Removing 4
Current sum is: 26
Removing 5
Current sum is: 21
Removing 7
Current sum is: 14
Removing 8
Current sum is: 6
Removing 6
```

Submitting

Submit your source code and your discussion log: `~csci132/bin/submit`
Be sure that the program prologue for each file you submit contains your name, course, date, and purpose of the program or a description of the contents of the file.