Data Structures

Queue Homework 3

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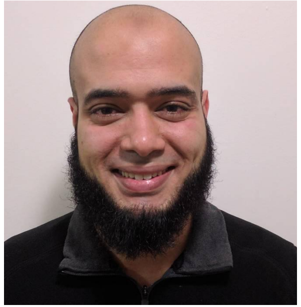
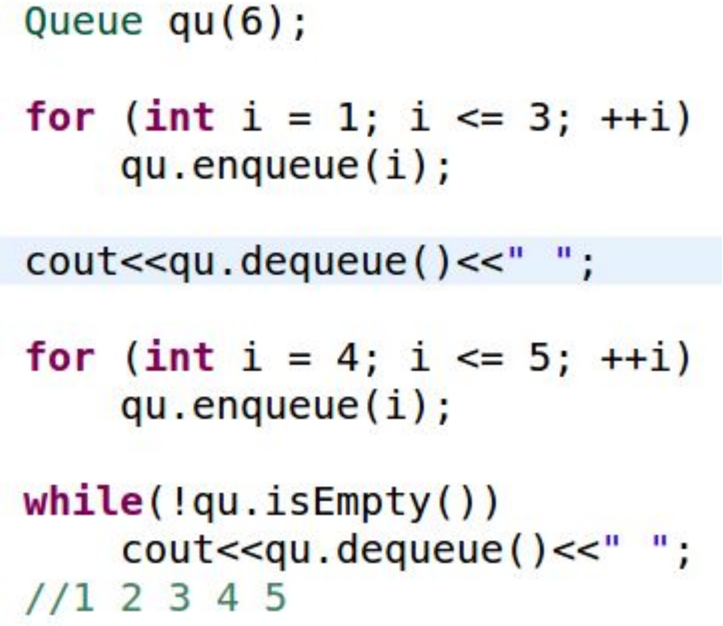
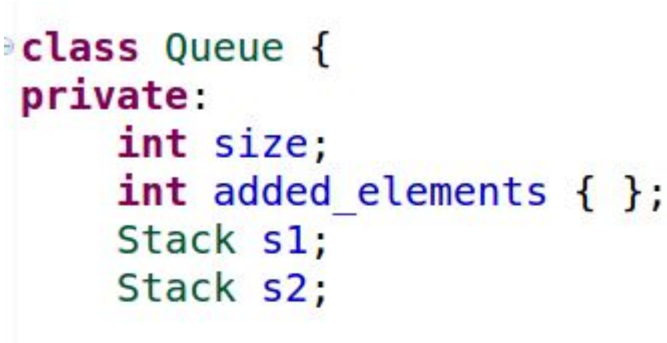


Problem #1: Queue using 2 Stacks: **O(1)** **enqueue**

- Implement Queue functionalities using 2 stack objects
- However, the **enqueue**() function must remain O(1)

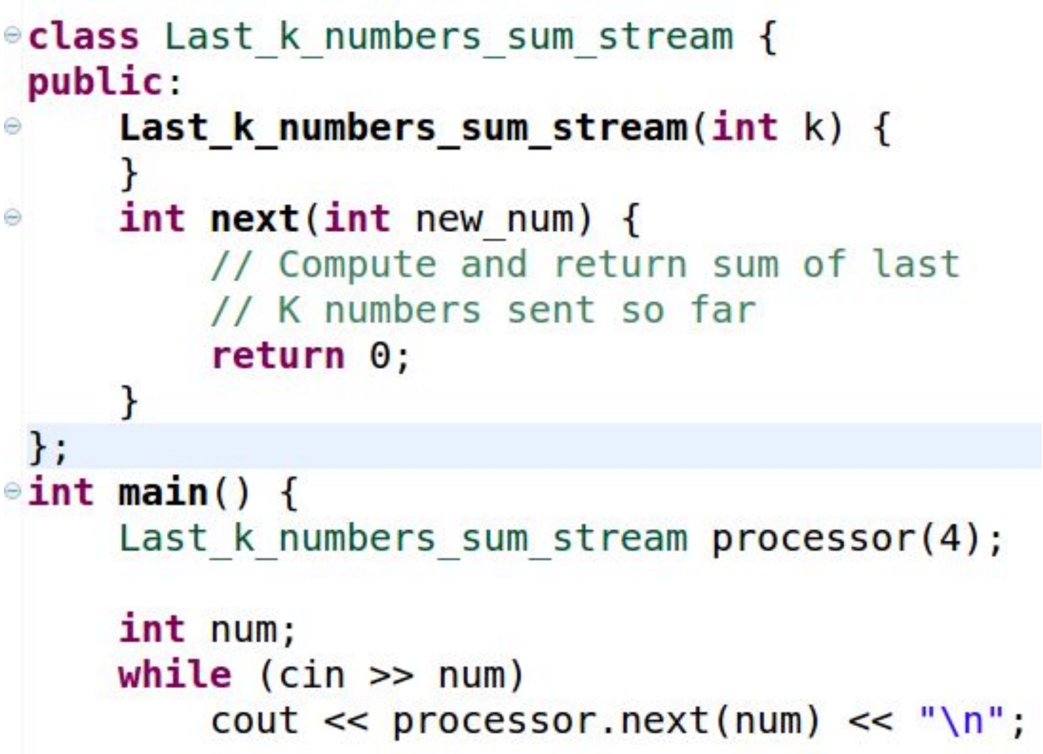


```
Queue qu(6);

for (int i = 1; i <= 3; ++i)
    qu.enqueue(i);

cout<<qu.dequeue()<<" ";

for (int i = 4; i <= 5; ++i)
    qu.enqueue(i);

while(!qu.isEmpty())
    cout<<qu.dequeue()<<" ";
//1 2 3 4 5
```



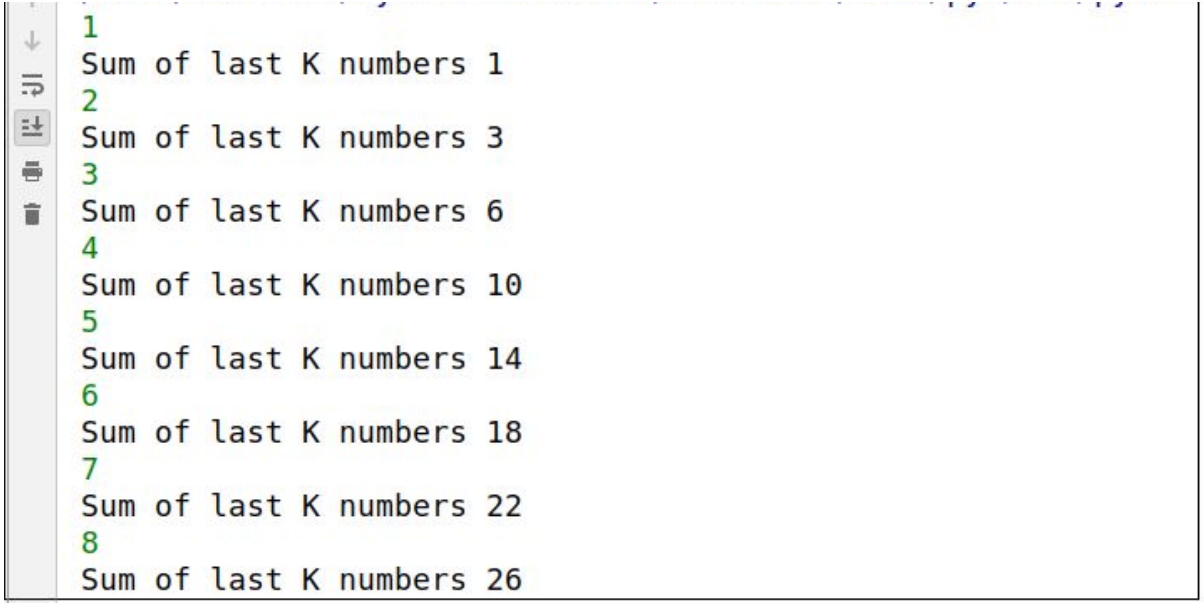
```
class Queue {
private:
    int size;
    int added_elements { };
    Stack s1;
    Stack s2;
```

Problem #2: Sum of last K numbers (stream)



```
class Last_k_numbers_sum_stream {
public:
    Last_k_numbers_sum_stream(int k) {
    }
    int next(int new_num) {
        // Compute and return sum of last
        // K numbers sent so far
        return 0;
    }
};
int main() {
    Last_k_numbers_sum_stream processor(4);

    int num;
    while (cin >> num)
        cout << processor.next(num) << "\n";
```

- This class receives an **infinite stream** of numbers, each time returning the sum of the last k numbers
- E.g. if k = 4
- Stream: 1 2 3 **4** 5 6 7 8 9
- Returns: 1, 1+2, 1+2+3, **1+2+3+4**, 2+3+4+5, 3+4+5+6, ..
  - That is for 6 ⇒ 18



```
1
Sum of last K numbers 1
2
Sum of last K numbers 3
3
Sum of last K numbers 6
4
Sum of last K numbers 10
5
Sum of last K numbers 14
6
Sum of last K numbers 18
7
Sum of last K numbers 22
8
Sum of last K numbers 26
```

“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”