C++ Programming

STL Practice #5

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Teaching, Training and Coaching since more than a decade!

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Practice: Sliding Window Maximum

Given an array *nums*, there is a sliding window of size *k* which is moving from the very left of the array to the very right. You can only see the *k* numbers in the window. Each time the sliding window moves right by one position. Return the max sliding window.

Input: *nums* = [1,3,-1,-3,5,3,6,7], and *k* = 3
Output: [3,3,5,5,6,7]
Explanation:

```
Window position                Max
---------------               -----
[1  3  -1] -3  5  3  6  7       3
 1 [3  -1  -3] 5  3  6  7       3
 1  3 [-1  -3  5] 3  6  7       5
 1  3  -1 [-3  5  3] 6  7       5
 1  3  -1  -3 [5  3  6] 7       6
 1  3  -1  -3  5 [3  6  7]      7
```

Practice: Sliding Window Maximum

- We can easily solve this problem by 2 nested loops.
- One over i for n, and another starts from i to k. Find maximum
- This is slow
- It is hard to design faster solutions.
  - We will show faster solution using mutliset
  - Optional: Attached a much faster solution use deque

Practice: Sliding Window Maximum

```
5  vector<int> maxSlidingWindow1(vector<int>& nums, int k) {
6      vector<int> ret;
7
8      if ((int)nums.size() < k)
9          return ret;
10
11     multiset<int> st;
12     for (int i = 0; i < k; ++i) {
13         st.insert(-nums[i]);
14     }
15     ret.push_back(-*st.begin());
16
17     for (int i = k; i < (int)nums.size(); ++i) {
18         st.erase(st.find(-nums[i-k]));
19         st.insert(-nums[i]);
20         ret.push_back(-*st.begin());
21     }
22     return ret;
23 }
```

Input: *nums* = [1,3,-1,-3,5,3,6,7], and *k* = 3
Output: [3,3,5,5,6,7]
Explanation:

Window position	Max
[1 3 -1] -3 5 3 6 7	**3**
1 [3 -1 -3] 5 3 6 7	**3**
1 3 [-1 -3 5] 3 6 7	**5**
1 3 -1 [-3 5 3] 6 7	**5**
1 3 -1 -3 [5 3 6] 7	**6**
1 3 -1 -3 5 [3 6 7]	**7**

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."