

Friday, 14 September 2018

LAB DEMO 03

PS1 debrief

- Common mistake(s):
 - Inserting into arbitrary position in vector/array -> $O(N)$ each insertion -> TLE
 - Try some $\log(N)$ solution using multiset/2 PQ (if you googled) -> TLE
 - Tried 'counting sort', but missed handling some corner case (e.g. no 3s) -> WA

PS1 debrief

Note that you are asked to implement a data structure for a total of $O(N)$ insertion + query median

Together with the analysis from Lab 02, we can estimate the rough time complexity needed for each of this ins + query operation

- A -> ins + query must be at most $O(N \log(N))$ -> sorting
- B -> ins + query must be at most $O(N)$ -> insertion into sorted array/vector (Note: `nth_element` would give an expected $O(N)$ for each operation, but due to its high constant, would TLE)
- C -> ins + query must be at most $O(1)$ -> “counting sort”!

PS1 debrief



1

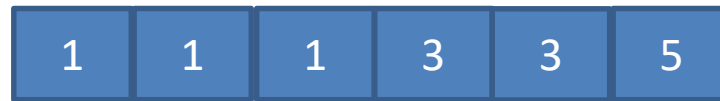


3



5

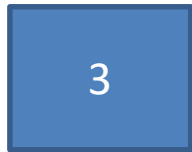
Use 3 'buckets' to count the number of each element (so far)



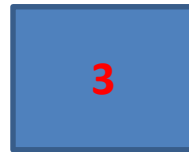
Simulate the array status
(without actually adding!!!)

$$\text{Median} = (1 + 3) / 2 = 2$$

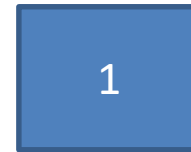
PS1 debrief



1



3



5

Add 3



Median = 3

PS1 debrief



1



3



5

Add 1



$$\text{Median} = (1 + 3) / 2 = 2$$

Last Week Homework:

- <https://nus.kattis.com/problems/throws>

C++ STL list demo

- constructor
- push_back, pop_back, push_front :O, pop_front :O
- insert, erase
- front, back
- begin, end
- <http://en.cppreference.com/w/cpp/container/list>
- <http://www.cplusplus.com/reference/iterator>
- <http://www.cplusplus.com/reference/list/list/sort>

Own List Implementation Demo

- We will first show a (truncated) SinglyLinkedList class that only show Insertion at head and Removal of head item (other details not necessary for this demo)

VisuAlgo Training Mode

PS2 is clearly about List :O

Make sure that you understand the explanation in:

<https://visualgo.net/en/list?slide=1> (until the last slide)

You can use VisuAlgo Online Quiz training mode to check your basic understanding about Linked List, Stack, Queue, Deque on “infinite” number of random questions:

<https://visualgo.net/training?diff=Hard&n=5&tl=5&module=list>

(Now the Hard mode is opened again for public :O...)

PS2 Status (as of today)

Name	A	B	C	D :O
Group A 0+2+0	AC	AC	AC	AC
Group B 7+1+0	AC	AC	AC	
Group C 2+0+0	AC	AC		
Group D 3+0+0	AC			
Have not tried: Group E 17+17+11				