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Demo ticket

Session

ID: demoTE52RC-2BR  
Time limit: 120 min.

Status: closed

Created on: 2014-12-14 09:10 UTC  
Started on: 2014-12-14 09:10 UTC  
Finished on: 2014-12-14 09:10 UTC

Tasks in test

1 | MaxCounters

Correctness

100%

Performance

100%

Task score

100%

Test score

100%  
100 out of 100 points

MEDIUM

1. MaxCounters

Calculate the values of counters after applying all alternating operations: increase counter by 1; set value of all counters to current maximum.

score: 100 of 100

Task description

You are given N counters, initially set to 0, and you have two possible operations on them:

- *increase(X)* – counter X is increased by 1,
- *max counter* – all counters are set to the maximum value of any counter.

A non-empty zero-indexed array A of M integers is given. This array represents consecutive operations:

- if A[K] = X, such that 1 ≤ X ≤ N, then operation K is *increase(X)*,
- if A[K] = N + 1 then operation K is *max counter*.

For example, given integer N = 5 and array A such that:

A[0] = 3  
A[1] = 4  
A[2] = 4  
A[3] = 6  
A[4] = 1  
A[5] = 4  
A[6] = 4

the values of the counters after each consecutive operation will be:

(0, 0, 1, 0, 0)  
(0, 0, 1, 1, 0)  
(0, 0, 1, 2, 0)  
(2, 2, 2, 2, 2)  
(3, 2, 2, 2, 2)  
(3, 2, 2, 3, 2)  
(3, 2, 2, 4, 2)

The goal is to calculate the value of every counter after all operations.

Solution

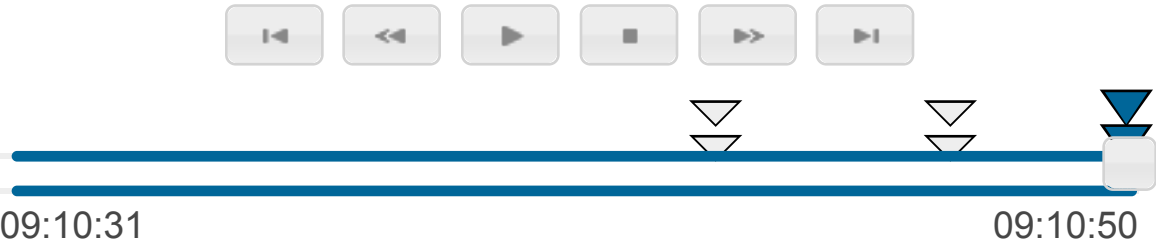
Programming language used: Ruby

Total time used: 1 minutes

Effective time used: 1 minutes

Notes: not defined yet

Task timeline



Code: 09:10:50 UTC, rb, final, score: 100.00

```
1 def solution(n, a)
2   #[3, 2, 2, 4, 2]
3   r = Array.new(n, 0)
4   max = 0
5   max_count_pending = 0
6   a.each do |e|
7     i = e - 1
8     if e > n
9       max_count_pending = max
10    else
11      if r[i] < max_count_pending
12        r[i] = max_count_pending
```

Write a function:

```
def solution(n, a)
```

that, given an integer N and a non-empty zero-indexed array A consisting of M integers, returns a sequence of integers representing the values of the counters.

The sequence should be returned as:

- a structure Results (in C), or
- a vector of integers (in C++), or
- a record Results (in Pascal), or
- an array of integers (in any other programming language).

For example, given:

```
A[0] = 3
A[1] = 4
A[2] = 4
A[3] = 6
A[4] = 1
A[5] = 4
A[6] = 4
```

the function should return [3, 2, 2, 4, 2], as explained above. Assume that:

- N and M are integers within the range [1..100,000];
- each element of array A is an integer within the range [1..N + 1].

Complexity:

- expected worst-case time complexity is O(N+M);
- expected worst-case space complexity is O(N), beyond input storage (not counting the storage required for input arguments).

Elements of input arrays can be modified.

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```
13     end
14     r[i] += 1
15     max = r[i] if max < r[i]
16   end
17 end
18 r.each_with_index do |v, k|
19   if r[k] < max_count_pending
20     r[k] = max_count_pending
21   end
22 end
23 r
24 end
```

Analysis

Detected time complexity:  
**O(N + M)**

test	time	result
Example tests		
example example test	0.068 s	OK
Correctness tests		
extreme_small all max_counter operations	0.064 s	OK
single only one counter	0.064 s	OK
small_random1 small random test, 6 max_counter operations	0.068 s	OK
small_random2 small random test, 10 max_counter operations	0.060 s	OK
Performance tests		
medium_random1 medium random test, 50 max_counter operations	0.072 s	OK
medium_random2 medium random test, 500 max_counter operations	0.068 s	OK
large_random1 large random test, 2120 max_counter operations	0.164 s	OK
large_random2 large random test, 10000 max_counter operations	0.276 s	OK
extreme_large all max_counter operations	0.372 s	OK

Training center