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[Interview Experience] [Island] Roblox OA 2023 Four Coding Questions | Summer Software Engineer | Only look at dry goods

overseas experience roblox

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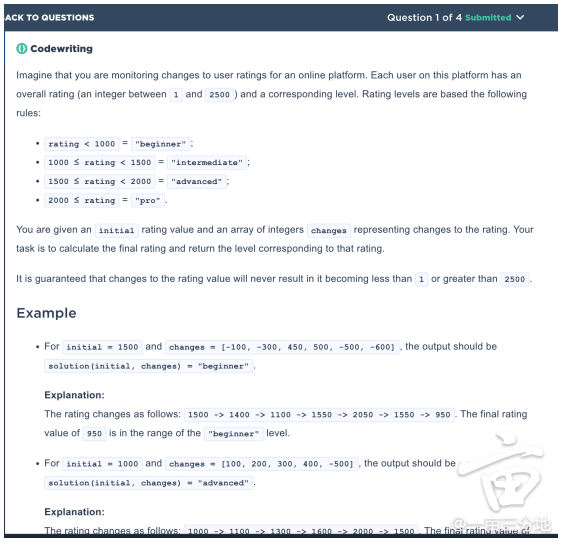
2022 (July-September) General Undergraduate Internship @ Roblox - Online Shanghai Investment - Online Written Test | Positive AverageOther | Fresh Graduates

Four Coding questions, three Easy and one Medium, 70min; I feel that the framework of Roblox is that the first two traverse the array, the third build a system (not too difficult but need to parse string), the fourth is a bit harder, array + extra Data structures, such as Hash, Prefix Sum, etc.; the following are four complete questions:

Q1: Calculate the final value

- traverse the array once, complete the addition and subtraction in the process, and get the final value

- O (n)



Q2: The longest string

- traverse the string and find the longest continuous substring

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Comparison of new crown vaccines in the United States: Pfizer, Moderna, Johnson & Johnson,

- O (n)

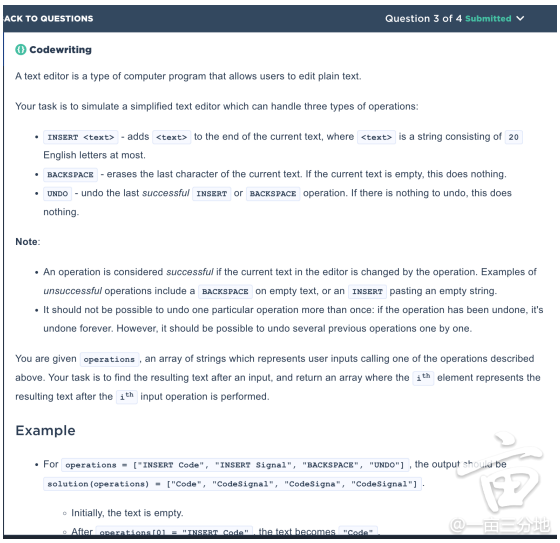
Q3: Design a text editor

- there are three kinds of commands: INSERT, BACKSPACE, UNDO

- you can use a stack to record the previous command, and you can pop one each time UNDO

- need to process the next string, but it is not too difficult

- O (n)

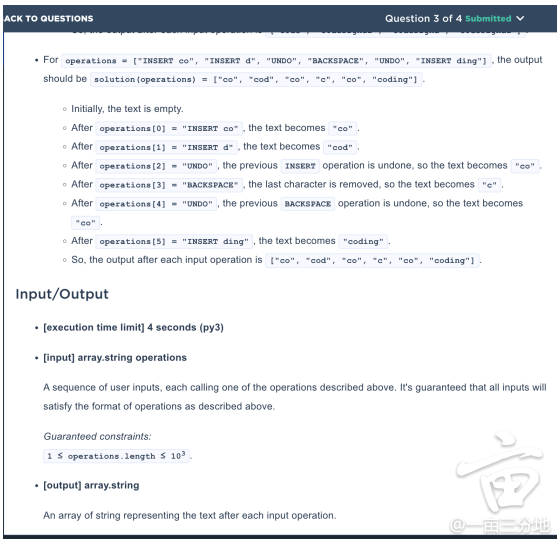


`solution(operations) = ["Code", "CodeSignal", "CodeSigna", "CodeSignal"]`.

- Initially, the text is empty.
- After `operations[0] = "INSERT Code"`, the text becomes `"Code"`.
- After `operations[1] = "INSERT Signal"`, the text becomes `"CodeSignal"`.
- After `operations[2] = "BACKSPACE"`, the last character is removed, so the text becomes `"CodeSigna"`.
- After `operations[3] = "UNDO"`, the previous `BACKSPACE` operation is undone, so the text becomes `"CodeSignal"`.
- So, the output after each input operation is `["Code", "CodeSignal", "CodeSigna", "CodeSignal"]`.

- For `operations = ["INSERT co", "INSERT d", "UNDO", "BACKSPACE", "UNDO", "INSERT ding"]`, the output should be `solution(operations) = ["co", "cod", "co", "c", "co", "coding"]`.
  - Initially, the text is empty.
  - After `operations[0] = "INSERT co"`, the text becomes `"co"`.
  - After `operations[1] = "INSERT d"`, the text becomes `"cod"`.
  - After `operations[2] = "UNDO"`, the previous `INSERT` operation is undone, so the text becomes `"co"`.
  - After `operations[3] = "BACKSPACE"`, the last character is removed, so the text becomes `"c"`.
  - After `operations[4] = "UNDO"`, the previous `BACKSPACE` operation is undone, so the text becomes `"co"`.
  - After `operations[5] = "INSERT ding"`, the text becomes `"coding"`.
  - So, the output after each input operation is `["co", "cod", "co", "c", "co", "coding"]`.

Input/Output



Q4: How many intervals are covered by each point

- give some intervals, that is, the range of street lights, let each point be illuminated by how many street lights

- you can use a diff array

- or slide from left to right, the record is still open of intervals, reducing the number of open intervals each time an end point is reached

- O (n)

Specifically, the lamps are represented in a two-dimensional array `lamps`, where the `i^th` lamp covers the segment from `lamps[i][0]` to `lamps[i][1]`, inclusive.

Additionally, you are given a list of control points on this number line, represented by an array `points`. Your task is to find the number of lamps that illuminate each control point. Specifically, for each control point `points[j]` in the array, your task is to find the number of lamps `lamps[i]` which include this point within its covered segment - when `points[j]` lies inside the segment `[lamps[i][0], lamps[i][1]]`.

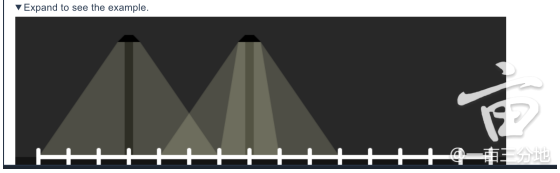
As a result, return an array of integers, where `i^th` integer corresponds to the answer for the `i^th` control point.

Example

For `lamps = [[1, 7], [5, 11], [7, 9]]` and `points = [7, 1, 5, 10, 9, 15]`, the output should be `solution(lamps, points) = [3, 1, 2, 1, 2, 0]`.

Explanation:

▼Expand to see the example.



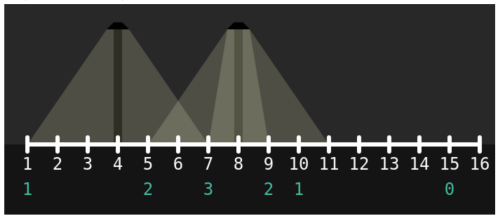
ACK TO QUESTIONS Question 4 of 4

Example

For `lamps = [[1, 7], [5, 11], [7, 9]]` and `points = [7, 1, 5, 10, 9, 15]`, the output should be `solution(lamps, points) = [3, 1, 2, 1, 2, 0]`.

Explanation:

▼Expand to see the example.



- `point[0] = 7` is illuminated by all three lamps: `7` lies in all three segments `[1, 7]`, `[5, 11]`, and `[7, 9]`.
- `point[1] = 1` is illuminated by `lamp[0]`: `1` lies inside `[1, 7]`.
- `point[2] = 5` is illuminated by `lamp[0]` and `lamp[1]`: `5` lies inside both `[1, 7]` and `[5, 11]`.
- `point[3] = 10` is illuminated by `lamp[1]`: `10` lies inside `[5, 11]`.
- `point[4] = 9` is illuminated by `lamp[1]` and `lamp[2]`: `9` lies inside both `[5, 11]` and `[7, 9]`.
- `point[5] = 15` is not illuminated by any lamps.

ACK TO QUESTIONS Question 4 of 4

- `point[5] = 15` is not illuminated by any lamps.

The final answer is `[3, 1, 2, 1, 2, 0]`.

Input/Output

- **[execution time limit] 4 seconds (py3)**
- **[input] array.array.integer lamps**

  A two-dimensional array containing segments of the number line illuminated by the lamps. Each lamp is described by a two-element array.

  Guaranteed constraints:
  `1 ≤ lamps.length ≤ 10^5`,
  `lamps[i].length = 2`,
  `1 ≤ lamps[i][0] ≤ lamps[i][1]`,
  `lamps[i][0] ≤ lamps[i][1] ≤ 10^9`.

- **[input] array.integer points**

  An array containing coordinates of control points.

  Guaranteed constraints:
  `1 ≤ points.length ≤ 10^5`,
  `1 ≤ points[i] ≤ 10^9`.

- **[output] array.integer**

  The number of lamps which illuminate each control point.

That's all four questions! It is recommended that

- the first course 3 minutes

- the second course 5 minutes

- the third course 30 minutes

- the fourth course 30 minutes

Answer to Q4

- use a diff array, add 1 to the starting point of each street light, and -1 to the end point

- and then build a res array, starting from 0, +1 every time you reach +1 in the diff array, and -1 when you reach the diff array

- In this way, the res array records how many lights hit each point~

- Time: O(n)

- Here is the C++ code

- Diff array reference can be found here: https://www.geeksforgeeks.org/di ... ge - update-query-o1/

```
#include <vector>
#include <iostream>
using namespace std;
vector<int> calcLamp(vector<vector<int> >& lamps, vector<int>& points){
    int Max = 0;
    // find the max / furthest position
    for(auto&
        if(vec[1] > Max) Max = vec[1];
    }
    for(int i : points){
        if(i > Max) Max = i;
    }
    // use Max position to initialize the diff array
    vector<int> diff(Max+2, 0);
    vector<int> res(Max+2, 0);
    // diff[] is the difference array
    for(auto& vec : lamps){
        diff[vec[0]] ++;
        diff [vec[1]+1] --;
    }
    // res[] records how many lamps overlap at each position
```

```
    }
    // build the answer array
    vector<int> ans;
    for(int point : points){
        ans.push_back(res[point]);
    }
    return ans;
}
int main(){
    vector<vector<int> > lamps;
    vector<int> points = {7, 1, 5, 10, 9, 15};
    lamps.push_back({1, 7});
    lamps.push_back({5, 11});
    lamps.push_back({7, 9});
    calcLamp(lamps, points);
}
```


Screen Shot 2022-08-23 at 2.48.43 PM.png (221.78 KB, Downloads: 3)

Explanation:

The rating changes as follows: `1000 -> 1100 -> 1300 -> 1600 -> 2000 -> 1500`. The final rating value of `1500` is in the range of the `"advanced"` level.

Input/Output

- **[execution time limit] 4 seconds (py3)**
- **[input] integer initial**

  An initial rating value.

  Guaranteed constraints:

  `1 ≤ initial ≤ 2500`.
- **[input] array.integer changes**

  An array of integers representing rating changes.

  Guaranteed constraints:

  `0 ≤ changes.length ≤ 1000`,

  `-1000 ≤ changes[i] ≤ 1000`.
- **[output] string**

  The level of the final rating as described above.

score

Number of participa	Rice +37	reason	put away
garimell	+ 1	thank you, owner	
God of Qing Dac	+ 30		
JJJEEE	+ 1	Give you a Like!	
LUDL0WS	+ 1	Give you a Like!	
qwertycc123	+ 1	Very useful information!	
in the evening	+ 1	Give you a Like!	
Xuan Xuan Xuan	+ 1	Very useful information!	
ghost2019	+ 1	Very useful information!	

check all ratings

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Has been added, the landlord. Can you ask more about the idea of the fourth question? I didn't want to understand the solution with a time complexity of N. Using the method you said, don't you need to sort the lamps first, so that there will be a complexity of NlogN. Thanks!

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第四题lamps不sort的话没法sweep line吧?

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已加米，楼主。能多问问第四题的思路吗，没有想明白时间复杂度为N的解。用你说的方法，不需要先sort一下lam ...

求问最后咋做的呀

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已加米，楼主。能多问问第四题的思路吗，没有想明白时间复杂度为N的解。用你说的方法，不需要先sort一下lam ...

Q4答案已补充到帖子，谢谢留言！

回复 评分 举报

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小宙_e3cf8fe 发表于 2022-9-1 02:57

最后一题可以用binary indexed tree做吧，时间复杂度是nlogn，O（n）没想到咋做

Binary index tree 应该也可以，用 diff array 可以做到 O(n)，答案已补充～

回复 评分 举报

地里匿名用户 匿名用户-034 2022-9-7 14:33:57

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匿名用户 发表于 2022-8-31 23:26

第四题lamps不sort的话没法sweep line吧?

是的 sweep line 应该需要先sort，不过用 diff array 应该可以 O(n)，已补充答案～

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