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Demo ticket

Session

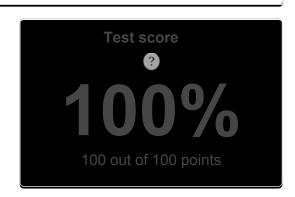
ID: demoKJ8RBQ-4WA Time limit: 120 min.

Status: closed

Created on: 2014-03-16 01:01 UTC Started on: 2014-03-16 01:02 UTC Finished on: 2014-03-16 02:02 UTC

Tasks in test

Task score



1. TapeEquilibrium

Minimize the value |(A[0] + ... + A[P-1]) - (A[P] + ... + A[N-1])|.

score: 100 of 100



Task description

A non-empty zero-indexed array A consisting of N integers is given. Array A represents numbers on a tape.

Any integer P, such that 0 < P < N, splits this tape into two non-empty parts: A[0], A[1], ..., A[P - 1] and A[P], A[P + 1], ..., A[N - 1].

The difference between the two parts is the value of: |(A[0] + A[1] + ... + A[P - 1]) - (A[P] + A[P + 1] + ... + A[N - 1])|

In other words, it is the absolute difference between the sum of the first part and the sum of the second part.

For example, consider array A such that:

A[0] = 3

A[1] = 1

A[2] = 2

A[3] = 4A[4] = 3

We can split this tape in four places:

- P = 1, difference = |3 10| = 7
- P = 2, difference = |4 9| = 5
- P = 3, difference = |6 7| = 1
- P = 4, difference = |10 3| = 7

Write a function:

```
int solution(vector<int> &A);
```

that, given a non-empty zero-indexed array A of N integers, returns the minimal difference that can be achieved.

For example, given:

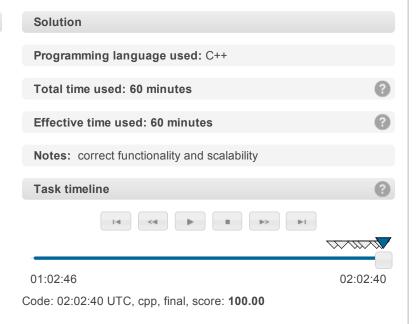
A[0] = 3A[1] = 1

A[2] = 2A[3] = 4

A[4] = 3

the function should return 1, as explained above.

Assume that:



01. 02. 03. int solution(vector<int> &A) { long sumleft = 0; 04. long sumright = 0; 05. long localmin; 06. 07. long ans; 08. 09. // start from 2nd element 10. for (int i = 1; i < (int)A.size(); i++) {</pre> 11. sumright += A[i]; 12. 13. 14. sumleft = A[0]; 15. ans = abs(sumright - sumleft); 16. for (int i = 1; i < (int)(A.size() - 1); i++) {</pre> 17. sumleft += A[i];
sumright -= A[i]; 18. 19. 20. localmin = abs(sumleft - sumright);

#include <cstdlib>

- N is an integer within the range [2..100,000];
- each element of array A is an integer within the range [-1,000..1,000].

Complexity:

- expected worst-case time complexity is O(N);
- 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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21.	<pre>if (localmin < ans) {</pre>
22.	ans = localmin;
23.	}
24.	}
25.	
26.	return ans;
27.	}

Analysis



Detected time complexity: O(N)

test	time	result
example example test	0.020 s.	ок
double two elements	0.020 s.	ок
simple_positive simple test with positive numbers, length = 5	0.020 s.	ок
simple_negative simple test with negative numbers, length = 5	0.020 s.	ок
small_random random small, length = 100	0.020 s.	ок
small_range range sequence, length = ~1,000	0.020 s.	ОК
small small elements	0.020 s.	ок
medium_random1 random medium, numbers from 0 to 100, length = ~10,000	0.020 s.	ок
medium_random2 random medium, numbers from -1,000 to 50, length = ~10,000	0.020 s.	ок
large_ones large sequence, numbers from -1 to 1, length = ~100,000	0.030 s.	ок
large_random random large, length = ~100,000	0.040 s.	ок
large_sequence large sequence, length = ~100,000	0.030 s.	ок
large_extreme large test with maximal and minimal values, length = ~100,000	0.030 s.	ок

Training center