Competitive Programming

Lec 3. Array & Sorting

Sorting Algorithms

1. Merge Sort
2. Quick sort

Avg. Time Complexity : O(N log N)

Algorithm visualization

Equilibrium point [Easy]

Given an array A of N positive numbers. The task is to find the position where equilibrium first occurs in the array. Equilibrium position in an array is a position such that the sum of elements before it is equal to the sum of elements after it.

Ex.

1 3 5 2 2

solution

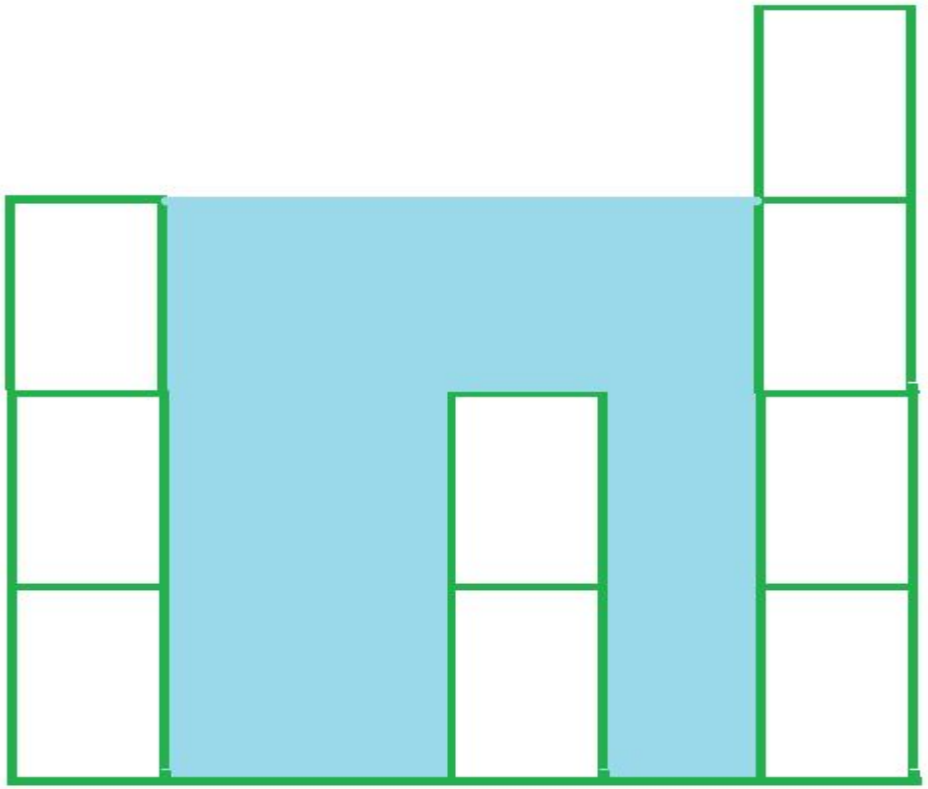
Trapping Rain Water [Medium]

Given an array arr[] of N non-negative integers representing height of blocks at index i as Ai where the width of each block is 1. Compute how much water can be trapped in between blocks after raining.

Ex.

Input:
4
7 4 0 9

Output:
10



Bars for input {3, 0, 0, 2, 0, 4}
Total trapped water = 3 + 3 + 1 + 3 = 10

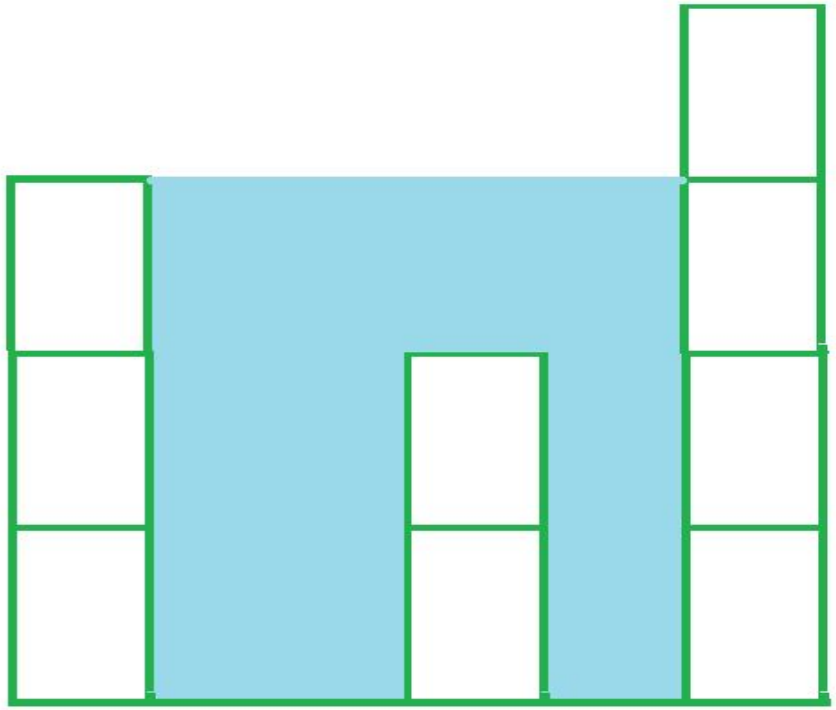
Amazon, Adobe, PayTm, Accolite

Trapping Rain Water [Medium]

Input : [2 3 0 0 2 0 4 0 5]

Left_Max: [2 3 3 3 3 3 4 4 5]
Right_Mx: [5 5 5 5 5 5 5 5 5]

solution



Bars for input {3, 0, 0, 2, 0, 4}
Total trapped water = 3 + 3 + 1 + 3 = 10

Maximum Consecutive Gap [Hard]

Given an unsorted array, find the maximum difference between the successive elements in its sorted form.

Try to solve it in **linear time/space**.

Example :

Hint: Radix sort

Input : [1, 10, 5]
Output : 5
Return 0 if the array contains less than 2 elements.

- You may assume that all the elements in the array are non-negative integers and fit in the 32-bit signed integer range.
- You may also assume that the difference will not overflow.

Homework

1. Leader [similar to Equilibrium point problem]
2. Eat Twice [vector of pairs]
3. Merge Overlapping Intervals [vector, pair, comparator, asked in Google, Amazon]
4. Spiral Order Matrix II [this problem will improve your implementation skills]
5. Sereja and Stairs [vector, sorting]