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C. Odd Subset XOR

Limits 1s, 512 MB

You are given a set of n distinct positive integers. There can be many subsets of this set. However, we are only interested in the subsets of odd length.

Let us define the strength of a set as the bit-wise XOR of all the elements of the set.

The task is to find the bit-wise XOR of the strengths of all the subsets of odd length, of the given set.

Input

The first line contains n ($0 < n < 10^6$).

The second line contains n distinct positive integers. All these integers are less than 10^9 .

Output

Print only one integer, the bit-wise XOR of the strengths of all the subsets of odd length, of the given set.

Sample

Input	Output
3 1 2 3	0

The subsets of odd lengths are $\{1\}$, $\{2\}$, $\{3\}$, $\{1, 2, 3\}$. The strengths of these sets are 1, 2, 3, 0. Bitwise XOR of these numbers is 0.

In most programming languages, the \wedge operator does the bit-wise XOR operation.

Submit

Choose a programming language, select your solution file, and click on Submit.

Python Python 3.12

Choose File No file chosen

Up to 64 kB.

Submit Open Editor

Clarifications Request

Is there any required time complexity for this problem?

28m ago