SGS Programming Challenge P1 - XOR in Computer Class

Andy recently learned about the bitwise XOR operation in computer class.

One of Andy's friends owns an array a, which has a length of N. Andy wants to make his friend sad by XORing all of the numbers in a by a non-negative number x such that the sum of the sums of each subarray is minimal. Since Andy is not an expert at XOR, he asks you to find x for him. If multiple solutions exist for x, output the smallest one.

Recall subarrays are consecutive subsequences. For example, the subarrays of the array $[1, 2, 3]$ are $[1], [2], [3], [1, 2], [2, 3], [1, 2, 3]$. The sum of the sums of each subarray for this array will be $(1) + (2) + (3) + (1 + 2) + (2 + 3) + (1 + 2 + 3) = 20$.

Constraints

For all subtasks:

$1 \leq N \leq 2 \times 10^5$

$0 \leq a_i \leq 10^9$

Subtask 1 [30%]

$0 \leq a_i \leq 1$

Subtask 2 [70%]

No additional constraints.

Input Specification

The first line contains an integer N.

The second line contains N integers, his friend's array a.

Output Specification

Output the minimal solution for x, which is the number that Andy wishes to know.

Sample Input 1

```
3
1 2 3
```

Sample Output 1

```
3
```

Explanation for Sample 1

After XORing by 3, the array becomes $[2, 1, 0]$. The sum of the sums of each subarray is $(2) + (1) + (0) + (2 + 1) + (1 + 0) + (2 + 1 + 0) = 10$. It can be shown that 10 is the smallest possible sum of the sums of each subarray.

Sample Input 2

```
7
7 9 10 43 56 2 4
```

Sample Output 2

```
10
```