Yet Another Minimax Problem

You are given n non-negative integers, $a_0, a_1, \ldots, a_{n-1}$. We define the *score* for some permutation (p) of length n to be the maximum of $a_{p_i} \oplus a_{p_{i+1}}$ for $0 \le i < n-1$.

HackerRank

Find the permutation with the minimum possible score and print its score.

Note: \oplus is the exclusive-OR (XOR) operator.

Input Format

The first line contains single integer, n, denoting the number of integers.

The second line contains n space-separated integers, $a_0, a_1, \ldots, a_{n-1}$, describing the respective integers.

Constraints

- $2 \le n \le 3000$
- $0 \leq a_i \leq 10^9$

Output Format

Print a single integer denoting the minimum possible score.

Sample Input 0

4 1 2 3 4

Sample Output 0

5

Sample Input 1

3 1 2 3

Sample Output 1

2

Explanation

Sample Case 0:

The permutation with the *minimum score* is (3, 2, 1, 4):

1/2

 $a_0\oplus a_1=3\oplus 2=1\ a_1\oplus a_2=2\oplus 1=3\ a_2\oplus a_3=1\oplus 4=5$

Because the permutation's score is the *maximum* of these values, we print ${f 5}$ on a new line.

Sample Case 1: The permutation with the minimum score is (1, 3, 2): $a_0 \oplus a_1 = 1 \oplus 3 = 2$ $a_1 \oplus a_2 = 3 \oplus 2 = 1$

Because the permutation's score is the maximum of these values, we print ${f 2}$ on a new line.