

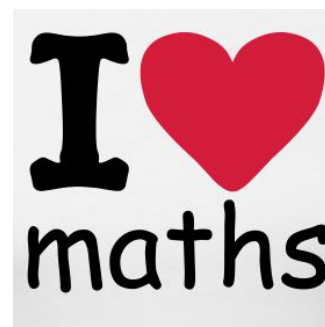
Problem H

Maximum XOR

Time Limit: 2 seconds

Thanh loves XOR operator (i.e. bitwise 'XOR' or 'exclusive or'). Last night he dreamed and saw a mathematic problem with XOR operator:

- Give a set of positive integers $T = \{a_1, a_2, a_3, \dots, a_{|S|}\}$, we call a function $X(T) = a_1 \oplus a_2 \oplus \dots \oplus a_{|S|}$. Where \oplus is the symbol for the XOR operator.
- For a set of N positive integers S , we need to compute function $F(S) = \text{maximum of the X-function for all subsets } T \text{ of the given set } S$. If S is empty then $F(S) = 0$.



This problem looks quite challenging but it is still too easy for competitive programmers at the ACM-ICPC contest. That's why Thanh decided to increase the difficulty of this problem to a new level:

- Instead of having a fixed set S at the beginning, now you need to deal with the dynamic set S .
- At the beginning, the set S is empty. We have N steps, at each step a new integer will be added to the set S or an integer in set S will be removed from the set. For each step, you must compute the function $F(S)$ after adding or removing action.
- It is always guaranteed that the integers in set S are pairwise distinct at any time. All the removing action is valid, i.e., we only remove numbers that already added in set S .

Input

The first line contains an integer N . ($1 \leq N \leq 10^5$).

The next line contains N integers, the i^{th} integer: v_i ($1 \leq |v_i| \leq 10^{18}$) define the action at step i .

- If $v_i > 0$, it is the action: Add integer v_i to set S .
- If $v_i < 0$, it is the action: Remove integer $|v_i|$ from set S .

Output

Display N space-separated numbers on the first line, the i^{th} number is the result of the F -function for the current set S after the adding/removing action at the i^{th} step.

Sample Input

Sample Output

4	1 3 7 5
1 2 4 -2	