Bit-Manipulation

video-5

Leetcode - 2433

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Find the original Array of Prefix Xor

Company :- Microsoft

2433. Find The Original Array of Prefix Xor

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You are given an **integer** array `pref` of size `n`. Find and return *the array* `arr` *of size* `n` *that satisfies*:

- `pref[i] = arr[0] ^ arr[1] ^ ... ^ arr[i]`.

Note that `^` denotes the **bitwise-xor** operation.

It can be proven that the answer is **unique**.

Example :- pref = [5, 2, 0, 3, 1]

arr = [5, 7, 2, 3, 2]

pref[i] ∧ pref[i-1] = arr[i]

pref[4] ∧ pref[3] = arr[4]

5 = a0

2 = a0 ∧ a1

0 = a0 ∧ a1 ∧ a2

3 = a0 ∧ a1 ∧ a2 ∧ a3

1 = a0 ∧ a1 ∧ a2 ∧ a3 ∧ a4

3 ∧ 1 = (a0 ∧ a1 ∧ a2 ∧ a3) ∧ (a0 ∧ a1 ∧ a2 ∧ a3 ∧ a4)

0)

10

$= (a0 \wedge a0) \wedge (a1 \wedge a1) \wedge (a2 \wedge a3) \wedge a4$

$2 = a4$

Associative $\Rightarrow (a \wedge b) \wedge c = a \wedge (b \wedge c)$ ⇐

Commutative $\Rightarrow (a \wedge b) = (b \wedge a)$ ⇐

XOR $\Rightarrow$ $1 \wedge 1 = 0$ ⇐ ⇐

$1 \wedge 0 = 1$

$0 \wedge 1 = 1$

$0 \wedge 0 = 0$

Story to Code ...

ⓐ arr

ⓑ arr[0] = pref[0]

ⓒ arr[i] = pref[i] ∧ pref[i-1]

T.C - O(n)

i: 0 1 2 3 4

pref = {5, 7, 2, 3, 2}