$$342 \rightarrow 300 + 40 + 2$$

$$-3 3 \times (00 + 4 \times 10 + 2) = 3 \times (0^{2} + 4 \times 10^{1} + 2 \times 10^{0})$$

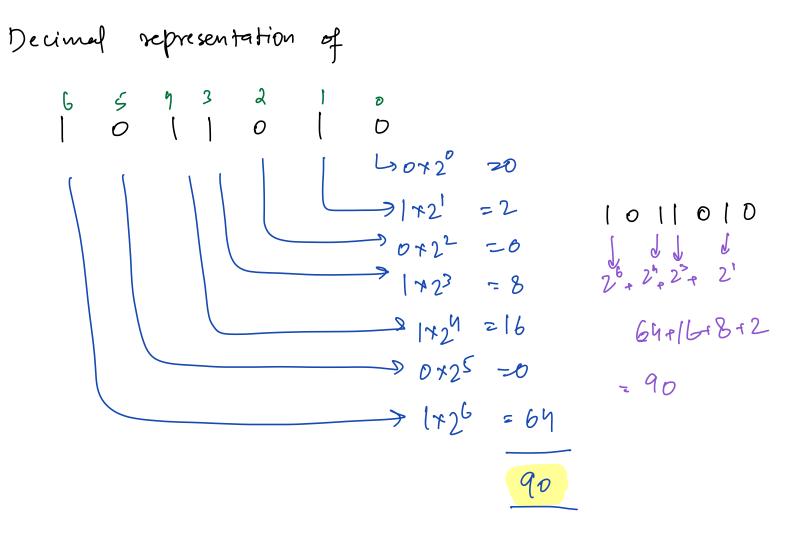
$$3 \times 3 \times 3 \times 3 \times 10^{2} + 4 \times 10^{1} + 3 \times 10^{0} + 6 \times 10^{0}$$

$$3 \times 3 \times 3 \times 10^{0} + 3 \times 10^{0} + 6 \times 10^{0}$$

$$6 \times 3 \times 10^{0} + 6 \times 10^{0}$$

$$6 \times 3 \times 10^{0} + 6 \times 10^{0}$$

$$6 \times 3 \times 10^{0} + 6 \times 10^{0}$$



Decimed to Binan

Addition in decimal

Addition in Binary

$$(2)_{10} \rightarrow ((0)_2$$

Som of
$$| 0 | 1 | 0 | (3)_{10} = (11)_{2}$$

$$| 0 | 0 | 1 | 1$$

$$| 1 | 1 | 1 | 0 | = (11|01)_{2}$$

Bitwise Operations

Properties

If
$$x=0$$
 \Rightarrow $0 - x^{2} + x^{2}$
even even even

a.
$$A20 = 0$$
 | $120 = 0$

2.
$$A20 = 0$$
 |20 = 0 | 010 = 0

3.
$$ALA = A$$

$$A = [0]$$

$$2 |0|$$

$$12| = 1$$

$$020 = 0$$

$$4. A \mid 0 = A$$

$$A = \mid 0 \mid$$

$$0 = 0$$

$$0 = 0$$

$$0 = 0$$

$$A = \{0 \mid 0 \}$$
 $0 = 0000$
 $0 \mid 0 \mid 0 = A$

$$\begin{vmatrix} 1 \\ 1 \end{vmatrix} = 0$$

$$0 \begin{vmatrix} 1 \\ 0 \end{vmatrix} = 0$$

$$A = \{0\} \{0\}$$

$$|-000|$$

$$|01|-A+1$$

Commutative Property

Association Property

(ALE) 2C = A & (BCC)

A | 0 | 1 0 | 7ALE > 00 | 00| 7(ALE) 2C, 00 | 00|

B | 0 0 | 0 | 1 | 7ALE > 00 | 00|

C | 1 | 0 0 | 7ALE > 00 | 00|

(A|B) C = A | (B|C)

(A^B) C = A | (B|C)

(A^B) C = A^ (B^C)

Subtion:
$$a^b a^b a^b b^b a^b$$
 $a^a a^b b^b b^b a^b$
 $a^a a^b b^b b^b a^b$

» (o ^o) ^ d

 $z o^{1}d z d$

Snution 1

Civen N etements, every element repeats twice in array except one. find the unique element?

a(5) = 25244

Aws=5)

XOR all array elements

Code int unique (a11) {
n=a.length

aw = 0

for [i=0; i<n; ++i) \{
aus = aus 1 a ii)

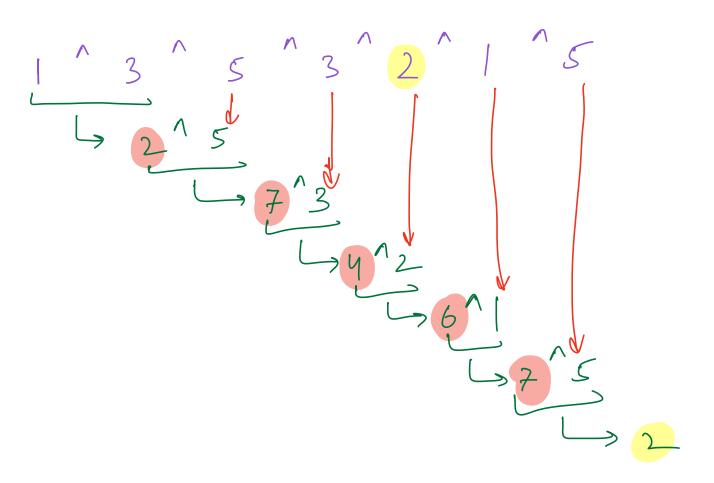
3

return ans

3

TC:0(N)

SC: O(1)



Left Shift

inf > 4 Bytes -> 32 bils

assume & 6it number

$$A = 45$$
 $A = 45$
 $A =$

mar value of 8 mit number:

$$A << 0 = A \times 2^{0}$$

$$A < <2 = A \times 2 \times 2 = A \times 2 =$$

$$|A| = |A| = |A| = 2^n$$

If you left shift many times your number will overflow.

Right Swift

A >> 1

A772

A>>3

$$000|0|00$$
 $000|0|00$
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$$A >> M = \frac{A}{2^{m}}$$

NO OVERFLOW

After right suiff many times, no. will always be zero.