Day 1

Sunday, 18 January 2026 9:08 AM

Rahul

- LL
- Arr (Pre-Sum ...)
- Soot
- Searching
- ~~Bit mani~~
- Stacks

- Math < gcd, prime Facto > ?
- Recursion ?
- Time Complexities ✓
  - BS → O(log n)
  - MS → O(n log n)

Bit manipulation (Prob^n)

eg A = 1010 (10)

(i) A & 1 = ?

A = 1010 (10) & 0001 = 0000 ⇒ 0

A = 1001 (9) & 0001 = 0001 ⇒ 1

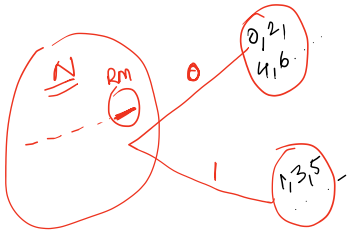
A & 1 ⇒ 0 ⇒ last bit in A is unset

⇒ 1 ⇒ " " set

1010 = E + E ⇒ E

$2^3 + 2^1 = 8 + 2 = 10$

1001 [i = 1] = E + 0 = 0



(ii) A & 0 ⇒ 0

(iii) A & A = A

A(10) ⇒ 1010

& 0000

0000 ⇒ 0

(4) $A \mid 0 = A$

(5) $A \mid A = A$

(6) $A \wedge 0 = A$

$A(10) = 1010$

$0 = \wedge\ 0000$

$1010 = A$

(7) $A \wedge A = 0$

(8) Commutative Property.

(i) $(a \& b) = (b \& a)$ ✓

(ii) $(a \mid b) = (b \mid a)$ ✓

(iii) $(a \wedge b) = (b \wedge a)$ ✓

$2 \& 5 = \_\_\_ = 5 \& 2$

1 0 1 0

0 1 0 1

(1) ✓

2 - 3

3 - 2

(2) ✗

(9) Associative

$a \& b \& c = (c \& a) \& b$ ✓

$a \& c \& b$

$a \& b \& c$

$a \mid b \mid c = b \mid a \mid c$

$a \mid b \mid c$ ✓

$a \wedge b \wedge c = b \wedge c \wedge a$

$b \wedge a \wedge c$

$a \wedge b \wedge c$

Q $a \wedge b \wedge c \wedge b \wedge a$

O/P $a \wedge a \wedge b \wedge b \wedge c$

$0 \wedge 0 \wedge c$

0 ^ C = (C) ✓

Q Given an int arr of size N-1
It contains nos. from 1...N.
Find the left out no.

eg N = 5
arr[] = {2, 1, 5, 4}
O/P ⇒ (3) ✓

Ans M-1

{1^2^3^4^5}^{2^1^5^4}
O(N) - P1 | O(N) - P2

1^1 ^ 2^2 ^ 4^4 ^ 5^5 ^ 3
0 0 0 0
0
0
0 ^ 3 ⇒ (3) ✓

TC = O(n)
SC = O(1)

M-2 (Sort)
(i) [1, 2, 4, 5]
0 1 2 3
(i+1)
(3) ✗

TC = O(nlogn) + O(n) ~ O(nlogn)
SC = O(1)

M-3

$\sum_{i=1}^{N} i - \{\sum_{i=1}^{N-1} arr[i]\}$ (P1) = (x) ✓

TotalSum = $\frac{n(n+1)}{2}$
O(1)

for i ← 0 - (n-2)
sum += arr[i]
O(n)

TC = O(n)
SC = O(1)

Left shift (<<)

8 bit
a = 22

0 0 0 1 0 1 1 0 ⇒ (22) ⇒ 22 * 1 ⇒ 22 * 2^0
(a<<1) 0 0 1 0 1 1 0 0 ⇒ 32 + 12 ⇒ (44) ⇒ 22 * 2 ⇒ 22 * 2^1
(a<<2) 0 1 0 1 1 0 0 0 ⇒ 64 + 24 ⇒ (88) ⇒ 22 * 2 * 2 ⇒ 22 * 2^2
(a<<3) 1 0 1 1 0 0 0 0 ⇒ 128 + 48 ⇒ (176) ⇒ 22 * 2 * 2 * 2 ⇒ 22 * 2^3

$a << i = a * 2^i$ ✓

Ta = 1 ⇒ $1 << i = 1 * 2^i$

A ⇒ 0 0 1 0 | 1 | 0 1

(1) 0 0 0 0 | 0 1 0 0

0 0 1 0 | 1 | 0 1 ⇒ 45 (A)

A ⇒ 0 0 1 0 | 1 1 0 1

(1) 0 0 0 1 | 0 0 0 0 ⇒

4 3 2 1 0

0 0 1 | 1 | 1 1 0 1 ⇒ 61 (45+16)

1<<4 = 2^4 = 16

N | (1<<i)

- (N) ⇒ if i^{th} bit is already set
- $(N + 2^i)$ ⇒ if i^{th} bit is unset

A ⇒ 0 0 1 0 | 1 | 0 1

^ 0 0 0 0 | 0 1 0 0

0 0 1 0 | 0 | 0 1 ⇒ (41)

A ⇒ 0 0 1 0 | 1 1 0 1

^ 0 0 0 1 | 0 0 0 0

0 0 1 1 | 1 1 0 1 ⇒ (61)

N ^ (1<<i)

- $N - (2^i)$ ⇒ if i^{th} bit is set
- $N + (2^i)$ ⇒ if i^{th} bit is unset.

A ⇒ 0 0 1 0 | 1 | 0 1

& 0 0 0 0 | 0 1 0 0

0 0 0 0 | 0 1 0 0 = 4

A ⇒ 0 0 1 0 | 1 1 0 1

& 0 0 0 1 | 0 0 0 0

0 0 0 0 | 0 0 0 0 = 0

N & (1<<i)

- 2^i ⇒ if i^{th} bit is set
- 0 ⇒ if i^{th} bit is unset.

Q Given an int 'N'

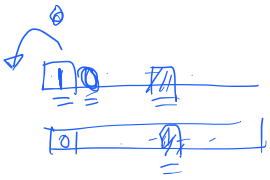
i) set i^{th} bit of 'N'

$N = N \mid (1 << i)$

(10) Toggle i^{th} bit. $(0 \rightarrow 1,\ 1 \rightarrow 0)$

$N = N \wedge (1 << i)$

N<<1



(11) Check if i^{th} bit is set or not.

M-1 if $(N \,\&\, (1 << i)) == 2^i (1 << i)$ ⇒ set

else ⇒ unset.

M-2 if $(N \mid (1 << i)) == N$

⇒ set

else ⇒ unset.

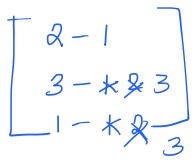
Expedia, Intuit

Q Given an int arr, except 1 ele all other ele having triplet.

Find the unique no.

eg [2, 3, 3, 1, 1, 3, 1] O/P ⇒ (2) ✓

M-1 ✓

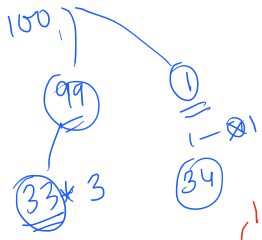


(2) ✓

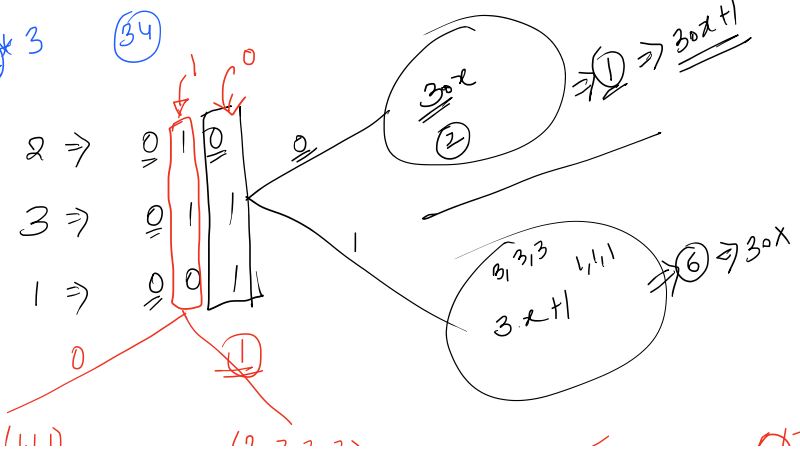
TC = O(N) + O(N/3) ⇒ O(N)

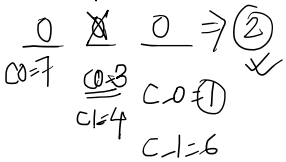
build Hmap — Traverse Hmap

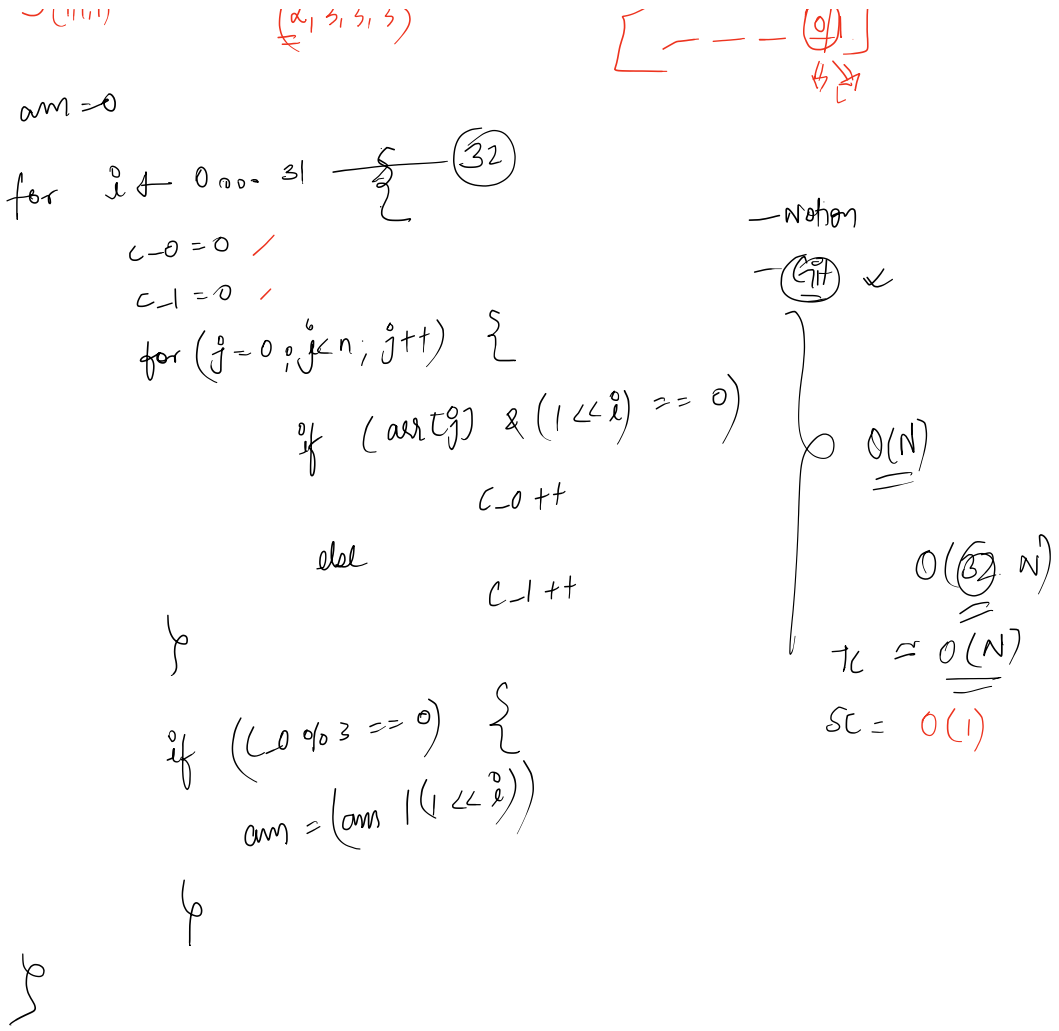
SC = O(N/3) = O(N)



M-2






ans = 0
for i ← 0 ... 31
32
c_0 = 0
c_1 = 0
for (j = 0; j < n; j++) {
if (arr[j] & (1 << i) == 0)
c_0 ++
else
c_1 ++
}
if (c_0 % 3 == 0) {
ans = (ans | (1 << i))
}
}
Notion
GIF
O(N)
O(32 N)
TC = O(N)
SC = O(1)