

Ques) Single no 1

We are given an integer array where every number occurs twice except for one number which occurs just once.
Find that number.

ex [4, 5, 5, 4, 1, 6, 6] → Ans 1.

[7, 5, 5, 1, 7, 6, 1, 6, 4] → Ans 4.

Value of $120 \wedge 5 \wedge 6 \wedge 6 \wedge 120 \wedge 5$ is -

↓
 $120 \wedge 120 \wedge 6 \wedge 6 \wedge 5 \wedge 5 \Rightarrow 0$
↓ ↓ ↓ ↓ ↓
6 6 6 5 5

Soln → 1

```
int x = 0;

for (int i = 0; i < arr.size(); ++i) {
    x = x ^ arr[i]; // XOR operation
}

print(x);
```

T.C → O(n)
S.C → O(1).

Soln → 2

A = [2, 3, 5, 6, 3, 6, 2]

	2	3	5	6
2 →	0	1	0	0
3 →	0	1	1	1
5 →	1	0	1	1
6 →	1	1	0	0
3 →	0	1	1	1
6 →	1	1	0	0
2 →	0	1	0	0

3 6 3
↓ ↓ ↓
1 0 1 → 5 only.


```
int ans = 0;
```

$T.C \rightarrow O(n)$

```
for (i=0; i<31; i++) {
```

$S.C \rightarrow O(1)$

```
    int cnt = 0;
```

```
    for (j=0; j<n; j++) {
```

```
        if (checkBit(ans[j], i) {
```

```
            cnt++
```

```
        if (cnt % 2) { // if count is odd;
```

```
            ans = ans | (1<<i) // setting ith bit
```

in ans;

```
        Print ans);
```

Ques) Single number 2 :-

Given an integer array, all the elements will occur thrice but one. Find the unique element.

Input: [4, 5, 5, 4, 1, 6, 6, 4, 5, 6] **Ans** \rightarrow 1

Brute force :-

time for loops. T.C $\rightarrow O(n^2)$
S.C $\rightarrow O(1)$

Approach-2

HashMap \rightarrow T.C $\rightarrow O(n)$
S.C $\rightarrow O(n)$

Approach 3 :- [5, 7, 5, 9, 7, 11, 11, 7, 5, 11]

	3	2	1	0
5 \rightarrow	0	1	0	1
7 \rightarrow	0	1	1	1
5 \rightarrow	0	1	0	1
9 \rightarrow	1	0	0	1
7 \rightarrow	0	1	1	1
11 \rightarrow	1	0	1	1
11 \rightarrow	1	0	1	1
7 \rightarrow	0	1	1	1
5 \rightarrow	0	1	0	1
11 \rightarrow	1	0	1	1

4	6	5	10
---	---	---	----

\rightarrow 1

```
int ans = 0;
```

```
for (i = 0; i < 31; i++) {
```

T.C $\rightarrow O(n)$

S.C $\rightarrow O(1)$;

```
    int cnt = 0;
```

```
    for (j = 0; j < n; j++) {
```

```
        if (checkbit(ans[j], i) {
```

```
            cnt++
```

```
        if (cnt % 3 == 1) {
```

```
            ans = ans | 1 << i;
```

```
    }  
    Print ans;
```


Every no. is coming 3 times, except unique
no., which is coming 2 times,

⑨

x	→	1
x	→	1
x	→	1
x	→	1
x	→	1
y	→	1
y	→	1
y	→	1
y	→	1
z	→	1
z	→	1
z	→	1

7. 5 = 3

A hand-drawn diagram of a cell. A large, irregular oval represents the cell membrane. Inside, a smaller, more rounded structure represents the nucleus. Within the nucleus, there is a small, dense, circular structure representing the nucleolus. Several short, horizontal lines radiate from the left side of the nucleus, representing nuclear pores. The entire diagram is drawn in blue ink on a white background.



8:03 AM - 8:13 AM

Quesⁿ Single Number 3

unique.

Given an integer array, all the elements will occur twice except two. Find those two elements.

Input: ~~[4, 5, 5, 4, 1, 6, 6, 1, 5, 6, 2]~~

Input \rightarrow [3, 6, 4, 4, 3, 8] \rightarrow 6, 8

[4, 9, 9, 8] \rightarrow 4, 8

ans \rightarrow 3, 7, 6, 7, 3, 8, 9, 9 \rightarrow 6, 8

idea \rightarrow Take xor, \rightarrow 14

Take xor \rightarrow 7, (2, 5), (1, 6), (3, 4)

ans [12] \rightarrow

(1010) 10 (1000) 8 (1100) 8 (1001) 9 (1100) 12 (1001) 9 (0110) 6 (1010) 11 (1010) 10 (1100) 6 (1100) 12 (1001) 17

4 3 2 1 0
11 \rightarrow 0 1 0 1 1
17 \rightarrow 1 0 0 0 1
11 xor 17 \rightarrow 1 1 0 1 0

Split my array based on 1st bit

if $x \& 1$ is 0
set
10, 6, 11, 10, 6
unset
8, 8, 9, 12, 9, 12, 17

divide based on 3rd bit :-

set
10, 10, 8, 8, 9, 9, 12, 12, 11,
unset
6, 6, 17

Pseudo Code

1) $V = 0;$ // Take xor of all.

for ($i = 0; i < n; i++$) {

$V = a[i];$
}

2) from V get a set bit pos.

for ($i = 0; i < 31; i++$) {

 if (checkBit (V, i)) {

$pos = i;$
 break;

3) Split array based on this pos into set and unset

$set = 0;$ $unset = 0;$

for $i = 0$ to $n-1$:

 if (checkBit ($a[i], pos$)) {

$set = set \vee a[i];$

 else:

$unset = unset \vee a[i];$

print $set + " - " + unset$;

$T.C \rightarrow O(n)$

$S.C \rightarrow O(1)$

Ques) Maximum And pair

Given N array elements, choose two indices (i, j) such that $(i \neq j)$ and $(arr[i] \& arr[j])$ is maximum.

$(\overset{0}{5}, \overset{1}{4}, \overset{2}{6}, \overset{3}{8}, \overset{4}{5}) \rightarrow (0, 4) \text{ is Max}$

$(27, 18, 20)$
 $\swarrow \searrow \rightarrow$
 $(27, 18) \quad (27, 20) \quad (18, 20)$
 $\downarrow \quad \downarrow \quad \downarrow$
 $18 \quad 16 \quad 16$

e.g2)

$arr[5] = \{21, 18, 24, 17, 16\}$
 $\rightarrow (21, 17)$

21 :	1	0	1	0	1
18 :	1	0	0	1	0
24 :	1	1	0	0	0
17 :	1	0	0	0	1
16 :	1	0	0	0	0

z \rightarrow	1	0	0	0	0	} \rightarrow 1 0 0 0 0
x \rightarrow	1	0	1	1	1	
y \rightarrow	0	0	1	1	1	
	<hr/>					
	0 0 1 1 1					
	<hr/>					

idea \rightarrow having more no. of set bits at same place \times .

$$\begin{array}{ccccccc} 1 & 0 & 0 & 0 & & 1 & 1 & 1 \\ \hline & \hline & \hline & \hline & & \hline & \hline & \hline \end{array} > \begin{array}{ccccccc} 1 & 0 & 1 & 1 & 1 & 1 & 1 \\ \hline & \hline & \hline & \hline & \hline & \hline & \hline \end{array}$$

ans = { 26, 19, 29, 28, 27, 7, 25 }



4 3 2 1 0

26 → 1 1 0 1 0

19 → ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~

29 → ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~

28 → ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~

27 → 1 1 0 1 1

07 → ~~0~~ ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~ ~~1~~

25 → ~~0~~ ~~1~~ ~~0~~ ~~1~~ ~~0~~ ~~0~~ ~~1~~

max Ad
value

1 1 0 1 0

ans = 0;

for (f=0; i>=0; i--) {

// find count of set bits at this place

int c=0;

for (j=0; j<n; j++) {

if (checkbit(arr[j], i)) {

c++;

if (c>=2) {

// we can form a pair whose and
will have a 1 at this place.

ans = ans | (1<<i) (setting bit)

remove unwanted elements.

for (j=0; j<n; j++) {

if (checkbit(arr[j], i) == false)

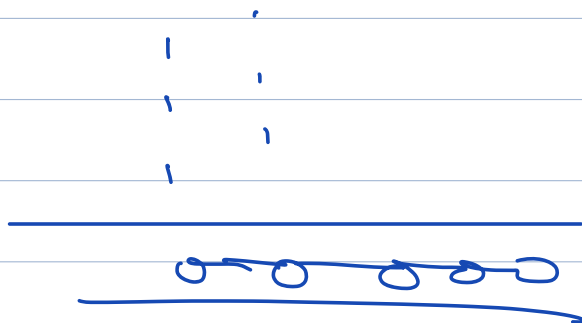
arr[j] = 0;

T.C $\rightarrow O(n)$

S.C $\rightarrow O(1)$

Ques) find Cent of pair's whose bitwise
and is Max_m .

↳ travel the array find $\text{sum}[i] \geq 0$,
as will be $\frac{n \times (n-1)}{2}$



3 set m's current bits.

3 set m's 4 set m's

↓

(111) < 14.

3 set m's

= 111 → 7

1000 → 8

(1 < 9) - 1

↓
1000

→

(111)

1111 → 15

10000 → 16

4 set m's.

1 < 4 10000 - 1

3 set m's

1111

(1 < 9) - 1 < 14.

(10000 - 1)

10000

11111

[illegible]