

# DSA SERIES

- Learn Coding



### Topic to be Covered today

## **Bit Manipulation**



### LETS START TODAY'S LECTURE

## **Bit Manipulation**

#### -

#### T shift

### ILecture - 37

### Bit Manipulation



1) How to convert a decimal number into binary format.

→ Binary matrab 0 and 1.

(Decimal) (Binary)2

This indicates the format of

There are different format of numbers:
Octal Number (8)

- · Hexadecimal (16) (0 to 3 & A-F)
- · Decimal (10)
- · Binary (2)

(J6) 10 = 
$$\frac{2 \cdot 16}{2 \cdot 8}$$
 0  $\frac{2 \cdot 1}{2 \cdot 9}$  2  $\frac{2 \cdot 1}{2 \cdot 9}$  0  $\frac{2 \cdot 1}{2 \cdot$ 

1n - 1010

Code for converting Decimal to Binary String func (int n) of res = " ". while (modes 1) of if (n%2 ==1) res+=1; else res+ = '0'; n= n/2; reverse (res): return ses: Code for converting Binary to decimal int funci(string x) } int len = x. langth(); for (i=1en-1 -10) } 4-1-1 iA ( 2013 = = = = = ) num = num xp int on = x. length(); int res = 0: for (int i=0; icn; i++)f ) ('1' = = ['] x) +i res += pow (2, m-1-1); zreturn rei;

1's Complement.

Just flip the bits.

5 = 0101

= 7777

signed > positive
Negative

most significant sit = 0

MIR = 1.

unsigned -> only non-negative number.

2's complement.

otaking 1's complement

Adding 1 to the result.

Suppose. :- We need to store - 10 int b. 8 bit - binay.

11110110 +1

So. -10 in 2's complement is 11110110

Computer do not directly store negative sourcer.

They store them in 2's complement form.

### Operators en Bit manipulation. Addition Rus. i) AND (4) (1) OR (1) iii) XOR ( A) 1+1 = 0 (carry more to next higher (~) TON (vi v) left shift (<<) vi) Right shift (>>) 1) And. (2) 7 7 7 1 Results I if both bits are 1, else o. 10000 0110 0011 0010 (i) OR (1) - Results 1 if at least one bit is 1. 0011 0111 (fil) XOR ( N) Exclusive OR.: Result 1 if bits are different, else o. Pouring A'-rel' & eta wifer!

(iv) NOT (~)

 $\sim M = -(M+1)$ 

 $0 \rightarrow 7$ 



(v) Left shift. (<<)

4) shifting all bits to the left empty with o.

Li Equivalent to multiplying 210.

5 - 0101

01010 => 5x 21

10100 Sx2

(vi) Right shift (>>)

Is shift all bits to night

> Equivalent to dividing by 2k

16. 1/10000

00100

16 - 16 CM

### Basic Questions.



(1) Smap two number

(i) Earlier me used a third variable to do so,

(i)a = a + b b = a - b d = a - b a = a - b a = a - b a = a - b a = a - b a = a - b a = a - b a = a - b a = a - b a = a - b a = a - b a = a - b

2) check if ith bit is set or @ Not.

0011 → check 0th bit is set or not.

20001 → 1 << i ← Make a mask.

20001 => 1 << 0

[(N&(1<<ii))!=0) -> It means that particular bit is set.

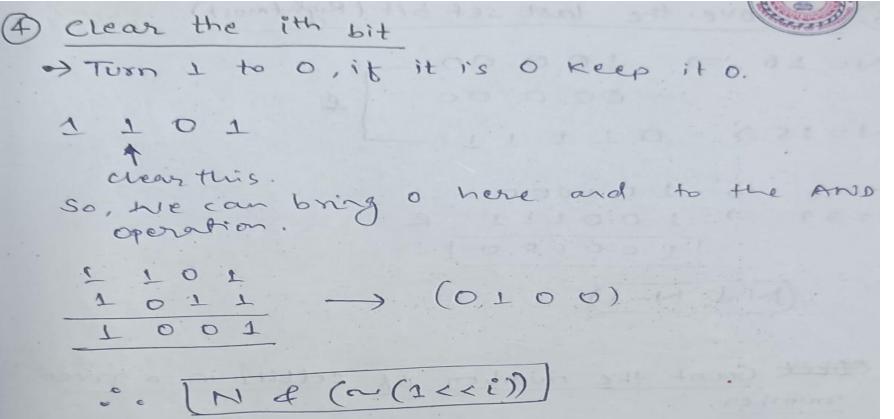
3) Set the ith bit

N=8, i=2

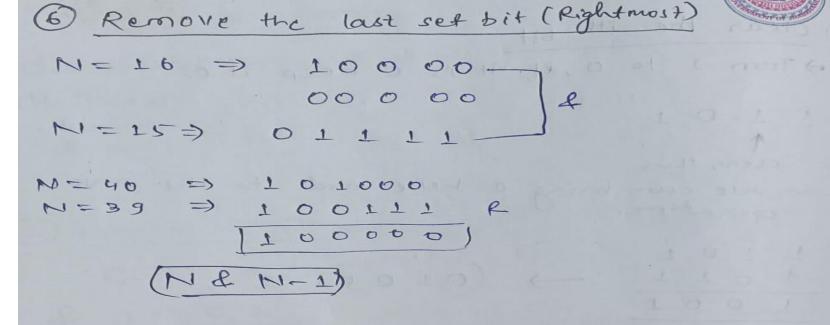
OR. 0100

1000

N 1 (1 < < i)



(5) Toggle the ith bit Is we need to simply the provence the bit value from there.



Franch Count the number of setbits in a given number.

int count SetBit (int n) {

cht = 0;

while (n > 1) {

if (m! = 1) cht ++; n = m/2;

if (m = 1) cht ++;

return cht;

The last bit of odd number is always 1.

To check this

(N&1) = = 1 => N is odd

else N is even.

Second Method.

cnt = 0; While (N! = 0) f N = N + (N-1); ent + +;



## Learn coding

## THANK YOU