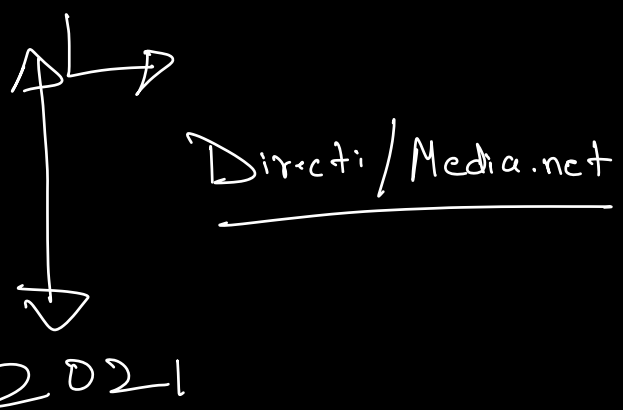
Yash Raj !

ACM ICPC

2013
2014 → DSA,
2016 → Directi
2017, Bits Pilani Hyd : Computer Scicce.



Hiring Comidee
2 years.
50 interview.

⇒ 2 months Intermediate.

⇒ 4 months **Advanced DSA**

⇒ 3 classes a week M-W-F 9pm.

⇒ 2 hours → 2:30

⇒ Pseudo Code ⇒ language agnostic

- Revise Lecture [1]
- Assignments [2]
- homework [3]

> 6 months

SDE 1

Count of factors

↓

any number that divides N completely.

N % i == 0

then i is a factor of N.

Ex1 N = 24 = [1, 2, 3, 4, 6, 8, 12, 24]

ans = 8

Ex2 N = 10 = [1, 2, 5, 10]

ans = 4

Brute force ⇒ Correct Solution but with no optimization.

Pseudo Code

```
int countFactors (int N) {
    int cnt = 0;
    for (int i = 1; i <= n; i++) {
        if (N % i == 0)
            cnt++;
    }
    return cnt;
}
```

Assumption

10^8 iterations = 1 sec

N	iterations	Time taken.
10^8	10^8	1 sec
10^{10}	10^{10}	100 sec
10^{18}	10^{18}	10^{10} sec

$\Downarrow$

317 years

10^8 iteration $\Rightarrow$ 1 sec

1 iteration $\Rightarrow \frac{1}{10^8}$

10^{10} iteration $\Rightarrow \frac{1}{10^8} \times 10^{10} \Rightarrow 10^2$

$\Rightarrow 100$

10^8 iteration $\Rightarrow$ 1 sec

1 iteration $\Rightarrow \frac{1}{10^8}$

10^{18} iteration $\Rightarrow \frac{1}{10^8} \times 10^{18} \Rightarrow 10^{10}$

$\# \frac{10^a}{10^b} \Rightarrow \underline{\underline{10^{a-b}}}$

N : i is a factor.

$$i \times j = N$$

$$j = \frac{N}{i}$$

Observation 1 : factors come in pairs

$N = 24$

i	N/i
1	24
2	12
3	8
4	6
6	4
8	3
12	2
24	1

Count
2
4
6
8

$$i \leq \frac{N}{i}$$

$$i \times i \leq N$$

$$i^2 \leq N$$

$$i \leq \sqrt{N}$$

$N = 100$

i	N/i	Count
1	100	2
2	50	4
4	25	6
5	20	8
10	10	9
20	5	
25	4	
50	2	
100	1	

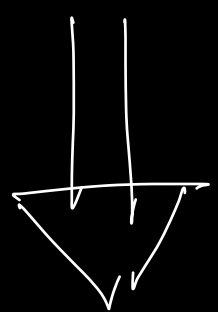
Pseudo code !

```
int countFactors (int N) {
    int cnt = 0
    for(int i=1; i*i <= N; i++) {
        if (N % i == 0) {
            if (i == N/i)
                cnt = cnt + 1
            else
                cnt = cnt + 2;
        }
    }
    return cnt;
}
```

Total iterations $= \sqrt{N}$

N	iterations	Time taken.
10^{18}	10^{9}	10 sec

OBSERVATION ⇒ Most important skill.



Practice ⇒ 200

10:36pm

Q2 Given a number N.
Return true if it is a prime number.

↓

count of factors ⇒ 2

Prime number is a number that is divisible by 1 and the number itself. except 1.

Pseudo code !

```
bool checkPrime (int n) {
    int cnt = countfactors (n);
    if (cnt == 2)
        return true
    else
        return false;
}
```

H.W optimize

$$S = 1 + 2 + 3 \cdots + 100$$

$$+\ S = 100 + 99 + 98 \cdots + 1$$

$$2S = 101 + 101 + 101 + 101 \cdots + 101$$

$$2S \Rightarrow 101 \times 100$$

$$S \Rightarrow \frac{101 \times 100}{2} \Rightarrow 5050$$

Sum of 1st n natural.

$$S \Rightarrow 1 + 2 + 3 \cdots n$$

$$S \Rightarrow n + (n-1) + (n-2) \cdots 1$$

$$2S \Rightarrow (n+1) + (n+1) + (n+1) \cdots (n+1)$$

$$2S \Rightarrow (n+1) \times n$$

$$S \Rightarrow \frac{n(n+1)}{2}$$

Q3 Given a perfect square N.
Find the square root.

$N = [1, 10^5]$

$sqrt(N) = [1, N]$

Pseudo code!

```
for (int i=1; i<=N; i++) {
    if (i*i == N)
        return i;
}
```

Amazon MCQs

1) $\sqrt{N}$ 2) N
3) $\log N$ 4) none of these

Q4 Find floor(sqrt(N)).

N is not always a perfect square.

floor(x) ⇒ greatest integer ≤ x

Ex1 floor(3) ⇒ 3

Ex2 floor(2.5) ⇒ 2

Ex N ⇒ 50 , ans ⇒ 7

i	i x i	ans
1	1	1
2	4	2
3	9	3
4	16	4
5	25	5
6	36	6
7	49	7
8	64	break

N = 50

Pseudo code

```
int findRoot (int n) {
    int ans;
    for (int i = 1; i <= n; i++) {
        if (i * i <= n)
            ans = i;
        else
            break;
    }
    return ans;
}
```

Total iteration = $\sqrt{n}$

Doubts !

- Technology
- Pay
- Culture
- Pride
- cool place
- get beautiful bride
- brand
- growth