

Hello Everyone

→ Welcome to Scales

→ Aman kumar → JP university CSE

→ Interned at FDH

WDC

Microsoft

Geekster

→ worked full time

- Microsoft (SDE)
- Pepcoding → Co-founder
- Scales (SDE and Instructor)

Today's Content :-

→ Count no. of factors

→ Prime number

→ check if n is prime

→ Gauss Sum

→ Divide num/2 till it reaches 1

→ Sqrt

⇒ How to make best of course.

FAQ's a) Notes will be uploaded right after session

b) Assignments will be unlocked once session ends

c) No dead line for assignments.

- d) no attendance during doubt session
- e) language Independent, `{ pseudocode }`

Quote

I wanted the reward and not the struggle.

I wanted the result and not the process.

I was not in love with the fight but only the victory.

And life doesn't work that way.

Count no. of factors

Q1: Is 4 a factor of 24 $\rightarrow 24 \% 4 = 0$ yes

$N=10$: {1, 2, 5, 10} $\rightarrow 4$

$N=12$: {1, 2, 3, 4, 6, 12} $\rightarrow 6$

$N \rightarrow [1 \text{ to } N]$

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

10^8 iterations = 1 sec

N	iterations	Time
10	10	-
10^8	10^8	1 sec
10^9	10^9	10 sec
10^{18}	10^{18}	317 years.

$$10^8 \text{ iter} = 1 \text{ sec}$$

$$1 \text{ iter} = \frac{1}{10^8} \text{ sec}$$

$$10^9 \text{ iter} = \frac{1}{10^8} \times 10^9 \text{ sec} \\ = 10 \text{ sec}$$

$$\rightarrow 10^{18} \text{ iter} = \frac{1}{10^8} \times 10^{18} \text{ sec}$$

$$= 10^{10} \text{ sec.}$$

Optimize

$$i * j = n$$

i & j both are factors of n .

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

claim:- if i is a factor of n ,

n/i is also factor
of n .

$N = 24$

i N/i

1 < 24 +2 $i \leq \frac{N}{i}$

2 < 12 +2

3 < 8 +2

$i^2 \leq N$

4 < 6 +2

$i \leq \sqrt{N}$

6 4

8 3

12 2

24 1

$N = 100$

i N/i

1 < 100 +2

2 < 50 +2

4 < 25 +2

5 < 20 +2

10 = 10 +2

20 5

25 4

50 2

100 1

int CountFactors(N) {

int c = 0;

for ($i = 1$; $i \leq \sqrt{N}$; $i++$) {

if ($N \% i == 0$) {

if ($i == N/i$) { $c = c + 1$ }

else { $c = c + 2$; }

}

}

return c;

}

N

iterations

Time

100

10

10^8

10^9

10sec

Intermediate :-

- ↳ Increasing observation skills.
- ↳ Learn interesting Techniques.

Prime Numbers :- Only 2 factors 1 & itself.

5, 9, 11, 1
↳ Count factors $\rightarrow == 2$: prime
 $\rightarrow \neq 2$: Not prime

void checkPrime (N) {

int c = 0;

for (i = 1; i <= \sqrt{N} ; i++) {

if (N % i == 0) {

if (i == N/i) { c = c + 1 }

else { c = c + 2; }

}

³
if (c == 2) { print (prime) }

else { print (Not prime) }

}

Tricks :- \rightarrow Gauss

kunal

\rightarrow 4th class

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

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

$$2S = 101 + 101 + 101 + \dots + 101$$

$$2S = (100) * (101)$$

$$S = \frac{100 * 101}{2}$$

1) Sum of first N natural numbers?

$$S = 1 + 2 + 3 + 4 + \dots + N-2 + N-1 + N$$

$$S = N + (N-1) + (N-2) + \dots + 3 + 2 + 1$$

$$2S = (N+1) + (N+1) + \dots + (N+1)$$

$$2S = N * (N+1) \Rightarrow S = \frac{N * (N+1)}{2}$$

log Basics

$$\log_a b$$

what should be the power of a to get b .

$$\log_2 64 = 6$$

$$\log_2 8 = 3$$

$$\log_3 27 = 3$$

$$\log_2 10 = 3.24$$

$$\log_5 25 = 2$$

$$\log_2 33 = 5. something.$$

$$\log_2 (2^{10}) = 10$$

$$\log_2 40 = 5. something$$

$$\log_3 3^5 = 5$$

$$\log_a a^n = n$$

$$N = 2^k \rightarrow \log_2 N = \log_2 2^k$$

$$\rightarrow \log_2 N = k$$

// Given +ve N , how many times, we
need to divide it by 2, until it reaches 1
↳ Next session 3

N ;

1

2 \rightarrow 1 time

4 \rightarrow 2 \rightarrow 1 \rightarrow 2 times

8 \rightarrow 4 \rightarrow 2 \rightarrow 1 \rightarrow 3 times.

9

12

24

16

32

$N \rightarrow$

\Rightarrow 951.

Break 10:03 pm - 10:13 pm.

Perfect Square

Given N a perfect square find $\text{sqrt}(N)$

$$N = 25 \rightarrow 5$$

$$N = 36 \rightarrow 6$$

$$N = 49 \rightarrow 7$$

$N = 30 \rightarrow$ { we will never get
invalid inputs }

$\rightarrow N$ is a perfect square.
`int sqrt(N) {`

`for (i = 1; i <= N; i++) {`

`if (i * i == N) { return i; }`

`}`

`}`

amazon :- Calculate iterations :-

a) N

b) $N/2$

c) $\log_2 N$

d) \sqrt{N}

$N = 36$: 1, 2, 3, 4, 5, 6

$N = 64$: 1, 2, 3, 4, 5, 6, 7, 8

Sqrt (n)

Note: If n is not perfect square, return floor (\sqrt{n})

$$N = 49 \rightarrow 7$$

$$N = 60 \rightarrow 7$$

$$N = 31 \rightarrow 5$$

$$N = 29 \rightarrow 5$$

$$N = 16 \rightarrow 4$$

Sqrt (n) {

$i = 1$; $ans = 1$

while ($i * i \leq n$) {

$ans = i$

$i = i + 1$

return ans

}

$N = 50$

i	$i * i$
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64

$N = 16$

i	$i * i$
1	1
2	4
3	9
4	16
5	25

Iterations:-

i : [1 to $\sqrt{n} + 1$]

$\log(n) \rightarrow \sqrt{n}$ iterations.

$\rightarrow \log_2 n$ iterations.



Advance Module.

Expectations :

1) Attend Session

2) Revise Notes

3) Solve assignment

1st after class

2nd weekend

3rd after month.

→ Most Important.

Classwork

Homework Assign

mostly discussed
in class

Indirect questions/topics
discussed in class

4) Doubts

Content/Concept

Assignments

a) please ask live
in class

b) Stay back &
get it clarified
in doubt session

a) debug in your own

b) Raise a TA request

c) Ask in whatsapp group

d) Doubt session

e) Once in 2/3 weeks

Problem Solving session

↳ recorded

non session
days

→ Problems with most doubts
↳ optional

5) Join on Time

6) If you miss

→ watch recordings

→ Atleast revise notes

8383803711 → whatsapp.

- 1) DSA
- 2) Resume
- 3) Tell me about yourself.
- 4) Core Subjects → CO, OS, DBMS,
- 5) System Design,