

Hello Dear friends



Welcome everyone

Parikshit Pruthi

Amazon SDE2, Ex Goldman Sachs, IIIT Delhi

→ Few small questions

→ 11:00 - 11:30 syllabus discussion

FAQs

→ Notes will be uploaded

→ 9PM - 11:30 PM + Doubt session

Attendance not counted

Q1) Count of factors

6  $\rightarrow$  1, 2, 3, 6

3 divides 6 completely

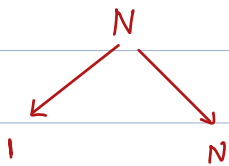
$$6 \% 3 = 0$$

x is a factor A:

$$A \% x = 0$$

factors of 24:

1, 2, 3, 4, 6, 8, 12, 24



8 factors

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

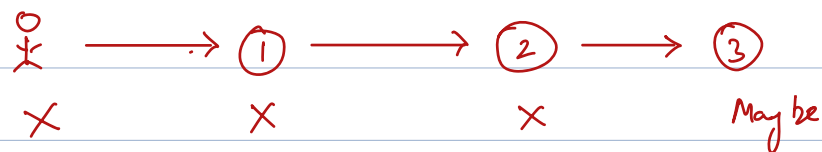
N	# iterations	time
10	10	
100	100	
$10^8$	$10^8$	1 second
$10^9$	$10^9$	10 seconds
$10^{18}$	$10^{18}$	$10^{10}$ seconds $\approx 317$ years

$10^8$  iterations take 1 second time

1 iteration takes  $\frac{1}{10^8}$  second

$$\frac{10^9}{10^8} = 10$$

$10^{18}$  iteration will take  $\frac{10^{18}}{10^8} = 10^{10}$



OPTIMISE

# count of factors

$$a \times b = N$$

$$b = \frac{N}{a}$$

a and b are factors of N

a and  $\frac{N}{a}$  are factors of N

$N = 24$

$i$	$N/i$	factors
1	24	+2
2	12	+2
3	8	+2
4	6	+2
6	4	8 factors
8	3	
12	2	
24	1	

$N = 100$

$i$	$N/i$	factors
1	100	+2
2	50	+2
4	25	+2
5	20	+2
10	10	+1
20	5	x
25	4	
50	2	
100	1	

$< \quad > \quad \leq \quad \geq$

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

$$i^2 \leq N$$

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

```

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

```

$N = 100$

N	# iterations	time
100	10	
$10^{18}$	$\sqrt{10^{18}} = 10^9$	10 seconds
		317 years $\rightarrow$ <u>10 seconds</u>

Q3) Given a number, check if it is prime or not?

if (count of factors (N) == 2) {

prime

3 → 1, 3

2 → 1, 2

7 → 1, 7

Prime number: Number having exactly 2 factors

77

if (count factor(77) > 2)

Not prime

if (count factor(N) == 2) {

prime

Break (10:07 - 10:17)

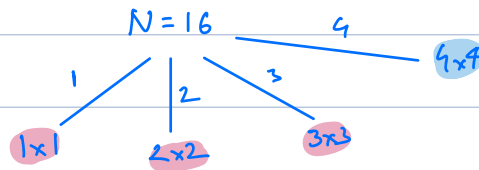




Q5) Given a perfect square, find its square root?

$N = 100$       output: 10

$N = 49$       out: 7



$N = 25$

int perfectsquare (N) {

iteration:  $\sqrt{N}$

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

if (i\*i == N) {

return i

}

$N = 25$

i	i*i == 25
1	F
2	F
3	F
4	F
5	T

$$\frac{7}{2} = \textcircled{3}5$$

$$\frac{2}{3} = 0$$

$$\frac{7}{2} = 3$$

$$\frac{7}{3} = 2$$

$$\text{floor}(7.34) = 7$$

only int part

$$\text{floor}\left(\frac{8}{3}\right) = 2$$

Q3) find floor of square root of a number  
 $\text{floor}(\sqrt{n})$

$$26 \rightarrow 5$$

$$34 \rightarrow 5$$

$$71 \rightarrow 8$$

$$64 \rightarrow 8$$

$$99 \rightarrow 9$$

26

i	$i * i == 26$
1	F
2	F
3	F
4	F
5	F
6	F (36)

5 - 6 floor '5

99

$i = 1, 2, \dots, 10$

$[9, 10]$  floor : 9

25

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

```
i = 1  
while (i * i < N) {  
    i++  
}
```

```
if (i * i == N)
```

```
    return i
```

```
if (i * i > N)
```

```
    return i - 1
```

## Log basis

$$2^3 = 8$$

what power of 2 is 8 = 3

$$\log_2 8 = 3$$

$$2^4 = 16$$

what power of 2 is 16 = 4

$$\log_2 16 = 4$$

$$3^3 = 27$$

what power of 3 is 27 = 3

$$\log_3 27 = 3$$

$$4^3 = 64$$

what power of 4 is 64 = 3

$$\log_4 64 = 3$$

$$5^2 = 25$$

what power of 5 is 25 = 2

$$\log_5 25 = 2$$

$$\log_2 32 = 5$$

$$\log_a a^n = n$$

$$\log_{10} 100 = 2$$

$$\log_3 81 = 4$$

$$\log_2 10 = 3 \dots = 3$$

$2^1$	$2^2$	$2^3$	$2^4$	$2^5$	$2^6$	$2^7$
2	4	8	16	32	64	128

$$\log_2 100 = 6$$

HW

Q5) Given positive number  $N$ , how many times we need to divide it by 2 until it reaches 1.

$N = 8$	$N = 16$	$N = 127$	$N = 32$
$\downarrow /2$	$\downarrow /2$	$\downarrow /2$	Ans: 5
4	8	63	
$\downarrow /2$	$\downarrow /2$	$\downarrow /2$	
2	4	31	
$\downarrow /2$	$\downarrow /2$	$\downarrow /2$	
1	2	15	
= 3	$\downarrow /2$	$\downarrow /2$	
	1	7	
	4	$\downarrow /2$	
		3	
		$\downarrow /2$	
		1	

6 division

Done!

if / else

while / for

Any programming language

AP (Arithmetic Progression)

GP (Geometric progression)

exponents

9:00 → 9:05 (sharp)

Random 9:15, 9:30

9 - 11:30 + Doubts session

Doubt

① ② ...

↑ ————— ↑

2:30 hour

Do not skip lectures

Recordings

Assignments + HW



Extra question

① Debug (30 mins)

② Hint

③ TA

7-8 question in 1 class

20-25 questions

HW (unlocked)



## Syllabus

(DSA)

### Introduction to RS

TC — 2

1-1.5 months

Arrays — 6

3 contests

Interview question (2)

viras

string — 1

↳ Mock interview

sorting — 1

LL — 1

BM — 1

Subsets & sub sq (1)

Advance

4.5 months

1) Deliver lecture

2) Notes, bookmarks in all recordings

AMA (15 mins)

$\frac{1}{a^b}$  ← fast exponentiation

$$a^b = a^{b/2} \times a^{b/2}$$

int x = (int) Math.sqrt(N)