Class 06

Wednesday, March 16, 2022 8:36 PM

$N = 10^7$

```
for(int i=1 ; i<=N ; i++)
{
    // some stuffs
}
```

single core - single thread

10^8 টা basic step → 1 sec

∴ 1 টা step → $\frac{1}{10^8}$ "

∴ 10^7 টা step → $\frac{10^7}{10^8}$ sec

$= 0.1$ sec

$\frac{N}{10^8}$ sec

$2^{x+1} = 2 \times 2^x$

$f(x) = x^2$

$O(n)$

$O(\frac{n}{2}) \longrightarrow O(n)$

$O(\frac{3n}{5} + \log_2(100))$

↳ $O(n)$

$2^k = n$

$\Rightarrow \log_2(2^k) = \log_2(n)$

$\Rightarrow k \cdot \log_2(2) = \log_2(n)$

$\therefore k = \log_2(n)$

$\log_2(10^{10000})$

≈ 40000

$\log_{10}(L) = 10001$

$\log_2(L) = ?$

$\log_{10}(L) = \frac{\log_2(L)}{\log_2(10)}$

$\therefore \log_2(L) = \log_2(10) \times 10001$

$= 4 \times 10001$

$= 4 \times 10001$

$= 40004$

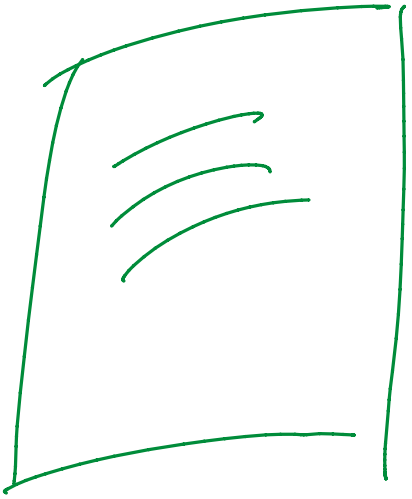
$n \times n\log_2 n \rightarrow n^2 \log_2 n$

```
for(i=1 ; i<=n; i++)  //O(n)
    for(j=5 ; j<=n ; j+=2)  //O(n)
        for(k=1 ; k<=n ; k=k*2)  //O(log2 n)
            //some stuffs
```

n → $\log_2 n$ times

$n \log_2 n$

$n \times \log_2(n)$



$1 \le T \le 10^5$ Time : 1 sec

$0 \le N \le 10^8$

(5)	
1	1
10	55
50	1275
100005375	⟶
0	⟶ 0

$O(T \times N) \rightarrow O(10^5 \times 10^8) \rightarrow O(10^{13})$

$SUM \le 10^{18}$

$\frac{n(n+1)}{2} \le 10^{18}$

$n^2 \le 10^{18}$

$\therefore n \le 10^9$

$T \propto \log_2 N$

$2 \times 10^5 \times \log_2(10^9)$

$2 \times 10^5 \times 30$

$\simeq 60 \times 10^5 \simeq 6 \times 10^6$

$(10^5 \times 8)B$

$\hookrightarrow 10^2 \times 8\ kB$

$$\frac{6 \times 10^6}{10^8} = 0.06\ sec$$

int v = 1234 ⟶ 12340 ⟶ 12345

$v = v \times 10$

$v = v + 5$

30

0! 1! 2! 3! 4! 5! 6! ----

1 1 2 6 24 120 720 ----