

Sorting - I

Complete Course on Algorithm - Part II

mm

PE

BS

ms

QS

IC

smrn

CSS

Selection Procedure

i/p: An array of n +ve distinct integers, integer-k

o/p: Find K^{th} smallest element.

ex

A

50	20	10	90	25	38	62	14
1	2	3	4	5	6	7	8

$K=4$ ✓

25

$K=8$

90

$K=1$

10

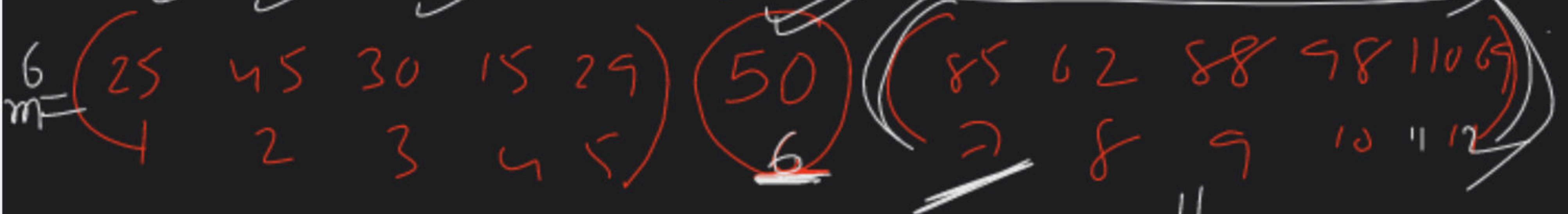
~~Algo ①~~ 1. sort \Rightarrow nfn \Rightarrow merge sort
2. return $a[k]$ \Rightarrow O(1) ~~O(n log n)~~ ~~EC~~

~~Algo ②~~ ① return k - index of selection sort \Rightarrow k_{arr}
② return $a[k]$ \Rightarrow O(1)
~~O(n) EC~~

~~Selection-mv(a, 1, 12, 7)~~

A	50	25	85	45	30	62	88	98	110	15	29	69
	1	2	3	4	5	6	7	8	9	10	11	12

Partition(x) \Rightarrow x K=6



Selection-mv(a, 7, 12, 7)

\Rightarrow
u = (u) u

$$m = \begin{pmatrix} 62 & 69 \\ 7 & 8 \end{pmatrix} \begin{pmatrix} 85 \\ 9 \end{pmatrix} \begin{pmatrix} 88 & 95 & 110 \\ 10 & 11 & 12 \end{pmatrix}$$

\Downarrow

$$\text{Schar-} m(a, 7, 8, 7)$$

$$\Downarrow$$

$$\text{rev}(u) \Rightarrow v$$

$$m = \begin{pmatrix} \end{pmatrix} \begin{pmatrix} 62 \\ 7 \end{pmatrix} \begin{pmatrix} 69 \\ 8 \end{pmatrix} \Rightarrow$$

Algo

$sp(a, p, v, k)$

$if(p == v)$ return $(a[p])$
else {

$m = partition(a, p, v)$

$if(m == k)$ return $(a[k])$

else

$if(k < m)$

$sp(a, p, m-1, k)$

else

$sp(a, m+1, v, k)$

$T(n) = \text{Bell's Time}$
 \swarrow
 $n = \theta(n)$

$T(n) = \text{worst case Time, Average}$

$T(n) = n + T(n-1) \checkmark$
 (or)
 $T(n-1) \checkmark$

all
cases

$$T(n) = \begin{cases} n + T(n-1) & \text{if } n > 1 \\ 1 & \text{if } n = 1 \end{cases}$$

(w) $T(n-1)$

~~Best case, Avg case~~

Worst case

~~$$T(n) = n + T(n/2)$$~~

~~$$= T(n/2) + n$$~~

\downarrow
log

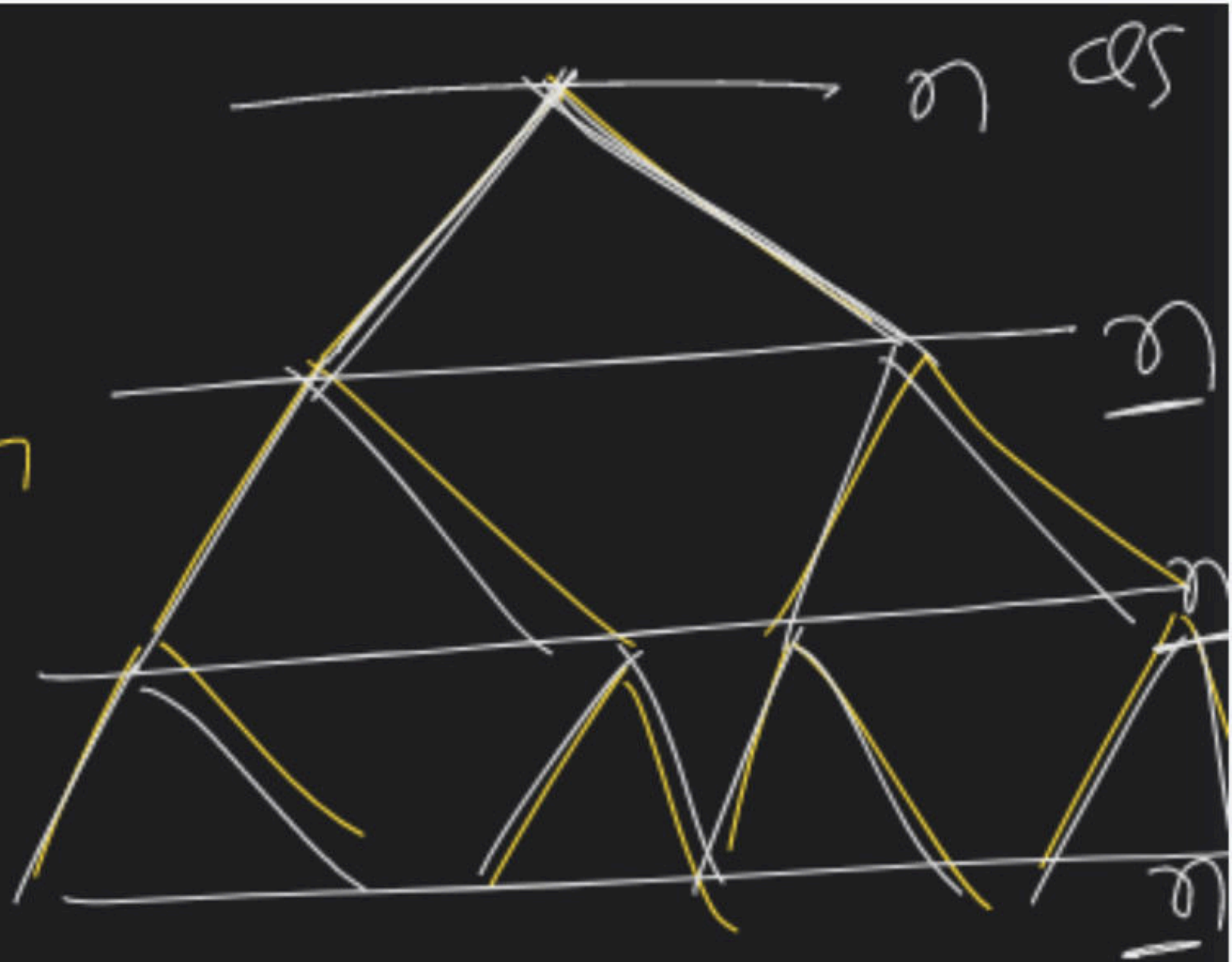
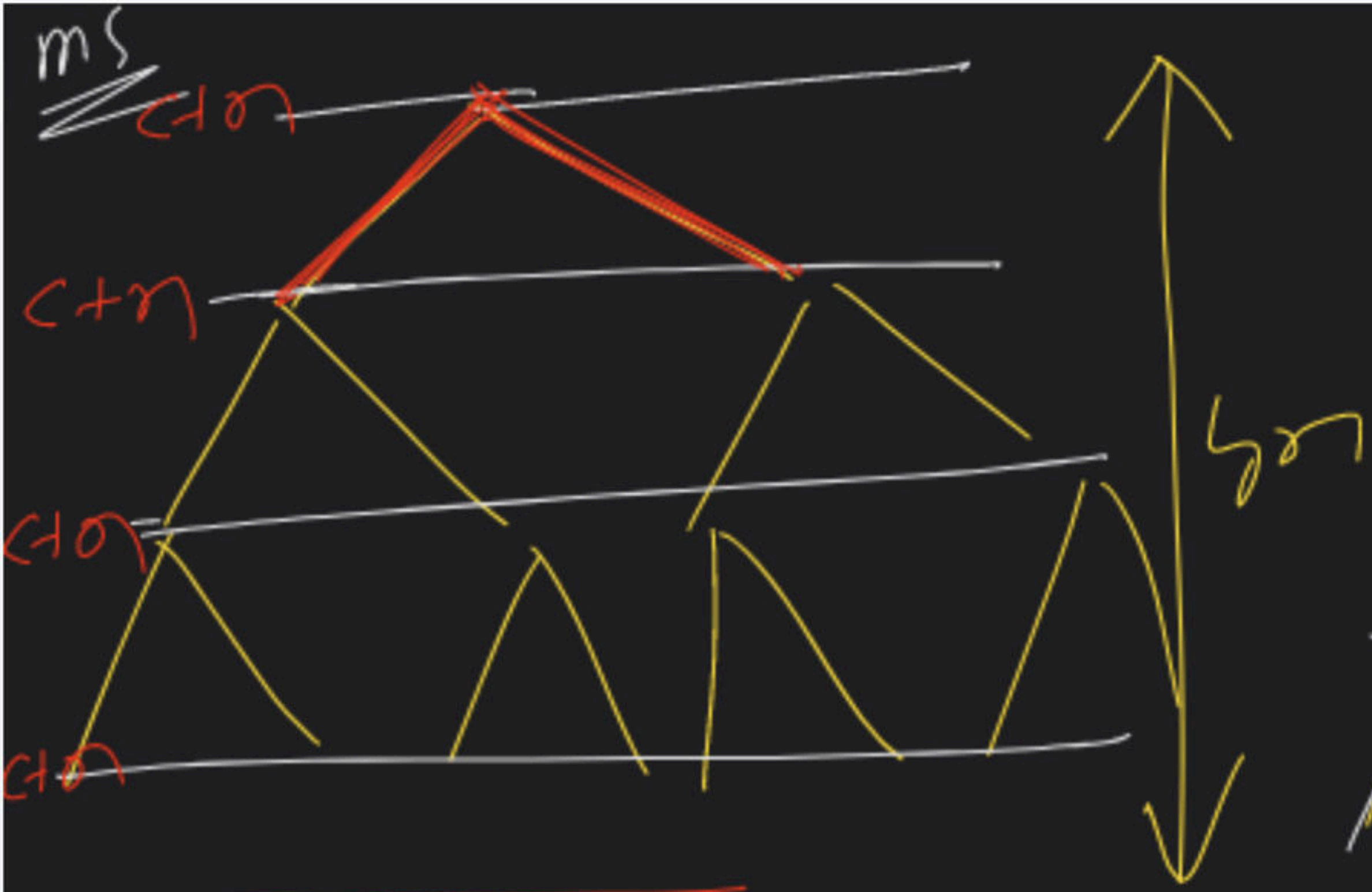
~~$$= n + n/2 + n/2 + \dots + \frac{n}{2^{\log n}} = O(n)$$~~

$$T(n) = n + T(n-1)$$

\downarrow
n

$$= 1 + 2 + 3 + \dots + n$$

$$= O(n^2)$$



$(c+n) \log \Rightarrow \log$

\log

✓

✓

✓

8882089903

practice class on
TOC & Algo

F, S, S \Rightarrow 10-12

DAC

