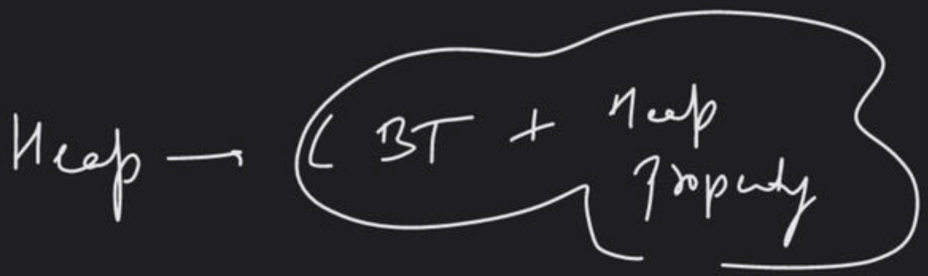
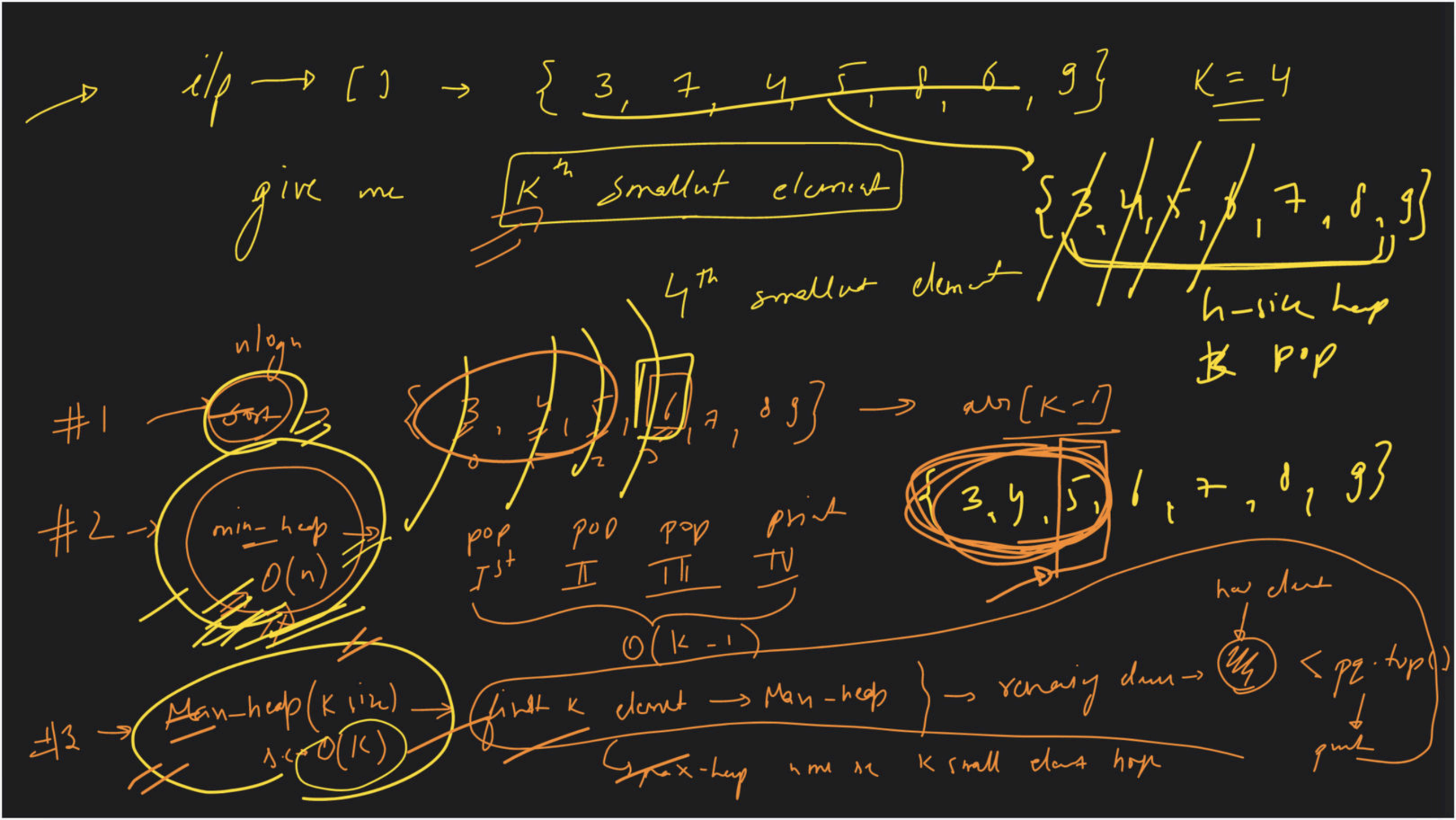
Heaps Class - 2

Special class



Love Babbar • Dec 17, 2023

(1)



→ i/p → [ ] → { 3, 7, 4, 5, 8, 6, 9 } K = 4

give me $\boxed{K^{th} \text{ smallest element}}$

{ 3, 4, 5, 6, 7, 8, 9 }

4th smallest element

h-size heap

K pop

#1 → sort (n log n) → { 3, 4, 5, 6, 7, 8, 9 } → arr[K-1]

0 1 2 3

#2 → min-heap → O(n)

pop Ist, pop II, pop III, print IV → O(K-1)

{ 3, 4, 5, 6, 7, 8, 9 }

#3 → Max-heap (K size) → first K element → Max-heap } → remaining elements → how elements < pq.top() → print

s.c. O(K)

max-heap n me se K small element hoge

(K = 4)

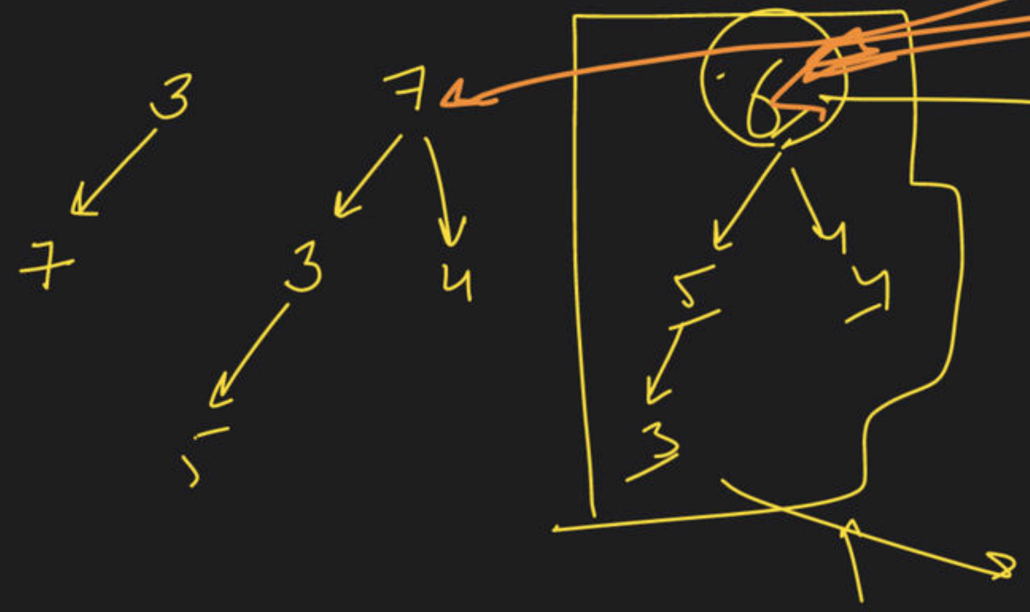
max-heap → k size

↳ first k element

①

3 4 5 6 7 8 9

{3, 7, 4, 5, 6, 8, 9}

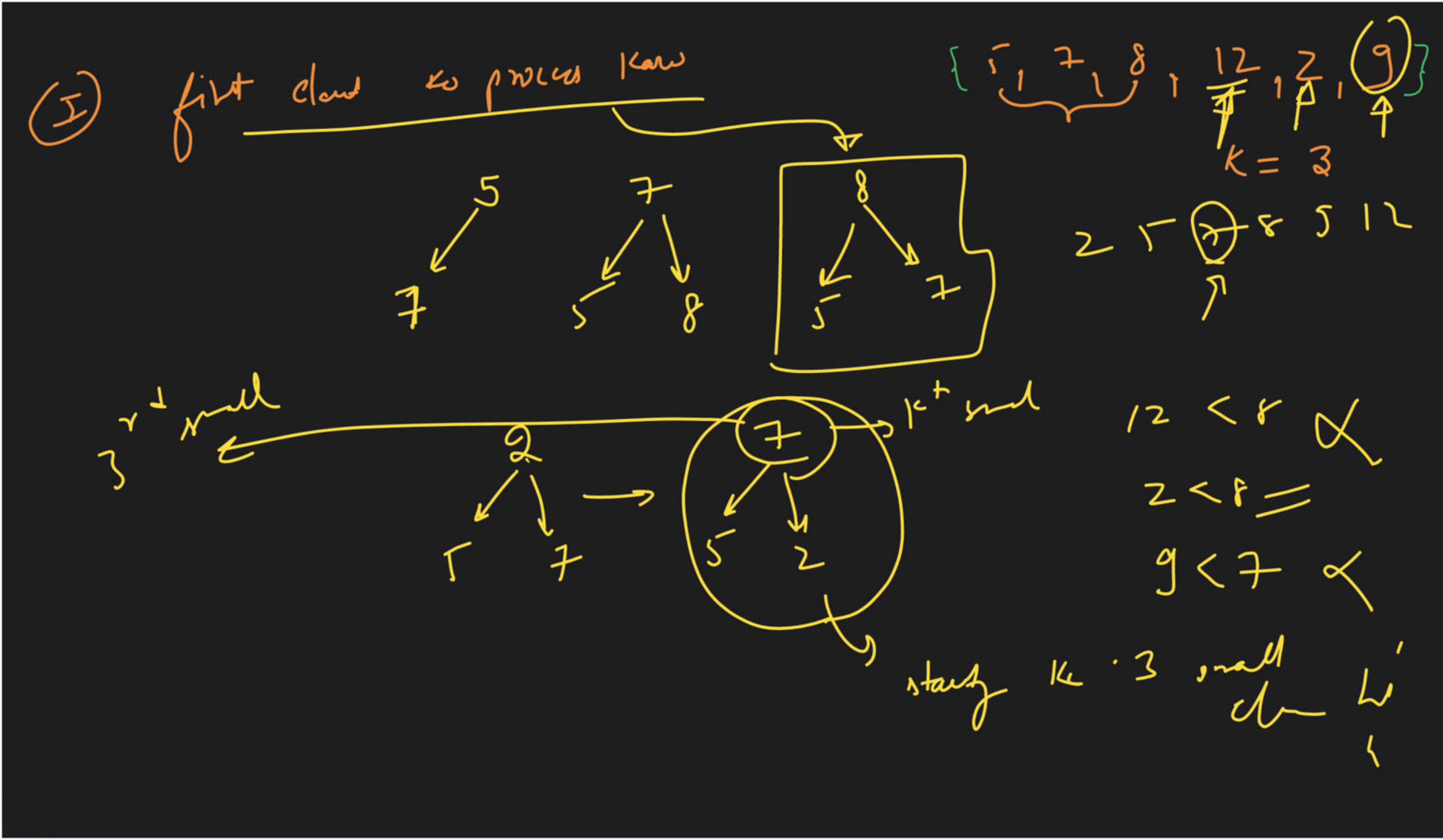


k^{th} smallest element

starting ~~k~~ Kc 4

small element here

(I) first case ko process karo



n^2

$(2)^2$

4

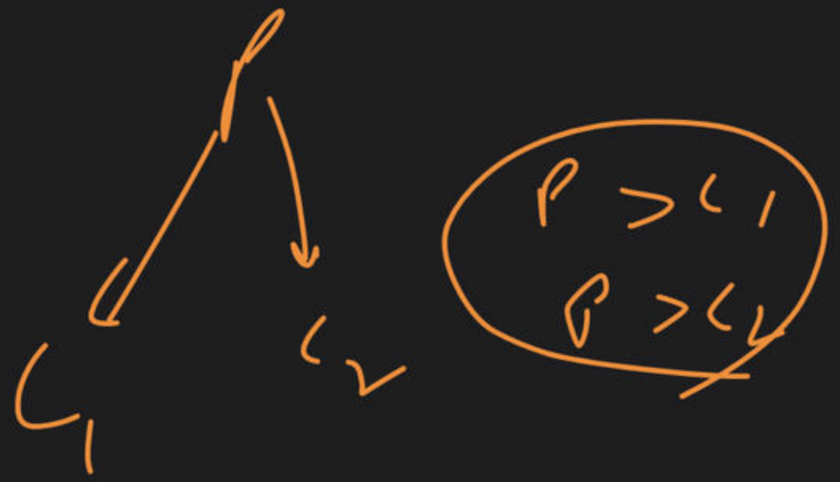
n^3

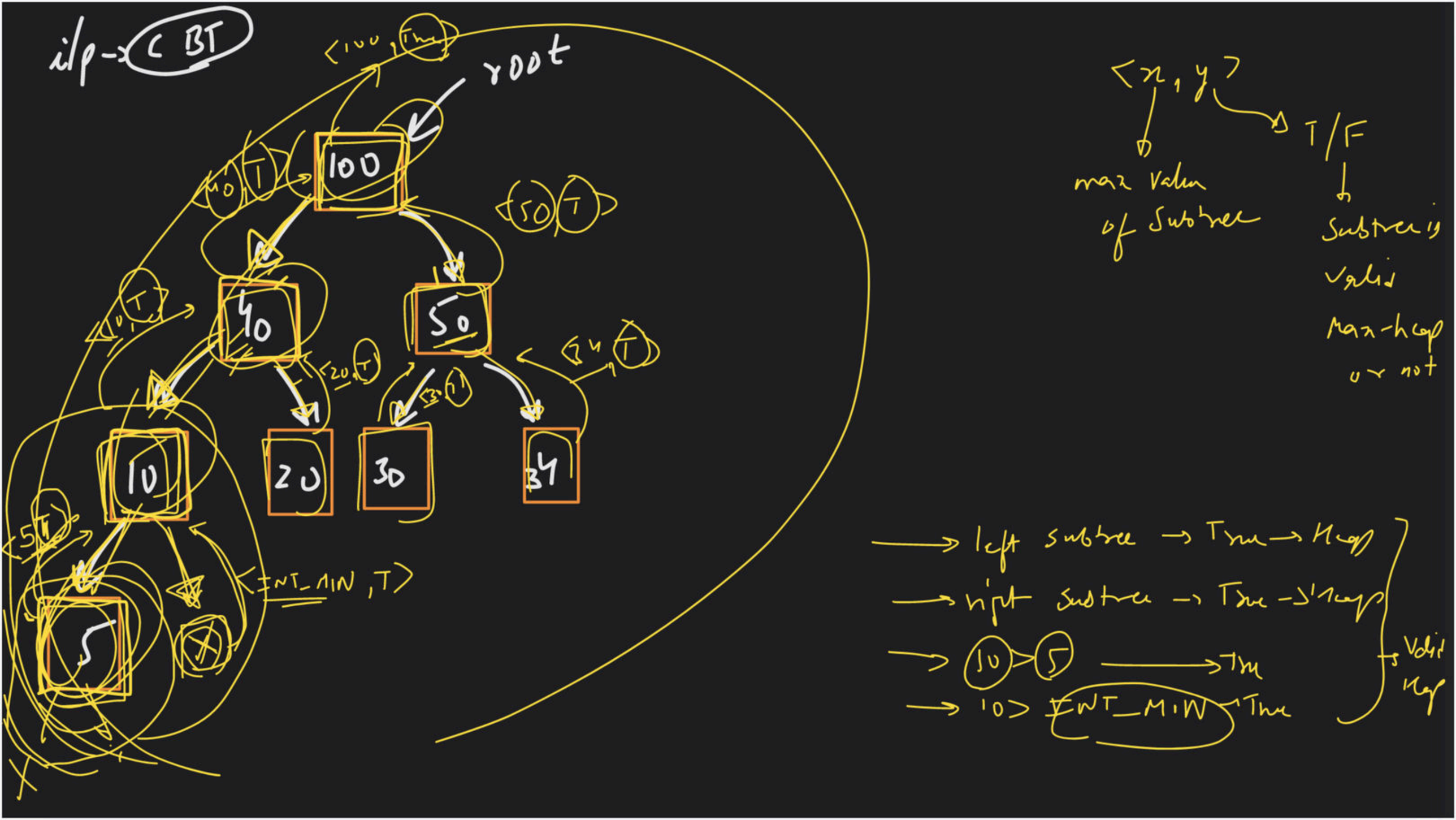
2^3

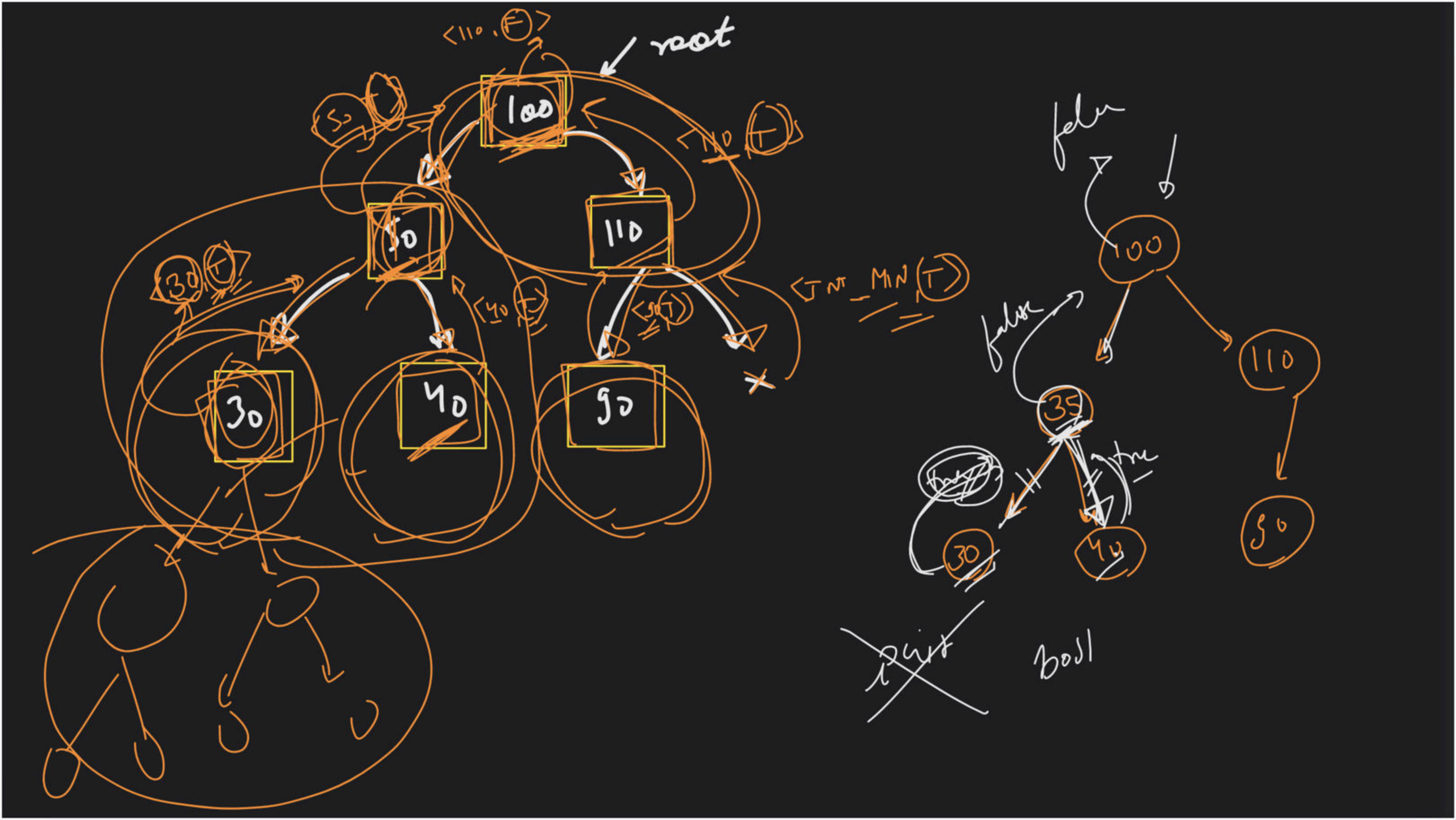
8

→ BT ⟶ is Valid Max Heap or not

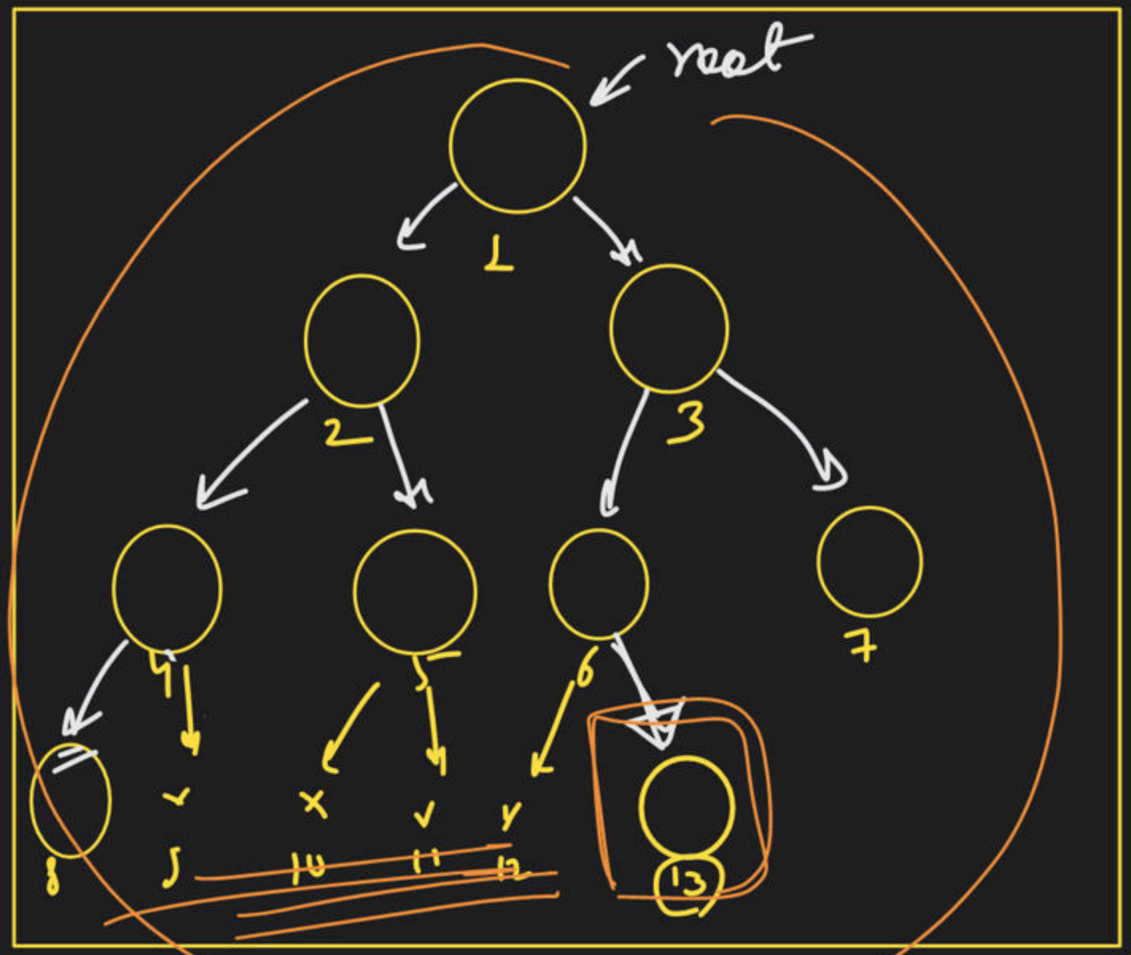
Heap ⟶ ~~BT~~ + Heap property




i/p -> C BT
root
100
40
50
10
20
30
34
5
INT_MIN, T
<x, y>
T/F
max value of subtree
Subtree is valid max-heap or not
left subtree -> True -> Heap
right subtree -> True -> Heap
10 5 -> True
'0' -> INT_MIN -> True
Valid Heap


root
100
50
110
30
40
90
false
false
true
100
35
110
30
40
90
bool

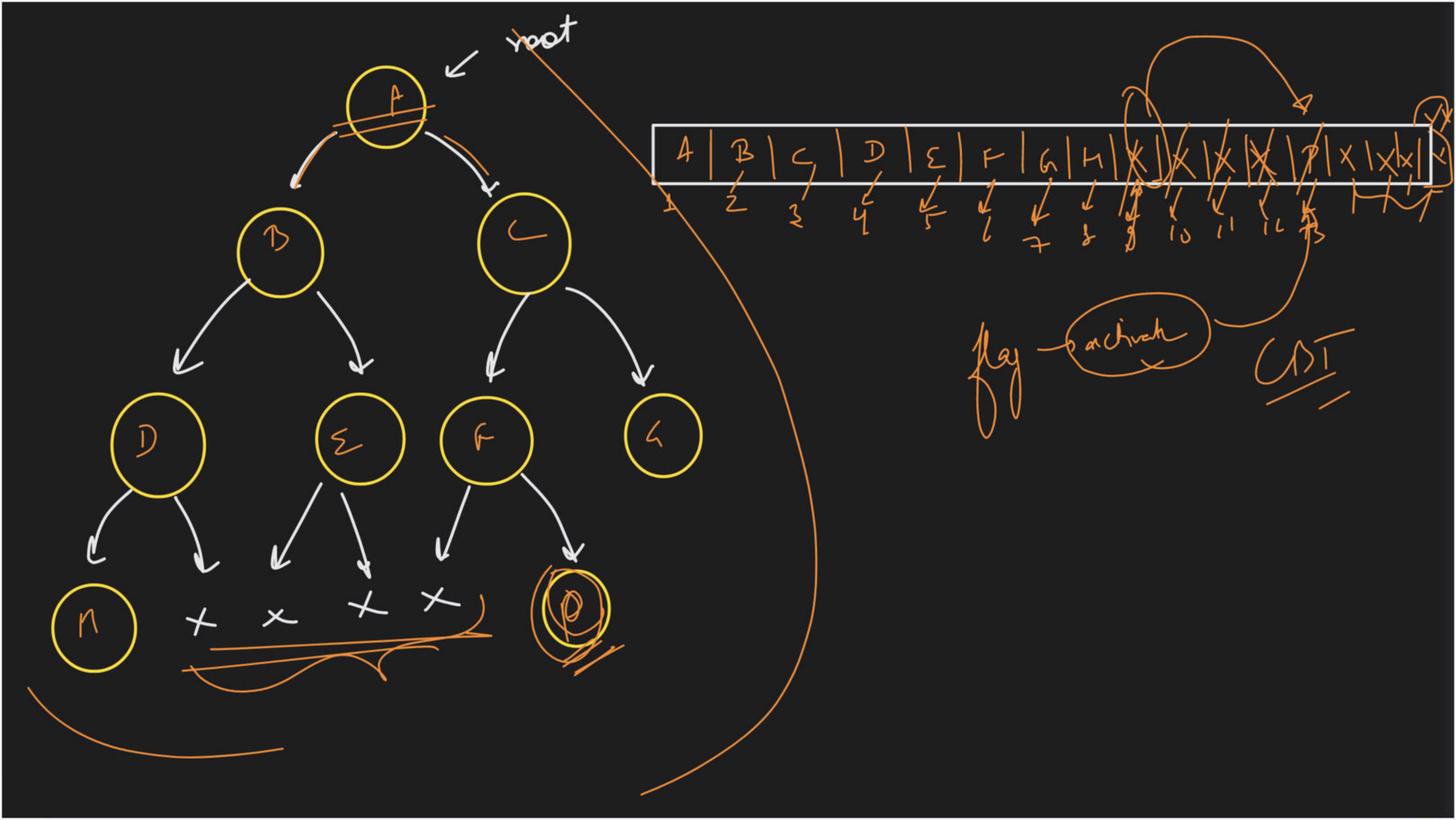
Whether a CBT or not

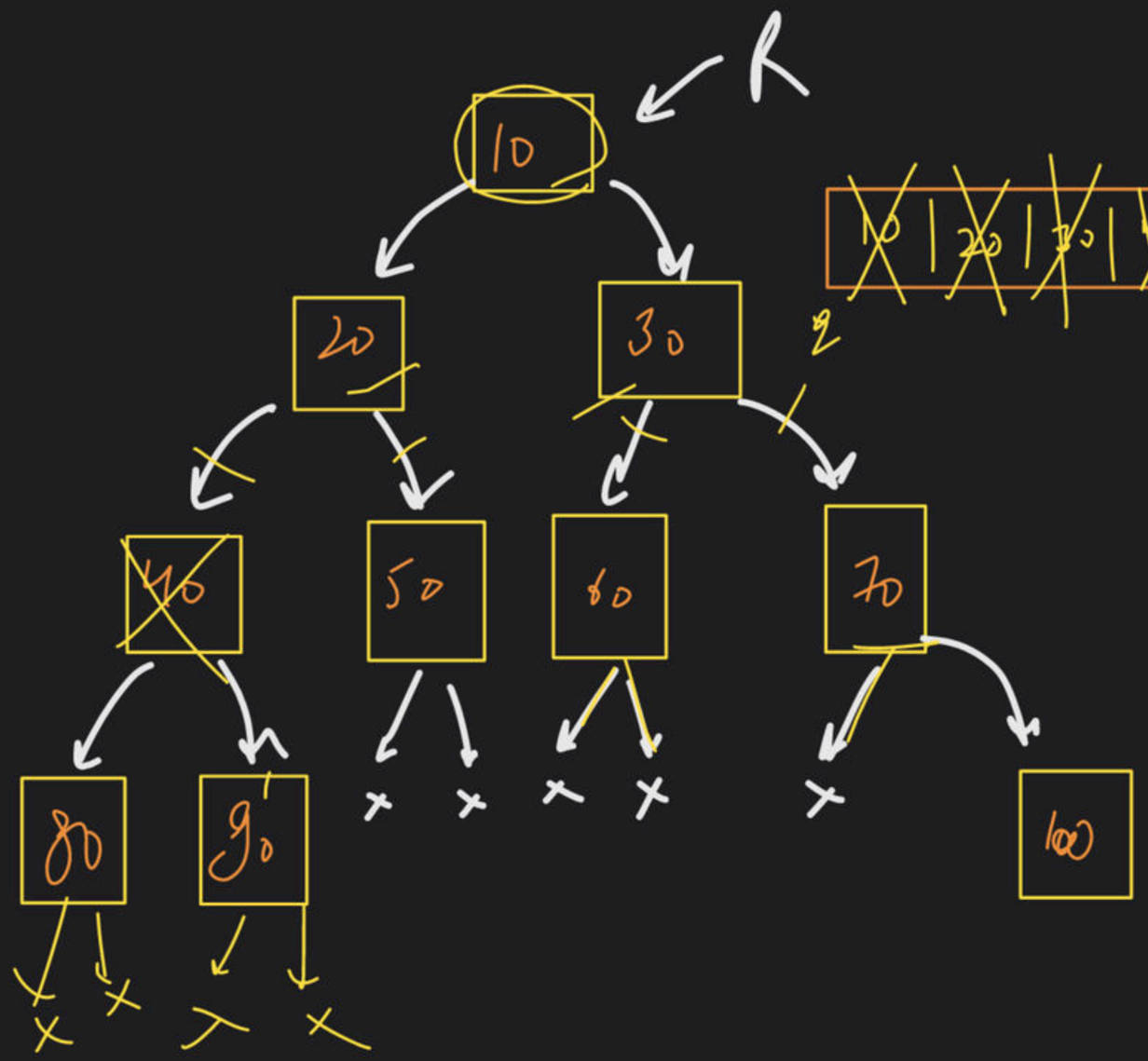


Last Node → 13

Total Node = 9

last node > total node → Not a CBT


root
A
B
C
D
E
F
G
A | B | C | D | E | F | G | H
flag
archive
CST

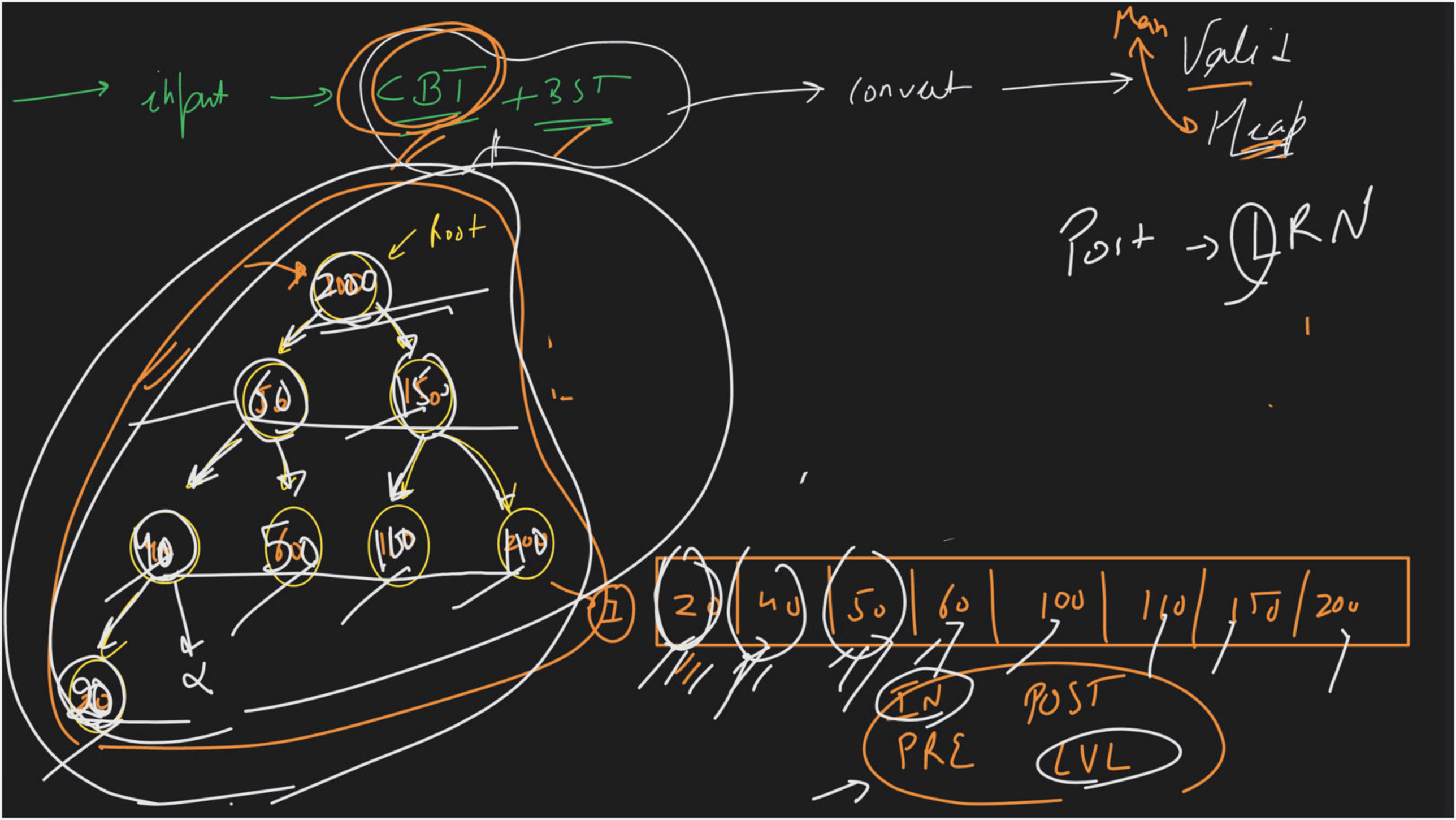


Null found = ~~Falsh~~ True → & ?

NON NUL

Invalid CBT → return false

~~10~~	~~20~~	~~30~~	~~40~~	~~50~~	~~60~~	~~70~~	~~80~~	~~90~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	100	X	X	X	X


input
CBT + BST
convert
Valid
Heap
Max
Post → LRN
root
2000
50
1500
40
500
100
400
90
α
20
40
50
60
100
110
150
200
IN
POST
PRE
LVL