

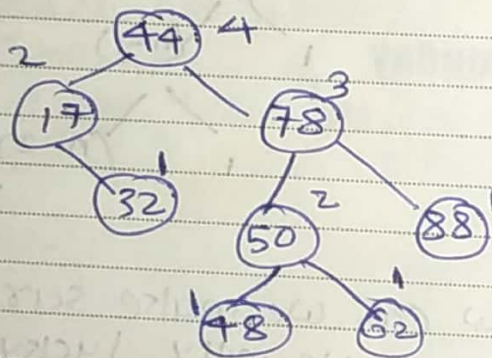
27 | Monday

8 am

AVL Trees

9 BST has worst case time $O(n^2)$, [Avg. $O(n \log n)$]
10 \therefore we modify that to AVL Tree

11 \circ AVL trees are balanced
12 \circ It is BST such that heights of children of v can differ by at most 1.



6 If $n(h)$ is min. no. of nodes in AVL tree of height h , $h < 2 \log n(h)$

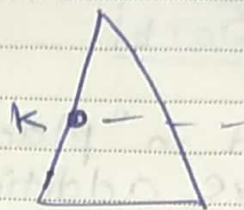
8 Thus height is $O(\log n)$

9 Consider an AVL tree on n nodes. Consider a leaf closest to the root.
Suppose leaf is at level k

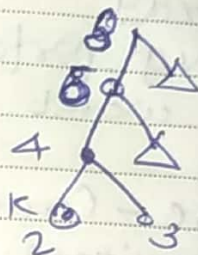
Note:

28 | Tuesday

8 am



Here



1 pm \therefore Relation is $2^k - 1$

2 Height of the tree is at most $(2^k - 1)$.

3 Tree has at least 2^{k-1} nodes

$$2^{k-1} \leq n \leq 2^k - 1$$

5 \therefore height of tree is at most $2^k - 1$ it has at most $2^{2^k - 1}$ nodes

6 ~~Height is at most $2^k - 1$ or least $k - 1$.~~

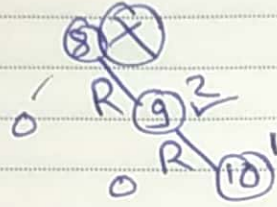
7 ~~complete~~ or ~~complete~~ $2^k - 1$

Note:

29 Wednesday

8 am * Inertion in AVL Tree
Difference in height of children can be -1, 0, +1

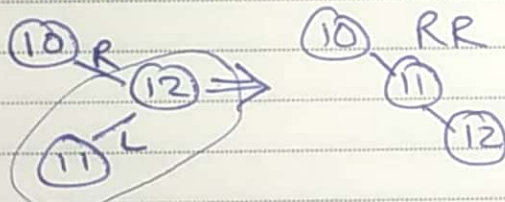
10 e.g. 8, 9, 10
11 ∴ This is not AVL.
12



Then rotate Anticlockwise



3 For RR → Anticlockwise
4 LL → clockwise
5 RL →



LR → LL → clockwise

Maximum height of AVL with n nodes

0 → 0 1 Nodes

1 → 0-0 2 Nodes

Note: 2 → 4 nodes

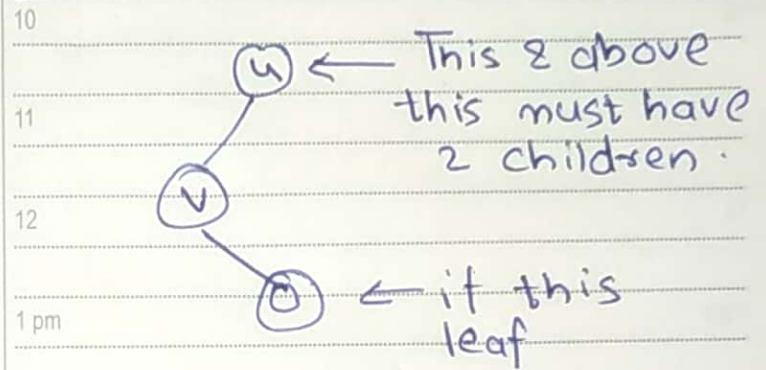
3 → 7 nodes

JULY							AUGUST							SEPTEMBER							OCTOBER							NOVEMBER							DECEMBER						
M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
	1	2	3	4	5	6					1	2	3		1	2	3	4	5	6	7					1	2		30	31						1					
7	8	9	10	11	12	13	4	5	6	7	8	9	10	8	9	10	11	12	13	14	6	7	8	9	10	11	12	3	4	5	6	8	9	10	2	3	4	5	6	7	8
14	15	16	17	18	19	20	11	12	13	14	15	16	17	15	16	17	18	19	20	21	13	14	15	16	17	18	19	11	12	13	14	15	16	17	9	10	11	12	13	14	15
																					20	21	22	23	24	25	26	18	19	20	21	22	23	24	16	17	18	19	20	21	22

30 Thursday

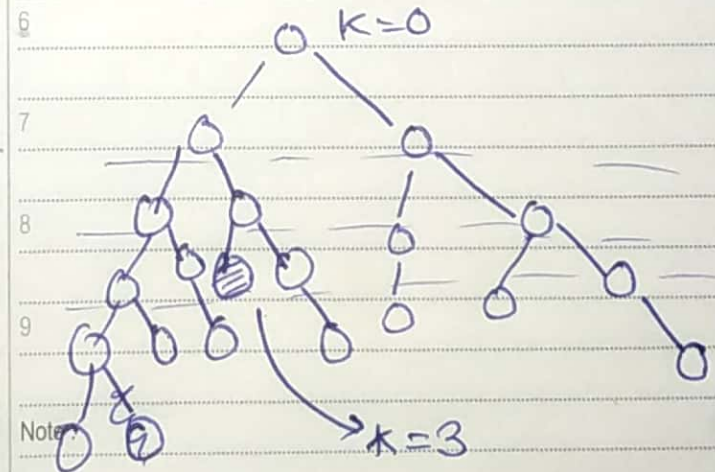
8 am

∴ Relation is
 $n(h) = n(h-1) + n(h-2) + 1$



3 Insestion / Deletion of element take $O(\log n)$
4 time.

5 Example how $2k-1$



Note: ∴ max. height is $2k-1=5$
or min. height = 3