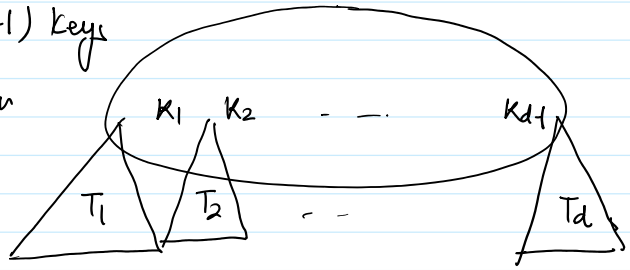
11) Lecture 26-27.5 | 2-4 Tree

01 October 2024 14:15

Multiway Search tree Each internal node of a multiway search tree T

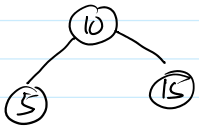
- has at least two children
- Stores collection of item of form (key, val)

- Each node at least one and at most (d-1) keys
- If an internal node has K keys, then it should have (K+1) children



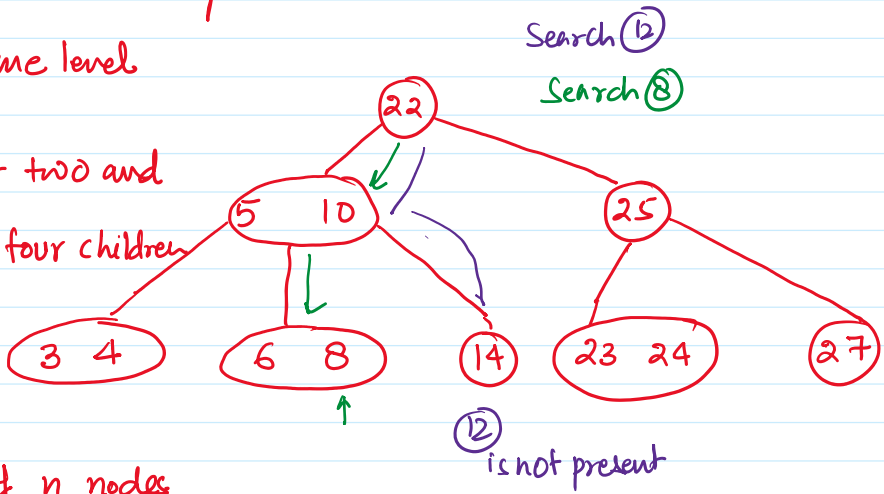
- $Key(T_1) \leq K_1 \leq Key(T_2) \leq K_2 \dots K_{d-1} \leq Key(T_d)$

$K_1 \leq K_2 \leq K_3 \dots \leq K_{d-1}$



(2-4) tree (d=4)

- Each node can have atleast one key
  atmost three keys
- All leaves should be at same level
- Each node can have atleast two and
  at most four children



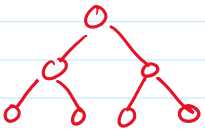
Claim If (2-4) tree consist of n nodes

$$\log_4 n \leq h \leq \log_2 n$$

↑ each node has — ↑ each node has

↑
each node has
exactly four children

↑
each node has
exactly two children



① Search

② Insertion

③ Deletion

Red black tree to (2-4) tree

Take a black node and its red children