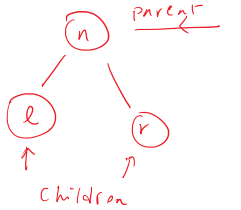
1 Midterm (Oct 19) up to Balanced Binary Search Trees.
(review on Oct 17)

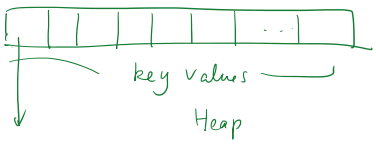
2. (a) Min-Heap



Max: $n \geq l$, $n \geq r$

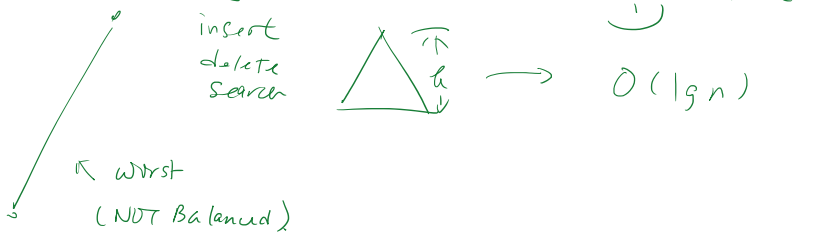
Min: $n \leq l$, $n \leq r$

(b)



Balanced Binary Search Trees

(1) for BST; Worst case All operations O(n)

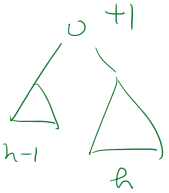


AVL trees

AVL tree node → height information integer

height of ~~left~~ right sub-tree − height of ~~right~~ left sub-tree

$-1, 0, 1$ → OK for balanced binary search tree.



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Self Adjusting BST (Splay tree)

→ NO Additional data to be tracked

→ Visiting imbalanced part will end up re-adjusting the height (more balanced than before)

→ Amortized Analysis

(M operations → M lg n time) worst case

↑ Insert

↑
Insert
delete
Search

worst case

∴ the Amortized cost for each operation is $\sim \lg n$

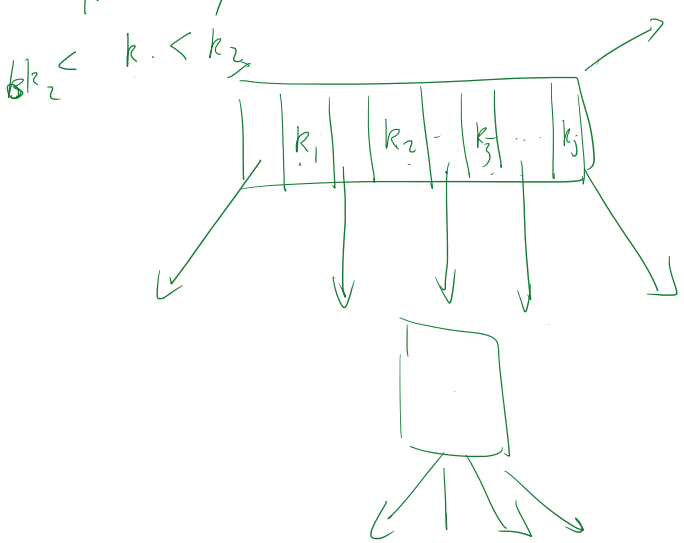
Splay (x, T)

→ ↓ being used in all dictionary operations

→ Comparable to AVL trees & many other balanced BST
↳ (in terms of performance)

Multiway trees

$k_1 < k < k_2$



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$k_1 < k_2 < k_3 < \ldots k_j$

k