AVL Trees Vs. Heaps

Note Title 11/13/2007

Can we use an AVL tree to sort?

(A thought question.)

↓

Building AVL Tree: $O(n \log n)$

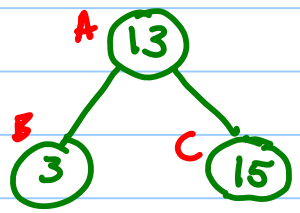
In-Order Traversal: $O(n)$

- Huh? It takes $O(n)$ to build a heap, but $O(n \log n)$ to build an AVL tree. Why?

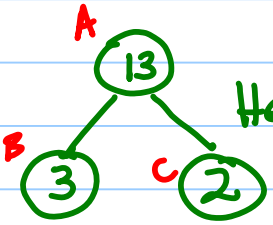
- What is the key difference between Heap + AVL?

We care about relative ordering of siblings.

We care about hierarchical ordering. (Relative Ordering of siblings doesn't matter!!)

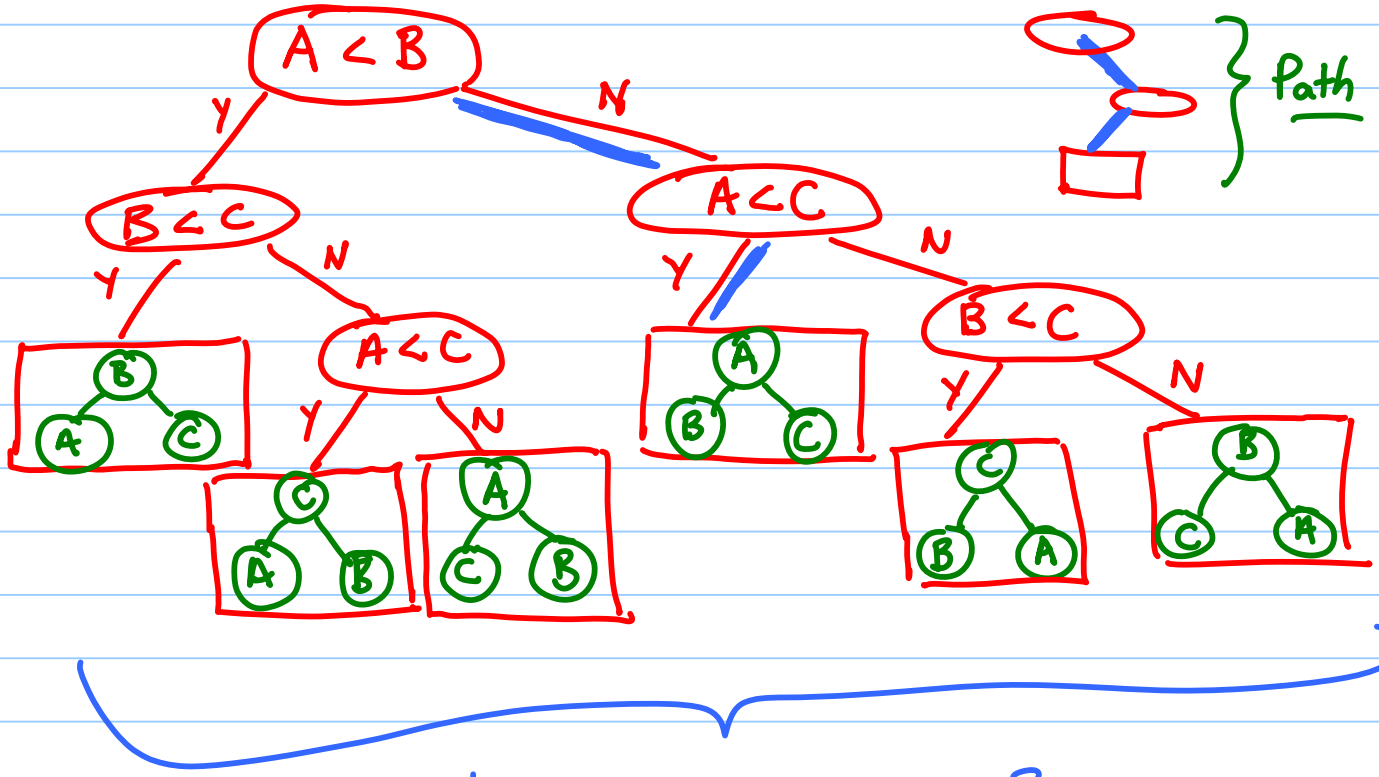


AVL.



Heap.

If we built a decision tree to describe BuildAVLTree, it would have leaves that were all possible permutations of the input.



How many leaves?

$3! = 3 \cdot 2 \cdot 1 = 6$

- There are n! leaf nodes
- The path length is log(n!)
- So the lower bound for work to build an AVL tree is O(log n!)
- We learned that this O(n log n).
- So AVL Search $\in O(n \log n + n) \in O(n \log n)$

Build AVL

Inorder traversal