EE 200 Lecture 19: Binary search trees

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19 November 2024

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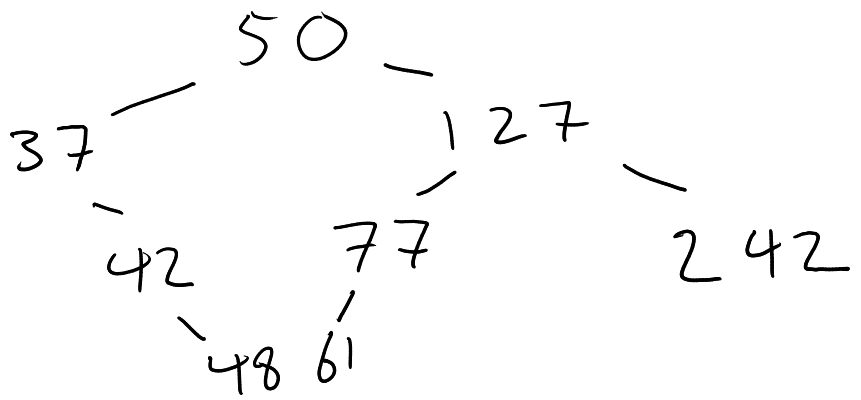
Animal game

Many copies passed around in the old DOS days,
now available online: animalgame.com

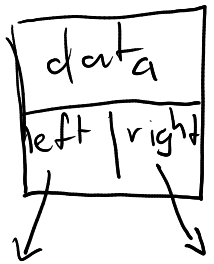
This isn't strictly a BST, but it illustrates search nicely.

Let's play the animal game with numbers

Linked list

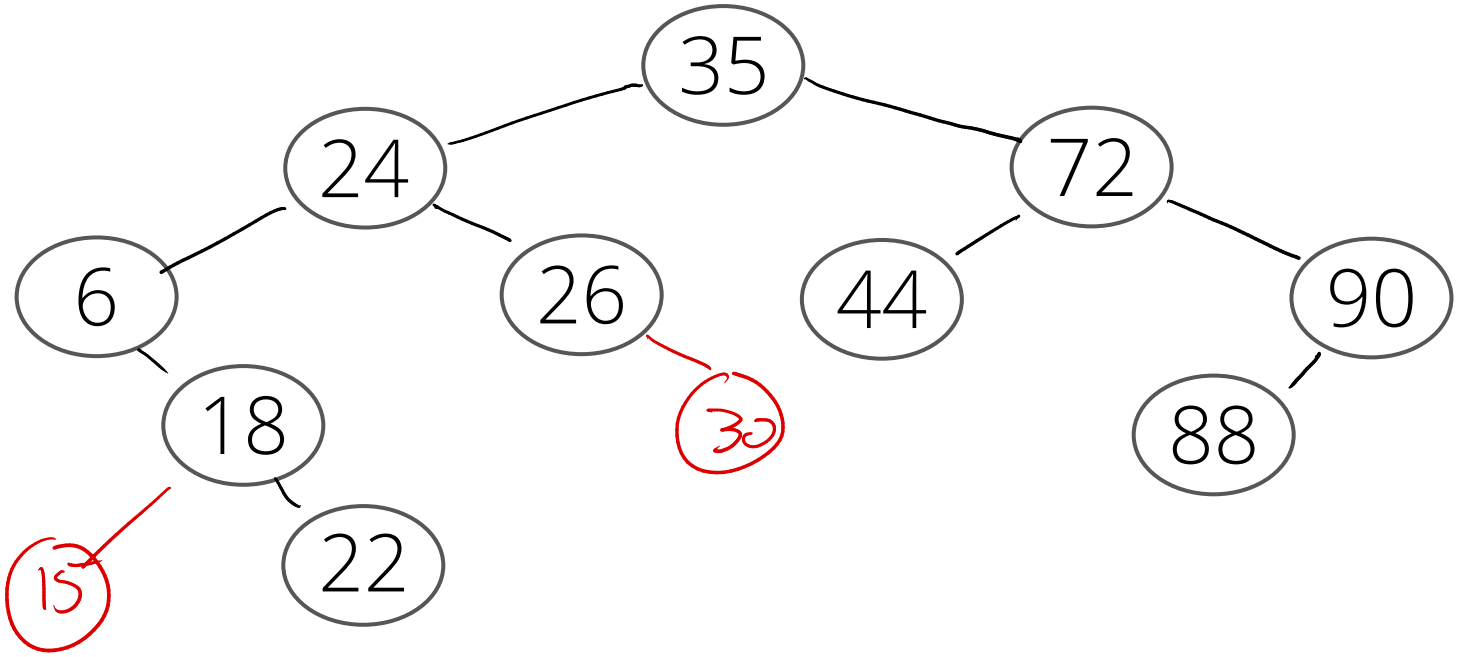


BST



Adding numbers to a BST

30

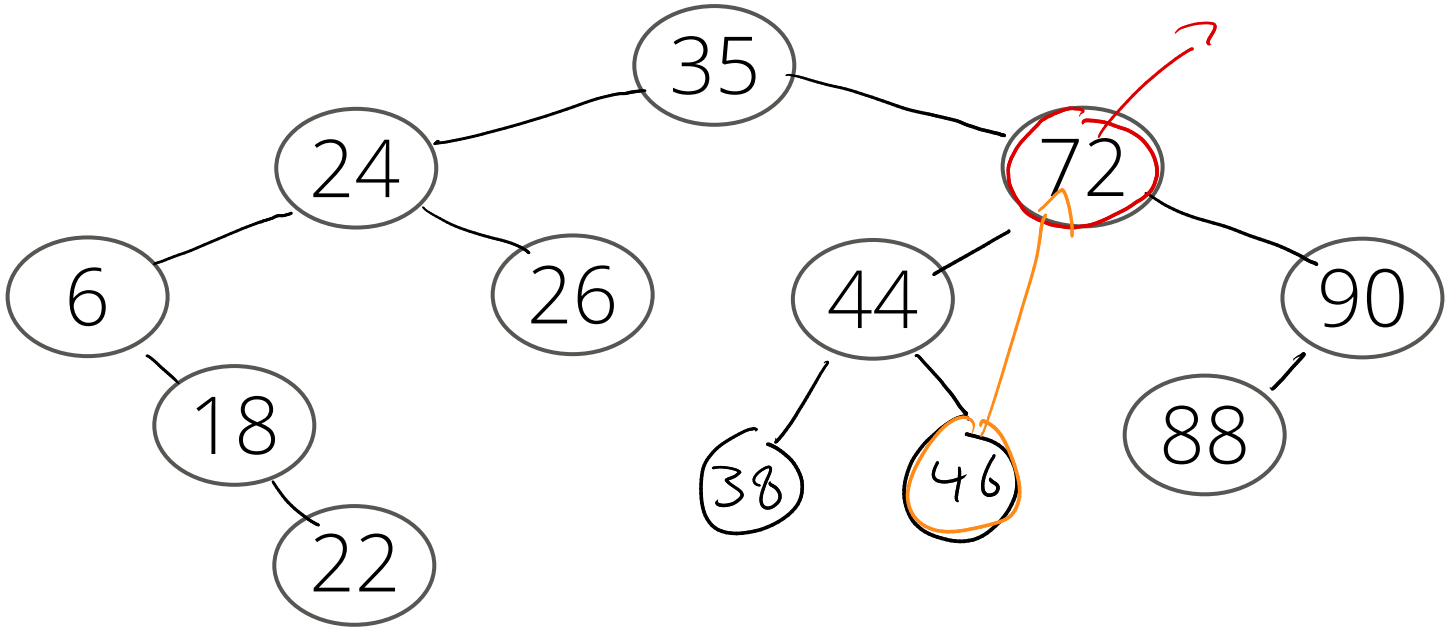


n comparisons for a tree with 2^n items

⇒ for N items, $O(\log_2(N))$ comparisons

Removing numbers from a BST

O(log(N))



Go left, then right all the way OR
right, left " "

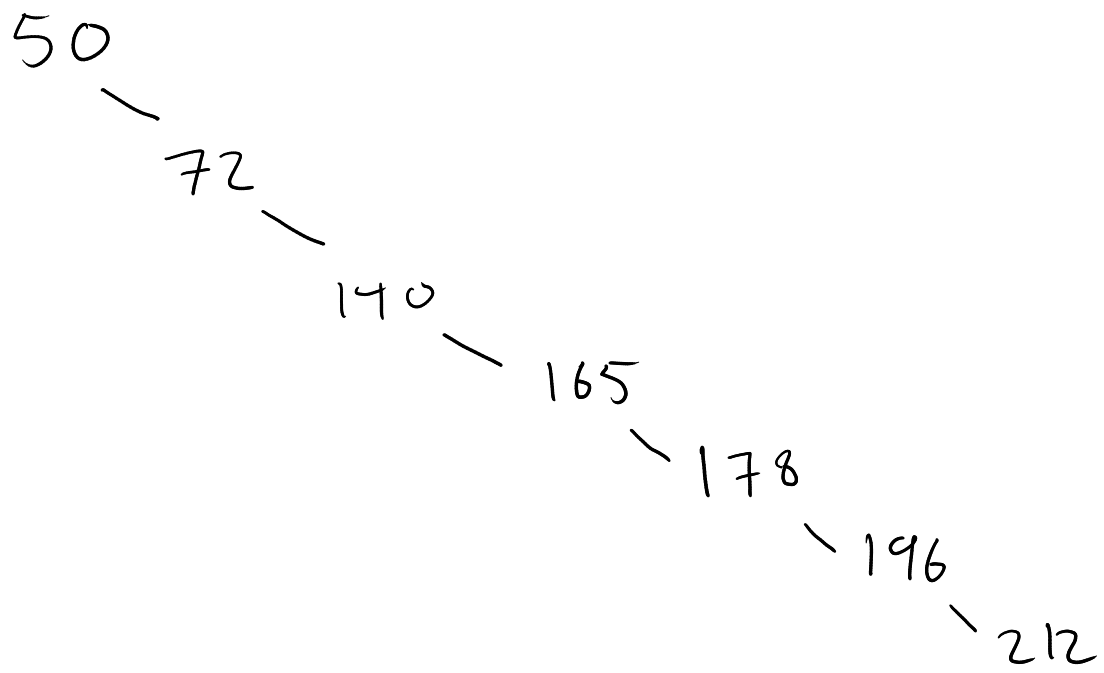
BSTs versus other sorted structures

	Array	Linked list	BST
Find	$O(\log(N))$	$O(N)$	$O(\log(N))$
Insert	$O(N)$	(find) $O(N)$ / (insert) $O(1)$	$O(\log(N))$
Look up by index	$O(1)$	$O(N)$	N/A

list [12]

BSTs versus other sorted structures

	Array	Linked list	BST
Find	$O(\log(N))$	$O(N)$	$O(\log(N))$
Insert	$O(N)$	(find) $O(N)$ / (insert) $O(1)$	$O(\log(N))$
Look up by index	$O(1)$	$O(N)$	N/A


50
72
140
165
178
196
212

Classwork 15 will be pushed to a Github repo

This will be the opposite of past assignments:

> I will provide you with 10 implementations of a binary search tree
>
> Your job is to write the autograder
> (and figure out which of the 10 is correct).

Code should be uploaded on Gradescope by midnight (11:59pm) in two weeks (12/3).

Logistics - next Tuesday?

Who plans to be around next Tuesday?