More recursion

5/4/26

Administrivia

- Exam 2 is a week from today (5/11)
  - In class, open note, written exam
  - Topics:
    - Data structures: Stack, Queue, Set, Map, Priority Queue, StringBuilder
    - Sorting and comparators
    - Design problems
    - Binary search and binary search trees
    - Tree traversals
    - More questions on running time
    - Search (backtracking and connected components)
    - Inheritance

Recall: Tree traversals

```
void traverse(Node n) {
        if(n == null)  return;
        //preorder: print here
        traverse(n.left);
        //inorder: print here
        traverse(n.right);
        //postorder: print here
}
```

Last time

- Draw two trees with preorder traversal a,b,c,d,e,f,g,h

- Draw two trees with inorder traversal a,b,c,d,e,f,g,h

Draw the unique tree with both

- preorder traversal:

  a,b,c,d,e,f,g,h

- inorder traversal:

  b,c,a,f,e,g,d,h

Alternate: Level-order traversal

- Visits the nodes one level at a time
  (the root, its children, its grandchildren...)

- Implemented using a queue

Recursive methods

- Check for base case

- Otherwise, break the problem into 1 or more smaller problem instances. Solve them by calling the same method and use the results to solve the original problem.

Sample problem: Towers of Hanoi

What is the 1st move when moving 5 disks from the left peg to the middle one?

A. Move from the left peg to the middle one
B. Move from the left peg to the right one
C. Move from the middle peg to the right one
D. Move from the middle peg to the middle one
E. Move from the right peg to the middle one

What is the 1st move when moving 5 disks from the left peg to the middle one?

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Sample problem: Count subsets of the first n integers

Sample problem: Identify subsets of the first n integers