LEC 09

CSE 123

Recursive Programming

Questions during Class?

Raise hand or send here

sli.do #cse123A

BEFORE WE START

Talk to your neighbors:

Coke, Pepsi, Dr. Pepper, or None of those?

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TAs:	Arohan	Ashar	Neha	Rohini	Rushil
	Ido	Zachary	Sebastian	Joshua	Sean
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	Ziao	Kieran	Marcus	Crystal	Eeshani
	Prakshi	Packard	Cora	Dixon	Nichole
	Niyati	Trien	Lawrence	Evan	Cady

Announcements

- Resubmission Period 2 due tonight (5/2) at 11:59pm
  - Last opportunity for C0
- Quiz 1 Tuesday (5/6) in your registered section
- Programming Assignment 1 is due Wednesday (5/7) at 11:59pm

Recursive Methods [Review]

- 2 components of every recursive method:

- Recursive case
  - Decompose problem into subproblem
  - Make the actual recursive call
  - Combine results meaningfully
- Base case
  - Simplest version of the problem
  - No subproblems to break into
  - Return known answer

If decomposing moves you closer to the base, no infinite recursion!

Why Recursion?

- Generally, anything you can write iteratively you can write recursively
  - So why write anything recursively?

Recursion is particularly useful when dealing with something that's recursively defined

- Math examples:
  - Factorial: $n! = n * (n-1)!$
  - Exponent: $x^n = x * x^{n-1}$
  - Fibonacci: $fib(n) = fib(n-1) + fib(n-2)$
- Non-math examples?
  - ListNodes (int data, ListNode next)
  - Other ideas?

Files

- We'll say that computer files fall into one of the following categories:

Standard file (.txt, .csv, .java)

```
f.isDirectory() -> false
```

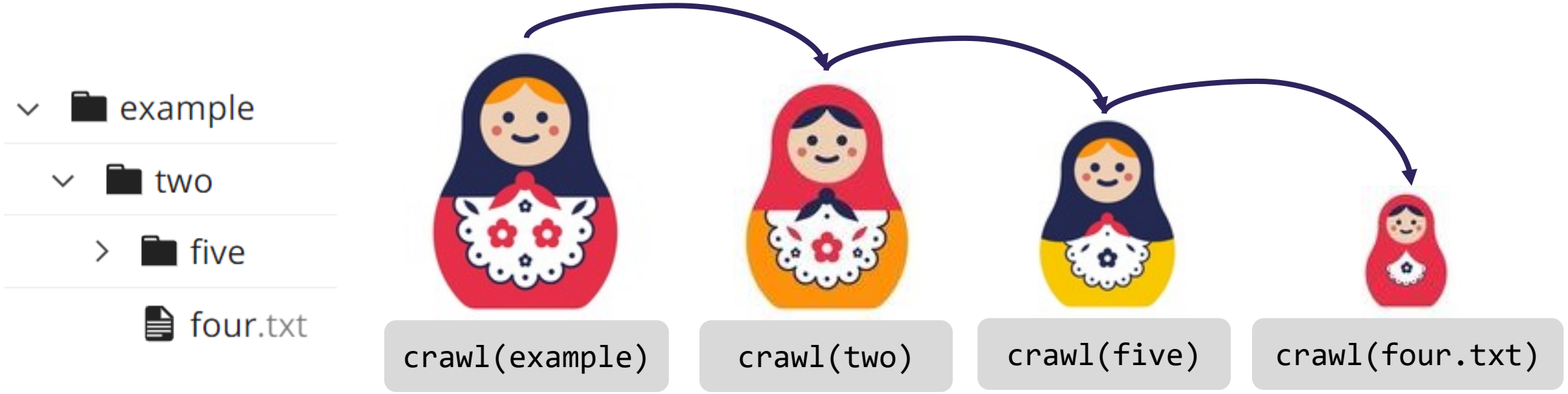
Directory w/ subfiles

```
f.isDirectory() -> true
File[] subFiles = f.listFiles()
```

This is a recursive definition! A File is either normal, or a directory with a File[] of subFiles

Crawl w/ Indentation

- How can one of our files know what level it's on?



- What if a bigger doll told the next smaller doll the level?
  - So long as the first doll is told the right value, this will work!
- Remember, recursive method calls are still method calls
  - How can we pass information from a bigger doll to a smaller doll?

Public / Private Pairs

- Used when we need additional information between recursive calls

- Private helper method hides additional info
  - Clients shouldn't have to worry about it
- All public method does is kick-start the private one
  - What's the correct starting value(s) for additional param(s)?

Question to ask: "Do I need to keep track of any additional information?"