

## What's the difference?

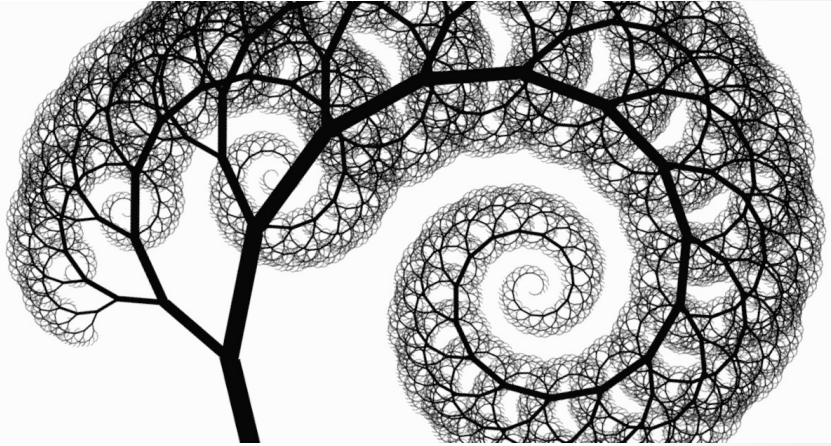
```
char buf[32];  
char* src = "foo";  
  
buf = src; // This?  
strncpy(buf, src, sizeof(buf)); // vs this?
```

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One moves a pointer (with a compiler warning). Creating "garbage"!  
The other copies data into separate memory.  
**DRAW A PICTURE!**

CS221  
C and Systems  
Programming



# Recursion in C

Recursion – a method that calls itself

- Needs a "stopping criterion"
- Used to solve problems where "the solution would be easy if we just had the solution to a slightly smaller version of the same problem"

Just like recursion in Python or Java...

Do a sample program that codes up factorial(), sum(), Fibonacci()

# Recursion in C

How does this look in memory?

The stack



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Stack is full of "stack frames".

Each call to Factorial() has its own frame, with its own input, output, and method variables.

Why use recursion?

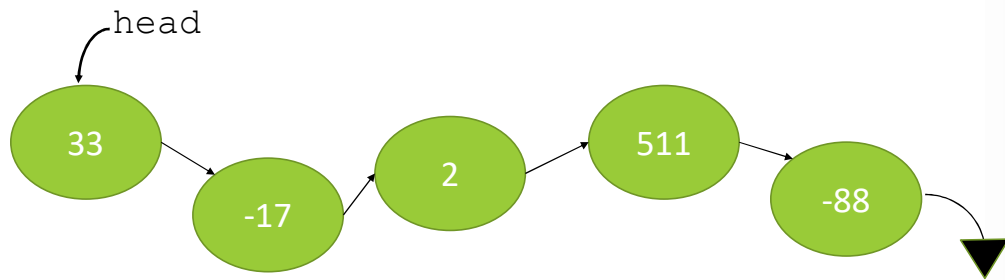
# Data Structures

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Show factorial, Fibonacci via for() loops

## CODE-ALONG: Linked List



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Code this up: insertion in front, walk-and-print list  
Node struct, List struct, methods for working with List.

## CODE-ALONG: Linked List

What's new in C?

We are responsible for freeing the memory we allocated

- Write `freeList()` method

## CODE-ALONG: Sorted list

Put new entries into LinkedList in the correct location.

..wouldn't it be nice to have Object Oriented Programming tools?



How big is that  
stack?



# ulimit

See and set resource limits

**ulimit -a**

These are per-user limits, not the physical limits in the server.

Other interesting commands (Linux/macOS only):

**ps**

**df**

**lscpu**

**free**

**dmidecode**

**lsusb**

**top**

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Talk about each resource, each command

On Windows, can install WSL = "Windows System Linux". Easy and good!

## SW to help you debug

Check your code, automatically report errors? Wow!

- Install **cppcheck** on your computer
- Install **cppcheckclipse** on your Eclipse for C/C++

Usage: right-click on a project in Eclipse, "Run cppcheck"

Remember Continuous Integration? Heavy use of SW tools to automate much of SW development and testing process.