

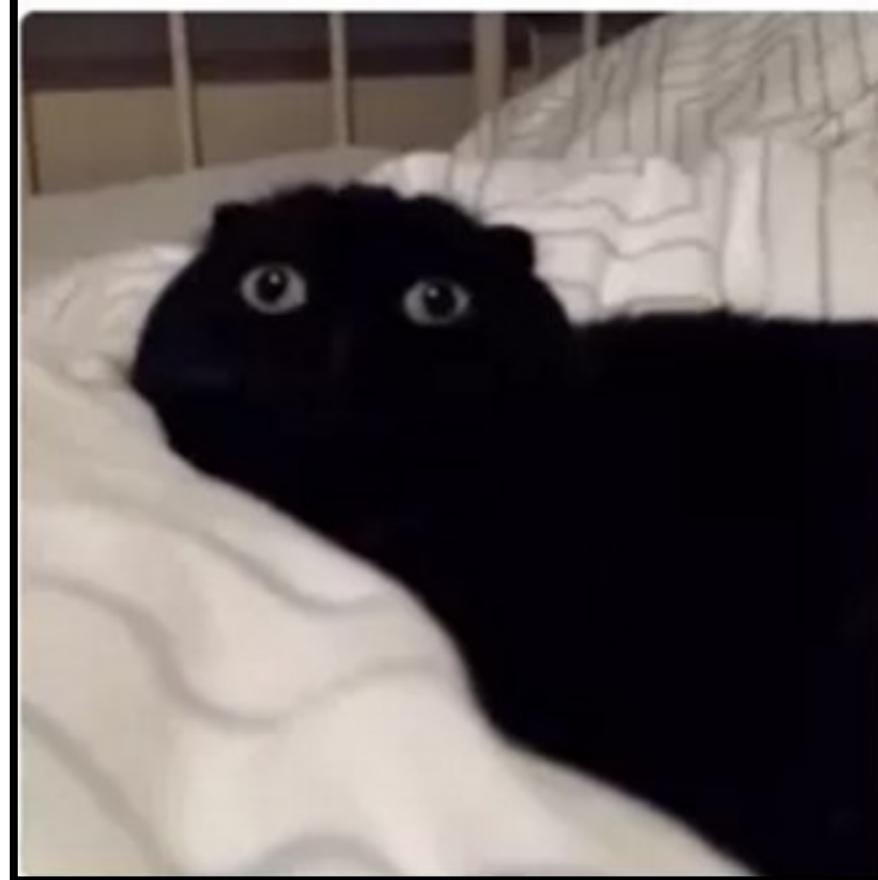
# How does the internet work?



# What is the internet?

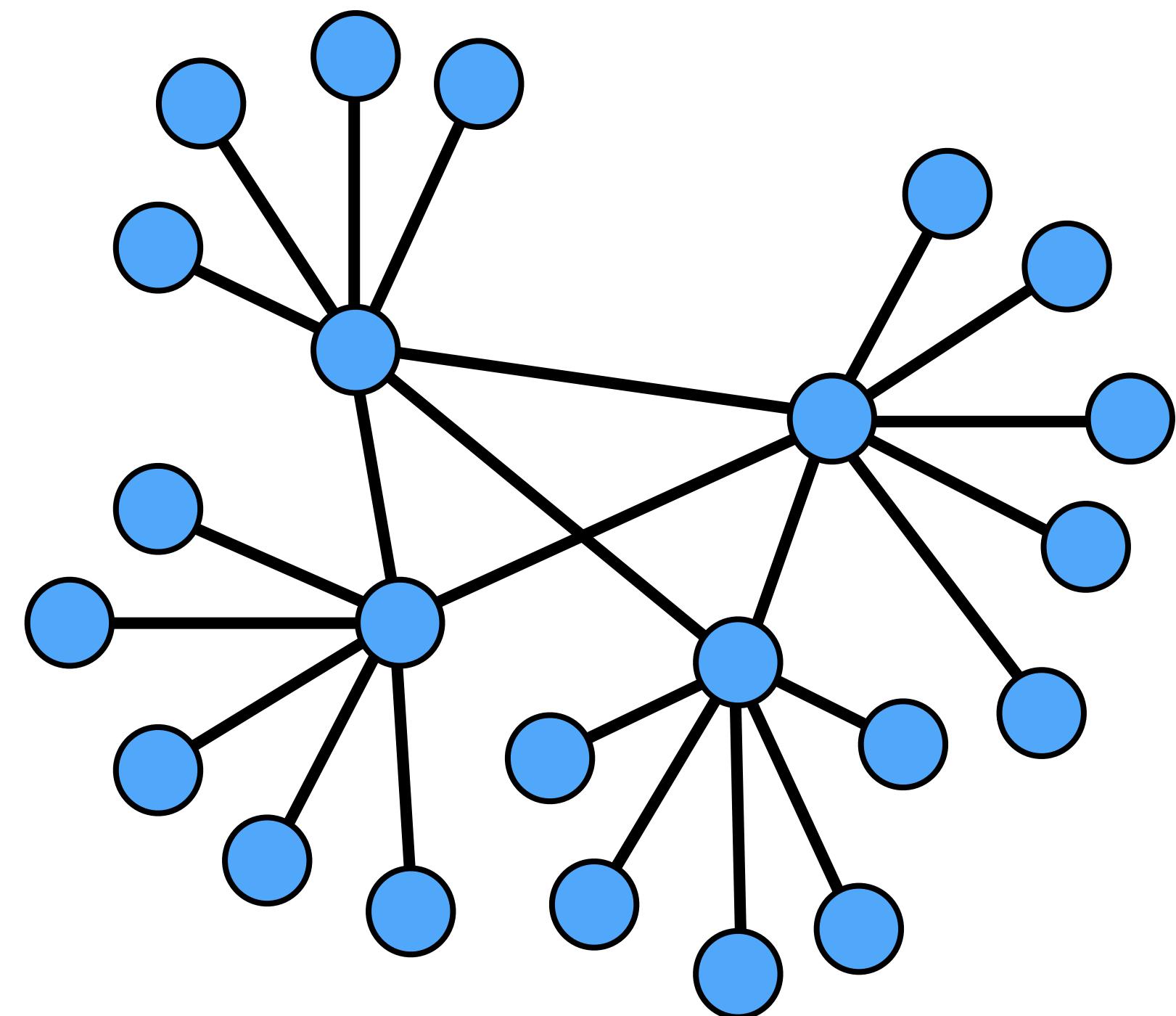
It's the place where all the cat memes are.

when you first meet me vs. when i get  
comfortable



# What is the internet?

It is a whole bunch of files located on lots of computers that are all connected.



# What is the internet?

It is a whole bunch of files located on lots of computers that are all connected.

## What is the main thing that happens on it?

Computers get files from other computers.

# File paths

## File paths *local*

C:\Desktop\CHDSS\notes.txt

/Users/username/Desktop/CHDSS/notes.txt

windows

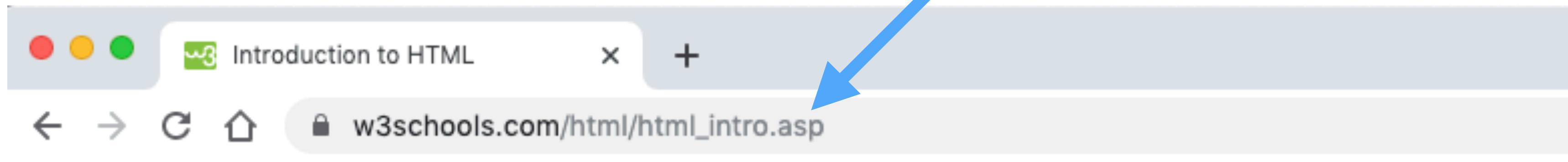
mac & linux

## File paths *internet*

www.example.com/CHDSS/notes.txt

# File paths

**URL**  
*Uniform Resource Locator*



**w3schools.com**

HTML CSS JAVASCRIPT SQL PYTHON PHP BOOTSTRAP MOR

HTML Tutorial  
HTML HOME  
**HTML Introduction**  
HTML Editors  
HTML Basic  
HTML Elements  
HTML Attributes  
HTML Headings  
HTML Paragraphs  
HTML Styles

## HTML Introduction

◀ Previous

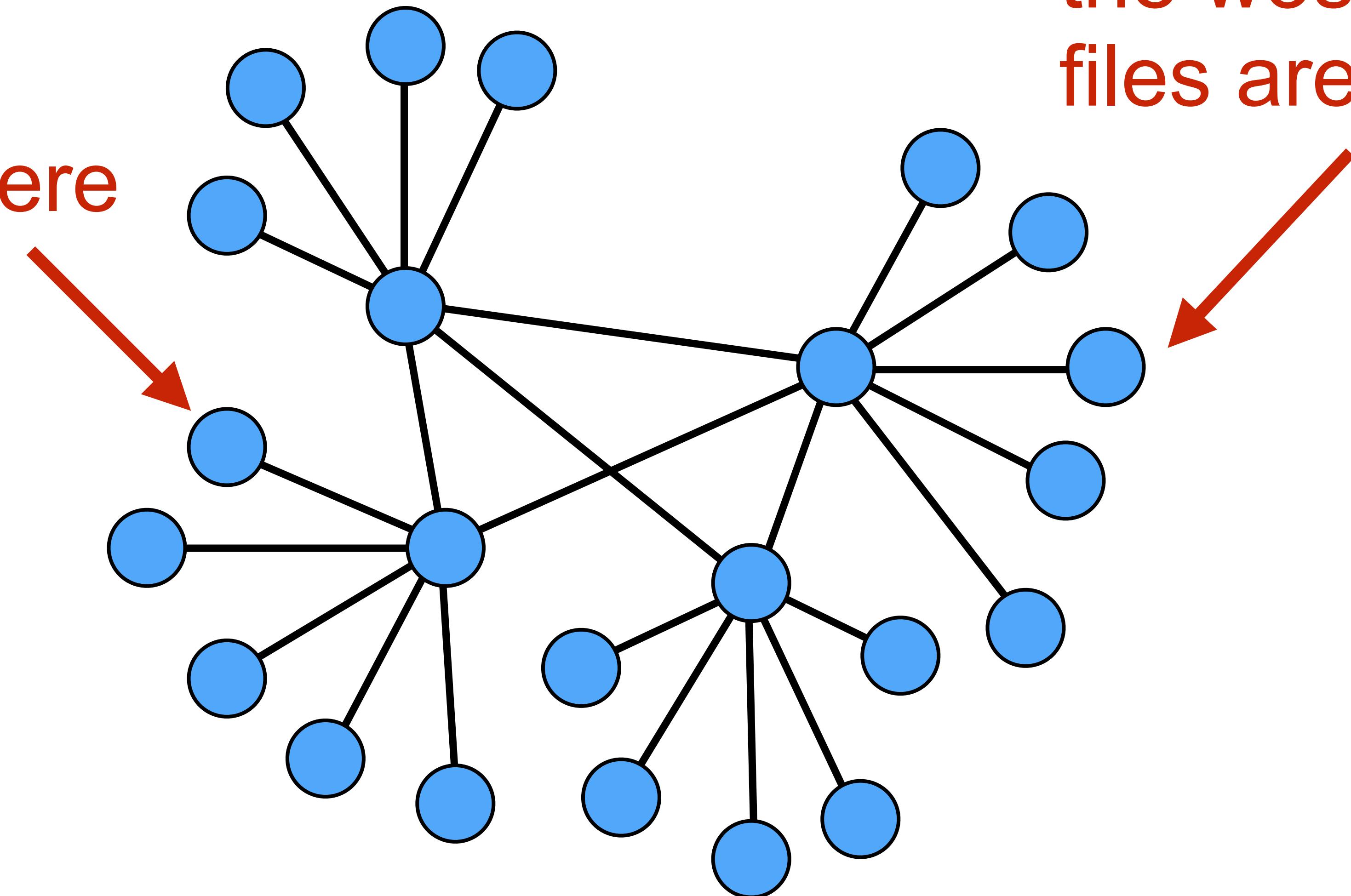
### What is HTML?

HTML is the standard markup language for creating Web pages.

# What is the internet?

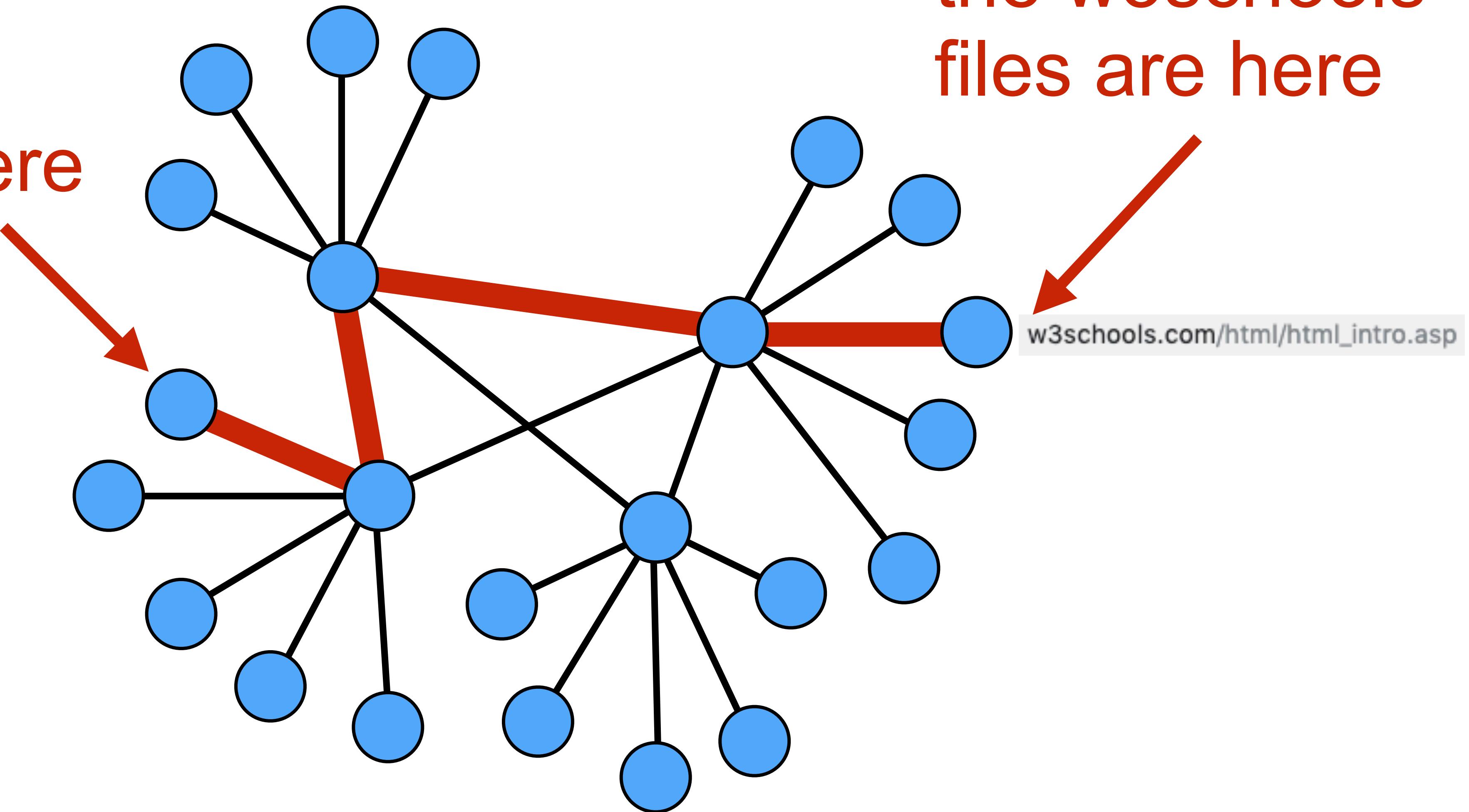
you are here

the w3schools  
files are here



# What is the internet?

you are here



the w3schools  
files are here

w3schools.com/html/html\_intro.asp

# File paths

**IP address**

Internet Protocol address

a unique number given to every machine that connects to the internet - and to every website

**104.244.42.193**

**URL**

Uniform Resource Locator

an unique name for a website that's easy for humans to remember

**twitter.com**

all URLs are mapped to a unique IP address

# File paths

How do you find a website's IP address?

K let's open the command line and I'll show you how



# How to open the command line

## Opening: OS X

Go to Applications → Utilities → Terminal.

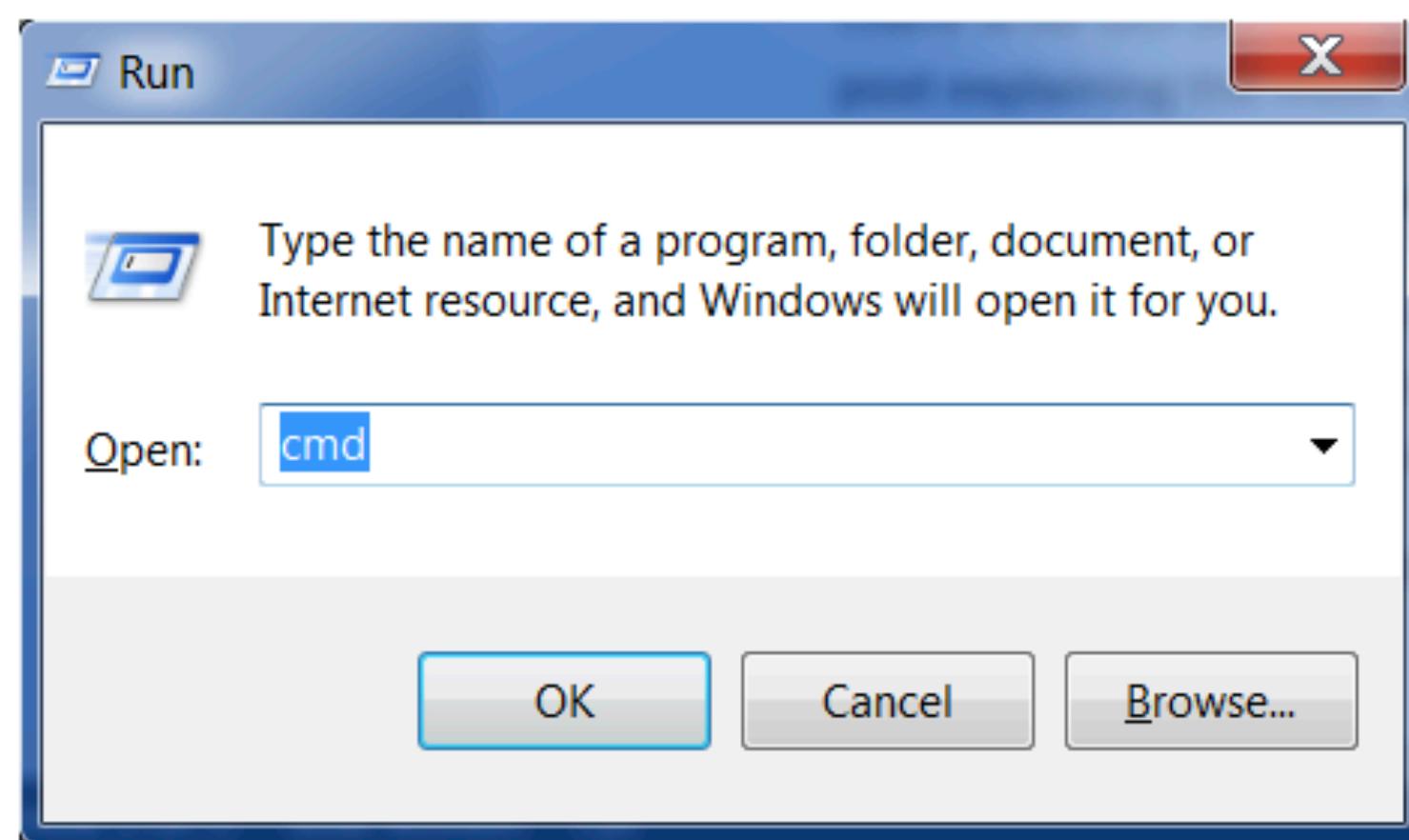
## Opening: Linux

It's probably under Applications → Accessories → Terminal,  
or Applications → System → Terminal, [ ]  
but that may depend on your system. If it's not there, you can try to Google it.

## Opening: Windows

Depending on your version of Windows and your keyboard, one of the following should open a command window (you may have to experiment a bit, but you don't have to try all of these suggestions):

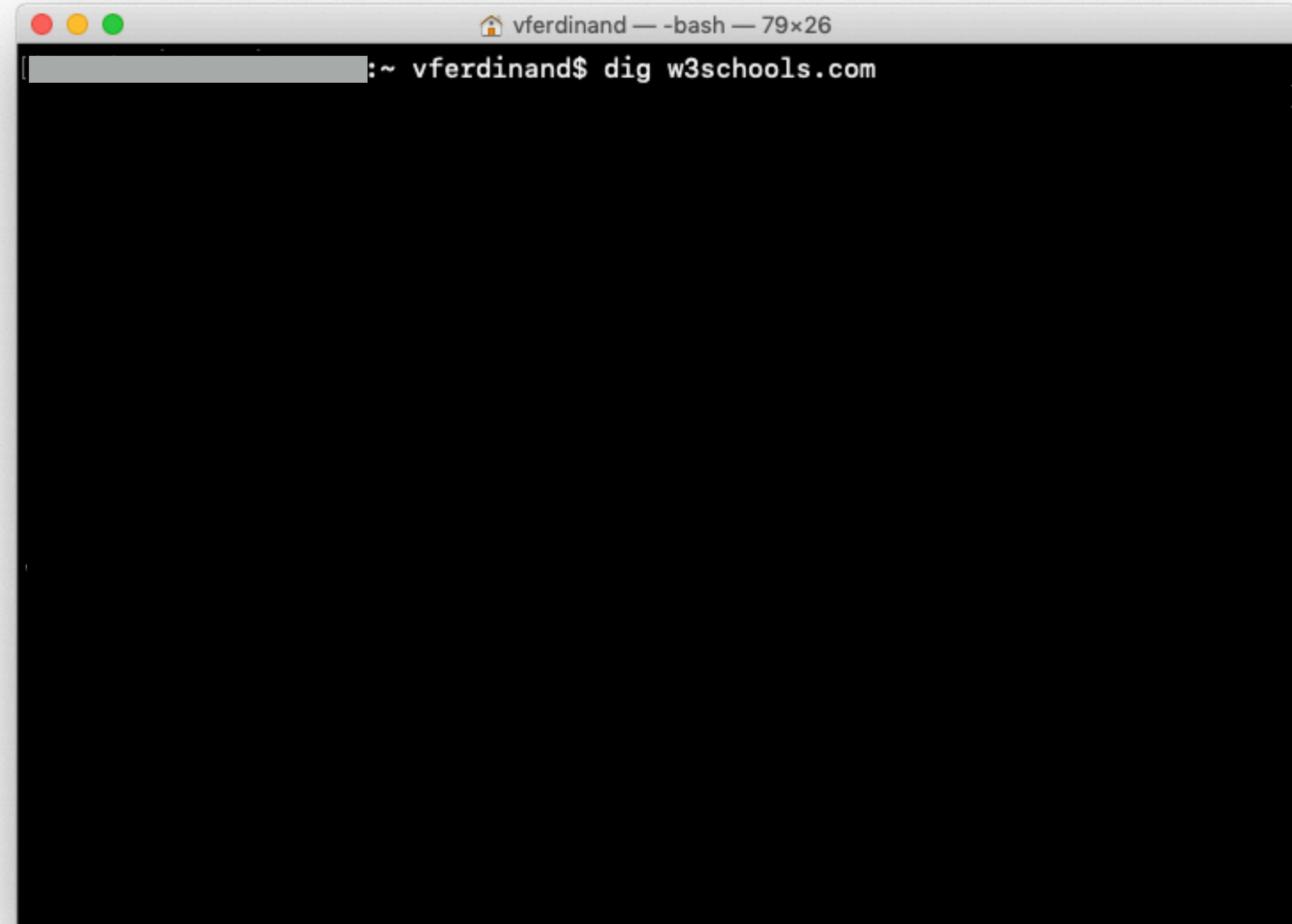
- Go to the Start menu or screen, and enter "Command Prompt" in the search field.
- Go to Start menu → Windows System → Command Prompt.
- Go to Start menu → All Programs → Accessories → Command Prompt.
- Go to the Start screen, hover your mouse in the lower-left corner of the screen, and click the down arrow that appears (on a touch screen, instead flick up from the bottom of the screen). The Apps page should open. Click on Command Prompt in the Windows System section.
- Hold the special Windows key on your keyboard and press the "X" key. Choose "Command Prompt" from the pop-up menu.
- Hold the Windows key and press the "R" key to get a "Run" window. Type "cmd" in the box, and click the OK key.



Great intro to using the command line:

[https://tutorial.djangogirls.org/en/intro\\_to\\_command\\_line/](https://tutorial.djangogirls.org/en/intro_to_command_line/)

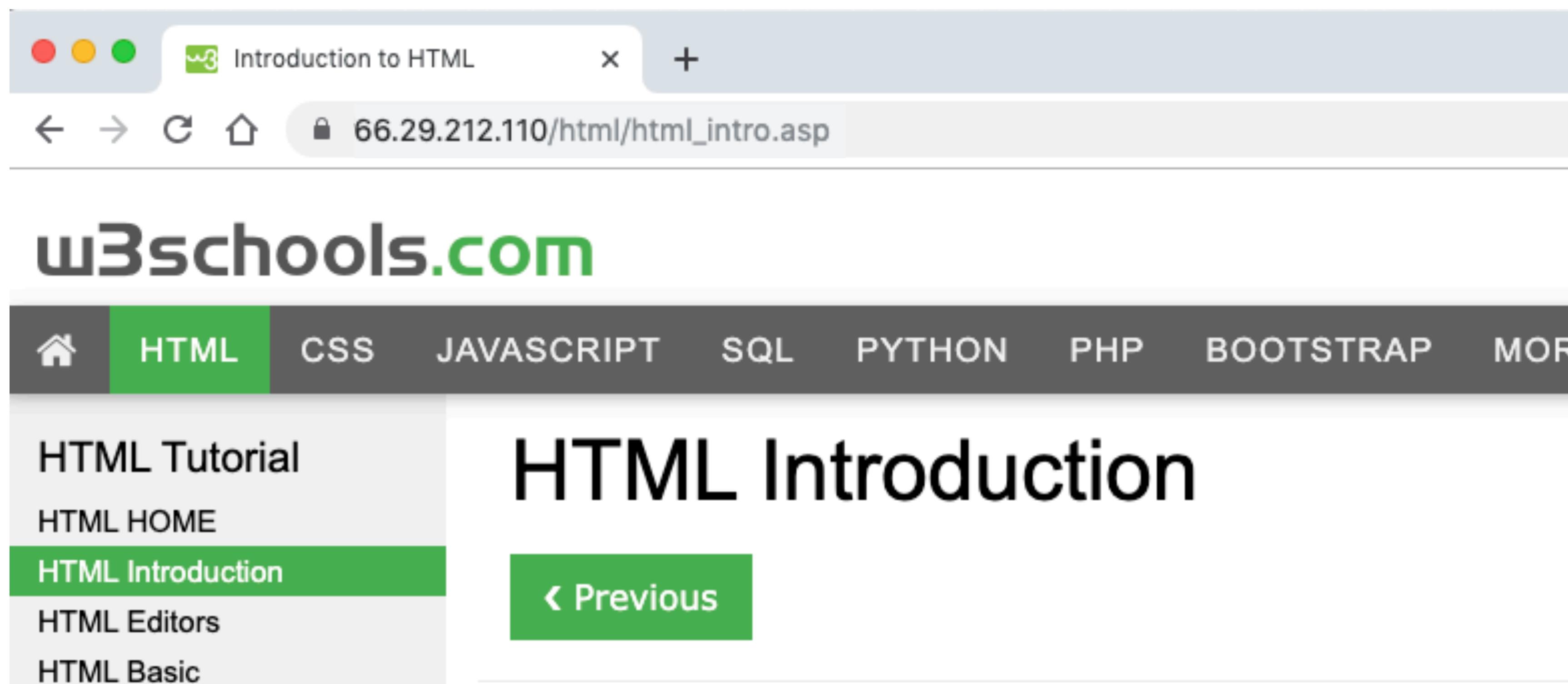
# File paths - find an IP address



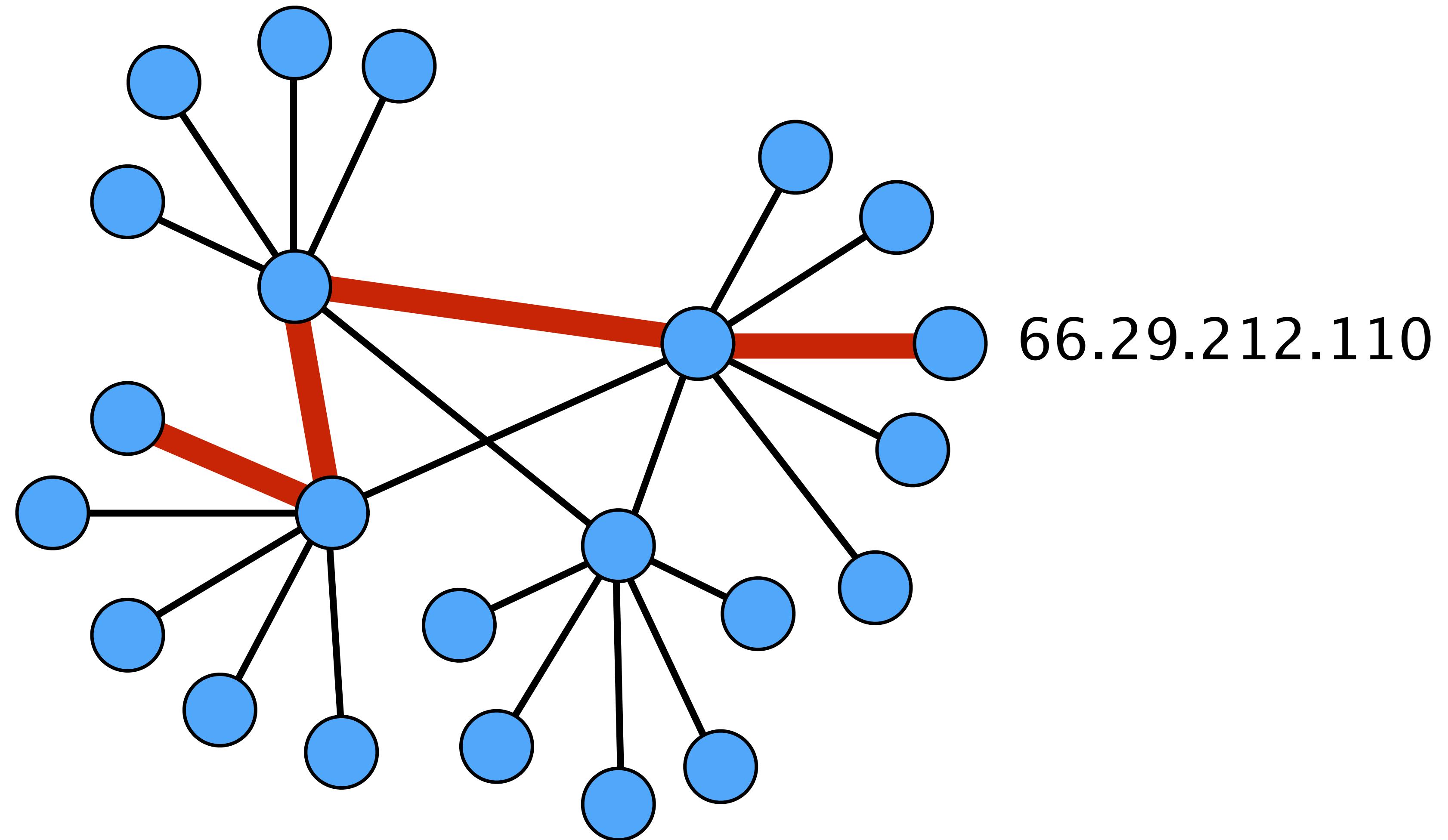
```
vferdinand — bash — 79x26
:~ vferdinand$ dig w3schools.com
```

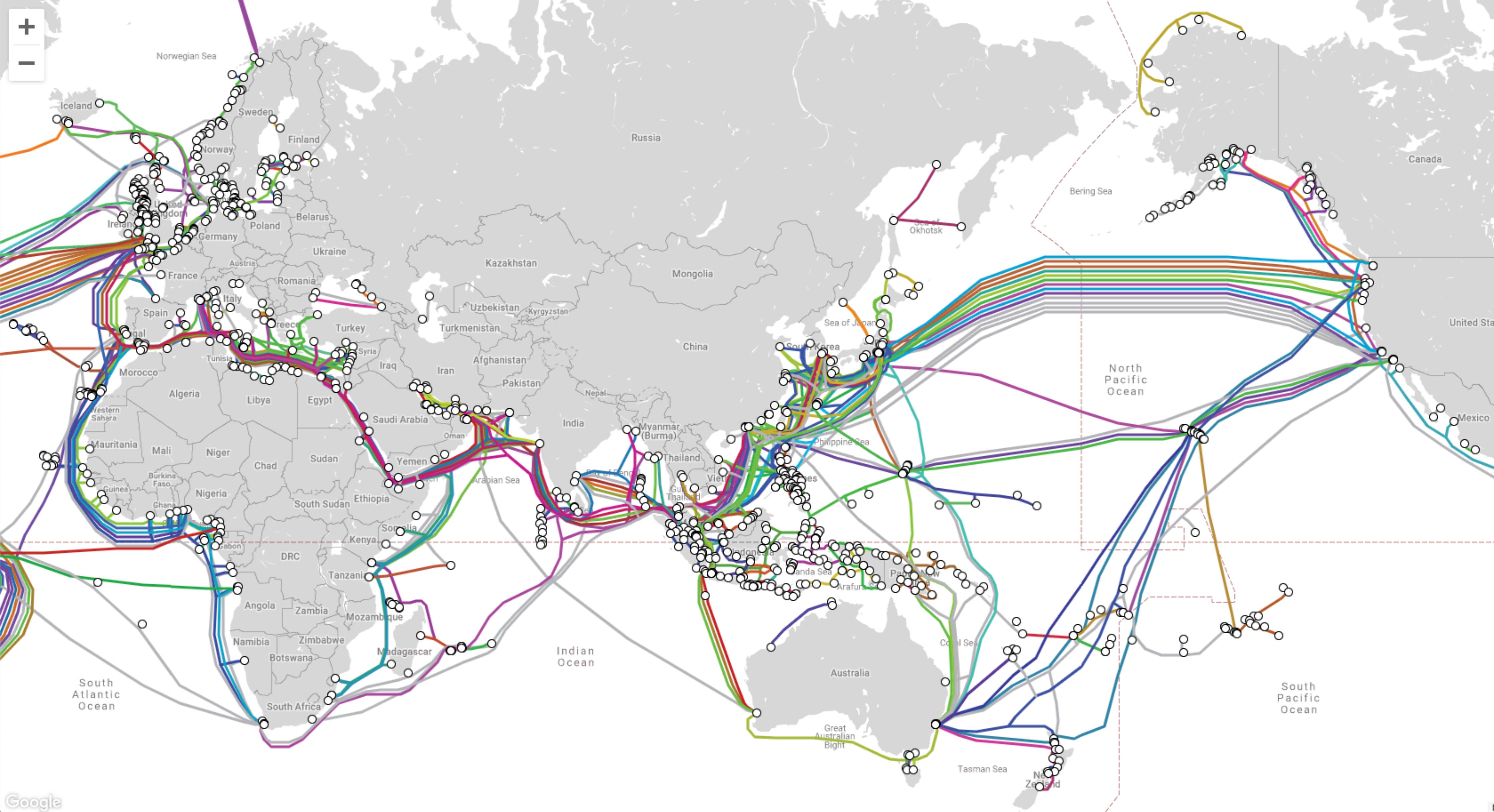
# File paths

66.29.212.110/html/html\_intro.asp



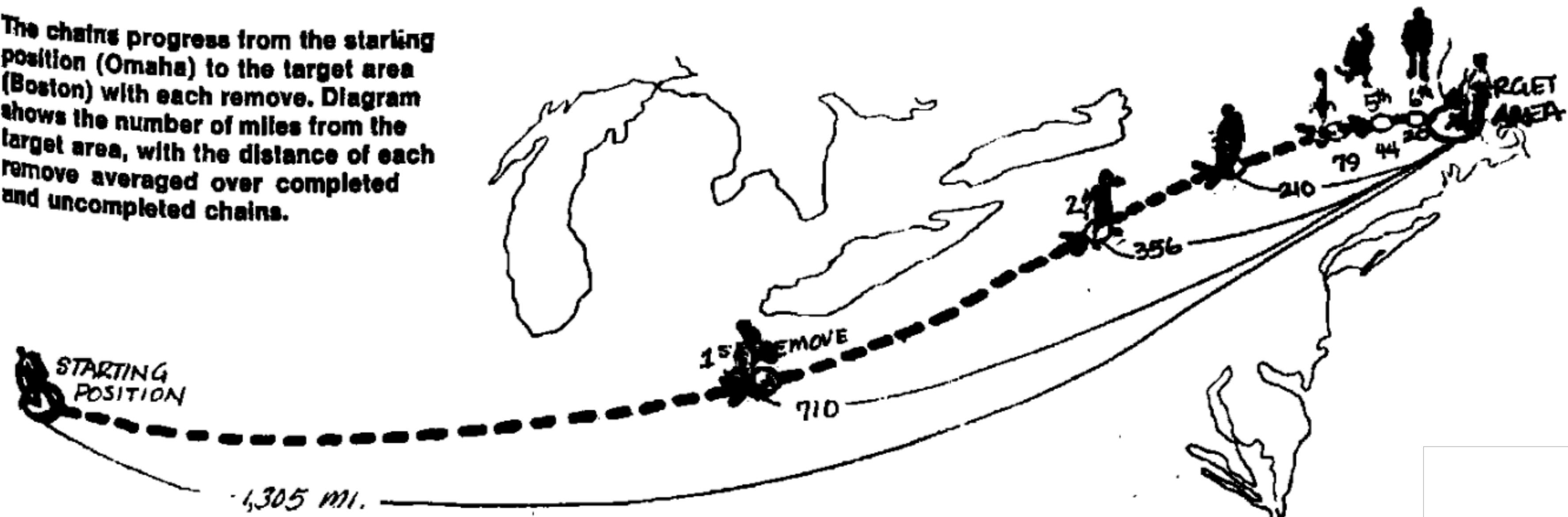
# Routers get you to the IP address you want





# It's a small world...

The chains progress from the starting position (Omaha) to the target area (Boston) with each remove. Diagram shows the number of miles from the target area, with the distance of each remove averaged over completed and uncompleted chains.



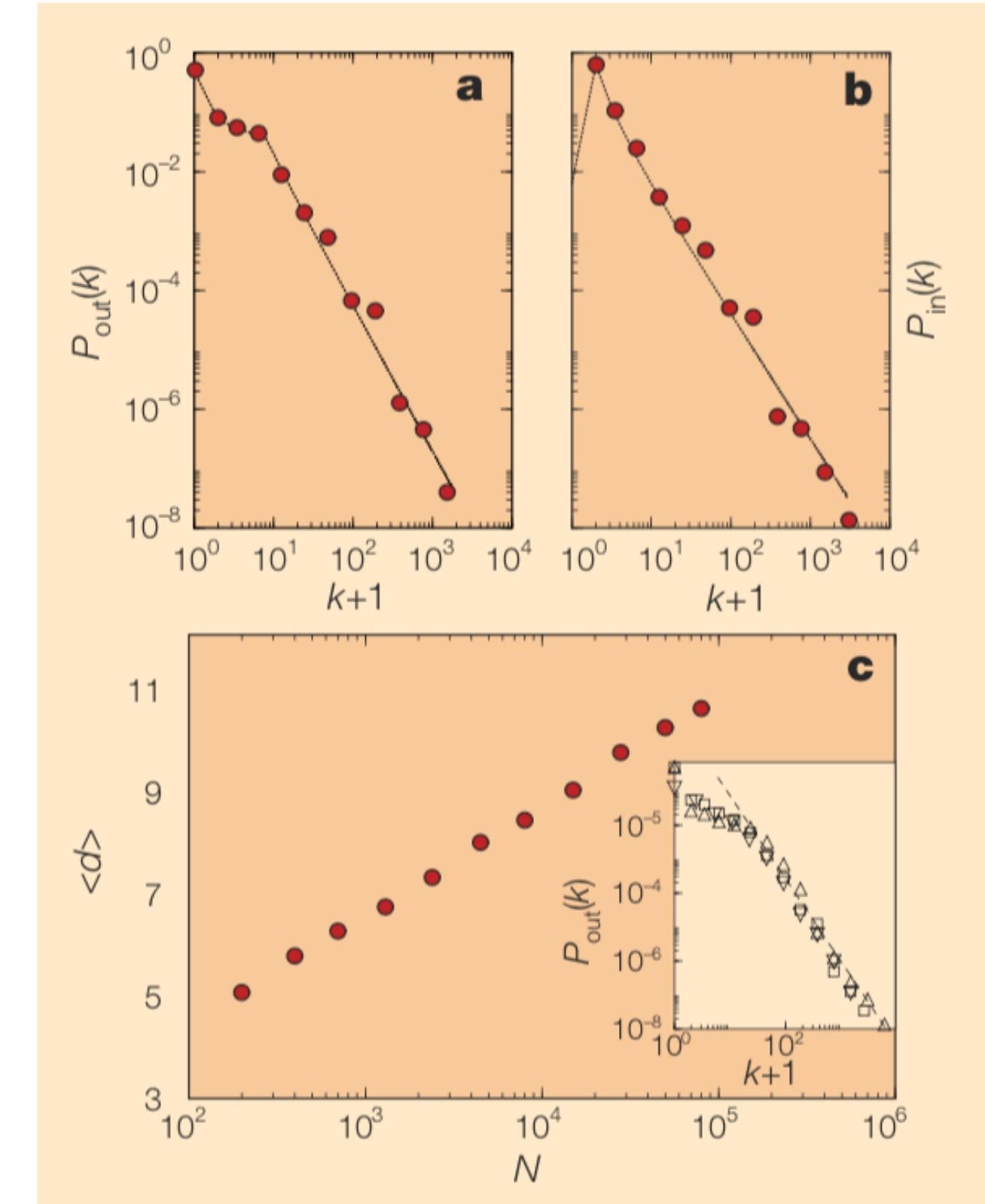
Milgram, Stanley (1967). The Small World Problem. *Psychology Today*.

# It's a small world...

Internet

## Diameter of the World-Wide Web

Despite its increasing role in communication, the World-Wide Web remains uncontrolled: any individual or institution can create a website with any number of documents and links. This unregulated growth leads to a huge and complex web, which becomes a large directed graph whose vertices are documents and whose edges are links (URLs) that point from one document to another. The topology of this graph determines the web's connectivity and consequently how effectively we can locate information on it. But its enormous size (estimated to be at least  $8 \times 10^8$  docu-



Albert, Jeong, & Barabási (1999). Internet: Diameter of the world-wide web. *Nature*.

# More command line fun times

Routers are the backbone of the internet

```
> traceroute w3schools.com
```

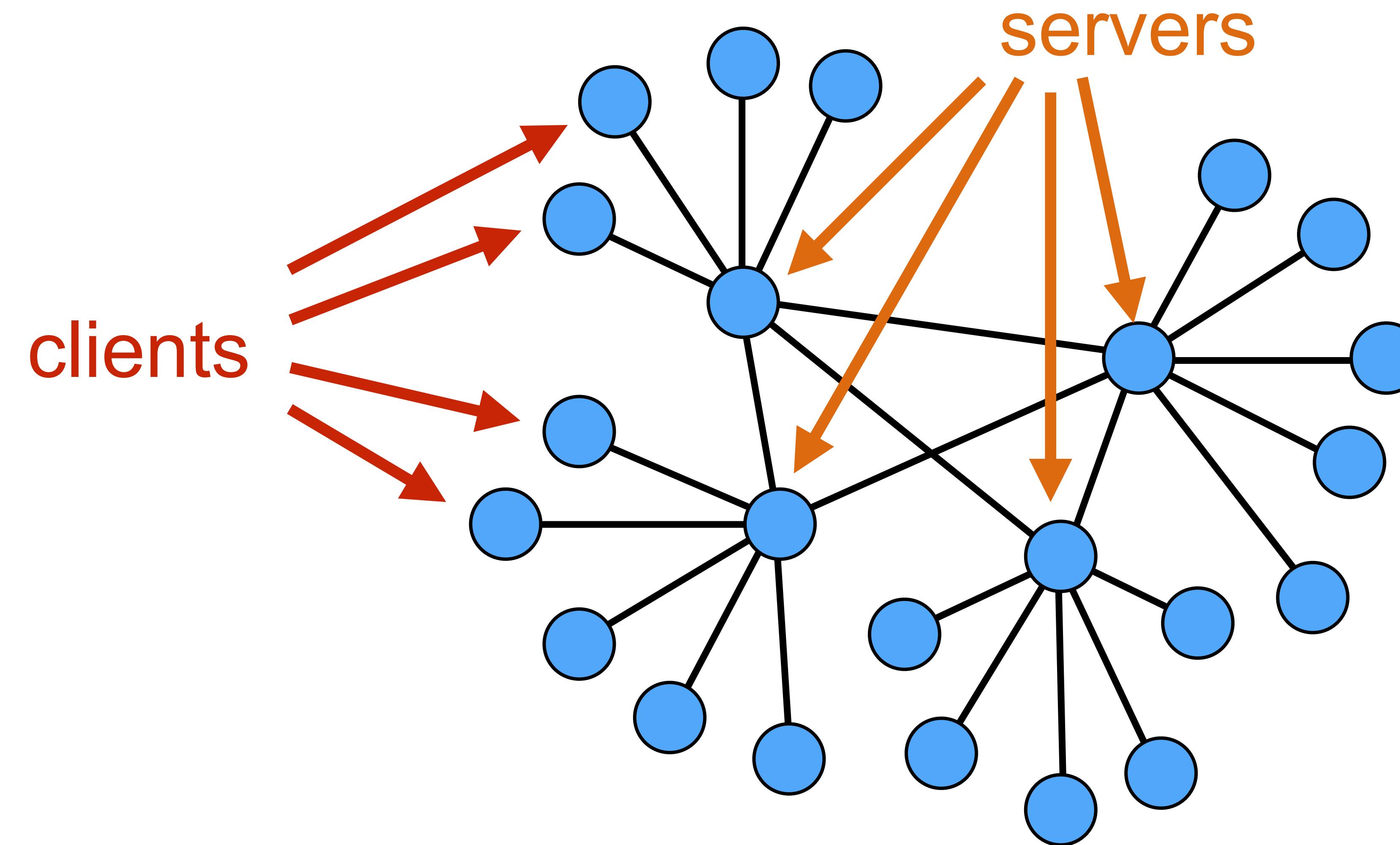
Get geographical location of an IP address

```
> curl https://freegeoip.app/xml/66.29.212.110
```

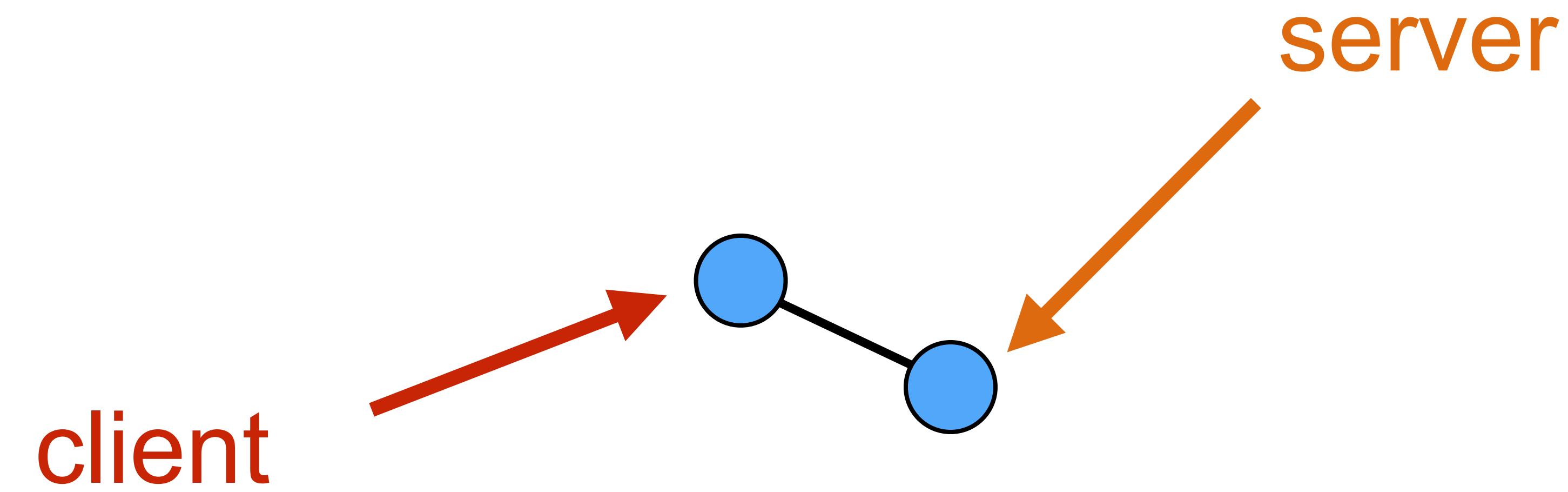
Find out who owns a website (and get their personal info)

```
> whois charleskemp.com
```

# The client-server model



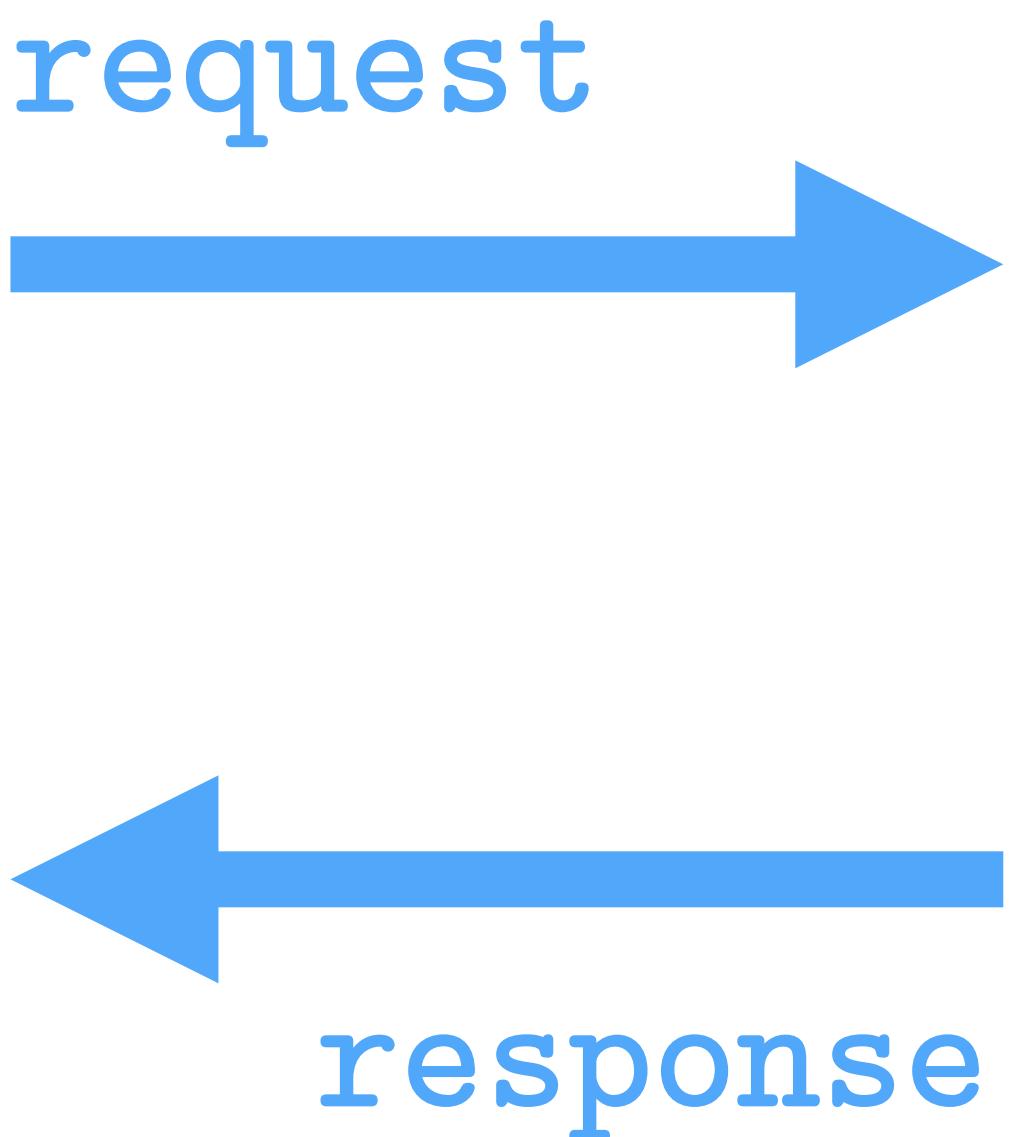
# The client-server model



# Client and Server



client



server

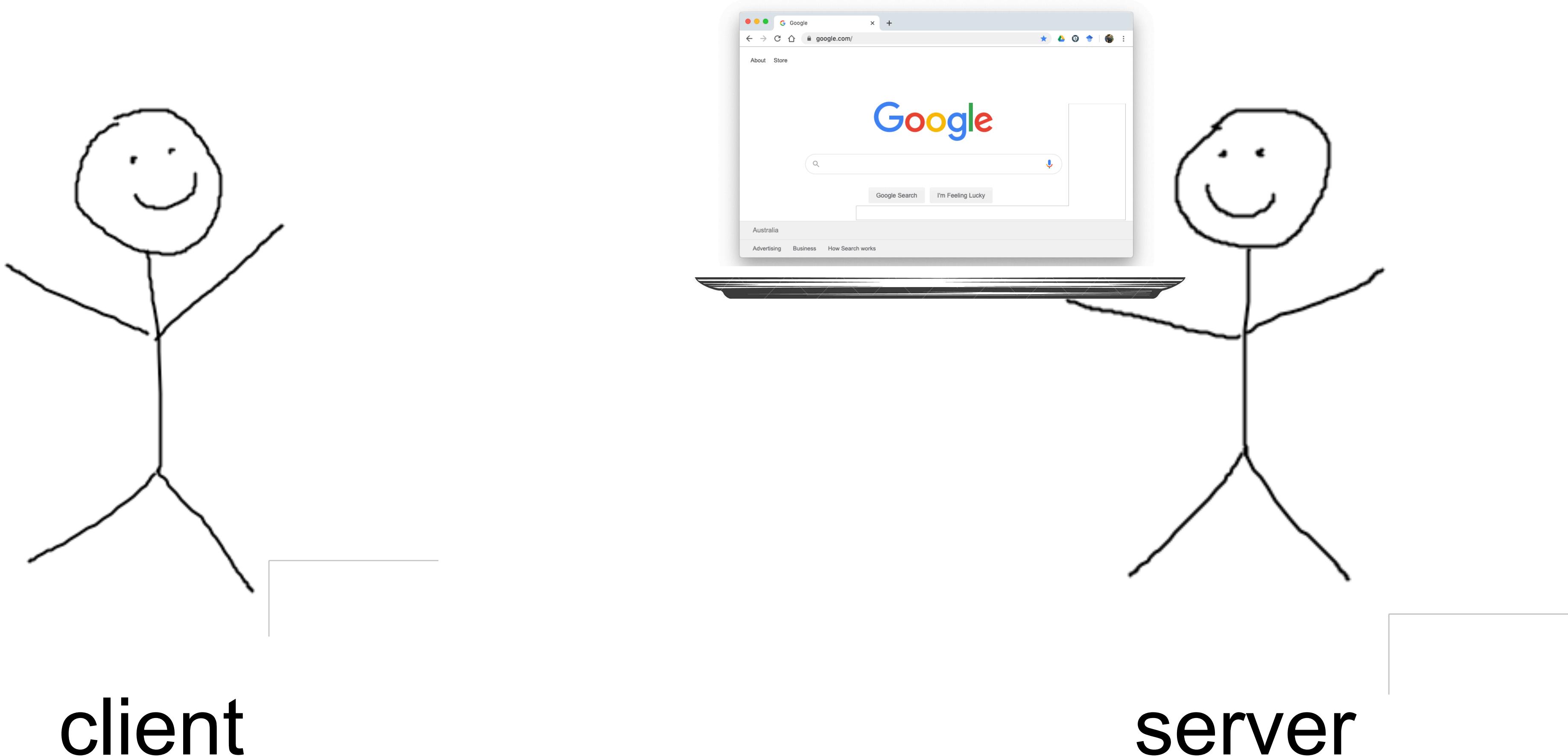
# Client and Server



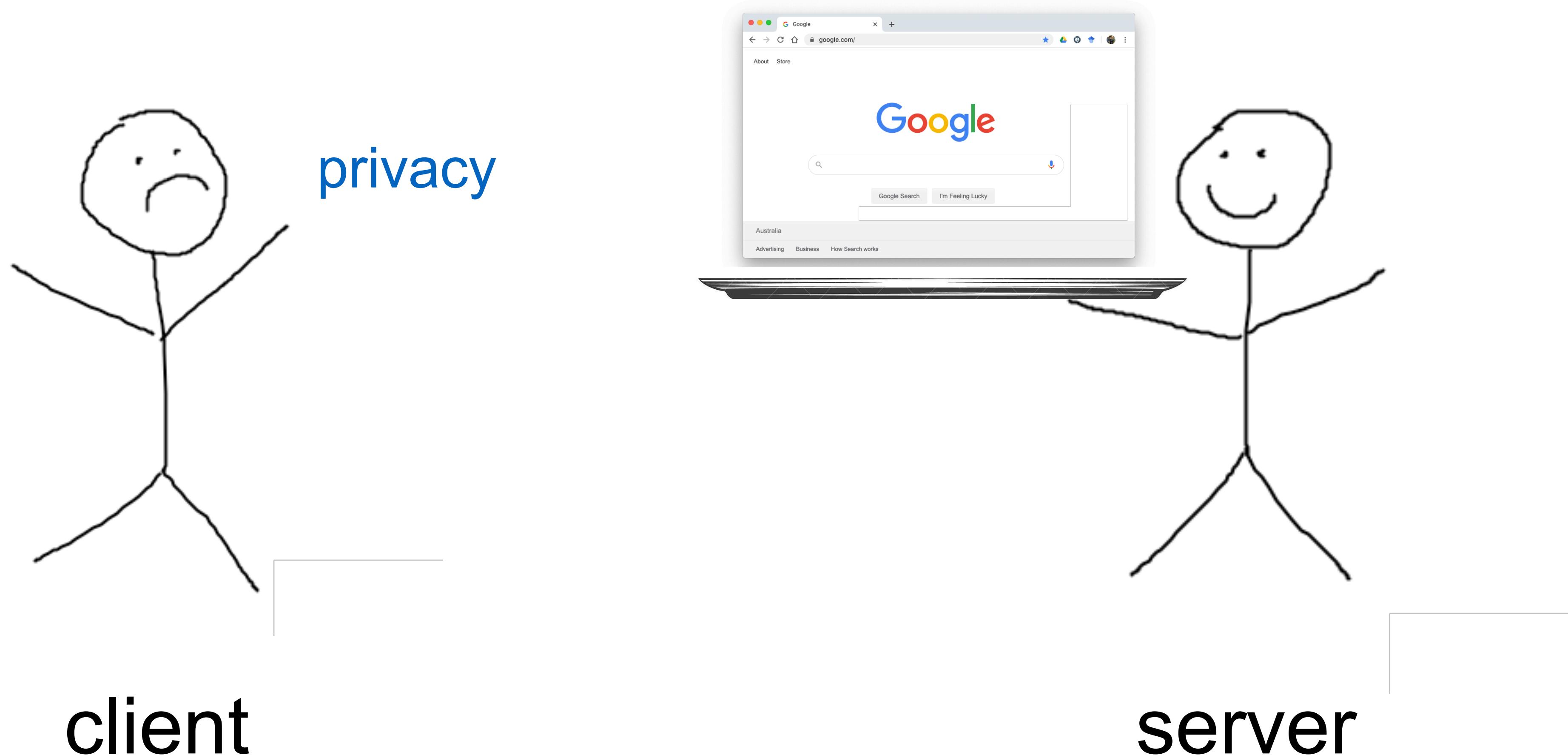
client

server

# Client and Server



# Client and Server



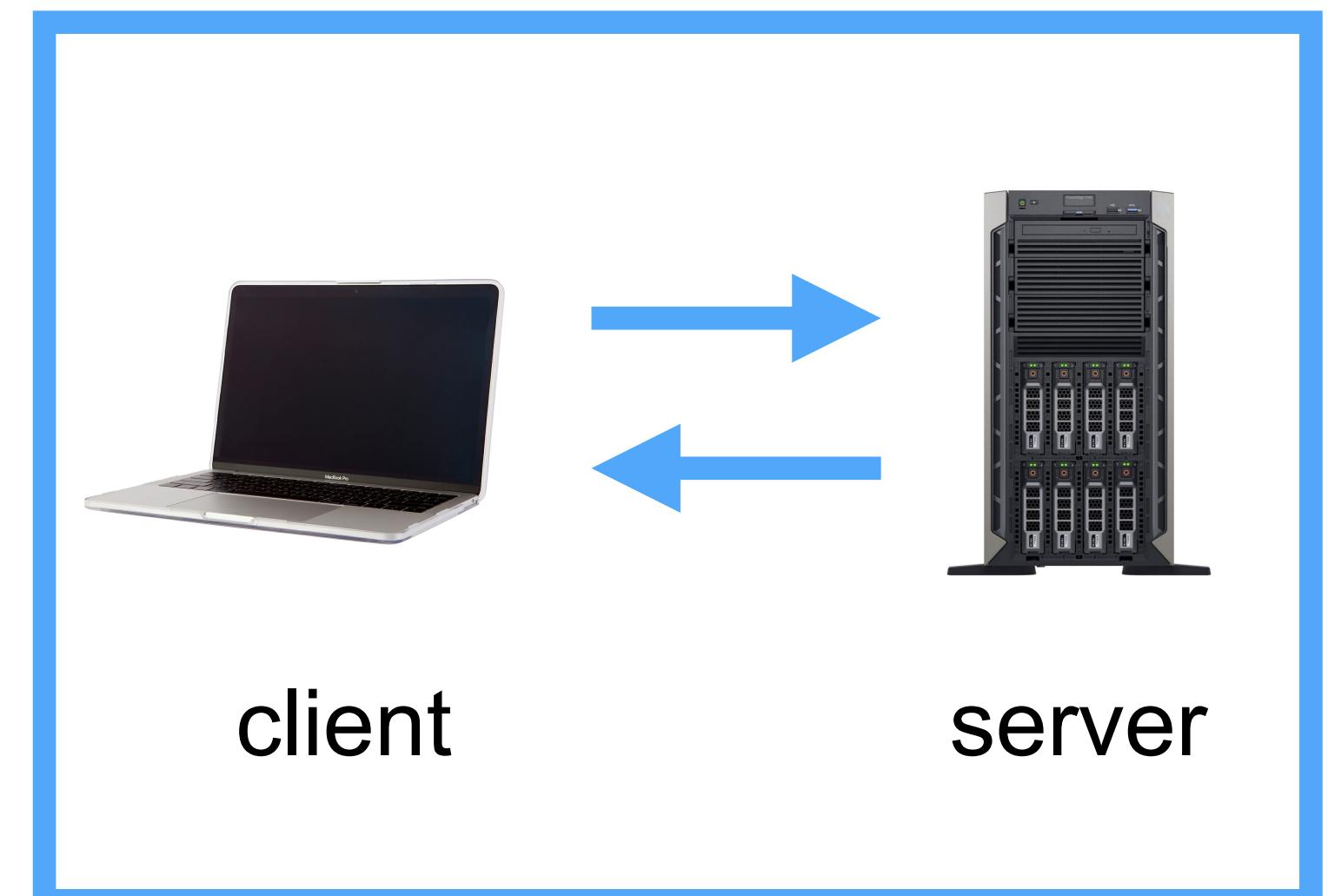
# Client and Server

All possible types of human relationships

get

get & give

give



# Client and Server

All possible types of human relationships

~~get~~

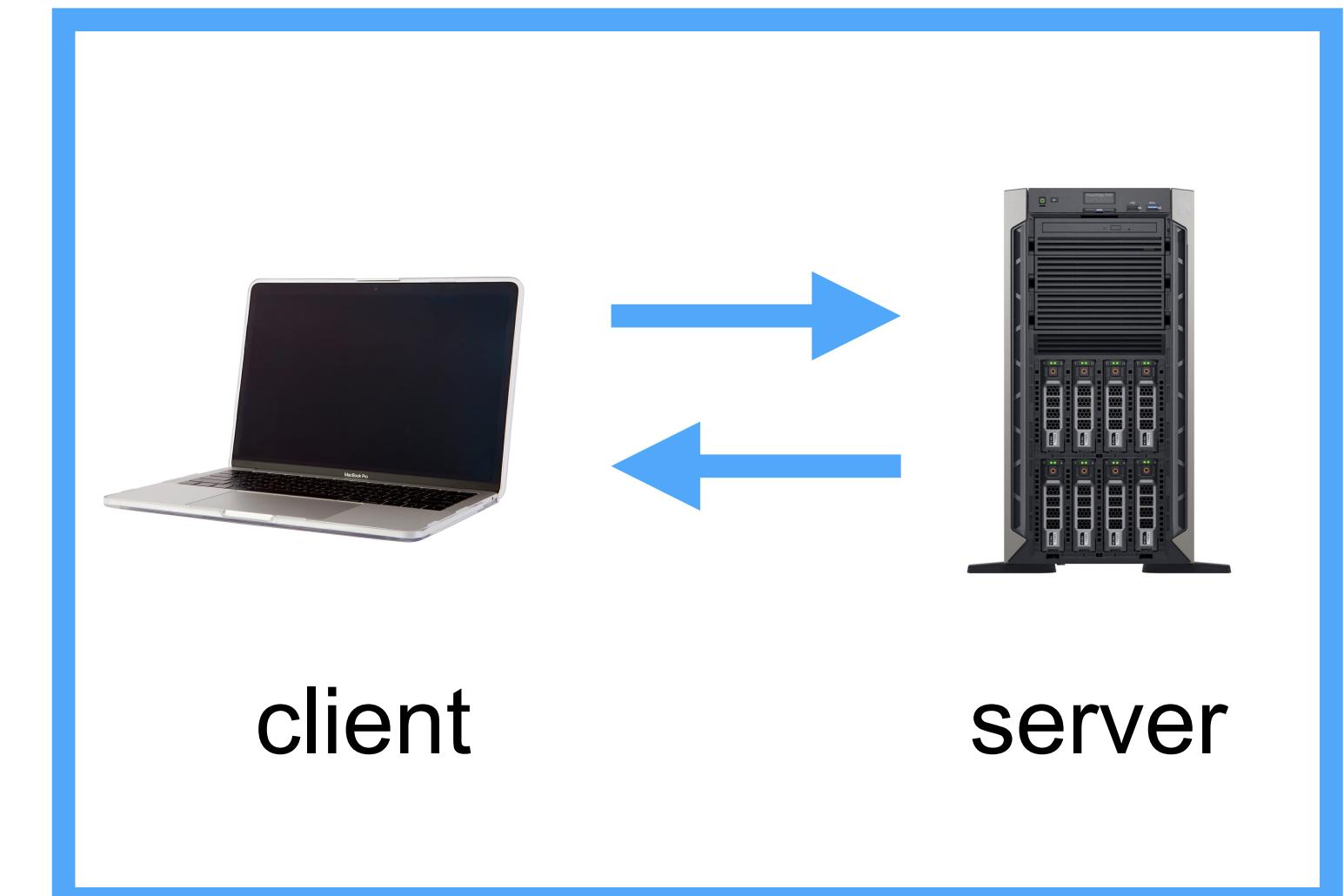
GET

~~get & give~~

POST

~~give~~

X



# Client and Server

## HTTP Requests

GET

POST

## HTTP Responses

200	request successful
404	server can't find the requested resource
500	internal server error
⋮	⋮

# Client and Server

## 100-599 HTTP Responses

### Status

418 I'm a teapot

The HTTP **418 I'm a teapot** client error response code indicates that the server refuses to brew coffee because it is a teapot. This error is a reference to Hyper Text Coffee Pot Control Protocol which was an April Fools' joke in 1998.

# Client and Server

this is making a GET http request

```
class joinExperiment(webapp2.RequestHandler):  
  
    def get(self):  
        self.response.headers['Content-Type'] = 'text/plain'  
  
        # assign participant to I or C condition  
        cond = random.sample(["C","I"],1)[0]  
  
        # check if there is a slot available in their condition  
  
        # check if condition I  
        if (cond == "I"):  
            I_matches = Individual.query(Individual.status == "available").fetch()  
  
    |
```

```
# send values you got from the datastore to experiment.js  
self.response.write(str(chosen_id)+"."+str(cnd)+"."+str(cod)+"."+str(dis)+"."+str(chn))
```

# Client and Server

this is making a POST http request

```
class saveRound(webapp2.RequestHandler):  
  
    def post(self):  
        # create a roundData() entity right here  
        r_data = roundData()  
  
        # then fill it with all the incoming round data from the experiment  
        # everything on the right-hand side are the experiment.js variable names  
        r_data.participant = self.request.get('c_code')  
        r_data.session_code = self.request.get('session_code')  
        r_data.condition = self.request.get('condition')  
        r_data.distribution = self.request.get('frequency_condition')  
        r_data.chain = self.request.get('chain')  
        r_data.generation = self.request.get('generation')  
        r_data.parent = self.request.get('parent')  
        r_data.word0 = self.request.get('word0')  
        r_data.word1 = self.request.get('word1')
```

# Client and Server

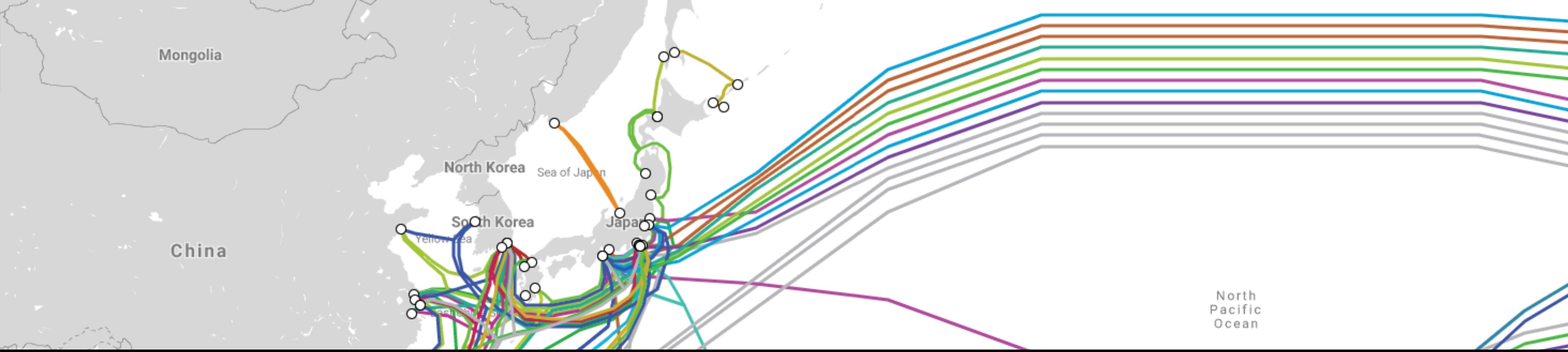
How do I make my computer into a server?

1. Install a web serving program on it, like Apache Web Server
2. Write some code that responds to HTTP requests
3. Then leave your computer on ALL. THE. TIME.

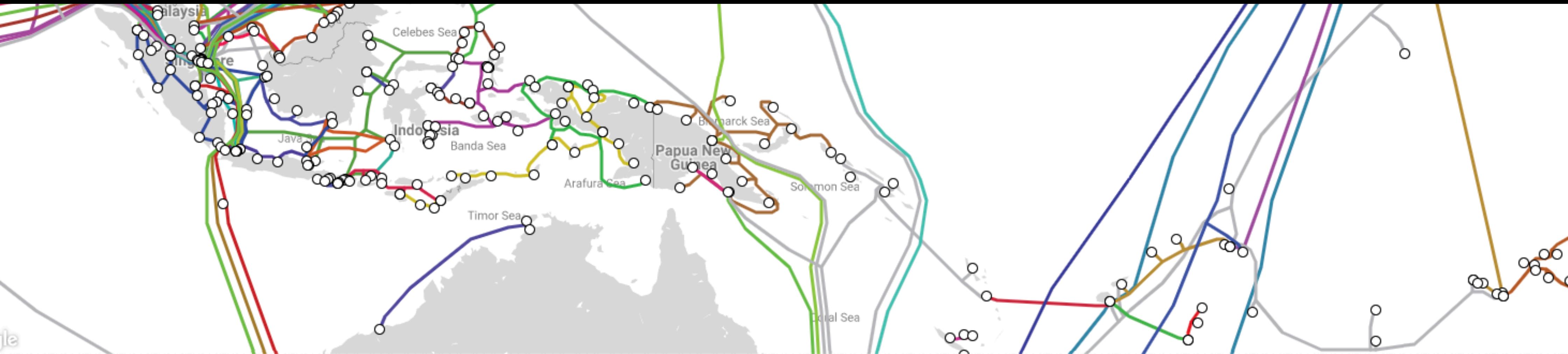
Or just use someone else's webserver



Google  
App Engine



end



# What is a webpage?

A web page is a system of files  
plus notes on how to display the contents of those files.

The files are stored on a server.

And the notes are written in the coding language HTML.