Internet

Derrick modified by Aidan
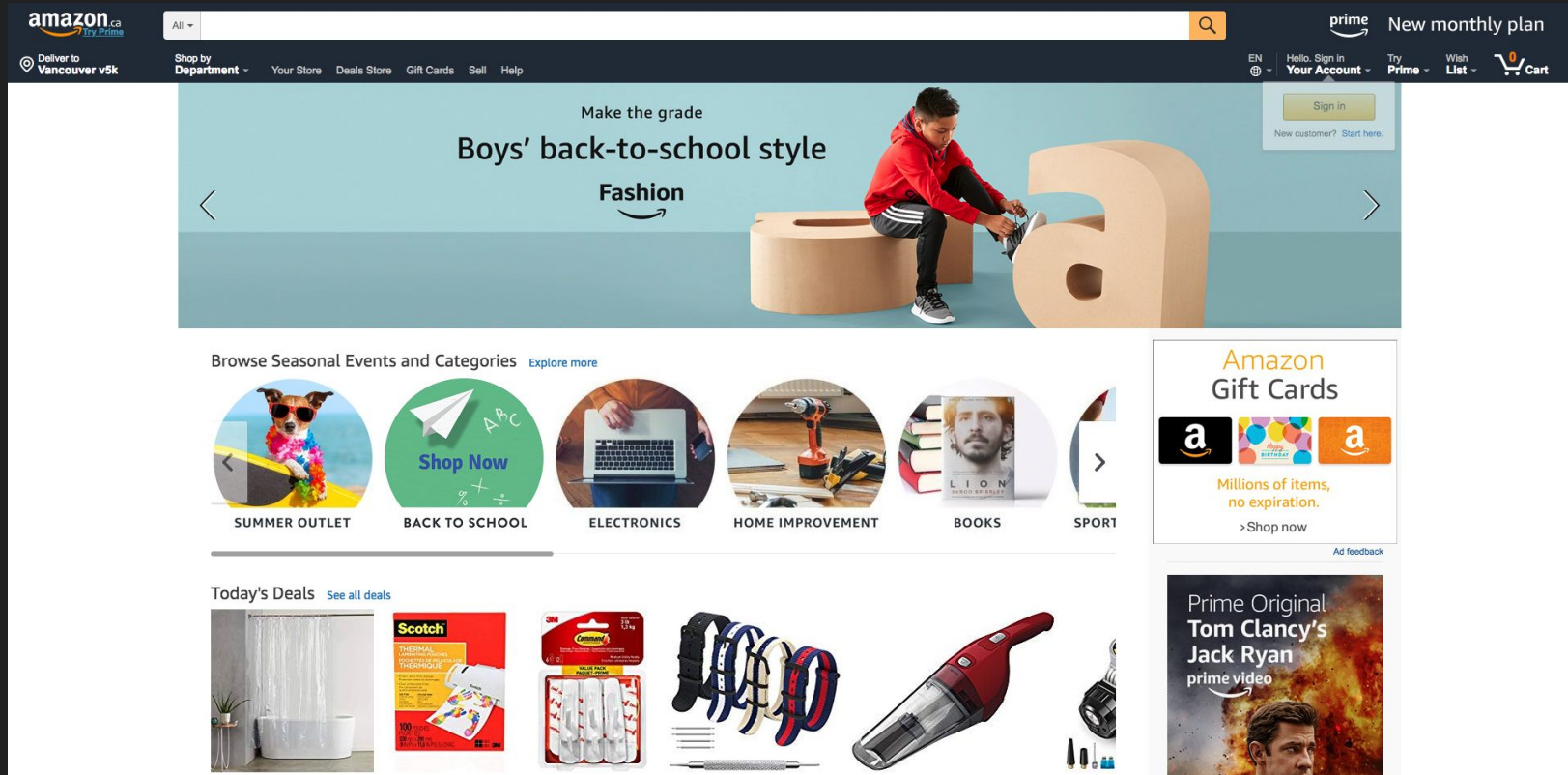
Communication

- How do we communicate with our friend on the phone?
  - "John Smith"
  - Look up his phone number in my contacts app.
  - Make a call
  - John responses

How do we talk to other computers?

- You type http://www.amazon.ca into your browser bar and press Enter. What happens?

Web page

Questions

- **What** is amazon.ca?
- **Where** is amazon.ca?
- **How** does my computer talk to amazon.ca?
- **What** does my computer say to amazon.ca?

Protocol

"A format and rules for exchanging information"
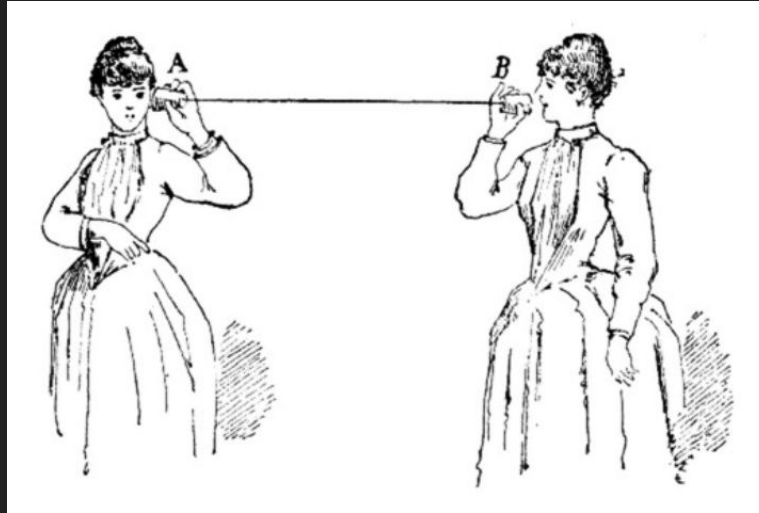
The OSI model

- A model to describe the how hardware and software work together

https://www.youtube.com/watch?v=y9PG-_ZNbWg

7	Application Layer	Human-computer interaction layer, where applications can access the network services
6	Presentation Layer	Ensures that data is in a usable format and is where data encryption occurs
5	Session Layer	Maintains connections and is responsible for controlling ports and sessions
4	Transport Layer	Transmits data using transmission protocols including TCP and UDP
3	Network Layer	Decides which physical path the data will take
2	Data Link Layer	Defines the format of data on the network
1	Physical Layer	Transmits raw bit stream over the physical medium

Internet Protocols layered, one protocol per task

Internet Protocol Suite (TCP/IP)

- Application Layer
  - HTTP/FTP/SMTP/etc.
- Transport Layer
  - TCP/UDP
- Network Layer
  - IPv4/IPv6
- Link Layer
  - 802.3 – Ethernet / 802.11 – Wireless LAN

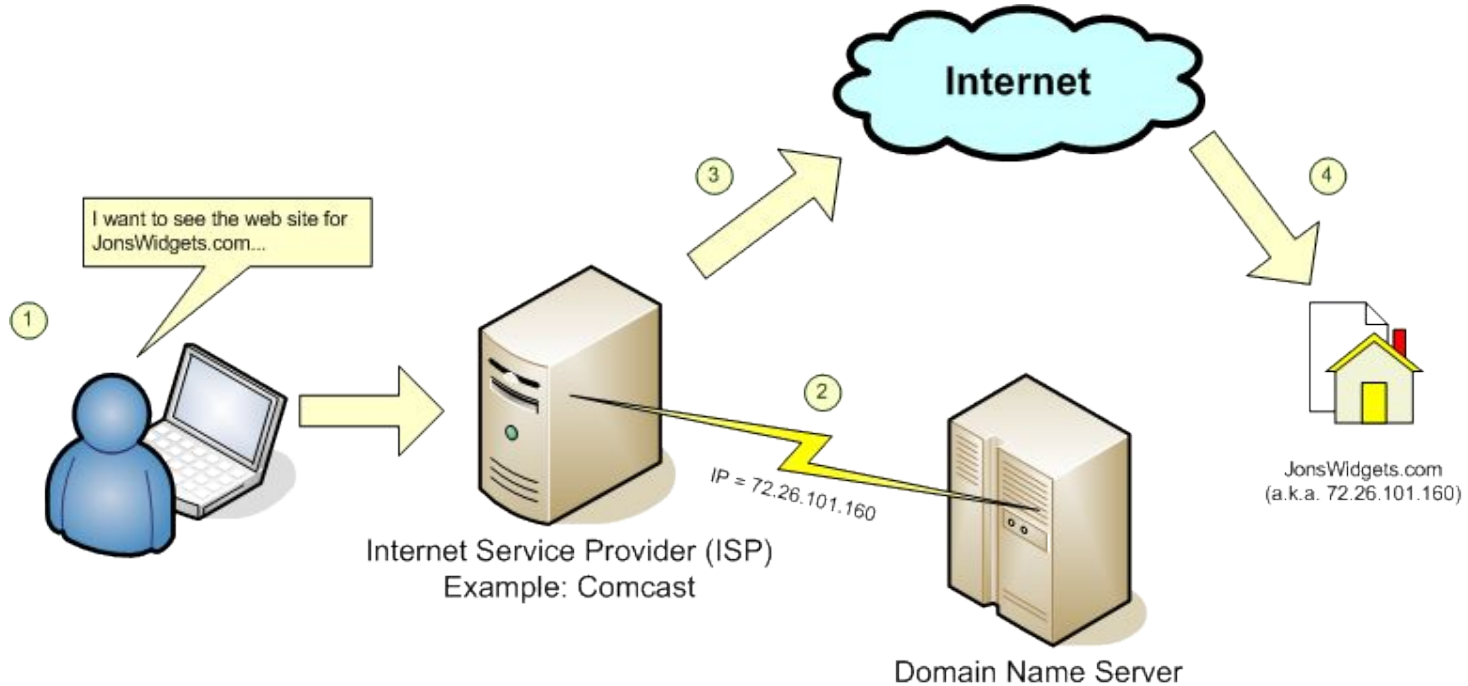# TCP Video

https://www.youtube.com/watch?v=HFRU01uS9nA

What is amazon.ca?

- Domain Name Service
  - DNS translates hostnames to addresses
- Amazon.ca   ===>   54.239.19.238

DNS (Domain Name System)

https://www.youtube.com/watch?v=72snZctFFtA

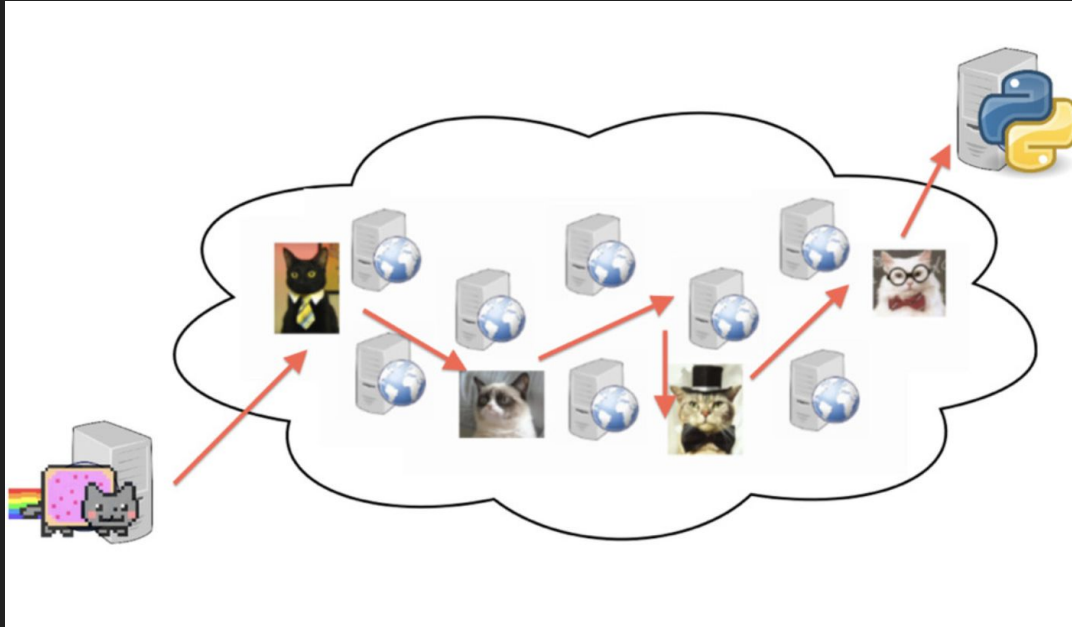# Where is amazon.ca?

- Internet Protocol
  - IP (54.239.19.238) handles addressing and routing
- IP geolocation finder

IP

- Your packets of data hop from router to router through the internet to their destination.

Traceroute demo

```
park  ~        traceroute amazon.ca
traceroute: Warning: amazon.ca has multiple addresses; using 52.94.225.242
traceroute to amazon.ca (52.94.225.242), 64 hops max, 52 byte packets
 1  192.168.86.1 (192.168.86.1)  2.343 ms  2.546 ms  1.215 ms
 2  192.168.0.1 (192.168.0.1)  2.548 ms  3.250 ms  1.433 ms
 3  amazon-a.ip4.torontointernetxchange.net (206.108.35.36)  50.728 ms  52.243 ms *
 4  * * *
 5  * 52.93.3.127 (52.93.3.127)  53.988 ms
    52.93.3.49 (52.93.3.49)  52.759 ms
 6  * * *
 7  *
```
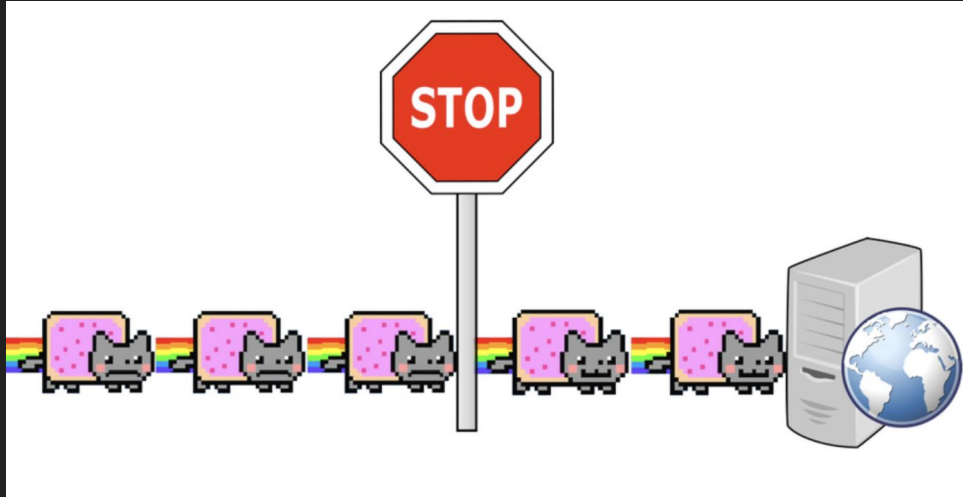
amazon.co.jp

http://submarinecablemap.com
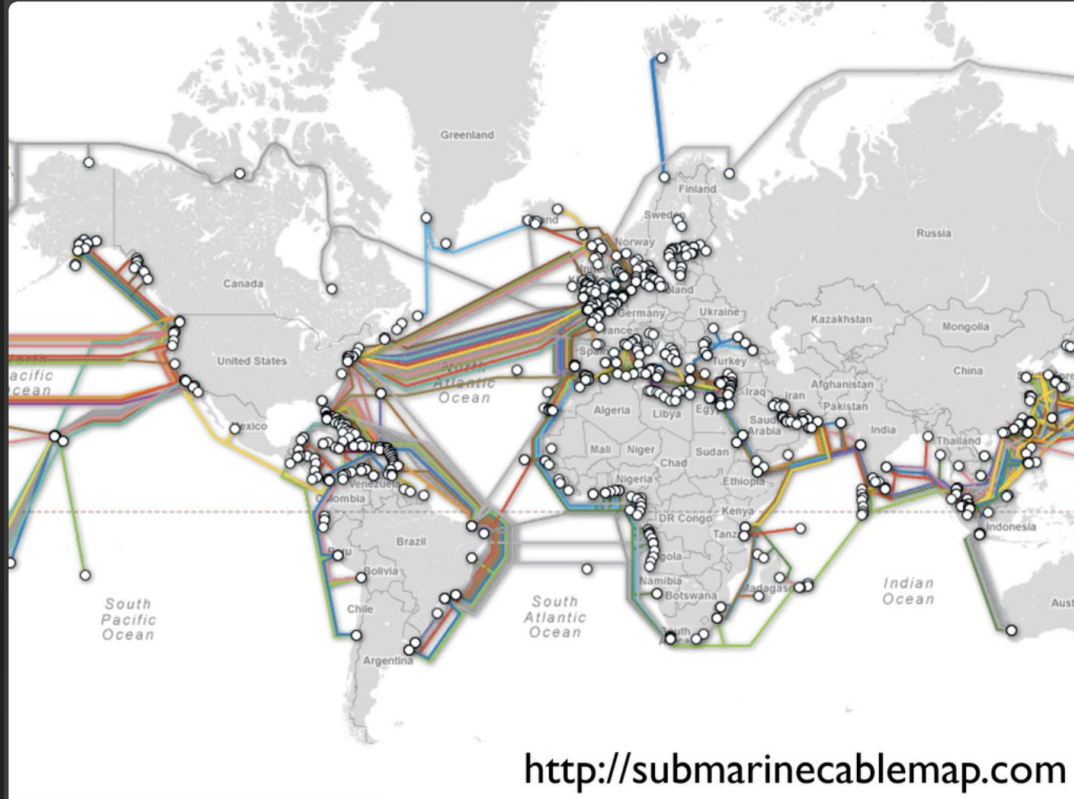
Submarine cable map

How does my computer talk to amazon.ca

- Transmission Control Protocol (TCP)
  - TCP reliably delivers data

Application-layer protocols that use TCP

- Web : HTTP/HTTPS
- Chat : IRC, XMPP/Jabber
- Email : SMTP, POP3, IMAP

Each application uses a different "port" number, so many different applications can use TCP to talk to an IP address at the same time.
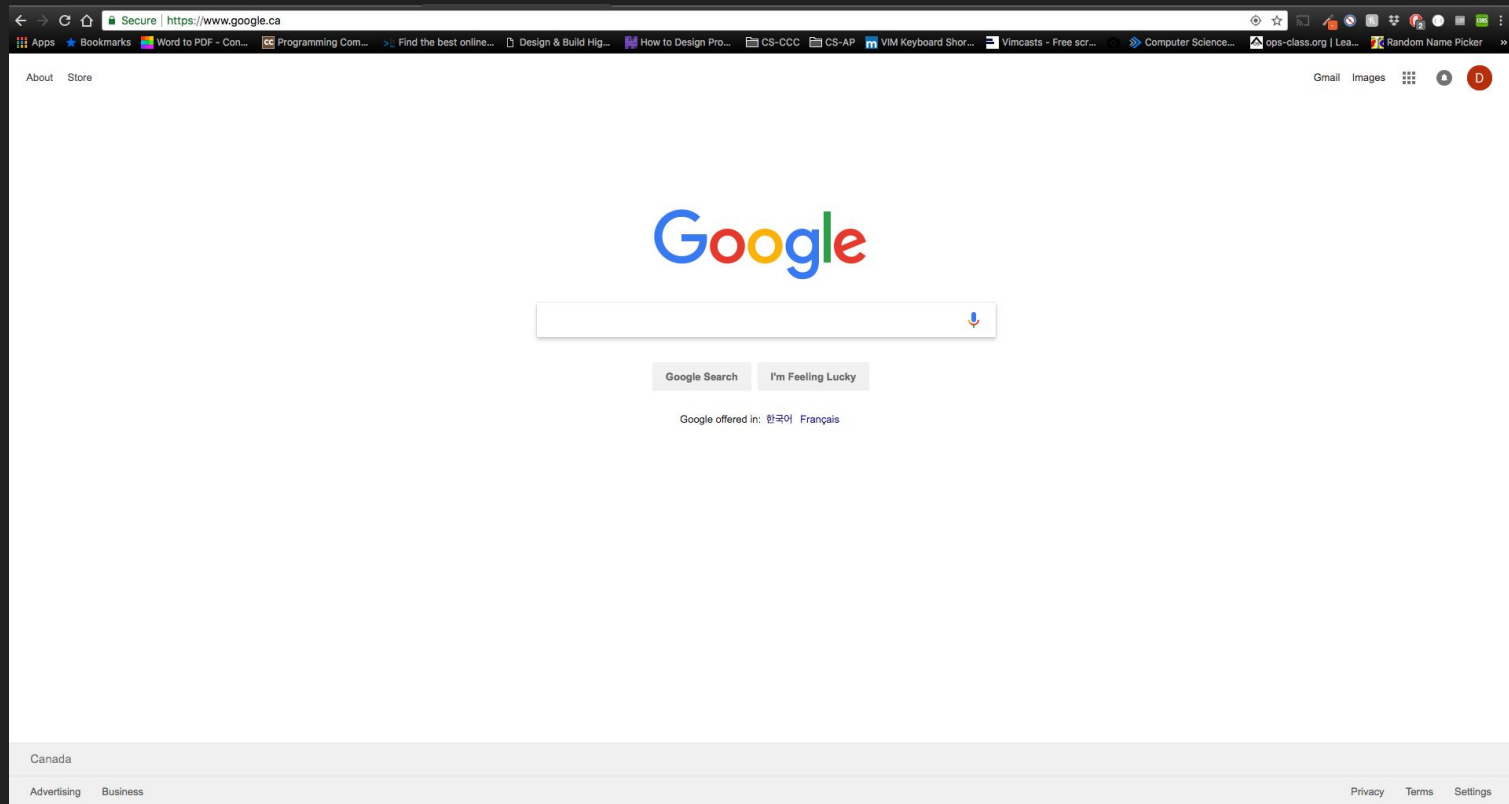
What does my computer say to amazon.ca?

- HyperText Transfer Protocol (HTTP)
  - Clients use HTTP to request resources from servers.
- Resources
  - http://www.amazon.ca
    - HTML
    - Images
    - Textual or binary data
    - Dynamically-generated query results
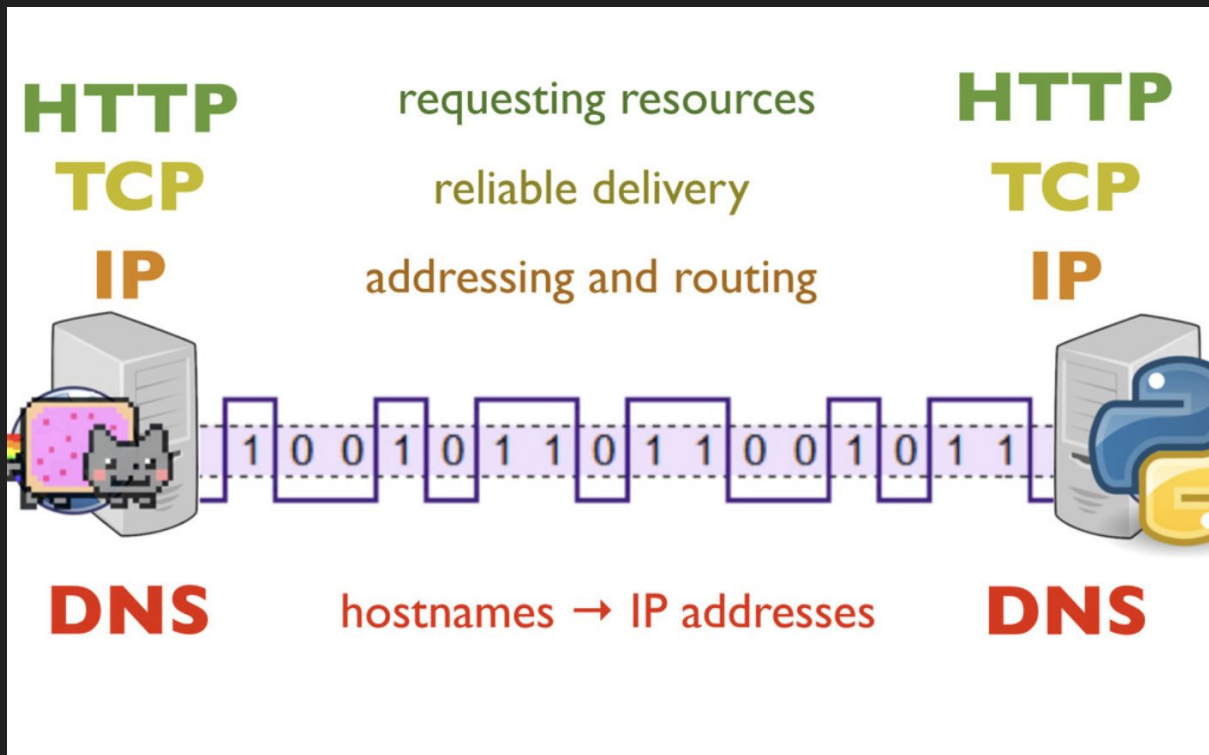
How to be a web browser?

- `telnet` demo!

Telnet is a protocol used on the Internet or local area network to provide a bidirectional interactive text-oriented communication facility using a virtual terminal connection.
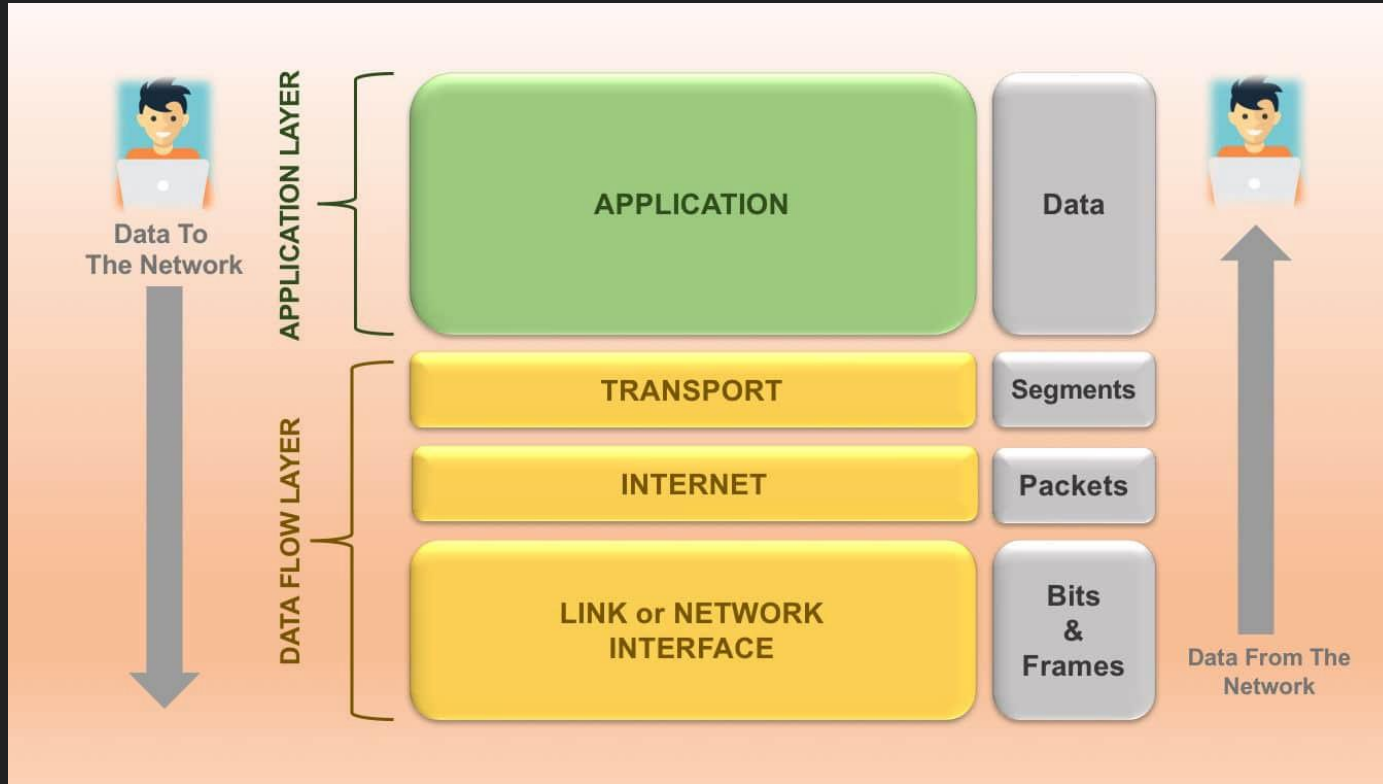
Browser knows how to render HTML

Review

Review

Videos

https://www.youtube.com/playlist?list=PLzdnOPI1iJNfMRZm5DDxco3UdsFegvuB7