The Request/Response Cycle
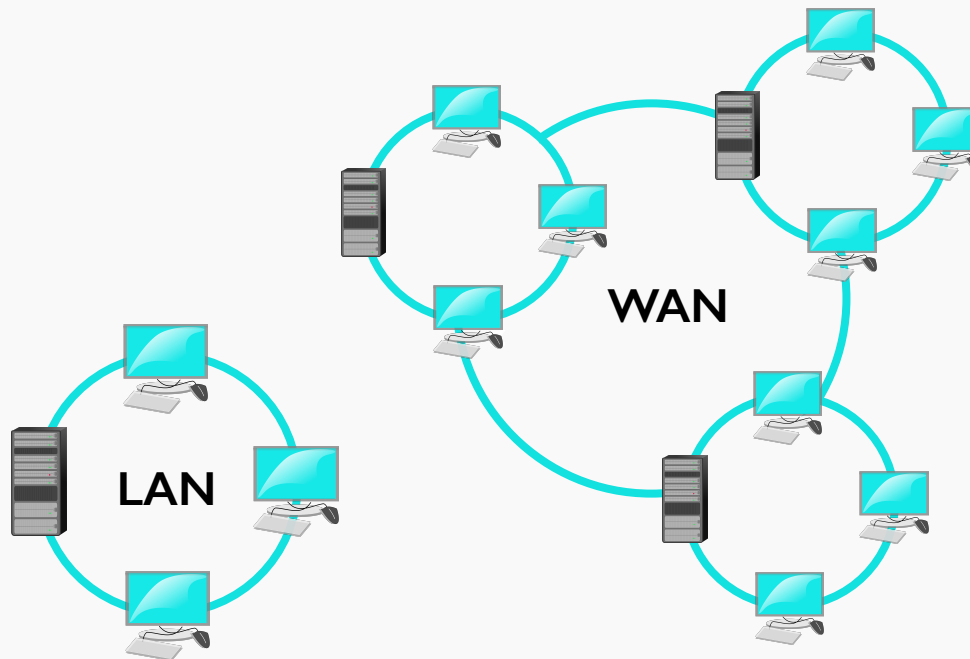
Or, what happens when you type something into the address bar

How Does This All Work?

- **When you type an address into the URL bar, what happens?**

- *Warning*: **This lecture is heavy on the acronyms.**

Networks

- **The Internet**
  - **LAN**
  - **WAN**

Client/Server Relationship

- **Servers**
  - **Machines that hold shared resources**
  - **Always connected to the network**

- **Clients**
  - **Machines for personal use (laptops, phones, etc.)**

Request/Response Cycle

- **This is what happens when your computer (the client) requests a page and a server responds with the appropriate files.**

Uniform Resource Locator

- **URL – three parts:**
  - **protocol – how to connect**
  - **domain – where to find the document you want**
  - **document – what specific file is needed***
    - *Most pages are made up of multiple files*

Protocols

- ## HTTP – Hypertext Transfer Protocol

- ## HTTPS – Secure Hypertext Transfer Protocol

- ## FTP – File Transfer Protocol

Domain Names

- ## Identifies the entity you want to connect to

  - umich.edu, google.com, wikipedia.org

- ## Each has different top-level domain

  - Determined by Internet Corporation for Assigned Names and Numbers (ICAAN)

  - https://www.icann.org/resources/pages/tlds-2012-02-25-en

IP Addresses and
the Domain Name Server (DNS)

- **Internet Protocol Version 4 (Ipv4) uses number format of xxx.xxx.xxx.xxx to identify each domain**

  - **can represent over 4 billion unique combinations (2^{32})!**

- **DNS looks up the domain and returns the IP address**

Document

- ## URLs can specify a specific document

    - ### http://www.intro-webdesign.com/contact.html

    - ### http://www.intro-webdesign.com/Ashtabula/harbor.html

- ## If no document is specified, the default document is returned.

    - ### Convention is *index.html*

The Request

- **Once the IP address is determined, the browser creates an HTTP request.**

- **Lots of hidden information in this request**
 - **header, cookies, form data, etc**

The Response

- **The server returns files, not "web pages"**
  - **It is up to the browser to decide what to do with those files**

- **If the server can't fulfill the request it will send back files with error codes: 404, 500, etc.**

**What happens when you type
"http://si.umich.edu/"
into the address bar.**

1. The browser look up the domain in the DNS

2. The DNS returns the IP address:54.88.175.189

The Request/Response
Cycle is initiated
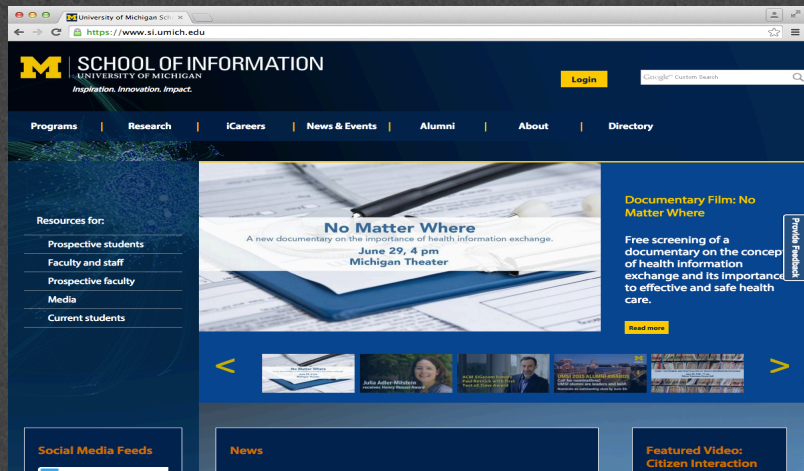
3. The browser sends an HTTP request to the server located at that address.

4. The server finds the requested file and sends it back as a response.

5. The browser takes the response and renders the HTML code as a nice graphical presentation, often repeating steps 3 – 4 as needed to request images and other supporting files.

Additional Notes

- **Live Example**

- **A new protocol IP Version 6 (Ipv6) will increase the number of combinations to 2^{128}.**

- **High-level domain name examples**

Original	Country	Generic
.org	.au	.airforce
.net	.br	.biz
.int	.de	.community
.edu	.ie	.jobs
.gov	.uk	.travel
.arpa	.us	.wiki

Review

- **A URL has three parts.**

- **Request/Response cycle typically requires multiple rounds of communication between the client and server.**

Acknowledgements/Contributions