The Request/Response Cycle

Or, what happens when you type something into the address bar

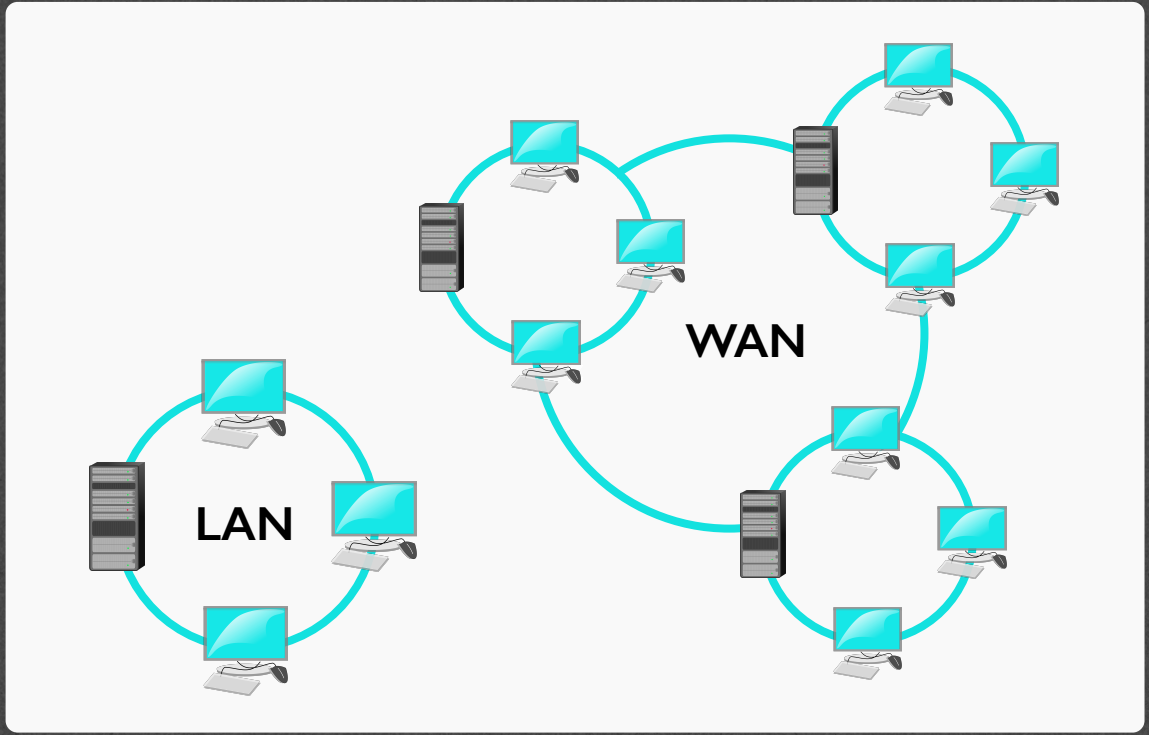
How Does This All Work?

- 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
    → Server
  - 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

→ HTML Code뿐만 아니라 any type of files도 transfer back and forth 함.

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

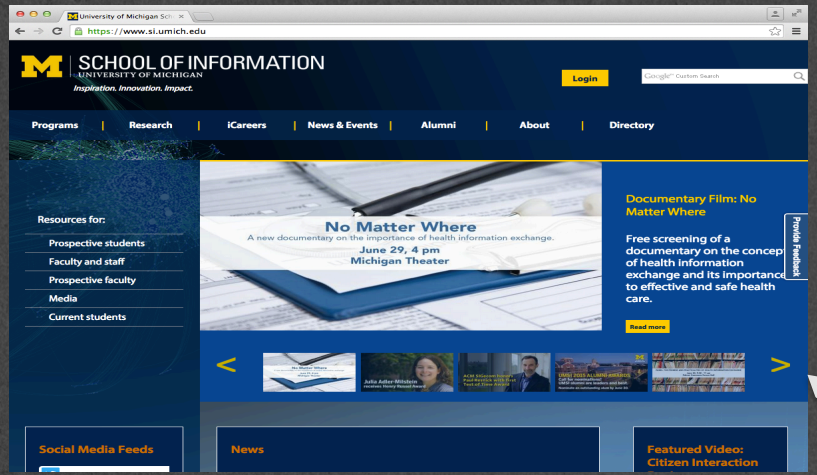
- The server returns files, not "web pages"
  - It is up to the browser to decide what to do with those files

- 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.

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