**TDC 563**  
Protocols and Techniques for Data Networks

By example...

Goal: browse to http://www.depaul.edu
What things happen first?

- What happens when you hit enter or click the link?
- What does the browser do?
URL interpretation

- Parses request URI
- It is an HTTP GET
- For www.depaul.edu
- What is www.depaul.edu?
Domain name look up

• Does the browser have the name cached?
• Let us assume the answer is no
• Browser issues a gethostbyname() or equivalent
• We embark on a resolution sub-process...
What is involved in resolving?

• Does hosts(.txt) have www.depaul.edu in it
• Are we a stub, forwarder or full resolver?
• Assume we're a stub, who do we talk to?
  • And how did we get that information?
  • That was probably derived from boot strap
• OK, let's format an A query. What about AAAA?
  • Maybe do both?
• Getting pretty complicated isn't it?
OK, let's send the query!?!?

- Not so fast!
- Put the DNS message in... UDP? Ya should work
- OK, IP datagram, sending to DNS resolver, easy
- From... my IP address? Uhm, am I connected?
- OK, send it on the wire?!?!
Finish your IP encap bub

• Fits in MTU, checksum, set TTL, etc... OK go, go!
• Wait, what L2 destination? Is it a local host?
• Oh, gotta talk to a router... OK lets do that.
  • How do I know who that is? Argh...
  • That was probably part of boot strap
• OK, got it, get this into Ethernet and off we go...
• Done yet? Not even close
Here ya go router!

• OK, Ethernet daddr is to the router.
  • Wha...? is that right
• Yep, unless your mask is broken
  • What the @?!# is a mask?
• Presume it's non-local, router gets it, now what?
• Router has a decision to make.
• Forwarding/policy decision, re-encap, ARP, etc...
• At least no DNS... I think
Skip ahead, DNS server has query!

We haven't even gotten to HTTP request yet!
DNS server processing

- Process query
  - Can we?
  - Do I know about this name? Cache or auth?
  - How do I go about finding out?
- If not auth and not cached, how many more steps?
- Quite a few maybe
- ...skip ahead ...skip ahead ...skip ahead
Time warp...

- Sending TCP packet
  - UDP for DNS, now TCP? What gives?
- Gotta setup a connection, the 3-way handshake
  - Connection? Isn't IP connectionless?!?!
- Exchange options, sequence numbers
- Timers, congestion control, sliding window, oh my!
- Is it time for HTTP now?
This isn't a cake walk

• Its hard to learn how this all works even after year's of experience, never mind a short networks course

• But we'll try our best...

• I left out a whole bunch of stuff. This slide deck could have been hundreds of pages long, easily! ..and that's without pictures

• Someone else's version of a related idea:

  https://github.com/alex/what-happens-when