

# Internet (Cont.): Networking

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CS-E1- Fall 2011

# Agenda

- + Course notes
- + Network Types
- + *Ports*
- + PIP (*Private IP Addresses*)
- + NAT (*Network Access Translation*)

# Course Notes

- + Homework assignment #2 is completed.
- + Homework assignment #3 is due by noon on Monday October 24<sup>th</sup>, 2011. Includes the following:
  - Create another post on the CS-E1 blog.
  - Create another Wiki post.
  - Recommended (not required) reading including Ch. 6 - 8, Spotlight 5 in *Computers Are Your Future*, 11th Edition
  - [https://www.computerscience1.net/Homework\\_3](https://www.computerscience1.net/Homework_3).

# Course Notes (Cont.)

- + Exam #1 review section on Tuesday October 11<sup>th</sup>, 2011 at 5:30PM
- + Exam #1 will take place on Tuesday **October 18<sup>th</sup>**, 2011 at 5:30PM in **Harvard Hall 201**.
- Note: the exam is closed book! (no notes, texts, or computers)

# Network Types

- + P2P (*Peer-to-Peer*): decentralized where both parties are consumers and suppliers of information. Uses include BitTorrent, Skype, etc.
- + *Client-Server*: centralized where a client requests information from a server; unidirectional. Uses include the Web, file transfer, etc.
- + Hybrid systems are possible, a distributed network where a client requests a server but servers are connected to one another as peers. Uses include USENET, SMTP mail, etc.

# Ports

- + Can be implemented as either hardware or software.
- + Like a phone extension that allows for multiple applications to run with a single IP address.
- + TCP/IP and UDP ports range from 0 - 65535 with the more common ports being lower (ie. 80 for HTTP).
- + Ports 0 - 1023 are taken by well-known applications; 1024 - 49151 can be registered by companies; 49152 - 65535 are private ports that can be used by anyone.

# Private IP Addresses

- + The aforementioned 4,228,250,625 possible IP addresses is actually much less thanks to private block.
- + 10.x.x.x, 169.254.x.x, 172.16.x.x -> 172.31.x.x, and 192.168.x.x are dedicated blocks for PIPs.
- + Used to hide networks/ devices or provide numerous devices Internet access without numerous public IPs.
- + A NAT (*Network Access Translation*) device routes and assigns IPs to devices.

# Private IPs (Cont.)

- + Similar to phone extensions where at least one, public IP address is required and a NAT device to route both inbound and outbound traffic.
- + 10.x.x.x offers 16,777,215 addresses, used by large companies; 192.168.x.x for consumers networks.
- + Private IPs might still be used in IPv6 for security, but would become unnecessary in cost reduction and IP address conservation.



# Private IPs (Cont.)

- + Can hide a device from the Internet (ie. local printer, local file servers.)

- + Cuts costs and saves IP addresses (esp. for IPv4 when there is a rather finite quantity of addresses).

- + Becomes difficult to establish a server on such a network.

- + Can make outbound VPN connections difficult.

# Inside the NAT

- + Sits between internal network and the world.
- + Analogy: similar to a secretary. A company tells the secretary to forward all calls by a particular client to them. Otherwise all other calls are rejected. In a NAT device specific traffic is routed to a specific device based on local IP addresses.
- + Techniques include *overloading* whereby a port is dedicated to a single device, one-to-one. Also know as a PAT (*Port Address Translation*). *Static* whereby one public IP is mapped to a private IP, one-to-one.

*Fin*