Computer Networks

Reading: pp. 14-19

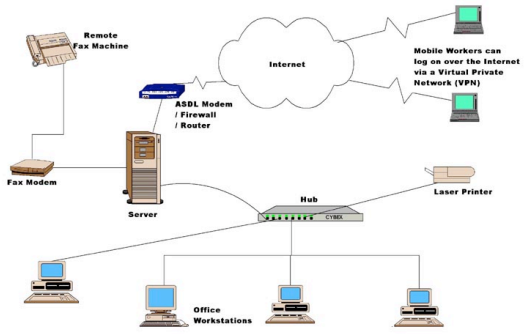
Learning Objectives:

- Computer Networks
- The Internet
- IP and DNS addresses

Computer Networks

- Networks allow computers to interconnect for the purpose of sharing data and computing resources
  - Q1: How do we share data?
  - Each computer on the network (host) has a name (address) which is used to identify the computer when data is transferred

Computer Network

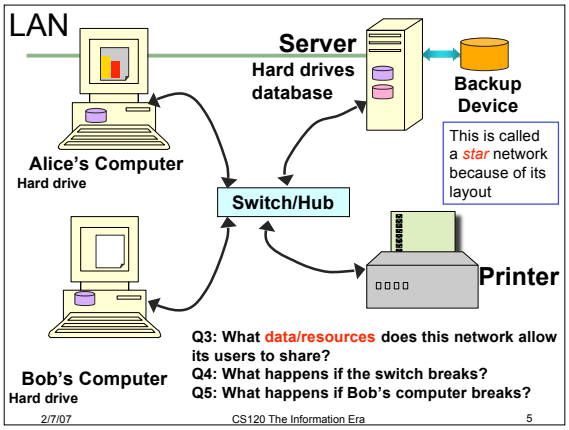


http://www.coras-it.co.uk/graphics/network.jpg

Local Area Network (LAN)

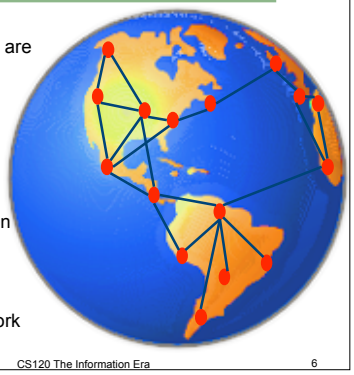
- Networks that are geographically close are called Local Area Networks (LANs)
  - Inter-office network for a small business
  - Inter-building network
    - share documents
    - access a database

Q2: Where else may a LAN be used?



Wide Area Network (WAN)

- Networks that are geographically distant are called Wide Area Networks (WANs)
  - Examples?
  - each may be a computer or a LAN
  - the WAN may be on top of an existing network
    - Internet
    - telephone network



The Internet

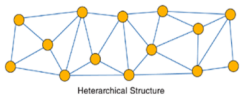
- The Internet is a network of networks that are spread all over the world
  - A network of LANs
- Not all LANs are connected to the Internet

Q6: Can you give an example of a LAN that you use that is connected to the Internet?

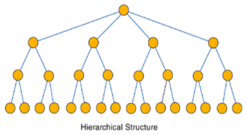
Q7: When would you not want your LAN connected to the Internet?

Network Structure

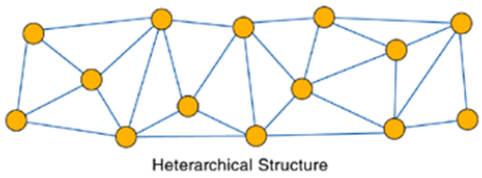
- A heterarchical network contains many nodes that are interconnected.
  - Each node is one computer



- A hierarchical network contains a tree-like structure where some nodes are superior to others.

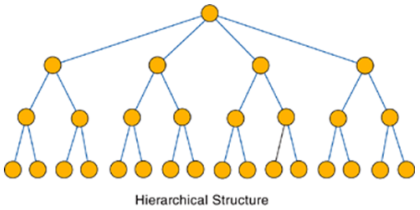


Heterarchical Network



Q8: T / F The Internet is a heterarchical structure. Why?

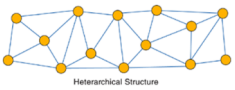
Hiearchical Network



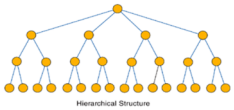
Q9: Give an example of something that is hierarchical.

The Internet

- A characteristic of a heterarchical network is that it is a robust network.
- If some nodes are removed, data can still be sent between nodes
- Q10: Hierarchical networks do not lend themselves to robustness. Why?



- The Internet also has dynamic routing, where the route of the data is determined at the time of transmission based on current network conditions.
- Q11: What current network conditions might affect routing?



Host Machines and Host Names

- Each computer on the Internet is a host machine.
- Each computer has a unique Internet Protocol address (name), such as 124.110.24.1
  - Some computers have a permanent (static) IP address
  - Some computers have a dynamic address

Q12: What is the IP address of your lab computer?

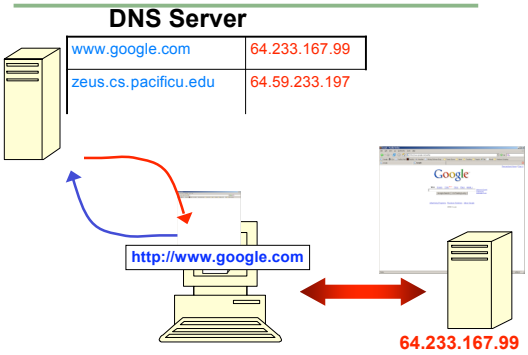
Q13: What are some computers with static IP addresses? Why?

Q14: What are some computers with dynamic IP addresses? Why?

Domain Name Servers

- But I type www.google.com, not 64.233.167.99!
- IP address for most hosts are mapped to a Domain Name Service (DNS) address
  - most often only hosts with static IP addresses
  - DNS is more more people-friendly
- Example DNS Address: mail.yahoo.com
  - Host Name is: mail
  - Domain Name is: yahoo.com
  - more specific, right to left

Internet Addresses



Host Machines and Host Names

- Each domain name consists of:
  - Site name
  - Top Level Domain name (TLD)
- Example: zeus.cs.pacificu.edu
  - edu refers to an educational site (TLD)
  - cs is Dept. of Math & Computer Science
  - pacificu is Pacific University
  - zeus is a specific machine (host)
  - domain name: cs.pacificu.edu

Host Machines and Host Names

- Examples of TLDs include:
  - .com a commercial organization
  - .edu a US educational site
  - .net a network site
  - .au Australia
  - .fr France
  - .hk Hong Kong
  - .es Spain

Host Machines and Host Names

- New TLDs have been added as the original set became overloaded
- Each machine has a unique IP address
  - may have multiple DNS addresses (aliases)
- Anyone can register a DNS address
- When you type in a DNS address, a domain name server translates it into an IP address.