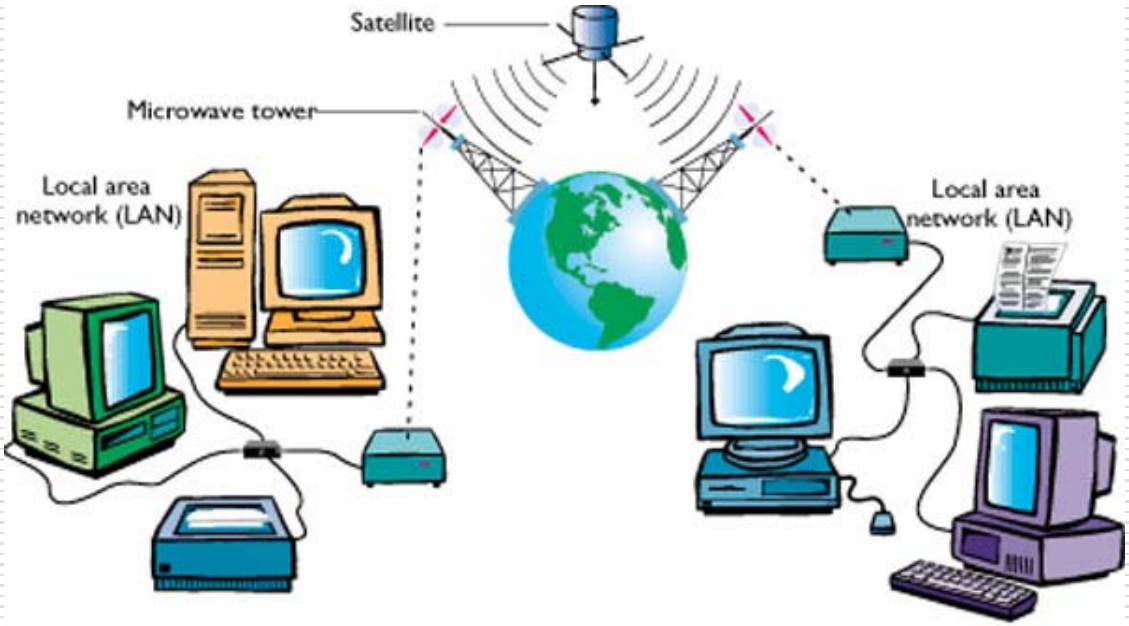
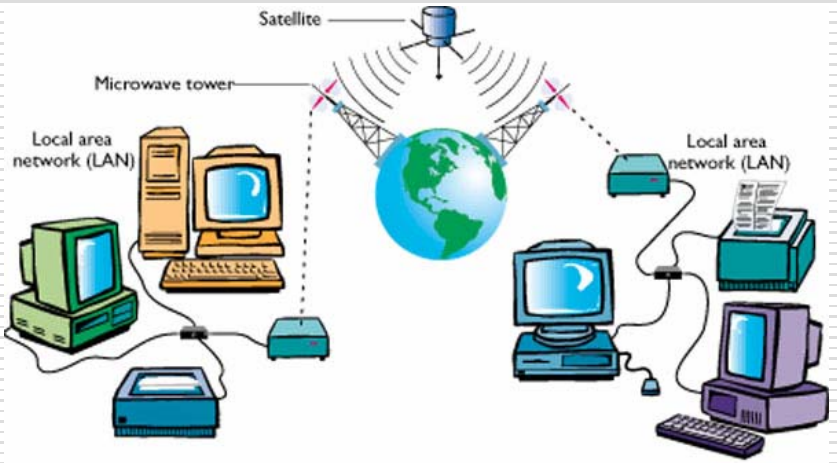
Computer Network & Internet



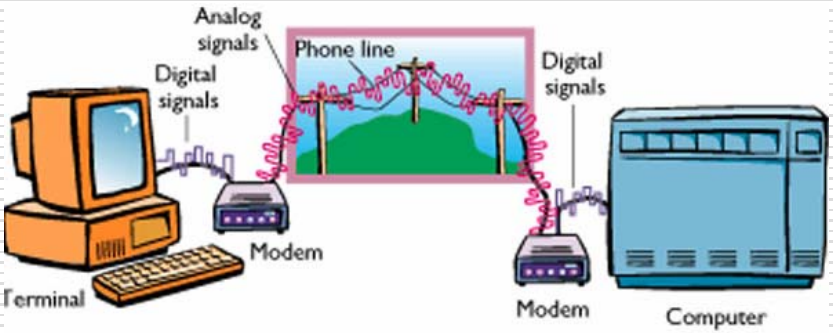
Basic Network Anatomy

- A computer network is any system of two or more computers that are linked together.
- Anatomy:
  - LAN: wired-LAN, wireless
  - MAN
  - WAN



Components of Computer Network

- Cable: UTP, coaxial
- Fiber optic
- NIC, Modem
- Router
- Server: File Server, Web Server, Email Server
- Client
- Protocol: TCP/IP, FTP, HTTP
- NOS



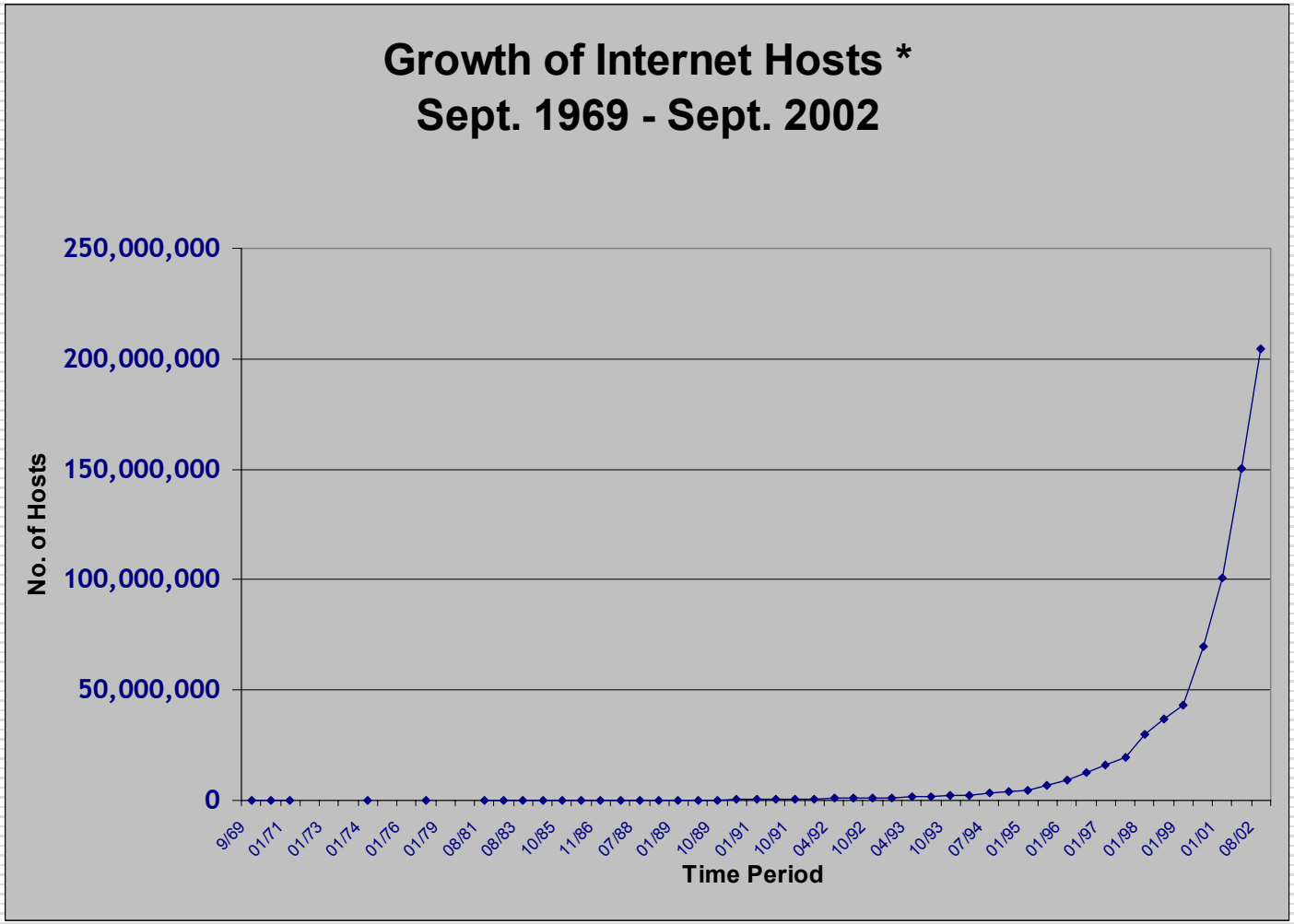
Communication model

- Client/server model
  - One or more computers act as dedicated servers and all the remaining computers act as clients.
- Peer-to-peer model
  - Every computer on the network is both client and server.
- Many networks are hybrids, using features of the client/server and peer-to-peer models.

Internet

- History
  - ARPAnet
  - DoD
  - 1969 (ARPAnet), 1980 (P2P), 1990 (HTTP)
- The Internet: an interconnected network of thousands of networks using TCP/IP protocol

Internet Growth



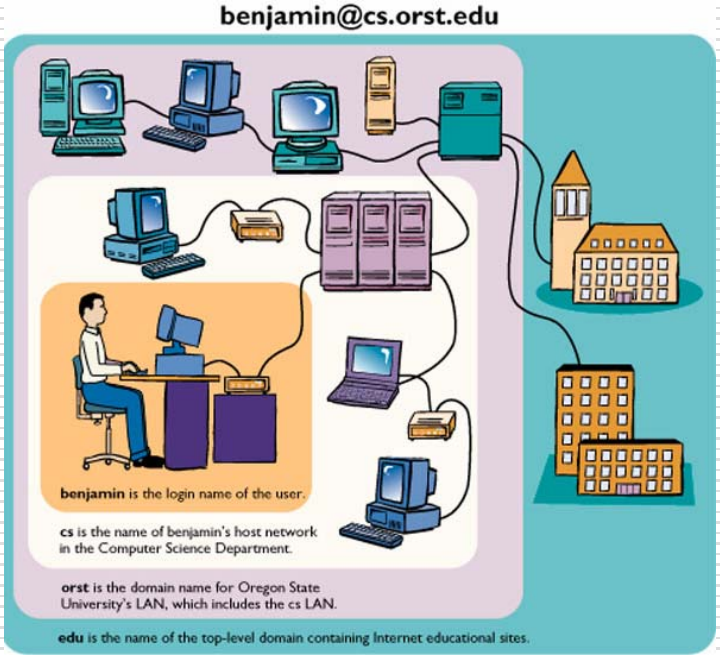
The Internet was not known as "The Internet" until January 1984, at which time there were 1000 hosts that were all converted over to using TCP/IP.

Internet Protocol, Address

- TCP/IP Layering Protocols
- IP Address
- Routing
- Domain Name & DNS
- Top-level domains include:
  - .edu - educational sites
  - .com - commercial sites
  - .gov - government sites
  - .mil - military sites
  - .net - network administration sites
  - .org - nonprofit organization sites

Email Address

- An email address includes: username@hostname.sub.dom
  - **username** is the person's "mailbox"
  - **hostname** is the name of the host computer and is followed by one or more domains separated by periods:
    - host.domain
    - host.subdomain.domain
    - host.subdomain.subdomain.domain



Network Applications

- Email
- Mailing List
- Newsgroups
- Instant Messaging
- Voice Mail
- Internet Telephony
- Massive Multiplayer Online Game
- Search Engine, Web-Robot Indexer/Web Crawler/Spider
- Specialized Search Engines: Google Maps, Froogle, and others

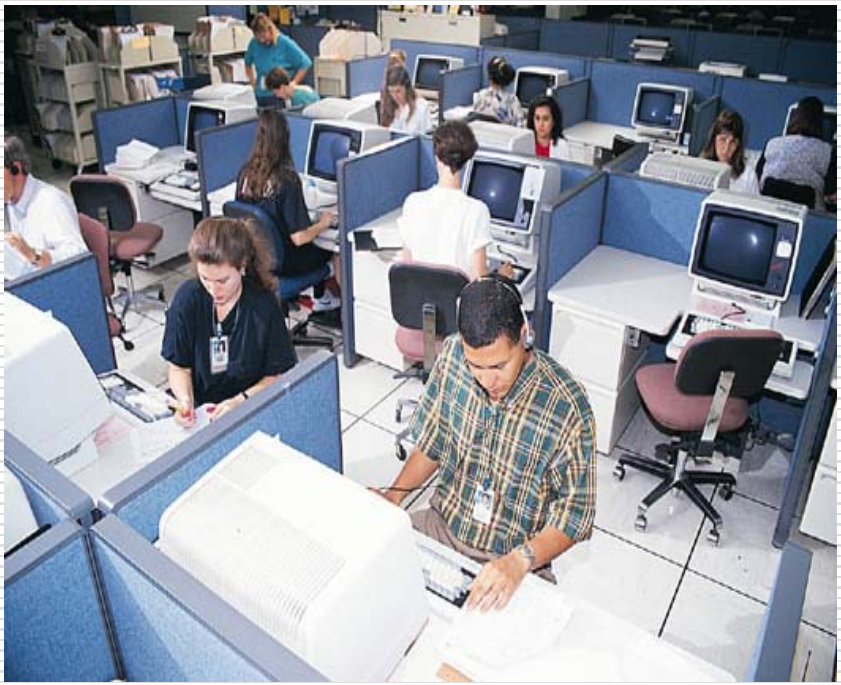
World Wide Web, Web

- Protocol HTTP, Web Server, Web Client/Browser
- Hypertext Markup Language (HTML)
- Beyond HTML: Scripting Language, XML, XHTML, VRML, Applet
- Web Address:

Web Applications

- Simple data processing tasks
- Most Web applications take advantage of the Web's connectivity
- Search Engine
- Online business transactions (e bay, amazon, paypal,…)
- News oriented Web applications
- Other Web applications support a more traditional form of information broadcasting.

The Use of Information Technology



IT Impacts

- ✓Computers have a big impact on all of today's job markets.
  - ➢Entertainment
    - ❑The production of television programs and movies
  - ➢Publishing
    - ❑Reporters scan the Internet for facts.
      - Write and edit stories on location
      - Transmit those stories by modem to central offices
    - ❑Artists design charts and drawings with graphics software.
    - ❑Photo retouchers use computers to edit photographs.

Medicine

- Medical students and professionals use virtual emergency rooms to simulate processes of collecting vital signs and other patient data.

Airline

- Commercial pilots use computer-controlled flight simulators to learn flight procedures and to upgrade and maintain their flying skills.

Science

- Scientists collect and analyze data using remote sensing devices, notebook computers, and statistical analysis programs.
- Scientists catalog and organize information in massive databases, many of which are accessible via the Web.
- Scientists use supercomputers, workstations, and processor-sharing grids to create computer models of objects or environments that would otherwise be out of reach.
- Scientists communicate with colleagues all over the world through the Internet

The Automated Factory

- Robots: computer-controlled machines
- Computers help track inventory, time the delivery of parts, control the quality of production, monitor wear and tear on machines, and schedule maintenance
- CAD/CAM

Enterprise Computing

- PCs are an essential part of the overall computing structure for most business enterprises.
  - Workers use technology tools, such as word processing, spreadsheets, desktop publishing, and email.
  - Companies can replace PCs with thin clients—low-cost, low-maintenance machines.
  - This allows workers to access critical network information without the overhead of a PC or workstation.
- Distributed computing integrates all kinds of computers, from mainframes to PCs, into a single, seamless system.

Workgroup computing

- Groupware: share calendars, send messages, access data, and work on documents simultaneously
- Intranets: to link employees
- Extranets: accessible to strategic partners and customers

The paperless office

- Magnetic and optical archives will replace reference books and file cabinets.
- Electronic communication will replace letters and memos.
- Web publications will replace newspapers and other periodicals.
- HTML, XML, Adobe's popular PDF (portable document format), and other current technologies make it easier for documents to be transmitted and stored electronically without loss of formatting.

The electronic cottage

- Futurist Alvin Toffler popularized the term.
- Electronic cottage describes a house in which technology allows a person to work at home.
- The number of American telecommuters almost tripled between 1995 and 2000.
- There are many strong arguments for telecommuting:
  - Reduces the number of automobile commuters
  - Saves time
  - Allows for a more flexible schedule
  - Can increase productivity

E-Commerce

- Buying and selling products through the Internet
  - Includes marketing, sales, support, customer service, and communication with business partners
- Modalities:
  - Business-to-business (B2B)
  - Business-to-consumer (B2C)

E-Government

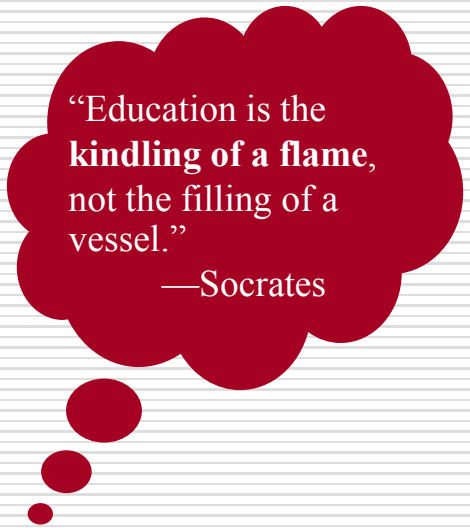
- The use of IT (ICT) to improve the efficiency, effectiveness, transparency and accountability
- Modalities:
  - Government to Citizen
  - Government to Business
  - G to G

Telecommuting

- Using IT for remote-collaborative working
- There are also strong arguments against telecommuting:
  - Doesn't work with jobs requiring interaction
  - Requires self-discipline
  - Lacks office social life
  - Causes low visibility

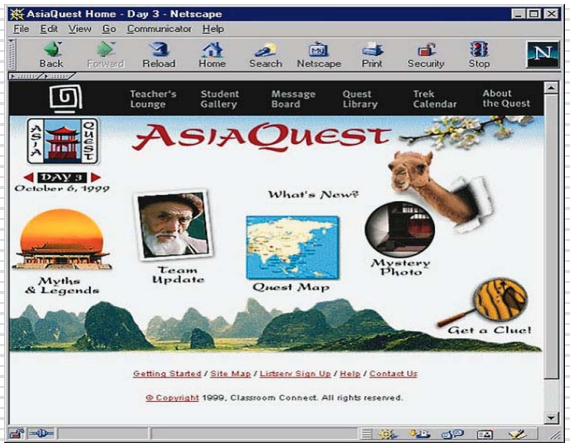
Information Age Education

- How should education provide for students in the information age?
  - Technological familiarity
  - Literacy
  - Mathematics
  - Culture
  - Communication
  - Learning how to learn



High-Tech Schools

- Computer Aided Instruction
- Productivity Tools
- Distance Education: Virtual Schools



Rules of Thumb: Considering Computer Careers

- ✓ Learn touch typing.
- ✓ Use computers regularly to help you accomplish your immediate goals; don't forsake the basics.
- ✓ Combine your passions.
- ✓ Ask questions.
- ✓ Cultivate community.
- ✓ If you can't find your dream job, create it yourself.
- ✓ When you're ready to look for a job, don't forget the Web.
- ✓ Prepare for change.

Social and Ethical Issues

Objectives

- Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally

ACRL Information Literacy Standards

- Standard One: Determine the extent of information needed
- Standard Two: Access the needed information effectively and efficiently
- Standard Three: Evaluate information and its sources critically
- Standard Four: Incorporate selected information into one's knowledge base
- Standard Five: Use information effectively to accomplish a specific purpose
- Standard Six: Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally

Ethics (Webster Definition)

1 *plural but singular or plural in construction* **: the discipline dealing with what is good and bad and with moral duty and obligation**

2 a : a set of moral principles or values **b :** a theory or system of moral values <the present-day materialistic *ethic*> **c** *plural but singular or plural in construction* **: the principles of conduct governing an individual or a group** <professional *ethics*> **d :** a guiding philosophy

Various Ethical Issues in IT

- Ethical dilemmas
- Plagiarism
- Piracy
- Hacking
- Computer crime
- Viruses
- Ergonomic/health issues
- Job Displacement
- Digital Divide
- … (see. Ruth Rikowski)

Social & Ethical Issues

- The threat to personal privacy posed by large databases and computer networks
- The hazards of high-tech crime and the difficulty of keeping data secure
- The difficulty of defining and protecting intellectual property
- The threat of automation & the dehumanization of work
- The abuse of information as a tool of political and economic power
- …

Internet Issues: Ethical and Political Dilemmas

- Filtering software to combat inappropriate content
- Digital cash to make online transactions easier and safer
- Encryption software to prevent credit card theft
- Digital signatures to prevent email forgery
- Access and censorship
- The digital divide

Net & Messaging Ettiquette

- Say what you mean, say it with care
- Keep it short
- Proofread your message
- Don’t assume you are anonymous
- Learn “non verbal” language of the Net
- Know your abbreviations
- …

Ethical Issues of E-Commerce

- An organization's code of ethics should include:
  - A clear, explicit statement of the organization's privacy policy
  - A policy statement addressing situations in which a person's permission must be secured before his/her ID, photo, ideas, or communications are used or transmitted
  - A clear policy stating how the company will inform customers of the intended uses of personal information gathered during an online transaction and how the company will secure permission from customers for those uses
  - A statement that addresses issues of ownership with respect to network postings and communications
  - A policy of how the company monitors, or tracks, user behavior on Web sites

Software Piracy and Intellectual Property Laws

- Software Piracy—illegal duplication of copyrighted software
  - The software industry is a $50 billion a year business sector.
  - Billions of dollars are lost each year to software pirates.
  - One-third of all software is illegally copied.
- Intellectual Property and the Law
  - Intellectual property includes the results of intellectual activities in the arts, science, and industry.
  - Laws ensure that mental labor is justly rewarded and encourage innovation.
  - The information age requires the outdated and inconsistent intellectual property laws to be changed and adapted.

Software Piracy (2005)

Proprietary, Free, Open Source SW

	Freely Modifiable	Free Use
Proprietary SW	✘	✘
Free SW	✘	✓
Open Source SW	✓	✓

Discussion