Computer Networks
ICS 651

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Why Study Computer Networks?

- interesting, complex, concurrent, distributed, heterogeneous, and not under central control

- pervasive, very useful, good to know their strengths and limitations, and maybe good for employment prospects

- TCP/IP

Computer Networking Software

It is hard to write networking software because the software must:

- run forever
- have no memory leaks
- accept arbitrary input
- be: interoperable
  - fast
  - efficient
  - secure
  - elegant

Why Write Computer Networking Software?

- create new applications
- do better than existing software

Networking Software Models

- due to the distributed nature of computer networks, it is essential to have a good model of how the systems will interact
- before writing any code!

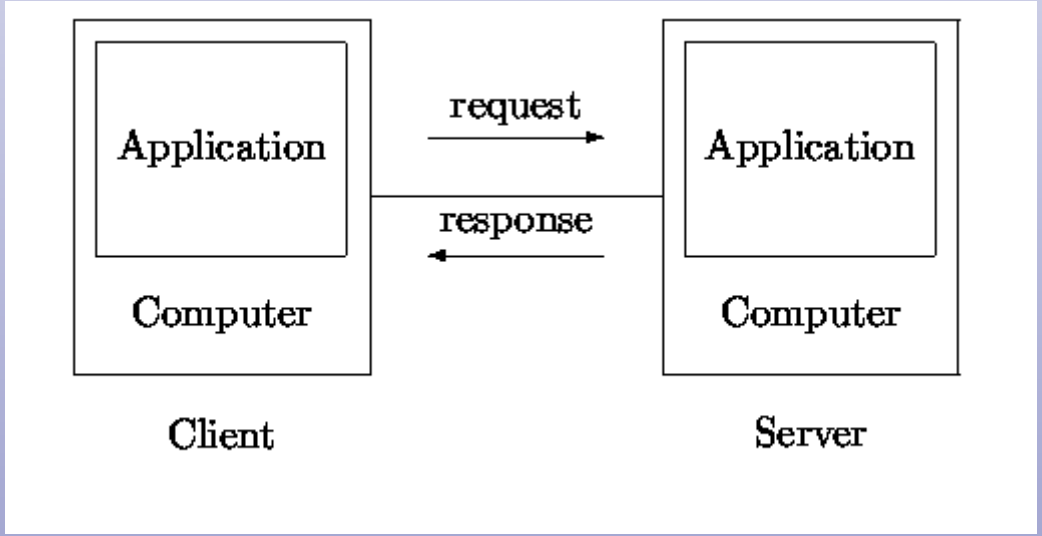
- common models: peer-to-peer (p2p), client-server

Client-Server Model

- a program that requests a service is a client
- a program that provides a service is a server
- clients and servers may run on different machines, and communicate over a computer network

Client-Server Model

- the client-server model is very general, and includes many common protocols



Client-Server Protocols

- WWW (clients: Firefox, Internet Explorer, Lynx, etc.. servers: Apache, etc)
- Domain Name Service (DNS)
- Telnet
- FTP
- Network Time Protocol (NTP)
- Network File Server (NFS)

  and many more!

Application Requirements

- Different applications have different requirements with regards to
  - reliability
  - security
  - delay and jitter (delay variation)
  - throughput

Application with Different Reliability Requirements

- remote file system (high reliability)
- web access (medium reliability)
- time protocol (low reliability)
- name server lookup
- remote login
- e-mail transfer

Five applications with Different Requirements

- file transfer, e.g. NFS and FTP
- visiting a digital library, e.g. HTTP (the Web)
- video playback (jitter matters, delay doesn't, high bandwidth)
- video conferencing (high bandwidth, jitter and delay both matter)
- interactive gaming (medium bandwidth, delay matters but jitter doesn't as much)

Computer Networks
Administrative Information

- MW 10:30-11:45 on zoom and
  later maybe also in POST 319
- instructor notes (no textbook)
- 2 midterms, 1 final
- 4 projects (I think)
- occasional homeworks, esp. at start
- student-instructor meetings
- office hours: M 3-4, F 9:30-10:30

http://www2.hawaii.edu/~esb/

Computer Networks
Homework 1

- read section 1 of the notes

- do homework 1:
  - use Unix clients to study the Internet
  - build a client
  - build a server

due August 31st