Announcements

Today’s Labs are moved to Tuesday ... join any section: 8:30, 9:30, 1:30, 2:30
• Office hours have been posted on the class Web Page

Networking

More than just a social interaction

Networks...

Computers are useful alone, but are better when connected (networked)
• Access more information and software than is stored locally
• Help users to communicate, exchange information ... changing ideas about social interaction
• Perform other services – printing, Web,...

Networking Changes Life

The Internet is making fundamental changes ... The FIT text gives 5 ways
• Nowhere is remote -- access to info is no longer bound to a place
• Connecting with others -- email is great
• Revised human relationships -- too much time spent online could be bad
• English becoming a universal language
• Enhanced freedom of speech, assembly

Can you think of others?

Network Structure

Networks are structured differently based (mostly) on how far apart the computers are
• Local area network (LAN) -- a small area such as a room or building
• Wide area networks (WAN) -- large area, e.g. distance is more than 1 Km

Internet: all of the wires, fibers, switches, routers etc. connecting named computers

Protocol Rules!

To communicate computers need to know how to set-up the info to be sent and interpret the info received
• Communication rules are a protocol
• Example protocols
  • EtherNet for physical connection in a LAN
  • TCP/IP – transmission control protocol / internet protocol -- for Internet
  • HTTP -- hypertext transfer protocol -- for Web
LAN in the Lab
EtherNet is a popular LAN protocol
• Recall, it’s a “party” protocol

Connection to campus network infrastructure

EtherNet Cable

Campus & The World
The campus subnetworks interconnect computers of the UW domain which connects to Internet via a gateway

IP -- Like Using Postcards
Information is sent across the Internet using IP -- Cerf uses postcard analogy
• Break message into fixed size units
• Form IP packets with destination address, sequence number and content
• Reassembled at destination forming msg
• Going separate routes sets packets by-passing operation and out-of-service switches

A Trip to Switzerland
A packet sent from UW to ETH (Swiss Fed. Tech. University) took 21 hops

Naming Computers I
People name computers by a domain name -- a hierarchical scheme that groups like computers
.edu All educational computers
.washington.edu All computers at UW
dante.washington.edu A UW computer
.ischool.washington.edu ISchool computers
cs.washington.edu CSE computers
.juno.cs.washington.edu A CSE computer

Naming Computers II
Computers are named by IP address, four numbers in the range 0-255
cse.washington.edu: 128.95.1.4
ischool.washington.edu: 128.208.100.150
• Remembering IP addresses would be brutal for humans, so we use domains
• Computers find the IP address for a domain name from the Domain Name System -- an IP address-book computer

Computer needs to know IP address of DNS server!
Domains
.edu .com .mil .gov .org .net domains are “top level domains” for the US
• Recently, new TLD names added
• Each country has a top level domain name: .ca (Canada), .es (Spain), .de (Germany), .au (Australia), .at (Austria), .us
[The FIT book contains the complete list]

Logical vs Physical
There are 2 ways to view the Internet
• Humans see a hierarchy of domains relating computers -- logical network
• Computers see groups of four number IP addresses -- physical network
• Both are ideal for the “users” needs
• The Domain Name System relates the logical network to the physical network by translating domains to IP.

Client/Server Structure
The Internet computers rely on the client/server protocol: servers provide services, clients use them
• Sample servers: email server, web server, ...
• UW servers: dante, courses, www, student,...
• Frequently, a “server” is actually many computers acting as one, e.g. dante is a group of more than 50 servers
[Protocol: Client packages a request, and sends it to Server. Server does the service and sends a reply]

World Wide Web
World Wide Web is the collection of servers (subset of Internet computers) & the information they give access to
• Clearly, WWW = Internet
• The “server” is the web site computer and the “client” is the surfer’s browser
• Many Web server’s domain names begin with www by tradition, but any name is OK
• Often multiple server names map to the same site: MoMA.org and www.MoMA.org

Brief Encounter
Web surfers are not “connected” to a server, but interact briefly: Browser (client) sends a request for a page, the server replies; it’s 2 transmissions
• This is a smart scheme: clients can fit from site to site; servers handle other requests
This scheme is part of the hypertext transfer protocol, http

Dissecting a URL
Web addresses are URLs, uniform resource locator, an IP address+path
• URLs are often redirected to other places; e.g. http://www.cs.washington.edu/100/03wi/ goes to
http://www.cs.washington.edu/education/courses/100/03wi/index.htm

| protocol | = http:// |
| Web server | = www |
| domain | = .cs.washington.edu |
| path | = education/courses/100/03wi/ directories (folders) |
| file | = index |
| file extension | = .htm | hyper text markup language |
Summary

Networking is changing the world

Internet: named computers using TCP/IP
WWW: servers providing access to info

• Principles
  • Logical network of domain names
  • Physical network of IP addresses
  • Domain Name System connects the two
  • Client/Server, fleeting relationship on WWW