A local area network is:

A. An exclusive social club.
B. A group of computers, usually in a single building, connected by cables.
C. Local television affiliates of the big networks.

Announcements

- For Friday, read chapter 4 of *Fluency*

- Slides for Monday and today are now available on the course Calendar.
- My goal
  - Post the slides the night before lecture so you can print them before lecture and not have to write everything down!

- Pop quizzes begin in lab this week
- One every week on a day of my choice

Drop-In Labs

<table>
<thead>
<tr>
<th>Time</th>
<th>Office Hours</th>
<th>Drop-In Labs</th>
<th>C.L.B. Tutoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 10:00am</td>
<td>Office Hours</td>
<td>Drop-In Labs</td>
<td>C.L.B. Tutoring</td>
</tr>
<tr>
<td>Tuesday 1:00pm</td>
<td>Office Hours</td>
<td>Drop-In Labs</td>
<td>C.L.B. Tutoring</td>
</tr>
<tr>
<td>Thursday 10:00am</td>
<td>Office Hours</td>
<td>Drop-In Labs</td>
<td>C.L.B. Tutoring</td>
</tr>
<tr>
<td>Thursday 1:00pm</td>
<td>Office Hours</td>
<td>Drop-In Labs</td>
<td>C.L.B. Tutoring</td>
</tr>
</tbody>
</table>

Labs where you can get help outside of lab or lecture
Announcements

- Register your Clickers by Thurs. night

Videocasts of the course are available within a couple hours after each lecture
- Linked at top of Calendar on the course Web site

More on GUI's


More on Metaphors

- http://uweoconnect.extn.washington.edu/metaphorsdslfit7/

Networking

More than just a social interaction

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, email
How much traffic is on UW’s networks each day?

UW’s networks move more than trillion bytes per day

Networks are structured differently based (mostly) on distance between computers:

- Local area network (LAN)
  - Small area: room or building
- Wide area networks (WAN)
  - Large area: more than 1 km

Network Structure

Basic Types of Networks

<table>
<thead>
<tr>
<th>Network Type</th>
<th>Differentiating Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer-to-Peer</td>
<td>• No computer running server software</td>
</tr>
<tr>
<td>Server-Based Networks</td>
<td>• Computer running server software manages network traffic</td>
</tr>
<tr>
<td>- Local Area Network (LAN)</td>
<td>• Limited geographical area</td>
</tr>
<tr>
<td></td>
<td>• One-time capital cost (wire or fiber optics cable installation)</td>
</tr>
<tr>
<td>- Wide Area Network (WAN)</td>
<td>• Across town or across the globe</td>
</tr>
<tr>
<td></td>
<td>• Third-party service provider (monthly $$)</td>
</tr>
<tr>
<td></td>
<td>• More bandwidth = more expense</td>
</tr>
<tr>
<td></td>
<td>• Connects to LANs with a router</td>
</tr>
<tr>
<td>Campus Network</td>
<td>• One-time capital expense</td>
</tr>
<tr>
<td>Metropolita Area Network (MAN)</td>
<td>• Buildings in close proximity separated from other clusters</td>
</tr>
<tr>
<td></td>
<td>• Third-party service provider (monthly $$)</td>
</tr>
</tbody>
</table>

LAN cabling at switch

Terms

- Turn to your neighbor and write definitions for
  - EtherNet
  - HTTP
  - TCP/IP
- I will call on three groups for definitions

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—for Internet—transmission control protocol / internet protocol
  - HTTP—for Web—hypertext transfer protocol
LAN in the Lab

EtherNet is a popular LAN protocol
- Recall, it’s a “party” protocol

Connection to campus infrastructure

Typical MGH or OUUG Lab

Ether Net
Cable

Campus & The World

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

All communication by TCP/IP

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
- Each makes its way separately to destination, possibly taking different routes
- Reassembled at destination forming msg

Taking separate routes lets packets by-pass congestion and out-of-service switches

TCP/IP

Packet Switching Animation

A Trip to Switzerland

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

Check Internet Hops

Interested?
- From Start menu, find "Command prompt"
- Enter tracert and a URL
  - www.microsoft.com
  - Switzerland eth.ch
  - Australia www.usyd.edu.au
  - Japan kyoto-u.ac.jp
  - South Africa www.uct.ac.za

Use Google to find foreign computers
Networking Changes Life

The Internet is making fundamental changes in our lives
1. Nowhere is remote
2. Email
3. Too much time online could be bad
4. English becoming a universal language
5. Enhanced freedom of speech, assembly
6. No one government is in charge

Can you think of others?

Privacy and Security issues

- Sweden handled internet for its neighbors June 2008
- New Signal Surveillance Act
- Local hub for
  - Norway
  - Finland
  - Russia

Naming Computers—Take 1

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
  - june.cs.washington.edu A CSE computer

Peers

Domains begin with a “dot” and get “larger” going right

Naming Computers—Take 2

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

Terms

- Turn to your neighbor and write definitions for
  - Logical network
  - Physical network
- I will call on two groups for definitions

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 (US)

The Fluency book contains the complete list—page 72
Logical vs Physical

View the Internet in two ways:
1. Humans see a hierarchy of domains relating computers—logical network
2. Computers see groups of four number IP addresses—physical network
   Both are ideal for the "user's" needs
   • The Domain Name System (DNS) relates the logical network to the physical network by translating domains to IP addresses

Internet vs. World Wide Web

• With your neighbor, write down definitions for
  • Internet
  • World Wide Web

| Internet: all of the wires, fibers, switches, routers etc., connecting named computers |
| Web: That part of the Internet that stores and serves Web pages—web servers, client computers |

Summary

Networking is changing the world
Internet: named computers using TCP/IP
WWW: servers providing Web pages
• Principles
  • Logical network of domain names
  • Physical network of IP addresses
  • Protocols rule: LAN, TCP/IP, http...
  • Domain Name System connects the two
  • Client/Server, fleeting relationship on WWW

Coming up....

• Submit HW1 by tonight at 10pm
• Submit clicker registration by tomorrow at 10pm
• Read chapter 4 for Friday
• Online quiz in labs today and tomorrow
  • You must attend lab to take the quiz!