Networking At UW, The Internet And Beyond

FIT 100

Various computers will be used in this class, so a quick introduction to their arrangement and networking is useful. Along the way we answer the pressing question: What *is* the difference between the Internet and the World Wide Web

Accomplishments To Date …

- ❖ You have a UWNetID that gives you access to the UW's computers, but also access to the World Wide Web … your account is on Dante
  - ❏ You have sent email, set up folders, set up an address book
  - ❏ You have visited home pages for UW, CSE100, other sites
  - ❏ You have tried out a search engine
- ❖ Other things you should find out about …
  - ❏ Printing is possible for most computer applications … how do you use the printers at OUGL or SUZ labs?
  - ❏ In Pine, it is possible to "postpone" a mail message that you are writing -- that is, set it aside to use Pine in other ways and then return to it. Try out "postpone" in your next mail.

Factoid: Pine was developed at UW and is used worldwide

Computers of the Realm...

❖ We will discuss how computers really work later, but for now think of them as having many forms

- ❏ Embedded -- processor, ROM, channels to sensor/actuators; μ-wave oven

- ❏ Laptop -- processor, RAM, floppy disk, hard disk, LCD; mobility

- ❏ Desk Top -- processor, RAM, floppy, hard disk, CD, monitor; educational and office work

- ❏ Server -- processors (4-32), RAM, many hard disks, CD; services

- ❏ Supercomputer -- processors (16-1K), RAM, hard disks; big science

FIT 100 Class Computers

- ❖ FIT100 uses
  - ✦ Laptop for lectures
  - ✦ Desktop in Collabs, OUGL, SUZ
  - ✦ Dante server

- ❖ An unconnected computer can only access the data stored locally on its hard disk, run the software stored locally, etc.

- ❖ The UW computers are connected, I.e. networked, together allowing us to send email and access the World Wide Web

Networks ...

❖ Networks connect computers, making them much more useful because

✦ Access more information and software

✦ Help users communicate, share information

✦ Perform services for one another

❖ UW's networks ship ~1/2 trillion bytes of data per day

✦ Half this information goes to or comes from the Internet

❖ How are these networks arranged?

Connection to campus network infrastructure

Collab 1

PC PC PC PC PC PC
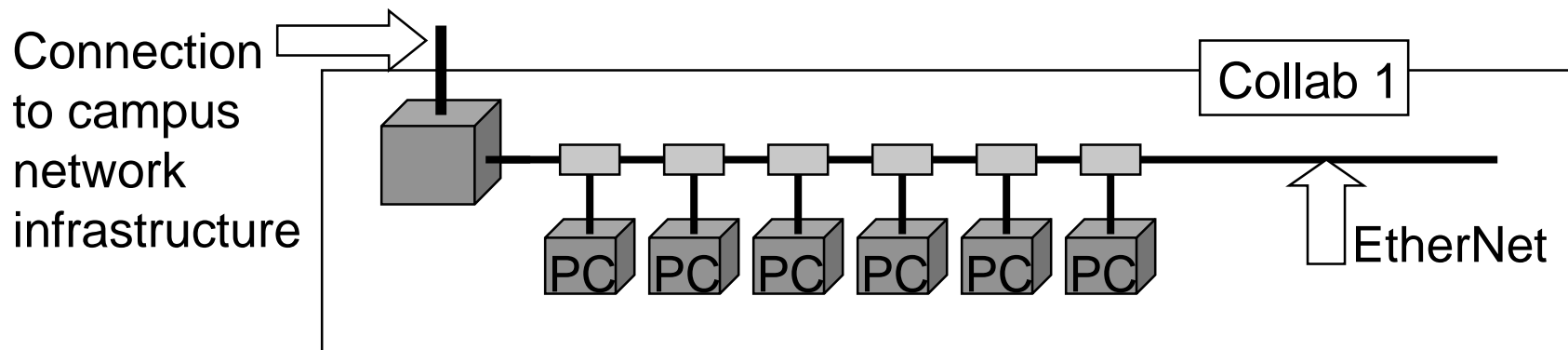
EtherNet

Ethernet … It's Like Conversation

- ❖ Think of a dozen students sitting around the dorm telling stories …
  - ❑ Everyone listens while one person tells his/her story
  - ❑ When the story is finished, there is a pause
  - ❑ A person with a story to tell starts talking, listening all the while
    - ✦ If no one else started talking too, the person continues
    - ✦ If others started talking, he/she stops and waits briefly before trying again
- ❖ In Ethernet, only the computers actually communicating listen to the transmission … the others simply wait for the break

UW Networks Connect To Internet

❖ The subnetworks of campus interconnect the computers of the UW domain (.washington.edu), which is connected to the Internet via a Gateway

Homer

Dante

U

CS

Collab 1

Gate way
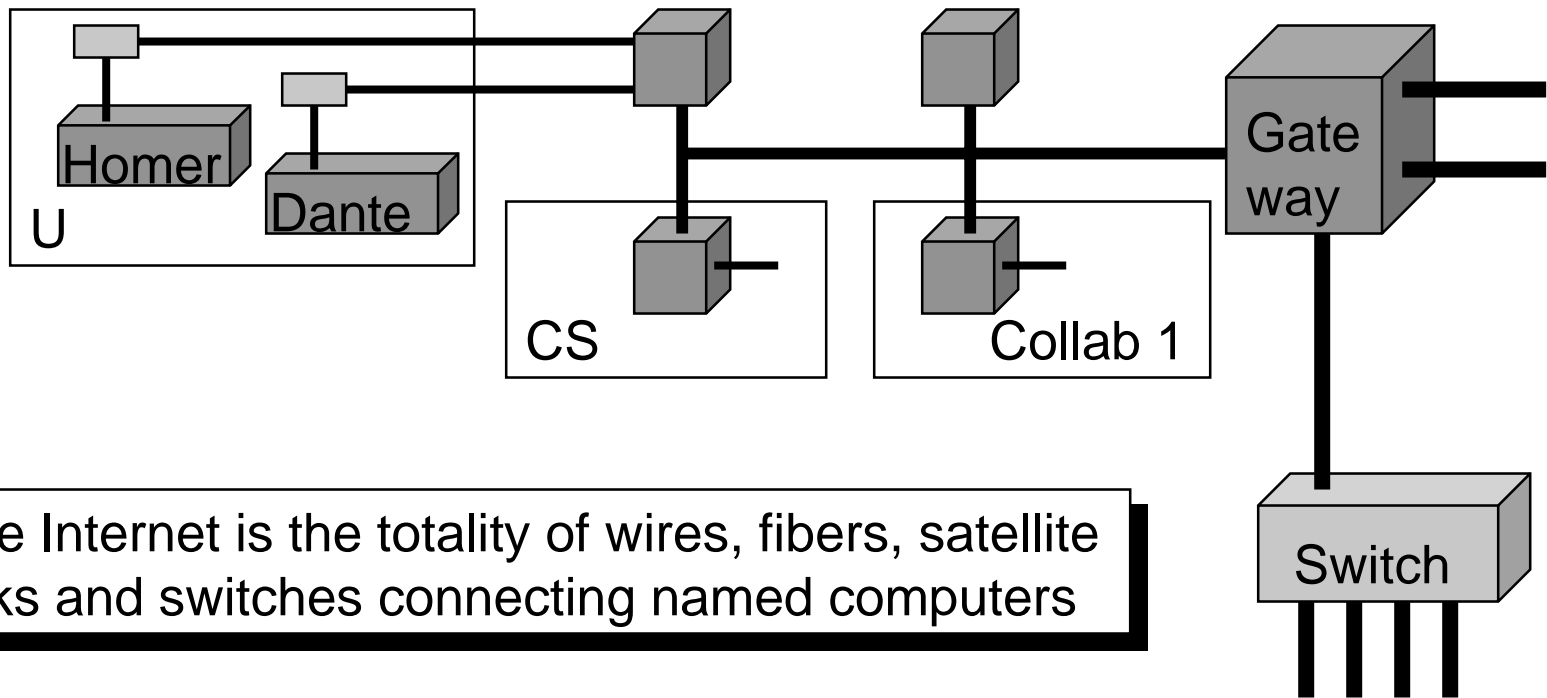
Switch

The Internet is the totality of wires, fibers, satellite links and switches connecting named computers

How Are Computers Named Logically

- ❖ The *logical* way to name computers is using domains
    - ✛ All educational institutions   .edu
    - ✛ U Dub   .washington.edu
    - ✛ CSE   .cs.washington.edu
    - ✛ Me   spiff.cs.washington.edu

- ❖ This scheme is hierarchical
    - ❏ Easier to remember names
    - ❏ Names are associated with like units
    - ❏ No limit to size or organizational depth

Top Level
.com
.edu
.gov
.org
.mil
.net
.xx

Country Pairs
.ca --Canada
.uk -- United Kingdom
.fr -- France
.de -- Germany as in
            Deutschland
.es -- Spain as in
            España
.us -- United States

How Are Computers Named Physically

❖ The *physical* way to name computers is using an Internet protocol address, or IP address

✦ spiff.cs.washington.edu's IP address is: 128.95.1.207

✦ cs.washington.edu's IP address: 128.95.1.4

✦ washington.edu's IP address: 140.142.15.163

❖ The domain name system (DNS) associates human readable names with the physical IP addresses for use by the computers and routers of the Internet
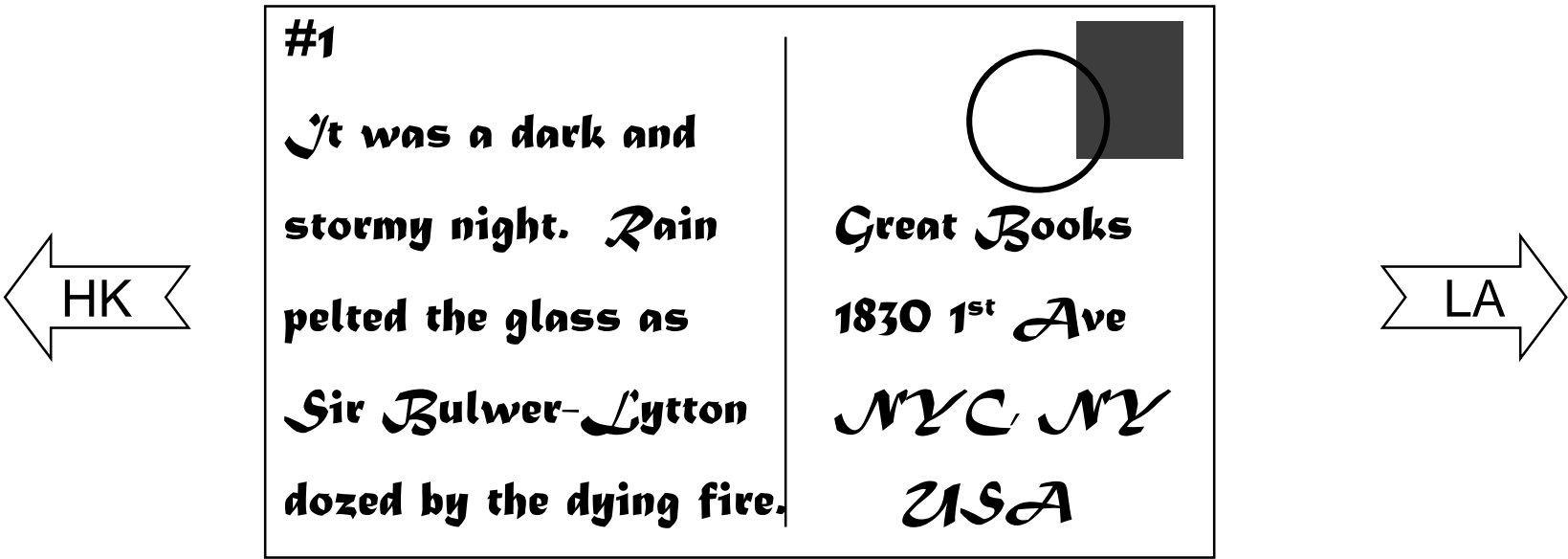
Logical Network ... Physical Network

An important concept ...

❖ In computing it is common to separate the *logical* idea of something -- the way you think about it -- from the *physical* implementation -- how it's actually built

❖ This is called a *physical / logical separation*

❖ In networking, the domain names make up our logical network, a hierarchical arrangement of names that tell us associations: cs.washington.edu

❖ The computers actually use physical addresses

❖ The DNS enables the separation by making the correspondence between the two

How Is Information Sent?

- ❖ Sending information over the Internet works like this:

- ❖ Imagine sending the novel you wrote from Tahiti where you live to New York City where your publisher is using only postcards

HK

LA

#1

It was a dark and stormy night. Rain pelted the glass as Sir Bulwer-Lytton dozed by the dying fire.

Great Books

1830 1ˢᵗ Ave

NYC NY

USA

The Internet Protocol

❖ How is the information sent?

- ❏ Information -- email, web pages, phone calls, everything sent over the internet -- is broken up into small units, called packets

- ❏ Packets contain an IP address, a sequence number and some actual information, a part of the whole message

- ❏ This scheme is called the Transmission Control Protocol and Internet Protocol, or TCP/IP

- ❏ The packets are sent independently, usually taking different routes, and reassembled at the destination to reconstruct the original message

address	#	data

World Wide Web

❖ The world wide web is composed of those computers, called web servers, capable of sending information to your browser, e.g. Netscape or IE

❖ In most domains the computer that is the web server is called "www", e.g. www.washington.edu

  ✦ But, a web server can have any name … your pages will be served by students.washington.edu

  ✦ The actual pages will be stored somewhere else, e.g. Dante

❖ There are different ways to connect to these servers

  ✦ Hyper-text transfer protocol, http for web pages

  ✦ File transfer protocol, ftp for files of information

Factoid: "WWW" is not short for "World Wide Web"

Web Pages

- ❖ Web pages are just text files containing instructions to your browser on how to lay out the web page
  - ✦ Web pages can be created with a text editor
  - ✦ Web pages can be created with special tools, eg Adobe Page Mill

- ❖ The Web page instructions are written in a special language, hyper-text mark-up language, HTML

- ❖ It is possible to see the HTML that is producing the page you are looking at by selecting "source" from the View menu in your browser

```
<HTML>
<HEAD>
<META HTTP-EQUIV="Content-Type" CONTENT="text/html; charset=windows-1252">
<META NAME="Generator" CONTENT="Microsoft Word 97">
<TITLE>Home Page</TITLE>
</HEAD>
<BODY LINK="#0000ff" VLINK="#800080" BGCOLOR="#ffffff">

<DL>
<DT><A NAME="top"></A></DT>
</DL>
<TABLE CELLSPACING=0 BORDER=0 CELLPADDING=10 WIDTH=702>
<TR><TD WIDTH="21%" VALIGN="TOP" ROWSPAN=4 BGCOLOR="#c0c0c0">
<P><A HREF="#Announcements"><I><FONT FACE="Verdana, Helvetica" SIZE=2
COLOR="#ff0000">Announcements</I></FONT></A></P>
<P><A HREF="vision.htm"><B><FONT FACE="Verdana, Helvetica" SIZE=2>CSE100
Vision</B></FONT></A></P>
<P><A HREF="syllabus.htm"><B><FONT FACE="Verdana, Helvetica"
SIZE=2>Syllabus</B></FONT></A> </P>
<P><A HREF="notes.htm"><B><FONT FACE="Verdana, Helvetica" SIZE=2>Class
Notes</B></FONT></A></P>
<P><A HREF="assignments.htm"><B><FONT FACE="Verdana, Helvetica"
SIZE=2>Assignments</B></FONT></A> </P>
<P><A HREF="exams.htm"><B><FONT FACE="Verdana, Helvetica" SIZE=2>Exams &amp;
Tests</B></FONT></A></P>
<P><A HREF="hype/"><B><FONT FACE="Verdana, Helvetica" SIZE=2>E-mail
Announcement Archive</B></FONT></A></P>
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Caution: Not for human consumption