# 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



## FIT 100 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 MGH 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



## FIT 100 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



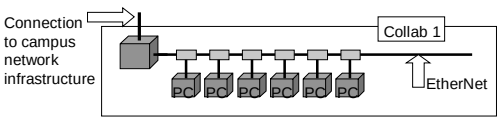
## FIT 100 Class Computers

- FIT100 uses
  - Laptop for lectures
  - Desktop in Collabs, OUGL, MGH
  - Dante server
- An unconnected computer can only access the data stored locally on its hard disk, run the software stored locally, read and write floppy disks, etc.
- The UW computers are connected, i.e. networked, together allowing us to send email and access the World Wide Web



## FIT 100 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?



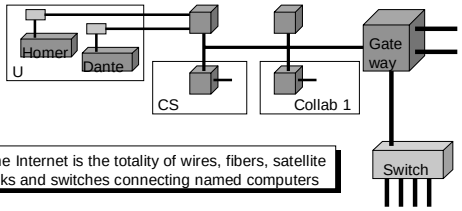



## FIT 100 Ethernet … It's Like Conversation

- 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

## FIT 100 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




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



## FIT 100 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 boris.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



## FIT 100 How Are Computers Named Physically

- The *physical* way to name computers is using an Internet protocol address, or IP address
  - boris.cs.washington.edu's IP address is: 128.95.2.227
  - 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



## FIT 100 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



## FIT 100 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

#1
It was a dark and stormy night. Rain pelted the glass as Sir Bulwer-Lytton dozed by the dying fire.
USA

Great Books
1830 1st Ave
NYC, NY

LA



## FIT 100 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 |
|---|---|---|

## FIT 100 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”



## FIT 100 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



## FIT 100 HTML From CSE100 Home Page

```
<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>
<hr>
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Caution: Not for human consumption