



Details before we start

Course Web Page
<http://courses.washington.edu/gbw/fit100/>

© Copyright 2000-2001, University of Washington

Networking at the UW, The Internet, and the World Wide Web



Various computers in various locations will be used in this class, so a quick introduction to their arrangement and to the concept of networking is useful.

We'll also find out the difference between the Internet and the World Wide Web

© Copyright 2000-2001, University of Washington



What you've accomplished in 3 short days...!

- ❖ You understand more about your computer space on Dante, the group of computers with space for student email, files, and web pages
- ❖ You have transferred files between a local computer and your remote account storage space using SSH Secure File Transfer.
 - This is a more secure protocol than regular FTP (File Transfer Protocol)

© Copyright 2000-2001, University of Washington



Computers come in all shapes and sizes

- ❖ The specifics of how computers work will be covered later. For now, think of them as having many forms and many names
 - **Embedded** – processor, ROM, channels to sensors/actuators; think of a microwave, or a newer toaster oven
 - **Laptop** – processor, RAM, floppy disk, hard disk, LCD; mobility
 - **Desk Top** – processor, RAM, floppy disk, hard disk, CD, monitor; educational and office work
 - **Server** – processors (4-32), RAM, many hard disks, CD; services
 - **Supercomputer** – processors (16-1000), RAM, hard disks: big science

© Copyright 2000-2001, University of Washington



Class Computers

- ❖ FIT 100 uses
 - Laptop** for lectures
 - Desktops** in Labs (MGH, OUGL)
 - Dante Server**: holding your computer account for email, web pages, and other files
- ❖ An unconnected computer can only get to data that is stored locally on its hard disk, etc.
- ❖ The **UW** computers are connected (i.e. networked) together. Allows us to send email, transfer files, and access the W W W

© Copyright 2000-2001, University of Washington



Networking

More than just a social interaction!

© Copyright 2000-2001, University of Washington



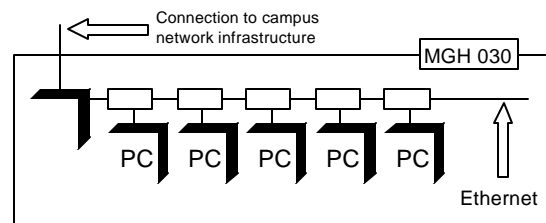
Networks ...

- ❖ Networks connect computers – making them much more useful than just a single terminal
 - Access more information and software
 - Help users communicate, exchange information
 - ≡ Changing our ideas about social interaction
 - Perform services for one another
 - ≡ (networked printers, etc.)
- ❖ The **UW** networks “exchange” more than ½ trillion bytes of data per day
 - Half of this exchanged data goes to or comes from the Internet

© Copyright 2000-2001, University of Washington



How are these networks arranged?

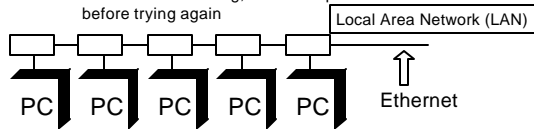


© Copyright 2000-2001, University of Washington

FIT 100 Ethernet...Imagine a party conversation

❖ Ethernet technology: It's like students sitting around the dorm room telling stories...

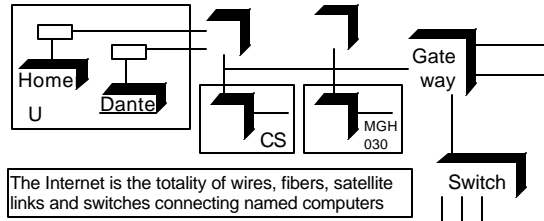
- Everyone listens (politely, of course) while one person talks
- When the story is finished, there is a pause
- A person with another story to tell starts talking, but listening at the same time
 - ≡ If no one else starts talking, the person continues
 - ≡ If others start talking, he/she stops and waits a moment before trying again



© Copyright 2000-2001, University of Washington

FIT 100 UW Networks Connect to The Internet

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



© Copyright 2000-2001, University of Washington

FIT 100 What's in a Name?

How Computers are Named Logically (for us humans)
vs.

How Computers are Named Physically
(names for computers, by computers!)

© Copyright 2000-2001, University of Washington

FIT 100 How are Computers Named Logically?

❖ The logical way to name computers is by using domains

- All education institutions .edu
- The UW .washington.edu
- The Information School ischool.washington.edu
- WebCT webct.ischool.washington.edu

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

❖ Notice the scheme is hierarchical

- Easier to remember names
- Names are associated with like units
- No limit to size or organizational depth

Country Pairs

.ca - Canada
.de - Germany (Deutschland)
.fr - France
.es - Spain (España)
.uk - United Kingdom
.us - United States

© Copyright 2000-2001, University of Washington



How are Computers Named Physically?

- ❖ The *physical* way to name computers is to use an Internet Protocol address, or *IP address*

webct.ischool.washington.edu	128.208.100.153
ischool.washington.edu	128.208.100.150
washington.edu (one of many)	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

© Copyright 2000-2001, University of Washington



Logical vs. Physical Network

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 is actually built.
- This is called a physical/logical separation
- In networking, the domain names make up the logical network. Domains consist of a hierarchical arrangement of names that tell us associations:
ischool.washington.edu
- The computers actually use the physical addresses
- The DNS makes the connection between the two, so you don't have to.

© Copyright 2000-2001, University of Washington



What is the Internet?

- ❖ The Internet is the totality of wires, fibers, satellite links and switches connecting named computers
- ❖ A network of networks
 - A worldwide system of computer networks
 - ARPA Net (1969)
 - ≡ Advanced Research Projects Network
- ❖ Uses a basic communication protocol so we all "speak the same language"
 - TCP/IP
 - ≡ Transmission Control Protocol/Internet Protocol
- ❖ <http://www.netsizer.com/>

© Copyright 2000-2001, University of Washington



The Internet Protocol

- ❖ How is the information sent?
 - Information such as email, web pages, phone calls -- anything sent over the Internet -- is broken up into units called packets
 - Packets contain an IP address, a sequence number and some of the actual information (like part of the whole email message)
 - This process is part of the scheme called the Transmission Control Protocol and Internet Protocol, or TCP/IP
 - The packets make their way, usually by different routes, to the destination address where they are reassembled in order to reconstruct the original message

address	#	data
---------	---	------

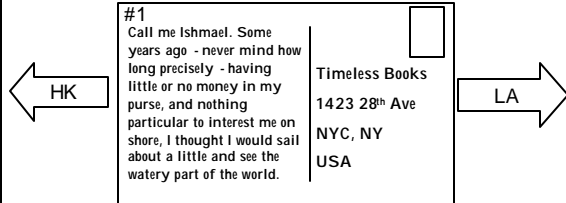
© Copyright 2000-2001, University of Washington



How is Information is Sent?

❖ Here is an analogy of how information is sent on the Internet:

- Imagine sending a novel you just wrote from Singapore, where you live, to New York City, where your publisher lives, using only postcards



© Copyright 2000-2001, University of Washington



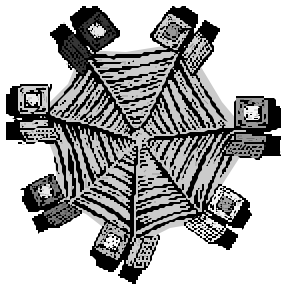
Internet Applications

- ❖ Protocol and Application
 - Protocol - set of rules or common language
 - Application - the software or program
- ❖ You may be familiar with:
 - W W W or web browsers (http)
 - Email (smtp, imap, pop)
 - SSH (sftp)
 - TeraTerm(SSH and telnet)

© Copyright 2000-2001, University of Washington



What is the World Wide Web?



© Copyright 2000-2001, University of Washington



What is the WWW?

A general description:

- ❖ "All resources and users on the Internet that are using the Hypertext Transfer Protocol (HTTP)"

-Definition from whatis.com-
- ❖ "The World Wide Web is the universe of network-accessible information, an embodiment of human knowledge."

-World Wide Web Consortium (W3C)-

© Copyright 2000-2001, University of Washington



World Wide Web

- ❖ The World Wide Web includes all computers, called web servers, that are capable of sending information to your browser (Netscape, IE, etc.)
- ❖ In most domains the computer that is the web server is called "www", e.g. www.washington.edu
However, a web server can have any name ... your web pages will be served by students.washington.edu
- ❖ There are different ways (schemes) to connect to these servers
 - Hyper-text transfer protocol, http for web pages
 - File transfer protocol, ftp for moving copies of files
 - The UW now uses **sftp**, or Secure File Transfer Protocol

© Copyright 2000-2001, University of Washington



Client/Server Model

- ❖ Client
 - Any computer that requests information
- ❖ Server
 - Any computer that provides a service

© Copyright 2000-2001, University of Washington



What is a Web Browser?

- ❖ An application using the HTTP Protocol
- ❖ Allows people to interact and look at all the information on the World Wide Web
- ❖ Netscape, Internet Explorer, AOL, Opera – all offer graphical user interfaces (GUI's)

© Copyright 2000-2001, University of Washington



Web Pages

- ❖ Web pages are just text files containing instructions for your browser on how to lay out (format) the web page
 - Web pages can be created with a text editor (like Notepad)
 - Web pages can be created with special tools (like FrontPage or DreamWeaver)
- ❖ The instructions for the browser are written in a special language, hyper-text mark-up language, HTML
- ❖ You can always take a look at the HTML that is being used to display the web page in a browser by selecting "Source" from the View menu in your browser

© Copyright 2000-2001, University of Washington



HTML from UW Home page

```

<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.0//EN"
"http://www.w3.org/TR/REC-html40/strict.dtd">
<HTML>
<HEAD>
<TITLE>University of Washington Home Page</TITLE>
<meta name="description" content="Official Web site of the University of
Washington, the major research university in the Pacific Northwest.">
<LINK REL="stylesheet" HREF="/home/home.css" TYPE="text/css">
<script language="JavaScript" type="text/javascript">
<!--
function mIn () { return true; }
function mOut () { return true; }
function makeLayer ( ) { return true; }
if (document.layers || document.all)
document.write ("<script src='home/scripts/flyout.js' " +
"language='JavaScript1.2' type='text/javascript '>" +
"</script> \n");
// -->
</script>
</HEAD>
<BODY BGCOLOR="#FFFFFF">
<TABLE BORDER="0" CELLSPACING="0" CELLPADDING="0">
<TR>
<td colspan="5"></td></tr>

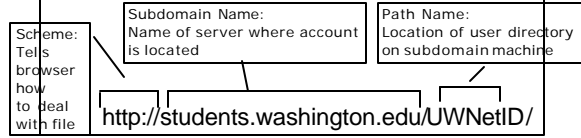
```

© Copyright 2000-2001, University of Washington



Where are YOU and your web page in this scheme?

- ❖ You have been give web page space on a web server in one of the subdomains:
students.washington.edu
- ❖ To find YOUR page at the UW, a user would enter in the name (address) of the subdomain where your account is stored and the path to your account:



© Copyright 2000-2001, University of Washington



Deconstructing a URL

http://www.ischool.washington.edu/research/newsletter.htm

scheme = http:// (HyperText Transfer Protocol)
host = www (World Wide Web)
subdomain = .ischool
domain = .washington
TLD = .edu (Educational Institution)
path (folder) = /research/
file = newsletter
extension = .htm (hypertext markup language)

© Copyright 2000-2001, University of Washington



For Friday

- ❖ Read Chapter 3 of the FIT coursepack
- ❖ Make sure you have added the course!
- ❖ Make sure your Dante services have all been activated

© Copyright 2000-2001, University of Washington