

## 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

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## 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

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## Computers At the UW

- ❖ FIT 100 uses
  - Laptops** for portability (me working at home!)
  - Desktops** in Labs (MGH, OUGL)
  - Server [Dante or Homer]:**  
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

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## Networking

More than just a social interaction!

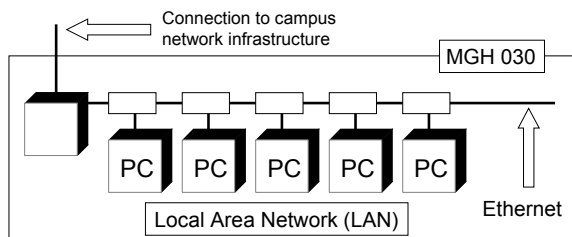
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**FIT 100** Networks ...

- ❖ 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

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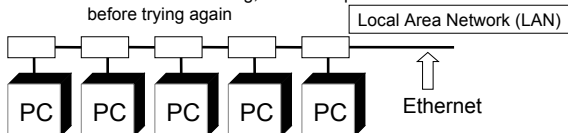
**FIT 100** How are these networks arranged?



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**FIT 100** Ethernet...Imagine a party conversation

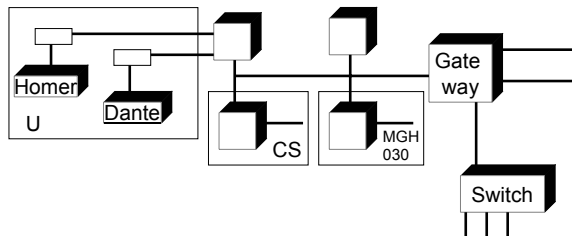
- ❖ Ethernet technology: It's like students sitting around the dorm room telling stories...
  - ❑ Everyone listens (politely, of course) while one person talks
  - ❑ When the story is finished, there is a pause
  - ❑ A person with another story to tell starts talking, but listening at the same time
    - + If no one else starts talking, the person continues
    - + If others starts talking, he/she stops and waits a moment before trying again



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**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



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## **FIT 100** What is the Internet?

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

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## **FIT 100** Protocols Rule!

- ❖ Protocol and Application
  - Protocol - set of rules or common language
  - Application - the software or program
- ❖ The Internet could not exist in its current form without protocols determining how information is:
  - Sent
  - Processed
  - Communicated
  - ...
- ❖ You may be familiar with these applications and the protocols they rely on:
  - W W W or web browsers (http)
  - Email (smtp, imap, pop)
  - SSH (sftp)
  - TeraTerm (SSH and telnet)

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## **FIT 100** Rules of the Road

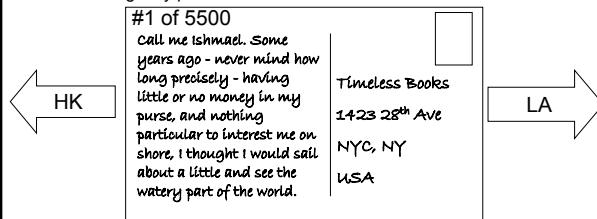
- ❖ How is the information sent across the Internet?
  - Information such as email, web pages, phone calls – anything sent over the Internet – is broken up into units called packets
  - Packets contain an IP address, a sequence number and some of the actual information (like part of the whole email message)
  - 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
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## **FIT 100** 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



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## **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!)

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## **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

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## **FIT 100** 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

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## **FIT 100** 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.

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## **FIT 100** World Wide Web

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## **FIT 100** What is the WWW?

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A general description:

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

~Definition from [whatis.com](http://whatis.com)~

- ❖ “The World Wide Web is the universe of network-accessible information, an embodiment of human knowledge.”

~World Wide Web Consortium (W3C)~

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## **FIT 100** World Wide Web

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- ❖ The World Wide Web includes all computers, called web servers, that are capable of sending information to your browser
- ❖ In most domains the computer that is the web server is called “www”, e.g. [www.washington.edu](http://www.washington.edu)  
However, a web server can have any name ... your web pages will be served by [students.washington.edu](http://students.washington.edu)
- ❖ The main protocol used to connect to these web servers is:
  - Hyper-text transfer protocol, http, for web pages
  - Another protocol that can be used in combination with http is: File transfer protocol, ftp, for moving copies of files

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## **FIT 100** Client/Server Model

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

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## **FIT 100** What is a Web Browser?

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

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## **FIT 100** 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)
    - ➔ You will be using text editors
  - ❑ Web pages can be created with special tools (like FrontPage or DreamWeaver)
    - ➔ You won't be using these tools
- ❖ 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

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## **FIT 100** HTML from FIT 100 Home Page

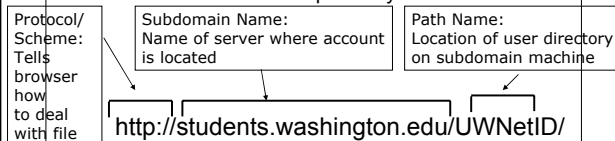
```
<HTML>
<HEAD>
<TITLE>Home Page for CSE/INFO 100</TITLE>
<LINK REL=stylesheet HREF="fitstyles.css" TYPE="text/css">
</HEAD>
<BODY>
<A NAME="top"></A>
<TABLE BORDER=0 CELLPADDING=10 WIDTH=700>
<TR>
<TD VALIGN=top ROWSPAN=5 bgcolor="#336699" WIDTH=150>
<P CLASS="menu"> <a href="#"#Announcements">
<font color="#FF0000">ANNOUNCEMENTS</font></a></P>
<P CLASS="menu">
<A HREF="index.shtml">Home</A> </P>
<P CLASS="menu"><A HREF="calendar.shtml">Calendar</A></P>
<P CLASS="menu">
</TD>
<TD WIDTH=550>
<P class="title"><B>
FIT 100, Spring 2002</B>
</P>
<p class="subtitle">
Fluency With Information Technology
</P>
</TD>
</TR>
<TR>
<TD WIDTH=550>
...

```

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## **FIT 100** 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:



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## Deconstructing a URL

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<http://courses.washington.edu/gbw/fit100sp02/labs/Lab1.htm>

<i>protocol</i>	=	http:// (HyperText Transfer Protocol)
<i>subdomain</i>	=	courses
<i>domain</i>	=	.washington
<i>TLD</i>	=	.edu (Educational Institution)
<i>path (folders)</i>	=	/gbw/fit100sp02/labs
<i>file</i>	=	Lab1
<i>extension</i>	=	.htm (hypertext markup language)

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## For Monday

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- ❖ The website reveals all!!!!
- ❖ Check the calendar for assignments and readings

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