

6. INTERNET

<TODO - clean up internet materials>

Topics:

- Internet; addressing, protocols, formats, etc.
- Design case

Objectives:

- To understand the Internet topics related to shop floor monitoring and control

6.1 INTRODUCTION

- The Internet is just a lot of LANs and WANs connected together. If your computer is on one LAN that is connected to the Internet, you can reach computers on other LANs.

- The information that networks typically communicate includes,

email - text files, binary files (MIME encoded)

programs - binary, or uuencoded

web pages - (HTML) Hyper Text Markup Language

- To transfer this information we count on access procedures that allow agreement about when computers talk and listen, and what they say.

email - (SMTP) Simple Mail Transfer Protocol, POP3, IMAP

programs - (FTP) File Transfer Protocol

login sessions - Telnet

web access - (HTTP) Hyper Text Transfer Protocol

Aside: Open a Dos window and type 'telnet river.it.gvsu.edu 25'. this will connect you to the main student computer. But instead of the normal main door, you are talking to a program that delivers mail. Type the following to send an email message.

```
ehlo northpole.com
mail from: santa
rcpt to: jackh
data
Subject: Bogus mail
this is mail that is not really from santa
.
```

6.1.1 Computer Addresses

- Computers are often given names, because names are easy to remember.
- In truth the computers are given numbers.

| | |
|-----------------|----------------------------|
| Machine Name: | claymore.engineer.gvsu.edu |
| Alternate Name: | www.eod.gvsu.edu |
| IP Number: | 148.61.104.215 |

- When we ask for a computer by name, your computer must find the number. It does this using a DNS (Domain Name Server). On campus we have two '148.61.1.10' and '148.61.1.15'.

EXERCISE: In netscape go to the location above using the name, and using the IP number (148.61.104.215).

- The number has four parts. The first two digits '148.61' indicate to all of the internet that the computer is at 'gvsu.edu', or on campus here (we actually pay a yearly fee of about \$50 to register this internationally). The third number indicates what LAN the computer is located on (Basically each hub has its own number). Finally the last digit is specific to a machine.

EXERCISE: Run the program 'winipcfg'. You will see numbers come up, including an IP number, and gateway. The IP number has been temporarily assigned to your computer. The gateway number is the IP address for the router. The router is a small computer that controls traffic between local computers (it is normally found in a locked cabinet/closet).

- Netmask, name servers, gateway

6.1.1.1 - IPV6

6.1.2 Phone Lines

- The merit dialup network is a good example. It is an extension of the internet that you can reach by phone.
- The phone based connection is slower (about 5 MB/hour peak)
- There are a few main types,

SLIP - most common

PPP - also common

ISDN - an faster, more expensive connection, geared to permanent connections

- You need a modem in your computer, and you must dial up to another computer that has a modem and is connected to the Internet. The slower of the two modems determines the speed of the connection. Typical modem speeds are,
 - 52.4 kbps - very fast
 - 28.8/33.3 kbps - moderate speed, inexpensive
 - 14.4 kbps - a bit slow for internet access
 - 2.4, 9.6 kbps - ouch
 - 300 bps - just shoot me

6.1.3 Mail Transfer Protocols

- Popular email methods include,

SMTP (Simple Mail Transfer Protocol) - for sending mail

POP3 - for retrieving mail

IMAP - for retrieving mail

EXERCISE: In netscape go to the 'edit-preferences' selection. Choose the 'mail and groups' option. Notice how there is a choice for mail service type under 'Mail Server'. It should be set for 'POP3' and refer to 'mailhost.gvsu.edu'. This is where one of the campus mail servers lives. Set it up for your river account, and check to see if you have any mail.

- Note that the campus mail system 'ccmail' is not standard. It will communicate with other mail programs using standard services, but internally special software must be used. Soon ccmil will be available using the POP3 standard, so that you will be able to view your ccmil using Netscape, but some of the features of ccmil will not be available.
- Listservers allow you to send mail to a single address, and it will distribute it to many users (IT can set this up for you).

6.1.4 FTP - File Transfer Protocol

- This is a method for retrieving or sending files to remote computers.

Aside: In Netscape ask for the location 'ftp://sunsite.unc.edu' This will connect you via ftp the same way as with the windows and the dos software.

6.1.5 HTTP - Hypertext Transfer Protocol

- This is the protocol used for talking to a web server.

6.1.6 Novell

- Allows us to share files stored on a server.

6.1.7 Security

- Security problems usually arise through protocols. For example it is common for a hacker to gain access through the mail system.
- The system administrator is responsible for security, and if you are using the campus server, security problems will normally be limited to a single user.

- Be careful with passwords, this is your own protection against hacking. General rules include,
 1. Don't leave yourself logged in when somebody else has access to your computer.
 2. Don't give your password to anybody (even the system administrator).
 3. Pick a password that is not,
 - in the dictionary
 - some variation of your name
 - all lower case letters
 - found in television
 - star trek, the bible
 - pet/children/spouse/nick names
 - swear words
 - colloquial phrases
 - birthdays
 - etc.
 4. Watch for unusual activity in your computer account.
 5. Don't be afraid to call information technology and ask questions.
 6. Don't run software that comes from suspect or unknown sources.
 7. Don't write your password down or give it to others.

6.1.7.1 - Firewall

6.1.7.2 - IP Masquerading

6.1.8 HTML - Hyper Text Markup Language

- This is a format that is invisible to the user on the web. It allows documents to be formatted to fit the local screen.

Aside: While looking at a home page in Netscape select 'View - Page Source'. You will see a window that includes the actual HTML file - This file was interpreted by Netscape to make the page you saw previously. Look through the file to see if you can find any text that was on the original page.

- Editors are available that allow users to update HTML documents the same way they use word processors.
- Keep in mind that the website is just another computer. You have directories and files there too. To create a web site that has multiple files we need to create other files or directory names.
- Note that some web servers do not observe upper/lower case and cut the 'html' extension to 'htm'. Microsoft based computers are notorious for this, and this will be the most common source of trouble.

6.1.9 URLs

- In HTML documents we need to refer to resources. To do this we use a label to identify the type of resource, followed by a location.

- Universal Resource Locators (URLs)

- http:WEB_SITE_NAME
- ftp:FTP_SITE_NAME
- mailto:USER@MAIL_SERVER
- news:NEWSGROUP_NAME

EXERCISE: In netscape type in 'mailto:YOUR_NAME@river.it.gvsu.edu'. After you are done try 'news:gvsu'.

6.1.10 Encryption

- Allows some degree of privacy, but this is not guaranteed.
- Basically, if you have something you don't want seen, don't do it on the computer.

6.1.11 Compression

- We can make a file smaller by compressing it (unless it is already compressed, then it gets larger)
- File compression can make files harder to use in Web documents, but the smaller size makes them faster to download. A good rule of thumb is that when the file is MB in size, compression will have a large impact.
- Many file formats have compression built in, including,

images - JPG, GIF
 video - MPEG, AVI
 programs - installation programs are normally compressed

- Typical compression formats include,

zip - zip, medium range compression
 gz - g-zip - good compression
 Z - unix compression

Stuffit - A Mac compression format

- Some files, such as text, will become 1/10 of their original size.

6.1.12 Clients and Servers

- Some computers are set up to serve others as centers of activity, sort of like a campus library. Other computers are set up only as users, like bookshelves in a closed office. The server is open to all, while the private bookshelf has very limited access.
- A computer server will answer requests from other computers. These requests may be,
 - to get/put files with FTP
 - to send email
 - to provide web pages
- A client does not answer requests.
- Both clients and servers can generate requests.

EXERCISE: Using Netscape try to access the IP number of the machine beside you. You will get a message that says the connection was refused. This is because the machine is a client. You have already been using servers to get web pages.

- Any computer that is connected to the network Client or Server must be able to generate requests. You can see this as the Servers have more capabilities than the Clients.
- Microsoft and Apple computers have limited server capabilities, while unix and other computer types generally have more.

Windows 3.1 - No client or server support without special software

Windows 95 - No server support without special software

Windows NT - Limited server support with special versions

MacOS - Some server support with special software

Unix - Both client and server models built in

- In general you are best advised to use the main campus servers. But in some cases the extra effort to set up and maintain your own server may also be useful.
- To set up your own server machine you might,

1. Purchase a computer and network card. A Pentium class machine will actually provide more than enough power for a small web site.
2. Purchase of copy of Windows NT server version.
3. Choose a name for your computer that is easy to remember. An example is 'artsite'.
4. Call the Information technology people on campus, and request an IP address. Also ask for the gateway number, netmask, and nameserver numbers. They will add your machine to the campus DNS so that others may find it by name (the number will always work if chosen properly).
5. Connect the computer to the network, then turn it on.
6. Install Windows NT, and when asked provide the network information. Indicate that web serving will be permitted.
7. Modify web pages as required.

6.1.13 Java

- This is a programming language that is supported on most Internet based computers.
- These programs will run on any computer - there is no need for a Mac, PC and Unix version.
- Most users don't need to program in Java, but the results can be used in your web pages

EXERCISE: Go to 'www.javasoft.com' and look at some sample java programs.

6.1.14 Javascript

- Simple programs can be written as part of an html file that will add abilities to the HTML page.

6.1.15 CGI

- CGI (Common Gateway Interface) is a very popular technique to allow the html page on the client to run programs on the server.
- Typical examples of these include,
 - counters
 - feedback forms
 - information requests

6.1.16 ActiveX

- This is a programming method proposed by Microsoft to reduce the success of Java - It has been part of the antitrust suit against Microsoft by the Justice Department.
- It will only work on IBM PC computers running the 'Internet Explorer' browser from Microsoft.
- One major advantage of ActiveX is that it allows users to take advantage of programs written for Windows machines.
- Note: Unless there is no choice avoid this technique. If similar capabilities are needed, use Java instead.

6.1.17 Graphics

- Two good formats are,

GIF - well suited to limited color images - no loss in compression. Use these for line images, technical drawings, etc

JPG - well suited to photographs - image can be highly compressed with minimal distortion. Use these for photographs.

- Digital cameras will permit image capture and storage - images in JPG format are best.
- Scanners will capture images, but this is a poor alternative as the image sizes are larger and image quality is poorer
 - Photographs tend to become grainy when scanned.
 - Line drawings become blurred.
- Screen captures are also possible, but do these with a lower color resolution on the screen (256 color mode).

6.2 DESIGN CASES

6.2.1 Remote Monitoring System

Problem: A system is to be designed to allow engineers and managers to monitor the shop floor conditions in real time. A network system and architecture must be designed to allow this system to work effectively without creating the potential for security breaches.

Solution:

6.3 SUMMARY

- The internet can be use to monitor and control shop floor activities.

6.4 PRACTICE PROBLEMS

6.5 ASSIGNMENT PROBLEMS

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