Networking

Computer Science IL
September 2003

Objectives

- Development of the Internet
- How to access the Internet
- Understand how Information travel across the Internet
- How the Internet is constructed
- Gain an understanding of basic Internet Terminology
- Be able to construct your own webpage

Objectives

- How a Uniform Resource Locator (URL) Works
- Learn common Net Etiquette
- How to use the following tools
  - E-Mail
  - FTP
  - Web Browser
  - Newsgroups
  - Search Engines
  - Other communications tools

What is the Internet ?

- A vast collection of interconnected networks
- A Global network
- Decentralized control – No Central authority
- Often referred to as "The 'Net"
- Approximately 459 Million Users

What can one do on the Net?

- Access to information
- Communication with Other users
- Financial Service such as Online Banking
  - www.ebucks.com
  - www.absadirect.co.za
- Purchase of Goods
  - www.amazon.com
  - www.kalahari.net
- Publish your own Information

What can one do on the Net?

- Online Training
  - www.digitalthink.com
- Entertainment and Leisure
  - www.imdb.com
- Online gaming
  - www.pigspeak.com (casino)
- Access and Exchange Files
  - Peer to Peer Networks
    - Kazaa, Imesh, e-Donkey

History of the Internet

- Originally a project of the US Defense Department
- Initial Goals
  - Network for sharing information between defense contractors
  - Could function if a portion the network was destroyed

History of the Internet :1960's

- **1957**
  - USSR launches Sputnik, first artificial earth satellite. US forms the Advanced Research Projects Agency (ARPA),
- **1961-1968**
  - The concept of Packet Switching Networks is developed
  - ARPA sponsors study on "cooperative network of time-sharing computers" using a 1200bps line
- **1968**
  - Bolt Beranek and Newman, Inc. (BBN) build Interface Message Processors (IMPs)
  - US Senator Edward Kennedy thanks BBN for its million-dollar ARPA contract to build the "Interfaith" Message Processor
- **1969**
  - ARPANET commissioned by DoD for research into networking
  - Nodes are connected with IMP's built by BBN each with 12K RAM & 50kbps lines
  - UCLA , Stanford Research Institute (SRI), UCSB, University of Utah
  - First Request for Comment (RFC): "Host Software" by Steve Crocker (7 April)
  - First packets sent by Charley Kline at UCLA as he tried logging into SRI. The first attempt resulted in the system crashing as the letter G of LOGIN was entered. (October 29)

History of the Internet: 1970's

1970
- First cross-country link installed by AT&T between UCLA and BBN at 56kbps. This line is later replaced by another between BBN and RAND. A second line is added between MIT and Utah

1971
- 15 nodes (23 hosts):
- Ray Tomlinson of BBN invents email program to send messages across a distributed network.
- Project Gutenberg is started with the purpose of making copyright-free works, including books, electronically available.

1972
- Ray Tomlinson (BBN) modifies email program for ARPANET where it becomes a quick hit. The @ sign was chosen.
- Larry Roberts writes first email management program (RD) to list, selectively read, file, forward, and respond to messages
- First computer-to-computer chat takes place at UCLA, and is repeated during ICCC, as psychotic PARRY (at Stanford) discusses its problems with the Doctor (at BBN).

1973
- First international connections to the ARPANET: University College of London (England) via NORSAR (Norway)
- Bob Kahn poses Internet problem, starts Internetting research program at ARPA.
- RFC 454: File Transfer specification
- SRI (NIC) begins publishing ARPANET News in March; number of ARPANET users estimated at 2,000
- ARPA study shows email composing 75% of all ARPANET traffic

1974
- Vint Cerf and Bob Kahn detail the design of a Transmission Control Program (TCP)

History of the Internet: 1970's

1975
- First ARPANET mailing list, MsgGroup is created by Steve Walker.
- John Vittal develops MSG, the first all-inclusive email program providing replying, forwarding, and filing capabilities.
- Satellite links cross two oceans (to Hawaii and UK) as the first TCP tests are run over them by Stanford, BBN, and UCL

1977
- RFC 733: Mail specification

1978
- TCP split into TCP and IP (March)

1979
- USENET established using UUCP between Duke and UNC
- ARPA establishes the Internet Configuration Control Board (ICCB)
- On April 12, Kevin MacKenzie emails the MsgGroup a suggestion of adding some emotion back into the dry text medium of email, such as -)
- 19 September 1982 ,emoticons became widely used after Scott Fahlman suggested the use of :-) and :-(

History of the Internet :1980's

1980
- ARPANET grinds to a complete halt on 27 October due to an accidentally-propagated status-message virus

1982
- DCA and ARPA establish the Transmission Control Protocol (TCP) and Internet Protocol (IP), as the protocol suite, commonly known as TCP/IP, for ARPANET.
- EUnet (European UNIX Network) is created by EUUG to provide email and USENET services

1983
- Name server developed at Univ of Wisconsin. Users no longer need to know the exact address of hosts
- ARPANET split into ARPANET and MILNET; 68 of the 113 existing nodes went to MILNET
- Desktop workstations come into being, many with Berkeley UNIX (42 BSD) which includes IP networking
- Networking needs switch from having a single, large time sharing computer connected to the Internet at each site, to instead connecting entire local networks

1984
- Domain Name System (DNS) introduced
- Number of hosts breaks 1,000
- JUNET (Japan Unix Network) established using UUCP

1985
- Information Sciences Institute (ISI) & SRI given responsibility for DNS root management and registrations
- Symbolics.com is assigned on 15 March to become the first registered domain.
- Other firsts: cmu.edu, purdue.edu, rice.edu, berkeley.edu, ucla.edu, rutgers.edu, bbn.com (24 Apr); mit.edu (23 May); think.com (24 may); css.gov (June); mitre.org, .uk (July)

History of the Internet :1980's

1986
- NSFNET created (backbone speed of 56Kbps)
- Internet Engineering Task Force (IETF) and Internet Research Task Force (IRTF) comes into existence
- Network News Transfer Protocol (NNTP) enhances Usenet news performance over TCP/IP.
- Mail Exchanger (MX) records allow non-IP network hosts to have domain addresses.

1987
- UUNET is founded with Usenix funds to provide commercial UUCP and Usenet access.
- Email link established between Germany and China using CSNET protocols
- 1000th RFC: "Request For Comments reference guide"
- Number of hosts breaks 10,000

1988
- 2 November - Internet worm burrows through the Net, affecting ~6,000 of the 60,000 hosts on the Internet
- CERT (Computer Emergency Response Team) formed by DARPA in response to the needs exhibited during the Morris worm incident. The worm is the only advisory issued this year.
- Internet Assigned Numbers Authority (IANA) established in December
- Internet Relay Chat (IRC) developed

1989
- Number of hosts breaks 100,000
- First relays between a commercial electronic mail carrier and the Internet
- Cuckoo's Egg by Clifford Stoll tells the real-life tale of a German cracker group who infiltrated numerous US facilities

History of the Internet :1990's

1990

- ARPANET ceases to exist
- The World comes on-line (world.std.com), becoming the first commercial provider of Internet dial-up access
- The first remotely operated machine to be hooked up to the Internet, the Internet Toaster by John Romkey,
- RFC 1149: A Standard for the Transmission of IP Datagrams on Avian Carriers. Implementation is completed 11 years later

1991

- Commercial Internet eXchange (CIX) Association, Inc. after NSF lifts restrictions on the commercial use of the Net
- World-Wide Web (WWW) released by CERN; Tim Berners-Lee developer (:pb1:)
- NSFNET traffic passes 1 trillion bytes/month and 10 billion packets/month
- South Africa (ZA) connects to NSFNET through Rhodes University

History of the Internet :1990's

1992

- Number of hosts breaks 1,000,000
- The term "surfing the Internet" is coined by Jean Armour Polly (:jap:)

1993

- InterNIC created by NSF to provide specific Internet services such as DNS
- US White House (http://www.whitehouse.gov/) and United Nations (UN) come on-line
- WWW Worms (W4), joined by Spiders, Wanderers, Crawlers, and Snakes ...
- Businesses and media begin taking notice of the Internet
- Mosaic takes the Internet by storm (22 Apr); WWW proliferates at a 341,634% annual growth

1994

- ARPANET/Internet celebrates 25th anniversary
- Shopping malls arrive on the Internet
- Arizona law firm of Canter & Siegel "spams" the Internet with email advertising green card lottery services; Net citizens flame back
- NSFNET traffic passes 10 trillion bytes/month
- WWW edges out telnet to become 2nd most popular service on the Net (behind ftp-data) based on % of packets and bytes traffic
- The first banner ads appear on hotwired.com in October.

History of the Internet :1990's

- **1995**
  - NSFNET reverts back to a research network Main US backbone traffic now routed through interconnected network providers
  - WWW surpasses ftp-data as the service with greatest traffic
  - Traditional online dial-up systems (CompuServe, America Online, Prodigy) begin to provide Internet access
  - A number of Net related companies IPO, with Netscape leading the pack with the 3rd largest ever NASDAQ share value
  - Registration of domain names is no longer free.
  - The first official Internet wiretap was successful in helping the Secret Service and Drug Enforcement Agency (DEA)
  - *Technologies of the Year:* WWW, Search engines
- **1996**
  - Domain name tv.com sold to CNET for US$15,000
  - New York's Public Access Networks Corp (PANIX) is shut down after repeated SYN attacks by a cracker
  - The Internet Ad Hoc Committee announces plans to add 7 new generic Top Level Domains.
  - The WWW browser war, fought primarily between Netscape and Microsoft, has rushed in a new age in software
- **1997**
  - 2000th RFC: "Internet Official Protocol Standards"
  - Domain name business.com sold for US$150,000
  - Longest hostname registered with InterNIC: CHALLENGER.MED.SYNAPSE.UAH.UALBERTA.CA
  - 101,803 Name Servers in whois database

History of the Internet :1990's

- **1998**
  - US Depart of Commerce (DoC) releases plans to privatize DNS
  - Web size estimates range between 275 (Digital) and 320 (NEC) million pages for Q11998
  - Companies flock to the Turkmenistan NIC in order to register their name under the .tm domain
  - Network Solutions registers its 2 millionth domain on 4 May
  - Compaq pays US$3.3million for altavista.com
  - US DoC enters into an agreement with the Internet Corporation for Assigned Numbers (ICANN) to establish a process for transitioning DNS from US Government management to industry (25 November)
  - Open source software comes of age
  - *Technologies of the Year:* E-Commerce, E-Auctions, Portals
  - *Emerging Technologies:* E-Trade, XML, Intrusion Detection
- **1999**
  - First Internet Bank of Indiana, the first full-service bank available only on the Net,
  - IBM becomes the first Corporate partner to be approved for Internet2 access
  - First large-scale Cyberwar takes place simultaneously with the war in Serbia/Kosovo
  - business.com is sold for US$7.5million (it was purchased in 1997 for US$150,000 (30 Nov)
  - *Viruses of the Year:* Melissa (March), ExploreZip (June)

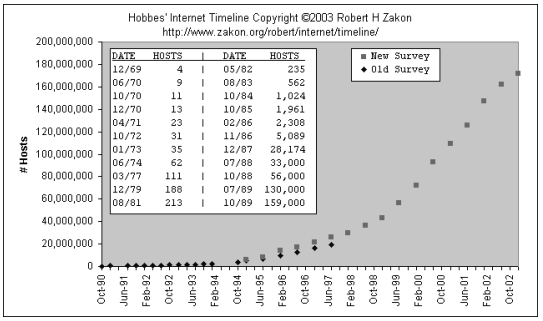
History of the Internet: 21st Centaury

- **2000**
  - The US timekeeper and a few other time services around the world report the new year as 19100 on 1 Jan
  - A massive denial of service attack is launched against major web sites, including Yahoo, Amazon, and eBay in early February
  - ICANN selects new TLDs: .aero, .biz, .coop, .info, .museum, .name, .pro
  - *Hacks of the Year:* RSA Security (Feb), Apache (May), Western Union (Sep), Microsoft (Oct)
  - *Technologies of the Year:* ASP, Napster
- **2001**
  - Napster keeps finding itself embroiled in litigation and is eventually forced to suspend service; it comes back later in the year as a subscription service
  - New Domains: .biz, .info and .museum go live
  - Code Red worm and Sircam virus infiltrate thousands of web servers and email accounts, respectively, causing a spike in Internet bandwidth usage and security breaches (July)
  - A fire in a train tunnel running through Baltimore, Maryland seriously damages various fiber-optic cable bundles used by backbone providers, disrupting Internet traffic in the Mid-Atlantic states and creating a ripple effect across the Internet at Large
  - September 11 Attack on World trade Center cause Major disruptions to Global Internet

History of the Internet

- **2002**
  - New Domains: .name, .coop and .aero go live
  - Internet2 now has 200 university, 60 corporate, and 40 affiliate members and deploys Native IPv6
  - Having your own Blog becomes hip
- **2003**
  - The SQL Slammer worm causes one of the largest and fastest spreading DDoS attacks ever. Taking roughly 10 minutes to spread worldwide, the worm took down 5 of the 13 DNS root servers along with tens of thousands of other servers, and impacted a multitude of systems ranging from (bank) ATM systems to air traffic control to emergency (911) systems (25 Jan)
  - MS Blaster and Welchia Worms follow in August

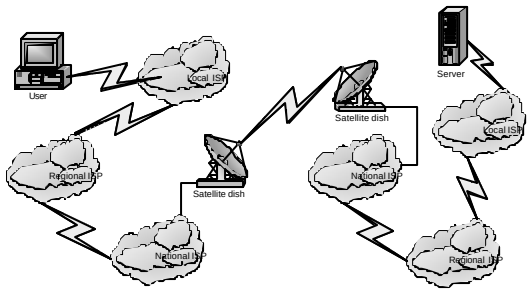
History of the Internet



How the Internet Works

- ISP (Internet Service Provider)
  - Public Access
  - Regional
  - National
- OSP (Online Service Provider)
  - Internet access
  - Added Value Content
  - MSN, AOL, CompuServe

How the Internet Works



Internet Addressing

- Each system on the Internet has a unique Address
- Known as an IP (Internet Protocol) Address
- Used for routing traffic to a particular host
- Consists of four components
  - AAA.BBB.CCC.DDD
  - Each component ranges from 0 to 255
- A Netmask determines what portion of the address refers to the Network and which to the host
  - NNN.NNN.NNH.HHH

The Domain Name System

- Allows for Mapping of Human Friendly names to an IP address which computers prefer
- Allows for the reverse mapping as well
- Domain Name System has an inverted Tree Structure
- All domains fall under a Top Level Domain (TLD)

Top Level Domains

- The original Top Level Domains were:
  - **.com** – Commercial use
  - **.org** – Non-Profit Organizations
  - **.net** – Network Related Hosts
  - **.edu** – US Educational Institutions
  - **.gov** – US Government
  - **.mil** – US Military
  - **.int** – International Organisations (1998)
- Known as gTLD's or TLD's

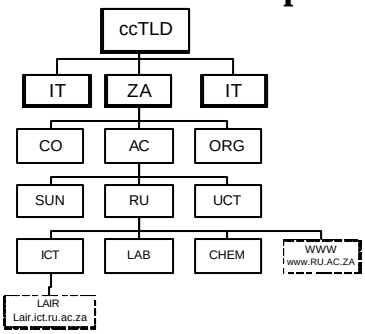
Top Level Domains

- Each Country has its own TLD code
  - ZA – South Africa
  - UK – United Kingdom
  - ZW – Zimbabwe
  - IT – Italy
- These are known as ccTLD's

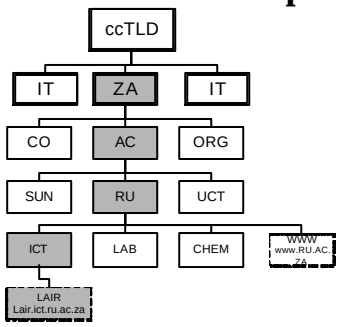
New TLD's

- In late 2000 a number of new TLDS were approved
  - .info - Information sites
  - .biz - Business
  - .pro – Professionals (Doctors, Lawyers etc.)
  - .museum - Museums
  - .aero – Aerospace Industry
  - .name – Personal names.
  - .coop - Cooperatives

DNS Example



DNS Example



Domain Name System

- Each TLD has multiple sub domains
- Within these Second Level domains, there can exist either more domains or hosts
- Example
  - lair.ict.ru.ac.za
  - 146.231.123.15
- Domain Name System (DNS) Servers are responsible for running the global DNS tree.
- Each DNS server is responsible for one or more domains
- Provide a service to clients for looking up DNS informtion

The Uniform Resource Locator (URL)

- What is a URL ?
  - http://www.icann.org/tlds/
  - http://www.google.com/advanced_search?q=FISH
- A URL consists of three Key portions
  - Protocol
  - Hostname
  - Path

Common Internet Protocols

- A number of commonly used protocols
  - ftp://
  - http://
  - https://
  - mailto:
  - mms://
- Other ones are used
  - ssh://
  - imap://

Dissecting a URL

http://homes.cs.ru.ac.za/B.Irwin/index.php

Protocol
Hypertext Transport Protocol

Host
homes.cs.ru.ac.za

Path
B.Irwin/index.php

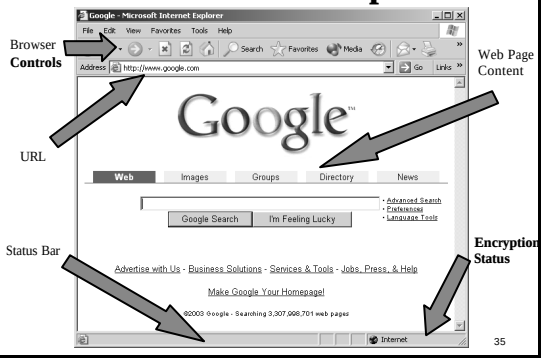
The World Wide Web (WWW)

- Platform for the integrated access of information
- Built over the Internet Using standard protocols
- Developed at CERN in the early 1990's
- Built on the concept of Hyperlinks
  - Able to link to information in other documents, and within the same document
  - Documents may be on different servers around the world
- HTTP – HyperText Transport Protocol
  - Used for communication between web browsers and Web Servers

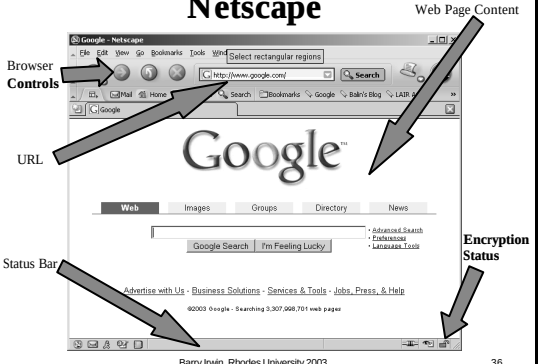
Using a Web Browser

- A Web browser is responsible for
  - Downloading the document referenced in a URL
  - Checking through the HTML document
  - Retrieving any other linked documents that should be displayed (such as images)
  - Compose the collected objects, and display them on your screen
  - Provide links for you to click on to connect to other documents

Microsoft Internet Explorer



Netscape



Secure Web Connections

Unsecured Connections

SSL Secured Connections

How information flows over the Internet

- Application on a PC generates a request to a server
- A connection is established to the server
- Content is transferred, and information exchanged
- When complete, one side signals to the other to disconnect

Making a connection

- In order to make a connection at a minimum the following pieces of information are needed
  - IP addresses of the Remote machine
  - The Remote port number
  - The protocol you will be connecting with
- These along with the IP address and port number for your local machine make up a unique combination which both sides use
- A port can be thought of as a simple socket into which you plug the ends of your connection

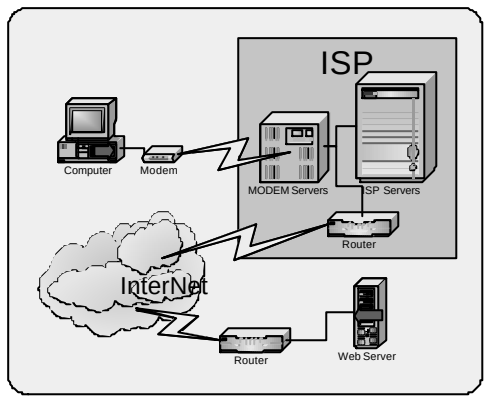
Protocols and Ports

- The two most common protocols for transferring data on the Internet are
  - TCP – Transmission Control Protocol
  - UDP – User Datagram Protocol
- On top of these other application protocols can be run
- TCP
  - HTTP (80) , FTP (20,21) , SMTP (25), IRC (6667)
- UDP
  - Audio streams, MSN chat (1863), DNS (53)

URL's with Explicit ports

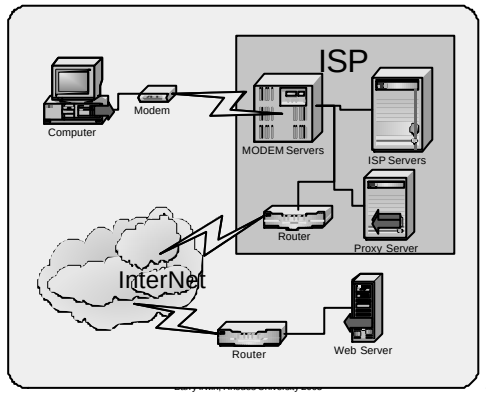
http://www.example.com:80/B.Irwin/index.php
http://www.example.com/B.Irwin/index.php
http://www.example.com:8080/B.Irwin/index.php

ftp://www.example.com:21/pub/files
ftp://www.example.com/pub/files
ftp://www.example.com:2100/pub/files



Proxy Servers

- What is a Proxy Sever ?
- Why should they be used ?
  - Allow for caching of content providing faster access
  - Allow for a centralised location for user management
  - Help hide the details of clients form remote sites
  - Can implement content filtering
    - Banner blocking
    - Filter out undesirable sites



Firewalls

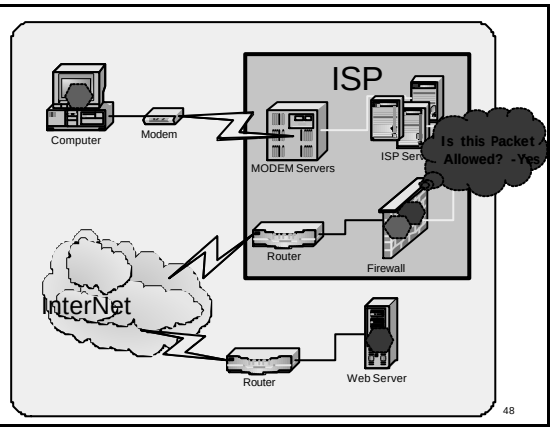
- What is a Firewall?
  - A firewall is simply a program or hardware device that filters the information coming through the Internet connection into your private network or computer system. If an incoming packet of information is flagged by the filters, it is not allowed through.
- Why is it called a firewall?

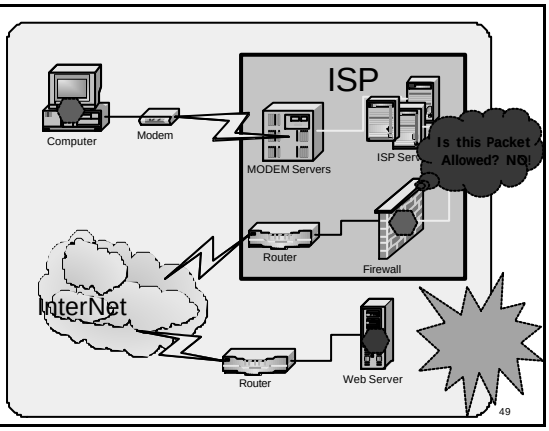
Firewalls

- Firewall usage
  - Preventing malicious attacks form the Internet
  - Preventing Users accessing certain sites
  - Enforcing requirements to use a Web Proxy Server
  - Management of Network Bandwidth
  - For protecting resources inside an organisation
- A Firewall in general is NOT
  - A prevention against viruses
  - A means of stopping web pop-ups
  - A means of controlling web content

Flexible Firewalls

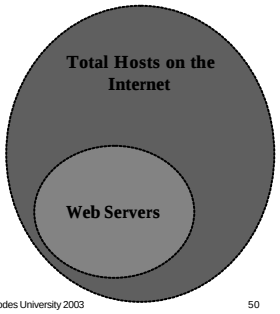
- Firewalls can filter on a number of factors
  - IP addresses
  - Protocols
  - Network Ports
  - Direction of Traffic
  - Any combination of the above





Searching for Information

- Why do we need Search Engines?
- Nearly 200 Million Systems connected to the Internet
- Only a small proportion of these systems are actually fileservers



How a Search Engine Works

- A search engine is a software program that provides access to a large database of web pages
- Web pages are indexes, and collected in a number of ways
  - By some kind of automated software
    - Spiders, bots, crawlers
  - By Manual Entry
  - By a combination of the above

Running a Search

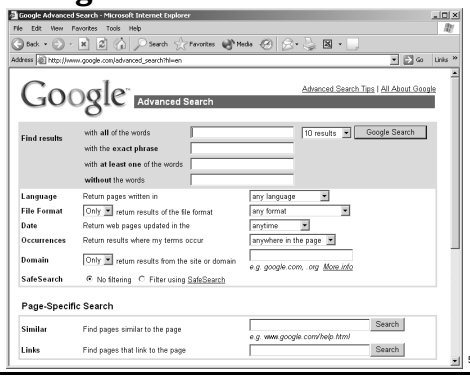
- User enters a key-word
- Search engine software then queries its database for the addresses of matching web pages
- Returned results are know as 'hits'
- On common phrases or terms millions of hits can be returned
- The more specific one can be the more accurate the search normally is
- Most engines offer advanced search tools to help narrow down large number of results

Search Engine Models

- Search engines tend to follow one of two broad categories
- General Search
  - Altavista, Hotbot, Lycos
- Directories
  - Yahoo!
- Google is slightly different
  - Main focus is a General search
  - Also provides a Directory view

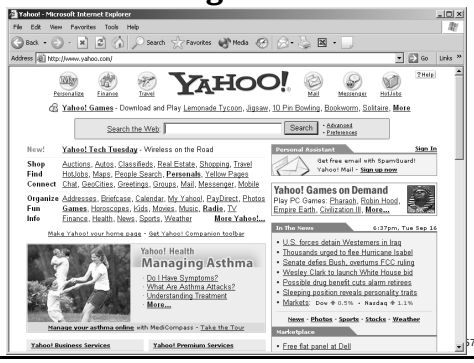
Search Engines: Google.com

Google.com Advanced Search



Search Engine: Altavista

Search Engines: Yahoo



Area Specific Search Engines

- Braby's Business Search
  - www.brabys.co.za
- SA Yellow Pages
  - www.yellowpages.co.za
- Internet Movie Database
  - www.imdb.com
- Ultimate Band List
  - www.ubl.com

REMINDER

Wednesday Afternoon Practicals will be run from 19h00-22h00

Tonight

Spot Test 22 September

1. What year was the Internet commercialised
2. Mosaic is an example of what kind of software?
3. Which .com site claims to be the largest bookstore on earth?
4. What does DNS stand for
5. Name one kind of content filtering a proxy server can perform

Spot Test Solutions

1. 1995
2. First Web Browser
3. Amazon.Com
4. Domain Name System
5. Ad banner blocking

   Or

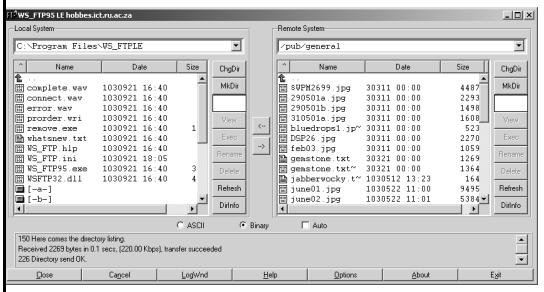
   Filtering of access to undesirable sites

FTP

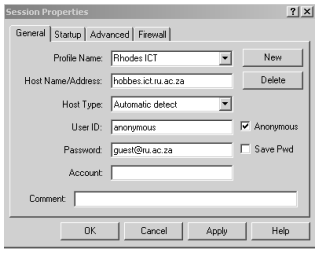
- File Transfer Protocol
- Very popular prior to the advent of the WWW
- Accounted for more than 50% of Network Traffic
- Used for transfer of large files
- Some regarded it as too arcane to be able to use properly
  - ls, cd, get, put

Using an FTP client

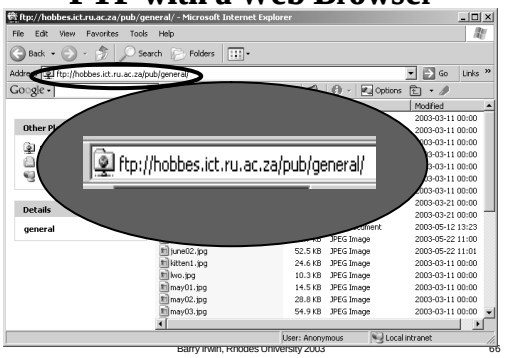
GUI FTP Client (WS_FTP)



GUI FTP: Adding a System



FTP with a Web Browser



File Transfer Protocol

- Why not use HTTP?
  - FTP was around long before HTTP
  - FTP is very efficient for
    - Transferring large numbers of files
    - Transferring very large amounts of data
  - HTTP is optimised
    - For quick transmission of many smaller objects

Common Internet Connectivity Options

- Dial-up Modem
  - Analog (33.6/56.6 Kbit/s)
  - Digital – ISDN (64Kbit/s)
- Digital Subscriber Lines (DSL) (256Kbit-5Mbit/s)
- Cable Modems (1-2Mbit/s)
- Dedicated Lines
  - Analog (33.6 Kbit/s)
  - Digital (64Kbit/s-8Mbit/s)
  - Optical (2Mbit – 1000Mbit/s)

Multimedia Technologies

- Graphics
  - JPEG, BMP, GIF, PNG
- Animations
  - GIF, Java, FLASH
- Streaming
  - RealAudio, QuickTime, Microsoft Streaming

Area Specific Search Examples

- Braby's Business Search
  - www.brabys.co.za
  - Exclusive Books
- SA Yellow Pages
  - www.yellowpages.co.za
  - Grahamstown Hotels
- Internet Movie Database
  - www.imdb.com
  - Equilibrium
- Ultimate Band List
  - www.ubl.com
  - Pink Floyd

Web Page Composition

- A web Site consists of a number of distinct components
  - Header information
  - Scripts
  - Images/Multimedia content
  - HTML Body Code
- HTML – Hypertext Markup Language
  - Used for providing instructions to a web browser on how text should be displayed

Introduction to HTML

- A basic HTML Page looks like

```
<html>
  <head>
    <title> Bill Gumby's Homepage </title>
  </head>
<body>
My first Webpage
</body>
</html>
```

Introduction to HTML

- HTML is based on the concept of Tags
- A Tag is an instruction contain between angle brackets < and >
- Most tags are matched– they have an opening and a closing tag, and the action is performed on the text between these
- Closing tags are of the form </tagname>
- Tags should not overlap
  - <u>This is **WRONG**</u>

Common HTML Tags

- Core Tags
  - <html> … </html>
  - <head> … </head>
  - <title> … </title>
  - <body> … </body>
- Text formatting tags
  - … - Bold
  - <u> … </u> - Underline
  - … -- Bold
  - … - Emphasis (usually appears as *italics*)

Common HTML Tags

- Images
  - <img src="imageurl" height="y" width="x">
  - Specifying height and width allows for better rendering of the page
- Hyperlinks
  - Link text

```
<a ref="http://homes.cs.ru.ac.za/B.lrwin/" >
Masters
</a>
```


More Text Layout Tags

- <h1> … </h1> Headings (1 – 6)
- You can arrange items in Lists
  - … - Unordered lists (bullets)
  - … -- Ordered lists (numbered)
  - Text - Item within one of the above lists
- List tags are nested

```
<ul>
  <li> My list item </li>
</ul>
```


Writing your own Web Page

- HTML is in ASCII Text format
- This means you need to use a PLAIN TEXT editor, NOT a Word Processor
- HTML pages can be viewed from your local system, but must be uploaded to a server for other people to view

Quick Test

- **Given the hostname www.centrinet.net.pk, Choose the most correct answers for the questions below**
- **What type of server is this likely to be?**
  Web Server, Mail Server , File Server, Chat Server
- **Which of the following countries is the host located in?**
  Platvia, Pakistan ,Peru, Poland
- **The owner Organisation of this system is likely to be?**
  A Non profit organisation, An Internet Business, A Community Educational institution, Core Network Infrastructure
- **Based on what type of Server you think this is, which URL protocol type would you use when typing it into your browser?**
  mailto, ftp, http, dns
- **With regards to domain naming ".pk" is referred to as?**
  Global Top Level Domain,Top Level Domain, Subdomain, CC Domain

Quick Test Answers

- Web Server,
- Pakistan (pk), (Poland is .pl)
- Core Network Infrastructure
- http
- CC Domain

Test Summary

- **September 29th Class Test**
- The test will be held as per the details contained in the Computer Science 2003 Handbook. For the networks section, the Test will cover the following topics:
  - History of the Internet
  - Internet connectivity - Including proxy servers, firewalls, and routers
  - Domain Name System (DNS)
  - Use of Internet Search Engine
  - Knowledge of URL's, protocols and IP addresses

Why not use a word processor

- **Microsoft Word**
  - **Save as web page**
- When using Word's "Save as web page", very complicated XML is used. This is bad for three reasons
  - It takes a long time to download
  - It defeats the purpose of HTML
  - It is only compatible with MS's Internet Explorer

Hands on building a webpage

- Building the Basics

```
<html>
<body>

</body>
</html>
```


Hands on building a webpage

- Adding a Header and title

```
<html>
 <head>
     <title>My First webpage</title>
  </head>
<body>

</body>
</html>
```


Hands on building a webpage

- Adding Content

```
<html>
 <head>
     <title>My First webpage</title>
  </head>
<body>
 <h1> Welcome to my page </h1>
This is my very first page on
the Internet
</body>
</html>
```

Hands on building a webpage

- Adding an Image

```
<html>
 <head>
     <title>My First webpage</title>
  </head>
<body>
 <h1> Welcome to my page </h1>
<center>
<img src="ru.shield.gif“ height=‘100’ width=‘100’>
</center>
This is my very first page on the Internet
</body>
</html>
```


Hands on building a webpage

- Brightening things up

```
<html>
 <head>
     <title>My First webpage</title>
  </head>
<body bgcolor=‘#0000ff’ <!– blue -->
      text=‘#00ff00’ <!– green -->
      link=‘#ff0000’ <!– red -->
      vlink=‘#ff00ff’ > <!– purple -->

 <h1> Welcome to my page </h1>
<center>
<img src="ru.shield.gif“ height=‘100’ width=‘100’>
</center>
This is my very first page on the Internet
</body>
</html>
```

Hands on building a webpage

Mailing Lists

- Millions of mailing lists exist
- Consist of an address where you send mail
- Special software then forwards your mail onto all the list members
- Exist for the discussion of a number of topics
- Moderated – All posts need to be checked
- Un-moderated – anyone can send through

Common Abbreviations

- BBL – be back later
- TMI – Too much info
- **FOAF -** Friend of A Friend
- **FYI -** For Your Information
- **IMHO -** In My Humble Opinion
- **IOW -** In Other Words
- **ROFL -** Rolling On the Floor Laughing
- **TTFN -** Ta Ta For Now

Smilies

- **:-)**
  - Your basic smiley. This smiley is used to inflect a sarcastic or joking statement since we can't hear voice inflection over e-mail.
- **;-)**
  - Winky smiley. User just made a flirtatious and/or sarcastic remark. More of a "don't hit me for what I just said" smiley.
- **:-(**
  - Frowning smiley. User did not like that last statement or is upset or depressed about something.
- **:-I**
  - Indifferent smiley. Better than a :-(but not quite as good as a :-).
- **:->**
  - User just made a really biting sarcastic remark. Worse than a ;-).
- **:)** - Happy Midget smiley.

Smilies gone Nuts!

C=}>;*{))

- A drunk, devilish chef with a toupee in an updraft, a mustache, and a double chin.

}:^#))

- Updrafted bushy-mustached pointy nosed smiley with a double-chin.

Chat Services and Instant Messaging

- Common Chat Services
  - MSN
  - Yahoo
  - AOL
- Requires a proprietary chat client
- Open platforms
  - IRC (Internet Relay Chat)
  - Jabber
  - SILC (Secure Internet Live Communications)

News Groups

- Usenet News
  - Used to be a primary platform for communication prior to the WWW
  - Unfortunately mailing lists, and an increase in SPAM on groups cause a demise
- Organised based on a hierarchy
  - Alt.
  - Rec.

Netiquette

- "Netiquette" is network etiquette, the do's and don'ts of online communication
- The Golden Rule

TYPING IN CAPITALS IS REGARDED AS SHOUTING

Core Rules

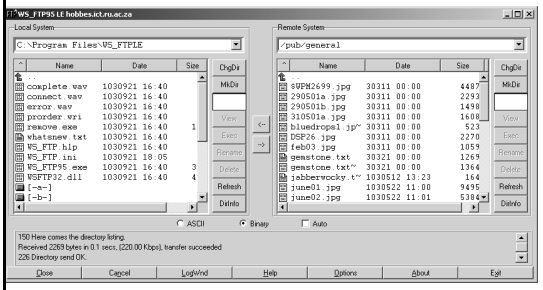
1. **Do unto others as you'd have others do unto you**
2. **Adhere to the same standards of behaviour online that you follow in real life**
3. **Know where you are in cyberspace** (*Lurk before you leap*)
4. **Respect other people's time and bandwidth**
5. **Make yourself look good online**
6. **Share expert knowledge**
7. **Help keep flame wars under control**
8. **Respect other people's privacy**
9. **Don't abuse your power**
10. **Be forgiving of other people's mistakes**

Practical Skills Review

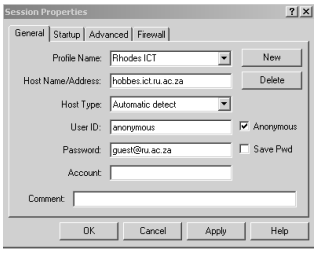
- Things you need to know for your practical Exam
  - FTP

    Downloading, and uploading files
  - Network Searches
  - Basic HTML
  - **READ** the questions carefully

GUI FTP Client (WS_FTP)



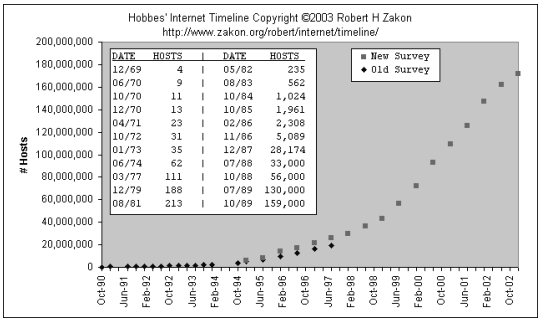
GUI FTP: Adding a System



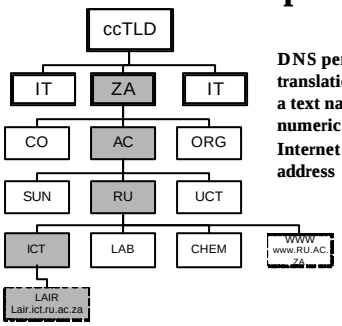
CS1L Networks Summary

- **Internet History**
- 1969 ARPANET commissioned by DoD for research into networking
- 1972 - email becomes a quick hit. The @ sign was chosen.
- 1973 - First international connections to the ARPANET
- 1975 - First ARPANET mailing list, MsgGroup created
- 1978 - TCP split into TCP and IP
- **1980** - ARPANET grinds to a complete halt on 27 October virus
- **1984 -** Domain Name System (DNS) introduced
- **1985** -Symbolics.com is assigned on 15 March to become the first registered domain.
- **1988** - Internet worm (Morris worm) burrows through the Net, affecting ~6,000 of the 60,000 hosts on the Internet
- **1994** - ARPANET/Internet celebrates 25th anniversary
  - -WWW edges out telnet to become 2nd most popular service on the Net (behind ftp-data)
- **1995** - NSFNET reverts back to a research network.
- **2000** - The US timekeeper and a few other time services around the world report the new year as 19100 on 1 Jan

History of the Internet



DNS Example



DNS performs the translation from a text name , to a numeric Internet Address - IP address

Dissecting a URL

http://homes.cs.ru.ac.za/B.Irwin/index.php

Protocol
Hypertext Transport Protocol

Host
homes.cs.ru.ac.za

Path
B.Irwin/index.php

Internet Addressing

- Each system on the Internet has a unique Address
- Known as an IP (Internet Protocol) Address
- Used for routing traffic to a particular host
- Consists of four components
  - AAA.BBB.CCC.DDD
  - Each component ranges from 0 to 255
- A Netmask determines what portion of the address refers to the Network and which to the host
  - NNN.NNN.NNH.HHH

Internet Addressing

- Which of the following is not a valid IP address?
  - 224.145.67.255
  - 172.271.143.5
  - 146.231.254.82
  - 10.37.1.0

Making a connection

- In order to make a connection at a minimum the following pieces of information are needed
  - IP addresses of the Remote machine
  - The Remote port number
  - The protocol you will be connecting with
- These along with the IP address and port number for your local machine make up a unique combination which both sides use
- A port can be thought of as a simple socket into which you plug the ends of your connection