



INTRODUCTION TO INTERNET

Introduction to Internet and WWW

What is the Internet?

History of the Internet

Internet Design Principles

Basic Internet protocols

Basic Internet tools

What is the World Wide Web

History of the World Wide Web

Basic concepts about WWW

Basic WWW protocols

Basic Web Tools

Creating A Web Site

The Internet: Development History

Grew out of a research network originally funded by U.S. Department of Defense.

Development of this network, known as the ARPAnet after the Advanced Research Projects Agency (ARPA), began in 1969.

As the network grew, it was used for applications beyond research, such as electronic mail.

In the early 1980s, the current versions of the core Internet protocols, TCP and IP, were introduced across the network.

*The term **Internet** comes from the word **inter-network** - an interconnected set of networks.*

In 1992, the Center for European Nuclear Research (CERN) released the first versions of World Wide Web software.

Subsequently, the number of Web servers has grown quickly.

The Internet Properties:

Key properties of the Internet:

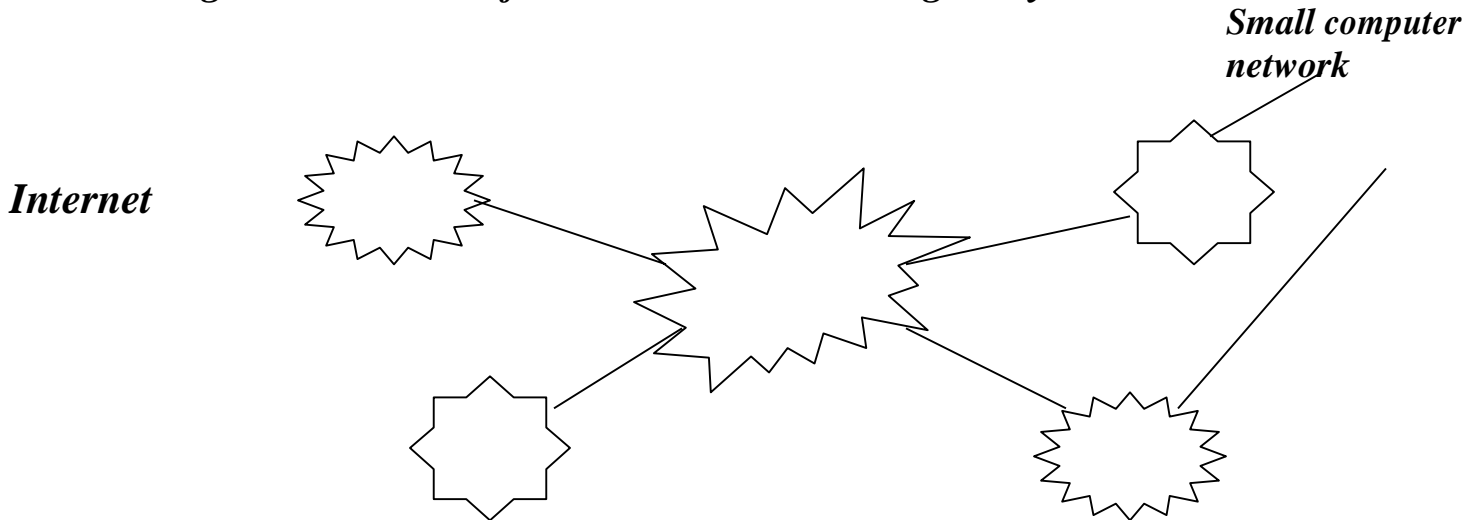
The Internet is interoperable.

The Internet is global.

The Web makes it easy.

The costs of the network are shared across multiple applications and borne by the end users.

The striking characteristic of the Internet --> heterogeneity.



The Internet Layered Architecture:

The Internet, as a network of connecting many small networks, consists of four layers:

Application Layer (HTTP, SMTP..)

Transport Layer (TCP, UDP)

Network Layer (IP)

Physical Layer

<i>Application layer (HTTP, SMTP)</i>
<i>Transport Layer (TCP, UDP)</i>
<i>Network Layer (IP)</i>
<i>Physical Layer (e.g. Ethernet)</i>

The Internet: Design Principles

The Internet has been successful because of some fundamental decisions about its design made early in its history.

Interoperability:

Independent implementations of Internet protocols actually work together.

Interoperability means that systems can be assembled using client and server computers and software from different vendors.

In the context of Internet commerce, interoperability means that buyers and sellers do not have to buy and upgrade software simultaneously from the same vendors to conduct commerce.

Layering:

Internet protocols are designed to work in layers, with each higher layer building on the facilities provided by lower layers.

The Internet: Design Principles

Simplicity:

One way to look at the layering of the Internet is that it grows both up and down from IP. IP is very simple, providing only addressing and formatting of packets.

Below the level of IP, there is the complexity of many different kinds of network hardware, topologies, and routers.

*IP hides that complexity from applications and insulates application developers from:
the complexities of different network devices
the complexities of implementing low-level network protocols.*

Above IP, higher-level protocols such as TCP offer service abstractions that are easy for application programmers to understand and use.

The Internet: Design Principles

Uniform naming and addressing:

The IP layer offers a uniform addressing structure that assigns a 32-bit address to each computer connected to the network.

Domain name system (DNS) offers a uniform way to translate human-readable names for computers, such as `wwwopenmarket.com` to the numeric address for that computer.

End-to-end:

Internet is designed around end-to-end protocols. That is, the interpretation of the data happens on the sending and receiving systems, but nothing in the network needs to look at anything but the destination address for delivering the packet.

End-to-end protocols have several advantages:

hide the internal structure of the network

provide simple abstractions to programmers

shielding them from such things as the messy details of recovering from lower-level errors.

The Internet Protocols

FTP:(File transfer protocol)

One of the most oldest and probably the most popular protocol to be used to move files on the Internet.

TCP/IP:(Transmission Control Protocol and Internet Protocol)

The low-level communications protocol that holds the Internet together.

It provides means to allows two software on difference machines on the Internet find each other, rendezvous, and transfer data.

It provides the essential service of making sure that each piece of data is transferred in the correct sequence and without error.

SMTP: (the e-mail message protocol)

A protocol to allow two users to communicate through e-mail messages over the Internet.

NNTP: (Net News Transfer Protocol)

A protocol, which can be used to access or transfer Usenet news over the Internet.

Telnet: - The traditional teletype-style communications protocol for communicating with text-based information services.

The World Wide Web: History

March, 1989, Tim Berners-Lee of Geneva's European Particle Physics Laboratory (CERN) circulated a proposal to develop a hypertext system for global information sharing in High Energy Physics community.

(<http://info.cern.ch/hypertext/WWW/TheProject.html>)

The World Wide Web project began to take shape at the beginning of 1991.

October 1991, the gateway for WAIS search (a crucial development for the Web's future as search as well as a browsing tool),

Before the end of 1991, CERN announced the Web to the High Energy Physics community in general.

Essentially, 1992 was a developmental year. In March of 1993, WWW traffic clocked in at 0.1 percent of total Internet backbone traffic.

In July of 1994, CERN began to turn over the Web project to a new group called the W3 organization, a joint venture between CERN and MIT to develop the Web further.

The World Wide Web: HTML

HTML is a simplified derivative of SGML, or Standard Generalized Markup language.

Its code can be used to make documents readable across a variety of platforms and software.

Like SGML, HTML operates through a series of codes placed within an ASCII doc. These codes are translated by a WWW client such as Lynx, Mosaic, Cello, Viola, or MacWeb into specific kinds of formats to be displayed on the screen.

Items include in a HTML page are:

- links, lists, headings, titles, images, forms, and maps.

Due to the limitation of HTML documents, now more advanced technologies are introduced to enrich its functions, such as , JavaScript, ActiveX, VML, SVG

The World Wide Web: HTTP

HTTP stands for HyperText Transfer Protocol.

It is a simple data transfer protocol that binds the Web together.

It supports the communications between a web client (browser) and its web server.

It consists of a set of messages and replies for both servers and browsers.

It treats documents, files, menus, and graphics as objects.

It relies on the Universal resource identifier (URI), enclosed in the universal resource locator (URL), to identify files.

It uses the Internet's TCP/IP network protocol.

(<http://info.cern.ch/hypertext/WWW/Protocols/HTTP/HTTP2.html>)

The World Wide Web: HTTP

Macintosh System 7.x:

MacHTTPD: http://www.uth.tmc.edu/mac_info/machttp_info.html

OS/2:

OS/2HTTPD: <ftp://ftp.netcom.com/pub/kfan/overview.html>

Unix:

*CERN httpd: <http://info.cern.ch/hypertext/WWW/Daemon/Status.html> NCSA httpd:
ftp://ftp.ncsa.uiuc.edu/Web/httpd/unix/ncsa_httpd*

Windows 3.1x:

NCSA httpd for windows:

<http://www.alisa.com/win.httpd/index.htm#news>

Windows NT:

HTTPS: <ftp://emwac.ed.ac.uk/pub/https>

The World Wide Web: URL

- Uniform Resource Locators (URL)

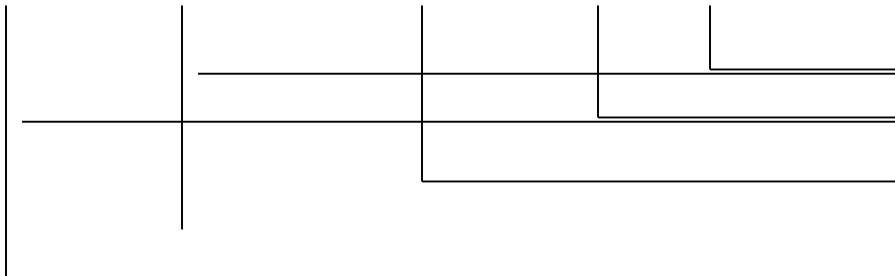
-> the addresses of Web resources.

Usually, an URL leads to a file, but that is not always the case.

A URL can point you to a single record in a database, the front-end of an Internet program, or a result of a query.

Example: <http://www.ibm.com/Features/Harlem/Harlem.html>

Resource Name Path Name Server Name Host Indicator Protocol



The World Wide Web: Protocols

Hypertext Transfer Protocol (HTTP)

HTTP is the original Web Communication protocol which supports the connectionless communications between a Web server and its clients above TCP layer.

Secure Sockets Layer (SSL)

Developed by: Netscape Communications Corp.,

It is the most widely used security protocol on the Internet.

Where does it fit in? between TCP and the application. It provides security services for any stream of data.

Features: Encrypting the communications, digital certificates.

Secure HTTP (S-HTTP)

Developed by: Enterprise Integration Technologies (EIT). Not widely used. Where does it fit in? at the application layer rather than the transport layer

Features: Clients and servers can specify authentication and privacy capabilities independently of one another.

The World Wide Web: Protocols

- Gopher:

A campus information service protocol invented at the university of Minnesota.

A protocol supports multiple document types, executable scripts, external viewers, and fill-out forms.

The main difference visible to the casual user is that its interface is a series of nested menus rather than hypertext documents.

- WAIS (Wide Area Information Search):

- A protocol that allows high speed remote searches of document databases over the network.

The World Wide Web: Tools

- Web Browsers and Web Servers:

HTTP is the original Web Communication protocol which supports the connectionless communications between a Web server and its clients above TCP layer.

To support the client-server communications on the Web,

-> web browsers and web servers

Web Browser:

A web browser is used as a client on the Web to support the following functions:

to process users requests

to connect to a web server using URL information

to send the request to the sever

to format the responding information (from the server)

to display the formatted information as a document

Web Sever:

a web server plays as a server on the web:

to listen for incoming requests from the browser

to find the requested document, and transmit to the browser or

to find the corresponding CGI program and execute it

The World Wide Web: Tools

Web Search Tools and Search Directories:

They provides on-line subject guides for users to find the useful information over the Web. Their major functions are:

process users search requests

conduct an information search according to a classified and well-structure index library (database).

generate the search results

display them to the users

Web Authoring Tools:

Group-ware Tools:

Email, FTP, Online Chat,

Administration Tools:

Performance monitor, Trace log, Traffic Monitor

The World Wide Web: Summary

The WWW project merges the techniques of network information and hyper- text to make an easy but powerful global information system.

The project presents any information accessible over the network as part of a seamless hypertext information space.

W3 was originally developed to allow information sharing within internationally dispersed teams, and the dissemination of information by support groups.

It is currently the most advanced information system deployed on the Internet, embraces within its data model most information in previous networked information systems.

In fact, the Web is an architecture which will also embrace any future advances in technology, including new networks, protocols, object types, and data forms.

Tim Berners-Lee on the World Wide Web, circa 1992. From <http://www.w3.org/Summary.html>

The World Wide Web: Applications

Distributing and Sharing Scientific Data:

Share scientific information (data, papers, databases) among scientists around the world

E-Commerce:

Electronic marketing and advertising, online shopping (order/purchase, payment), online trading, online customer services.

Online Education and Training:

On-line courses, training program and information, distance learning

Organization and Public Service:

Distributing public service information for organizations and government offices.

Online Publishing:

Online books, magazines and journals, newspapers, Video, CD .

Online Banking and Trading:

Support online bank transactions for banks and stockbrokerages

Steps to Creating a Web Site

Internet or Intranet?

A web site can be accessible to the whole world via the Internet, or can be a private affair available only to users in the organization.

Private web sites are called intranet servers.

used by internal users in the organization only.

set-up inside a firewall to protect access and attack from external users.

shared by all internal users across many types of local area TCP/IP based computer network.

Public web sites: (Internet sites)

Bring the Internet to your site

--> establish a connection between your organization and the Internet

For example, set a link to the Internet via an Internet Server provider (ISP)

Take your site to Internet

--> place your web site at a remote location where there is an Internet connection in place.

Often this remote location is on a computer maintained by an Internet service provider.

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Steps to Creating a Web Site

Pros and Cons of setting up a web server in-house:

Advantages:

You have complete control over it.

You can choose hardware and software, set up access control and security.

You are free to write server scripts interacting with other systems.

Disadvantages:

You need to connect to Internet.

You need to find an administrator to maintain the server.

Pros and Cons of Having your web site hosted by your service provider.

Advantages:

You don't need to worry about hardware and network.

You get high speed leased lines from the ISP provider.

You may get free training.

Disadvantages:

You have to administer it remotely using tools such as FTP.

You give up the ability to integrate your web site with other systems.

Steps to Creating a Web Site

Finding an ISP:

There are hundreds of ISPs.

Large ones usually provide better connections.

Small ones usually provide better prices and services. Check the list of ISPs in your area through Yahoo:

http://www.yahoo.com/Business_and_Economy/Companies/Internet_Services/ Ask questions:

Speed? Cost? And

Will you be able to configure the Web server and install server scripts?

If they offer several virtual sites on a single server?

Can you switch vendors or upgrade server software?

Steps to Creating a Web Site

*Max. Web Traffic for Various Speeds of Internet Link: Network Speed
Connection/Minute*

		<i>1 kb</i>	<i>10 kb</i>	<i>25 kb</i>
<i>56</i>	<i>kbps</i>	<i>314</i>	<i>31</i>	<i>12</i>
<i>64</i>	<i>kbps</i>	<i>358</i>	<i>36</i>	<i>14</i>
<i>128</i>	<i>kbps</i>	<i>717</i>	<i>72</i>	<i>29</i>
<i>1,544</i>	<i>kbps</i>	<i>8646</i>	<i>865</i>	<i>346</i>

Steps to Creating a Web Site

Rough Cost on an Internet Connection:

<i>Conn Speed (kbps)</i>	<i>EQ Costs</i>	<i>ML Fees</i>	<i>ISP charge</i>
<i>ISDN 56-128</i>	<i>\$300-\$1000</i>	<i>\$100-\$1000</i>	<i>\$100 -\$500</i>
<i>Switched-5656</i>	<i>\$1200-\$2000</i>	<i>\$100-\$200</i>	<i>\$300-\$600</i>
<i>FrameRelay 56-1544</i>	<i>\$1000-\$1500</i>	<i>\$125-\$1000</i>	<i>\$300-\$1500</i>
<i>Fractional T1 65-1544</i>	<i>\$1000-\$2000</i>	<i>\$100-\$1000</i>	<i>\$300-\$1000</i>
<i>T1 1544</i>	<i>\$1000-\$2000</i>	<i>\$500-\$2000</i>	<i>\$1500-\$2500</i>
<i>T3 45000</i>	<i>\$1000-\$2000</i>	<i>\$2000-\$4000</i>	<i>\$2000-\$4000</i>

Steps to Creating a Web Site

Steps:

Choose good domain name

Choose the server hardware and OS

Select and install server software

Write your site's web pages

Enhance your site with scripts and applets

Allocate responsibility

Web Administrator

Web Author

Web Script Developer

Web Master

Publicize your site