

The Internet

Internet:-

- * Internet is a world wide system of computer networks. - a network of networks in which users at any one computer can, if they have permission, get information from any other computer.
- * Internet uses set of protocols called TCP/IP (Transmission control protocol / Internet protocol).
- * Two recent adaptation of ~~recent~~ internet technology, the intranet and the extranet, also make use of the TCP/IP protocol.

Intranet:-

- An intranet net is private network that is contained within an enterprise. It may consist of many inter linked local area networks (LAN) and also use leased lines in the wide area network (WAN).
- Typically, an intranet includes connections through one or more gateway computers to the outside internet.
- The main purpose of an intranet is to share companies information and computing resources among employees.

→ An intranet can also be used to facilitate working in groups and for teleconferences.

Extranet:-

→ An extranet is a private network that uses internet technology and the public telecommunication system to securely share part of a

business's information or operations with supplier vendors, partners, customers, or other businesses.

→ An extranet can be viewed as part of a company's intranet that is extended to users outside the company.

→ It has also been described as a "state of mind" in which the internet is perceived as a way to do business with other companies as well as to sell products to customers.

Internet History :-

Origins:-

ARPA (Advanced Research Project Agency)

ARPAnet - late 1960 and early 1970s.

- network reliability

- Its for ARPA funded research organizations in the US.

ARPA is now stands for Address and Routing Parameter Area.

- BITNET, CSnet - late 1970 and early 1980s
 - email and file transfer for other institutions.
- NSFnet - 1986 (National Science Foundation network)
 - Originally for non DoD (Department of Defense) funded places
 - Initially connected five super computer centers
 - By 1990, it had replaced ARPANet for non-military use.
 - NSF became the network for all (by the early 1990s) and it known as the Internet

Internet History (1981 to 1988)

1981:- CSNET backbone was created. This was a 56 kbps network for institutions, not connected to ARPANET.

BITNET was created. It was used for email and list servs.

1983: TCP/IP became the core Internet protocol. Every machine connected to ARPANET had to use TCP/IP.

1984: Domain Name System (DNS) was created. DNS translates host names into numerical IP addresses. ARPA net divided into two networks MILNET which serve military and ARPA net which support research.

1985: The NSF (National Science Foundation) began to deploy the new T1 lines, 1.5 mbps in NSFNET

T1 line:- It means that the phone company has brought a fiber optic line. (T1 line might also come in on copper).

1987: BITNET and CSNET merged to form the [CRDN] Corporation for Research and Education Network (CERN)

1988: The deployment of T1 lines on NSFNET backbone was completed. The traffic was increased drastically.

→ In the view of increased traffic, a Corporation called Advance Network System (ANS) was formed to conduct research for high speed networking and the concept of T3, 45Mbps line was proposed.

T3 line:- A dedicated physical circuit that uses

high-speed media to transmit data, voice and video at the rate of 45Mbps. It offers a

broadband connection consisting of 672 individual channel of 64 kilobits each.

Internet Proto cols:

- IP addresses: every node has a unique address. It's a ~~long~~ 32-bit binary number.
new standard, IPv6 has 128 bits (1998)
- Organizations are assigned group of IPs for their computers. by the mid 1980s several different protocols had been invented and were being used on the Internet, all with different user interfaces (Telnet, FTP, Usenet, mailto etc).
- Internet protocol is responsible for addressing hosts and for routing datagrams (packets) from a source host to a destination host across one or more IP addresses (networks)
- It's the principal communication protocol in the Internet Protocol suite for relaying datagrams across network boundaries. Its routing function enables internetworking, and essentially establishes the internet.
- The first major version of IP, internet protocol Version 4 (IPv4) is the dominant protocol of the internet. Its successor is internet protocol version 6 (IPv6).

Client and Server :-

Domain Names :-

form: host-name. domain-names.

Fully qualified domain name: the hostname and all of the domain names.

DNS servers - Convert fully qualified domain names to IPs.

The World-Wide Web

→ Tim Berners-Lee at CERN proposed the web in 1989.

Purpose: To allow scientists to have access to many databases of scientific work through their own computers.

→ Document form: Hypertext exp: Pages, documents, resources & hyper media (images, sounds, video etc).

- Web Browsers:-

Browsers are clients: always initiate, servers react (sometimes servers required responses).

→ NCSA (National Center for Super Computing Applications) [Univ. of Illinois] is first to use a GUI in 1993, led to explosion of web use.

- Initially for X-Windows under unix, but was ported to other platforms by late 1993.
- All communication between browsers and servers use HTTP (Hyper Text Transfer Protocol.)

Web Server Operations:

- Web servers run as background processes in the operating system. It monitors a communications port on the host, accepting HTTP messages when they appear.
- All current web servers came from either
 - The origin from ~~CERN~~ CERN
 - The second one, from NCSA

Details of Web server Operations:

- Web servers have two main directories
- Document root (servable documents)
 - Server root (server system software).
- Document root is accessed indirectly by client
 - * Its actual location is set by the server configuration file.
 - * Requests are mapped to actual location.
 - Virtual document trees
 - Virtual hosts
 - Proxy servers
 - Web servers now support other Internet Protocols.

Web Server Operations : (Apache)

Apache (open source, fast, reliable)

Directives (Operation control):

- ServerName 192.168.0.12 example.com
- ServerRoot
- ServerAdmin
- DocumentRoot
- Alias 192.168.0.12 www.example.com
- Redirect
- DirectoryIndex
- UserDir

Internet Information Services (IIS)

Internet information services (IIS) is a flexible, general-purpose web server from Microsoft that runs on windows system to serve requested HTML pages or files.

URLs (Uniform Resource Locators):

A URL provides a way to locate a resource on the web, the hypertext system that operates over the internet.

URL general form: scheme: Object-address

- The scheme is often a communications protocol such as telnet, ftp or http etc.
- Object address is fully qualified domain name / doc path for the file protocol only doc path is needed.

- Host name may include a port number, such as in ZEPPO:80 (80 is the default port).
- URLs cannot include spaces or any of a collection of other special characters (semicolons, colons, --)
- The doc path may be abbreviated as a partial path. The rest is furnished by the server configuration. If the doc path ends with a slash, it means its a directory.

Hyper Text Transfer Protocol (HTTP):

HTTP protocol used by all web communications.

Request Phase:-

format:

HTTP method	domain part of URL	HTTP version
GET	1 degrees.html	HTTP/1.1

exp:

Header fields

Blank line

Message body

HTTP methods:-

GET - Fetch a document

POST - Execute the document, using the data in body

HEAD - fetch just header of the document

PUT - Store a new document under the server

DELETE - Remove a document from the server

HTTP Headers:

four categories of HTTP Headers

(i) General (ii) request (iii) response (iv) entity

i) General:

headers are name-value pairs that appears in both request and response messages. The name of the header is separated from the value by a single colon.

Exp: User-Agent: Mozilla/5.0 (Windows NT 6.3; WOW64; Trident/7.0; rv:11.0) like Gecko

provides a header called User-Agent whose value is Mozilla/4.0 (Compatible; MSIE 6.0, Windows NT 6.3). The purpose of this particular header is to supply the web server with information about the type of browser making the request.

ii) Request Header:

HTTP clients use headers in the request message to identify themselves and control how content is returned. If you are IE, you will have seen the following headers sent with the request.

Exp: Accept: */* (The header indicates that the browser will accept all types of content)

Accept-Language: en-gb (The browser prefers British English content)

(iii) Response Headers:

HTTP servers use headers in the response message to specify how content is being returned and how it should be handled.

Exp: cache-control: no-cache

This header indicates whether the resource may be cached by the browser or any immediate ~~effec~~ caches. The value no-cache disables all caching.

→ Content-length: 2748

This header contains the length in bytes of the resource.

(iv) Entity Headers:

An entity header is an HTTP header describing content of the body of the message. Entity headers are used in both, HTTP requests and responses.

Exp: content-length, content-Language,

Content-Encoding etc.

Ex P: 2 : POST /myform.htm HTTP/1.1

request
headers ← [Host: developer.mozilla.org
User-Agent: Mozilla/5.0 (Macintosh;

Intel Mac OS X 10.9; rv:50.0) Gecko/
20100101 Firefox/50.0

entity
header ← Content-Length: 128

HTTP Response:

Form:

Status Line

Response Header Fields

blank line

Response body

Status Line format:

HTTP Version Status code Explanation

ExP: HTTP/1.1 200 OK

Status code is three digit number, first digit specify the general status

1xx => informational

It means the request was received and the process is continuing

2xx => Success

Action was successful received, understood and accepted

3xx => Redirection

Further action must be taken to in order to complete the request

4xx => Client error

Request contain incorrect syntax or cannot be fulfilled

5xx => server error

Server failed to fulfill an apparently valid request

Response Header Fields:

The response header fields allows the server to pass additional information about the response which cannot be placed in the Status-Line.

Ex: Accept-Ranges, Proxy-Authenticate, Retry-After etc.

HTTP response example:-

HTTP/1.1 200 OK

Date: Fri, 30 June 2017 10:14:03 GMT

Server: Apache (Red-Hat|Linux)

Last-modified: Fri, 30 June 2017 10:02:54 GMT

Accept-ranges: bytes

Content-length: 364

Connection: Close

Content-type: text/html; charset=ISO-8859-1

<html> <body>

<h1> Hello World </h1>

</body> </html>

History of HTML

→ HTML is the official language of the World Wide Web and was first conceived in 1990.

→ HTML is a product of SGML (Standard Generalized Markup Language) which is a complex, technical specification describing

markup languages, especially those who used in electronic document exchange, document management & document publishing.

- HTML was originally created to allow those who were not specialized in SGML to publish and exchange scientific and other technical documents
- HTML especially facilitated this exchange by incorporating the ability to link documents electronically hyperlinks. Thus the name HyperText Markup Language.
- HTML proposed by Tim Berners-Lee, in 1987

HTML Versions:

(i) HTML 1.0 (1989- 1994)

→ The first version of HTML that supported inline images and text controls. HTML 1.0 was very limited in terms of styling and presenting of content.

→ HTML 1.0 could not support

- (a) tables or forms
- (b) specify fonts
- (c) change page back ground (or) we have

- HTML 1.0 only supported by Lynx (non-graphical browser running on UNIX) and Mosaic.
- HTML 1.0 looked the same with similar background and the type of font.

(ii) HTML 2.0 (1995):

- This specification supported more browsers
- HTML 2.0 was considerably improved to support

- It supported

- (a) forms with limited set of form elements such as text boxes, and option buttons
- (b) change of page background
- (c) Use of tables.

- Between HTML 1.0 & HTML 2.0, W3C was formed.
- Around this time HTML 1.1 also existed and was created by Netscape.

(iii) HTML 3.2 (1997):

- This version included support for creating tables and expanded options for form elements.
- This version allowed web pages to include complex mathematical equations.
- Because W3C delayed agreeing on the next version of HTML, HTML 3.2 was created instead.

of HTML 3.0.

- Although HTML 3.2D specification included support for CSS, browser manufacturers did not support it very well in their browsers.
- Browser manufacturers included support for frame even though HTML 3.2 specification did not support this feature.

(iv) HTML 4.01 (1999):

- This version added support for style sheets and scripting ability for multimedia elements.
- In HTML 4.01 with the use of style sheets it's now possible to change the appearance/look of the website by changing just style sheet(s) itself.

(v) HTML 5.1 (2014-16)

- The W3C HTML5 recommendation was released 28 October 2014.
- W3C also published an HTML 5.1 candidate recommendations on 21st June 2016
- HTML5 supports in all modern browsers, in addition, all browsers, old and new automatically handle unrecognized elements

as inline elements. Because of this, you can "teach" older browser to handle "unknown" HTML elements.

- HTML5 defines eight new semantic elements. All these are block level elements.

To secure correct behavior in older browsers, you can ~~use~~ set the CSS display properly for these HTML elements to block.

header, section, footer, aside, nav, main, article, figure { display: block; }

- You can also add new elements to ~~the~~ an HTML page with a browser trick.

* The javascript statement document.createElement("myhero") is needed to create a new element in IE9 and earlier.

- You should use the HTML5 shiv when you are using new HTML5 elements such as <article>, <section>, <aside>, <nav>, <footer>