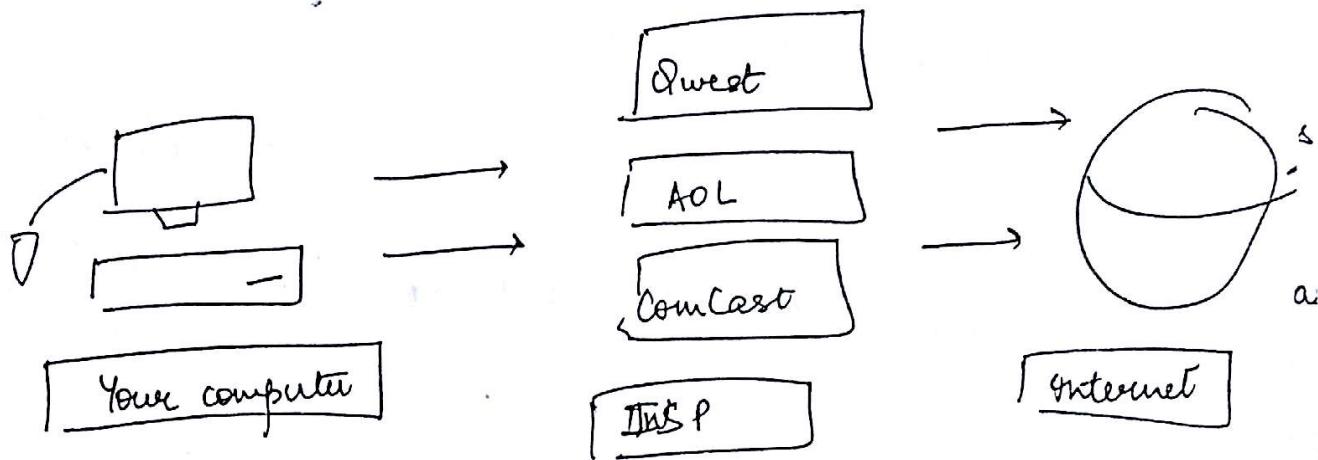


(4) & (5)

## Internet Service Provider:

- A company that provides Internet access for customers  
(example : Comcast, Qwest, AOL)
- Your computer connects to the Internet Service Provider (ISP),  
then to the internet.



3 ways to connect to Internet

- Dial-up
- High speed / DSL
- Wireless Connection (Wi-Fi)

Dial-up: → All you need is a computer, phone-line & ISP  
→ Not as fast as other Internet connections but often more affordable  
→ Dial up access with point to point protocol.

Your computer → Landline → ISP → Internet

## 2) High Speed (Cable / Digital subscriber line - DSL) Internet Connection

- Travels through fiber optic cables underground
- Needs to be connected by a modem to your computer
  - Modem: A hub that connects the computer to Internet
- Faster than Dial-up

## 3) Wireless Internet connection (Wi-Fi)

- Your computer must have a "Wireless enabled" device
- Your computer can pick up signals from different wireless networks

-or-

Web Browser: A web based program that displays the Internet web by displaying a web document & enable user to link to other web pages. The 1<sup>st</sup> Browsers were Text only.

Mosaic was the 1<sup>st</sup> graphical Browser (Netscape Navigator - first commercial graphical browser originally known as Mosaic Navigator)

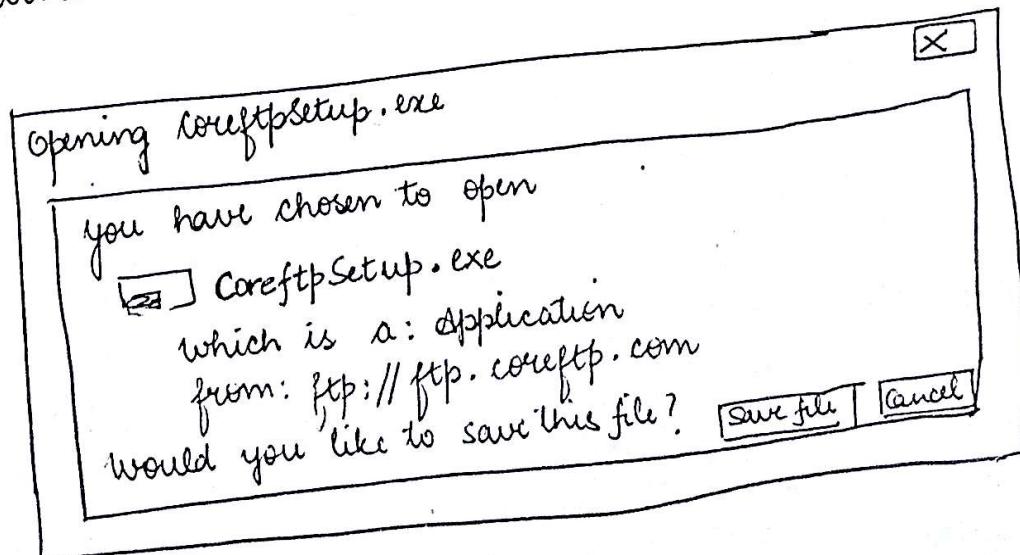
### Common Browsers:

- Safari (Apple/ Mac)
- IE (for Windows only)
- Google Chrome (created by Google)
- Mozilla Firefox (works on Mac & PC)

## F12

[FTP] → File Transfer Protocol

- FTP is used to transfer files b/w the FTP server & a computer.
- It is a standard used to transfer files over Internet.
- FTP is not platform specific, so as long as you have a computer (DOS, Macintosh, UNIX etc.) that is connected to the Internet, you can copy files.
- Transferring files from an FTP site to the client is known as downloading.
- Transferring files from the client to an FTP site is known as uploading.
- Clients may store files on an FTP site's server.
- Transfer file b/w an FTP server & a computer, for example, to download software.



Specifically, FTP is a commonly used protocol for exchanging files over any network that supports the TCP/IP protocol (such as the Internet or an intranet). There are 2 computers involved in an FTP transfer: a server and a client.

The FTP server, running the FTP server s/w, listens on the network for connection requests from other computers. The client computer, running FTP client software, initiates a connection to the server. Once connected, the client can do a no. of file manipulation operations such as upload files to the server, download files from the server, rename or delete files on the server & so on.

The biggest benefit FTP provides is that it allows to send very large files without using the email system. Many email administrators are imposing limits on the size of file attachments in order to maintain stable email system operation. Since FTP bypasses the email system, you are free to send files of almost any size.

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## F 7.3 to 7.6 |

Telnet :

- The telnet protocol is often thought of as simply providing a facility for remote login to computer via the internet
  - Follows client/server model
  - You run a piece of software on your own PC (the client) to use the resources of a distant server computer (host computer)
- Telnet enables the user of a PC to log in to a host computer at another site on the internet. The user's PC then acts as a dumb terminal attached to the remote host.
- To use telnet you need to know the internet address of the host whose resources you want to use.
  - It's a way you can access someone else's computer assuming they have given the permission

Practical uses:

library catalog

- 2) Usenet is the world's biggest electronic discussion forum.
- People from all over the world participate in discussions on thousands of specific areas of interest called newsgroups
  - Usenet & all messages are stored on Usenet servers
  - Global bulletin board & discussion area.

3) VoIP: Voice over Internet Protocol

Allows delivery of voice communications over IP networks.

4) ~~Internet~~ chat & Instant messaging

1) IM

2) ICQ (I seek you) → useful communication programs  
allows to send message (chat), files,  
URLs & more to anyone with ICQ.

IRC (Internet Relay Chat)

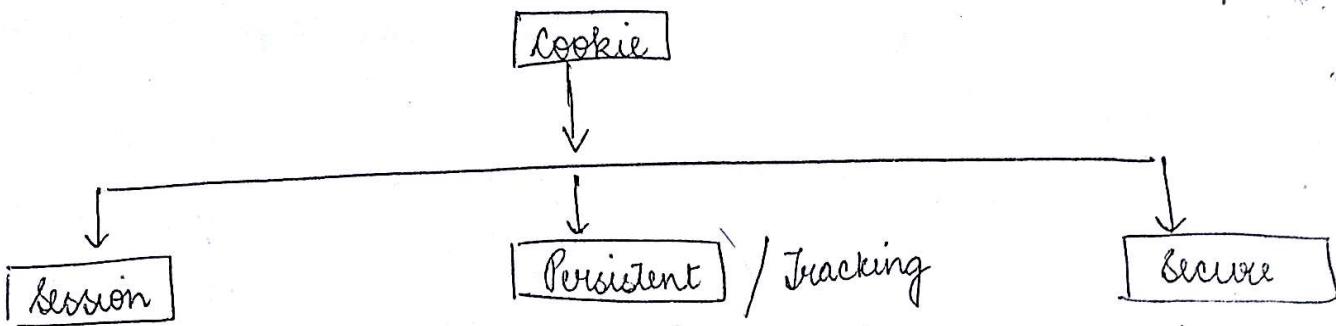
download free  
ICQ no.

I  
IRC chat program.

→ IRC has many networks that are completely separate from one another.

→ Some popular are Undernet / EF net / Dal net.

→ If you want to chat with someone on IRC, you need to make sure that both of you are on same n/w)



- A session cookie only lasts for the duration of users using the website.
- The web browser normally deletes session cookies when it quits.

- A persistent cookie will outlast user sessions.
- If a persistent cookie has its Max-Age set to 1 year, then, within the year, the initial value set in that cookie would be sent back to the server every time the user visited the server.
- A secure cookie is used when a browser is visiting a server via HTTPS, ensuring that the cookie is always encrypted when transmitting from client to server.

Zombie cookie :- A zombie cookie is any cookie that is automatically recreated after the user has deleted it.

Uses of cookies :-

a cookie is user related as well now,  
or browser cookie, is used

8/10/22

Cookie is an application based solution to provide state over a stateless protocol.

## User-server state: cookies

Many major Web sites use cookies

Four components:

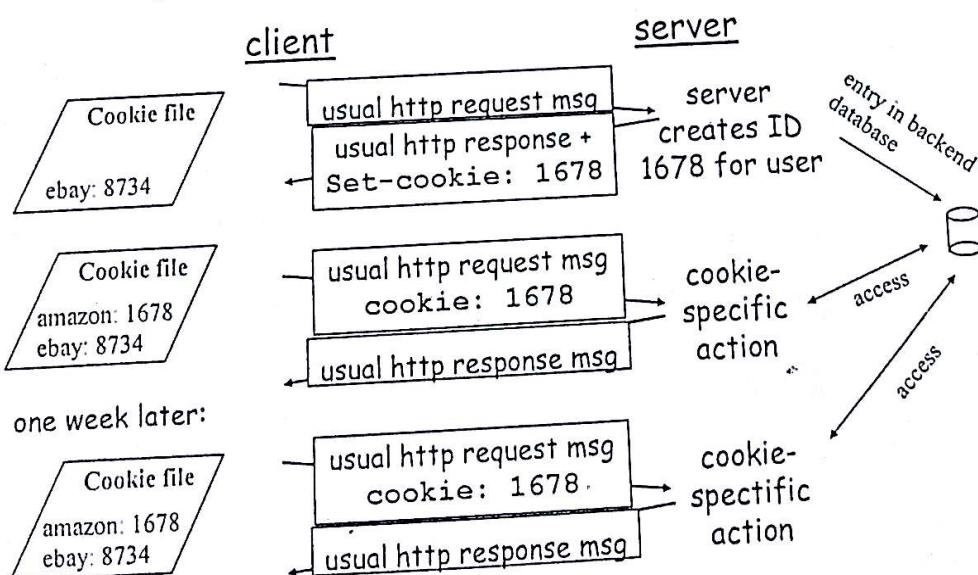
- 1) cookie header line of HTTP response message
- 2) cookie header line in HTTP request message
- 3) cookie file kept on user's host, managed by user's browser
- 4) back-end database at Web site

Example:

- Susan access Internet always from same PC
- She visits a specific e-commerce site for first time
- When initial HTTP requests arrives at site, site creates a unique ID and creates an entry in backend database for ID

cookies are not S/W. They cannot be programmed, cannot carry viruses & cannot install malware on the host computer.

## Cookies: keeping "state" (cont.)



However, they can be used by spyware to track user's browsing activities

## Cookies (continued)

### What cookies can bring:

- ✓ authorization
- ✗ shopping carts
- ✗ recommendations
- ✓ user session state (Web e-mail)

### How to keep "state":

- Protocol endpoints: maintain state at sender/receiver over multiple transactions
- cookies: http messages carry state

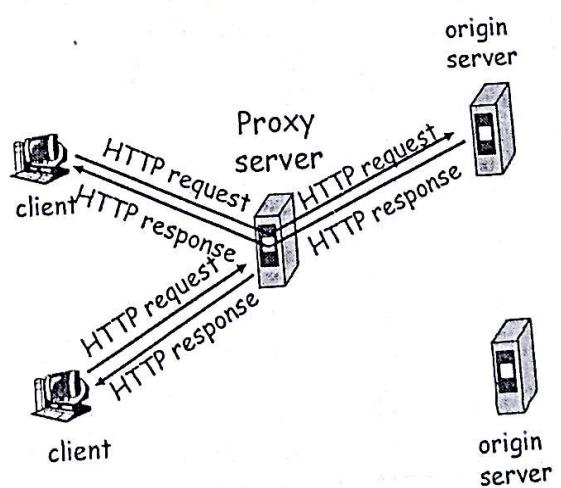
### Cookies and privacy:

- aside
- cookies permit sites to learn a lot about you
  - you may supply name and e-mail to sites

## Web caches (proxy server)

Goal: satisfy client request without involving origin server

- user sets browser: Web accesses via cache
- browser sends all HTTP requests to cache
  - object in cache: cache returns object
  - else cache requests object from origin server, then returns object to client



## More about Web caching

- Cache acts as both client and server
- Typically cache is installed by ISP (university, company, residential ISP)

### Why Web caching?

- ✓ Reduce response time for client request.
- ✓ Reduce traffic on an institution's access link.
- ✓ Internet dense with caches: enables "poor" content providers to effectively deliver content (but so does P2P file sharing)

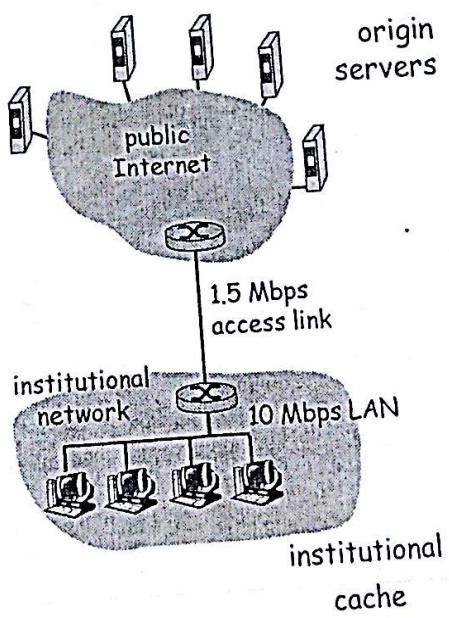
## Caching example

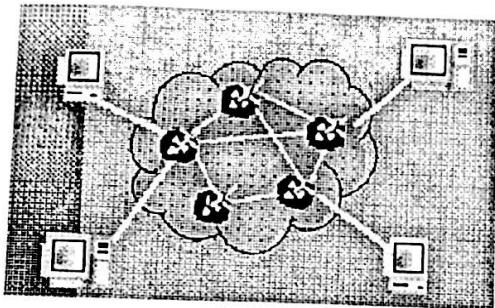
### Assumptions

- average object size = 100,000 bits
- avg. request rate from institution's browsers to origin servers = 15/sec
- delay from institutional router to any origin server and back to router = 2 sec

### Consequences

- utilization on LAN = 15%
- utilization on access link = 100%
- total delay = Internet delay + access delay + LAN delay  
= 2 sec + minutes + milliseconds



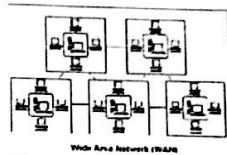


There are two types of computer networks:

**Local Area Network (LAN):** A LAN is two or more connected computers sharing certain resources in a relatively small geographic location (the same building, for example), a small network of computers in close proximity to each other.



**Wide Area Network (WAN):** A WAN typically consists of 2 or more LANs. The computers are farther apart and are linked by telephone lines, dedicated telephone lines, or radio waves.



- How does internet work
  - 1) Client + Server
  - 2) Protocol (IP/TCP)
  - 3) IP address
  - 4) Domain name
  - 5) URL

all computers on Internet  
(a WAN) categorized

Client (request program)      Server (provide service)

## The Internet is a giant WAN

- The Internet is the largest Wide Area Network (WAN) in existence.
- The Internet is a means of transport for information. It is not a thing; it is a set of standards which allow disparate things to communicate with each other.
- The fact that railway rails are four feet eight and a half inches apart means that a train can travel from the North of Punjab through Delhi, Rajasthan and Gujarat to Mumbai. (The standard runs out at the Western Railway Line.) Similarly arbitrary standards - lots of them - make the internet international and independent of any one manufacturer.
- Lots of different "services" run over the internet "tracks"

- All computers on the Internet (a wide area network, or WAN) can be lumped into two groups: servers and clients. In a network, clients and servers communicate with one another.

A server is the common source that:

- Provides shared services (for example, network security measures) with other machines
- AND
- Manages resources (for example, one printer many people use) in a network
- The term server is often used to describe the hardware (computer), but the term also refers to the software (application) running on the computer. Many servers are dedicated, meaning they only perform specific tasks.

For example,

- An email server is a computer that has software running on it allowing it to "serve" email-related services.
- A web server has software running on it that allows it to "serve" web-related services.

A server is a computer program that provides services to other computer programs in the same other computers.

Client-server is the computing architecture used by most internet services

Internet Technology  
(Layered Stack)  
→ Architecture  
→ Services      → Protocol

A client is the requesting program in a client/server relationship. e.g., the user of a web browser is effectively making client requests for pages from servers all over the web.

## Clients

- Remember, all computers on the Internet (a wide area network, or WAN) can be lumped into two groups: **servers** and **clients**, which communicate with one another.
- Independent computers connected to a server** are called **clients**. Most likely, your home or office computer does not provide services to other computers. Therefore, it is a **client**.
- Clients run multiple **client software applications** that perform specific functions.

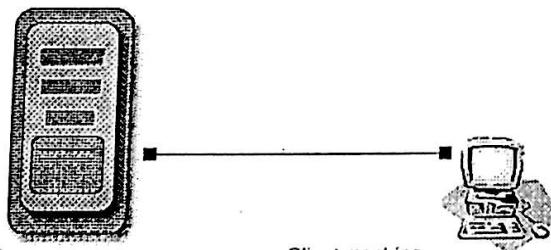
For example,

- An email application such as Microsoft Outlook is client software.
- Your web browser (such as Internet Explorer or Netscape) is client software.

## Servers and Clients Communicate

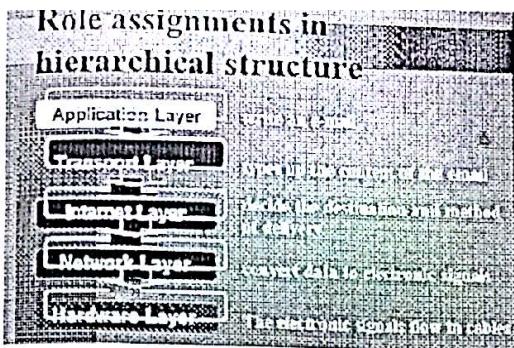
- Your computer (client hardware) is running a web browser such as Internet Explorer (client software).
- When you want to surf the web, your browser connects to a remote server and requests a web page.
- The remote server (server hardware) runs web server software (server software).
- The web server sends the web page to your computer's web browser.
- Your web browser displays the page.

## Servers and Clients Communicate



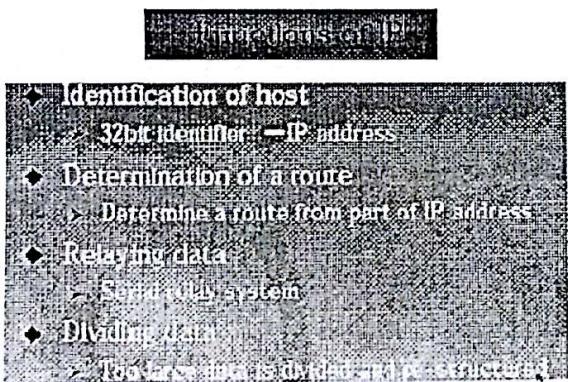
- Server machine running a web server**
- Remote server runs web server software
  - Web server sends the web page to the client machine's browser
- Client machine running a web browser**
- Running a web browser such as Netscape Navigator
  - Connects to server and requests a web page
  - Web browser displays the web page

- Many computers of various...  
Intel, Sun, Palm Pilots, Atari, Apple, embedded systems, etc.  
: Windows 3.11, 95, 98, NT, 2000, UNIX, Linux, Mac OS's, etc.  
Space Shuttle to PCs  
16MHz 8086's to 1 GHz machines
- How do I get all of them talking together?



## Internet Protocol (IP)

- The most basic protocol of the Internet
- Designed to get a single packet from one computer to another
- Abstracts the physical connection between two machines.



## IP Addresses

- IP address is expressed in 32 bits of "0" and "1".
- IP address is separated into four segments by dots and a range of each segment is between 0 and 255.  
- My home machine: 216.132.81.61
- IP address is assigned to a device (computer, etc.) like a phone number and identifies every device.
- IP address is unique number in the world and controlled by address registry.

URL stands for Uniform Resource Locator. The URL specifies the Internet address of a file stored on a host computer, or SERVER, connected to the Internet. Web browsers use the URL to retrieve the file from the server. This file is downloaded to the user's computer, or CLIENT, and displayed on the monitor connected to the machine.

URL: "standard" way of easily expressing the location & data type of a resource

URLs in general take the form "protocol://address" 8/2/2011  
where protocol is something like HTTP, FTP, telnet &  
address is merely a server name of a given resource or page.

### Transmission Control Protocol (TCP)

- Adds certain information to an IP packet
  - Packet 1 of 10
  - Time sent
  - Error correction information
  - Destination application (email, web, etc.)
    - the "port" number
- The destination computer asks the original computer to resend any missing or corrupted packets.
- Resorts the packets into the proper order.

### TCP/IP

- Abbreviation for Transmission Control Protocol/Internet Protocol
- Rule for data communication in the Internet
- A data is sent as several packets and the entire data is not sent at a time

every file on the Internet, no matter what its protocol, has a unique URL (Uniform Resource Locator - address of information). URL specifies the internet address of a file stored on a host computer (server), connected to the Internet. Web browsers use the URL to retrieve (software)

DNS refers to a network service that associates host names (alphanumeric) with their equivalent TCP/IP address. This is done by the means of a standard look-up table

### DNS: Domain Name Server

Role

- a mechanism to make it easier for humans to use the Internet.

Keywords

- Domain name
- DNS
- Name server

• For example, 207.46.192.254 is also www.microsoft.com

### Why is domain name/DNS necessary?

- Computers on the Internet can only communicate with an IP address
  - It's difficult to remember IP addresses.
- It would be nice if we can use names instead of numbers.

Domain name/DNS

BOOKMARK is a URL that your browser has saved

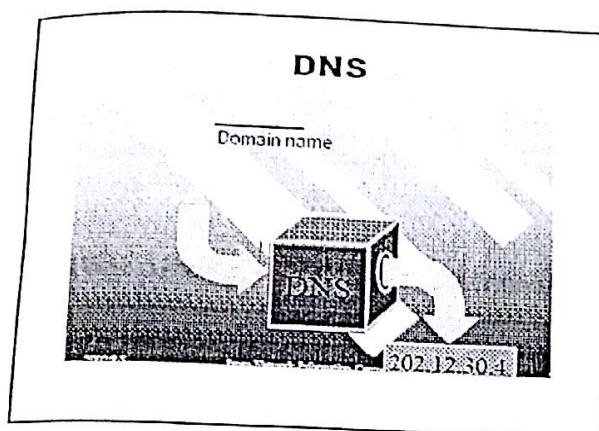
the file from the server. This file is downloaded to the user's computer, or client and displayed on the monitor connected to the m/c.

### ANATOMY OF URL :-

protocol://host/path/filename

PROTOCOL Host 2<sup>nd</sup> LDN TLDN directory /  
http://www.dce.edu/Academics/  
antiragging.php

file name



[www.example.co.jp](http://www.example.co.jp)

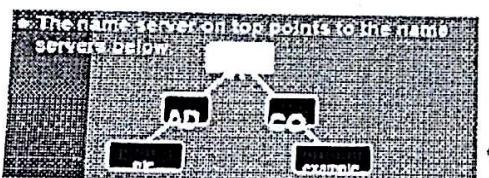
- jp : country or area
  - co: company or organizations or group
  - example: company name or group name
  - www : host name
- There is no distinction between capital letters and small letters.

[www.nic.ad.jp](http://www.nic.ad.jp)

### DNS has hierarchical Structure (tree structure)

#### Hierarchical Structure (Tree Structure)

- mechanism to coordinate the database, which has been divided up and spread out.



7. top - level domains currently in use :-

- .com = commercial
- .gov = government
- .edu = educational
- .net = networks
- .org = other organizations (often nonprofits)
- .mil = military installations
- Two-letter country codes for geographic sites:
  - .au (Australia), .uk (United Kingdom), .ae (United Arab Emirates), .zw (Zimbabwe)

Domain

. jp

→ country / purpose commonality

company      group

nest      2<sup>nd</sup> LDN      Top level DN  
www. microsoft.com

207.46.192.254

- .biz - registered companies
- .store - net-shopping sites
- .arts - art-related and creative sites
- .web - things pertaining to the WWW
- .rec - recreational subject matter
- .info - informational sites
- .name - personal sites

## HTTP (HyperText Transfer Protocol)

- **Viewing websites**
- **HTTP** (HyperText Transfer Protocol) transmits hypertext over networks. This is the protocol of the Web.

Internet Explorer Home Help

File Edit View History Bookmarks Tools Help

http://www.internetducks.net

## E-mail (Simple Mail Transport Protocol or SMTP):

- **Sending/Receiving E-mail**
- **E-mail** (Simple Mail Transport Protocol or SMTP): distributes e-mail messages and attached files to one or more electronic



## FTP (File Transfer Protocol):

- **FTP** (File Transfer Protocol): transfers files between an FTP server and a computer, for example, to download software.

