# CHAPTER 1
# Introduction to the Internet & the WWW

# REVISION

- **IN 5 MINUTES, PLEASE FIND THE ANSWER FOR THE CROSS WORD PUZZLE GIVEN.**

- Click here

# History of the Internet

- J.C.R. Licklider
  - envisioned "Galactic Network" concept - a globally interconnected set of computers through which everyone could quickly access data and programs from any site (MIT, Aug 1962)
  - 1st head of the computer research program at DARPA (Oct 1962)
- Lawrence G. Roberts
  - develop the computer network concept & publish ARPANET (DARPA, 1967)
  - ARPANET had been turned over to the Defense Communications Agency
- Ira Fuchs and Greydon Freeman (1981)
  - devised BITNET, which linked academic mainframe computers for electronic mail

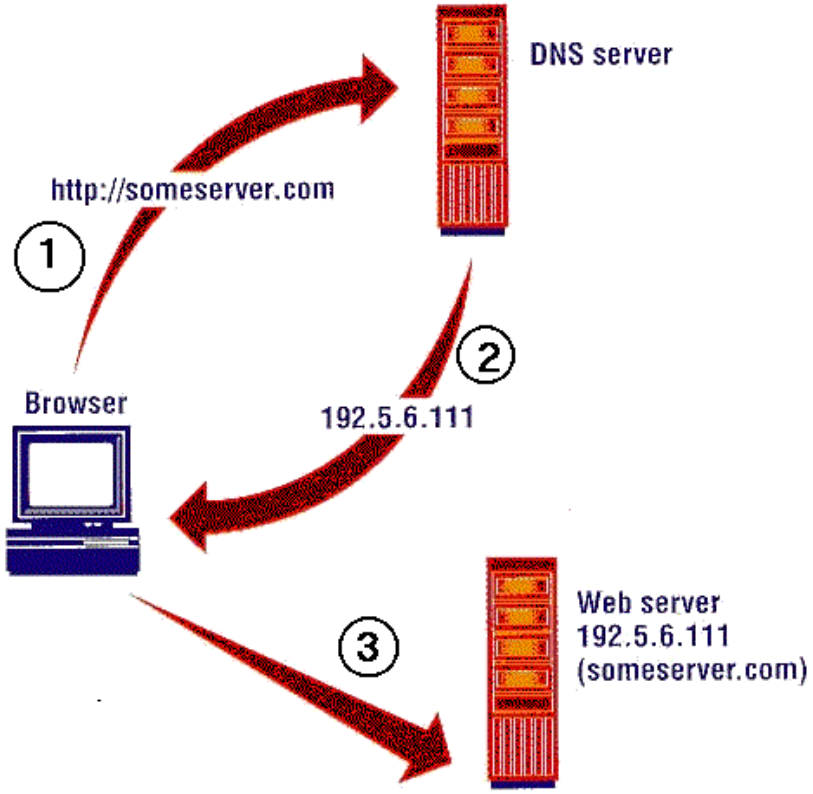
# History of the Internet

- CSNET- 1981
  - National Science Foundation (NSF) developed the Computer Science Network (CSNET) (1981) to extend the ARPANET networking benefits for computer science departments at academic & research institutions.
  - The Internet protocol suite (TCP/IP) was standardized, and consequently, the concept of a world-wide network of interconnected TCP/IP networks, called the Internet, was introduced. (1982)
  - Commercial Internet service providers(ISPs) began to emerge in the late 1980s and early 1990s.

# How does the internet work?

What is the internet?

- A huge collection of computers connected by **TCP/IP** (Transmission Control Protocol/Internet Protocol) i a network
  - IP addresses
    - Set of four integers uniquely identifying eac node
    - Example: 128.135.197.7
  - Since numbers are difficult remember, the Internet evolved DNS addresses

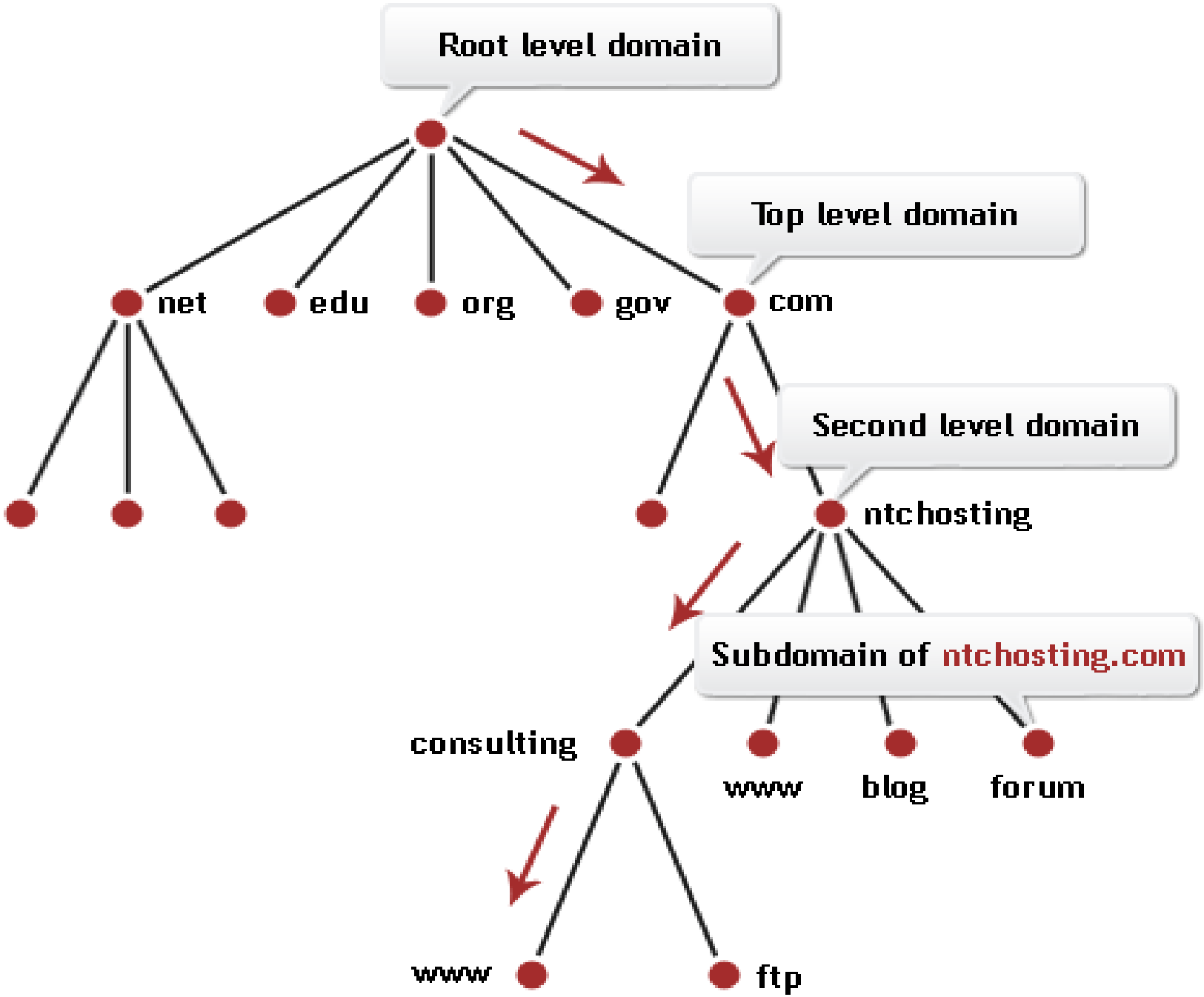


# Internet Protocol (IP)

- Computers are identified by unique numeric addresses
- Form: 32-bit binary number
- Example : **191.57.126.0** to **191.57.126.255** has 256 IP addresses
- Written as four 8-bit numbers, separated by periods
- Organizations are assigned groups of IPs for their computers

# Domain Name System (DNS)

- DNS translates domain names to network addresses. For example:
  - altavista.com is 192.136.112.39
- Separate domain administrations:
  - Defined types: COM, EDU, GOV, BIZ, TEL, NET, ORG, INFO, NAME, MOBI
  - Countries: US, JP, FR, MY, RU, CH, UK, etc.
- Tree structured directory
- A DNS address (`ftmk.utem.edu.my`) consists of:
  - Domain name for organizations (**`ftmk.utem.edu.my`**)
    - institutional site name (**`ftmk.utem`**)
    - top-level domain(tld) name (**`edu.my`**)
  - host name for individual machines (**`ftmk`**)


Root level domain
Top level domain
net
edu
org
gov
com
Second level domain
ntchosting
Subdomain of ntchosting.com
consulting
www
blog
forum
www
ftp

# Domain naming rules

- Max 255 characters per name
- From 2 to 5 labels per domain name
  - faizal.uhost.co.tv has 4 labels
- Labels of up to 63 characters
- Allowable characters are A-Z, 0-9, and '-'
- Domain names are not case sensitive
  - Other parts of a URL may be case sensitive
- Trademark owners get preference

# World Wide Web (Web)

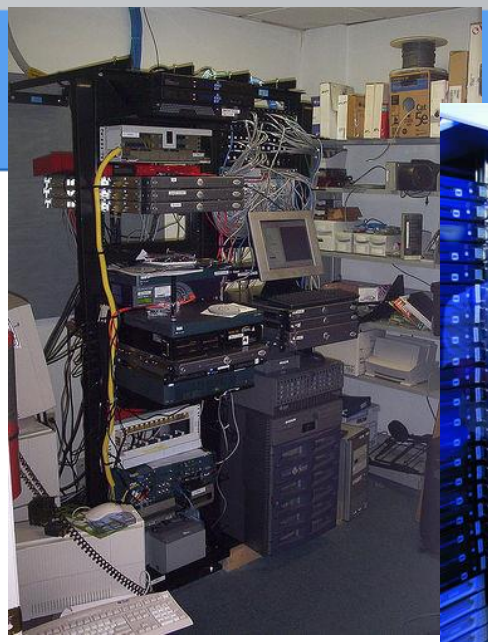
- Web allows computer users to locate and view multimedia-based documents on almost any subject over the Internet
- Web is an application to share and access Web documents on top of the Internet
  - Other applications: email, FTP, newsgroups, instant messaging, etc.
- Founded by Tim Berners Lee of CERN, 1989
- The WWW is *not* the Internet
- Tim developed a technology for sharing information via hyperlinked text documents called HTML
- Tim also wrote communication protocols to form the backbone of the WWW. He wrote the Hypertext Transfer Protocol (HTTP) – a communication protocol used to send information over the Web
- Web documents (Web pages) are formatted in HyperText Markup Language(HTML)

# Web browsers

- Client software  that allows users to access the Web's rich content
  - Microsoft's Internet Explorer, Mozilla' Firefox, Apple's Safari & Opera Software's Opera
- People use web browsers to access th information available on the Web & to share or exchange the content with other users
- May include tools for e-mail, address book, news, Web authoring, etc.
- May run programs in Java, Javascript, ActiveX, or Shockwave
- Records data in Cookies, logs, cache

# Web Servers

- A specialized software that responds to client requests (typically from a web browser) by providing resources such as HTML documents.
- E.g. Apache HTTP Server, Microsoft Internet Information Server (IIS) etc.
- Provides access to files
- Runs programs in CGI, Perl, Java, C, etc.
- May support relational database (Oracle, DB2, SQL Server, etc.)
- May provide access to legacy applications
- May log access requests



# Uniform Resource Locator (URL)

- All Web pages are addressed with URLs
- Format: *protocol:address*
  - *protocol* may be
    - ftp, http, mailto, telnet, etc
  - *address* specifies
    - A server name
    - A directory path (optional)
    - A filename
- Example:
  - http://www.eftmk.utem.edu.my/bitm2113/rajah1.png

# MIME

- MIME stands for Multipurpose Internet Mail Extensions (MIME)
- Originally developed for email
- Used to specify to the browser the form of a file returned by the server (attached by the server to the beginning of the document)
- Form: type/subtype
  - Examples: text/plain, text/html, image/gif, image/jpeg
- Server gets type from the requested file name's suffix
  - *.html implies text/html
- Browser gets the type explicitly from the server
- Experimental types
  - Subtype begins with x-, example, video/x-msvideo
  - Experimental subtypes are added to MIME specification stored in user's Web server.
- Experimental types require the server to send a helper application or plug-in so the browser can deal with the file

# HTTP - Hyper Text Transfer Protocol

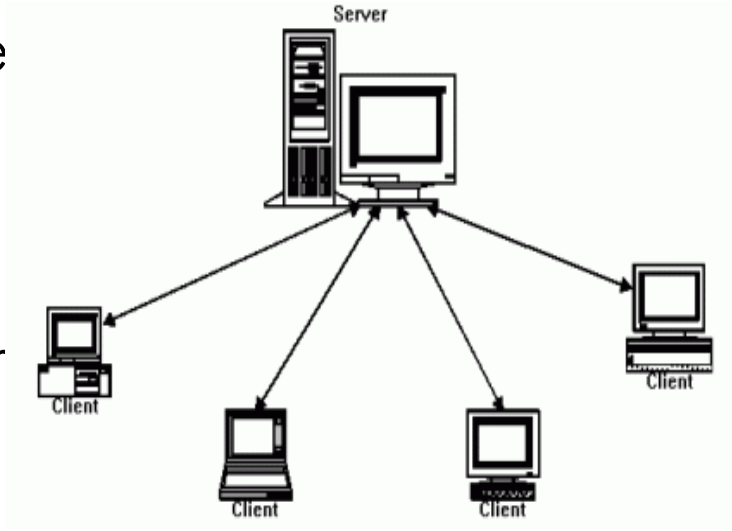
- Transactions between client and server
  - Client connects
  - Client makes one or more Reque
  - Server Responds to Requests
  - Client drops connection
- Http client request has three parts:

  1) Method, document URL, HTTP ver

  Most frequently used methods are:
  - GET request a document or data
  - HEAD request document attributes only
  - POST send data to server

  2) Browser type, OS, and acceptable media

  3) Optional data



# HTTP request example

```
GET /articles/news/today.asp HTTP/1.1
Accept: */*
Accept-Language: en-us
Connection: Keep-Alive
Host: localhost
Referer: http://localhost/links.asp
User-Agent: Mozilla/4.0 (compatible; MSIE 5.5; Windows
   NT 5.0)
Accept-Encoding: gzip, deflate
```

The header of a request must be followed by a blank line, which is used to separate the header from the body of the request.

# HTTP server response

- Response has three parts:
- 1) HTTP version, response code, message
- 2) Header information
  - Date and time
  - Server type
  - Last modified date and time
  - Content type and length
- 3) Body (optional)

# Response Phase Form

Status line
Response header fields
blank line
Response body

Status line format:

HTTP version  status code  explanation
Example: `HTTP/1.1  200  OK`

Status code is a three-digit number; first digit specifies the general status

1 => Informational
2 => Success
3 => Redirection
4 => Client error
5 => Server error

Status code 404 is for?????

# HTTP response example

- The header field, **`Content-type`**, is required
- An example of a complete response header:

```
HTTP/1.1  200  OK
Date: Mon, 27 Jun 2002 17:22:47 GMT
Server: Apache/1.3.22 (Unix) (Red-Hat/Linux)
Last-modified: Wed, 26 Jun 2002 18:12:29 GMT
Accept-ranges: bytes
Content-length: 75
Connection: close
Content-type: text/html

<HTML>
<BODY>
....
```

# Scriptings

- Client-side scripting
  - Validates user input
  - Accesses the browser
  - Enhances Web pages with ActiveX® controls, applets, etc.
  - Manipulates browser documents
- Client-side validation
  - Reduces number of requests that need to be passed to server
- Client-side scripting limitations
  - Browser dependency
  - Viewable to users through View Source command
- Example of Client-side scripting – JavaScript, VBScripts

# Scriptings

- Server-side scripts
  - Provides programmers greater flexibility
  - Generates custom responses for clients
  - Contains greater programmatic capabilities than client-side equivalents
  - Has access to server-side software that extend server fu
  - Example of serv
    JSP, CGI/Perl