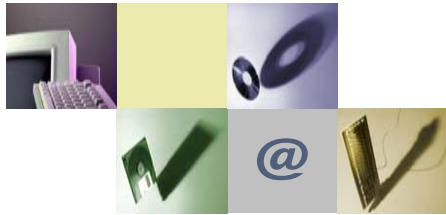


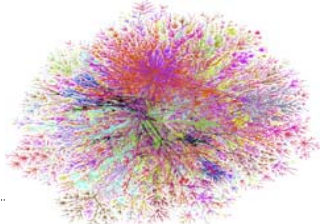
Internet



Digital Computer Concept and Practice

Introduction

- A large network made up of a number of smaller networks irrespective of OS or kinds of computers.
- A worldwide, publicly accessible series of interconnected computer networks that transmit data by packet switching using TCP/IP protocol .
- Internet is decentralized.
 - Each internet computer (a host) is independent.



Different colors based on IP address
<http://research.lumeta.com/ches/map>



Introduction

- ARPANET (1969)
 - ARPA (Advanced Research Project Agency) Network
- Explosive growth in mid- to late-80's.
 - Government → academia → research labs → corporations → individuals
- Goal: Exchange of information



http://mappa.mundi.net/maps/maps_001/



Introduction

- Intranet
 - A private enterprise network that uses internet and web technologies for information gathering and distribution within an organization.
- Extranet
 - A community of interest created by extending an intranet to selected entities external to an organization.



Requirements of Internet Uses

- Computer
- Modem or LAN card
- Browser
- ISP (Internet Service Provider)
 - A company or business that provides access to the internet and related services
- NIC (Network Information Center)
 - IP address, domain name

Internet protocol
Internet address
Internet services (WWW, E-mail, FTP)



TCP/IP

- TCP (Transmission Control Protocol)
 - A set of rules to exchange messages with other internet points at the information packet level.
 - Provides reliable, in-order delivery of a stream of bytes, making it suitable for applications like file transfer and e-mail.
- IP (Internet Protocol)
 - A set of rules to send and receive messages at the internet address level.
 - Provides the service of communicable unique global addressing among computers.
 - Messages → Packets



(1) Internet Protocol

- Protocol
 - Can be defined as a set of rules governing the syntax, semantics and synchronization of communication.
 - Communication by sending or receiving packets
 - Rules for converting a "message" into "packets"
- TCP/IP
 - A set of rules to enable computers to communicate over a network (internet).



(2) Internet Address

- IP address (IPv4)
 - A unique identifier for a computer or device on a TCP/IP network.
 - Uses 32-bit (4-byte) addresses, which limits the address space to 2^{32} possible unique addresses → IPv6
 - Written as four numbers separated by periods.

An IPv4 address (dotted-decimal notation)

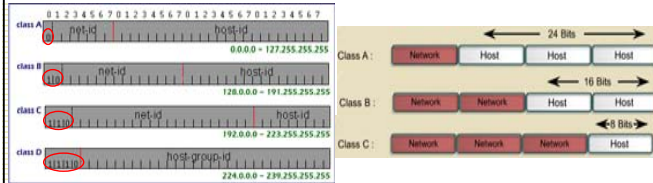
172 . 16 . 254 . 1
↓ ↓ ↓ ↓
10101100.00010000.11111110.00000001
└──────────┬──────────┘
One byte = Eight bits
└──────────────────────────┘
Thirty-two bits (4 * 8), or 4 bytes

- Network address + host address
cf.) MAC (Media Access Control) address



IP Address

IP address class



- Class A: large organizations, governments
- Class B: medium-sized organizations
- Class C: small organizations



DNS (Domain Name System)

- Using IP address only?
- DNS
 - Internet system to translate domain names into IP addresses
 - Serves as a 'phone book' for Internet by translating human-readable computer hostnames e.g. 147.46.10.20 → portal.snu.ac.kr
- Domain name: host name + domain name
 - portal.snu.ac.kr
 - └ host └ domain



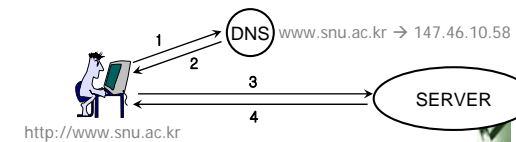
Port

- Several programs in a computer use the same network → Assign a unique number (port) to each program
- Port number is a way to identify a specific process to which an internet or other network message is to be forwarded when it arrives at a server.
- Needs "IP address" and "port" to communicate with other computers .
- Common port numbers
 - WWW: 80
 - FTP: 21
 - Telnet: 23

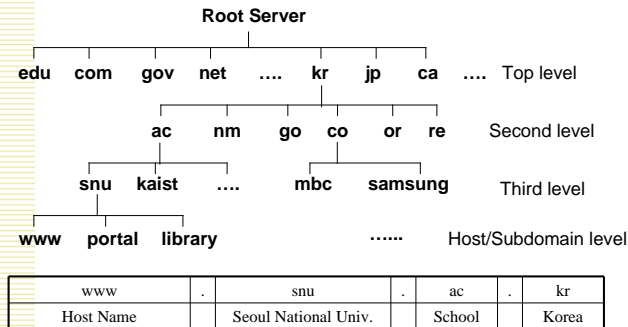


DNS (Domain Name System)

- DNS server
 - The DNS consists of a hierarchical set of DNS servers.
 - DNS server translates a domain name into the corresponding IP address.
 - If a host does not know the IP address of a domain name → ask a name server
 - e.g. SNU: 147.46.80.1, 147.46.37.10



Domains



Internet Services

- Telnet
 - Telnet is a common way to remotely control servers.
 - Windows telnet program
- Usenet (User's Network)
 - Usenet is a global, distributed Internet discussion system.
 - Outlook Express
- Internet chatting
 - IRC (Internet Relay Chatting): mIRC
 - IM (Instant messenger): MSN (Live) messenger, NateON
- P2P (peer to peer)
 - Napster, eMule, Pruna



(3) Internet Services

- WWW (World Wide Web)
 - Supports text, images, videos, and other multimedia and navigates between them using hyperlinks.
 - Internet Explorer, Firefox, Netscape, ...
- E-mail (Electronic Mail)
 - Internet mailing systems
 - Web mail service: Hanmail, Hotmail, Gmail, etc
 - Mailer: Outlook Express, Thunderbird
- FTP (File Transport Protocol)
 - Used to transfer data (file) through a network.
 - ALFTP, Cute FTP



WWW (World Wide Web)

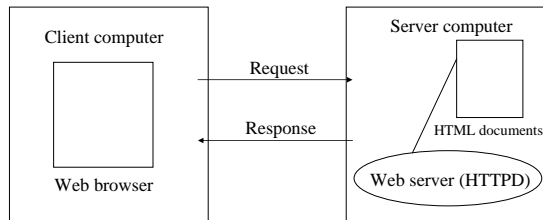
- A system of interlinked hypertext documents accessed via the Internet.
- Created by Sir Tim Berners-Lee, working at CERN in Geneva, Switzerland (1989).
- Web browser: Mosaic (1993)
 - Various protocols support
 - FTP, Gopher, News, Mail etc.
 - Graphic interface

- HTTP
- URL
- HTML



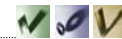
HTTP (Hypertext Transfer Protocol)

- A communications protocol for the transfer of information on the WWW.
- Client /Server structure



HTML (HyperText Markup Language)

- HTML is the predominant markup language for Web documents.
- Represents the structure and layout of a Web document using tags and their attributes.
- HTML tags
 - <HTML></HTML>
 - <HEAD></HEAD>
 - <TITLE></TITLE>
 - <BODY></BODY>



URL (Uniform Resource Locator)

- Global address of documents and other resources on the World Wide Web
- URL format

Protocol://Domain (IP) address [:Port number] / Directory / File

- `http://www.naver.com:80/index.html`
 - 80 can be omitted (default port number)
 - URL does not specifies a filename → transmit "index.html"



E-mail

- Email Address: `bcbae@icomf.idis.or.kr`
- Using E-mail: Web services or e-mail clients
- E-mail protocol
 - SMTP (Simple Message Transfer Protocol)
 - Standard protocol for e-mail transmissions across the Internet.
 - POP3 (Post Office Protocol 3)
 - Local e-mail clients use the POP3 to retrieve e-mail from a remote server over a TCP/IP connection.
 - POP3 support → Can use e-mail clients
- E-mail structure
 - Header: receiver, sender, title, date, cc, bcc
 - Contents

