The Internet

Wasara Rodhetbhai
wasara@cp.su.ac.th

Today...

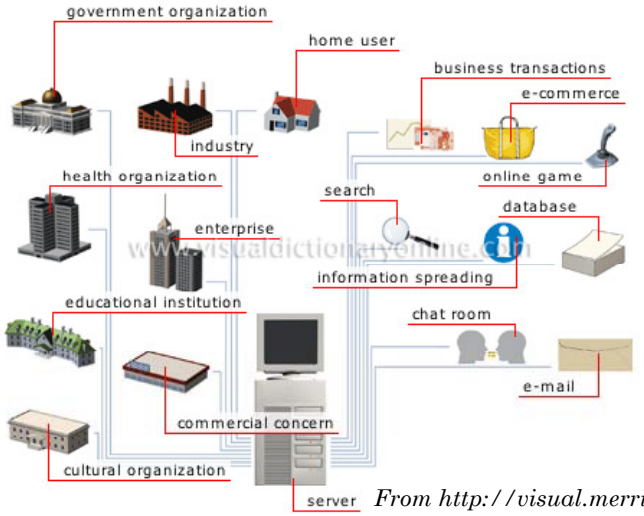
- What is? How does?
- Services on the Internet
- WWW
- Web Services
- Cyber Crime

Internet

- The Internet is a global system of interconnected computer networks that use the standardized Internet Protocol Suite (TCP/IP: Transmission Control Protocol / Internet Protocol).
- It is a network of networks that consists of millions of private and public, academic, business, and government networks of local to global scope that are linked by copper wires, fiber-optic cables, wireless connections, and other technologies.

****from wikipedia*

Use of the Internet



From http://visual.merriam-webster.com

Birth of the Net

- 1960: The Internet grew out of an experiment by the U.S. Department of Defense.
- The DoD wanted to create a computer network that would continue to function in the event of a disaster, such as a nuclear war. If part of the network was damaged or destroyed, the rest of the system still had to work.
- That network was ARPANET (Advanced Research Projects Agency Network) which linked U.S. scientific and academic researchers.

Birth of the Net

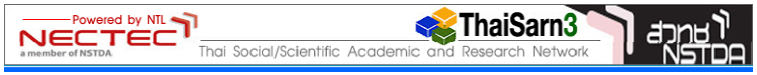
- In 1985, the National Science Foundation (NSF), an American research organization, created NSFNET, a series of networks for research and education communication.
- Based on ARPANET protocols, the NSFNET created a national backbone service, provided free to any American research and educational institution.
- At the same time, regional networks were created to link individual institutions with the national backbone service.

Birth of the Net

- NSFNET grew rapidly as people discovered its potential and as new software applications were created to make access easier.
- Corporations such as Sprint and MCI began to build their own networks that they then linked to NSFNET. When commercial firms and other regional network providers took over the operation of the major Internet arteries, NSF withdrew from the backbone business.

Internet in Thailand

- อินเทอร์เน็ตในประเทศไทยเชื่อมต่อครั้งแรกในปี พ.ศ.2530 โดย ม.สงขลานครินทร์ และ สถาบันเทคโนโลยีแห่งเอเชีย (AIT) เพื่อรับส่งข้อมูลจากโครงการ IDP ประเทศออสเตรเลีย
- พ.ศ.2535 NECTEC เชื่อมโยงเครือข่าย 6 สถาบัน เรียกว่า ไทยสาร (ThaiSarn: Thai Social/Scientific Academic and Research Network)
- พ.ศ.2537 การสื่อสารแห่งประเทศไทยเปิดให้บริษัทเอกชนเปิดบริการอินเทอร์เน็ต

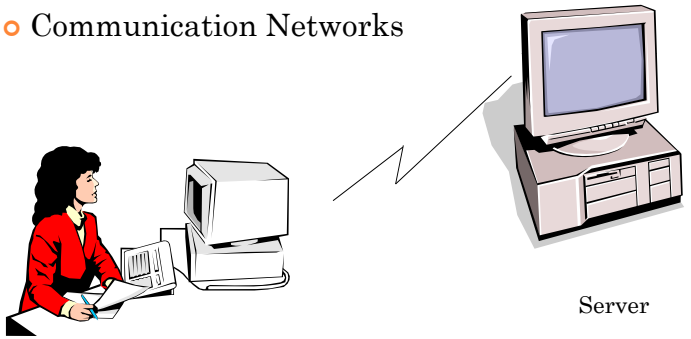


Some services on the Internet

- Telnet
- FTP
- Electronic Mail (E-mail)
- Instant Messaging (IM)
- Internet Telephony (VoIP)
- Usenet (USErs Network)
- World Wide Web (WWW)

Client &Server Architecture

- Clients - Applications that run on computers
- Servers - Computers or processes that manage network resources
- Communication Networks



Client

Server

TCP (Transmission Control Protocol)

- adds multiplexing, guaranteed message delivery on top of IP
- multiplexing: multiple programs using the same IP address
- port: a number given to each program or service
  - port 80: web browser (port 443 for secure browsing)
  - port 25: email
  - port 22: ssh
  - port 5190: AOL Instant Messenger
  - Etc.

IP Protocol and IP address

- IP Protocol: simple protocol for attempting to send data between two computers.
- All computer in the Internet has its own unique number which is called **IP Address** or **Internet Address**. IP Address is compared as "the house number of a computer"
- Managing IP address is a duty of the **Internet Network Information Center (InterNIC)**
- IP uses 32-bit (four-byte) addresses, which limits the address space to 4,294,967,296 (2^{32}) possible unique addresses.

เลขฐานสอง	11111111.00000000.11111111.00000000
เลขฐานสิบ	255 . 0 . 255 . 0

IP Address class

- IP address can be separated into 5 Classes

CLASS	RANGE
A	0.0.0.0-127.255.255.255
B	128.0.0.0-191.255.255.255
C	192.0.0.0-223.255.255.255
D	224.0.0.0-239.255.255.255
E	240.0.0.0-247.255.255.255

- You can check your IP address of your computer : http://whatismyip.com
- IPV6 Overcome IPv4 scaling problem , It is 128 bits - written as eight 16-bit hex numbers.

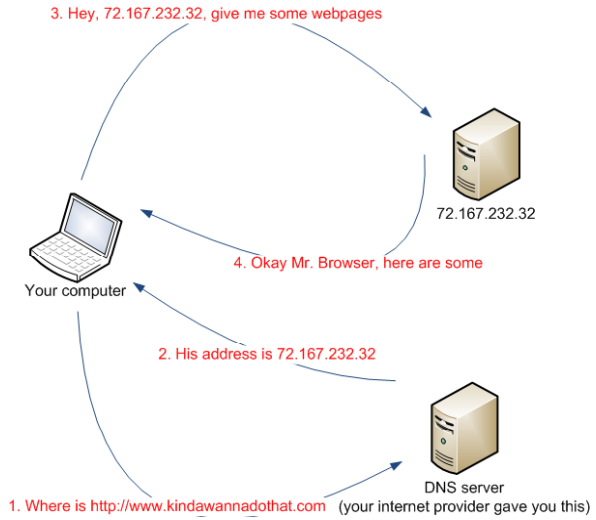
```
5f1b:df00:ce3e:e200:0020:0800:2078:e3e3
```


DNS (Domain Name Service)

- Domain Name System (DNS) provides such a system for converting names to IP addresses and IP addresses to names.

203.107.136.6 -> www.sanook.com

- The domain name system is often described in analogy to the telephone system directory information systems in which subscriber names are translated to telephone numbers.
- **DNS name server** is a server that stores the DNS records and responds with answers to queries against its database.



THNIC : Thailand Network Information Center (http://www.thnic.net) : for domain name registration in Thailand.

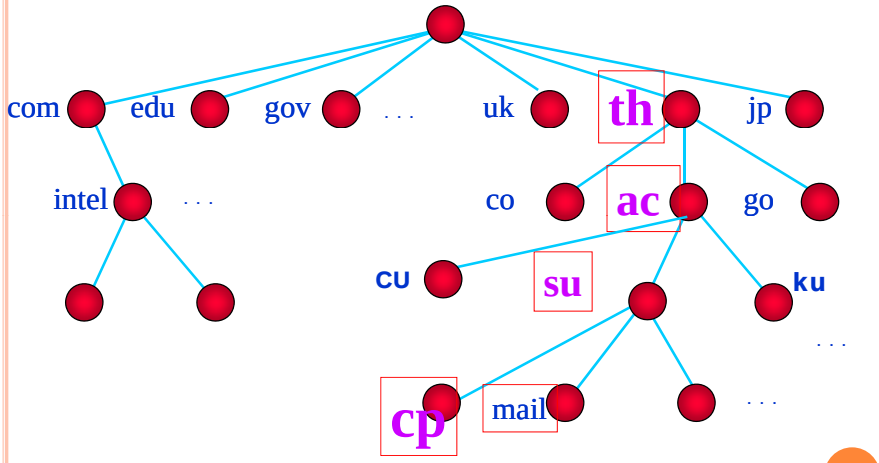
General Internet DNS Top Level Domains:gTLDs

- Generic domain was a set of "general purpose domains": mostly have 3 alphabets. Widely used in USA.
  - edu – education
  - com – commercial
  - gov – government
  - int – international
  - mil – military
  - net – network
  - org – organization

Country Code Top Level Domains: ccTLDs)

- is an Internet top-level domain generally used or reserved for a country (a sovereign state or a dependent territory).
  - th Thailand
  - cn China
  - uk United Kingdom
  - jp Japan
  - sg Singapore
  - au Australia

DNS



cp.su.ac.th

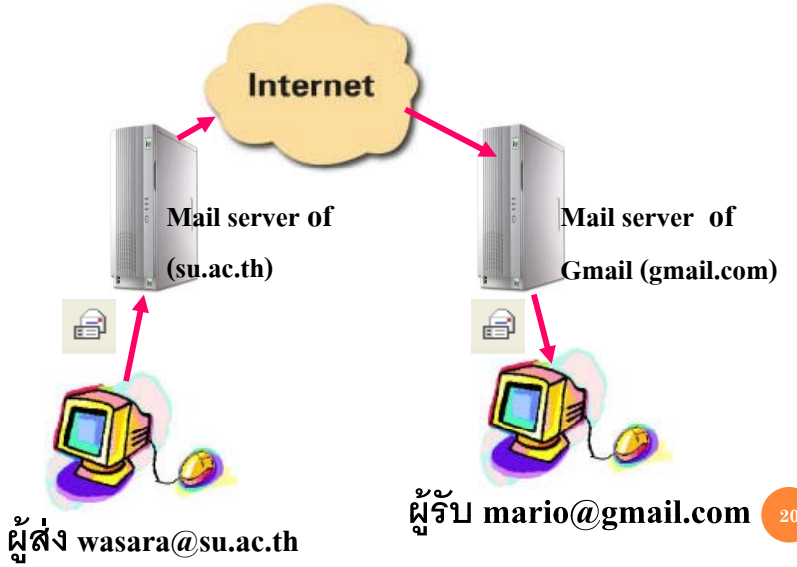
Email

- e-mail address contains

Username@domain name

wasara@su.ac.th

- E-mail is sent and received through electronic "post offices" known as **mail servers**.
- To read your e-mail, you must retrieve it from the **mail server**.



2 Types of E-mail

- Corporate e-mail is email which created for employees or people in companies or organization. For example wasara@su.ac.th
- Free e-mail is an email that you can subscribe and use for free. Mostly they are web mail system.
  - Gmail www.gmail.com
  - Hotmail www.hotmail.com
  - Yahoo Mail www.yahoo.com
  - Thai Mail www.thaimail.com
  - Chaiyo Mail www.chaiyo.com

Instant Messaging (IM)

- is a collection of technologies that create the possibility of real-time text-based communication between two or more participants over the internet or some form of internal network/intranet.
- Many instant messaging services have begun to offer video conferencing features, Voice Over IP (VoIP) and web conferencing services.
- Example application: IRC, ICQ, Yahoo, MSN, Gtalk, skype

Sanctioned Uses of IM

- Customer Service
- Inter-Office, Inter-Department, Inter-Branch Communication
- Status Reports
- Ad-hoc Online Meetings

Unsanctioned Uses of IM

- Chatting with friends and family
- Cybersex
- Group chatting or chat rooms
- Gaming

FTP(File Transfer Protocol)

- Allows a user to copy files to/from remote hosts

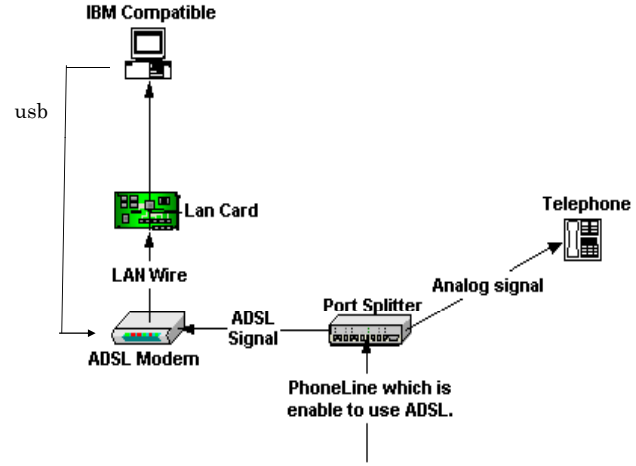
STEP

- Client program connects to FTP server
- provides a login id and password
- allows the user to explore the directories
- and download and upload files with the server

- FTP server example: ftp://ftp.nectec.or.th
- FTP client example:ws-ftp, cute-ftp, securefx

How to connect

- Modem, Router
- Change digital to analogs and vice vesa



Internet Service Provider (ISP)

- Internet Thailand
- A-net Internet
- Internet KSC
- Loxinfo Internet
- Asia Access
- KSC
- Samart Cybernet

Broadband

- High speed connection to the Internet
  - Greater than 128Kbps
  - Always on!
  - Simultaneous up-Link and down-link communication
  - Overcomes Internet frustrations
  - Made possible by digital modems
- Leading broadband access technologies
  DSL, cable, satellite, ISDN digital modems

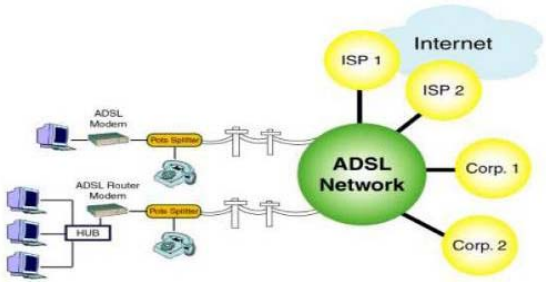
Speed Benefit

Average Download Times			
Connection Speed	Web Page (30KBytes)	3 minute Music File (3MBytes)	30 second Video/Movie (50 MBytes)
28.8 kbps	9 seconds	15 minutes	4 hours
56 kbps	4.5 seconds	7.5 minutes	2 hours
ISDN (144 kbps)	2 seconds	3 minutes	55 minutes
DSL (1.5Mbps)	<1 seconds	15 seconds	5 minutes

** from http://japan.xilinx.com

ADSL (Asymmetric Digital Subscriber Line) is a technology for transmitting digital information at high bandwidths on existing phone lines to homes and businesses. Unlike regular dial-up phone service, ADSL provides continously-available, "always on" connection.

ADSL is asymmetric in that it uses most of the channel to transmit downstream to the user and only a small part to receive information from the user.



WWW (World Wide Web)

- WWW is client-server architecture.
- WWW created in 1989-91 by Tim Berners-Lee
- popular web browsers released: Netscape 1994, IE 1995
- Amazon.com opened in 1995; Google.com - January 1996

Web Browser

- A web browser is the software program you use to access the World Wide Web, the graphical portion of the Internet.
- NCSA Mosaic (early 1990s) is the first browser. It was developed at the National Center for Supercomputing Applications.
- Microsoft Internet Explorer and Netscape Navigator are the two most popular ones in that time.
- Currently, there are many web browsers. Name it..IE, Opera, Firefox, Maxton, Google Chrome.

Web Server

- Web Server : the remote computers that store electronic files.
- Software that listens for web page requests using protocol.
  - Apache
  - Microsoft Internet Information Server (IIS)

STEP

- Browser requests the web page from the web server that hosts the requested site.
- The server sends the data over the Internet to your computer.
- Your web browser interprets the data, displaying it on your computer screen.

URL: UNIFORM RESOURCE LOCATOR

- an identifier for the location of a document on a web site

http://www.su.ac.th/info/regisstepp/index.html

- upon entering this URL into the browser, it would:
  1. ask the DNS server for the IP address of www.su.ac.th
  2. connect to that IP address at port 80
  3. ask the server to GET /info/regisstepp/index.html
  4. display the resulting page on the screen

NAVIGATING THE WEB

- The "glue" that holds the Web together is called **hypertext and hyperlinks**. This feature allows electronic files on the Web to be linked so you can jump easily between them.
- On the Web, you navigate through pages of information--commonly known as **browsing** or **surfing**--based on what interests you at that particular moment.
- Web pages are written in a computer language called **Hypertext Markup Language** or **HTML**.

HTML EXAMPLE

```
<!--html code starts here -->
<html>
<head>
    <title>Video Library </title>
</head>

<body bgcolor="#DEDEDE">

<div align="center">
<h2>Media Streaming : Video Library Project</h2>
<h3>If you are viewing videos from this collection
    for the first time, please download
    <a href="http://localhost/videofiles/StreamingMediaPlayer.msi">
    Streaming Media Player</a>
<br />
<a href="ums:\\TCP:localhost:5119\videofiles\hrm.mpg">
Introduction Human Resource Management</a>
</h3></div>
</body> </html>
<!--html code ends here -->
```

Web Technology

- Web 1.0s
- Web 2.0
- Web 3.0
- Artificial Intelligence (AI)
- Semantic Web and SOA
- Web3D Consortium
- Composite Applications
- Scalable Vector Graphics (SVG)
- Semantic Wiki
- Metadata (Data About Data)

Web Search tool

- Tool designed to search for information on the World Wide Web. The search results are usually presented in a list.
- Example: (Thai) Thaiseek, Thaifind, Hotsearch
  : Google search, altravista
- Internet search tools fall into two main groups. **The directory-based search services** is typified by "Yahoo" and "Lycos." A second category, **the search engine**, is represented by other web sites such as "Hotbot" and "Alta Vista."

Directory-based search services

- the primary frame of reference is the subject matter. The site listings are compiled and reviewed manually.
- For example, Yahoo, the best known Internet Directory, dedicates staff to review and categorize site suggestions and then adds them to a specific directory on Yahoo.
- The directory structure is hierarchical and starts with a general subject heading such as dentistry.

The Search Engine

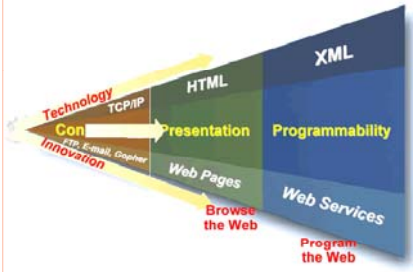
- completely automates the process of indexing the sites and totally removes the human component.
- A software robot called a spider or crawler gathers sites from across the web as it scans pages and connects to associated links.
- One particular advantage is that the spider will automatically return to the same site periodically to check for new content or new pages.

GOOGLE

- Web Search
- Image
- Map
- Scholar
- Calendar
- GTalk
- Gmail

WEB SERVICES

- A web service is programmable application logic accessible via standard Web protocols.
- Available to a variety of clients (platform independent).
- Examples: stock quote, weather, and work flow, team collaboration.
- Makes building distributed applications easy.
- an application with which other applications can communicate over via a network, often using XML to encapsulate data and context, and HTTP as the transport layer.



WEB ERA

ยุคที่ 3
Web Services: A2A
publish, request & response services (sw components)

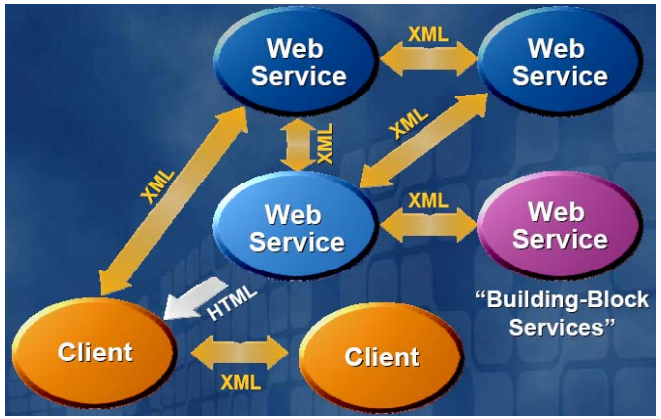
ยุคที่ 2
Dynamic Web: HTML + Database

ยุคที่ 1
Static Web: HTML
publish, request & response HTML files

COMMUNICATION AND STANDARDS

- Efficient (or indeed any) communication is dependent on a shared vocabulary and grammar.
- Because web services deals with inter-organization communication these must be universal standards.

Overview of Web Services



***From Ref.[5]*

Foundation for Web Services

Service Directory:	UDDI
Service Description:	WSDL
Service Interaction:	SOAP
Format Description:	XML Schema
Data Format:	XML
Communication Protocol:	HTTP
Communication Network:	Internet

***From Ref.[5]*

The Basic Standards for Web Services

- XML (Extensible Markup Language)
- SOAP (simple object access protocol)
- WSDL (web services description language)
- UDDI (universal description, discovery and integration)

Making a Service Available

- In order for someone to use your service they have to know about it.
- To allow users to discover a service it is published to a registry (UDDI).
- To allow users to interact with a service you must publish a description of it's interface (methods & arguments).
- This is done using WSDL.

Making a service available

- Once you have published a description of your service you must have a host set up to serve it.
- A web server is often used to deliver services (although custom application – application communication is also possible).
- This is functionality which has to be added to the web server. In the case of the apache web server a 'container' application (Tomcat) can be used to make the application (servlet) available to apache (deploying).

XML

- All Web Services documents are written in XML
- XML Schema are used to define the elements used in Web Services communication
- XML stands for extensible markup language
- It is a hierarchical data description language
- It is defined by w3c (The World Wide Web Consortium).

HTML&XML

- HTML is a presentation markup language – provides no information about content.
- There is only one standard definition of all of the tags used in HTML.
- XML can define both presentation style and give information about content.
- XML relies on custom documents defining the meaning of tags

SOAP

- SOAP is one of the standard distributed object technologies.
- Actually used to communicate with the Web Service
- Both the request and the response are SOAP messages
- The body of the message (whose grammar is defined by the WSDL) is contained within a SOAP "envelope"

UDDI

- UDDI is used to register and look up services with a central registry
- Service Providers can publish information about their business and the services that they offer
- Service consumers can look up services that are available by
  - Business
  - Service category
  - Specific service
- Presented by many companies: Ariba, Microsoft, IBM, etc.

WSDL

- Describes the Web Service and defines the functions that are exposed in the Web Service
- Defines the XML grammar to be used in the messages
- Uses the W3C Schema language

EXAMPLE OF CYBER CRIME

- HACKING – Hacker, Cracker, Script Kidder
- DENIAL OF SERVICE ATTACK
- VIRUS DISSEMINATION
- SOFTWARE PIRACY
- PORNOGRAPHY
- IRC CRIME
- CREDIT CARD FRAUD
- NET EXTORTION

EXAMPLE OF CYBER CRIME

- PHISHING
- SPOOFING
- CYBER STALKING
- CYBER DEFAMATION
- THREATENING
- SALAMI ATTACK
- WIFI HIGHJACKING

รู้ไว้ใช่ว่า ...

- กฎหมายเทคโนโลยีสารสนเทศ
- พระราชบัญญัติว่าด้วยการกระทำความผิดเกี่ยวกับคอมพิวเตอร์ พ.ศ. 2550

REFERENCE&RESOURCE

1. http://www.isoc.org/internet/
2. http://thaisarn.nectec.or.th/htmlweb/index.php
3. http://people.du.ac.in/~ssirpal/presentations/Internet.pdf
4. http://www.thejcdp.com/issue008/day/04day.htm
5. http://download.microsoft.com/download/d/4/a/d4af3ec3-5b08-439e-bdda-4a140df15eb1/Web_Services.pdf
6. http://www.wikipedia.org
7. http://www.google.com
8. http://www.w3.org

- Etc.

ASSIGNMENT

NOTE