Internet, WWW and Web accessibility

ITCS 210 Web Programming

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Section 1 : Friday 24th August 2018, 1.00-4.00p.m., IT324
Section 2 : Monday 20th August 2018, 1.00-4.00p.m., IT324
Section 3 : Thursday 21st August 2018, 9.00-12.00p.m., IT312

Class Objectives

- To know the history of internet, its components and how Internet and WWW works
- To know the basic concept of web programming
- To understand a concept of Web Accessibility and be aware of the web users with special needs.

What is Internet?

- **Internet** is the largest network in the world.
  - Network that connects many networks all over the world.
  - Communicate by the policy called TCP/IP

History of Internet

- The Internet had its origins in American research and defense work of the 1970's and 1980's.

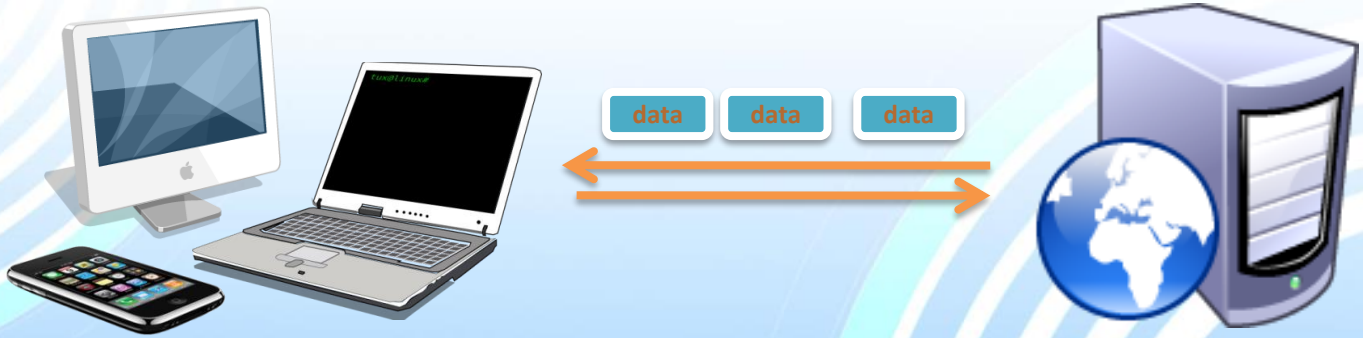
Year	Events
1966	ARPA (Advanced Research Project Agency) project had begun.
1969	First ARPANET node installed at UCLA Network Measurement Center.
1973	ARPANET had international connections to other universities.
1974	Details of TCP (Transmission Control Protocol) design was published.
1983	DNS (Domain Name Server) was designed.
1990	• ARPANET ended. • World Wide Web (WWW) has been created.

Example of Internet Usage

- Communication
  - Hotmail
  - Messenger
  - Web board
- Knowledge resource
  - Wiki.org
  - Cnn.com
- Business and service
  - Amazon.com
  - eBay.com

Internet Components

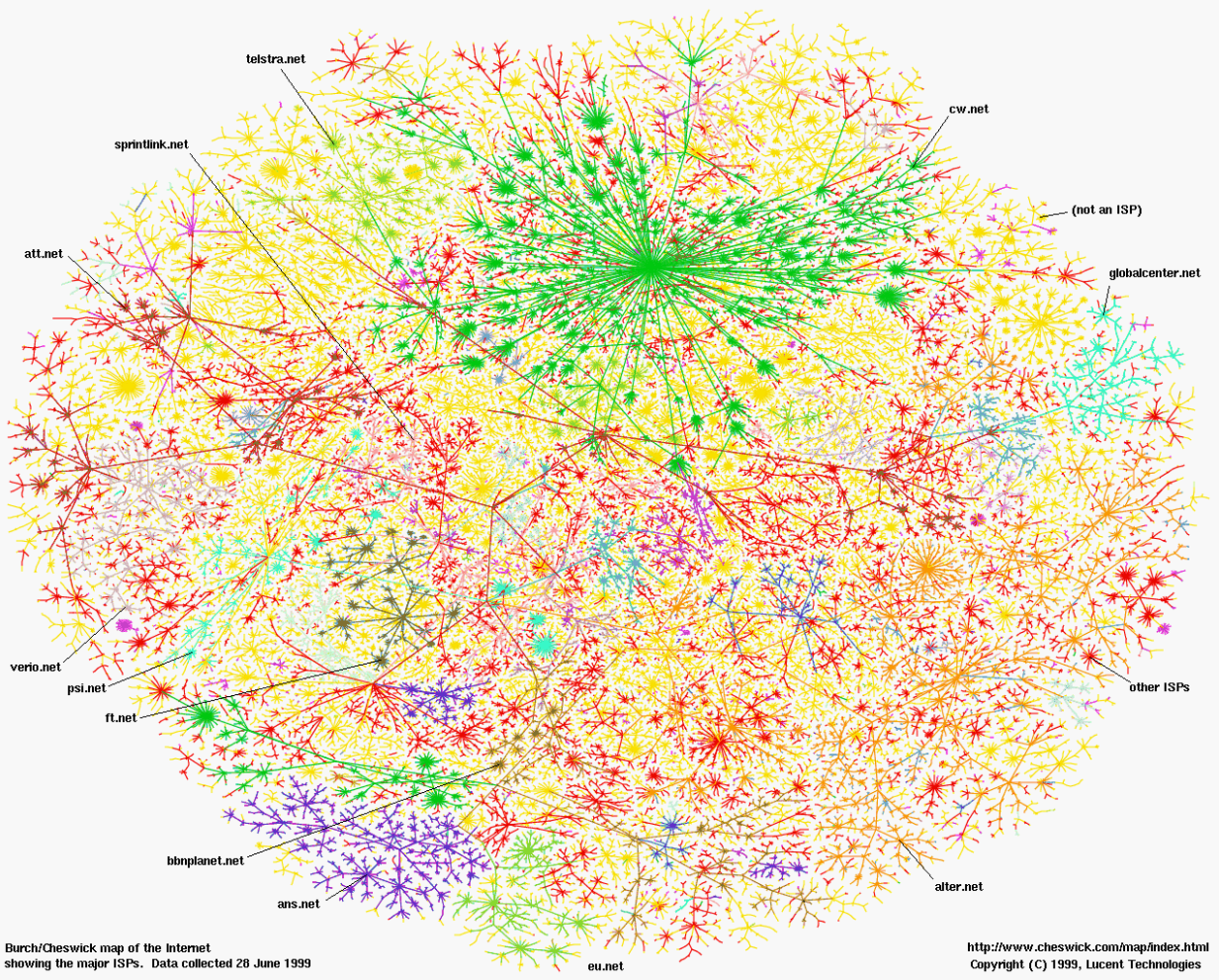
- **Client.** A computer that connects to obtain data and services from servers.
- **Server.** A computer that provides services or resources, e.g. web server, mail server.



Internet Components(cont.)

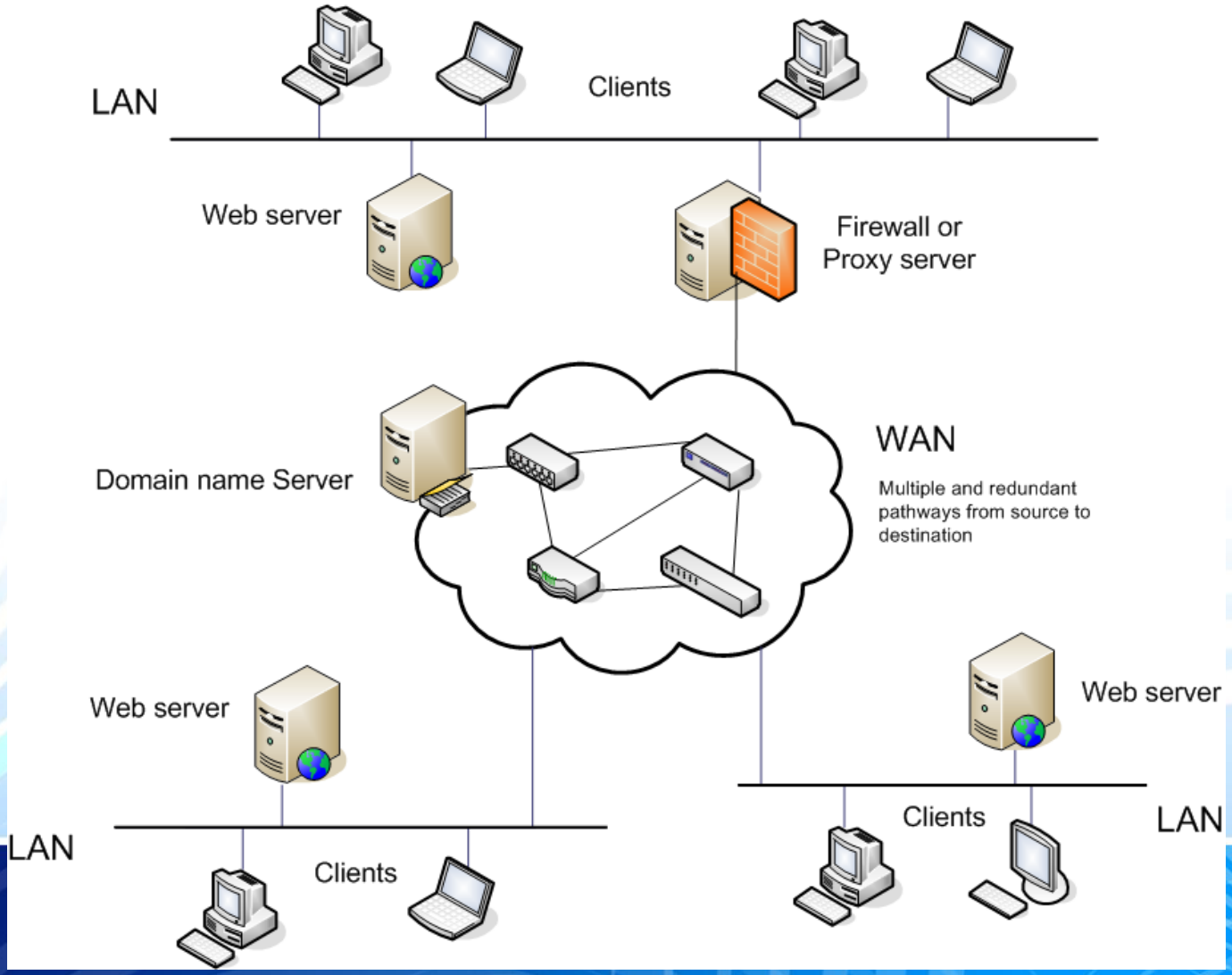
- **Network.** A group of computers connected together.
  - **Router or gateway.** A hardware connecting 2 or more networks that passes data packets from sources to the destinations.
  - **Firewall.** A hardware acts like a guard to examine data going into/out of a network for security purpose.
  - **Web proxy.** A server that provides content (web pages) caching or blocking services to browser clients.

Map of the Internet

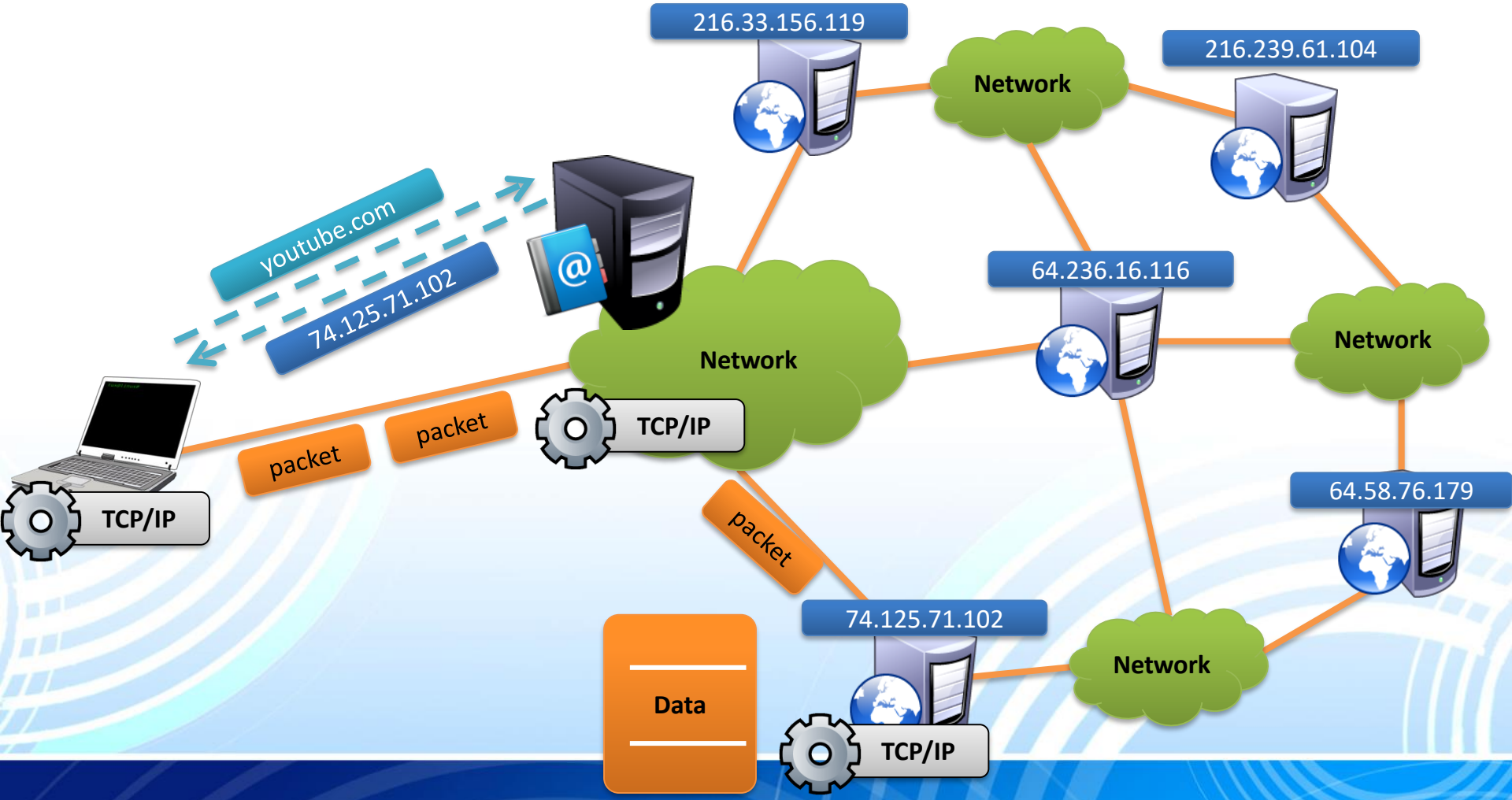


http://research.lumeta.com/ches/map/gallery/isp-ss.gif

The “Cloud” Architecture of the Internet



How Internet works



TCP/IP Protocols

- The Internet uses a **packet-switching architecture**. This divides information as chunks of data when it is sent, and provides a means for determining that all of the data arrived correctly at the target from the source.
- When you send data traffic across the Internet, a **protocol** (a predefined interaction between two computers) called the **TCP/IP** protocol is used.
  - The **Transmission Control Protocol (TCP)**
    - breaks the data into small size chunks called packets
    - Combines the packets when they arrive.
  - The **Internet Protocol (IP)** routes packets to the destination.

IP Addressing

74.125.71.102

- IP Address is numerical label that is assigned to devices participating in a network.
  - IPv4 and IPv6
- The IPv4 (mainly used) specifies that Internet addresses are in form ###.###.###.###; where each ### can run from 0 to 255 (2^8), e.g.
  - 64.236.16.116 (cnn)
  - 64.58.76.179 (yahoo)
  - 216.33.156.119 (ebay)

Services and Ports

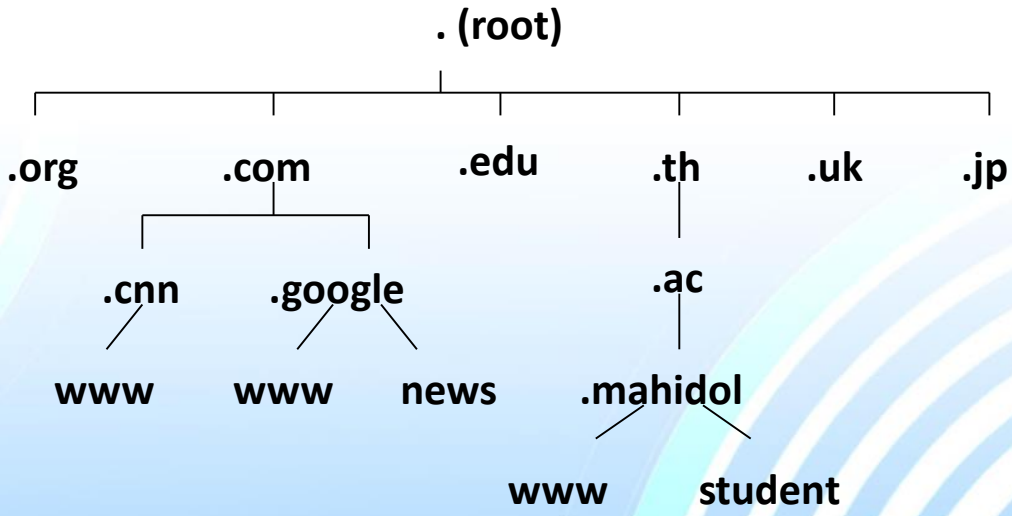
- TCP/IP defines a number of “channels”, called, **ports** that a service (server) uses for data transferring to/from clients.

- All Internet services work on top of TCP/IP protocols and have their own specific port numbers and specific protocols, e.g.
  - HTTP 80
  - FTP 21
  - Telnet 23
  - SMTP 25

Domain Name

youtube.com

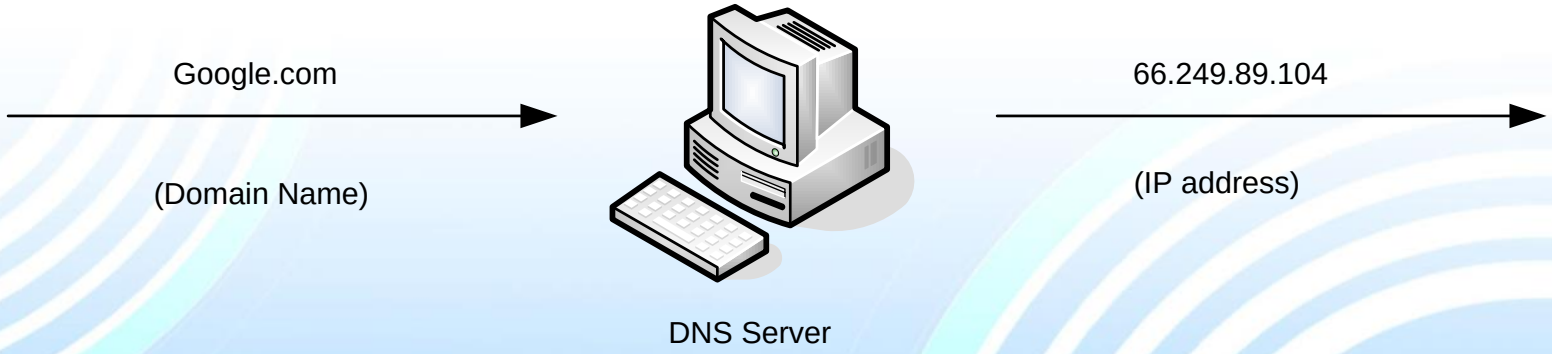
- Domain name is (roughly) text label version of IP Address
- Domain name is hierarchical structures.
  - .COM (commercial), .EDU (education), .GOV (government), .ORG (organization), .CA (Canada), among others



Domain Name Server

- A server that provides service to translate between IP addresses and friendly domain names

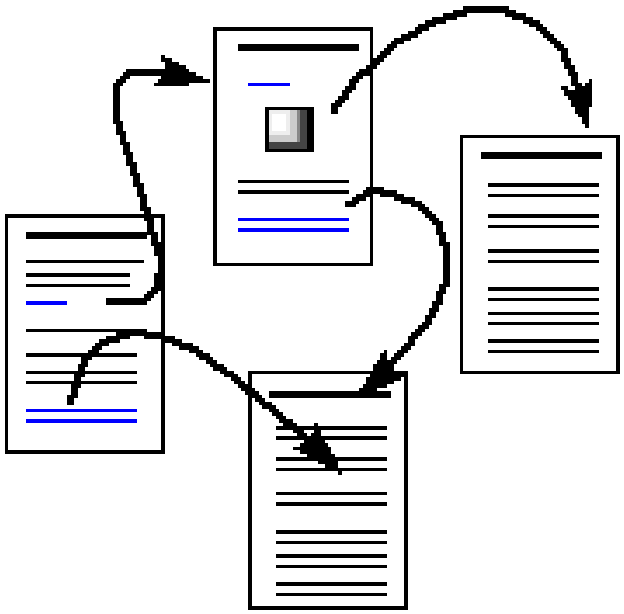
  - e.g. www.google.com. = 66.249.89.104



What is the WWW?

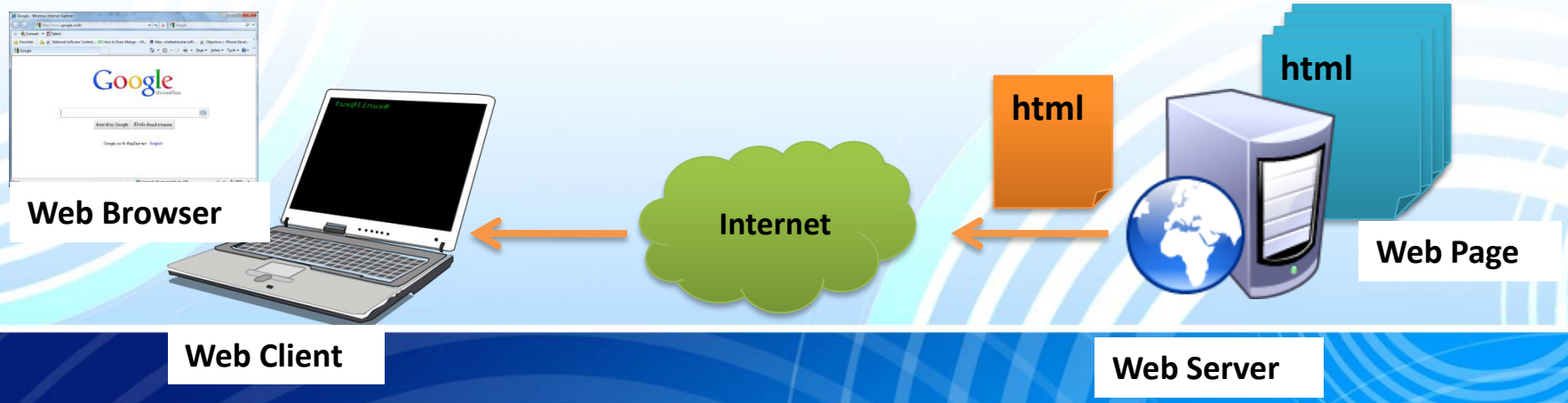
- WWW stands for the World Wide Web, called **the Web.**
- WWW is a service designed to allow easier access to the information on the Internet through the use of graphical user interfaces.
- Introduced in 1992 by Tim Berners-Lee
- A user views Web pages that contain texts, images, and other multimedia and navigates between pages using **hyperlinks**.
- WWW uses a standard communication protocol between servers and clients called **HTTP protocol.**
- Frequently used (incorrectly) when referring to “The Internet”.

Web Pages and Hypertext Links



How does the WWW Work?

- **Web Servers**: Computers storing web page files
  - **Web pages**: Documents storing information
  - Usually they are written in **HTML** format.
- **Web Clients**: Computers reading the Web pages
  - **Web browser**: program displaying the pages at the clients
  - Most popular browsers are Internet Explorer and Mozilla Firefox.



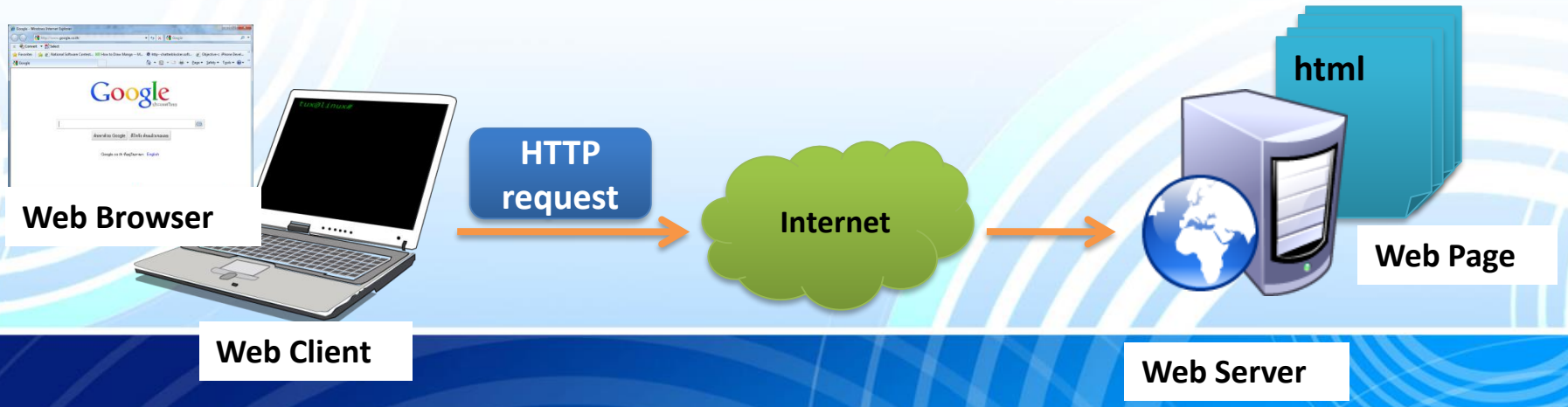
Web Servers

- Web servers can be just a single computer or a group of computers running web server software.
  - Apache on Unix or Linux
  - Internet Information Services (IIS) on Windows

Google's web server cluster

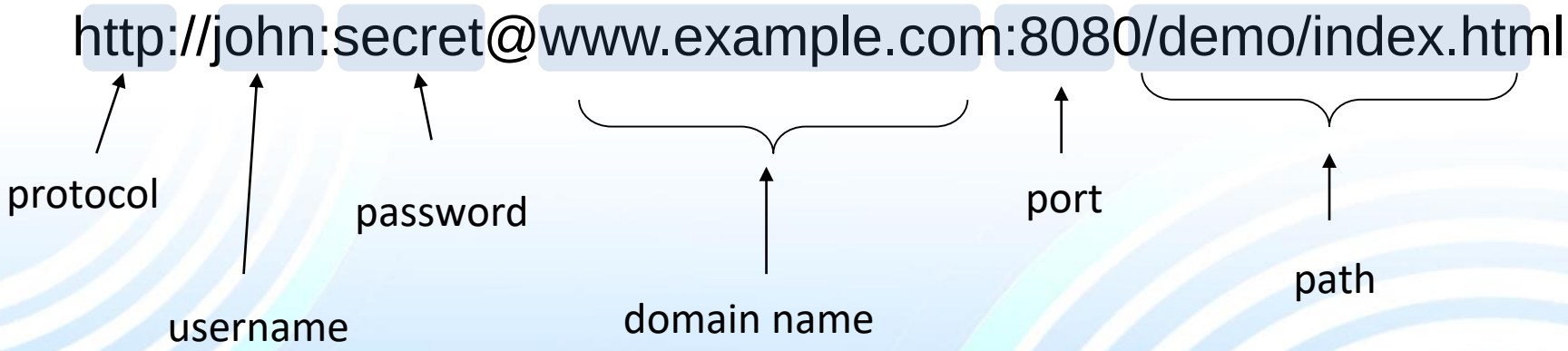
How Does the Browser Fetch the Pages?

- A browser fetches a Web page from a server by **an HTTP request**.
- A request contains a **URL** of the page.
- A URL looks like: http://www.someone.com/page.html

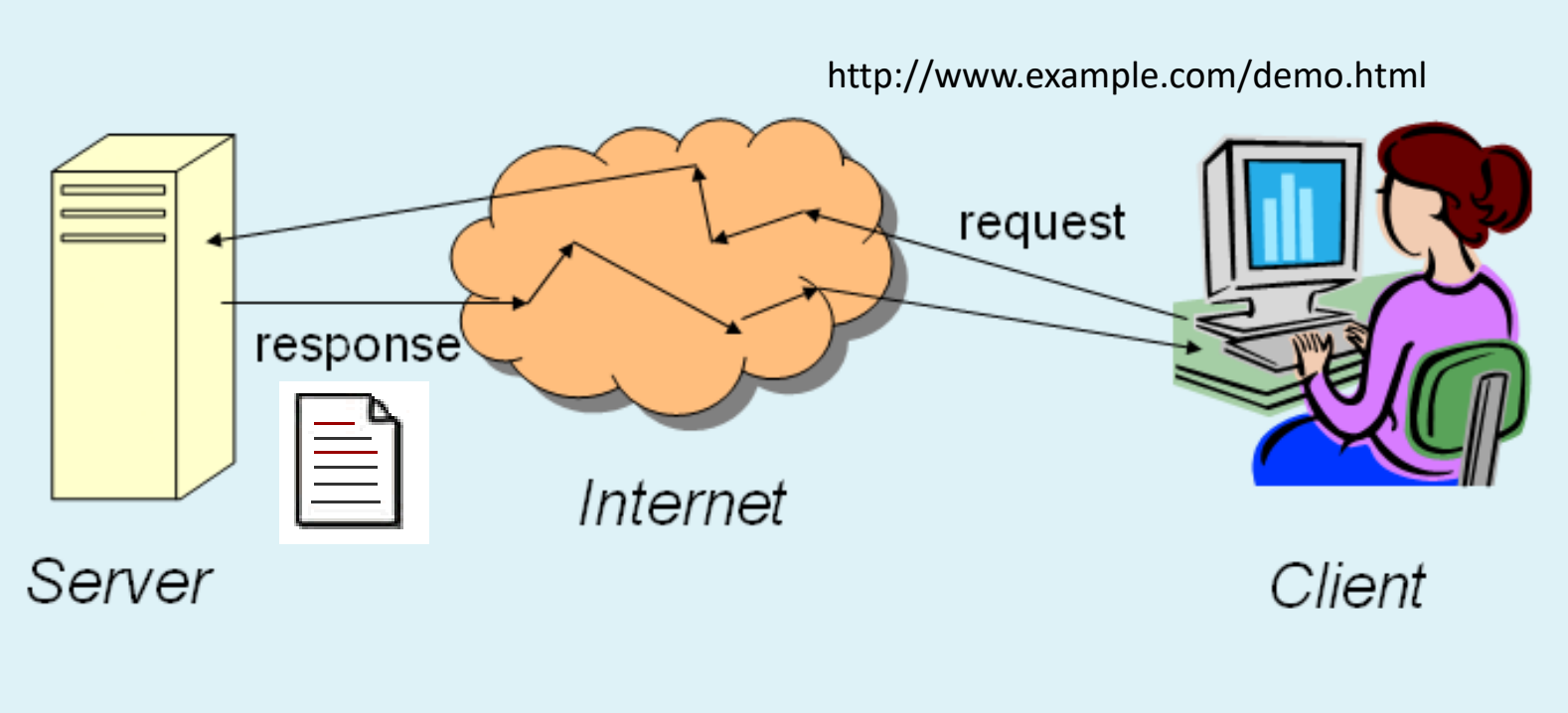


Uniform Resource Locators (URLs)

- A URL is a string used to identify a resource or service on the Internet (not just web pages).



Web Client and Web Server



How Does the Browser Display the Pages?

- All Web pages contain instructions on **how content to be displayed**, i.e. control the appearance and layout of the pages.
- These instructions are called **HTML markup tags**. The browser displays the page by reading and processing these instructions
- In addition, **CSS** can be used to define styles of web pages.

Web Programming

- Web programming is a combination of the following two or more components to meet the above requirements:
  - **HTML** provides formatting and layout of text and graphics as well as hypertext links between web pages
  - **CSS** (Cascading Style Sheet) provides more powerful control of style and formatting.
  - **Client-Side Scripts** provide processing at browser, e.g. JavaScript, ActiveX components, Java applets, Flash components, and so forth. They provide dynamically changing web page content.
  - **Server-Side Scripts** provide server processing, e.g. CGI, ASP, JSP, PHP, and others. They enables access to databases and other information resources.

HTML - The Language of the Web

- HTML is the language of the Web, and every Web developer should have a basic understanding of it.
- HTML stands for **H**yper **T**ext **M**arkup **L**anguage.
- An HTML file is a text file containing HTML markup tags.
- An HTML file usually have an .**htm** or .**html** file extension.
- An HTML file can be created using a simple text editor like notepad or EditPlus.

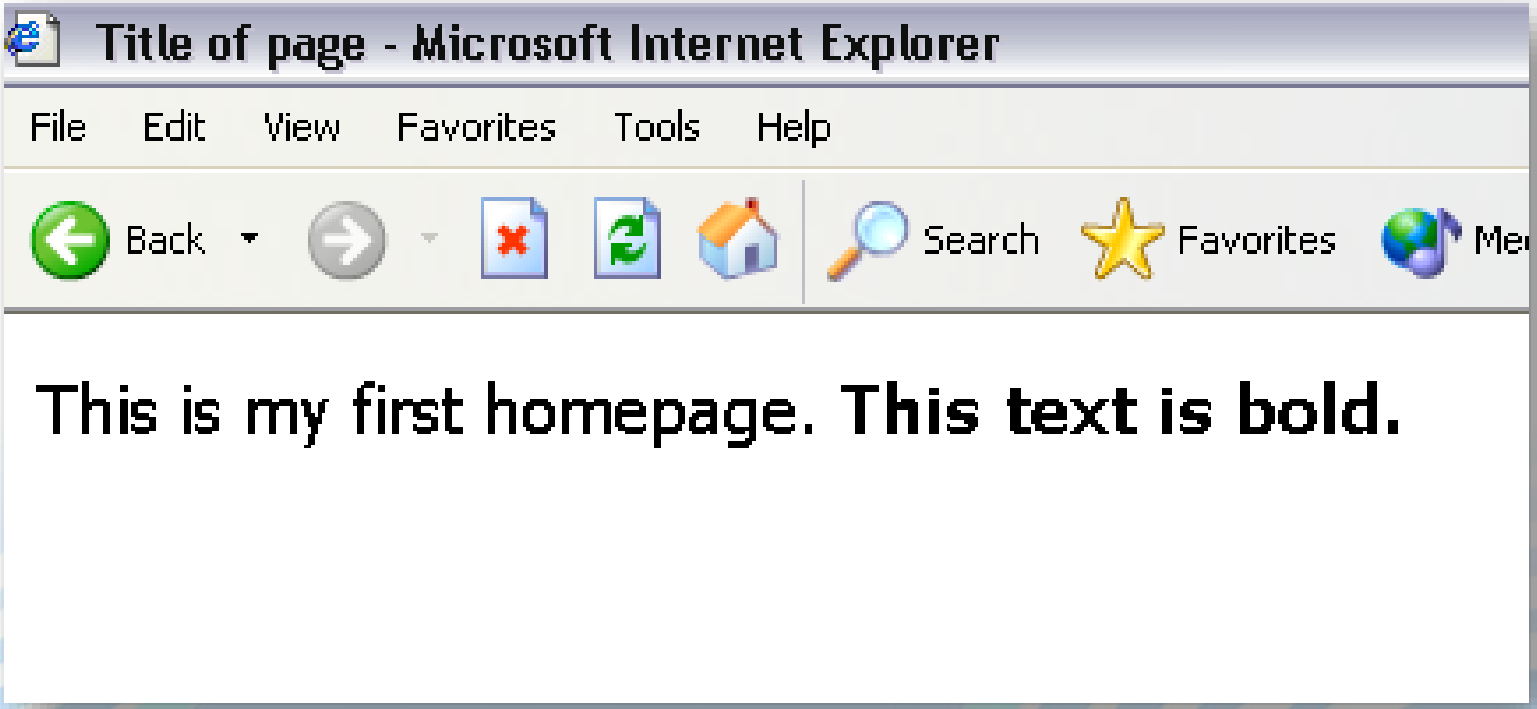
Structure of the HTML Web Page

Type in the following text and save it into the file as "mypage.html“, then in a browser, use File/Open mypage.html

```
<html>
<head>
<title>Title of page</title>
</head>
<body>
This is my first homepage. <b>This text is bold.</b> </body>
</html>
```

Structure of the HTML Web Page

- **<html>** tag
  The start of an HTML document.
- **</html>** tag
  The end of the HTML document.
- **<head>** and **</head>** tags
  The text between <header> and </header> tag is header information, it is not displayed in the browser window.
- **<title>** and **</title>** tags
  The text between the <title> and </title> tags will be displayed in your browser's caption.
- **<body>** and **</body>** tags
  The text between the <body> and </body>tags will be displayed in your browser. It is the content of the page.
- **** and **** tags
  The text between the and tags will be displayed in a bold font.


Title of page - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
This is my first homepage. This text is bold.

What is CSS?

- CSS stands for Cascading Style Sheets
- Styles define **how to display** HTML elements
- When styles are saved in external files, **CSS files**, you can change the style and appearance of all the HTML pages in your Web, just by changing your CSS files.
- Internal and external style sheets will **Cascade** into one
- With CSS, your HTML documents can be displayed using different output styles:

http://www.w3schools.com/css/css_syntax.asp

http://www.w3schools.com/css/css_examples.asp

An Example of CSS

```
<html>
<head>
<style type="text/css">
  p.uppercase {text-transform: uppercase}
  p.lowercase {text-transform: lowercase}
  p.capitalize {text-transform: capitalize}
</style>
</head>

<body>
<p class="uppercase">This is some text in a paragraph</p>
<p class="lowercase">This is some text in a paragraph</p>
<p class="capitalize">This is some text in a paragraph</p>
</body>
</html>
```

THIS IS SOME TEXT IN A PARAGRAPH

this is some text in a paragraph

This Is Some Text In A Paragraph

What is JavaScript?

- JavaScript is a scripting language which is a lightweight programming language
- A JavaScript is lines of executable computer code and usually embedded directly in HTML pages
- JavaScript is used in millions of Web pages to improve the design, validate forms, and much more.
- JavaScript was developed by Netscape and is the most popular scripting language on the internet.

Why JavaScript?

- JavaScript gives HTML designers a programming tool

  HTML authors are normally not programmers, but JavaScript is a scripting language with a very simple syntax! Almost anyone can put small "snippets" of code into their HTML pages.

- JavaScript can put dynamic text into an HTML page

  JavaScript statement like this:

  document.write("<h1>" + name + "</h1>")

  can write a variable text into an HTML page.

Why JavaScript?

- JavaScript can react to events

  A JavaScript can be set to execute when something happens, like when a page has finished loading or when a user clicks on an HTML element.

- JavaScript can read and write HTML elements

  A JavaScript can read and change the content of an HTML element.

- JavaScript can be used to validate data

  A JavaScript can be used to validate form data before it is submitted to a server, this will save the server from extra processing.

How to Put JavaScript Into an HTML Page

The HTML tag **<script>** is used to insert JavaScript into an HTML page:

```
<html> <body>
<script type="text/javascript">
document.write("Hello World!")
</script>
</body> </html>
```

The code above will produce this output on an HTML page:

Hello World!

Example Explained

To insert a script in an HTML page, we use the **<script>** tag. Use the **type** attribute to define the scripting language

```
<script type="text/javascript">
```

Then, the JavaScript starts.

The JavaScript command for writing some output to a page is **document.write**

```
document.write("Hello World!")
```

Next, the **<script>** tag has to be closed

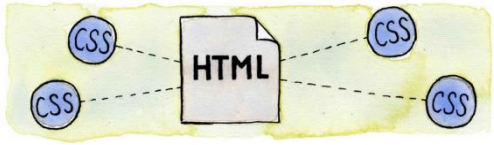
```
</script>
```

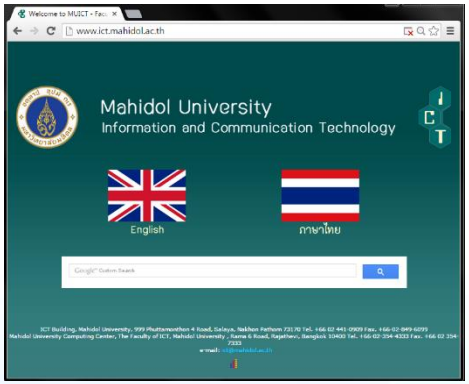
Server Side Scripting

- Server-side scripting is a web server technology that run directly on the web server based on the user request in order to generate the dynamic HTML page
- With server-side scripting, It is enable you to build the website that interact with the databases or other data sources and return the results to a browser
- To be able to deliver more dynamic web site content, you should teach yourself server-side scripting such as ASP, ASP.NET, PHP, JSP, Servlet, etc.

Web Technologies in this Course

- Layout&Display: HTML+CSS
- Client-side Script: Javascript
- Server-side Script: PHP
- Data : Web Services
- Interactive Website: AJAX





Web Pages

HW1: A Personal Website

- Develop web pages to introduce yourself (e.g. Basic information, education, three words to define yourself, Motto, and Contact me), containing at least 3 web pages.
- Give appropriate comments in your code to explain each chunk of code. The comments need to reflect the marking criteria.
- Each web page should contain a hyperlink that can link to other web pages.

HW1: A Personal Website

Submit a zip file containing your code and related files (**named: secX_HW1_ID5988xxx.zip**) on http://Mycourses.ict.mahidol.ac.th.

Due date for each section is as follow (Week 3):

- Section 1 on Friday 7th September 2018, 11 p.m.
- Section 2 on Monday 3rd September 2018, 11 p.m.
- Section 3 on Thursday 6th September 2018, 11 p.m.

Note: No late submission and plagiarism will not be accepted.

The power of the Web is in its universality.

Access by everyone regardless of disability is an essential aspect.

Tim Berners-Lee,
W3C Director and inventor of the World Wide Web

World Wide Web Consortium (W3C)

- W3C
  - Founded in 1994 by Tim Berners-Lee
- Homepage at www.w3.org
- Goals
  - Internet universally accessible
  - Standardization
    - W3C Recommendations: technologies standardized by W3C
      - include the Extensible HyperText Markup Language (XHTML), Cascading Style Sheets (CSS), HyperText Markup Language, and the Extensible Markup Language (XML).
      - not an actual software product, but a document that specifies a technology's role, syntax rules and so forth.

Web Accessibility Initiative (WAI)

The W3C Web Accessibility Initiative (WAI) is the collaboration of people from industry, disability organizations, government, and research labs from around the world to

- develop guidelines and resources to help make the Web accessible to people with disabilities.

Ref: https://www.w3.org/WAI/intro/accessibility.php

Introduction to Web Accessibility

- **Web accessibility means that people with disabilities can use the Web**.
  - Perceive
  - Understand
  - Navigate and interact with the Web
  - Contribute to the Web
- Web accessibility also benefits others, e.g., older people with changing abilities due to aging.
- also **benefits** people *without* disabilities.

  For example, such as people using a slow Internet connection, people with "temporary disabilities" such as a broken arm

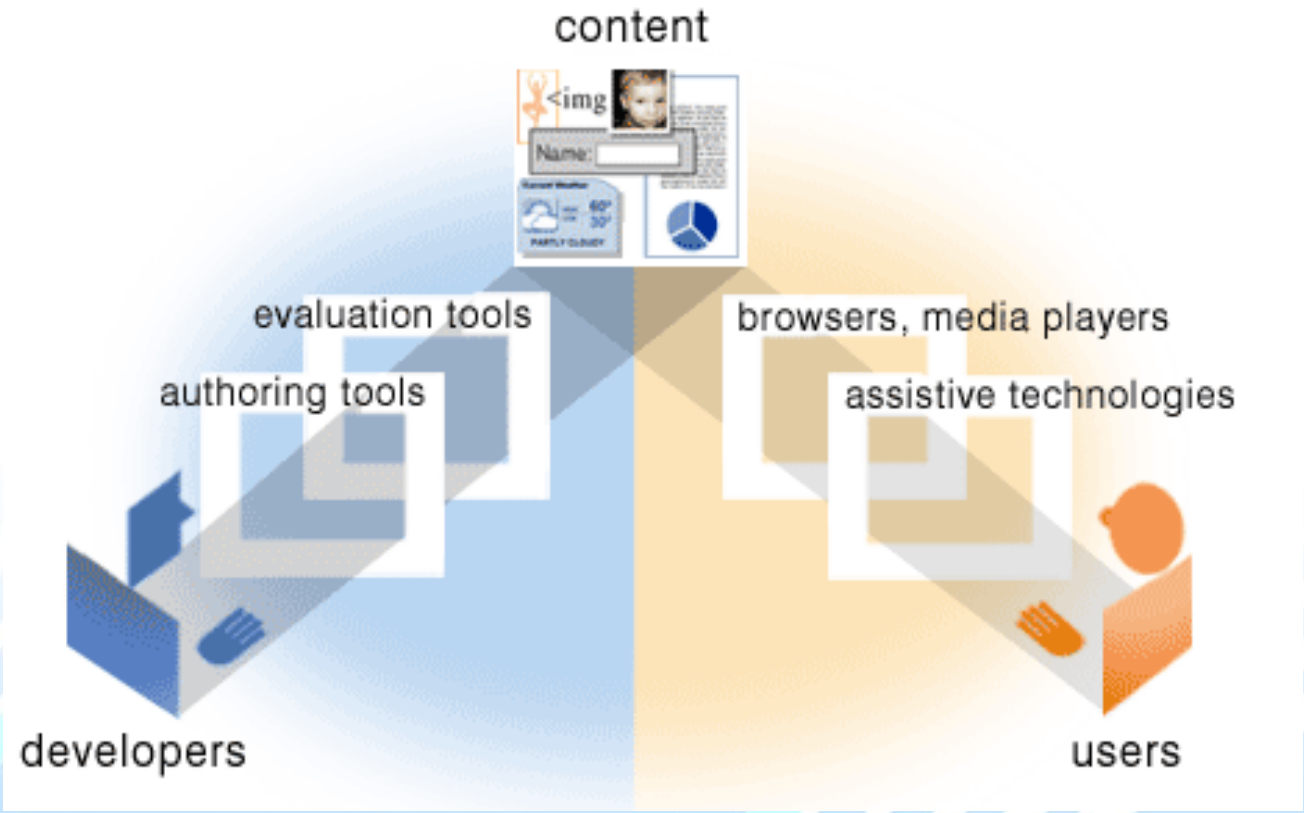
Web Accessibility Components

- **content** - the information in a Web page or Web application, including:
  - natural information such as text, images, and sounds
  - code or markup that defines structure, presentation, etc.
- **Web browsers, media players**, and other "user agents"
- **assistive technology**, in some cases - screen readers, alternative keyboards, switches, scanning software, etc.

Web Accessibility Components

- **users**' knowledge, experiences, and in some cases, adaptive strategies using the Web
- **developers** - designers, coders, authors, etc., including developers with disabilities and users who contribute content
- **authoring tools** - software that creates Web sites
- **evaluation tools** - Web accessibility evaluation tools, HTML validators, CSS validators, etc.

Web Accessibility Components



Web Usage for disabilities

- **Individual work**

- **Meet your friend:**

  1.Mr. Lee, 2.Mr. Jones, 3.Ms. Martinez, 4.Ms. Laitinen,5.Mr. Yunus, 6.Mr. Sands

- **Propose a suggestion for the web developer to help your friend access webpages.**

Diversity of Web Users

Auditory

- **Hard of hearing** - mild or moderate hearing impairments in one or both ears
- **Deafness** - substantial, uncorrectable impairment of hearing in both ears
- **Deaf-blindness** - substantial, uncorrectable hearing and visual impairments

Auditory disabilities need

- Transcripts and captions of audio content, including audio-only content and audio tracks in multimedia
- Media players that display captions and provide options to adjust the text size and colors of captions
- Options to stop, pause, or adjust the volume of audio content (independently of the system volume)
- High-quality foreground audio that is clearly distinguishable from any background noise

Cognitive and neurological

- Cognitive and neurological disabilities involve disorders of any part of the nervous system, including the brain and the peripheral nervous system. This can impact how well people hear, move, see, speak, and understand information. Cognitive and neurological disabilities do not necessarily affect the intelligence of a person.
- For example, **Autism spectrum disorder (ASD), Intellectual disabilities, Learning disabilities, etc.**

cognitive and neurological disabilities need

Depending on the particular needs of an individual, people with cognitive and neurological disabilities need:

- Clearly structured content that facilitates overview and orientation
- Consistent labeling of forms, buttons, and other content parts
- Predictable link targets, functionality, and overall behavior
- Different ways of navigating websites, such as through a hierarchical menu or search option
- Options to suppress blinking, flickering, flashing, or otherwise distracting content
- Simpler text that is supplemented by images, graphs, and other illustrations

Physical

- Physical disabilities (sometimes called "motor disabilities") include weakness, limitations of muscular control (such as involuntary movements including tremors, lack of coordination, or paralysis), limitations of sensation, joint problems (such as arthritis), pain that impedes movement, or missing limbs.

physical disabilities need

people with physical disabilities often use specialized hardware and software such as:

- Ergonomic or specially designed keyboard or mouse
- Head pointer, mouth stick, and other aids to help typing
- On-screen keyboard with trackball, joystick, and switches to operate it
- Voice recognition, eye tracking, and other approaches for hands-free interaction

Speech

- Speech disabilities include difficulty producing speech that is recognizable by others or by voice recognition software. For instance, the loudness or clarity of someone's voice might be difficult to understand.

speech disabilities need

- To use services that rely on voice, people with speech disabilities need alternative modes for interaction
- such as a text-based chat to interact with hotline representatives or keyboard commands to operate web applications.
- Also, websites that provide telephone numbers as the only means of communicating with an organizations pose barriers for people with speech disabilities. Alternative means of communication include e-mail and feedback forms.

Visual

- **Color blindness** - includes difficulty distinguishing between colors such as between red and green, or between yellow and blue, and sometimes inability to perceive any color
- **Low vision** - includes poor acuity (vision that is not sharp), tunnel vision (seeing only the middle of the visual field), central field loss (seeing only the edges of the visual field), and clouded vision
- **Blindness** - substantial, uncorrectable loss of vision in both eyes
- **Deaf-blindness** - substantial, uncorrectable visual and hearing impairments

visual disabilities need

- People with visual disabilities typically rely on changing the presentation of web content into forms that are more usable for their particular needs. For example by:
- Enlarging or reducing text size and images
- Customizing settings for fonts, colors, and spacing
- Listening to text-to-speech synthesis of the content
- Listening to audio descriptions of video in multimedia
- Reading text using refreshable braille (small dots that are raised and lowered to display characters that are read by scanning over the raised dots using the fingertips)

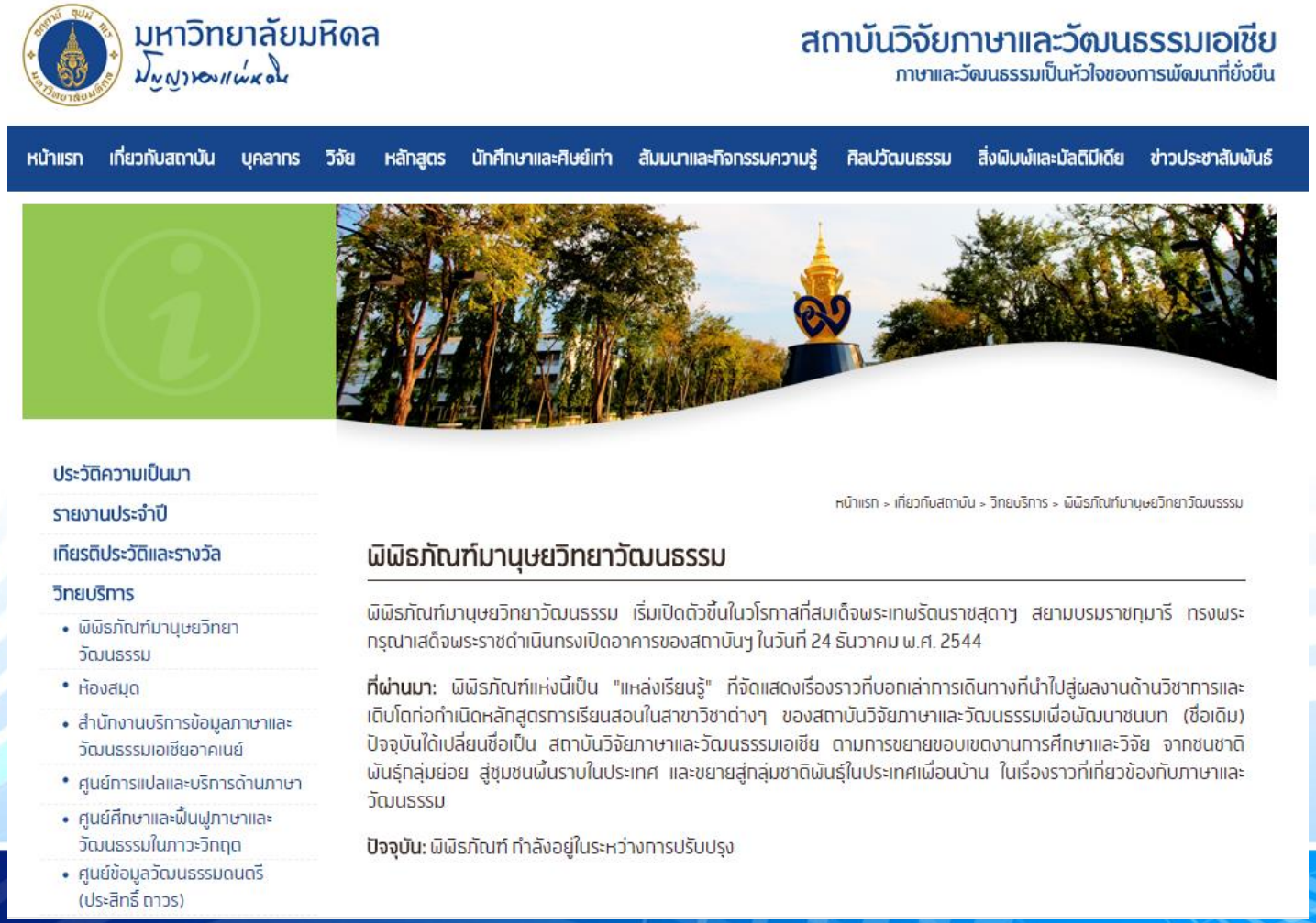
Assistive Technologies & Adaptive Strategies

- **Assistive Technologies** - software or hardware that people with disabilities use to improve interaction with the web. These include screen readers that read aloud web pages for people who cannot read text, screen magnifiers for people with some types of low vision, and voice recognition software and selection switches for people who cannot use a keyboard or mouse.
- **Adaptive Strategies** - techniques that people with disabilities use to improve interaction with the web, such as increasing text size, reducing mouse speed, or turning on captions. Adaptive strategies include techniques with standard software, mainstream browsers, or with assistive technologies.

Web accessibility standards

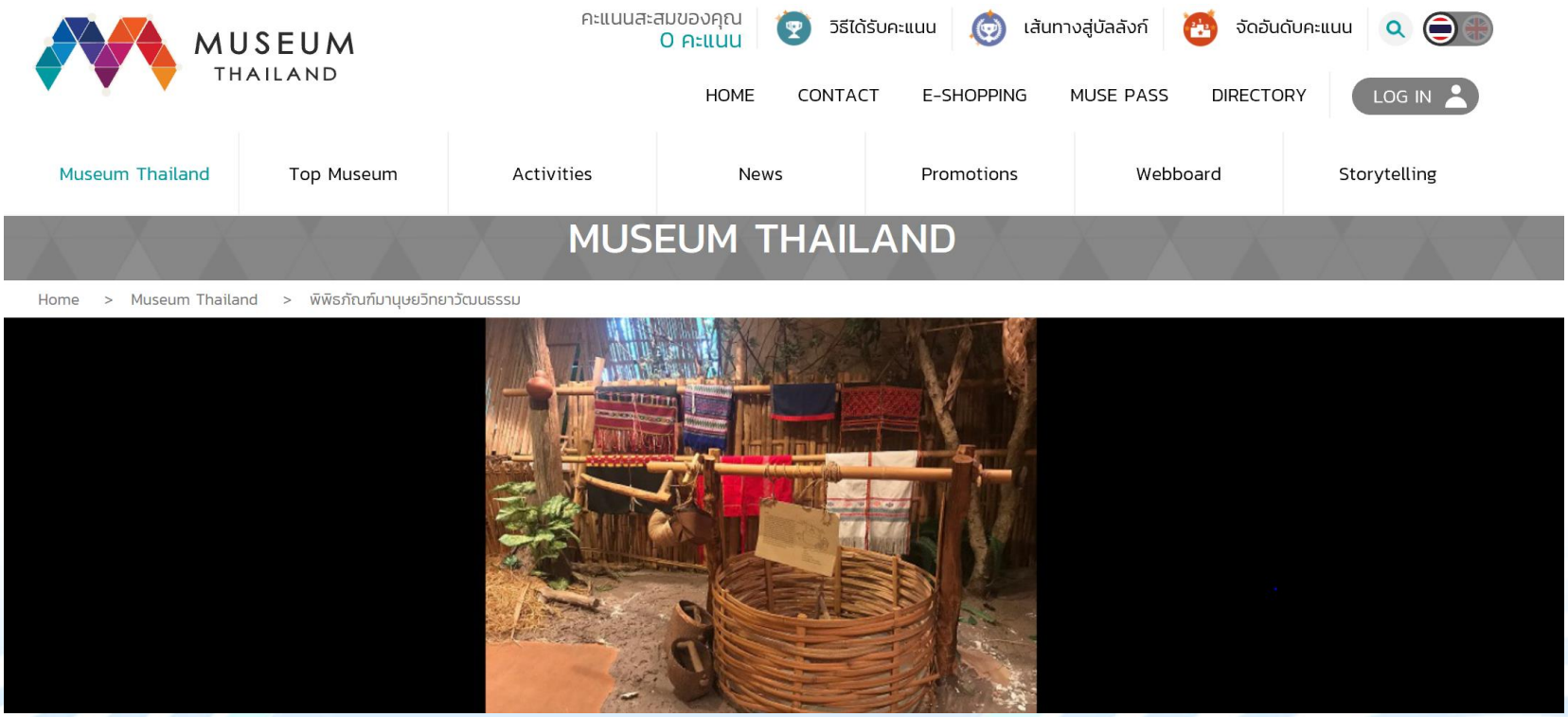
- Web accessibility relies on several components that work together. Some of these include:
- **Web content** - refers to any part of a website, including text, images, forms, and multimedia, as well as any markup code, scripts, applications, and such.
- **User agents** - software that people use to access web content, including desktop graphical browsers, voice browsers, mobile phone browsers, multimedia players, plug-ins, and some assistive technologies.
- **Authoring tools** - software or services that people use to produce web content, including code editors, document conversion tools, content management systems, blogs, database scripts, and other tools.

Term Project Part 1 - Introduction



Ref: http://www.lc.mahidol.ac.th/th/AboutUs/AnthropologyMuseum.htm

Term Project Part 1 - Introduction



http://www.museumthailand.com/lcmahidolacththAboutUsAnthropologyMuseumhtm

Term Project Part 1 - Description

- Design and create an interactive website based on a given topic.
- Group Report should be submitted for grading
  - Web Programming: Design Rationale and Implementation
  - Technical English II: Writing in English
- Visit the museum: Wed 29th August, 1-4 p.m. @ The Research Institute for Languages and Cultures of Asia (RILCA)

Term Project Part 1 - Description

- Form a group of 3 persons

- Section 1: Group of 3 = 18 Groups
- Section 2: Group of 3 = 13 Groups & Group of 4 = 2 Groups
- Section 3: Group of 3 = 16 Groups & Group of 4 = 1 Groups

Write your group information in:

https://docs.google.com/spreadsheets/d/19iKq21lelgaR_qqe4h9GtiekDKdWkWxgiJC0W2Z68VU/edit?usp=sharing

Term Project Part 1 - Submission

- **Presentation Week 8**
- Section 1: 12th October, 1.00-4.00 p.m.
- Section 2: 8th October, 1.00-4.00 p.m.
- Section 3: 11th October, 9.00 a.m.-12.00 p.m.

- **Submit Report (.pdf) and Sourcecode (.zip) on My Courses**