Study Unit 1:   History and Evolution of Internet & Web Technologies

Outline

- The Internet
- The World Wide Web (WWW)
- Web 2.0

Learning Outcomes of Study Unit 1

Upon completion of this study unit, you should be able to

1.1   The Internet

- History

- Key aspects

- People and organizations

- Protocols: IP, TCP

1.2   The World Wide Web (WWW)

- Servers and browsers

- Protocols: DNS, URL, HTTP, MIME

- Web langauges / technologies

1.3   Web 2.0

- Features, advantages, and technologies

1.4   HTML / CSS

- Definitions, Overview

1.1   The Internet

The Internet

- Wikipedia: http://en.wikipedia.org/wiki/Internet
- A connection of computer networks using the Internet Protocol Suite (TCP/IP) (The internet is a massive network of networks, a networking infrastructure.)

- What's the difference between the Internet and the World Wide Web (WWW)? (is a way of accessing information over the medium of the internet.)

- WWW = HTML* + HTTP(S)

  * *Including CSS, JavaScript, and other browser enabled contents*

Brief History

- Began as a US Department of Defense network called ARPANET (1960s-70s)
- Initial services: electronic mail, file transfer
- Opened to commercial interests in late 80s
- WWW created in 1989-91 by Tim Berners-Lee
- Popular web browsers released: Netscape 1994, IE 1995
- Amazon.com opens in 1995; Google in1996
- Chinese First Connection with Internet：Chinese Academics Net, by Computer Applying Technology Institute of Beijing1986
- First email, Sep. 14 1987, from CATIB, "Across the Great Wall we can reach every corner in the world"
- Chinese First Full Internet Connection：NCFC (National Computing and Networking Facility of China) 1994
- Baidu in1999；Taobao in 2003

Key Aspects of the Internet

- Internet is for information sharing

- "internet" vs. "Internet"

- Subnetworks can stand on their own

- Computers can dynamically join and leave the network

- Built on open standards; anyone can create a new device

- Lack of centralized control (mostly)

- Everyone can use it with simple, commonly available software

People and Organizations

- Internet Engineering Task Force (IETF): internet protocol standards

- Internet Corporation for Assigned Names and Numbers (ICANN): decides top-level domain names (For example, in the domain name www.example.com, the top-level domain is com.)
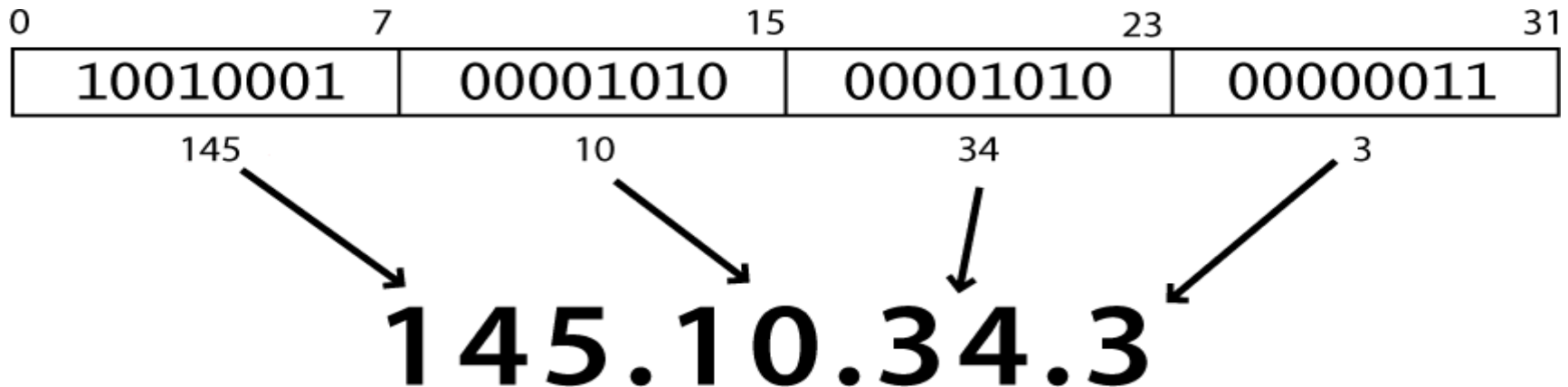
- World Wide Web Consortium (W3C): Web standards

Internet Protocol (IP)

- **IP** is the underlying protocol of communication for all data (packets) sent across the internet.

- Each device has a 32-bit IP address, shown as four 8-bit numbers (0-255)

0	7	15	23	31
10010001	00001010	00001010	00000011
145	10	34	3

145.10.34.3

- Find out your internet IP address: whatismyip.com
- Find out your local IP address:

- in a terminal, type: ipconfig (Windows) or ifconfig (Mac/Linux)
- IP v4 vs. IP v6 (32-b vs. 128-b)

Transmission Control Protocol (TCP)

- Adds multiple, guaranteed message delivery on top of IP
- **Multiplexing**: multiple programs using the same IP address :
  - **Port**: a number given to each program or service
    - 80: Web browser (443 for secure browsing)
    - 25: Email
    - 22: SSH
    - 21: FTP
    - More common ports
- Some programs (QQ, games, streaming media programs) use simpler UDP protocol instead of TCP
- Find out ports used:

- In a terminal, using **netstat** (Windows) command

Outline

-

- **The Word Wide Web (WWW)**

- Web 2.0

1.2 The World Wide Web (WWW)

Web Servers and Browsers

- **Web server**: software that listens for Web page requests
  - Apache
  - Microsoft Internet Information Server (IIS) (part of Windows)
- **Web browser**: fetches/displays documents from Web servers
  - Microsoft Internet Explorer (IE)
  - Mozilla Firefox
  - Apple Safari
  - Google Chrome
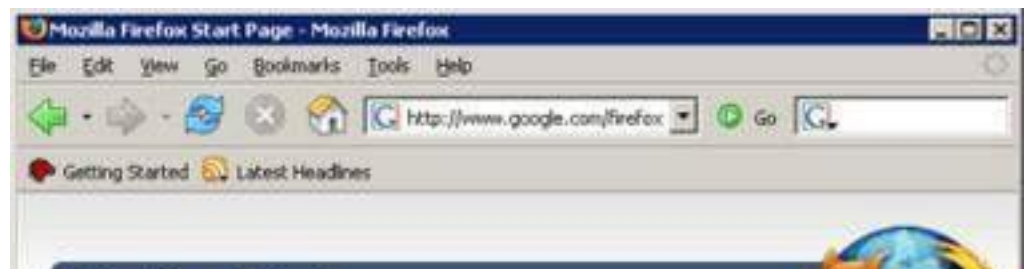
- [Opera](#)

Domain Name System (**DNS**)

- A set of servers that map written names to IP addresses
  - Example: google.com ➔ 172.217.170.46

    w3schools.com ➔ 66.29.212.110
  - Using Windows command **nslookup** to find out IP address

- Many systems maintain a local cache called a host file
  - Windows: C:\Windows\system32\drivers\etc\hosts
  - Mac: /private/etc/hosts
  - Linux: /etc/hosts

Uniform Resource Locator (URL)

- An identifier for the location of a document on a web site
- A basic URL:

  http://www.aw-bc.com:80/info/regesstepp/index.html

  ~~~ ~~~~~~~~~~~~   ~~ ~~~~~~~~~~~~~~~~~~~

  protocol   host   port   path

- Upon entering this URL into the browser, it would:
  - Ask the DNS server for the IP address of `www.aw-bc.com`
  - Connect to that IP address at port 80
  - Ask the server to GET `/info/regesstepp/index.html`
  - Display the resulting page on the screen

More Advanced URLs

- **Anchor**: jumps to a given section of a web page
  http://www.textpad.com/download/index.html**#downloads**
  - Fetches index.html then jumps down to the part of the page labeled downloads

- **Port**: for web servers on ports other than the default 80
  http://www.cs.washington.edu**:8080**/secret/money.txt

- **Query string**: a set of parameters passed to a web program
  http://www.google.com/search**?q=miserable+failure&start=10**
  - Parameter q is set to "miserable+failure"
  - parameter start is set to 10

HyperText Transport Protocol (HTTP)

- The set of commands understood by a web server and sent from a browser

- Some HTTP commands (your browser sends these internally):

  - GET *filename* : download
  - POST *filename* : send a web form resquest
  - PUT *filename* : upload
  - DELETE *filename*: remove entity
  - HEAD *filename*: only status information, not entire content

HTTP Error Codes

- When something goes wrong, the web server returns a special "error code" number to the browser, possibly followed by an HTML document

- Common error codes:

Number	Description
200	OK
301-303	page has moved (permanently or temporarily)
403	you are forbidden to access this page
404	page not found
500	internal server error

Internet Media (**MIME**) Types

- Sometimes when including resources in a page (style sheet, icon, multimedia object), we specify their type of data

MIME Type	File Extension
text/html	.html , .htm, shtml, .shtm
text/plain	.txt
image/gif	.gif
image/jpeg	.jpg
video/quicktime	.mov
application/octet-stream	.exe

- Lists of MIME types: by type, by extension
- ".html"   vs. ".htm"

Web Languages / Technologies

- HyperText Markup Language (HTML): used for writing web pages

- Cascading Style Sheets (CSS): stylistic info for web pages

- PHP HyperText Processor (PHP): dynamically create pages on a web server
  – of course, there are many other languages and scripts that can do this ...

- JavaScript: interactive and programmable web pages

- Asynchronous JavaScript and XML (AJAX): accessing data for web applications

- eXtensible Markup Language (XML): meta-language for organizing data

- Structured Query Language (MYSQL): interaction with databases

Terms

- **Internet Service Provider (ISP)**

  - Enterprises or organizations who provide Internet access to you,
  - Who? please identify your ISPs

- **Web Hosting**

  - Provide a place for consumers to store pages designed to be consumed by the Web surfing public
  - ISPs often offer Web hosting services along with their standard connectivity packages.

- **Client Side Scripting/Programming**

  - Writing code consumed by browsers to render Web pages and to respond to users' interactions

- **Server Side Scripting/Programming**

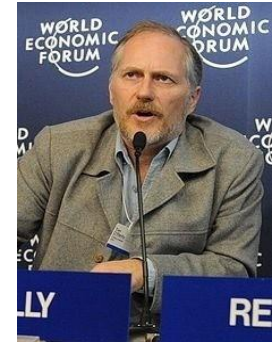 - Writing code used to generate the code consumed by browsers

Outline

- **The Internet**
- The Word Wide Web (WWW)
- **Web 2.0**

Web 1.0 vs. Web 2.0

- **Web 1.0** is about publishing
  - Users are limited to the passive browsing of information that is provided to them
- **Web 2.0** is about interaction
  - Allows its users to interact with other users or to change website content
  - Information sharing, interoperability, user-centered design and collaboration
  - Hosted services, web applications, social-networking sites, video-sharing sites, wikis, blogs, mashups and folksonomies.

Difference:

With *Web 1.0* the information displayed on-screen *is* mostly static and the data *is* only updated once *in a* while. With Web *2.0*, the information *is* very dynamic and the rate that information *is* updated *is* extremely fast. Sites like Twitter and technologies like syndication are two examples *of* how dynamic Web *2.0 is*.

Web 2.0 Technologies

- *Browser side*

  - Asynchronous JavaScript and XML (AJAX),

  - RIA (Rich Internet applications…. **Web**-based applications that have some characteristics of graphical desktop applications)
    - Adobe Flash
    - JavaScript / AJAX frameworks
      - Prototype, script.aculo.us, Yahoo! UI Library, Dojo Toolkit, MooTools, jQuery, ExtJS, …

- *Server side*

  - many of the same technologies as Web 1.0
    - PHP, Ruby, ColdFusion, Perl, Python, JSP, Servlet, and ASP

1.4 HTML & CSS

What is HTML

HyperText Markup Language, the authoring language used to create documents on the World Wide Web. **HTML** defines the structure and layout of a Web document by using a variety of tags and attributes

1. The **<html></html>** tag is the highest level element that encloses every HTML page.

2. The **<head></head>** tag holds meta information such as the page's title and charset.

```
<html>
  <head>
    <!-- META INFORMATION -->
  </head>
  <body>
    <!-- PAGE CONTENT -->
  </body>
</html>
```

3. Finally, the **<body></body>** tag encloses all the content that appears on the page.

- The `<!DOCTYPE html>` declaration defines this document to be HTML5
- The `<html>` element is the root element of an HTML page
- The `<head>` element contains meta information about the document
- The `<title>` element specifies a title for the document
- The `<body>` element contains the visible page content
- The `<h1>` element defines a large heading
- The `<p>` element defines a paragraph

```html
<!DOCTYPE html>
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</head>
<body>

<h1>My First Heading</h1>
<p>My first paragraph.</p>

</body>
</html>
```

What is CSS

1. **CSS** stands for **C**ascading **S**tyle **S**heets
2. CSS describes **how HTML elements are to be displayed on screen, paper, or in other media**
3. CSS **saves a lot of work**. It can control the layout of multiple web pages all at once
4. External stylesheets are stored in **CSS files**
5. **CSS** is used to define styles for your web pages, including the design, layout and variations in display for different devices and screen sizes.

There are three types of CSS which are given below:

	```<!DOCTYPE html>```
	 ```<html>```
	    ```<head>```
	      ```<title>Inline, Internal, External</title>```
	      ```<link rel="stylesheet" href="example.css"/>```
	    ```</head>```

1. Inline CSS
 	
2. Internal or Embedded CSS
 	
3. External CSS
	<pre> <style>
	        p { text-align:center; }
	    </style>
	<body>
	    <p style = "color:#009900; font-size:50px;
	            font-style:italic; ">
	        GeeksForGeeks
	    </p>
	</body>
	</html></pre>

Exercises

- Link an External Cascading Style sheet with HTML Page.

- Using Windows command to find out w3schools.com IP address.
- Install the Firefox and the Firebug add-on

Self-Review Questions (SRQ) For Study Session 1

Now that you have completed this study unit, you can assess how well you have achieved its Learning Outcomes by answering these questions. Write your answers in your Study Diary and discuss them with your Tutor at the next Study Support Meeting or Online interactive sessions. You can also check your answers at the Self-Review Answers section which is located at the end of this Module.

1. What is Internet?
2. What is the difference between TCP/IP and IP protocol?
3. What is difference between web browser and web server?
4. What are the parts of a URL?
5. What is HTTP and why it is used?
6. What is HTTP and HTML?
7. What is difference http and https?
8. What is the difference between DNS and HTTP?
9. What are MIME types used for?
10. What is web 1.0 and web 2.0?
11. What are some examples of Web 2.0 tools?
12. What is HTML describe with examples?
13. What is CSS describe with examples?

Self-Review Answers (SRA) for Study Unit 1

1: What is Internet?

The **Internet** (or **internet**) is the global system of interconnected computer networks that uses the **Internet** protocol suite (TCP/IP) to communicate between networks and devices.

2: What is the difference between TCP/IP and IP protocol?

The difference is that TCP is responsible for the data delivery of a packet

And IP is responsible for the logical addressing. In other words,

IP obtains the address and TCP guarantees delivery of data to that address.

3: What is difference between web browser and web server?

Web Browser is an Application program that displays a World wide web document.

It usually uses the internet service to access the document.

Web server is a program or the computer that provide services to other programs called client.

 The Web browser requests the server for the web documents and services

4: What are the parts of a URL?

A URL for HTTP (or HTTPS) is normally made up of three or four components:

Example = Http://mysite.com/info/home.html?q=10

- Protocal. The scheme identifies the protocol to be used to access the resource on the Internet. ... (Http ://)

- Host. The host name identifies the host that holds the resource. ...(mysite.com)

- Path. ...(info/home.html)

- Query string. (?q=10)

5: What is HTTP and why it is used?

HTTP is a protocol which allows the fetching of resources, such as HTML documents.

It is the foundation of any data exchange on the Web and it is a client-server protocol,

Which means requests are initiated by the recipient, usually the Web browser.

6: What is HTTP and HTML?

HTML (Hypertext Markup Language) is a language for marking the normal text so that it gets converted into hypertext. ...

. On the contrary, HTTP (Hypertext Transfer Protocol)

7: What is difference http and https?

HTTPS is HTTP with encryption. The only difference between the two protocols is that HTTPS uses TLS (SSL)

To encrypt normal HTTP requests and responses.

8: What is the difference between DNS and HTTP?

On the Internet, this can happen between web servers, when one web server forwards you on to another web server.

DNS gets you to the IP address of the first web server,

And after your browser establishes a TCP/IP connection, it speaks HTTP and requests some content – typically a web page.

... A website that uses HTTP has http:// in its URL, while a website that uses HTTPS has https://.

9: What are MIME types used for?

A MIME type (or media type) is an identifier for file formats or format contents on the Internet.

MIME stands for Multipurpose Internet Mail Extensions

And all MIME types are officially maintained by the Internet Assigned Numbers Authority (IANA).

10: What is web 1.0 and web 2.0?

In Web 1.0, there is only limited interaction between sites and web users. Web 1.0 is simply an information portal

Where users passively receive information without being given the opportunity to post reviews,

Comments, and feedback. Web 2.0. It is the "writable" phrase of the World Wide Web with interactive data.

11: What are some examples of Web 2.0 tools?

Familiar examples of Web 2.0 sites and tools include wikis and blogs (PBworks and WordPress),

Social networking sites (Facebook and Twitter), image and video hosting sites (Flicker and YouTube),

And applications to generate Web content for education, business, and social purposes (Wikipedia, Weebly, and Instagram).

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	        </p>
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	</html>
	``

References and Additional Reading Materials

- A Brief Histroy of the Internet http://www.isoc.org/internet/history/brief.shtml
- Introduction to Web 2.0 http://en.wikipedia.org/wiki/Web_2.0 , http://oreilly.com/web2/archive/what-is-web-20.html
- Introduction to Html & Css https://www.w3schools.com/