15.1 The Internet & 15.2 The web-Reading

Notebook:	How Computers Work [CM1030]
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Cornell Notes	**Topic:** 15.1 The internet & 15.2 The web-Reading	Course: BSc Computer Science
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Essential Question:
What are the various technologies/protocols that make up the World Wide Web and its Websites?

Questions/Cues:
- What is Hypertext?   - What is a Browser?   - What are web servers?   - What is a URL?   - What is HTML?   - What is XML?   - What are Search Engines?   - What is the Application Layer?   - What is the Transport Layer?   - What is the Network Layer?   - What is the Link Layer?   - What is TCP?   - What is UDP?   - What is Hop count?

Notes
- Hypertext = linked documents   - World Wide Web = hypertext document format for embedding hyperlinks to other docs; a protocol for transferring hypertext across the network and a server process that supplied hypertext pages upon request in the early days   - Browser = is on user's comp and is charged with the tasks of obtaining materials requested by user & presenting these materials to the user in organized manner   - Web servers = reside on on comp containing hypertext docs to be accessed. Its task is to provide access to docs under its control as requested by clients (browsers). Hypertext docs transferred between web servers and browsers using protocol known as Hypertext Transfer Protocol (HTTP)   - URL(Uniform Resource Locator) = A unique address, Each URL contains the info needed by browser to contact the proper server & request the desired doc

Figure 4.8 A typical URL

```
http://eagle.mu.edu/authors/Shakespeare/Julius_Caesar.html
```

Mnemonic name of
host holding the
document

Document name

Protocol required
to access the
document. In
this case it is
hypertext transfer
protocol (http).

Directory path
indicating the
location of the
document within
the host's
file system
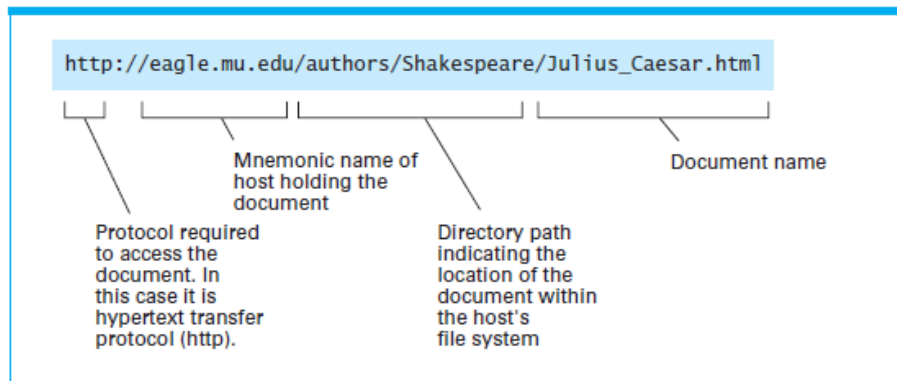
- Hypertext Markup Language (HTML) = system of tags, that describe how the doc should appear on a display screen, what multimedia resources (such as images) should accompany the doc & which items within the doc are linked to other docs. Tags are denoted by "<" & ">"

Figure 4.9 A simple webpage

a. The page encoded using HTML.

Tag indicating
beginning of
document

```
<html>
```

Preliminaries

```
<head>
<title>demonstration page</title>
</head>
```

The part of the
document that
will be displayed
by a browser

```
<body>
<h1>My Web Page</h1>
<p>Click here for another page.</p>
</body>
```

Tag indicating
end of document

```
</html>
```

b. The page as it would appear on a computer screen.

My Web Page

Click here for another page.

Figure 4.10 An enhanced simple webpage

a. The page encoded using HTML.

```
<html>
<head>
<title>demonstration page</title>
</head>
<body>
<h1>My Web Page</h1>
<p>Click
        <a href="http://crafty.com/demo.html">
        here
        </a>
        for another page.</p>
</body>
</html>
```

Anchor tag containing parameter — `<a href="http://crafty.com/demo.html">`

Closing anchor tag — `</a>`

b. The page as it would appear on a computer screen.

My Web Page

Click here for another page.

- eXtensible Markup Language (XML) = standardized style for designing notational systems for rep'ing data as text files. Following XML, notational systems call markup langs have been developed for reping math, multimedia presentations and music. In fact, HTML is markup lang based on XML standard that was developed for reping webpages (Original HTML was developed before solidification of XML, so some features of HTML don't conform to XML standard). XML allows development of new markup langs that emphasize semantics rather than appearance like HTML
- Search engines = websites that assist user in locating Web material pertaining to a subject of interest
- Application layer = consists of software units such clients and servers that use Internet comm to carry out their task, not restricted to the software in the app but includes many utility packages (file transfer using FTP or remote login using SSH). App layer uses transport lay to send & receive msgs over Internet, it's the app layer's responsibility to provide an address that is compatible with the Internet infrastructure. To fulfill this, app layer may use the services of name servers within the Internet to translate mnemonic addresses used by humans into Internet-compatible IP addresses
- Transport Layer = accepts msgs from app layer & ensures that msgs are properly formatted for transmission over Internet. It divides long msgs into small segments, which are transmitted over Internet as individual units. Then it adds sequence nums to the small segments it produces so that segments can be reassembled at msg's destination. Then it hands these segments known as packets over to the network layer.

- Network Layer = job to decide in which direction a packet should be sent at each step along the packet's path through Internet. It's a combination of the network & link layer that make up the software on Internet routers. Network layer is in charge of maintaining router's forwarding table & uses this table to determine direction in which to forward packets.
- Link Layer = at router level is in charge of receiving & transmitting packets. Link Layer has responsibilty of transferring packet, so it must deal with comm details particular to individual network in which comp resides (i.e CSMA/CD for Ethernet & CSMA/CA for WiFi).

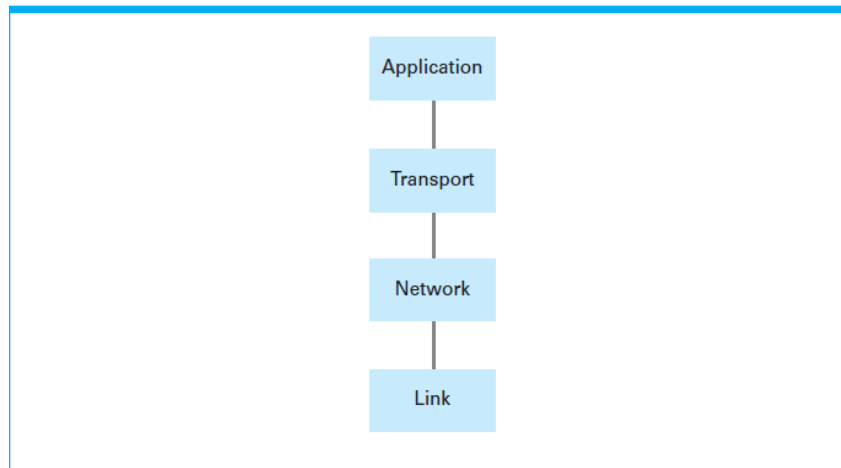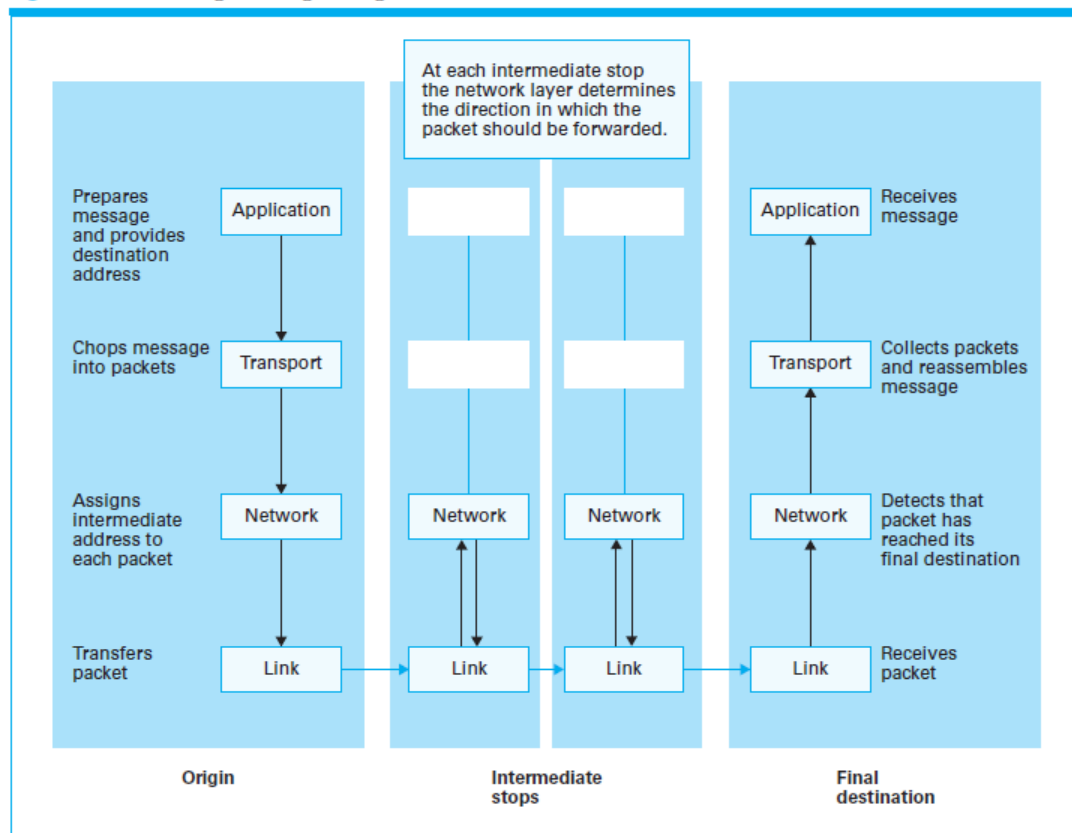**Figure 4.13** The Internet software layers

Figure 4.14 Following a message through the Internet

- Transmission Control Protocol (TCP) = transport layer protocol, before sending msg it send an "acknowledge" msg to establish a connection with receiving end.
  - TCP at both ends works together by means of acknowledgements & packet retransmissions to assure all segments of msg are successfully transferred to destination. TCP is called a reliable protocol
  - TCP offers flow control, meaning TCP at origin can reduce the rate of segment transmission from overwhelming its end receiver & congestion control also at

origin to adjust rate to alleviate congestion between nodes
- User Datagram Protocol (UDP) = transport layer protocol that doesn't establish a connection with receiving end (connectionless). UDP doesn't offer packet retransmission, so it's called unreliable protocol.
- Hop count = time to live for a packet, limit of the # of times a packet can be forwarded, each time IP network layer forwards a packet it decrements it by one.

Summary

In this week, we learned about the Internet app protocols like HTTP, what a browser is, what a web server, & the various Layer of involved in Internet Transmission. Alongside this, we explored, web markup languages like HTML & XML, the difference TCP & UDP and the hop count of a packet.