WebTech Week1 Lecture 1

Intro

Communication/protocols

* Protocols are agreements for how to communicate
* Computer protocols are agreements that are specified with enough clarity that a computer can follow them
* Internet and web are really just communication methods (protocols) -agreements for how two machines can exchange info

Internet

* Global system of interconnected computer networks
* Built on shared and agreed protocols – the internet Protocol suite (TCP/IP)
* WWW is just one information resource/service that communicates  
  using the Internet

Internet Protocols

* Application Layer: DNS, HTTP, IMAP, POP
* Transport Layer: TCP
* Internet Layer: IP
* Link Layer: Ethernet

HTTP

* Application layer protocol for distributed and collaborative hypermedia/hypertext systems
* Request-response protocol that uses the client-server model
* Client (browser) makes a request HTTP server (software running on an Internet connected  
  computer) listens and responds according to the protocol.
* Server stores resources and returns a response that may include providing access to those resources
* HTTP Session – a sequence of request-response transition transmitted over TCP. Connects to a specific port (usually 80, sometimes 8080) on an IP address. HTTP server listens on that port
* Request method: HTTP verbs, e.g GET,HEAD,POST,PUT, DELETE, OPTIONS, PATCH
* What is transmitted between client and server is plain text
* Has secure variants: HTTPS and HSTS

HyperText

* Text displayed on an electronic device that incorporates references, call Hyperlinks, to other text.
* Hyperlinks can be followed or navigated immediately
* Text becomes non-linear as a result – instead of one page following the next we can jump between them, consuming them in variety of orders
* NB. Doesn’t always refer solely to text so hypertext and hypermedia are often used interchangeably
* One implementation of hypertext is in HTML
* Diagram

  Description automatically generated

INVENTION OF THE WEB

* An implementation of a hypermedia system
* Invented in 1989 by Sir Tim Berners-Lee
* First web browser written in 1990
* Originally seen as a way to share scientific research, e.g. amongst physicists. Obviously we’ve come a way since then.
* Initially formatted text only, rapidly moved to support images, audio, video, and other media types.
* Text formatted using HTML & communicated using HTTP

HTML

* Hyper Text Markup Language
* A language for turning text into hypertext using markup
* Text- strings (sequences of characters) encoded using an agreed format (Generally UTF8)
* Language- Means for communication
  + Many kinds of language, e.g. natural (e.g. English) & artificial (e.g. programming like Python or Javascript)
  + Usually some degree of agreement over the elements of the language, how they relate, and their meaning
* Hypertext- links between text
* Markup- Many ways to do markup, not specific to HTML. HTML uses Tags, generally placed around the element being tagged, e.g

<h1>Hello</h1>

Servers

* A piece of software that runs on a computer
* Listens for messages & calculates the right response to make
* A server is a piece of software that uses a particular protocol
  + We’ll assume a server running on an Internet connected machine (TCP/IP)
  + A web server listens for messages that are sent using web protocols (HTTP)

Web Clients

* Another piece of software (nothing particularly special)
* Known as a user agent
* The Browser is one type of web client but there are others:
  + web crawlers, voice browsers, mobile apps - any software that accesses, consumes, or displays web content, e.g. can talk to an HTTP server
* Sends messages from an Internet connected machine (host) to a server that listens, interprets the request & generates an appropriate response:
  + e..g a web browser making a request to a web server using HTTP

Browsers

* Software containing a layout engine that renders web pages (HTML)
* Also invented by Berners-Lee
* Used to navigate the web but also private networks, IoT interfaces, local file systems.
* Have become a default cross-platform environment

Basic Web Architecture

* We now have all of the pieces for the basic client-server architecture of the web
* Clients -software that communicate to a server by making requests (using HTTP)
* Servers - software that responds to communications (HTTP requests) from clients (browsers).The response is a document (HTML)
* NB. Can get (much) more complicated than that but this is a good starting place

Client-server Model

* Diagram

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The DOM

* Document Object Model
* A cross-platform, language independent API
* HTML is treated as a tree data structure within your browser.
* HTML is parsed into this data structure to construct the DOM (for that document)
* Each node in the tree is an object representing part of the document
* Objects can be manipulated programmatically, e.g. using Javascript, and the results displayed in the viewpane of the useragent (browser)
* What you see in view source is just the HTML
* HTML displayed in developer tools is a representation of the DOM