2.4 INTERNET SERVICE TECHNOLOGIES

DATA STORAGE FOR WEB APPLIACTIONS

1ST VERSION OF THE WEB

→ there were no mechanisms or web pages to store data about their previous interactions with users

→ Designers could not allow users to customize a site

→Every time you visited a site it would be as if you are visiting for the first time

MODERN WEBSITES

EXAMPLES OF ASPECTS MADE POSSIBLE BY DATA STORAGE:

- If you change the language of your Google display, you will never have to change it again (no matter what device) as long as you are logged into you account
  → Google stores your settings online
  →Also stores information of your device to remember who you are & log you in automatically

- Pinterest – allows you to make boards online by storing information about these boards online – linked to your account

- E-commerce sites want to keep track of their client's previous purchases & browsing history so they can recommend products
  → Also make use of cookies (textfiles stored on your computer that identifies you and signs you in) so that all your setting stored on the server can be accessed

STORING DATA LOCALLY

- The web page writes and reads data to and from your local hard drive
- Web page saves a set of configuration or setting data to a text file on your hard drive
  - → Name of the file & data in the file tells it which website the data belongs to
  - → Textfile = cookie
  - → When you visit a website, it looks for the cookie with the name that it specifies
- When you turn of cookies in browser settings – turning off permission for websites to store data locally → Anything on the site that you have customised will be lost & site returned to default state
- Cookies have limited size (max 4kb) & need to be sent to sent to the web server and received again every time you load a page – makes browsing slower
- Another technology used is Web Storage Specification
  - → Allows more data to be stored
  - → Data is only read & written by JavaScript programs executed by the browser
  - → Data not continually sent & downloaded from the serve (like a cookie) = faster browsing

STORING DATA ONLINE

- Data is stored on the web server itself, not on the user's computer or device
- NB when the web page is dynamically created as the user views it
  → the server has fast access to its own data stores which it uses to put together the webpage
- NB when website or application is a front end to a large database-centric system
  e.g. Cell phone shops:
  → Use a front-end app that runs in browser to manage the accounts of contract customers
  → System is linked to a ventral database of all the clients of the company
  → Far more efficient than having to maintain locally installed software in all their stores
  → The processing & storage is done on the server while the website/app is used to capture data

IMPORTANT TO UNDERSTAND

- We are not discussing online *file* storage (Dropbox, OneDrive, Google Drive, iCloud)
- Talking about a diff type of online storage
  → refers to a webserver which stores data in a database & which manages resources needed anto generate web pages

Apps and online Storage

→Local software on your mobile device manages the resource-intensive task of creating and displaying the user interface, processing etc

→ Only the data is transferred over the internet connection which reduces data and speeds up app

RUNNING INSTRUCTIONS

JAVASCRIPT

- JavaScript commands in a webpage transform a web page from static to dynamic and interactable
- Examples
  - Interactive slide shows with previous and next buttons
  - Buttons/pictures that respond when the cursor hovers over them'
  - Tabbed areas with tabs you can click to see different content in the same space
  - Messages that pop up

- JavaScript is a language designed specifically for execution inside web browser.
  The instructions are downloaded from the server as text commands and executed on the local computer
  → JavaScript is executed **after** the webpage has been downloaded onto the local computer by the browser
  → This makes JavaScript better for web programming that interacts with the user than for programming that generates customised web content

Java vs JavaScript

JavaScript has nothing to do with Java programming language

Java = Created by Sun Microsystems as a "real" programming Language
JavaScript = Created by Netscape as a tool for automating/scripting elements on web pages

Storage and Execution

JavaScript instructions can either be stored as separate files with the .js extension or directly in the text file of the .html file

Instructions are followed one line at a time by the JavaScript interpreter built into the web browser

SERVER-SIDE INSTRUCTIONS/SCRIPTING/PRGRAMMING

- Used when website displays different, customized pages for logged in users
- Instructions to display customised content is saved to the server online (not the device)
- Written in languages like: Perl, Ruby, ASP.NET, Python and PHP
- Instructions are carried out **before** the .html (web-page) file is sent to the browser
- Links to a database (usually also on the server) as a source for the customized content it generates for each user

SQL-STORED PROCEDURES

- Server-side scripting language is used to create SQL queries
  → These queries are then used to fetch the content with which to create the web page dynamically
  → BUT when the Server-side scripting language creates the SQL instructions – it can become very complex and have many lines of code

- It is easier to for a person to create the SQL instruction and store them inside the database for easy reuse later
  → i.e.: they take a bunch of SQL instructions, group them together and give them a unique name

- That is SQL-stored procedure: a way to develop a database with a whole lot of pre-programmed SQL instructions built into it

THE REALLY INTERACTIVE WEB

- Problem with Client-Side Scripting, Server-side Scripting and SQL is that it generates a single page for which all data and elements need to be downloaded all at once to the browser
  → If you only need one byte of new data the entire page needs to refresh
  → Slow, visually unattractive and requires a lot of extra data transfer

- Solution = AJAX (Asynchronous JavaScript and XML)
  → Combines JavaScript with a browser command to allow the browser to download with needing the whole page to refresh
  → JavaScript is then used to display the new data in the appropriate areas of the page
  → Used by Google Maps (you can pan, zoom, search for a new place w/o whole page refreshing)

The word Asynchronous in AJAX is used to indicate that the page can send data to the server and request/load additional data after the page structure has been downloaded and displayed

HTML and XML

- Webpages encoded using html (hypertext mark-up language)
  → a set of text-based codes that tell a browser how to display content
  → has a very specific set of commands/tags that can be used and are defined by the HTML specification
- XML = a set of rules that you follow when creating your own codes, to allow you to structure data in a text document in any way you need to
- XML therefore most often used to store structured data in a text file
- The webpage's HTML and CSS are used to control the formatting & appearance of the page whilst separate data is stored and transferred in XML files

FORMATTING OUTPUT

- As website become larger & more complicated the task of designing them becomes harder
- Instead of designing and formatting each individual .html file, CSS (Cascading Style Sheets) is used
  → allows you to define and name styles and then specify the formatting of those styles & save it all to a .css file
  → .html file can link to the .css file
- Advantage of CSS is that it separates the formatting from the HTML & gathers it all into one place
  → make changes in one place and all pages that use that styles will automatically have the correct formatting applied