**How Browsers Work**

Definition:

A browser is defined simply as something or someone who browses – to look through or glance at casually, at random.

In digital technology terms a browser or client browser is anything used to locate, retrieve and display content on the World Wide Web, including Web pages, images, video and other files. It allows users to find and read encoded documents in a form suitable for display, especially such as a program for use on the World Wide Web.

Taking the above definition into consideration a browser can, in essence, refer to the following:

* Desktop Browser
* Mobile Web Browser
* An application with embedded browser
* Appliance (watch, fridge, car dashboard etc.)

However, we will look at how desktop and mobile browsers work.

The Process:

1. User tells browser something

When a user sits down to use his/her computer or laptop or phone and opens the browser, he/she has particular thing they want to do with the browser, say access a website. The user therefore has to tell the browser to go to the desired website. This is done by the use of a URL (Uniform Resource Locator)

The URL is usually in the format below:

scheme://domain:port/path?query#fragment

e.g.

<https://en.wikipedia.org/wiki/Uniform_resource_locator>

* + scheme – http or https
  + Domain – the name of the server or machine (Wikipedia) followed by top level domain (.org, .biz, .net etc)
  + Port - default: 80; only shows if not the case
  + Path – Path to the resource with name and extension (/wiki/Uniform\_resource\_locator). It ells the server where exactly the resource is
  + Query and fragment – optional

URL’s can also appear in HTML tags for resources used within pages.

1. Browser issues a HTTP protocol command ‘GET’ with regards to the URL.

The command then goes through the internet in search of the machine (server) that has been referred to in the domain name. The machine receives the ‘Get” request.

1. The machine (server) then takes the path indicated in the URL and searches in its file system for where the particular resource is.
2. It locates the resource and sends what it has found back to the browser. The browser accepts the file and starts to process it. This is a summary of the “processing”:

Take an HTML file/ page. For example:

a. The browser ‘parses’ the file. This means that it breaks it down into pieces then works accordingly on each piece. A HTML file has:

* Content: Text content for the webpage
* Structure: The outline of the page i.e. headings, paragraphs etc. all organized in a particular way
* URLs: These are in page links to other resources e.g. media content

b. The browser fetches the linked resources from the URLs be it

* + Media – pictures, videos etc.
  + Stylesheet – in CSS format. It determines how the webpage looks like (appearance, positioning, font, colours etc.)
  + Javascript file – describes how a webpage should behave once everything has come together

The respective servers then send the requested data back to the browser.

c. As the resources come back, the browser puts them together and builds the document. It sores this in an internal data structure and renders it. This means that it creates a visible page to display on the user’s window. It also published the document as a Document Object Model (DOM) – a standard way to describe web pages.

d. The java scripts in the document run and use this DOM to manipulate the webpage. However, these don’t necessarily run at the end of the process; they run as soon as the browser finds them.

1. The webpage is then displayed on the users screen.

The figure below summarizes the process.

2. Issues HTTP Request

Processes the sent resources and creates webpage

3. Receives Request.

Searches for files/resources in system as instructed by URL.

4. Sends Resources to Browser

WEB SERVER

5. Webpage is displayed on screen

1. Types URL in browser

BROWSER

And that, in a nutshell, is how browsers work.