Web Browsers

A **web browser** or frequently called as **browser** is an application software that is installed on a computer to provide access to the World Wide Web. It fetches the web pages from the server along with the necessary files like, images, flashes, videos etc, interprets them and then displays it on the screen. All you have to do is simply type the URL (Uniform Resource Locator) of a webpage in the address bar and the browser will bring the web page on your screen.

Primary function of the Web Browsers

- Web browser functions are to provide the resources or information to the user when asked by them.
- It processes the user inputs in the form of URL like http://www.google.com in the browser and allows the access to that page.
- URL is used to identify the resources and fetch them from the server and displays it to the client.
- It allows the user to interact with the web pages and dynamic content like surveys, forms, etc.
- It also allows the user to navigate through the complete web page and see its source code in the HTML format.
- It provides security to the data and the resources that are available on the web that is by using the secure methods.

Anatomy of Web Browsers

Title Bar – The text that appears at the top of the browser window is called the title bar. This usually includes text that describes the content that appears on the web page.

Toolbar – A tool bar is a menu bar of buttons and input boxes on the browser.

Address Field – This input box displays the address, or URL, of the webpage you are viewing. You can enter any web address in this box to navigate to new pages. You can also copy a URL (web page address) and paste it into this box.

RSS Button – If a web page offers and RSS feed, in most modern browsers, you will see the orange square with white lines. This indicates an RSS feed is available for that particular web page. You can click this button to open a new dialogue box in your browser that will give you options for subscribing to this RSS feed.

Search Box – The search box is a standard on most modern web browsers. Instead of visiting Google or Yahoo! to search for something, just enter your search phrase into this box on the top left of your browser and hit enter. The browser should automatically send the query to the desired search engine and send you to a search engine results page. Google Chrome works a little differently in that both the address field and the search box are combined in the same field. You can type either a URL or a search query, and Google will send you to the appropriate page.

Status Bar - The status bar appears at the bottom of your web browser. When you are loading a web page, this bar usually will show the browser's progress. Also, when you hover links with your pointer, the address of those links will often appear in this status box. This allows you to see which web page your browser will load before clicking the link. The status bar can offer more functions when you add extensions or add ons to your browsers.

Tabs - Tabs give your browser the ability to load multiple web pages without opening a new window. To open a new tab, press Ctrl+T. You then will have a new tab where you can open a new web page and easily switch back and forth between your other tabs. When multitasking, web work without tabs would be nearly impossible.

Bookmarks - A bookmark is a saved shortcut that directs your browser to a specific webpage. It stores the title, URL, and favicon of the corresponding page. Saving bookmarks allows you to easily access your favorite locations on the Web. All major web browsers allow you to create bookmarks, though each browser provides a slightly different way of managing them. For example, Chrome and Firefox display your bookmarks in an open window, while Safari displays them in a list in the sidebar of the browser window. Internet Explorer uses the name "Favorites" to refer to bookmarks, and like Safari, it displays all your favorites in a list within the browser window sidebar.

NOTE: A bookmark only stores the location of a webpage, not store the contents of the webpage itself. Therefore, when you open a previously saved bookmark, the contents of page may have changed since the last time you viewed it.

Browser Cookie

Cookies are small pieces of information websites store on your computer. Cookies only contain bits of text, not anything else. The text can be a user ID, session ID, or any other text. For example, web pages can be configurable – a web page could have a Hide link that hides a certain element on the page. The page can save this setting on your computer with a cookie. When you load the page in the future, the page can examine the cookie and automatically hide the element.

If you clear your cookies, you'll be logged out of all websites and websites won't remember any settings you've changed on them.

Cookies are very common – you probably have hundreds or even thousands stored in your browser right now.

How Cookies Work

Your web browser stores and manages cookies. You can find a list of websites storing cookies and view the cookies themselves – although it's usually not interesting to look at the content of the cookies – in your browser's settings. If you use multiple web browsers on your computer, each browser has its own set of cookies.

Websites are only allowed to look at their own cookies – for example, when you visit How-To Geek, we can't examine cookies from other websites. This prevents malicious websites from snooping and stealing your login sessions.

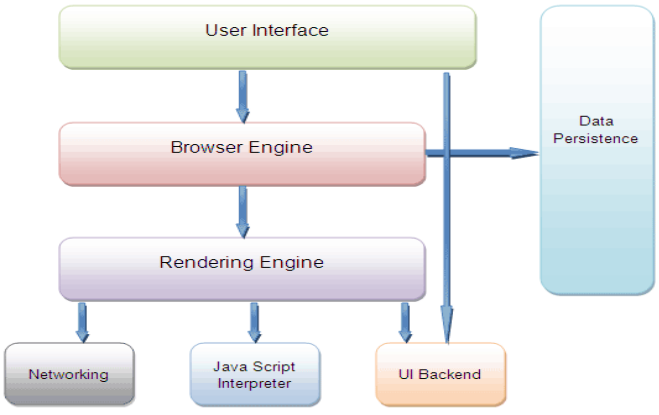
Good Uses for Cookies

As we've seen, cookies have a number of very important uses. The web wouldn't be what it is without them today.

- Cookies store your login state. Without them, you wouldn't be able to log into websites. Websites use cookies to remember and identify you.
- Cookies store preferences on websites. You couldn't change settings and have them persist between page loads without cookies.
- Cookies allow websites to provide personalized content. For example, if you're shopping on Amazon, Amazon can remember the products you've browsed and recommend similar products – even if you're not logged in.

Architecture of a Browser

The browser's main functionality is to fetch the files from the server and to display them on the screen. It basically displays html files containing images, PDF, videos, flashes, etc in an ordered layout. A browser is a group of structured codes that performs plenty of tasks to display a webpage on the screen. These codes are separated in to different components according to their tasks performed. The structure of a browser is shown in the below image.



User Interface – It is the space where interaction between users and the browser occurs. Most of the browsers have common inputs for user interface. Some of them are - an address bar, next and back buttons, buttons for home, refresh and stop, options to bookmark web pages, etc. It may be integrated with the desktop environment to provide browser session management or communication with other desktop applications.

Browser Engine – It is the piece of code that communicates the inputs of user interface with the rendering engine. It loads a given URI and supports primitive browsing actions such as forward, back,

and reloads. It provides hooks for viewing various aspects of the browsing session such as current page load progress and JavaScript alerts. It is responsible for querying and manipulating the rendering engine according to the inputs from various user interfaces.

Rendering Engine – It is the part thoroughly responsible for displaying the requested content on the screen. The Rendering Engine subsystem produces a visual representation for a given URI. It is capable of displaying HTML and Extensible Markup Language (XML) documents, optionally styled with CSS, as well as embedded content such as images. It first parses the html tags and then using the styles, it builds a render tree and finally a render layout, which displays the content on the screen.

Networking – The fraction of the code written in the browser, responsible to send various network calls. It implements file transfer protocols such as HTTP and FTP. It translates between different character sets, and resolves MIME media types for files. It may implement a cache of recently retrieved resources. For example sending the http requests to the server.

Java Script Interpreter – It is the component of the browser written to interpret the java script code presented in a web page. The JavaScript Interpreter evaluates JavaScript (also known as ECMAScript) code, which may be embedded in web pages. JavaScript is an object-oriented scripting language developed by Netscape. Certain JavaScript functionality, such as the opening of pop-up windows, may be disabled by the Browser Engine or Rendering Engine for security purposes.

UI Backend – This draws basic widgets on the browser like combo boxes, windows, etc.

Data Storage – It is small database created on the local drive of the computer where the browser is installed. This database stores various files like cache, cookies, etc.