How the Web Functions

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The internet has become one of the most important aspects of industrialized society over the past couple decades. Billions of people around the world now have access and it has become so common the vast majority of today's younger generations don't know a world without it. The ability to log on at a moment's notice and with a single click rapidly look up almost anything anyone desires, for many, is simply taken for granted these days. But how many of those web surfers actually understand just how the information comprising the web page they're currently looking at made it to their computer, or device? This high-level overview intends to piece some of that together.

At the highest of levels, when one types a dot com, a web address, or URL into their browser's address bar, such as https://www.techtonicgroup.com and hits enter, or clicks the link to open that web page, whatever it is they're using to browse the web (computer, smart-phone, etc.) needs to make a connection to a server that contains the data they seek. It sends a request for that data and the server that contains that data sends it back to the computer, or device's browser app in which the request was made. The browser then renders the data into the web page ultimately seen.

To do this, the first thing it needs to do is figure out which machine it needs to connect to for that data. Because this is the internet, address to those connections don't actually have names, like the dot coms typed in, each URL is instead assigned a unique IP (Internet Protocol) address that a special database called a DNS (Domain Name System) keeps track of for everyone. If the associated IP address isn't already stored locally on the user's computer (via browser, OS, or router cache) because of a previous visit to the same website, a DNS query is made to one of multiple external servers responsible for keeping those associations, which will respond with small packets of data that contain information such as the IP address needed.

Once the user's browser receives the matching IP address it will start to build a TCP connection with the server associated with that IP address. This connection is made using what's called the TCP/IP three-way handshake, where the browser and server exchange SYN (synchronize) and ACK (acknowledge) messages to establish a connection. Once that connection is made, the transfer of data from the server to the browser can begin.

That transfer of data begins with a GET request from the browser to the server. Within that request is a small packet of data that includes the original URL typed into the browser, or via the link that was clicked. A web server program (i.e. Apache, IIS, etc.) within the physical server receives that request and passes it to a request handler (typically written in ASP.NET, PHP, Ruby, etc.) to evaluate the request and respond accordingly. In this case, with the data written from the files created to originally build the website, www.techtonicgroup.com, most commonly with programming languages such as HTML, CSS, Javascript, PHP, etc.

That’s when the information for the web page originally requested is sent to the user’s browser for rendering and display. The info contains the web page requested, as well as the status code, compression type (content-encoding), instructions for the browser to cache the page, cookies to save, in addition to privacy information and more.

In stages, the browser first renders the HTML portion of the website code, then checks HTML tags and sends out further GET requests for additional elements on the page, such as images, CSS styling, and JavaScript functionality, etc. Some or all of this code, including the page’s IP address, can be saved, or “cached” by the browser, as previously mentioned, to attempt avoiding having to fetch as much information the next time that page is visited, so to speak.

When it’s all said and done, nowadays typically within just a few seconds of when the URL was typed into the browser’s address bar, or when the link was clicked (depending on your internet connection speed), you’re likely looking at the fully-rendered web page you originally wanted to see.