

What happens when you type <https://www.google.com> in your browser and press Enter

In our daily routine, almost everyone used the internet to get things done. When you typed "<https://www.google.com>" into a browser. Were you ever curious about what happens immediately after clicking the enter key?

Here are some brief explanation of what happens when you type a URL for example "<https://www.google.com>" into a web browser

When you type a URL like "<https://www.google.com>" into a web browser and hit your enter key, there are a lot of things that go on before you finally get some output on your browser.

However, all these things happen in a split second, so you hardly ever stop to think about them. Those operations that happen in those microsecond are discuss below:

DNS REQUEST

Your computer sends a request to the domain name system (DNS) server which serves as an address book for all domain names. Let said for instance If it can't find the IP address for the URL requested then it asks your operating system to locate the web site. The first place your operating system is going to check for the address of the URL you specified is in the hosts file (/etc/hosts in Linux and Mac, c:\windows\system32\drivers\etc\hosts in Windows). If the URL is not found inside this file, then the OS will make a DNS request to find the IP Address of the web page. The first step is to ask the Resolver (or Internet Service Provider) server to look up in its cache to see if it knows the IP Address, if the Resolver does not know then it asks the root server to ask the .COM TLD (Top Level Domain) server – if your URL ends in .net then the TLD server would be .NET and so on – the TLD server will again check in its cache to see if the requested IP Address is there. If not, then it will have at least one of the authoritative name servers associated with that URL, and after going to the Name Server, it will return the IP Address associated with your URL.

TCP/IP

TCP (Transmission Control Protocol) and IP (Internet Protocol) are two of the main protocols that make up the internet.

They work together to establish a connection between a client and a server and facilitate the transmission of data between them.

After the DNS server received the request, it then sends back the exact IP address of the server which <https://www.google.com> points to.

Knowing this IP, your computer then establishes a connection with the server through the IP address. The type of this connection is known as Transmission Control Protocol (TCP) and your computer is able to establish this connection through the Internet Protocol (IP). This whole process is known as a "handshake".

FIREWALL

A firewall is a security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. Its primary purpose is to protect a network from external threats, such as hackers and malware.

When you type a URL like "[google.com](https://www.google.com)" into your browser, the request that your browser makes to Google's server passes through the firewall on its way. The firewall checks the incoming request to make sure it is allowed based on its security rules.

If your computer is behind a firewall, the firewall checks to ensure that the particular request you are making is allowed before permitting it. Also, if the server you are trying to access is also behind a firewall, a similar check will be done before you are finally able to connect to the server.

HTTP/SSL

HTTPS (Hypertext Transfer Protocol Secure) is a secure version of the HTTP protocol used to transmit data on the internet. It is used to encrypt the data transmitted between your browser and Google's server.

SSL (Secure Sockets Layer) and TLS (Transport Layer Security) are encryption protocols that are used to secure the data transmitted over HTTPS.

After establishing the connection, your browser now sends a request for the webpage using an encryption protocol like Secure Sockets Layer (SSL) or Transport Layer Security (TLS) in order to encrypt the data that will be shared between your computer and the server. This type of encryption is what is responsible for the "s" in "https" which also implies that the connection is secure.

LOAD BALANCER

A load balancer is a device that distributes incoming network traffic across a group of servers or resources.

Its primary function is to ensure that the traffic is distributed evenly across the servers in order to avoid overloading any single server and to increase the overall capacity and reliability of the system

Companies like Google with high traffic maintain a host of servers and for that matter they have a load balancer that receives most of the requests and sends it to a particular server. The request from your browser will therefore hit the load balancer first which will forward it to a specific server depending on the algorithm used by the load balancer.

The server that receives the request then sends a response back to the load balancer which also forwards the response back to your browser. This response will mostly include HTML, CSS, and JavaScript files that makes up Google's homepage.

The HTML files returned tells the browser how to render the content of the page. The CSS file tells the browser how to style the content while the JavaScript file adds interactivity to the page.

WEB SERVER

A web server is a computer program that is responsible for handling requests for web pages from clients (such as a browser trying to access [google.com](https://www.google.com)). When a client sends a request for a web page to a web server, the server processes the request and returns the appropriate response to the client.

This means that when trying to access [google.com](https://www.google.com), Google's server will receive a request from the load balancer.

The web server would then process the request and generate a response, which would typically include the HTML, CSS, and JavaScript files that make up the web page.

The web server would then send this response back to the load balancer, which would forward it on to the browser. The browser would then use the HTML, CSS, and JavaScript files to render the web page for the user.

APPLICATION SERVER

Unlike the web server, the application server handles dynamic content. When using "[google.com](https://www.google.com)", the application server will be responsible for generating the search results (which change based on the query you put into the search engine).

When you submit a search query to Google, the request is first sent to the load balancer, which forwards it to one of the web servers in the Google server network. The web server then sends the request to the application server, which processes the request and generates the search results.

DATABASE

Depending on the complexity of the search query, the application server may need to make a request to a database in order to retrieve the necessary data.

For example, if you are searching for a specific product on an e-commerce website, the application server may need to retrieve information about the product from a database.

Once the application server has obtained the necessary data, it sends it back to the web server, which includes it in the response that is sent back to the browser. The browser then uses this information to display the search results to you.

Finally, the browser will render the page and display it to you.