

What is DNS and how does it work?

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November 11, 2013

In order for one computer to send data to another computer, the IP address of the receiving computer must be known. The DNS system allows IP addresses to be translated into more human readable (and rememberable) domain names.

Before DNS

In the early days of the Internet, there were only a few hundred machines online, so a single text file could contain all the host names and corresponding IP addresses. This text file was managed by the Stanford Research Institute and was called `Hosts.txt`. System administrators would periodically copy that file onto their own systems, and so the mapping of IP addresses to domain names was kept consistent over the whole network.

However, as the Internet grew, it soon became too much work to manually update the `Hosts.txt` file, since changes were being made every few minutes, and so the DNS system was developed as an automated and scalable solution.

How does DNS work?

DNS stands for Domain Name System, and is able to resolve domain names into IP addresses and be dynamically updated.

Each device on the Internet is called a host (this can be anything, from a gaming computer to an Internet connected toaster), and it has a unique IP address. Just as the IP address is unique to the host, the domain name is also unique. To allow for more variety, domain names aren't limited to one level, and allow for many sub-domains.

Top level domains are the last part of a domain name, such as `.com` or `.gov.uk`. They are usually managed by top level domain servers.

A sub-domain is the part before the main domain name. *blog* in `blog.test.com` for example.

In order to translate a domain name into an IP address, your computer first constructs a DNS query containing the domain name and then sends it to the DNS server listed in the IP settings of your computer.

When the DNS server receives the request, it checks its cache of previously resolved names and if it contains the one it's looking for, it will send the IP address back to your computer. If the server doesn't have the domain name cached, then it'll send a request to the top level domain server, which will find the specific DNS server for that domain and find the IP.