

Domain Name System(DNS)

DNS is a host name to IP address translation service. DNS is a distributed database implemented in a hierarchy of name servers. It is an application layer protocol for message exchange between clients and servers.

Requirement

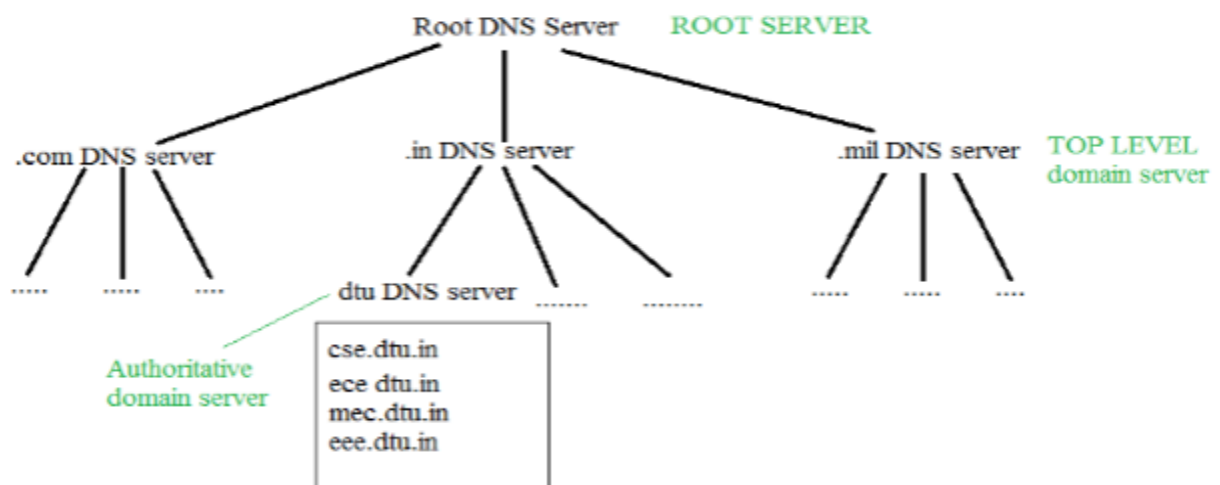
Every host is identified by the IP address but remembering numbers is very difficult for the people and also the IP addresses are not static therefore a mapping is required to change the domain name to IP address. So DNS is used to convert the domain name of the websites to their numerical IP address.

Domain :

There are various kinds of DOMAIN :

1. Generic domain : .com(commercial) .edu(educational) .mil(military) .org(non profit organization) .net(similar to commercial) all these are generic domain.
2. Country domain .in (india) .us .uk
3. Inverse domain if we want to know what is the domain name of the website. Ip to domain name mapping. So DNS can provide both the mapping for example to find the ip addresses of abc.org then we have to type nslookup www.abc.org.

Organization of Domain



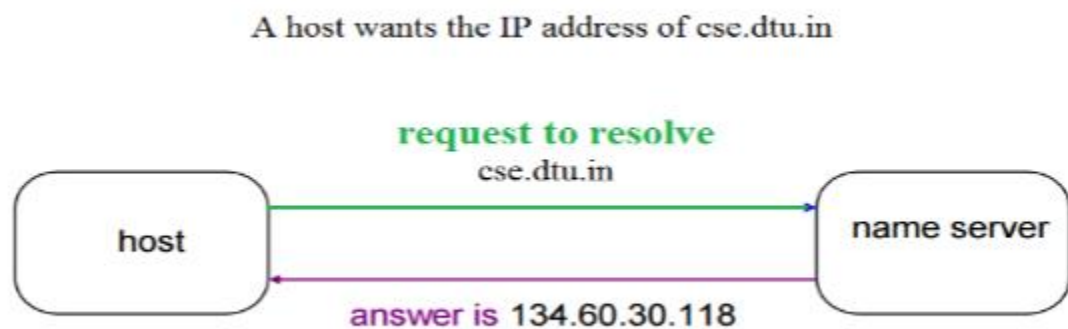
It is Very difficult to find out the ip address associated to a website because there are millions of websites and with all those websites we should be able to generate the ip address immediately, there should not be a lot of delay for that to happen organization of database is very important.

DNS record – Domain name, ip address what is the validity?? what is the time to live ?? and all the information related to that domain name. These records are stored in tree like structure.

Namespace – Set of possible names, flat or hierarchical . Naming system maintains a collection of bindings of names to values – given a name, a resolution mechanism returns the corresponding value –

Name server – It is an implementation of the resolution mechanism.. DNS (Domain Name System) = Name service in Internet – Zone is an administrative unit, domain is a subtree.

Name to Address Resolution



The host request the DNS name server to resolve the domain name. And the name server returns the IP address corresponding to that domain name to the host so that the host can future connect to that IP address.

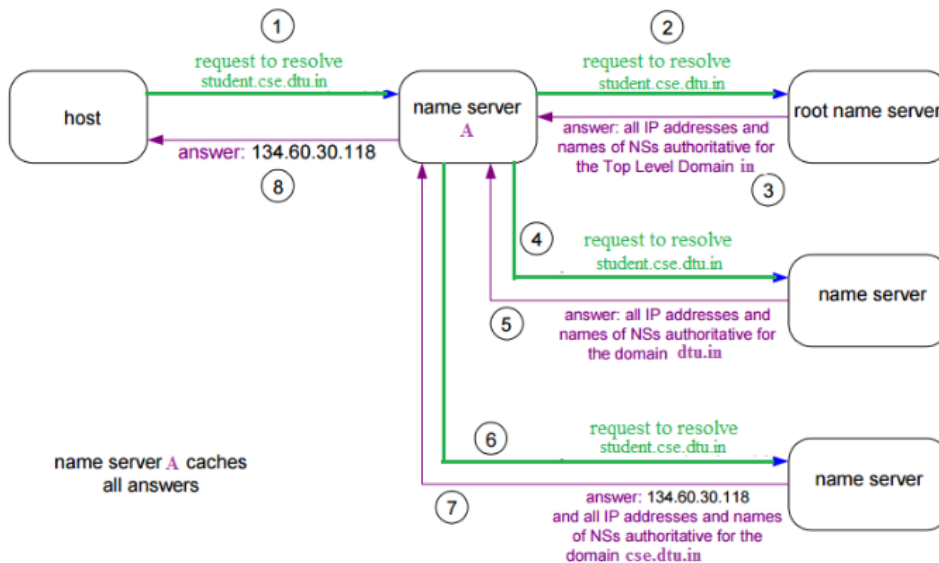
Hierarchy of Name Servers

Root name servers – It is contacted by name servers that can not resolve the name. It contacts authoritative name server if name mapping is not known. It then gets the mapping and return the IP address to the host.

Top level server – It is responsible for com, org, edu etc and all top level country domains like uk, fr, ca, in etc. They have info about authoritative domain servers and know names and IP addresses of each authoritative name server for the second level domains.

Authoritative name servers This is organization's DNS server, providing authoritative hostName to IP mapping for organization servers. It can be maintained by organization or service provider. In order to reach cse.dtu.in we have to ask the root DNS server, then it will point out to the top level domain server and then to authoritative domain name server which actually contains the IP address. So the authoritative domain server will return the associative ip address.

Domain Name Server



The client machine sends a request to the local name server, which, if root does not find the address in its database, sends a request to the root name server, which in turn, will route the query to an intermediate or authoritative name server. The root name server can also contain some host Name to IP address mappings. The intermediate name server always knows who the authoritative name server is. So finally the IP address is returned to the local name server which in turn returns the IP address to the host.

Example Of Dns Working

DNS translates the domain name into IP address automatically. Following steps will take you through the steps included in domain resolution process:

When we type www.youtube.com into the browser, it asks the local DNS Server for its IP address.

Here the local DNS is at ISP(internet service provider) end.

When the local DNS does not find the IP address of requested domain name, it forwards the request to the root DNS server and again enquires about IP

address of it.

The root DNS server replies with delegation that **I do not know the IP address of www.youtube.com but know the IP address of DNS Server.**

The local DNS server then asks the com DNS Server the same question.

The **com** DNS Server replies the same that it does not know the IP address of www.youtube.com but knows the address of youtube.com.

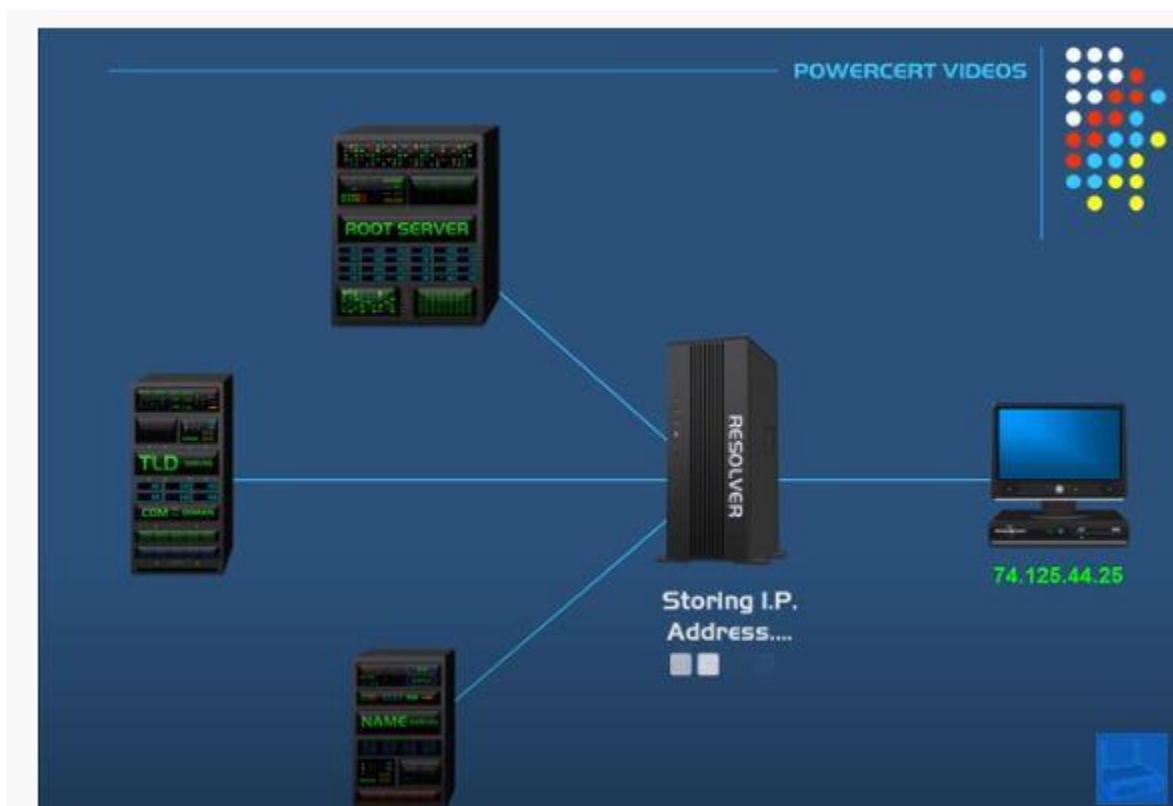
Then the local DNS asks the youtube.com DNS server the same question.

Then youtube.com DNS server replies with IP address of

www.youtube.com.

Now, the local DNS sends the IP address of www.youtube.com to the computer that sends the request.

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Search Engines

The word *search engine* resonates with Google, one of the most powerful and popular web-searching mediums in use. Any query typed into the Google search bar returns hundreds of

corresponding web pages. The lesser-known fact however is that the technology backing Google's incredible ability falls into a category of search techniques employed to carry out a swift exploration.

The traditional method of an inquiry into the search box is followed by:

- Search through the search engine database
- Identification of relevant web pages
- Display of Search Engine Result Page (SERP)

All search engines strive to provide the service of delivering relevant pages from the World Wide Web but the manner in which listings are generated differ based on the kind of search engine and algorithms used.

Let us now understand, **how do these search engines work?**

Basically all search engines go through **three stages**:

- Crawling
- Indexing
- Ranking and Retrieval

Crawling

This stage involves scanning the sites and obtaining information about everything that is contained there: page title, keywords, layout, pages that it links to – at a bare minimum.

This task is performed by special software robots, called “**spiders**” or “**crawlers**”. These robots usually start with the most heavily used servers and popular web pages. The link structure is very important to determine the route that these “crawlers” follow. The new links are followed next to find many interconnected documents, also revisiting the previous sites to check for newly made changes. A never-ending process.

Sometimes the “crawlers” give up, if the actual content is hidden many clicks away from the homepage.

Indexing

Once all the data has been assimilated, selected pieces of it are stored in huge storage facilities. We can relate in this way: we possess several number of books. Going through all of it is the **crawling**, and making a list of them, along with their authors and other related information is the **indexing**.

This example provides a small-scale view.

If we expand this assumption to books contained in all the libraries in this world, that pretty much explains the magnitude a search engine undertakes.

Ranking and Retrieval

Search engines are answer machines. Whenever we perform an online search, the search engines scour its database for the most relevant results. Also, it ranks these results based on the popularity of the websites. **Relevance** and **popularity** are the most

important factors to be considered by these search engines to provide satisfactory performance.

Ranking algorithms differ for different search engines. An engine might assign a weight to each entry, relative to their appearance in the title, meta tags or the sub-headings.

The most basic algorithm uses the frequency of the keyword being searched. This, however, led to something called “**keyword stuffing**”, where the pages are mostly filled with nonsense as long as it includes the keyword.

This gave way to the concept based on linking – **more popular sites would be linked more.**

At present, search engines are trying to develop for **natural language queries**. Being able to understand what we speak, in a free manner, will truly revolutionize this technology.