What is a domain name?

Domain names are a key part of the Internet infrastructure. They provide a human-readable address for any web server available on the Internet.

Any Internet-connected computer can be reached through a public IP. Computers can handle such addresses easily, but people have a hard time finding out who is running the server or what service the website offers, and have the factor that IP is hard to remember and might change over time.

To solve all those problems we use human-readable addresses called domain names.

What is the difference between a domain name and a URL?

A uniform resource locator (URL), sometimes called a web address, contains the domain name of a site as well as other information, including the protocol and the path. For example, in the URL *"https://cloudflare.com/learning/", "cloudflare.com"* is the domain name, while *"https"* is the protocol and *"/learning/"* is the path to a specific page on the website.

Structure of domain names

A domain name has a simple structure made of several parts, separated by dots and read from right to left. For example: "docs.google.com" where 'docs' is the label 2, 'google' is the label 1 and 'com' is the TLD (Top-Level Domain).

Top-Level Domain (TLD)

TLDs tell users the general purpose of the service behind the domain name. The most generic TLDs are: .com, .org, .net; don't require web services to meet any particular criteria, but some TLDs enforce stricter policies so it is clearer what their purpose is. For example:

- **Local TLDS:** .us, .fr or .se can require the service to be provided in a given language or hosted is a certain country - They are supposed to indicate a resource in a particular language or country;

- **.gov:** Are only allowed to be used by government departments;
- **.edu:** Is only for use by educational and academic institutions;

TLDs can have a 63 maximum length, although most are around 2-3.

Label (or component)

The labels are what follow the TLD. A label is a case-insensitive character sequence anywhere from one to sexty-three characters in length, containing only the letters A-Z, 0-9, and the '-' character (which may not be the first or last character in the label).

The label located right before the TLD is also called a Secondary Level Domain (SLD).

Domain names can have many labels. It is not mandatory nor necessary to have 3 labels to form a domain name.

Who owns a domain name?

You cannot "buy a domain name". This is so that unused domain names eventually become available to be used again by someone else. If every domain name was bought, the web would quickly fill up with unused domain names that were locked and couldn't be used by anyone.

Instead, you pay for the right to use a domain name for one or more years. You can renew your right, and your renewal has priority over other people's applications. But you never own the domain name.

Companies called registrars use domain name registries to keep track of technical and administrative information connecting you to your domain name.

Finding an available domain name

To find out whether a given domain name is available,

- Go to a domain name registrar's website. Most of them provide a "whois" service that tells you whether a domain name is available;

- Alternatively, if you use a system with a built-in shell, type a whois command into it: *whois mozilla.org*
    - Here mozilla.org is owned by the Mozilla Foundation.
    - If the domain isn't owned, it going to return a NOT FOUND, that means the domain is not owned;

Getting a domain name

The process is quite straightforward:

- Go to a registrar's website;
- Usually there is a prominent "get a domain name" call to action;
- Fill out the form with all required details. Make sure, especially, that you have not misspelled your desired domain name. Once it's paid for, it's too late!
- The registrar will let you know when the domain name is properly registered. Within a few hours, all DNS servers will have received your DNS information;

DNS refreshing

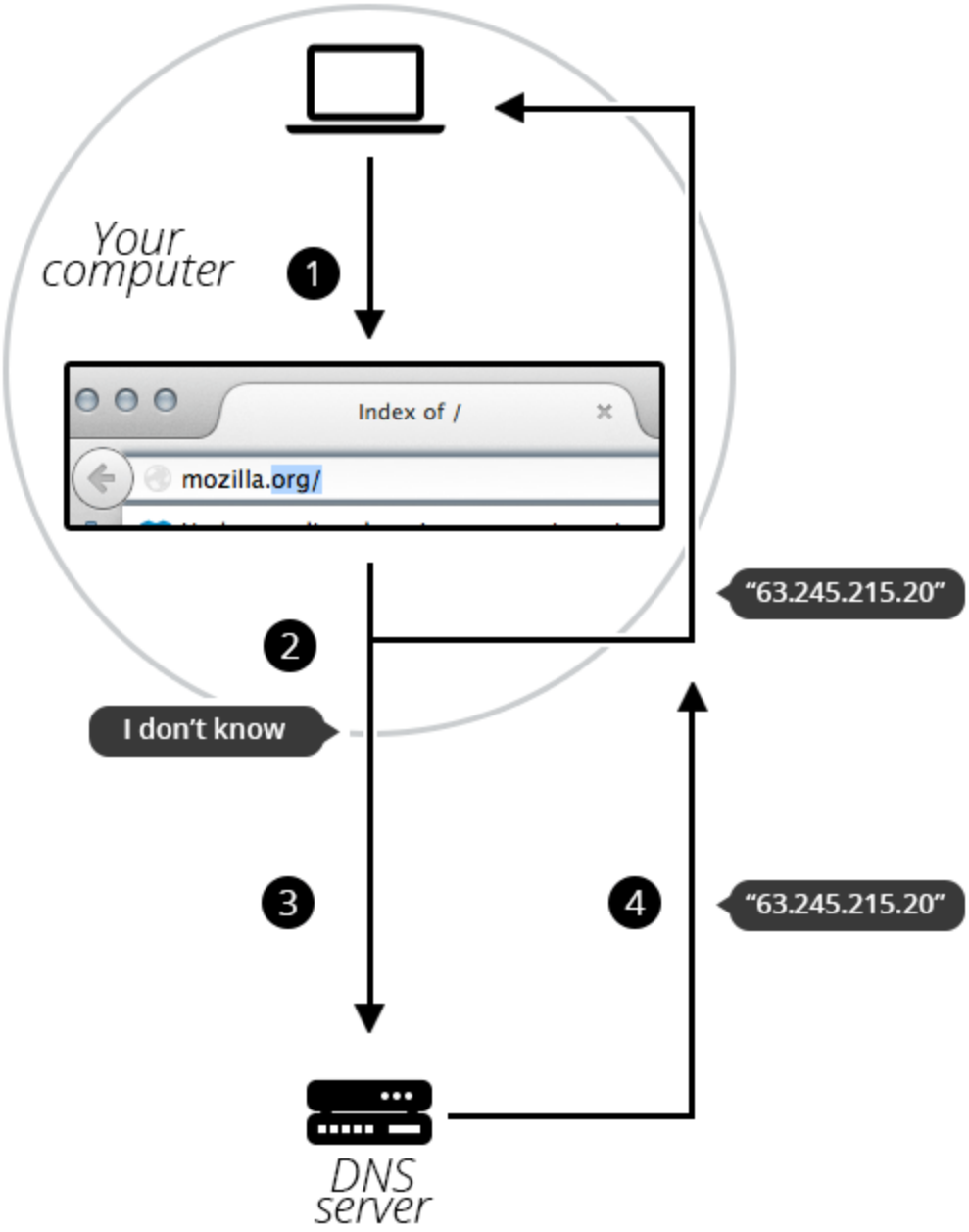
DNS databases are stored on every DNs server worldwide, and all these servers refer to a few special servers called "authoritative name servers" or "top-level DNS servers" - These are like the boss servers that manage the system.

Whenever your registrar creates or updates any information for a given domain, the information must be refreshed in every DNS database. Each DNS server that knows about a given domain stores the information for some time before it is automatically invalidated and then refreshed. Thus, it takes some time for DNS servers that know about this domain name to get the up-to-date information.

How does a DNS request work?

As we already saw, when you want to display a webpage in your browser it's easier to type a domain name than an IP address. Let's take a look at the process:

- Type mozilla.org (or other domain) in your browser's location bar;
- Your browser asks your computer if it already recognizes the IP address identified by this domain name. If it does, the name is translated to the IP address and the browser negotiates contents with the web server. End of story;
- If your computer does not know which IP is behind the mozilla.org (or other domain), it goes on to ask a DNS server, whose job is precisely to tell your computer which IP address matches each registered domain name;
- Now that the computer knows the requested IP address, your browser can negotiate contents with the web server;



References

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[What is a domain name? | Domain name vs. URL | Cloudflare]