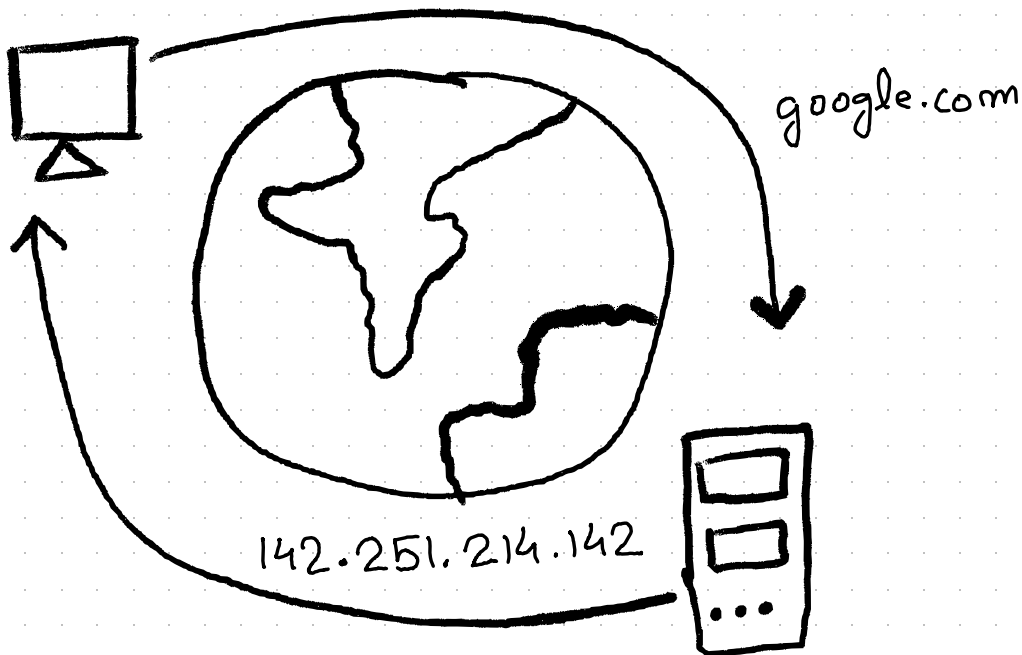


How DNS Works?



Yasir Khurshid, 11th October 2024

Contents

- 1) The browser
- 2) Resolver
- 3) The root Server
- 4) Top level domain
server
- 5) Authoritative name
Server

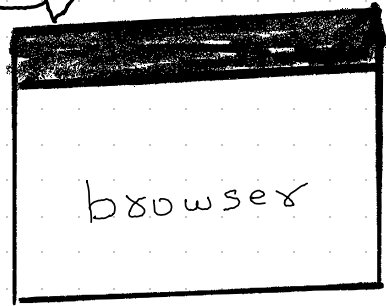
Browser

①

OK, I will find this domain for you



google.com



→ Computers use IP Addresses to communicate with each other

10.0.0.1

192.168.1.0

8.8.8.8

→ Humans cannot remember IP Addresses so they use words

google.com

facebook.com

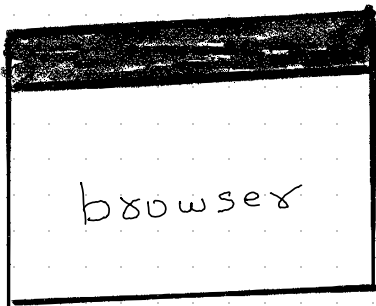
2

→ Here DNS (Domain Name System) helps to bring the words and IP addresses together.

142.251.214.142 → google.com

140.82.116.3 → github.com

→ OK now back to the browser



Let me check my cache to get the IP address of google.com

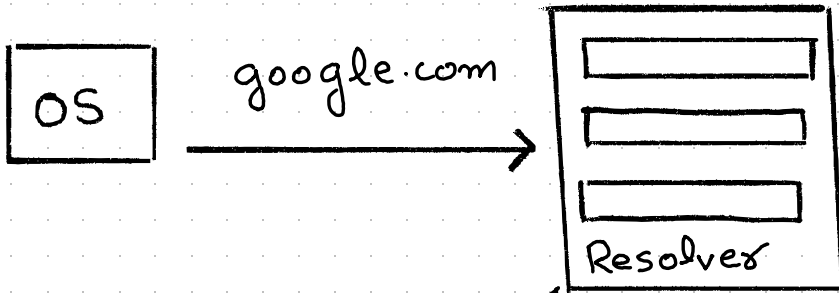
OK, I have no record in my cache, Let me ask the OS

OS

Let me check my cache, Nope I don't have it. Let me ask the Resolver

Resolver

③



Let me check my cache
oh no I do not have it. But
I can ask the root server

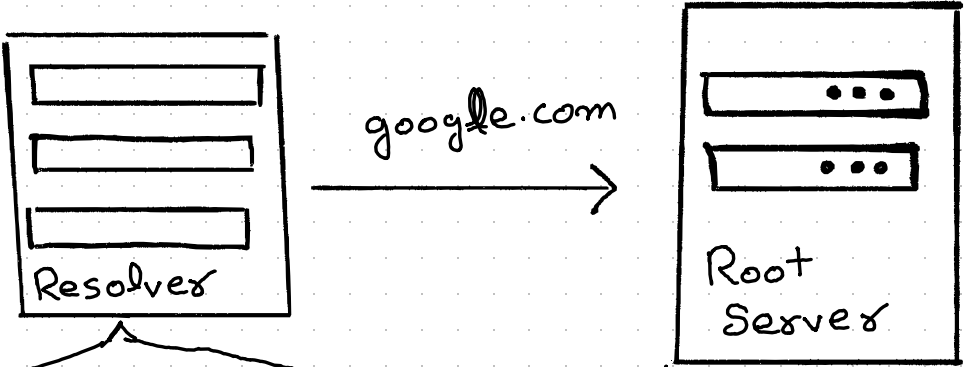
→ Resolver is your ISP (Internet Service Provider)

→ All resolvers know where to find the root server.

→ The root server has information about TLD server (Top Level Domain server)

Root Server

4



OK, Let me save the .com TLD address, so I do not ask you again

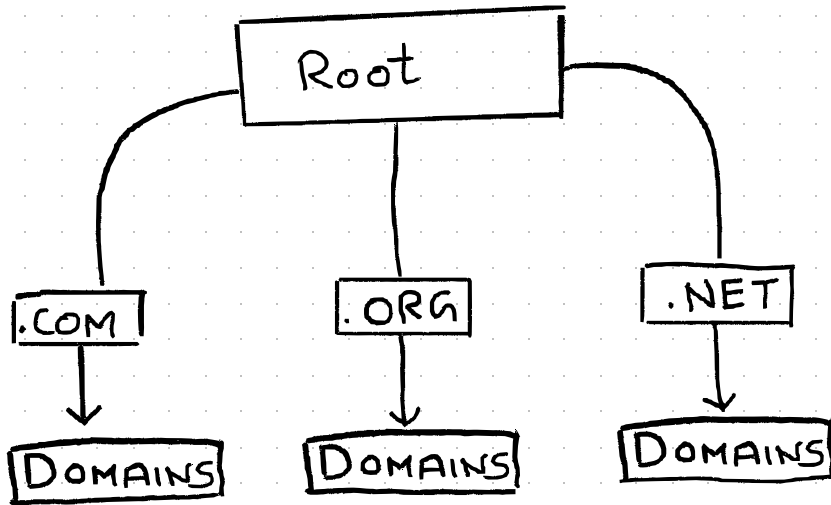
I can tell you where to find .com Top-level domain server!

here is the address of .com TLD

→ There are in total 13 root servers available

(5)

→ Root servers are at the top of DNS hierarchy



→ They are located at different global locations & operated by 12 organisations.

→ They are named from A to M

a.root-servers.net

b.root-servers.net

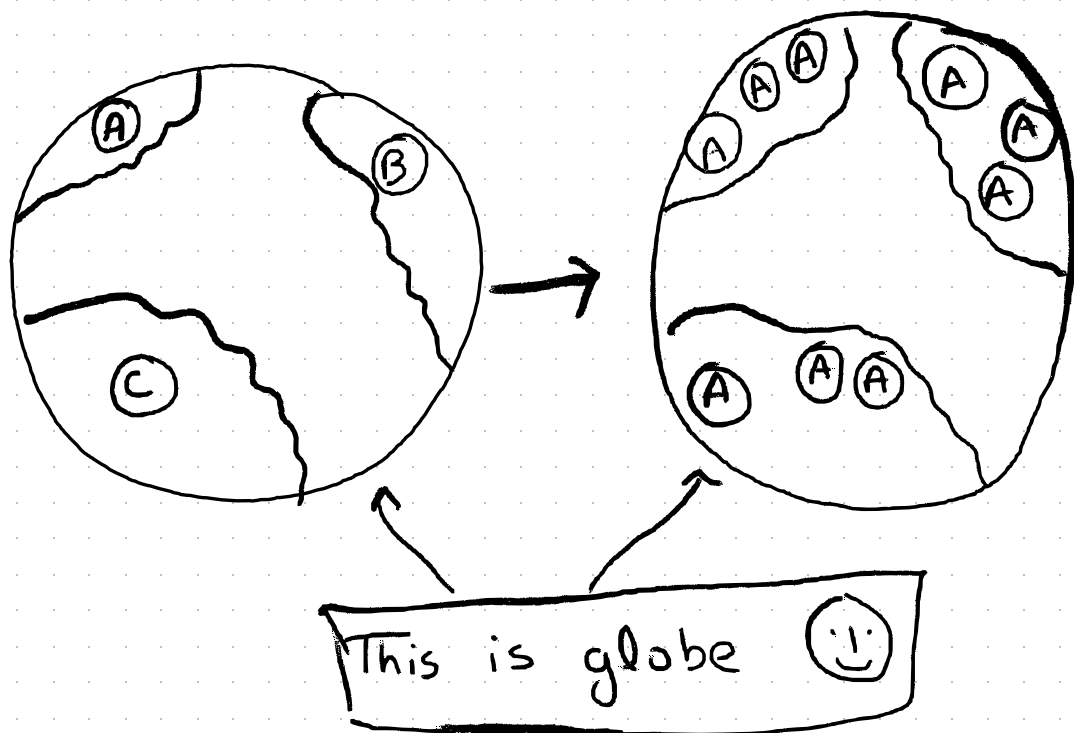
⋮

m.root-servers.net

⑥

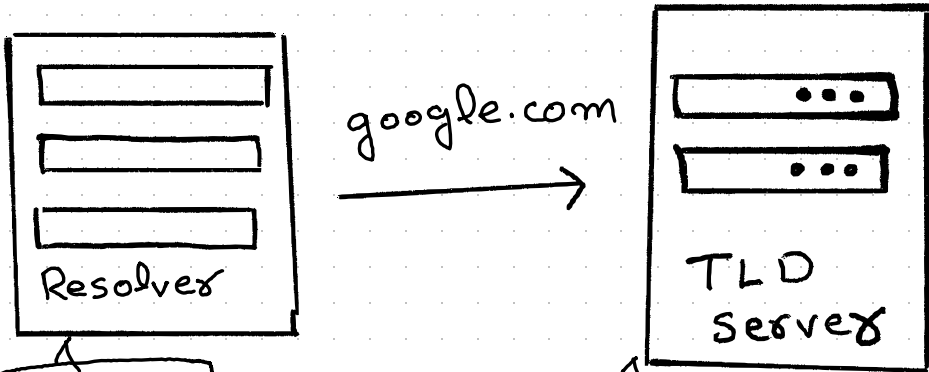
→ These are not only 13 physical servers to support the whole internet

→ Each organisation provides multiple physical servers distributed around the globe.



TOP LEVEL DOMAIN SERVER (TLD)

7



OK, Let me
save this
Information

I don't know the IP of
google.com but I know the
name servers which you can
ask for IP

→ TLD belongs to ICANN (Internet Corporation for assigned Names & Numbers)

→ .COM TLD was the first created in 1985 (Now a days it is the largest TLD on the Internet)

→ Other types of TLDs:

- Country code TLD

.DE → Germany

.PK → Pakistan

- Generic TLD

.NET

.ORG

.EDU

- Infrastructure TLD

.ARPA → used for reverse
DNS lookup

10.0.0.1 → Domain

- New generic TLD

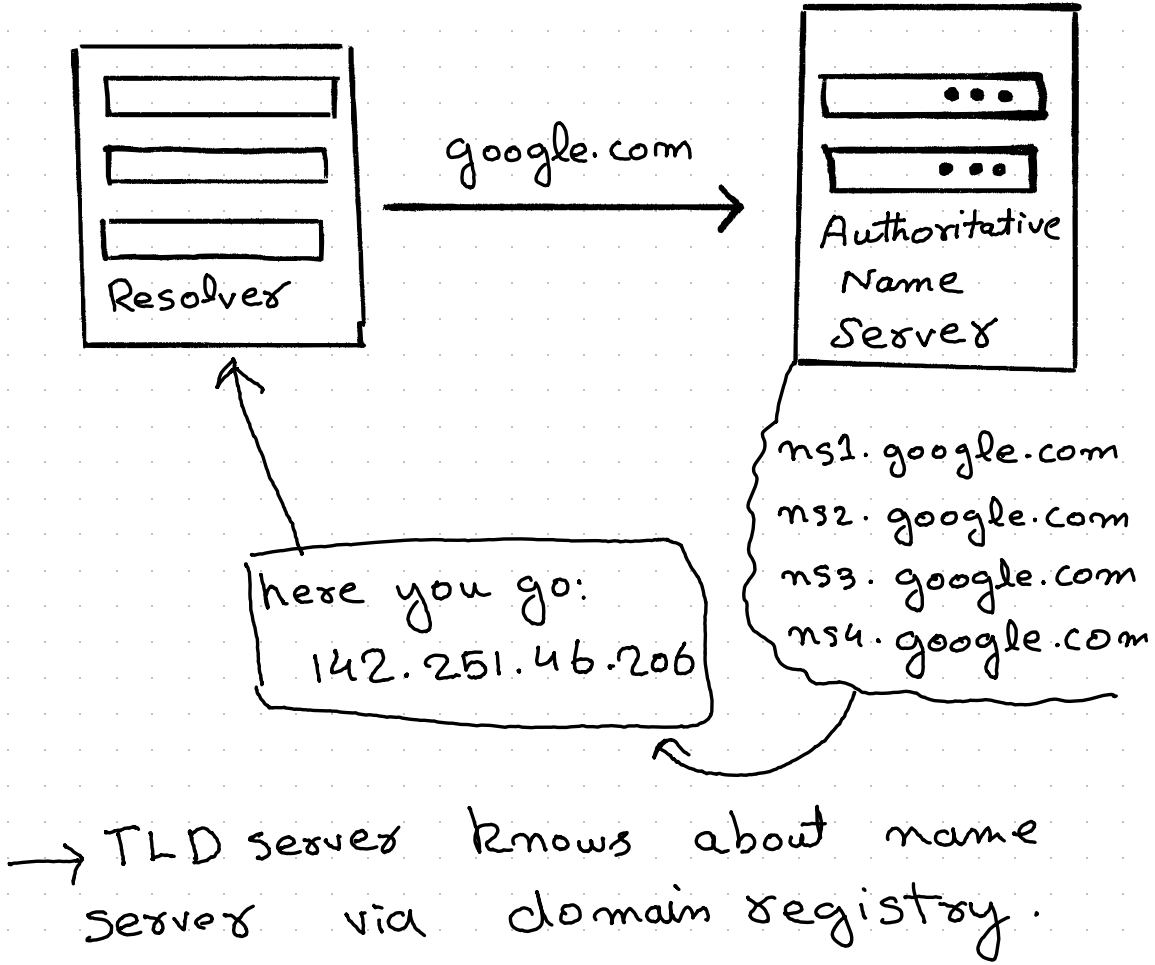
.PIZZA

.APP

.HEALTH

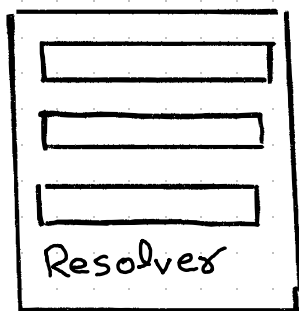
Authoritative Name Servers

9

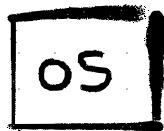


→ When a new domain is purchased, domain registry informs TLD about the name servers.

- There are more than one name server attached to any domain like ns1, ns2....
- They provide info about DNS like website, email.
- Resolver get the name server list in some unknown order
- With different name servers the load is distributed and DNS zone availability is increased
- Whois query can be used to find the name servers for a domain



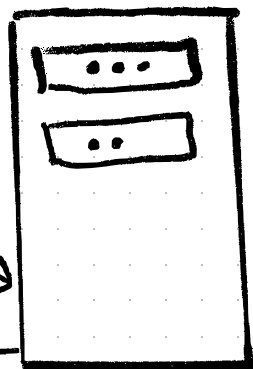
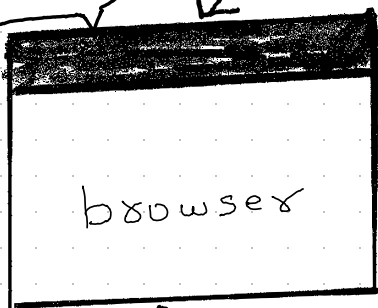
The IP for google.com
is 142.251.46.206



Super thanks, let
me save it in
my cache

142.251.46.20

I have saved
the IP in
my cache



here is the
page!

142.251.46.20