Domain Name System

Thursday, 11 June 2020 11:42 PM

Let's look at a URL

http://cs144.scs.stanford.edu/labs/sc.html

- http://: application protocol
- cs144.scs.stanford.edu: Host
- labs/sc.html: file/resource

Instead of this we can write 171.66.3.9 or the IP address of the host

HOSTS.txt

mapping URL — IP

Way back when Internet was tiny this file was used.

All hosts were in a file HOSTS.txt, maintained by a network information center

> Maintained at SR:SRI-NIC.ARPA, 26.0.0.73

→ Hosts periodically used a file transfer protocol (FTP) to download a new version.

→ Was not scalable

Domain Name System

scaler.com
scaler.confusion
stanfor.edu

stanfor.edu/user

→ Maps names to address

→ Must be able to handle huge number of records

→ Must have distributed control: (Ex- amazon you can manage these under your name)

→ Must be robust to failures

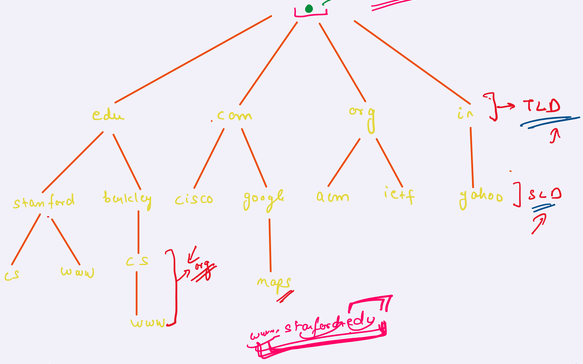
Safe

Note ① This DNS is read only or read mostly.

② Loose consistency is allowed → If a node mapping changes it's ok if someone sees it later or delayed.

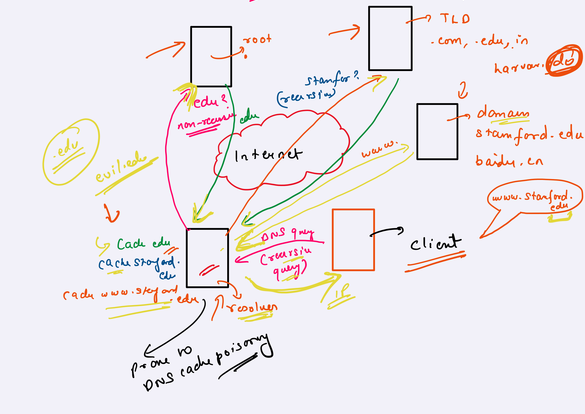
These above properties allows extensive caching → Look up a name & keep result for a long time

DNS Name Architecture



There are replicated DNS servers to avoid single point of failure.

* DNS query & types
  - Recursive → Resolve all steps of query
  - Non recursive → Resolve one step of query



DNS message structure

Header
Question
Answer
Authority
Additional

Empty in queries

dig

Local DNS CACHE

local resolver library

DHCP

8EB31684-2659-44A0...

```
sanketsingh@Sankets-MacBook-Air ~ % dig www.scaler.com

; <<>> DiG 9.10.6 <<>> www.scaler.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51988
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 4, ADDITIONAL: 4

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;www.scaler.com.                IN      A

;; ANSWER SECTION:
www.scaler.com.         60      IN      A       52.11.63.65
www.scaler.com.         60      IN      A       44.228.98.5

;; AUTHORITY SECTION:
scaler.com.             55112   IN      NS      ns-240.awsdns-30.com.
scaler.com.             55112   IN      NS      ns-1522.awsdns-02.org.
scaler.com.             55112   IN      NS      ns-824.awsdns-39.net.
scaler.com.             55112   IN      NS      ns-2033.awsdns-62.co.uk.

;; ADDITIONAL SECTION:
ns-240.awsdns-30.com.   51792   IN      A       205.251.192.240
ns-824.awsdns-39.net.   170142  IN      A       205.251.195.56
ns-824.awsdns-39.net.   170092  IN      AAAA    2600:9000:5303:3800::1

;; Query time: 33 msec
;; SERVER: 103.59.199.14#53(103.59.199.14)
;; WHEN: Fri Jun 12 00:47:14 IST 2020
;; MSG SIZE  rcvd: 272

sanketsingh@Sankets-MacBook-Air ~ %
```

header

Authoritative Servers

DNS