Domain Name Service (DNS)

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Origins

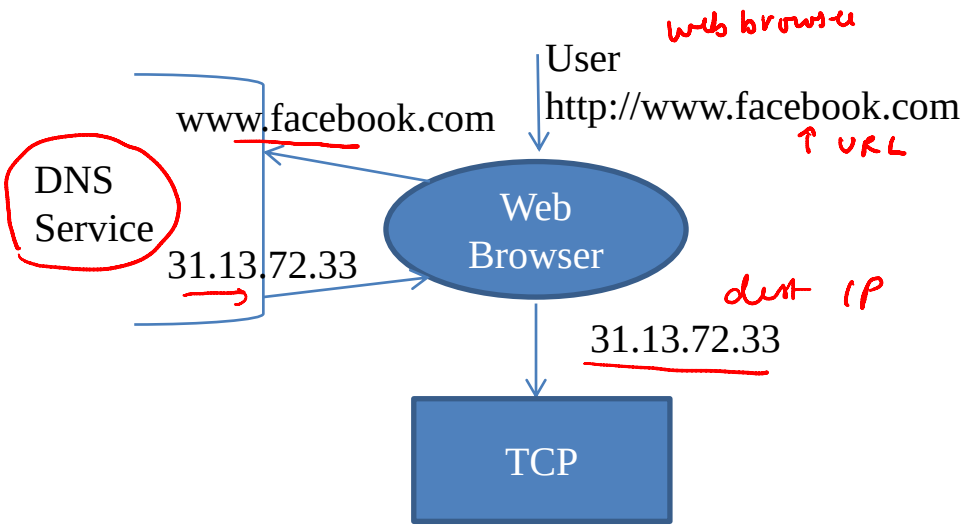
- People have many identifiers: Full name, Pet name, Roll number, Passport number
- Internet hosts are no less
  - Hostnames and IP addresses

E.g. www.facebook.com
• Variable Length
• Mnemonic → easy to remember
• Carry no info to help route packets towards them

E.g.31.13.72.33
• Fixed Length
• Numeric
• Routing information embed within them

Problem and Solution

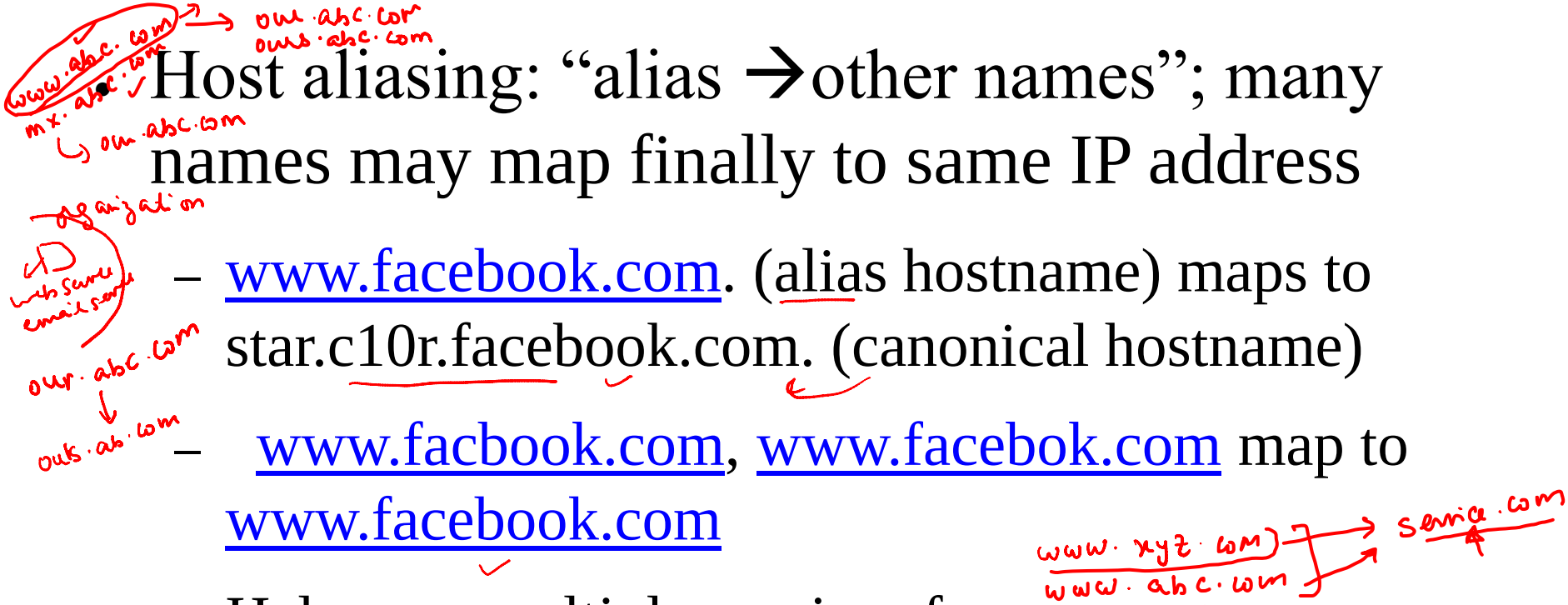
- People prefer hostnames
- Routers prefer IP addresses
- Need a service (DNS) that converts hostnames/domains to Values → IP address



Domain Name: Label that defines a realm of administrative autonomy
E.g. facebook.com; iitb.ac.in; mit.edu

DNS Services

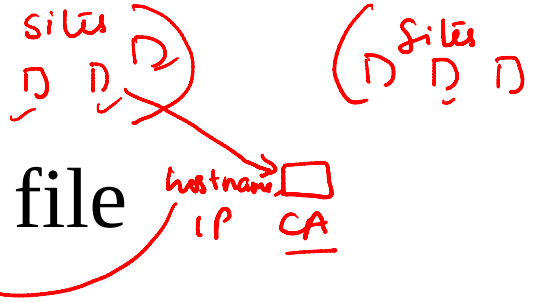
- Host name to IP address translation
- Host aliasing: “alias →other names”; many names may map finally to same IP address
  - www.facebook.com. (alias hostname) maps to star.c10r.facebook.com. (canonical hostname)
  - www.facbook.com, www.facebok.com map to www.facebook.com
  - Helps run multiple services from same server



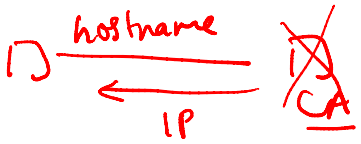
DNS Services

- Mail server aliasing: Help specify mailserver of a given domain
  - E.g. cse.iitb.ac.in maps to jeeves.cse.iitb.ac.in
  - facebook.com maps to msgin.t.facebook.com
- Load distribution: Helps distribute load across replicated servers
  - A single hostname associated with many IP addresses; order rotated on each request

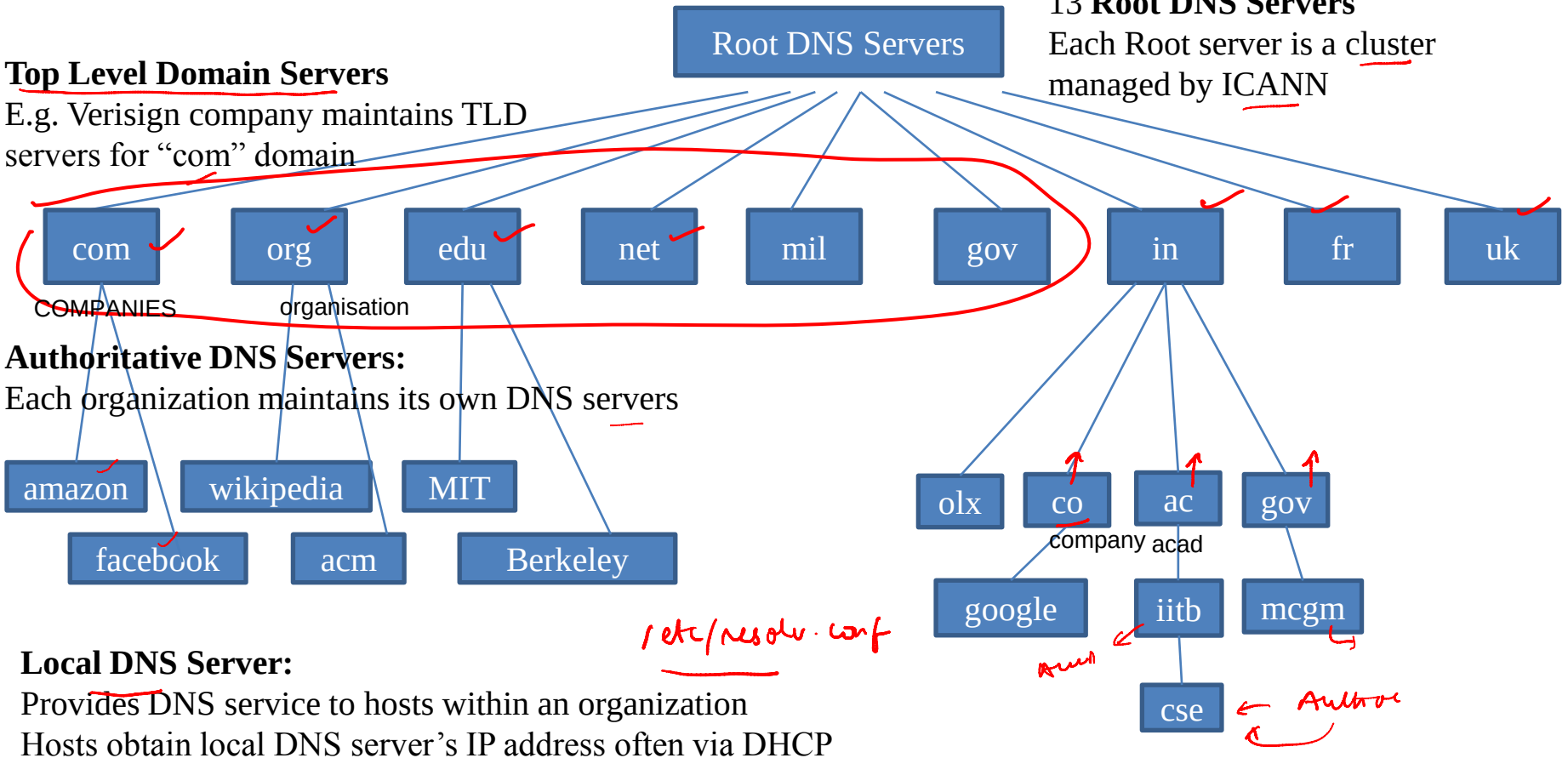
Implementation



- Original Implementation: hosts.txt file
- Centralized Architecture:
  - Single point of failure
  - Has to cope with high traffic volume
  - Location: where should it be placed?
  - Huge database maintenance
  - Overall its not scalable



Hierarchical and Distributed Implementation



Root Servers

Example

Root DNS Server
202.12.27.33

Local DNS server can cache mappings (discarded after some time)

Cache
.com TLD, IP
.org TLD IP

TTL
Cache
www.facebook.com
31.13.72.33

2
3
Try .com TLD
192.55.83.30

Com TLD Server

www.facebook.com

www.facebook.com
4

Local DNS Server

5 Try a.ns.facebook.com
69.171.239.12

6 www.facebook.com

Whats IP of www.facebook.com?
1

8
Its 31.13.72.33

7
Its 31.13.72.33

local servers
know ip of
root servers

manually set at _Init_()

local servers cache entries
but theytoo expire

Facebook 's
Authoritative
Server

Break