

## Module-2: Application Layer-4

Monday, January 31, 2022 3:30 PM

### Services typically offered by DNS

- ① hostname - to - IP address translation.
- ② alias hostname - to - canonical hostname translation.
- ③ distribution of load among multiple replicated servers.

### DNS Servers:

- ✓ Root DNS Servers — hostname - to - IP address mapping for the TLD DNS servers.
- ✓ TLD DNS Servers — hostname - to - IP address mapping for the authoritative DNS servers.
- ✓ Authoritative DNS Servers — hostname - to - IP address mapping for the web servers, mail servers, etc.

→ authoritative DNS servers  
An Organization can have many offices at different places of the world. Each office can maintain a local DNS server for quick host-to-IP address translation/resolution.

DNS query resolution 

- iterative (interaction b/w requesting host and local DNS server is recursive)
- recursive  
P. DNS query resolution:

recursive  
→ actually responsible for DNS query resolution.  
Local DNS server — Close to the host

DNS queries are resolved in quick time.

- ✓ For institutional ISPs — it may be on the same LAN.  
(Companies/universities)
- ✓ For residential ISPs — it is typically separated from the host by no more than a few routers.

(authoritative DNS server)

✓ DNS Server — authoritative for a particular hostname — will contain a Type A record for the host name.

✓ DNS Server — not authoritative for a particular hostname — may contain Type A record in its cache.

✓ DNS Server — not authoritative for a hostname — will contain a Type NS record for the domain that includes the hostname — will also contain the a Type A record that provide IP address of the DNS server in the value field of the NS record.

Steps included in hostname - IP address resolution by DNS

- ① A user wants to view the webpage www.somecompany.com.
- ② His host sends a DNS query to his local DNS server.
- ③ If the local DNS server will contact TLD (.com) server

(2) This most sends ... V V

(3) The local DNS server will contact TLD (.com) server  
(the local DNS server can also contact the root DNS server if the address of a TLD server is not cached).

(4) The TLD server contains the Type NS and Type A RRs <sup>for the authoritative DNS servers.</sup> that have been inserted by the registrar.

(5) The TLD server sends a reply to the user's local DNS server containing the above two records.

(6) The local DNS server sends a DNS query to 212.212.212.1 (primary authoritative DNS server) asking for Type A record corresponding to www.somecompany.com.

(7) This record provides the IP address (say, 212.212.212.71) of the desired web page which the local DNS server passes to the user's host.

(8) The user's browser can now initiate a TCP connection to the resolved IP address and send HTTP request over the connection.