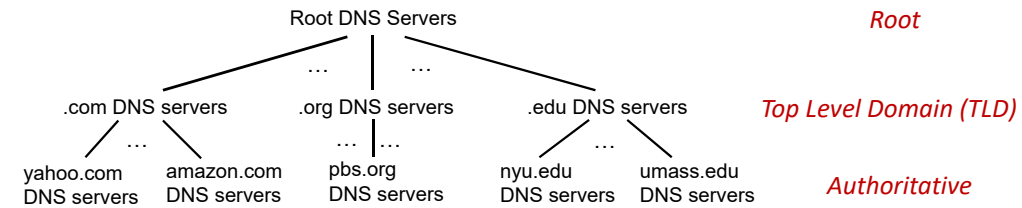


Brief introduction to Domain Name System (DNS)

- For addressing
 - people use identifiers
 - Ex. `www.nthu.edu.tw`
 - Internet hosts and routers use **IP addresses**
 - Ex. `140.114.69.135`
- Translation between IP address and name needs **DNS**
- DNS
 - distributed database
 - implemented in hierarchy of many name servers
 - application-layer protocol
 - hosts and DNS servers communicate to resolve names (address/name translation)
 - complexity at network's "edge"
 - traffic volume
 - Ex. Akamai DNS servers alone: 2.2T DNS queries/day

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DNS: a distributed, hierarchical database



Client wants IP address for `www.amazon.com`; 1st approximation:

- client queries root server to find .com DNS server
- client queries .com DNS server to get amazon.com DNS server
- client queries amazon.com DNS server to get IP address for `www.amazon.com`

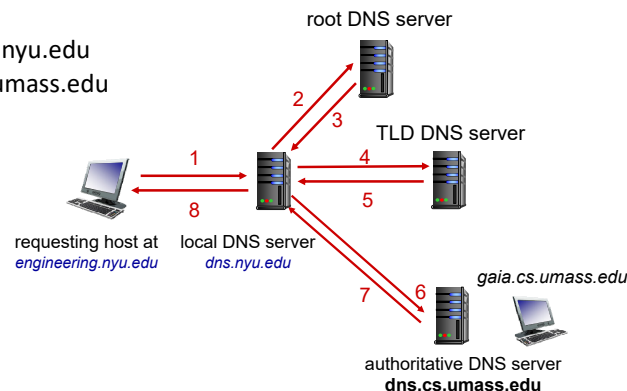
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DNS name resolution: iterated query

Example: host at `engineering.nyu.edu` wants IP address for `gaia.cs.umass.edu`

Iterated query:

- contacted server replies with name of server to contact
- "I don't know this name, but ask this server"



Can have more layers (in-between TLD and authoritative)

- Ex. root, .edu, nthu.edu, dns.cs.nthu.edu.tw

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More on DNS

- Can have more layers (in-between TLD and authoritative)
 - Ex. root, .edu, nthu.edu, dns.cs.nthu.edu.tw
- **DNS caching**
 - once (any) name server learns mapping, it caches mapping, and **immediately** returns a cached mapping in response to a query
 - caching improves response time
 - cache entries timeout (disappear) after some time (TTL)
 - TLD servers typically cached in local name servers

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