



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

19CSB302- COMPUTER NETWORKS

UNIT-5 APPLICATION LAYER



DNS: domain name system



people: many identifiers:

- SSN, name, passport #

Internet hosts, routers:

- IP address (32 bit) - used for addressing datagrams
- “name”, e.g., www.yahoo.com - used by humans

Q: how to map between IP address and name, and vice versa ?

Domain Name System:

- *distributed database*
implemented in hierarchy of many name servers
- *application-layer protocol:*
hosts, name servers
communicate to *resolve* names
(address/name translation)

note: core Internet function, implemented as application-layer protocol



DNS: services, structure



DNS services

- hostname to IP address translation
- host aliasing
 - canonical, alias names
- mail server aliasing
- runs over UDP and uses port 53
- load distribution
 - replicated Web servers: many IP addresses correspond to one name

why not centralize DNS?

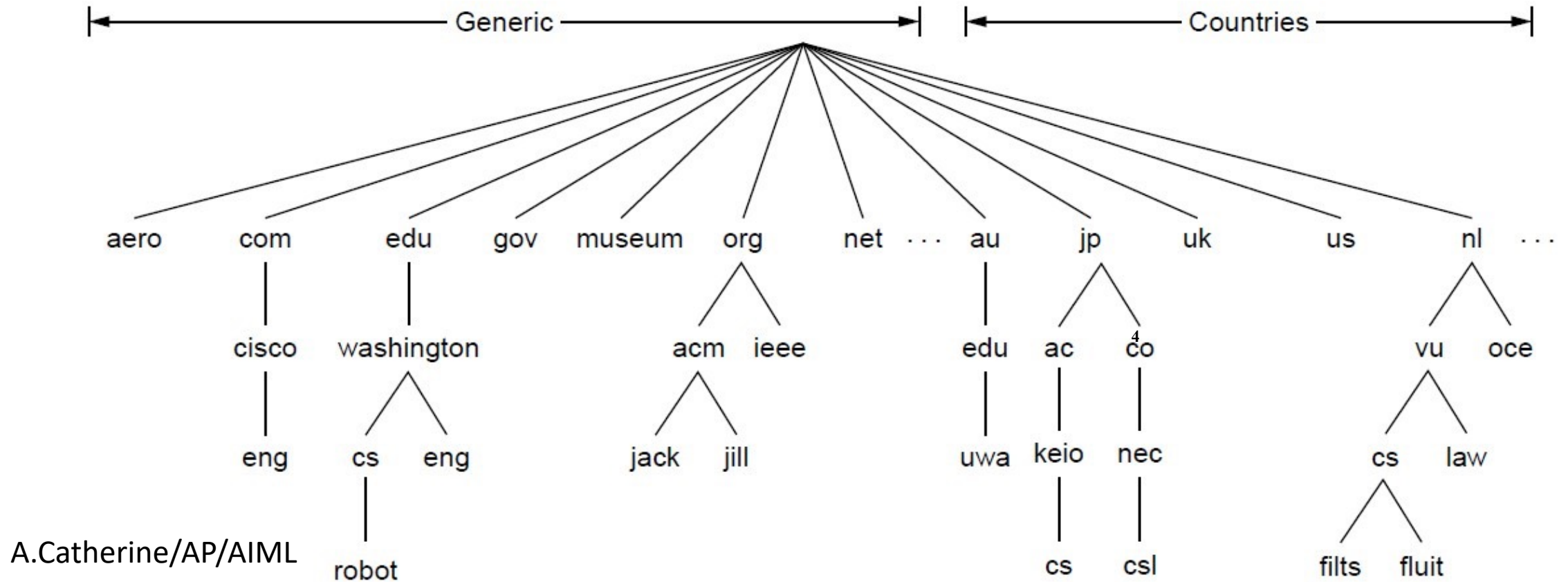
- single point of failure
- traffic volume
- distant centralized database
- maintenance

A: doesn't scale!



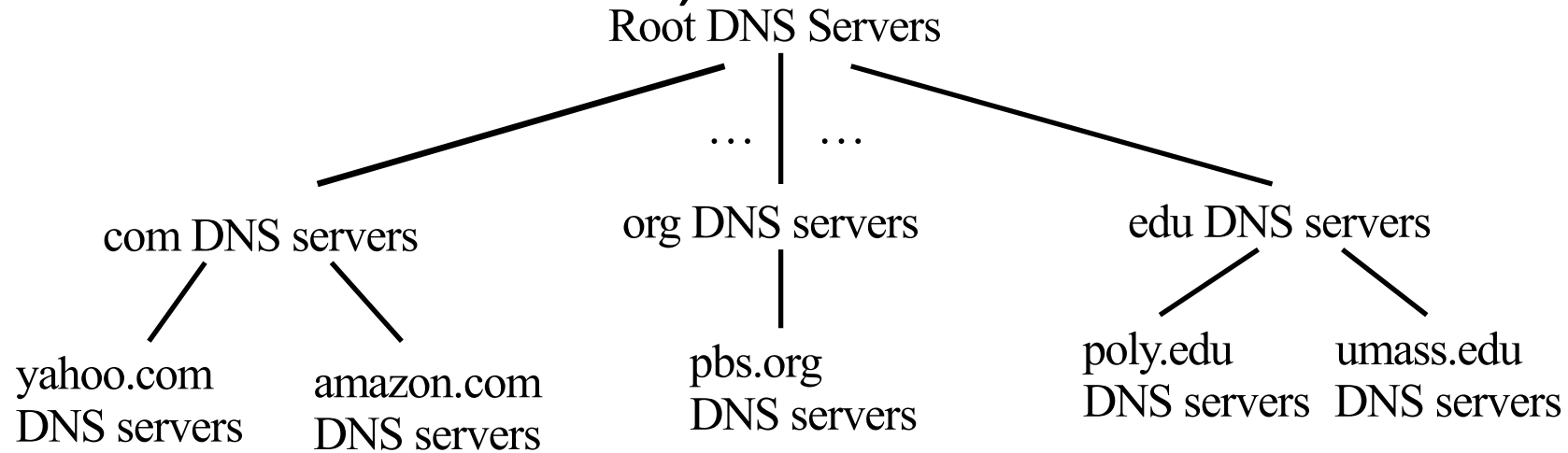
Domain Name Space

- DNS is hierarchical
- Assigned based on affiliation of institution





DNS: a distributed, hierarchical database



client wants IP 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



DNS: root name servers



contacted by local name server that can not resolve name

➤ root name server:

- contacts authoritative name server if name mapping not known
- gets mapping
- returns mapping to local name server

- c. Cogent, Herndon, VA (5 other sites)
- d. U Maryland College Park, MD
- h. ARL Aberdeen, MD
- j. Verisign, Dulles VA (69 other sites)

k. RIPE London (17 other sites)

i. Netnod, Stockholm (37 other sites)

m. WIDE Tokyo (5 other sites)

e. NASA Mt View, CA

f. Internet Software C.
Palo Alto, CA (and 48 other sites)

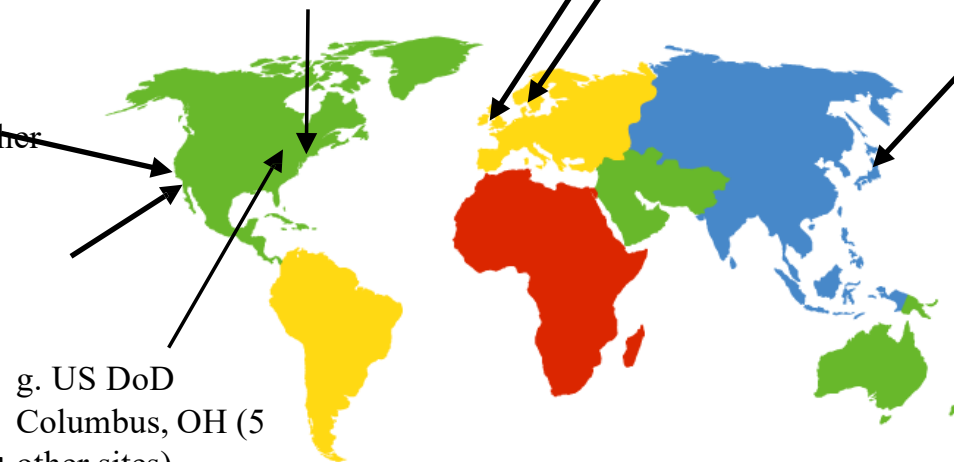
a. Verisign, Los Angeles CA (5 other sites)

b. USC-ISI Marina del Rey, CA

l. ICANN Los Angeles, CA (41 other sites)

g. US DoD
Columbus, OH (5 other sites)

A. Catherine/AP/AIML other sites)



*13 logical root name
“servers” worldwide
• each “server” replicated
many times*



TLD, authoritative servers



top-level domain (TLD) servers:

- responsible for com, org, net, edu, aero, jobs, museums, and all top-level country domains, e.g.: uk, fr, ca, jp
- Network Solutions maintains servers for .com TLD
- Educause for .edu TLD

authoritative DNS servers:

- organization's own DNS server(s), providing authoritative hostname to IP mappings for organization's named hosts
- can be maintained by organization or service provider



Local DNS name server



- does not strictly belong to hierarchy
- each ISP (residential ISP, company, university) has one
 - also called “default name server”
- when host makes DNS query, query is sent to its local DNS server
 - has local cache of recent name-to-address translation pairs (but may be out of date!)
 - acts as proxy, forwards query into hierarchy

8



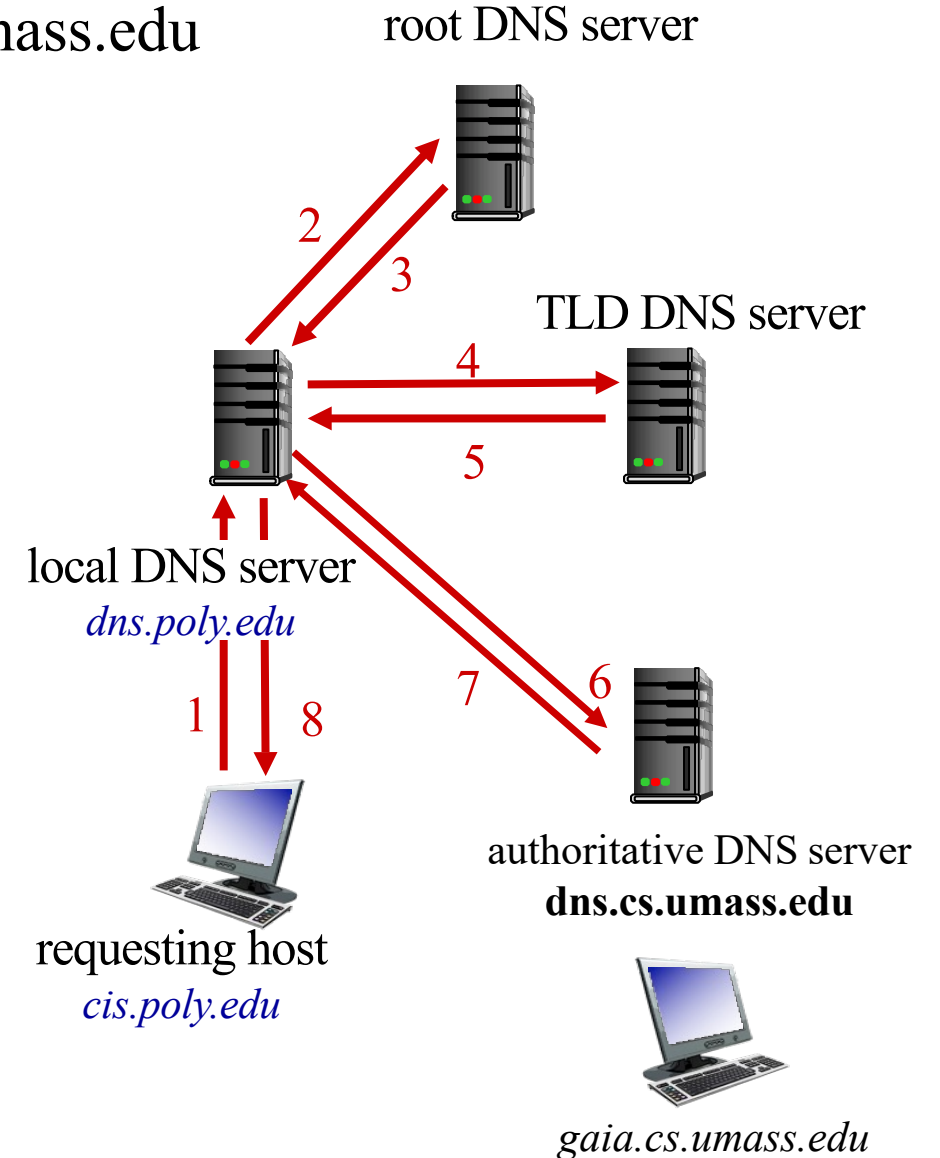
DNS name resolution example



- host at cis.poly.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”

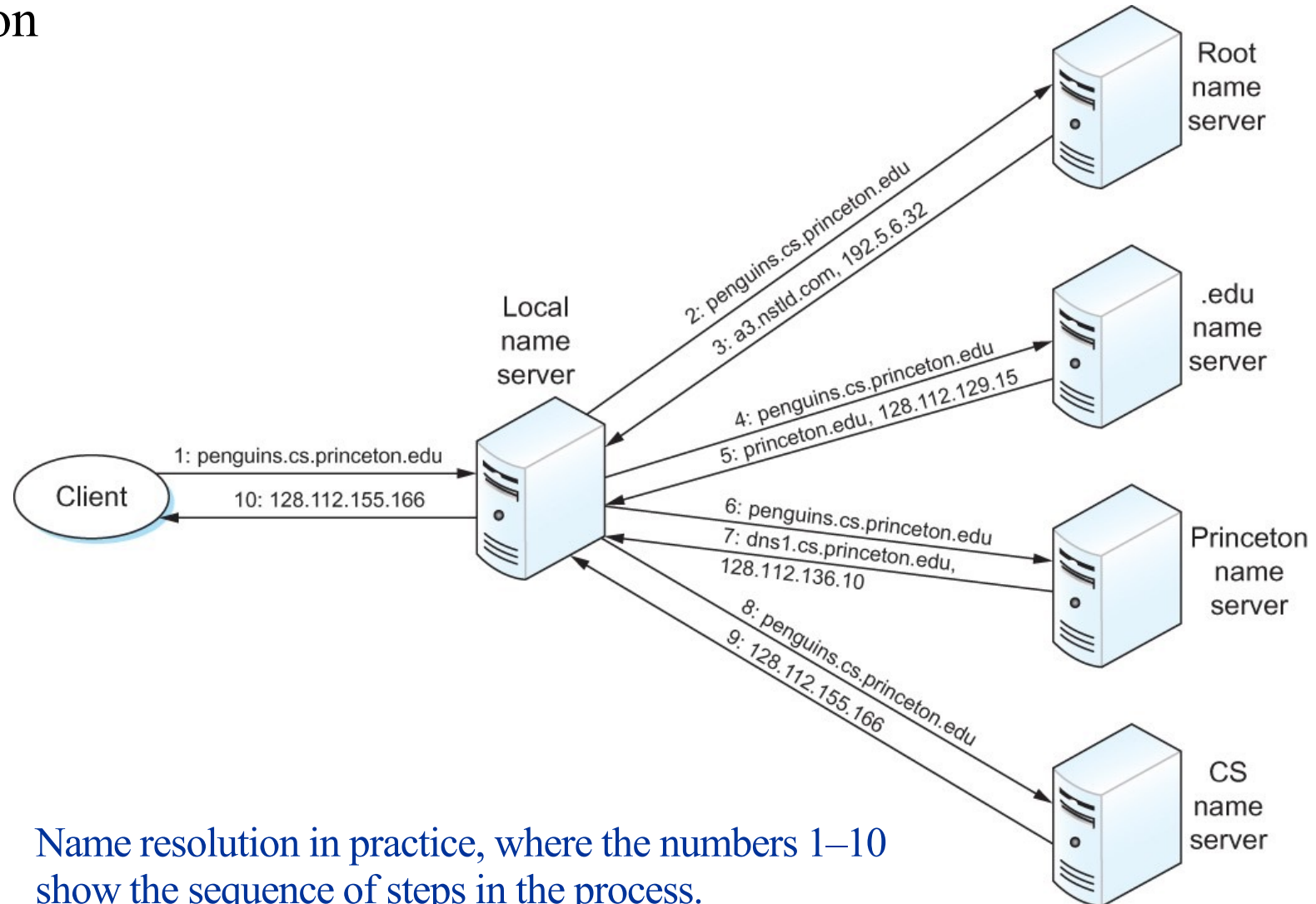




Infrastructure Services



➤ Name Resolution



Name resolution in practice, where the numbers 1–10 show the sequence of steps in the process.