Naming

Outline
> Terminology
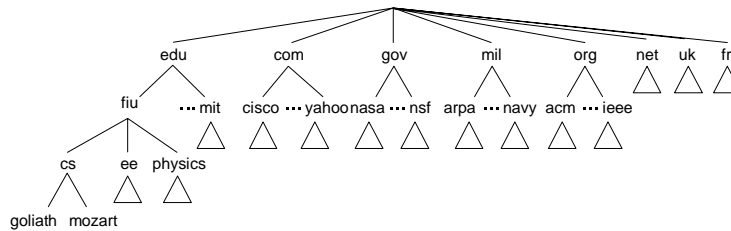> Domain Naming System

Overview

- Names vs. addresses
  - Human-friendly vs. Machine-readable
- Naming
  - name → IP address *bindings*
  - One-to-one map
  - Also ARP: IP address → Eth address
- Location transparent
- Hierarchical Management
  - Name and address hierarchy
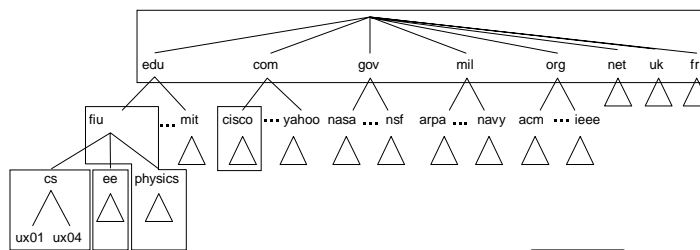 - Organizational and geographical hierarchy

Domain Naming System

- Naming
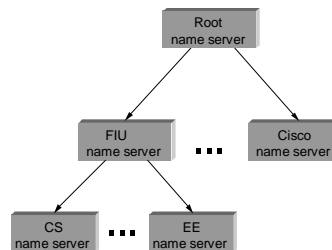 - **goliath.cs.fiu.edu** → **131.94.130.72**
- Hierarchy

Name Servers
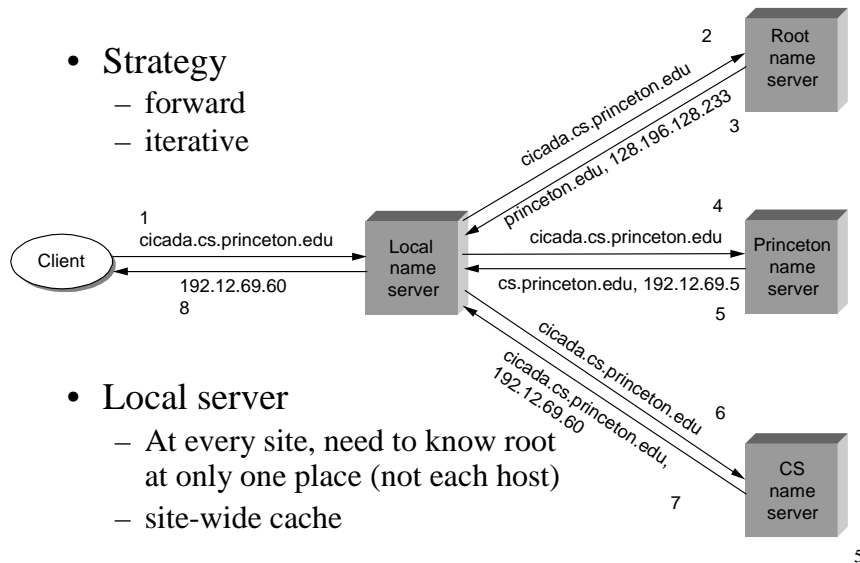
- Partition hierarchy into *zones*

- Each zone implemented by two or more *name servers*

Name Resolution

- Strategy
  - forward
  - iterative

1. cicada.cs.princeton.edu
2. cicada.cs.princeton.edu
3. princeton.edu, 128.196.128.233
4. cicada.cs.princeton.edu
5. cs.princeton.edu, 192.12.69.5
6. cicada.cs.princeton.edu
7. cicada.cs.princeton.edu, 192.12.69.60
8. 192.12.69.60

Client — Local name server — Root name server — Princeton name server — CS name server

- Local server
  - At every site, need to know root at only one place (not each host)
  - site-wide cache

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Resource Records

- Each name server maintains a collection of *resource records*

  (Name, Value, Type, Class, TTL)

- Name/Value: not necessarily host names to IP addresses
- Type
  - NS: a domain → domain name of its name server
    - e.g. fiu.edu → ns.fiu.edu
  - A: the domain name of a host → its IP address
    - e.g. ns.fiu.edu → 131.94.128.2
    - e.g. goliath.cs.fiu.edu → 131.94.130.72
- Class: allow other entities to define types
- TTL: how long the resource record is valid

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The DNS Name Space

Type of record	Associated entity	Description
SOA	Zone	Holds information on the represented zone
A	Host	Contains an IP address of the host this node represents
MX	Domain	Refers to a mail server to handle mail addressed to domain
SRV	Domain	Refers to a server handling a specific service
NS	Zone	Refers to a name server that implements the represented zone
CNAME	Node	Symbolic link with the primary name of the represented node
PTR	Host	Contains the canonical name of a host
HINFO	Host	Holds information on the host this node represents
TXT	Any kind	Contains any entity-specific information considered useful

The most important types of resource records forming the contents of nodes in the DNS name space.

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DNS Implementation

- An excerpt from the DNS database for the zone *cs.vu.nl*.

Name	Record type	Record value
cs.vu.nl	SOA	star (1999121502,7200,3600,2419200,86400)
cs.vu.nl	NS	star.cs.vu.nl
cs.vu.nl	NS	top.cs.vu.nl
cs.vu.nl	NS	solo.cs.vu.nl
cs.vu.nl	TXT	"Vrije Universiteit - Math. & Comp. Sc."
cs.vu.nl	MX	1 zephyr.cs.vu.nl
cs.vu.nl	MX	2 tornado.cs.vu.nl
cs.vu.nl	MX	3 star.cs.vu.nl
star.cs.vu.nl	HINFO	Sun Unix
star.cs.vu.nl	MX	1 star.cs.vu.nl
star.cs.vu.nl	MX	10 zephyr.cs.vu.nl
star.cs.vu.nl	A	130.37.24.6
star.cs.vu.nl	A	192.31.231.42
zephyr.cs.vu.nl	HINFO	Sun Unix
zephyr.cs.vu.nl	MX	1 zephyr.cs.vu.nl
zephyr.cs.vu.nl	MX	2 tornado.cs.vu.nl
zephyr.cs.vu.nl	A	192.31.231.66
www.cs.vu.nl	CNAME	soling.cs.vu.nl
ftp.cs.vu.nl	CNAME	soling.cs.vu.nl
soling.cs.vu.nl	HINFO	Sun Unix
soling.cs.vu.nl	MX	1 soling.cs.vu.nl
soling.cs.vu.nl	MX	10 zephyr.cs.vu.nl
soling.cs.vu.nl	A	130.37.24.11
laser.cs.vu.nl	HINFO	PC MS-DOS
laser.cs.vu.nl	A	130.37.30.32
vucs-das.cs.vu.nl	PTR	0.26.37.130.in-addr.arpa
vucs-das.cs.vu.nl	A	130.37.26.0

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