

SCOM/ SRSI DNS

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Naming

Network service

- DNS is a network service

Names are used to identify resources

- Names identify resources

- Addresses identify locations of resources

Names are

- More convenient than addresses

- More transparent

Names can be resolved to obtain information about the location of the resource

- Binding: association between name and resource attributes

Name Service

Stores bindings between names and entities

Name space: collection of all names recognised by a specific service

- Flat

- Structured

- Hierarchical

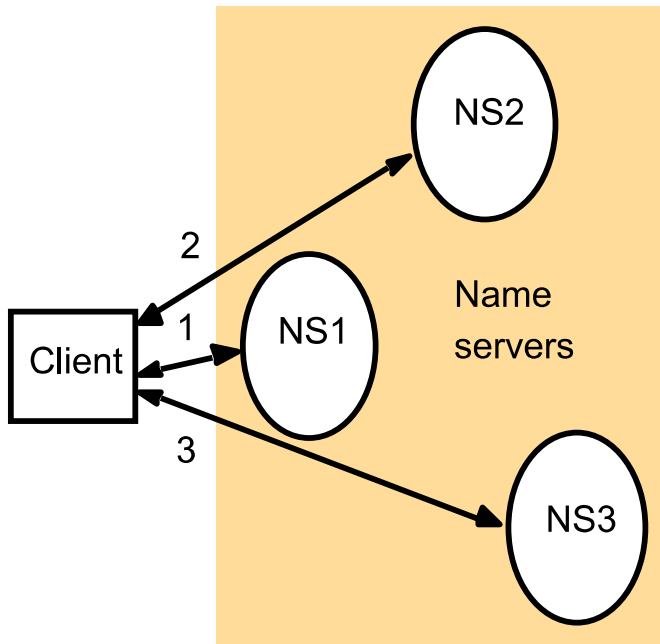
Name scope (computer science/ programming): part of a system/ program within which a name binding is valid

Naming domain (networking): name space for which there is only one administrative authority, and one binding

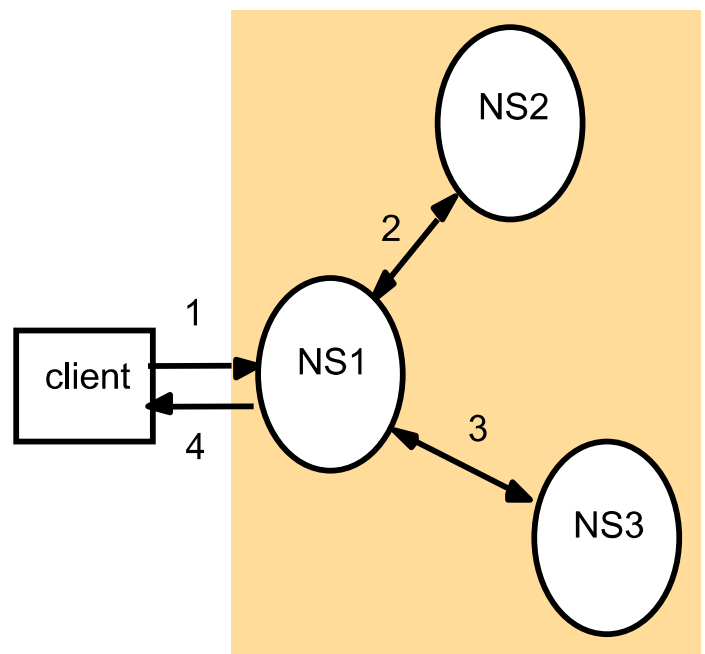
Resolution mechanism: return attributes when provided with a name

Name Resolution

Iterative



Recursive



How would you design a name service for the Internet?

Domain Name System

Network service

Initially DNS was a file called hosts.txt

Then, the Internet grew

DNS requirements

- Scalability

- Reliability

- Availability

- Manageable by distributed entities

- Freshness (but not strict consistency)

Domain Name System (DNS)

Hierarchical namespace

Each zone is managed by an authority

ICANN (<https://www.icann.org/>) is responsible for the root

Each zone has a name server that is responsible for the names in the zone: authoritative server

Each domain must have an authoritative server, and may have other servers

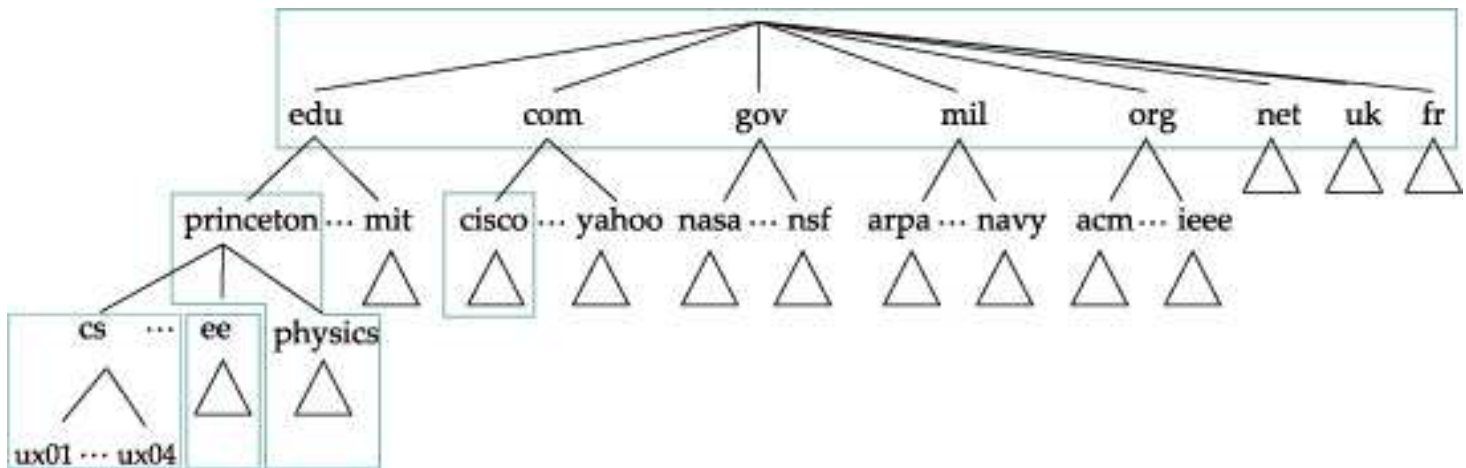
Authoritative server is also responsible for email and web server

Explicit delegation

Authoritative server delegates on other servers

Other servers are responsible for answer

Domain Name System



DNS Resolution

Lookup queries

“what is the IP for this name?”

No search

Bootstrap

Root servers are known out-of-band

Local name server is configurable

Caching

Local name servers cache entries to reduce iterative resolution

Transport Protocol

Uses UDP

Why not TCP?

Resource Record

<Name, Value, Class, Type, TTL>

Value: address

Type

A: Address

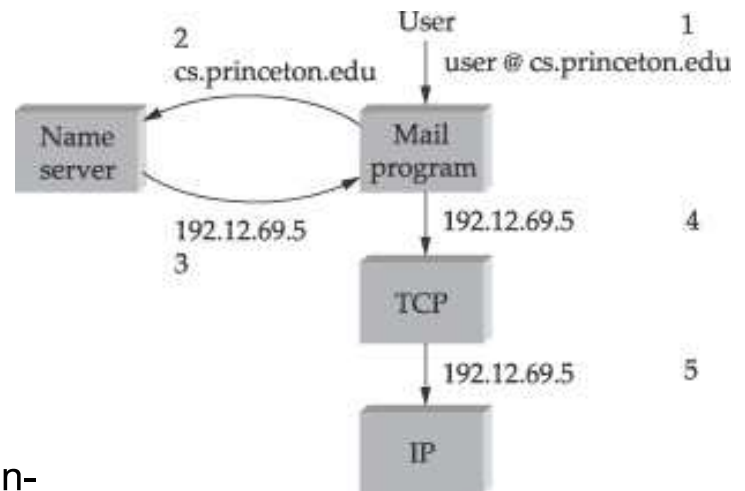
NS: Name Server

CNAME: Canonical name

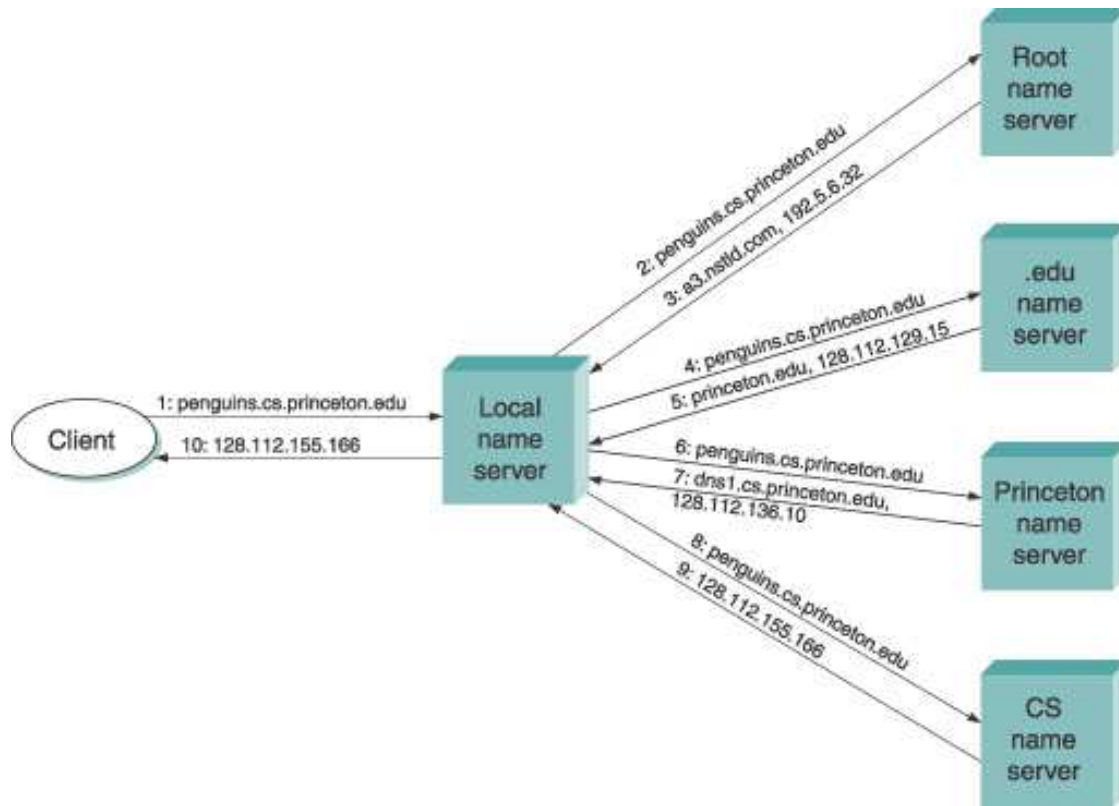
MX: Mail Exchange

TTL: time to live

Maximum time for caching at non-authoritative server



DNS Resolution



Exercise

- Use dig to resolve a name, e.g. fe.up.pt, by hand
 - `dig +trace` or `dig +norecurse`
 - Find out the names of the root servers
- How many steps did it take?
- How much time did it take?
 - Do not consider the time you took for writing the commands.
- Does it make sense to cache?
 - If yes, what and where?

Can you answer these questions?

- Are all DNS entries for a certain domain always consistent?
 - Why/ why not?
- What is the longest period that a service may be unreachable after an IP change?
 - What is the cause of the inconsistency?
- If you want to use DNS to dynamically direct accesses to e.g. the least loaded server, should you use a large or a small TTL?