

VE489 Computer Networks

Domain Name System

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What is DNS?

Domain Name System is the system and protocol that maps domain names to IP addresses.

Domain name: ji.sjtu.edu.cn

Ip address: 202.121.178.212

Why DNS?

- Convenience
 - ji.sjtu.edu.cn is easier to rememeber than 202.121.178.212
- Indirection
 - Decouple name from address
 - Load balancing

History of DNS

Once upon a time..

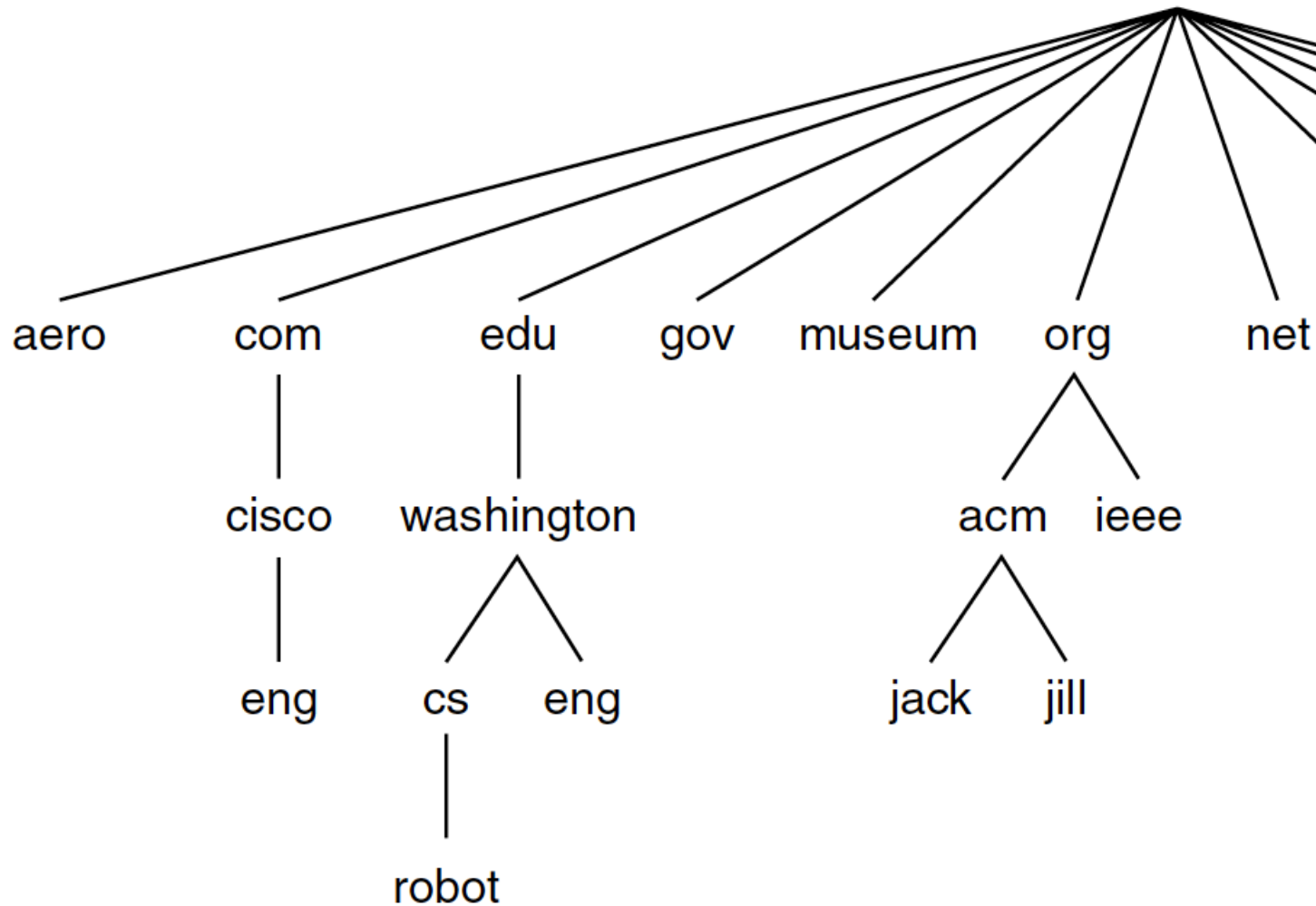
- All mappings managed by Stanford Research Institute (SRI)
- Distributes `hosts.txt` to every computer
- Changes submitted to SRI
- Updates fetched from SRI

History of DNS

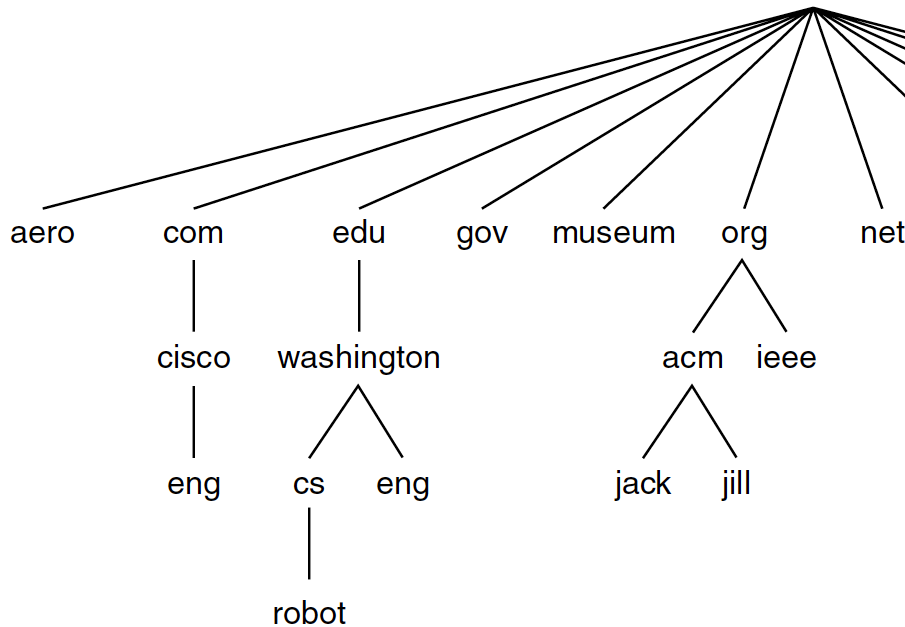
Problems:

- Poor scalability
- Name conflict
- Inaccurate copies of `hosts.txt`

Hierarchical namespace

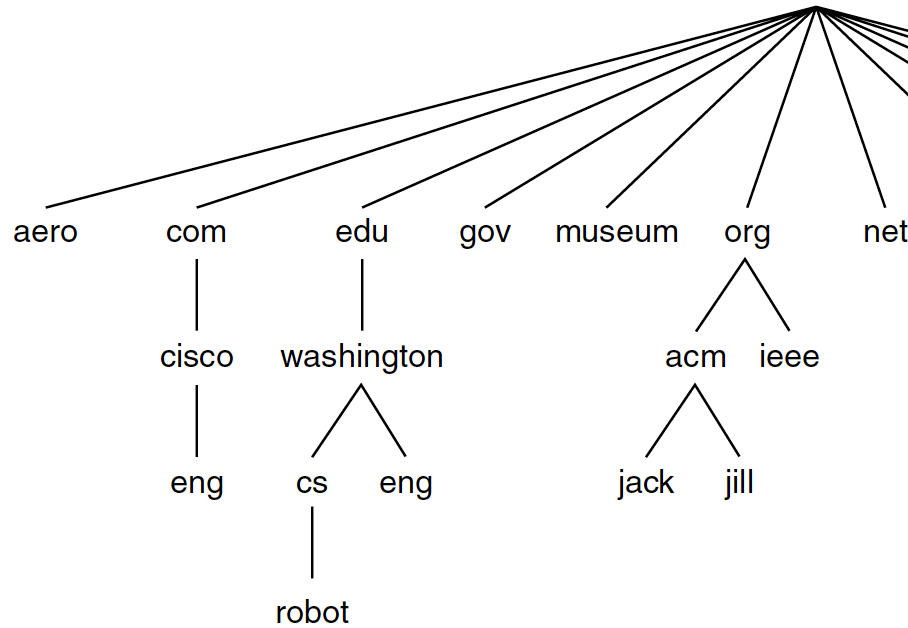


Hierarchical namespace



- Name is a leaf to root path: `robot.cs.washington.edu`
- Pro
 - Name collision avoided
 - Distributed administration

Hierarchical administration



- Top-level domains managed by ICANN (Internet Corporation for Assigned Names and Numbers)
e.g. com edu gov jp uk ...
- UW controls the domain `washington.edu`
- SJTU controls the domain `sjtu.edu.cn`

Hierarchy of servers

- Root servers
- Top-level domain (TLD) servers
- Authoritative DNS servers
 - Actually store the name-to-address mapping
 - Maintained by the corresponding administrative authority

The idea is:

- All the servers know root servers
- Root servers know all about top-level domains

Name Resolution

Iterative Name Resolution

Recursive Name Resolution

DNS caching

- Caching
 - Authoritative records
 - Cached records (TTL)
- Negative caching
e.g. www.biadu.com

Demo

Experimental setting

- Wireshark: you guys know this!
- dig: command-line tool for querying remote DNS servers

Demo

We somehow know that there is an root server @ 198.41.0.4

```
dig @198.41.0.4 ji.sjtu.edu.cn
```