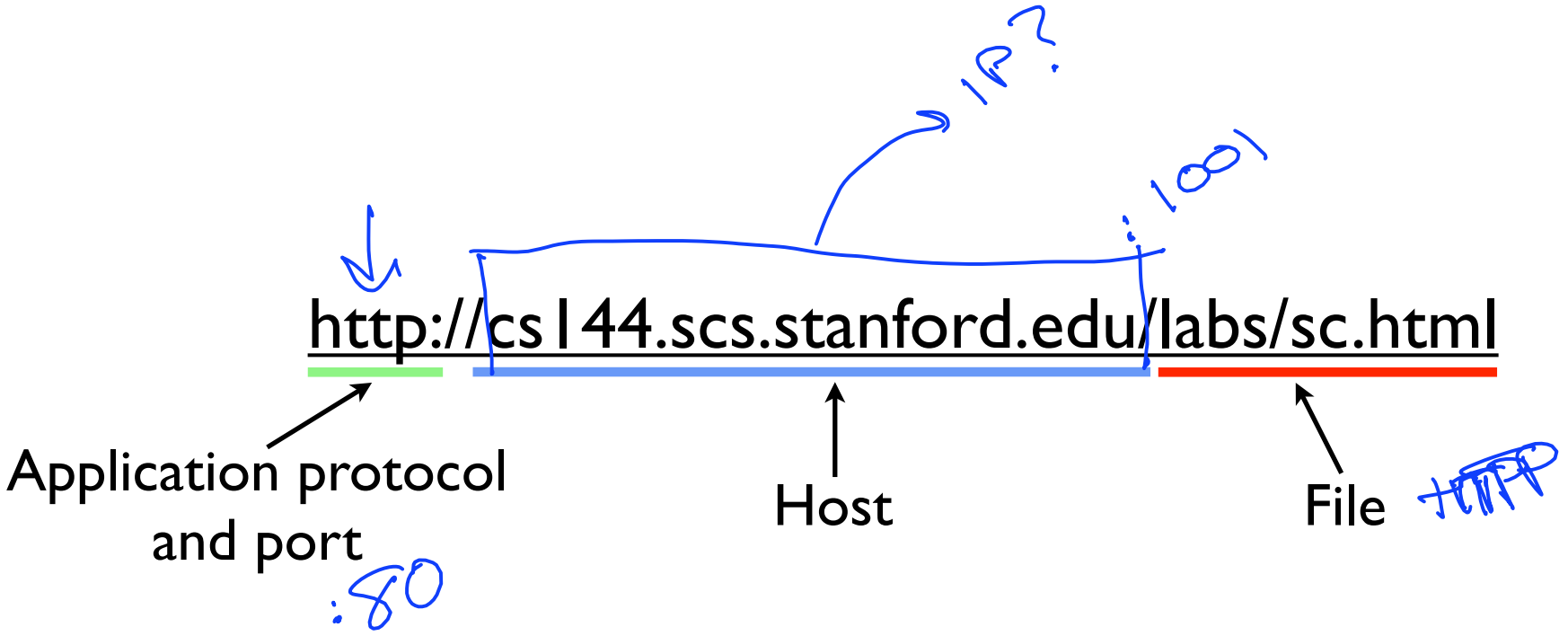
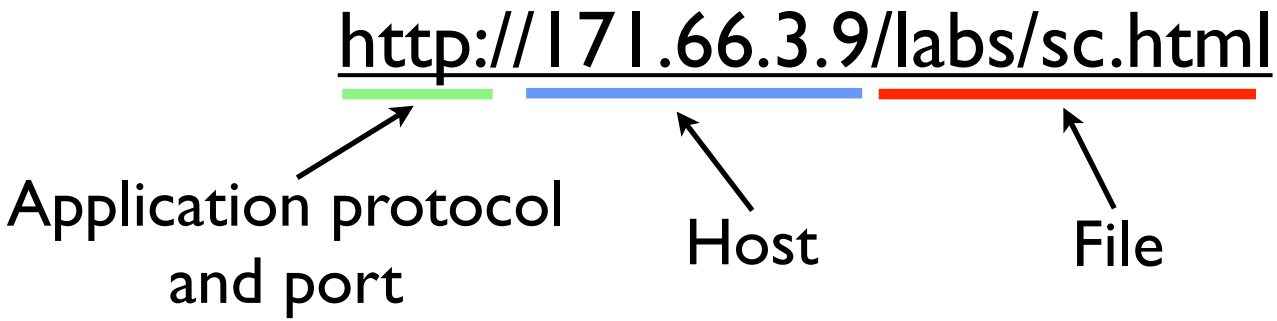
Domain Name System (DNS)

Parsing a URL



Parsing a URL



HOSTS.TXT

- Originally, all hosts were in a file HOSTS.TXT, maintained by Network Information Center
  - Maintained at SR: SRI-NIC.ARPA, 26.0.0.73 (RFC952)
- Hosts periodically used a file transfer protocol to download new version
  - Requires n^2 network capacity, does not scale well

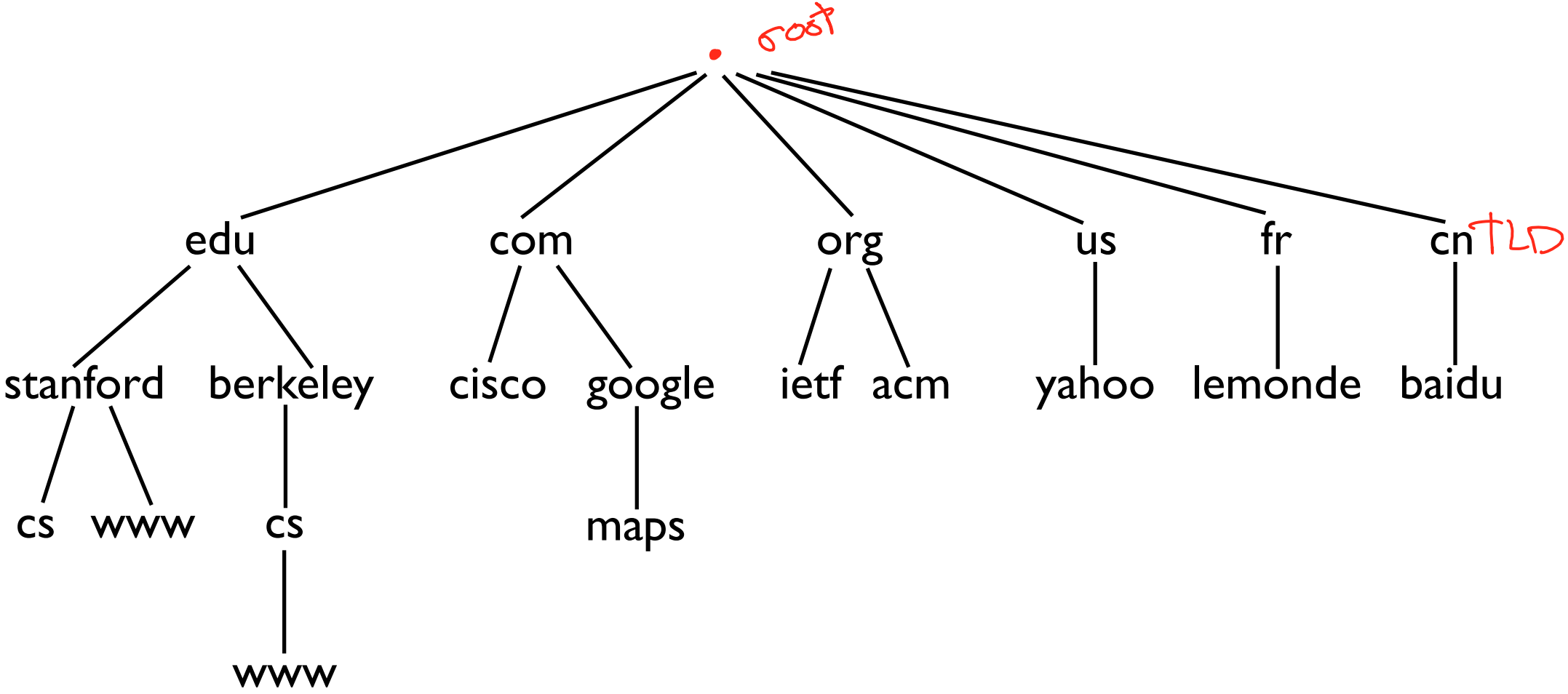
Domain Name System

- Map names to addresses (more generally, values)
- Must be able to handle *huge* number of records
- Must have distributed control: people can control their own names
- Must be robust to individual node failures

Domain Name System Design

- Two properties make DNS design feasible
  - Read-only or read-mostly database: hosts look up names much more often than update them
  - Loose consistency: changes can take a little while to propagate
- Two properties allow extensive caching
  - Look up a name, keep result for a long time

DNS Name Architecture

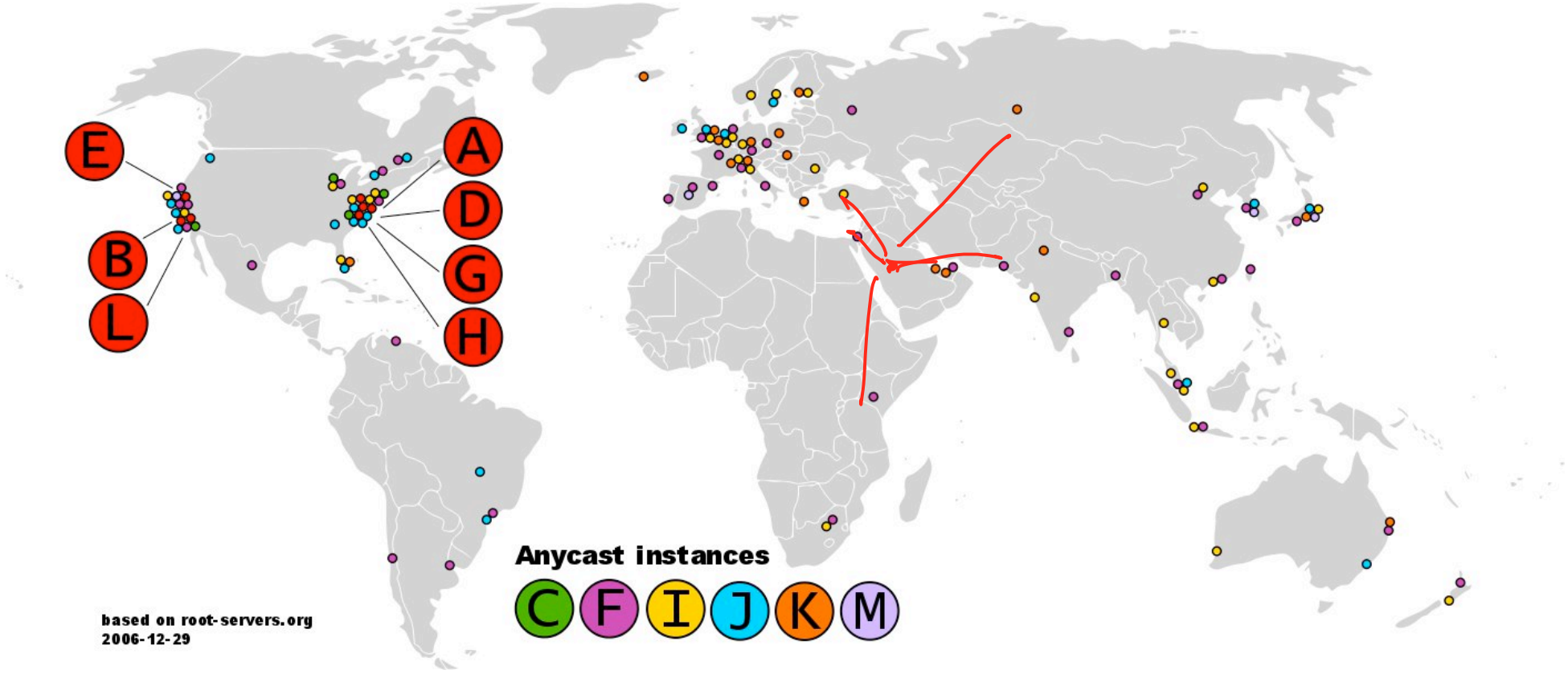


DNS Servers

- Hierarchical zones ("root" zone, edu, stanford, scs)
- Each zone can be separately administered
- Each zone served from several replicated servers
- Root zone: 13 servers, highly replicated (a, b, c, ... m)
  - Bootstrap: root server IPs are stored in a file on name server
  - Replicated through anycast (discussed later in course)

DDoS "root servers"

DNS Root Servers



http://en.wikipedia.org/wiki/File:Root-current.svg

A DNS Query

- Two types of queries
  - Recursive
  - Non-recursive
  - Specified by bit in query
- UDP port 53
  - 512 byte message limit
- Can use TCP port 53
  - Prefix messages with 16-bit length field