

DNS refresher

IP: Identifiers on the Internet

- The fundamental identifier on the internet is an IP address.
- Each host connected to the Internet has a unique IP address
 - IPv4 or IPv6
 - Uniqueness guaranteed through allocation from one single pool

How Devices use Identifiers

- On operating system level only the numbers matter
- Terminology in this context
 - TCP/IP Stack
 - Sockets
- The devices do not care about names

What is easier to remember?

- Humans tend to remember names better, easier to associate

TG 867 TK 0115 or 768, Avenue de Calais, Tokoin LOME - TOGO

TG 9132 AD or Alain's old BW

128.223.157.19 or nsrc.org

- Devices may be moved between networks, in which case their IP address will change.

host.txt

- In the 1970's ARPA NET, tables were maintained mapping host-names to IP
 - SRI-NIC
 - Tables were pulled from the single machine
 - Problems
 - traffic and load
 - Name collisions
 - Consistency

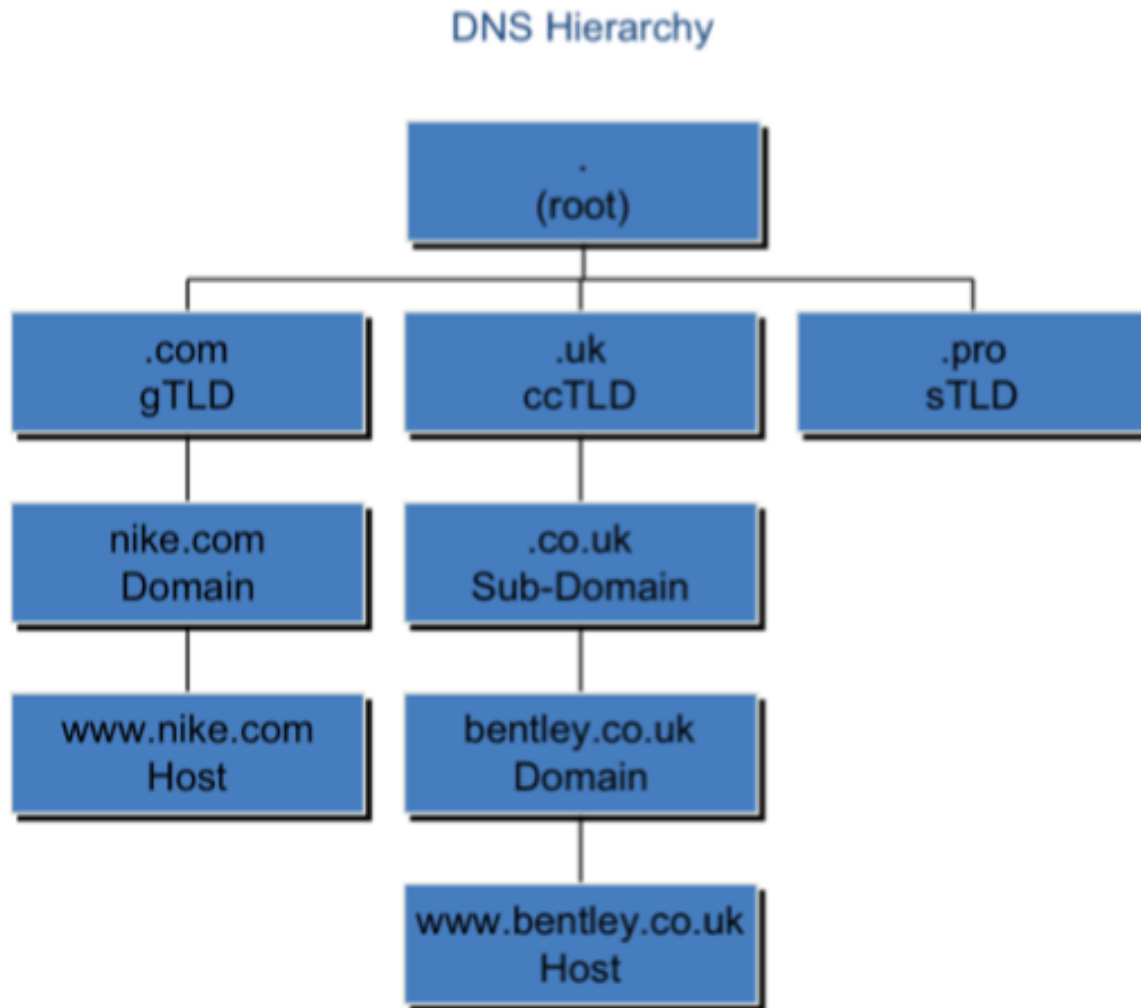
DNS

- Domain Name System provides a scalable, distributed lookup mechanism.
- DNS created in 1983 by Paul Mockapetris
 - RFCs 882 and 883
- IETF Full Standard: RFCs 1034 - 1035 (1987)
 - Modified, updated, and enhanced
 - DNS Security extensions being the most recent

DNS is a tree

- DNS is a hierarchical structure that allows separate entities to manage “zones” of data.
- The DNS tree points downward, so if you know the top (the root), it will refer you until you find the answer you’re looking for

The DNS Tree



Resolution

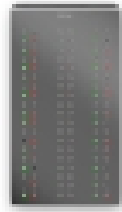
<http://www.nike.com>



Resolution

http://www.nike.com

ISP's DNS

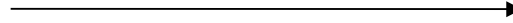
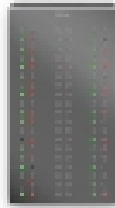


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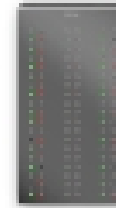
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ISP's DNS

Root Server



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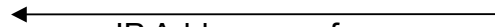
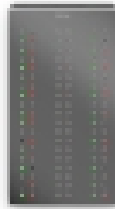


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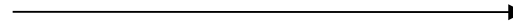
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ISP's DNS

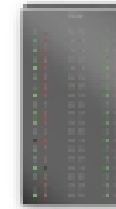


IP Addresses of .com
DNS servers



www.nike.com?

Root Server

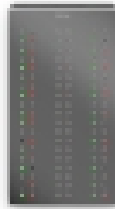


Resolution

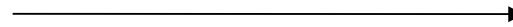
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ISP's DNS

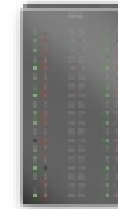
Root Server



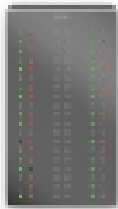
IP Addresses of .com
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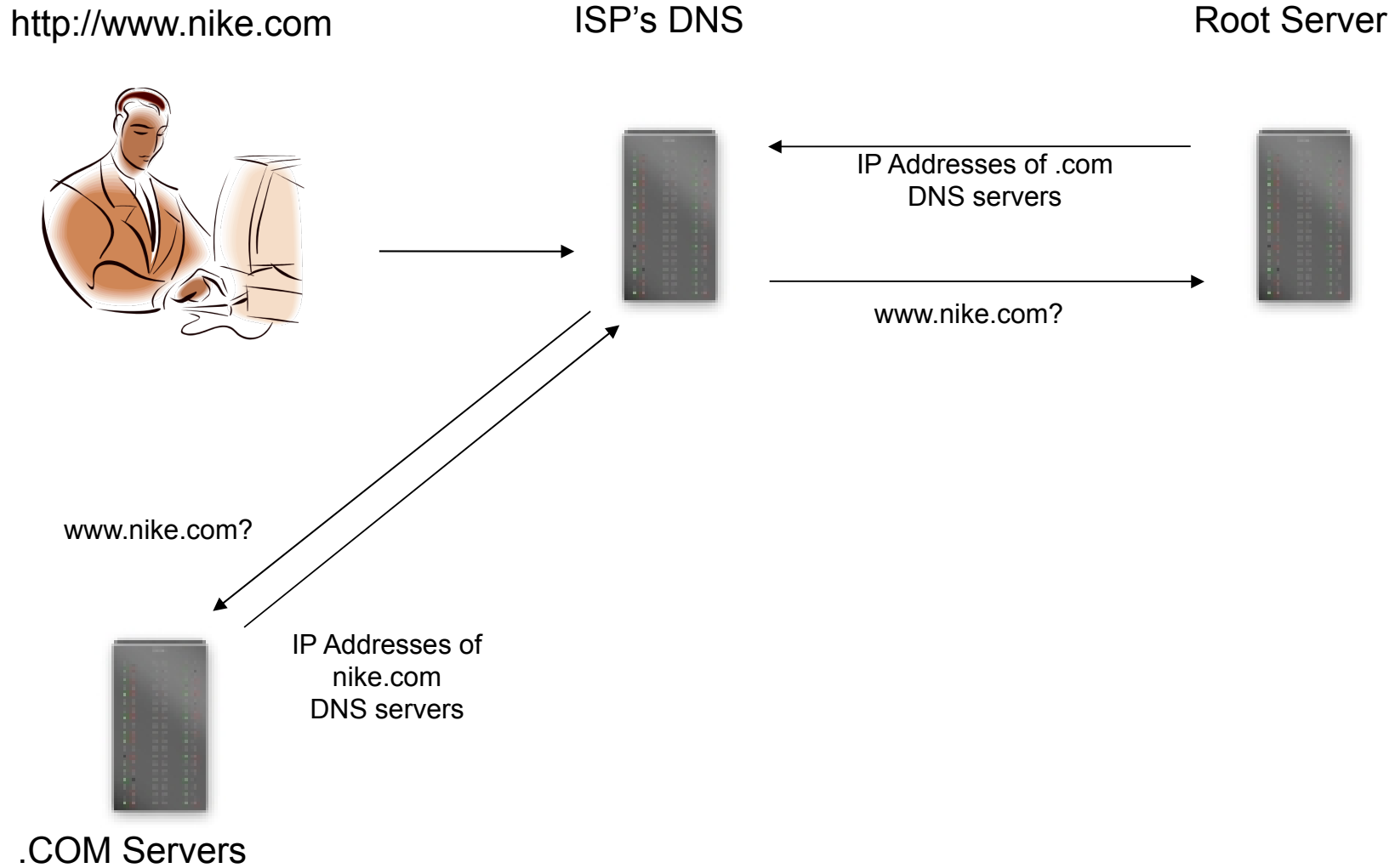


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.COM Servers

Resolution

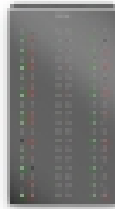


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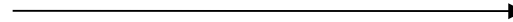
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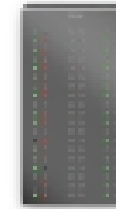
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IP Addresses of .com
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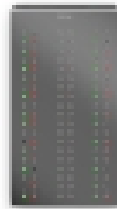
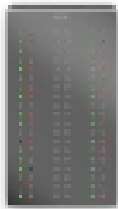
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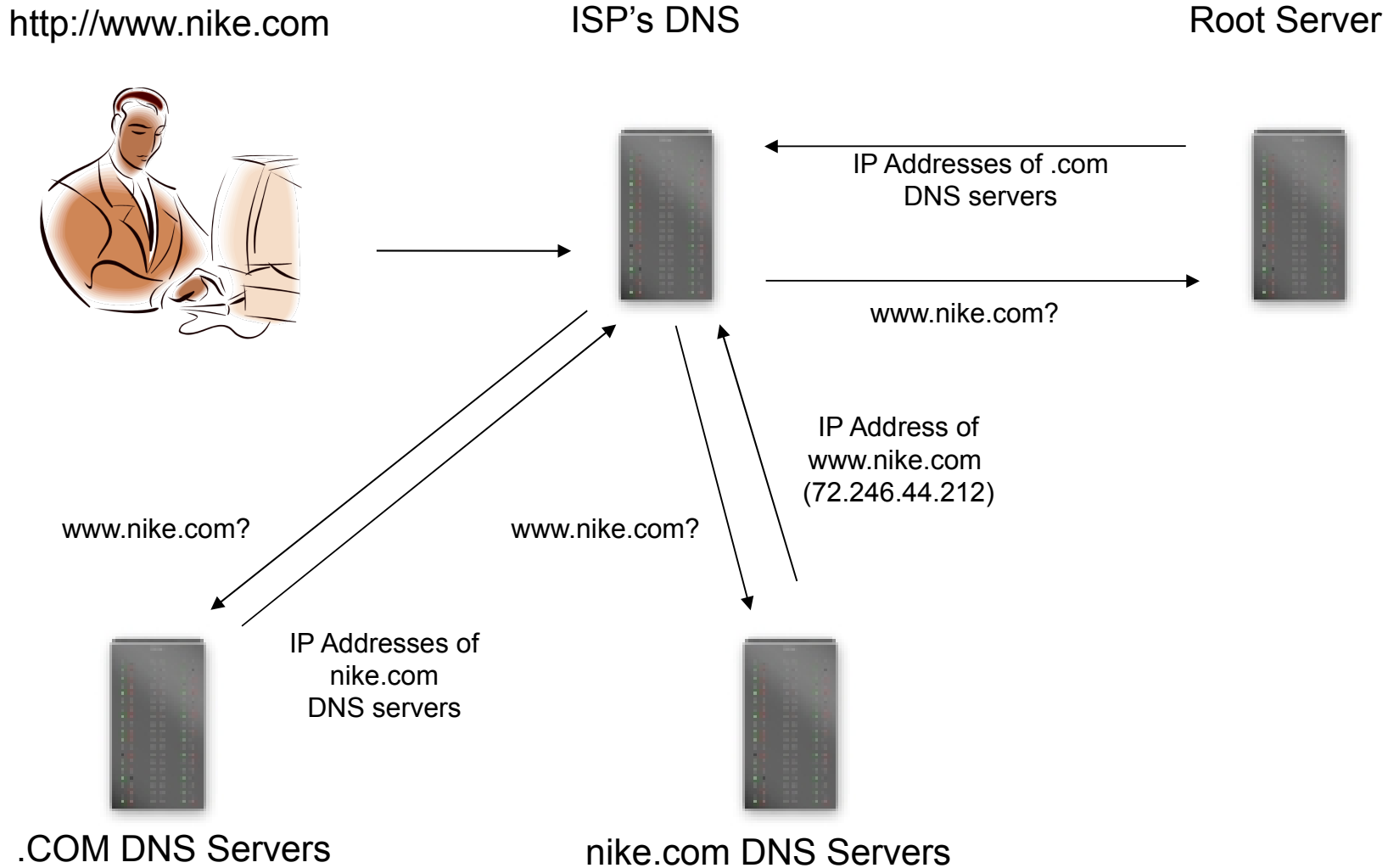
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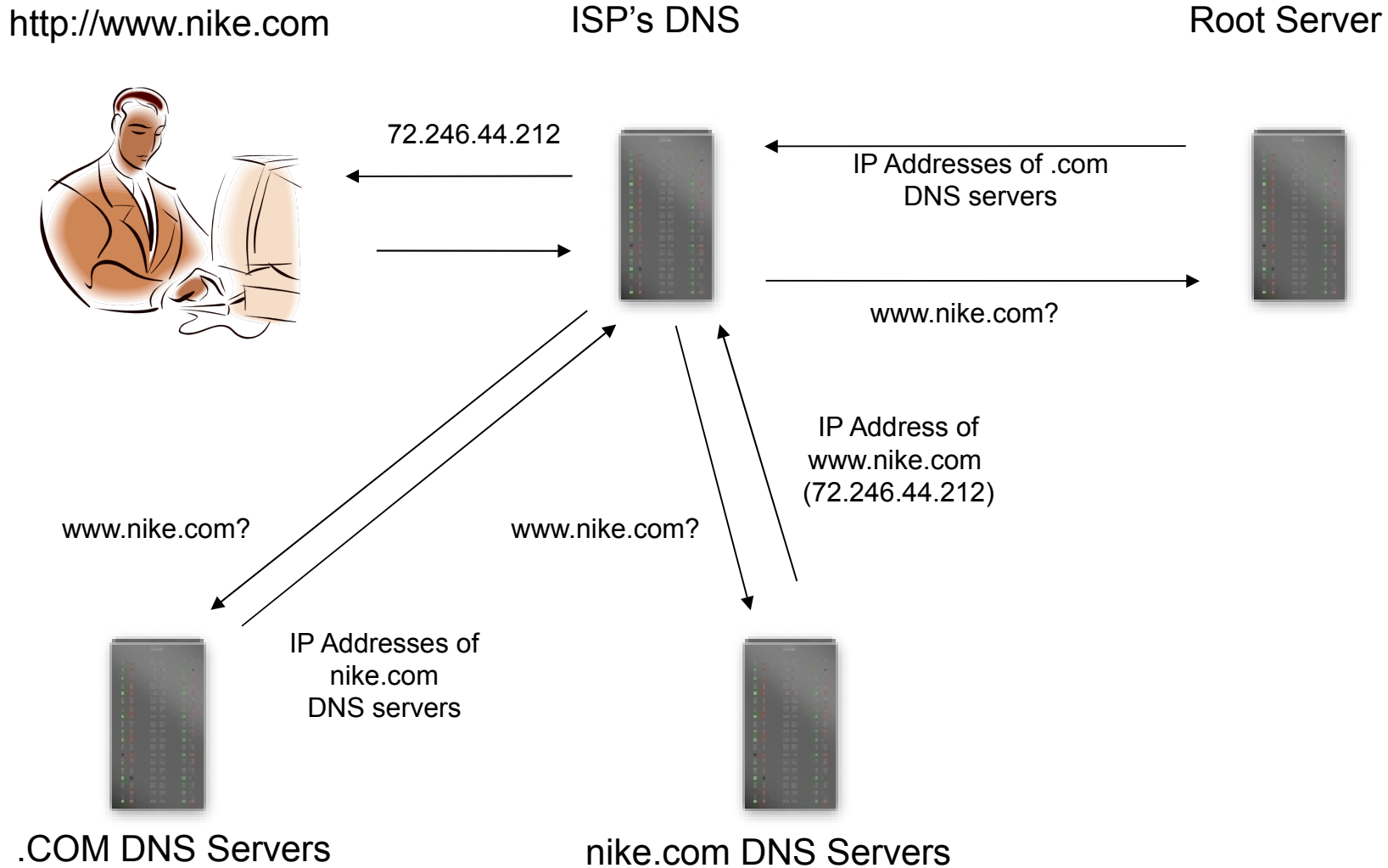
.COM DNS Servers

nike.com DNS Servers

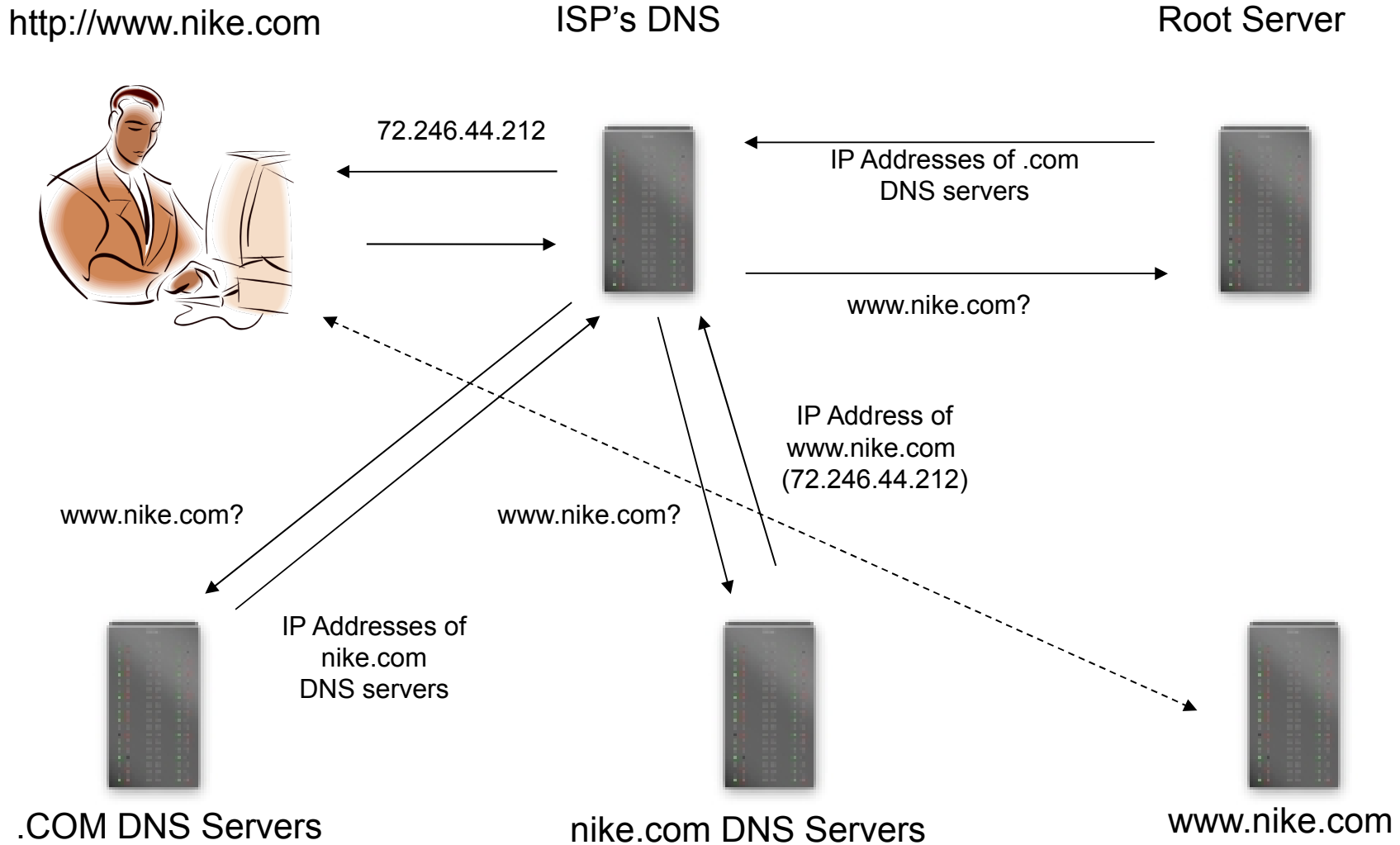
Resolution



Resolution



Resolution



Resolution

- Average response time is in the milliseconds
- DNS servers “cache” results so it doesn’t have to ask unnecessary queries
- Cached results hold the answers that the DNS server has asked for the TTL (time to live) of the domain.
- Once TTL expires, DNS will go back “up” the tree when querying.

Resource Record Types

DNS “zone files” hold many types of resource records

- MX - Mail Servers
- A / AAAA - IP address (v4 / v6) of hosts
- NS - Name Server
- SOA- Start Of Authority
- PTR- Pointer to Names
- DNSKEY
- NSEC
- RRSIG
- NSEC3



Resources

- <http://www.rfc-editor.org/rfc/rfc1034.txt>
- <http://www.rfc-editor.org/rfc/rfc1035.txt>
- <http://tools.ietf.org/wg/dnsop/>
- <http://tools.ietf.org/wg/dnsext/>
- <http://www.iana.org>
- <http://en.wikipedia.org/wiki/dns>

Questions?

