



Communication Networks

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Exercises week 13 – Application: DNS

DNS zone file

```
$TTL 3600
@           IN SOA ns.smart.com. adm.smart.com. (
                2002022401 ; serial
                3H ; refresh (hours)
                15m ; retry (minutes)
                1w ; expire (weeks)
                3h ; minimum (hours)
)
IN         NS ns.clever.com.
IN         NS ns.smart.com.
@          IN A 111.10.20.3
www        IN A 111.10.20.5
upload     IN A 111.10.20.5
ns.smart.com. IN A 111.10.20.1
ns.clever.com. IN A 222.80.90.1
ftp        IN CNAME smart.com.
web        IN CNMAE smart.com.
```

Zone file for smart.com

You are the administrator of SmartCompany (smart.com) responsible for the Internet service infrastructure of the company. SmartCompany runs its own web-services on a set of 8 static IP-Addresses (111.10.20.0 - 111.10.20.7). The file on the left is called a zone file^a and describes the DNS configuration of your zone (smart.com). Taking into consideration the zone file, respond to the following questions:

- What could be the meaning of the entries at the top (refresh, retry, ...)?
- Can you figure out which web-services are running on servers of the SmartCompany?
- What is the IP address (if any) of the host ftp.smart.com?
- What is the IP address (if any) of the host www.smart.com?
- What are the FQDN (fully qualified domain name) and IP addresses of the primary and the secondary nameservers for the zone smart.com? Clearly indicate which is the primary and which is the secondary nameserver.

^ahttps://en.wikipedia.org/wiki/Zone_file

Local DNS server

On Linux and Mac computers you can use the command line tool `dig` to perform DNS lookups. The corresponding tool for Windows is `nslookup`. First, perform a lookup for `nyu.edu` using your default DNS server by running the command:

```
dig nyu.edu
```

```
nslookup nyu.edu
```

- What is the IP address of the server behind `nyu.edu`?

Now, perform the same lookup, but use one of the DNS root servers (e.g., `a.root-servers.net`) by running the command:

```
dig @a.root-servers.net nyu.edu
```

```
nslookup nyu.edu a.root-servers.net
```

- Why does the answer differ compared to the one from your local DNS server?
- How would you proceed with this answer to find the IP address behind `nyu.edu`?

Local vs. authoritative DNS server

Perform a DNS query for the URL `uzh.ch` using first the authoritative DNS server (`ns1.uzh.ch`) and then your local server.

- Compare the ANSWER SECTION of the responses. Can you see differences between the answers from your local DNS server and the authoritative server? Run the query to your local server multiple times to make the differences more obvious.
- What is the reason for this difference?
- As you have seen in the lecture, DNS can be used to balance the incoming load. What are the considerations one has to make when using DNS load balancing with respect to the TTL?

Multiple answers

Whenever a client (e.g., your computer) receives multiple IP addresses as answer to a DNS lookup, it picks the very first one. Only if that one does not work, it tries the next one in order.

When you run `dig yahoo.com`, you receive multiple IP addresses as an answer compared to, for example, `dig google.com`.

Can you think of a reason for answering with multiple IP addresses? Run the DNS lookup for `yahoo.com` multiple times.