Communication Networks

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Exercise 10 – DNS part II & HTTP

10.1 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:

```
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`?

10.2 Local vs. authoritative DNS server

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

Note: When using `nslookup` on Windows, you need to specify the `-debug` flag to get the relevant information for this task. For example:

```
nslookup -debug uzh.ch
```

- 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?

10.3 Curious students

Consider that ITET has a local DNS server serving the DNS requests for all students' devices connected in the department. How could you determine if an external website has been visited recently by a fellow colleague of yours? Explain.

10.4 HTTP host header

Perform a DNS lookup for `google.ch` and open `http://172.217.168.35` in your browser. What do you observe?

Now try to repeat the same process for `nsg.ee.ethz.ch` and `comm-net.ethz.ch`. Open the websites in your browser using the IP(s) from the DNS lookup. Do you see the expected websites?

Normally, one machine can host multiple websites at the same time. To distinguish which website has to be provided by the server, clients can add a so called "host header" in their HTTP request which specifies the website they want to access. You can try that yourself with the two websites from above. For example with the following commands:

```
telnet comm-net.ethz.ch 80

GET / HTTP/1.1
Host: comm-net.ethz.ch
```

Do you see another way how you could host multiple websites on the same machine? Can you see potential problems with this approach compared to the host header?