7. Naming and Directory Services

7.1. Explain the main functions of naming and directory services. What is the main difference between the two services?

7.2. Different servers must communicate with each other in order to carry out a distributed name interpretation. What possibilities exist for the realization of this and what are the associated consequences for the querying client?

7.3. Two German companies “Computer” and “Network” have corresponding departments “Development”, “Sales” and “Research”.

a) Present in a tree-like diagram, a hierarchical namespace for these two companies using the DNS name schema.

b) Add the English company “Commercial” with the departments “Development”, “Service” and “Research” for DNS.

c) Provide an example of a relative name within the company “Computer” for DNS. In which context is this name interpreted?

7.4. From the execution of the command dig +trace -t A www.scss.tcd.ie the following result was printed. Sketch the name resolution of an DNS query based that information. Check the result of the name resolution by using the nslookup command.

```plaintext
; <> DiG 9.8.3-P1 <> +trace -t A www.scss.tcd.ie
;; global options: +cmd
.
118896 IN NS i.root-servers.net.
118896 IN NS k.root-servers.net.
118896 IN NS m.root-servers.net.
118896 IN NS f.root-servers.net.
118896 IN NS h.root-servers.net.
118896 IN NS j.root-servers.net.
118896 IN NS d.root-servers.net.
118896 IN NS c.root-servers.net.
118896 IN NS a.root-servers.net.
118896 IN NS l.root-servers.net.
118896 IN NS g.root-servers.net.
118896 IN NS b.root-servers.net.
118896 IN NS e.root-servers.net.

; Received 508 bytes from 141.30.66.135#53(141.30.66.135) in 11 ms
ie. 172800 IN NS a.ns.ie.
ie. 172800 IN NS b.ns.ie.
ie. 172800 IN NS f.ns.ie.
ie. 172800 IN NS g.ns.ie.
ie. 172800 IN NS c.ns.ie.
ie. 172800 IN NS d.ns.ie.
ie. 172800 IN NS e.ns.ie.
ie. 172800 IN NS h.ns.ie.

; Received 488 bytes from 192.5.5.241#53(192.5.5.241) in 21 ms
tcd.ie. 172800 IN NS auth-ns2.ucd.ie.
tcd.ie. 172800 IN NS auth-ns1.tcd.ie.
tcd.ie. 172800 IN NS auth-ns3.tcd.ie.
```

7.5. The German companies “Computer” and “Network” have the departments “Development”, “Sales” and “Research”, the English company “Commercial” has the departments “Administration” and “Service”

a) Look up the definition of the object classes in RFC 4519. Propose the structure of a Directory Information Tree that can store the given information according to the X.500 standard.

b) Provide an example of a relative name within the company “Computer” for X.500. In which context is this name interpreted?

c) Which object class could be used to store the employees of the two companies as substructure of the department they belong to. The following information should be stored for each employee: name, address, telephone number, email and employee type.

d) Every employee who is working for the company for more than 10 years gets assigned the status of a senior. Name the search query for listing all senior employees across all organizations in Germany.