

q1:

ns2.tecnico.ulisboa.pt

ns1.tecnico.ulisboa.pt

a.ul.pt

q2:

Together those 2 records are needed to resolve the query of type A for www.ulisboa.pt. It contains one record of CNAME type to know the alias for www.ulisboa.pt and the other record has type A and shows us the IP of that canonical name.

q3:

dns-admin@dsi.tecnico.ulisboa.pt

q4:

For HTTP:

193.136.128.169

For SMTP:

smtp1.tecnico.ulisboa.pt

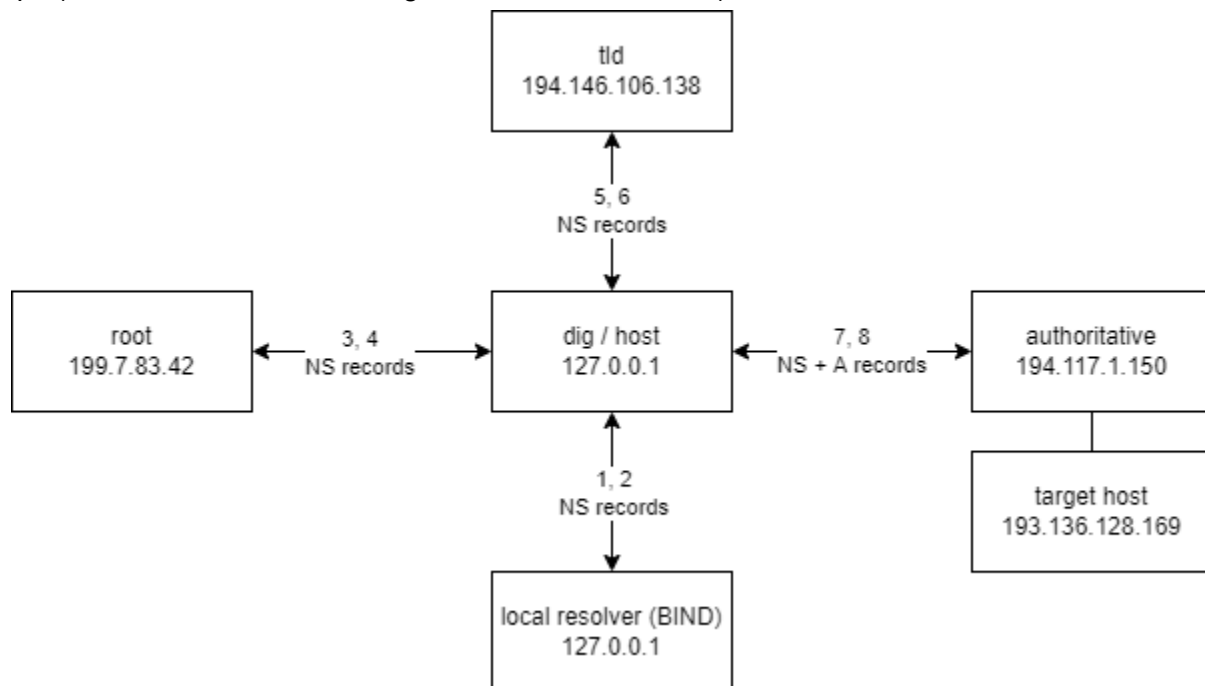
smtp2.tecnico.ulisboa.pt

smtp.tecnico.ulisboa.pt

q5:

4 (Local Resolver (BIND) + Root + TLD + Authoritative)

q6: (onde se lê 127.0.0.1 no dig, devia ler-se 10.0.2.15)



```
rc@rc-lab: ~  
;; Received 278 bytes from 194.117.0.150#53(a.ul.pt) in 8 ms  
rc@rc-lab:~$ dig +trace tecnico.ulisboa.pt +nodnssec -4  
; <<>> DiG 9.16.1-Ubuntu <<>> +trace tecnico.ulisboa.pt +nodnssec -4  
;; global options: +cmd  
.  
 0      IN      NS      f.root-servers.net.  
.  
 0      IN      NS      g.root-servers.net.  
.  
 0      IN      NS      j.root-servers.net.  
.  
 0      IN      NS      b.root-servers.net.  
.  
 0      IN      NS      d.root-servers.net.  
.  
 0      IN      NS      k.root-servers.net.  
.  
 0      IN      NS      c.root-servers.net.  
.  
 0      IN      NS      m.root-servers.net.  
.  
 0      IN      NS      l.root-servers.net.  
.  
 0      IN      NS      a.root-servers.net.  
.  
 0      IN      NS      h.root-servers.net.  
.  
 0      IN      NS      e.root-servers.net.  
.  
 0      IN      NS      i.root-servers.net.  
;; Received 851 bytes from 127.0.0.1#53(127.0.0.1) in 12 ms  
pt.  
 172800 IN      NS      a.dns.pt.  
pt.  
 172800 IN      NS      b.dns.pt.  
pt.  
 172800 IN      NS      c.dns.pt.  
pt.  
 172800 IN      NS      d.dns.pt.  
pt.  
 172800 IN      NS      e.dns.pt.  
pt.  
 172800 IN      NS      g.dns.pt.  
pt.  
 172800 IN      NS      h.dns.pt.  
pt.  
 172800 IN      NS      ns.dns.br.  
pt.  
 172800 IN      NS      ns2.nic.fr.  
;; Received 606 bytes from 199.7.83.42#53(l.root-servers.net) in 12 ms  
ulisboa.pt.  
 7200  IN      NS      ns1.tecnico.ulisboa.pt.  
ulisboa.pt.  
 7200  IN      NS      b.ul.pt.  
ulisboa.pt.  
 7200  IN      NS      a.ul.pt.  
ulisboa.pt.  
 7200  IN      NS      ns2.tecnico.ulisboa.pt.  
;; Received 324 bytes from 194.146.106.138#53(h.dns.pt) in 268 ms  
tecnico.ulisboa.pt.  
 3600  IN      A       193.136.128.169  
tecnico.ulisboa.pt.  
 3600  IN      NS      ns2.tecnico.ulisboa.pt.  
tecnico.ulisboa.pt.  
 3600  IN      NS      a.ul.pt.  
tecnico.ulisboa.pt.  
 3600  IN      NS      ns1.tecnico.ulisboa.pt.  
;; Received 278 bytes from 194.117.1.150#53(b.ul.pt) in 8 ms  
rc@rc-lab:~$
```

q7:

They can contain valuable information (like aliases, IPs and nameservers) to make the name resolution faster.

q8:

Yes, it is authoritative, because the result (the IP for tecnico.ulisboa.pt) comes from an authoritative server.

q9:

dig contacts only 1 server (resolver)

resolver contacts only 1 server too (root), excluding the communication with dig

q10:

No, it is not authoritative, because the result comes from our resolver and not from an authoritative server.

q11:

1ª vez: 7ms

2ª vez: 667ms

Da 2ª vez, como a cache é limpa, não tem o resultado em cache e demora mais tempo a resolver a query.

q12:

No, because clients couldn't see the different IP, hence would be unable to access the server, until the cache entry in their system was replaced (after TTL reaches 0) by a new one with the new IP for IST.

q13:

No, 30 secs it's a very small TTL, because, considering it could resolve the name in less than 30 secs, if the cache entry expires after that time, we would need another name resolution, so the amount of traffic generated in the network would be a lot, leading us to increment TTL.

q14:

```
GNU nano 4.8          named.conf.local
//
// Do any local configuration here
//
// Consider adding the 1918 zones here, if they are not used in your
// organization
include "/etc/bind/zones.rfc1918";

zone "rc.leic" {
    type master;
    file "/etc/bind/db.rc.leic";
};

zone "████.rc.leic" {
    type master;
    file "/etc/bind/db.████.rc.leic";
};

[ Read 17 lines ]
^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify   ^C Cur Pos
^X Exit      ^R Read File ^_ Replace   ^U Paste Text ^T To Spell  ^_ Go To Line
```

```
rc@rc-lab: /etc/bind
GNU nano 4.8          db.rc.leic
$ORIGIN rc.leic.      ; The domain
$TTL 604800            ; Default TTL (in seconds)

@ IN SOA ns1.rc.leic. admin.rc.leic. (
    202111281          ; Serial (today's date + today's serial)
    604800             ; Refresh (in seconds)
    86400              ; Retry (in seconds)
    2419200            ; Expire (in seconds)
    604800 )           ; Negative Cache TTL (in seconds)

@ IN NS ns1.rc.leic.   ; ns1.rc.leic and ns2.rc.leic are the
@ IN NS ns2.rc.leic.   ; Authoritative DNS servers for rc.leic

ns1 IN A 127.0.0.1      ; «ns1» is the same as «ns1.rc.leic»
ns2 IN A 127.0.0.1

@ IN A 127.0.0.1        ; The IPv4 address the TLD server

████.rc.leic. IN NS ns1.████.rc.leic.
ns1.████.rc.leic. IN A 127.0.0.1

████.rc.leic. IN NS ns2.████.rc.leic.
ns2.████.rc.leic. IN A 127.0.0.1
```

```
rc@rc-lab: /etc/bind
GNU nano 4.8 db. .rc.leic
$ORIGIN .rc.leic. ; The domain
$TTL 604800 ; Default TTL (in seconds)

@ IN SOA ns1. .rc.leic. admin. .rc.leic. (
    202111281 ; Serial (today's date + today's serial)
    604800 ; Refresh (in seconds)
    86400 ; Retry (in seconds)
    2419200 ; Expire (in seconds)
    604800 ) ; Negative Cache TTL (in seconds)

@ IN NS ns1. .rc.leic. ; ns1.rc.leic and ns2.rc.leic are the
@ IN NS ns2. .rc.leic. ; Authoritative DNS servers for rc.leic
www IN CNAME @ ; alias
@ IN MX 10 mail ; mail

ns1 IN A 127.0.0.1 ; «ns1» is the same as «ns1.rc.leic»
ns2 IN A 127.0.0.1
mail IN A 127.0.0.1

@ IN A 127.0.0.1 ; The IPv4 address the TLD server
```

q15:

O servidor que atente o pedido existe, daí haver algo na “Authority section”, mas o domínio não existe, porque é fictício, logo o servidor não é capaz de dar uma resposta e a “Answer section” vem vazia.