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.

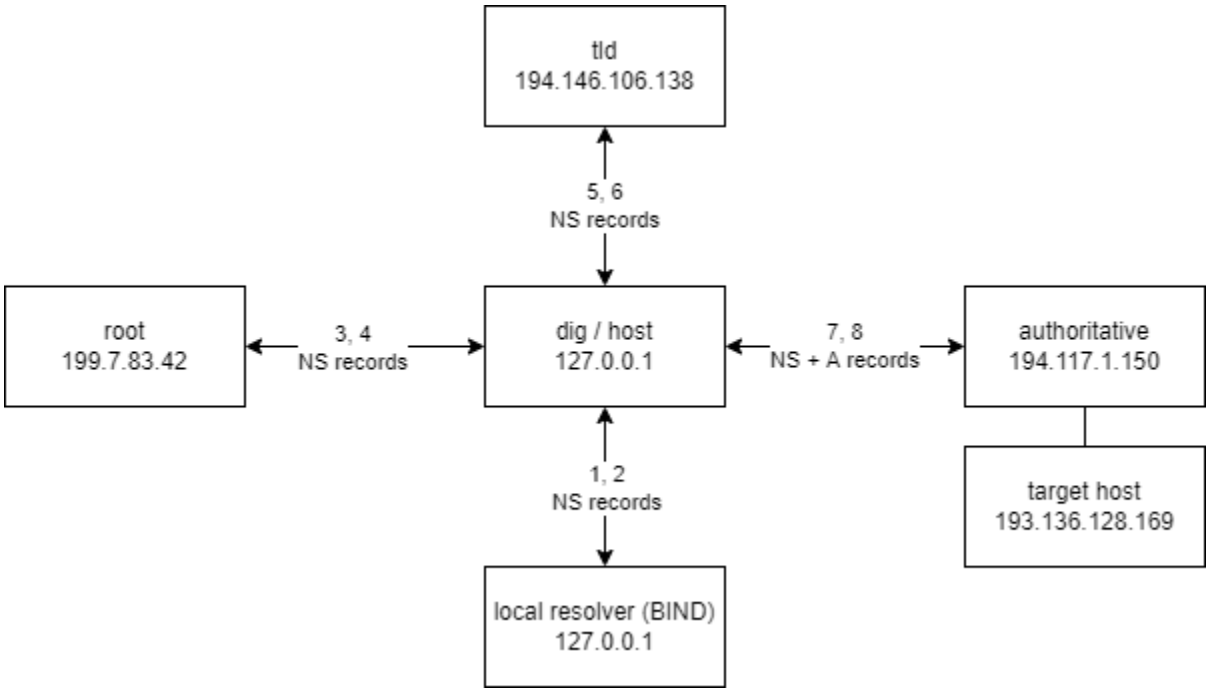
q3:
dns-admin@dsi.tecnico.ulisboa.pt

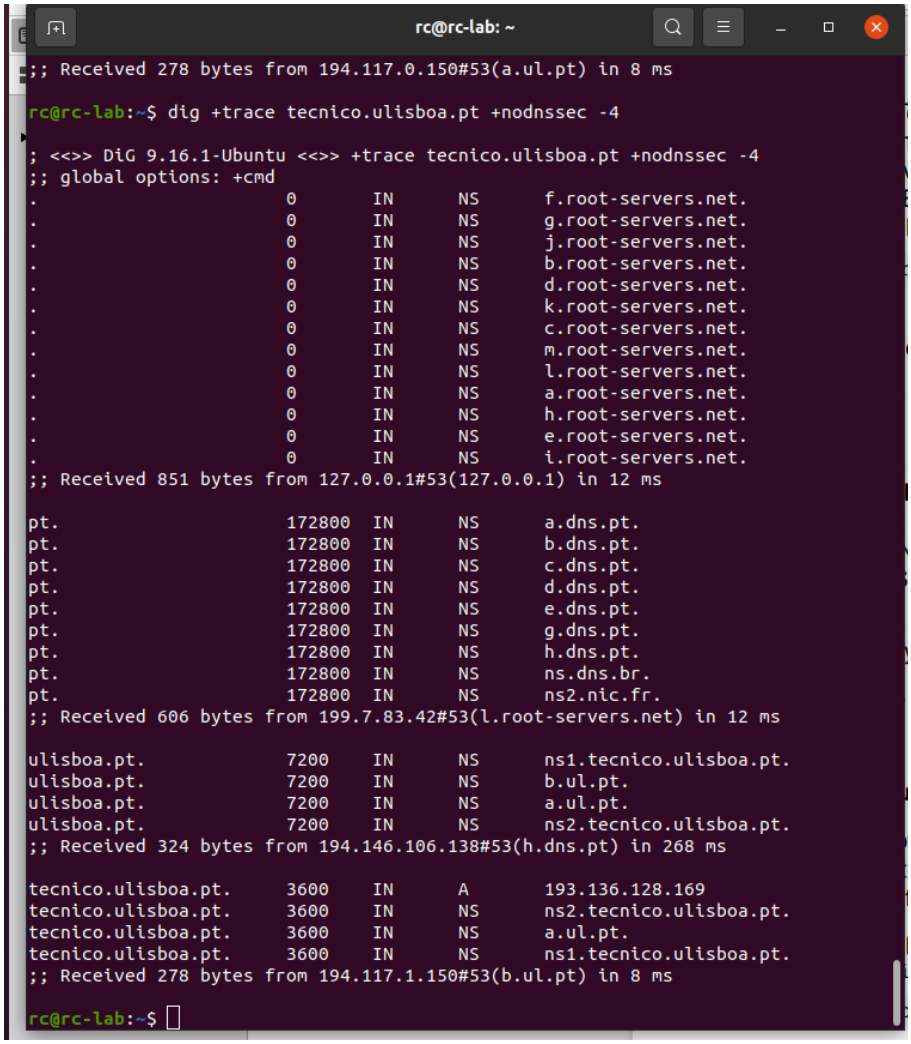
q4:
For HTTP:
193.136.128.169

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)





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

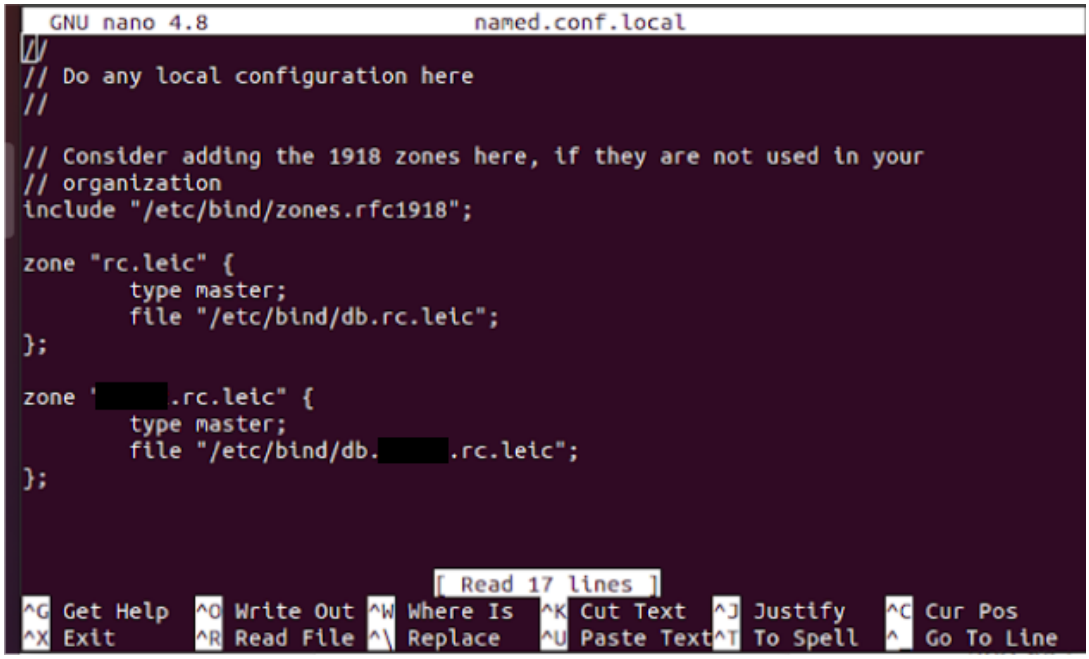
q10:
No, it is not authoritative, because the result comes from our resolver and not from an authoritative server.

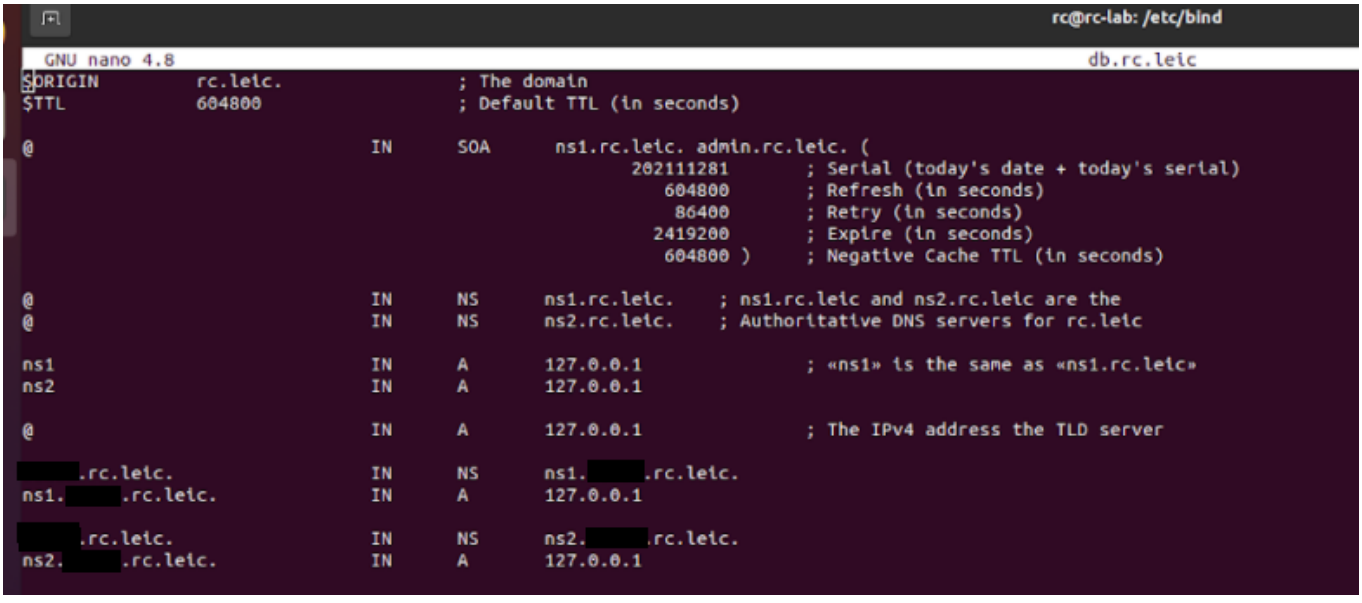
q11:
1ª vez: 7ms
2ª vez: 667ms
Da 2ª vez, como a cache é limpa, não tem o resultado em cache e demora mais tempo a resolver a query.

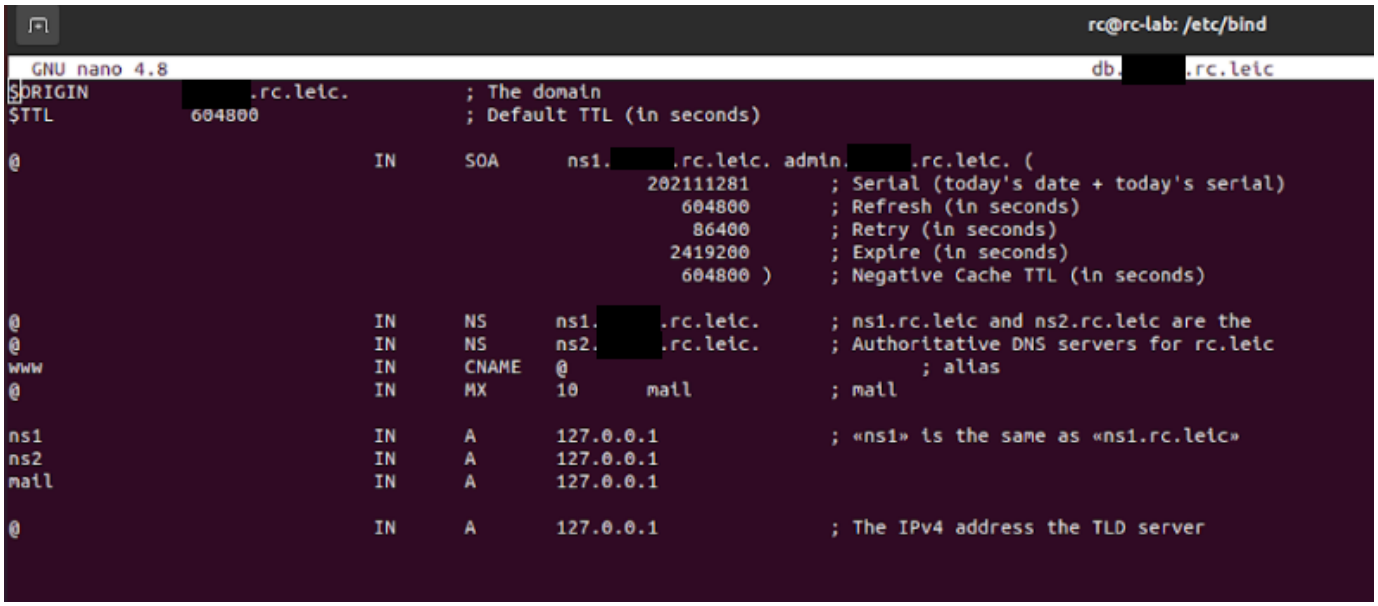
q12:
No, because clients couldn't see the different IP, hence would be unable to access the server, until the cache entry in their system was replaced (after TTL reaches 0) by a new one with the new IP for IST.

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:







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.