Exercise 3

Question 1. What is the IP address of www.cecs.anu.edu.au . What type of DNS query is sent to get this answer?

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig www.cecs.anu.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> www.cecs.anu.edu.au
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6174
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 9, ADDITIONAL: 19

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;www.cecs.anu.edu.au.           IN      A

;; ANSWER SECTION:
www.cecs.anu.edu.au.    1628    IN      CNAME   rproxy.cecs.anu.edu.au.
rproxy.cecs.anu.edu.au. 3112    IN      A       150.203.161.98

;; AUTHORITY SECTION:
au.                     74369   IN      NS      s.au.
au.                     74369   IN      NS      q.au.
au.                     74369   IN      NS      t.au.
au.                     74369   IN      NS      a.au.
au.                     74369   IN      NS      r.au.
au.                     74369   IN      NS      c.au.
au.                     74369   IN      NS      d.au.
au.                     74369   IN      NS      m.au.
au.                     74369   IN      NS      n.au.

;; ADDITIONAL SECTION:
a.au.                   20220   IN      A       58.65.254.73
a.au.                   16316   IN      AAAA    2407:6e00:254:306::73
c.au.                   11023   IN      A       162.159.24.179
c.au.                   42859   IN      AAAA    2400:cb00:2049:1::a29f:18b3
d.au.                   8617    IN      A       162.159.25.38
d.au.                   110205  IN      AAAA    2400:cb00:2049:1::a29f:1926
m.au.                   28550   IN      A       156.154.100.24
m.au.                   42860   IN      AAAA    2001:502:2eda::24
n.au.                   4205    IN      A       156.154.101.24
n.au.                   110205  IN      AAAA    2001:502:ad09::24
q.au.                   6010    IN      A       65.22.196.1
q.au.                   31613   IN      AAAA    2a01:8840:be::1
r.au.                   23771   IN      A       65.22.197.1
r.au.                   23771   IN      AAAA    2a01:8840:bf::1
s.au.                   33873   IN      A       65.22.198.1
s.au.                   17021   IN      AAAA    2a01:8840:c0::1
t.au.                   3987    IN      A       65.22.199.1
t.au.                   3987    IN      AAAA    2a01:8840:c1::1

;; Query time: 1 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Mar 10 12:55:16 AEDT 2020
;; MSG SIZE  rcvd: 625
```

The IP address is 150.203.161.98 and the type of DNS query is Type A.

Question 2. What is the canonical name for the CECS ANU web server? Suggest a reason for having an alias for this server.

The canonical name for the CECS ANU web server is rproxy.cecs.anu.edu.au.

It has the same IP address due to Type CANME.

the reason for having an alias for this server is because just as humans can be identified in many ways. One identifier for a host is its hostname and hosts are also identified by so-called IP addresses.

Question 3. What can you make of the rest of the response (i.e. the details available in the Authority and Additional sections)?

Authority section means that the server(s) that are the ultimate authority for answering DNS queries about that domain. The reason for this section is that we can query any DNS server(s) to answer a query.

Question 4. What is the IP address of the local nameserver for your machine?

```
;; Query time: 1 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Mar 10 12:55:16 AEDT 2020
;; MSG SIZE  rcvd: 625
```

We can see that IP address is 129.94.242.2.

Question 5. What are the DNS nameservers for the "cecs.anu.edu.au" domain (note: the domain name is cecs.anu.edu.au and not www.cecs.anu.edu.au)? Find out their IP addresses? What type of DNS query is sent to obtain this information?

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig cecs.anu.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> cecs.anu.edu.au
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 57654
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 3, ADDITIONAL: 4

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;cecs.anu.edu.au.               IN      A

;; ANSWER SECTION:
cecs.anu.edu.au.        1854    IN      A       150.203.161.98

;; AUTHORITY SECTION:
anu.edu.au.             529     IN      NS      ns.adelaide.edu.au.
anu.edu.au.             529     IN      NS      ns1.anu.edu.au.
anu.edu.au.             529     IN      NS      una.anu.edu.au.

;; ADDITIONAL SECTION:
ns.adelaide.edu.au.     63482   IN      A       129.127.40.3
ns1.anu.edu.au.         529     IN      A       150.203.1.10
una.anu.edu.au.         529     IN      A       150.203.22.28

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Mar 10 15:59:37 AEDT 2020
;; MSG SIZE  rcvd: 170
```

The DNS name servers for the "cecs.anu.edu.au" domain and IP address

ns.adelaid.edu.au. 129.127.40.3

ns1.anu.edu.au. 150.203.1.10

una.anu.edu.au. 150.203.22.28

The type of DNS query sent to obtain this information is NS.

Question 6. What is the DNS name associated with the IP address 111.68.101.54? What type of DNS query is sent to obtain this information?

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig -x 111.68.101.54

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> -x 111.68.101.54
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 14728
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;54.101.68.111.in-addr.arpa.    IN      PTR

;; ANSWER SECTION:
54.101.68.111.in-addr.arpa. 870 IN      PTR     webserver.seecs.nust.edu.pk.

;; AUTHORITY SECTION:
101.68.111.in-addr.arpa. 524    IN      NS      ns2.hec.gov.pk.
101.68.111.in-addr.arpa. 524    IN      NS      ns1.hec.gov.pk.

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Mar 10 15:41:56 AEDT 2020
;; MSG SIZE  rcvd: 140
```

The DNS name is webserver.seecs.nust.edu.pk. and the type is PTR.

Question 7. Run dig and query the CSE nameserver (129.94.242.33) for the mail servers for Yahoo! Mail (again the domain name is yahoo.com, not www.yahoo.com). Did you get an authoritative answer? Why?

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @129.94.242.33 yahoo.com

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.242.33 yahoo.com
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 21670
;; flags: qr rd ra; QUERY: 1, ANSWER: 6, AUTHORITY: 5, ADDITIONAL: 8

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;yahoo.com.                     IN      A

;; ANSWER SECTION:
yahoo.com.              813     IN      A       72.30.35.9
yahoo.com.              813     IN      A       72.30.35.10
yahoo.com.              813     IN      A       98.137.246.7
yahoo.com.              813     IN      A       98.137.246.8
yahoo.com.              813     IN      A       98.138.219.231
yahoo.com.              813     IN      A       98.138.219.232

;; AUTHORITY SECTION:
yahoo.com.              9306    IN      NS      ns1.yahoo.com.
yahoo.com.              9306    IN      NS      ns2.yahoo.com.
yahoo.com.              9306    IN      NS      ns4.yahoo.com.
yahoo.com.              9306    IN      NS      ns5.yahoo.com.
yahoo.com.              9306    IN      NS      ns3.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com.          169032  IN      A       68.180.131.16
ns1.yahoo.com.          4066    IN      AAAA    2001:4998:130::1001
ns2.yahoo.com.          241601  IN      A       68.142.255.16
ns2.yahoo.com.          9306    IN      AAAA    2001:4998:140::1002
ns4.yahoo.com.          9094    IN      A       98.138.11.157
ns5.yahoo.com.          66154   IN      A       202.165.97.53
ns5.yahoo.com.          9532    IN      AAAA    2406:2000:ff60::53

;; Query time: 0 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Tue Mar 10 15:46:48 AEDT 2020
;; MSG SIZE  rcvd: 372
```

No, it is not an authoritative answer because there is no aa.

Question 8. Repeat the above (i.e. Question 7) but use one of the nameservers obtained in Question 5. What is the result?

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @129.94.242.33 ns.adelaide.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.242.33 ns.adelaide.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 61518
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 4, ADDITIONAL: 9
```

It still not include aa, so there is no an authoritative answer.

Question 9. Obtain the authoritative answer for the mail servers for Yahoo! mail. What type of DNS query is sent to obtain this information?

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @ns5.yahoo.com  yahoo.com

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @ns5.yahoo.com yahoo.com
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 2299
;; flags: qr aa rd; QUERY: 1, ANSWER: 6, AUTHORITY: 5, ADDITIONAL: 10
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1272
;; QUESTION SECTION:
;yahoo.com.                     IN      A

;; ANSWER SECTION:
yahoo.com.              1800    IN      A       98.138.219.232
yahoo.com.              1800    IN      A       98.138.219.231
yahoo.com.              1800    IN      A       72.30.35.10
yahoo.com.              1800    IN      A       72.30.35.9
yahoo.com.              1800    IN      A       98.137.246.7
yahoo.com.              1800    IN      A       98.137.246.8

;; AUTHORITY SECTION:
yahoo.com.              172800  IN      NS      ns3.yahoo.com.
yahoo.com.              172800  IN      NS      ns2.yahoo.com.
yahoo.com.              172800  IN      NS      ns4.yahoo.com.
yahoo.com.              172800  IN      NS      ns1.yahoo.com.
yahoo.com.              172800  IN      NS      ns5.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com.          1209600 IN      A       68.180.131.16
ns2.yahoo.com.          1209600 IN      A       68.142.255.16
ns3.yahoo.com.          1800    IN      A       27.123.42.42
ns4.yahoo.com.          1209600 IN      A       98.138.11.157
ns5.yahoo.com.          86400   IN      A       202.165.97.53
ns1.yahoo.com.          86400   IN      AAAA    2001:4998:130::1001
ns2.yahoo.com.          86400   IN      AAAA    2001:4998:140::1002
ns3.yahoo.com.          1800    IN      AAAA    2406:8600:f03f:1f8::1003
ns5.yahoo.com.          86400   IN      AAAA    2406:2000:ff60::53

;; Query time: 94 msec
;; SERVER: 202.165.97.53#53(202.165.97.53)
;; WHEN: Tue Mar 10 16:28:49 AEDT 2020
;; MSG SIZE  rcvd: 416
```

I choose ns5.yahoo.com to obtain the authoritative answer and the type of DNS query is A.

Question 10. In this exercise you simulate the iterative DNS query process to find the IP address of your machine (e.g. lyre00.cse.unsw.edu.au).

First, find the name server (query type NS) of the "." domain (root domain).

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig . NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> . NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 42667
;; flags: qr rd ra; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 27

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;.                              IN      NS

;; ANSWER SECTION:
.                       139597  IN      NS      h.root-servers.net.
.                       139597  IN      NS      k.root-servers.net.
.                       139597  IN      NS      d.root-servers.net.
.                       139597  IN      NS      m.root-servers.net.
.                       139597  IN      NS      i.root-servers.net.
.                       139597  IN      NS      g.root-servers.net.
.                       139597  IN      NS      b.root-servers.net.
.                       139597  IN      NS      l.root-servers.net.
.                       139597  IN      NS      e.root-servers.net.
.                       139597  IN      NS      a.root-servers.net.
.                       139597  IN      NS      c.root-servers.net.
.                       139597  IN      NS      f.root-servers.net.
.                       139597  IN      NS      j.root-servers.net.

;; ADDITIONAL SECTION:
a.root-servers.net.     3939    IN      A       198.41.0.4
a.root-servers.net.     17440   IN      AAAA    2001:503:ba3e::2:30
b.root-servers.net.     77601   IN      A       199.9.14.201
b.root-servers.net.     81352   IN      AAAA    2001:500:200::b
c.root-servers.net.     66512   IN      A       192.33.4.12
c.root-servers.net.     270402  IN      AAAA    2001:500:2::c
d.root-servers.net.     60165   IN      A       199.7.91.13
d.root-servers.net.     270402  IN      AAAA    2001:500:2d::d
e.root-servers.net.     416655  IN      A       192.203.230.10
e.root-servers.net.     425094  IN      AAAA    2001:500:a8::e
f.root-servers.net.     60764   IN      A       192.5.5.241
f.root-servers.net.     160005  IN      AAAA    2001:500:2f::f
g.root-servers.net.     585900  IN      A       192.112.36.4
g.root-servers.net.     565514  IN      AAAA    2001:500:12::d0d
h.root-servers.net.     63503   IN      A       198.97.190.53
h.root-servers.net.     270402  IN      AAAA    2001:500:1::53
i.root-servers.net.     145495  IN      A       192.36.148.17
i.root-servers.net.     81352   IN      AAAA    2001:7fe::53
j.root-servers.net.     274117  IN      A       192.58.128.30
j.root-servers.net.     418988  IN      AAAA    2001:503:c27::2:30
k.root-servers.net.     229104  IN      A       193.0.14.129
k.root-servers.net.     423856  IN      AAAA    2001:7fd::1
l.root-servers.net.     525104  IN      A       199.7.83.42
l.root-servers.net.     270402  IN      AAAA    2001:500:9f::42
m.root-servers.net.     58808   IN      A       202.12.27.33
m.root-servers.net.     147403  IN      AAAA    2001:dc3::35

;; Query time: 1 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Mar 10 18:12:12 AEDT 2020
;; MSG SIZE  rcvd: 811
```

Query this nameserver to find the authoritative name server for the "au." domain.

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @198.41.0.4 lyre00.cse.unsw.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @198.41.0.4 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 16776
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 9, ADDITIONAL: 19
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1472
;; QUESTION SECTION:
;lyre00.cse.unsw.edu.au.                IN      A

;; AUTHORITY SECTION:
au.                     172800  IN      NS      a.au.
au.                     172800  IN      NS      c.au.
au.                     172800  IN      NS      d.au.
au.                     172800  IN      NS      m.au.
au.                     172800  IN      NS      n.au.
au.                     172800  IN      NS      q.au.
au.                     172800  IN      NS      r.au.
au.                     172800  IN      NS      s.au.
au.                     172800  IN      NS      t.au.

;; ADDITIONAL SECTION:
a.au.                   172800  IN      A       58.65.254.73
c.au.                   172800  IN      A       162.159.24.179
d.au.                   172800  IN      A       162.159.25.38
m.au.                   172800  IN      A       156.154.100.24
n.au.                   172800  IN      A       156.154.101.24
q.au.                   172800  IN      A       65.22.196.1
r.au.                   172800  IN      A       65.22.197.1
s.au.                   172800  IN      A       65.22.198.1
t.au.                   172800  IN      A       65.22.199.1
a.au.                   172800  IN      AAAA    2407:6e00:254:306::73
c.au.                   172800  IN      AAAA    2400:cb00:2049:1::a29f:18b3
d.au.                   172800  IN      AAAA    2400:cb00:2049:1::a29f:1926
m.au.                   172800  IN      AAAA    2001:502:2eda::24
n.au.                   172800  IN      AAAA    2001:502:ad09::24
q.au.                   172800  IN      AAAA    2a01:8840:be::1
r.au.                   172800  IN      AAAA    2a01:8840:bf::1
s.au.                   172800  IN      AAAA    2a01:8840:c0::1
t.au.                   172800  IN      AAAA    2a01:8840:c1::1

;; Query time: 116 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Tue Mar 10 18:13:52 AEDT 2020
;; MSG SIZE  rcvd: 591
```

Query this second server to find the authoritative nameserver for the "edu.au." domain.

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @162.159.24.179 lyre00.cse.unsw.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @162.159.24.179 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 29994
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 4, ADDITIONAL: 9
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;lyre00.cse.unsw.edu.au.                IN      A

;; AUTHORITY SECTION:
edu.au.                 86400   IN      NS      r.au.
edu.au.                 86400   IN      NS      q.au.
edu.au.                 86400   IN      NS      t.au.
edu.au.                 86400   IN      NS      s.au.

;; ADDITIONAL SECTION:
q.au.                   86400   IN      A       65.22.196.1
r.au.                   86400   IN      A       65.22.197.1
s.au.                   86400   IN      A       65.22.198.1
t.au.                   86400   IN      A       65.22.199.1
q.au.                   86400   IN      AAAA    2a01:8840:be::1
r.au.                   86400   IN      AAAA    2a01:8840:bf::1
s.au.                   86400   IN      AAAA    2a01:8840:c0::1
t.au.                   86400   IN      AAAA    2a01:8840:c1::1

;; Query time: 6 msec
;; SERVER: 162.159.24.179#53(162.159.24.179)
;; WHEN: Tue Mar 10 18:17:05 AEDT 2020
;; MSG SIZE  rcvd: 291
```

Now query this nameserver to find the authoritative nameserver for "unsw.edu.au".

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @65.22.196.1 lyre00.cse.unsw.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @65.22.196.1 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 17263
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 3, ADDITIONAL: 6
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;lyre00.cse.unsw.edu.au.                IN      A

;; AUTHORITY SECTION:
unsw.edu.au.            900     IN      NS      ns3.unsw.edu.au.
unsw.edu.au.            900     IN      NS      ns2.unsw.edu.au.
unsw.edu.au.            900     IN      NS      ns1.unsw.edu.au.

;; ADDITIONAL SECTION:
ns1.unsw.edu.au.        900     IN      A       129.94.0.192
ns2.unsw.edu.au.        900     IN      A       129.94.0.193
ns3.unsw.edu.au.        900     IN      A       192.155.82.178
ns1.unsw.edu.au.        900     IN      AAAA    2001:388:c:35::1
ns2.unsw.edu.au.        900     IN      AAAA    2001:388:c:35::2

;; Query time: 56 msec
;; SERVER: 65.22.196.1#53(65.22.196.1)
;; WHEN: Tue Mar 10 18:18:18 AEDT 2020
;; MSG SIZE  rcvd: 209
```

Next query the nameserver of unsw.edu.au to find the authoritative name server of cse.unsw.edu.au.

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @129.94.0.192 lyre00.cse.unsw.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.0.192 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 55983
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 2, ADDITIONAL: 5
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;lyre00.cse.unsw.edu.au.                IN      A

;; AUTHORITY SECTION:
cse.unsw.edu.au.        10800   IN      NS      maestro.orchestra.cse.unsw.edu.au.
cse.unsw.edu.au.        10800   IN      NS      beethoven.orchestra.cse.unsw.edu.au.

;; ADDITIONAL SECTION:
beethoven.orchestra.cse.unsw.edu.au. 10800 IN A 129.94.242.2
beethoven.orchestra.cse.unsw.edu.au. 10800 IN A 129.94.172.11
beethoven.orchestra.cse.unsw.edu.au. 10800 IN A 129.94.208.3
maestro.orchestra.cse.unsw.edu.au. 10800 IN A   129.94.242.33

;; Query time: 4 msec
;; SERVER: 129.94.0.192#53(129.94.0.192)
;; WHEN: Tue Mar 10 18:19:09 AEDT 2020
;; MSG SIZE  rcvd: 171
```

Now query the nameserver of cse.unsw.edu.au to find the IP address of your host. How many DNS servers do you have to query to get the authoritative answer?

```
z5238059@vx2:/tmp_amd/cage/export/cage/5/z5238059$ dig @129.94.242.2 lyre00.cse.unsw.edu.au

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.242.2 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38812
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;lyre00.cse.unsw.edu.au.                IN      A

;; ANSWER SECTION:
lyre00.cse.unsw.edu.au. 3600    IN      A       129.94.210.20

;; AUTHORITY SECTION:
cse.unsw.edu.au.        3600    IN      NS      maestro.orchestra.cse.unsw.edu.au.
cse.unsw.edu.au.        3600    IN      NS      beethoven.orchestra.cse.unsw.edu.au.

;; ADDITIONAL SECTION:
maestro.orchestra.cse.unsw.edu.au. 3600 IN A    129.94.242.33
beethoven.orchestra.cse.unsw.edu.au. 3600 IN A  129.94.242.2

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Mar 10 18:20:15 AEDT 2020
;; MSG SIZE  rcvd: 155
```

There 6 DNS servers during getting the authoritative answer.

Question 11. Can one physical machine have several names and/or IP addresses associated with it?

Yes, of course. There are some reasons:

In order to host multiple SSL sites as already mentioned.

In order to use different public IP addresses to avoid firewalls or to avoid being blacklisted in SPAM filters.

In order to run the same service multiple times