Lab Exercise 3: DNS & Socket Programming

Yiting Liu (z5211008)

Exercise 3: Digging into DNS

```
z5211008@vx4:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ 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: 16029
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 3, ADDITIONAL: 7

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

;; ANSWER SECTION:
www.cecs.anu.edu.au.    3173    IN      CNAME   rproxy.cecs.anu.edu.au.
rproxy.cecs.anu.edu.au. 3572    IN      A       150.203.161.98

;; AUTHORITY SECTION:
cecs.anu.edu.au.        207     IN      NS      ns3.cecs.anu.edu.au.
cecs.anu.edu.au.        207     IN      NS      ns2.cecs.anu.edu.au.
cecs.anu.edu.au.        207     IN      NS      ns4.cecs.anu.edu.au.

;; ADDITIONAL SECTION:
ns2.cecs.anu.edu.au.    2934    IN      A       150.203.161.36
ns2.cecs.anu.edu.au.    3115    IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.    2472    IN      A       150.203.161.50
ns3.cecs.anu.edu.au.    3507    IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.    2472    IN      A       150.203.161.38
ns4.cecs.anu.edu.au.    3507    IN      AAAA    2001:388:1034:2905::26

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Oct 08 16:51:45 AEDT 2019
;; MSG SIZE  rcvd: 271
```

Dig output for Question 1 - 4

Question 1.

The IP address is **150.203.161.98**.
The type of this DNS query is **A**.

Question 2.

The canonical name is **rproxy.cecs.anu.edu.au**.
Because canonical names are always hard to remember, so we can use proxy name to handle this.

Question 3.

The Authority Section told us that www.cecs.anu.edu.au had three authoritative name servers. Here are their addresses,

```
ns3.cecs.anu.edu.au.
ns4.cecs.anu.edu.au.
ns2.cecs.anu.edu.au.
```

The Additional Section told us that the IP addresses of the three name servers in IPv4 and IPv6 format. Here are the addresses,

```
ns2.cecs.anu.edu.au.    3173    IN      A       150.203.161.36
ns2.cecs.anu.edu.au.    3173    IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.    3434    IN      A       150.203.161.50
ns3.cecs.anu.edu.au.    3434    IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.    499     IN      A       150.203.161.38
ns4.cecs.anu.edu.au.    3434    IN      AAAA    2001:388:1034:2905::26
```

A represents IPv4 address, AAAA represents IPv6 address.

Question 4.

As shown by Dig, the IP address of my machine is **129.94.242.2**

```
SERVER: 129.94.242.2#53(129.94.242.2)
```

Question 5.

```
z5211008@vx4:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig cecs.anu.edu.au NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> cecs.anu.edu.au NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51789
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 7

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

;; ANSWER SECTION:
cecs.anu.edu.au.        300     IN      NS      ns4.cecs.anu.edu.au.
cecs.anu.edu.au.        300     IN      NS      ns3.cecs.anu.edu.au.
cecs.anu.edu.au.        300     IN      NS      ns2.cecs.anu.edu.au.

;; ADDITIONAL SECTION:
ns2.cecs.anu.edu.au.    1677    IN      A       150.203.161.36
ns2.cecs.anu.edu.au.    1677    IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.    1940    IN      A       150.203.161.50
ns3.cecs.anu.edu.au.    3600    IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.    2865    IN      A       150.203.161.38
ns4.cecs.anu.edu.au.    3600    IN      AAAA    2001:388:1034:2905::26

;; Query time: 22 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Oct 08 23:13:21 AEDT 2019
;; MSG SIZE  rcvd: 230
```

There are three authoritative name servers:

NS	IPv4 Address	IPv6 Address
ns2.cecs.anu.edu.au	150.203.161.36	2001:388:1034:2905::24
ns3.cecs.anu.edu.au	150.203.161.50	2001:388:1034:2905::32
ns4.cecs.anu.edu.au	150.203.161.38	2001:388:1034:2905::26

The type of DNS query is **NS**.

Question 6.

```
z5211008@vx4:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ 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: 36989
;; 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. 3327 IN     PTR     webserver.seecs.nust.edu.pk.

;; AUTHORITY SECTION:
101.68.111.in-addr.arpa. 49988  IN      NS      ns1.hec.gov.pk.
101.68.111.in-addr.arpa. 49988  IN      NS      ns2.hec.gov.pk.

;; Query time: 1 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Oct 08 22:22:49 AEDT 2019
;; MSG SIZE  rcvd: 140
```

The DNS name of this IP address is **webserver.seecs.nust.edu.pk**.
The type of this DNS query is **PTR**.

Question 7.

```
z5211008@vx4:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @129.94.242.33 yahoo.com MX

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.242.33 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 34395
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 9

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

;; ANSWER SECTION:
yahoo.com.              1575    IN      MX      1 mta6.am0.yahoodns.net.
yahoo.com.              1575    IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.              1575    IN      MX      1 mta5.am0.yahoodns.net.

;; AUTHORITY SECTION:
yahoo.com.              1753    IN      NS      ns3.yahoo.com.
yahoo.com.              1753    IN      NS      ns5.yahoo.com.
yahoo.com.              1753    IN      NS      ns4.yahoo.com.
yahoo.com.              1753    IN      NS      ns1.yahoo.com.
yahoo.com.              1753    IN      NS      ns2.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com.          329920  IN      A       68.180.131.16
ns1.yahoo.com.          84742   IN      AAAA    2001:4998:130::1001
ns2.yahoo.com.          131692  IN      A       68.142.255.16
ns2.yahoo.com.          68304   IN      AAAA    2001:4998:140::1002
ns3.yahoo.com.          1142    IN      A       27.123.42.42
ns3.yahoo.com.          1142    IN      AAAA    2406:8600:f03f:1f8::1003
ns4.yahoo.com.          146593  IN      A       98.138.11.157
ns5.yahoo.com.          563967  IN      A       119.160.253.83

;; Query time: 1 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Tue Oct 08 22:30:48 AEDT 2019
;; MSG SIZE  rcvd: 371
```

We didn't get an authoritative answer, because the addresses in the Additional Section didn't give us all the addresses of name servers. The reason of this situation is that we don't have the authority on yahoo to receive messages.

Question 8.

```
z5211008@vx4:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @ns2.cecs.anu.edu.au. yahoo.com MX

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @ns2.cecs.anu.edu.au. yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 45758
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1
;; WARNING: recursion requested but not available

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

;; Query time: 8 msec
;; SERVER: 150.203.161.36#53(150.203.161.36)
;; WHEN: Tue Oct 08 23:19:40 AEDT 2019
;; MSG SIZE  rcvd: 38
```

When I use one of name server “ns2.cecs.anu.edu.au”, I get **no response**, and **no authoritative answer**. That’s because the server of yahoo find our query doesn’t send from cecs.anu.edu.au.

Question 9.

```
z5211008@vx1:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @ns1.yahoo.com yahoo.com MX

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @ns1.yahoo.com yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 48840
;; flags: qr aa rd; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 9
;; WARNING: recursion requested but not available

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

;; ANSWER SECTION:
yahoo.com.              1800    IN      MX      1 mta5.am0.yahoodns.net.
yahoo.com.              1800    IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.              1800    IN      MX      1 mta6.am0.yahoodns.net.

;; AUTHORITY SECTION:
yahoo.com.              172800  IN      NS      ns1.yahoo.com.
yahoo.com.              172800  IN      NS      ns2.yahoo.com.
yahoo.com.              172800  IN      NS      ns3.yahoo.com.
yahoo.com.              172800  IN      NS      ns5.yahoo.com.
yahoo.com.              172800  IN      NS      ns4.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.          1209600 IN      A       119.160.253.83
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

;; Query time: 145 msec
;; SERVER: 68.180.131.16#53(68.180.131.16)
;; WHEN: Wed Oct 09 15:22:46 AEDT 2019
;; MSG SIZE  rcvd: 371
```

By using ***dig @ns1.yahoo.com yahoo.com MX***, we send a query in type of **MX**.

Question 10.

First, assuming the IP address of my machine is **lyre00.cse.unsw.edu.au**, and find the nameserver of the **root** domain.

```
z5211008@vx1:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig . NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> . NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 20222
;; 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:
.                       183015  IN      NS      d.root-servers.net.
.                       183015  IN      NS      e.root-servers.net.
.                       183015  IN      NS      c.root-servers.net.
.                       183015  IN      NS      a.root-servers.net.
.                       183015  IN      NS      k.root-servers.net.
.                       183015  IN      NS      m.root-servers.net.
.                       183015  IN      NS      i.root-servers.net.
.                       183015  IN      NS      j.root-servers.net.
.                       183015  IN      NS      h.root-servers.net.
.                       183015  IN      NS      b.root-servers.net.
.                       183015  IN      NS      f.root-servers.net.
.                       183015  IN      NS      l.root-servers.net.
.                       183015  IN      NS      g.root-servers.net.

;; ADDITIONAL SECTION:
a.root-servers.net.     429569  IN      A       198.41.0.4
a.root-servers.net.     492662  IN      AAAA    2001:503:ba3e::2:30
b.root-servers.net.     12586   IN      A       199.9.14.201
b.root-servers.net.     161525  IN      AAAA    2001:500:200::b
c.root-servers.net.     24512   IN      A       192.33.4.12
c.root-servers.net.     60662   IN      AAAA    2001:500:2::c
d.root-servers.net.     12623   IN      A       199.7.91.13
d.root-servers.net.     60662   IN      AAAA    2001:500:2d::d
e.root-servers.net.     24512   IN      A       192.203.230.10
e.root-servers.net.     47842   IN      AAAA    2001:500:a8::e
f.root-servers.net.     74191   IN      A       192.5.5.241
f.root-servers.net.     24511   IN      AAAA    2001:500:2f::f
g.root-servers.net.     1871    IN      A       192.112.36.4
g.root-servers.net.     47842   IN      AAAA    2001:500:12::d0d
h.root-servers.net.     24512   IN      A       198.97.190.53
h.root-servers.net.     24511   IN      AAAA    2001:500:1::53
i.root-servers.net.     92651   IN      A       192.36.148.17
i.root-servers.net.     512260  IN      AAAA    2001:7fe::53
j.root-servers.net.     309     IN      A       192.58.128.30
j.root-servers.net.     60662   IN      AAAA    2001:503:c27::2:30
k.root-servers.net.     12624   IN      A       193.0.14.129
k.root-servers.net.     512260  IN      AAAA    2001:7fd::1
l.root-servers.net.     74191   IN      A       199.7.83.42
l.root-servers.net.     520175  IN      AAAA    2001:500:9f::42
m.root-servers.net.     12623   IN      A       202.12.27.33
m.root-servers.net.     259575  IN      AAAA    2001:dc3::35

;; Query time: 0 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Wed Oct 09 15:34:41 AEDT 2019
;; MSG SIZE  rcvd: 811
```

Then, we query one of this nameserver to find the authoritative name server for the "**au.**" domain.

```
z5211008@vx1:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @198.41.0.4 lyre00.cse.unsw.edu.au NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @198.41.0.4 lyre00.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 49956
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 9, ADDITIONAL: 18
;; WARNING: recursion requested but not available

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

;; AUTHORITY SECTION:
au.                     172800  IN      NS      a.au.
au.                     172800  IN      NS      c.au.
au.                     172800  IN      NS      d.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.
au.                     172800  IN      NS      u.au.
au.                     172800  IN      NS      v.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
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
u.au.                   172800  IN      A       211.29.133.32
v.au.                   172800  IN      A       202.12.31.53
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
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
v.au.                   172800  IN      AAAA    2001:dd8:12::53

;; Query time: 178 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Wed Oct 09 15:39:33 AEDT 2019
;; MSG SIZE  rcvd: 563
```

Then, we query one of this second server to find the authoritative nameserver for the "**edu.au.**" domain

```
z5211008@vx1:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @58.65.254.73 lyre00.cse.unsw.edu.au NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @58.65.254.73 lyre00.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38522
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 4, ADDITIONAL: 9
;; WARNING: recursion requested but not available

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

;; AUTHORITY SECTION:
edu.au.                 86400   IN      NS      s.au.
edu.au.                 86400   IN      NS      r.au.
edu.au.                 86400   IN      NS      t.au.
edu.au.                 86400   IN      NS      q.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: 15 msec
;; SERVER: 58.65.254.73#53(58.65.254.73)
;; WHEN: Wed Oct 09 15:42:05 AEDT 2019
;; MSG SIZE  rcvd: 291
```

Then, we query one of this nameserver to find the authoritative nameserver for "**unsw.edu.au**".

```
z5211008@vx1:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @65.22.196.1 lyre00.cse.unsw.edu.au NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @65.22.196.1 lyre00.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 19461
;; 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      NS

;; AUTHORITY SECTION:
unsw.edu.au.            900     IN      NS      ns3.unsw.edu.au.
unsw.edu.au.            900     IN      NS      ns1.unsw.edu.au.
unsw.edu.au.            900     IN      NS      ns2.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: 7 msec
;; SERVER: 65.22.196.1#53(65.22.196.1)
;; WHEN: Wed Oct 09 15:47:03 AEDT 2019
;; MSG SIZE  rcvd: 209
```

Then, we query one of the nameserver of unsw.edu.au to find the authoritative name server of **cse.unsw.edu.au.**

```
z5211008@vx1:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @129.94.0.192 lyre00.cse.unsw.edu.au NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.0.192 lyre00.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 17996
;; 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      NS

;; 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: 3 msec
;; SERVER: 129.94.0.192#53(129.94.0.192)
;; WHEN: Wed Oct 09 15:54:44 AEDT 2019
;; MSG SIZE  rcvd: 171
```

Then, we query the nameserver of cse.unsw.edu.au to find the IP address of the **host** in A**.**

```
z5211008@vx1:/tmp_amd/glass/export/glass/3/z5211008/Desktop/COMP3331/Labs/lab3$ dig @129.94.242.2 lyre00.cse.unsw.edu.au A

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.242.2 lyre00.cse.unsw.edu.au A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 61101
;; 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      beethoven.orchestra.cse.unsw.edu.au.
cse.unsw.edu.au.        3600    IN      NS      maestro.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: Wed Oct 09 15:55:41 AEDT 2019
;; MSG SIZE  rcvd: 155
```

Thus, the IP address of my machine is **129.94.210.20**.
In this process, I query **5 DNS servers** to get the authoritative answer:

- **d.root-servers.net.**
- **a.au.**
- **s.au.**
- **ns3.unsw.edu.au.**
- **maestro.orchestra.cse.unsw.edu.au.**

Question 11.

Yes. One physical machine can have several names or IP addresses.