Exercise 3: Digging into DNS (marked, include in the lab report)

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

Answer:

The IP address of www.cecs.anu.edu.au is 150.203.161.98. The type is A.

```
z5185842@vx4:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ 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: 20087
;; 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.    3600    IN      CNAME   rproxy.cecs.anu.edu.au.
rproxy.cecs.anu.edu.au. 3600    IN      A       150.203.161.98

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

;; ADDITIONAL SECTION:
ns2.cecs.anu.edu.au.    2262    IN      A       150.203.161.36
ns2.cecs.anu.edu.au.    2262    IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.    300     IN      A       150.203.161.50
ns3.cecs.anu.edu.au.    2262    IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.    300     IN      A       150.203.161.38
ns4.cecs.anu.edu.au.    2262    IN      AAAA    2001:388:1034:2905::26

;; Query time: 70 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Sun Oct 06 17:05:52 AEDT 2019
;; MSG SIZE  rcvd: 271
```

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

Answer:

The canonical name is rproxy.cecs.anu.edu.au.

Using an alias is much easier to remember than using the canonical name as the canonical name is usually long and hard to remember.

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

Answer:

The Authority section contains NS resource records, it includes four authoritative name servers, and they are ns1.cecs.anu.edu.au, ns2.cecs.anu.edu.au, ns3.cecs.anu.edu.au and ns4.cecs.anu.edu.au.

The additional section contains additional “helpful” info that may be used, here it contains IP addresses for the authoritative name servers mentioned in authority section.

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

Answer:

The local nameserver is 129.94.242.2, and it is the local DNS of the my machine.

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?

Answer:

The nameservers are ns4.cecs.anu.edu.au, ns3.cecs.anu.edu.au, ns2.cecs.anu.edu.au.
The IP address is 150.203.161.36, 150.203.161.50, 150.203.161.38.
For DNS nameserver the type is NS and for IP address is A.

```
z5185842@vx4:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ 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: 3139
;; 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.        273     IN      NS      ns3.cecs.anu.edu.au.
cecs.anu.edu.au.        273     IN      NS      ns2.cecs.anu.edu.au.
cecs.anu.edu.au.        273     IN      NS      ns4.cecs.anu.edu.au.

;; ADDITIONAL SECTION:
ns2.cecs.anu.edu.au.    129     IN      A       150.203.161.36
ns2.cecs.anu.edu.au.    129     IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.    273     IN      A       150.203.161.50
ns3.cecs.anu.edu.au.    129     IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.    273     IN      A       150.203.161.38
ns4.cecs.anu.edu.au.    129     IN      AAAA    2001:388:1034:2905::26

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Sun Oct 06 17:41:25 AEDT 2019
;; MSG SIZE  rcvd: 230
```

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?

Answer:

The DNS name is ns1.nust.edu.pk.

The query type is PTR.

```
z5185842@vx4:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ 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: 13317
;; 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. 1029 IN     PTR     webserver.seecs.nust.edu.pk.

;; AUTHORITY SECTION:
101.68.111.in-addr.arpa. 79613  IN      NS      ns1.hec.gov.pk.
101.68.111.in-addr.arpa. 79613  IN      NS      ns2.hec.gov.pk.

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Sun Oct 06 17:49:22 AEDT 2019
;; MSG SIZE  rcvd: 140
```

```
z5185842@vx4:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ dig webserver.seecs.nust.edu.pk NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> webserver.seecs.nust.edu.pk NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 16102
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;webserver.seecs.nust.edu.pk.   IN      NS

;; AUTHORITY SECTION:
seecs.nust.edu.pk.      10800   IN      SOA     ns1.nust.edu.pk. manager\.web.nust.edu.pk. 2019082001 10800 3600 604800 10800

;; Query time: 422 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Sun Oct 06 17:51:00 AEDT 2019
;; MSG SIZE  rcvd: 108
```

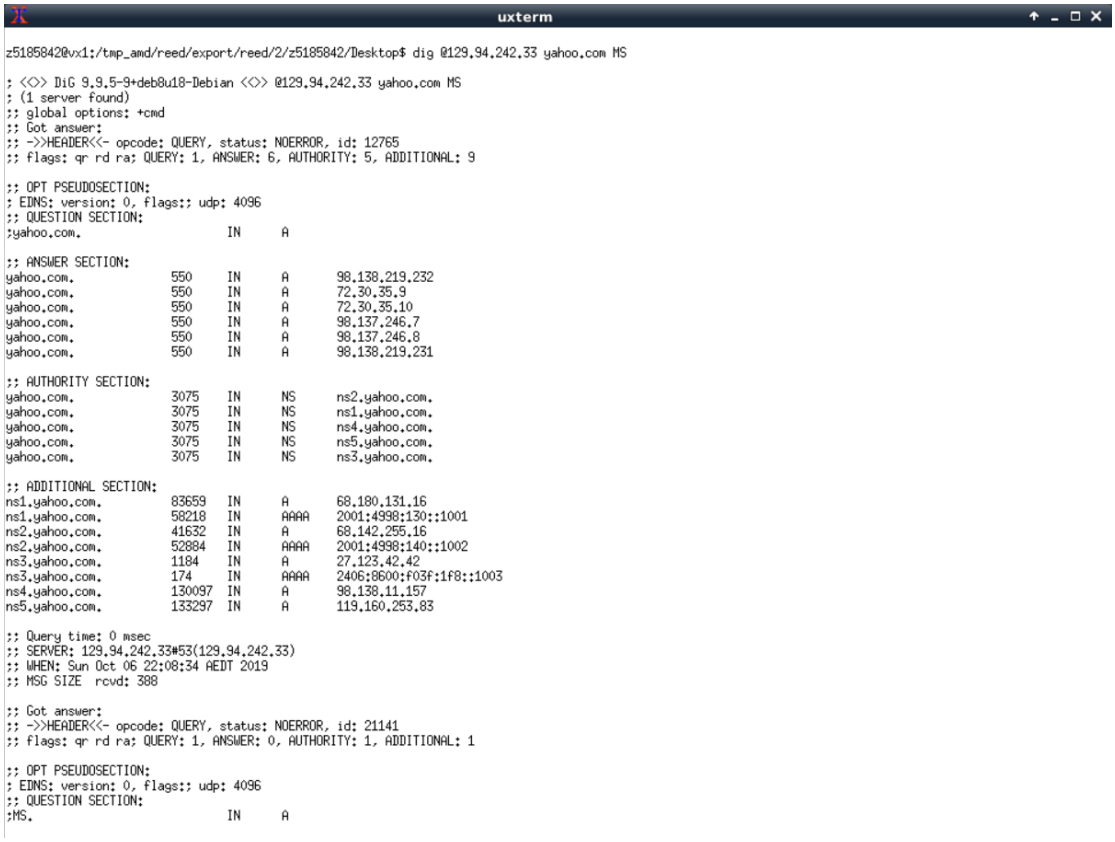
Question 7. Run dig and query the CSE nameserver (129.94.242.33) for the mail servers for Yahoo! Mail (again the domain name is yahoo.com, not www.yahoo.com). Did you get an authoritative answer? Why? (HINT: Just because a response contains information in the authoritative part of the DNS response message does not mean it came from an authoritative name server. You should examine the flags in the response to determine the answer)

Answer:

No, the flags are “qr, rd, ra”.

QR means whether this message is a query or a response. RD means recursion desired. RA means recursion available.

AA means authoritative answer, there is no “aa” in flags , we don’t get an authoritative answer. This is because we only get the authority in UNSW domain but not Yahoo.



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

Answer:

There is no answer. Because of the use of external network queries, there is no permission to get result.

```
z5185842@vx1:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ dig @ns2.cecs.anu.edu.au yahoo.com MS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @ns2.cecs.anu.edu.au yahoo.com MS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 13065
;; 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      A

;; Query time: 8 msec
;; SERVER: 150.203.161.36#53(150.203.161.36)
;; WHEN: Sun Oct 06 22:13:40 AEDT 2019
;; MSG SIZE  rcvd: 38

;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 47101
;; 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:
;MS.                            IN      A

;; Query time: 7 msec
```

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

Answer:

Firstly we should dig yahoo.com NS. Then we can get some authority DNS servers of yahoo.com. Choose one of them to obtain yahoo.com mail servers (dig @ns2.yahoo.com yahoo.com MS). Finally we can see the ‘aa’ flag.

```
z5185842@vx3:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ dig @ns2.yahoo.com yahoo.com MX

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @ns2.yahoo.com yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 17493
;; 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 mta7.am0.yahoodns.net.
yahoo.com.              1800    IN      MX      1 mta5.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      ns3.yahoo.com.
yahoo.com.              172800  IN      NS      ns2.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: 149 msec
;; SERVER: 68.142.255.16#53(68.142.255.16)
;; WHEN: Fri Oct 11 15:05:33 AEDT 2019
;; MSG SIZE  rcvd: 371
```

Now we got an authoritative answer for Yahoo mail and the type of the DNS query is MX.

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). Query this nameserver to find the authoritative name server for the "au." domain. Query this second server to find the authoritative nameserver for the "edu.au." domain. Now query this nameserver to find the authoritative nameserver for "unsw.edu.au". Next query the nameserver of unsw.edu.au to find the authoritative name server of cse.unsw.edu.au. 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?

Answer:

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

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

;; ANSWER SECTION:
.                       13511   IN      NS      m.root-servers.net.
.                       13511   IN      NS      a.root-servers.net.
.                       13511   IN      NS      c.root-servers.net.
.                       13511   IN      NS      d.root-servers.net.
.                       13511   IN      NS      k.root-servers.net.
.                       13511   IN      NS      j.root-servers.net.
.                       13511   IN      NS      b.root-servers.net.
.                       13511   IN      NS      f.root-servers.net.
.                       13511   IN      NS      h.root-servers.net.
.                       13511   IN      NS      i.root-servers.net.
.                       13511   IN      NS      e.root-servers.net.
.                       13511   IN      NS      l.root-servers.net.
.                       13511   IN      NS      g.root-servers.net.

;; ADDITIONAL SECTION:
a.root-servers.net.     260066  IN      A       198.41.0.4
a.root-servers.net.     323159  IN      AAAA    2001:503:ba3e::2:30
b.root-servers.net.     90073   IN      A       199.9.14.201
b.root-servers.net.     90073   IN      AAAA    2001:500:200::b
c.root-servers.net.     286564  IN      A       192.33.4.12
c.root-servers.net.     90073   IN      AAAA    2001:500:2::c
d.root-servers.net.     447930  IN      A       199.7.91.13
d.root-servers.net.     90072   IN      AAAA    2001:500:2d::d
e.root-servers.net.     73884   IN      A       192.203.230.10
e.root-servers.net.     486739  IN      AAAA    2001:500:a8::e
f.root-servers.net.     424022  IN      A       192.5.5.241
f.root-servers.net.     73884   IN      AAAA    2001:500:2f::f
g.root-servers.net.     504750  IN      A       192.112.36.4
g.root-servers.net.     511939  IN      AAAA    2001:500:12::d0d
h.root-servers.net.     507712  IN      A       198.97.190.53
h.root-servers.net.     73884   IN      AAAA    2001:500:1::53
i.root-servers.net.     424850  IN      A       192.36.148.17
i.root-servers.net.     342757  IN      AAAA    2001:7fe::53
j.root-servers.net.     368508  IN      A       192.58.128.30
j.root-servers.net.     73884   IN      AAAA    2001:503:c27::2:30
k.root-servers.net.     447923  IN      A       193.0.14.129
k.root-servers.net.     342757  IN      AAAA    2001:7fd::1
l.root-servers.net.     523611  IN      A       199.7.83.42
l.root-servers.net.     350672  IN      AAAA    2001:500:9f::42
m.root-servers.net.     447927  IN      A       202.12.27.33
m.root-servers.net.     90072   IN      AAAA    2001:dc3::35

;; Query time: 0 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Fri Oct 11 14:39:44 AEDT 2019
;; MSG SIZE  rcvd: 811
```

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

```
z5185842@vx3:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ dig @198.41.0.4 AU . NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @198.41.0.4 AU . NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 10172
;; 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:
;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      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 this second server to find the authoritative nameserver for the "edu.au." domain.

```
z5185842@vx3:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ dig @162.159.25.38 edu.au. NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @162.159.25.38 edu.au. NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 8515
;; 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:
;edu.au.                                IN      NS

;; AUTHORITY SECTION:
edu.au.                 86400   IN      NS      t.au.
edu.au.                 86400   IN      NS      r.au.
edu.au.                 86400   IN      NS      s.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: 2 msec
;; SERVER: 162.159.25.38#53(162.159.25.38)
;; WHEN: Fri Oct 11 14:44:07 AEDT 2019
;; MSG SIZE  rcvd: 275
```

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

```
z5185842@vx3:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ dig @65.22.196.1 unsw.edu.au. NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @65.22.196.1 unsw.edu.au. NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 43194
;; 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:
;unsw.edu.au.                   IN      NS

;; AUTHORITY SECTION:
unsw.edu.au.            900     IN      NS      ns2.unsw.edu.au.
unsw.edu.au.            900     IN      NS      ns1.unsw.edu.au.
unsw.edu.au.            900     IN      NS      ns3.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: Fri Oct 11 14:46:10 AEDT 2019
;; MSG SIZE  rcvd: 198
```

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

```
z5185842@vx3:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ dig @129.94.0.192 cse.unsw.edu.au. NS

; <<>> DiG 9.9.5-9+deb8u18-Debian <<>> @129.94.0.192 cse.unsw.edu.au. NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 40871
;; 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:
;cse.unsw.edu.au.               IN      NS

;; AUTHORITY SECTION:
cse.unsw.edu.au.        10800   IN      NS      beethoven.orchestra.cse.unsw.edu.au.
cse.unsw.edu.au.        10800   IN      NS      maestro.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: Fri Oct 11 15:13:06 AEDT 2019
;; MSG SIZE  rcvd: 164
```

Now query the nameserver of cse.unsw.edu.au to find the IP address of your host.

```
z5185842@vx3:/tmp_amd/reed/export/reed/2/z5185842/Desktop$ 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: 31517
;; 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: Fri Oct 11 14:49:57 AEDT 2019
;; MSG SIZE  rcvd: 155
```

How many DNS servers do you have to query to get the authoritative answer

Six DNS servers.

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

Answer:
Yes, each machine can have several interfaces. Each interface can have several IP addresses, moreover, with several names(alias) associate with each IP addresses.