

COMP3331 LAB03 REPORT

Exercise 3

```
uxterm
z5191546@vx2:/tmp_and/reed/export/reed/3/z5191546$ dig www.cecs.anu.edu.au

;<> DiG 9.9.5-9+deb8u17-Debian <> www.cecs.anu.edu.au
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 800
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 3, ADDITIONAL: 4

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

;; ANSWER SECTION:
www.cecs.anu.edu.au.      3037    IN      CNAME   rproxy.cecs.anu.edu.au.
rproxy.cecs.anu.edu.au.  2401    IN      A       150.203.161.98

;; AUTHORITY SECTION:
anu.edu.au.               367     IN      NS       ana.anu.edu.au.
anu.edu.au.               367     IN      NS       ns.adelaide.edu.au.
anu.edu.au.               367     IN      NS       ns1.anu.edu.au.

;; ADDITIONAL SECTION:
ns.adelaide.edu.au.       66793   IN      A        129.127.40.3
ns1.anu.edu.au.           49      IN      A        150.203.1.10
ana.anu.edu.au.           367     IN      A        150.203.22.28

;; Query time: 2 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Wed Jun 26 15:35:52 AEST 2019
;; MSG SIZE rcvd: 195

z5191546@vx2:/tmp_and/reed/export/reed/3/z5191546$
```

(output for Q1, Q2, Q3, Q4)

Q1: IP address is 150.203.161.98, with type A

Q2: CNAME: rproxy.cecs.anu.edu.au. The reason for having an alias for this server is that it can provide multiple network addresses on a single physical interface.

Q3: The authority section indicates that there are three servers that authority for answering DNS queries about the domain, and the additional section indicates that there are four IP addresses of DNS servers in the authority section.

Q4: 129.94.242.2

```
uxterm
; <> DiG 9.9.5-9+deb8u17-Debian <> cecs.anu.edu.au
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 17437
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 3, ADDITIONAL: 7

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

;; ANSWER SECTION:
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.  1428    IN      A        150.203.161.36
ns2.cecs.anu.edu.au.  788     IN      AAAA     2001:388:1034:2905::24
ns3.cecs.anu.edu.au.  2112    IN      A        150.203.161.50
ns3.cecs.anu.edu.au.  788     IN      AAAA     2001:388:1034:2905::32
ns4.cecs.anu.edu.au.  1171    IN      A        150.203.161.38
ns4.cecs.anu.edu.au.  1171    IN      AAAA     2001:388:1034:2905::26

;; Query time: 32 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Thu Jun 27 22:06:56 AEST 2019
;; MSG SIZE rcvd: 246

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$
```

(output for Q5)

Q5: The DNS nameservers for the “cecs.anu.edu.au” domain are

ns2.cecs.anu.edu.au (150.203.161.35)

ns3.cecs.anu.edu.au (150.203.161.50)

ns4.cecs.anu.edu.au (150.203.161.38)

The type is UDP.

```

uxterm
:: WHEN: Thu Jun 27 22:36:00 AEST 2019
:: MSG SIZE rcvd: 117

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ man dig
z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$
z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ dig -b 111.68.101.54
dig: isc_socket_bind: address not available
z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ dig -x 111.68.101.54

; <<> DiG 9.9.5-9+deb8u17-Debian <<> -x 111.68.101.54
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 59685
;; 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. 3600 IN PTR webserver.seecs.nust.edu.pk.

;; AUTHORITY SECTION:
101.68.111.in-addr.arpa. 58808 IN NS ns2.hec.gov.pk.
101.68.111.in-addr.arpa. 58808 IN NS ns1.hec.gov.pk.

;; Query time: 726 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Thu Jun 27 23:29:23 AEST 2019
;; MSG SIZE rcvd: 140

```

(output for Q6)

Q6: The DNS name is secns.nust.edu.pk, type is PTR.

```

uxterm
z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ dig @129.94.242.33 yahoo.com MX

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @129.94.242.33 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 42584
;; 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. 1800 IN MX 1 mta5.am0.yahoodns.net.
yahoo.com. 1800 IN MX 1 mta6.am0.yahoodns.net.
yahoo.com. 1800 IN MX 1 mta7.am0.yahoodns.net.

;; AUTHORITY SECTION:
yahoo.com. 113018 IN NS ns1.yahoo.com.
yahoo.com. 113018 IN NS ns5.yahoo.com.
yahoo.com. 113018 IN NS ns2.yahoo.com.
yahoo.com. 113018 IN NS ns4.yahoo.com.
yahoo.com. 113018 IN NS ns3.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com. 127664 IN A 68.180.131.16
ns1.yahoo.com. 46607 IN AAAA 2001:4998:130::1001
ns2.yahoo.com. 15469 IN A 68.142.255.16
ns2.yahoo.com. 51191 IN AAAA 2001:4998:140::1002
ns3.yahoo.com. 296232 IN A 203.84.221.53
ns3.yahoo.com. 62582 IN AAAA 2406:b600:b8:fe03::1003
ns4.yahoo.com. 46665 IN A 98.138.11.157
ns5.yahoo.com. 315061 IN A 119.160.253.83

;; Query time: 151 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Fri Jun 28 00:02:50 AEST 2019
;; MSG SIZE rcvd: 371

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$

```

(output for Q7)

Q7: I didn't get an authoritative answer because the flags for this query didn't contain 'AA'.

```

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ dig @ns2.cecs.anu.edu.au yahoo.com MX

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @ns2.cecs.anu.edu.au yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 17730
;; 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: 7 msec
;; SERVER: 150.203.161.36#53(150.203.161.36)
;; WHEN: Fri Jun 28 00:08:01 AEST 2019
;; MSG SIZE rcvd: 38

```

(output for Q8)

Q8: The result shows that is query has been refused.

```

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @ns2.yahoo.com yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 47722
;; 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 mta6.am0.yahoodns.net.
yahoo.com.                1800    IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.                1800    IN      MX      1 mta5.am0.yahoodns.net.

;; AUTHORITY SECTION:
yahoo.com.                172800  IN      NS      ns4.yahoo.com.
yahoo.com.                172800  IN      NS      ns1.yahoo.com.
yahoo.com.                172800  IN      NS      ns2.yahoo.com.
yahoo.com.                172800  IN      NS      ns5.yahoo.com.
yahoo.com.                172800  IN      NS      ns3.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.            1209600 IN      A       203.84.221.53
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.            86400   IN      AAAA    2406:8600:b8:fe03::1003

;; Query time: 150 msec
;; SERVER: 68.142.255.16#53(68.142.255.16)
;; WHEN: Fri Jun 28 00:16:08 AEST 2019
;; MSG SIZE rcvd: 371

z5191546@vx3:/tmp_amd/reed/export/reed/3/z5191546$

```

(output for Q9)

Q9: To obtain the authoritative answer, I send a MX type query.

Q10: STEP1: send query of type NS to the root domain.

```
; <<> DiG 9.9.5-9+deb8u17-Debian <<> . NS
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 62953
;; 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:
.                234621  IN      NS      b.root-servers.net.
.                234621  IN      NS      e.root-servers.net.
.                234621  IN      NS      i.root-servers.net.
.                234621  IN      NS      f.root-servers.net.
.                234621  IN      NS      k.root-servers.net.
.                234621  IN      NS      c.root-servers.net.
.                234621  IN      NS      a.root-servers.net.
.                234621  IN      NS      g.root-servers.net.
.                234621  IN      NS      l.root-servers.net.
.                234621  IN      NS      j.root-servers.net.
.                234621  IN      NS      d.root-servers.net.
.                234621  IN      NS      m.root-servers.net.
.                234621  IN      NS      h.root-servers.net.

;; ADDITIONAL SECTION:
a.root-servers.net. 299727 IN      A      198.41.0.4
a.root-servers.net. 444475 IN      AAAA   2001:503:ba3e::2:30
b.root-servers.net. 74700  IN      A      199.9.14.201
b.root-servers.net. 2370   IN      AAAA   2001:500:200::b
c.root-servers.net. 447006 IN      A      132.53.4.12
c.root-servers.net. 2370   IN      AAAA   2001:500:2::c
d.root-servers.net. 129572 IN      A      199.7.91.13
d.root-servers.net. 2365   IN      AAAA   2001:500:2d::d
e.root-servers.net. 2370   IN      A      192.203.230.10
e.root-servers.net. 202918 IN      AAAA   2001:500:a8::e
f.root-servers.net. 444533 IN      A      192.5.5.241
f.root-servers.net. 2370   IN      AAAA   2001:500:2f::f
g.root-servers.net. 1612   IN      A      132.112.36.4
g.root-servers.net. 2370   IN      AAAA   2001:500:12::d0d
h.root-servers.net. 339092 IN      A      198.97.190.53
h.root-servers.net. 2365   IN      AAAA   2001:500:11::53
i.root-servers.net. 97076  IN      A      192.36.148.17
i.root-servers.net. 73614  IN      AAAA   2001:7fe::53
j.root-servers.net. 514525 IN      A      192.58.128.30
j.root-servers.net. 2365   IN      AAAA   2001:503:c27::2:30
k.root-servers.net. 2365   IN      A      193.0.14.129
k.root-servers.net. 1891   IN      AAAA   2001:7fd::1
l.root-servers.net. 451250 IN      A      199.7.83.42
l.root-servers.net. 563416 IN      AAAA   2001:500:9f::42
m.root-servers.net. 526152 IN      A      202.12.27.33
m.root-servers.net. 563416 IN      AAAA   2001:dc3::35

;; Query time: 1 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Fri Jun 28 13:30:05 AEST 2019
;; MSG SIZE rcvd: 811
```

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546\$



STEP2: I choose to dig the first IP address, which is 198.41.0.4

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546\$ dig @198.41.0.4 lyre00.cse.unsw.edu.au

```
; <<> DiG 9.9.5-9+deb8u17-Debian <<> @198.41.0.4 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 19185
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 10, ADDITIONAL: 20
;; 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      b.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
b.au.              172800  IN      A      58.65.253.73
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
b.au.              172800  IN      AAAA   2407:6e00:253:306::73
c.au.              172800  IN      AAAA   2400:cb00:2049:11::a29f:18b3
d.au.              172800  IN      AAAA   2400:cb00:2049:11::a29f:1926
q.au.              172800  IN      AAAA   2a01:8840:b6::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: 159 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Fri Jun 28 13:39:13 AEST 2019
;; MSG SIZE rcvd: 623
```

STEP3: I choose IP address 58.65.254.73, now we get the edu.au.

```
; <<> DiG 9.9.5-9+deb8u17-Debian <<> 058.65.254.73 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 53841
;; 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      A

;; AUTHORITY SECTION:
edu.au.                7200    IN      NS      s.au.
edu.au.                7200    IN      NS      q.au.
edu.au.                7200    IN      NS      r.au.
edu.au.                7200    IN      NS      t.au.

;; ADDITIONAL SECTION:
q.au.                  7200    IN      A        65.22.196.1
r.au.                  7200    IN      A        65.22.197.1
s.au.                  7200    IN      A        65.22.198.1
t.au.                  7200    IN      A        65.22.199.1
q.au.                  7200    IN      AAAA     2a01:8840:be::1
r.au.                  7200    IN      AAAA     2a01:8840:bf::1
s.au.                  7200    IN      AAAA     2a01:8840:c0::1
t.au.                  7200    IN      AAAA     2a01:8840:c1::1

;; Query time: 154 msec
;; SERVER: 58.65.254.73#53(58.65.254.73)
;; WHEN: Fri Jun 28 13:42:07 AEST 2019
;; MSG SIZE rcvd: 291

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ █
```

STEP4: I choose the IP address 65.22.196.1, getting the unsw.edu.au.

```
z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ dig 065.22.196.1 lyre00.cse.unsw.edu.au

; <<> DiG 9.9.5-9+deb8u17-Debian <<> 065.22.196.1 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 40203
;; 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: 7 msec
;; SERVER: 65.22.196.1#53(65.22.196.1)
;; WHEN: Fri Jun 28 13:46:20 AEST 2019
;; MSG SIZE rcvd: 209
```

STEP5: I choose the IP address 129.94.0.192

```
z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ dig @129.94.0.192 lyre00.cse.unsw.edu.au

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @129.94.0.192 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 27122
;; 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      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        129.94.172.11
beethoven,orchestra.cse.unsw.edu.au. 10800   IN      A        129.94.208.3
beethoven,orchestra.cse.unsw.edu.au. 10800   IN      A        129.94.242.2
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: Fri Jun 28 13:48:22 AEST 2019
;; MSG SIZE rcvd: 171
```

STEP6: I choose the IP address 129.94.172.11

```
z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ dig @129.94.172.11 lyre00.cse.unsw.edu.au
; <<> DiG 9.9.5-9+deb8u17-Debian <<> @129.94.172.11 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 5605
;; 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: 129.94.172.11#53(129.94.172.11)
;; WHEN: Fri Jun 28 13:50:31 AEST 2019
;; MSG SIZE rcvd: 155

z5191546@vx3:/tmp_and/reed/export/reed/3/z5191546$ █
```

Now I find the IP address of my host by querying six DNS servers.

Q11: Yes, it can have several names and IP addresses associated with it. A physical machine can have several routes to access internet, which will have many IP addresses, and each IP address can have different names, which is 'alias'.