Lab Exercise 3: DNS & Socket Programming

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

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

IP address: 23.185.0.1

DNS query: Type A

```
wagner % dig www.eecs.berkeley.edu

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> www.eecs.berkeley.edu
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 1143
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 4, ADDITIONAL: 5

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;www.eecs.berkeley.edu.         IN      A

;; ANSWER SECTION:
www.eecs.berkeley.edu.  69227   IN      CNAME   live-eecs.pantheonsite.io.
live-eecs.pantheonsite.io. 151  IN      CNAME   fe1.edge.pantheon.io.
fe1.edge.pantheon.io.   212     IN      A       23.185.0.1

;; AUTHORITY SECTION:
edge.pantheon.io.       212     IN      NS      ns-644.awsdns-16.net.
edge.pantheon.io.       212     IN      NS      ns-2013.awsdns-59.co.uk.
edge.pantheon.io.       212     IN      NS      ns-1213.awsdns-23.org.
edge.pantheon.io.       212     IN      NS      ns-233.awsdns-29.com.

;; ADDITIONAL SECTION:
ns-233.awsdns-29.com.   53270   IN      A       205.251.192.233
ns-644.awsdns-16.net.   1566    IN      A       205.251.194.132
ns-1213.awsdns-23.org.  144415  IN      A       205.251.196.189
ns-2013.awsdns-59.co.uk. 23358  IN      A       205.251.199.221

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Mon Mar 14 17:21:00 AEDT 2022
;; MSG SIZE  rcvd: 341
```

Question 2. What is the canonical name for the eecs.berkeley webserver? Suggest a reason for having an alias for this server.

live-eecs.pantheonsite.io.

fe1.edge.pantheon.io.

Because the canonical name is difficult to remember and spell. Alias is normally included the familiar name which is easier to remember and access.

Question 3. What can you make of the rest of the response?

The Authority section is included four authoritative name servers. (edge.panthoen.io.)

The Additional section is included the IP address of the four authoritative name servers.

(ns-233.awsdns-29.com. 205.251.192.233)

(ns-644.awsdns-16.net. 205.251.194.132)

(ns-1213.awsdns-23.org. 205.251.196.189)

(ns-2013.awsdns-59.co.uk. 205.251.199.221)

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

129.94.242.2

Question 5. What are the DNS nameservers for the “eecs.berkeley.edu.” domain? Find out their IP addresses? What type of DNS query is sent to obtain this information?

ns.CS.berkeley.edu. A 169.229.60.61

ns.CS.berkeley.edu. AAAA 2607:f140:8:1260::30

ns.eecs.berkeley.edu. A 169.229.60.153

ns.eecs.berkeley.edu. AAAA 2607:f140:8:2160::30

adns1.berkeley.edu. A 128.32.136.3

adns2.berkeley.edu. A 128.32.136.14

adns3.berkeley.edu. A 192.107.102.142

adns3.berkeley.edu. AAAA 2607:f140:a000:d::abc

DNS query: Type NS

```
wagner % dig eecs.berkeley.edu NS

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> eecs.berkeley.edu NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 46351
;; flags: qr rd ra; QUERY: 1, ANSWER: 5, AUTHORITY: 0, ADDITIONAL: 9

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

;; ANSWER SECTION:
eecs.berkeley.edu.      920     IN      NS      adns2.berkeley.edu.
eecs.berkeley.edu.      920     IN      NS      adns1.berkeley.edu.
eecs.berkeley.edu.      920     IN      NS      ns.CS.berkeley.edu.
eecs.berkeley.edu.      920     IN      NS      adns3.berkeley.edu.
eecs.berkeley.edu.      920     IN      NS      ns.eecs.berkeley.edu.

;; ADDITIONAL SECTION:
ns.CS.berkeley.edu.     6408    IN      A       169.229.60.61
ns.CS.berkeley.edu.     68918   IN      AAAA    2607:f140:8:1260::30
ns.eecs.berkeley.edu.   7454    IN      A       169.229.60.153
ns.eecs.berkeley.edu.   7454    IN      AAAA    2607:f140:8:2160::30
adns1.berkeley.edu.     2143    IN      A       128.32.136.3
adns2.berkeley.edu.     635     IN      A       128.32.136.14
adns3.berkeley.edu.     635     IN      A       192.107.102.142
adns3.berkeley.edu.     635     IN      AAAA    2607:f140:a000:d::abc

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Mon Mar 14 18:13:47 AEDT 2022
;; MSG SIZE  rcvd: 307
```

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?

DNS name: webserver.seecs.nust.edu.pk.

DNS query: PTR

```
wagner % dig -x 111.68.101.54

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> -x 111.68.101.54
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51396
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3

;; 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. 2900   IN      NS      ns2.hec.gov.pk.
101.68.111.in-addr.arpa. 2900   IN      NS      ns1.hec.gov.pk.

;; ADDITIONAL SECTION:
ns1.hec.gov.pk.         2488    IN      A       103.4.93.5
ns2.hec.gov.pk.         3313    IN      A       103.4.93.6

;; Query time: 174 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Mon Mar 14 18:28:50 AEDT 2022
;; MSG SIZE  rcvd: 172
```

Question 7. Run dig and query the CSE nameserver (129.94.242.33) for the mail servers for Yahoo! Mail. Did you get an authoritative answer? Why?

;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 8

No, if it is aa then it is Authoritative answer and the flag is not included aa flag.

```
wagner % dig @129.94.242.33 yahoo.com MX

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @129.94.242.33 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 3060
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 8

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

;; ANSWER SECTION:
yahoo.com.              225     IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.              225     IN      MX      1 mta6.am0.yahoodns.net.
yahoo.com.              225     IN      MX      1 mta5.am0.yahoodns.net.

;; AUTHORITY SECTION:
yahoo.com.              171357  IN      NS      ns4.yahoo.com.
yahoo.com.              171357  IN      NS      ns3.yahoo.com.
yahoo.com.              171357  IN      NS      ns1.yahoo.com.
yahoo.com.              171357  IN      NS      ns2.yahoo.com.
yahoo.com.              171357  IN      NS      ns5.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com.          246576  IN      A       68.180.131.16
ns1.yahoo.com.          62774   IN      AAAA    2001:4998:1b0::7961:686f:6f21
ns2.yahoo.com.          71552   IN      A       68.142.255.16
ns2.yahoo.com.          71707   IN      AAAA    2001:4998:1c0::7961:686f:6f21
ns4.yahoo.com.          65765   IN      A       98.138.11.157
ns5.yahoo.com.          1740    IN      A       202.165.97.53
ns5.yahoo.com.          39072   IN      AAAA    2406:2000:1d0::7961:686f:6f21

;; Query time: 0 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Mon Mar 14 18:56:27 AEDT 2022
;; MSG SIZE  rcvd: 355
```

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

;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1

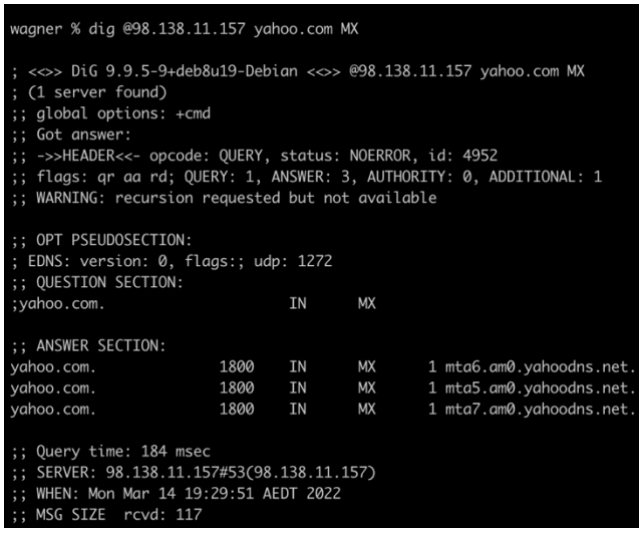
No, if it is aa then it is Authoritative answer, the flag is not included aa flag.

```
wagner % dig @ns.eecs.berkeley.edu yahoo.com MX

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @ns.eecs.berkeley.edu yahoo.com MX
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 21159
;; 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: 166 msec
;; SERVER: 169.229.60.153#53(169.229.60.153)
;; WHEN: Mon Mar 14 19:20:23 AEDT 2022
;; MSG SIZE  rcvd: 38
```

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

98.138.11.157 is IP address of ns4.yahoo.com.

DNS query: Type MX



```
wagner % dig @98.138.11.157 yahoo.com MX

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @98.138.11.157 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 4952
;; flags: qr aa rd; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1
;; 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 mta5.am0.yahoodns.net.
yahoo.com.              1800    IN      MX      1 mta7.am0.yahoodns.net.

;; Query time: 184 msec
;; SERVER: 98.138.11.157#53(98.138.11.157)
;; WHEN: Mon Mar 14 19:29:51 AEDT 2022
;; MSG SIZE  rcvd: 117
```

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). If you are using VLAB Then find the IP address of one of the following: lyre00.cse.unsw.edu.au, lyre01.cse.unsw.edu.au, drum00.cse.unsw.edu.au or drum01.cse.unsw.edu.au. First, find the name server (query type NS) of the "." domain (root domain).

```
wagner % dig . NS

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> . NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 14030
;; 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:
.                       136341  IN      NS      d.root-servers.net.
.                       136341  IN      NS      e.root-servers.net.
.                       136341  IN      NS      i.root-servers.net.
.                       136341  IN      NS      g.root-servers.net.
.                       136341  IN      NS      k.root-servers.net.
.                       136341  IN      NS      h.root-servers.net.
.                       136341  IN      NS      f.root-servers.net.
.                       136341  IN      NS      j.root-servers.net.
.                       136341  IN      NS      c.root-servers.net.
.                       136341  IN      NS      m.root-servers.net.
.                       136341  IN      NS      a.root-servers.net.
.                       136341  IN      NS      l.root-servers.net.
.                       136341  IN      NS      b.root-servers.net.

;; ADDITIONAL SECTION:
a.root-servers.net.     58431   IN      A       198.41.0.4
a.root-servers.net.     333437  IN      AAAA    2001:503:ba3e::2:30
b.root-servers.net.     14643   IN      A       199.9.14.201
b.root-servers.net.     57863   IN      AAAA    2001:500:200::b
c.root-servers.net.     57863   IN      A       192.33.4.12
c.root-servers.net.     423451  IN      AAAA    2001:500:2::c
d.root-servers.net.     467656  IN      A       199.7.91.13
d.root-servers.net.     439973  IN      AAAA    2001:500:2d::d
e.root-servers.net.     114622  IN      A       192.203.230.10
e.root-servers.net.     136974  IN      AAAA    2001:500:a8::e
f.root-servers.net.     497239  IN      A       192.5.5.241
f.root-servers.net.     269433  IN      AAAA    2001:500:2f::f
g.root-servers.net.     599931  IN      A       192.112.36.4
g.root-servers.net.     225054  IN      AAAA    2001:500:12::d0d
h.root-servers.net.     60666   IN      A       198.97.190.53
h.root-servers.net.     154584  IN      AAAA    2001:500:1::53
i.root-servers.net.     57863   IN      A       192.36.148.17
i.root-servers.net.     269800  IN      AAAA    2001:7fe::53
j.root-servers.net.     60666   IN      A       192.58.128.30
j.root-servers.net.     62147   IN      AAAA    2001:503:c27::2:30
k.root-servers.net.     57863   IN      A       193.0.14.129
k.root-servers.net.     252364  IN      AAAA    2001:7fd::1
l.root-servers.net.     489938  IN      A       199.7.83.42
l.root-servers.net.     265698  IN      AAAA    2001:500:9f::42
m.root-servers.net.     306337  IN      A       202.12.27.33
m.root-servers.net.     232028  IN      AAAA    2001:dc3::35

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Mon Mar 14 19:55:29 AEDT 2022
;; MSG SIZE  rcvd: 811
```

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

```
wagner % dig @a.root-servers.net. au. NS

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @a.root-servers.net. au. NS
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 47800
;; 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:
;au.                            IN      NS

;; AUTHORITY SECTION:
au.                     172800  IN      NS      q.au.
au.                     172800  IN      NS      t.au.
au.                     172800  IN      NS      s.au.
au.                     172800  IN      NS      r.au.

;; ADDITIONAL SECTION:
q.au.                   172800  IN      A       65.22.196.1
q.au.                   172800  IN      AAAA    2a01:8840:be::1
t.au.                   172800  IN      A       65.22.199.1
t.au.                   172800  IN      AAAA    2a01:8840:c1::1
s.au.                   172800  IN      A       65.22.198.1
s.au.                   172800  IN      AAAA    2a01:8840:c0::1
r.au.                   172800  IN      A       65.22.197.1
r.au.                   172800  IN      AAAA    2a01:8840:bf::1

;; Query time: 140 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Mon Mar 14 20:04:25 AEDT 2022
;; MSG SIZE  rcvd: 271
```

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

```
weber % dig @q.au. edu.au. NS

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @q.au. edu.au. NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 8564
;; flags: qr aa rd; QUERY: 1, ANSWER: 4, AUTHORITY: 0, ADDITIONAL: 1
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
;; QUESTION SECTION:
;edu.au.                                IN      NS

;; ANSWER SECTION:
edu.au.                 900     IN      NS      r.au.
edu.au.                 900     IN      NS      s.au.
edu.au.                 900     IN      NS      q.au.
edu.au.                 900     IN      NS      t.au.

;; Query time: 24 msec
;; SERVER: 65.22.196.1#53(65.22.196.1)
;; WHEN: Mon Mar 14 22:15:40 AEDT 2022
;; MSG SIZE  rcvd: 99
```

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

```
weber % dig @r.au. unsw.edu.au. NS

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @r.au. unsw.edu.au. NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 20141
;; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 3, ADDITIONAL: 6
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
;; 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      ns3.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: 24 msec
;; SERVER: 65.22.197.1#53(65.22.197.1)
;; WHEN: Mon Mar 14 22:17:13 AEDT 2022
;; MSG SIZE  rcvd: 198
```

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

```
weber % dig @ns2.unsw.edu.au. cse.unsw.edu.au. NS

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @ns2.unsw.edu.au. cse.unsw.edu.au. NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 42920
;; 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.        300     IN      NS      beethoven.orchestra.cse.unsw.edu.au.
cse.unsw.edu.au.        300     IN      NS      maestro.orchestra.cse.unsw.edu.au.

;; ADDITIONAL SECTION:
beethoven.orchestra.cse.unsw.edu.au. 300 IN A   129.94.242.2
beethoven.orchestra.cse.unsw.edu.au. 300 IN A   129.94.172.11
beethoven.orchestra.cse.unsw.edu.au. 300 IN A   129.94.208.3
maestro.orchestra.cse.unsw.edu.au. 300 IN A     129.94.242.33

;; Query time: 3 msec
;; SERVER: 129.94.0.193#53(129.94.0.193)
;; WHEN: Mon Mar 14 22:18:58 AEDT 2022
;; MSG SIZE  rcvd: 164
```

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

```
weber % hostname -f
weber.orchestra.cse.unsw.EDU.AU
weber % dig @beethoven.orchestra.cse.unsw.edu.au. weber.orchestra.cse.unsw.EDU.AU A

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @beethoven.orchestra.cse.unsw.edu.au. weber.orchestra.cse.unsw.EDU.AU A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 25098
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;weber.orchestra.cse.unsw.EDU.AU. IN    A

;; ANSWER SECTION:
weber.orchestra.cse.unsw.EDU.AU. 3600 IN A      129.94.242.53

;; AUTHORITY SECTION:
orchestra.cse.unsw.EDU.AU. 3600 IN      NS      beethoven.orchestra.cse.unsw.EDU.AU.
orchestra.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: Mon Mar 14 22:21:43 AEDT 2022
;; MSG SIZE  rcvd: 154
```

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

```
weber % dig @beethoven.orchestra.cse.unsw.EDU.AU. lyre00.cse.unsw.edu.au A

; <<>> DiG 9.9.5-9+deb8u19-Debian <<>> @beethoven.orchestra.cse.unsw.EDU.AU. lyre00.cse.unsw.edu.au A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 47514
;; 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: Mon Mar 14 22:27:23 AEDT 2022
;; MSG SIZE  rcvd: 177
```

Through root NS, .au, .edu.au, .unsw.edu.au, .cse.unsw.edu.au. Total DNS server is 5.

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

Yes. A physical machine can have multiple names and associated IP addresses.