

LAB 3

Exercise 1: Explore DNS records:

DNS servers use different record types for different purposes. For each type of DNS record, there is an associated type of DNS query.

- A: (Host Address) – Most basic and commonly used DNS record type. Used to translate domain names (www.example.com) into IP addresses(23.123.123.24).
- CNAME: (Canonical name for an alias) – These are domain name aliases. If a computer performs multiple roles (web server, chat server, etc.), then it may need an alias name. So, "www.xyz.com" = "computer1.xyz.com".

This is also the case when a single server hosts many different domain names.

Usually done by creating an A-record for the short name and a CNAME-record for the www name pointing to the short name. C-NAME record always points to A record and never to itself to avoid circular references.

- MX: (Mail Exchange) – Used to specify the e-mail servers responsible for a domain name. It must always point directly to the mail server, not the IP address of the mail server.
- NS: (Authoritative Name Sever) – Are responsible for identifying the DNS servers responsible for an authoritative server.
- PTR: (Pointer) – Reverse records – Used to map IP Addresses to A-recotd0073
- SOA (Start of authority) – Zone contains one start of authority-record which holds the following details:
 - Name of primary DNS server – Host name of primary DNS server for the zone
 - Email-address of responsible person
 - Serial number – Used by secondary DNS servers to see if the zone has changed. If serial number is higher than secondary zone, then a zone transfer will be initiated
 - Refresh Interval – How often secondary DNS servers should check if changes are made to the zone
 - Retry interval – How often secondary DNS servers should retry checking If changes are made
 - Expire interval – How long the zone will be valid after a refresh
 - Minimum(default) TTL – Used by DNS servers to cache negative responses.

Question 3: What is the IP address of www.cecs.anu.edu.au . What type of DNS query is sent to get this answer?

```
uxterm
z5161678@vx3:/tmp_amd/glass/export/glass/3/z5161678/Desktop$ dig www.cecs.anu.edu.au

; <<> DiG 9.7.3 <<> www.cecs.anu.edu.au
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 10551
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 3, ADDITIONAL: 6

;; QUESTION SECTION:
;www.cecs.anu.edu.au.      IN      A

;; ANSWER SECTION:
www.cecs.anu.edu.au.     658     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.        868     IN      NS      ns4.cecs.anu.edu.au.
cecs.anu.edu.au.        868     IN      NS      ns3.cecs.anu.edu.au.
cecs.anu.edu.au.        868     IN      NS      ns2.cecs.anu.edu.au.

;; ADDITIONAL SECTION:
ns2.cecs.anu.edu.au.    869     IN      A       150.203.161.36
ns2.cecs.anu.edu.au.    868     IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.    883     IN      A       150.203.161.50
ns3.cecs.anu.edu.au.    883     IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.    883     IN      A       150.203.161.38
ns4.cecs.anu.edu.au.    868     IN      AAAA    2001:388:1034:2905::26

;; Query time: 14 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Sun Mar 17 14:48:01 2019
;; MSG SIZE rcvd: 260
```

Its IP address is 150.203.161.98. This was discovered using an A(Internet Address) query.

What is the canonical name for the CECS ANU web server? What is its IP address? Suggest a reason for having an alias for this server.

The canonical name (CNAME) for the CECS ANU web server is rproxy.cecs.anu.edu.au. Its IP address is 150.203.161.98 (the same as for the alias).

The reason for an alias is because canonical names are usually very hard to remember and having an alias is more mnemonic and easier to remember. It is also extremely useful when running multiple services (email/web server) from a single IP address.

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

Authority: Contains NS resource records for the 'cecs.anu.edu.au' domain name. This includes 3 authoritative name servers for this domain name, which are ns2.cecs.anu.edu.au, ns23.cecs.anu.edu.au, ns4.cecs.anu.edu.au.

Additional: Contains the IP addresses for the four authoritative name servers. These include IPv4 addresses (in the type A resource records) and IPv6 records (in the type AAAA resource records)

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

The IP address for the local machine is given at the bottom of the dig command. It is 129.94.242.45.

The output is in the format 'SERVER: 129.94.242.45#53(129.94.242.45)'

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?

The IP addresses are:

- ns2.cecs.anu.edu.au : 150.203.161.36
- ns2.cecs.anu.edu.au : 150.203.161.50
- ns2.cecs.anu.edu.au : 150.203.161.38

These were obtained with the NS query.

Question 6. What is the DNS name associated with the IP address 149.171.158.109? What type of DNS query is sent to obtain this information?

The DNS name associated with the IP address is engplws.eng.unsw.edu.au. The PTR (Pointer to Canonical Name) query was used to obtain this information.

```
uxterm
z5161678@vx3:/tmp_and/glass/export/glass/3/z5161678/Desktop$ dig -x 149.171.158.109

: <<>> DiG 9.7.3 <<>> -x 149.171.158.109
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 28715
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 3, ADDITIONAL: 4

;; QUESTION SECTION:
;109.158.171.149.in-addr.arpa. IN PTR

;; ANSWER SECTION:
109.158.171.149.in-addr.arpa. 2656 IN PTR engplws008.eng.unsw.edu.au.
109.158.171.149.in-addr.arpa. 2656 IN PTR engplws008.ad.unsw.edu.au.

;; AUTHORITY SECTION:
158.171.149.in-addr.arpa. 365 IN NS ns1.unsw.edu.au.
158.171.149.in-addr.arpa. 365 IN NS ns2.unsw.edu.au.
158.171.149.in-addr.arpa. 365 IN NS ns3.unsw.edu.au.

;; ADDITIONAL SECTION:
ns1.unsw.edu.au. 7404 IN A 129.94.0.192
ns2.unsw.edu.au. 7404 IN A 129.94.0.193
ns3.unsw.edu.au. 7404 IN A 192.155.82.178
ns3.unsw.edu.au. 8955 IN AAAA 2600:3c01::f03c:91ff:fe73:5f10

;; Query time: 0 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Sun Mar 17 14:47:17 2019
;; MSG SIZE rcvd: 244

z5161678@vx3:/tmp_and/glass/export/glass/3/z5161678/Desktop$
```

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)

```

uxterm
z5161678@vx3:/tmp_and/glass/export/glass/3/z5161678/Desktop$ dig @129.94.242.33 yahoo.com MX

; <<> DiG 9.7.3 <<> @129.94.242.33 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 21288
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 7

;; QUESTION SECTION:
yahoo.com.                IN      MX

;; ANSWER SECTION:
yahoo.com.                978     IN      MX      1 mta6.am0.yahoodns.net.
yahoo.com.                978     IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.                978     IN      MX      1 mta5.am0.yahoodns.net.

;; AUTHORITY SECTION:
yahoo.com.                17881   IN      NS      ns1.yahoo.com.
yahoo.com.                17881   IN      NS      ns3.yahoo.com.
yahoo.com.                17881   IN      NS      ns2.yahoo.com.
yahoo.com.                17881   IN      NS      ns5.yahoo.com.
yahoo.com.                17881   IN      NS      ns4.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com.            189568  IN      A       68.180.131.16
ns2.yahoo.com.            199457  IN      A       68.142.255.16
ns2.yahoo.com.            60      IN      AAAA    2001:4998:140::1002
ns3.yahoo.com.            83861   IN      A       203.84.221.53
ns3.yahoo.com.            4635    IN      AAAA    2406:8600:b8:fe03::1003
ns4.yahoo.com.            28069   IN      A       98.138.11.157
ns5.yahoo.com.            92384   IN      A       119.160.253.83

;; Query time: 2 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Sun Mar 17 14:53:50 2019
;; MSG SIZE rcvd: 332

```

The server we queried can't give us an authoritative answer since the flags do not contain an aa. They do not have the authority for the Yahoo! Domain.

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

When we try the same query with the ANU server, we get a 'refused' reply from the server. This could be because the servers do not allow devices not part of the ANU network too send DNS queries (as part of a security measure).

```
uxterm
z5161678@vx3:/tmp_amd/glass/export/glass/3/z5161678/Desktop$ dig @ns2.anu.edu.au yahoo.com MX

; <<>> DiG 9.7.3 <<>> @ns2.anu.edu.au yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 48024
;; flags: qr rd: QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 0
;; WARNING: recursion requested but not available

;; QUESTION SECTION:
;yahoo.com.                IN      MX

;; Query time: 7 msec
;; SERVER: 150.203.22.28#53(150.203.22.28)
;; WHEN: Sun Mar 17 14:59:14 2019
;; MSG SIZE rcvd: 27

z5161678@vx3:/tmp_amd/glass/export/glass/3/z5161678/Desktop$ █
```

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

The query was done using one of the listed in (Question (7)).



```
z5161678@vx3:/tmp_and/glass/export/glass/3/z5161678/Desktop$ dig @ns2.yahoo.com yahoo.com MX
```

```
; <<> DiG 9.7.3 <<> @ns2.yahoo.com yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 44557
;; flags: qr aa rd; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 8
;; WARNING: recursion requested but not available

;; 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      ns5.yahoo.com.
yahoo.com.                 172800  IN      NS      ns4.yahoo.com.
yahoo.com.                 172800  IN      NS      ns3.yahoo.com.
yahoo.com.                 172800  IN      NS      ns1.yahoo.com.
yahoo.com.                 172800  IN      NS      ns2.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: 149 msec
;; SERVER: 68.142.255.16#53(68.142.255.16)
;; WHEN: Sun Mar 17 15:10:28 2019
;; MSG SIZE rcvd: 360
```

A MX(Email server host names) query was used to obtain the authoritative answer for the mail servers for Yahoo! Mail. These are:

- [mta7.am0.yahoodns.net](#)
- [mta6.am0.yahoodns.net](#)
- [mta5.am0.yahoodns.net](#)

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?

First: Query the root serve. Output:

```

: <<>> DiG 9.7.3 <<>> . NS
:; global options: +cmd
:; Got answer:
:; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 60410
:; flags: qr rd ra; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 13

:; QUESTION SECTION:
:;                          IN      NS

:; ANSWER SECTION:
:;      494611 IN      NS      c.root-servers.net.
:;      494611 IN      NS      b.root-servers.net.
:;      494611 IN      NS      m.root-servers.net.
:;      494611 IN      NS      j.root-servers.net.
:;      494611 IN      NS      e.root-servers.net.
:;      494611 IN      NS      i.root-servers.net.
:;      494611 IN      NS      f.root-servers.net.
:;      494611 IN      NS      h.root-servers.net.
:;      494611 IN      NS      d.root-servers.net.
:;      494611 IN      NS      a.root-servers.net.
:;      494611 IN      NS      k.root-servers.net.
:;      494611 IN      NS      g.root-servers.net.
:;      494611 IN      NS      l.root-servers.net.

:; ADDITIONAL SECTION:
a.root-servers.net. 67837 IN      A      198.41.0.4
a.root-servers.net. 83143 IN      AAAA   2001:503:ba3e::2:30
o.root-servers.net. 94980 IN      A      199.9.14.201
o.root-servers.net. 94981 IN      AAAA   2001:500:200::b
o.root-servers.net. 201046 IN     A      192.33.4.12
o.root-servers.net. 94620 IN      AAAA   2001:500:2::c
f.root-servers.net. 78449 IN      A      199.7.91.13
f.root-servers.net. 343403 IN     AAAA   2001:500:2d::d
e.root-servers.net. 245947 IN     A      192.203.230.10
e.root-servers.net. 94691 IN      AAAA   2001:500:a8::e
i.root-servers.net. 275242 IN     A      192.5.5.241
i.root-servers.net. 438003 IN     AAAA   2001:500:2f::f
j.root-servers.net. 94140 IN      A      192.112.36.4

:; Query time: 0 msec
:; SERVER: 129.94.242.45#53(129.94.242.45)
:; WHEN: Sun Mar 17 15:23:20 2019
:; MSG SIZE  rcvd= 508

```

Then query one of the name servers (198.41.0.4):


```
; <<> DiG 9.7.3 <<> @198.41.0.4 lyre.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 43384
;; flags: qr rd: QUERY: 1, ANSWER: 0, AUTHORITY: 10, ADDITIONAL: 15
;; WARNING: recursion requested but not available

;; QUESTION SECTION:
lyre.cse.unsw.edu.au.      IN      NS

;; AUTHORITY SECTION:
au.      172800 IN      NS      d.au.
au.      172800 IN      NS      v.au.
au.      172800 IN      NS      u.au.
au.      172800 IN      NS      q.au.
au.      172800 IN      NS      t.au.
au.      172800 IN      NS      s.au.
au.      172800 IN      NS      r.au.
au.      172800 IN      NS      b.au.
au.      172800 IN      NS      a.au.
au.      172800 IN      NS      c.au.

;; ADDITIONAL SECTION:
d.au.      172800 IN      A      162.159.25.38
d.au.      172800 IN      AAAA   2400:cb00:2049:1::a29f:1926
v.au.      172800 IN      A      202.12.31.53
v.au.      172800 IN      AAAA   2001:dd8:12::53
u.au.      172800 IN      A      211.29.133.32
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
b.au.      172800 IN      A      58.65.253.73
a.au.      172800 IN      A      58.65.254.73

;; Query time: 160 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Sun Mar 17 15:32:24 2019
;; MSG SIZE rcvd: 510
```

Then, query one of the .au servers:

```
z5161678@vx3:/tmp_and/glass/export/glass/3/z5161678/Desktop$ dig @162.159.25.38 lyre00.cse.unsw.edu.au
```

```
; <<> DiG 9.7.3 <<> @162.159.25.38 lyre00.cse.unsw.edu.au
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 35159
;; flags: qr rd: QUERY: 1, ANSWER: 0, AUTHORITY: 4, ADDITIONAL: 8
;; WARNING: recursion requested but not available

;; QUESTION SECTION:
lyre00.cse.unsw.edu.au.      IN      A

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

;; ADDITIONAL SECTION:
q.au.      86400 IN      A      65.22.196.1
v.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
v.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: 162.159.25.38#53(162.159.25.38)
;; WHEN: Sun Mar 17 15:35:36 2019
;; MSG SIZE rcvd: 280
```

And another one:

```
:5161678@vx3:/tmp_amd/glass/export/glass/3/z5161678/Desktop$ dig @65.22.196.1 lyre00.cse.unsw.edu.au

;<<> DiG 9.7.3 <<> @65.22.196.1 lyre00.cse.unsw.edu.au
; (1 server found)
; global options: +cmd
; Got answer:
; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 41457
; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 3, ADDITIONAL: 5
; WARNING: recursion requested but not available

;; QUESTION SECTION:
;lyre00.cse.unsw.edu.au.          IN      A

;; AUTHORITY SECTION:
nsw.edu.au.      900      IN      NS      ns3.unsw.edu.au.
nsw.edu.au.      900      IN      NS      ns2.unsw.edu.au.
nsw.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: Sun Mar 17 15:36:00 2019
;; MSG SIZE rcvd: 198
```

Then query one of the nsw servers:

```
:5161678@vx3:/tmp_amd/glass/export/glass/3/z5161678/Desktop$ dig @129.94.0.192 lyre00.cse.unsw.edu.au NS

;<<> DiG 9.7.3 <<> @129.94.0.192 lyre00.cse.unsw.edu.au NS
; (1 server found)
; global options: +cmd
; Got answer:
; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 50712
; flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 2, ADDITIONAL: 4
; WARNING: recursion requested but not available

; QUESTION SECTION:
;lyre00.cse.unsw.edu.au.          IN      NS

; AUTHORITY SECTION:
se.unsw.edu.au. 10800    IN      NS      maestro.orchestra.cse.unsw.edu.au.
se.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: Sun Mar 17 15:37:49 2019
; MSG SIZE rcvd: 160
```

Then query the cse servers with the A query:

```

z5161678@vx3:/tmp_and/glass/export/glass/3/z5161678/Desktop$ dig @129.94.242.2 lyre00.cse.unsw.edu.au A
; <<> DiG 9.7.3 <<> @129.94.242.2 lyre00.cse.unsw.edu.au A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 17321
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 2

;; 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: 1 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Sun Mar 17 15:39:06 2019
;; MSG SIZE rcvd: 144

```

This returns lyre00.cse.unsw.edu.au as the answer. The IP address is 129.94.210.20. Following the root nameserver, we had to query 5 DNS servers (a.root-servers.net, d.au, q.au, ns3.unsw.edu.au, maestro.orchestra.unsw.edu.au).

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

Yes, a machine can have several names/IP addresses associated with it. For example, in Question (1), the 150.203.161.98 IP addresses was associated with several hostnames (www.cecs.anu.edu.au and rproxy.cecs.anu.edu.au).