

Lab 3

Exercise 3: Digging into DNS

Question 1:



```
z5190669@vx1:/tmp_and/kamen/export/kamen/4/z5190669/9331$ 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: 13090
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 10, ADDITIONAL: 20

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

;; ANSWER SECTION:
www.cecs.anu.edu.au.      2815    IN      CNAME   rproxy.cecs.anu.edu.au.
rproxy.cecs.anu.edu.au.  2732    IN      A       150.203.161.98

;; AUTHORITY SECTION:
au.      24390    IN      NS       c.au.
au.      24390    IN      NS       r.au.
au.      24390    IN      NS       b.au.
au.      24390    IN      NS       s.au.
au.      24390    IN      NS       q.au.
au.      24390    IN      NS       a.au.
au.      24390    IN      NS       u.au.
au.      24390    IN      NS       v.au.
au.      24390    IN      NS       d.au.
au.      24390    IN      NS       t.au.

;; ADDITIONAL SECTION:
a.au.      4282    IN      A       58.65.254.73
a.au.      119611  IN      AAAA    2407:6e00:254:306::73
b.au.      5377    IN      A       58.65.253.73
b.au.      40809   IN      AAAA    2407:6e00:253:306::73
c.au.      6774    IN      A       162.159.24.179
c.au.      40809   IN      AAAA    2400:cb00:2049:1::a29f:18b3
d.au.      6983    IN      A       162.159.25.38
d.au.      40809   IN      AAAA    2400:cb00:2049:1::a29f:1926
q.au.      859     IN      A       65.22.196.1
q.au.      171833  IN      AAAA    2a01:8840:be::1
r.au.      7090    IN      A       65.22.197.1
r.au.      171833  IN      AAAA    2a01:8840:bf::1
s.au.      5492    IN      A       65.22.198.1
s.au.      171833  IN      AAAA    2a01:8840:c0::1
t.au.      6127    IN      A       65.22.199.1
t.au.      171833  IN      AAAA    2a01:8840:c1::1
u.au.      2975    IN      A       211.29.133.32
v.au.      4781    IN      A       202.12.31.53
v.au.      40809   IN      AAAA    2001:dd8:12::53

;; Query time: 1 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Mon Jun 24 13:44:51 AEST 2019
;; MSG SIZE rcvd: 657
```

```
z5190669@vx1:/tmp_and/kamen/export/kamen/4/z5190669/9331$ █
```

The IP address of www.cecs.anu.edu.au is 150.203.161.98. I use type A query to get this answer.

Question 2:

The cononical name for the CECS ANU web server is rproxy.cecs.anu.edu.au. The reason for having an alias for this server is: compare to IP addresses, alias are usually easier for us to remember.

Question 3:

The authority section contains NS(nameserver responsible for the domain). There are 10 different authoritative name servers for this domain name.

The additional section contains IP addresses for the 10 authoritative name servers, type A and type AAAA for IPv4 addresses and IPv6 addresses respectively.

Question 4:

The IP address of the local nameserver for my machine is 129.94.242.45. I connect the CSE network via vlab.

Question 5:

```
z5190669@vx1:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ dig cecs.anu.edu.au NS
; <<> DiG 9.9.5-9+deb8u17-Debian <<> cecs.anu.edu.au NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 57636
;; 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.          150     IN      NS      ns2.cecs.anu.edu.au.
cecs.anu.edu.au.          150     IN      NS      ns3.cecs.anu.edu.au.
cecs.anu.edu.au.          150     IN      NS      ns4.cecs.anu.edu.au.

;; ADDITIONAL SECTION:
ns2.cecs.anu.edu.au.      1763    IN      A        150.203.161.36
ns2.cecs.anu.edu.au.      1515    IN      AAAA     2001:388:1034:2905::24
ns3.cecs.anu.edu.au.      2051    IN      A        150.203.161.50
ns3.cecs.anu.edu.au.      1515    IN      AAAA     2001:388:1034:2905::32
ns4.cecs.anu.edu.au.      1756    IN      A        150.203.161.38
ns4.cecs.anu.edu.au.      1515    IN      AAAA     2001:388:1034:2905::26

;; Query time: 5 msec
;; SERVER: 129.94.242.45#53(129.94.242.45)
;; WHEN: Mon Jun 24 14:17:33 AEST 2019
;; MSG SIZE rcvd: 230

z5190669@vx1:/tmp_amd/kamen/export/kamen/4/z5190669/9331$
```

The nameservers are:

ns2.cecs.anu.au (IP address: 150.203.161.36)

ns3.cecs.anu.au (IP address: 150.203.161.50)

ns4.cecs.anu.au (IP address: 150.203.161.38)

type AAAA for IPv6 addresses. The type of DNS query is NS.

Question 6:



```
z5190669@vx4:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ 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: 43428
;; 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. 780 IN      PTR      webserver.seecs.nust.edu.pk.

;; AUTHORITY SECTION:
101.68.111.in-addr.arpa. 26505 IN      NS       ns1.hec.gov.pk.
101.68.111.in-addr.arpa. 26505 IN      NS       ns2.hec.gov.pk.

;; ADDITIONAL SECTION:
ns1.hec.gov.pk.           780      IN      A        103.4.93.5
ns2.hec.gov.pk.           780      IN      A        103.4.93.6

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Jun 25 12:06:15 AEST 2019
;; MSG SIZE rcvd: 172
```

```
z5190669@vx4:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ █
```

I use reverse DNS, which is a type PTR query for 54.101.68.111 in-addr.arpa.
The DNS name associated with 111.68.101.54 is webserver.seecs.nust.edu.pk.

Question 7:



```
z5190669@vx4:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ 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: 39436
;; 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.                1627    IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.                1627    IN      MX      1 mta5.am0.yahoodns.net.
yahoo.com.                1627    IN      MX      1 mta6.am0.yahoodns.net.

;; AUTHORITY SECTION:
yahoo.com.                158151  IN      NS      ns3.yahoo.com.
yahoo.com.                158151  IN      NS      ns2.yahoo.com.
yahoo.com.                158151  IN      NS      ns1.yahoo.com.
yahoo.com.                158151  IN      NS      ns5.yahoo.com.
yahoo.com.                158151  IN      NS      ns4.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com.            343130  IN      A        68.180.131.16
ns1.yahoo.com.            25255   IN      AAAA     2001:4998:130::1001
ns2.yahoo.com.            230935  IN      A        68.142.255.16
ns2.yahoo.com.            23345   IN      AAAA     2001:4998:140::1002
ns3.yahoo.com.            34818   IN      A        203.84.221.53
ns3.yahoo.com.            23345   IN      AAAA     2406:8600:b8:fe03::1003
ns4.yahoo.com.            262131  IN      A        98.138.11.157
ns5.yahoo.com.            2912    IN      A        119.160.253.83

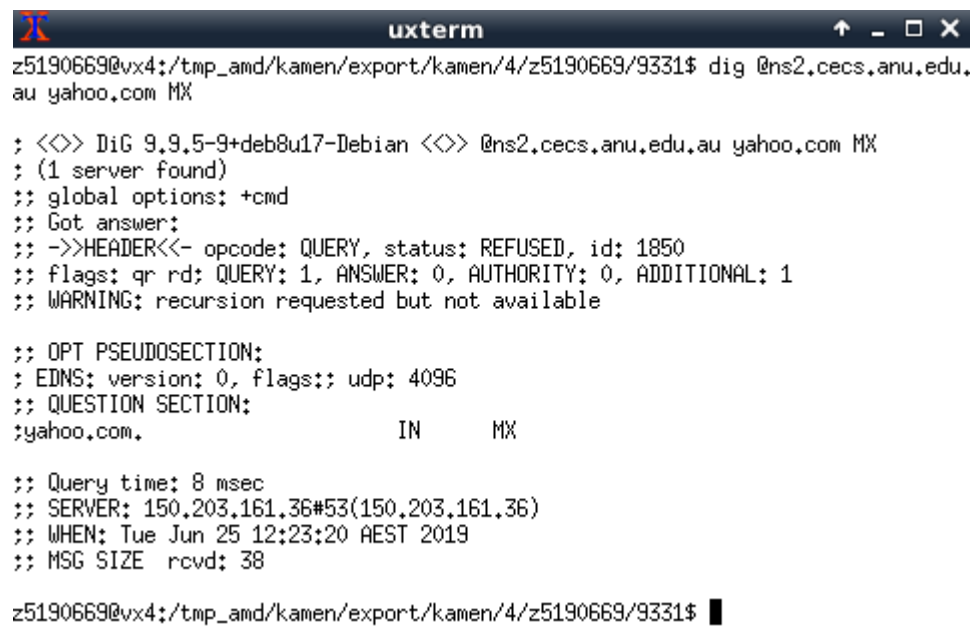
;; Query time: 1 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Tue Jun 25 12:11:44 AEST 2019
;; MSG SIZE rcvd: 371

z5190669@vx4:/tmp_amd/kamen/export/kamen/4/z5190669/9331$
```

No, I didn't get an authoritative answer because the flags do not contain aa (which represents the authoritative answer).

This is because the server from CSE only has authority for the cse.unsw.edu.au domain and not for the Yahoo domain.

Question 8:



```
z5190669@vx4:/tmp_and/kamen/export/kamen/4/z5190669/9331$ 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: 1850
;; 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 Jun 25 12:23:20 AEST 2019
;; MSG SIZE rcvd: 38

z5190669@vx4:/tmp_and/kamen/export/kamen/4/z5190669/9331$
```

I didn't get a response when I use nameservers obtained in Question 5. The reason could be that these nameservers do not reply to DNS queries that are sent outside the anu network for security consideration.

Question 9:



```
z5190669@vx4:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ dig @ns1.yahoo.com yahoo.com MX
```

```
;; <<>> DiG 9.9.5-9+deb8u17-Debian <<>> @ns1.yahoo.com yahoo.com MX
;; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 65150
;; 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      ns4.yahoo.com.
yahoo.com.                172800  IN      NS      ns5.yahoo.com.
yahoo.com.                172800  IN      NS      ns2.yahoo.com.
yahoo.com.                172800  IN      NS      ns1.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: 145 msec
;; SERVER: 68.180.131.16#53(68.180.131.16)
;; WHEN: Tue Jun 25 12:31:55 AEST 2019
;; MSG SIZE rcvd: 371
```

```
z5190669@vx4:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ █
```

I use type MX query to obtain this information.

Question 10:

I am using brass14. The current hostname is drum14.cse.unsw.edu.au.

First, I query for the IP address of the root nameservers.



```
z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ dig . NS

;<<> DiG 9.9.5-9+deb8u17-Debian <<> . NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 34227
;; 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:
.             137974 IN      NS      g.root-servers.net.
.             137974 IN      NS      c.root-servers.net.
.             137974 IN      NS      e.root-servers.net.
.             137974 IN      NS      m.root-servers.net.
.             137974 IN      NS      i.root-servers.net.
.             137974 IN      NS      a.root-servers.net.
.             137974 IN      NS      d.root-servers.net.
.             137974 IN      NS      f.root-servers.net.
.             137974 IN      NS      k.root-servers.net.
.             137974 IN      NS      j.root-servers.net.
.             137974 IN      NS      b.root-servers.net.
.             137974 IN      NS      l.root-servers.net.
.             137974 IN      NS      h.root-servers.net.

;; ADDITIONAL SECTION:
a.root-servers.net. 80161 IN      A        198.41.0.4
a.root-servers.net. 84542 IN      AAAA     2001:503:ba3e::2:30
b.root-servers.net. 242831 IN      A        199.9.14.201
b.root-servers.net. 31876 IN      AAAA     2001:500:200::b
c.root-servers.net. 86613 IN      A        192.33.4.12
c.root-servers.net. 31876 IN      AAAA     2001:500:2::c
d.root-servers.net. 166047 IN      A        199.7.91.13
d.root-servers.net. 31876 IN      AAAA     2001:500:2d::d
e.root-servers.net. 144603 IN      A        192.203.230.10
e.root-servers.net. 391913 IN      AAAA     2001:500:a8::e
f.root-servers.net. 73796 IN      A        192.5.5.241
f.root-servers.net. 31876 IN      AAAA     2001:500:2f::f
g.root-servers.net. 73797 IN      A        192.112.36.4
g.root-servers.net. 247251 IN      AAAA     2001:500:12::d0d
h.root-servers.net. 73796 IN      A        198.97.190.53
h.root-servers.net. 31876 IN      AAAA     2001:500:1::53
i.root-servers.net. 341957 IN      A        192.36.148.17
i.root-servers.net. 31875 IN      AAAA     2001:7fe::53
j.root-servers.net. 273192 IN      A        192.58.128.30
j.root-servers.net. 31876 IN      AAAA     2001:503:c27::2:30
k.root-servers.net. 176059 IN      A        193.0.14.129
k.root-servers.net. 94203 IN      AAAA     2001:7fd::1
l.root-servers.net. 71148 IN      A        199.7.83.42
l.root-servers.net. 31876 IN      AAAA     2001:500:9f::42
m.root-servers.net. 597908 IN      A        202.12.27.33
m.root-servers.net. 31876 IN      AAAA     2001:dc3::35

;; Query time: 1 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Tue Jun 25 17:28:44 AEST 2019
```

Next, I choose to query the first nameserver 198.41.0.4.

```

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ dig @198.41.0.4 drum14
.cse.unsw.edu.au NS

;; <<>> DiG 9.9.5-9+deb8u17-Debian <<>> @198.41.0.4 drum14.cse.unsw.edu.au NS
;; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 19587
;; 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:
;drum14.cse.unsw.edu.au.                IN      NS

;; 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:cb00:2049:1::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: 159 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Tue Jun 25 17:30:03 AEST 2019
;; MSG SIZE rcvd: 623

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ █

```

As we can see, we have been referred to the .au nameservers, I choose to query the first nameserver 58.65.254.73.



```
z5190669@vx2:/tmp_and/kamen/export/kamen/4/z5190669/9331$ dig @58.65.254.73 drum
14.cse.unsw.edu.au NS

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @58.65.254.73 drum14.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 18835
;; 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:
;drum14.cse.unsw.edu.au.          IN      NS

;; AUTHORITY SECTION:
edu.au.          7200    IN      NS      q.au.
edu.au.          7200    IN      NS      r.au.
edu.au.          7200    IN      NS      t.au.
edu.au.          7200    IN      NS      s.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: Tue Jun 25 17:31:30 AEST 2019
;; MSG SIZE rcvd: 291

z5190669@vx2:/tmp_and/kamen/export/kamen/4/z5190669/9331$ █
```

We have been referred to the edu.au nameservers, I choose to query the first nameserver 65.22.196.1.

```

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ dig @65.22.196.1 drum14.cse.unsw.edu.au NS

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @65.22.196.1 drum14.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 27108
;; 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:
;drum14.cse.unsw.edu.au.          IN      NS

;; 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: 8 msec
;; SERVER: 65.22.196.1#53(65.22.196.1)
;; WHEN: Tue Jun 25 17:32:28 AEST 2019
;; MSG SIZE rcvd: 209

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ █

```

We have been referred to the unsw.edu.au nameservers, I choose to query the first nameserver 129.94.0.192.

```

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ dig @129.94.0.192 drum
14.cse.unsw.edu.au NS

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @129.94.0.192 drum14.cse.unsw.edu.au NS
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 3452
;; 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:
;drum14.cse.unsw.edu.au.          IN      NS

;; AUTHORITY SECTION:
cse.unsw.edu.au.      10800   IN      NS      maestro.orchestra.cse.unsw.edu.a
u.
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: Tue Jun 25 17:33:24 AEST 2019
;; MSG SIZE rcvd: 171

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ █

```

We have been referred to the cse.unsw.edu.au nameservers, however this time, we can not use type NS query anymore, we need to use type A query to get the IP address of drum14.

```

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ dig @129.94.242.2 drum
14.cse.unsw.edu.au A

; <<> DiG 9.9.5-9+deb8u17-Debian <<> @129.94.242.2 drum14.cse.unsw.edu.au A
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 49099
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 3

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;drum14.cse.unsw.edu.au.          IN      A

;; ANSWER SECTION:
drum14.cse.unsw.edu.au. 3600    IN      A      129.94.209.44

;; AUTHORITY SECTION:
cse.unsw.edu.au.        3600    IN      NS      maestro.orchestra.cse.unsw.edu.a
u.
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: Tue Jun 25 17:34:46 AEST 2019
;; MSG SIZE rcvd: 155

z5190669@vx2:/tmp_amd/kamen/export/kamen/4/z5190669/9331$ █

```

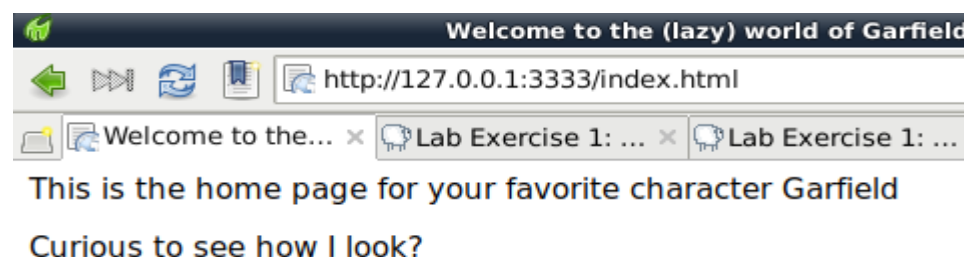
As we can see from the ANSWER SECTION above, the IP address of drum14 is 129.94.209.44.

We have to query 5 DNS servers to get the authoritative answer. They are a.root-servers.net, a.au, q.au, ns1.unsw.edu.au, beethoven.orchestra.cse.unsw.edu.au respectively.

Question 11

Yes, one physical machine can have several network interfaces, and a network interface can have several IP addresses associated with it. An IP address can also have several hostnames associated with it.

Exercise 4: A Simple Web Server



test HTML file return the content in index.html.

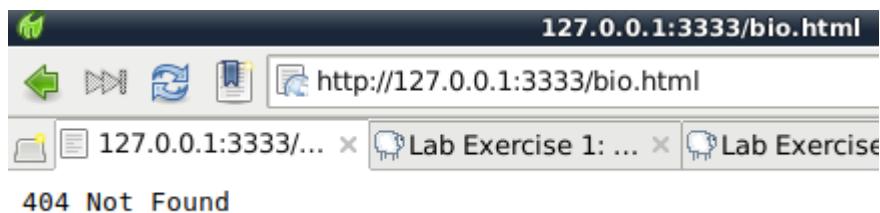


```
z5190669@vx3:/tmp_amd/kamen/export/kamen/4/z5190669$ nslookup cnn.com
Server:      129.94.242.45
Address:     129.94.242.45#53

Non-authoritative answer:
Name:   cnn.com
Address: 151.101.129.67
Name:   cnn.com
Address: 151.101.193.67
Name:   cnn.com
Address: 151.101.1.67
Name:   cnn.com
Address: 151.101.65.67

z5190669@vx3:/tmp_amd/kamen/export/kamen/4/z5190669$
```

test image files return image called 111.png on my machine.



```
404 Not Found
```

test object does not exist return 404 Not Found.

WebServer.py is attached in the tar file.

Use python3 WebServer.py port (4 digit number) to run.