

## Lab3

### Exercise 3

#### Question 1

```
weill % 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: 396
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 4, ADDITIONAL: 8

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

;; ANSWER SECTION:
www.cecs.anu.edu.au.      1412    IN      CNAME   rproxy.cecs.anu.edu.au.
rproxy.cecs.anu.edu.au.   975     IN      A       150.203.161.98

;; AUTHORITY SECTION:
edu.au.                   47250   IN      NS       r.au.
edu.au.                   47250   IN      NS       s.au.
edu.au.                   47250   IN      NS       q.au.
edu.au.                   47250   IN      NS       t.au.

;; ADDITIONAL SECTION:
q.au.                     11408   IN      A       65.22.196.1
q.au.                     36100   IN      AAAA    2a01:8840:bef::1
r.au.                     13654   IN      A       65.22.197.1
r.au.                     64430   IN      AAAA    2a01:8840:bef::1
s.au.                     20193   IN      A       65.22.198.1
s.au.                     20337   IN      AAAA    2a01:8840:c0::1
t.au.                     8243    IN      A       65.22.199.1
t.au.                     19532   IN      AAAA    2a01:8840:c1::1

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Wed Aug 15 10:32:36 2018
;; MSG SIZE  rcvd: 314
```

The IP address of [www.cecs.anu.edu.au](http://www.cecs.anu.edu.au) is 150.203.161.98;

Type A;

#### Question 2

From the output from question1, the canonical name for the CECS ANU web server is rproxy.cecs.anu.edu.au.

The IP address of it is 150.203.161.98;

The reason of having an alias for this server is that it can provide convenience when running multiple servers from a single IP address.

#### Question 3

Use the rest details, I can see the name servers of [www.cecs.anu.edu.au](http://www.cecs.anu.edu.au) and their IP addresses.

#### Question 4

```
weill % dig localhost
; <<>> DiG 9.7.3 <<>> localhost
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 37091
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1

;; QUESTION SECTION:
;localhost.                IN      A

;; ANSWER SECTION:
localhost.                42715   IN      A      127.0.0.1

;; AUTHORITY SECTION:
localhost.                42715   IN      NS      localhost.

;; ADDITIONAL SECTION:
localhost.                42715   IN      AAAA    ::1

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Wed Aug 15 10:30:26 2018
;; MSG SIZE rcvd: 85
```

The IP address of the local nameserver for my machine is 127.0.0.1

#### Question 5

```
weill % dig cecs.anu.edu.au NS
; <<>> DiG 9.7.3 <<>> cecs.anu.edu.au NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 36836
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 6

;; QUESTION SECTION:
;cecs.anu.edu.au.          IN      NS

;; ANSWER SECTION:
cecs.anu.edu.au.          941     IN      NS      ns2.cecs.anu.edu.au.
cecs.anu.edu.au.          941     IN      NS      ns3.cecs.anu.edu.au.
cecs.anu.edu.au.          941     IN      NS      ns4.cecs.anu.edu.au.

;; ADDITIONAL SECTION:
ns2.cecs.anu.edu.au.      2018    IN      A      150.203.161.36
ns2.cecs.anu.edu.au.      941     IN      AAAA    2001:388:1034:2905::24
ns3.cecs.anu.edu.au.      2018    IN      A      150.203.161.50
ns3.cecs.anu.edu.au.      941     IN      AAAA    2001:388:1034:2905::32
ns4.cecs.anu.edu.au.      2018    IN      A      150.203.161.38
ns4.cecs.anu.edu.au.      941     IN      AAAA    2001:388:1034:2905::26

;; Query time: 5 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Wed Aug 15 10:42:50 2018
;; MSG SIZE rcvd: 219
```

The DNS name servers of cecs.anu.edu.au are

- ns2.cecs.anu.edu.au; IP: 150.203.161.36
- ns3.cecs.anu.edu.au; IP: 150.203.161.50
- ns4.cecs.anu.edu.au; IP: 150.203.161.38

the type is NS

## Question 6

```
weill % 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: 31483
; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 3, ADDITIONAL: 6

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

;; ANSWER SECTION:
109.158.171.149.in-addr.arpa. 3600 IN PTR engplwd008.ad.unsw.edu.au.
109.158.171.149.in-addr.arpa. 3600 IN PTR engplwd008.eng.unsw.edu.au.
109.158.171.149.in-addr.arpa. 3600 IN PTR www.engineering.unsw.edu.au.

;; AUTHORITY SECTION:
158.171.149.in-addr.arpa. 1166 IN NS ns3.unsw.edu.au.
158.171.149.in-addr.arpa. 1166 IN NS ns2.unsw.edu.au.
158.171.149.in-addr.arpa. 1166 IN NS ns1.unsw.edu.au.

;; ADDITIONAL SECTION:
ns1.unsw.edu.au. 7564 IN A 129.94.0.192
ns1.unsw.edu.au. 1016 IN AAAA 2001:388:c1:35::1
ns2.unsw.edu.au. 7564 IN A 129.94.0.193
ns2.unsw.edu.au. 1016 IN AAAA 2001:388:c1:35::2
ns3.unsw.edu.au. 7564 IN A 192.155.82.178
ns3.unsw.edu.au. 328 IN AAAA 2600:3c01::f03c:91ff:fe73:5f10

;; Query time: 6 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Wed Aug 15 10:49:42 2018
;; MSG SIZE rcvd: 330
```

The DNS names associated with 149.171.158.109 are

Engplwd008.ad.unsw.edu.au;

[www.engineering.unsw.edu.au](http://www.engineering.unsw.edu.au);

Type: PTR

## Question 7:

```
weill % 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: 4326
; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 5, ADDITIONAL: 8

;; 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. 15277 IN NS ns5.yahoo.com.
yahoo.com. 15277 IN NS ns4.yahoo.com.
yahoo.com. 15277 IN NS ns3.yahoo.com.
yahoo.com. 15277 IN NS ns1.yahoo.com.
yahoo.com. 15277 IN NS ns2.yahoo.com.

;; ADDITIONAL SECTION:
ns1.yahoo.com. 190111 IN A 68.180.131.16
ns1.yahoo.com. 7357 IN AAAA 2001:4998:130::1001
ns2.yahoo.com. 172993 IN A 68.142.255.16
ns2.yahoo.com. 76047 IN AAAA 2001:4998:140::1002
ns3.yahoo.com. 363977 IN A 203.84.221.53
ns3.yahoo.com. 5801 IN AAAA 2406:8600:b8:fe03::1003
ns4.yahoo.com. 179797 IN A 98.138.111.157
ns5.yahoo.com. 165868 IN A 119.160.253.83

;; Query time: 248 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Wed Aug 15 10:58:18 2018
;; MSG SIZE rcvd: 360
```

No, I did not get the authoritative answer; because there is no aa in flags.

### Question 8:

```
weill % dig @150.203.161.36 yahoo.com MX

; <<>> DiG 9.7.3 <<>> @150.203.161.36 yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: REFUSED, id: 23760
;; 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: 150.203.161.36#53(150.203.161.36)
;; WHEN: Wed Aug 15 11:01:21 2018
;; MSG SIZE  rcvd: 27
```

### Question 9:

```
weill % dig @ns1.yahoo.com yahoo.com MX

; <<>> DiG 9.7.3 <<>> @ns1.yahoo.com yahoo.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 41064
;; flags: qr aa rd QUERY: 1, ANSWER: 0, AUTHORITY: 5, ADDITIONAL: 0
;; WARNING: recursion requested but not available

;; 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       ns2.yahoo.com.
yahoo.com.                172800  IN      NS       ns3.yahoo.com.
yahoo.com.                172800  IN      NS       ns1.yahoo.com.
yahoo.com.                172800  IN      NS       ns4.yahoo.com.
yahoo.com.                172800  IN      NS       ns5.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        203.04.221.53
ns4.yahoo.com.            1209600 IN      A        98.130.11.157
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:b6:fe03::1003

;; Query time: 145 msec
;; SERVER: 68.180.131.16#53(68.180.131.16)
;; WHEN: Wed Aug 15 11:14:10 2018
;; MSG SIZE  rcvd: 360
```

Type: MX

## Question 10

The name servers of '.' are:

```
;; ANSWER SECTION:
.      29465  IN      NS      k.root-servers.net.
.      29465  IN      NS      d.root-servers.net.
.      29465  IN      NS      l.root-servers.net.
.      29465  IN      NS      e.root-servers.net.
.      29465  IN      NS      i.root-servers.net.
.      29465  IN      NS      g.root-servers.net.
.      29465  IN      NS      m.root-servers.net.
.      29465  IN      NS      h.root-servers.net.
.      29465  IN      NS      j.root-servers.net.
.      29465  IN      NS      c.root-servers.net.
.      29465  IN      NS      f.root-servers.net.
.      29465  IN      NS      b.root-servers.net.
.      29465  IN      NS      a.root-servers.net.
```

The authoritative name server for "au.":

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

The authoritative name server for "edu.au":

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

The authoritative name server for "unsw.edu.au":

```
;; AUTHORITY SECTION:
unsw.edu.au.  900     IN      NS      ns3.unsw.edu.au.
unsw.edu.au.  900     IN      NS      ns1.unsw.edu.au.
unsw.edu.au.  900     IN      NS      ns2.unsw.edu.au.
```

The authoritative name server for "cse.unsw.edu.au":

```
;; 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.
```

The IP address of lyre01.cse.unsw.edu.au is

```
;; ANSWER SECTION:  
lyre01.cse.unsw.edu.au. 3600    IN      A       129.94.210.21
```

There are 6 DNS servers I have to query to get the authoritative answer.

Question 11:

Yes, a machine may have several name or IP addresses associated with it.

## Code for Exercise 4

```
WebServer.py x
1  from socket import *
2  import os
3  import sys
4
5  # take in the argument
6  serverPort = int(sys.argv[1])
7
8  # connect in TCP
9  serverSocket = socket(AF_INET, SOCK_STREAM)
10
11 #bind the serverSocket with the Port
12 serverSocket.bind(('', serverPort))
13
14 # listen in an infinite loop
15 serverSocket.listen(1)
16 print "The server is ready to receive"
17 while 1:
18
19     # Server accept an Client
20     connectionSocket, addr = serverSocket.accept()
21     try:
22         # receive the data from the socket
23         sentence = connectionSocket.recv(1024)
24
25         #Split the GET request; only take the http://XXXX
26         temp = sentence.split(" ")
27         target = temp[1]
28
29         # Split the http://XXXXX and only take the value we need
30         # like index.html
31         temp2 = target.split("/")
32         #print(temp2)
33         html = temp2[1]
34
35         #open the requested file
36         file = open(html)
37
38         # take in the data of the file
39         data = file.read()
40
41         # if there do have this file, i send this to the Client w with header 200ok
42         connectionSocket.send("HTTP/1.1 200 OK\n\n")
43
44         # send the data
45         connectionSocket.send(data)
46
47         # close the socket
48         connectionSocket.close()
49
50 except IOError:
51     # if there is no such file existing
52     # first send the header
53     connectionSocket.send("HTTP/1.1 404 Not Found\n\n")
54     # then send the body
55     r = "<html><body>404 NOT FOUND</body></html>"
56     connectionSocket.send(r)
57     connectionSocket.close()
```