

Exercise 1

- A – Address record. Returns a 32-bit IPv4 address, most commonly used to map hostnames to an IP address of the host.
- CNAME – Canonical name record. Alias of one name to another.
- MX – Mail exchange record. List of mail exchange servers that accept email for a domain.
- NS - Name server record. Delegates a DNS zone to use the given authoritative name servers.
- PTR – PTR resource record. Pointer to a canonical name.
- SOA - Start of [a zone of] authority record. Specifies authoritative information about a DNS zone, including the primary name server, the email of the domain administrator, the domain serial number, and several timers relating to refreshing the zone.

Exercise 2

```
Frame 19: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface 0
Encapsulation type: Ethernet (1)
Arrival Time: Sep 1, 2004 07:06:12.188023000 AEST
[Time shift for this packet: 0.000000000 seconds]
Epoch Time: 1093986372.188023000 seconds
[Time delta from previous captured frame: 0.000219000 seconds]
[Time delta from previous displayed frame: 0.000219000 seconds]
[Time since reference or first frame: 4.953172000 seconds]
Frame Number: 19
Frame Length: 71 bytes (568 bits)
Capture Length: 71 bytes (568 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:udp:dns]
[Coloring Rule Name: UDP]
[Coloring Rule String: udp]
> Ethernet II, Src: IBM_10:60:99 (00:09:6b:10:60:99), Dst: All-HSRP-routers_00 (00:00:0c:07:ac:00)
> Internet Protocol Version 4, Src: 128.238.38.160, Dst: 128.238.29.22
> User Datagram Protocol, Src Port: 3742, Dst Port: 53
> Domain Name System (query)
```

Question 1: What transport layer protocol is being used by the DNS messages?

UDP

Question 2: What are the source and destination port for the DNS query message and the corresponding response?

User Datagram Protocol, Src Port: 3742, Dst Port: 53

```
Source Port: 3742
Destination Port: 53
Length: 37
Checksum: 0x5890 [unverified]
[Checksum Status: Unverified]
[Stream index: 3]
> [Timestamps]
UDP payload (29 bytes)
```

For the query message, source port is 3742, destination port is 53. For the response source port is 53 destination port is 3742.

Question 3: To what IP address is the DNS query message sent? Is this the same as the default local DNS server?

Destination Address: 128.238.29.22

The IP address is 128.238.29.22. This is the same as the default DNS server, which means that we are sending the packet to our local DNS server.

Question 4: How many “questions” are contained in the DNS query message? What “Type” of DNS queries are they? Does the query message also contain any “answers”?

Domain Name System (query)

Transaction ID: 0x0003

> Flags: 0x0100 Standard query

Questions: 1

Answer RRs: 0

Authority RRs: 0

Additional RRs: 0

> Queries

[\[Response In: 20\]](#)

1 question contained in the DNS query message. The query message is of type A. The query message does not contain any answers.

Question 5: Examine the DNS response message. Provide details of the contents of the “Answers”, “Authority” and “Additional Information” fields. What can you infer from these?

Domain Name System (response)

Transaction ID: 0x0003

> Flags: 0x8580 Standard query response, No error

Questions: 1

Answer RRs: 1

Authority RRs: 3

Additional RRs: 3

✓ Queries

> www.mit.edu: type A, class IN

✓ Answers

> www.mit.edu: type A, class IN, addr 18.7.22.83

✓ Authoritative nameservers

> mit.edu: type NS, class IN, ns BITSY.mit.edu

> mit.edu: type NS, class IN, ns STRAWB.mit.edu

> mit.edu: type NS, class IN, ns W20NS.mit.edu

✓ Additional records

> BITSY.mit.edu: type A, class IN, addr 18.72.0.3

> STRAWB.mit.edu: type A, class IN, addr 18.71.0.151

> W20NS.mit.edu: type A, class IN, addr 18.70.0.160

[\[Request In: 19\]](#)

[Time: 0.016757000 seconds]

Answer contains the IP address of www.mit.edu. Authoritative nameservers shows the three nameservers of mit.edu. Additional records shows the ip address of each of these nameservers.

Exercise 3

```
z5417590@vx04:~$ dig www.stanford.edu

; <<>> DiG 9.16.44-Debian <<>> www.stanford.edu
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33586
;; flags: qr rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:: udp: 1232
; COOKIE: ed5df5e20335035b01000000651d3ff01f87a42d326abd07 (good)

;; QUESTION SECTION:
;www.stanford.edu.                IN      A

;; ANSWER SECTION:
www.stanford.edu.                1800    IN      CNAME   pantheon-systems
.map.fastly.net.
pantheon-systems.map.fastly.net. 30      IN      A        151.101.30.133

;; Query time: 20 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Wed Oct 04 21:35:28 AEDT 2023
;; MSG SIZE rcvd: 134
```

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

The IP address is 151.101.30.133. The DNS query is type A.

Question 2. What is the canonical name for the Stanford webserver (i.e., www.stanford.edu)? Suggest a reason for having an alias for this server.

The canonical name is pantheon-systems.map.fastly.net. The reason for having an alias is that it is easier to remember making it easier for users to access. Can also be useful in posting multiple services under one name.

Question 3. What can you make of the rest of the response/what it is used for (i.e. the details available in the DNS response (cookie and other fields))?

There are flags which tell us if it is authoritative or not. For the flags qr means A cookie is given for security reason and we can also find the DNS version. We can also find the message size being 134 bytes.

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

The IP address of my machine is 129.94.242.2 using the CSE servers.

Question 5. What are the DNS nameservers for the "stanford.edu." domain (note: the domain name is stanford.edu and not www.stanford.edu . This is an example of what is referred to as the apex/naked domain)? Find their IP addresses. What type of DNS query is sent to obtain this information?

The DNS name servers and IP addresses of Stanford nameservers are:

- ns5.dnsmadeeasy.com.: 204.94.148.13
- ns6.dnsmadeeasy.com.: 208.80.124.13
- ns7.dnsmadeeasy.com.: 208.80.126.13
- avallone.stanford.edu.: 204.63.224.53
- argus.stanford.edu.: 171.64.7.115
- atalante.stanford.edu.: 171.64.7.61

The DNS query sent to obtain this data is an NS query to obtain nameserver.

```
z5417590@vx12:~$ dig stanford.edu ns
; <<>> DiG 9.16.44-Debian <<>> stanford.edu ns
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 54392
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 6, AUTHORITY: 0, ADDITIONAL: 5
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 0577aeee20886eeb01000000651e1b595d2ff360c8e50264 (good)
;; QUESTION SECTION:
;stanford.edu.                IN      NS
;; ANSWER SECTION:
stanford.edu.                27966   IN      NS      ns7.dnsmadeeasy.com.
stanford.edu.                27966   IN      NS      argus.stanford.edu.
stanford.edu.                27966   IN      NS      ns5.dnsmadeeasy.com.
stanford.edu.                27966   IN      NS      avallone.stanford.edu.
stanford.edu.                27966   IN      NS      atalante.stanford.edu.
stanford.edu.                27966   IN      NS      ns6.dnsmadeeasy.com.
;; ADDITIONAL SECTION:
ns5.dnsmadeeasy.com.         50348   IN      A        208.94.148.13
ns6.dnsmadeeasy.com.         77991   IN      A        208.80.124.13
ns7.dnsmadeeasy.com.         10692   IN      A        208.80.126.13
avallone.stanford.edu.       539     IN      A        204.63.224.53
;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Thu Oct 05 13:11:37 AEDT 2023
;; MSG SIZE rcvd: 268

z5417590@vx12:~$ dig argus.stanford.edu.
; <<>> DiG 9.16.44-Debian <<>> argus.stanford.edu.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 12091
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 345d146f34fd4a4901000000651e1be9231be46f9bbd1fab (good)
;; QUESTION SECTION:
;argus.stanford.edu.         IN      A
;; ANSWER SECTION:
argus.stanford.edu.         1634    IN      A        171.64.7.115
;; Query time: 7 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Thu Oct 05 13:14:01 AEDT 2023
;; MSG SIZE rcvd: 91
z5417590@vx12:~$ dig atalante.stanford.edu.
; <<>> DiG 9.16.44-Debian <<>> atalante.stanford.edu.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 37621
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: a76268ee29dd55ab01000000651e1c2c8fa684f6276137cb (good)
;; QUESTION SECTION:
;atalante.stanford.edu.      IN      A
;; ANSWER SECTION:
atalante.stanford.edu.      1800    IN      A        171.64.7.61
;; Query time: 7 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Thu Oct 05 13:15:08 AEDT 2023
;; MSG SIZE rcvd: 94
```

Question 6. What is the DNS name associated with the IP address 129.25.60.56 ? What type of DNS query is sent to obtain this information?

```
z5417590@vx04:~$ dig -x 129.25.60.56

; <>> DiG 9.16.44-Debian <>> -x 129.25.60.56
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 57284
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:: udp: 1232
; COOKIE: 2d832cbe4f18d50101000000651d429337ad630cbf689ae1 (good)
;; QUESTION SECTION:
;56.60.25.129.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
56.60.25.129.in-addr.arpa. 31      IN      PTR      ece.drexel.edu.

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Wed Oct 04 21:46:43 AEDT 2023
;; MSG SIZE rcvd: 110
```

The DNS name associated with the IP address is ece.drexel.edu. The type of DNS query used was PTR.

Question 7. Run, dig and query the CSE nameserver (129.94.242.33) for the mail servers for google.com (again, the domain name is google.com, not www.google.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 message to determine the answer)

```
z5417590@vx04:~$ dig @129.94.242.33 google.com MX

; <>> DiG 9.16.44-Debian <>> @129.94.242.33 google.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; -->HEADER<-- opcode: QUERY, status: NOERROR, id: 44533
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: f01ecb5bc4bfd4e401000000651d457cdc27ba0c2812e059 (good)
;; QUESTION SECTION:
;google.com.                IN      MX

;; ANSWER SECTION:
google.com.                 300     IN      MX      10 smtp.google.com.

;; Query time: 8 msec
;; SERVER: 129.94.242.33#53(129.94.242.33)
;; WHEN: Wed Oct 04 21:59:08 AEDT 2023
;; MSG SIZE rcvd: 88
```

Did not get an authoritative answer. Examining the flags AA is not included which means that the response is not authoritative.

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

The answer is that Stanford refused to answer to us. As seen above the status: REFUSED. This was likely because we are not part of the Stanford network.

```
z5417590@vx12:~$ dig google.com NS

; <>> DiG 9.16.44-Debian <>> google.com NS
;; global options: +cmd
;; Got answer:
;; -->HEADER<-- opcode: QUERY, status: NOERROR, id: 61990
;; flags: qr rd ra; QUERY: 1, ANSWER: 4, AUTHORITY: 0, ADDITIONAL: 9

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 6afaf36224a0ac0701000000651e9962c29b4350fb793f (good)
;; QUESTION SECTION:
;google.com.                IN      NS

;; ANSWER SECTION:
google.com.                 17605   IN      NS      ns1.google.com.
google.com.                 17605   IN      NS      ns4.google.com.
google.com.                 17605   IN      NS      ns3.google.com.
google.com.                 17605   IN      NS      ns2.google.com.

;; ADDITIONAL SECTION:
ns1.google.com.             166379  IN      A       216.239.32.10
ns2.google.com.             65216   IN      A       216.239.34.10
ns3.google.com.             165119  IN      A       216.239.36.10
ns4.google.com.             162010  IN      A       216.239.38.10
ns1.google.com.             104490  IN      AAAA    2001:4860:4802:32::a
ns2.google.com.             104490  IN      AAAA    2001:4860:4802:34::a
ns3.google.com.             104490  IN      AAAA    2001:4860:4802:36::a
ns4.google.com.             104490  IN      AAAA    2001:4860:4802:38::a

;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Thu Oct 05 13:25:29 AEDT 2023
;; MSG SIZE rcvd: 315
```

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

```

z5417590@vx12:~$ dig google.com NS
; <<> DiG 9.16.44-Debian <<> google.com NS
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 61990
;; flags: qr rd ra; QUERY: 1, ANSWER: 4, AUTHORITY: 0, ADDITIONAL: 9
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 6afaf36224a0ac0701000000651e1e9962c29b4350fb793f (good)
;; QUESTION SECTION:
;google.com.
;
;
;; ANSWER SECTION:
google.com.      17605 IN      NS      ns1.google.com.
google.com.      17605 IN      NS      ns4.google.com.
google.com.      17605 IN      NS      ns3.google.com.
google.com.      17605 IN      NS      ns2.google.com.
;
;; ADDITIONAL SECTION:
ns1.google.com.  166379 IN      A       216.239.32.10
ns2.google.com.  65216  IN      A       216.239.34.10
ns3.google.com.  165119 IN      A       216.239.36.10
ns4.google.com.  162010 IN      A       216.239.38.10
ns1.google.com.  104490 IN      AAAA    2001:4860:4802:32::a
ns2.google.com.  104490 IN      AAAA    2001:4860:4802:34::a
ns3.google.com.  104490 IN      AAAA    2001:4860:4802:36::a
ns4.google.com.  104490 IN      AAAA    2001:4860:4802:38::a
;
;; Query time: 0 msec
;; SERVER: 129.94.242.2#53(129.94.242.2)
;; WHEN: Thu Oct 05 13:25:29 AEDT 2023
;; MSG SIZE rcvd: 315

z5417590@vx12:~$ dig @ns1.google.com. google.com MX
; <<> DiG 9.16.44-Debian <<> @ns1.google.com. google.com MX
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 37953
;; flags: qr aa rd; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 10
;; WARNING: recursion requested but not available
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 512
;; QUESTION SECTION:
;google.com.
;
;
;; ANSWER SECTION:
google.com.      300 IN      MX      10 smtp.google.com.
;
;; ADDITIONAL SECTION:
smtp.google.com. 300 IN      A       74.125.68.27
smtp.google.com. 300 IN      A       64.233.170.27
smtp.google.com. 300 IN      A       64.233.170.26
smtp.google.com. 300 IN      A       142.251.175.27
smtp.google.com. 300 IN      A       142.251.175.26
smtp.google.com. 300 IN      AAAA    2404:6800:4003:c02::1a
smtp.google.com. 300 IN      AAAA    2404:6800:4003:c1a::1a
smtp.google.com. 300 IN      AAAA    2404:6800:4003:c1a::1b
smtp.google.com. 300 IN      AAAA    2404:6800:4003:c1c::1a
;
;; Query time: 91 msec
;; SERVER: 216.239.32.10#53(216.239.32.10)
;; WHEN: Thu Oct 05 13:27:20 AEDT 2023
;; MSG SIZE rcvd: 252

```

First find the name servers of google.com. Using one of these servers we can find the authoritative answer for the mail servers for google.com. We know it is authoritative because the flag has aa. The type of DNS query used is MX.

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, flute00.cse.unsw.edu.au or flute01.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?

6 DNS servers are queried to get the authoritative answer. The IP address of lyre00.cse.unsw.edu.au is 129.94.210.20.

	DNS screenshots
Root Domain	<pre> z5417590@vx04:~\$ dig . NS ; <<> DiG 9.16.44-Debian <<> . NS ;; global options: +cmd ;; Got answer: ;; -->HEADER<-- opcode: QUERY, status: NOERROR, id: 49021 ;; flags: qr rd ra ad; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 27 ;; OPT PSEUDOSECTION: ; EDNS: version: 0, flags:; udp: 1232 ; COOKIE: ae0d1186051624da0100000065229cc8e7508731b2f6c65e (good) ;; QUESTION SECTION: . IN NS ;; ANSWER SECTION: . 43701 IN NS m.root-servers.net. . 43701 IN NS e.root-servers.net. . 43701 IN NS b.root-servers.net. . 43701 IN NS a.root-servers.net. . 43701 IN NS c.root-servers.net. . 43701 IN NS i.root-servers.net. . 43701 IN NS k.root-servers.net. . 43701 IN NS g.root-servers.net. . 43701 IN NS d.root-servers.net. . 43701 IN NS f.root-servers.net. . 43701 IN NS h.root-servers.net. . 43701 IN NS j.root-servers.net. . 43701 IN NS l.root-servers.net. ADDITIONAL SECTION: root-servers.net. 302904 IN A 198.41.0.4 root-servers.net. 310193 IN A 199.9.14.2 root-servers.net. 213624 IN A 192.33.4.1 root-servers.net. 261517 IN A 199.7.91.1 root-servers.net. 220930 IN A 192.203.23.1 root-servers.net. 319081 IN A 192.5.5.24 root-servers.net. 210798 IN A 192.112.36.1 root-servers.net. 309569 IN A 198.97.196.1 root-servers.net. 240397 IN A 192.36.148.1 root-servers.net. 282167 IN A 192.58.128.1 root-servers.net. 68102 IN A 193.0.14.1 root-servers.net. 352057 IN A 199.7.83.4 root-servers.net. 220910 IN A 202.12.27.1 root-servers.net. 113782 IN AAAA 2001:503:b::1 root-servers.net. 63888 IN AAAA 2001:500:2::1 root-servers.net. 63888 IN AAAA 2001:500:2::1 root-servers.net. 63888 IN AAAA 2001:500:2::1 root-servers.net. 300226 IN AAAA 2001:500:2::1 root-servers.net. 522540 IN AAAA 2001:500:1::1 root-servers.net. 63888 IN AAAA 2001:500:1::1 root-servers.net. 63888 IN AAAA 2001:7fe::1 root-servers.net. 63888 IN AAAA 2001:503::1 root-servers.net. 63888 IN AAAA 2001:7fd::1 root-servers.net. 63888 IN AAAA 2001:500:2::1 root-servers.net. 63888 IN AAAA 2001:dc3::1 Query time: 4 msec SERVER: 129.94.242.2#53(129.94.242.2) WHEN: Sun Oct 08 23:12:56 AEDT 2023 MSG SIZE rcvd: 851 </pre>

<p>A root server</p> <p>dig @a.root-servers.net. .au NS</p>	<pre>z5417590@vx04:~\$ dig @a.root-servers.net. .au NS dig: '.au' is not a legal name (empty label) z5417590@vx04:~\$ dig @a.root-servers.net. au. NS ; <<> DiG 9.16.44-Debian <<> @a.root-servers.net. au. NS ; (1 server found) ;; global options: +cmd ;; Got answer: ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 38712 ;; 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: 96 msec ;; SERVER: 198.41.0.4#53(198.41.0.4) ;; WHEN: Sun Oct 08 23:15:14 AEDT 2023 ;; MSG SIZE rcvd: 271</pre>	
<p>q.au</p> <p>dig @q.au. edu.au. NS</p>	<pre>z5417590@vx04:~\$ dig @q.au. edu.au. NS ; <<> DiG 9.16.44-Debian <<> @q.au. edu.au. NS ; (1 server found) ;; global options: +cmd ;; Got answer: ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 30550 ;; 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: ;q.au. IN NS ;; ANSWER SECTION: edu.au. 900 IN NS r.au. edu.au. 900 IN NS s.au. edu.au. 900 IN NS t.au. edu.au. 900 IN NS q.au. ;; Query time: 4 msec ;; SERVER: 65.22.196.1#53(65.22.196.1) ;; WHEN: Sun Oct 08 23:16:22 AEDT 2023 ;; MSG SIZE rcvd: 99</pre>	

edu.au dig @q.au. unsw.edu.au NS	<pre>z5417590@vx04:~\$ dig @q.au. unsw.edu.au NS ; <<> DiG 9.16.44-Debian <<> @q.au. unsw.edu.au NS ; (1 server found) ;; global options: +cmd ;; Got answer: ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 46963 ;; 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 ns1.unsw.edu.au. unsw.edu.au. 900 IN NS ns3.unsw.edu.au. unsw.edu.au. 900 IN NS ns2.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: 4 msec ;; SERVER: 65.22.196.1#53(65.22.196.1) ;; WHEN: Sun Oct 08 23:18:54 AEDT 2023 ;; MSG SIZE rcvd: 198</pre>	
Unsw.edu.au dig @ns1.unsw.edu.au. cse.unsw.edu.au NS	<pre>z5417590@vx04:~\$ dig @ns1.unsw.edu.au. cse.unsw.edu.au NS ; <<> DiG 9.16.44-Debian <<> @ns1.unsw.edu.au. cse.unsw.edu.au NS ; (1 server found) ;; global options: +cmd ;; Got answer: ;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 60594 ;; 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 maestro.orchestra.cse.unsw.edu.au. cse.unsw.edu.au. 300 IN NS beethoven.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 129.94.242.33 maestro.orchestra.cse.unsw.edu.au. 300 IN A 129.94.242.33 ;; Query time: 4 msec ;; SERVER: 129.94.0.192#53(129.94.0.192) ;; WHEN: Sun Oct 08 23:20:23 AEDT 2023 ;; MSG SIZE rcvd: 164</pre>	

Beethoven.orchestra.cse.unsw.edu.au
dig
@beethoven.orchestra.cse.unsw.edu.au.
lyre00.cse.unsw.edu.au A

```
z5417590@vx04:~$ dig @beethoven.orchestra.cse.unsw.edu.au. lyre00.cse.unsw.edu.  
; <<> DiG 9.16.44-Debian <<> @beethoven.orchestra.cse.unsw.edu.au. lyre00.cse.  
w.edu.au A  
; (1 server found)  
;; global options: +cmd  
;; Got answer:  
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 20879  
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1  
  
;; OPT PSEUDOSECTION:  
; EDNS: version: 0, flags:; udp: 1232  
; COOKIE: 67e365b7cb81088e0100000065229eec52d0c520662f1200 (good)  
;; QUESTION SECTION:  
;lyre00.cse.unsw.edu.au.                IN      A  
  
;; ANSWER SECTION:  
lyre00.cse.unsw.EDU.AU. 3600      IN      A      129.94.210.20  
  
;; Query time: 0 msec  
;; SERVER: 129.94.242.2#53(129.94.242.2)  
;; WHEN: Sun Oct 08 23:22:04 AEDT 2023  
;; MSG SIZE rcvd: 117
```

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

Yes, a machine can have several names or IP addresses. IP addresses can have multiples aliases associated with them.