COMP 3203 Assignment 2

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1.

    a. In the example in the textbook (page 120), we saw that when the client sends a line consisting of a single period, it indicates the end of the message to the server.

```
S: 220 hamburger.edu
C: HELO crepes.fr
S: 250 Hello crepes.fr, pleased to meet you
C: MAIL FROM: <alice@crepes.fr>
S: 250 alice@crepes.fr ... Sender ok
C: RCPT TO: <bob@hamburger.edu>
S: 250 bob@hamburger.edu ... Recipient ok
C: DATA
S: 354 Enter mail, end with "." on a line by
itself
C: Do you like ketchup?
C: How about pickles?
C: .
S: 250 Message accepted for delivery
C: QUIT
S: 221 hamburger.edu closing connection
```

    b. The HTTP uses the Content Length header field to indicate length of a header field

```
HTTP/1.1 200 OK
Connection: close
Date: Tue, 18 Aug 2015 15:44:04 GMT
Server: Apache/2.2.3 (CentOS)
Last-Modified: Tue, 18 Aug 2015 15:11:03 GMT
Content-Length: 6821
Content-Type: text/html

(data data data data data ...)
```

    c. No, since HTTP messages could be binary data (since they are more efficient to parse and leads to slightly smaller frames and are less error prone) whereas in SMTP the message body must be in ASCII format. Therefore we cannot use the same method for HTTP and SMTP to mark the end of a message body.

2.
   a. Delegation chain for cisl.carleton.ca

   Command 1: dig +trace cisl.carleton.ca

```
C:\Users\nirmi>dig +trace cisl.carleton.ca

; <<>> DiG 9.16.25 <<>> +trace cisl.carleton.ca
;; global options: +cmd
.                       338523  IN      NS      f.root-servers.net.
.                       338523  IN      NS      j.root-servers.net.
.                       338523  IN      NS      c.root-servers.net.
.                       338523  IN      NS      a.root-servers.net.
.                       338523  IN      NS      b.root-servers.net.
.                       338523  IN      NS      d.root-servers.net.
.                       338523  IN      NS      l.root-servers.net.
.                       338523  IN      NS      e.root-servers.net.
.                       338523  IN      NS      k.root-servers.net.
.                       338523  IN      NS      h.root-servers.net.
.                       338523  IN      NS      m.root-servers.net.
.                       338523  IN      NS      g.root-servers.net.
.                       338523  IN      NS      i.root-servers.net.
.                       338523  IN      RRSIG   NS 8 0 518400 20220225170000 20220212160000 9799 . W3Wpzu80BLP1zBYUpt
m7X36eE8usDH0TzYpqoOAKKZ/QLJY+JEy+w3TB xy4KEsp2kNAhyxskaHh9Wtl0ACRqAZMcIkIMSi6+Xwlqz459osbnx2RB 020iL9Qbu0edgKTnmw+6A
9FfVL9k83eyhO/lzmsgtuQKhYjZd6c6WF4h P0ekCMJ+mMcrTw4dwyMp3iYxeT0UIV0fPCZnTdf8fuhqoVUb4uMeg+Vh yhPGYj2WrTAY/zPdpiQG6CQN
DHqyZc0wiwBTZlj+7u9oRdWSXc46PUgK lLTePDVnFCxhwOjR4nlMTC/iNkQpbGE0O3WWvrURbwaCcCFMZZppaM84 up4FyA==
;; Received 1097 bytes from 192.168.2.1#53(192.168.2.1) in 11 ms

ca.                     172800  IN      NS      any.ca-servers.ca.
ca.                     172800  IN      NS      x.ca-servers.ca.
ca.                     172800  IN      NS      c.ca-servers.ca.
ca.                     172800  IN      NS      j.ca-servers.ca.
ca.                     86400   IN      DS      48662 8 2 B88605073AE242E4917A795ADA1EAC2580C0FA9D622B228926FECB40 8B
41C3F9
ca.                     86400   IN      RRSIG   DS 8 1 86400 20220225170000 20220212160000 9799 . TNlxJxa2p+MVZdSX7yL
XkqQ/1zilYm1fV0OcSMYFH6BAGEUhiEx40gEb ONUOPiPOq2s4tRhKYsfiS9xyvLT0lDZBU57zv02Q806nyIdfXUk/84EX pa1QVEq6SsMvgD9Iy//v9T
dSvb++ytaMVEP9xqgaHU5N/AI1yrkIOUBy nIyEQcwxOED/izYAXkKYltlwSHGho8BPWwMVAUFOL8J+MCMxe5/0fQRO qeWgsOq8tUnJwvFeHb4NMlUxK
Mr0f5Pe4qYBlFSxaB9g6CQ6iWp+A7pd enPe+N6U1GwC8UK4A18c3kVy3D8cBivhvGJ2026S3p40I1F08HsgGv9R VGPZ+Q==
;; Received 633 bytes from 198.41.0.4#53(a.root-servers.net) in 28 ms

carleton.ca.            86400   IN      NS      ns1.d-zone.ca.
carleton.ca.            86400   IN      NS      ns1.carleton.ca.
carleton.ca.            86400   IN      NS      ns2.d-zone.ca.
carleton.ca.            86400   IN      NS      ns2.carleton.ca.
t8k75i4tj36jf102o518ir5q4l99kmqm.ca. 3600 IN NSEC3 1 1 5 - T8M1UC6TIL2UFI0RBGM0I9U6PO9HL5UU NS SOA RRSIG DNSKEY NSEC3
PARAM
74g25r787jg24qikgb8mhamfr9ll9vbb.ca. 3600 IN NSEC3 1 1 5 - 74H3DTD6SLM6868R1FBAI0Q9K9PQ3G26 NS DS RRSIG
t8k75i4tj36jf102o518ir5q4l99kmqm.ca. 3600 IN RRSIG NSEC3 8 2 3600 20220217133029 20220210162833 44701 ca. cEoD3Ve3ImA
4EWuV4oXqtDXPyM1JjCWsTQ1ZKl/wSLMTs68paI0mvDwN WhtvHJWPEUJlxri7JZ2ZDYj4gxy86SMcbjzHnN1TeMQd7i1XmZNn3yZ3 OHCNglZTewbRnM
Hjmya4G+Jqvfbxsay6PQUg74EJN/mUkGvTsLfRHVsR bFQ=
74g25r787jg24qikgb8mhamfr9ll9vbb.ca. 3600 IN RRSIG NSEC3 8 2 3600 20220217061527 20220210162833 44701 ca. J/B5YBmTofA
ov8x9d1IvELFGcI9CPGIBlV1qsClUWCac3Aa4TVgNvASF AQ26xx86Q0fs404imptlWAr69seUiCJ5O3tPJLSO88P9MXR1Hb8UUhqk tgGW9fBalg2aLK
pHngX00Fb0kn9dFMRlMO+mbyMzFGe4w5Qt3oQ5dx2h K/c=
;; Received 752 bytes from 199.4.144.2#53(any.ca-servers.ca) in 18 ms

cisl.carleton.ca.       14400   IN      A       134.117.225.9
;; Received 89 bytes from 134.117.253.195#53(ns1.carleton.ca) in 17 ms
```

I will be using the following for the commands
f.root-servers.net
x.ca-servers.ca
ns1.carleton.ca

Second command: dig +norecurse @a.root-servers.net any cisl.carleton.ca

```
;; AUTHORITY SECTION:
ca.                     172800  IN      NS      any.ca-servers.ca.
ca.                     172800  IN      NS      x.ca-servers.ca.
ca.                     172800  IN      NS      c.ca-servers.ca.
ca.                     172800  IN      NS      j.ca-servers.ca.

;; ADDITIONAL SECTION:
any.ca-servers.ca.      172800  IN      A       199.4.144.2
any.ca-servers.ca.      172800  IN      AAAA    2001:500:a7::2
x.ca-servers.ca.        172800  IN      A       199.253.250.68
x.ca-servers.ca.        172800  IN      AAAA    2620:10a:80ba::68
c.ca-servers.ca.        172800  IN      A       185.159.196.2
c.ca-servers.ca.        172800  IN      AAAA    2620:10a:8053::2
j.ca-servers.ca.        172800  IN      A       198.182.167.1
j.ca-servers.ca.        172800  IN      AAAA    2001:500:83::1
```

Third Command: dig +norecurse @c.ca-servers.ca any cisl.carleton.ca

```
;; AUTHORITY SECTION:
carleton.ca.            86400   IN      NS      ns1.d-zone.ca.
carleton.ca.            86400   IN      NS      ns1.carleton.ca.
carleton.ca.            86400   IN      NS      ns2.d-zone.ca.
carleton.ca.            86400   IN      NS      ns2.carleton.ca.

;; ADDITIONAL SECTION:
ns1.carleton.ca.        86400   IN      A       134.117.253.195
ns2.carleton.ca.        86400   IN      A       134.117.253.196
ns1.d-zone.ca.          86400   IN      A       162.219.54.2
ns1.d-zone.ca.          86400   IN      AAAA    2620:10a:80eb::2
ns2.d-zone.ca.          86400   IN      A       162.219.55.2
ns2.d-zone.ca.          86400   IN      AAAA    2620:10a:80ec::2
```

Fourth Command: dig +norecurse @ns1.carleton.ca any cisl.carleton.ca

```
; <<>> DiG 9.16.25 <<>> +norecurse @ns1.carleton.ca any cisl.carleton.ca
; (1 server found)
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 53868
;; flags: qr aa; QUERY: 1, ANSWER: 5, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 4096
; COOKIE: 5d592ac2f53dea9f85df07786208565b506e7622796da080 (good)
;; QUESTION SECTION:
;cisl.carleton.ca.              IN      ANY

;; ANSWER SECTION:
cisl.carleton.ca.       14400   IN      NS      ns1.carleton.ca.
cisl.carleton.ca.       14400   IN      NS      mario.ccsl.carleton.ca.
cisl.carleton.ca.       14400   IN      NS      zelda.ccsl.carleton.ca.
cisl.carleton.ca.       14400   IN      A       134.117.225.9
cisl.carleton.ca.       14400   IN      SOA     mario.ccsl.carleton.ca. admin.ccsl.carleton.ca. 2021110502 3600 3600 1209600 3600

;; Query time: 15 msec
;; SERVER: 134.117.253.195#53(134.117.253.195)
;; WHEN: Sat Feb 12 19:52:44 Eastern Standard Time 2022
;; MSG SIZE  rcvd: 194
```

From here we get the IP address to be 134.117.225.9

b. Running the dig command for stem.open.ac.uk we get

We will use the following delegation chain for getting the site IP address

d.root-servers.net

nsa.nic.uk

ns0.ja.net

dns2.easydns.net

Second Command: dig +norecurse @a.root-servers.net any stem.open.ac.uk

```
;; AUTHORITY SECTION:
uk.                     172800  IN      NS      dns1.nic.uk.
uk.                     172800  IN      NS      dns4.nic.uk.
uk.                     172800  IN      NS      nsa.nic.uk.
uk.                     172800  IN      NS      nsd.nic.uk.
uk.                     172800  IN      NS      nsc.nic.uk.
uk.                     172800  IN      NS      nsb.nic.uk.
uk.                     172800  IN      NS      dns3.nic.uk.
uk.                     172800  IN      NS      dns2.nic.uk.

;; ADDITIONAL SECTION:
dns1.nic.uk.            172800  IN      A       213.248.216.1
dns1.nic.uk.            172800  IN      AAAA    2a01:618:400::1
dns4.nic.uk.            172800  IN      A       43.230.48.1
dns4.nic.uk.            172800  IN      AAAA    2401:fd80:404::1
nsa.nic.uk.             172800  IN      A       156.154.100.3
nsa.nic.uk.             172800  IN      AAAA    2001:502:ad09::3
nsd.nic.uk.             172800  IN      A       156.154.103.3
nsd.nic.uk.             172800  IN      AAAA    2610:a1:1010::3
nsc.nic.uk.             172800  IN      A       156.154.102.3
nsc.nic.uk.             172800  IN      AAAA    2610:a1:1009::3
nsb.nic.uk.             172800  IN      A       156.154.101.3
nsb.nic.uk.             172800  IN      AAAA    2001:502:2eda::3
dns3.nic.uk.            172800  IN      A       213.248.220.1
dns3.nic.uk.            172800  IN      AAAA    2a01:618:404::1
dns2.nic.uk.            172800  IN      A       103.49.80.1
dns2.nic.uk.            172800  IN      AAAA    2401:fd80:400::1
```

Third Command: dig +norecurse @nsa.nic.uk any stem.open.ac.uk

```
;; AUTHORITY SECTION:
ac.uk.                  172800  IN      NS      ns3.ja.net.
ac.uk.                  172800  IN      NS      ns1.surfnet.nl.
ac.uk.                  172800  IN      NS      ns0.ja.net.
ac.uk.                  172800  IN      NS      dns-3.dfn.de.
ac.uk.                  172800  IN      NS      ns4.ja.net.
ac.uk.                  172800  IN      NS      ns2.ja.net.
ac.uk.                  172800  IN      NS      auth03.ns.uu.net.
```

Fourth Command: dig +norecurse @ns0.ja.net any stem.open.ac.uk

```
;; AUTHORITY SECTION:
open.ac.uk.             86400   IN      NS      ns5.dnsmadeeasy.com.
open.ac.uk.             86400   IN      NS      dns1.easydns.com.
open.ac.uk.             86400   IN      NS      nse-2.open.ac.uk.
open.ac.uk.             86400   IN      NS      nse-1.open.ac.uk.
open.ac.uk.             86400   IN      NS      ns7.dnsmadeeasy.com.
open.ac.uk.             86400   IN      NS      ns6.dnsmadeeasy.com.
open.ac.uk.             86400   IN      NS      dns3.easydns.org.
open.ac.uk.             86400   IN      NS      dns2.easydns.net.
open.ac.uk.             86400   IN      NS      nse-0.open.ac.uk.

;; ADDITIONAL SECTION:
nse-0.open.ac.uk.       86400   IN      A       137.108.198.108
nse-1.open.ac.uk.       86400   IN      A       137.108.198.109
nse-2.open.ac.uk.       86400   IN      A       137.108.198.110
```

Fifth Command: dig +norecurse @dns2.easydns.net any stem.open.ac.uk

```
;; ANSWER SECTION:
stem.open.ac.uk.        3600    IN      A       137.108.200.32
```

The IP address is 137.108.200.32