Screenshots

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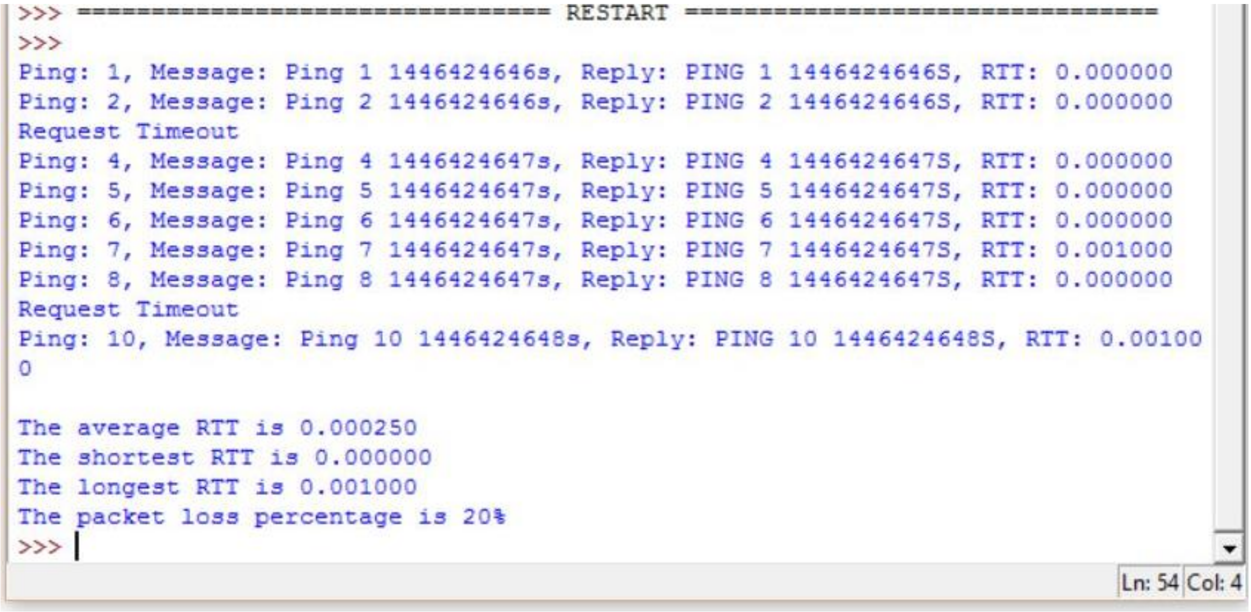
Part 1: UDP

Q1

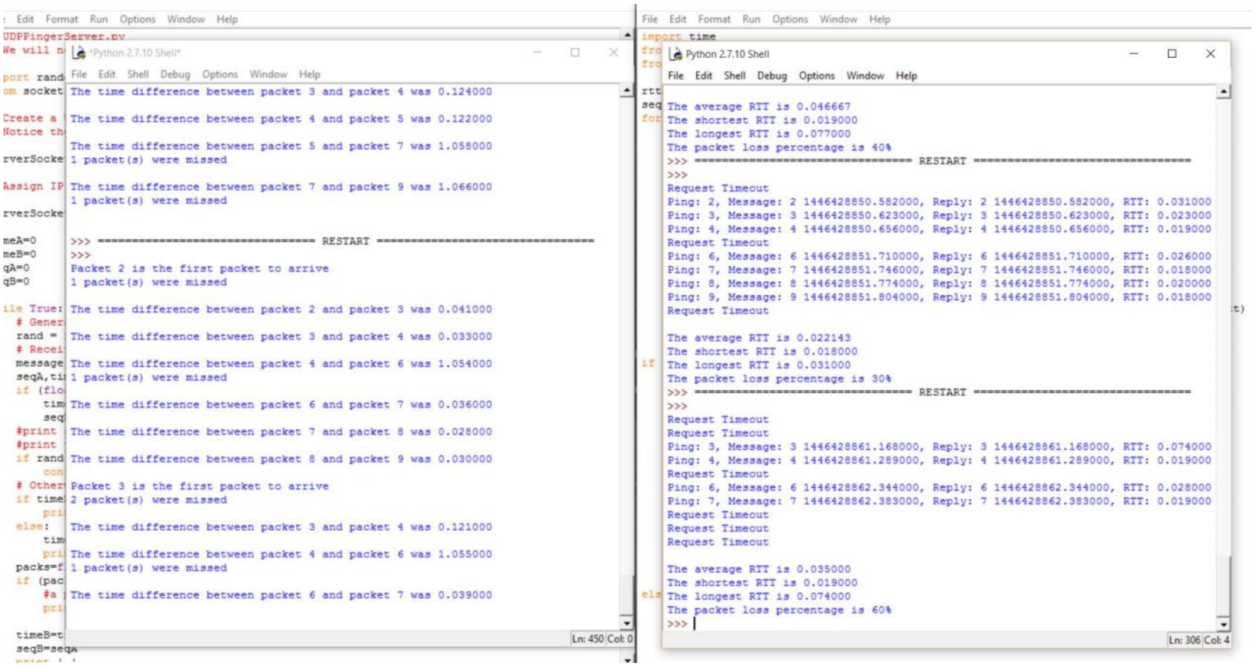
The client ping program output.



```
>>> ================================ RESTART ================================
>>>
Ping: 1, Message: Ping 1 1446424646s, Reply: PING 1 1446424646S, RTT: 0.000000
Ping: 2, Message: Ping 2 1446424646s, Reply: PING 2 1446424646S, RTT: 0.000000
Request Timeout
Ping: 4, Message: Ping 4 1446424647s, Reply: PING 4 1446424647S, RTT: 0.000000
Ping: 5, Message: Ping 5 1446424647s, Reply: PING 5 1446424647S, RTT: 0.000000
Ping: 6, Message: Ping 6 1446424647s, Reply: PING 6 1446424647S, RTT: 0.000000
Ping: 7, Message: Ping 7 1446424647s, Reply: PING 7 1446424647S, RTT: 0.001000
Ping: 8, Message: Ping 8 1446424647s, Reply: PING 8 1446424647S, RTT: 0.000000
Request Timeout
Ping: 10, Message: Ping 10 1446424648s, Reply: PING 10 1446424648S, RTT: 0.00100
0

The average RTT is 0.000250
The shortest RTT is 0.000000
The longest RTT is 0.001000
The packet loss percentage is 20%
>>> 
```

Q2

The client and server heartbeat program output. Note the lab provided little specification so I assumed it was a slight variation on ping that told the server to check for the time difference and sequence numbers between pings.

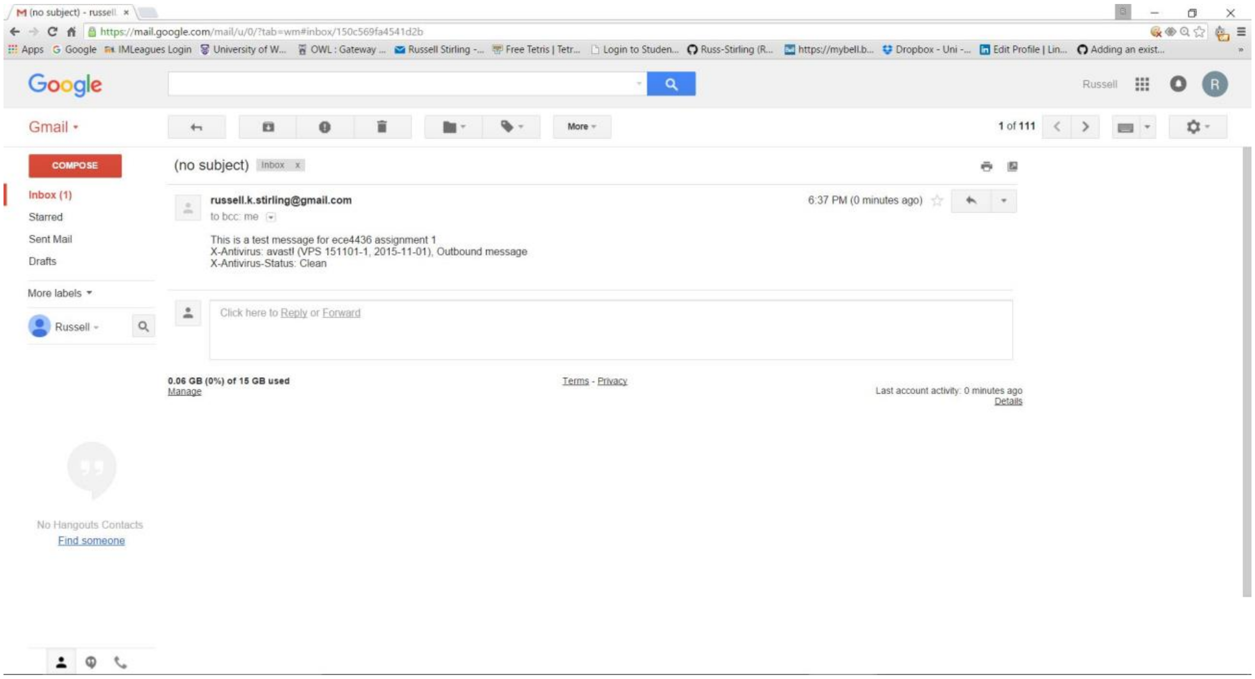


```
The time difference between packet 3 and packet 4 was 0.124000

The time difference between packet 4 and packet 5 was 0.122000

The time difference between packet 5 and packet 7 was 1.058000
1 packet(s) were missed

The time difference between packet 7 and packet 9 was 1.066000
1 packet(s) were missed


>>> ================================ RESTART ================================
>>>
Packet 2 is the first packet to arrive
1 packet(s) were missed

The time difference between packet 2 and packet 3 was 0.041000

The time difference between packet 3 and packet 4 was 0.033000

The time difference between packet 4 and packet 6 was 1.054000
1 packet(s) were missed

The time difference between packet 6 and packet 7 was 0.036000

The time difference between packet 7 and packet 8 was 0.028000

The time difference between packet 8 and packet 9 was 0.030000

Packet 3 is the first packet to arrive
2 packet(s) were missed

The time difference between packet 3 and packet 4 was 0.121000

The time difference between packet 4 and packet 6 was 1.055000
1 packet(s) were missed

The time difference between packet 6 and packet 7 was 0.039000
```

```
The average RTT is 0.046667
The shortest RTT is 0.019000
The longest RTT is 0.077000
The packet loss percentage is 40%
>>> ================================ RESTART ================================
>>>
Request Timeout
Ping: 2, Message: 2 1446428850.582000, Reply: 2 1446428850.582000, RTT: 0.031000
Ping: 3, Message: 3 1446428850.623000, Reply: 3 1446428850.623000, RTT: 0.023000
Ping: 4, Message: 4 1446428850.656000, Reply: 4 1446428850.656000, RTT: 0.019000
Request Timeout
Ping: 6, Message: 6 1446428851.710000, Reply: 6 1446428851.710000, RTT: 0.026000
Ping: 7, Message: 7 1446428851.746000, Reply: 7 1446428851.746000, RTT: 0.018000
Ping: 8, Message: 8 1446428851.774000, Reply: 8 1446428851.774000, RTT: 0.020000
Ping: 9, Message: 9 1446428851.804000, Reply: 9 1446428851.804000, RTT: 0.018000
Request Timeout

The average RTT is 0.022143
The shortest RTT is 0.018000
The longest RTT is 0.031000
The packet loss percentage is 30%
>>> ================================ RESTART ================================
>>>
Request Timeout
Request Timeout
Ping: 3, Message: 3 1446428861.168000, Reply: 3 1446428861.168000, RTT: 0.074000
Ping: 4, Message: 4 1446428861.289000, Reply: 4 1446428861.289000, RTT: 0.019000
Request Timeout
Ping: 6, Message: 6 1446428862.344000, Reply: 6 1446428862.344000, RTT: 0.028000
Ping: 7, Message: 7 1446428862.383000, Reply: 7 1446428862.383000, RTT: 0.019000
Request Timeout
Request Timeout
Request Timeout

The average RTT is 0.035000
The shortest RTT is 0.019000
The longest RTT is 0.074000
The packet loss percentage is 60%
>>>
```

Part 2: SMTP

The email which arrived in my inbox.



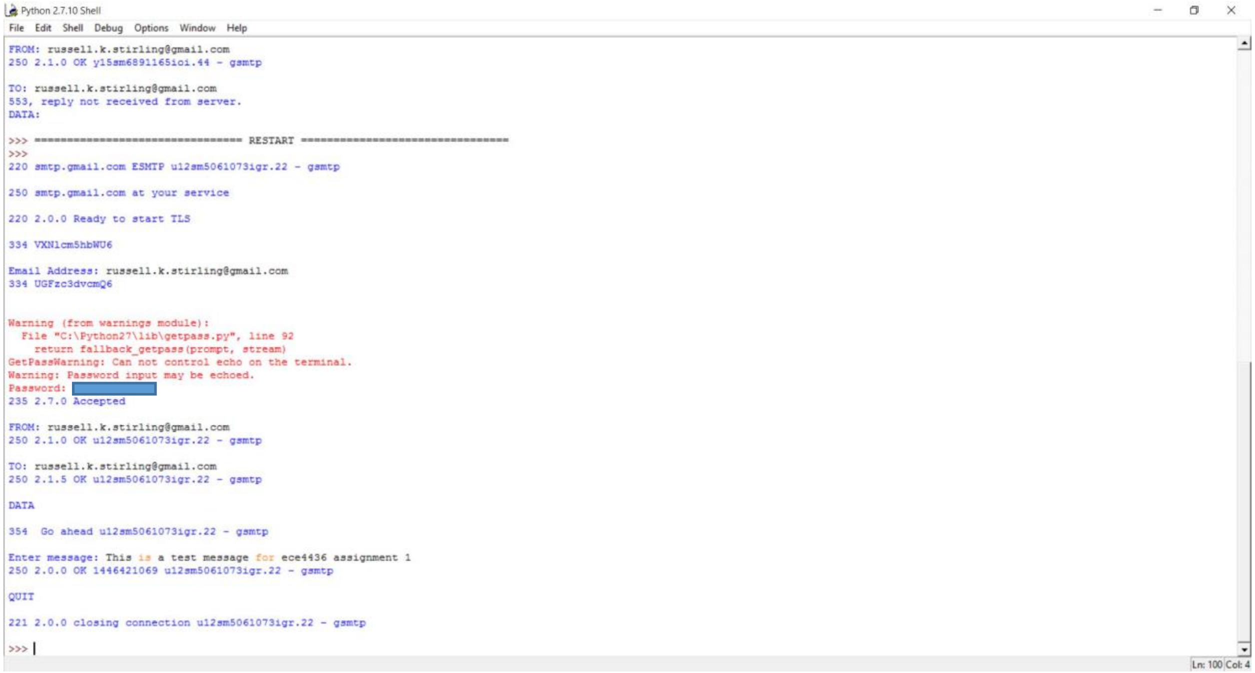
(no subject) Inbox

russell.k.stirling@gmail.com 6:37 PM (0 minutes ago)
to bcc: me

This is a test message for ece4436 assignment 1
X-Antivirus: avast! (VPS 151101-1, 2015-11-01), Outbound message
X-Antivirus-Status: Clean

https://mail.google.com/mail/u/0/?tab=wm#inbox/150c569fa4541d2b
Gmail
COMPOSE
Inbox (1)
Starred
Sent Mail
Drafts
More labels
Russell
1 of 111
Click here to Reply or Forward
0.06 GB (0%) of 15 GB used
Manage
Terms - Privacy
Last account activity: 0 minutes ago
Details
No Hangouts Contacts
Find someone

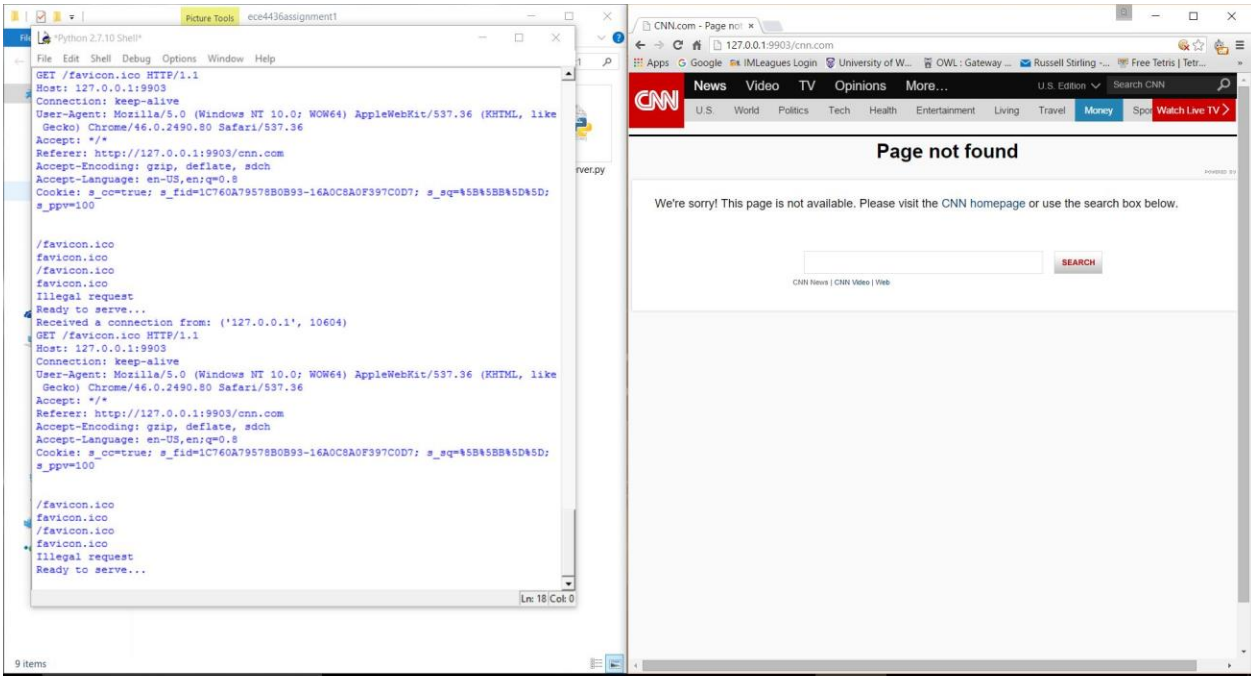
The shell output for the email client.



```
FROM: russell.k.stirling@gmail.com
250 2.1.0 OK y15sm6891165ioi.44 - gsmtp

TO: russell.k.stirling@gmail.com
553, reply not received from server.
DATA:

>>> ================================ RESTART ================================
>>>
220 smtp.gmail.com ESMTP u12sm5061073igr.22 - gsmtp

250 smtp.gmail.com at your service

220 2.0.0 Ready to start TLS

334 VXNlcm5hbWU6

Email Address: russell.k.stirling@gmail.com
334 UGFzc3dvcmQ6


Warning (from warnings module):
  File "C:\Python27\lib\getpass.py", line 92
    return fallback_getpass(prompt, stream)
GetPassWarning: Can not control echo on the terminal.
Warning: Password input may be echoed.
Password: [redacted]
235 2.7.0 Accepted

FROM: russell.k.stirling@gmail.com
250 2.1.0 OK u12sm5061073igr.22 - gsmtp

TO: russell.k.stirling@gmail.com
250 2.1.5 OK u12sm5061073igr.22 - gsmtp

DATA

354  Go ahead u12sm5061073igr.22 - gsmtp

Enter message: This is a test message for ece4436 assignment 1
250 2.0.0 OK 1446421069 u12sm5061073igr.22 - gsmtp

QUIT

221 2.0.0 closing connection u12sm5061073igr.22 - gsmtp

>>> |
```

Part 3: HTTP Web Proxy Server

The shell and output at first site attempt of cnn.com.



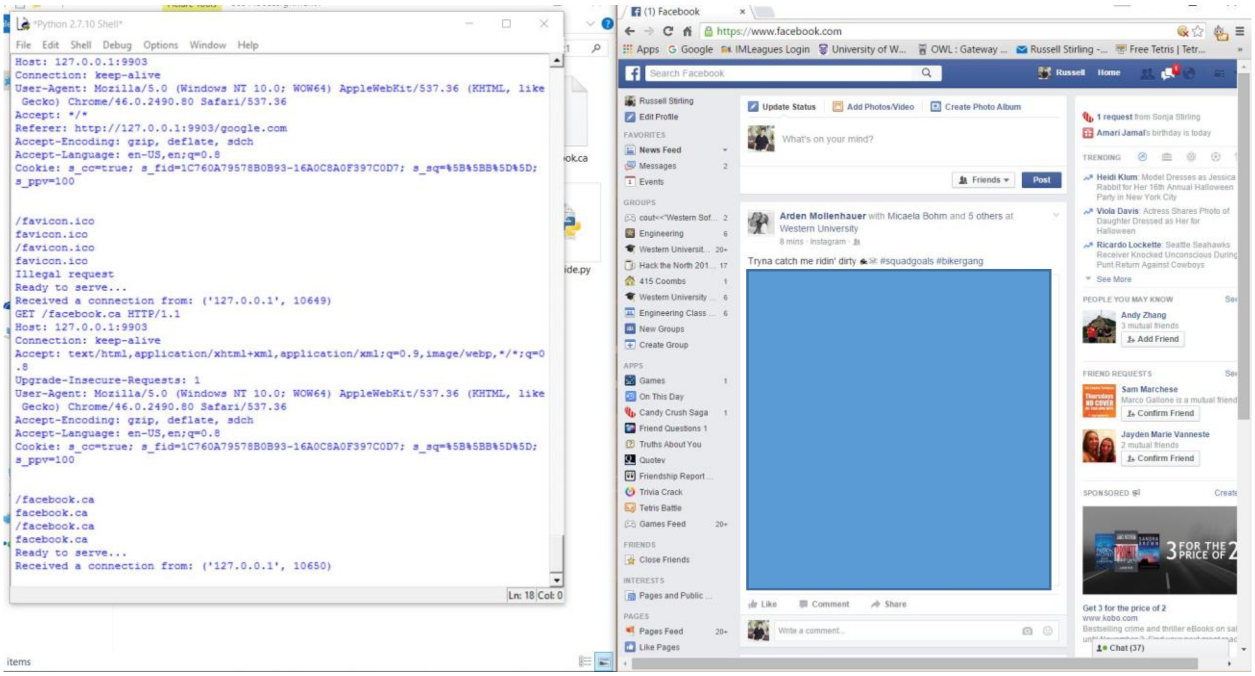
Picture Tools
ece4436assignment1
Python 2.7.10 Shell
File Edit Shell Debug Options Window Help
Ln: 18 Col: 0
9 items
CNN.com - Page not
127.0.0.1:9903/cnn.com
Apps Google IMLeagues Login University of W... OWL : Gateway ... Russell Stirling -... Free Tetris | Tetr...
CNN
News Video TV Opinions More...
U.S. Edition
Search CNN
U.S. World Politics Tech Health Entertainment Living Travel Money Spor
Watch Live TV
SEARCH
CNN News | CNN Video | Web

```
GET /favicon.ico HTTP/1.1
Host: 127.0.0.1:9903
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like
 Gecko) Chrome/46.0.2490.80 Safari/537.36
Accept: */*
Referer: http://127.0.0.1:9903/cnn.com
Accept-Encoding: gzip, deflate, sdch
Accept-Language: en-US,en;q=0.8
Cookie: s_cc=true; s_fid=1C760A79578B0B93-16A0C8A0F397C0D7; s_sq=%5B%5BB%5D%5D;
s_ppv=100


/favicon.ico
favicon.ico
/favicon.ico
favicon.ico
Illegal request
Ready to serve...
Received a connection from: ('127.0.0.1', 10604)
GET /favicon.ico HTTP/1.1
Host: 127.0.0.1:9903
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like
 Gecko) Chrome/46.0.2490.80 Safari/537.36
Accept: */*
Referer: http://127.0.0.1:9903/cnn.com
Accept-Encoding: gzip, deflate, sdch
Accept-Language: en-US,en;q=0.8
Cookie: s_cc=true; s_fid=1C760A79578B0B93-16A0C8A0F397C0D7; s_sq=%5B%5BB%5D%5D;
s_ppv=100


/favicon.ico
favicon.ico
/favicon.ico
favicon.ico
Illegal request
Ready to serve...
```

Page not found

We're sorry! This page is not available. Please visit the CNN homepage or use the search box below.

The shell and output at a successfully loaded webpage.



```
Host: 127.0.0.1:9903
Connection: keep-alive
User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like
 Gecko) Chrome/46.0.2490.80 Safari/537.36
Accept: */*
Referer: http://127.0.0.1:9903/google.com
Accept-Encoding: gzip, deflate, sdch
Accept-Language: en-US,en;q=0.8
Cookie: s_cc=true; s_fid=1C760A79578B0B93-16A0C8A0F397C0D7; s_sq=%5B%5BB%5D%5D;
s_ppv=100


/favicon.ico
favicon.ico
/favicon.ico
favicon.ico
Illegal request
Ready to serve...
Received a connection from: ('127.0.0.1', 10649)
GET /facebook.ca HTTP/1.1
Host: 127.0.0.1:9903
Connection: keep-alive
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0
.8
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; WOW64) AppleWebKit/537.36 (KHTML, like
 Gecko) Chrome/46.0.2490.80 Safari/537.36
Accept-Encoding: gzip, deflate, sdch
Accept-Language: en-US,en;q=0.8
Cookie: s_cc=true; s_fid=1C760A79578B0B93-16A0C8A0F397C0D7; s_sq=%5B%5BB%5D%5D;
s_ppv=100


/facebook.ca
facebook.ca
/facebook.ca
facebook.ca
Ready to serve...
Received a connection from: ('127.0.0.1', 10650)
```