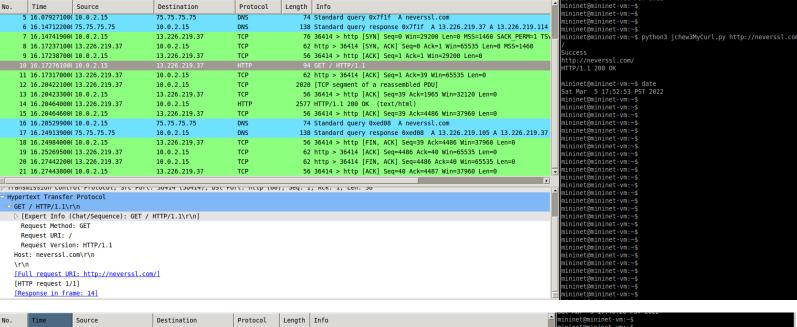Jacqueline Chew
CSE 150 Final Project
3/5/2022

How to use jchew3MyCurl.py:
- python3 jchew3MyCurl.py [fullURL] [opthostname]
- If fullURL includes an IP address, [opthostname] is required.
- If fullURL contains a domain name, [opthostname] is not required.
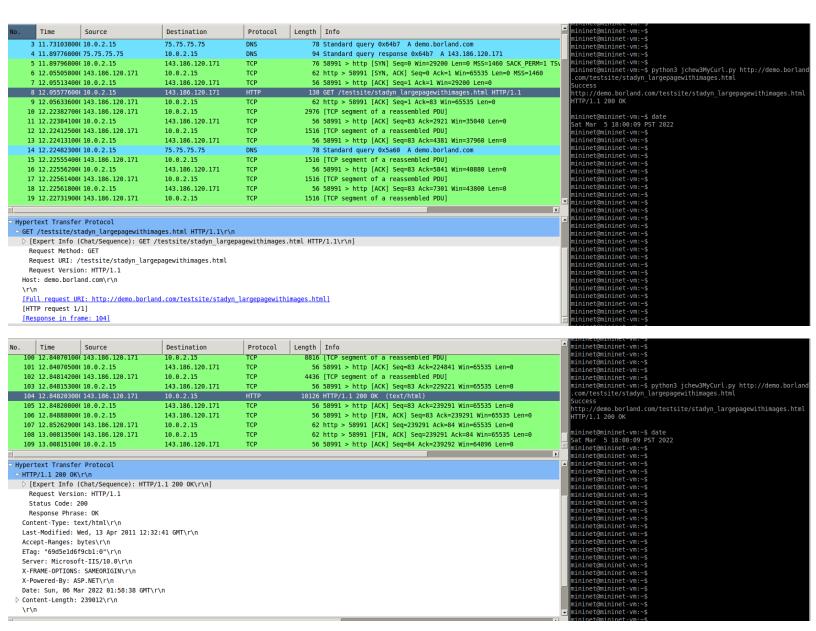
Test URLs:
- http://neverssl.com/
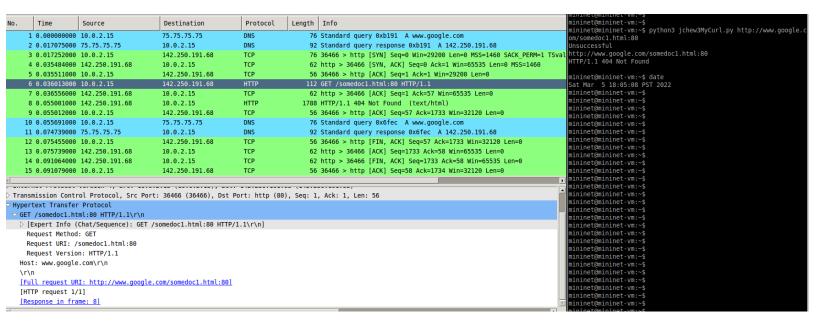 - Successful download
  - Matches Curl

- http://demo.borland.com/testsite/stadyn_largepagewithimages.html
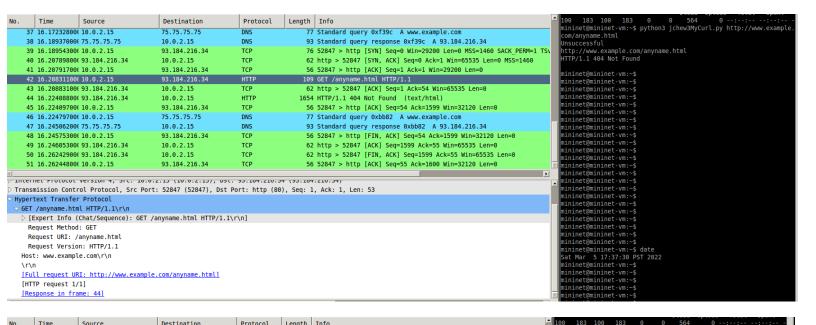 - Successful download
  - Matches Curl

- http://www.google.com/somedoc1.html:80
  - Unsuccessful download
  - Matches Curl

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.2.15	75.75.75.75	DNS	76	Standard query 0xb191 A www.google.com
2	0.017075000	75.75.75.75	10.0.2.15	DNS	92	Standard query response 0xb191 A 142.250.191.68
3	0.017252000	10.0.2.15	142.250.191.68	TCP	76	36466 > http [SYN] Seq=0 Win=29200 Len=0 MSS=1460 SACK_PERM=1 TSval
4	0.035484000	142.250.191.68	10.0.2.15	TCP	62	http > 36466 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460
5	0.035511000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [ACK] Seq=1 Ack=1 Win=29200 Len=0
6	0.036013000	10.0.2.15	142.250.191.68	HTTP	112	GET /somedoc1.html:80 HTTP/1.1
7	0.036556000	142.250.191.68	10.0.2.15	TCP	62	http > 36466 [ACK] Seq=1 Ack=57 Win=65535 Len=0
8	0.055001000	142.250.191.68	10.0.2.15	HTTP	1788	HTTP/1.1 404 Not Found (text/html)
9	0.055012000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [ACK] Seq=57 Ack=1733 Win=32120 Len=0
10	0.055691000	10.0.2.15	75.75.75.75	DNS	76	Standard query 0x6fec A www.google.com
11	0.074739000	75.75.75.75	10.0.2.15	DNS	92	Standard query response 0x6fec A 142.250.191.68
12	0.075455000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [FIN, ACK] Seq=57 Ack=1733 Win=32120 Len=0
13	0.075739000	142.250.191.68	10.0.2.15	TCP	62	http > 36466 [ACK] Seq=1733 Ack=58 Win=65535 Len=0
14	0.091064000	142.250.191.68	10.0.2.15	TCP	62	http > 36466 [FIN, ACK] Seq=1733 Ack=58 Win=65535 Len=0
15	0.091079000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [ACK] Seq=58 Ack=1734 Win=32120 Len=0

```
> Transmission Control Protocol, Src Port: 36466 (36466), Dst Port: http (80), Seq: 1, Ack: 1, Len: 56
▽ Hypertext Transfer Protocol
  ▽ GET /somedoc1.html:80 HTTP/1.1\r\n
    > [Expert Info (Chat/Sequence): GET /somedoc1.html:80 HTTP/1.1\r\n]
      Request Method: GET
      Request URI: /somedoc1.html:80
      Request Version: HTTP/1.1
    Host: www.google.com\r\n
    \r\n
    [Full request URI: http://www.google.com/somedoc1.html:80]
    [HTTP request 1/1]
    [Response in frame: 8]
```

```
mininet@mininet-vm:~$
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.google.c
om/somedoc1.html:80
Unsuccessful
http://www.google.com/somedoc1.html:80
HTTP/1.1 404 Not Found

mininet@mininet-vm:~$ date
Sat Mar  5 18:05:08 PST 2022
mininet@mininet-vm:~$
```

No.	Time	Source	Destination	Protocol	Length	Info
5	0.035511000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [ACK] Seq=1 Ack=1 Win=29200 Len=0
6	0.036013000	10.0.2.15	142.250.191.68	HTTP	112	GET /somedoc1.html:80 HTTP/1.1
7	0.036556000	142.250.191.68	10.0.2.15	TCP	62	http > 36466 [ACK] Seq=1 Ack=57 Win=65535 Len=0
8	0.055001000	142.250.191.68	10.0.2.15	HTTP	1788	HTTP/1.1 404 Not Found (text/html)
9	0.055012000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [ACK] Seq=57 Ack=1733 Win=32120 Len=0
10	0.055691000	10.0.2.15	75.75.75.75	DNS	76	Standard query 0x6fec A www.google.com
11	0.074739000	75.75.75.75	10.0.2.15	DNS	92	Standard query response 0x6fec A 142.250.191.68
12	0.075455000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [FIN, ACK] Seq=57 Ack=1733 Win=32120 Len=0
13	0.075739000	142.250.191.68	10.0.2.15	TCP	62	http > 36466 [ACK] Seq=1733 Ack=58 Win=65535 Len=0
14	0.091064000	142.250.191.68	10.0.2.15	TCP	62	http > 36466 [FIN, ACK] Seq=1733 Ack=58 Win=65535 Len=0
15	0.091079000	10.0.2.15	142.250.191.68	TCP	56	36466 > http [ACK] Seq=58 Ack=1734 Win=32120 Len=0

```
> Transmission Control Protocol, Src Port: http (80), Dst Port: 36466 (36466), Seq: 1, Ack: 57, Len: 1732
▽ Hypertext Transfer Protocol
  ▽ HTTP/1.1 404 Not Found\r\n
    > [Expert Info (Chat/Sequence): HTTP/1.1 404 Not Found\r\n]
      Request Version: HTTP/1.1
      Status Code: 404
      Response Phrase: Not Found
    Content-Type: text/html; charset=UTF-8\r\n
    Referrer-Policy: no-referrer\r\n
    > Content-Length: 1577\r\n
    Date: Sun, 06 Mar 2022 02:05:00 GMT\r\n
    \r\n
    [HTTP response 1/1]
    [Time since request: 0.018988000 seconds]
    [Request in frame: 6]
> Line-based text data: text/html
```

```
mininet@mininet-vm:~$
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.google.c
om/somedoc1.html:80
Unsuccessful
http://www.google.com/somedoc1.html:80
HTTP/1.1 404 Not Found

mininet@mininet-vm:~$ date
Sat Mar  5 18:05:08 PST 2022
mininet@mininet-vm:~$
```

- http://www.example.com/anyname.html
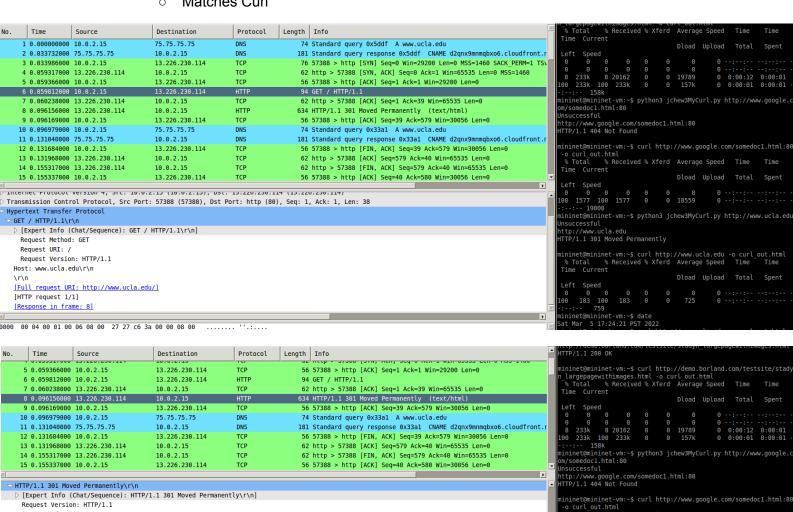 - Unsuccessful download
  - Matches Curl

No.	Time	Source	Destination	Protocol	Length	Info
37	16.17232800(	10.0.2.15	75.75.75.75	DNS	77	Standard query 0xf39c A www.example.com
38	16.18937000(	75.75.75.75	10.0.2.15	DNS	93	Standard query response 0xf39c A 93.184.216.34
39	16.18954300(	10.0.2.15	93.184.216.34	TCP	76	52847 > http [SYN] Seq=0 Win=29200 Len=0 MSS=1460 SACK_PERM=1 TS\
40	16.20789800(	93.184.216.34	10.0.2.15	TCP	62	http > 52847 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460
41	16.20791700(	10.0.2.15	93.184.216.34	TCP	56	52847 > http [ACK] Seq=1 Ack=1 Win=29200 Len=0
42	16.20831100(	10.0.2.15	93.184.216.34	HTTP	109	GET /anyname.html HTTP/1.1
43	16.20883100(	93.184.216.34	10.0.2.15	TCP	62	http > 52847 [ACK] Seq=1 Ack=54 Win=65535 Len=0
44	16.22408800(	93.184.216.34	10.0.2.15	HTTP	1654	HTTP/1.1 404 Not Found (text/html)
45	16.22409700(	10.0.2.15	93.184.216.34	TCP	56	52847 > http [ACK] Seq=54 Ack=1599 Win=32120 Len=0
46	16.22479700(	10.0.2.15	75.75.75.75	DNS	77	Standard query 0xbb82 A www.example.com
47	16.24506200(	75.75.75.75	10.0.2.15	DNS	93	Standard query response 0xbb82 A 93.184.216.34
48	16.24575300(	10.0.2.15	93.184.216.34	TCP	56	52847 > http [FIN, ACK] Seq=54 Ack=1599 Win=32120 Len=0
49	16.24605300(	93.184.216.34	10.0.2.15	TCP	62	http > 52847 [ACK] Seq=1599 Ack=55 Win=65535 Len=0
50	16.26242900(	93.184.216.34	10.0.2.15	TCP	62	http > 52847 [FIN, ACK] Seq=1599 Ack=55 Win=65535 Len=0
51	16.26244800(	10.0.2.15	93.184.216.34	TCP	56	52847 > http [ACK] Seq=55 Ack=1600 Win=32120 Len=0

```
▷ Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 93.184.216.34 (93.184.216.34)
▷ Transmission Control Protocol, Src Port: 52847 (52847), Dst Port: http (80), Seq: 1, Ack: 1, Len: 53
▽ Hypertext Transfer Protocol
  ▽ GET /anyname.html HTTP/1.1\r\n
    ▷ [Expert Info (Chat/Sequence): GET /anyname.html HTTP/1.1\r\n]
      Request Method: GET
      Request URI: /anyname.html
      Request Version: HTTP/1.1
    Host: www.example.com\r\n
    \r\n
    [Full request URI: http://www.example.com/anyname.html]
    [HTTP request 1/1]
    [Response in frame: 44]
```


No.	Time	Source	Destination	Protocol	Length	Info
42	16.20831100(	10.0.2.15	93.184.216.34	HTTP	109	GET /anyname.html HTTP/1.1
43	16.20883100(	93.184.216.34	10.0.2.15	TCP	62	http > 52847 [ACK] Seq=1 Ack=54 Win=65535 Len=0
44	16.22408800(	93.184.216.34	10.0.2.15	HTTP	1654	HTTP/1.1 404 Not Found (text/html)
45	16.22409700(	10.0.2.15	93.184.216.34	TCP	56	52847 > http [ACK] Seq=54 Ack=1599 Win=32120 Len=0
46	16.22479700(	10.0.2.15	75.75.75.75	DNS	77	Standard query 0xbb82 A www.example.com
47	16.24506200(	75.75.75.75	10.0.2.15	DNS	93	Standard query response 0xbb82 A 93.184.216.34
48	16.24575300(	10.0.2.15	93.184.216.34	TCP	56	52847 > http [FIN, ACK] Seq=54 Ack=1599 Win=32120 Len=0
49	16.24605300(	93.184.216.34	10.0.2.15	TCP	62	http > 52847 [ACK] Seq=1599 Ack=55 Win=65535 Len=0
50	16.26242900(	93.184.216.34	10.0.2.15	TCP	62	http > 52847 [FIN, ACK] Seq=1599 Ack=55 Win=65535 Len=0
51	16.26244800(	10.0.2.15	93.184.216.34	TCP	56	52847 > http [ACK] Seq=55 Ack=1600 Win=32120 Len=0

```
▽ HTTP/1.1 404 Not Found\r\n
  ▷ [Expert Info (Chat/Sequence): HTTP/1.1 404 Not Found\r\n]
    Request Version: HTTP/1.1
    Status Code: 404
    Response Phrase: Not Found
  Accept-Ranges: bytes\r\n
  Age: 366819\r\n
  Cache-Control: max-age=604800\r\n
  Content-Type: text/html; charset=UTF-8\r\n
  Date: Sun, 06 Mar 2022 01:35:40 GMT\r\n
  Expires: Sun, 13 Mar 2022 01:35:40 GMT\r\n
  Last-Modified: Tue, 01 Mar 2022 19:42:01 GMT\r\n
  Server: ECS (sab/571B)\r\n
  Vary: Accept-Encoding\r\n
  X-Cache: 404-HIT\r\n
  ▷ Content-Length: 1256\r\n
  \r\n
```

- http://www.ucla.edu
  - Unsuccessful (Redirect)
  - Matches Curl


```
No.    Time          Source          Destination      Protocol  Length  Info
  1 0.000000000   10.0.2.15        75.75.75.75       DNS       74   Standard query 0x5ddf  A www.ucla.edu
  2 0.033732000   75.75.75.75      10.0.2.15         DNS       181  Standard query response 0x5ddf  CNAME d2qnx9mnmqbxo6.cloudfront.r
  3 0.033986000   10.0.2.15        13.226.230.114    TCP       76   57388 > http [SYN] Seq=0 Win=29200 Len=0 MSS=1460 SACK_PERM=1 TSV
  4 0.059317000   13.226.230.114   10.0.2.15         TCP       62   http > 57388 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460
  5 0.059366000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [ACK] Seq=1 Ack=1 Win=29200 Len=0
  6 0.059812000   10.0.2.15        13.226.230.114    HTTP      94   GET / HTTP/1.1
  7 0.060238000   13.226.230.114   10.0.2.15         TCP       62   http > 57388 [ACK] Seq=1 Ack=39 Win=65535 Len=0
  8 0.096156000   13.226.230.114   10.0.2.15         HTTP      634  HTTP/1.1 301 Moved Permanently  (text/html)
  9 0.096169000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [ACK] Seq=39 Ack=579 Win=30056 Len=0
 10 0.096979000   10.0.2.15        75.75.75.75       DNS       74   Standard query 0x33a1  A www.ucla.edu
 11 0.131040000   75.75.75.75      10.0.2.15         DNS       181  Standard query response 0x33a1  CNAME d2qnx9mnmqbxo6.cloudfront.r
 12 0.131684000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [FIN, ACK] Seq=39 Ack=579 Win=30056 Len=0
 13 0.131968000   13.226.230.114   10.0.2.15         TCP       62   http > 57388 [ACK] Seq=579 Ack=40 Win=65535 Len=0
 14 0.155317000   13.226.230.114   10.0.2.15         TCP       62   http > 57388 [FIN, ACK] Seq=579 Ack=40 Win=65535 Len=0
 15 0.155337000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [ACK] Seq=40 Ack=580 Win=30056 Len=0
```

```
Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 13.226.230.114 (13.226.230.114)
Transmission Control Protocol, Src Port: 57388 (57388), Dst Port: http (80), Seq: 1, Ack: 1, Len: 38
Hypertext Transfer Protocol
  GET / HTTP/1.1\r\n
    [Expert Info (Chat/Sequence): GET / HTTP/1.1\r\n]
      Request Method: GET
      Request URI: /
      Request Version: HTTP/1.1
  Host: www.ucla.edu\r\n
  \r\n
  [Full request URI: http://www.ucla.edu/]
  [HTTP request 1/1]
  [Response in frame: 8]
```

```
0000  00 04 00 01 00 06 08 00  27 27 c6 3a 00 00 08 00   ........''.:....
```

```
No.    Time          Source          Destination      Protocol  Length  Info
  5 0.059366000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [ACK] Seq=1 Ack=1 Win=29200 Len=0
  6 0.059812000   10.0.2.15        13.226.230.114    HTTP      94   GET / HTTP/1.1
  7 0.060238000   13.226.230.114   10.0.2.15         TCP       62   http > 57388 [ACK] Seq=1 Ack=39 Win=65535 Len=0
  8 0.096156000   13.226.230.114   10.0.2.15         HTTP      634  HTTP/1.1 301 Moved Permanently  (text/html)
  9 0.096169000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [ACK] Seq=39 Ack=579 Win=30056 Len=0
 10 0.096979000   10.0.2.15        75.75.75.75       DNS       74   Standard query 0x33a1  A www.ucla.edu
 11 0.131040000   75.75.75.75      10.0.2.15         DNS       181  Standard query response 0x33a1  CNAME d2qnx9mnmqbxo6.cloudfront.r
 12 0.131684000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [FIN, ACK] Seq=39 Ack=579 Win=30056 Len=0
 13 0.131968000   13.226.230.114   10.0.2.15         TCP       62   http > 57388 [ACK] Seq=579 Ack=40 Win=65535 Len=0
 14 0.155317000   13.226.230.114   10.0.2.15         TCP       62   http > 57388 [FIN, ACK] Seq=579 Ack=40 Win=65535 Len=0
 15 0.155337000   10.0.2.15        13.226.230.114    TCP       56   57388 > http [ACK] Seq=40 Ack=580 Win=30056 Len=0
```

```
HTTP/1.1 301 Moved Permanently\r\n
  [Expert Info (Chat/Sequence): HTTP/1.1 301 Moved Permanently\r\n]
    Request Version: HTTP/1.1
    Status Code: 301
    Response Phrase: Moved Permanently
  Server: CloudFront\r\n
  Date: Sun, 06 Mar 2022 01:20:49 GMT\r\n
  Content-Type: text/html\r\n
  Content-Length: 183\r\n
  Connection: keep-alive\r\n
  Location: https://www.ucla.edu/\r\n
  X-Cache: Redirect from cloudfront\r\n
  Via: 1.1 703d8189eecba19920d4f049a6c8c1c2.cloudfront.net (CloudFront)\r\n
  X-Amz-Cf-Pop: LAX50-C3\r\n
  X-Amz-Cf-Id: Lg9ef-yAYSotkGCXKhHY7a97ycAkYJfj9neBEd6o9tJTmJgyzaQn8w==\r\n
  \r\n
```

```
0040  20 33 30 31 20 4d 6f 76  65 64 20 50 65 72 6d 61   301 Mov ed Perma
0050  6e 65 6e 74 6c 79 0d 0a  53 65 72 76 65 72 3a 20   nently.. Server:
0060  43 6c 6f 75 64 46 72 6f  6e 74 0d 0a 44 61 74 65   CloudFro nt..Date
0070  3a 20 53 75 6e 2c 20 30  36 20 4d 61 72 20 32 30   : Sun, 0 6 Mar 20
```

```
n_largepagewithimages.html  -o curl_out.html
 % Total    % Received % Xferd  Average Speed   Time    Time
 Time  Current
                                 Dload  Upload   Total   Spent
 Left  Speed
  0     0      0     0    0     0      0      0 --:--:-- --:--:-- -
  8   233k    8 20162    0     0  19789      0  0:00:12  0:00:01 -
100  233k  100  233k    0     0   157k      0  0:00:01  0:00:01 -
-:--:--  158k
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.google.c
om/somedoc1.html:80
Unsuccessful
http://www.google.com/somedoc1.html:80
HTTP/1.1 404 Not Found
mininet@mininet-vm:~$ curl http://www.google.com/somedoc1.html:80
 -o curl_out.html
 % Total    % Received % Xferd  Average Speed   Time    Time
 Time  Current
                                 Dload  Upload   Total   Spent
 Left  Speed
  0     0      0     0    0     0      0      0 --:--:-- --:--:-- -
100  1577  100  1577    0     0  18559      0 --:--:-- --:--:-- -
-:--:--  19000
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.ucla.edu
Unsuccessful
http://www.ucla.edu
HTTP/1.1 301 Moved Permanently
mininet@mininet-vm:~$ curl http://www.ucla.edu -o curl_out.html
 % Total    % Received % Xferd  Average Speed   Time    Time
 Time  Current
                                 Dload  Upload   Total   Spent
 Left  Speed
  0     0      0     0    0     0      0      0 --:--:-- --:--:-- -
100   183  100   183    0     0    725      0 --:--:-- --:--:-- -
-:--:--   759
mininet@mininet-vm:~$ date
Sat Mar  5 17:24:21 PST 2022
```

```
http://demo.borland.com/testsite/stady11_targepagewithimages.html
HTTP/1.1 200 OK
mininet@mininet-vm:~$ curl http://demo.borland.com/testsite/stady
n_largepagewithimages.html -o curl_out.html
 % Total    % Received % Xferd  Average Speed   Time    Time
 Time  Current
                                 Dload  Upload   Total   Spent
 Left  Speed
  0     0      0     0    0     0      0      0 --:--:-- --:--:-- -
  0     0      0     0    0     0      0      0 --:--:-- --:--:-- -
  8   233k    8 20162    0     0  19789      0  0:00:12  0:00:01 -
100  233k  100  233k    0     0   157k      0  0:00:01  0:00:01 -
-:--:--  158k
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.google.c
om/somedoc1.html:80
Unsuccessful
http://www.google.com/somedoc1.html:80
HTTP/1.1 404 Not Found
mininet@mininet-vm:~$ curl http://www.google.com/somedoc1.html:80
 -o curl_out.html
 % Total    % Received % Xferd  Average Speed   Time    Time
 Time  Current
                                 Dload  Upload   Total   Spent
 Left  Speed
  0     0      0     0    0     0      0      0 --:--:-- --:--:-- -
100  1577  100  1577    0     0  18559      0 --:--:-- --:--:-- -
-:--:--  19000
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.ucla.edu
Unsuccessful
http://www.ucla.edu
HTTP/1.1 301 Moved Permanently
mininet@mininet-vm:~$ curl http://www.ucla.edu -o curl_out.html
 % Total    % Received % Xferd  Average Speed   Time    Time
 Time  Current
                                 Dload  Upload   Total   Spent
 Left  Speed
  0     0      0     0    0     0      0      0 --:--:-- --:--:-- -
100   183  100   183    0     0    725      0 --:--:-- --:--:-- -
-:--:--   759
mininet@mininet-vm:~$ date
Sat Mar  5 17:24:21 PST 2022
```

- http://www.google.com:443
  - Unsuccessful download (port 443)
  - Matches Curl

No.	Time	Source	Destination	Protocol	Length	Info
59	2.974568000	10.0.2.15	75.75.75.75	DNS	76	Standard query 0x8dc1 A www.google.com
60	2.992872000	75.75.75.75	10.0.2.15	DNS	92	Standard query response 0x8dc1 A 172.217.5.100
61	2.993116000	10.0.2.15	172.217.5.100	TCP	76	38144 > https [SYN] Seq=0 Win=29200 Len=0 MSS=1460 SACK_PERM=1 TS
62	3.011272000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460
63	3.011292000	10.0.2.15	172.217.5.100	TCP	56	38144 > https [ACK] Seq=1 Ack=1 Win=29200 Len=0
64	3.011671000	10.0.2.15	172.217.5.100	SSL	96	Continuation Data
65	3.012209000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [ACK] Seq=1 Ack=41 Win=65535 Len=0
66	3.031609000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [FIN, ACK] Seq=1 Ack=41 Win=65535 Len=0
67	3.032002000	10.0.2.15	172.217.5.100	TCP	56	38144 > https [ACK] Seq=41 Ack=2 Win=29200 Len=0
68	3.032329000	10.0.2.15	75.75.75.75	DNS	76	Standard query 0xaf26 A www.google.com
69	3.051992000	75.75.75.75	10.0.2.15	DNS	92	Standard query response 0xaf26 A 142.251.32.36
70	3.052317000	10.0.2.15	172.217.5.100	TCP	56	38144 > https [FIN, ACK] Seq=41 Ack=2 Win=29200 Len=0
71	3.052688000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [ACK] Seq=2 Ack=42 Win=65535 Len=0

Transmission Control Protocol, Src Port: 38144 (38144), Dst Port: https (443), Seq: 1, Ack: 1, Len: 0
    Source port: 38144 (38144)
    Destination port: https (443)
    [Stream index: 29]
    Sequence number: 1   (relative sequence number)
    Acknowledgment number: 1   (relative ack number)
    Header length: 20 bytes
    Flags: 0x010 (ACK)
        000. .... = Reserved: Not set
        ...0 .... = Nonce: Not set
        .... 0... .... = Congestion Window Reduced (CWR): Not set
        .... .0.. .... = ECN-Echo: Not set
        .... ..0. .... = Urgent: Not set
        ....1 .... = Acknowledgment: Set

```
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.google.c
om:443
Empty reply from server.
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$ date
Sat Mar  5 17:43:34 PST 2022
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
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mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
```

No.	Time	Source	Destination	Protocol	Length	Info
59	2.974568000	10.0.2.15	75.75.75.75	DNS	76	Standard query 0x8dc1 A www.google.com
60	2.992872000	75.75.75.75	10.0.2.15	DNS	92	Standard query response 0x8dc1 A 172.217.5.100
61	2.993116000	10.0.2.15	172.217.5.100	TCP	76	38144 > https [SYN] Seq=0 Win=29200 Len=0 MSS=1460 SACK_PERM=1 TS
62	3.011272000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460
63	3.011292000	10.0.2.15	172.217.5.100	TCP	56	38144 > https [ACK] Seq=1 Ack=1 Win=29200 Len=0
64	3.011671000	10.0.2.15	172.217.5.100	SSL	96	Continuation Data
65	3.012209000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [ACK] Seq=1 Ack=41 Win=65535 Len=0
66	3.031609000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [FIN, ACK] Seq=1 Ack=41 Win=65535 Len=0
67	3.032002000	10.0.2.15	172.217.5.100	TCP	56	38144 > https [ACK] Seq=41 Ack=2 Win=29200 Len=0
68	3.032329000	10.0.2.15	75.75.75.75	DNS	76	Standard query 0xaf26 A www.google.com
69	3.051992000	75.75.75.75	10.0.2.15	DNS	92	Standard query response 0xaf26 A 142.251.32.36
70	3.052317000	10.0.2.15	172.217.5.100	TCP	56	38144 > https [FIN, ACK] Seq=41 Ack=2 Win=29200 Len=0
71	3.052688000	172.217.5.100	10.0.2.15	TCP	62	https > 38144 [ACK] Seq=2 Ack=42 Win=65535 Len=0

    Sequence number: 41   (relative sequence number)
    Acknowledgment number: 2   (relative ack number)
    Header length: 20 bytes
    Flags: 0x011 (FIN, ACK)
        000. .... = Reserved: Not set
        ...0 .... = Nonce: Not set
        .... 0... .... = Congestion Window Reduced (CWR): Not set
        .... .0.. .... = ECN-Echo: Not set
        .... ..0. .... = Urgent: Not set
        ....1 .... = Acknowledgment: Set
        .... 0... = Push: Not set
        .... .0.. = Reset: Not set
        ....0. = Syn: Not set
        ....1 = Fin: Set

```
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.google.c
om:443
Empty reply from server.
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$ date
Sat Mar  5 17:43:34 PST 2022
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
mininet@mininet-vm:~$
```

```
mininet@mininet-vm:~$ python3 jchew3MyCurl.py http://www.google.c
om:443
Empty reply from server.
mininet@mininet-vm:~$ curl http://www.google.com:443 -o curl_out.
html
  % Total    % Received % Xferd  Average Speed   Time    Time
Time  Current
                                 Dload  Upload   Total   Spent
Left  Speed
  0     0    0     0     0     0      0      0 --:--:-- --:--:-- -
  0     0    0     0     0     0      0      0 --:--:-- --:--:-- -
-:--:--      0
curl: (52) Empty reply from server
mininet@mininet-vm:~$ date
Sat Mar  5 17:48:20 PST 2022
mininet@mininet-vm:~$
```