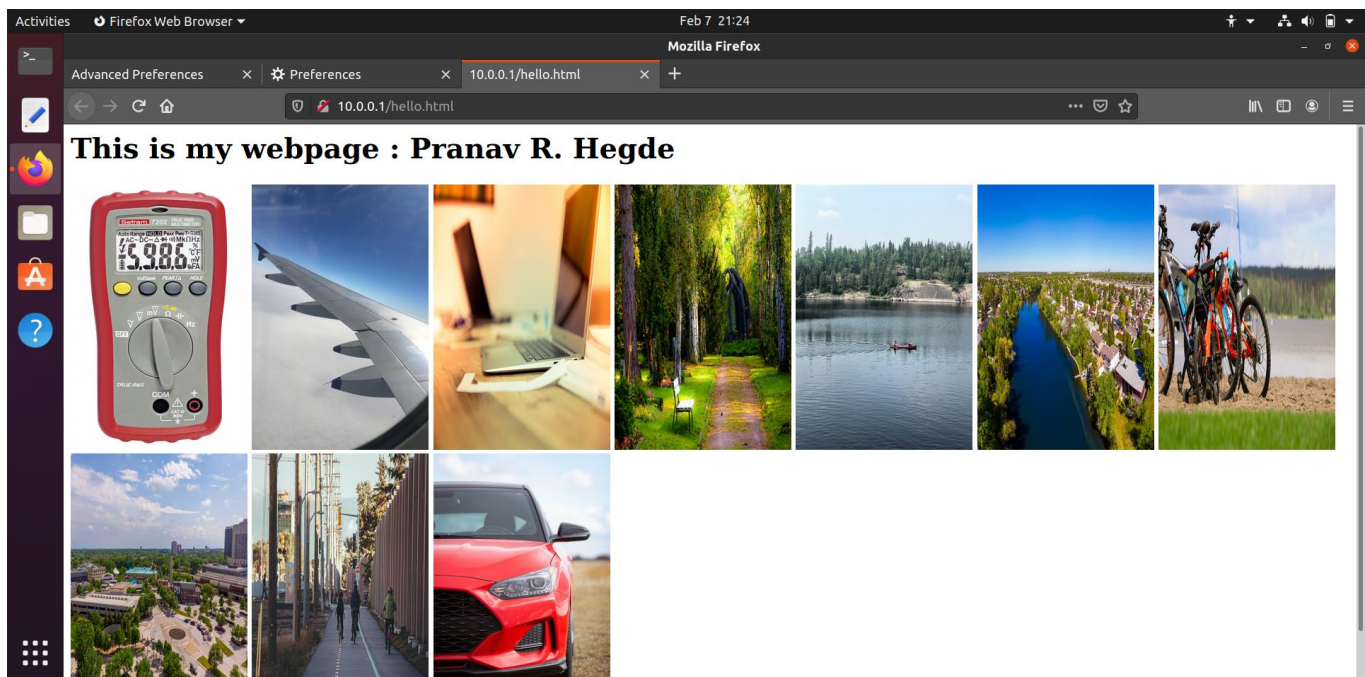


Computer networks lab 2

Non persistent and persistent HTTP connections

Name: Pranav R. Hegde SRN: PES1UG19CS343 Section: F

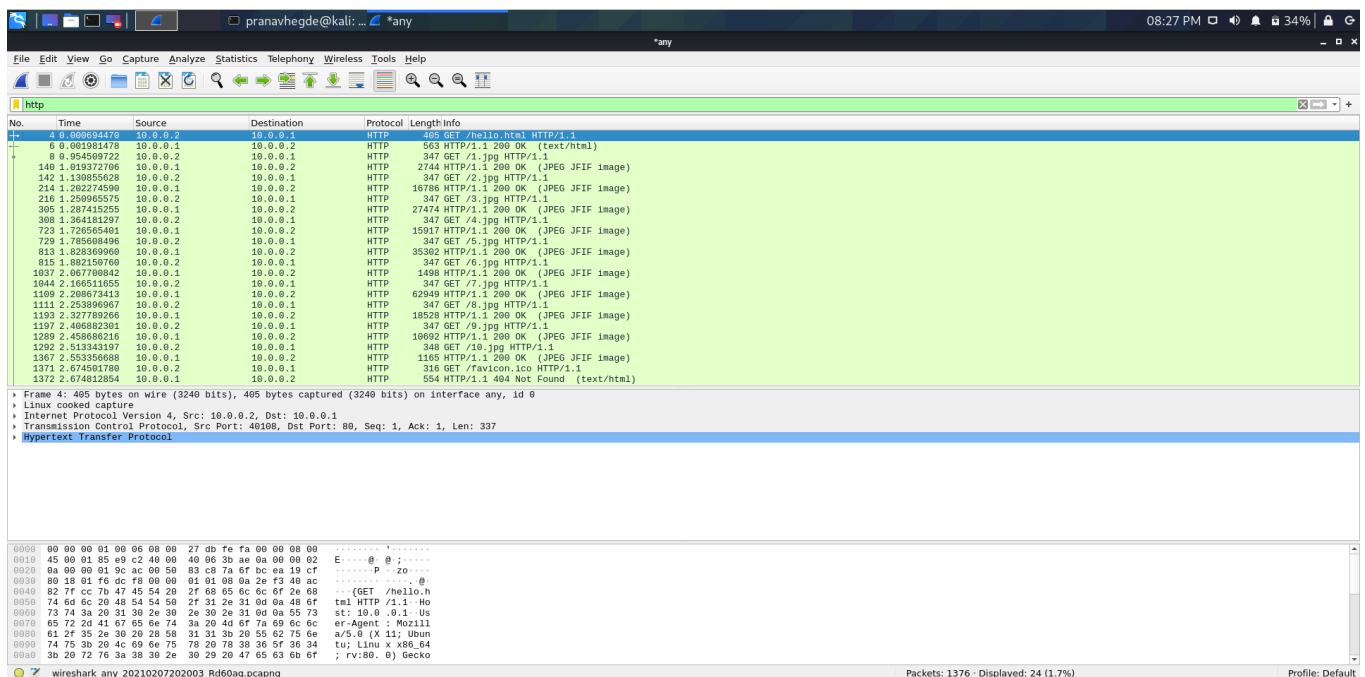
The website created and hosted on server machine that is accessed via the client machine:



NON – PERSISTENT CONNECTION

Wireshark HTTP capture of the non-persistent connection:

Time required for all the 10 images to load: $2.553356688 - 0.954509722 = 1.598846966s$



PERSISTENT CONNECTION

Persistent connection Wireshark http capture for different max connections:

1) Max persistent connections per server = 2

Time required to load all the 10 images: $2.657942877 - 0.935636378 = 1.722306499s$

Wireshark capture of HTTP traffic for max persistent connections = 2. The packet list shows 24 packets, with the last packet being a 404 Not Found. The packet details pane shows the HTTP 404 response.

No.	Time	Source	Destination	Protocol	Length	Info
4	0.901674568	10.0.0.2	10.0.0.1	HTTP	405	GET /hello.html HTTP/1.1
6	0.902535246	10.0.0.1	10.0.0.2	HTTP	563	HTTP/1.1 200 OK (text/html)
8	0.935636378	10.0.0.2	10.0.0.1	HTTP	347	GET /1.jpg HTTP/1.1
26	0.984305805	10.0.0.2	10.0.0.1	HTTP	347	GET /2.jpg HTTP/1.1
507	1.101422896	10.0.0.1	10.0.0.2	HTTP	12880	HTTP/1.1 200 OK (JPEG JFIF image)
591	1.151224624	10.0.0.1	10.0.0.2	HTTP	13891	HTTP/1.1 200 OK (JPEG JFIF image)
594	1.199895945	10.0.0.2	10.0.0.1	HTTP	347	GET /3.jpg HTTP/1.1
648	1.236868064	10.0.0.2	10.0.0.1	HTTP	347	GET /4.jpg HTTP/1.1
614	1.319258382	10.0.0.1	10.0.0.2	HTTP	46298	HTTP/1.1 200 OK (JPEG JFIF image)
1839	1.510142294	10.0.0.2	10.0.0.1	HTTP	347	GET /5.jpg HTTP/1.1
1275	1.616297192	10.0.0.1	10.0.0.2	HTTP	22270	HTTP/1.1 200 OK (JPEG JFIF image)
1388	1.734484773	10.0.0.2	10.0.0.1	HTTP	347	GET /6.jpg HTTP/1.1
1880	2.106935188	10.0.0.1	10.0.0.2	HTTP	34306	HTTP/1.1 200 OK (JPEG JFIF image)
1995	2.142158619	10.0.0.1	10.0.0.2	HTTP	1589	HTTP/1.1 200 OK (JPEG JFIF image)
1913	2.206720943	10.0.0.2	10.0.0.1	HTTP	347	GET /7.jpg HTTP/1.1
1991	2.341155567	10.0.0.1	10.0.0.2	HTTP	13717	HTTP/1.1 200 OK (JPEG JFIF image)
1993	2.388817229	10.0.0.2	10.0.0.1	HTTP	347	GET /8.jpg HTTP/1.1
2054	2.414732734	10.0.0.2	10.0.0.1	HTTP	347	GET /9.jpg HTTP/1.1
2152	2.455915947	10.0.0.1	10.0.0.2	HTTP	14184	HTTP/1.1 200 OK (JPEG JFIF image)
2229	2.500579926	10.0.0.1	10.0.0.2	HTTP	33860	HTTP/1.1 200 OK (JPEG JFIF image)
2232	2.598343082	10.0.0.2	10.0.0.1	HTTP	348	GET /10.jpg HTTP/1.1
2330	2.657942877	10.0.0.1	10.0.0.2	HTTP	17093	HTTP/1.1 200 OK (JPEG JFIF image)
2341	2.801132804	10.0.0.2	10.0.0.1	HTTP	316	GET /favicon.ico HTTP/1.1
2342	2.801346605	10.0.0.1	10.0.0.2	HTTP	554	HTTP/1.1 404 Not Found (text/html)

2) Max persistent connections per server = 4

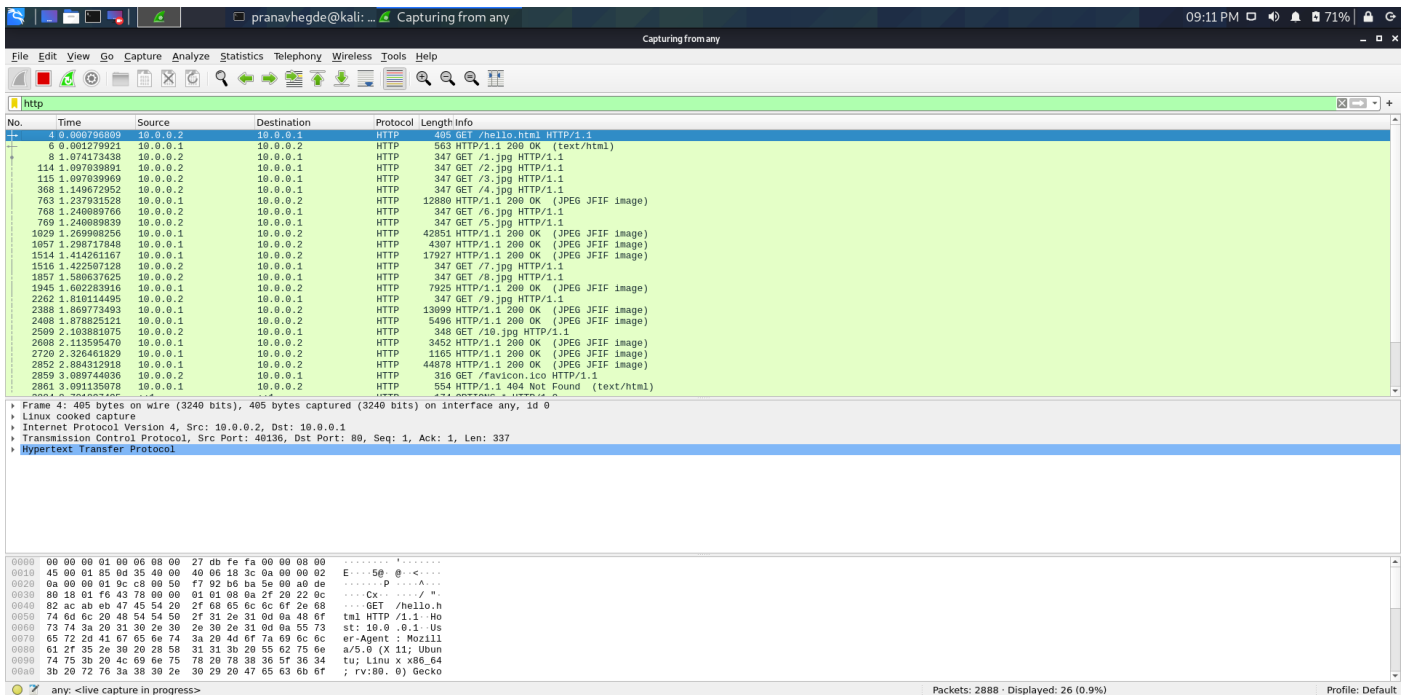
Time required to load all the 10 images: $3.298980341 - 1.22942082 = 2.069559521s$

Wireshark capture of HTTP traffic for max persistent connections = 4. The packet list shows 27 packets, with the last packet being a 404 Not Found. The packet details pane shows the HTTP 404 response.

No.	Time	Source	Destination	Protocol	Length	Info
4	0.906359683	10.0.0.2	10.0.0.1	HTTP	405	GET /hello.html HTTP/1.1
6	0.906995532	10.0.0.1	10.0.0.2	HTTP	563	HTTP/1.1 200 OK (text/html)
8	1.122942082	10.0.0.2	10.0.0.1	HTTP	347	GET /1.jpg HTTP/1.1
172	1.160587836	10.0.0.2	10.0.0.1	HTTP	347	GET /3.jpg HTTP/1.1
173	1.160587897	10.0.0.2	10.0.0.1	HTTP	347	GET /2.jpg HTTP/1.1
290	1.169873931	10.0.0.2	10.0.0.1	HTTP	347	GET /4.jpg HTTP/1.1
700	1.198564115	10.0.0.1	10.0.0.2	HTTP	28800	HTTP/1.1 200 OK (JPEG JFIF image)
1201	1.486376630	10.0.0.1	10.0.0.2	HTTP	11547	HTTP/1.1 200 OK (JPEG JFIF image)
1323	1.536347640	10.0.0.1	10.0.0.2	HTTP	3755	HTTP/1.1 200 OK (JPEG JFIF image)
1416	1.605919191	10.0.0.2	10.0.0.1	HTTP	347	GET /5.jpg HTTP/1.1
1519	1.737373239	10.0.0.2	10.0.0.1	HTTP	347	GET /6.jpg HTTP/1.1
1681	1.813984919	10.0.0.1	10.0.0.2	HTTP	1990	HTTP/1.1 200 OK (JPEG JFIF image)
1690	1.803634491	10.0.0.2	10.0.0.1	HTTP	347	GET /7.jpg HTTP/1.1
2011	2.149645589	10.0.0.1	10.0.0.2	HTTP	5029	HTTP/1.1 200 OK (JPEG JFIF image)
2953	2.319195848	10.0.0.2	10.0.0.1	HTTP	347	GET /8.jpg HTTP/1.1
2235	2.545540577	10.0.0.1	10.0.0.2	HTTP	14184	HTTP/1.1 200 OK (JPEG JFIF image)
2277	2.822636077	10.0.0.2	10.0.0.1	HTTP	347	GET /9.jpg HTTP/1.1
2535	2.998942230	10.0.0.1	10.0.0.2	HTTP	2804	HTTP/1.1 200 OK (JPEG JFIF image)
2547	3.041266596	10.0.0.1	10.0.0.2	HTTP	36250	HTTP/1.1 200 OK (JPEG JFIF image)
2583	3.089266895	10.0.0.2	10.0.0.1	HTTP	348	GET /10.jpg HTTP/1.1
2739	3.205149761	10.0.0.1	10.0.0.2	HTTP	22885	HTTP/1.1 200 OK (JPEG JFIF image)
2753	3.298980341	10.0.0.1	10.0.0.2	HTTP	27502	HTTP/1.1 200 OK (JPEG JFIF image)
2759	3.633926277	10.0.0.2	10.0.0.1	HTTP	316	GET /favicon.ico HTTP/1.1
2761	3.633913546	10.0.0.1	10.0.0.2	HTTP	554	HTTP/1.1 404 Not Found (text/html)

3) Max persistent connections per server = 6

Time required to load all the 10 images: $2.884312918 - 1.074173438 = 1.81013948s$

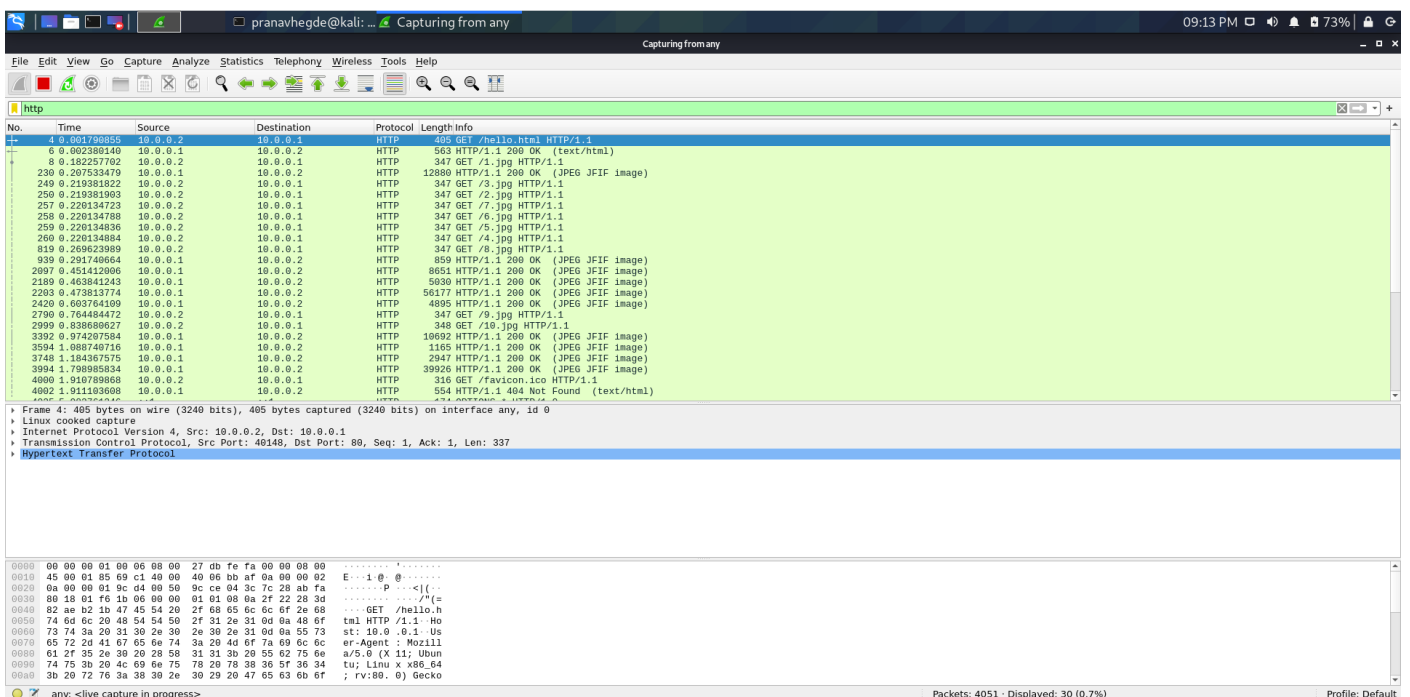


The screenshot shows a Wireshark capture of HTTP traffic. The packet list pane displays 2888 packets, with the first 1000 packets being GET requests for various image files (e.g., /1.jpg, /2.jpg, /3.jpg, /4.jpg, /5.jpg, /6.jpg, /7.jpg, /8.jpg, /9.jpg, /10.jpg). The packet details pane shows the selected packet (No. 405) as a GET request for /hello.html. The packet bytes pane shows the raw data of the selected packet, which is a GET request for /hello.html.

No.	Time	Source	Destination	Protocol	Length	Info
405	0.00179921	10.0.0.2	10.0.0.1	HTTP	405	GET /hello.html HTTP/1.1
406	0.00179921	10.0.0.2	10.0.0.1	HTTP	563	HTTP/1.1 200 OK (text/html)
407	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /1.jpg HTTP/1.1
408	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /2.jpg HTTP/1.1
409	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /3.jpg HTTP/1.1
410	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /4.jpg HTTP/1.1
411	0.00179921	10.0.0.2	10.0.0.1	HTTP	12880	HTTP/1.1 200 OK (JPEG JFIF image)
412	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /5.jpg HTTP/1.1
413	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /6.jpg HTTP/1.1
414	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /7.jpg HTTP/1.1
415	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /8.jpg HTTP/1.1
416	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /9.jpg HTTP/1.1
417	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /10.jpg HTTP/1.1
418	0.00179921	10.0.0.2	10.0.0.1	HTTP	42051	HTTP/1.1 200 OK (JPEG JFIF image)
419	0.00179921	10.0.0.2	10.0.0.1	HTTP	4307	HTTP/1.1 200 OK (JPEG JFIF image)
420	0.00179921	10.0.0.2	10.0.0.1	HTTP	17927	HTTP/1.1 200 OK (JPEG JFIF image)
421	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /7.jpg HTTP/1.1
422	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /8.jpg HTTP/1.1
423	0.00179921	10.0.0.2	10.0.0.1	HTTP	7925	HTTP/1.1 200 OK (JPEG JFIF image)
424	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /9.jpg HTTP/1.1
425	0.00179921	10.0.0.2	10.0.0.1	HTTP	13099	HTTP/1.1 200 OK (JPEG JFIF image)
426	0.00179921	10.0.0.2	10.0.0.1	HTTP	5496	HTTP/1.1 200 OK (JPEG JFIF image)
427	0.00179921	10.0.0.2	10.0.0.1	HTTP	346	GET /10.jpg HTTP/1.1
428	0.00179921	10.0.0.2	10.0.0.1	HTTP	3452	HTTP/1.1 200 OK (JPEG JFIF image)
429	0.00179921	10.0.0.2	10.0.0.1	HTTP	1105	HTTP/1.1 200 OK (JPEG JFIF image)
430	0.00179921	10.0.0.2	10.0.0.1	HTTP	44878	HTTP/1.1 200 OK (JPEG JFIF image)
431	0.00179921	10.0.0.2	10.0.0.1	HTTP	316	GET /favicon.ico HTTP/1.1
432	0.00179921	10.0.0.2	10.0.0.1	HTTP	554	HTTP/1.1 404 Not Found (text/html)

4) Max persistent connections per server = 8

Time required to load all the 10 images: $1.798985834 - 0.182257702 = 1.616728132s$

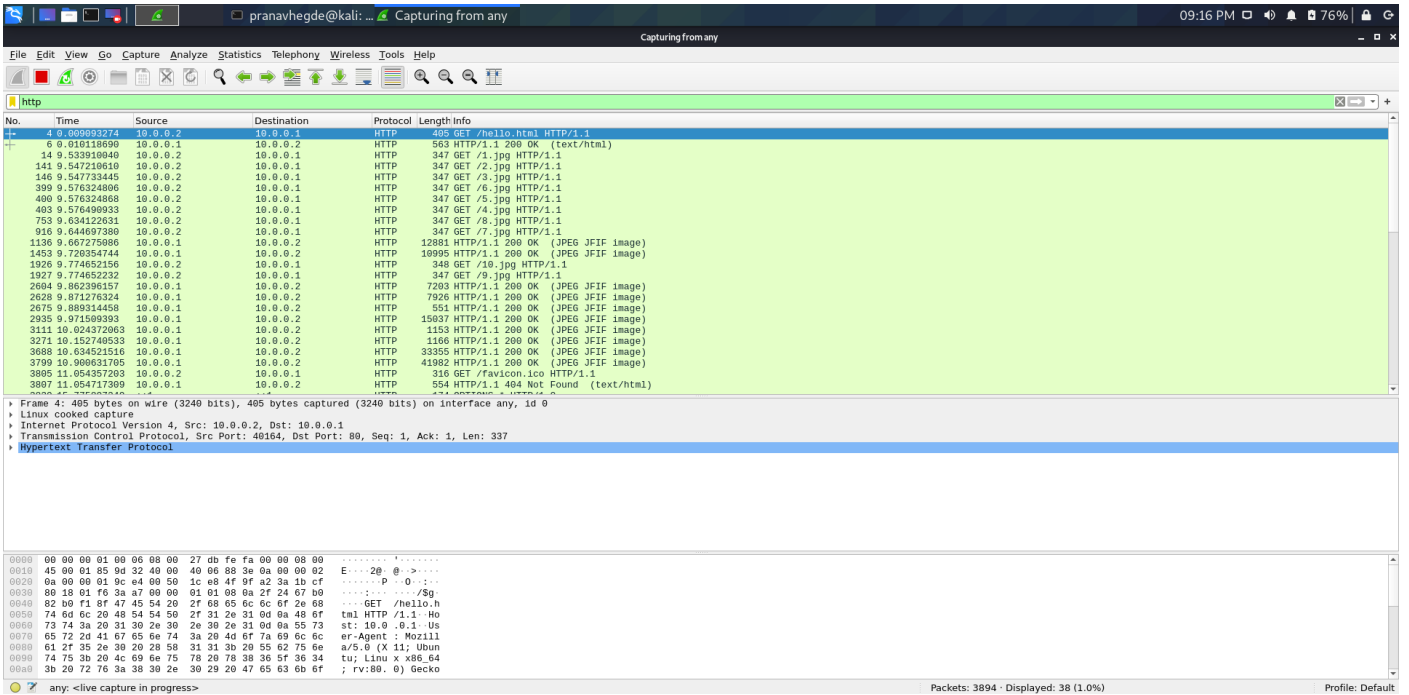


The screenshot shows a Wireshark capture of HTTP traffic. The packet list pane displays 4051 packets, with the first 1000 packets being GET requests for various image files (e.g., /1.jpg, /2.jpg, /3.jpg, /4.jpg, /5.jpg, /6.jpg, /7.jpg, /8.jpg, /9.jpg, /10.jpg). The packet details pane shows the selected packet (No. 405) as a GET request for /hello.html. The packet bytes pane shows the raw data of the selected packet, which is a GET request for /hello.html.

No.	Time	Source	Destination	Protocol	Length	Info
405	0.00179921	10.0.0.2	10.0.0.1	HTTP	405	GET /hello.html HTTP/1.1
406	0.00179921	10.0.0.2	10.0.0.1	HTTP	563	HTTP/1.1 200 OK (text/html)
407	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /1.jpg HTTP/1.1
408	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /2.jpg HTTP/1.1
409	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /3.jpg HTTP/1.1
410	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /4.jpg HTTP/1.1
411	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /5.jpg HTTP/1.1
412	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /6.jpg HTTP/1.1
413	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /7.jpg HTTP/1.1
414	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /8.jpg HTTP/1.1
415	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /9.jpg HTTP/1.1
416	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /10.jpg HTTP/1.1
417	0.00179921	10.0.0.2	10.0.0.1	HTTP	42051	HTTP/1.1 200 OK (JPEG JFIF image)
418	0.00179921	10.0.0.2	10.0.0.1	HTTP	4307	HTTP/1.1 200 OK (JPEG JFIF image)
419	0.00179921	10.0.0.2	10.0.0.1	HTTP	17927	HTTP/1.1 200 OK (JPEG JFIF image)
420	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /7.jpg HTTP/1.1
421	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /8.jpg HTTP/1.1
422	0.00179921	10.0.0.2	10.0.0.1	HTTP	7925	HTTP/1.1 200 OK (JPEG JFIF image)
423	0.00179921	10.0.0.2	10.0.0.1	HTTP	347	GET /9.jpg HTTP/1.1
424	0.00179921	10.0.0.2	10.0.0.1	HTTP	13099	HTTP/1.1 200 OK (JPEG JFIF image)
425	0.00179921	10.0.0.2	10.0.0.1	HTTP	5496	HTTP/1.1 200 OK (JPEG JFIF image)
426	0.00179921	10.0.0.2	10.0.0.1	HTTP	346	GET /10.jpg HTTP/1.1
427	0.00179921	10.0.0.2	10.0.0.1	HTTP	3452	HTTP/1.1 200 OK (JPEG JFIF image)
428	0.00179921	10.0.0.2	10.0.0.1	HTTP	1105	HTTP/1.1 200 OK (JPEG JFIF image)
429	0.00179921	10.0.0.2	10.0.0.1	HTTP	44878	HTTP/1.1 200 OK (JPEG JFIF image)
430	0.00179921	10.0.0.2	10.0.0.1	HTTP	316	GET /favicon.ico HTTP/1.1
431	0.00179921	10.0.0.2	10.0.0.1	HTTP	554	HTTP/1.1 404 Not Found (text/html)

5) Max persistent connections per server = 10

Time required to load all the 10 images: $10.900631705 - 9.533910040 = 1.366721665s$



No.	Time	Source	Destination	Protocol	Length	Info
4	9.609893274	10.0.0.2	10.0.0.1	HTTP	405	GET /hello.html HTTP/1.1
5	9.610118690	10.0.0.1	10.0.0.2	HTTP	563	HTTP/1.1 200 OK (text/html)
14	9.533919840	10.0.0.2	10.0.0.1	HTTP	347	GET /1.jpg HTTP/1.1
141	9.547210610	10.0.0.2	10.0.0.1	HTTP	347	GET /2.jpg HTTP/1.1
146	9.547733445	10.0.0.2	10.0.0.1	HTTP	347	GET /3.jpg HTTP/1.1
389	9.576324886	10.0.0.2	10.0.0.1	HTTP	347	GET /6.jpg HTTP/1.1
400	9.576324888	10.0.0.2	10.0.0.1	HTTP	347	GET /5.jpg HTTP/1.1
403	9.576489933	10.0.0.2	10.0.0.1	HTTP	347	GET /4.jpg HTTP/1.1
753	9.634122631	10.0.0.2	10.0.0.1	HTTP	347	GET /8.jpg HTTP/1.1
916	9.644697380	10.0.0.2	10.0.0.1	HTTP	347	GET /7.jpg HTTP/1.1
1136	9.667275986	10.0.0.1	10.0.0.2	HTTP	12881	HTTP/1.1 200 OK (JPEG JFIF image)
1453	9.720354744	10.0.0.1	10.0.0.2	HTTP	18995	HTTP/1.1 200 OK (JPEG JFIF image)
1926	9.774652156	10.0.0.2	10.0.0.1	HTTP	348	GET /10.jpg HTTP/1.1
1927	9.774652232	10.0.0.2	10.0.0.1	HTTP	347	GET /9.jpg HTTP/1.1
2604	9.862396157	10.0.0.1	10.0.0.2	HTTP	7203	HTTP/1.1 200 OK (JPEG JFIF image)
2628	9.871276324	10.0.0.1	10.0.0.2	HTTP	7926	HTTP/1.1 200 OK (JPEG JFIF image)
2675	9.889314458	10.0.0.1	10.0.0.2	HTTP	551	HTTP/1.1 200 OK (JPEG JFIF image)
2935	9.971589393	10.0.0.1	10.0.0.2	HTTP	15037	HTTP/1.1 200 OK (JPEG JFIF image)
3111	10.024372063	10.0.0.1	10.0.0.2	HTTP	1153	HTTP/1.1 200 OK (JPEG JFIF image)
3271	10.152749533	10.0.0.1	10.0.0.2	HTTP	1160	HTTP/1.1 200 OK (JPEG JFIF image)
3688	10.634521510	10.0.0.1	10.0.0.2	HTTP	33355	HTTP/1.1 200 OK (JPEG JFIF image)
3799	10.900631705	10.0.0.1	10.0.0.2	HTTP	41982	HTTP/1.1 200 OK (JPEG JFIF image)
3805	11.054357203	10.0.0.2	10.0.0.1	HTTP	316	GET /favicon.ico HTTP/1.1
3807	11.054717399	10.0.0.1	10.0.0.2	HTTP	554	HTTP/1.1 404 Not Found (text/html)

Frame 4: 485 bytes on wire (3240 bits), 405 bytes captured (3240 bits) on interface any, id 0

Linux cooked capture

Internet Protocol Version 4, Src: 10.0.0.2, Dst: 10.0.0.1

Transmission Control Protocol, Src Port: 48164, Dst Port: 80, Seq: 1, Ack: 1, Len: 337

Hypertext Transfer Protocol

0000 00 00 00 01 00 06 08 00 27 db fa 00 00 00 002@ @->....
0010 45 00 01 85 9d 32 40 00 40 06 88 3e 0a 00 00 02 E...2@ @->....
0020 0a 00 00 01 9c e4 00 50 1c e8 4f 0f a2 3a 1b cfP...0...
0030 80 18 01 f6 3a a7 00 00 01 00 0a 2f 24 67 00-.../Sg
0040 82 80 f1 8f 47 45 54 20 2f 68 65 6c 6c 6f 2e 68 ...GET /hello.h
0050 74 6d 6c 20 48 54 54 50 2f 31 2e 31 0d 0a 48 6f tml HTTP /1.1- Ho
0060 73 74 3a 20 31 30 2e 38 2e 30 2e 31 0d 0a 55 73 st: 10.0.0.1- Us
0070 65 72 2d 41 67 65 6e 74 3a 20 4d 6f 7a 69 6c 6c er-Agent: Mozilla
0080 61 2f 35 2e 30 20 28 58 31 31 3b 20 55 62 75 6e a/5.0 (X 11; Ubu
0090 74 75 3b 20 4c 69 6e 75 78 20 78 38 36 5f 36 34 tu; Linu x86_64
00a0 3b 20 72 76 3a 38 30 2e 30 29 20 47 65 63 db 6f ; rv:80.0) Gecko

any: <live capture in progress>

Packets: 3894 · Displayed: 38 (1.0%)

Profile: Default

OBSERVATION

- An apache2 server was created in the server machine.
- 10 images all of whose size are above 2MB in size were used to create a webpage
- This webpage was then hosted via server machine on the apache2 server
- This webpage was then accessed via the client machine using the custom added IP address to the network interface.
- Some observations were made for a comparison between persistent and non-persistent http connections

NON - PERSISTENT CONNECTION

Time required for all the 10 images to load: $2.553356688 - 0.954509722 = 1.598846966s$

PERSISTENT CONNECTION

- 1) Max persistent connections per server = 2

Time required to load all the 10 images: $2.657942877 - 0.935636378 = 1.722306499s$

- 2) Max persistent connections per server = 4

Time required to load all the 10 images: $3.298980341 - 1.22942082 = 2.069559521s$

- 3) Max persistent connections per server = 6

Time required to load all the 10 images: $2.884312918 - 1.074173438 = 1.81013948s$

- 4) Max persistent connections per server = 8

Time required to load all the 10 images: $1.798985834 - 0.182257702 = 1.616728132s$

- 5) Max persistent connections per server = 10

Time required to load all the 10 images: $10.900631705 - 9.533910040 = 1.366721665s$

