

### Assign Ip address

```
/bin/bash 139x33
seed@VM:~$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:11:b4:20 brd ff:ff:ff:ff:ff:ff
        inet 10.0.7.5/24 brd 10.0.7.255 scope global dynamic enp0s3
            valid_lft 416sec preferred_lft 416sec
        inet6 fe80::4420:5100:7276:6ace/64 scope link
            valid_lft forever preferred_lft forever
seed@VM:~$ 
```

"VM" 01:00 15-Sep-20

### Apache2.conf - maxkeepalive condition

```
/bin/bash 139x33
# identification number when it starts.
# This needs to be set in /etc/apache2/envvars
#
# PidFile ${APACHE_PID_FILE}
#
# Timeout: The number of seconds before receives and sends time out.
# Timeout 300
#
# KeepAlive: Whether or not to allow persistent connections (more than
# one request per connection). Set to "Off" to deactivate.
# KeepAlive On
#
# MaxKeepAliveRequests: The maximum number of requests to allow
# during a persistent connection. Set to 0 to allow an unlimited amount.
# We recommend you leave this number high, for maximum performance.
# MaxKeepAliveRequests 2
#
# KeepAliveTimeout: Number of seconds to wait for the next request from
# the same client on the same connection.
#
# KeepAliveTimeout 5
"apache2.conf" 221L, 7112C written      99,22      39%
[0] 0:sudo*
```

"VM" 07:02 15-Sep-20

## Apache status

The screenshot shows a terminal window titled 'Apache status' with the command '/bin/bash'. It displays the output of 'ls' in the directory '/var/www/html' and the status of the Apache2 service via 'systemctl status apache2'. The Apache logs show the server starting and reloading.

```
seed@VM:/var/www/html$ ls
10.jpg 1.jpg 3.jpg 5.jpg 7.jpg 9.jpg      PES1201800410.html
13.jpg 2.jpg 4.jpg 6.jpg 8.jpg index.html
seed@VM:/var/www/html$ /bin/bash 139x33
seed@VM:~$ systemctl status apache2
● apache2.service - LSB: Apache2 web server
  Loaded: loaded (/etc/init.d/apache2; bad; vendor preset: enabled)
  Drop-In: /lib/systemd/system/apache2.service.d
            └─apache2-systemd.conf
    Active: active (running) since Tue 2020-09-15 06:48:29 EDT; 9min ago
      Docs: man:systemd-sysv-generator(8)
   Process: 2868 ExecReload=/etc/init.d/apache2 reload (code=exited, s
   Process: 1995 ExecStart=/etc/init.d/apache2 start (code=exited, sta
     CGroup: /system.slice/apache2.service
             ├─2024 /usr/sbin/apache2 -k start
             ├─2905 /usr/sbin/apache2 -k start
             ├─2906 /usr/sbin/apache2 -k start
             ├─2907 /usr/sbin/apache2 -k start
             ├─2908 /usr/sbin/apache2 -k start
             ├─2909 /usr/sbin/apache2 -k start
             ├─3165 /usr/sbin/apache2 -k start
             └─3165 /usr/sbin/apache2 -k start

Sep 15 06:48:28 VM systemd[1]: Starting LSB: Apache2 web server...
Sep 15 06:48:28 VM apache2[1995]: * Starting Apache httpd web server
Sep 15 06:48:28 VM apache2[1995]: AH00112: Warning: DocumentRoot [/va
Sep 15 06:48:28 VM apache2[1995]: AH00558: apache2: Could not reliabl
Sep 15 06:48:29 VM apache2[1995]: *
Sep 15 06:48:29 VM systemd[1]: Started LSB: Apache2 web server.
Sep 15 06:53:23 VM systemd[1]: Reloading LSB: Apache2 web server.
Sep 15 06:53:23 VM apache2[2868]: * Reloading Apache httpd web serve
Sep 15 06:53:23 VM apache2[2868]: *
Sep 15 06:53:23 VM systemd[1]: Reloaded LSB: Apache2 web server.
[lines 1-27/27 (END)]
```

"VM" 06:58 15-Sep-20

## main html page

The screenshot shows a Sublime Text editor window titled 'PES1201800410.html - Sublime Text (UNREGISTERED)'. The code editor displays the HTML content of the file 'PES1201800410.html', which includes ten image tags pointing to files '1.jpg' through '10.jpg' in the same directory.

```
<html>
<body>
<h2> CN Lab 2 </h2>










</body>
</html>
```

Line 14, Column 21 | Tab Size: 4 | HTML

SEEDLABS

## Firefox web page

Mozilla Firefox

File Edit View History Bookmarks Tools Help

10.0.7.24/PES1201800410.h ✕ about:config ✕ +

10.0.7.24/PES1201800410.html

Most Visited SEED Labs Sites for Labs

CN Lab 2

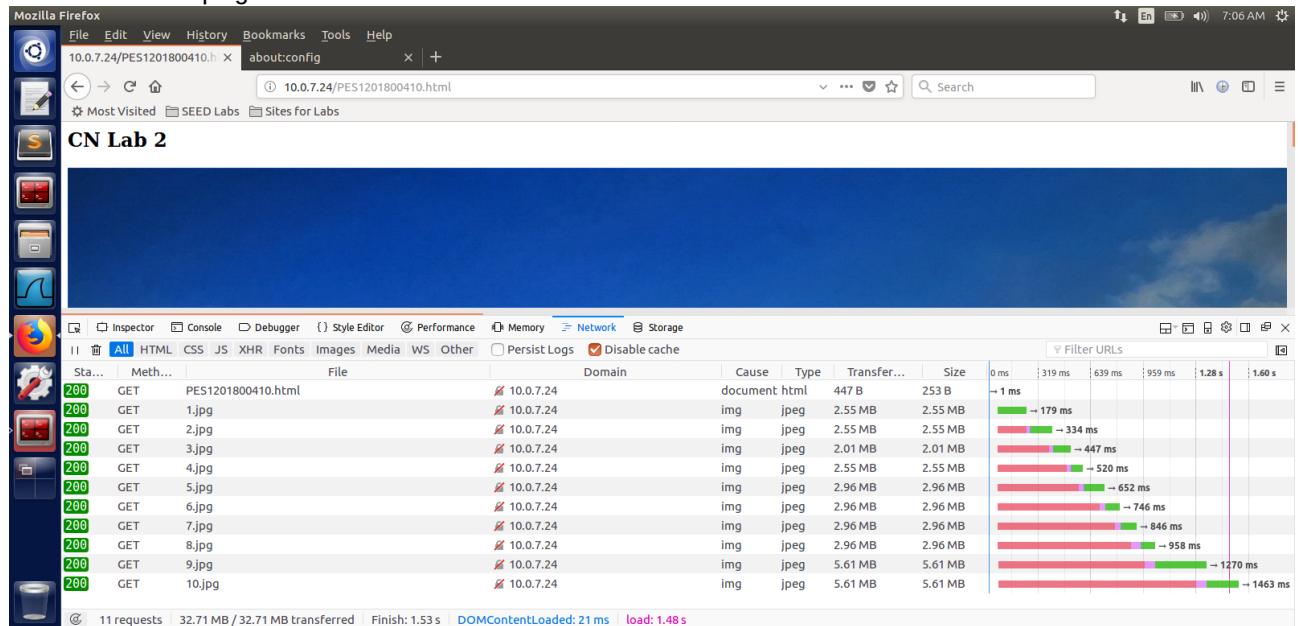
Inspector Console Debugger Style Editor Performance Memory Network Storage

All HTML CSS JS XHR Fonts Images Media WS Other Persist Logs Disable cache

Sta... Meth... File Domain Cause Type Transfer... Size 0 ms 319 ms 639 ms 959 ms 1.28 s 1.60 s

Sta...	Meth...	File	Domain	Cause	Type	Transfer...	Size	0 ms	319 ms	639 ms	959 ms	1.28 s	1.60 s
200	GET	PES1201800410.html	10.0.7.24		document html	447 B	253 B	→ 1 ms	→ 179 ms	→ 334 ms	→ 447 ms	→ 520 ms	→ 652 ms
200	GET	1.jpg	10.0.7.24		img	jpeg	2.55 MB	2.55 MB					
200	GET	2.jpg	10.0.7.24		img	jpeg	2.55 MB	2.55 MB					
200	GET	3.jpg	10.0.7.24		img	jpeg	2.01 MB	2.01 MB					
200	GET	4.jpg	10.0.7.24		img	jpeg	2.55 MB	2.55 MB					
200	GET	5.jpg	10.0.7.24		img	jpeg	2.96 MB	2.96 MB					
200	GET	6.jpg	10.0.7.24		img	jpeg	2.96 MB	2.96 MB					
200	GET	7.jpg	10.0.7.24		img	jpeg	2.96 MB	2.96 MB					
200	GET	8.jpg	10.0.7.24		img	jpeg	2.96 MB	2.96 MB					
200	GET	9.jpg	10.0.7.24		img	jpeg	5.61 MB	5.61 MB					
200	GET	10.jpg	10.0.7.24		img	jpeg	5.61 MB	5.61 MB					

11 requests | 32.71 MB / 32.71 MB transferred | Finish: 1.53 s | DOMContentLoaded: 21 ms | load: 1.48 s



## No persistent Connections

Mozilla Firefox

File Edit View Bookmarks Tools Help

about:config

Firefox | about:config

Most Visited SEED Labs Sites for Labs

Search: persist

Preference Name	Status	Type	Value
browser.pageActions.persistedActions	modified	string	{"version":1,"ids":["bookmark","bookmarkSeparator","copyURL","emailLink","sendToDevice","..."]}
devtools.netmonitor.persistlog	default	boolean	false
devtools.webconsole.persistlog	default	boolean	false
network.http.max-persistent-connections-per-proxy	default	integer	32
<b>network.http.max-persistent-connections-per-server</b>	modified	integer	0
network.http.spdy.persistent-settings	default	boolean	false
plugin.persistentPermissionAlways.intervalInDays	default	integer	90

## wireshark output

\*enp0s3

http

No.	Time	Source	Destination	Protocol	Length Info
4	0.000328810	10.0.7.25	10.0.7.24	HTTP	442 GET /PES1201800410.html HTTP/1.1
6	0.000666201	10.0.7.24	10.0.7.25	HTTP	513 HTTP/1.1 200 OK (text/html)
8	0.066735684	10.0.7.25	10.0.7.24	HTTP	385 GET /1.jpg HTTP/1.1
211	0.194439838	10.0.7.24	10.0.7.25	HTTP	1200 HTTP/1.1 200 OK (JPEG JFIF image)
213	0.245127688	10.0.7.25	10.0.7.24	HTTP	385 GET /2.jpg HTTP/1.1
360	0.357437751	10.0.7.24	10.0.7.25	HTTP	2648 HTTP/1.1 200 OK (JPEG JFIF image)
367	0.369280855	10.0.7.25	10.0.7.24	HTTP	385 GET /3.jpg HTTP/1.1
451	0.473365655	10.0.7.24	10.0.7.25	HTTP	47923 HTTP/1.1 200 OK (JPEG JFIF image)
456	0.489907539	10.0.7.25	10.0.7.24	HTTP	385 GET /4.jpg HTTP/1.1
576	0.504899189	10.0.7.24	10.0.7.25	HTTP	21472 HTTP/1.1 200 OK (JPEG JFIF image)
583	0.563143296	10.0.7.25	10.0.7.24	HTTP	385 GET /5.jpg HTTP/1.1
698	0.666810514	10.0.7.24	10.0.7.25	HTTP	50885 HTTP/1.1 200 OK (JPEG JFIF image)
702	0.688653557	10.0.7.25	10.0.7.24	HTTP	385 GET /6.jpg HTTP/1.1
853	0.764922445	10.0.7.24	10.0.7.25	HTTP	20477 HTTP/1.1 200 OK (JPEG JFIF image)
856	0.781626924	10.0.7.25	10.0.7.24	HTTP	385 GET /7.jpg HTTP/1.1
989	0.874682679	10.0.7.24	10.0.7.25	HTTP	30613 HTTP/1.1 200 OK (JPEG JFIF image)
993	0.877610277	10.0.7.25	10.0.7.24	HTTP	385 GET /8.jpg HTTP/1.1
1132	0.918464486	10.0.7.24	10.0.7.25	HTTP	23373 HTTP/1.1 200 OK (JPEG JFIF image)
1135	0.962565409	10.0.7.25	10.0.7.24	HTTP	385 GET /9.jpg HTTP/1.1
1355	1.086098670	10.0.7.24	10.0.7.25	HTTP	22982 HTTP/1.1 200 OK (JPEG JFIF image)
1359	1.278529129	10.0.7.25	10.0.7.24	HTTP	386 GET /10.jpg HTTP/1.1
1608	1.462547912	10.0.7.24	10.0.7.25	HTTP	9950 HTTP/1.1 200 OK (JPEG JFIF image)

Frame 4: 442 bytes on wire (3536 bits), 442 bytes captured (3536 bits) on interface 0

Ethernet II, Src: PcsCompu\_59:7a:dc (08:00:27:59:7a:dc), Dst: PcsCompu\_11:b4:20 (08:00:27:11:b4:20)

Internet Protocol Version 4, Src: 10.0.7.25, Dst: 10.0.7.24

Transmission Control Protocol, Src Port: 58504, Dst Port: 80, Seq: 2342639404, Ack: 1871470356, Len: 376

Hypertext Transfer Protocol

0000 08 00 27 11 b4 20 08 00 27 59 7a dc 08 00 45 00 .'. . . 'Vz...E.

0010 01 ac e5 c5 40 00 40 06 96 56 0a 00 07 19 0a 00 ..@. .V.....

0020 07 18 e4 88 00 50 8b a1 d7 2c 6f 8c 5f 14 80 18 ....P.. ,o....

0030 00 e5 a2 69 00 00 01 01 08 0a 00 03 51 e8 00 02 .i... .Q...

0040 fc 26 47 45 54 20 2f 50 45 53 31 32 30 31 38 30 .&GET /P E5120180

0050 30 34 31 30 2e 68 74 6d 6c 20 48 54 54 50 2f 31 0410.htm l HTTP/1

Time taken = 1.462547912 - 0.000328810 = 1.462219102

## 2 persistent

Preference Name	Status	Type	Value
browser.pageActions.persistedActions	modified	string	{"version":1,"ids":["bookmark","bookmarkSeparator","copyURL","emailLink","sendToDevice",...]
devtools.netmonitor.persistlog	default	boolean	false
devtools.webconsole.persistlog	default	boolean	false
network.http.max-persistent-connections-per-proxy	default	integer	32
network.http.max-persistent-connections-per-server	modified	integer	2
network.http.spdy.persistent-settings	default	boolean	false
plugin.persistentPermissionAlways.intervalInDays	default	integer	90

## 2 persistant wireshark output

Packets: 1726 - Displayed: 22 (1.3%) Profile: Default

Time taken = 10.784162460 - 9.597794591 = 1.1863678689999997

## 4 persistant connections

Preference Name	Status	Type	Value
browser.pageActions.persistedActions	modified	string	{"version":1,"ids":["bookmark","bookmarkSeparator","copyURL","emailLink","sendToDevice",...
devtools.netmonitor.persistlog	default	boolean	false
devtools.webconsole.persistlog	default	boolean	false
network.http.max-persistent-connections-per-proxy	default	integer	32
<b>network.http.max-persistent-connections-per-server</b>	<b>modified</b>	<b>integer</b>	<b>4</b>
network.http.spdy.persistent-settings	default	boolean	false
plugin.persistentPermissionAlways.intervalInDays	default	integer	90

## wireshark output

Frame 4: 442 bytes on wire (3536 bits), 442 bytes captured (3536 bits) on interface 0  
 ▷ Ethernet II, Src: PcsCompu\_59:7a:dc (08:00:27:59:7a:dc), Dst: PcsCompu\_11:b4:20 (08:00:27:11:b4:20)  
 ▷ Internet Protocol Version 4, Src: 10.0.7.25, Dst: 10.0.7.24  
 ▷ Transmission Control Protocol, Src Port: 58510, Dst Port: 80, Seq: 3913096371, Ack: 2960295071, Len: 376  
 ▷ Hypertext Transfer Protocol

Time taken = 1.020340458 - 0.000434934 = 1.019905524

## 6 persistant connections

The screenshot shows the Firefox configuration page (about:config) with a search bar containing "persis". A table lists several preferences related to network connections:

Preference Name	Status	Type	Value
browser.pageActions.persistedActions	modified	string	{"version":1,"ids":["bookmark","bookmarkSeparator","copyURL","emailLink","sendToDevice",...]
devtools.netmonitor.persistlog	default	boolean	false
devtools.webconsole.persistlog	default	boolean	false
network.http.max-persistent-connections-per-proxy	default	integer	32
<b>network.http.max-persistent-connections-per-server</b>	<b>default</b>	<b>integer</b>	<b>6</b>
network.http.spdy.persistent-settings	default	boolean	false
plugin.persistentPermissionAlways.intervalInDays	default	integer	90

## wireshark output

The screenshot shows Wireshark capturing traffic on interface enp0s3. The packet list shows numerous HTTP GET requests on port 80, primarily for files like /index.html and /0410.htm. The details and bytes panes provide the structure of the captured frames.

Key details from the packet list:

- Frame 4: 442 bytes on wire (3536 bits), 442 bytes captured (3536 bits) on interface 0
- Ethernet II, Src: PcsCompu\_59:7a:dc (08:00:27:59:7a:dc), Dst: PcsCompu\_11:b4:20 (08:00:27:11:b4:20)
- Internet Protocol Version 4, Src: 10.0.7.25, Dst: 10.0.7.24
- Transmission Control Protocol, Src Port: 58518, Dst Port: 80, Seq: 1177829714, Ack: 4223161814, Len: 376
- Hypertext Transfer Protocol

Time taken = 0.970819098 - 0.000311311 = 0.970507787

## 8 persistant connections

about:config - Mozilla Firefox

File Edit View History Bookmarks Tools Help

10.0.7.24/PES1201800410.htm × about:config × +

Firefox | about:config

Most Visited SEED Labs Sites for Labs

Search: persis

Preference Name	Status	Type	Value
browser.pageActions.persistedActions	modified	string	{"version":1,"ids":["bookmark","bookmarkSeparator","copyURL","emailLink","sendToDevice",...]
devtools.netmonitor.persistlog	default	boolean	false
devtools.webconsole.persistlog	default	boolean	false
network.http.max-persistent-connections-per-proxy	default	integer	32
<b>network.http.max-persistent-connections-per-server</b>	modified	integer	<b>8</b>
network.http.spdy.persistent-settings	default	boolean	false
plugin.persistentPermissionAlways.intervalInDays	default	integer	90

## wireshark output

Capturing from enp0s3

http

No.	Time	Source	Destination	Protocol	Length	Info
4	0.000270778	10.0.7.25	10.0.7.24	HTTP	442	442 GET /PES1201800410.html HTTP/1.1
6	0.00546969	10.0.7.24	10.0.7.25	HTTP	513	513 HTTP/1.1 200 OK (text/html)
8	0.071600947	10.0.7.25	10.0.7.24	HTTP	385	385 GET /1.jpg HTTP/1.1
92	0.077945447	10.0.7.25	10.0.7.24	HTTP	385	385 GET /5.jpg HTTP/1.1
96	0.077992748	10.0.7.25	10.0.7.24	HTTP	385	385 GET /4.jpg HTTP/1.1
100	0.078018589	10.0.7.25	10.0.7.24	HTTP	385	385 GET /3.jpg HTTP/1.1
102	0.078030752	10.0.7.25	10.0.7.24	HTTP	385	385 GET /2.jpg HTTP/1.1
114	0.078217269	10.0.7.25	10.0.7.24	HTTP	385	385 GET /8.jpg HTTP/1.1
117	0.078241743	10.0.7.25	10.0.7.24	HTTP	385	385 GET /7.jpg HTTP/1.1
120	0.078264563	10.0.7.25	10.0.7.24	HTTP	385	385 GET /6.jpg HTTP/1.1
2337	0.342283067	10.0.7.24	10.0.7.25	HTTP	5998	5998 HTTP/1.1 200 OK (JPEG JFIF image)
2479	0.365827676	10.0.7.24	10.0.7.25	HTTP	1200	1200 HTTP/1.1 200 OK (JPEG JFIF image)
2846	0.473997271	10.0.7.24	10.0.7.25	HTTP	6993	6993 HTTP/1.1 200 OK (JPEG JFIF image)
2900	0.485207115	10.0.7.24	10.0.7.25	HTTP	62617	62617 HTTP/1.1 200 OK (JPEG JFIF image)
3031	0.507619958	10.0.7.24	10.0.7.25	HTTP	1654	1654 HTTP/1.1 200 OK (JPEG JFIF image)
3148	0.563274415	10.0.7.24	10.0.7.25	HTTP	5998	5998 HTTP/1.1 200 OK (JPEG JFIF image)
3173	0.564041113	10.0.7.24	10.0.7.25	HTTP	1588	1588 HTTP/1.1 200 OK (JPEG JFIF image)
3181	0.568342142	10.0.7.25	10.0.7.24	HTTP	385	385 GET /9.jpg HTTP/1.1
3182	0.568359322	10.0.7.25	10.0.7.24	HTTP	386	386 GET /10.jpg HTTP/1.1
3391	0.595590123	10.0.7.24	10.0.7.25	HTTP	206	206 HTTP/1.1 200 OK (JPEG JFIF image)
4098	0.988809506	10.0.7.24	10.0.7.25	HTTP	34566	34566 HTTP/1.1 200 OK (JPEG JFIF image)
4197	1.009813013	10.0.7.24	10.0.7.25	HTTP	17190	17190 HTTP/1.1 200 OK (JPEG JFIF image)

Frame 4: 442 bytes on wire (3536 bits), 442 bytes captured (3536 bits) on interface 0  
 Ethernet II, Src: PcsCompu\_59:7a:dc (08:00:27:59:7a:dc), Dst: PcsCompu\_11:b4:20 (08:00:27:11:b4:20)  
 Internet Protocol Version 4, Src: 10.0.7.25, Dst: 10.0.7.24  
 Transmission Control Protocol, Src Port: 58530, Dst Port: 80, Seq: 4728321, Ack: 1052247106, Len: 376  
 Hypertext Transfer Protocol

0000 08 00 27 11 b4 28 08 00 27 59 7a dc 08 00 45 00 ..'..Yz...E.  
 0010 01 ac 06 58 40 00 40 06 18 c4 0a 00 07 19 0a 00 ..X@.0.....  
 0020 07 18 e4 a2 00 50 00 48 26 01 3e b8 04 42 80 18 .....P.H &.>..B..  
 0030 00 e5 cd 9b 00 00 01 01 08 0a 00 05 20 56 00 04 .....V.....V..  
 0040 ca 94 47 45 54 28 2f 50 45 53 31 32 30 31 38 39 ..GET /P ES120180  
 0050 30 34 31 30 2e 68 74 6d 6c 20 48 54 50 2f 31 0410.htm l HTTP/1.1

Packets: 4223 - Displayed: 22 (0.5%)

Profile: Default

Time taken = 1.009813013 - 0.000270778 = 1.009542235

## 10 persistant connections

Preference Name	Status	Type	Value
browser.pageActions.persistedActions	modified	string	{"version":1,"ids":["bookmark","bookmarkSeparator","copyURL","emailLink","sendToDevice","..."]}
devtools.netmonitor.persistlog	default	boolean	false
devtools.webconsole.persistlog	default	boolean	false
network.http.max-persistent-connections-per-proxy	default	integer	32
<b>network.http.max-persistent-connections-per-server</b>	<b>modified</b>	<b>integer</b>	<b>10</b>
network.http.spdy.persistent-settings	default	boolean	false
plugin.persistentPermissionAlways.intervalInDays	default	integer	90

## wireshark output

Frame 4: 442 bytes on wire (3536 bits), 442 bytes captured (3536 bits) on interface 0  
 ▶ Ethernet II, Src: PcsCompu\_59:7a:dc (08:00:27:59:7a:dc), Dst: PcsCompu\_11:b4:20 (08:00:27:11:b4:20)  
 ▶ Internet Protocol Version 4, Src: 10.0.7.25, Dst: 10.0.7.24  
 ▶ Transmission Control Protocol, Src Port: 58566, Dst Port: 80, Seq: 1543083451, Ack: 2030121879, Len: 376  
 ▶ Hypertext Transfer Protocol

0000 08 00 27 11 b4 20 08 00 27 59 7a dc 08 00 45 00 ..Yz....  
 0010 01 ac e6 37 40 00 40 06 30 e4 0a 00 07 19 0a 00 ..@.0.....  
 0020 07 18 e4 c6 00 58 5b f9 95 bb 79 61 33 97 80 18 .....P. .y.3...  
 0030 00 e5 f1 f7 00 00 01 01 08 0a 00 05 73 91 00 05 .....S...  
 0040 1d ce 47 45 54 20 2f 50 45 53 31 32 30 31 38 30 ..GET /P ES120180  
 0050 30 34 31 30 2e 68 74 6d 6c 20 48 54 54 50 2f 31 0410.htm l HTTP/1.1

Time taken = 1.020814456 - 0.001328671 = 1.019485785

Find out the time taken to load images for 2 4 6 persistent connections is lesser or greater than 10 persistent compared to non-persistent

And: Is greater lesser than 10 persistent connections

factors affecting no of connections are

- Each transaction opens/closes a new connection, costing time and bandwidth.
- Each new connection has reduced performance because of TCP slow start.
- There is a practical limit on the number of open parallel connections.

So the best no of persistant connection is 6 (for apache setting maxkeepaliveRequest 2)