

COMPUTER NETWORKS LAB-3

NAME: LIKHITH R

SECTION: K

SRN: PES1UG20CS659

ROLL NO: 12

Server Side:

Step 2: Check your Web Server At the end of the installation process, Ubuntu 16.04 starts Apache.

```
likhith@likhith-VirtualBox:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2022-02-25 20:21:34 IST; 1min 20s ago
     Docs: https://httpd.apache.org/docs/2.4/
    Main PID: 4509 (apache2)
      Tasks: 55 (limit: 2295)
     Memory: 4.8M
    CGroup: /system.slice/apache2.service
            └─4509 /usr/sbin/apache2 -k start
              └─4511 /usr/sbin/apache2 -k start
                └─4512 /usr/sbin/apache2 -k start

Feb 25 20:21:34 likhith-VirtualBox systemd[1]: Starting The Apache HTTP Server...
Feb 25 20:21:34 likhith-VirtualBox apache2[4508]: AH00558: apache2: Could not reliably determine the server's
Feb 25 20:21:34 likhith-VirtualBox systemd[1]: Started The Apache HTTP Server.
lines 1-15/15 (END)
```

Step 3: Server IP address can be set by the following command:

\$sudo ip addr add 172.16.10.1/24 dev enp0s3

\$sudo ip addr

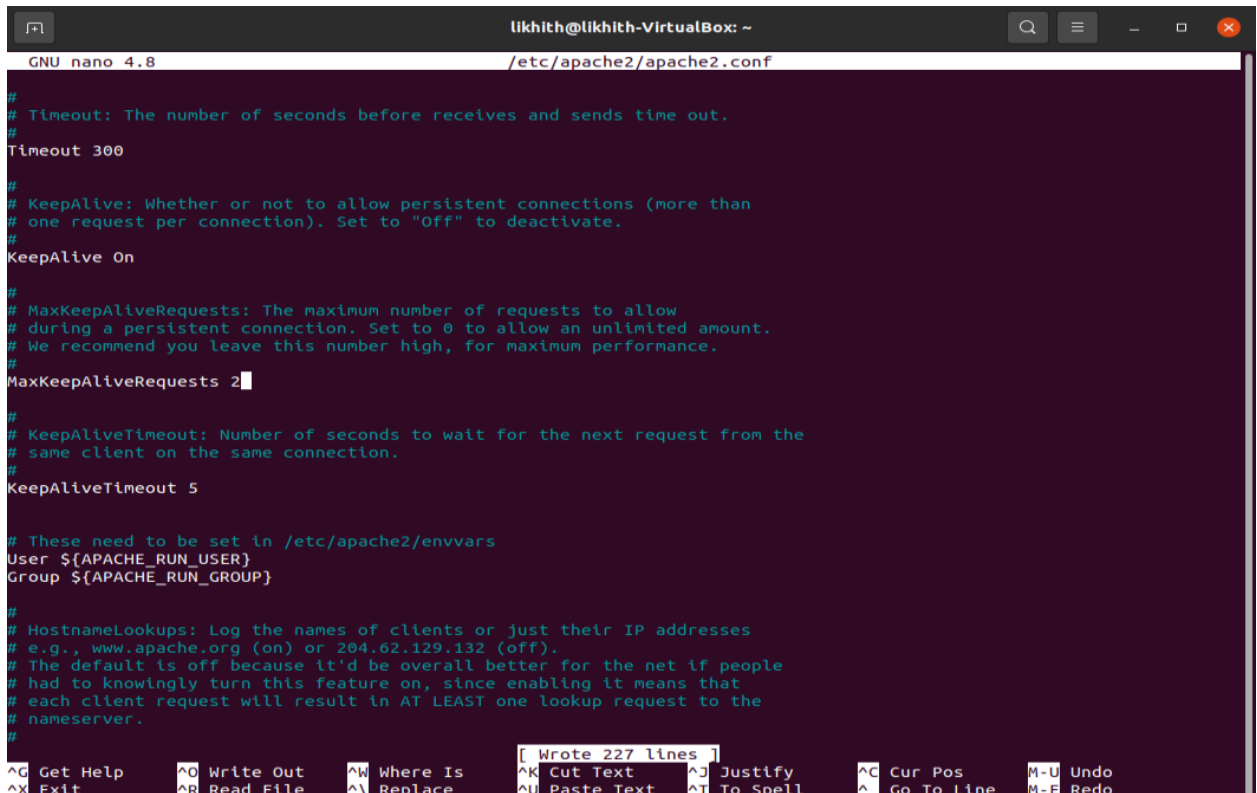
```
likhith@likhith-VirtualBox:/var/www/html$ sudo ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
   link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
     inet 127.0.0.1/8 scope host lo
         valid_lft forever preferred_lft forever
     inet6 ::1/128 scope host
         valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default ql
en 1000
   link/ether 08:00:27:7e:49:ff brd ff:ff:ff:ff:ff:ff
     inet 172.16.10.1/24 brd 172.16.10.255 scope global noprefixroute enp0s3
         valid_lft forever preferred_lft forever
     inet6 fe80::319e:b5c3:e662:8f0e/64 scope link noprefixroute
         valid_lft forever preferred_lft forever
likhith@likhith-VirtualBox:/var/www/html$
```

Step 4: The apache2.conf file present in the etc/apache2 directory is modified as:

a) The keep-alive option was set (i.e. value was made ON)

b) The MaximumKeepAliveRequests were set to 2

\$sudo nano /etc/apache2/apache2.conf



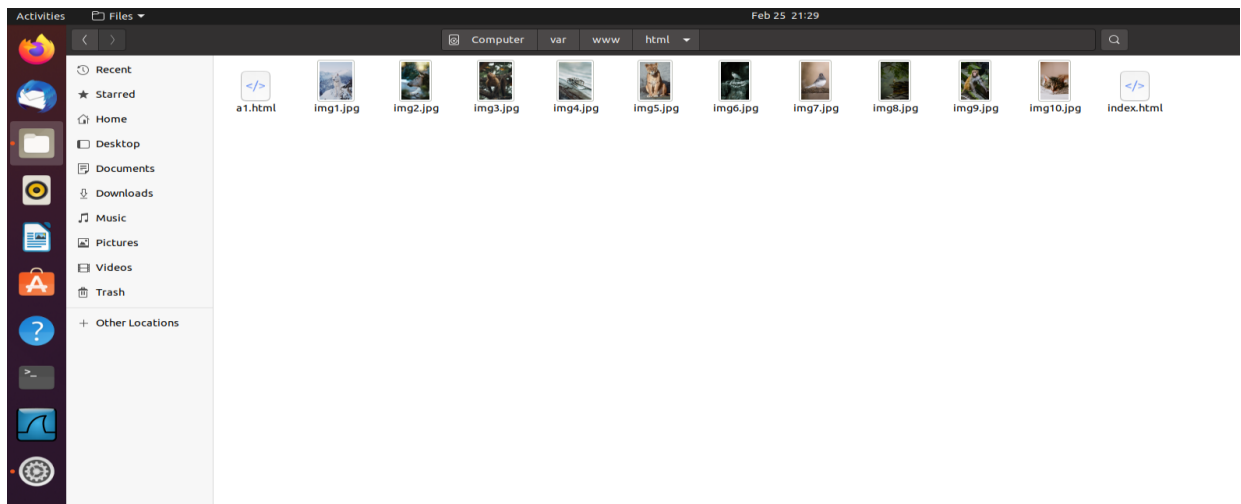
The screenshot shows a terminal window titled "likhith@likhith-VirtualBox: ~". The terminal is running the nano text editor on the file "/etc/apache2/apache2.conf". The configuration file content is as follows:

```
#  
# 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  
  
# These need to be set in /etc/apache2/envvars  
User ${APACHE_RUN_USER}  
Group ${APACHE_RUN_GROUP}  
#  
# HostnameLookups: Log the names of clients or just their IP addresses  
# e.g., www.apache.org (on) or 204.62.129.132 (off).  
# The default is off because it'd be overall better for the net if people  
# had to knowingly turn this feature on, since enabling it means that  
# each client request will result in AT LEAST one lookup request to the  
# nameserver.  
#
```

The bottom status bar of the nano editor shows: "[Wrote 227 lines]". The bottom menu bar includes options like ^G Get Help, ^O Write Out, ^W Where Is, ^K Cut Text, ^J Justify, ^C Cur Pos, M-U Undo, ^X Exit, ^R Read File, ^_ Replace, ^U Paste Text, ^T To Spell, ^_ Go To Line, and M-E Redo.

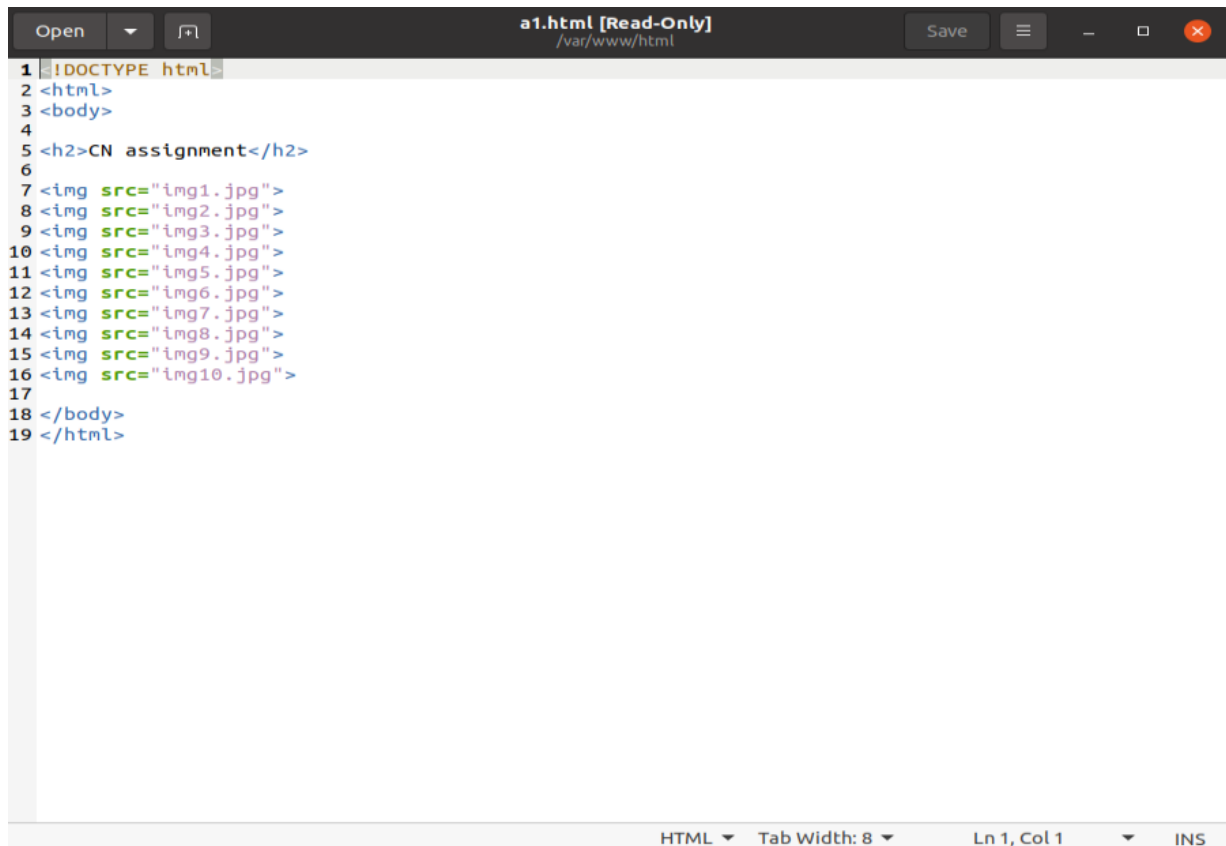
Step 5: Store images in the server path. A html page consisting of 10 images having size > 2MB were placed and accessed by the client.

This html page is stored in the location - /var/www/html/file_name.html.



Step 6: Prepare a web page as shown below. The html file needs to add 10 images.

(Kindly skip the style attribute in the below image)



```
1 <!DOCTYPE html>
2 <html>
3 <body>
4
5 <h2>CN assignment</h2>
6
7 
8 
9 
10 
11 
12 
13 
14 
15 
16 
17
18 </body>
19 </html>
```

CLIENT SIDE:

```
likhith@likhith-VirtualBox:~$ sudo ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
   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 fq_codel state UP group default qlen 1000
   link/ether 08:00:27:c5:b2:97 brd ff:ff:ff:ff:ff:ff
   inet 172.16.10.2/24 brd 172.16.10.255 scope global noprefixroute enp0s3
       valid_lft forever preferred_lft forever
   inet6 fe80::2e60:946f:63f0:41d6/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

NON-PERSISTENT:

Non-Persistent-connection-per-server : 0

Advanced Preferences

Firefox about:config

persist

Show only modified preferences

browser.pageActions.persistedActions	("ids":["bookmark"],"idsinUriBar":["bookmark"],"idsinUriBarPreProton":[],"version":1}	
devtools.netmonitor.persistlog	false	
devtools.webconsole.persistlog	false	
media.clearkey.persistent-license.enabled	false	
network.http.max-persistent-connections-per-proxy	32	
network.http.max-persistent-connections-per-server	0	
network.http.spdy.persistent-settings	false	

persist ☒ Boolean ☐ Number ☐ String

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

http

No.	Time	Source	Destination	Protocol	Length	Info
688	7.593958586	172.16.10.2	172.16.10.1	HTTP	495	GET /a1.html HTTP/1.1
690	7.594608454	172.16.10.1	172.16.10.2	HTTP	530	HTTP/1.1 200 OK (text/html)
772	7.840749949	172.16.10.2	172.16.10.1	HTTP	353	GET /img1.jpg HTTP/1.1
1113	7.840876431	172.16.10.1	172.16.10.2	HTTP	2970	HTTP/1.1 200 OK (JPEG JFIF image)
1115	8.032072965	172.16.10.2	172.16.10.1	HTTP	353	GET /img2.jpg HTTP/1.1
1500	8.131918106	172.16.10.1	172.16.10.2	HTTP	14360	HTTP/1.1 200 OK (JPEG JFIF image)
1505	8.254878155	172.16.10.2	172.16.10.1	HTTP	353	GET /img3.jpg HTTP/1.1
1846	8.355276278	172.16.10.1	172.16.10.2	HTTP	274	HTTP/1.1 200 OK (JPEG JFIF image)
1848	8.448722354	172.16.10.2	172.16.10.1	HTTP	353	GET /img4.jpg HTTP/1.1
2019	8.512478343	172.16.10.1	172.16.10.2	HTTP	4956	HTTP/1.1 200 OK (JPEG JFIF image)
2021	8.561385776	172.16.10.2	172.16.10.1	HTTP	353	GET /img5.jpg HTTP/1.1
2245	8.601930665	172.16.10.1	172.16.10.2	HTTP	8297	HTTP/1.1 200 OK (JPEG JFIF image)
2247	8.693509541	172.16.10.2	172.16.10.1	HTTP	353	GET /img6.jpg HTTP/1.1
2517	8.750981490	172.16.10.1	172.16.10.2	HTTP	6132	HTTP/1.1 200 OK (JPEG JFIF image)
2520	8.919350887	172.16.10.2	172.16.10.1	HTTP	353	GET /img7.jpg HTTP/1.1
2652	8.968959117	172.16.10.1	172.16.10.2	HTTP	13031	HTTP/1.1 200 OK (JPEG JFIF image)
2654	8.992582938	172.16.10.2	172.16.10.1	HTTP	353	GET /img8.jpg HTTP/1.1
2835	9.160865712	172.16.10.1	172.16.10.2	HTTP	1098	HTTP/1.1 200 OK (JPEG JFIF image)
2837	9.279609796	172.16.10.2	172.16.10.1	HTTP	353	GET /img9.jpg HTTP/1.1
3481	9.573887320	172.16.10.1	172.16.10.2	HTTP	24381	HTTP/1.1 200 OK (JPEG JFIF image)
3487	9.664606551	172.16.10.2	172.16.10.1	HTTP	356	GET /favicon.ico HTTP/1.1
3488	9.665095750	172.16.10.1	172.16.10.2	HTTP	557	HTTP/1.1 404 Not Found (text/html)
3490	9.665293147	172.16.10.2	172.16.10.1	HTTP	354	GET /img10.jpg HTTP/1.1
3893	9.741905942	172.16.10.1	172.16.10.2	HTTP	2254	HTTP/1.1 200 OK (JPEG JFIF image)

Time: 9.741905942-7.593958586 = 2.147947356

PERSISTENT:

Persistent-connection-per-server : 2

Advanced Preferences

Firefox about:config

persist

Show only modified preferences

browser.pageActions.persistedActions	("ids":["bookmark"],"idsinUriBar":["bookmark"],"idsinUriBarPreProton":[],"version":1}	
devtools.netmonitor.persistlog	false	
devtools.webconsole.persistlog	false	
media.clearkey.persistent-license.enabled	false	
network.http.max-persistent-connections-per-proxy	32	
network.http.max-persistent-connections-per-server	2	
network.http.spdy.persistent-settings	true	

persist ☒ Boolean ☐ Number ☐ String

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Capturing from any

http

No.	Time	Source	Destination	Protocol	Length	Info
428	16.337711571	172.16.10.2	172.16.10.1	HTTP	405	GET /a1.html HTTP/1.1
430	16.338393552	172.16.10.1	172.16.10.2	HTTP	530	HTTP/1.1 200 OK (text/html)
672	16.643783349	172.16.10.2	172.16.10.1	HTTP	353	GET /img1.jpg HTTP/1.1
837	16.668003035	172.16.10.1	172.16.10.2	HTTP	353	GET /img2.jpg HTTP/1.1
1158	16.753300649	172.16.10.1	172.16.10.2	HTTP	15755	HTTP/1.1 200 OK (JPEG JFIF image)
1511	16.832090213	172.16.10.1	172.16.10.2	HTTP	18765	HTTP/1.1 200 OK (JPEG JFIF image)
1515	17.195264358	172.16.10.2	172.16.10.1	HTTP	353	GET /img3.jpg HTTP/1.1
1845	17.3095058624	172.16.10.1	172.16.10.2	HTTP	6066	HTTP/1.1 200 OK (JPEG JFIF image)
1847	17.443339718	172.16.10.2	172.16.10.1	HTTP	353	GET /img4.jpg HTTP/1.1
2056	17.499254098	172.16.10.1	172.16.10.2	HTTP	6484	HTTP/1.1 200 OK (JPEG JFIF image)
2058	17.558703194	172.16.10.2	172.16.10.1	HTTP	353	GET /img5.jpg HTTP/1.1
2211	17.618393407	172.16.10.2	172.16.10.1	HTTP	353	GET /img6.jpg HTTP/1.1
2447	17.750816010	172.16.10.1	172.16.10.2	HTTP	3953	HTTP/1.1 200 OK (JPEG JFIF image)
2605	17.842967735	172.16.10.1	172.16.10.2	HTTP	6132	HTTP/1.1 200 OK (JPEG JFIF image)
2667	17.920284567	172.16.10.2	172.16.10.1	HTTP	353	GET /img7.jpg HTTP/1.1
2836	17.974361408	172.16.10.1	172.16.10.2	HTTP	20271	HTTP/1.1 200 OK (JPEG JFIF image)
2838	18.003355600	172.16.10.2	172.16.10.1	HTTP	353	GET /img8.jpg HTTP/1.1
2948	18.052121197	172.16.10.2	172.16.10.1	HTTP	353	GET /img9.jpg HTTP/1.1
3109	18.085054511	172.16.10.1	172.16.10.2	HTTP	14130	HTTP/1.1 200 OK (JPEG JFIF image)
3531	18.458328526	172.16.10.2	172.16.10.1	HTTP	354	GET /img10.jpg HTTP/1.1
4056	18.605076847	172.16.10.1	172.16.10.2	HTTP	6598	HTTP/1.1 200 OK (JPEG JFIF image)
4105	18.647834330	172.16.10.1	172.16.10.2	HTTP	11349	HTTP/1.1 200 OK (JPEG JFIF image)
4112	19.026209906	172.16.10.2	172.16.10.1	HTTP	356	GET /favicon.ico HTTP/1.1
4113	19.026919907	172.16.10.1	172.16.10.2	HTTP	557	HTTP/1.1 404 Not Found (text/html)

Time: 18.647834330-16.337711571 = 2.310122759

Persistent-connection-per-server : 4

Firefox Developer Tools - Network tab showing a list of network requests. The selected request is `405 GET /a1.html HTTP/1.1` with a status of 405 (Not Allowed).

Advanced Preferences window showing the `network.http.spdy.persistent-settings` set to `true`.

Wireshark packet capture showing a list of HTTP requests. The selected packet is `405 GET /a1.html HTTP/1.1` with a status of 405 (Not Allowed).

Time: 10.868355005-9.629315490 = 1.239039515

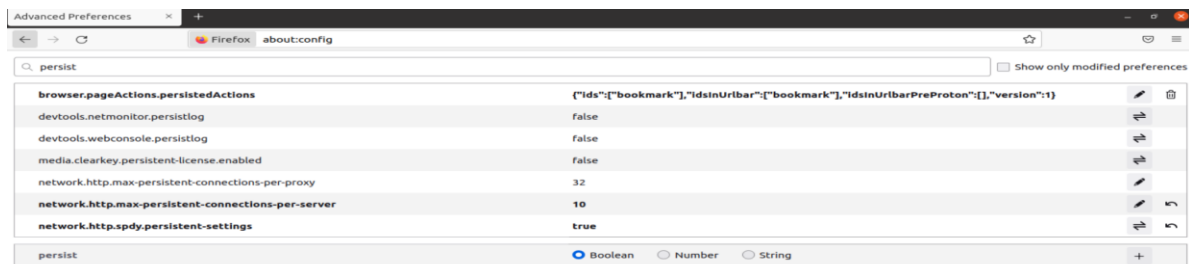
Persistent-connection-per-server : 6

Advanced Preferences window showing the `network.http.spdy.persistent-settings` set to `true`.

Wireshark packet capture showing a list of HTTP requests. The selected packet is `405 GET /a1.html HTTP/1.1` with a status of 405 (Not Allowed).

Time: 42.210829771-41.150014248 = 1.060815528

Persistent-connection-per-server : 10



Capturing from any							
No.	Time	Source	Destination	Protocol	Length	Info	
678	8.620179974	172.16.10.2	172.16.10.1	HTTP	405	GET /a1.html	HTTP/1.1
680	8.621049270	172.16.10.1	172.16.10.2	HTTP	520	HTTP/1.1 200 OK (text/html)	
778	8.858645037	172.16.10.2	172.16.10.1	HTTP	353	GET /img1.jpg	HTTP/1.1
1002	8.873488415	172.16.10.2	172.16.10.1	HTTP	353	GET /img2.jpg	HTTP/1.1
1310	8.936609201	172.16.10.2	172.16.10.1	HTTP	353	GET /img3.jpg	HTTP/1.1
1547	8.960745009	172.16.10.2	172.16.10.1	HTTP	353	GET /img4.jpg	HTTP/1.1
1571	8.972425151	172.16.10.2	172.16.10.1	HTTP	353	GET /img5.jpg	HTTP/1.1
2215	9.034908674	172.16.10.1	172.16.10.2	HTTP	2978	HTTP/1.1 200 OK (JPEG JFIF image)	
2219	9.035270587	172.16.10.2	172.16.10.1	HTTP	353	GET /img6.jpg	HTTP/1.1
2265	9.042525003	172.16.10.2	172.16.10.1	HTTP	353	GET /img8.jpg	HTTP/1.1
2373	9.052331319	172.16.10.2	172.16.10.1	HTTP	353	GET /img7.jpg	HTTP/1.1
2687	9.083448971	172.16.10.2	172.16.10.1	HTTP	354	GET /img10.jpg	HTTP/1.1
2794	9.093806926	172.16.10.2	172.16.10.1	HTTP	353	GET /img9.jpg	HTTP/1.1
4019	9.278695651	172.16.10.1	172.16.10.2	HTTP	13305	HTTP/1.1 200 OK (JPEG JFIF image)	
4087	9.306400630	172.16.10.1	172.16.10.2	HTTP	1097	HTTP/1.1 200 OK (JPEG JFIF image)	
4516	9.493085608	172.16.10.1	172.16.10.2	HTTP	16975	HTTP/1.1 200 OK (JPEG JFIF image)	
5223	10.034365480	172.16.10.1	172.16.10.2	HTTP	2253	HTTP/1.1 200 OK (JPEG JFIF image)	
5294	10.465649326	172.16.10.2	172.16.10.1	HTTP	356	GET /favicon.ico	HTTP/1.1
5296	10.466236238	172.16.10.1	172.16.10.2	HTTP	556	HTTP/1.1 404 Not Found (text/html)	

Time: 10.034365480-8.620179974 = 1.41485506

Conclusion:

The optimal number of HTTP persistent connections are 6.

The time difference for 6 connections is found to be the least

3(a) - UNDERSTANDING WORKING OF HTTP HEADERS

a. To install apache utility

```
likhith@likhith-VirtualBox:~/Desktop/LIKHITH/week3$ sudo apt-get install apache2 apache2-utils
Reading package lists... Done
Building dependency tree
Reading state information... Done
apache2 is already the newest version (2.4.41-4ubuntu3.9).
apache2-utils is already the newest version (2.4.41-4ubuntu3.9).
apache2-utils set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 218 not upgraded.
likhith@likhith-VirtualBox:~/Desktop/LIKHITH/week3$
```

b. Provide username and password to set authentication

```
likhith@likhith-VirtualBox:~/Desktop/LIKHITH/week3$ sudo htpasswd -c /etc/apache2/.htpasswd smilepeace
New password:
Re-type new password:
Adding password for user smilepeace
```

```
likhith@likhith-VirtualBox:~/Desktop/LIKHITH/week3$ sudo cat /etc/apache2/.htpasswd
smilepeace:$apr1$0PDilQWU$Mla/00AQpcwf7Yy3NCDYn0
```

c. To setup the authentication phase

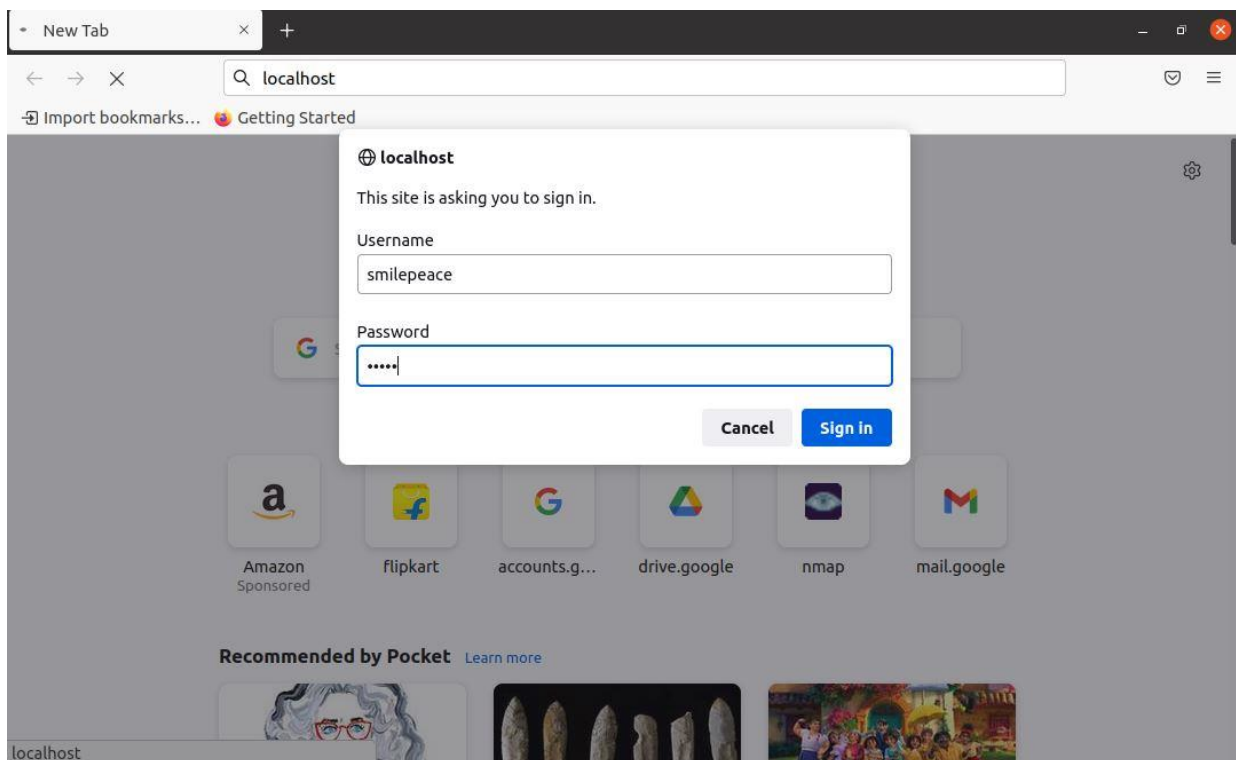
```
GNU nano 4.8 /etc/apache2/sites-available/000-default.conf Modified
<VirtualHost *:80>

    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/html

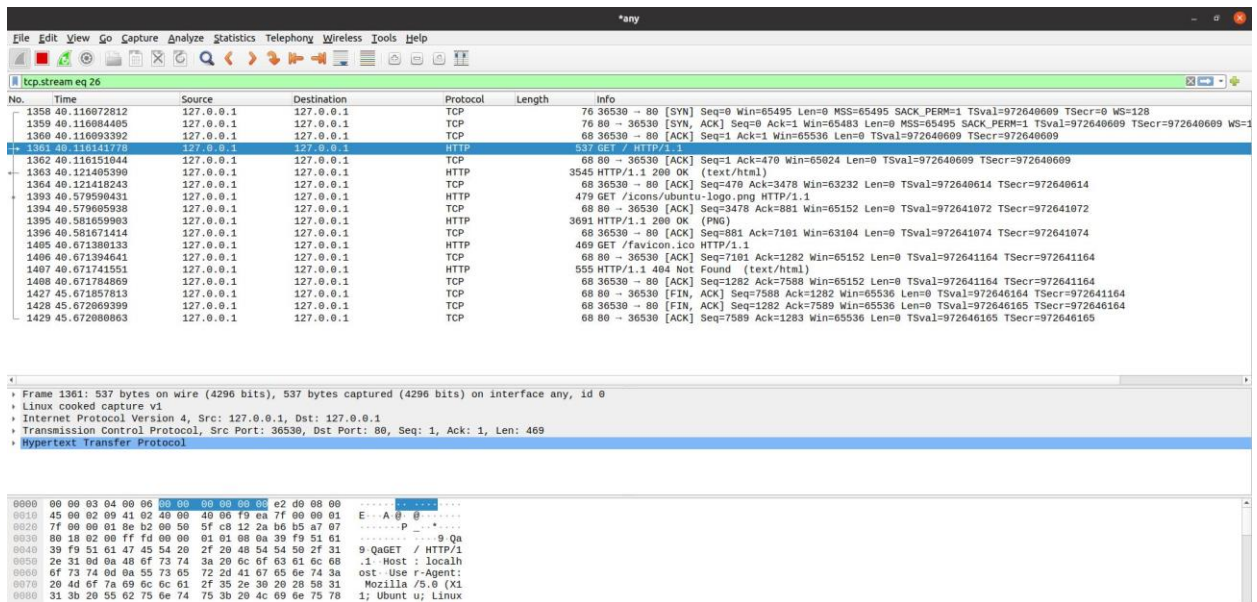
    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

    <Directory "/var/www/html">
        AuthType Basic
        AuthName "RESTRICTED"
        AuthUserFile /etc/apache2/.htpasswd
        Require valid-user >
    </Directory>
</VirtualHost>
```

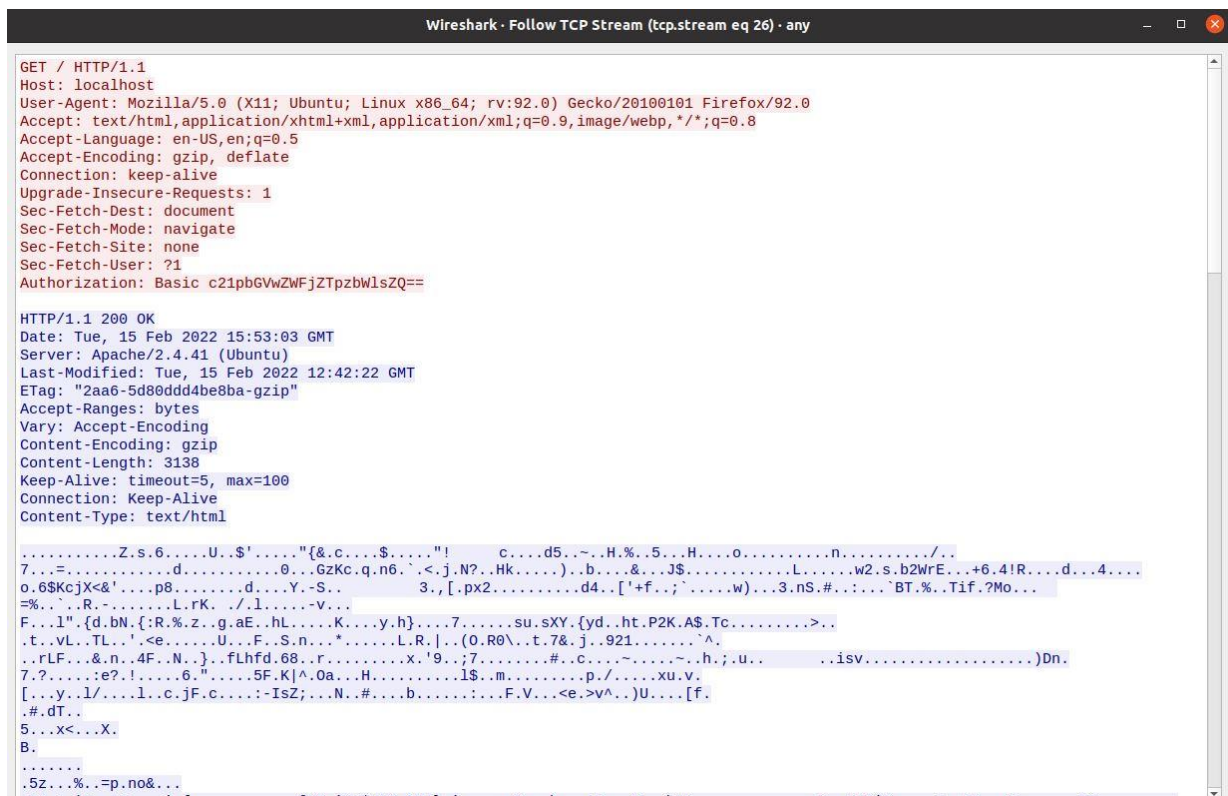
d. Localhost access



e. Wireshark is used to capture

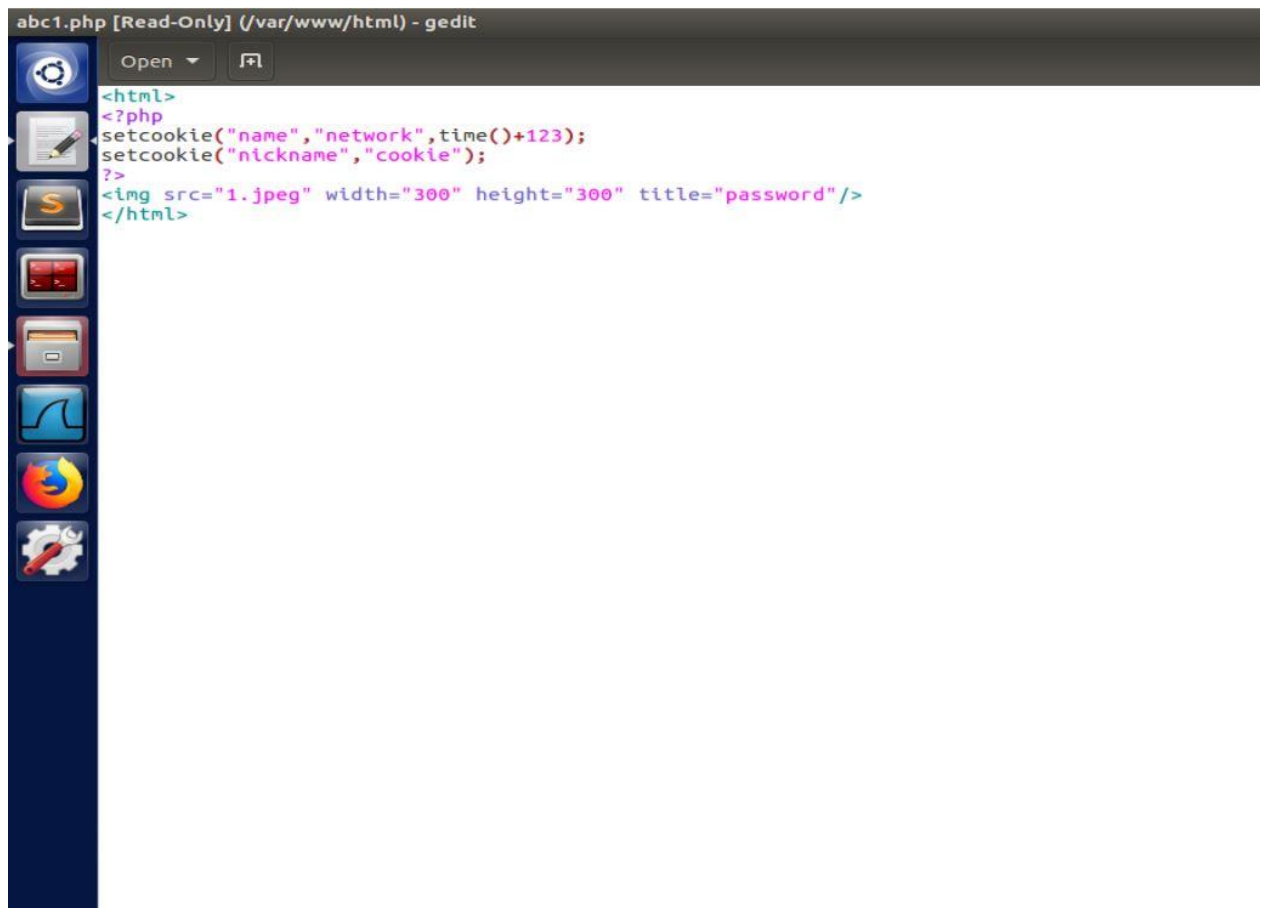


f. The password retrieve



2) COOKIE SETTING

a. Code to set the cookie



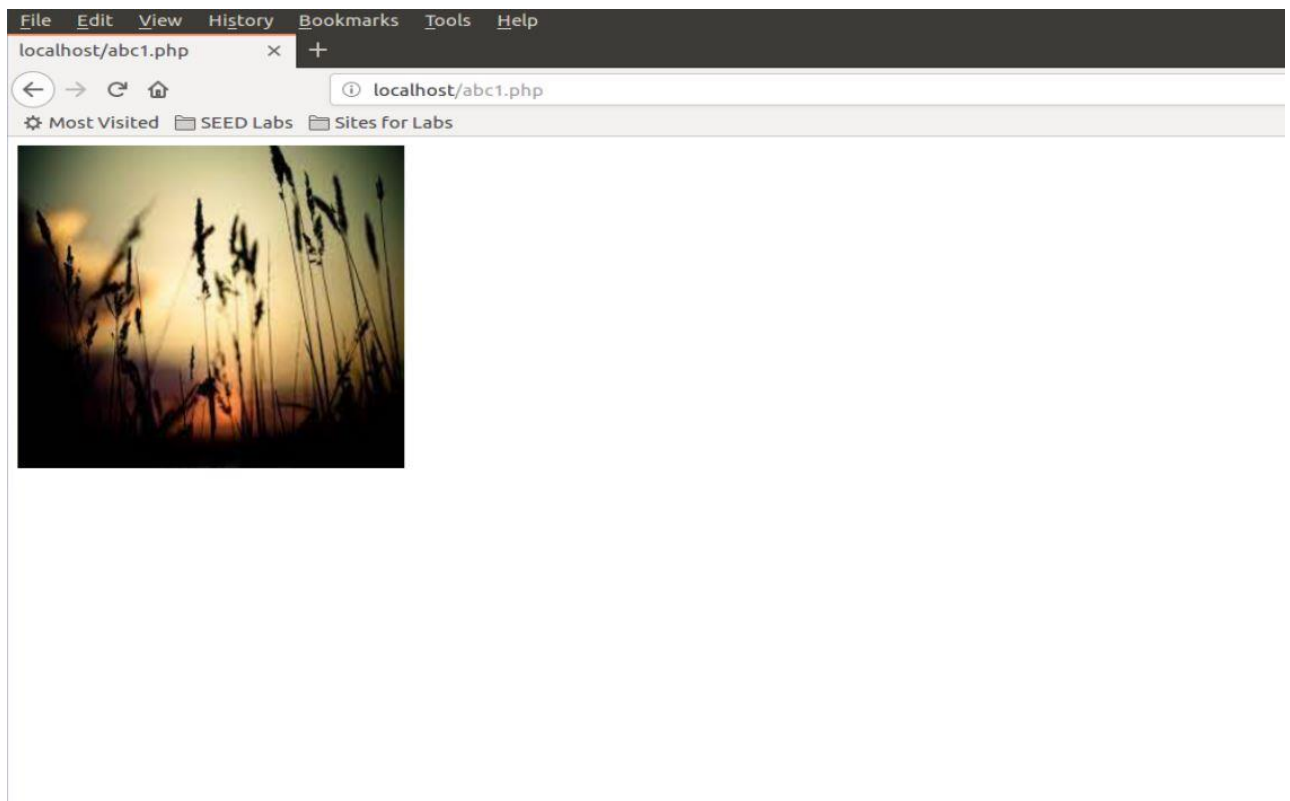
The screenshot shows a gedit text editor window titled "abc1.php [Read-Only] (/var/www/html) - gedit". The editor contains the following code:

```
<html>
<?php
setcookie("name","network",time()+123);
setcookie("nickname","cookie");
?>

</html>
```

The left sidebar of the gedit window displays a vertical stack of application icons, including a gear, a document with a pencil, a terminal, a file manager, a web browser, and a settings icon.

b. The .php file is placed under /var/www/html for accessing



c. The packets are captured using wireshark

No.	Time	Source	Destination	Protocol	Length	Info
40	2022-02-17 12:08:57.5640881	127.0.0.1	127.0.0.1	TCP	76	36044 → 80 [SYN] Seq=3779504084 Win=43698 Len=0 MSS=65495 SACK_PERM=1 TSval=1316642...
41	2022-02-17 12:08:57.5640960	127.0.0.1	127.0.0.1	TCP	76	80 → 36044 [SYN, ACK] Seq=1038916374 Ack=3779504085 Win=43698 Len=0 MSS=65495 SACK...
42	2022-02-17 12:08:57.5641021	127.0.0.1	127.0.0.1	TCP	68	36044 → 80 [ACK] Seq=3779504085 Ack=1038916375 Win=43776 Len=0 TSval=1316642 TSecr=...
43	2022-02-17 12:08:57.5641405	127.0.0.1	127.0.0.1	HTTP	391	GET /abc1.php HTTP/1.1
44	2022-02-17 12:08:57.5641455	127.0.0.1	127.0.0.1	TCP	68	80 → 36044 [ACK] Seq=1038916375 Ack=3779504408 Win=44800 Len=0 TSval=1316642 TSecr=...
45	2022-02-17 12:08:57.5658190	127.0.0.1	127.0.0.1	HTTP	511	HTTP/1.1 200 OK (text/html)
46	2022-02-17 12:08:57.5679701	127.0.0.1	127.0.0.1	TCP	68	36044 → 80 [ACK] Seq=3779504408 Ack=1038916818 Win=44800 Len=0 TSval=1316643 TSecr=...
47	2022-02-17 12:08:57.6451393	127.0.0.1	127.0.0.1	HTTP	374	GET /1.jpeg HTTP/1.1
48	2022-02-17 12:08:57.6452650	127.0.0.1	127.0.0.1	HTTP	7753	HTTP/1.1 200 OK (JPEG JFIF image)
49	2022-02-17 12:08:57.6452705	127.0.0.1	127.0.0.1	TCP	68	36044 → 80 [ACK] Seq=3779504714 Ack=1038924503 Win=175744 Len=0 TSval=1316662 TSecr=...
56	2022-02-17 12:09:02.6504214	127.0.0.1	127.0.0.1	TCP	68	80 → 36044 [FIN, ACK] Seq=1038924503 Ack=3779504714 Win=45952 Len=0 TSval=1317913 T...
57	2022-02-17 12:09:02.6507220	127.0.0.1	127.0.0.1	TCP	68	36044 → 80 [FIN, ACK] Seq=3779504714 Ack=1038924504 Win=175744 Len=0 TSval=1317913 ...
58	2022-02-17 12:09:02.6507338	127.0.0.1	127.0.0.1	TCP	68	80 → 36044 [ACK] Seq=1038924504 Ack=3779504715 Win=45952 Len=0 TSval=1317913 TSecr=...

▶ Frame 43: 391 bytes on wire (3128 bits), 391 bytes captured (3128 bits) on interface 0
 ▶ Linux cooked capture
 ▶ Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
 ▶ Transmission Control Protocol, Src Port: 36044, Dst Port: 80, Seq: 3779504085, Ack: 1038916375, Len: 323
 ▶ Hypertext Transfer Protocol

```
Wireshark · Follow TCP Stream (tcp.stream eq 1) · wireshark_any_20220217120845_sanExC

GET /abc1.php HTTP/1.1
Host: localhost
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux i686; rv:60.0) Gecko/20100101 Firefox/60.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1

HTTP/1.1 200 OK
Date: Thu, 17 Feb 2022 17:08:57 GMT
Server: Apache/2.4.18 (Ubuntu)
Set-Cookie: name=network; expires=Thu, 17-Feb-2022 17:11:00 GMT; Max-Age=123
Set-Cookie: nickname=cookie
Vary: Accept-Encoding
Content-Encoding: gzip
Content-Length: 87
Keep-Alive: timeout=5, max=2
Connection: Keep-Alive
Content-Type: text/html; charset=UTF-8

.....(.....MW(.J.U2..*HMWR(.L)..U260PR.H.L(.rJ2KrRm.
.....R.....!...y+..M...GET /1.jpeg HTTP/1.1
Host: localhost
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux i686; rv:60.0) Gecko/20100101 Firefox/60.0
Accept: */*
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Referer: http://localhost/abc1.php
Cookie: name=network; nickname=cookie
Connection: keep-alive
```

The Cookie is set.

3) Conditional Get :

Firefox Web Browser

Feb 25 18:24

gaia.cs.umass.edu/wireshark

gaia.cs.umass.edu/wireshark-labs/HTTP-wireshark-file2.html

Congratulations again! Now you've downloaded the file lab2-2.html.
This file's last modification date will not change.

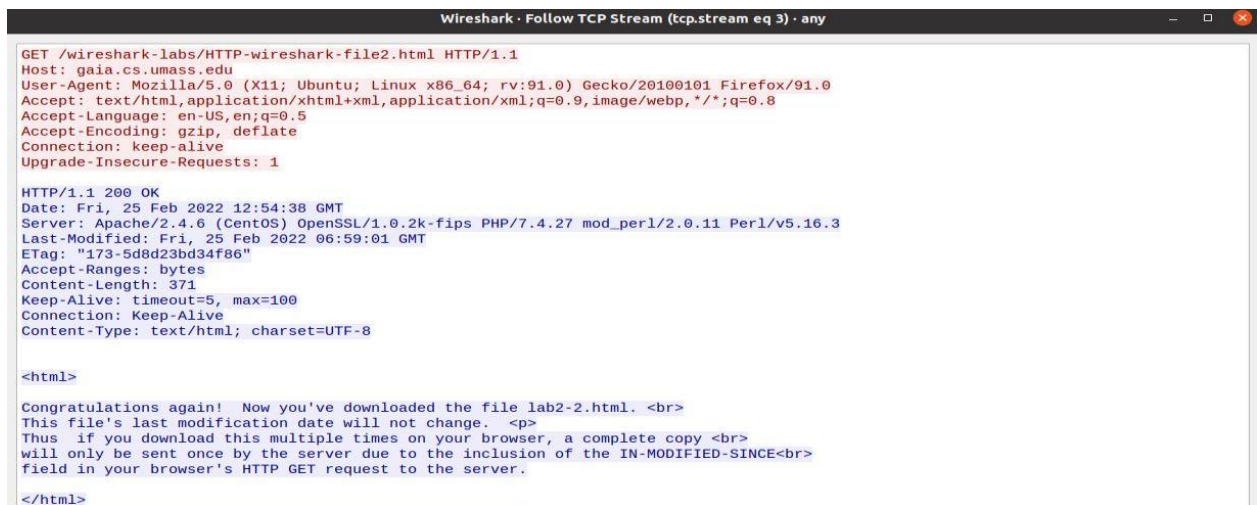
Thus if you download this multiple times on your browser, a complete copy will only be sent once by the server due to the inclusion of the IN-MODIFIED-SINCE field in your browser's HTTP GET request to the server.

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

http

No.	Time	Source	Destination	Protocol	Length	Info
20	14.547337849	10.0.2.15	128.119.245.12	HTTP	432	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
26	14.918577413	128.119.245.12	10.0.2.15	HTTP	786	HTTP/1.1 200 OK (text/html)
50	15.256917023	10.0.2.15	128.119.245.12	HTTP	389	GET /favicon.ico HTTP/1.1
62	15.572330065	128.119.245.12	10.0.2.15	HTTP	541	HTTP/1.1 404 Not Found (text/html)
70	17.856551345	10.0.2.15	128.119.245.12	HTTP	544	GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
72	18.195203763	128.119.245.12	10.0.2.15	HTTP	295	HTTP/1.1 304 Not Modified
160	134.573176047	10.0.2.15	35.224.170.84	HTTP	143	GET / HTTP/1.1
162	134.911803941	35.224.170.84	10.0.2.15	HTTP	204	HTTP/1.1 204 No Content

First HTTP request:

A screenshot of the Wireshark interface showing a packet capture of an HTTP GET request. The title bar reads "Wireshark · Follow TCP Stream (tcp.stream eq 3) · any". The packet list on the left shows a single packet of type "HTTP". The packet details pane on the right shows the structure of the HTTP request. The request line is "GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1". The host is "gaia.cs.umass.edu". The user agent is "Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0". The accept headers are "text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8". The accept-encoding is "gzip, deflate". The connection is "keep-alive". The upgrade-insecure-requests header is set to "1". The status bar at the bottom shows "HTTP/1.1 200 OK". The packet bytes pane at the bottom shows the raw HTML content of the response, which includes a congratulatory message and a note about the file's last modification date.

```
GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Host: gaia.cs.umass.edu
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1

HTTP/1.1 200 OK
Date: Fri, 25 Feb 2022 12:54:38 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.27 mod_perl/2.0.11 Perl/v5.16.3
Last-Modified: Fri, 25 Feb 2022 06:59:01 GMT
ETag: "173-5d8d23bd34f86"
Accept-Ranges: bytes
Content-Length: 371
Keep-Alive: timeout=5, max=100
Connection: Keep-Alive
Content-Type: text/html; charset=UTF-8

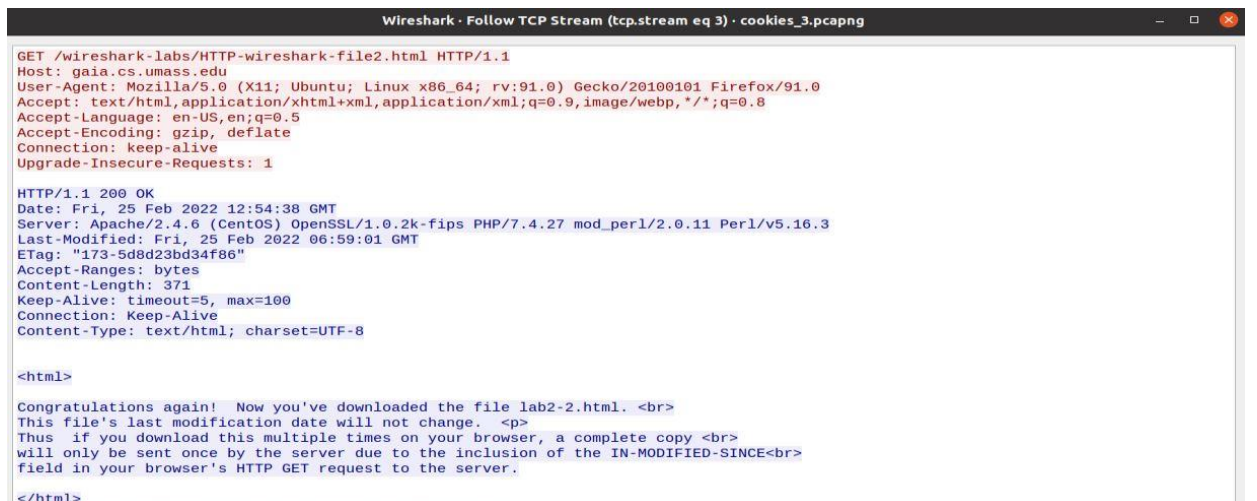
<html>

Congratulations again! Now you've downloaded the file lab2-2.html. <br>
This file's last modification date will not change. <p>
Thus if you download this multiple times on your browser, a complete copy <br>
will only be sent once by the server due to the inclusion of the IN-MODIFIED-SINCE<br>
field in your browser's HTTP GET request to the server.

</html>
```

NO, there is no “IF-MODIFIED-SINCE” line in the get message.

First HTTP response

A screenshot of the Wireshark interface showing a packet capture of an HTTP GET response. The title bar reads "Wireshark · Follow TCP Stream (tcp.stream eq 3) · cookies_3.pcapng". The packet list on the left shows a single packet of type "HTTP". The packet details pane on the right shows the structure of the HTTP response. The status bar at the bottom shows "HTTP/1.1 200 OK". The packet bytes pane at the bottom shows the raw HTML content of the response, which includes a congratulatory message and a note about the file's last modification date.

```
GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Host: gaia.cs.umass.edu
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1

HTTP/1.1 200 OK
Date: Fri, 25 Feb 2022 12:54:38 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.27 mod_perl/2.0.11 Perl/v5.16.3
Last-Modified: Fri, 25 Feb 2022 06:59:01 GMT
ETag: "173-5d8d23bd34f86"
Accept-Ranges: bytes
Content-Length: 371
Keep-Alive: timeout=5, max=100
Connection: Keep-Alive
Content-Type: text/html; charset=UTF-8

<html>

Congratulations again! Now you've downloaded the file lab2-2.html. <br>
This file's last modification date will not change. <p>
Thus if you download this multiple times on your browser, a complete copy <br>
will only be sent once by the server due to the inclusion of the IN-MODIFIED-SINCE<br>
field in your browser's HTTP GET request to the server.

</html>
```

YES, server explicitly return the contents of the file.

The server sent the data which is showed on the browser.

Second HTTP request:

```
Wireshark · Follow TCP Stream (tcp.stream eq 3) · any

GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Host: gaia.cs.umass.edu
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1

HTTP/1.1 200 OK
Date: Fri, 25 Feb 2022 12:54:38 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.27 mod_perl/2.0.11 Perl/v5.16.3
Last-Modified: Fri, 25 Feb 2022 06:59:01 GMT
ETag: "173-5d8d23bd34f86"
Accept-Ranges: bytes
Content-Length: 371
Keep-Alive: timeout=5, max=100
Connection: Keep-Alive
Content-Type: text/html; charset=UTF-8

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will only be sent once by the server due to the inclusion of the IN-MODIFIED-SINCE<br>
field in your browser's HTTP GET request to the server.

</html>

GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Host: gaia.cs.umass.edu
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
If-Modified-Since: Fri, 25 Feb 2022 06:59:01 GMT
If-None-Match: "173-5d8d23bd34f86"
Cache-Control: max-age=0

HTTP/1.1 304 Not Modified
Date: Fri, 25 Feb 2022 12:54:41 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.27 mod_perl/2.0.11 Perl/v5.16.3
Connection: Keep-Alive
Keep-Alive: timeout=5, max=99
ETag: "173-5d8d23bd34f86"
```

YES, In the second HTTP message “IF-MODIFIED-SINCE” is included.
It gives the information of the date and time that I last accessed it.

Second HTTP response


```
Wireshark · Follow TCP Stream (tcp.stream eq 3) · any

GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Host: gaia.cs.umass.edu
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1

HTTP/1.1 200 OK
Date: Fri, 25 Feb 2022 12:54:38 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.27 mod_perl/2.0.11 Perl/v5.16.3
Last-Modified: Fri, 25 Feb 2022 06:59:01 GMT
ETag: "173-5d8d23bd34f86"
Accept-Ranges: bytes
Content-Length: 371
Keep-Alive: timeout=5, max=100
Connection: Keep-Alive
Content-Type: text/html; charset=UTF-8

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field in your browser's HTTP GET request to the server.

</html>

GET /wireshark-labs/HTTP-wireshark-file2.html HTTP/1.1
Host: gaia.cs.umass.edu
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
If-Modified-Since: Fri, 25 Feb 2022 06:59:01 GMT
If-None-Match: "173-5d8d23bd34f86"
Cache-Control: max-age=0

HTTP/1.1 304 Not Modified
Date: Fri, 25 Feb 2022 12:54:41 GMT
Server: Apache/2.4.6 (CentOS) OpenSSL/1.0.2k-fips PHP/7.4.27 mod_perl/2.0.11 Perl/v5.16.3
Connection: Keep-Alive
Keep-Alive: timeout=5, max=99
ETag: "173-5d8d23bd34f86"

2 client pkts, 2 server pkts, 3 turns.
Entire conversation (1,833 bytes) Show and save data as ASCII Stream 3
Find: Find Next
Help Filter Out This Stream Print Save as... Back Close
```

HTTP status code : 304

Phrase : “Not Modified”

The server didn't explicitly return the contents of the file because the file content were stored in the cache hence retrived from cache.