PES UNIVERSITY
EC CAMPUS, BANGALORE
COMPUTER NETWORK LABORATORY
WEEK 3

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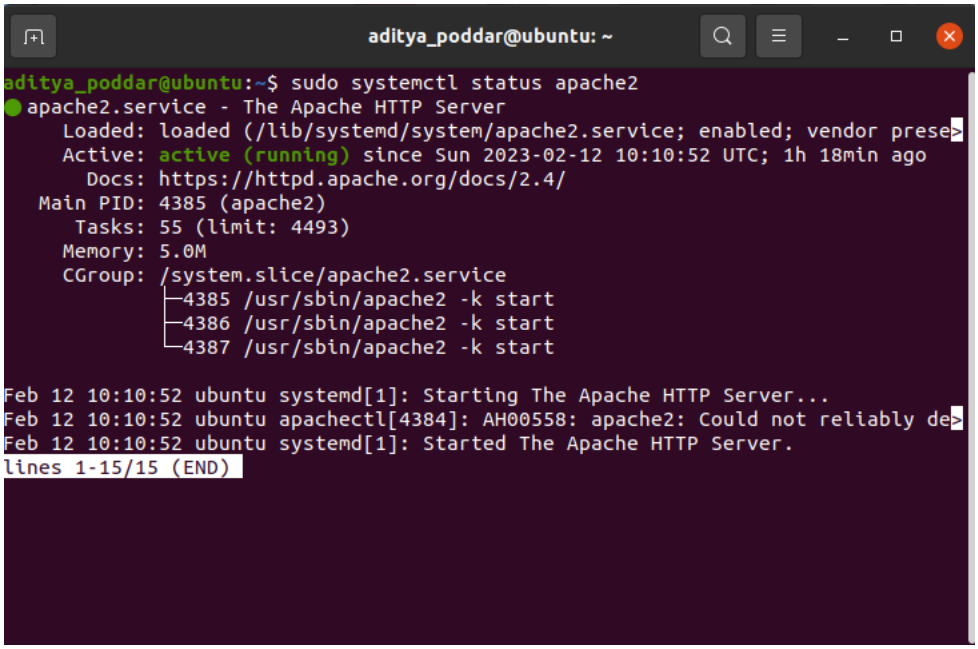
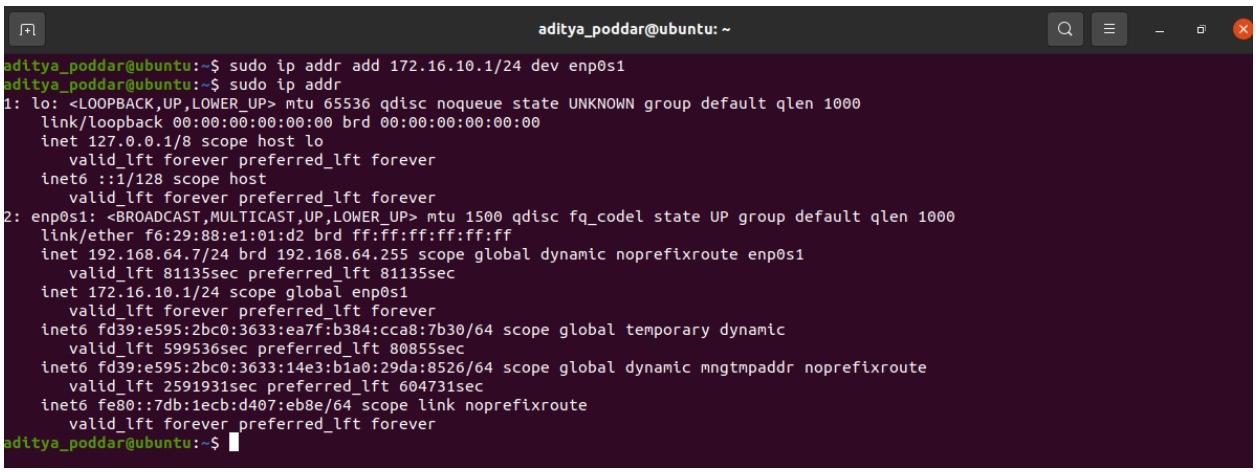
AIM: To understand persistent and non-persistent HTTP Connections and corresponding performance impact.

1. Installing Apache2 and making sure the server is running.



2. Changing the IP address of server machine.



3. In apache2.conf
    - KeepAlive was set to ON
    - MaxKeepAliveRequests to 2

```
  GNU nano 4.8                                  /etc/apache2/apache2.conf
#
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


# 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

^G Get Help    ^O Write Out   ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos     M-U Undo       M-A Mark Text
^X Exit        ^R Read File   ^\ Replace     ^U Paste Text  ^T To Spell    ^_ Go To Line  M-E Redo       M-6 Copy Text
```

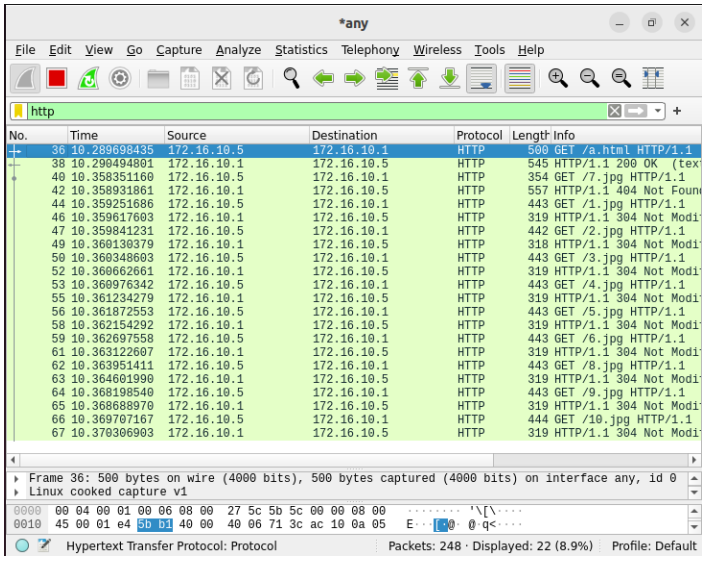
4. Store images and create html file.

Open | Week3_File.html ~/var/www/html | Save

```
1 <!DOCTYPE html>
2 <html>
3 <head>
4 </head>
5
6 <body>
7         <img src="1.jpg" alt="1" style="width:340px;height:225px;">
8         <img src="2.jpg" alt="2" style="width:340px;height:225px;">
9         <img src="3.jpg" alt="3" style="width:340px;height:225px;">
10        <img src="4.jpg" alt="4" style="width:340px;height:225px;">
11        <img src="5.jpg" alt="5" style="width:340px;height:225px;">
12        <img src="6.jpg" alt="6" style="width:340px;height:225px;">
13        <img src="7.jpg" alt="7" style="width:340px;height:225px;">
14        <img src="8.jpg" alt="8" style="width:340px;height:225px;">
15        <img src="9.jpg" alt="9" style="width:340px;height:225px;">
16        <img src="10.jpg" alt="10" style="width:340px;height:225px;">
17 </body>
18 </html>
```

Observations:

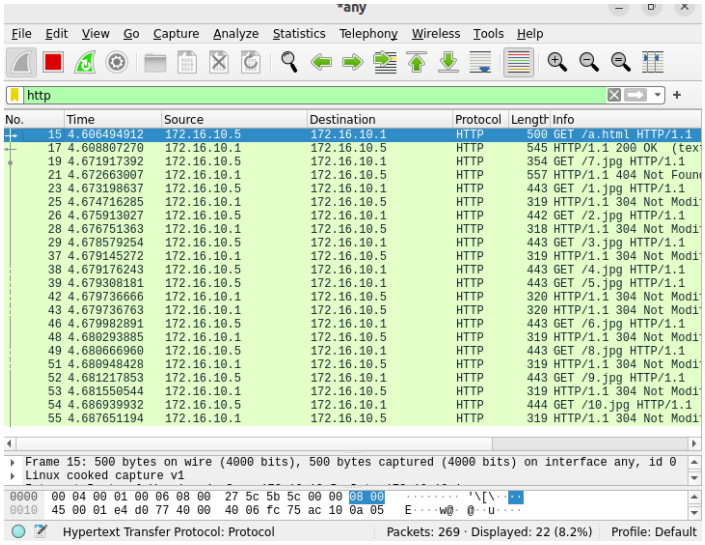
1. Non-Persistent



Time = 10.370306903 – 10.289698435

= 0.080608468

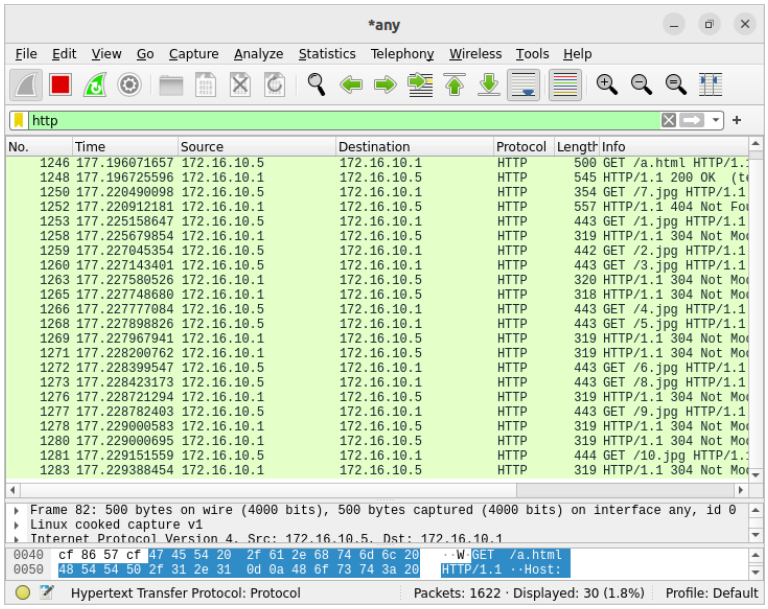
2. Persistant-2



Time = 4.686939932 – 4.606494912

= 0.08044502

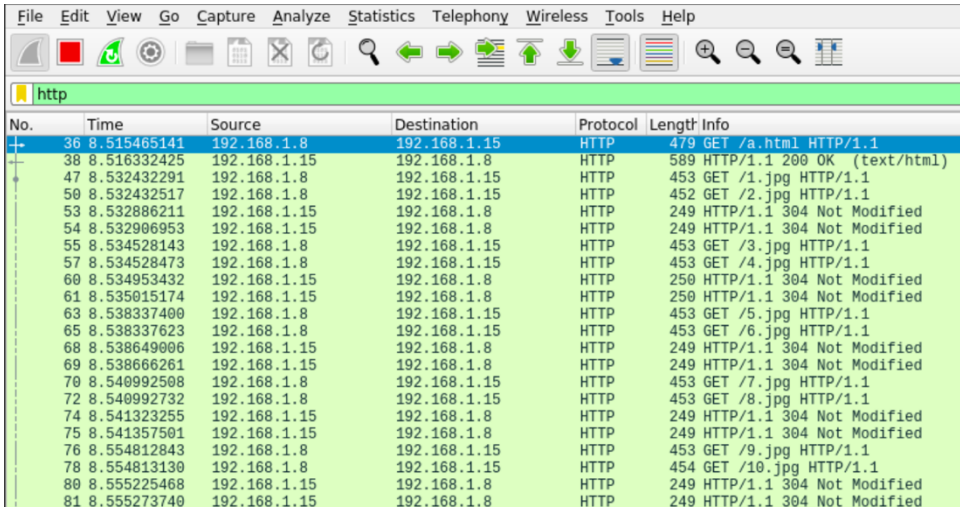
3. Persistant-4



Time = 177.229151559 – 177.196071657

= 0.033079902

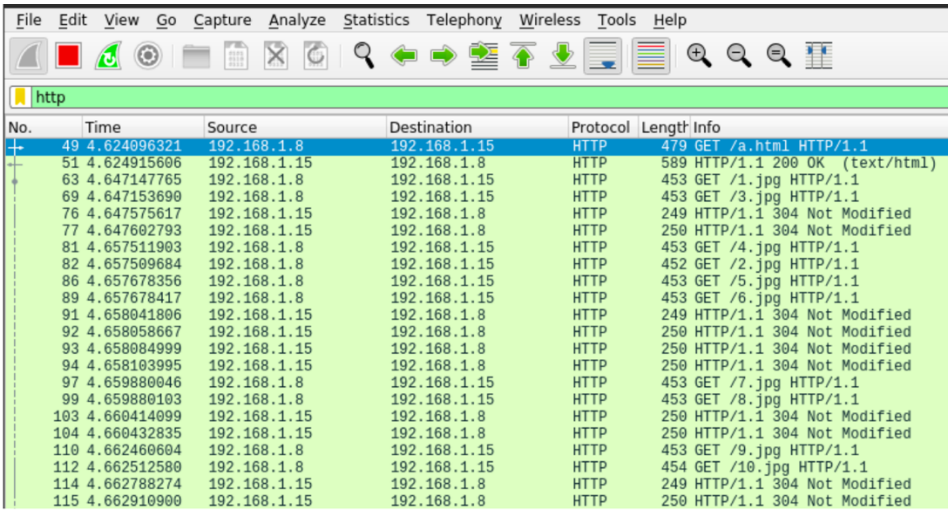
4. Persistant-6



Time = 8.554813130 – 8.532432291

= 0.022380839

5. Persistant-10



No.	Time	Source	Destination	Protocol	Length	Info
49	4.624096321	192.168.1.8	192.168.1.15	HTTP	479	GET /a.html HTTP/1.1
51	4.624915606	192.168.1.15	192.168.1.8	HTTP	589	HTTP/1.1 200 OK (text/html)
63	4.647147765	192.168.1.8	192.168.1.15	HTTP	453	GET /1.jpg HTTP/1.1
69	4.647153690	192.168.1.8	192.168.1.15	HTTP	453	GET /3.jpg HTTP/1.1
76	4.647575617	192.168.1.15	192.168.1.8	HTTP	249	HTTP/1.1 304 Not Modified
77	4.647602793	192.168.1.15	192.168.1.8	HTTP	250	HTTP/1.1 304 Not Modified
81	4.657511903	192.168.1.8	192.168.1.15	HTTP	453	GET /4.jpg HTTP/1.1
82	4.657509684	192.168.1.8	192.168.1.15	HTTP	452	GET /2.jpg HTTP/1.1
86	4.657678356	192.168.1.8	192.168.1.15	HTTP	453	GET /5.jpg HTTP/1.1
89	4.657678417	192.168.1.8	192.168.1.15	HTTP	453	GET /6.jpg HTTP/1.1
91	4.658041806	192.168.1.15	192.168.1.8	HTTP	249	HTTP/1.1 304 Not Modified
92	4.658058667	192.168.1.15	192.168.1.8	HTTP	250	HTTP/1.1 304 Not Modified
93	4.658084999	192.168.1.15	192.168.1.8	HTTP	250	HTTP/1.1 304 Not Modified
94	4.658103995	192.168.1.15	192.168.1.8	HTTP	250	HTTP/1.1 304 Not Modified
97	4.659880046	192.168.1.8	192.168.1.15	HTTP	453	GET /7.jpg HTTP/1.1
99	4.659880103	192.168.1.8	192.168.1.15	HTTP	453	GET /8.jpg HTTP/1.1
103	4.660414099	192.168.1.15	192.168.1.8	HTTP	250	HTTP/1.1 304 Not Modified
104	4.660432835	192.168.1.15	192.168.1.8	HTTP	250	HTTP/1.1 304 Not Modified
110	4.662460604	192.168.1.8	192.168.1.15	HTTP	453	GET /9.jpg HTTP/1.1
112	4.662512580	192.168.1.8	192.168.1.15	HTTP	454	GET /10.jpg HTTP/1.1
114	4.662788274	192.168.1.15	192.168.1.8	HTTP	249	HTTP/1.1 304 Not Modified
115	4.662910900	192.168.1.15	192.168.1.8	HTTP	250	HTTP/1.1 304 Not Modified

Time = 4.662512580 – 4.647147765
= 0.015364815

Conclusion:

Q1.Explain the response time difference.

Ans) Non-persistent and persistent are the two types of HTTP connections used to connect the client with the webserver. The non-persistent connection has connection type 1.0 and persistent connection has connection type 1.1. After the client receives the object in non-persistent, the connection is closed. On the other hand the persistent connection ensures the transfer of multiple objects over a single connection.

RTT is the time taken to request the object from the client to the server and then retrieve it from the server back to the client. The non-persistent connection takes the connection time of 2RTT + each file transmission time. A persistent connection takes the connection time of 2RTT + transfers all objects at a go over the single connection. This is the reason why a persistent connection is faster.

Q2. What is the optimal number of persistent connections for best performance?

Ans) Higher the number of persistent connections, lower is the time taken. The optimal connection is 4 or 6. For best case, use 10. Clients should have **at most 2** persistent connections to any server to prevent the server from being overloaded. A non-persistent connection takes the most time.