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Task 1 work:

To build a web server using apache, we should install apache in our laptop first.

“sudo apt-get update” && “sudo apt-get upgrade”(better if execute this before starting)

1)Installing apache server in ubuntu inside virtualbox: “sudo apt install apache2”

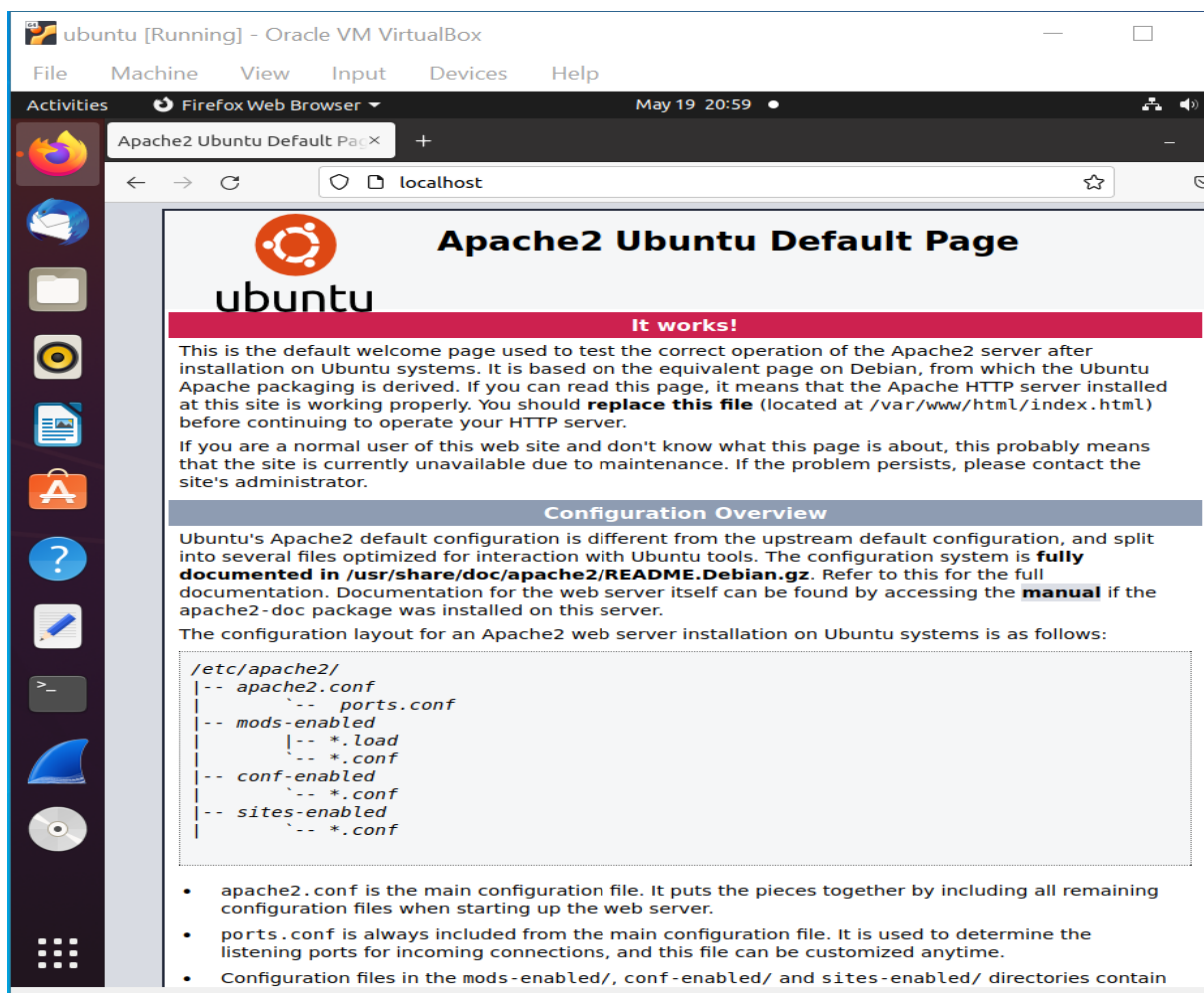
2)Activate apache2 server : “systemctl start apache2”

(this activation is there in Subbu anna report but I don't know whether it is a must required thing to do or not-choose apache2 server bcz Subbu anna used it)

After this a apache2 HTTP web server is installed in our laptop itself.so our laptop is acting as a web server(ofcourse don't know if this can be accessed through internet,localhost access will work,for me accessing through wsl ubuntu also worked through wget command at last)

3)Better to Verify apache2 is installed correctly or not:Type “localhost” in any browser and hit enter.

(must read this entire default page to get some idea of how apache web server works)



When we type localhost in browser, browser itself adds 80 port number to it and opens apache installed in our laptop itself.

Now management of this whole apache2 web server is there in /etc/apache2 location I guess(except hosts file in /etc location)-not completely sure

4)Creating .conf files for virtual hosts(here 2 .conf files for 2 hosts)

Hosts implies 2 websites I guess

Go to location through command “cd /etc/apache2/sites-available”.type “ls” we can see 000-default.conf file already in that location.

I cant open this location without terminal.why I don't know.i cant find this folders etc visually,only accessible through terminal and seeing through “ls” command only as of I know.not completely sure.

Default .conf file:

```
<VirtualHost *:80>
# The ServerName directive sets the request scheme, hostname and port that
# the server uses to identify itself. This is used when creating
# redirection URLs. In the context of virtual hosts, the ServerName
# specifies what hostname must appear in the request's Host: header to
# match this virtual host. For the default virtual host (this file) this
# value is not decisive as it is used as a last resort host regardless.
# However, you must set it for any further virtual host explicitly.
#ServerName www.example.com

ServerAdmin webmaster@localhost
DocumentRoot /var/www/html

# Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
# error, crit, alert, emerg.
# It is also possible to configure the loglevel for particular
# modules, e.g.
#LogLevel info ssl:warn

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

# For most configuration files from conf-available/, which are
# enabled or disabled at a global level, it is possible to
# include a line for only one particular virtual host. For example the
# following line enables the CGI configuration for this host only
# after it has been globally disabled with "a2disconf".
#Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
~
~
```

Now create host1.conf file in that location first.

```
sudharshan@sudharshanb190512cs:/etc$ cd ..
sudharshan@sudharshanb190512cs:/$ sudo cp /etc/apache2/sites-available/000-default.conf /etc/apache2/sites-available/host1.conf
[sudo] password for sudharshan:
Sorry, try again.
[sudo] password for sudharshan:
sudharshan@sudharshanb190512cs:/$ cd /etc/apache2/sites-available
sudharshan@sudharshanb190512cs:/etc/apache2/sites-available$ ls
000-default.conf  default-ssl.conf  host1.conf
sudharshan@sudharshanb190512cs:/etc/apache2/sites-available$
```

Through above command a file will be created with name host1.conf in same location with contents of 000-default.conf file.

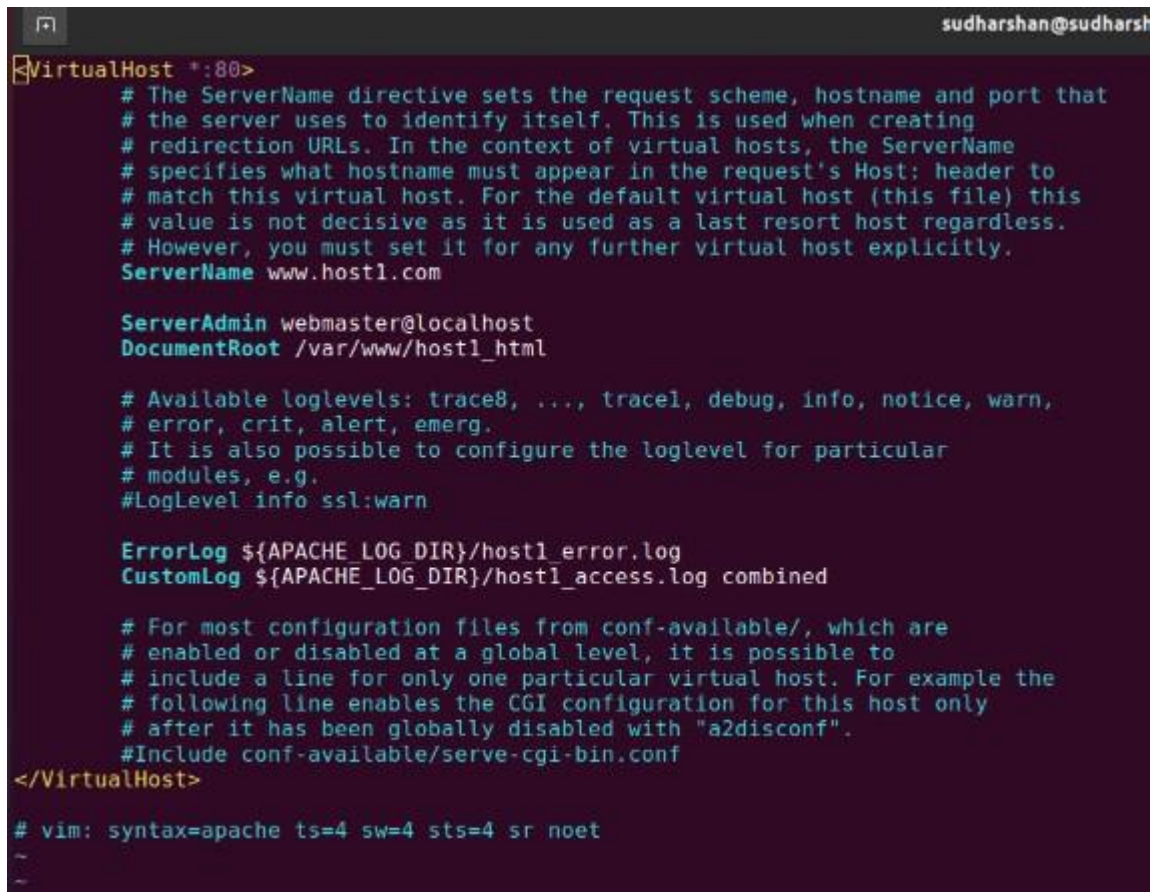
Now edit the host1.conf file appropriately.(go to location and type “sudo gedit host1.conf”

a)uncomment servername and give a name to the server

b)Add document root,error log and custom log file paths in which sites html pages,error logs and other custom logs are stored.(took this line from Subbu anna report,actually we will store html pages later in 6th point)

c)save and close the file

my host1.conf file after editing:



```
VirtualHost *:80>
# The ServerName directive sets the request scheme, hostname and port that
# the server uses to identify itself. This is used when creating
# redirection URLs. In the context of virtual hosts, the ServerName
# specifies what hostname must appear in the request's Host: header to
# match this virtual host. For the default virtual host (this file) this
# value is not decisive as it is used as a last resort host regardless.
# However, you must set it for any further virtual host explicitly.
ServerName www.host1.com

ServerAdmin webmaster@localhost
DocumentRoot /var/www/host1_html

# Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
# error, crit, alert, emerg.
# It is also possible to configure the loglevel for particular
# modules, e.g.
#LogLevel info ssl:warn

ErrorLog ${APACHE_LOG_DIR}/host1_error.log
CustomLog ${APACHE_LOG_DIR}/host1_access.log combined

# For most configuration files from conf-available/, which are
# enabled or disabled at a global level, it is possible to
# include a line for only one particular virtual host. For example the
# following line enables the CGI configuration for this host only
# after it has been globally disabled with "a2disconf".
#Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
```

Do for host2.conf also in similar manner.just changing host1 to host2 that's it.

host1_html and host2_html directories mentioned in Document root are not created by us till now.will create and put html pages in it later in 6th point.

Even though error logs and custom logs are mentioned in above .conf file,subbu anna ignored them i.e., never created them bcz they are not required to create as per given ass pdf I guess not sure.

Now we have configuration files for 2 virtual hosts.but we should do one more step.

Go to /etc/apache2 location and execute below commands i.e., adding domains to sites-enabled directory

```

sudharshan@sudharshanb190512cs:/etc/apache2$ sudo a2ensite host1.conf
[sudo] password for sudharshan:
Enabling site host1.
To activate the new configuration, you need to run:
  systemctl reload apache2
sudharshan@sudharshanb190512cs:/etc/apache2$ sudo a2ensite host2.conf
Enabling site host2.
To activate the new configuration, you need to run:
  systemctl reload apache2
sudharshan@sudharshanb190512cs:/etc/apache2$ systemctl reload apache2
sudharshan@sudharshanb190512cs:/etc/apache2$ 

```

5)there is one file named “hosts” in /etc location

Add ip addresses of the 2 new virtual hosts host1 and host2 in hosts file.

Original hosts file(list of hosts with ip addresses)

```

1 127.0.0.1      localhost
2 127.0.1.1      sudharshan-VirtualBox
3
4 # The following lines are desirable for IPv6 capable hosts
5 ::1           ip6-localhost ip6-loopback
6 fe00::0       ip6-localnet
7 ff00::0       ip6-mcastprefix
8 ff02::1       ip6-allnodes
9 ff02::2       ip6-allrouters

```

hosts file after adding:

```

1 127.0.0.1      localhost
2 127.0.1.1      sudharshan-VirtualBox
3 127.0.0.1      www.host1.com
4 127.0.0.1      www.host2.com
5
6 # The following lines are desirable for IPv6 capable hosts
7 ::1           ip6-localhost ip6-loopback
8 fe00::0       ip6-localnet
9 ff00::0       ip6-mcastprefix
10 ff02::1       ip6-allnodes
11 ff02::2       ip6-allrouters

```

I gave same 127.0.0.1 for both again bcz Subbu anna gave like that.

6)putting sample html pages in document root category:

Type “cd /var/www”

Create new directories host1_html and host2_html:observe in .conf files of host1.conf and host2.conf in document root this is there.we are doing this creation late.

```

sudharshan@sudharshanb190512cs:/var/www$ sudo mkdir host1_html
[sudo] password for sudharshan:
sudharshan@sudharshanb190512cs:/var/www$ ls
host1_html  html
sudharshan@sudharshanb190512cs:/var/www$ sudo mkdir host2_html
sudharshan@sudharshanb190512cs:/var/www$ ls
host1_html  host2_html  html
sudharshan@sudharshanb190512cs:/var/www$ 

```

Create a new index.html file in both directories:”sudo touch index.html” command in both directories will create two index.html files respectively.

Be in respective directory of host1_html or host2_html and type "sudo gedit index.html"-will open index.html files for editing through gedit text editor (if already installed).fill a sample html page in both index.html files

Write a sample html code in index.html file:

```
!DOCTYPE html
<html>
  <head>
    <title>
      Apache host1
    </title>
  </head>
  <body>
    <h1>
      HOST1 OPENED
    </h1>
    <p>
      You have connected to host 1
    </p>
  </body>
</html>
```

7)Telnet to web server port 80

In ass pdf it is asked to telnet to web server port 80 and give some simple http request to server and observe headers of http request packet and response packets using wireshark.

Should do 1."telnet www.host1.com 80", 2."GET / HTTP/1.1", 3."HOST: www.host1.com"(simple http request to server-according to Subbu anna report these 3 commands should work).

But for me request time out response came from server as shown below.i don't know why not working properly for me.

```
sudharshan@sudharshanb190512cs:~/Desktop$ telnet www.host1.com 80
Trying 127.0.0.1...
Connected to www.host1.com.
Escape character is '^]'.
GET / HTTP/1.1
HOST: www.host1.com
HTTP/1.1 408 Request Timeout
Date: Wed, 18 May 2022 06:12:09 GMT
Server: Apache/2.4.41 (Ubuntu)
Content-Length: 296
Connection: close
Content-Type: text/html; charset=iso-8859-1

<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>408 Request Timeout</title>
</head><body>
<h1>Request Timeout</h1>
<p>Server timeout waiting for the HTTP request from the client.</p>
<hr>
<address>Apache/2.4.41 (Ubuntu) Server at 10.0.2.15 Port 80</address>
</body></html>
Connection closed by foreign host.
sudharshan@sudharshanb190512cs:~/Desktop$
```

Server response should be like this(Subbu anna screenshot):

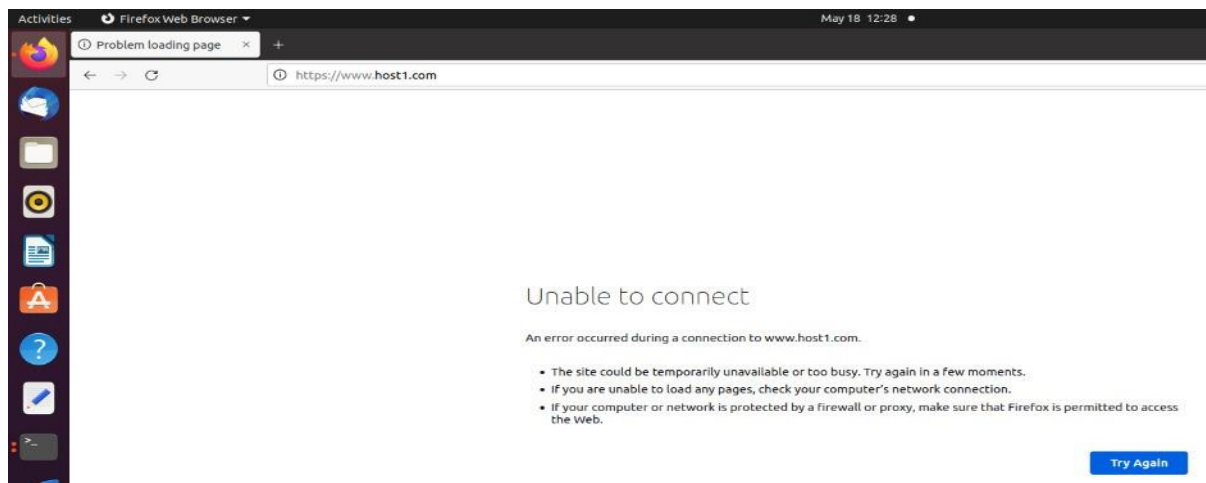
```
(kali㉿kali)-[~]
$ telnet www.host1.com 80
Trying 127.0.0.1...
Connected to www.host1.com.
Escape character is '^]'.
GET / HTTP/1.1
HOST: www.host1.com

HTTP/1.1 200 OK
Date: Sun, 14 Mar 2021 18:53:47 GMT
Server: Apache/2.4.46 (Debian)
Last-Modified: Sun, 14 Mar 2021 17:10:52 GMT
ETag: "b3-5bd82372fb4d1"
Accept-Ranges: bytes
Content-Length: 179
Vary: Accept-Encoding
Content-Type: text/html

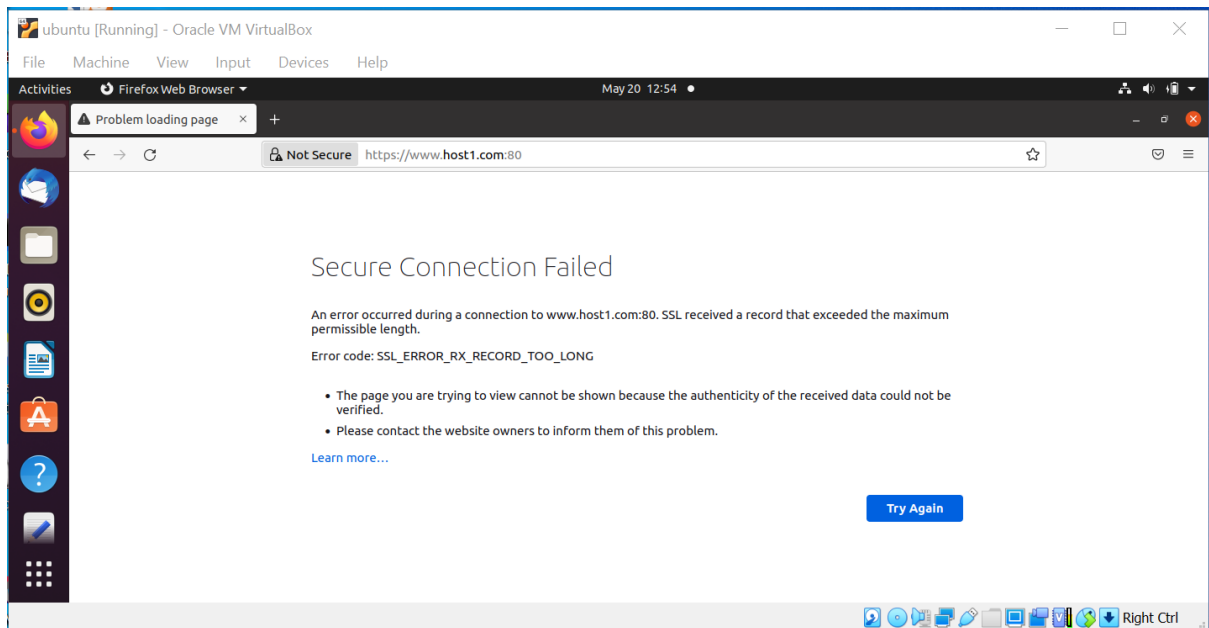
<!DOCTYPE html>
<html>
  <head>
    <title>
      Apache host1
    </title>
  </head>
  <body>
    <h1>
      HOST1 OPENED
    </h1>
    <p>
      You have connected to host 1
    </p>
  </body>
</html>
Connection closed by foreign host.
```

I tried connecting to server through browser once and below response came:

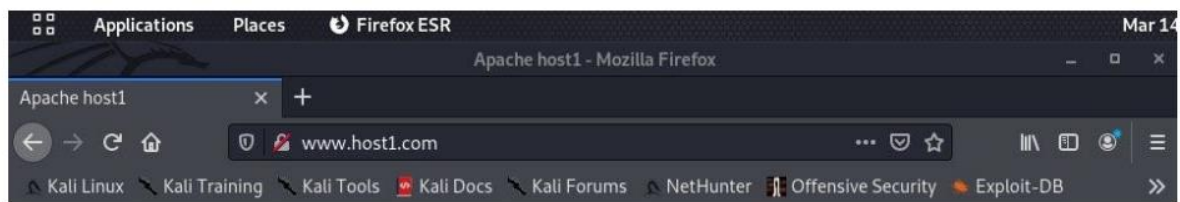
“<http://www.host1.com>”



“<http://www.host1.com:80>”



But for Subbu anna below response came:



HOST1 OPENED

You have connected to host 1

So I used below command to see whether it works or not and it worked, index.html file got saved in desktop.

```
sudharshan@sudharshanb190512cs:~/Desktop$ wget www.host1.com
--2022-05-19 20:34:25-- http://www.host1.com/
Resolving www.host1.com (www.host1.com)... 127.0.0.1
Connecting to www.host1.com (www.host1.com)|127.0.0.1|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 312 [text/html]
Saving to: 'index.html'

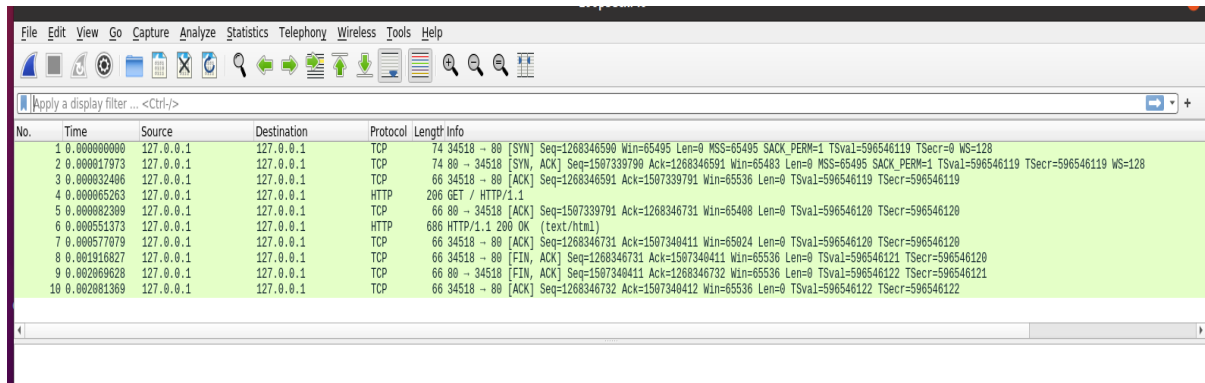
index.html      100%[=====>]      312  --.-KB/s    in 0s
2022-05-19 20:34:25 (15.7 MB/s) - 'index.html' saved [312/312]

sudharshan@sudharshanb190512cs:~/Desktop$
```

Same problems with host2.com too for me.

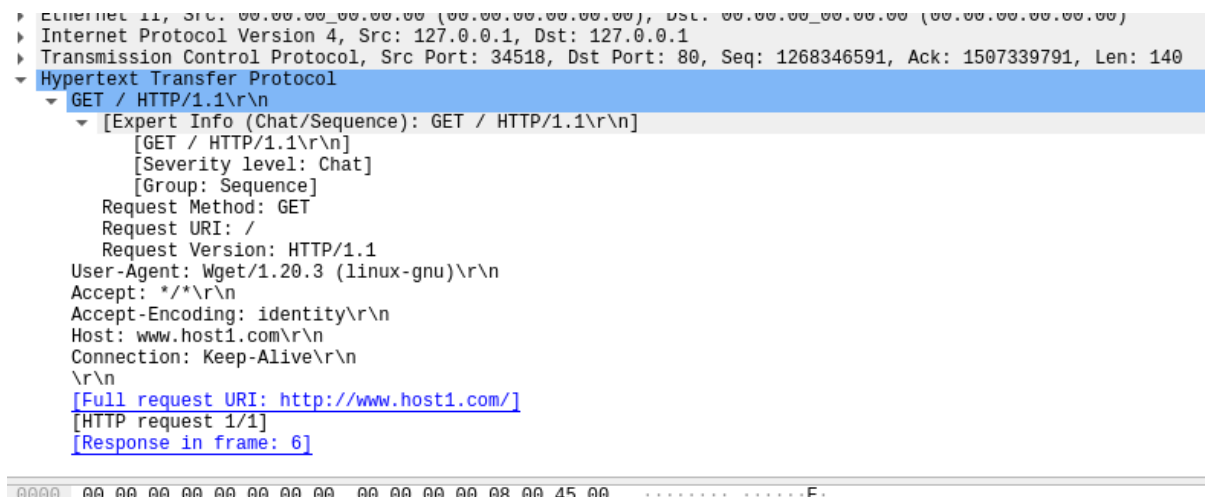
This wget download I tried through wsl ubuntu also and it worked since same device even though OS is different. ofcourse if we type above command in other system, this index.,html file will not get downloaded in that system bcz it has to pass through internet and that system don't know the domain name to ip address conversion of our website(DNS server of that system don't have our entry) I guess. and some other things also might be done to make this through internet thing work.

Wireshark capture of above wget download for me on loopback interface.

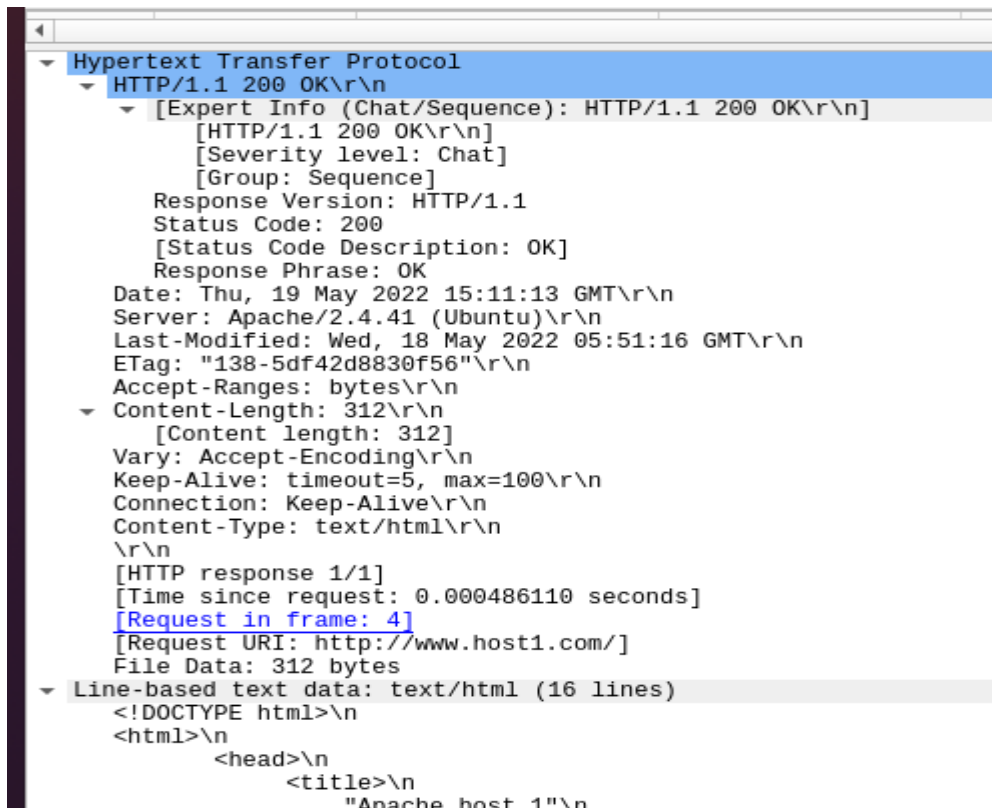


Only 2 HTTP packets are present in the capture(4th and 6th packets)

HTTP REQUEST PACKET(4TH packet in above capture):



HTTP RESPONSE PACKET(6th packet in above capture):



Task 2(Very simple web server):

Didnot understand the 1)actual question in task2 of ass pdf+2)Subbu anna .c program +3)Subbu anna report content if task 2.

3)Subbu anna report content:

Run VSWs.c program and type "localhost:8080" in browser.when typed in browser a new client connected msg will be displayed as below and HTTP response will be sent.(just connecting to web server running on port 8080 through browser)

```

sudharshan@sudharshanb190512cs:~/Desktop$ gcc vsws.c
sudharshan@sudharshanb190512cs:~/Desktop$ ./a.out
New Client connected

Http request message received:
[GET / HTTP/1.1
Host: localhost:8080
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:100.0) Gecko/20100101 Firefox/100.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate, br
Connection: keep-alive
Upgrade-Insecure-Requests: 1
Sec-Fetch-Dest: document
Sec-Fetch-Mode: navigate
Sec-Fetch-Site: none
Sec-Fetch-User: ?1
]
Http response sent:
[HTTP/1.1 200 OK
Server: vswsprocess
Content-Length: 74
Content-type: text/html

<!DOCTYPE html><html><body><h1>Welcome to Networks Lab!</h1></body></html>]
Connection closed
^C
sudharshan@sudharshanb190512cs:~/Desktop$

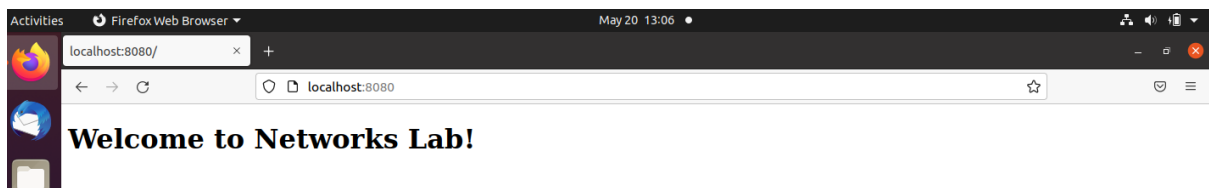
```

For task2 there is no relation with apache2 server installed. Just the vsws.c program itself is the whole web server. If that process is running then website is UP and RUNNING condition.

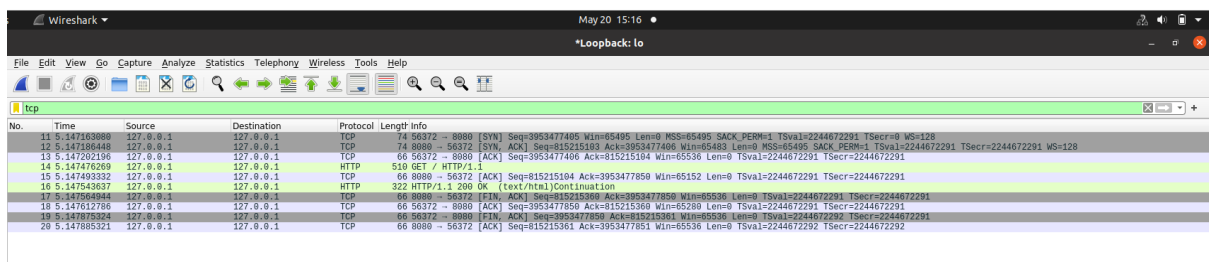
No need of client socket program, web browser itself is the client process.

Why response string in vsws.c program is like that only? Don't know exactly I used because Subbu Anna used the same response string.

Received request from browser to vsws.c process is enclosed in square brackets. This request is actually generated by browser itself on its own. Response sent is also enclosed in square brackets.



Wireshark capture of above process:



If tried accessing through browser without running the VSWC.c program :

