

# Lab 5 HTTP, Web and DNS

## Team Members:

**Name : Abhinav Reddy Gutha**  
**Roll No. : 2103102**

**Name : Nidamanuri Sai Adarsh**  
**Roll No. : 2103123**

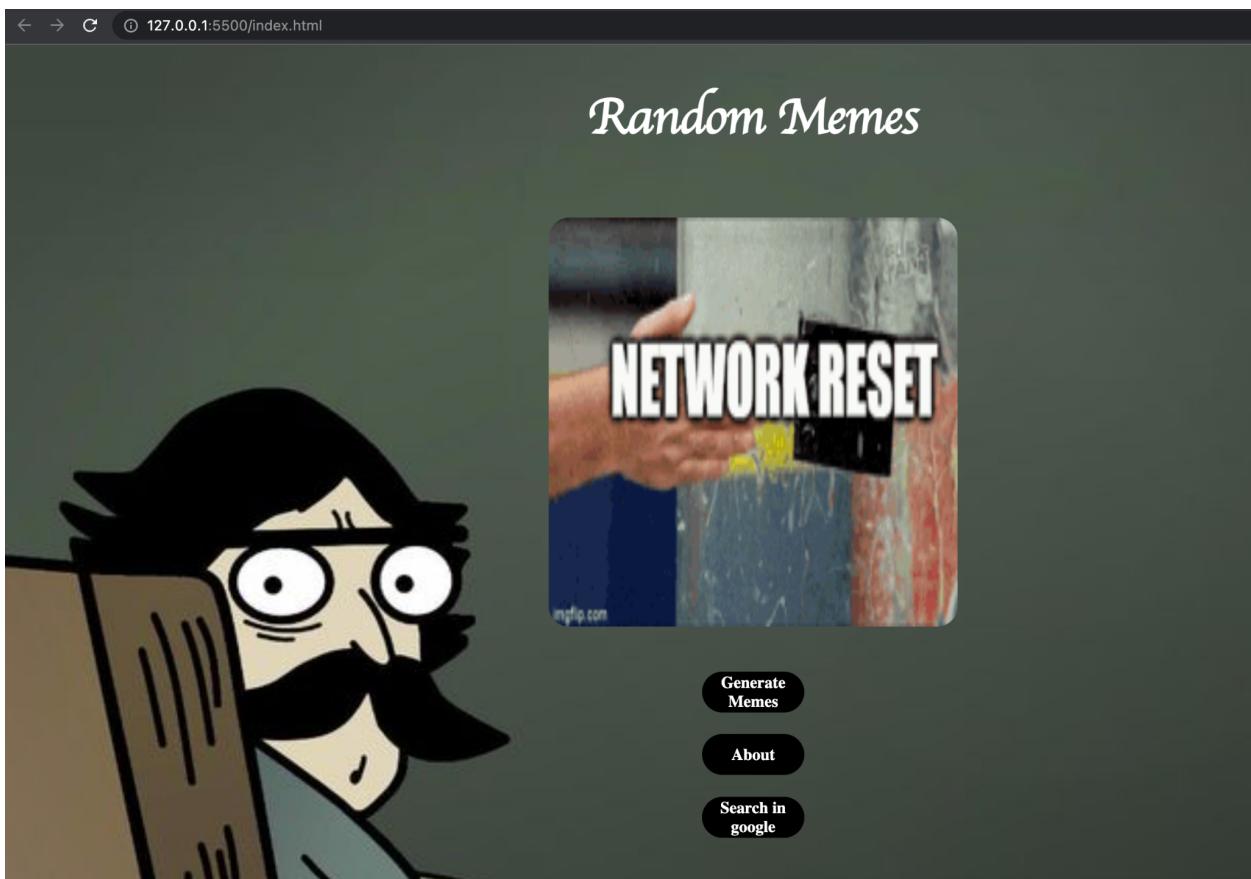
## PART 1: Creating Webpages using HTML and Javascript

- 1. Choose a name for your team. Create a website for your team focussed on any theme/topic of your choice, using only raw HTML and a text editor. (Some suggested themes: Internet memes, Networking-related jokes, Networking history...)**
    - **The website should consist of at least 2 web pages, where one of the pages should be named “index.html”**
    - **Each web page should contain a hyper-link to the other.**
    - **The web pages should contain:**
      - **at least one link to some external website**
      - **at least one image**
      - **some formatted text such as headings and bold text.**
- Do not include inappropriate content in the webpages.**

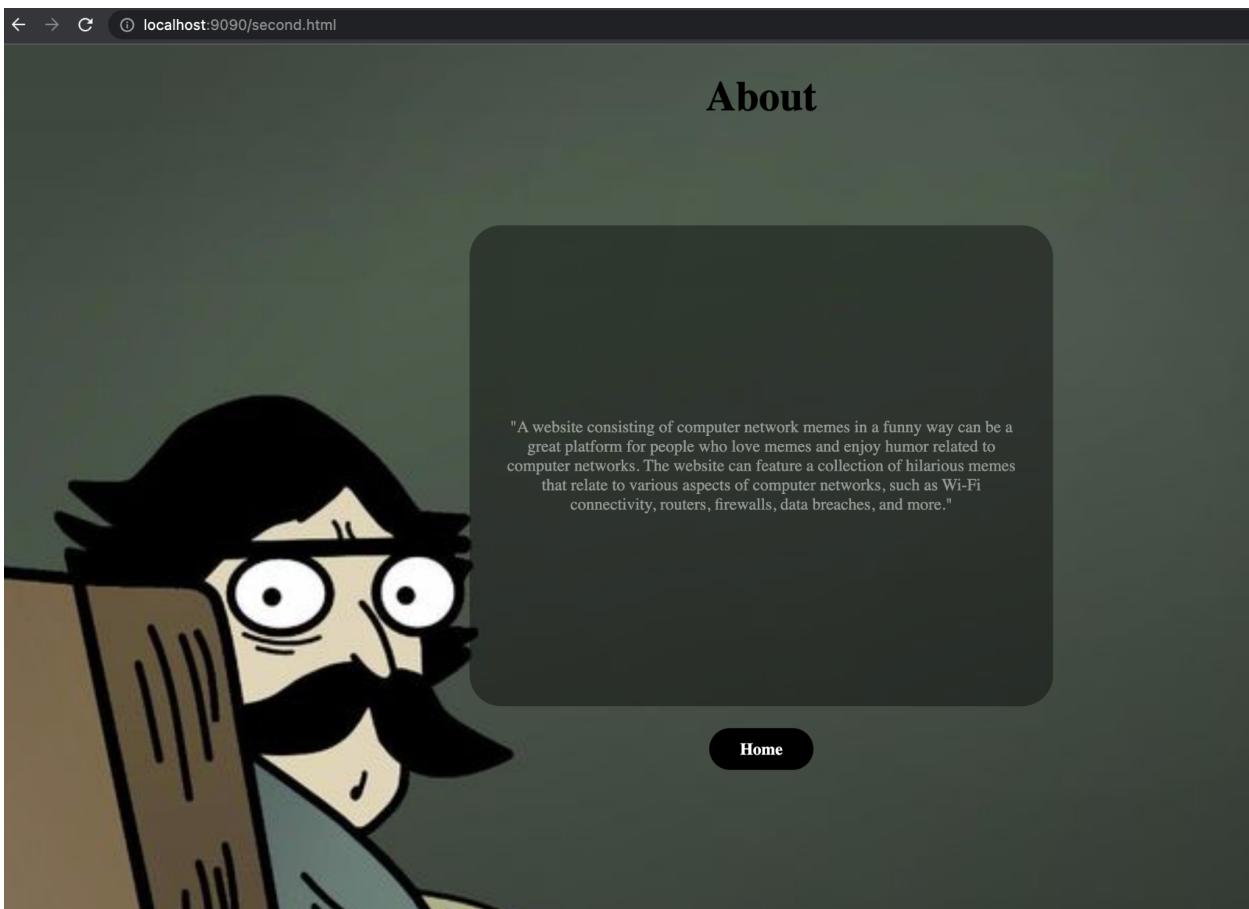
**Store the objects (.html files, images etc) in a single folder on the local machine and test your web pages by opening the html files in a browser.**

**A)** Here's my web server where you can see two web pages (index.html and second.html). I have also added an external link which will redirect you to google web page. You can also find images, GIFS in our web server. You can also see the headings and bold text also in second.html.

**index.html :**



## second.html :



## external link :

memes on computer networks

All Images News Books Tools

About 4,96,00,000 results (0.43 seconds)

Images for memes on computer networks

computer science internet memes science memes

GO FIX IT

Pinterest https://www.pinterest.com ... Education Subjects

network engineering meme

Engineering T-shirts, funny engineer, mechanical engineers, electrical engineer, construction engineer. Nurul Fauzi · Simpan Cepat.

https://www.pinterest.com > pin > Translate this page

Computer networks finally explained - Funny

We deliver hundreds of new memes daily and much more humor anywhere you go. ... Computer networks finally explained Best Funny Pictures, Meme Pictures, ...

Network Computing

**2. The essential components/technologies that go into a modern webpage are:**

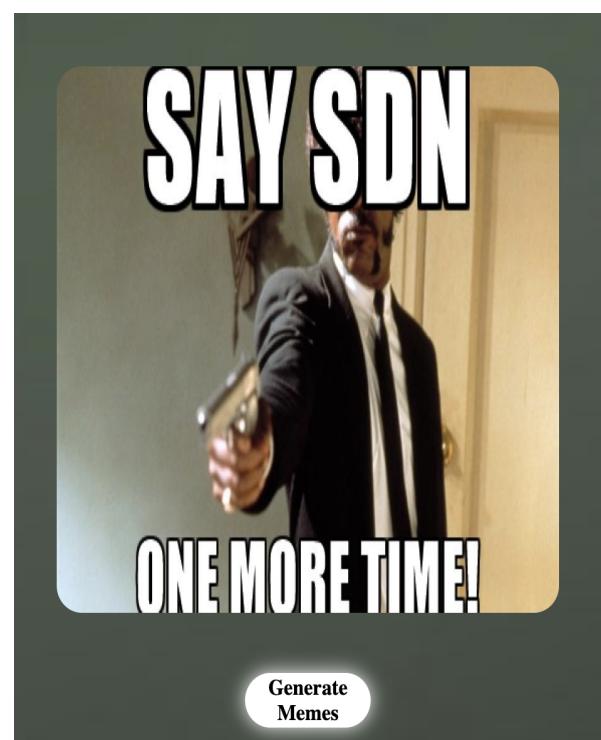
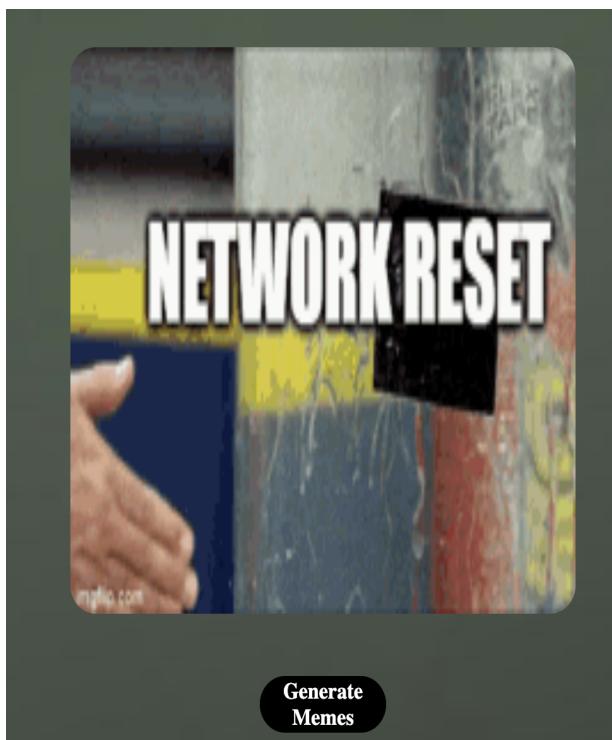
- **HTML:** to define the content of web pages
- **CSS:** to specify the style/layout of web pages and
- **JavaScript:** to program the behavior of web pages

Tutorials and references for all three can be found here:

<https://www.w3schools.com/default.asp>.

- Go through the initial tutorials for Javascript at <https://www.w3schools.com/js/default.asp>.
- Using Javascript, add a button to your webpage (created in q1) such that each time the user clicks this button, one of the images in your webpage changes to some other image.

**A)** Here's what it would look when I click on generate memes in my web server :





The logic here is something like this :

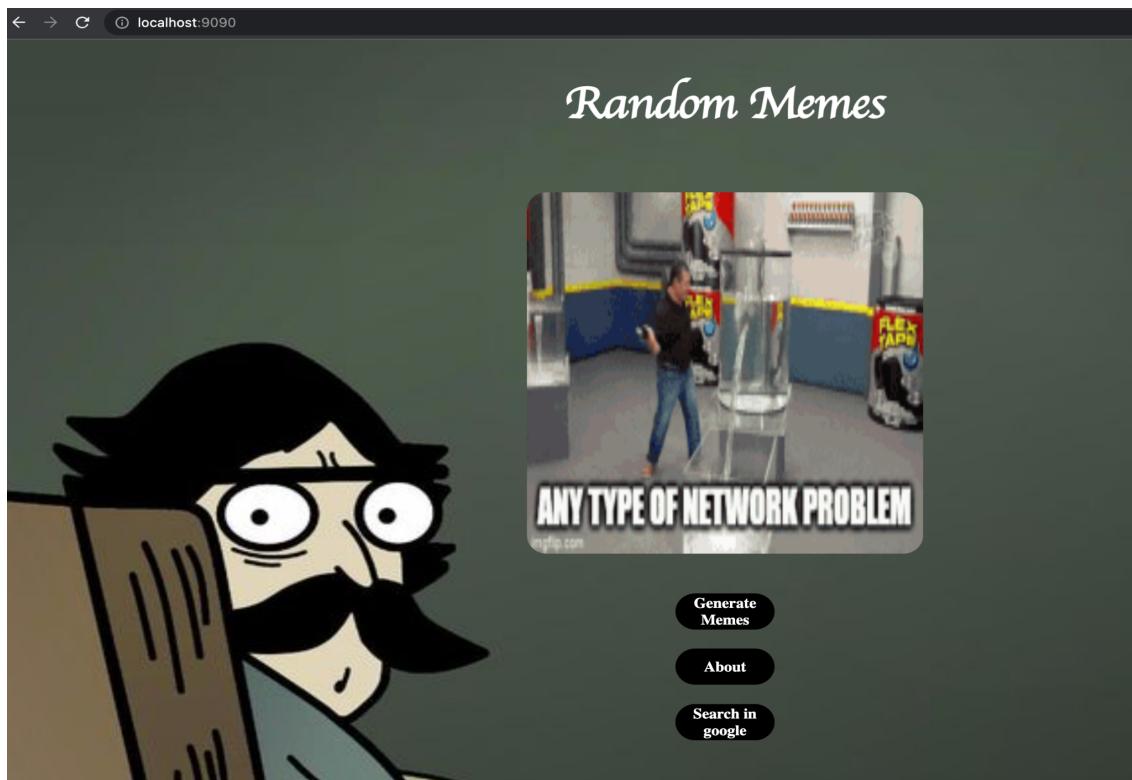
I have created a list and added all the paths of the image in this list. I have set a variable to be shown as the 1st element of the array. When I click on this button, it will run the function where this variable gets updated to 3nd element of the array. This loop continues until the end and once the end is reached and we click the button again, it will go to the starting element of the array. This creates a loop here.

## PART 2: Creating a Web-server and observing HTTP traffic

**3. Create a web-server for your website using Python. The webserver process should accept a TCP connection from a Client process on port 9090 and generate responses to GET requests for objects contained in your website's folder. (You can modify and use the template for a simple Python Web Server provided on Google Classroom.)**

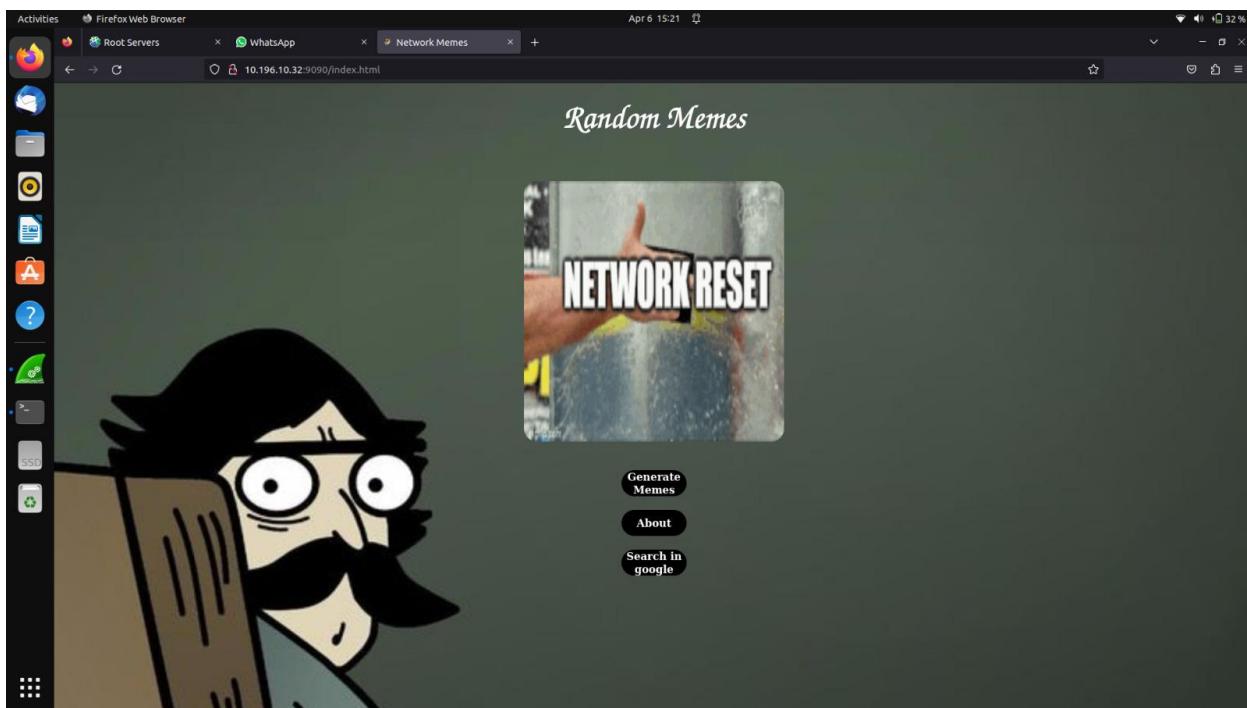
- Test your web server by entering the following url in a browser's address bar: “<http://localhost:9090>” on the same machine.

**A) Here's what I got when I ran the code using my localhost as IP address.**



- Check if your website can be accessed from another machine in the lab. Use the private IP address of the web server (10.xx.xx.xx) instead of ‘localhost’.

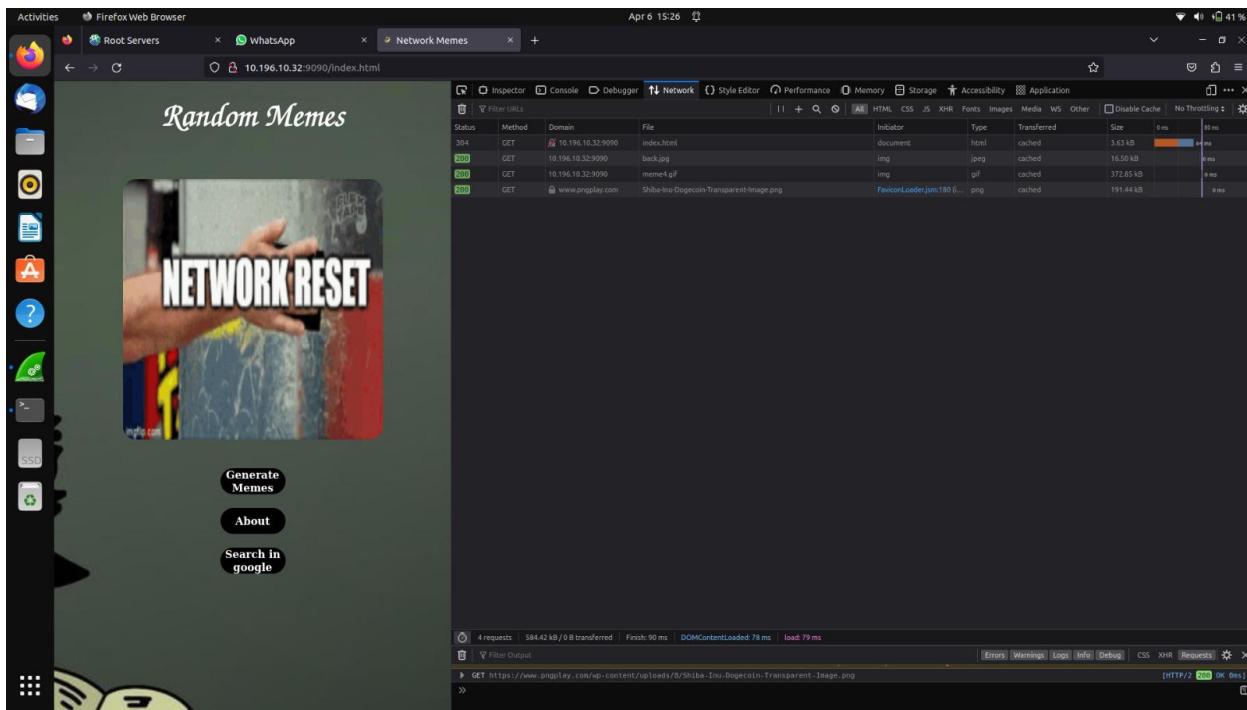
A) Here's what I got when I changed from local host to my IP address.



4. View the HTTP Request and Response traffic generated by the web browser using the browser’s developer/Network tool. (For Google-Chrome, press F12 to view the Network Tools)

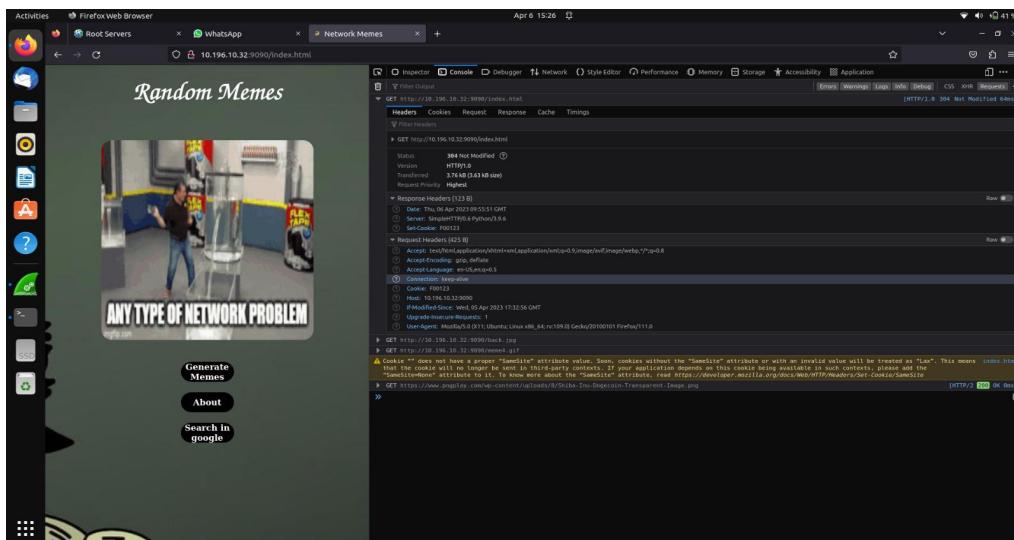
- Check if you can see the “raw” HTTP requests and responses.

Here's what I got when I analyzed the network traffic of my web server.



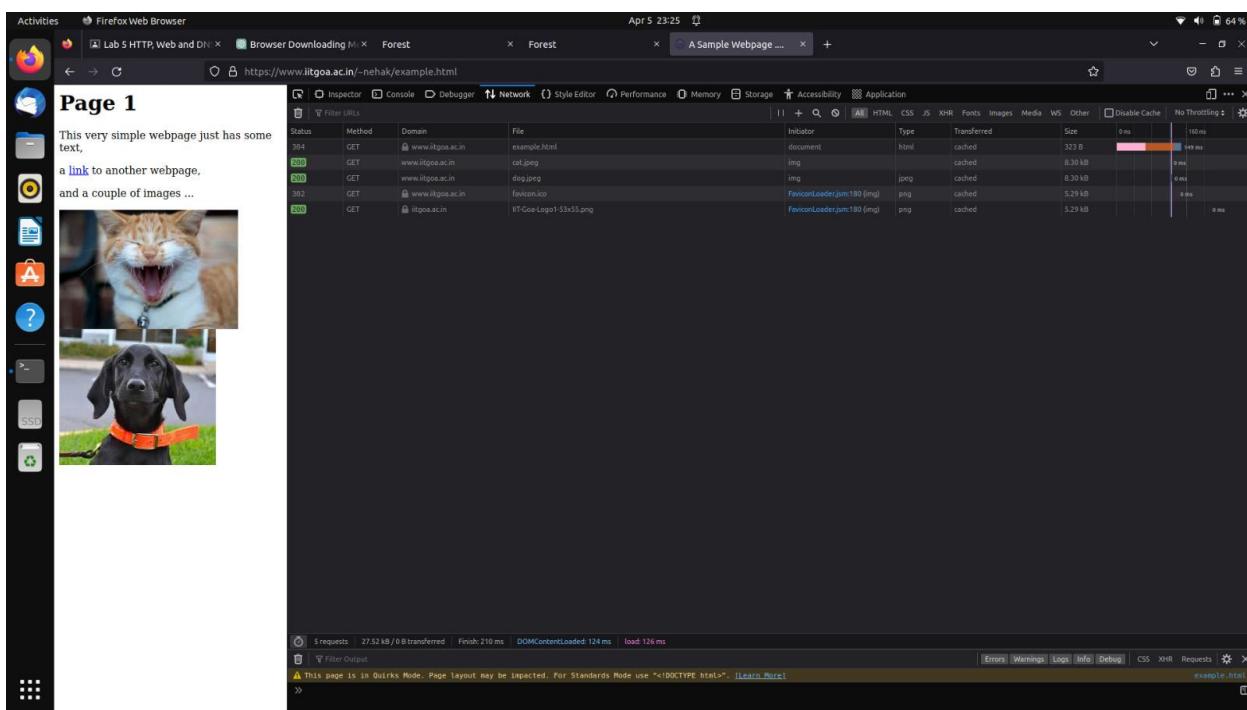
- Find out whether persistent or non-persistent connection was used by the browser for viewing your web pages.

I have found that my connection was keep alive which tells us that my connection is persistent for viewing web pages. You can check this in the figure below.



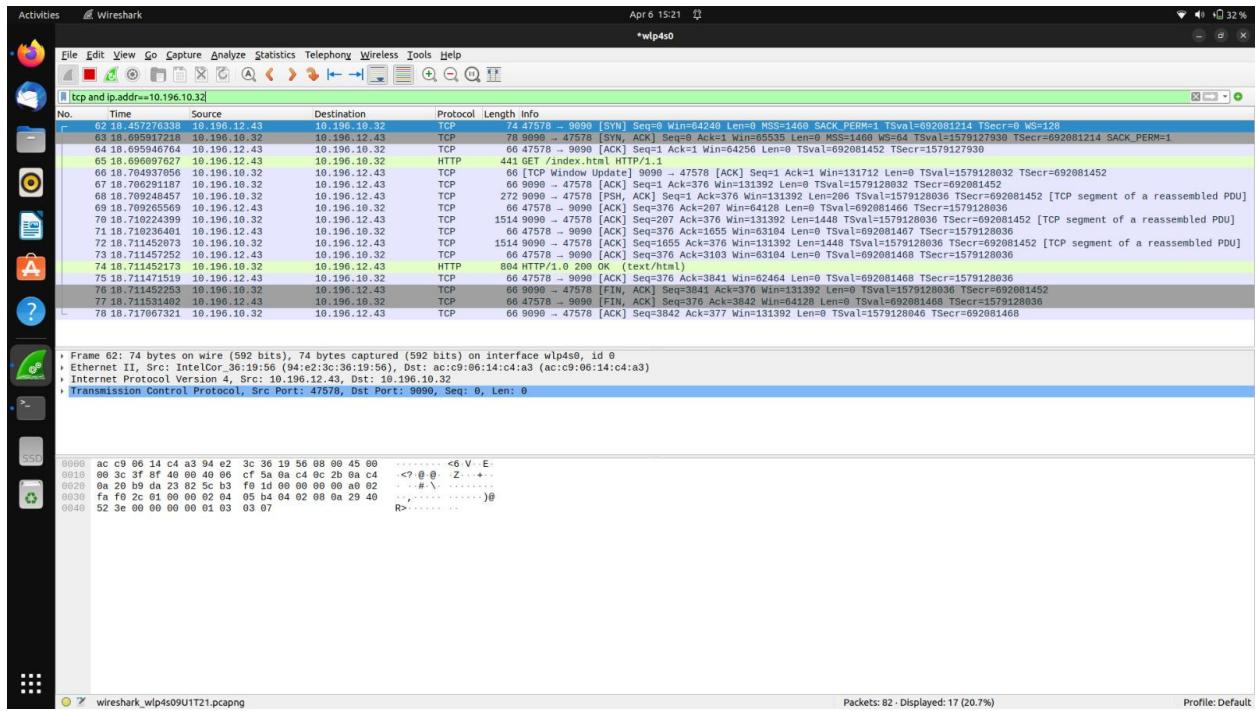
- Open another webpage hosted remotely, such as <https://www.iitgoa.ac.in/~nehak/example.html>. View the HTTP traffic for this webpage in the Network tool. Does the browser download the webpages components (images etc) in a sequential or pipelined or parallel manner? [find out and show a demo to the TAs]

Here's what I got when I checked the traffic of your webserver. Here I have observed that my images are downloaded in a pipelined manner in my browser.



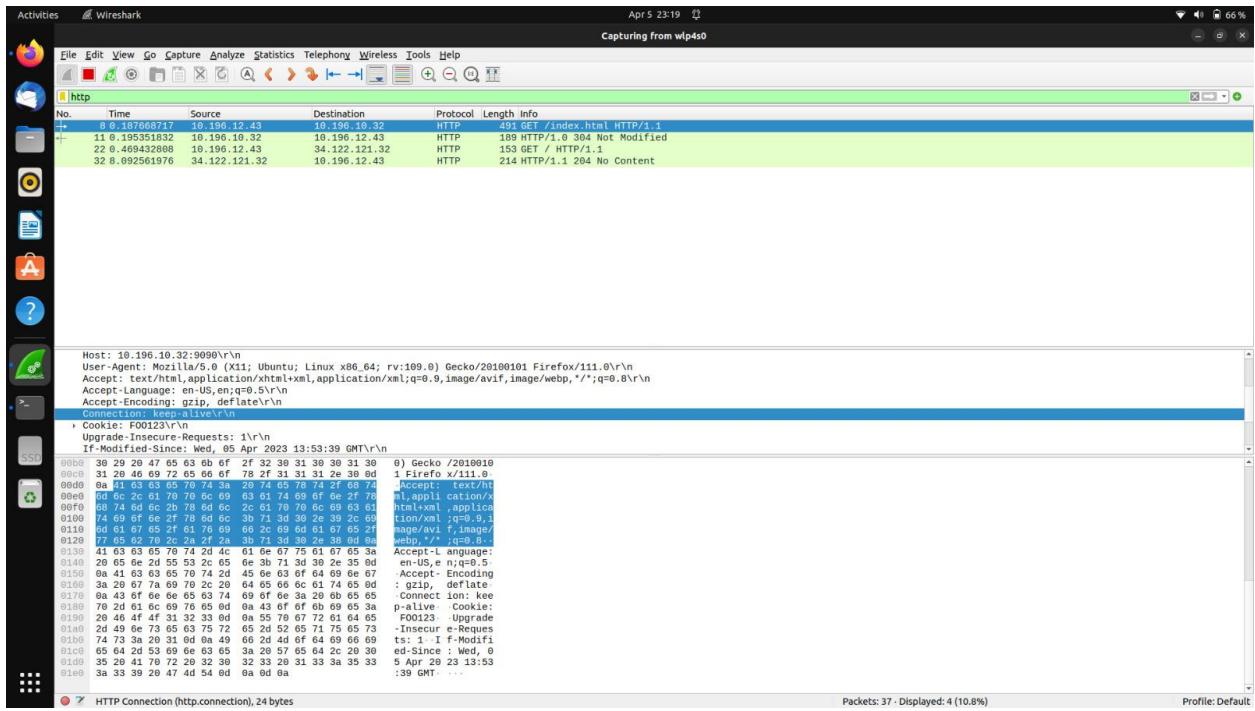
- Observe the HTTP requests in Wireshark. Look out for the TCP handshaking (SYN/SYN-ACK/ACK sequence). Is there one persistent TCP connection per webpage?

Here's what I got when I have checked the network traffic on wireshark :



The first 3 lines in the above photo would check the TCP handshaking (SYN/ SYN-ACK/ ACK sequence).

Yes, There is one persistent TCP connection I found. I have analyzed the GET requests of our http server and I have found that the connection was kept alive. This tells us that our connection is persistent. You can refer to the photo below for finding out whether our connection was persistent or not.



## PART 3: DNS

**5. You can use the dig command to send DNS queries to any specified DNS server. General format of the command:**

**\$ dig @<DNS server> <name to be looked up> <type>**

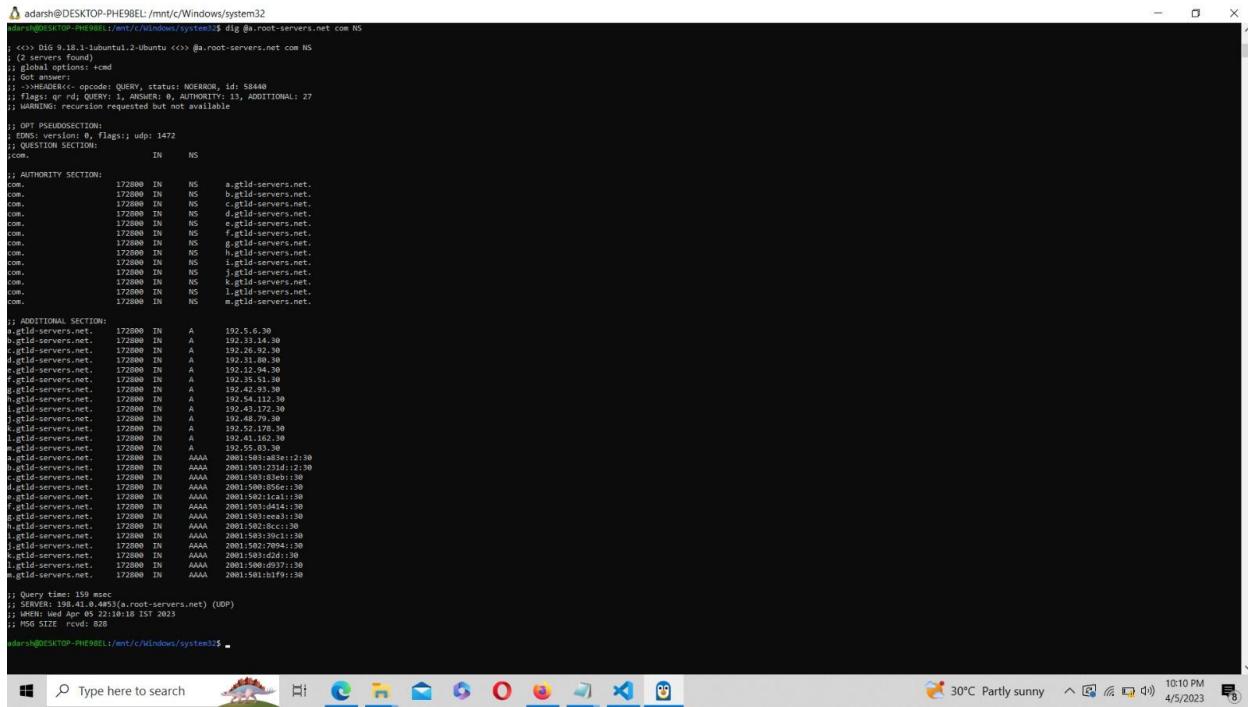
**Example: \$ dig @a.root-servers.net com NS**

- Go through this short tutorial for the dig command

**<https://www.hostinger.in/tutorials/how-to-use-the-dig-command-in-linux/>**

- Find out the appropriate command options (for dig) to send a DNS query to the root server “a.root-servers.net”, requesting for the address of all name-servers (NS) for the “com” top-level domains.

Here's what I got when I run the following command  
dig @a.root-servers.net com NS :



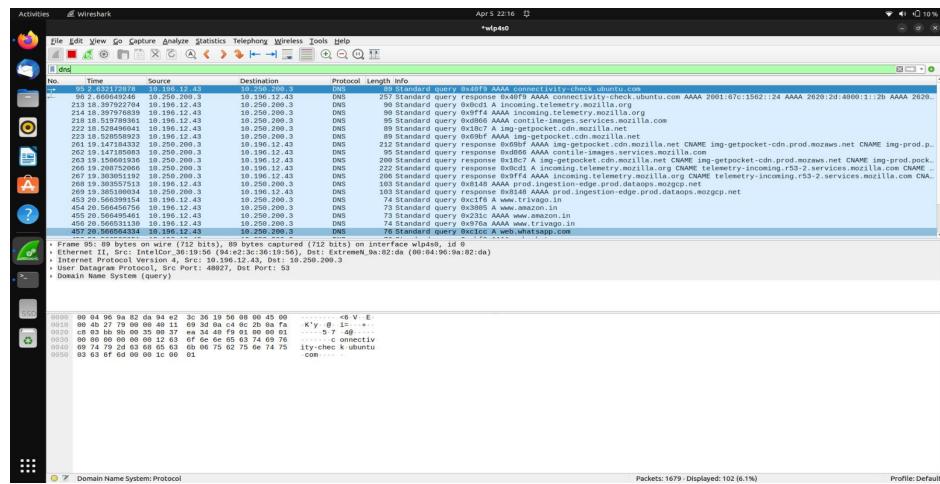
```
dasharsh@DESKTOP-PHE98EL:/mnt/c/Windows/system32$ dig @a.root-servers.net com NS
; <>> OPCODE: QUERY status: NOERROR id: 58440
; (2 servers found)
; global options: +cd
; Got answer:
;--HEADER--
; Flags: qr rd; QUERY: 1, ANSWER: 0, AUTHORITY: 13, ADDITIONAL: 27
; WARNING: recursion requested but not available
; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: ud; udp: 1472
;QUESTION SECTION:
;com. IN NS
;AUTHORITY SECTION:
;com. 172800 IN NS a.gtld-servers.net.
;com. 172800 IN NS b.gtld-servers.net.
;com. 172800 IN NS c.gtld-servers.net.
;com. 172800 IN NS d.gtld-servers.net.
;com. 172800 IN NS e.gtld-servers.net.
;com. 172800 IN NS f.gtld-servers.net.
;com. 172800 IN NS g.gtld-servers.net.
;com. 172800 IN NS h.gtld-servers.net.
;com. 172800 IN NS i.gtld-servers.net.
;com. 172800 IN NS j.gtld-servers.net.
;com. 172800 IN NS k.gtld-servers.net.
;com. 172800 IN NS l.gtld-servers.net.
;com. 172800 IN NS m.gtld-servers.net.
;ADDITIONAL SECTION:
;a.gtld-servers.net. 172800 IN A 192.2.5.8.30
;a.gtld-servers.net. 172800 IN A 192.31.14.30
;t.gtld-servers.net. 172800 IN A 192.26.92.30
;g.gtld-servers.net. 172800 IN A 192.3.100.30
;e.gtld-servers.net. 172800 IN A 192.32.51.30
;f.gtld-servers.net. 172800 IN A 192.35.51.30
;g.gtld-servers.net. 172800 IN A 192.42.93.30
;h.gtld-servers.net. 172800 IN A 192.43.113.30
;l.gtld-servers.net. 172800 IN A 192.43.172.30
;j.gtld-servers.net. 172800 IN A 192.48.79.30
;k.gtld-servers.net. 172800 IN A 192.49.103.30
;l.gtld-servers.net. 172800 IN A 192.41.162.30
;a.gtld-servers.net. 172800 IN A 192.55.83.30
;a.gtld-servers.net. 172800 IN AAAA 2801:587:231d:1:21:30
;a.gtld-servers.net. 172800 IN AAAA 2801:587:231d:1:21:30
;t.gtld-servers.net. 172800 IN AAAA 2801:587:83eb:1:30
;t.gtld-servers.net. 172800 IN AAAA 2801:586:856e:1:30
;g.gtld-servers.net. 172800 IN AAAA 2801:587:133:1:30
;f.gtld-servers.net. 172800 IN AAAA 2801:587:d454:1:30
;g.gtld-servers.net. 172800 IN AAAA 2801:587:ee3:1:30
;h.gtld-servers.net. 172800 IN AAAA 2801:587:139:1:30
;l.gtld-servers.net. 172800 IN AAAA 2801:587:39c1:1:30
;j.gtld-servers.net. 172800 IN AAAA 2801:587:7094:1:30
;k.gtld-servers.net. 172800 IN AAAA 2801:587:109:1:30
;l.gtld-servers.net. 172800 IN AAAA 2801:586:9937:1:30
;m.gtld-servers.net. 172800 IN AAAA 2801:581:b1f9:1:30
; Query time: 159 msec
; SERVER: 198.41.0.46#53(a.root-servers.net) (UDP)
; WHEN: Sat Apr 05 22:10:18 IST 2023
; MSG SIZE rcvd: 828
```

- Try running dig with the “+trace” option to see all the steps performed in iteratively querying the hierarchy of DNS servers. Try to make sense of the output.
- Example: dig +trace @8.8.8.8 stackoverflow.com

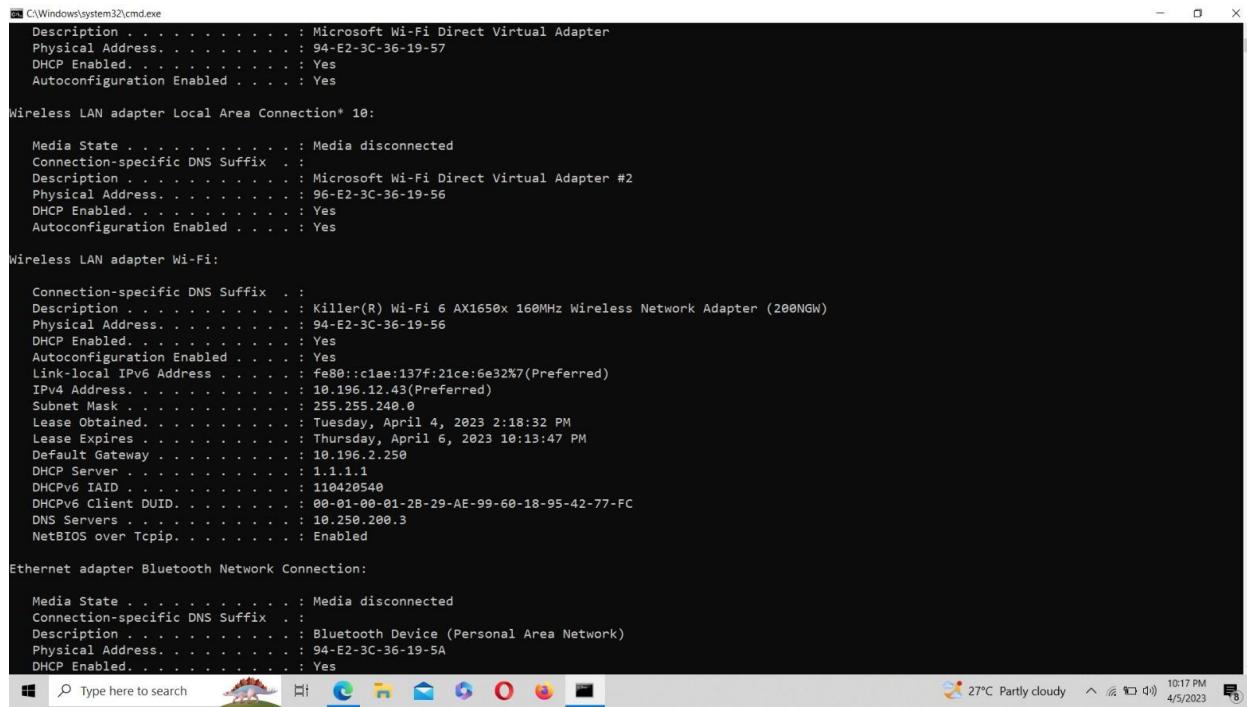
I have run the example which you gave in our terminal. Here's what we got :

- Open Wireshark and observe the DNS traffic on your computer using the filter “dns”.

I have used the filter dns in our wireshark and we have checked the DNS traffic for google.com . Here's what we got :



- **Find address of your local DNS server.**



The screenshot shows a Windows Command Prompt window with the title 'C:\Windows\system32\cmd.exe'. It displays detailed information about various network adapters:

- Microsoft Wi-Fi Direct Virtual Adapter**: Physical Address: 94-E2-3C-36-19-57, DHCP Enabled: Yes, Autoconfiguration Enabled: Yes.
- Wireless LAN adapter Local Area Connection\* 10:** Media State: Media disconnected. Connection-specific DNS Suffix: . Description: Microsoft Wi-Fi Direct Virtual Adapter #2. Physical Address: 96-E2-3C-36-19-56. DHCP Enabled: Yes. Autoconfiguration Enabled: Yes.
- Wireless LAN adapter Wi-Fi:** Connection-specific DNS Suffix: . Description: Killer(R) Wi-Fi 6 AX1650x 160MHz Wireless Network Adapter (200NGW). Physical Address: 94-E2-3C-36-19-56. DHCP Enabled: Yes. Autoconfiguration Enabled: Yes. Link-local IPv6 Address: fe80::c1ae:137f:21ce:6e32%7(PREFERRED). IPv4 Address: 10.196.12.43(Preferred). Subnet Mask: 255.255.240.0. Lease Obtained: Tuesday, April 4, 2023 2:18:32 PM. Lease Expires: Thursday, April 6, 2023 10:13:47 PM. Default Gateway: 10.196.2.250. DHCP Server: 1.1.1.1. DHCPv6 IAID: 118420540. DHCPv6 Client DUID: 00-01-00-01-2B-29-AE-99-60-18-95-42-77-FC. DNS Servers: 10.250.200.3. NetBIOS over Tcpip: Enabled.
- Ethernet adapter Bluetooth Network Connection:** Media State: Media disconnected. Connection-specific DNS Suffix: . Description: Bluetooth Device (Personal Area Network). Physical Address: 94-E2-3C-36-19-5A. DHCP Enabled: Yes.

The taskbar at the bottom shows icons for File Explorer, Edge, File Explorer, Mail, Task View, and a search bar. The system tray shows the date (4/5/2023), time (10:17 PM), weather (27°C Partly cloudy), and battery status.

You can find the line DNS servers present 2 lines above the Ethernet adapter bluetooth connection (In the above picture)

10.250.200.3 is the address of my local DNS server.

- **Find out addresses of any 3 root-level DNS servers.**

A) Here are 3 root - level DNS servers :

1. Host Name = a.root-servers.net  
IP - address = 198.41.0.4 , 2001:503:ba3e::2:30  
Operator = Verisign, Inc.

2. Host Name = b.root-servers.net

**IP - address = 199.9.14.201 , 2001:500:200::b**  
**Operator = University of Southern California,**  
**Information Sciences Institute.**

3. Host Name = c.root-servers.net  
**IP - address = 199.33.4.12 , 2001:500:2::c**  
**Operator = Cogent Communications.**