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Practical No. 1

Objective: To encrypt and decrypt Data Using a Hacker Tool.

Requirements:

1. Kali Linux Terminal
2. Tools: - fcrackzip

Procedure:

A. Encrypting and decrypting data using a hacker tool

Step 1: Open Kali Linux Terminal and proceed by creating a new directory named "Zip-Files" using command:

```
mkdir Zip-Files
```

Step 2: Move into the directory and create text files using the following command:

```
cd Zip-Files
echo This is a sample text file > sample-1.txt
echo This is a sample text file > sample-2.txt
echo This is a sample text file > sample-3.txt
```

Verify whether the text files have been created:

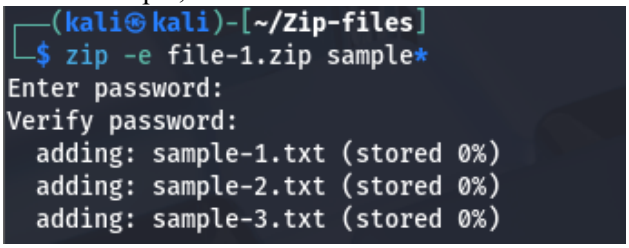
```
ls
```

Step 3: Zip and encrypt the files

Step 1: Create an encrypted zip file called file-1.zip containing the three text files using the following command:

```
zip -e file-1.zip sample*
```

Step 2: When prompted for a password, enter a one-character password of your choice. In the example, the letter **B** was entered. Enter the same letter when prompted to verify.



Step 3: Repeat the procedure to create the following 4 other files

file-2.zip using a 2-character password of your choice. In our example, we used **R2**.

file-3.zip using a 3-character password of your choice. In our example, we used **0B1**.

```
┌──(kali㉿kali)-[~/Zip-files]
└─$ zip -e file-2.zip sample*
Enter password:
Verify password:
  adding: sample-1.txt (stored 0%)
  adding: sample-2.txt (stored 0%)
  adding: sample-3.txt (stored 0%)

┌──(kali㉿kali)-[~/Zip-files]
└─$ zip -e file-3.zip sample*
Enter password:
Verify password:
  adding: sample-1.txt (stored 0%)
  adding: sample-2.txt (stored 0%)
  adding: sample-3.txt (stored 0%)
```

Verify if the zip files have been created using the ls command

```
┌──(kali㉿kali)-[~/Zip-files]
└─$ ls
file-1.zip  file-2.zip  file-3.zip  sample-1.txt  sample-2.txt  sample-3.txt
```

Step 4: Attempt to open zip files using an incorrect password as shown.

```
unzip file-1.zip
```

```
┌──(kali㉿kali)-[~/Zip-files]
└─$ unzip file-1.zip
Archive:  file-1.zip
[file-1.zip] sample-1.txt password:
password incorrect--reenter:
password incorrect--reenter:
   skipping: sample-1.txt            incorrect password
[file-1.zip] sample-2.txt password:
password incorrect--reenter:
password incorrect--reenter:
   skipping: sample-2.txt            incorrect password
[file-1.zip] sample-3.txt password:
password incorrect--reenter:
password incorrect--reenter:
   skipping: sample-3.txt            incorrect password
```

Step 5: **Recover Encrypted Zip File Passwords (fcrackzip- recovers the passwords of encrypted zip)**

a. Install fcrackzip tool using command:

```
sudo apt install fcrackzip
```

b. To recover password use the following command:

```
fcrackzip -vul 1-4 file-1.zip
```

```
┌──(kali㉿kali)-[~/Zip-files]
└─$ fcrackzip -vul 1-4 file-1.zip
found file 'sample-1.txt', (size cp/uc     39/    27, flags 9, chk a1da)
found file 'sample-2.txt', (size cp/uc     39/    27, flags 9, chk a1dd)
found file 'sample-3.txt', (size cp/uc     39/    27, flags 9, chk a1e2)


PASSWORD FOUND!!!!: pw == B
```

B. Encrypting and Decrypting Data Using OpenSSL

Objective: Use OpenSSL to encrypt and decrypt text messages.

Procedure:

Step 1: Encrypt the text file (cd– to enter the file, cat– to read the file, openssl– will ask password, aes-256- to encrypt the text file,-in– input,-out- output).

a. Make the directory "OpenSSL" and enter the directory using the following commands:

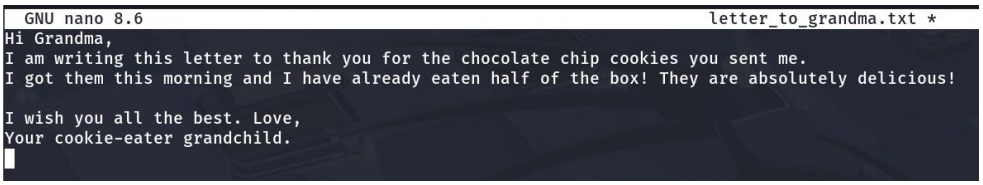
```
mkdir OpenSSL
cd OpenSSL
```

b. Create a text file named ***"letter_to_grandma.txt"*** using Nano Editor and write down the contents in file

```
sudo nano letter_to_grandma.txt
```

File Contents:

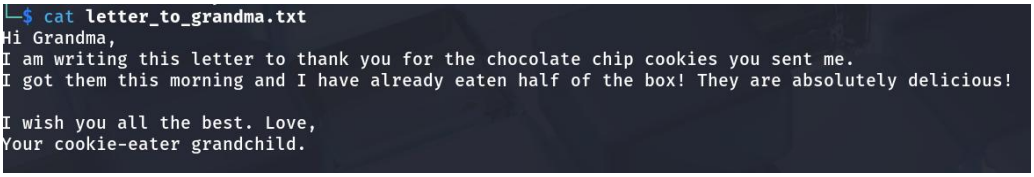
```
Hi Grandma,
I am writing this letter to thank you for the chocolate chip cookies you sent me. I got them this morning and I have already eaten half of the box! They are absolutely delicious!

I wish you all the best. Love,
Your cookie-eater grandchild.
```



Exit Nano Editor: CTRL + O > ENTER > CTRL+X.

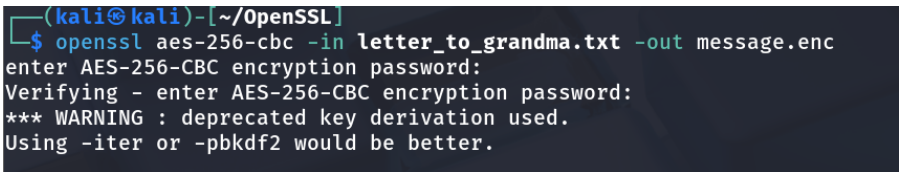
c. Verify the contents of the file using command:

```
cat letter_to_grandma.txt
```



d. Encrypt the text file with OPENSSL using the following command:

```
openssl aes-256-cbc -in letter_to_grandma.txt -out message.enc
```



Enter any password of your choice. Example: kali

e. When the process is finished, use the cat command again to display the contents of the **message.enc** file.

```
cat message.enc
```

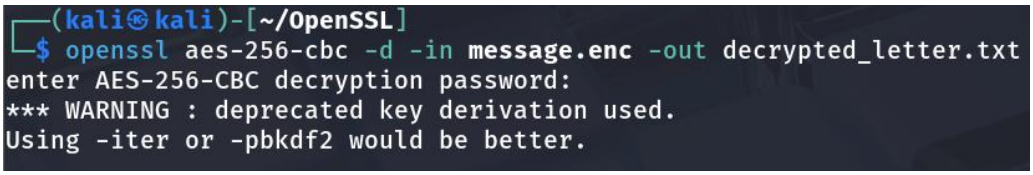
As seen below, the message has been encrypted successfully.

Step 2: Decrypt the encrypted letter using OpenSSL

a. Use the following command to decrypt the encrypted message and store the decrypted contents in the file: *decrypted_letter.txt*:

```
openssl aes-256-cbc -d -in message.enc -out decrypted_letter.txt
```

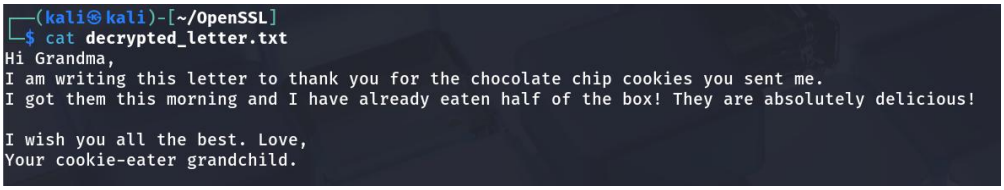
and enter the password set during encryption (kali)



b. Use the cat command to verify the contents of the decrypted letter(*decrypted_letter.txt*)

```
cat decrypted_letter.txt
```

As seen below, OpenSSL successfully decrypted the file using the specified password



C. Hashing a text file with openssl and verifying hashes (hash- a fixed-size, unique string of characters)

Objective: Hashing a text file with OPENSSL and verifying hashes

Procedure:

Step 1: Verify the contents of letter_to_grandma.txt using *cat* command.

```
cat letter_to_grandma.txt
```

```
┌──(kali㉿kali)-[~/OpenSSL]
└─$ cat letter_to_grandma.txt
Hi Grandma,
I am writing this letter to thank you for the chocolate chip cookies you sent me.
I got them this morning and I have already eaten half of the box! They are absolutely delicious!

I wish you all the best. Love,
Your cookie-eater grandchild.
```

Step 2: Issue the command below to hash the text file. The command will use SHA-2-256 as the hashing algorithm to generate a hash of the text file.

```
openssl sha256 letter_to_grandma.txt
```

```
┌──(kali㉿kali)-[~/OpenSSL]
└─$ openssl sha256 letter_to_grandma.txt
SHA2-256(letter_to_grandma.txt)= 6849ea92a1b90472bdb3c944dc6bd3e4b096b1e7bbecdfa8e8bd24d6156a56e7
```

Step 3: A hashing algorithm with longer bit-length, such as SHA-2-512, can also be used. To generate a SHA-2-512 hash of the letter_to_grandma.txt file, use the command below:

```
openssl sha512 letter_to_grandma.txt
```

```
┌──(kali㉿kali)-[~/OpenSSL]
└─$ openssl sha512 letter_to_grandma.txt
SHA2-512(letter_to_grandma.txt)= e5e71fa7c236842017d3df4cf07b126d51de43fabb7709e3ce7f7fe6c537dfdfa28d057c685eed5b9ba55d7546cad37bf6f9dd1b527732c53dbe8c8d01a7056f
```

Step 4: Use sha256sum and sha512sum to generateSHA-2-256 and SHA-2-512 hash of the letter_to_grandma.txt file

```
sha256sum letter_to_grandma.txt
sha512sum letter_to_grandma.txt
```

```
┌──(kali㉿kali)-[~/OpenSSL]
└─$ sha256sum letter_to_grandma.txt
6849ea92a1b90472bdb3c944dc6bd3e4b096b1e7bbecdfa8e8bd24d6156a56e7  letter_to_grandma.txt

┌──(kali㉿kali)-[~/OpenSSL]
└─$ sha512sum letter_to_grandma.txt
e5e71fa7c236842017d3df4cf07b126d51de43fabb7709e3ce7f7fe6c537dfdfa28d057c685eed5b9ba55d7546cad37bf6f9dd1b527732c53dbe8c8d01a7056f  letter_to_grandma.txt
```

Step 5: Verifying the Hashes

a. Generate sample img file using commands:

```
dd if=/dev/zero of=sample.img bs=1M count=1
```

b. Generate a SHA-256 hash file

```
sha256sum sample.img > sample.img_SHA256.sig
```

c. Use the cat command to display the contents of the sample.img_SHA256.sig file:

```
cat sample.img_SHA256.sig
```

```
┌──(kali㉿kali)-[~/OpenSSL]
└─$ cat sample.img_SHA256.sig
30e14955ebf1352266dc2ff8067e68104607e750abb9d3b36582b8af909fcb58  sample.img
```

d. Use SHA256sum to calculate the SHA-2-256 hash of the sample.img file:

```
sha256sum sample.img
```

```
┌──(kali㉿kali)-[~/OpenSSL]
└─$ sha256sum sample.img
30e14955ebf1352266dc2ff8067e68104607e750abb9d3b36582b8af909fcb58  sample.img
```

Compare this output to the .sig file: if they match, the file hasn't been modified. This is how you verify integrity.

Practical No. 2

Objective: Examining Telnet and SSH in Wireshark

Procedure:

Step 1:Configure Telnet

a. Install Telnet and start server

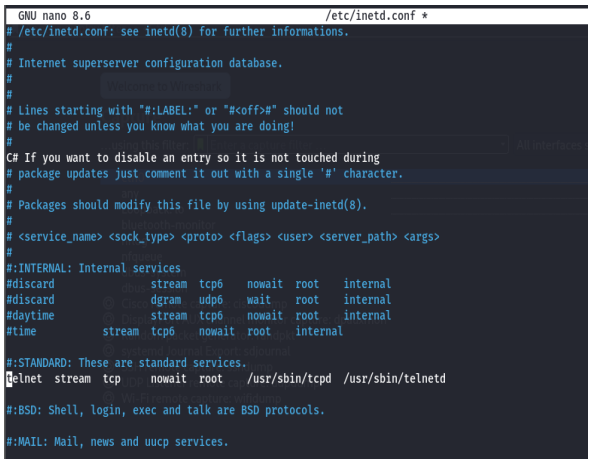
```
sudo apt update
sudo apt install telnetd -y
sudo systemctl enable inetutils-inetd
sudo systemctl start inetutils-inetd
```

b. Confirm that telnet service is configured for inetd

```
sudo nano /etc/inetd.conf
```

c. **Uncomment** the lines as shown below and then à Press ctrl + O (to confirm)→Enter→ ctrl + X (to exit). {Remove "#<off># "}

```
#<off># telnet  stream  tcp  nowait  root  /usr/sbin/tcpd  /usr/sbin/telnetd
```



d. Now restart inetd to run the configuration

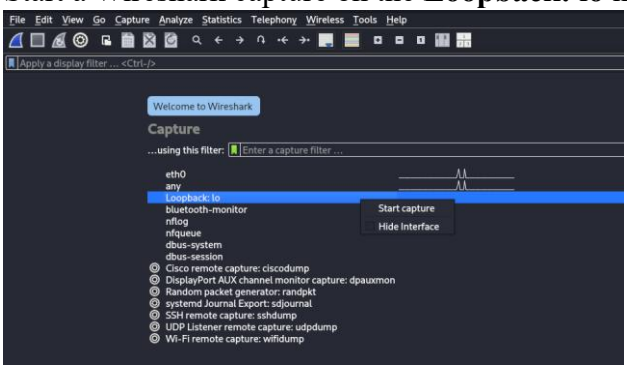
```
sudo systemctl restart inetutils-inetd
```

Step 2: Capture Telnet Packets using Wireshark

a. Open a terminal window and start Wireshark using command:

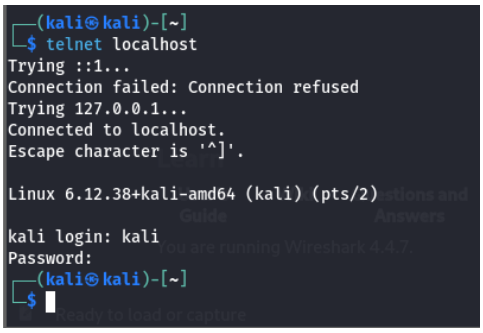
```
wireshark
```

b. Start a Wireshark capture on the **Loopback: lo** interface



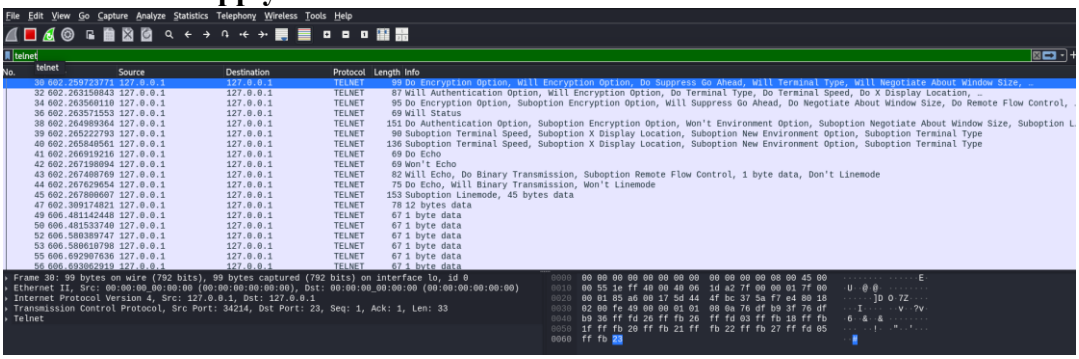
c. Open another terminal window. Start a Telnet session to the localhost.

```
telnet localhost
```

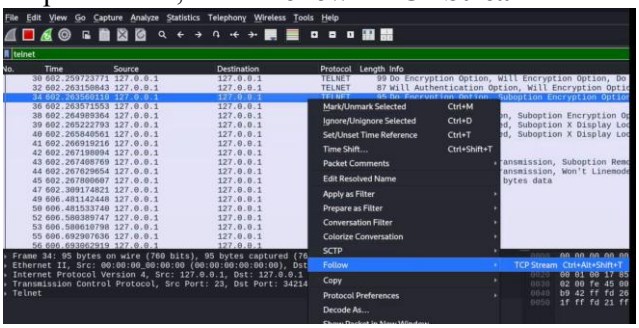


Step 3: Examine the Telnet session on Wireshark.

a. Apply a filter that only displays Telnet-related traffic. Enter **telnet** in the filter field and click **Apply**.



b. Right-click one of the **Telnet** lines in the **Packet list** section of Wireshark, and from the drop-down list, select **Follow > TCP Stream**



c. The Follow TCP Stream window displays the data for your Telnet session as seen below:

d. After you have finished reviewing your Telnet session in the **Follow TCP Stream** window, click **Close**.

e. Type exit at the terminal to exit the **Telnet** session.

Step 4: Configure SSH

a. Install SSH Server

```
sudo apt update
sudo apt install openssh-server -y
```

b. Start and enable the SSH service

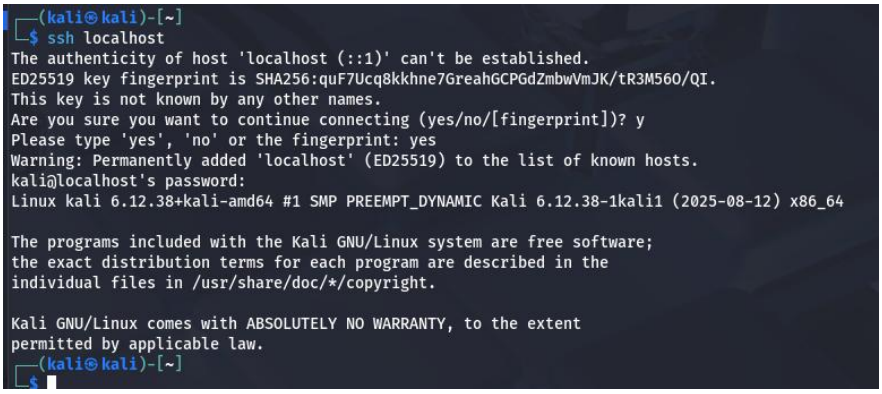
```
sudo systemctl enable ssh
sudo systemctl start ssh
```

Step 5: Examine an SSH Session with Wireshark

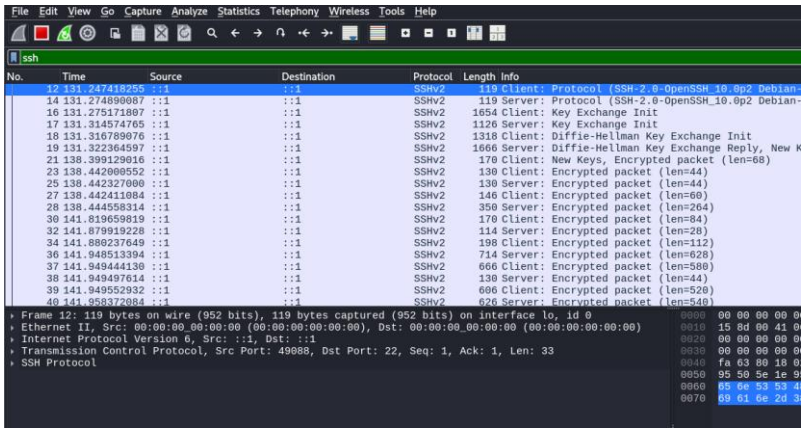
a. Start another Wireshark capture using the Loopback: lo interface.

b. You will establish an SSH session with the localhost. At the terminal use command:

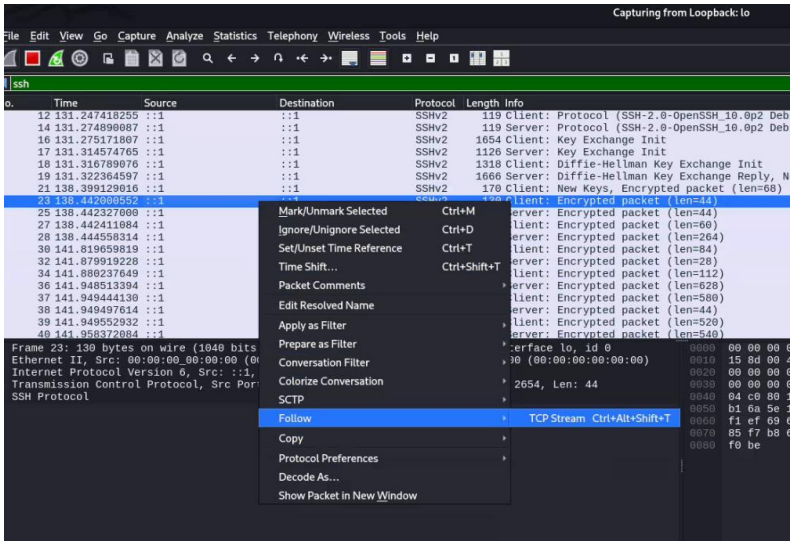
```
ssh localhost
```



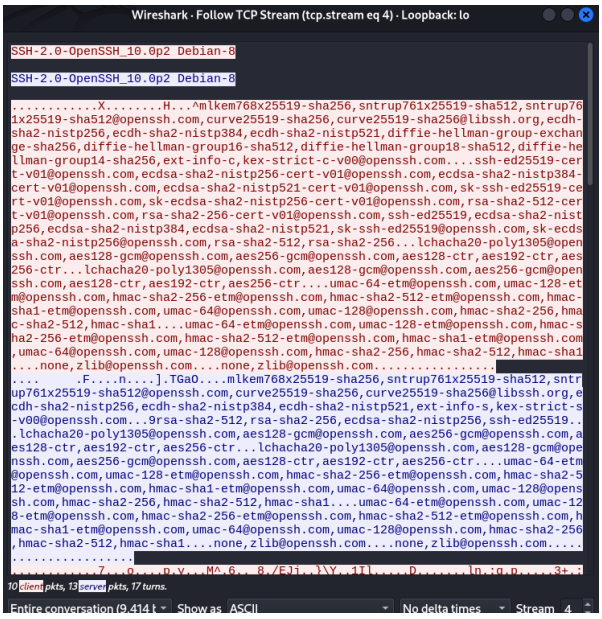
c. Apply an SSH filter on the Wireshark capture data. Enter ssh in the filter field and click **Apply.**



d. Right-click one of the **SSHv2** lines in the **Packet list** section of Wireshark, and in the drop-down list, select the **Follow > TCP Stream**.



e. Examine the **Follow TCP Stream** window of your SSH session. The data has been encrypted and is unreadable. Compare the data in your SSH session to the data of your Telnet session.



Practical No. 3

Objective: A. To demonstrate Extract an Executable from a PCAP.

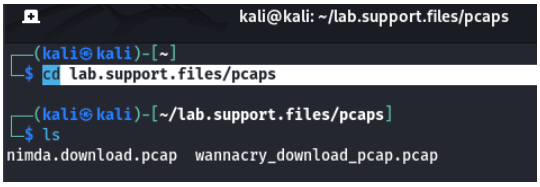
Procedure:

Pre-requisites: For this practical you need the lab.support.files folder, which you can download from here:
https://drive.google.com/drive/folders/1bQQViseJ2BQ70cqjnKPXMQUoqHB6fiy4?usp=sharing

Once downloaded extract the folder.

Step 1: Change directory to the lab.support.files/pcaps folder, and get a listing of files using the ls command

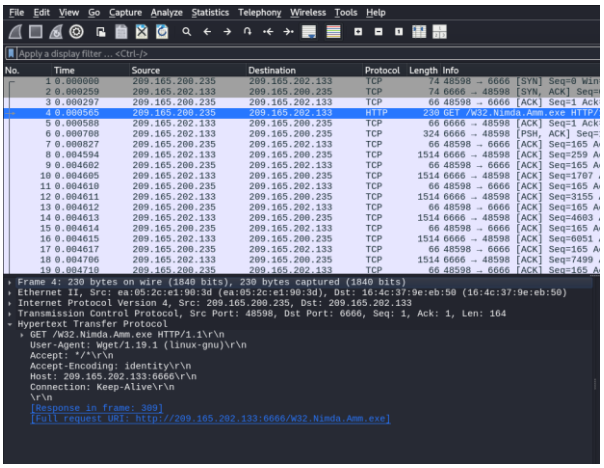
```
cd lab.support.files/pcaps
ls
```



Step 2: Issue the command below to open the *nimda.download.pcap* file in Wireshark**.**

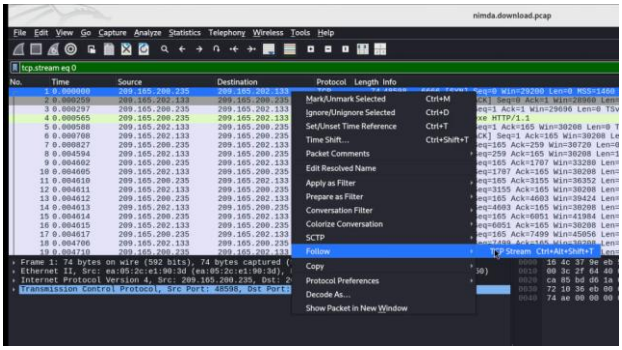
```
wireshark nimda.download.pcap
```

Step 3: The nimda.download.pcap file contains the packet capture related to the malware download performed in a previous lab. The pcap contains all the packets sent and received while tcpdump was running. Select the fourth packet in the capture and expand the Hypertext Transfer Protocol to display as shown below.



Packets one through three are the TCP handshake. The fourth packet shows the request for the malware file. Confirming what was already known, the request was done over HTTP, sent as a GET request

Step 4: Because HTTP runs over TCP, it is possible to use Wireshark's Follow TCP Stream feature to rebuild the TCP transaction. Select the first TCP packet in the capture, a SYN packet. Right-click it and choose Follow > TCP Stream.



Wireshark displays another window containing the details for the entire selected TCP flow.

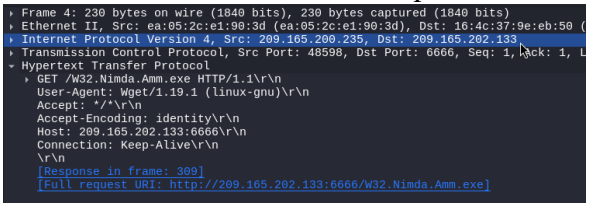
Step 5: Click Close in the Follow TCP Stream window to return to the Wireshark ***nimda.download.pcap*** file.

Part 2: Extract Downloaded Files from PCAP

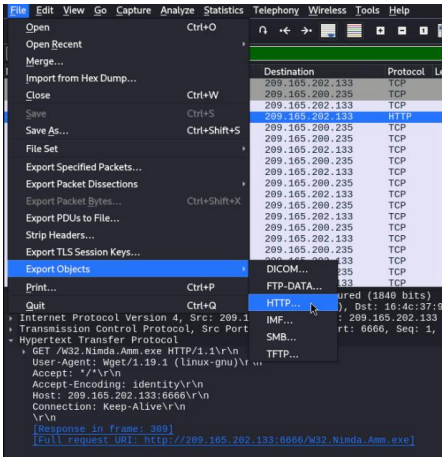
Because capture files contain all packets related to traffic, a PCAP of a download can be used to retrieve a previously downloaded file.

Follow the steps below to use Wireshark to retrieve the Nimda -malware.

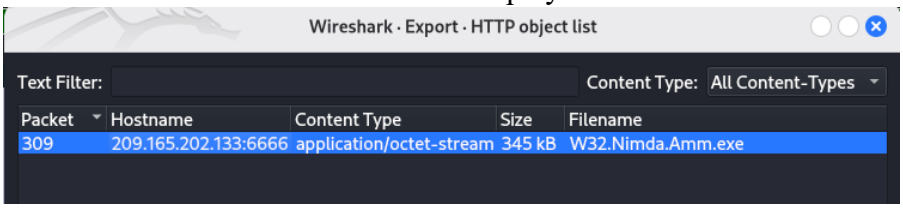
Step 1: In that fourth packet in the nimda.download.pcap file, notice that the HTTP GET request was generated from 209.165.200.235 to 209.165.202.133. The Info column also shows this is in fact the GET request for the file.



Step 2: With the GET request packet selected, navigate to File > Export Objects > HTTP, from Wireshark's menu



Step 3: Wireshark will display all HTTP objects present in the TCP flow that contains the GET request. In this case, only the Nimda.Amm.exe file is present in the capture. It will take a few seconds before the file is displayed.

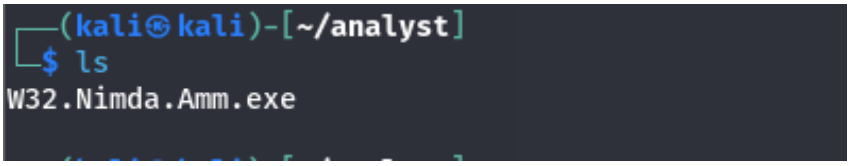


Step 4: In the HTTP object list window, select the Nimda.Amm.exe file and click Save As at
the bottom of the screen.

Step 5: Click the left arrow until you see the Home Click Home and then click the analyst folder (if analyst folder doesn't exist create a folder and name it "analyst"). Save the file there.

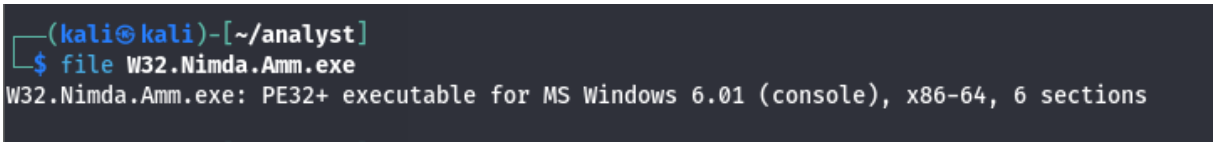
Step 6: Return to your terminal window and ensure the file was saved. Change directory to the
/home/analyst folder and list the files in the folder using the ls command

```
cd home/analyst
ls
```



Step 7: The file command gives information on the file type. Use the file command to learn a
little more about the malware, as show below:

```
file W32.Nimda.Amm.exe
```



3B. To Demonstrate a practical for exploring DNS Traffic

Part 1: Capture DNS Traffic

Step 1: Download and install Wireshark. a. Download the latest stable version of Wireshark from www.wireshark.org. Choose the software version you need based on your PC's architecture and operating system.

1) In Windows, enter ipconfig /flushdns in Command Prompt

```
C:\Users\ITCS>ipconfig/flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.
```

2) At a command prompt or terminal, type nslookup enter the interactive mode. Enter the domain name of a website. The domain name www.cisco.com is used in this example.

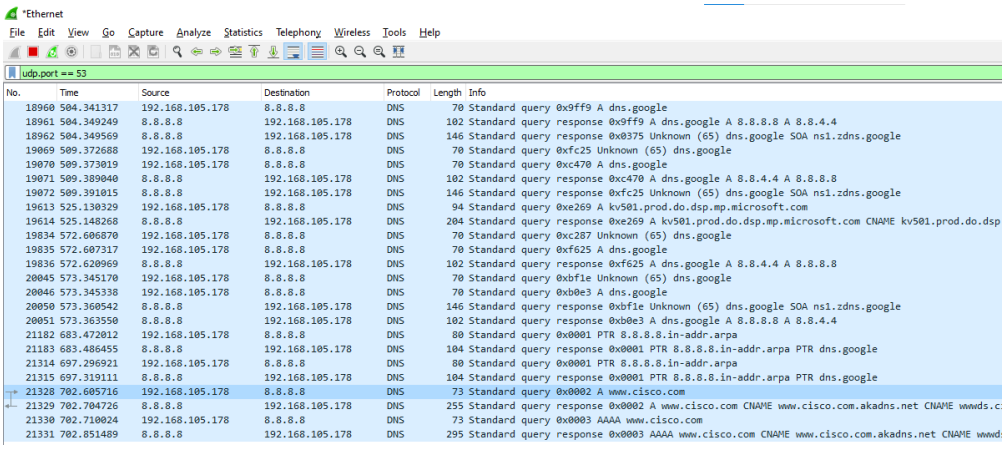
```
C:\Users\ITCS>nslookup
Default Server:  dns.google
Address:  8.8.8.8

> www.cisco.com
Server:  dns.google
Address:  8.8.8.8

Non-authoritative answer:
Name:    e2867.dsca.akamaiedge.net
Addresses:  2600:1417:75:d9f::b33
          2600:1417:75:d8a::b33
          23.211.154.121
Aliases:  www.cisco.com
          www.cisco.com.akadns.net
          wwwds.cisco.com.edgekey.net
          wwwds.cisco.com.edgekey.net.globalredir.akadns.net

> exit
```

3) Type exit when finished. Close the command prompt.

Part 2: Explore DNS Query Traffic

a. Observe the traffic captured in the Wireshark Packet List pane. Enter udp.port ==53 in the filter box and click the arrow (or press enter) to display only DNS packets.

b. Select the DNS packet contains **Standard query** and **A www.cisco.com** in the Info column



c. In the Packet Details pane, notice this packet has Ethernet II, Internet Protocol Version 4, User Datagram Protocol and Domain Name System (query).

```
> Frame 21328: 73 bytes on wire (584 bits), 73 bytes captured (584 bits) on interface 0
v Ethernet II, Src: BiostarM_76:bc:bb (f4:b5:20:76:bc:bb), Dst: Sophos_c0:d7:c0 (7c:5a:1c:c0:d7:c0)
  > Destination: Sophos_c0:d7:c0 (7c:5a:1c:c0:d7:c0)
  > Source: BiostarM_76:bc:bb (f4:b5:20:76:bc:bb)
    Type: IPv4 (0x0800)
> Internet Protocol Version 4, Src: 192.168.105.178, Dst: 8.8.8.8
> User Datagram Protocol, Src Port: 60118, Dst Port: 53
> Domain Name System (query)
```

d. Expand **Ethernet II** to view the details. Observe the source and destination fields.

```
v Internet Protocol Version 4, Src: 192.168.105.178, Dst: 8.8.8.8
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 59
    Identification: 0x3d00 (15616)
  > Flags: 0x0000
    Time to live: 128
    Protocol: UDP (17)
    Header checksum: 0x0000 [validation disabled]
    [Header checksum status: Unverified]
    Source: 192.168.105.178
    Destination: 8.8.8.8
> User Datagram Protocol, Src Port: 60118, Dst Port: 53
> Domain Name System (query)
```

e. Expand the **User Datagram Protocol**. Observe the source and destination ports.

```
v User Datagram Protocol, Src Port: 60118, Dst Port: 53
    Source Port: 60118
    Destination Port: 53
    Length: 39
    Checksum: 0x3aa3 [unverified]
    [Checksum Status: Unverified]
    [Stream index: 418]
> Domain Name System (query)
```

f. Determine the IP and MAC address of the PC.

1. In a Windows command prompt, enter **arp –a** and **ipconfig /all** to record the MAC and IP addresses of the PC.

```
C:\Users\ITCS>arp -a

Interface: 192.168.105.178 --- 0xe
  Internet Address      Physical Address      Type
  192.168.105.113       f4-b5-20-76-b7-8a     dynamic
  192.168.105.143       f4-b5-20-76-c2-54     dynamic
  192.168.105.151       f4-b5-20-76-c0-49     dynamic
  192.168.105.157       f4-b5-20-76-c2-c3     dynamic
  192.168.105.159       f4-b5-20-76-c4-b8     dynamic
  192.168.105.167       f4-b5-20-76-57-10     dynamic
  192.168.105.174       f4-b5-20-76-bb-b7     dynamic
  192.168.105.176       f4-b5-20-76-be-0c     dynamic
  192.168.105.179       f4-b5-20-76-bb-c8     dynamic
  192.168.105.182       f4-b5-20-76-c4-c1     dynamic
  192.168.105.185       f4-b5-20-76-c4-77     dynamic
  192.168.105.190       f4-b5-20-76-53-e0     dynamic
  192.168.105.199       f4-b5-20-76-5a-89     dynamic
  192.168.105.219       f4-b5-20-76-c4-87     dynamic
  192.168.105.220       f4-b5-20-76-c4-bd     dynamic
  192.168.105.229       6c-0b-5e-47-ac-1c     dynamic
  192.168.105.246       f4-b5-20-76-c4-bf     dynamic
  192.168.105.249       f4-b5-20-76-57-76     dynamic
  192.168.105.252       f4-b5-20-76-c3-7d     dynamic
  192.168.106.62        6c-0b-5e-44-4c-aa     dynamic
  192.168.106.65        6c-0b-5e-44-4a-fb     dynamic
  192.168.106.192       f4-b5-20-76-bb-68     dynamic
  192.168.106.193       f4-b5-20-76-c4-b6     dynamic
  192.168.107.253       7c-5a-1c-c0-d7-c0     dynamic
  192.168.107.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.2             01-00-5e-00-00-02     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

```
C:\Users\ITCS>ipconfig/all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : COMPedu4010
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : F4-B5-20-76-BC-BB
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::8549:98c4:dafa:66e2%14(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.105.178(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.252.0
```

2. For Linux and macOS PC, enter **ifconfig** or **ip address** in a terminal.

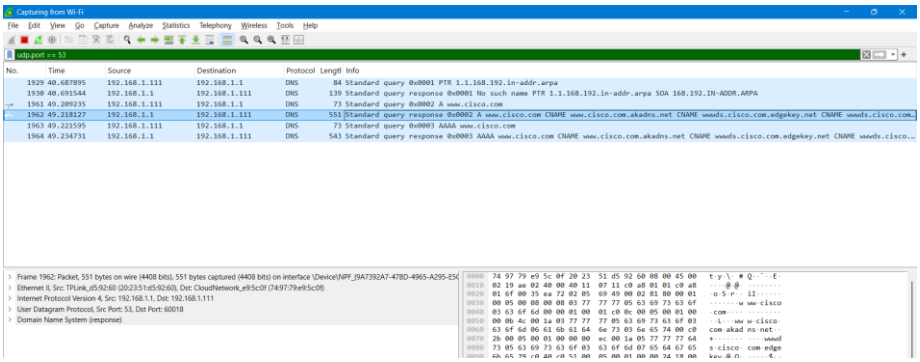
```
└─$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 00:0c:29:2f:2e:ff brd ff:ff:ff:ff:ff:ff
    inet 192.168.189.131/24 brd 192.168.189.255 scope global dynamic noprefixroute eth0
       valid_lft 1520sec preferred_lft 1520sec
    inet6 fe80::c83b:89b2:aa7a:4195/64 scope link noprefixroute
       valid_lft forever preferred_lft forever

┌──(kali㉿kali)-[~]
└─$
```

f. Expand **Domain Name System (query)** in the Packet Details pane. Then expand the **Flags** and **Queries**.

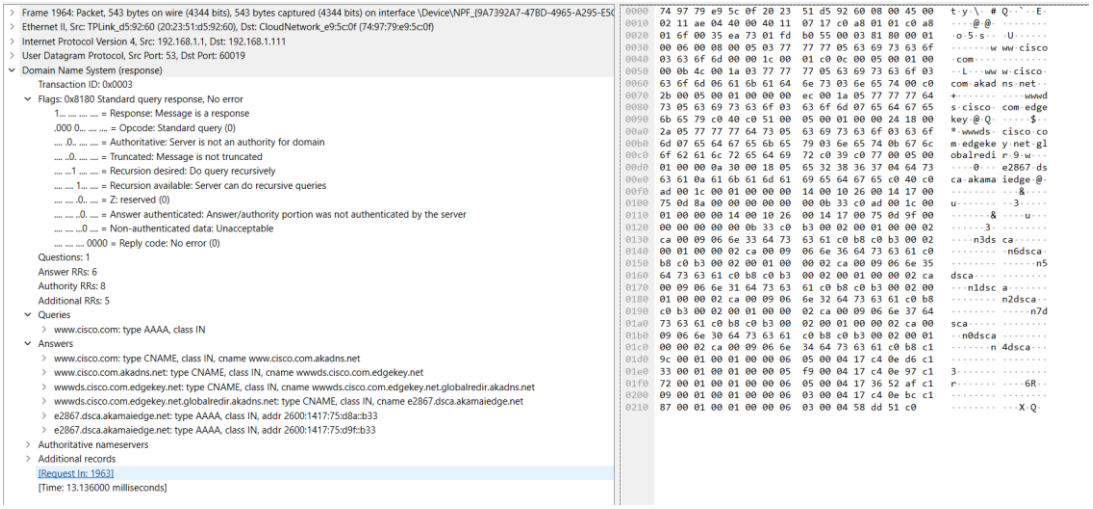
```
▼ Domain Name System (query)
    Transaction ID: 0x0002
  ▼ Flags: 0x0100 Standard query
      0... .... .... .... = Response: Message is a query
      .000 0... .... .... = Opcode: Standard query (0)
      .... ..0. .... .... = Truncated: Message is not truncated
      .... ...1 .... .... = Recursion desired: Do query recursively
      .... .... .0.. .... = Z: reserved (0)
      .... .... ...0 .... = Non-authenticated data: Unacceptable
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  ▼ Queries
    › www.cisco.com: type A, class IN
    [Response In: 373]
```

Part 3: Explore DNS Response Traffic

a. Select the corresponding response DNS packet has **Standard query response** and **A www.cisco.com** in the Info column.



b. Expand Domain Name System (response). Then expand the Flags, Queries, and Answers, observe the results.



c. Observe the CNAME and A records in the Answers details.

Practical No. 4

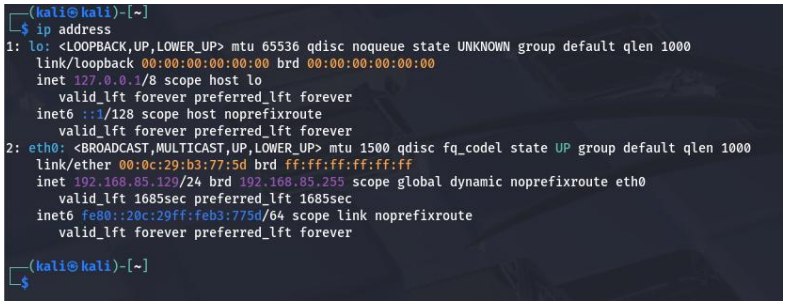
Objective: A. To use Wireshark to examine HTTP and HTTPS Traffic

Procedure:

A. Part 1: Capture and View HTTP traffic

Step 1: Check for available network interfaces within your kali-linux machine using command:

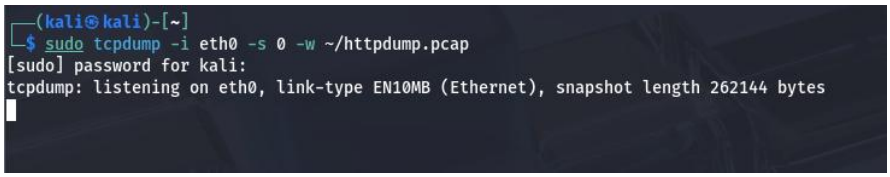
```
ip address
```



Step 2: From the above available interfaces, we choose **eth0** for this lab, as it is an active network interface and capable of capturing HTTP/HTTPS traffic.

Step 3: Start tcpdump and write to a pcap(httpdump.pcap) file using this command:

```
sudo tcpdump -i eth0 -s 0 -w ~/httpdump.pcap
```



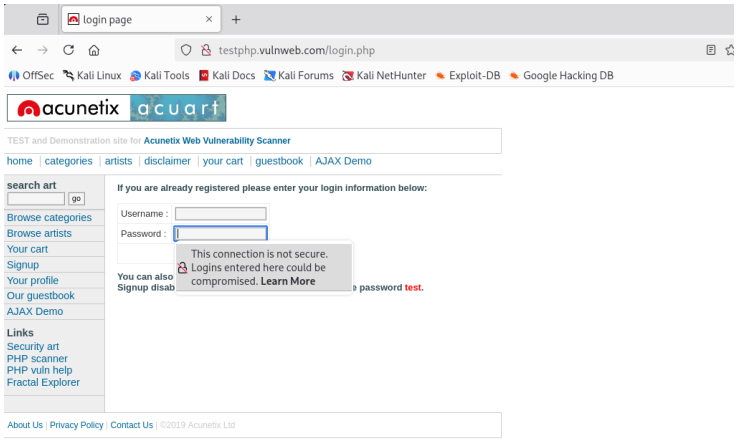
This command starts tcpdump and records network traffic on the **eth0** interface.

- The -i command option allows you to specify the interface. If not specified, the tcpdump will capture all traffic on all interfaces.
- The -s command option specifies the length of the snapshot for each packet. You should limit snaplen to the smallest number that will capture the protocol information in which you are interested. Setting snaplen to 0 sets it to the default of 262144, for backwards compatibility with recent older versions of tcpdump.
- The -w command option is used to write the result of the tcpdump command to a file. Adding the extension .pcap ensures that operating systems and applications will be able to read to file. All recorded traffic will be printed to the file httpdump.pcap in the home directory of the user analyst.

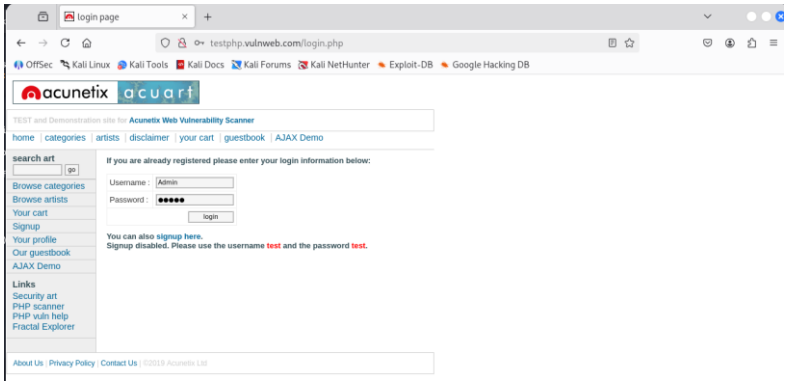
Step 4: To generate HTTP traffic open web browser(Firefox) and open the following website:

```
http://testphp.vulnweb.com/login.php
```

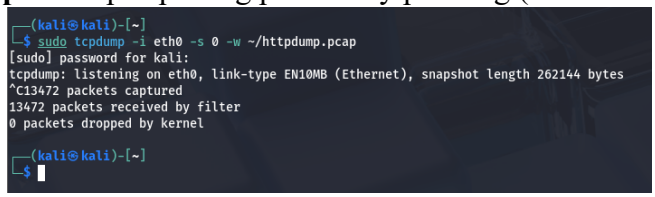
Because this website uses HTTP, the traffic is not encrypted. Click the Password field to see the warning pop up.



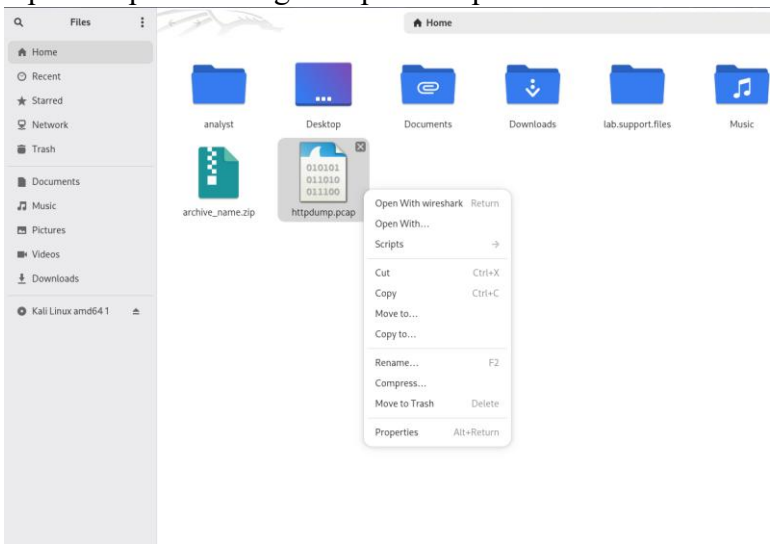
Step 5: Enter Username and Password both as "Admin" and click ***Login*** to submit, then close the browser.



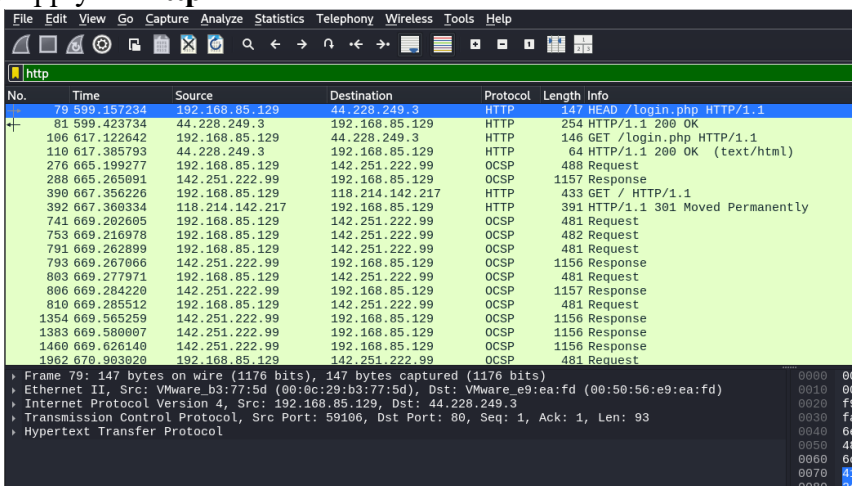
Step 6: Stop capturing packets by pressing (CTRL + C) inside the terminal.



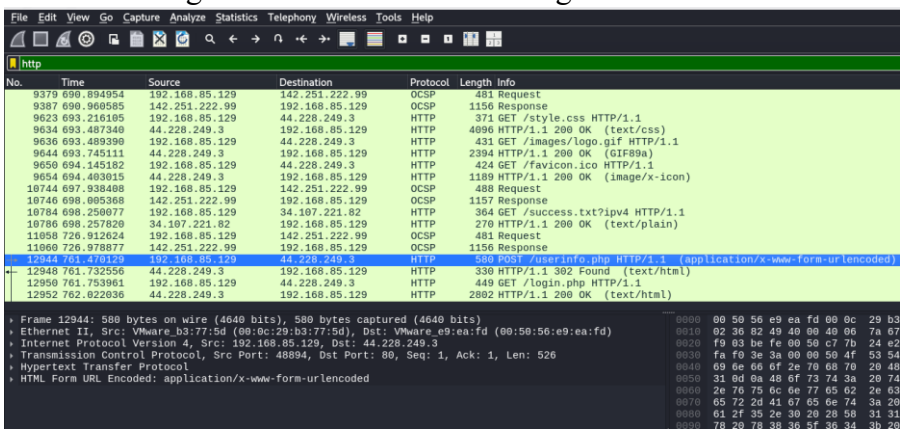
Step 7: View the HTTP capture stored in the *httpdump.pcap* file located in the home directory. Open the packet using the option "Open with Wireshark".



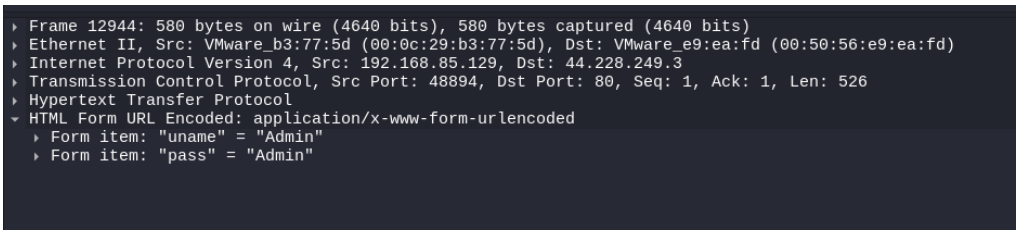
Step 8: Apply the **http** filter as shown below



Step 9: Browse through the different HTTP messages and select the **POST** message.



Step 10: In the lower window, the message is displayed. Expand the ***HTML Form URL Encoded: application/x-www-form-urlencoded*** section.



What two pieces of information are displayed?

→ The uname(username) and pass(password) that we entered as “Admin”.

Step 11: Close the Wireshark application.

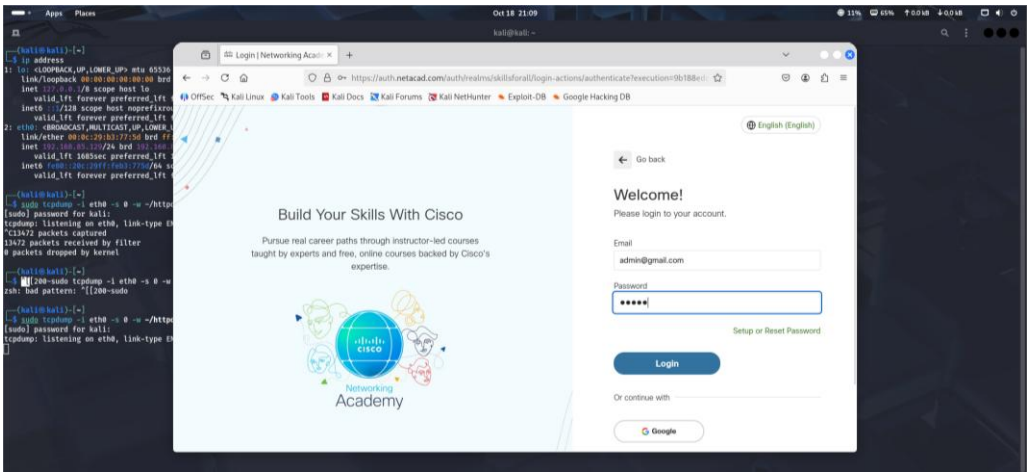
Part 2. Capture and View HTTPS Traffic

Step 1: Start tcpdump to record HTTPS traffic:

```
sudo tcpdump -i eth0 -s 0 -w ~/httpsdump.pcap
```

Step 2: Now, open firefox browser and visit the website: https://www.netacad.com

Step 3: Click on Login and enter random credentials as shown below



Step 4: Click Login and close the browser.

Step 5: Return to the tcpdump terminal and press Ctrl+C. tcpdump will stop and save ***~/httpsdump.pcap.***

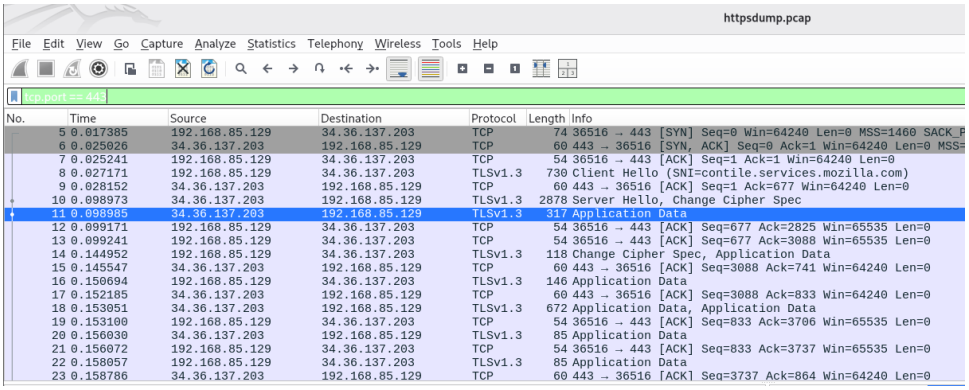
```
┌──(kali㉿kali)-[~]
└─$ sudo tcpdump -i eth0 -s 0 -w ~/httpsdump.pcap
tcpdump: listening on eth0, link-type EN10MB (Ethernet), snapshot length 262144 bytes
^C911 packets captured
911 packets received by filter
0 packets dropped by kernel
```

Step 6: Open the pcap in Wireshark and filter HTTPS traffic use following command:

```
sudo wireshark httpsdump.pcap.
```

This will open the captured packets in wireshark

Step 7: Apply the filter **tcp.port = = 443** to view HTTPS traffic. Browse through the different HTTPS messages and select an **Application Data** message.



Step 8: Completely expand the **Transport Layer Security** section.

```
▸ Frame 11: 317 bytes on wire (2536 bits), 317 bytes captured (2536 bits)
▸ Ethernet II, Src: VMware_e9:ea:fd (00:50:56:e9:ea:fd), Dst: VMware_b3:77:5d (00:0c:29:b3:77:5d)
▸ Internet Protocol Version 4, Src: 34.36.137.203, Dst: 192.168.85.129
▸ Transmission Control Protocol, Src Port: 443, Dst Port: 36516, Seq: 2825, Ack: 677, Len: 263
▸ [2 Reassembled TCP Segments (2954 bytes): #10(2691), #11(263)]
▾ Transport Layer Security
  ▾ TLSv1.3 Record Layer: Application Data Protocol: Hypertext Transfer Protocol
      Opaque Type: Application Data (23)
      Version: TLS 1.2 (0x0303)
      Length: 2949
      Encrypted Application Data […]: 1ca01d0734de85b3b559677f30d55d881622c343db97c0101c0563d1c5f3bec7c…
      [Application Data Protocol: Hypertext Transfer Protocol]
```

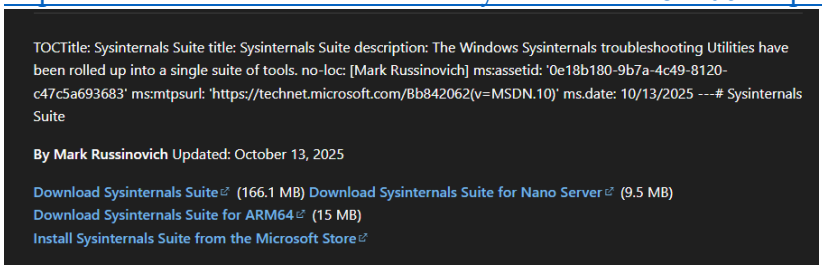
If you expand the Application Data, you will see **Encrypted Application Data** — the payload is **not readable** (ciphertext).

HTTP is replaced by the TLS section and the application data is encrypted and unreadable.

4B. Exploring Processes, Threads, Handles, and Windows Registry

Step 1: Download Windows SysInternals Suite.

a. Navigate to the following link to download Windows **SysInternals Suite**: https://technet.microsoft.com/en-us/sysinternals/bb842062.aspx



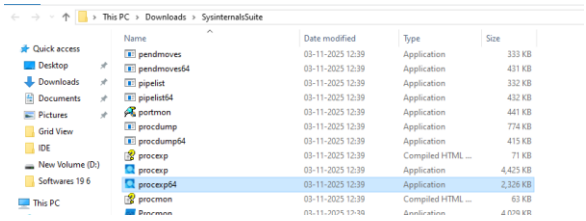
b. After the download is completed, extract the files from the folder.

c. Leave the web browser open for the following steps.

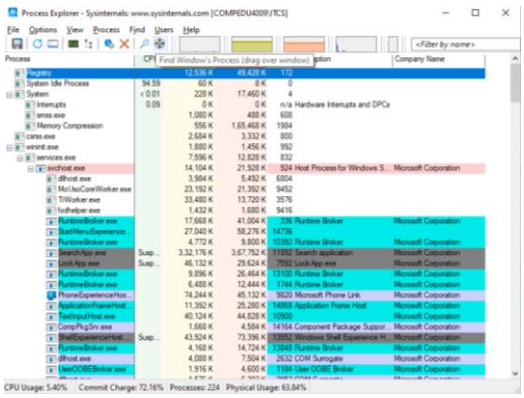
Step 2: Explore an active process.

a. Navigate to the SysinternalsSuite folder with all the extracted files.

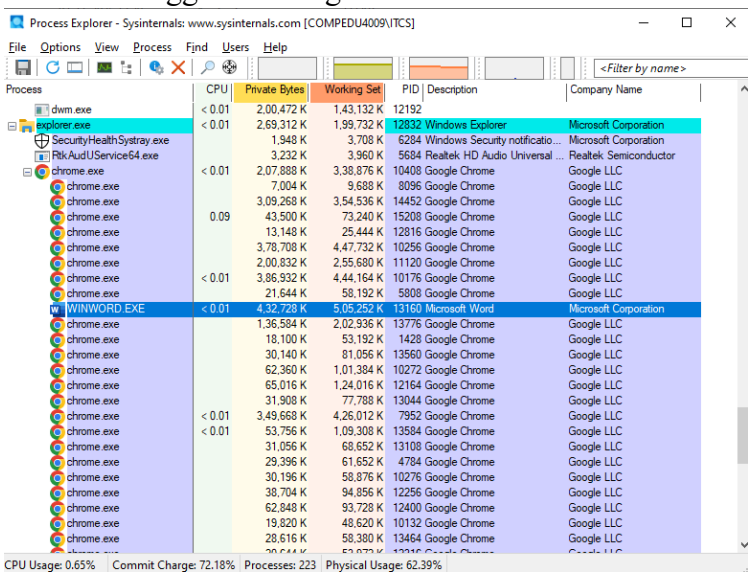
b. Open procexp.exe. Accept the Process Explorer License Agreement when prompted.



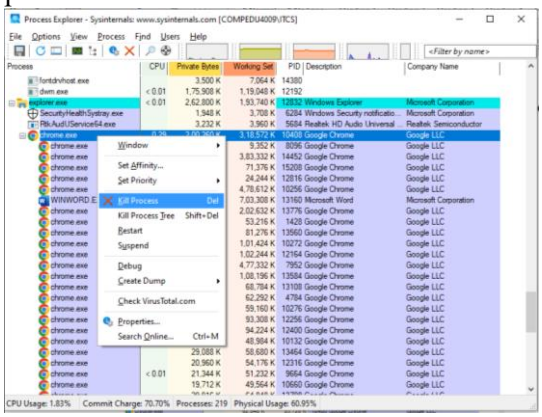
c. The Process Explorer displays a list of currently active processes.



d. Drag this icon to the web browser to view it in process explorer. In this example the icon was dragged to Google Chrome:



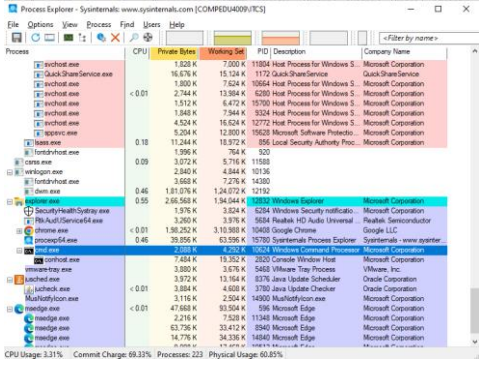
e. The Microsoft Edge process can be terminated in the Process Explorer. Right-click the selected process and select Kill Process.



What happened to the web browser window when the process is killed?
The web browser window closes.

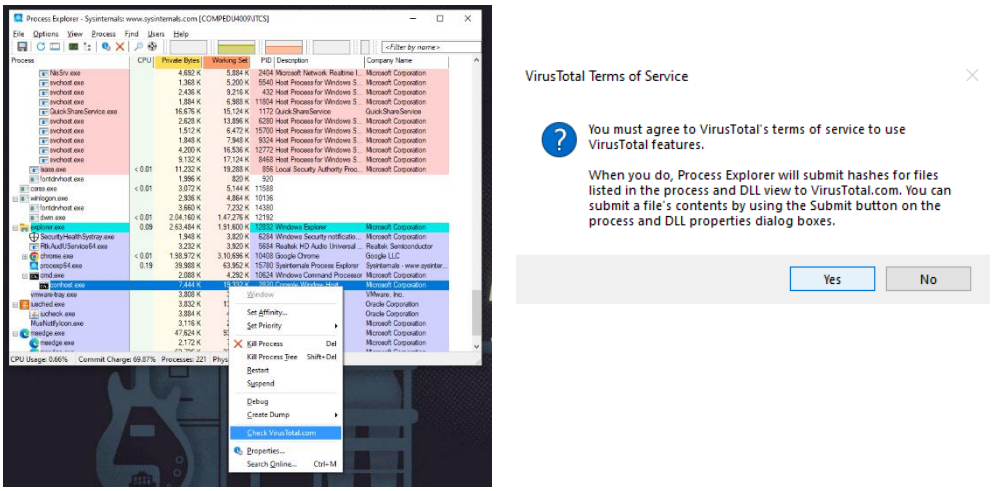
Step 3: Start another process.

a. Open a Command Prompt. (Start > search Command Prompt > select Command Prompt)
b. Drag the Find Window's Process icon to the Command Prompt window and locate the highlighted Command Prompt process in Process Explorer.
c. The process for the Command Prompt is cmd.exe. Its parent process is explorer.exe process. The cmd.exe has a child process, conhost.exe.



d. Navigate to the Command Prompt window. Start a ping at the prompt and observe the changes under the cmd.exe process.
What happened during the ping process?
A child process PING.EXE listed under the cmd.exe during the ping process.

e. As you review the list of active processes, you find that the child process conhost.exe may be suspicious. To check for malicious content, right-click **conhost.exe** and select **Check VirusTotal**. When prompted, click **Yes** to agree to VirusTotal Terms of Service. Then click **OK** for the next prompt.



f. Expand the Process Explorer window or scroll to the right until you see the VirusTotal column. Click the link under the VirusTotal column. The default web browser opens with the results regarding the malicious content of conhost.exe.

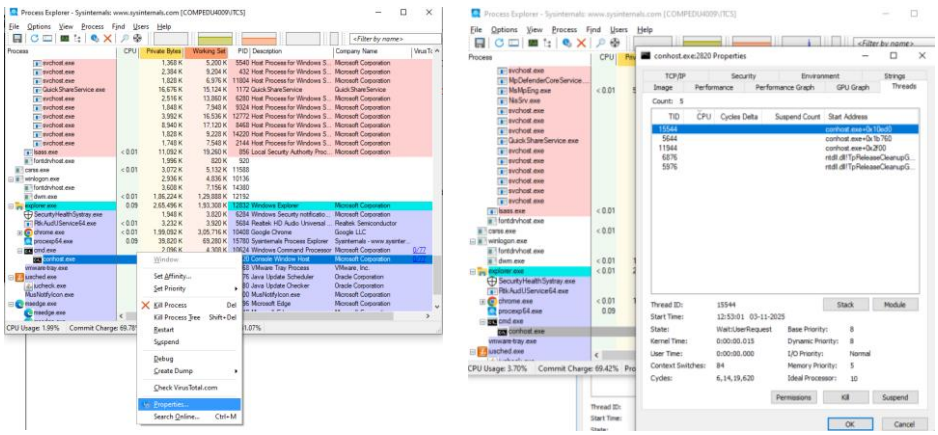
g. Right-click the cmd.exe process and select **Kill Process**. What happened to the child process conhost.exe?
The child process depends on the parent process. So when the parent process stops, the child process also stops.

Part 2: Exploring Threads and Handles

Step 1: Explore threads.

a. Open a command prompt.

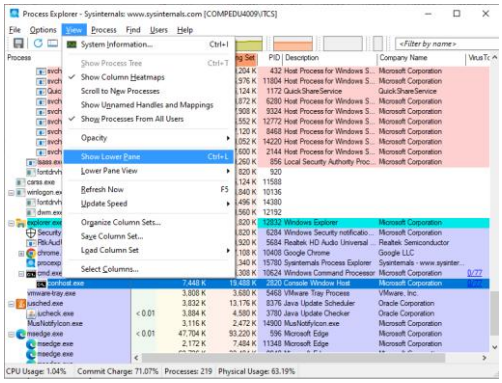
b. In Process Explorer window, right-click conhost.exe and Select Properties….. Click the Threads tab to view the active threads for the conhost.exe process.

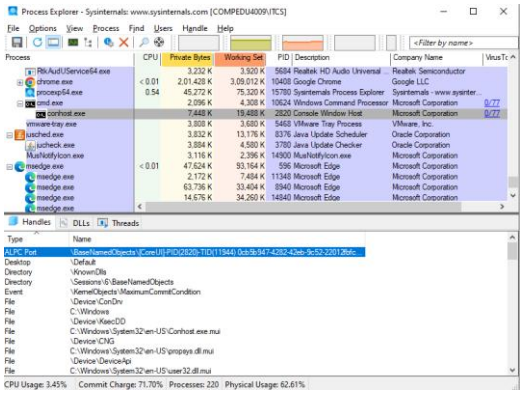


c. Examine the details of the thread. What type of information is available in the Properties window?
Information available includes environment variable, security information, performance information, and printable strings.

Step 2: Explore handles.

a. In the Process Explorer, click View > select Show Lower Pane > Handles to view the handles associated with the conhost.exe process.

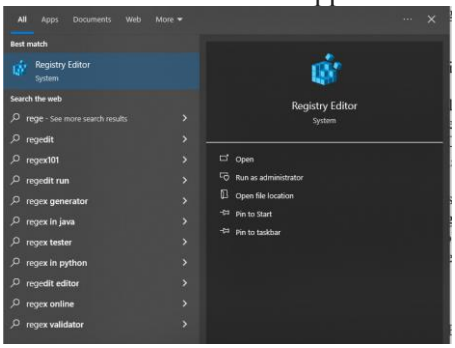




Part 3: Exploring Windows Registry

The Windows Registry is a hierarchical database that stores most of the operating systems and desktop environment configuration settings. In this part, you will

a. To access the Windows Registry, click Start > Search for regedit and select Registry Editor. Click Yes when asked to allow this app to make changes.

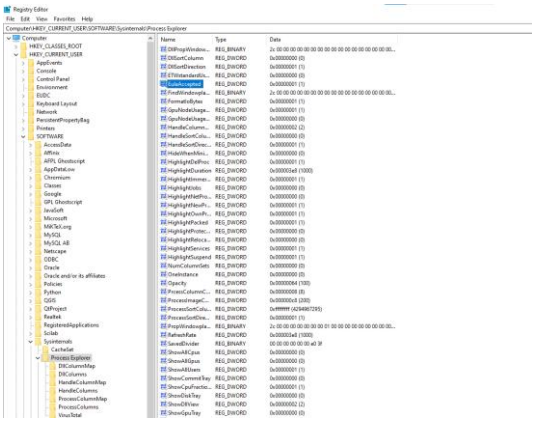


The Registry Editor has five hives. These hives are at the top level of the registry.

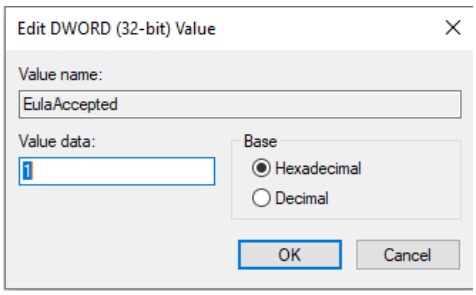
- HKEY_CLASSES_ROOT is actually the Classes subkey of HKEY_LOCAL_MACHINE\Software\. It stores information used by registered applications like file extension association, as well as a programmatic identifier (ProgID), Class ID (CLSID), and Interface ID (IID) data.
- HKEY_CURRENT_USER contains the settings and configurations for the users who are currently logged in.
- HKEY_LOCAL_MACHINE stores configuration information specific to the local computer.
- HKEY_USERS contains the settings and configurations for all the users on the local computer.
- HKEY_CURRENT_USER is a subkey of HKEY_USERS.
- HKEY_CURRENT_CONFIG stores the hardware information that is used at bootup by the local computer.

b. In a previous step, you had accepted the EULA(End-User License Agreement) for Process Explorer. Navigate to the EulaAccepted registry key for Process Explorer.

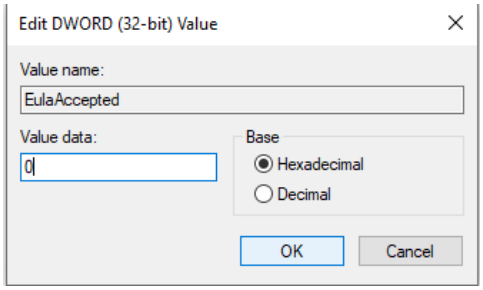
Click to select Process Explorer in HKEY_CURRENT_USER > Software > Sysinternals > Process Explorer. Scroll down to locate the key EulaAccepted. Currently, the value for the registry key EulaAccepted is 0x00000001(1).



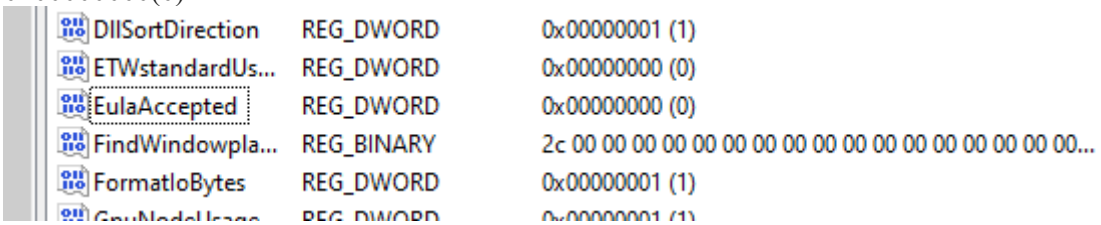
c. Double-click EulaAccepted registry key. Currently the value data is set to 1. The value of 1 indicates that the EULA has been accepted by the user.



d. Change the 1 to 0 for Value data. The value of 0 indicates that the EULA was not accepted. Click OK to continue.



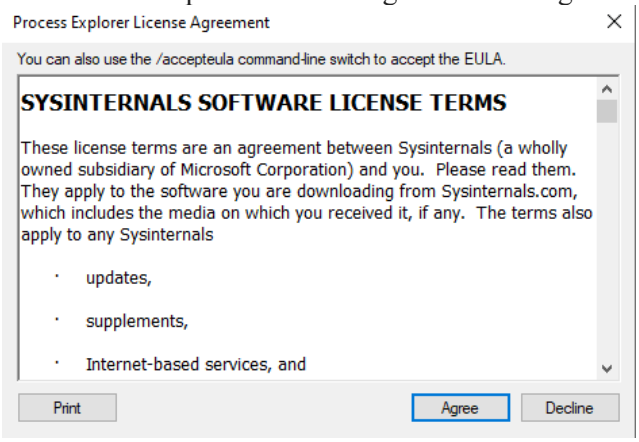
What is value for this registry key in the Data column?
0x00000000(0)



e. Open the Process Explorer. Navigate to the folder where you have downloaded SysInternals. Open the folder SysInternalsSuite > Open procexp.exe.

When you open the Process Explorer, what did you see?

The Process Explorer License Agreement dialog box



Practical No. 5

Objective: To perform a practical to Attack on a mySQL Database by using PCAP file

Procedure:

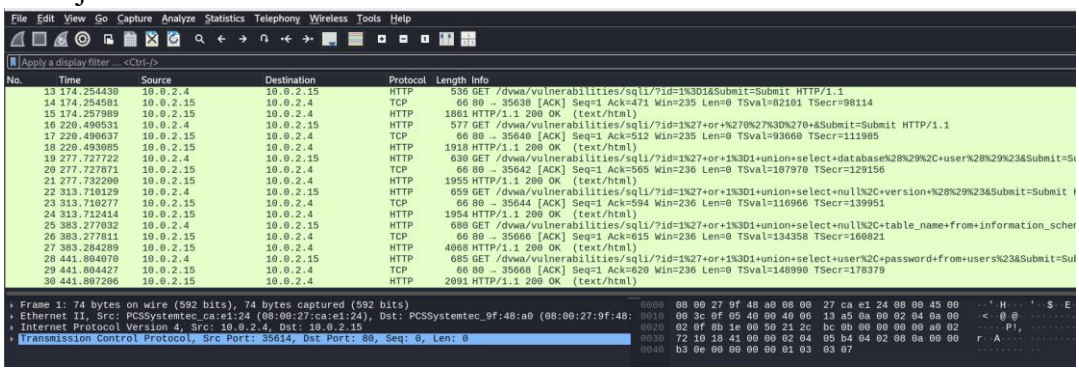
Step 1: Open Terminal and open the lab.support.files and locate the **SQL_Lab.pcap** file:

```
cd lab.support.files
ls
```

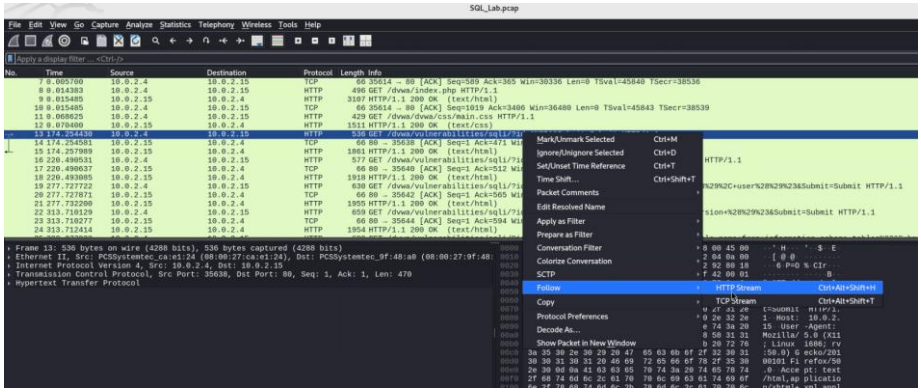
Step 2: Open **SQL_Lab.pcap** in Wireshark to examine the captured network traffic.

```
wireshark SQL_Lab.pcap &
```

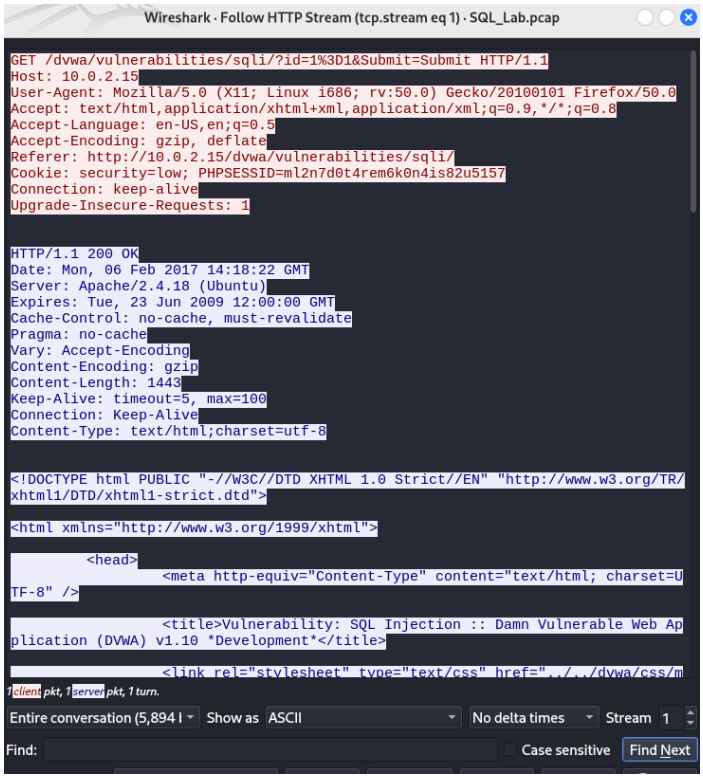
a. The PCAP file opens within Wireshark and displays the captured network traffic. This capture file extends over an 8-minute (441 second) period, the duration of this SQL injection attack



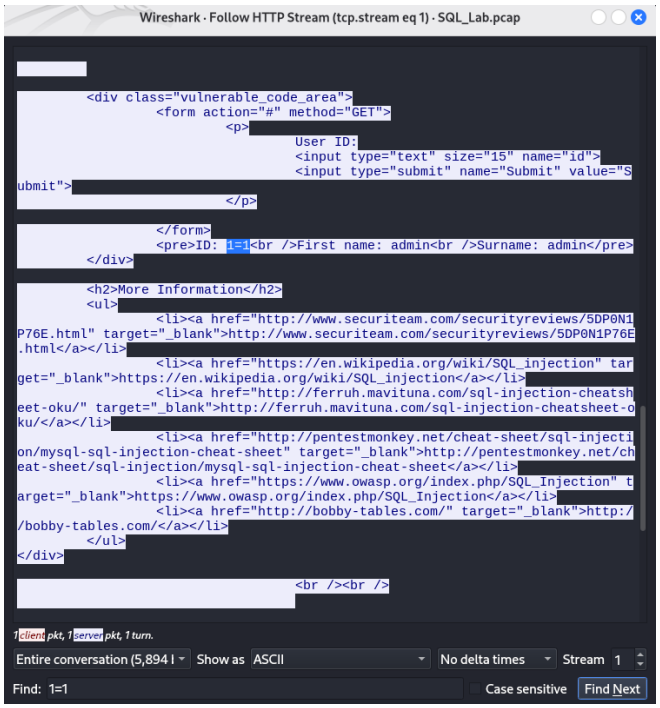
Step 3: Within the Wireshark capture, right-click line 13 and select Follow > HTTP Stream. Line 13 was chosen because it is a GET HTTP request. This will be very helpful in following the data stream as the application layers sees it and leads up to the query testing for the SQL injection



Step 4: The source traffic is shown in red. The source has sent a GET request to host 10.0.2.15. In blue, the destination device is responding back to the source.



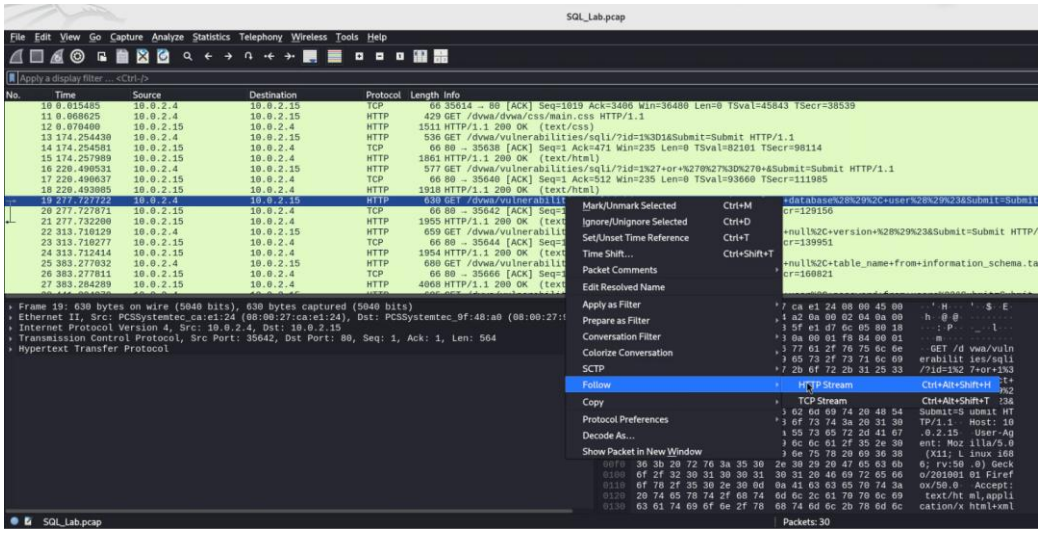
Step 5: In the Find field, enter 1=1. Click Find Next.

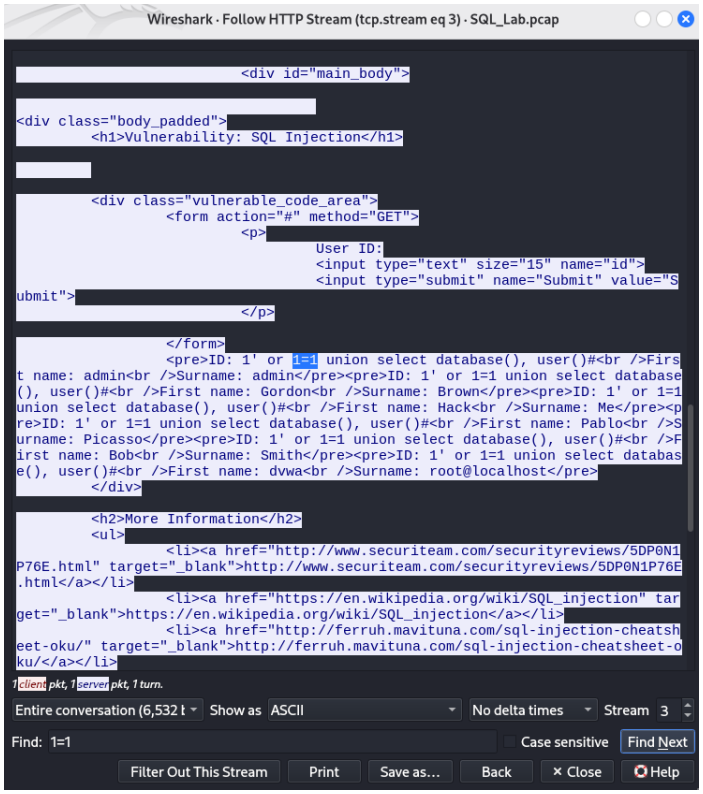


Explanation: The attacker has entered a query (1=1) into a UserID search box on the target 10.0.2.15 to see if the application is vulnerable to SQL injection. Instead of the application responding with a login failure message, it responded with a record from a database. The attacker has verified they can input an SQL command and the database will respond. The search string 1=1 creates an SQL statement that will be always true. In the example, it does not matter what is entered into the field, it will always be true.

Step 6: Close the HTTP stream window. In the next step, you will be viewing the continuation of an attack.

Step 7: Within the Wireshark capture, right-click line 19, and click Follow > HTTP Stream. In the Find field, enter 1=1. Click Find Next.





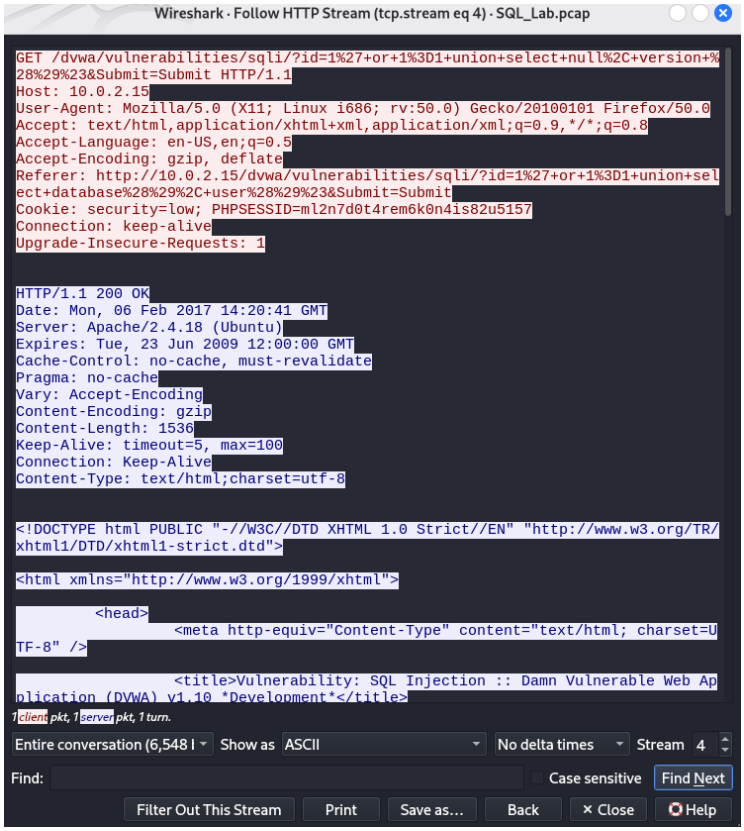
Step 8: The attacker has entered a query (1' or 1=1 union select database(), user()#) into a UserID search box on the target 10.0.2.15. Instead of the application responding with a login failure message, it responded with the following information:

```
                </form>
                <pre>ID: 1' or 1=1 union select database(), user()#<br />First name: admin<br />Surname: admin</pre><pre>ID: 1' or 1=1 union select database(), user()#<br />First name: Gordon<br />Surname: Brown</pre><pre>ID: 1' or 1=1 union select database(), user()#<br />First name: Hack<br />Surname: Me</pre><pre>ID: 1' or 1=1 union select database(), user()#<br />First name: Pablo<br />Surname: Picasso</pre><pre>ID: 1' or 1=1 union select database(), user()#<br />First name: Bob<br />Surname: Smith</pre><pre>ID: 1' or 1=1 union select database(), user()#<br />First name: dvwa<br />Surname: root@localhost</pre>
        </div>
```

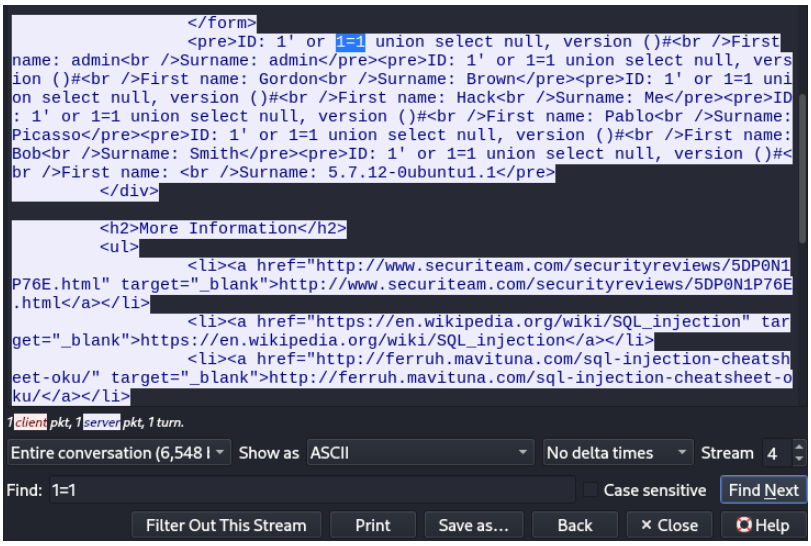
The database name is dvwa and the database user is root@localhost. There are also multiple user accounts being displayed.

Step 9: Close the Follow HTTP Stream window and Click **Clear display filter** to display the entire Wireshark conversation

Step 10: Within the Wireshark capture, right-click line 22 and select Follow > HTTP Stream. In red, the source traffic is shown and is sending the GET request to host 10.0.2.15. In blue, the destination device is responding back to the source.



Step 11: In the **Find** field, enter **1=1**. Click **Find Next**.



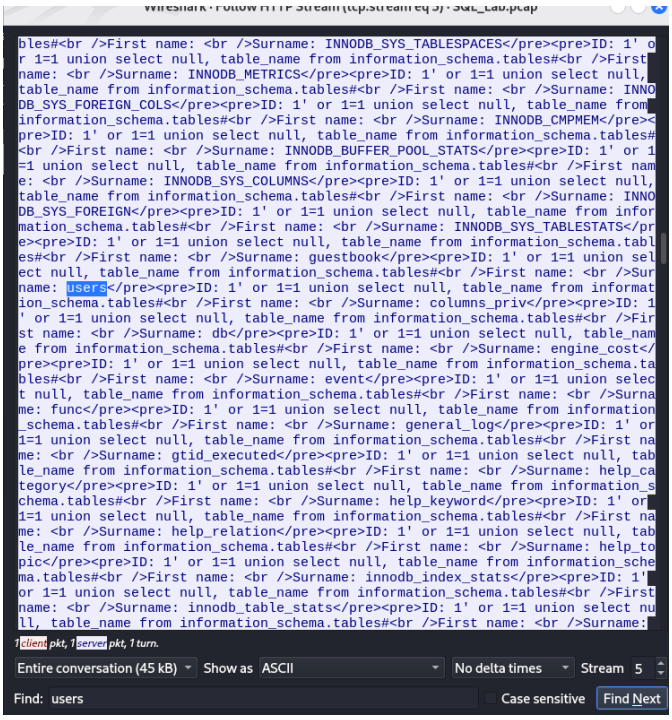
Explanation: The attacker has entered a query (1' or 1=1 union select null, version ()#) into a UserID search box on the target 10.0.2.15 to locate the version identifier. Notice how the version identifier is at the end of the output right before the </pre>. closing HTML code.

Step 12: Close the Follow HTTP Stream window and click Clear display filter to display the entire Wireshark conversation

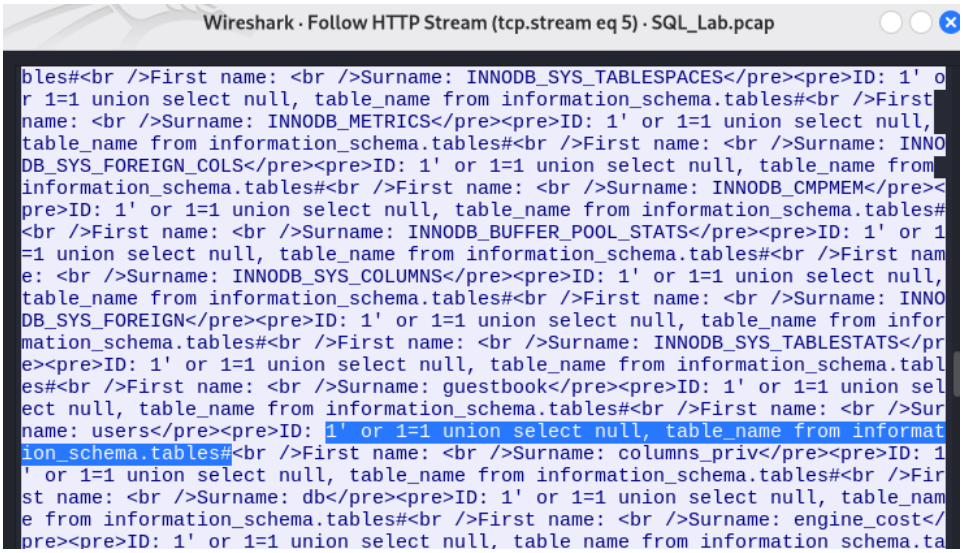
The attacker knows that there is a large number of SQL tables that are full of information. The attacker attempts to find them.

Step 13: Within the Wireshark capture, right-click on line 25 and select **Follow > HTTP Stream**. The source is shown in red. It has sent a GET request to host 10.0.2.15. In blue, the destination device is responding back to the source.

Step 14: In the **Find** field, enter **users**. Click **Find Next**.



The attacker has entered a query (1'or 1=1 union select null, table_name from information_schema.tables#) into a UserID search box on the target 10.0.2.15 to view all the tables in the database. This provides a huge output of many tables, as the attacker specified "null" without any further specifications.



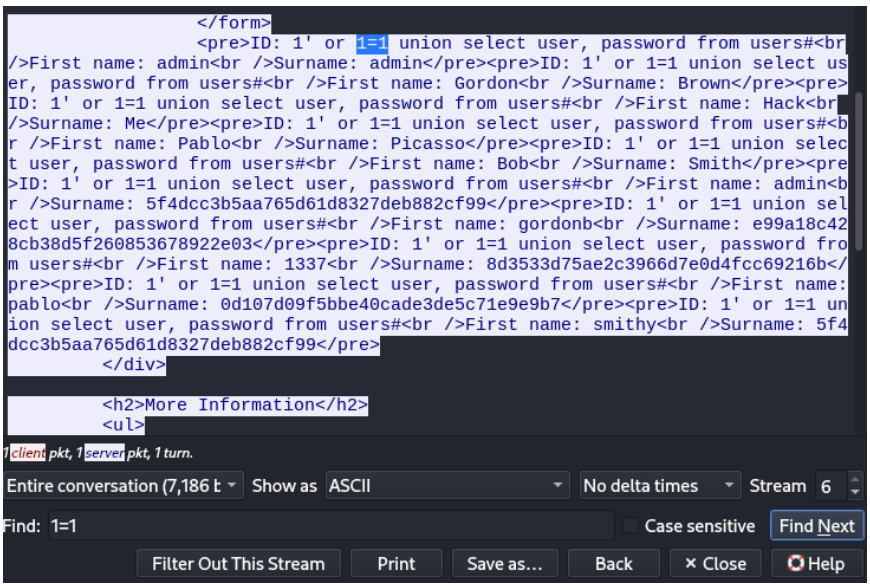
What would the modified command of (1′ OR 1=1 UNION SELECT null, column_name FROM INFORMATION_SCHEMA.columnsWHERE table_name='users') do for the attacker?

→ The database would respond with a much shorter output filtered by the occurrence of the word "users".

The attack ends with the best prize of all; password hashes.

Step 15: Within the Wireshark capture, right-click line 28 and select Follow > HTTP Stream. The source is shown in red. It has sent a GET request to host 10.0.2.15. In blue, the destination device is responding back to the source.

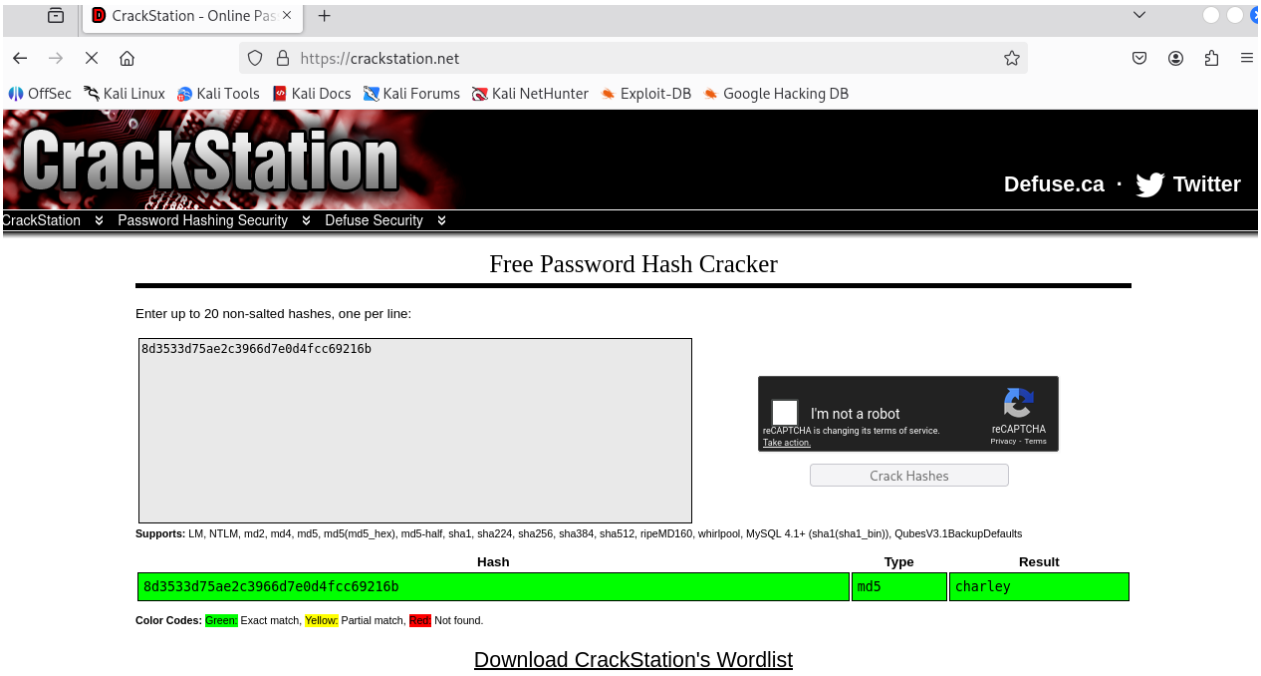
Click Find and type in 1=1. Search for this entry.



As seen above the password hashes for certain users are visible, using a website such as https://crackstation.net/, copy the password hash into the password hash cracker to reveal the plain-text password.

Hashed Password: 8d3533d75ae2c3966d7e0d4fcc69216b

Cracked Password from the Hash:



Practical No. 6

Objective: To create your own syslog Server.

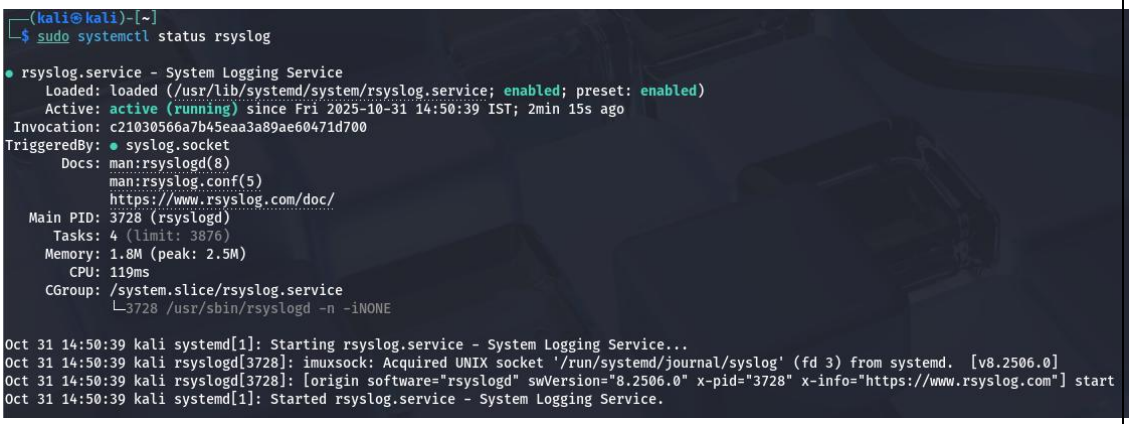
Procedure:

Step 1: Install rsyslog

```
sudo apt update
sudo apt install rsyslog -y
```

Step 2: Verify whether rsyslog is running:

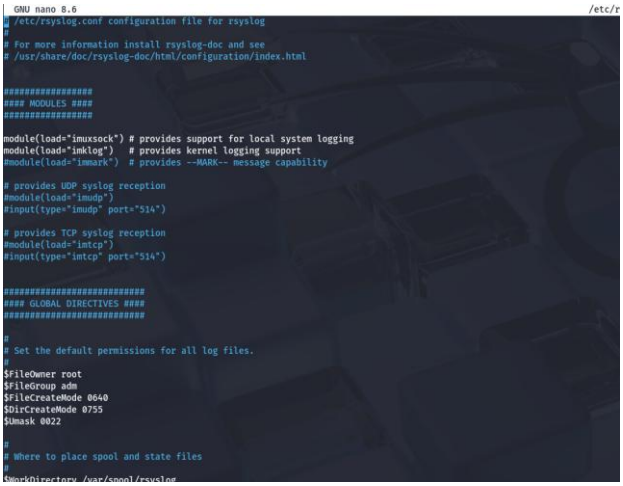
```
sudo systemctl status rsyslog
```



Step 3: Enable UDP and TCP Reception

i. Open the rsyslog.conf file in nano editor:

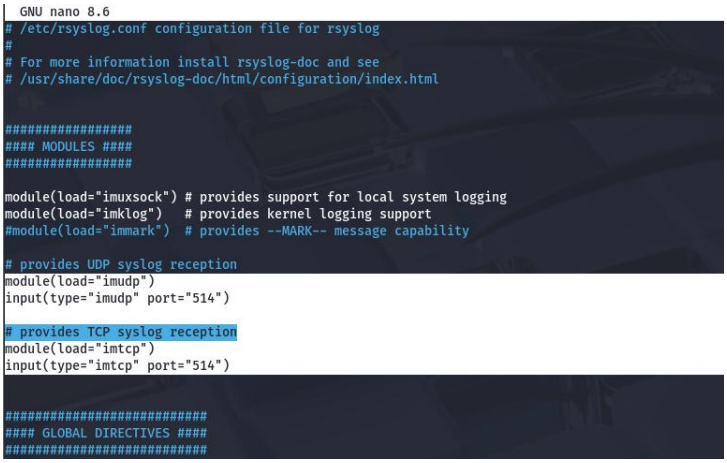
```
sudo nano /etc/rsyslog.conf
```



ii. Uncomment the following lines:

```
module(load="imudp")
input(type="imudp" port="514")
module(load="imtcp")
input(type="imtcp" port="514")
```

This tells rsyslog to listen for incoming log messages on port **514** (the default syslog port).



Step 4: Add a Separate Log Section (Inside the SAME File)

i. Scroll to the **bottom** and the following configurations to the file:

```
# Remote logging section (store logs from remote clients)
$template RemoteLogs,"/var/log/remote_logs/%HOSTNAME%.log"
*.* ?RemoteLogs
& stop

# Forward all logs via UDP to remote syslog server:
*.* @192.168.1.10:514
# Forward all logs via TCP to remote syslog server:
*.* @@192.168.1.10:514
```

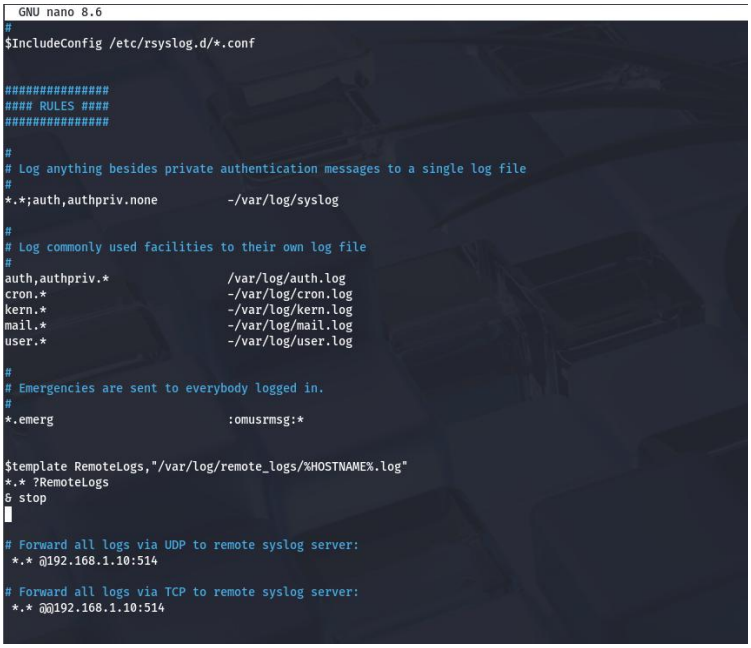


Figure 1 Final Configuration

ii. Press CTRL + O →Enter→CTRL + X to confirm the configurations

iii. Create the directory and provide appropriate permissions:

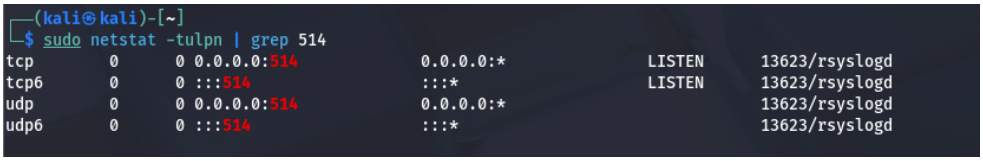
```
sudo mkdir /var/log/remote_logs
sudo chmod 755 /var/log/remote_logs
```

Step 5: **Restart the Rsyslog Service**

```
sudo systemctl restart rsyslog
sudo systemctl enable rsyslog
```

Step 6: **Verify whether Syslog Server is Running:**

```
sudo netstat -tulpn | grep 514
```



The above output tells us that:

→ Your rsyslog server is **actively listening** on port **514** for both **TCP and UDP**.
→ It accepts connections from **any network interface** (IPv4 and IPv6).
→ You're ready to start receiving logs from remote syslog clients.

Your Linux machine is now *acting as a syslog server*, ready to receive logs from any client.

Practical No. 7

Objective: To configure your Linux system to send syslog messages to a syslog server and read them.

Procedure:

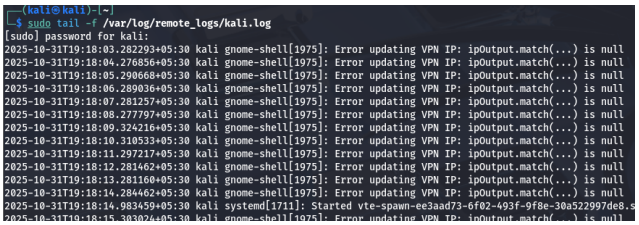
Step 1: **Ensure all steps in Practical 5, were correctly executed**

Step 2: **Verify whether syslog server is running:**

```
sudo systemctl status rsyslog
```

Step 3: **Start Logging in a new terminal window**

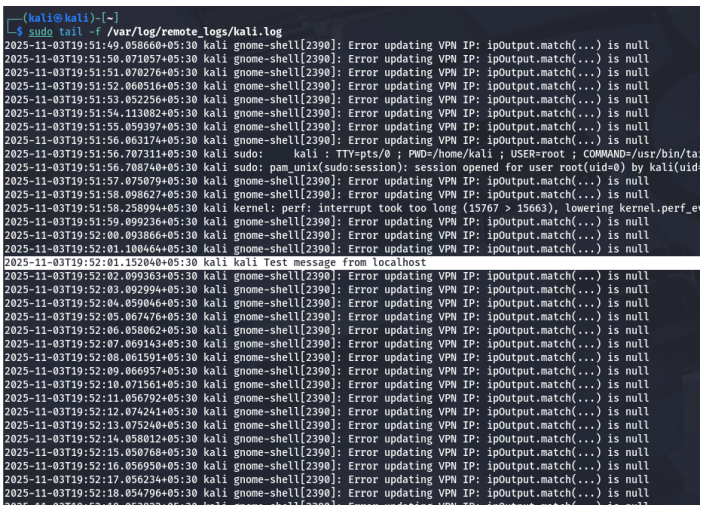
```
sudo tail -f /var/log/remote_logs/kali.log
```



Step 4: **Return to previous terminal and send a log message:**

```
logger -n 127.0.0.1 -P 514 "Test message from client"
```

Step 5: **The log message will be visible in terminal 2**



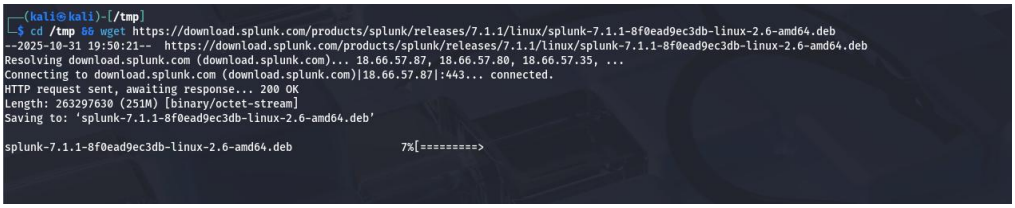
Practical No. 8

Objective: To Install and Run Splunk on Linux

Procedure:

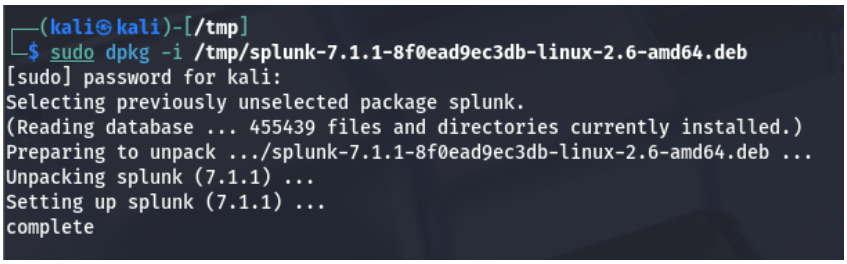
Step 1: **Download the splunk installer**

```
cd /tmp && wget
https://download.splunk.com/products/splunk/releases/7.1.1/
linux/splunk-7.1.1-8f0ead9ec3db-linux-2.6-amd64.deb
```



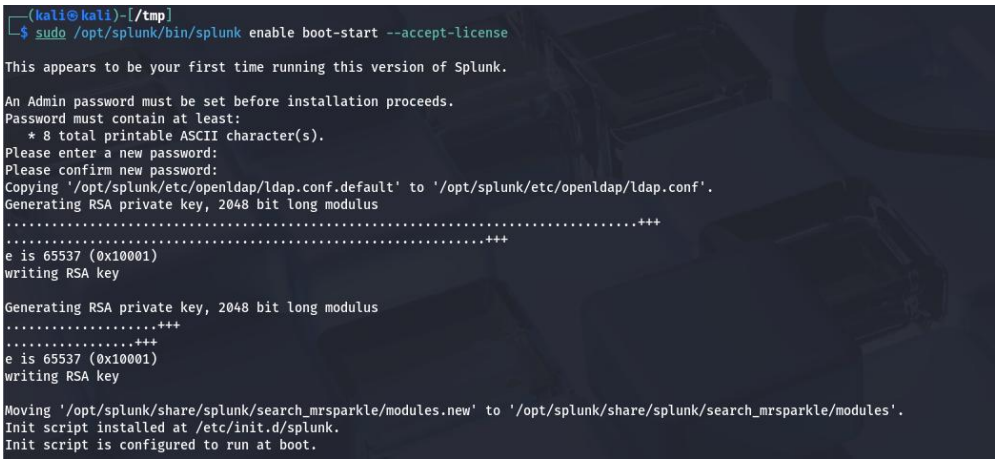
Step 2: **Install Splunk**

```
sudo dpkg -i /tmp/splunk-7.1.1-8f0ead9ec3db-linux-2.6-
amd64.deb
```



Step 3: **Enable Splunk to start at boot**

```
sudo /opt/splunk/bin/splunk enable boot-start --accept-
license
```



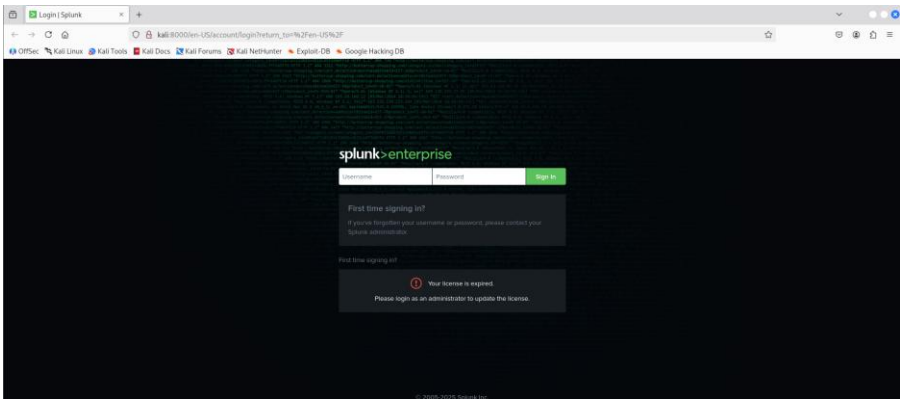
Set password as : **Splunk123!**

Step 4: **Start Splunk for the first time.**

```
sudo /opt/splunk/bin/splunk start
```

```
┌──(kali㉿kali)-[/tmp]
└─$ sudo /opt/splunk/bin/splunk start
[sudo] password for kali:

Splunk> Another one.

Checking prerequisites...
       Checking http port [8000]: open
       Checking mgmt port [8089]: open
       Checking appserver port [127.0.0.1:8065]: open
       Checking kvstore port [8191]: open
       Checking configuration...  Done.
               Creating: /opt/splunk/var/lib/splunk
               Creating: /opt/splunk/var/run/splunk
               Creating: /opt/splunk/var/run/splunk/appserver/i18n
               Creating: /opt/splunk/var/run/splunk/appserver/modules/static/css
               Creating: /opt/splunk/var/run/splunk/upload
               Creating: /opt/splunk/var/spool/splunk
               Creating: /opt/splunk/var/spool/dirmoncache
               Creating: /opt/splunk/var/lib/splunk/authDb
               Creating: /opt/splunk/var/lib/splunk/hashDb
New certs have been generated in '/opt/splunk/etc/auth'.
       Checking critical directories...        Done
       Checking indexes...
               Validated: _audit _internal _introspection _telemetry _thefishbucket history main summary
       Done


Your license is expired. Please login as an administrator to update the license.

       Checking filesystem compatibility...  Done
       Checking conf files for problems...
       Done
       Checking default conf files for edits...
       Validating installed files against hashes from '/opt/splunk/splunk-7.1.1-8f0ead9ec3db-linux-2.6-x86_64-manifest'
       All installed files intact.
       Done
All preliminary checks passed.

Starting splunk server daemon (splunkd)...
Generating a 2048 bit RSA private key
.....+++
```

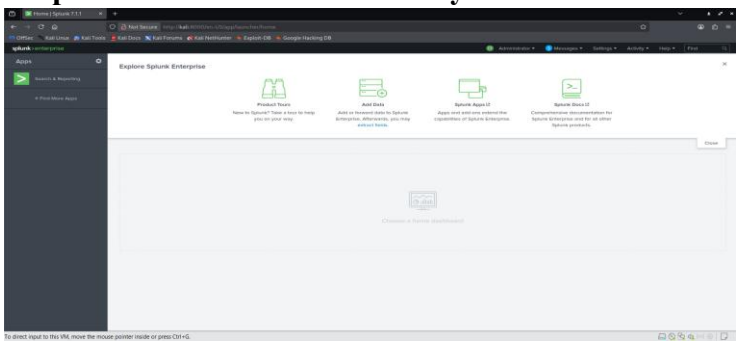
Step 5: **The Splunk web interface is at http://kali:8000. (or click on the link provided in the terminal). The following page will be visible:**



Step 6: **Enter Username and Password and click sign in**

```
Username: Admin
Password : Splunk123!
```

Step 7: **The Splunk dashboard is now ready to use**



Practical No. 9

Objective: Install and Configure ELK Stack (Elasticsearch, Logstash, and Kibana) on Linux

Procedure:

Step 1: Update system packages

```
sudo apt update && sudo apt upgrade -y
```

Step 2: Install Java

```
sudo apt install openjdk-11-jdk -y
```

Check Java Version:

```
java -version
```

Step 3: Install Elasticsearch

i. Add Elastic APT Repository and GPG Key

```
curl -fsSL https://artifacts.elastic.co/GPG-KEY-
elasticsearch |sudo gpg --dearmor -o
/usr/share/keyrings/elastic.gpg
```

ii. Next, add the Elastic source list to the sources.list.d directory, where APT will search for new sources:

```
echo "deb [signed-by=/usr/share/keyrings/elastic.gpg]
https://artifacts.elastic.co/packages/7.x/apt stable main"
|

sudo tee -a /etc/apt/sources.list.d/elastic-7.x.list
```

iii. Next, update your package lists so APT will read the new Elastic source:

```
sudo apt update
```

iv. Then install elastic search using command:

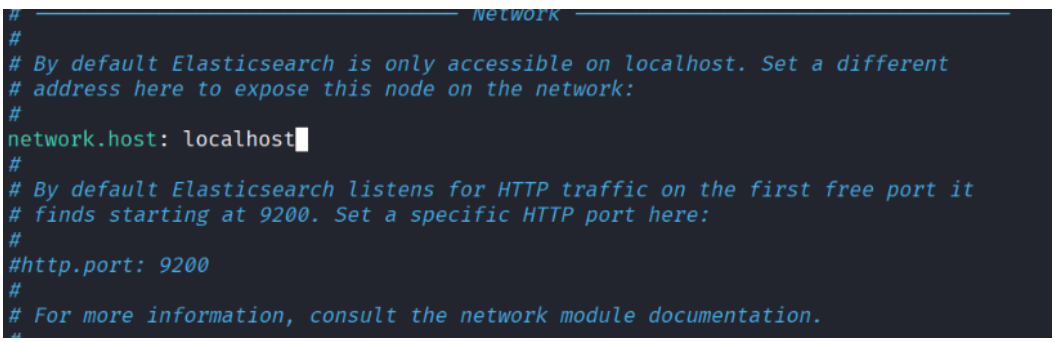
```
sudo apt install elasticsearch
```

v. Edit the elasticsearch configuration file:

```
sudo nano /etc/elasticsearch/elasticsearch.yml
```

vi. Uncomment or add the following configuration:

```
network.host: localhost
```



Press Ctrl + O →ENTER →Ctrl + X

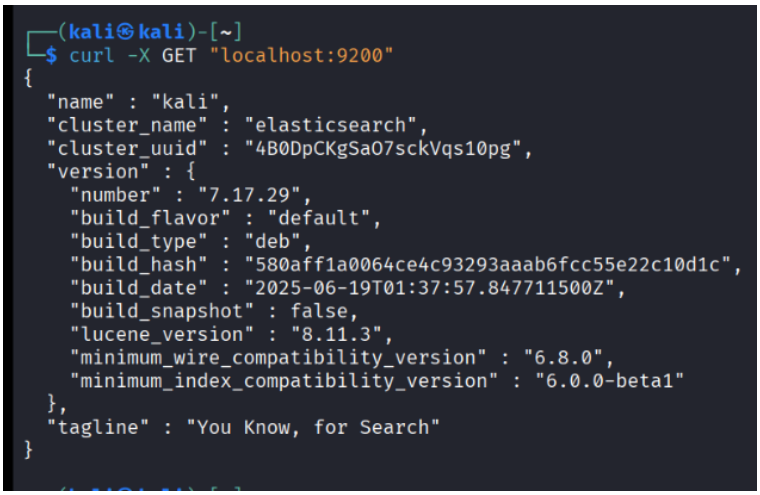
vii. Start and enable the Elasticsearch service with systemctl.

```
sudo systemctl start elasticsearch
sudo systemctl enable elasticsearch
```

viii. Test whether elastic search is running:

```
curl -X GET "localhost:9200"
```

Output:



Step 4: Install Kibana

i. Start by installing kibana

```
sudo apt install kibana
```

ii. Then enable and start the Kibana service:

```
sudo systemctl enable kibana
sudo systemctl start kibana
```

iii. Create a Kibana Administrative User

```
echo "admin:`openssl passwd -apr1`" | sudo tee -a
/etc/nginx/htpasswd.users
```

When prompted for a password set the password as : kali

Username: admin

Password: kali

iv. Create a Nginx Server Block for Kibana

```
sudo nano /etc/nginx/sites-available/your_domain
```

Add the following configurations the file:

```
server {
    listen 80;

    server_name 127.0.0.1;
```

```
    auth_basic "Restricted Access";
    auth_basic_user_file /etc/nginx/htpasswd.users;

    location / {
        proxy_pass http://localhost:5601;
        proxy_http_version 1.1;
        proxy_set_header Upgrade $http_upgrade;
        proxy_set_header Connection 'upgrade';
        proxy_set_header Host $host;
        proxy_cache_bypass $http_upgrade;
    }
}
```

Press ctrl+o → enter → ctrl + x

v. Enable the Nginx Configuration

```
sudo ln -s /etc/nginx/sites-available/your_domain
/etc/nginx/sites-enabled/your_domain
```

Test the configuration using the command:

```
sudo nginx -t
```

It must return successful as shown below:

```
┌──(kali㉿kali)-[~]
└─$ sudo nginx -t
nginx: the configuration file /etc/nginx/nginx.conf syntax is ok
nginx: configuration file /etc/nginx/nginx.conf test is successful
```

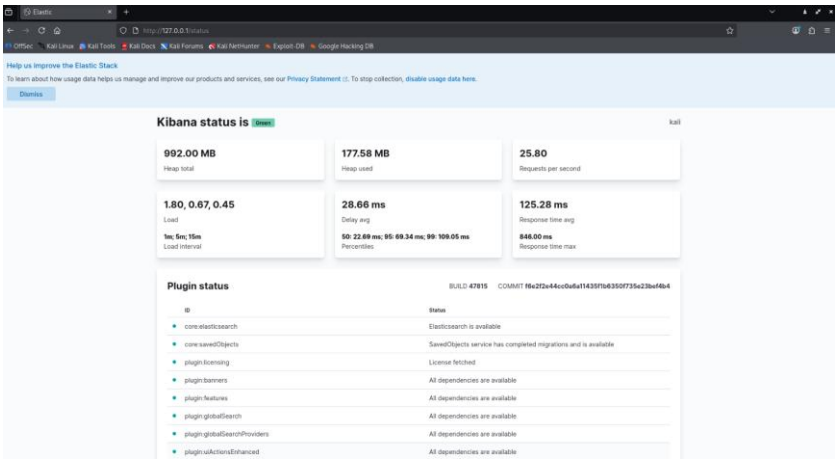
vi. If its successful, then reload nginx:

```
sudo systemctl start nginx
sudo systemctl enable nginx
sudo systemctl reload nginx
```

vii. Test if kibana was configured successfully, by opening the link in **firefox,** when prompted for username and password enter the username and password you had set earlier. {username: admin password: kali}.

```
http://127.0.0.1/status
```

Output:



Step 5: Install Logstash

i. Use the following command to install Logstash

```
sudo apt install logstash
```

ii. Configure Logstash Input(to Beats)

```
sudo nano /etc/logstash/conf.d/02-beats-input.conf
```

Add the following configuration, which tells Logstash to listen for Beats data on TCP port 5044:

```
input {
  beats {
    port => 5044
  }
}
```

Save and exit (CTRL + O, ENTER, CTRL + X).

iii. Configure Logstash Output (To Elasticsearch)

```
sudo nano /etc/logstash/conf.d/30-elasticsearch-output.conf
```

Insert the following output configuration:

```
output {
  if [@metadata][pipeline] {
    elasticsearch {
      hosts => ["localhost:9200"]
      manage_template => false
      index => "%{[@metadata][beat]}-%{[@metadata][version]}-
%{+YYYY.MM.dd}"
      pipeline => "%{[@metadata][pipeline]}"
    }
  } else {
    elasticsearch {
      hosts => ["localhost:9200"]
      manage_template => false
      index => "%{[@metadata][beat]}-%{[@metadata][version]}-
%{+YYYY.MM.dd}"
    }
  }
}
```

Save and exit (CTRL + O, ENTER, CTRL + X).

iv. Test Logstash Configuration

```
sudo -u logstash /usr/share/logstash/bin/logstash --
path.settings /etc/logstash -t
```

```
┌──(kali㉿kali)-[~]
└─$ sudo -u logstash /usr/share/logstash/bin/logstash --path.settings /etc/logstash -t

Using bundled JDK: /usr/share/logstash/jdk
OpenJDK 64-Bit Server VM warning: Option UseConcMarkSweepGC was deprecated in version 9.0 and will likely be removed in a future releas
Sending Logstash logs to /var/log/logstash which is now configured via log4j2.properties
[2025-11-04T21:36:19,497][INFO ][logstash.runner          ] Log4j configuration path used is: /etc/logstash/log4j2.properties
[2025-11-04T21:36:19,527][INFO ][logstash.runner          ] Starting Logstash {"logstash.version"=>"7.17.29", "jruby.version"=>"jruby 9
.2.20.1 (2.5.8) 2021-11-30 2a2962fbd1 OpenJDK 64-Bit Server VM 11.0.26+4 +indy +jit [linux-x86_64]"}
[2025-11-04T21:36:19,531][INFO ][logstash.runner          ] JVM bootstrap flags: [-Xms1g, -Xmx1g, -XX:+UseConcMarkSweepGC, -XX:CMSIniti
atingOccupancyFraction=75, -XX:+UseCMSInitiatingOccupancyOnly, -Djava.awt.headless=true, -Dfile.encoding=UTF-8, -Djdk.io.File.enableADS
=true, -Djruby.compile.invokedynamic=true, -Djruby.jit.threshold=0, -Djruby.regexp.interruptible=true, -XX:+HeapDumpOnOutOfMemoryError,
 -Djava.security.egd=file:/dev/urandom, -Dlog4j2.isThreadContextMapInheritable=true]
[2025-11-04T21:36:19,597][INFO ][logstash.settings        ] Creating directory {:setting=>"path.queue", :path=>"/var/lib/logstash/queue
"}
[2025-11-04T21:36:19,626][INFO ][logstash.settings        ] Creating directory {:setting=>"path.dead_letter_queue", :path=>"/var/lib/lo
gstash/dead_letter_queue"}
[2025-11-04T21:36:22,392][INFO ][org.reflections.Reflections] Reflections took 121 ms to scan 1 urls, producing 119 keys and 419 values

Configuration OK
[2025-11-04T21:36:24,108][INFO ][logstash.runner          ] Using config.test_and_exit mode. Config Validation Result: OK. Exiting Logs
tash
```

v. Enable and Start Logstash

```
sudo systemctl start logstash
sudo systemctl enable logstash
```

vi. Verify Logstash Listening on Port 5044

```
sudo ss -tlnp | grep 5044
```

```
┌──(kali㉿kali)-[~]
└─$ sudo ss -tlnp | grep 5044
LISTEN 0      4096                *:5044            *:*    users:(("java",pid=98538,fd=131))
```

Practical No. 10

Objective: To install and configure GrayLog on Linux**.**

Procedure:

Step 1: **Update system**

```
sudo apt update && sudo apt upgrade -y
```

Step 2: **Install Java**

```
sudo apt install openjdk-21-jdk -y
```

Step 3: **Install, start & enable MongoDB**

```
sudo apt install -y mongodb
sudo systemctl enable mongodb
sudo systemctl start mongodb
```

Check whether mongodb is running: (should be active(running))

```
sudo systemctl status mongodb
```

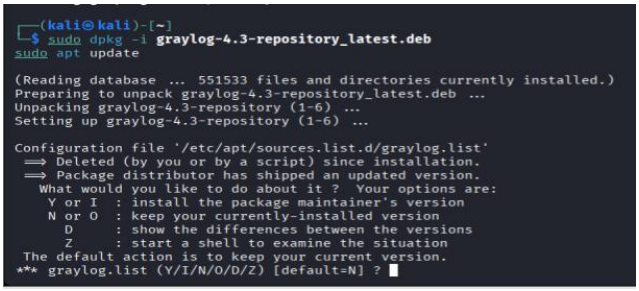
Step 4: **Verify whether elasticsearch is running**

Step 5: **Install Graylog**

```
wget https://packages.graylog2.org/repo/packages/graylog-4.3-repository_latest.deb
```

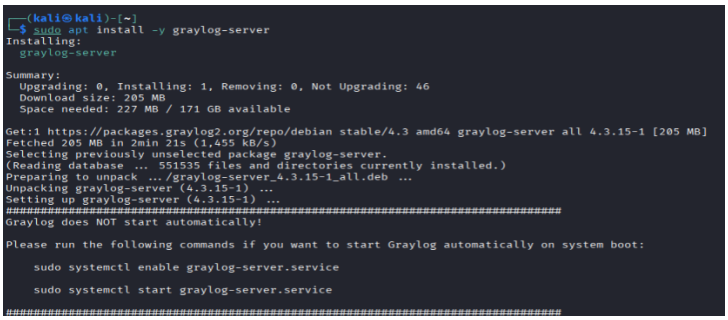
Install repo:

```
sudo dpkg -i graylog-4.3-repository_latest.deb
sudo apt update
```



Install graylog server:

```
sudo apt install graylog-server -y
```



Step 6: **Generate secrets and password**

Generate admin password hash

```
echo -n admin123 | sha256sum
```

The generated hash will be **root_password_sha2**

Generate password_secret:

```
sudo pwgen -N 1 -s 96
```

The generated hash will be **password_secret**

Copy both hashes and save in notepad

Output:

```
┌──(kali㉿kali)-[~]
└─$ echo -n admin123 | sha256sum
240be518fabd2724ddb6f04eeb1da5967448d7e831c08c8fa822809f74c720a9
┌──(kali㉿kali)-[~]
└─$ sudo pwgen -N 1 -s 96
uVShhuVXBjUjOu4wKvLZEzgSIBkxYFGN8EocOGTjm3aY0Yj05rRUmbjRJl578pPV0mmln7tsdsRqLgDTjdT9HPU34DrKH9h0
```

Step 1: Configure Graylog

sudo nano /etc/graylog/server/server.conf

Set the following according to the hashes generated in your terminal

```
password_secret =
uVShhuVXBjUjOu4wKvLZEzgSIBkxYFGN8EocOGTjm3aY0Yj05rRUmbjRJl578pPV0mmln7tsdsRqLgDTjdT9HPU34DrKH9h0

root_password_sha2 =
240be518fabd2724ddb6f04eeb1da5967448d7e831c08c8fa822809f74c720a9
```

Now Scroll down in the same nano window and set the http_bind_address to 127.0.0.1:9000

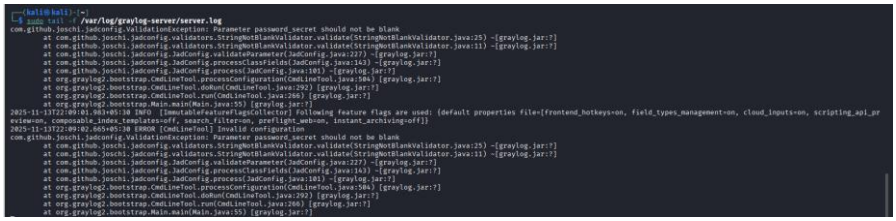
Ctrl + O → Enter →Ctrl + X

Step 2: Start and enable graylog server

```
sudo systemctl daemon-reload
sudo systemctl start graylog-server
sudo systemctl enable graylog-server
```

Step 3: Start Logging

```
sudo tail -n 50 /var/log/graylog-server/server.log
```



Step 10: **Open the link on firefox:**
https://127.0.0.1:9000
Enter username: admin
Password: admin123