SECURITY OPERATION CENTER

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PRACTICAL NO.01: ENCRYPTING AND DECRYPTING DATA USING OPENSSL.

Part 1: Encrypting Messages with OpenSSL
Part 2: Decrypting Messages with OpenSSL

Part 1: Encrypting Messages with OpenSSL
Before Start the installation you need to follow these instruction from CyberOps Workstation from this link:
https://contenthub.netacad.com/legacy/CyberOps/1.1/en/course/files/1.1.1.4%20Lab%20-%20Installing%20the%20CyberOps%20Workstation%20Virtual%20Machine.pdf

OpenSSL can be used as a standalone tool for encryption. While many encryption algorithms can be used, this lab focuses on AES. To use AES to encrypt a text file directly from the command line using OpenSSL,
1.Start the Security Workstation VM and log in with username
2.Open a terminal window.
3.Because the text file to be encrypted is in the /home/sec_admin/lab.support.files/directory, change to that directory:

Command:

[analyst@secOps ~]$ cd lab.support.files/

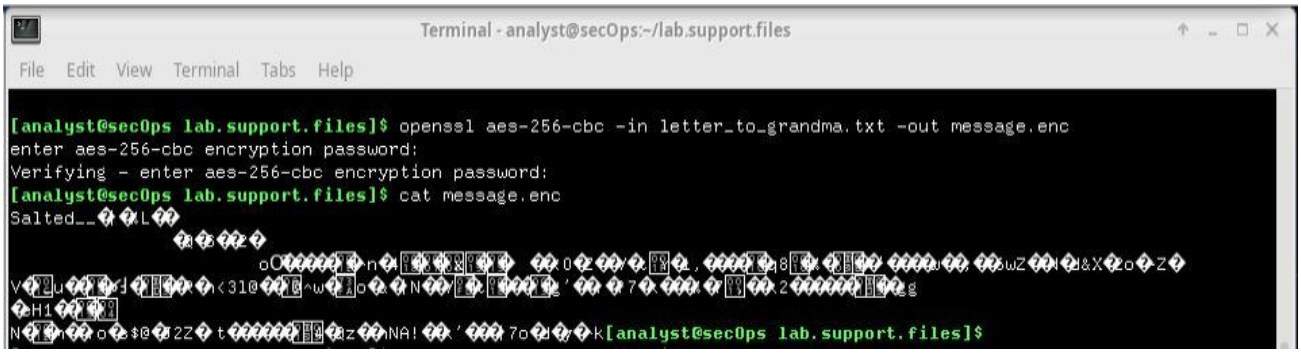
[analyst@secOps lab.support.files]$ ls
apache_in_epoch.log cyops.mn letter_to_grandma.txt openssl_lab sample.img_SHA256.sig
applicationX_in_epoch.log elk_services logstash-tutorial.log pcaps scripts
attack_scripts h2_dropbear.banner malware pox SQL_Lab.pcap
confidential.txt instructor mininet_services sample.img

[analyst@secOps lab.support.files]$ 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.

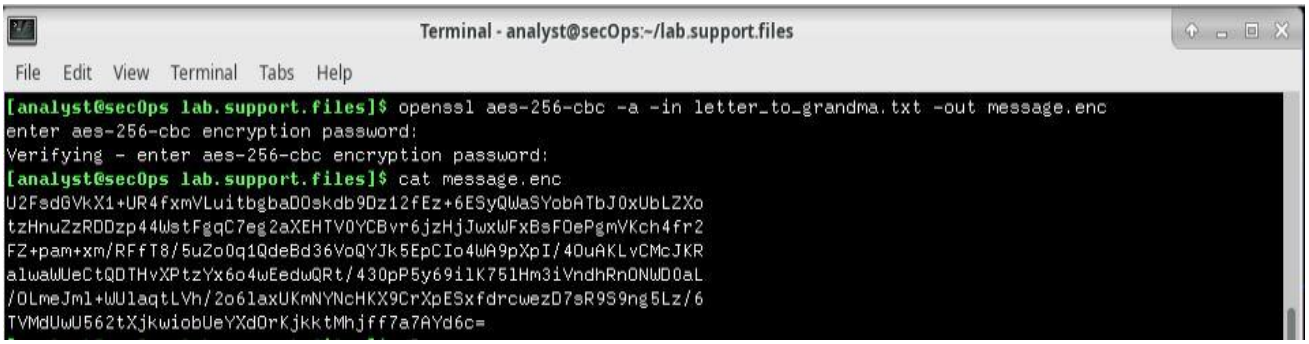
[analyst@secOps lab.support.files]$ openssl aes-256-cbc -in letter_to_grandma.txt -out message.enc
enter aes-256-cbc encryption password:
Verifying - enter aes-256-cbc encryption password:

[analyst@secOps lab.support.files]$ cat message.enc



[analyst@secOps lab.support.files]$ openssl aes-256-cbc -a -in letter_to_grandma.txt -out message.enc
enter aes-256-cbc encryption password:
Verifying - enter aes-256-cbc encryption password:

[analyst@secOps lab.support.files]$ cat message.enc

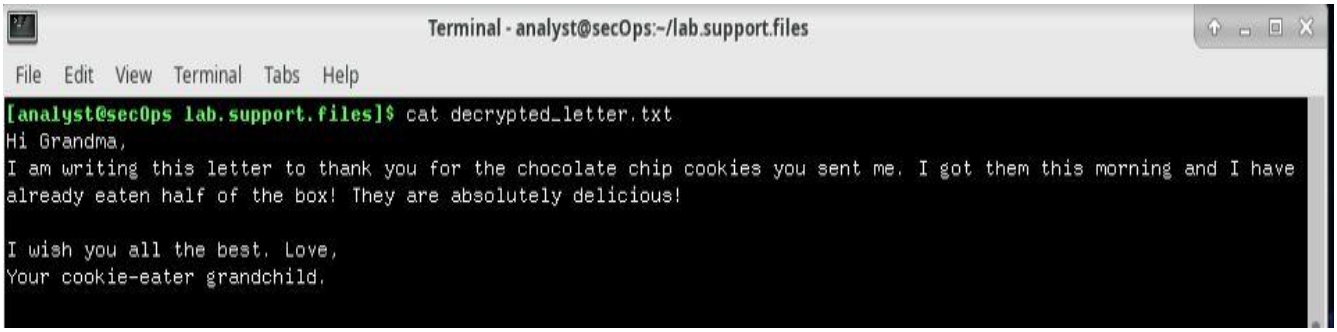


Part 2: Decrypting Messages with OpenSSL

[analyst@secOps lab.support.files]$ openssl aes-256-cbc -a -d -in message.enc -out decrypted_letter.txt
enter aes-256-cbc decryption password:

When OpenSSL finishes decrypting the message.enc file, it saves the decrypted message in a text file called decrypted_letter.txt. Use the cat display the contents of decrypted_letter.txt

[analyst@secOps lab.support.files]$ cat decrypted_letter.txt



PRACTICAL NO.02: SNORT AND FIREWALL RULES

Part 1: Preparing the Virtual Environment
Part 2: Firewall and IDS Logs

Part 1: Preparing the Virtual Environment

Launch Oracle VirtualBox and change the CyberOps Workstation for Bridged mode. Launch the CyberOps Workstation VM, open a terminal and configure its network by executing the configure_as_dhcp.sh script.

Command:

[analyst@secOps ~]$ sudo ./lab.support.files/scripts/configure_as_dhcp.sh
[sudo] password for analyst:
Configuring the NIC to request IP info via DHCP...
Requesting IP information...
IP Configuration successful.

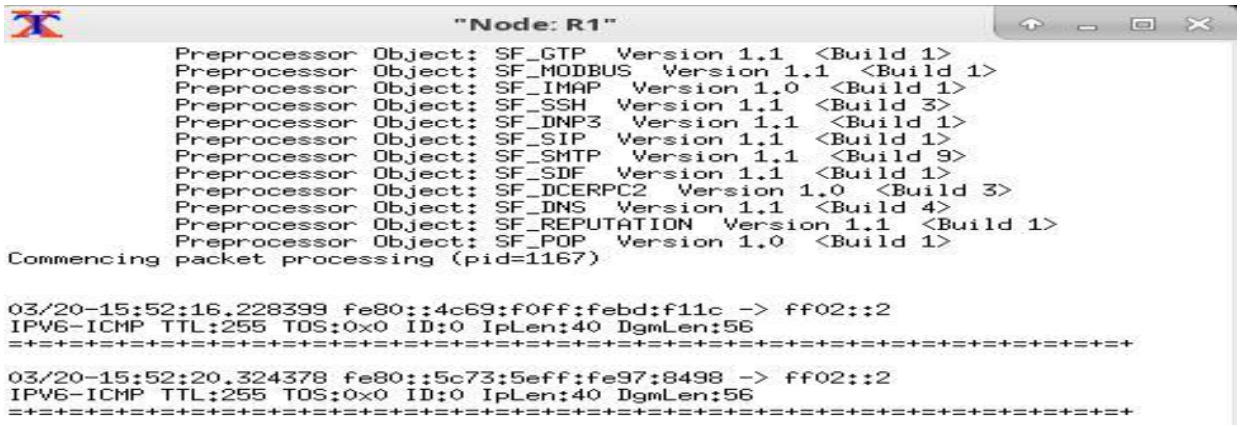
Part 2: Firewall and IDS Logs

1.Real-Time IDS Log Monitoring

From the CyberOps Workstation VM, run the script to start mininet.

[analyst@secOps ~]$ sudo ./lab.support.files/scripts/cyberops_extended_topo_no_fw.py
*** Adding controller
*** Add switches
*** Add hosts
*** Add links
*** Starting network
*** Configuring hosts
R1 R4 H1 H2 H3 H4 H5 H6 H7 H8 H9 H10 H11
*** Starting controllers
*** Starting switches
*** Add routes
*** Post configure switches and hosts
*** Starting CLI:
mininet>

From R1's shell, start the Linux-based IDS, Snort.

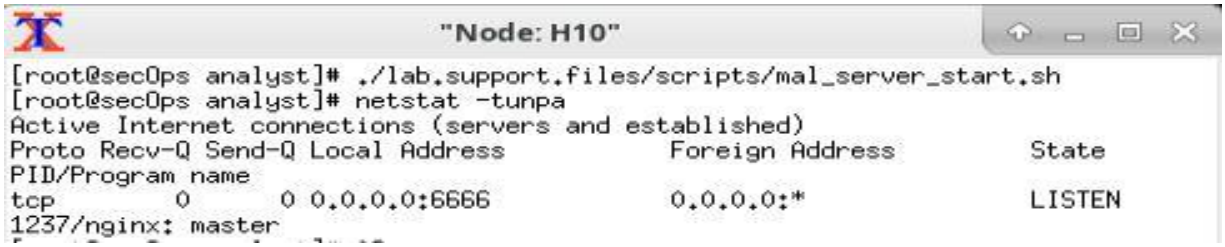


Note: You will not see a prompt as Snort is now running in this window. If for any reason, Snort stops running and the [root@secOps analysts]# prompt is displayed, rerun the script to launch Snort. Snort must be running to capture alerts later in the lab.

From the CyberOps Workstation VM mininet prompt, open shells for hosts H5 and H10.

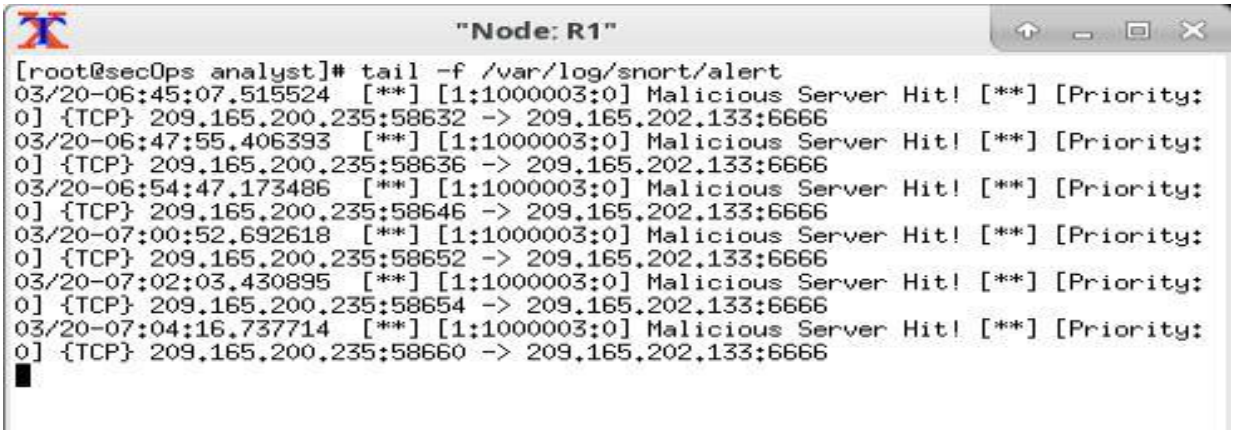
mininet> xterm H5
mininet> xterm H10

H10 will simulate a server on the Internet that is hosting malware. On H10, run the mal_server_start.sh script to start the server.



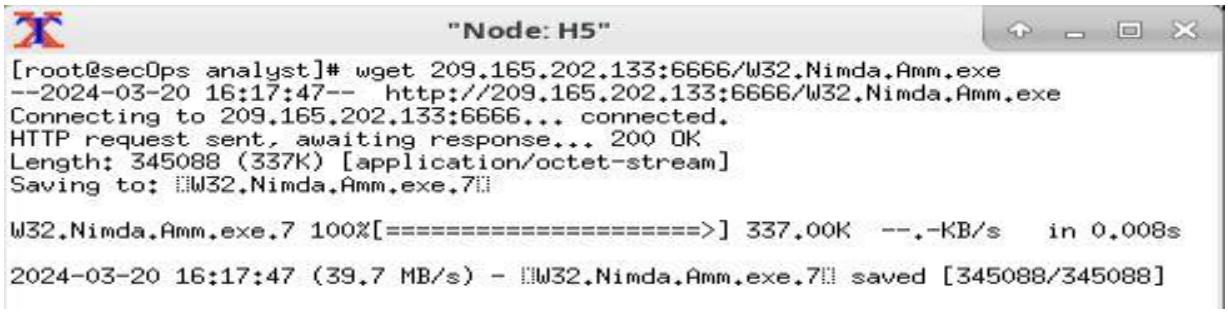
The lightweight webserver *nginx* is running and listening to connections on port *TCP 6666*.

In the new R1 terminal tab, run the tail command with the - f option to monitor the /var/log/snort/alert file in real - time. This file is where snort is con figured to record alerts.

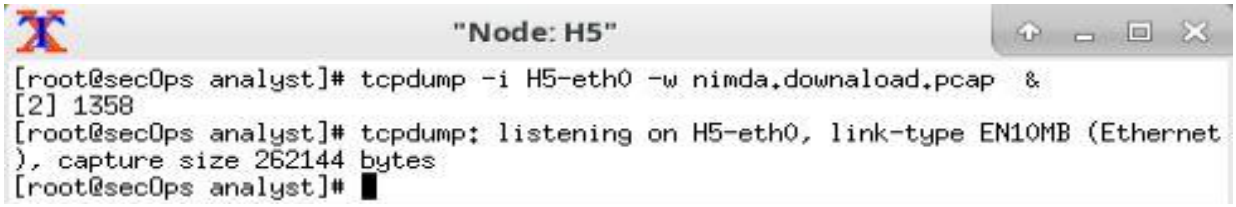


In above image, snort is running with the help of these command tail -f /var/log/snort/alert
It shows alert entries shown with timestamp, IP address, pointer and port number.

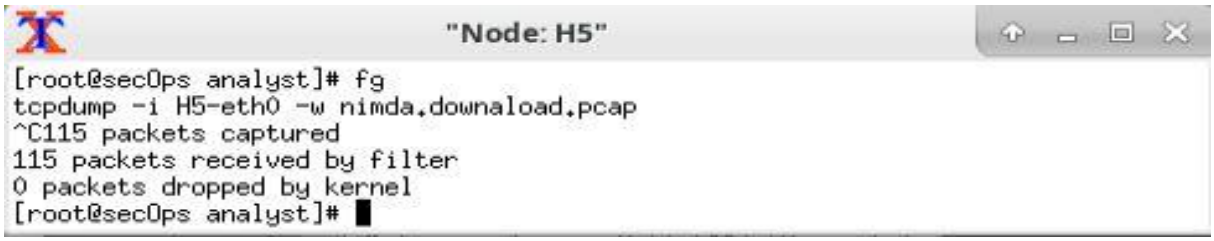
From H5, use the wget command to download a file named W32.Nimda.Amm.exe. Designed to download content via HTTP, wget is a great tool for downloading files from web servers directly from the command line.



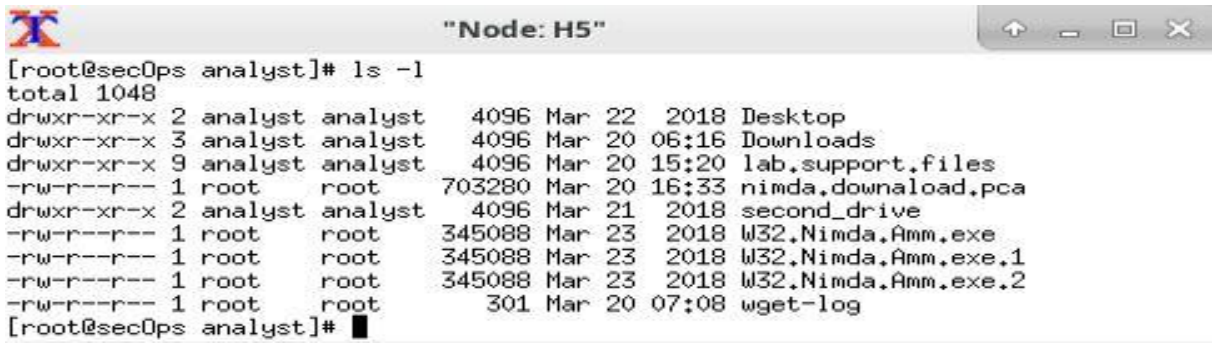
On H5, use the tcpdump command to capture the event and download the malware file again so you can capture the transaction. Issue the following command below start the packet capture:



Stop the capture by bringing tcpdump to foreground with the fg command. Because tcpdump was the only process sent to background, there i s no need to specify the PID . Stop the tcpdump process with Ctrl+C . The tcpdump process stops and displays a summary of the capture. The number of packets may be different for your capture.



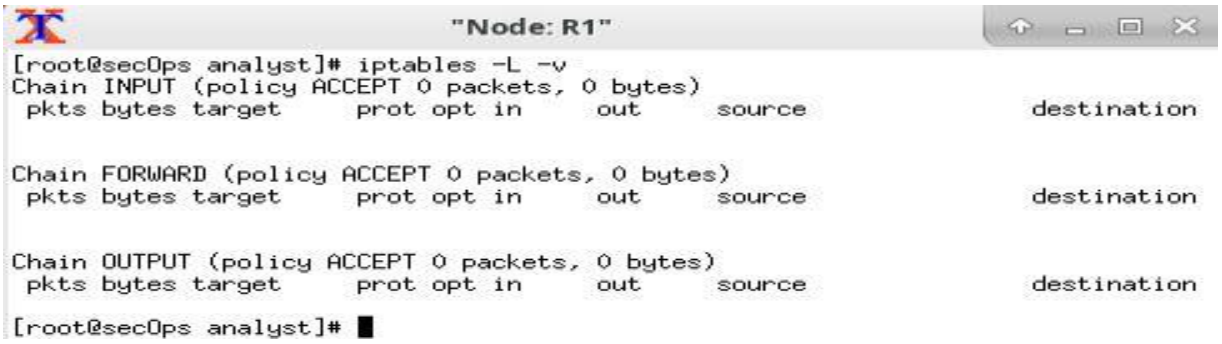
On H5, Use the ls command to verify the pcap file was in fact saved to disk and has size greater than zero:



2. Tuning Firewall Rules Based on IDS Alerts

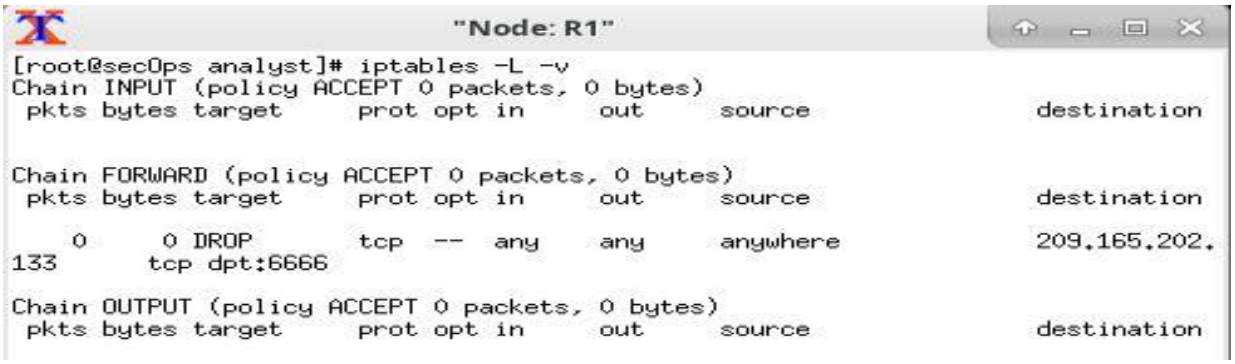
mininet> xterm R1

In the new R1 terminal window, use the iptables command to list the chains and their rules currently in use:



Connections to the malici ous server generate packets that must transverse the iptables firewall on R1. Packets traversing the firewall are handled by the FORWARD rule and therefore, that is the chain that will receive the blocking rule. To keep user computers from connecting to th e malicious server identified in Step 1, add the following rule to the FORWARD chain on R1:

Use the iptables command again to ensure the rule was added to the FORWARD chain. The CyberOps Workstation VM may take a few seconds to generate the output:



On H5, try to download the file again:

PRACTICAL NO.03: DEMONSTRATE EXTRACT AN EXECUTABLE FROM A PCAP

Part 1: Analyze Pre-Captured Logs and Traffic Captures
Part 2: Extract Downloaded Files from PCAP

Part 1: Analyze Pre-Captured Logs and Traffic Captures.

Change directory to the support.files/pcaps folder, and get a listing of files using the ls –l command.

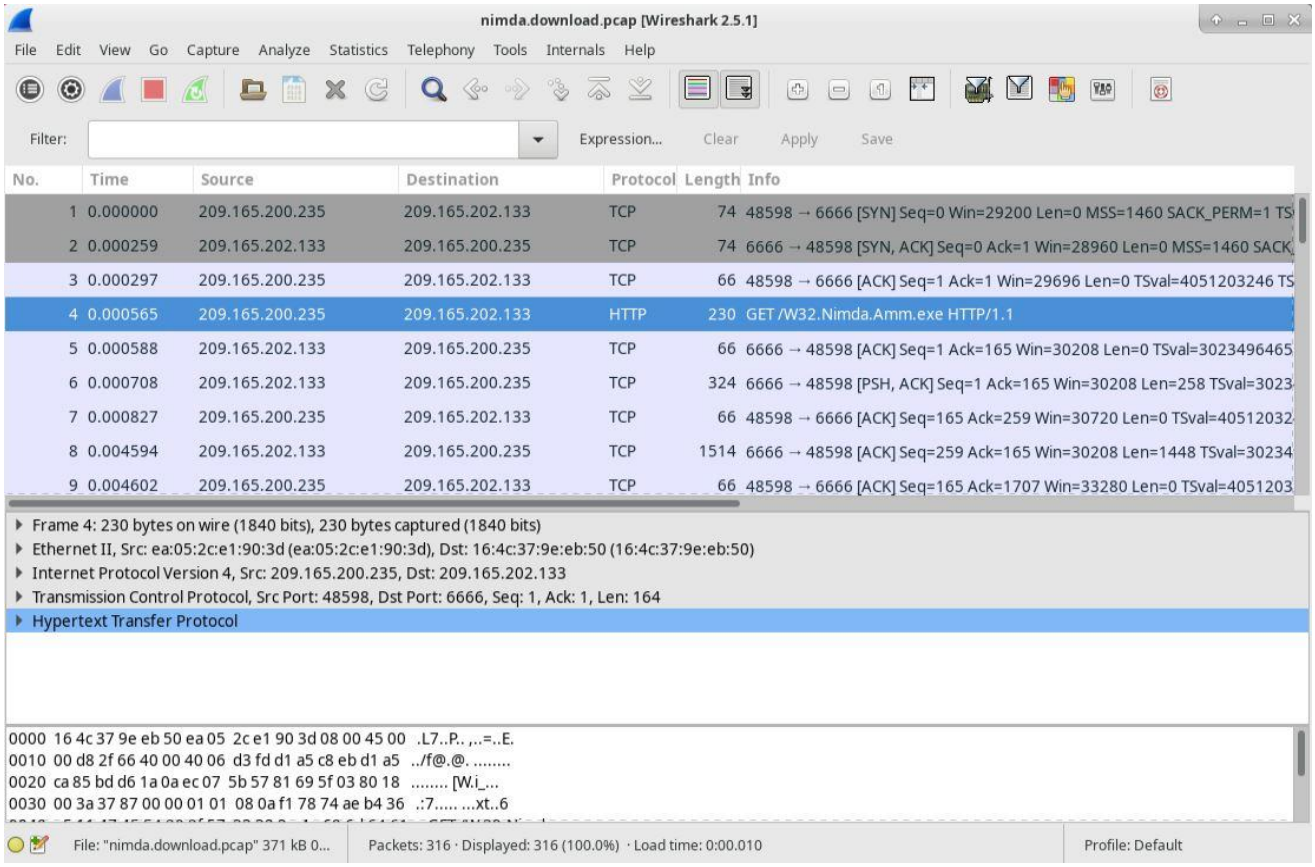
Command:

[analyst@secOps ~]$ cd lab.support.files/pcaps/

[analyst@secOps pcaps]$ ls -l
total 4028
-rw-r--r-- 1 analyst analyst 371462 Mar 21 2018 nimda.download.pcap
-rw-r--r-- 1 analyst analyst 3750153 Mar 21 2018 wannacry_download_pcap.pcap

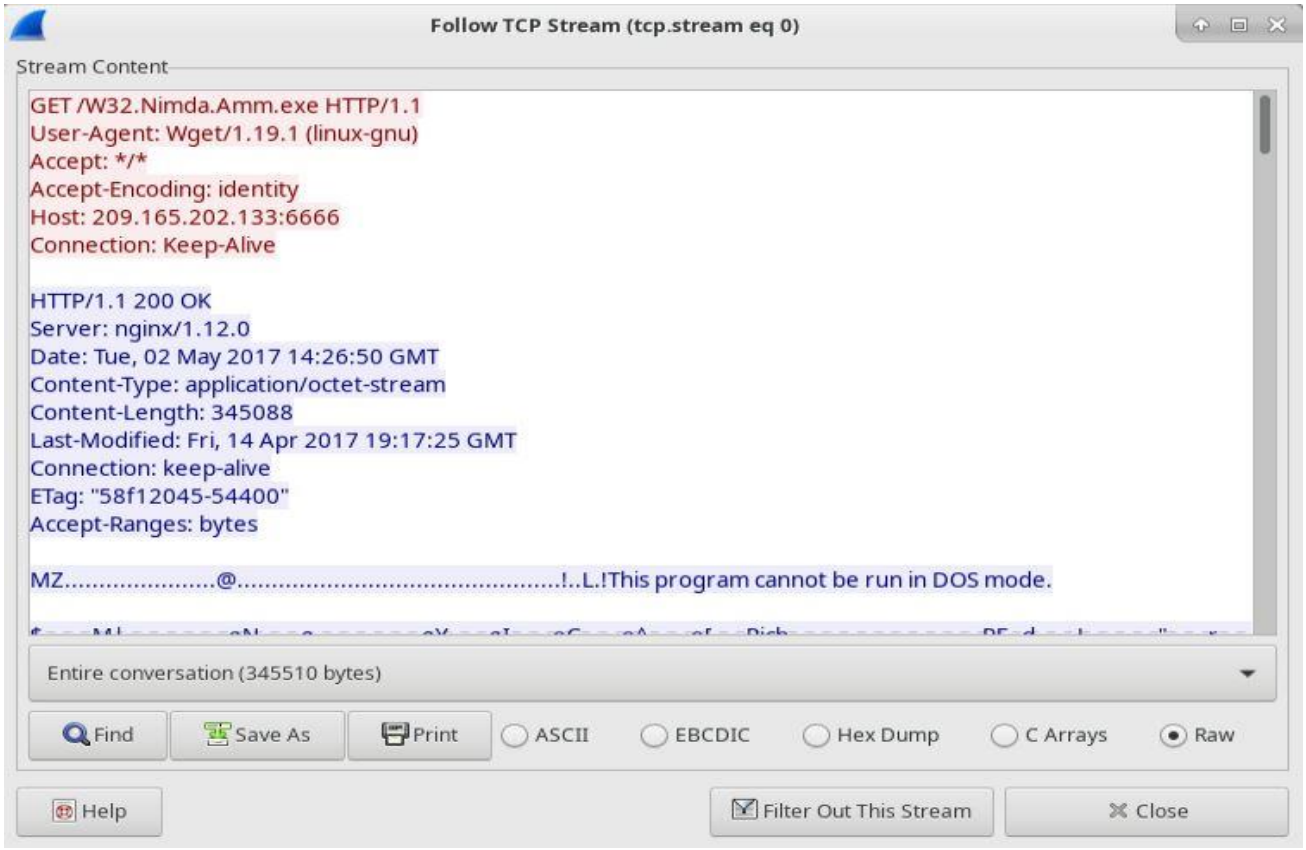
Issue the command below to open the download.pcap file in Wireshark.

[analyst@secOps pcaps]$ wireshark-gtk nimda.download.pcap



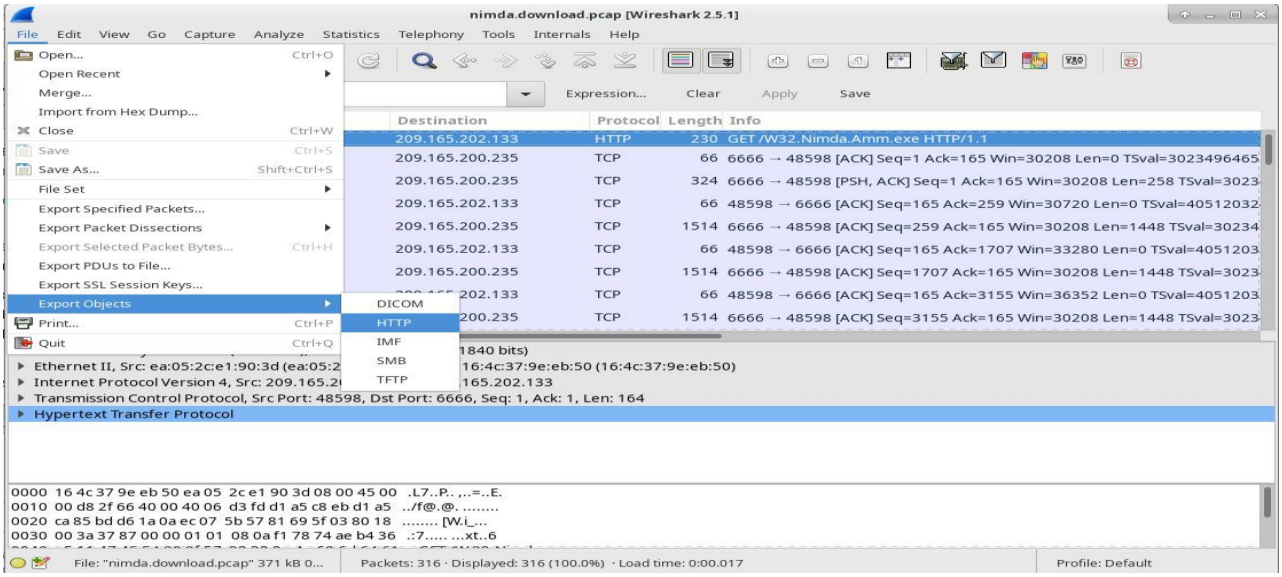
Select the fourth packet in the capture and expand the Hypertext Transfer Protocol to display as shown below.

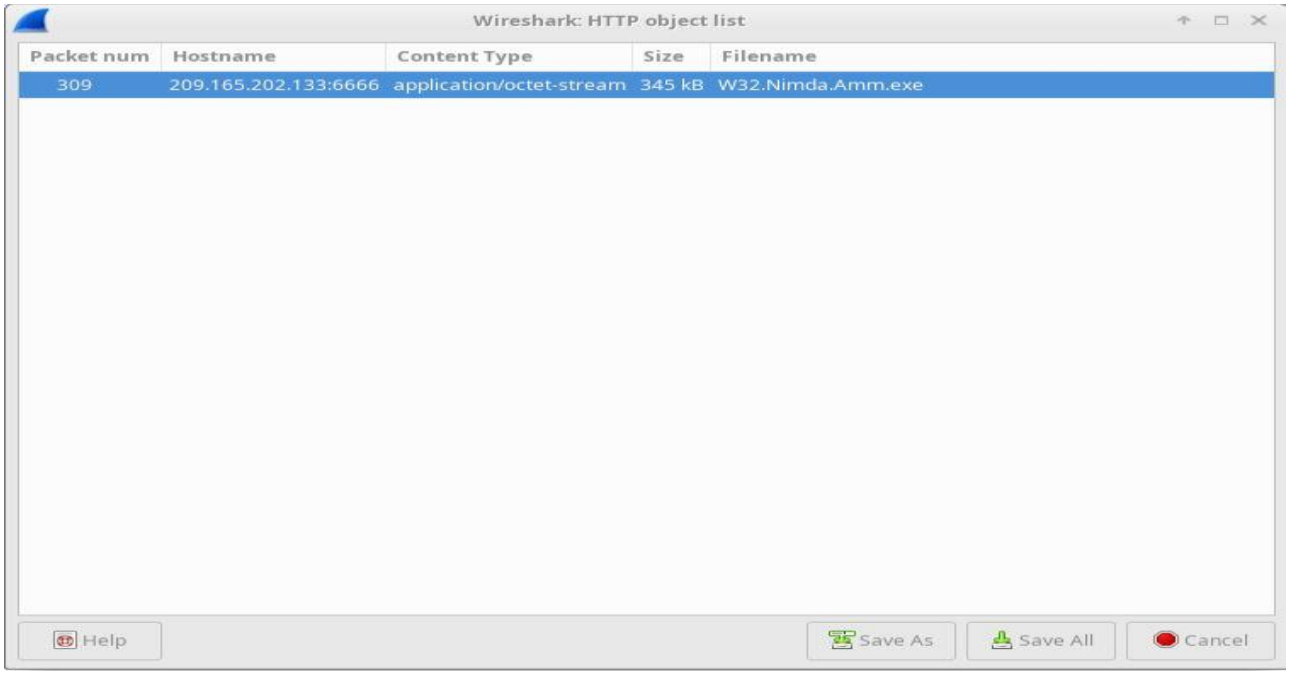
Because HTTP runs over TCP, it is possible to use Wireshark's Follow TCP Stream feature to rebuild the TCP transaction. Select the first TCP packet in the capture, a SYN packet. Right-click it and choose TCP Stream.



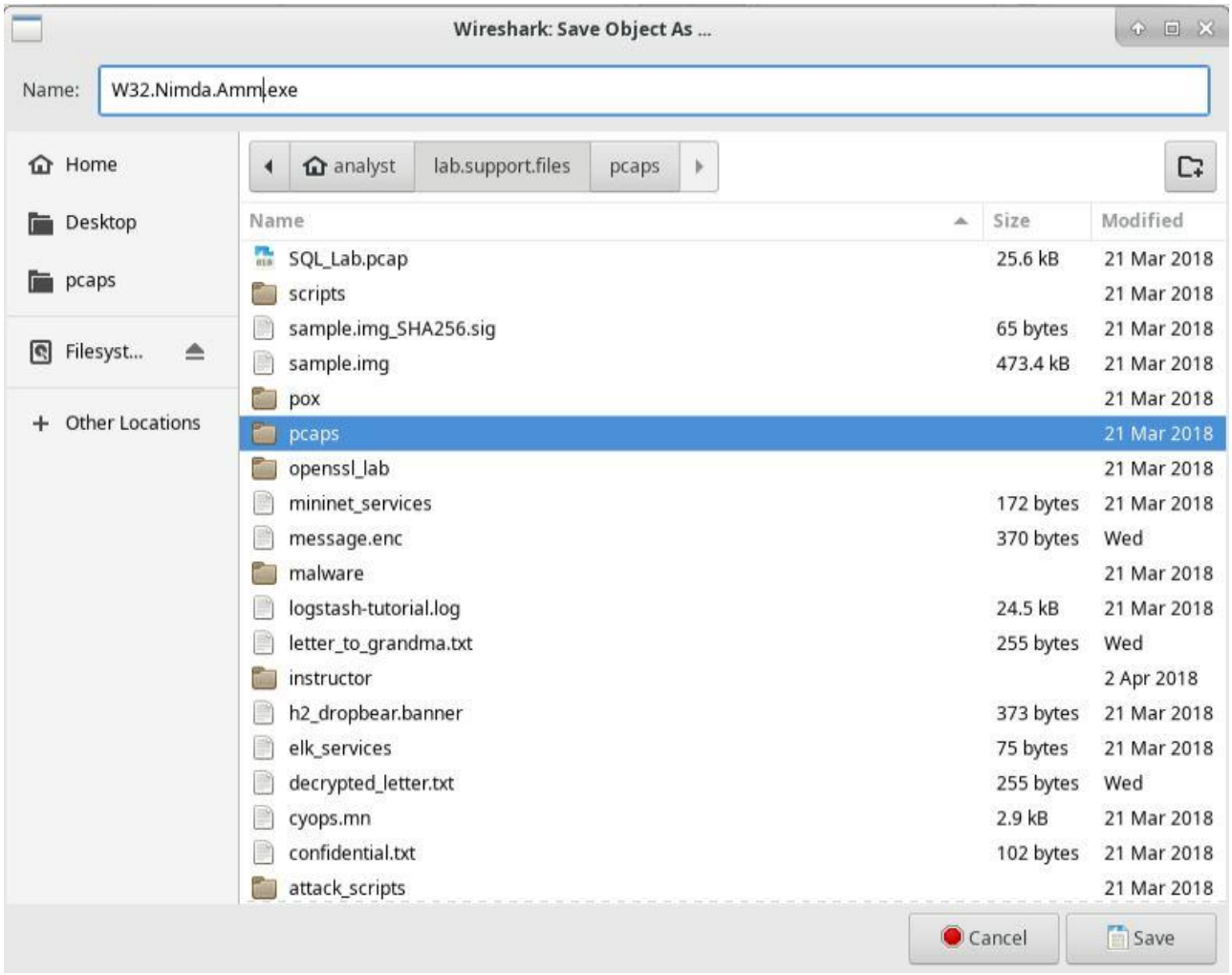
Part 2: Extract Downloaded Files from PCAP

In that fourth packet in the 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.

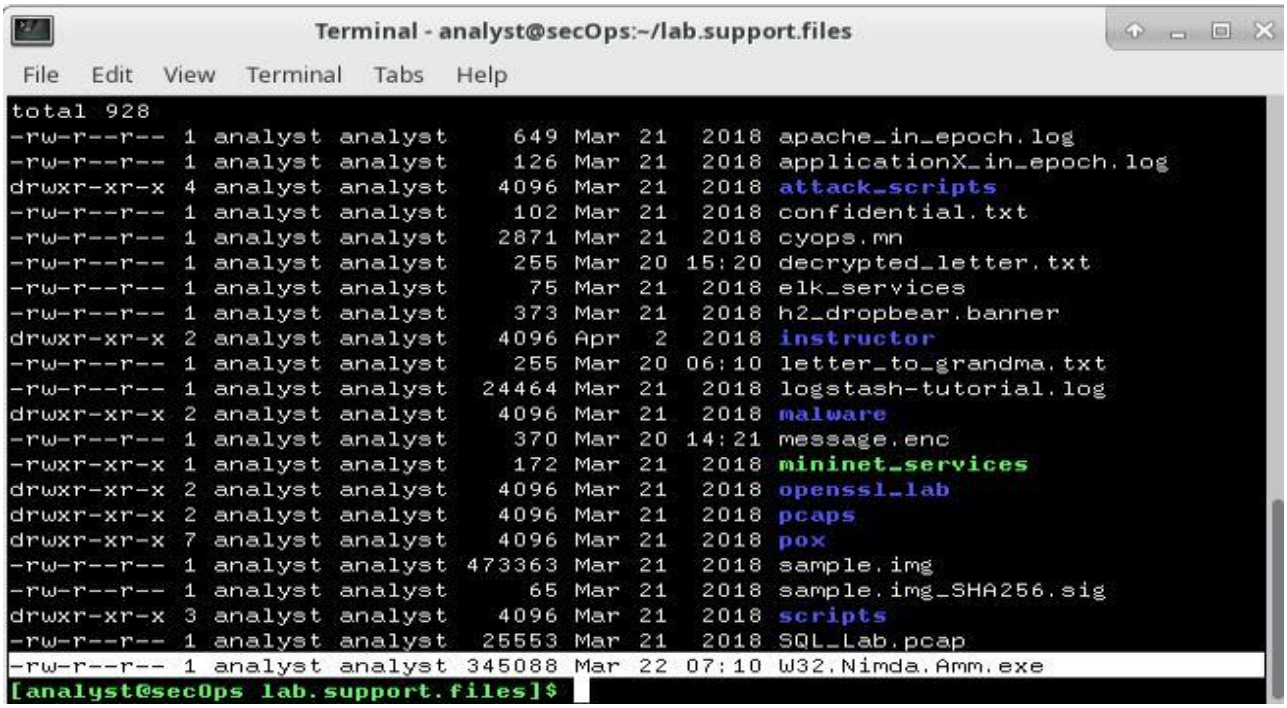




In the **HTTP object list** window, select the **Nimda.Amm.exe** file and click **Save As** at the bottom of the screen.



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 -l.

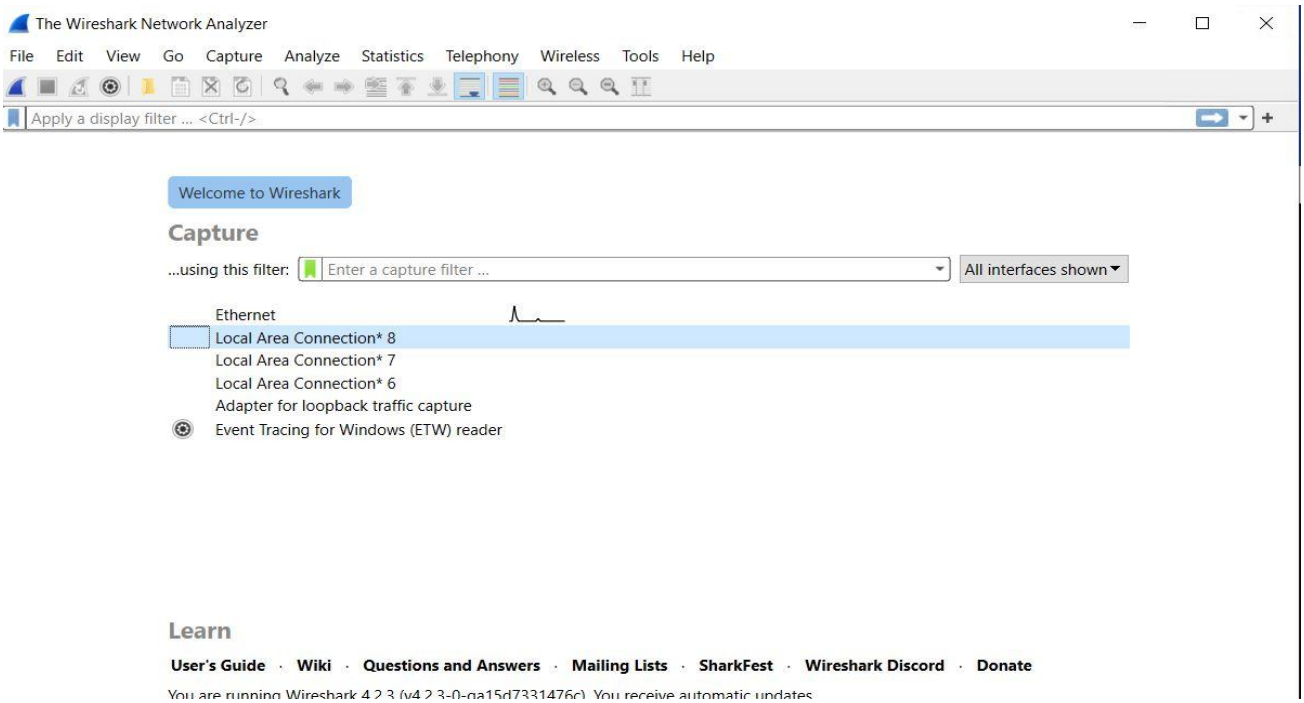


PRACTICAL NO.04: DEMONSTRATE ANALYSIS OF DNS TRAFFIC

Part 1: Capture DNS Traffic
Part 2: Explore DNS Query Traffic
Part 3: Explore DNS Response Traffic

Part 1: Capture DNS Traffic

Step 1: Download and install Wireshark.
Step 2: Capture DNS traffic.



Start Wireshark. Select an active interface with traffic for packet capture. In Windows, enter ipconfig /flushdns in Command Prompt.

Command:

C:\Users\WDAGUtilityAccount>ipconfig/flushdns

Windows IP Configuration
Successfully flushed the DNS Resolver Cache.

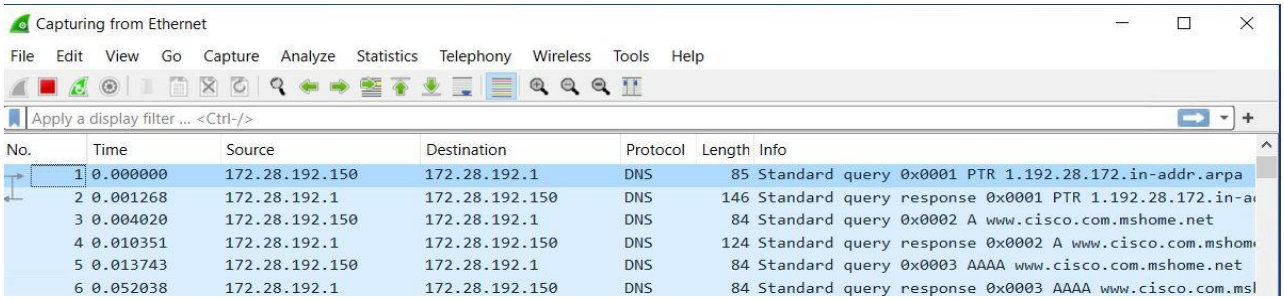
At a command prompt or terminal, type nslookup enter the interactive mode, the domain name is www.cisco.com type exit when finished. Close the command prompt.

C:\Users\WDAGUtilityAccount>nslookup www.cisco.com
Server: Home-Laptop.mshome.net
Address: 172.28.192.1

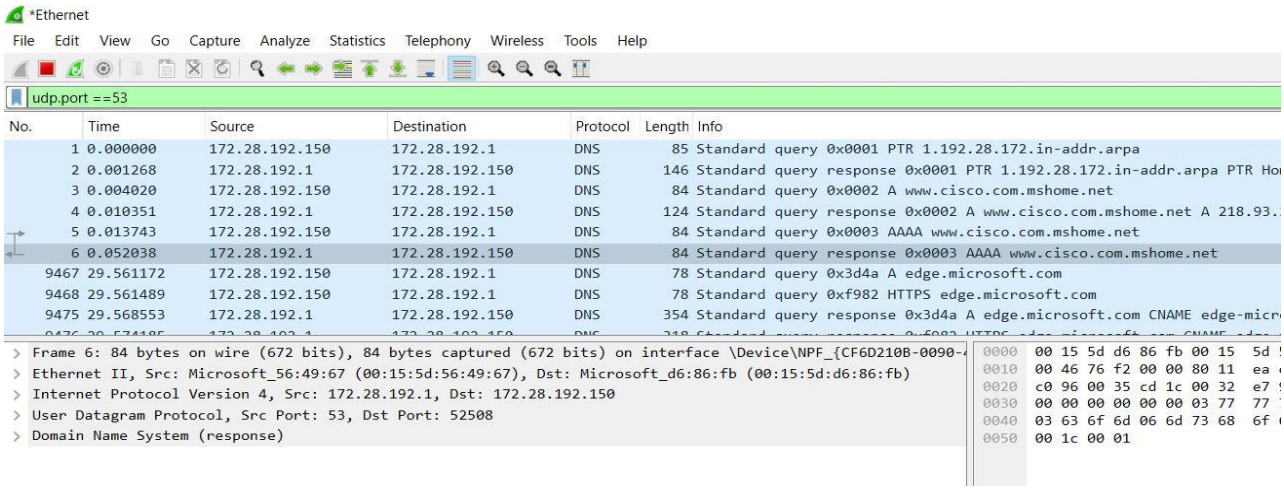
Non-authoritative answer:
Name: www.cisco.com.mshome.net
Address: 218.93.250.18

Part 2: Explore DNS Query Traffic

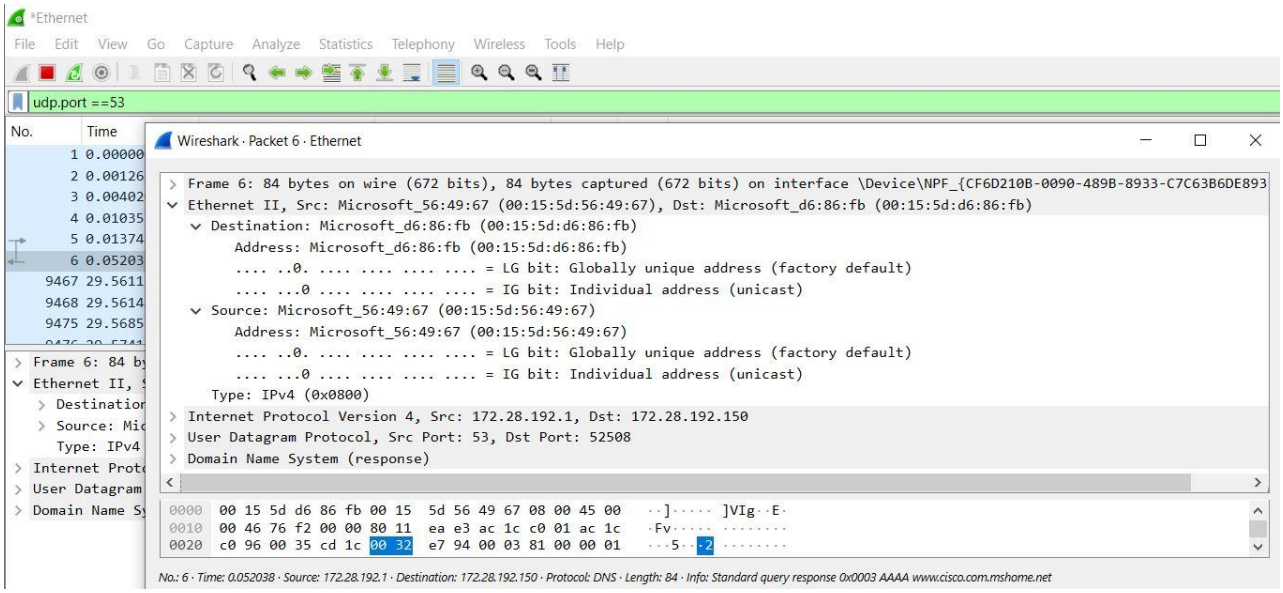
Observe the traffic captured in the Wireshark Packet List pane. Enter udp.port == 53 in the filter box and click the arrow (or press enter) to display only DNS packets.



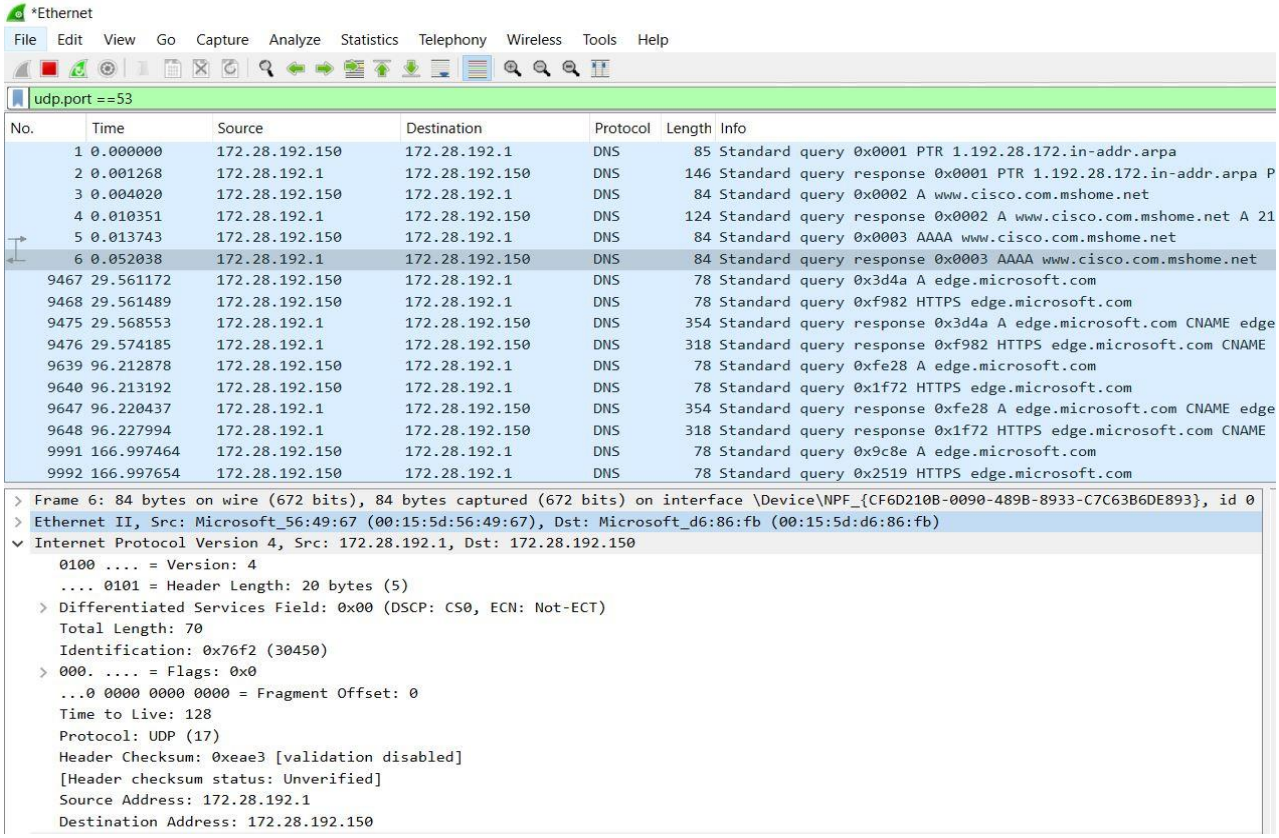
Select the DNS packet contains Standard query and A www.cisco.com in the Info column.



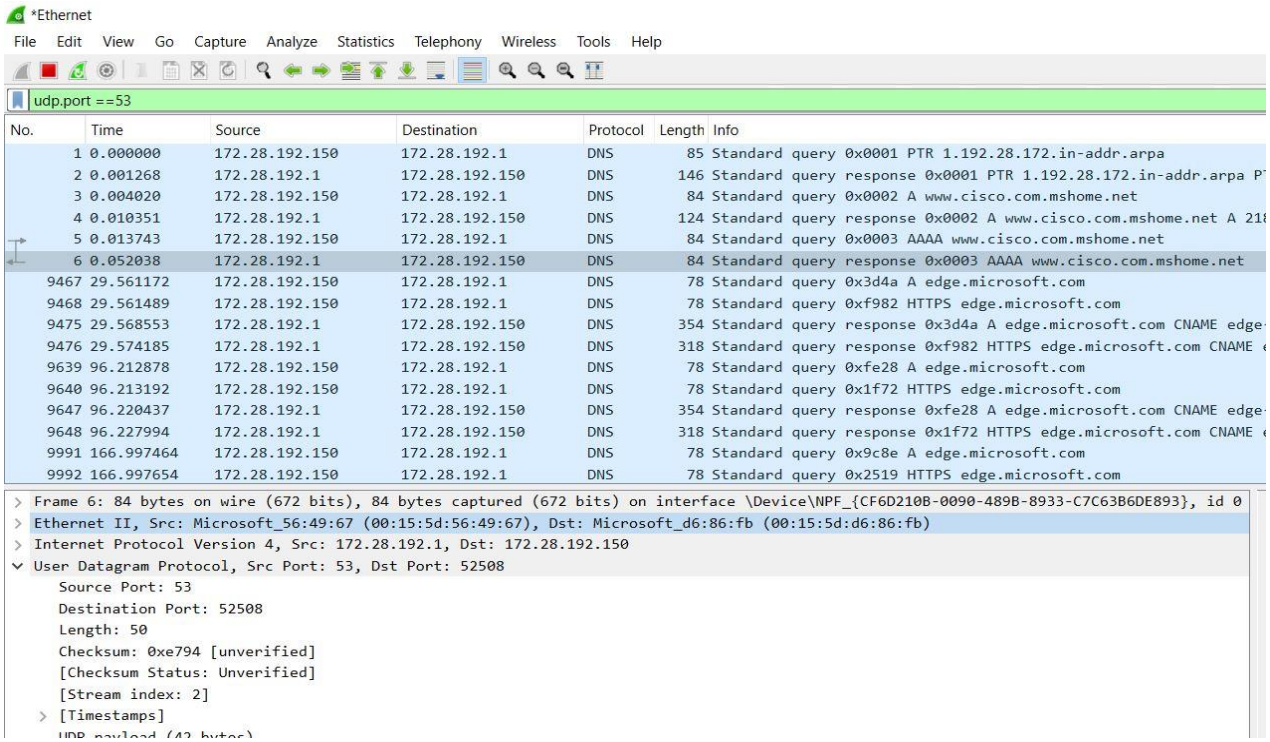
Expand Ethernet II to view the details



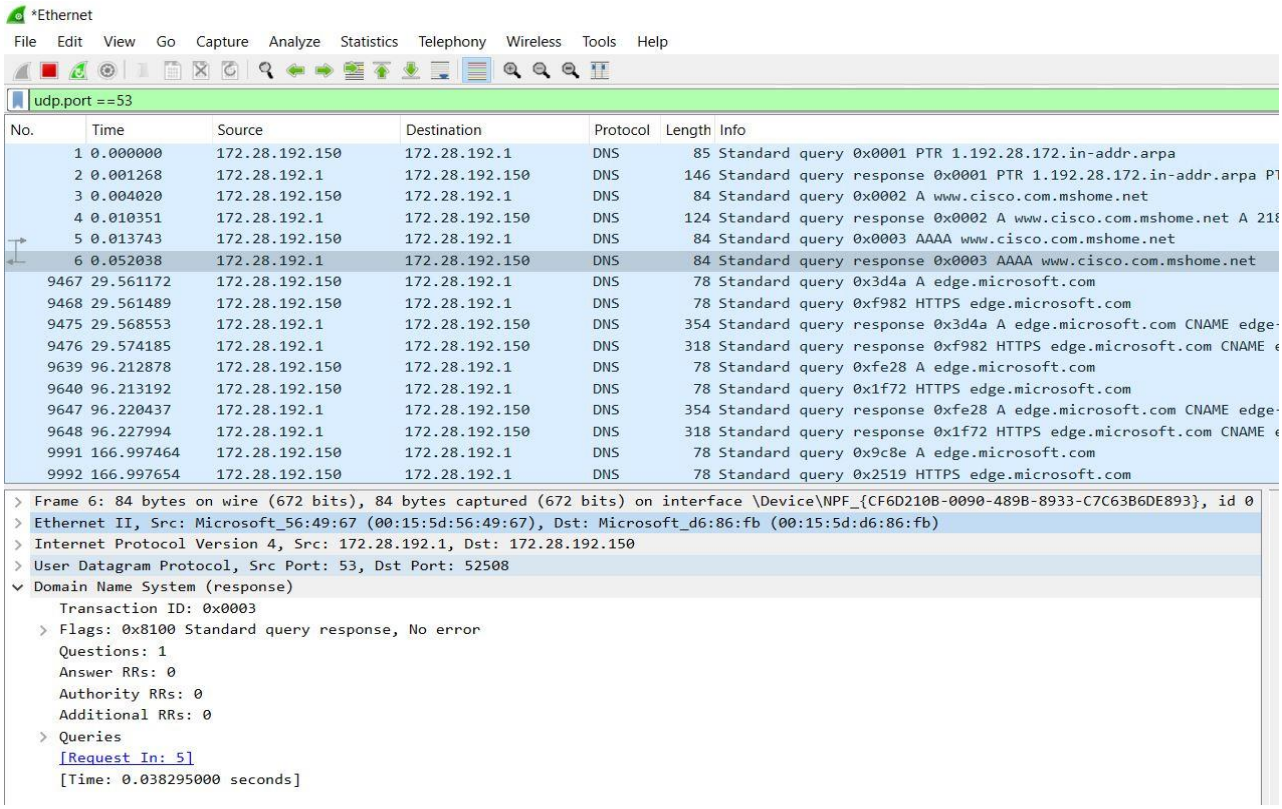
Expand Internet Protocol Version 4.



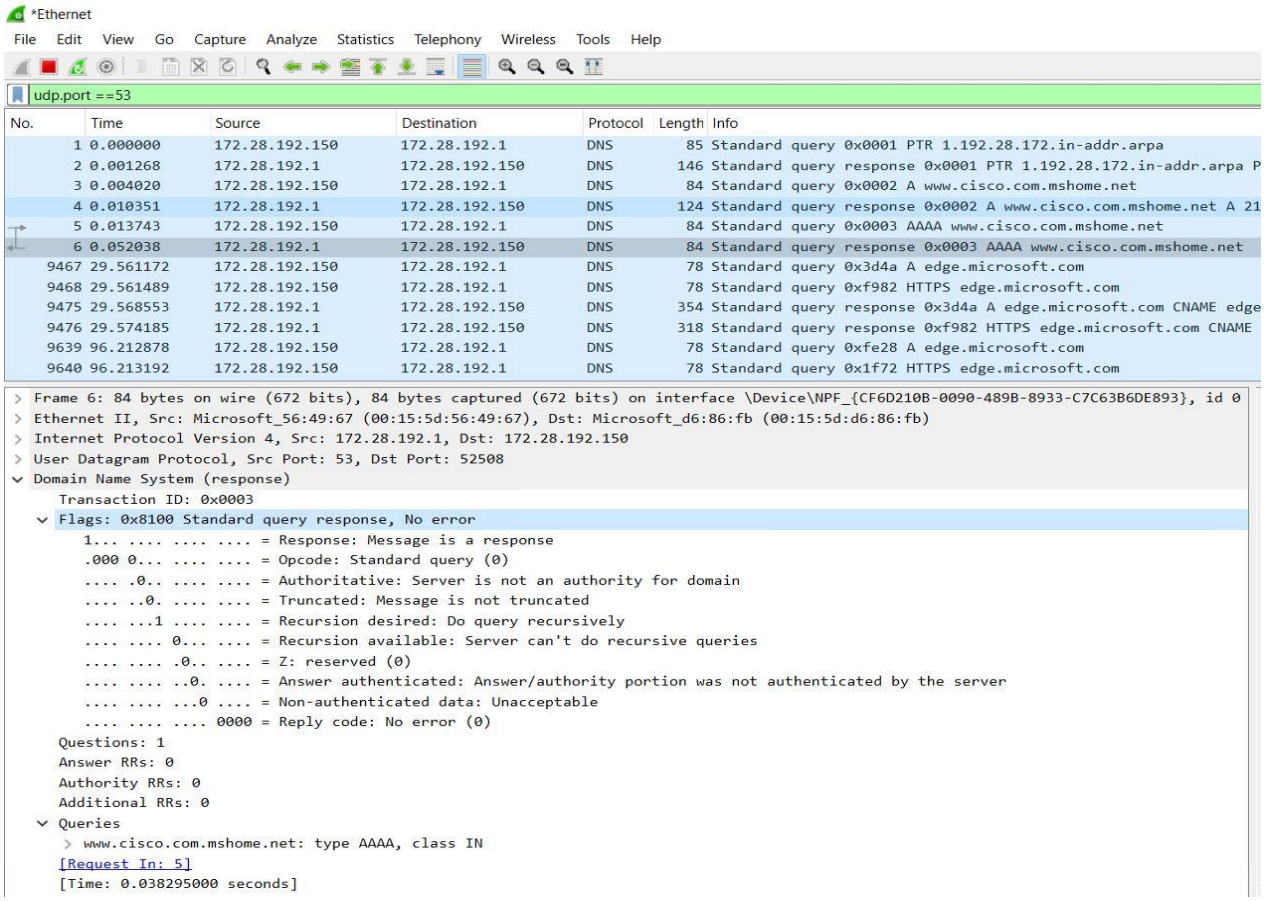
Expand the User Datagram Protocol.



Expand Domain Name System (query) in the Packet Details pane.



Part 3: Explore DNS Response Traffic



PRACTICAL NO.05: CREATE YOUR OWN SYSLOG SERVER

How to configure a Syslog Server:

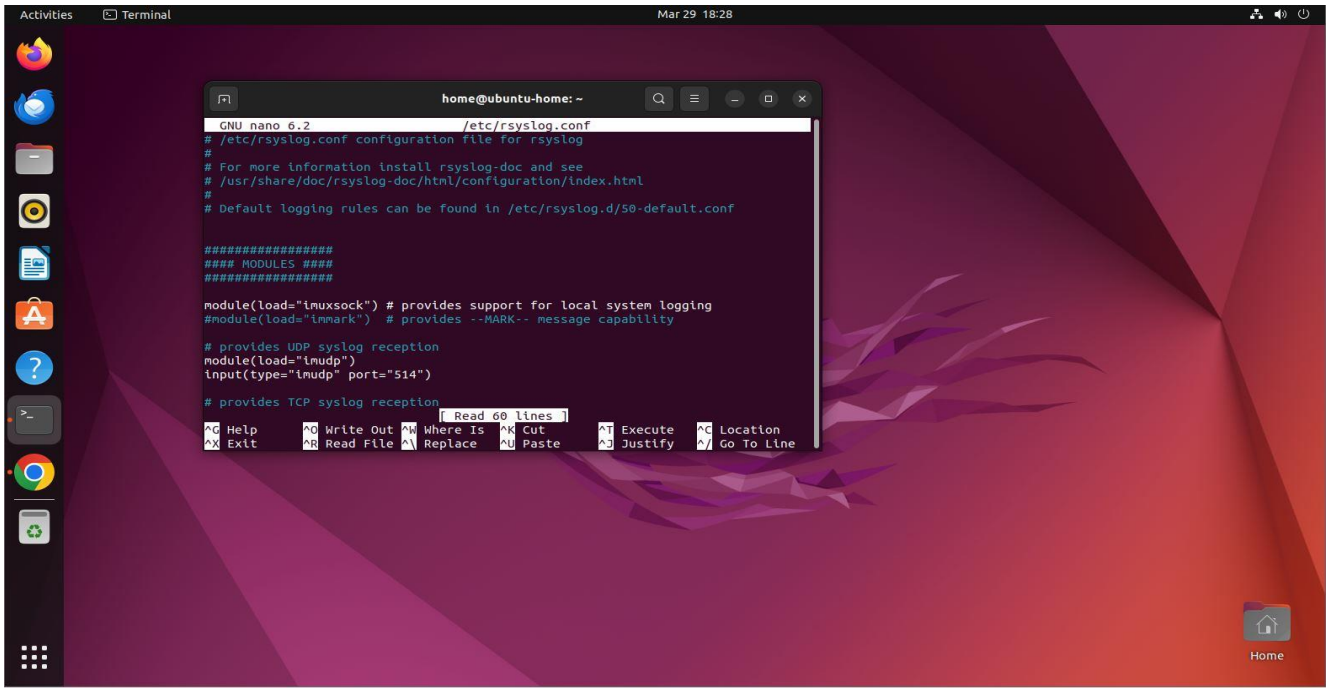
The first step to creating this logging solution is to login to the Linux host you would like to be the Syslog Server. This is where the log files will be stored.

As always, we will open a terminal and update our system.

home@ubuntu-home:~$ sudo apt-get update && sudo apt-get update

Once your machine is finished updating, we need to edit the rsyslog.conf file. This can be done by entering the command:

home@ubuntu-home:~$ sudo nano /etc/rsyslog.conf

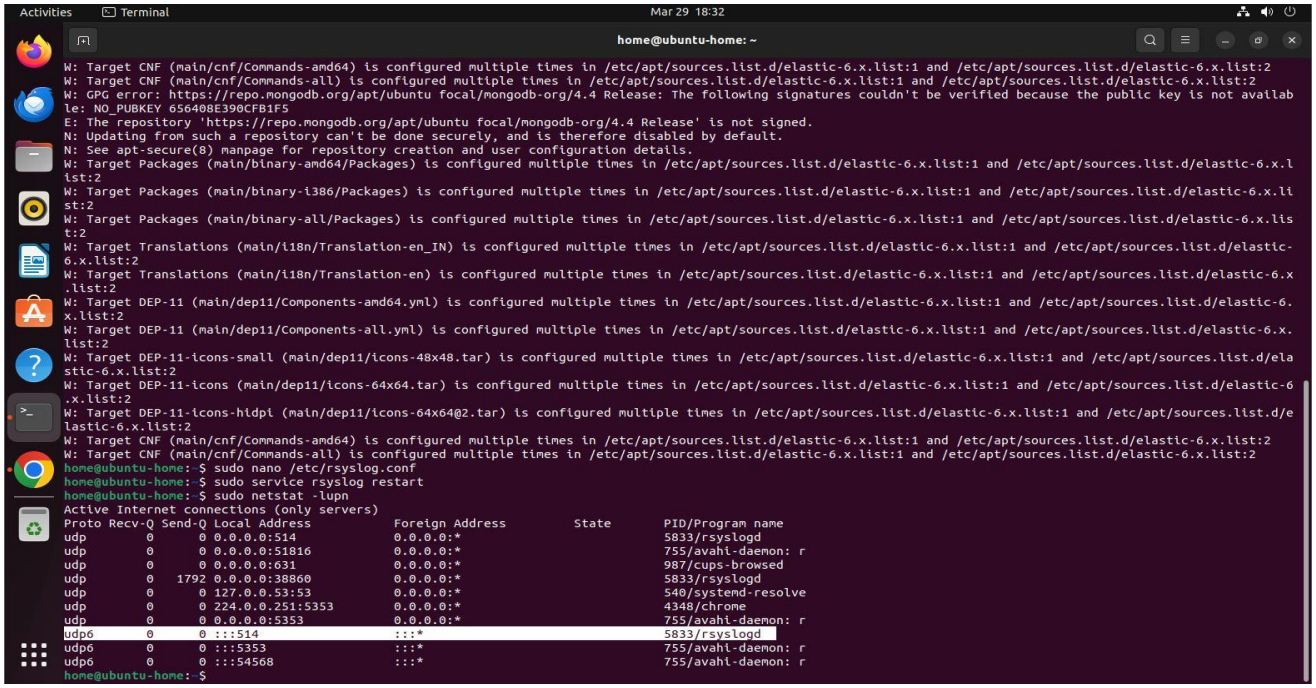


Once we have made these changes, go ahead and exit and save the file by pressing. Next, we need to start the rsyslog service, so it is aware of our new configuration. We will do this by entering the following command:

home@ubuntu-home:~$ sudo service rsyslog restart

What we have just done there is, allowed our Linux host to listen on UDP port 514. You can change the port number if you would like, but I will stick with the default Syslog port. The final step we need to take on the server side, is to confirm that our server is in fact listening on port 514.

home@ubuntu-home:~$ sudo netstat -lupn



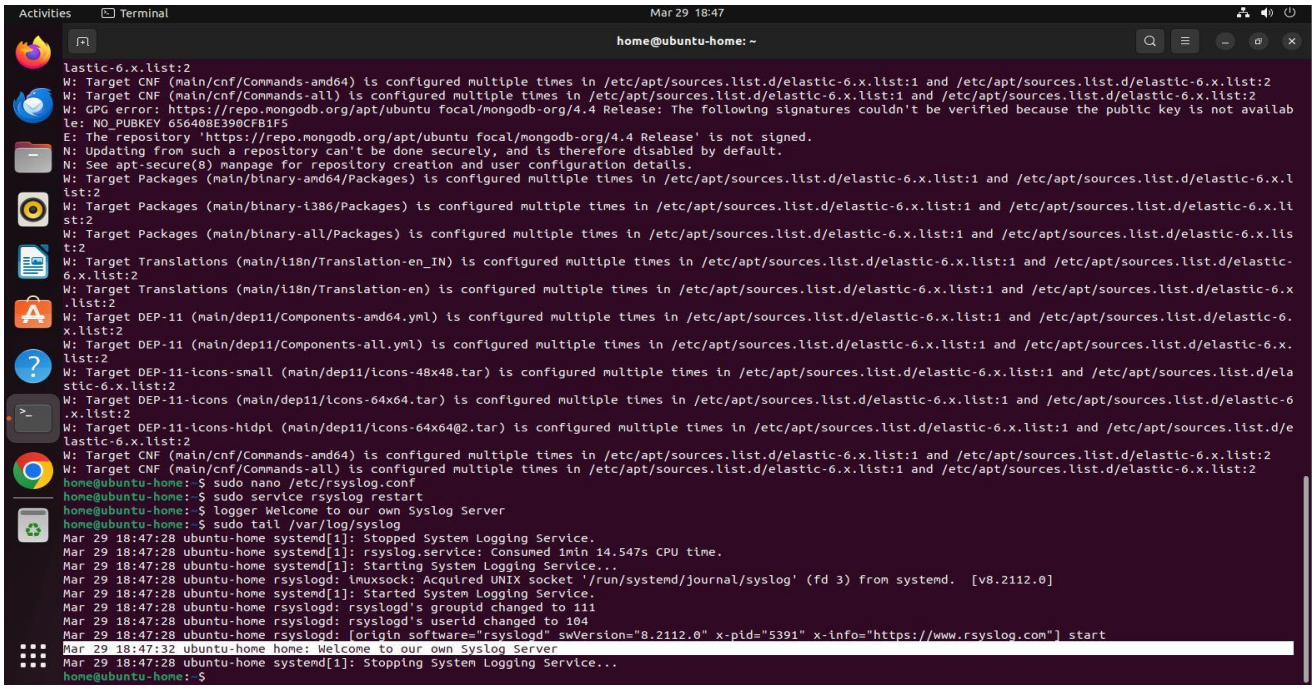
We can see that we are listening on port 514.

We can check the log whether it is creating the log message.

home@ubuntu-home:~$ logger Welcome to our own Syslog Server

We can check our logs on the Syslog Server with the command:

home@ubuntu-home:~$ sudo tail /var/log/syslog



PRACTICAL NO.06: CONFIGURE YOUR LINUX SYSTEM TO SEND SYSLOG MESSAGES TO A SYSLOG SERVER AND READ THEM

Prerequisites:

1.A Linux host (Ubuntu Server)

2.Another Linux Host (Syslog Client)

We will perform these two processes

1.How to configure a Syslog Server.

2.How to configure a Linux Host to forward logs to the Syslog Server.

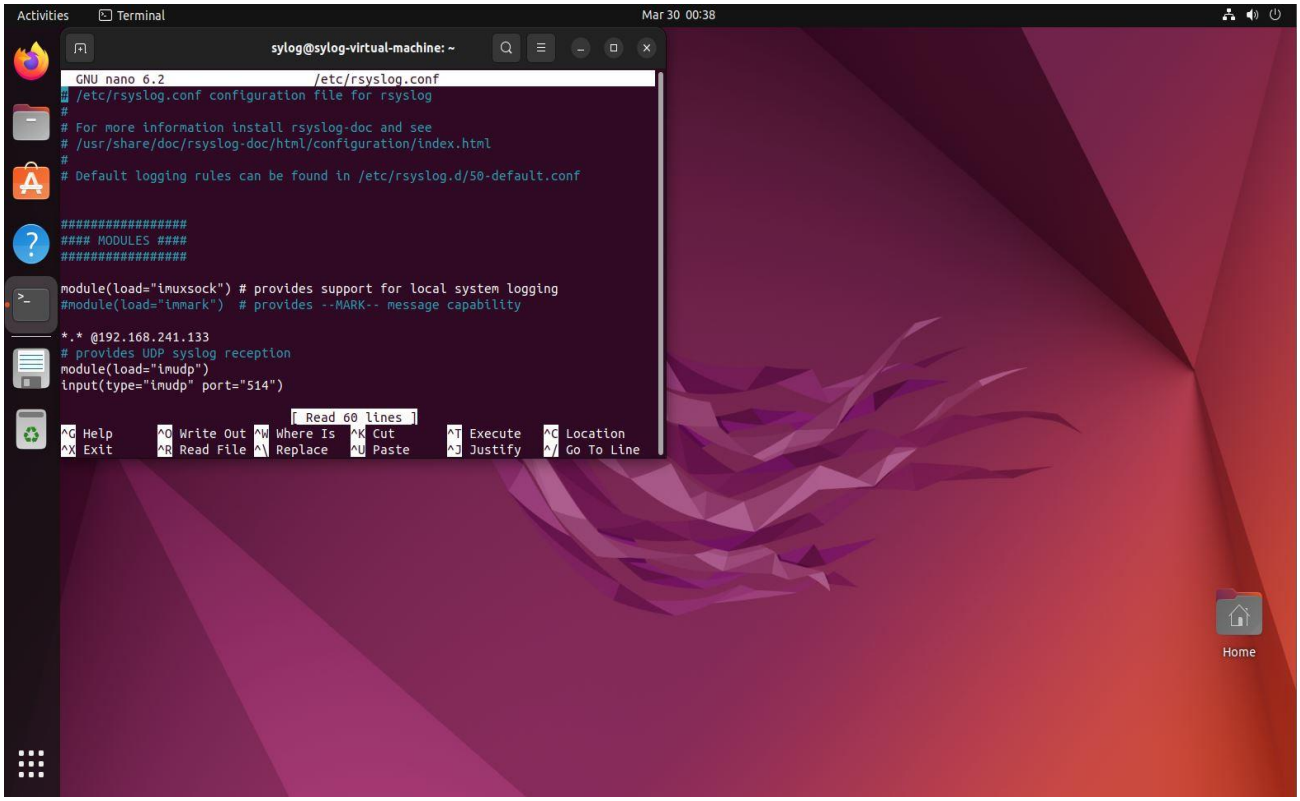
1st step we are skipped because above practical we had been configuring a Syslog Server (Ubuntu), so now that we need to configure a Syslog Client that can forwards its logs to Syslog Server (Ubuntu).

Go ahead and login to your Syslog client machine, and open up the terminal. Next run your update commands:

Command:

sylog@sylog-virtual-machine:~$ sudo apt-get upgrade && apt-get update

Once the machine is up to date, we need to edit the same configuration file from earlier, but on this machine now.



If you would like to send all of your client machine logs to your Syslog server, Next, we will save and exit the file using.

Now all we need to do is check to make sure the logs are actually being sent to our server. We can do this quickly with the logger command, restart the rsyslog server.

sylog@sylog-virtual-machine:~$ sudo service rsyslog restart

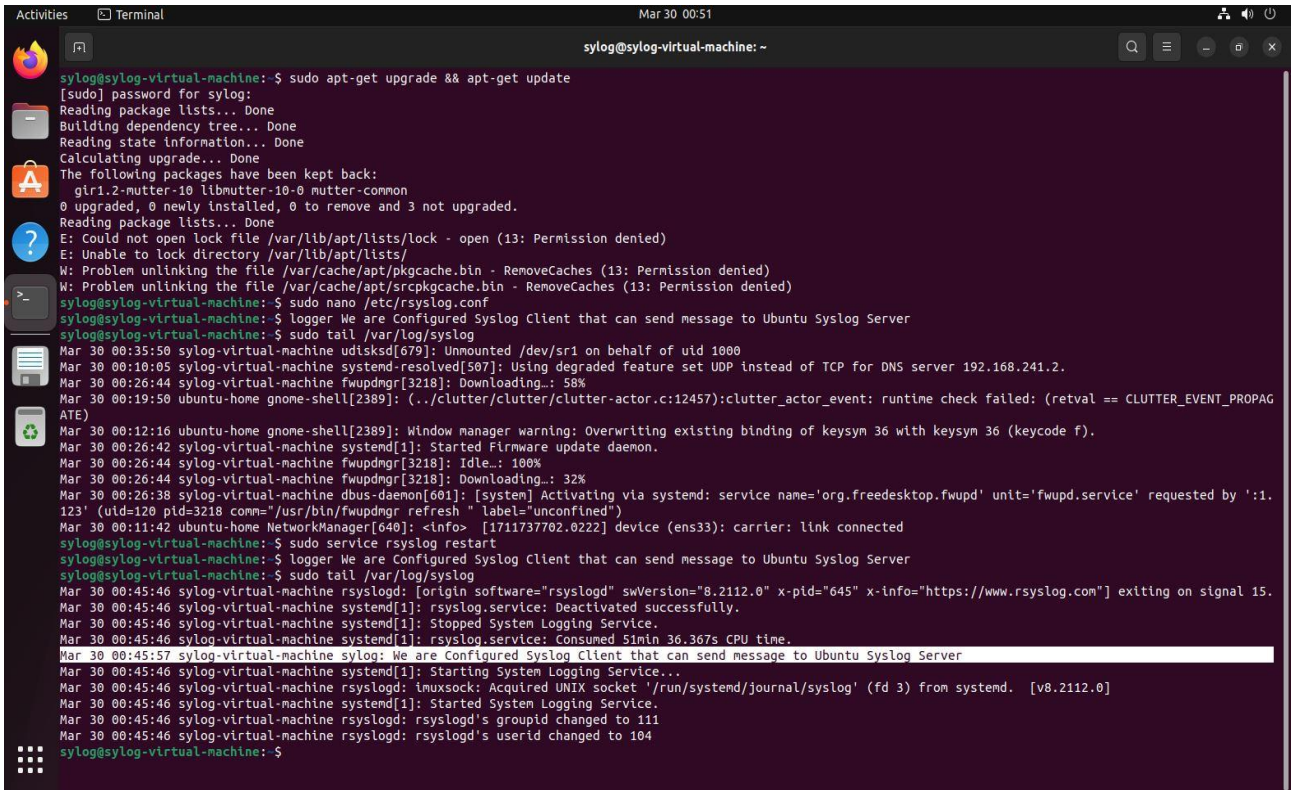
The logger command will allow us to write to our logs directly.

sylog@sylog-virtual-machine:~$ logger We are Configured Syslog Client that can send message to Ubuntu Syslog Server

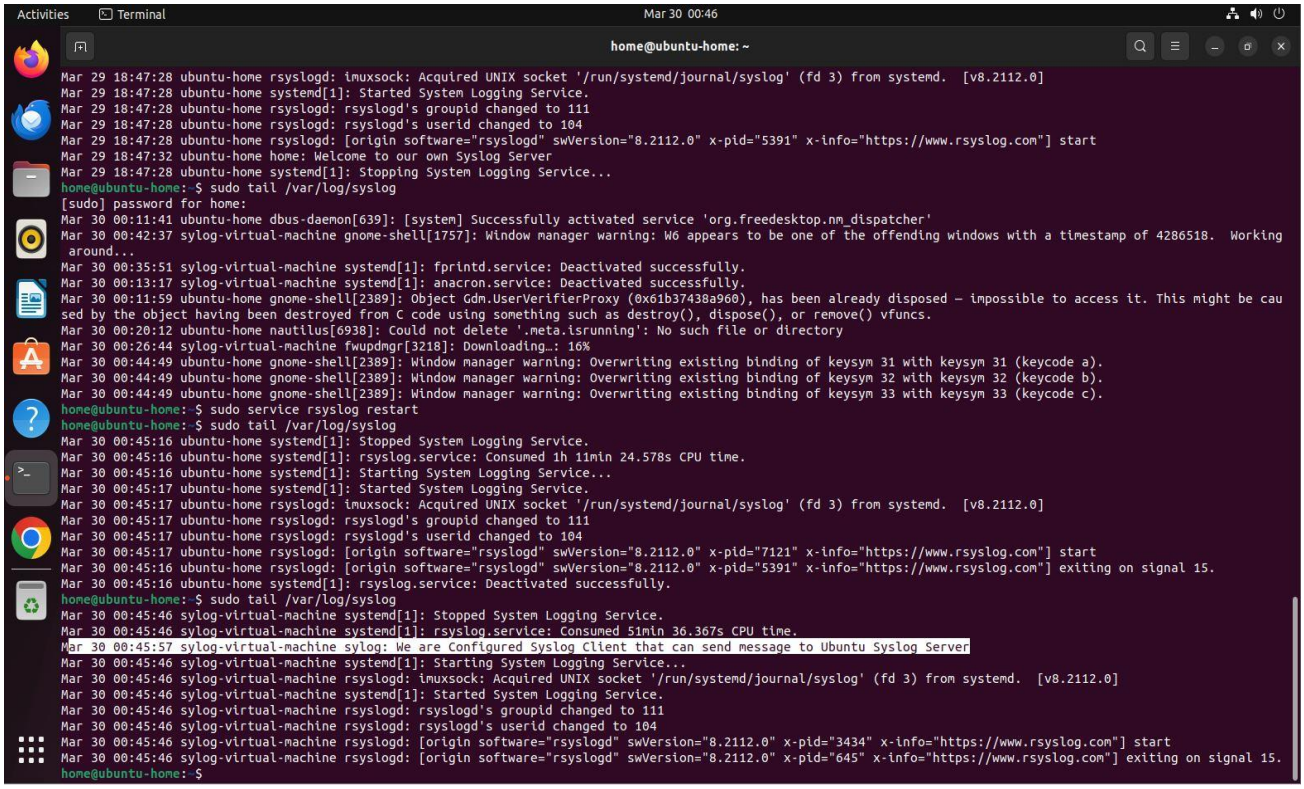
We can check our logs on the client machine with the command:

sylog@sylog-virtual-machine:~$ sudo tail /var/log/syslog

We should be able to see our logger log.



Now, we run the exact same command on our server. As you can see, we can see our test log entry on both our server and client.



PRACTICAL NO.07: INSTALL AND RUN SPLUNK ON LINUX

Before using Splunk we need to install and configure Splunk within the kali Linux operating system, we have to follow these steps.

1.Go to Splunk Official website → create account select → Splunk Enterprise Choose the installation package splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb

wget -O splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb "https://download.splunk.com/products/splunk/releases/9.2.0.1/linux/splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb"

2.Install the Splunk on Kali Linux.

Command:

┌──(yusuf㉿kali)-[/home/yusuf]

└─PS> wget -O splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb "https://download.splunk.com/products/splunk/releases/9.2.0.1/linux/splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb"

--2024-03-25 00:47:45-- https://download.splunk.com/products/splunk/releases/9.2.0.1/linux/splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb

Unpacked the Package and retrieving we need to use the command dpkg -i

┌──(yusuf㉿kali)-[/home/yusuf/Desktop/Security Operation Center]

└─PS> sudo dpkg -i ./splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb

[sudo] password for yusuf:

Selecting previously unselected package splunk.

(Reading database ... 437967 files and directories currently installed.)

Preparing to unpack .../splunk-9.2.0.1-d8ae995bf219-linux-2.6-amd64.deb ...

Unpacking splunk (9.2.0.1+d8ae995bf219) ...

Setting up splunk (9.2.0.1+d8ae995bf219) ...

Complete

3.Configure the Splunk using sudo /opt/splunk/bin/splunk start.

┌──(yusuf㉿kali)-[/home/yusuf/Desktop/Security Operation Center]

└─PS> sudo /opt/splunk/bin/splunk start

Its show all terms and condition which we need to accepted through Y keyword and press enter key.

Splunk software must create an administrator account during startup, Create administrator username.

Please enter an administrator username: Yusuf

Please enter a new password: ****

Please confirm new password: ****

After Some few seconds it will loads and configure the web interface, it will provide port number:8000

The Splunk web interface is at http://kali:8000

Check your network address using ifconfig command

┌──(yusuf㉿kali)-[/home/yusuf/Desktop/Security Operation Center]

└─PS> ifconfig

eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500

inet 192.168.241.132 netmask 255.255.255.0 broadcast 192.168.241.255

inet6 fe80::20c:29ff:feaa:be7c prefixlen 64 scopeid 0x20<link>

ether 00:0c:29:aa:be:7c txqueuelen 1000 (Ethernet)

RX packets 864228 bytes 1259317972 (1.1 GiB)

RX errors 0 dropped 0 overruns 0 frame 0

TX packets 214422 bytes 15379301 (14.6 MiB)

TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536

inet 127.0.0.1 netmask 255.0.0.0

inet6 ::1 prefixlen 128 scopeid 0x10<host>

loop txqueuelen 1000 (Local Loopback)

RX packets 2030 bytes 465743 (454.8 KiB)

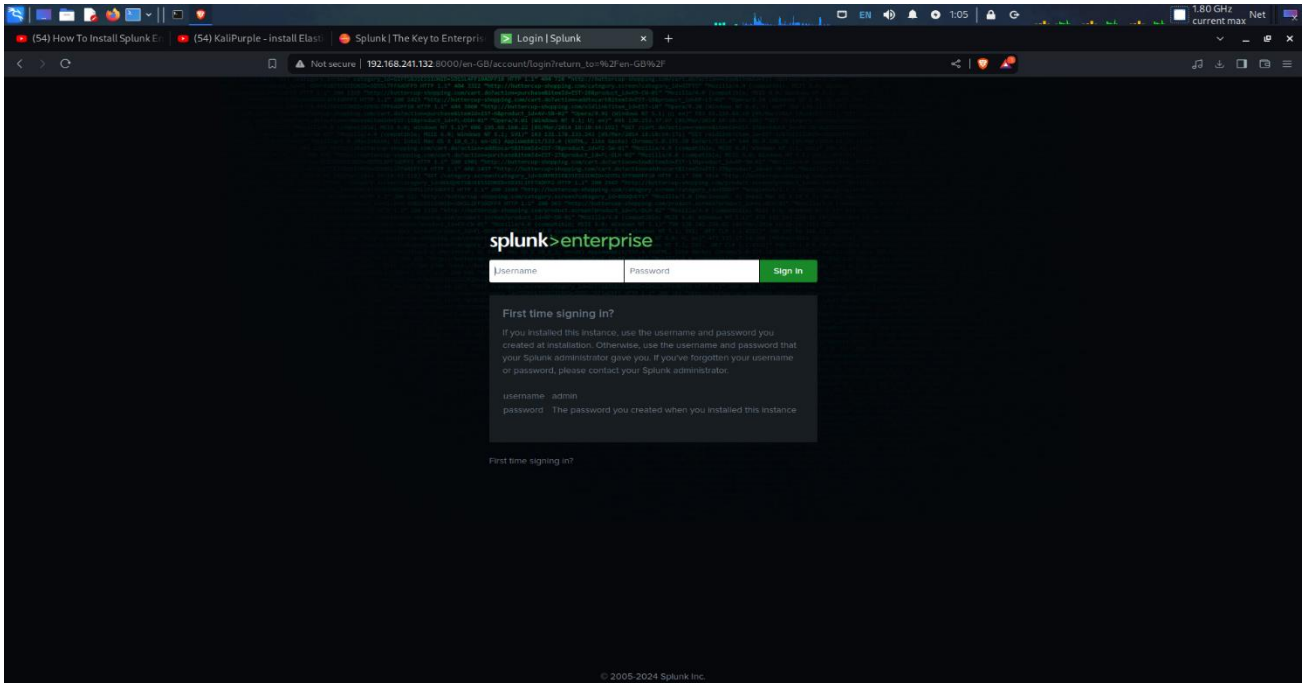
RX errors 0 dropped 0 overruns 0 frame 0

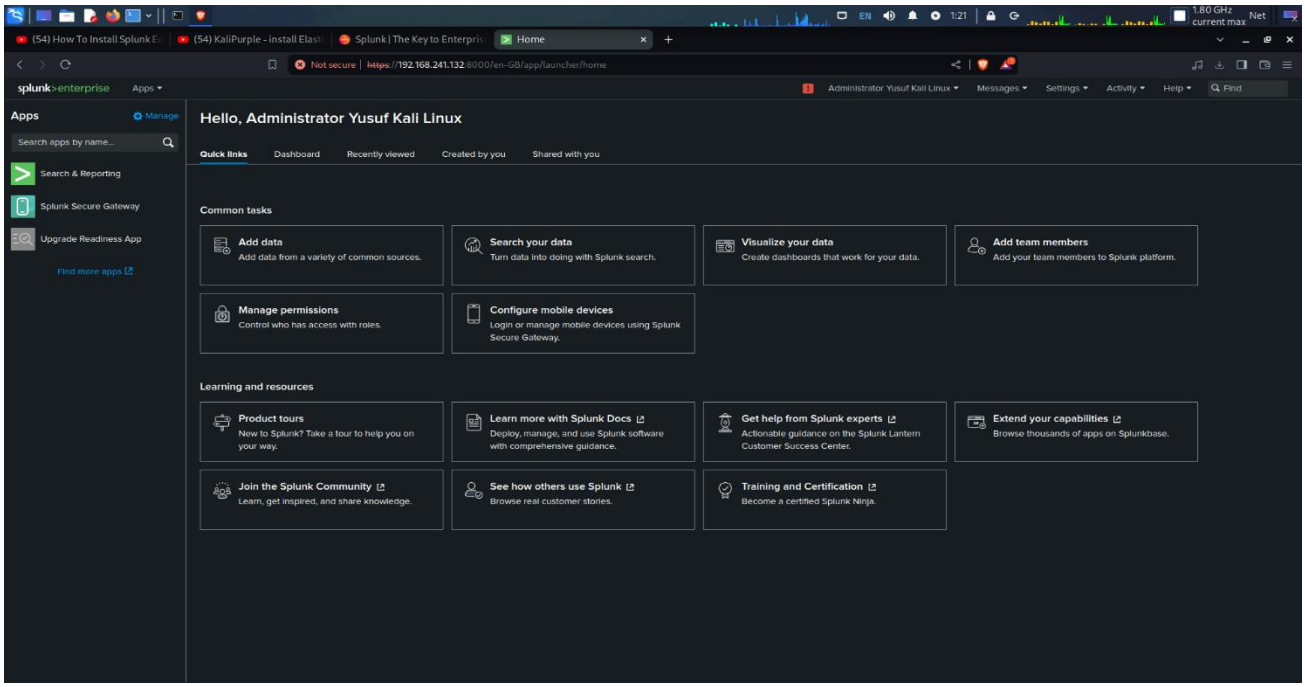
TX packets 2030 bytes 465743 (454.8 KiB)

TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

4.Open the Browser type in URL

https://192.168.241.132:8000/en-GB/app/launcher/home





PRACTICAL NO.08: INSTALL AND CONFIGURE ELK ON LINUX

Step 1: Install Dependencies

Command:

home@ubuntu-home:~$ sudo apt-get install openjdk-8-jdk

Step 2: Install Nginx

Nginx works as a web server and proxy server. It's used to configure password-controlled access to the Kibana dashboard.

home@ubuntu-home:~$ sudo apt-get install nginx

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

nginx is already the newest version (1.18.0-6ubuntu14.4).

0 upgraded, 0 newly installed, 0 to remove and 347 not upgraded.

Step 3: Add Elastic Repository

Elastic repositories enable access to all the open-source software in the ELK stack. To add them, start by importing the GPG key.

home@ubuntu-home:~$ wget -qO - https://artifacts.elastic.co/GPG-KEY-elasticsearch | sudo apt-key add -

Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).

OK

Next, install the apt-transport-https package:

home@ubuntu-home:~$ sudo apt-get install apt-transport-https

Reading package lists... Done

Building dependency tree... Done

Reading state information... Done

apt-transport-https is already the newest version (2.4.11).

0 upgraded, 0 newly installed, 0 to remove and 347 not upgraded.

Add the Elastic repository to your system's repository list:

home@ubuntu-home:~$ echo "deb https://artifacts.elastic.co/packages/7.x/apt stable main" | sudo tee –a /etc/apt/sources.list.d/elastic-7.x.list

deb https://artifacts.elastic.co/packages/7.x/apt stable main

Step 4: Install Elasticsearch

home@ubuntu-home:~$ sudo apt-get update

Hit:1 https://artifacts.elastic.co/packages/7.x/apt stable InRelease

Hit:2 http://in.archive.ubuntu.com/ubuntu jammy InRelease

Get:3 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]

Hit:4 https://dl.google.com/linux/chrome/deb stable InRelease

Get:5 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]

Hit:6 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease

Fetched 229 kB in 6s (38.0 kB/s)

Reading package lists... Done

Install Elasticsearch with the following command:

home@ubuntu-home:~$ sudo apt-get install elasticsearch

Reading package lists... Done

Building dependency tree... Done

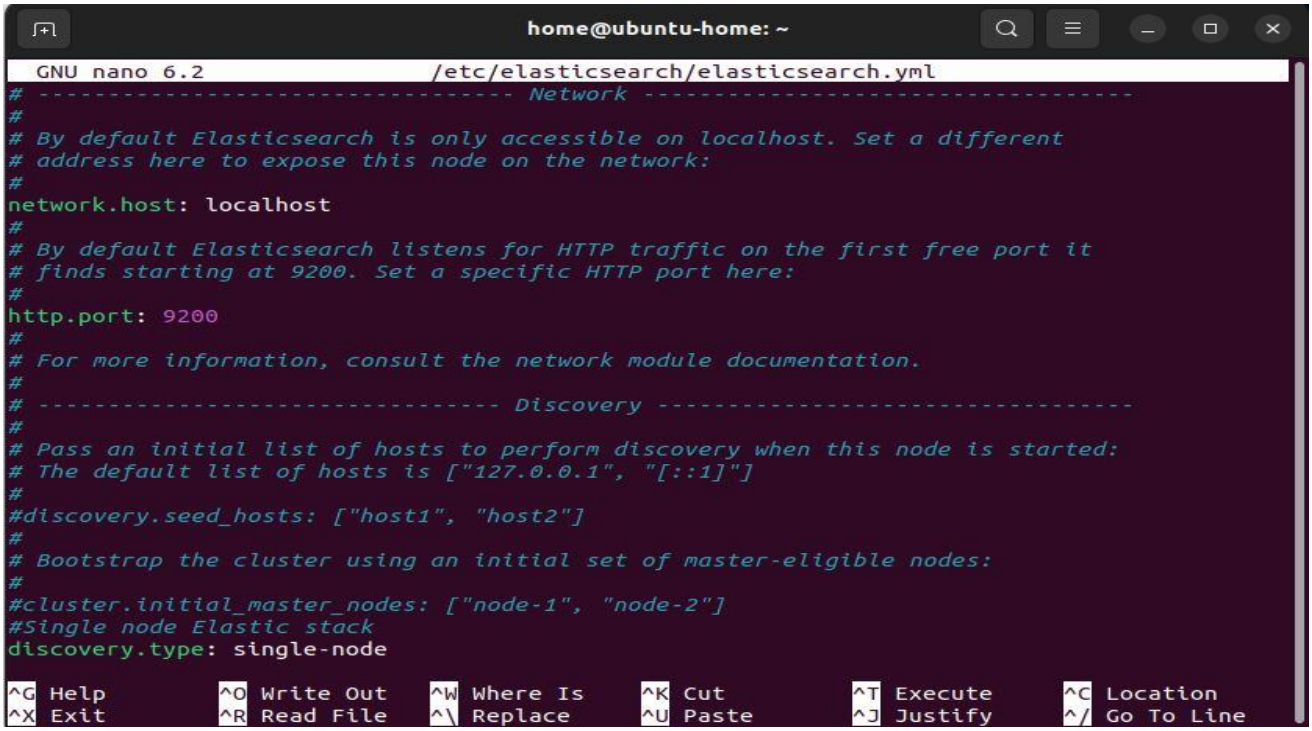
Reading state information... Done

elasticsearch is already the newest version (7.17.18).

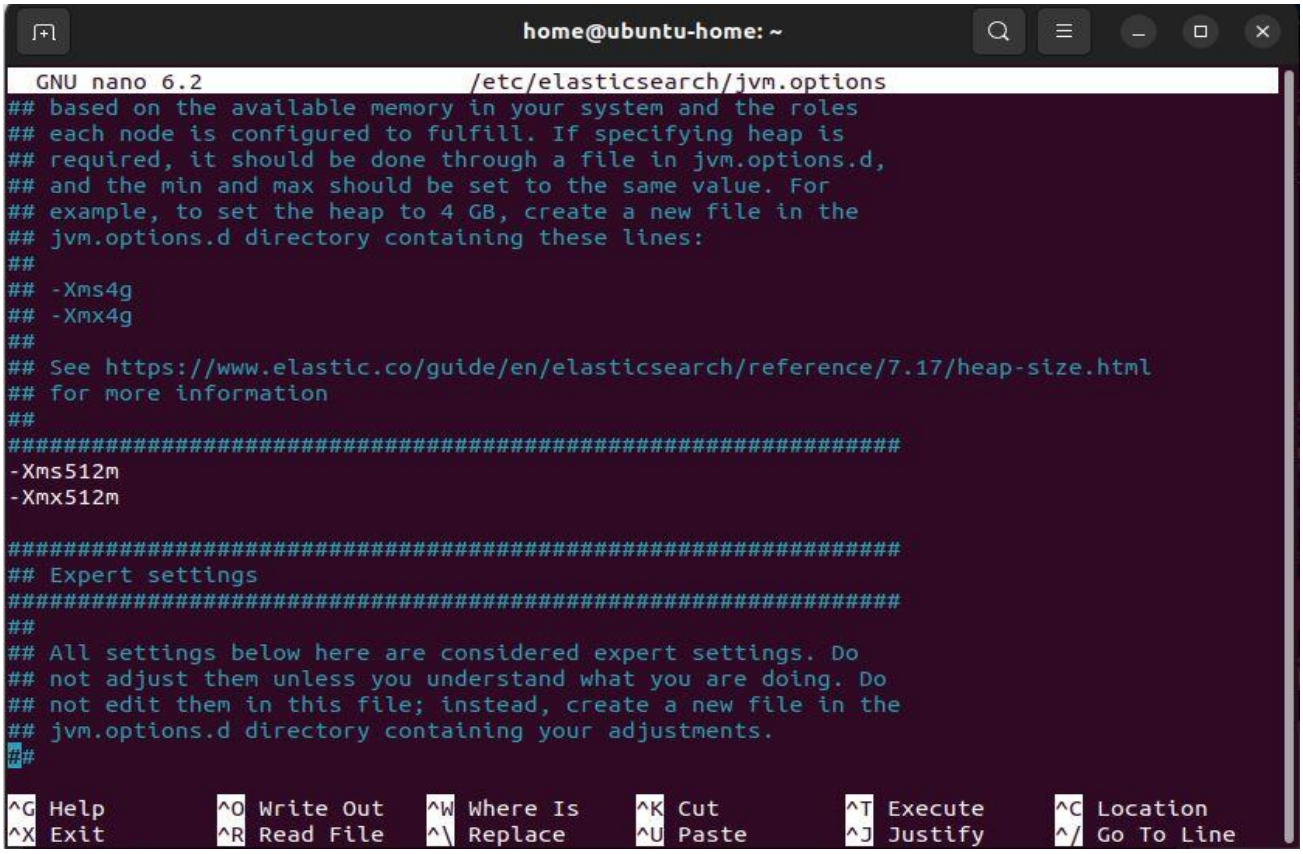
0 upgraded, 0 newly installed, 0 to remove and 347 not upgraded.

Configure Elasticsearch

1. Elasticsearch uses a configuration file to control how it behaves. Open the configuration file for editing in a text editor of your choice. We will be using nano:



By default, JVM heap size is set at 1GB. We recommend setting it to no more than half the size of your total memory. Open the following file for editing:



Start Elasticsearch

Start the Elasticsearch service by running a systemctl command:

home@ubuntu-home:~$ sudo systemctl start elasticsearch.service

Enable Elasticsearch to start on boot:

home@ubuntu-home:~$ sudo systemctl enable elasticsearch.service

Synchronizing state of elasticsearch.service with SysV service script with /lib/systemd/systemd-sysv-install.

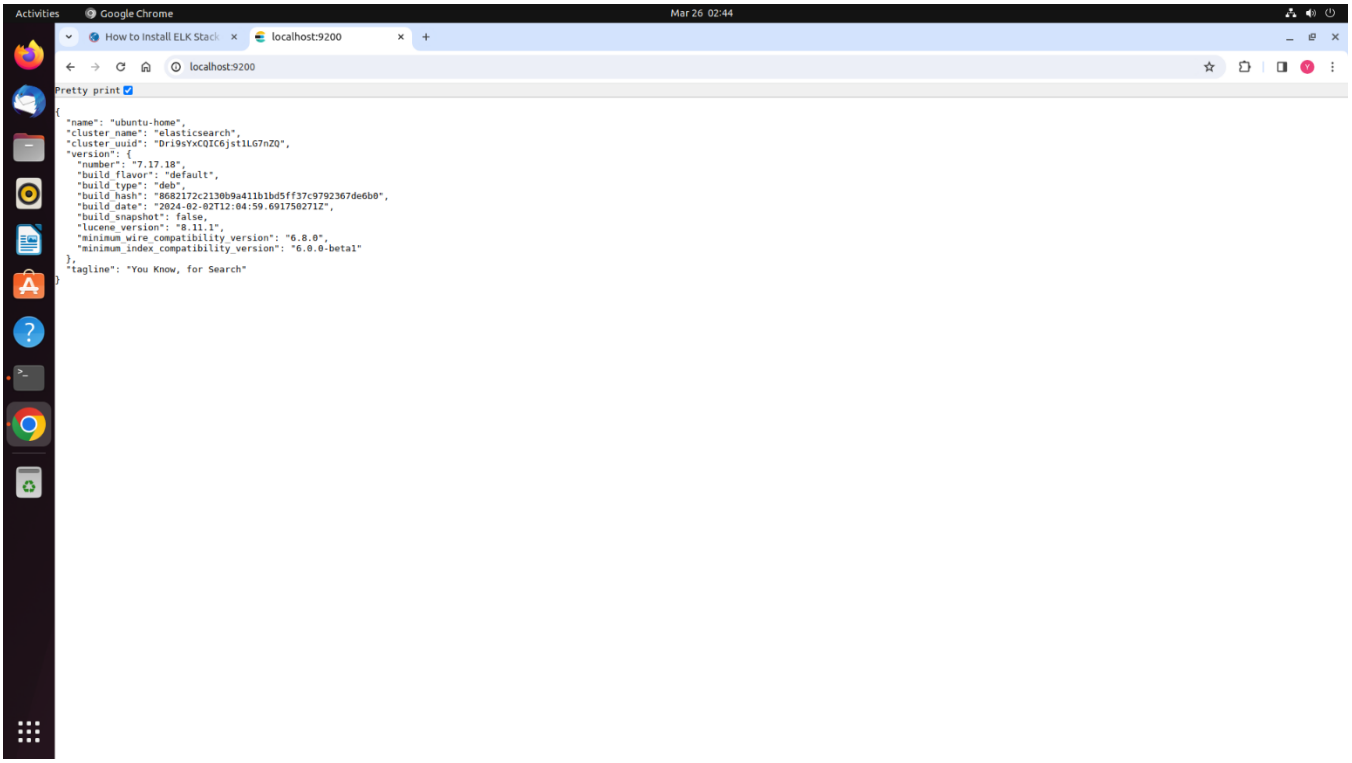
Executing: /lib/systemd/systemd-sysv-install enable elasticsearch

Test Elasticsearch

Use the curl command to test your configuration. Enter the following:

home@ubuntu-home:~$ curl -X GET "localhost:9200"


```
{
  "name" : "ubuntu-home",
  "cluster_name" : "elasticsearch",
  "cluster_uuid" : "Dri9sYxCQIC6jst1LG7nZQ",
  "version" : {
    "number" : "7.17.18",
    "build_flavor" : "default",
    "build_type" : "deb",
    "build_hash" : "8682172c2130b9a411b1bd5ff37c9792367de6b0",
    "build_date" : "2024-02-02T12:04:59.691750271Z",
    "build_snapshot" : false,
    "lucene_version" : "8.11.1",
    "minimum_wire_compatibility_version" : "6.8.0",
    "minimum_index_compatibility_version" : "6.0.0-beta1"
  },
  "tagline" : "You Know, for Search"
}
```

PRACTICAL NO.09: INSTALL AND CONFIGURE GRAYLOG ON LINUX

Graylog is an open-source, web-based log management and aggregation system used to analyze large amounts of data. It stores and analyzes logs collected from the server and sends alerts. It uses Elasticsearch for indexing logs data with MongoDB for storing meta information.

Before using installing graylog you need to install some pre-requisite packages, you need to follow these commands.

Command:

1.Install OpenJDK

Install OpenJDK required by Elasticsearch and other dependencies.

sylog@sylog-virtual-machine:~$ sudo apt -y install bash-completion apt-transport-https uuid-runtime pwgen openjdk-11-jre-headless

[sudo] password for sylog:

```
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
bash-completion is already the newest version (1:2.11-5ubuntu1).
bash-completion set to manually installed.
uuid-runtime is already the newest version (2.37.2-4ubuntu3).
uuid-runtime set to manually installed.
Suggested packages:
  default-jre fonts-dejavu-extra fonts-ipafont-gothic fonts-ipafont-mincho
  fonts-wqy-microhei | fonts-wqy-zenhei
The following NEW packages will be installed:
  apt-transport-https ca-certificates-java java-common openjdk-11-jre-headless
  pwgen
0 upgraded, 5 newly installed, 0 to remove and 0 not upgraded.
```

2.Install Elasticsearch

Import the Elasticsearch PGP signing key.

sylog@sylog-virtual-machine:~$ wget -qO - https://artifacts.elastic.co/GPG-KEY-elasticsearch | sudo apt-key add -

Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).

OK

Add the Elasticsearch repository.

sylog@sylog-virtual-machine:~$ echo "deb https://artifacts.elastic.co/packages/oss-6.x/apt stable main" | sudo tee -a /etc/apt/sources.list.d/elastic-6.x.list

deb https://artifacts.elastic.co/packages/oss-6.x/apt stable main

Update the system.

sylog@sylog-virtual-machine:~$ sudo apt update

Install Elasticsearch.

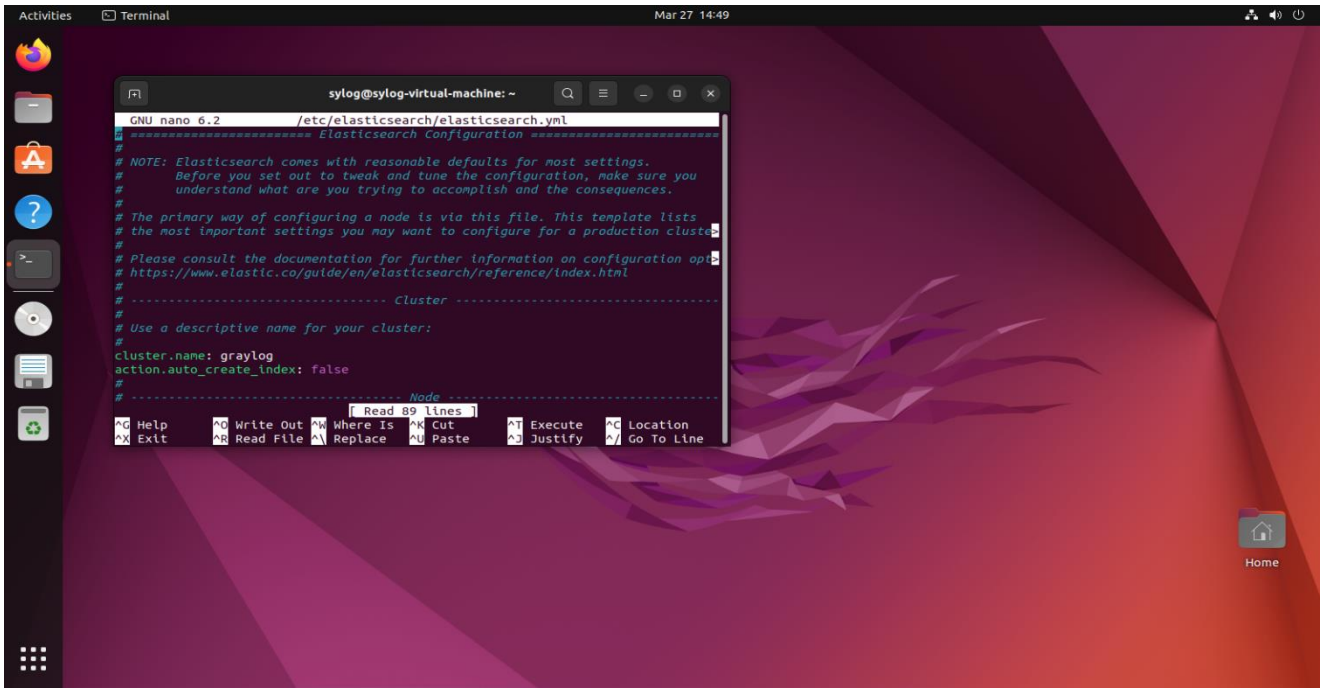
sylog@sylog-virtual-machine:~$ sudo apt -y install elasticsearch-oss

```
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  elasticsearch-oss
0 upgraded, 1 newly installed, 0 to remove and 3 not upgraded.
Need to get 68.5 MB of archives.
After this operation, 108 MB of additional disk space will be used.
Get:1 https://artifacts.elastic.co/packages/oss-6.x/apt stable/main amd64 elasticsearch-oss all 6.8.23 [68.5 MB]
Fetched 68.5 MB in 22s (3,179 kB/s)
Selecting previously unselected package elasticsearch-oss.
(Reading database ... 178673 files and directories currently installed.)
Preparing to unpack .../elasticsearch-oss_6.8.23_all.deb ...
Creating elasticsearch group... OK
Creating elasticsearch user... OK
Unpacking elasticsearch-oss (6.8.23) ...
Setting up elasticsearch-oss (6.8.23) ...
Created elasticsearch keystore in /etc/elasticsearch
```

Edit the Elasticsearch configuration file.

sylog@sylog-virtual-machine:~$ sudo nano /etc/elasticsearch/elasticsearch.yml

Add these two lines to the end of the file.



Save and exit the file & reload the system daemon.

Restart Elasticsearch service.

sylog@sylog-virtual-machine:~$ sudo systemctl daemon-reload

sylog@sylog-virtual-machine:~$ sudo systemctl restart elasticsearch

Enable Elasticsearch to run on system startup.

sylog@sylog-virtual-machine:~$ sudo systemctl enable elasticsearch

Synchronizing state of elasticsearch.service with SysV service script with /lib/systemd/systemd-sysv-install.

Executing: /lib/systemd/systemd-sysv-install enable elasticsearch

Created symlink /etc/systemd/system/multi-user.target.wants/elasticsearch.service → /lib/systemd/system/elasticsearch.service.

3.Install MongoDB

Start the MongoDB service.

sylog@sylog-virtual-machine:~$ sudo apt-get install gnupg

Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
gnupg is already the newest version (2.2.27-3ubuntu2.1).
0 upgraded, 0 newly installed, 0 to remove and 3 not upgraded.

sylog@sylog-virtual-machine:~$ wget -qO - https://www.mongodb.org/static/pgp/server-6.0.asc | sudo apt-key add -

Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).

OK

sylog@sylog-virtual-machine:~$ echo "deb [arch=amd64,arm64] https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/6.0 multiverse" | sudo tee /etc/apt/sources.list.d/mongodb-org-6.0.list

deb [arch=amd64,arm64] https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/6.0 multiverse

Start the MongoDB service.

sylog@sylog-virtual-machine:~$ sudo service mongod start

Enable MongoDB service to start at system startup.

sylog@sylog-virtual-machine:~$ sudo systemctl enable mongod

Created symlink /etc/systemd/system/multi-user.target.wants/mongod.service → /lib/systemd/system/mongod.service.

4. Install Graylog

Add the Graylog repository.

sylog@sylog-virtual-machine:~$ wget https://packages.graylog2.org/repo/packages/graylog-4.1-repository_latest.deb

--2024-03-27 15:13:32-- https://packages.graylog2.org/repo/packages/graylog-4.1-repository_latest.deb

Resolving packages.graylog2.org (packages.graylog2.org)... 172.67.153.95, 104.21.88.209, 2606:4700:3035::ac43:995f, ...

Connecting to packages.graylog2.org (packages.graylog2.org)|172.67.153.95|:443... connected.

HTTP request sent, awaiting response... 302 Found

Location: https://graylog-package-repository.s3.eu-west-1.amazonaws.com/packages/graylog-4.1-repository_latest.deb?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20240327T094333Z&X-Amz-SignedHeaders=host&X-Amz-Expires=600&X-Amz-Credential=AKIAIJSI6MCSPXFVDPIA%2F20240327%2Feu-west-1%2Fs3%2Faws4_request&X-Amz-Signature=c1e744cd4c12cb014592e342f2bcb104f46e56f7f53d13c8c91cfed67f6fa587 [following]

--2024-03-27 15:13:33-- https://graylog-package-repository.s3.eu-west-1.amazonaws.com/packages/graylog-4.1-repository_latest.deb?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20240327T094333Z&X-Amz-SignedHeaders=host&X-Amz-Expires=600&X-Amz-Credential=AKIAIJSI6MCSPXFVDPIA%2F20240327%2Feu-west-1%2Fs3%2Faws4_request&X-Amz-Signature=c1e744cd4c12cb014592e342f2bcb104f46e56f7f53d13c8c91cfed67f6fa587

Resolving graylog-package-repository.s3.eu-west-1.amazonaws.com (graylog-package-repository.s3.eu-west-1.amazonaws.com)... 3.5.69.106, 3.5.66.218, 52.218.56.64, ...

Connecting to graylog-package-repository.s3.eu-west-1.amazonaws.com (graylog-package-repository.s3.eu-west-1.amazonaws.com)|3.5.69.106|:443... connected.

HTTP request sent, awaiting response... 200 OK

Length: 2084 (2.0K) [application/x-debian-package]

Saving to: ‘graylog-4.1-repository_latest.deb’

graylog-4.1-reposit 100%[===================>]   2.04K --.-KB/s   in 0s

2024-03-27 15:13:34 (44.8 MB/s) - ‘graylog-4.1-repository_latest.deb’ saved [2084/2084]

Install the Graylog server package.

sylog@sylog-virtual-machine:~$ sudo dpkg -i graylog-4.1-repository_latest.deb

Selecting previously unselected package graylog-4.1-repository.

(Reading database ... 178903 files and directories currently installed.)

Preparing to unpack graylog-4.1-repository_latest.deb ...

Unpacking graylog-4.1-repository (1-3) ...

Setting up graylog-4.1-repository (1-3) ...

Update the system.

sylog@sylog-virtual-machine:~$ sudo apt update

Install Graylog.

sylog@sylog-virtual-machine:~$ sudo apt -y install graylog-server

```
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  graylog-server
0 upgraded, 1 newly installed, 0 to remove and 3 not upgraded.
Need to get 197 MB of archives.
After this operation, 218 MB of additional disk space will be used.
Get:1 https://packages.graylog2.org/repo/debian stable/4.1 amd64 graylog-server all 4.1.14-1 [197 MB]
Fetched 197 MB in 1min 42s (1,927 kB/s)
Selecting previously unselected package graylog-server.
(Reading database ... 178907 files and directories currently installed.)
Preparing to unpack .../graylog-server_4.1.14-1_all.deb ...
Unpacking graylog-server (4.1.14-1) ...
Setting up graylog-server (4.1.14-1) ...
################################################################################
Graylog does NOT start automatically!

Please run the following commands if you want to start Graylog automatically on
system boot:

   sudo systemctl enable graylog-server.service

   sudo systemctl start graylog-server.service

################################################################################
```

Generate a 96-character random string for Graylog and save a copy to use in the Graylog server configuration file.

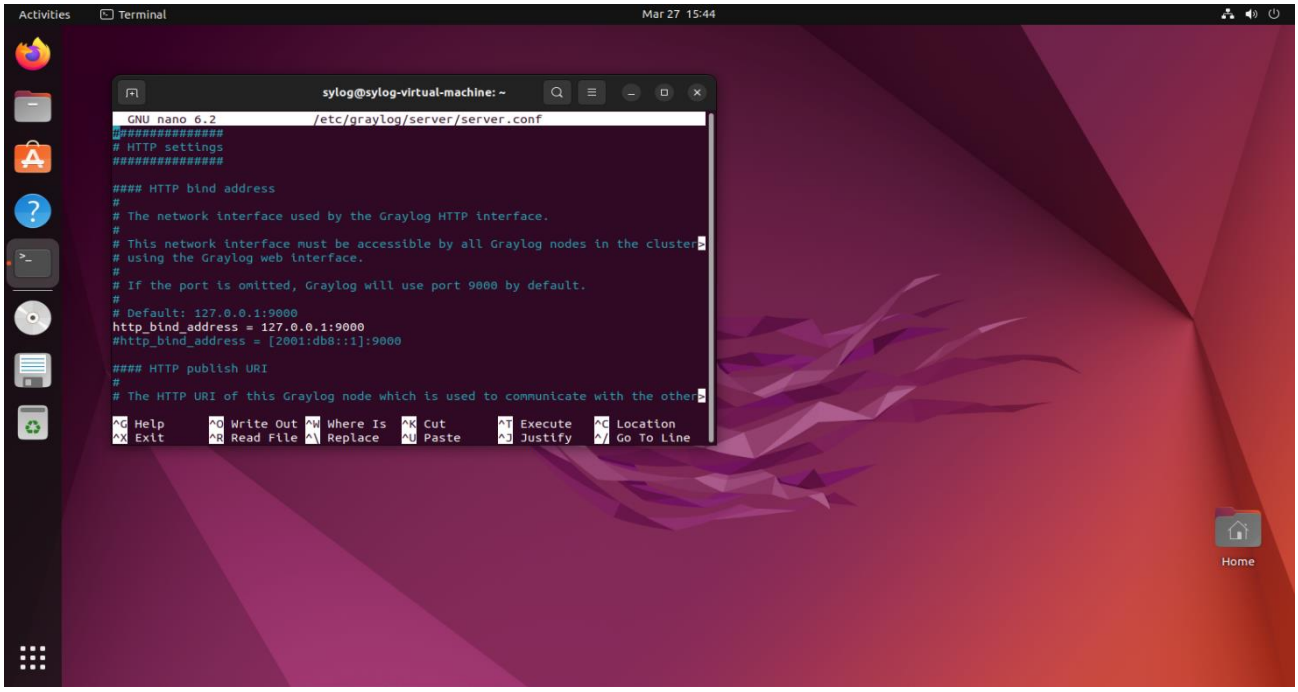
yZi6xi10Ww8UkbLi7yBCnbpi54QqqCcYXtGTcLIOercyAgflffd9hmoVjQV2yYzHABe5rTYTUBZOz3wAiny7VQMehkWRs7Wg

Choose a strong password for your admin account and generate a 64-character hash. For example, if you choose StrongPassword:

05a181f00c157f70413d33701778a6ee7d2747ac18b9c0fbb8bd71a62dd7a223 -

Edit the Graylog configuration file.

sylog@sylog-virtual-machine:~$ sudo nano /etc/graylog/server/server.conf



Update http_bind_address as shown:

http_bind_address = 127.0.0.1:9000

Save and close the file & restart the system daemon.

sylog@sylog-virtual-machine:~$ sudo systemctl daemon-reload

Restart the Graylog service.

sylog@sylog-virtual-machine:~$ sudo systemctl restart graylog-server

Enable the Graylog service to run on system startup.

Synchronizing state of graylog-server.service with SysV service script with /lib/systemd/systemd-sysv-install.

Executing: /lib/systemd/systemd-sysv-install enable graylog-server

Created symlink /etc/systemd/system/multi-user.target.wants/graylog-server.service → /lib/systemd/system/graylog-server.service.

Verify the status of the Graylog server.

sylog@sylog-virtual-machine:~$ sudo systemctl status graylog-server

- graylog-server.service - Graylog server

  Loaded: loaded (/lib/systemd/system/graylog-server.service; enabled; vendo>

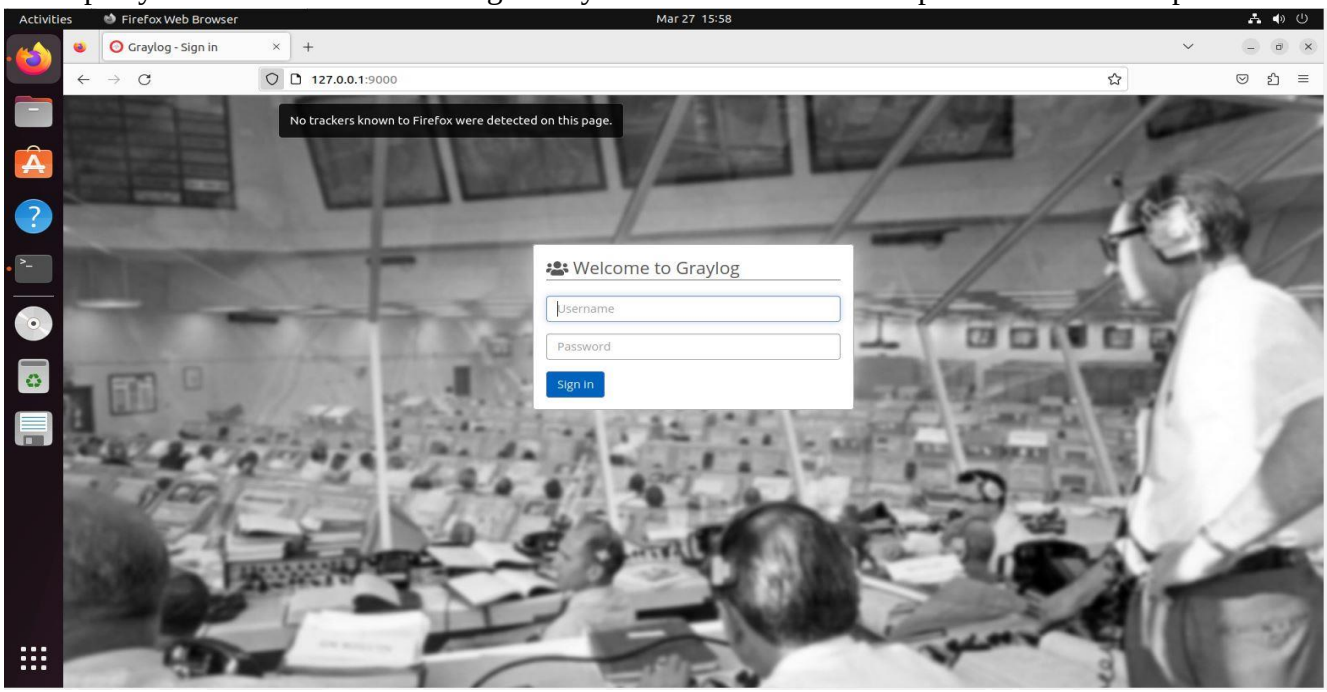
  Active: active (running) since Wed 2024-03-27 15:47:50 IST; 1min 4s ago

```
     Docs: http://docs.graylog.org/
 Main PID: 10605 (graylog-server)
    Tasks: 108 (limit: 2217)
   Memory: 729.1M
      CPU: 41.739s
   CGroup: /system.slice/graylog-server.service
           ├─10605 /bin/sh /usr/share/graylog-server/bin/graylog-server
           └─10642 /usr/bin/java -Xms1g -Xmx1g -XX:NewRatio=1 -server -XX:+Re>

Mar 27 15:47:50 sylog-virtual-machine systemd[1]: Started Graylog server.
Mar 27 15:47:50 sylog-virtual-machine graylog-server[10642]: OpenJDK 64-Bit Ser>
Mar 27 15:47:51 sylog-virtual-machine graylog-server[10642]: WARNING: sun.refle>
Mar 27 15:48:01 sylog-virtual-machine graylog-server[10642]: WARNING: An illega>
Mar 27 15:48:01 sylog-virtual-machine graylog-server[10642]: WARNING: Illegal r>
Mar 27 15:48:01 sylog-virtual-machine graylog-server[10642]: WARNING: Please co>
Mar 27 15:48:01 sylog-virtual-machine graylog-server[10642]: WARNING: Use --ill>
Mar 27 15:48:01 sylog-virtual-machine graylog-server[10642]: WARNING: All illeg>
lines 1-20/20 (END)
```

5. Access Graylog Web UI

Open your web browser and navigate to your servers IP address at port 9000. for example:



PRACTICAL NO.10: DEMONSTRATE CONVERSION OF DATA INTO A UNIVERSAL FORMAT

Part 1: Normalize Timestamps in a Log File

Part 2: Normalize Timestamps in an Apache Log File

Part 1: Normalize Timestamps in a Log File

Timestamps are used in log entries to specify when the recorded event took place. While it is best practice to record timestamps in UTC, the format of the timestamp varies from log source to log source. There are two common timestamp formats, known as Unix Epoch and Human Readable.

Converting Epoch to Human Readable Timestamps with AWK

Command:

Use the cd command to change to the /home/analyst/lab.support.files/ directory. A copy of the file shown above is stored there.

[analyst@secOps ~]$ cd ./lab.support.files/

[analyst@secOps lab.support.files]$ ls -l

```
total 932
-rw-r--r-- 1 analyst analyst    649 Mar 21  2018 apache_in_epoch.log
-rw-r--r-- 1 analyst analyst    126 Mar 25 06:31 applicationX_in_epoch.log
-rw-r--r-- 1 analyst analyst    285 Mar 25 06:33 applicationX_in_human.log
drwxr-xr-x 4 analyst analyst   4096 Mar 21  2018 attack_scripts
-rw-r--r-- 1 analyst analyst    102 Mar 21  2018 confidential.txt
-rw-r--r-- 1 analyst analyst   2871 Mar 21  2018 cyops.mn
-rw-r--r-- 1 analyst analyst    255 Mar 20 15:20 decrypted_letter.txt
-rw-r--r-- 1 analyst analyst     75 Mar 21  2018 elk_services
-rw-r--r-- 1 analyst analyst    373 Mar 21  2018 h2_dropbear.banner
drwxr-xr-x 2 analyst analyst   4096 Apr  2  2018 instructor
-rw-r--r-- 1 analyst analyst    255 Mar 20 06:10 letter_to_grandma.txt
-rw-r--r-- 1 analyst analyst  24464 Mar 21  2018 logstash-tutorial.log
drwxr-xr-x 2 analyst analyst   4096 Mar 21  2018 malware
-rw-r--r-- 1 analyst analyst    370 Mar 20 14:21 message.enc
-rwxr-xr-x 1 analyst analyst    172 Mar 21  2018 mininet_services
drwxr-xr-x 2 analyst analyst   4096 Mar 21  2018 openssl_lab
drwxr-xr-x 2 analyst analyst   4096 Mar 21  2018 pcaps
drwxr-xr-x 7 analyst analyst   4096 Mar 21  2018 pox
-rw-r--r-- 1 analyst analyst 473363 Mar 21  2018 sample.img
-rw-r--r-- 1 analyst analyst     65 Mar 21  2018 sample.img_SHA256.sig
drwxr-xr-x 3 analyst analyst   4096 Mar 21  2018 scripts
-rw-r--r-- 1 analyst analyst  25553 Mar 21  2018 SQL_Lab.pcap
-rw-r--r-- 1 analyst analyst 345088 Mar 22 07:10 W32.Nimda.Amm.exe
```

Issue the following AWK command to convert and print the result on the terminal:

[analyst@secOps lab.support.files]$

[analyst@secOps lab.support.files]$ awk 'BEGIN {FS=OFS="|"}

{$3=strftime("%c",$3)} {print}' applicationX_in_epoch.log

2|Z|Mon 18 Aug 2008 11:00:00 AM EDT|AF|0

3|N|Tue 19 Aug 2008 11:00:00 AM EDT|AF|89

4|N|Sun 07 Sep 2008 11:00:00 AM EDT|AS|12

1|Z|Mon 08 Sep 2008 11:00:00 AM EDT|AS|67

5|N|Tue 09 Sep 2008 11:00:00 AM EDT|EU|23

6|R|Wed 10 Sep 2008 11:00:00 AM EDT|OC|89

||Wed 31 Dec 1969 07:00:00 PM EST

Use nano (or your favorite text editor) to remove the extra empty line at the end of the file and run the AWK script again.

[analyst@secOps lab.support.files]$ nano applicationX_in_epoch.log

While printing the result on the screen is useful for troubleshooting the script, analysts will likely need to save the output in a text file. Redirect the output of the script above to a file named applicationX_in_human.log to save it to a file:

[analyst@secOps lab.support.files]$ awk 'BEGIN {FS=OFS="|"}

{$3=strftime("%c",$3)} {print}'
applicationX_in_epoch.log>applicationX_in_human.log

Use cat to view the applicationX_in_human.log.

[analyst@secOps lab.support.files]$ cat applicationX_in_human.log

2|Z|Mon 18 Aug 2008 11:00:00 AM EDT|AF|0

3|N|Tue 19 Aug 2008 11:00:00 AM EDT|AF|89

4|N|Sun 07 Sep 2008 11:00:00 AM EDT|AS|12

1|Z|Mon 08 Sep 2008 11:00:00 AM EDT|AS|67

5|N|Tue 09 Sep 2008 11:00:00 AM EDT|EU|23

6|R|Wed 10 Sep 2008 11:00:00 AM EDT|OC|89

||Wed 31 Dec 1969 07:00:00 PM EST

Part 2: Normalize Timestamps in an Apache Log File

convert Unix Epoch to Human Readable timestamps.

[analyst@secOps lab.support.files]$ cat apache_in_epoch.log

198.51.100.213 - - [1219071600] "GET /twiki/bin/edit/Main/Double_bounce_sender?topicparent=Main.ConfigurationVariables HTTP/1.1" 401 12846

198.51.100.213 - - [1219158000] "GET /twiki/bin/rdiff/TWiki/NewUserTemplate?rev1=1.3&rev2=1.2 HTTP/1.1" 200 4523

198.51.100.213 - - [1220799600] "GET /mailman/listinfo/hsdivision HTTP/1.1" 200 6291

198.51.100.213 - - [1220886000] "GET /twiki/bin/view/TWiki/WikiSyntax HTTP/1.1" 200 7352

198.51.100.213 - - [1220972400] "GET /twiki/bin/view/Main/DCCAndPostFix HTTP/1.1" 200 5253

198.51.100.213 - - [1221058800] "GET /twiki/bin/oops/TWiki/AppendixFileSystem?template=oopsmore&m1=1.12&m2=1.12 HTTP/1.1" 200 11382

Use an awk script to convert the timestamp field to a human readable format. Notice that the command contains the same script used previously, but with a few adjustments for the timestamp field and file name.

**[analyst@secOps lab.support.files]$** awk 'BEGIN {FS=OFS=" "}{$4=strftime("%c",$4)} {print}' /home/analyst/lab.support.files/apache_in_epoch.log

198.51.100.213 - - Wed 31 Dec 1969 07:00:00 PM EST "GET /twiki/bin/edit/Main/Double_bounce_sender?topicparent=Main.ConfigurationVariables HTTP/1.1" 401 12846

198.51.100.213 - - Wed 31 Dec 1969 07:00:00 PM EST "GET /twiki/bin/rdiff/TWiki/NewUserTemplate?rev1=1.3&rev2=1.2 HTTP/1.1" 200 4523

198.51.100.213 - - Wed 31 Dec 1969 07:00:00 PM EST "GET /mailman/listinfo/hsdivision HTTP/1.1" 200 6291

198.51.100.213 - - Wed 31 Dec 1969 07:00:00 PM EST "GET /twiki/bin/view/TWiki/WikiSyntax HTTP/1.1" 200 7352

198.51.100.213 - - Wed 31 Dec 1969 07:00:00 PM EST "GET /twiki/bin/view/Main/DCCAndPostFix HTTP/1.1" 200 5253

198.51.100.213 - - Wed 31 Dec 1969 07:00:00 PM EST "GET /twiki/bin/oops/TWiki/AppendixFileSystem?template=oopsmore&m1=1.12&m2=1.12 HTTP/1.1" 200 11382

To fix the problem, the square brackets must be removed from the timestamp field before the conversion takes place. Adjust the script by adding two actions before the conversion, as shown below:

**[analyst@secOps lab.support.files]$** awk 'BEGIN {FS=OFS=" "}{gsub(/\[|\]/,"",$4)}{print}{$4=strftime("%c",$4)}{print}' apache_in_epoch.log

198.51.100.213 - - 1219071600 "GET /twiki/bin/edit/Main/Double_bounce_sender?topicparent=Main.ConfigurationVariables HTTP/1.1" 401 12846

198.51.100.213 - - Mon 18 Aug 2008 11:00:00 AM EDT "GET /twiki/bin/edit/Main/Double_bounce_sender?topicparent=Main.ConfigurationVariables HTTP/1.1" 401 12846

198.51.100.213 - - 1219158000 "GET /twiki/bin/rdiff/TWiki/NewUserTemplate?rev1=1.3&rev2=1.2 HTTP/1.1" 200 4523

198.51.100.213 - - Tue 19 Aug 2008 11:00:00 AM EDT "GET /twiki/bin/rdiff/TWiki/NewUserTemplate?rev1=1.3&rev2=1.2 HTTP/1.1" 200 4523

198.51.100.213 - - 1220799600 "GET /mailman/listinfo/hsdivision HTTP/1.1" 200 6291

198.51.100.213 - - Sun 07 Sep 2008 11:00:00 AM EDT "GET /mailman/listinfo/hsdivision HTTP/1.1" 200 6291

198.51.100.213 - - 1220886000 "GET /twiki/bin/view/TWiki/WikiSyntax HTTP/1.1" 200 7352

198.51.100.213 - - Mon 08 Sep 2008 11:00:00 AM EDT "GET /twiki/bin/view/TWiki/WikiSyntax HTTP/1.1" 200 7352

198.51.100.213 - - 1220972400 "GET /twiki/bin/view/Main/DCCAndPostFix HTTP/1.1" 200 5253

198.51.100.213 - - Tue 09 Sep 2008 11:00:00 AM EDT "GET /twiki/bin/view/Main/DCCAndPostFix HTTP/1.1" 200 5253

198.51.100.213 - - 1221058800 "GET /twiki/bin/oops/TWiki/AppendixFileSystem?template=oopsmore&m1=1.12&m2=1.12 HTTP/1.1" 200 11382

198.51.100.213 - - Wed 10 Sep 2008 11:00:00 AM EDT "GET /twiki/bin/oops/TWiki/AppendixFileSystem?template=oopsmore&m1=1.12&m2=1.12 HTTP/1.1" 200 11382