# Real-Time Threat Detection Using Snort IDS Integrated with Splunk

## System Requirements for Snort IDS Lab Setup

**Operating System:**
Ubuntu (installed on either a physical machine or a virtual machine).

**Internet Connectivity:**
A stable internet connection to install necessary packages and updates.

**Virtualization (if using a VM):**
A preferred hypervisor like VirtualBox, VMware, or KVM should be installed and configured.

**Web Server:**
Apache HTTP Server must be installed and running on Ubuntu for testing Snort rules related to HTTP traffic.

1. **Remote Access Server:**
   OpenSSH Server must be installed and running on Ubuntu for testing Snort rules related to SSH traffic.

## Step 1: Get the Latest List of Packages

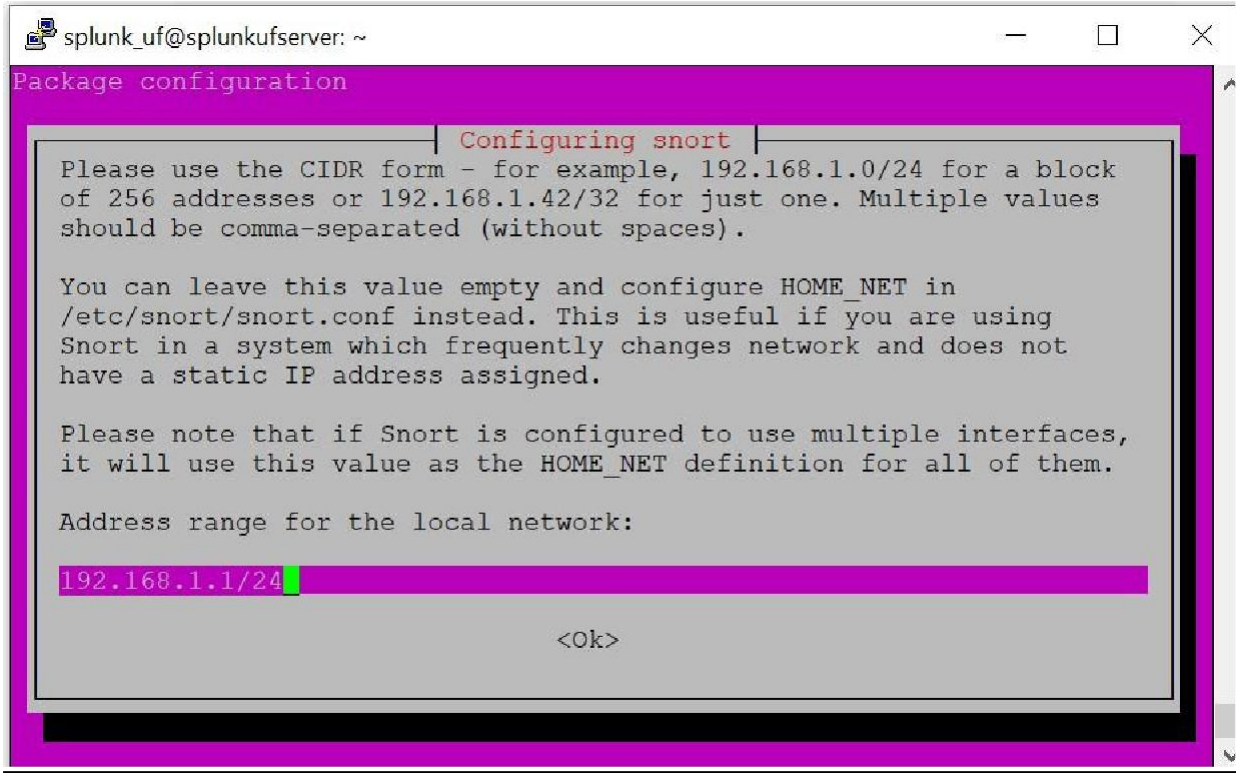
```
sudo apt-get
update
```

## Step 2: Install Snort

Installing Snort on Ubuntu is effortless, simply use the following command:

```
sudo apt-get install snort -y
```

While installing Snort, we will be asked to determine which interface will be listened to by Snort.




192.168.1.1/24 then click ok.

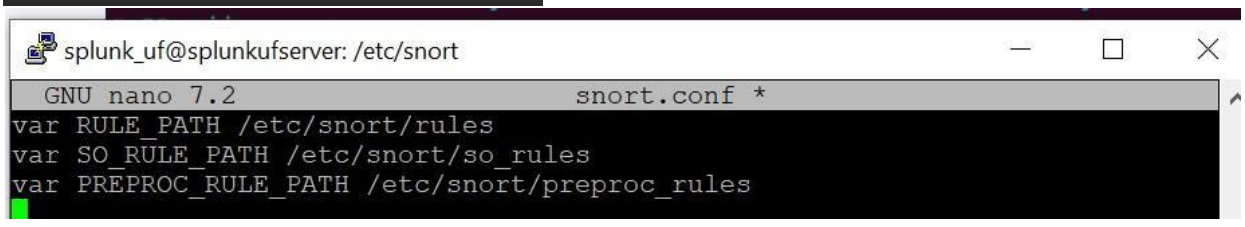
# Step 3: Configuring Snort

Snort configuration file snort.conf will be seen under the ***/etc/snort*** directory. Snort will run according to this file.

## Configure Network Variables

We are using Snort as a Host Based IDS, so we should type the Ubuntu Machine's IP address as a ***HOME_NET*** variable with an editor of your choice. We will be using VIM as an editor to configure ***/etc/snort/snort.conf*** file.

```
sudo nano /etc/snort/snort.conf
```




Ctrl + O, Enter Ctrl + x.

## Examining Rule Path and Rule Files

The ***RULE_PATH*** variable in the ***snort.conf*** file determines the location of the snort rule files.

***/etc/snort/rules/local.rules*** files contain our snort rules. When writing Snort rules, this file will be used.

Snort installation comes with some default community rules with classification. For example, if we want to examine backdoor rules we can examine the backdoor.rules file.

# Configure Output Files

To generate log files to examine alerts for the rule matching traffic pattern, we can use several methods. In this article we will write the logs to CSV files and PCAP files.

To generate logs in CSV files, the following line in the snort.conf file should be added to the “Configure output plugins” section.

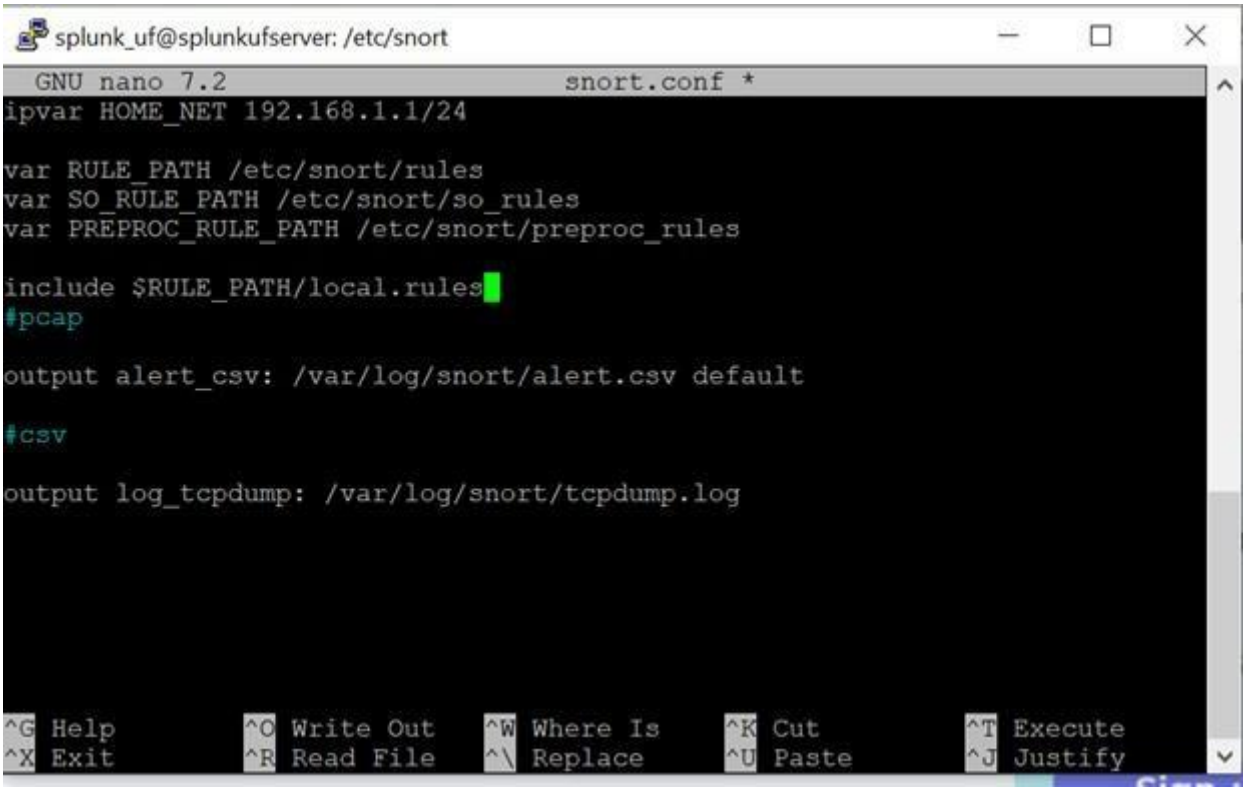
#pcap

```
output alert_csv: /var/log/snort/alert.csv default
```

To generate logs in PCAP files, the following line in the snort.conf file should be added to the “Configure output plugins” section.

#csv

```
output log_tcpdump: /var/log/snort/tcpdump.log
```



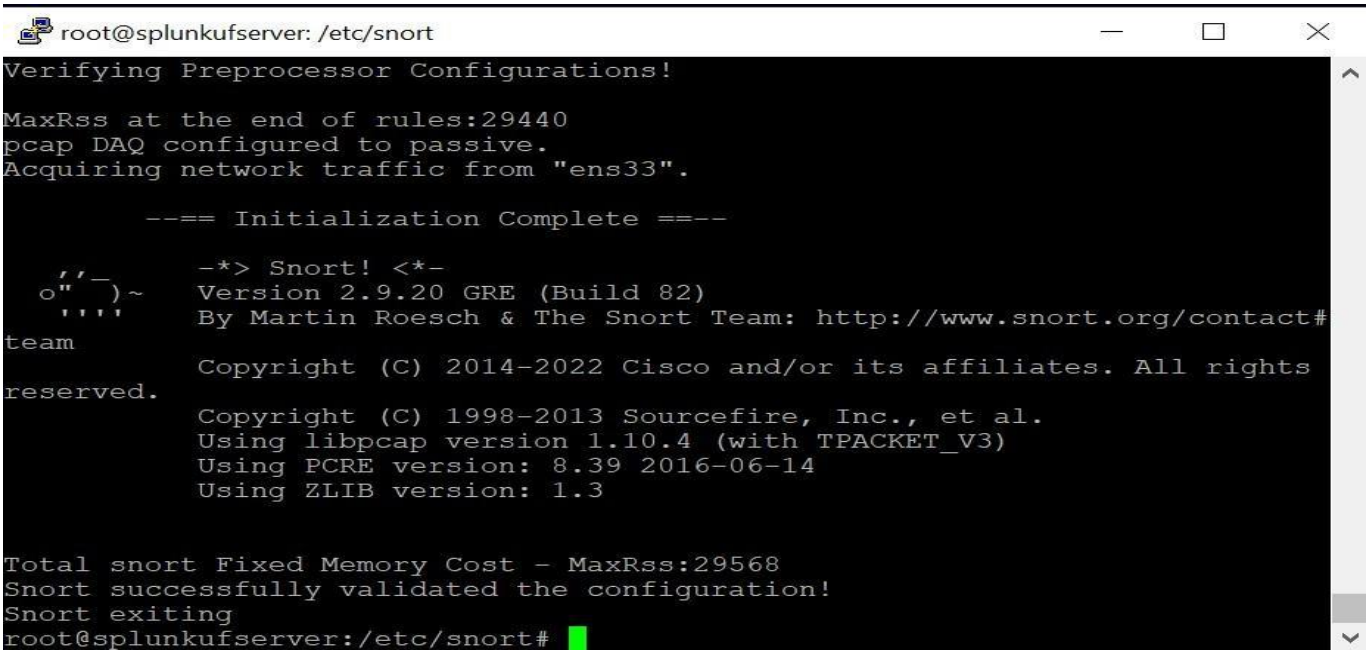

# Test the Configuration File

We can test our configuration with the following command. The relevant command will produce an error if we made any mistakes in the configuration file.

```
sudo snort -T -i enp0s3 -c /etc/snort/snort.conf
```

To determine which interface Snort should listen on, type the interface on the Snort configuration area after typing the following command. # ip a or # ifconfig

If everything is configured correctly, you will see a “Snort successfully validated the configuration!” message at the bottom of the screen as shown below.




# Step 4: Understanding Snort Rule Structure

Snort rules consist of two parts which are Rule Header and Rule Options.

Rule header contains the **Rule’s Action, Protocol, Source IP Address, Source Port, Direction, Destination IP Address and Destination Port** information.

**Rule options form the heart of Snort’s intrusion detection engine combining ease of use with power and flexibility**. All Snort Rule Options are seperated from each other using semicolon(;). Rule option keywords are separated from their arguments with a colon(:).

Some general rule options are: message, SID, REV.

Some general detection options are: content, distance, within, PCRE Here

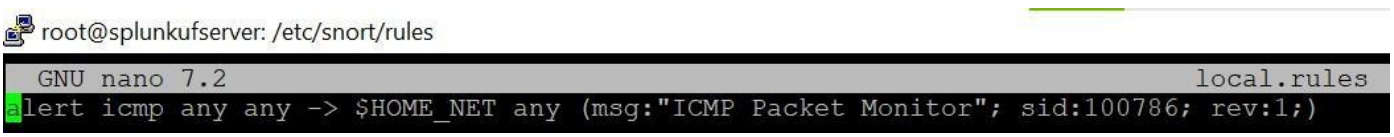
is the snort rule structure:

```
action protocol sourceIP sourceport -> destinationIP destinationport ([Rule options])
```

## ICMP Detection Rule

Open ***/etc/snort/rules/local.rules*** file to write custom ICMP rule with the editor of your choice and add the following rule to detect incoming ICMP packets.

[ **alert icmp any any -> $HOME_NET any (msg:"ICMP Packet Monitor"; sid:100786; rev:1;)** ]

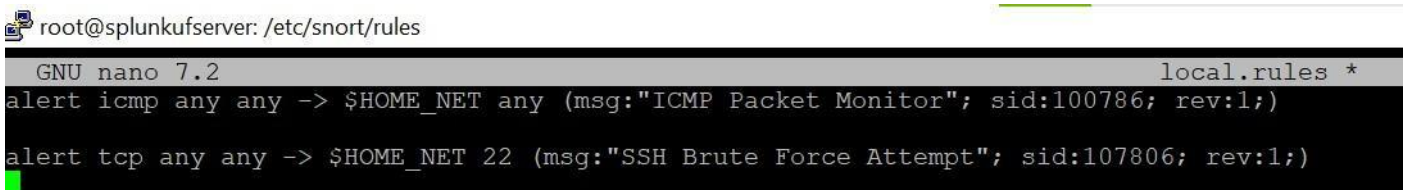



Ctrl + O, Enter Ctrl + x.

## SSH Connection Attempts Detection Rule

As you know SSH protocol is running on TCP 22 by default. There is an SSH Server running on the Ubuntu machine. To detect incoming SSH connection attempts with the snort add the second rule to the /etc/snort/rules/local.rules file as following:

**[ alert tcp any any -> $HOME_NET 22 (msg:"SSH Brute Force Attempt"; sid:107806; rev:1;) ]**




Ctrl + O, Enter Ctrl + x.

# Step 5: Testing Snort Rules

We will test ICMP, SSH, and HTTP (curl) based Snort alerts using an attacker machine and your Ubuntu Snort machine.

## Before Testing — Run Snort in Alert Mode

On your **Ubuntu machine (Snort installed)**, run the following command to monitor and see alerts in real time:

```
# sudo snort -q -l /var/log/snort -i ens33 -A console -c /etc/snort/snort.conf
```

Replace `eth0` with your **actual network interface**. Use `ip a` to check it (e.g., `ens33`, `enp0s3`, etc.).

### 🎯 Now Perform These 2 Attacks from Attacker Machine (e.g., Kali Linux)!

1 - ICMP Ping Test (Triggers ICMP Rule)

On the **attacker machine**, run:

```
ping <target_ip>
```

2 - SSH Connection Attempt (Triggers SSH Rule)

On the **attacker machine**, run:

```
ssh <target-IP>
```

**ADD Forward server to monitor logs in splunk enterprise server**

**# sudo add forward-server 192.168.100.3:9997**

**Splunk username: admin**

**Password: admin@123**

```
splunk_uf@splunkufserver:/$ cd /opt/splunkforwarder/bin
splunk_uf@splunkufserver:/opt/splunkforwarder/bin$ sudo ./splunk add forward-server 192.168.100.3:9997
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R splunkfwd:splunkfwd /opt/splunkforwarder"
Your session is invalid.  Please login.
Splunk username: admin
Password:
```

Add file/directory to be monitored

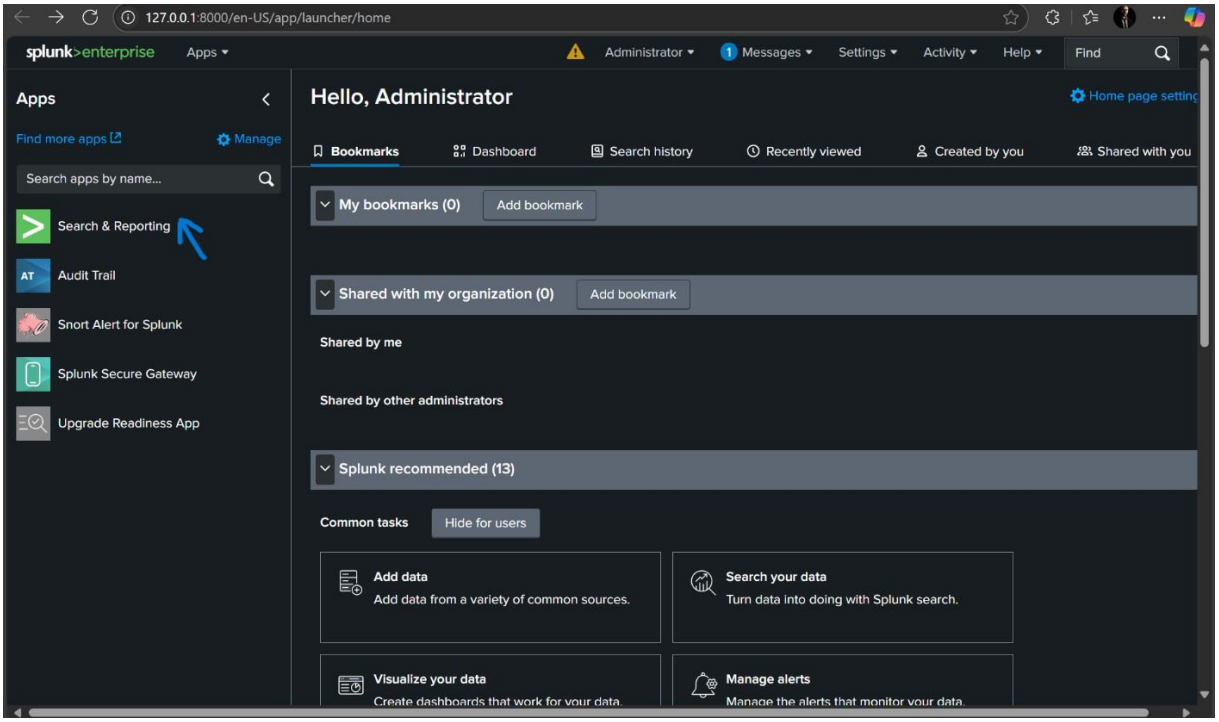
# sudo ./splunk add monitor /var/log/snort -auth admin:admin@123

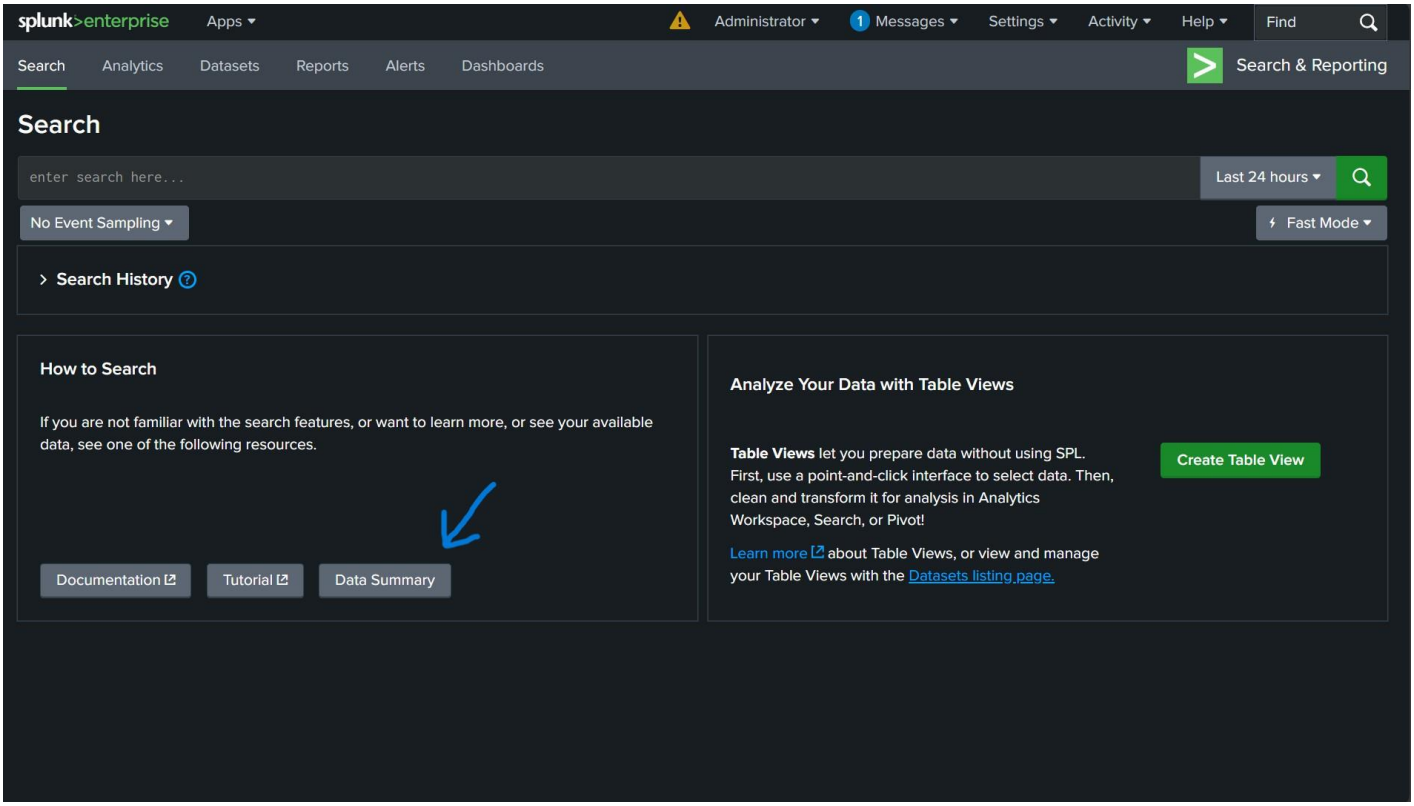
```
splunk_uf@splunkufserver:/opt/splunkforwarder/bin$ sudo ./splunk add  monitor /var/log/snort/alert -auth admin:admin@123
Warning: Attempting to revert the SPLUNK_HOME ownership
Warning: Executing "chown -R splunkfwd:splunkfwd /opt/splunkforwarder"
Added monitor of '/var/log/snort/alert'.
splunk_uf@splunkufserver:/opt/splunkforwarder/bin$
```

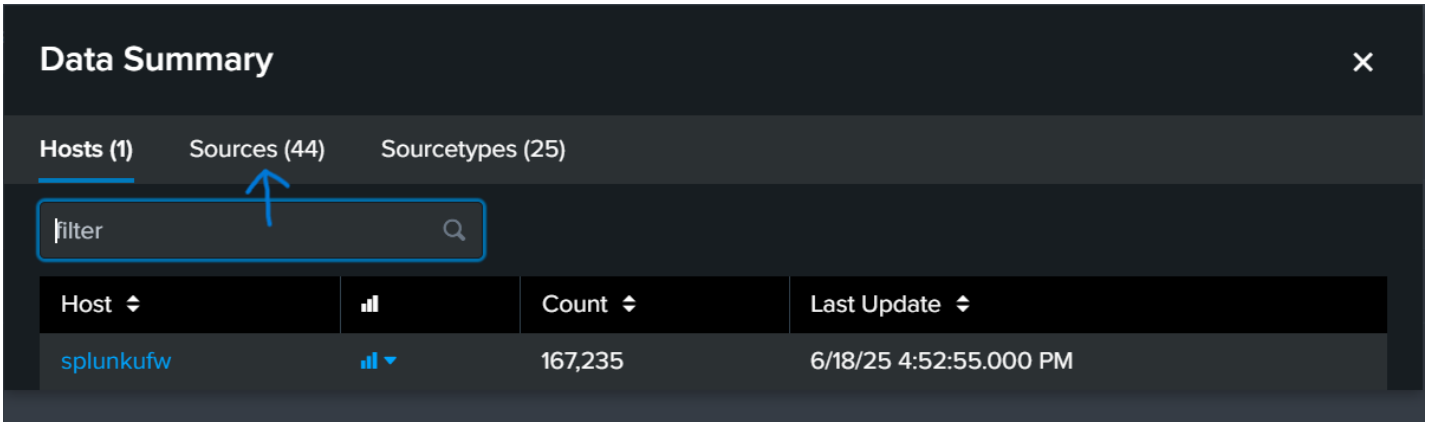
**Then restart splunk**

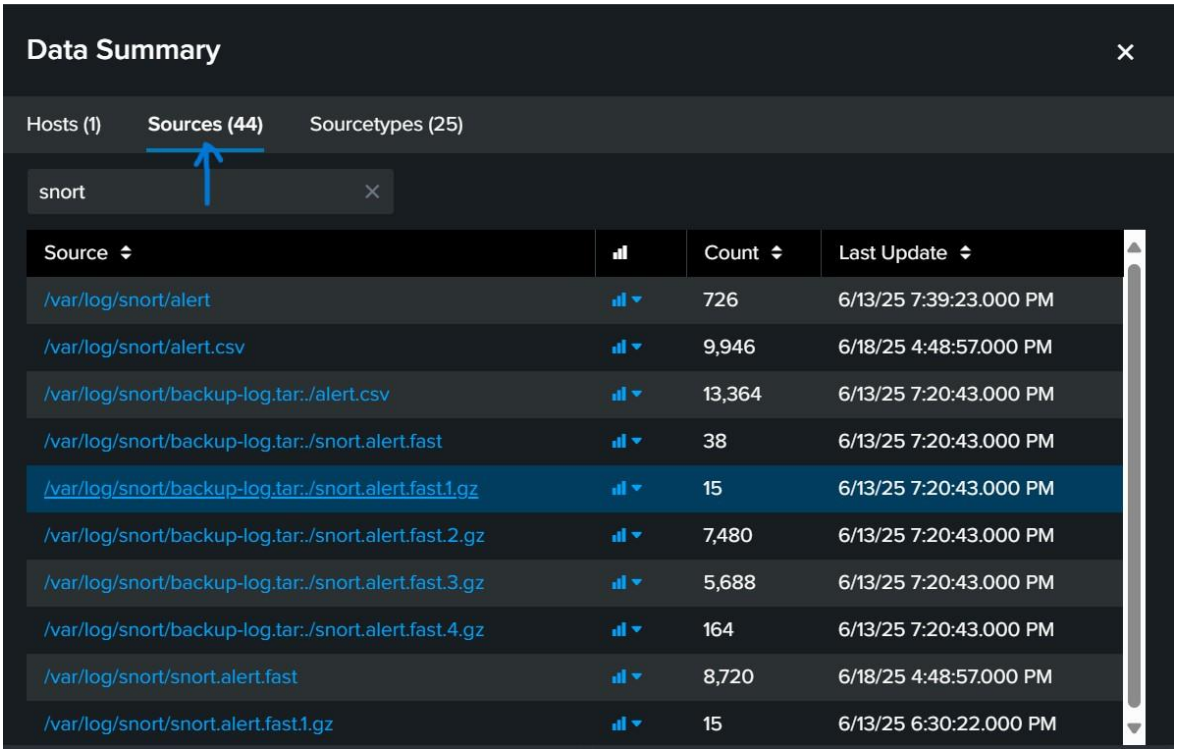
**# sudo ./splunk restart**

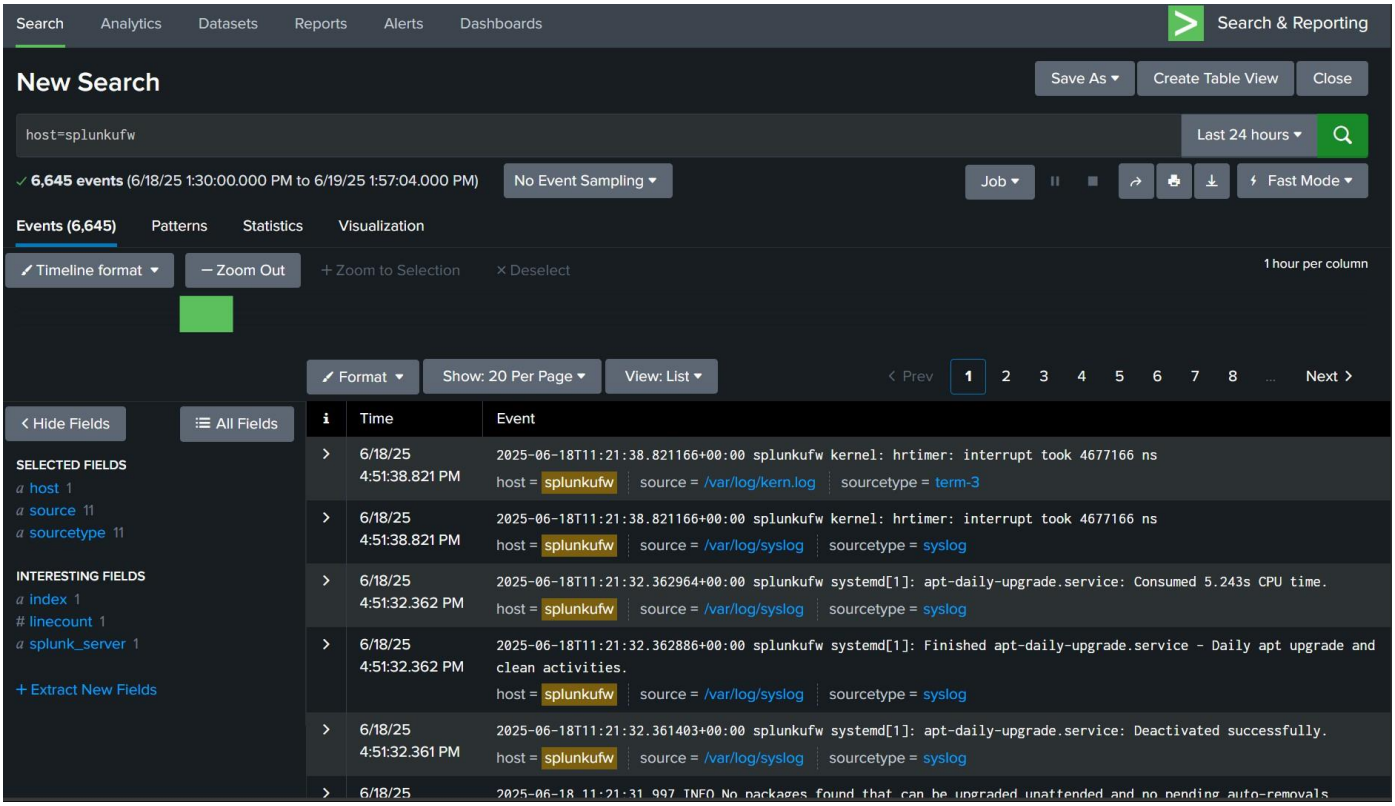
**Login to splunk enterprise server and follow below instruction to monitor Snort integrated logs.**




splunk>enterprise
Apps
Administrator
1 Messages
Settings
Activity
Help
Find
Search
Analytics
Datasets
Reports
Alerts
Dashboards
Search & Reporting
Search
enter search here...
Last 24 hours
No Event Sampling
Fast Mode
Search History
How to Search
If you are not familiar with the search features, or want to learn more, or see your available data, see one of the following resources.
Documentation
Tutorial
Data Summary
Analyze Your Data with Table Views
Table Views let you prepare data without using SPL. First, use a point-and-click interface to select data. Then, clean and transform it for analysis in Analytics Workspace, Search, or Pivot!
Create Table View
Learn more about Table Views, or view and manage your Table Views with the Datasets listing page.


Data Summary
Hosts (1)
Sources (44)
Sourcetypes (25)
filter
Host
Count
Last Update
splunkufw
167,235
6/18/25 4:52:55.000 PM


Data Summary
Hosts (1)
Sources (44)
Sourcetypes (25)
snort
Source
Count
Last Update
/var/log/snort/alert 726 6/13/25 7:39:23.000 PM
/var/log/snort/alert.csv 9,946 6/18/25 4:48:57.000 PM
/var/log/snort/backup-log.tar:./alert.csv 13,364 6/13/25 7:20:43.000 PM
/var/log/snort/backup-log.tar:./snort.alert.fast 38 6/13/25 7:20:43.000 PM
/var/log/snort/backup-log.tar:./snort.alert.fast.1.gz 15 6/13/25 7:20:43.000 PM
/var/log/snort/backup-log.tar:./snort.alert.fast.2.gz 7,480 6/13/25 7:20:43.000 PM
/var/log/snort/backup-log.tar:./snort.alert.fast.3.gz 5,688 6/13/25 7:20:43.000 PM
/var/log/snort/backup-log.tar:./snort.alert.fast.4.gz 164 6/13/25 7:20:43.000 PM
/var/log/snort/snort.alert.fast 8,720 6/18/25 4:48:57.000 PM
/var/log/snort/snort.alert.fast.1.gz 15 6/13/25 6:30:22.000 PM




✅ **Summary:**

- Installed Snort IDS on Ubuntu
- Configured directories, interfaces, and `snort.conf`
- Wrote and tested rules for ICMP ping, SSH login attempts, and HTTP requests
- Verified real-time alerts in console mode
  This practical implementation strengthened my skills in network security and intrusion detection.

# 🎯 Project Objective

This project aims to simulate and detect real-time network threats using **Snort IDS** installed on Ubuntu, and send those alerts to **Splunk Enterprise** for centralized log analysis and real-time monitoring — just like a real SOC environment.

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🔐 Focus: Threat Detection | Splunk | IDS/IPS | Real-Time Monitoring