Suricata NIDS Tools: Setup and Alert Workflow Report

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Prepared By: Nelson M. Mosisah

1. Summary

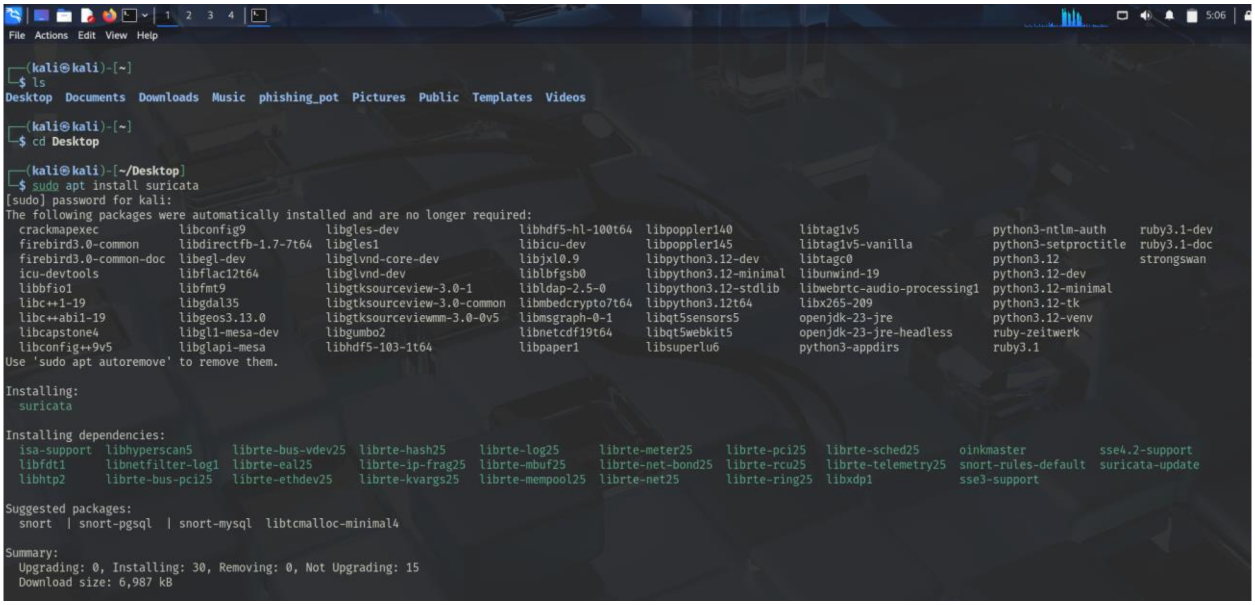
Suricata is an advanced, open-source network intrusion detection and prevention system (NIDS/NIPS) developed by the Open Information Security Foundation (OISF). It provides real-time packet analysis, protocol identification, and alert generation for suspicious network activity. This report outlines the steps to install, configure, and test Suricata, including the creation and verification of a custom detection rule.

2. Installing Suricata

Suricata must be installed on the target host system. Use the package manager appropriate for your operating system.

For Kali Linux/Debian:

```
sudo apt update
sudo apt install suricata
```

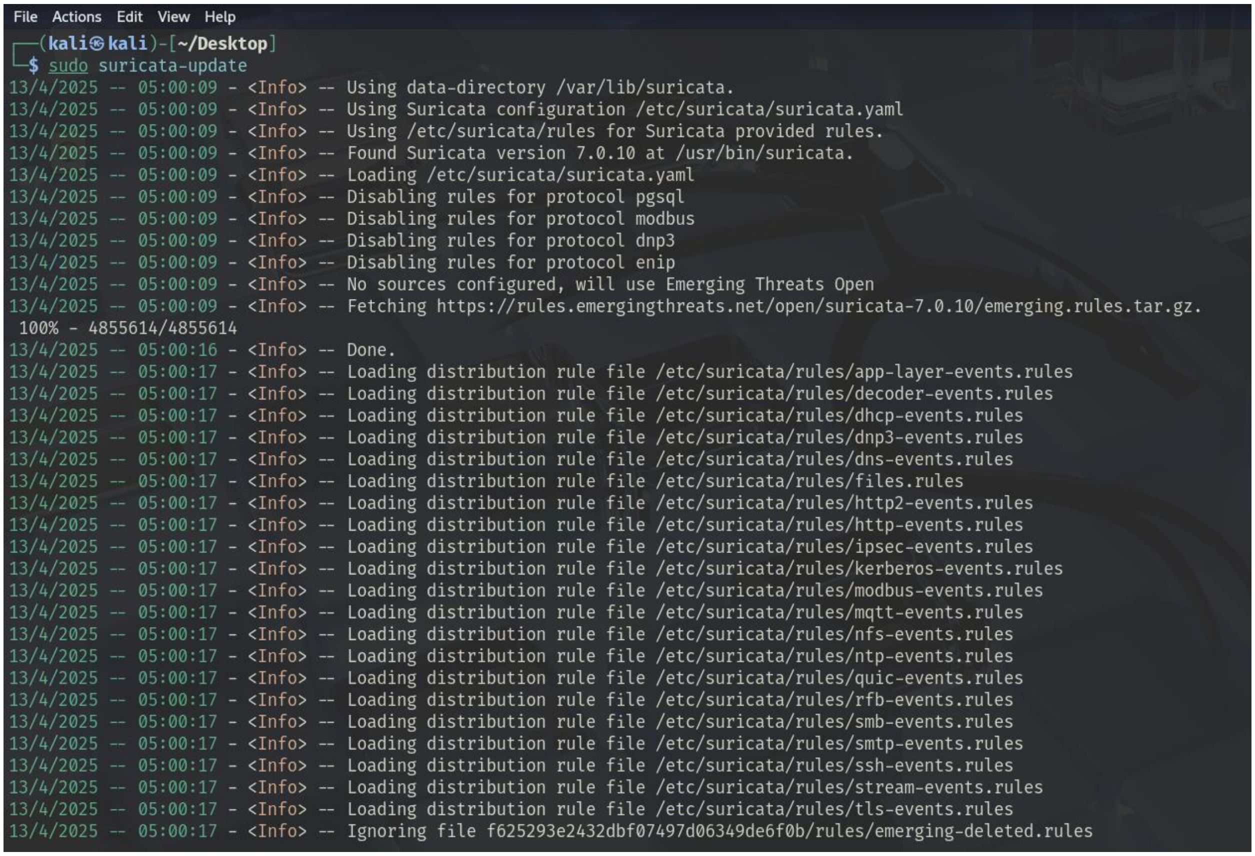


```
┌──(kali㉿kali)-[~]
└─$ ls
Desktop  Documents  Downloads  Music  phishing_pot  Pictures  Public  Templates  Videos

┌──(kali㉿kali)-[~]
└─$ cd Desktop

┌──(kali㉿kali)-[~/Desktop]
└─$ sudo apt install suricata
[sudo] password for kali:
The following packages were automatically installed and are no longer required:
  crackmapexec           libconfig9           libgles-dev                 libhdf5-hl-100t64 libpoppler140         libtag1v5                   python3-ntlm-auth    ruby3.1-dev
  firebird3.0-common     libdirectfb-1.7-7t64 libgles1                    libicu-dev        libpoppler145         libtag1v5-vanilla           python3-setproctitle ruby3.1-doc
  firebird3.0-common-doc libegl-dev           libglvnd-core-dev           libjxl0.9         libpython3.12-dev     libtagc0                    python3.12           strongswan
  icu-devtools           libflac12t64         libglvnd-dev                liblbfgsb0        libpython3.12-minimal libunwind-19                python3.12-dev
  libbfio1               libfmt9              libgtksourceview-3.0-1      libldap-2.5-0     libpython3.12-stdlib  libwebrtc-audio-processing1 python3.12-minimal
  libc++1-19             libgdal35            libgtksourceview-3.0-common libmbedcrypto7t64 libpython3.12t64      libx265-209                 python3.12-tk
  libc++abi1-19          libgeos3.13.0        libgtksourceviewmm-3.0-0v5  libmsgraph-0-1    libqt5sensors5        openjdk-23-jre              python3.12-venv
  libcapstone4           libgl1-mesa-dev      libgumbo2                   libnetcdf19t64    libqt5webkit5         openjdk-23-jre-headless     ruby-zeitwerk
  libconfig++9v5         libglapi-mesa        libhdf5-103-1t64            libpaper1         libsuperlu6           python3-appdirs             ruby3.1
Use 'sudo apt autoremove' to remove them.

Installing:
  suricata

Installing dependencies:
  isa-support  libhyperscan5     librte-bus-vdev25 librte-hash25    librte-log25     librte-meter25    librte-pci25  librte-sched25     oinkmaster          sse4.2-support
  libfdt1      libnetfilter-log1 librte-eal25      librte-ip-frag25 librte-mbuf25    librte-net-bond25 librte-rcu25  librte-telemetry25 snort-rules-default suricata-update
  libhtp2      librte-bus-pci25  librte-ethdev25   librte-kvargs25  librte-mempool25 librte-net25      librte-ring25 libxdp1            sse3-support

Suggested packages:
  snort  | snort-pgsql  | snort-mysql  libtcmalloc-minimal4

Summary:
  Upgrading: 0, Installing: 30, Removing: 0, Not Upgrading: 15
  Download size: 6,987 kB
```

3. Updating Suricata

To ensure you have the latest threat detection capabilities, update the rule sets using sudo

```
sudo suricata-update
```



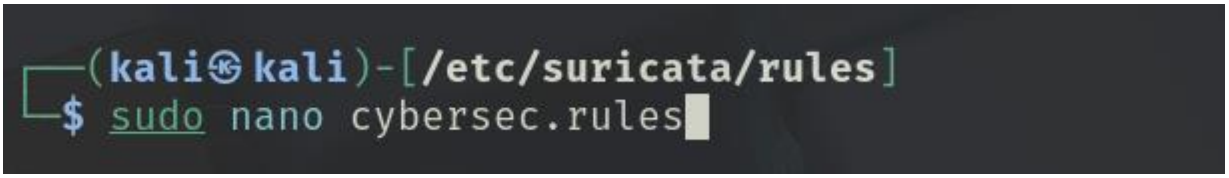
```
┌──(kali㉿kali)-[~/Desktop]
└─$ sudo suricata-update
13/4/2025 -- 05:00:09 - <Info> -- Using data-directory /var/lib/suricata.
13/4/2025 -- 05:00:09 - <Info> -- Using Suricata configuration /etc/suricata/suricata.yaml
13/4/2025 -- 05:00:09 - <Info> -- Using /etc/suricata/rules for Suricata provided rules.
13/4/2025 -- 05:00:09 - <Info> -- Found Suricata version 7.0.10 at /usr/bin/suricata.
13/4/2025 -- 05:00:09 - <Info> -- Loading /etc/suricata/suricata.yaml
13/4/2025 -- 05:00:09 - <Info> -- Disabling rules for protocol pgsql
13/4/2025 -- 05:00:09 - <Info> -- Disabling rules for protocol modbus
13/4/2025 -- 05:00:09 - <Info> -- Disabling rules for protocol dnp3
13/4/2025 -- 05:00:09 - <Info> -- Disabling rules for protocol enip
13/4/2025 -- 05:00:09 - <Info> -- No sources configured, will use Emerging Threats Open
13/4/2025 -- 05:00:09 - <Info> -- Fetching https://rules.emergingthreats.net/open/suricata-7.0.10/emerging.rules.tar.gz.
 100% - 4855614/4855614
13/4/2025 -- 05:00:16 - <Info> -- Done.
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/app-layer-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/decoder-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/dhcp-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/dnp3-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/dns-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/files.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/http2-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/http-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/ipsec-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/kerberos-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/modbus-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/mqtt-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/nfs-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/ntp-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/quic-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/rfb-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/smb-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/smtp-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/ssh-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/stream-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Loading distribution rule file /etc/suricata/rules/tls-events.rules
13/4/2025 -- 05:00:17 - <Info> -- Ignoring file f625293e2432dbf07497d06349de6f0b/rules/emerging-deleted.rules
```

This command downloads current community rules, such as those from Emerging Threats.

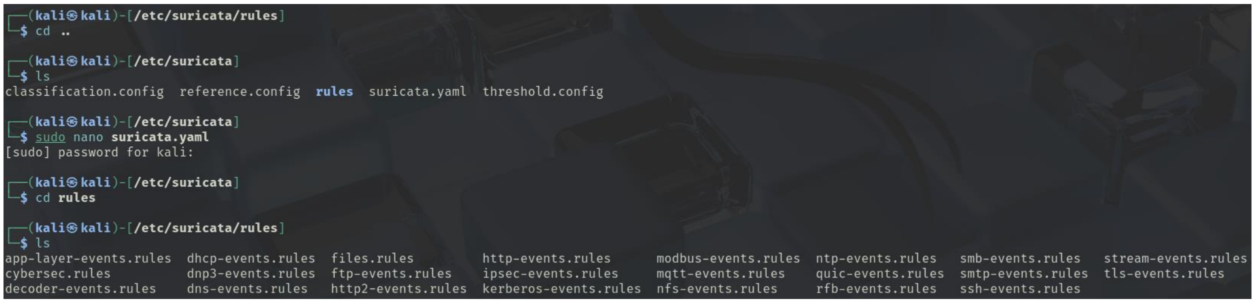
4. Setting a New Rule Destination

Custom rules are typically stored in:

```
/etc/suricata/rules/
```



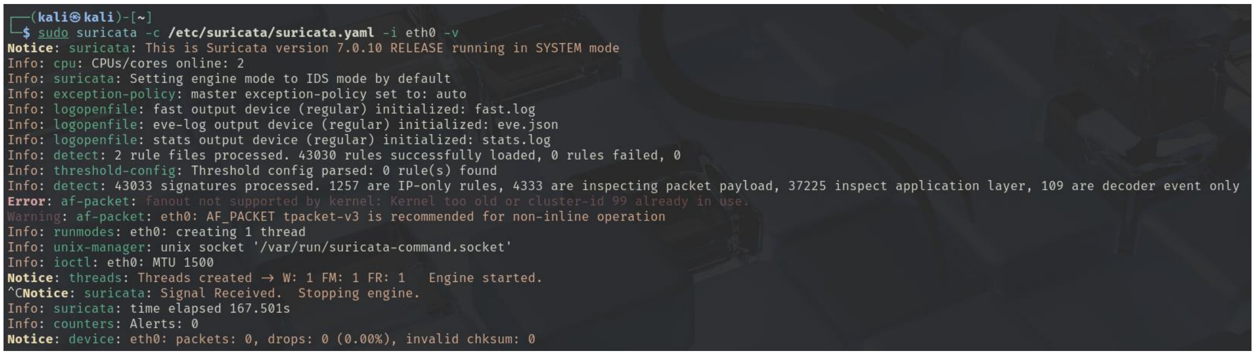
```
┌──(kali㉿kali)-[/etc/suricata/rules]
└─$ sudo nano cybersec.rules
```



```
┌──(kali㉿kali)-[/etc/suricata/rules]
└─$ cd ..

┌──(kali㉿kali)-[/etc/suricata]
└─$ ls
classification.config  reference.config  rules  suricata.yaml  threshold.config

┌──(kali㉿kali)-[/etc/suricata]
└─$ sudo nano suricata.yaml
[sudo] password for kali:

┌──(kali㉿kali)-[/etc/suricata]
└─$ cd rules

┌──(kali㉿kali)-[/etc/suricata/rules]
└─$ ls
app-layer-events.rules  dhcp-events.rules  files.rules        http-events.rules      modbus-events.rules  ntp-events.rules   smb-events.rules   stream-events.rules
cybersec.rules          dnp3-events.rules  ftp-events.rules   ipsec-events.rules     mqtt-events.rules    quic-events.rules  smtp-events.rules  tls-events.rules
decoder-events.rules    dns-events.rules   http2-events.rules kerberos-events.rules  nfs-events.rules     rfb-events.rules   ssh-events.rules
```

Ensure this file is referenced in the main configuration file:

```
/etc/suricata/suricata.yaml
```

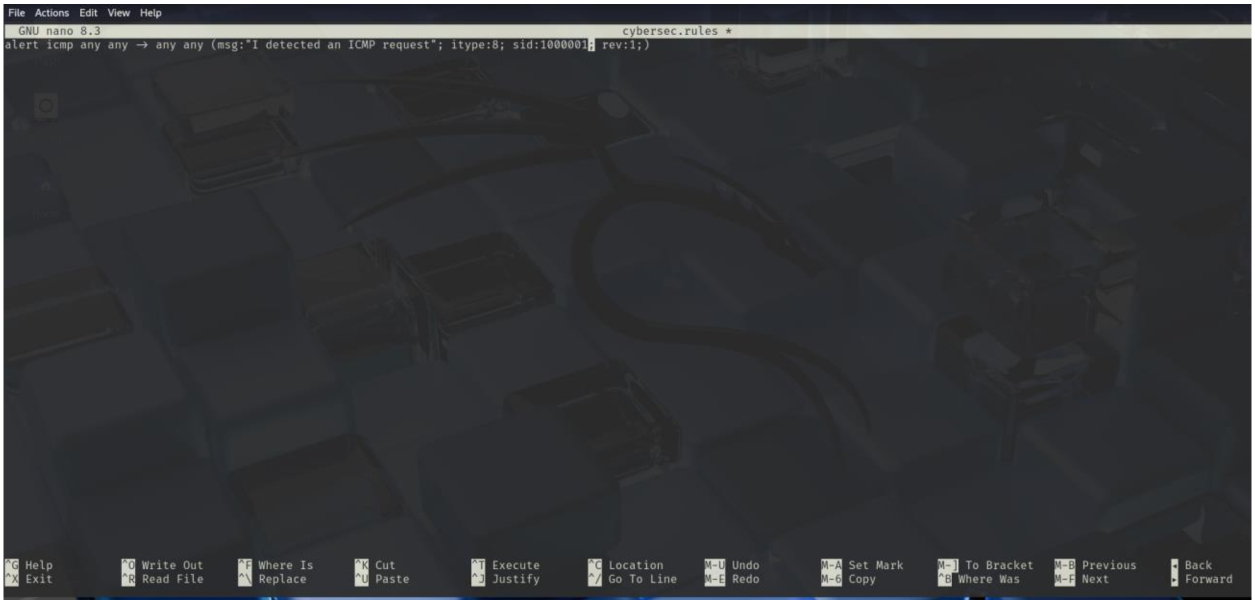


```
┌──(kali㉿kali)-[~]
└─$ sudo suricata -c /etc/suricata/suricata.yaml -i eth0 -v
Notice: suricata: This is Suricata version 7.0.10 RELEASE running in SYSTEM mode
Info: cpu: CPUs/cores online: 2
Info: suricata: Setting engine mode to IDS mode by default
Info: exception-policy: master exception-policy set to: auto
Info: logopenfile: fast output device (regular) initialized: fast.log
Info: logopenfile: eve-log output device (regular) initialized: eve.json
Info: logopenfile: stats output device (regular) initialized: stats.log
Info: detect: 2 rule files processed. 43030 rules successfully loaded, 0 rules failed, 0
Info: threshold-config: Threshold config parsed: 0 rule(s) found
Info: detect: 43033 signatures processed. 1257 are IP-only rules, 4333 are inspecting packet payload, 37225 inspect application layer, 109 are decoder event only
Error: af-packet: fanout not supported by kernel: Kernel too old or cluster-id 99 already in use.
Warning: af-packet: eth0: AF_PACKET tpacket-v3 is recommended for non-inline operation
Info: runmodes: eth0: creating 1 thread
Info: unix-manager: unix socket '/var/run/suricata-command.socket'
Info: ioctl: eth0: MTU 1500
Notice: threads: Threads created → W: 1 FM: 1 FR: 1   Engine started.
^CNotice: suricata: Signal Received.  Stopping engine.
Info: suricata: time elapsed 167.501s
Info: counters: Alerts: 0
Notice: device: eth0: packets: 0, drops: 0 (0.00%), invalid chksum: 0
```

5. Adding a New Rule

Add a basic ICMP alert rule to detect ping traffic:

```
alert icmp any any -> any any (msg:"I detected an ICMP request"; itype:8; sid:1000001; rev:1)
```



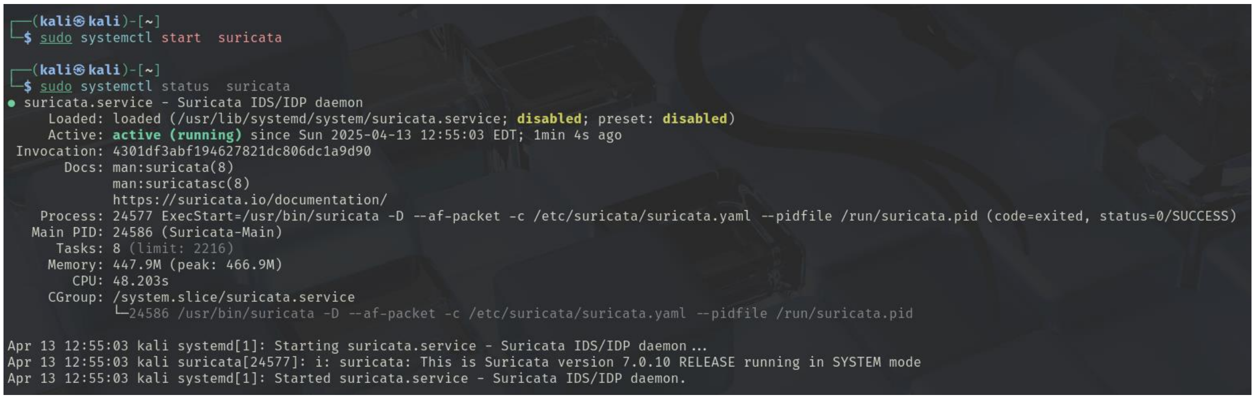
```
alert icmp any any → any any (msg:"I detected an ICMP request"; itype:8; sid:1000001; rev:1;)
```

This rule instructs Suricata to generate an alert whenever an ICMP packet is detected.

6. Starting the Suricata Service

Begin monitoring traffic using the correct network interface:

```
sudo systemctl start suricata
# OR
sudo suricata -c /etc/suricata/suricata.yaml -i eth0
```

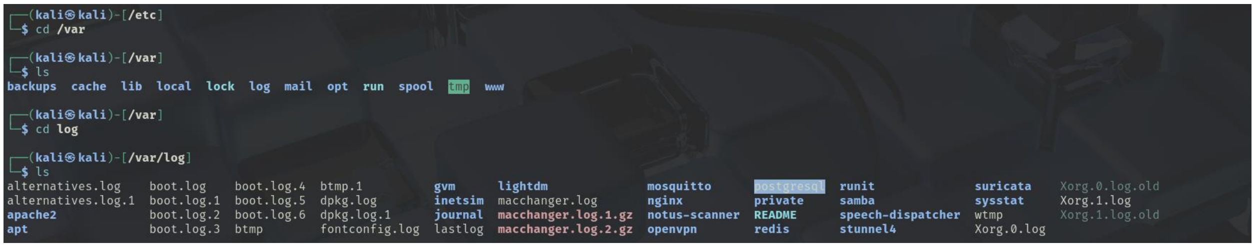


```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl start  suricata

┌──(kali㉿kali)-[~]
└─$ sudo systemctl status  suricata
● suricata.service - Suricata IDS/IDP daemon
     Loaded: loaded (/usr/lib/systemd/system/suricata.service; disabled; preset: disabled)
     Active: active (running) since Sun 2025-04-13 12:55:03 EDT; 1min 4s ago
 Invocation: 4301df3abf194627821dc806dc1a9d90
       Docs: man:suricata(8)
             man:suricatasc(8)
             https://suricata.io/documentation/
    Process: 24577 ExecStart=/usr/bin/suricata -D --af-packet -c /etc/suricata/suricata.yaml --pidfile /run/suricata.pid (code=exited, status=0/SUCCESS)
   Main PID: 24586 (Suricata-Main)
      Tasks: 8 (limit: 2216)
     Memory: 447.9M (peak: 466.9M)
        CPU: 48.203s
     CGroup: /system.slice/suricata.service
             └─24586 /usr/bin/suricata -D --af-packet -c /etc/suricata/suricata.yaml --pidfile /run/suricata.pid

Apr 13 12:55:03 kali systemd[1]: Starting suricata.service - Suricata IDS/IDP daemon...
Apr 13 12:55:03 kali suricata[24577]: i: suricata: This is Suricata version 7.0.10 RELEASE running in SYSTEM mode
Apr 13 12:55:03 kali systemd[1]: Started suricata.service - Suricata IDS/IDP daemon.
```

7. Running Suricata

Confirm Suricata is running and parsing traffic:

```
/var/log/suricata/suricata.log
```



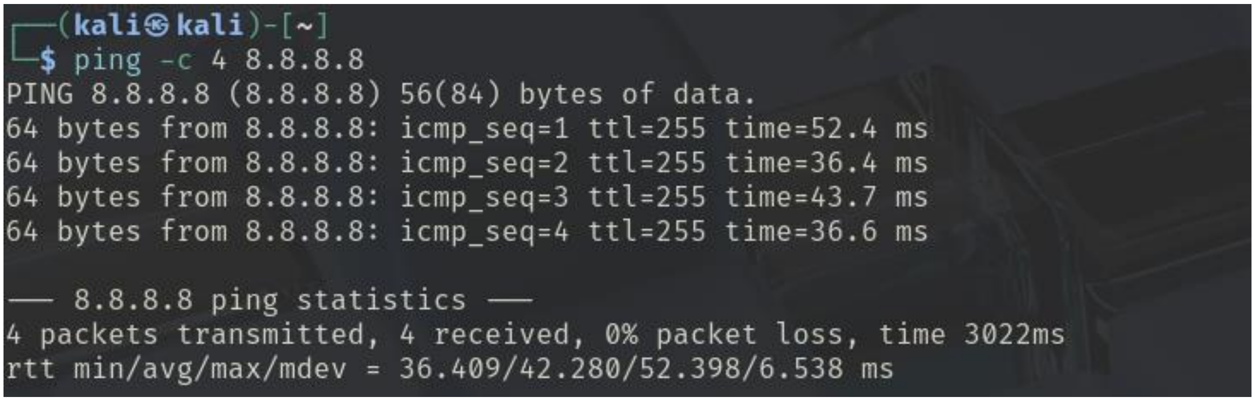
```
┌──(kali㉿kali)-[/etc]
└─$ cd /var

┌──(kali㉿kali)-[/var]
└─$ ls
backups  cache  lib  local  lock  log  mail  opt  run  spool  tmp  www

┌──(kali㉿kali)-[/var]
└─$ cd log

┌──(kali㉿kali)-[/var/log]
└─$ ls
alternatives.log    boot.log    boot.log.4  btmp.1          gvm      lightdm             mosquitto      postgresql  runit              suricata    Xorg.0.log.old
alternatives.log.1  boot.log.1  boot.log.5  dpkg.log        inetsim  macchanger.log      nginx          private     samba              sysstat     Xorg.1.log
apache2             boot.log.2  boot.log.6  dpkg.log.1      journal  macchanger.log.1.gz notus-scanner  README      speech-dispatcher  wtmp        Xorg.1.log.old
apt                 boot.log.3  btmp        fontconfig.log  lastlog  macchanger.log.2.gz openvpn        redis       stunnel4           Xorg.0.log
```

Watch for log entries indicating rule loading and live traffic capture.

8. Triggering the Alert

To verify that the custom rule is functioning, initiate traffic that matches the rule. For the ICMP rule:

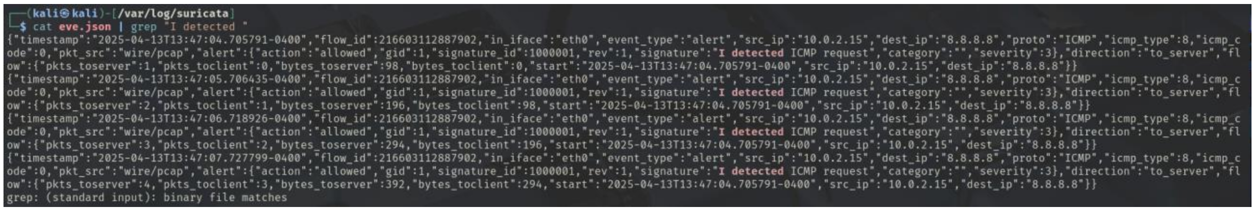
```
ping -c 4 8.8.8.8
```



```
┌──(kali㉿kali)-[~]
└─$ ping -c 4 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=255 time=52.4 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=255 time=36.4 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=255 time=43.7 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=255 time=36.6 ms

--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3022ms
rtt min/avg/max/mdev = 36.409/42.280/52.398/6.538 ms
```

9. Investigating the Alert

Review Suricata’s alert log to confirm that the rule was triggered:
Example Output:



```
┌──(kali㉿kali)-[/var/log/suricata]
└─$ cat eve.json | grep "I detected "
{"timestamp":"2025-04-13T13:47:04.705791-0400","flow_id":216603112887902,"in_iface":"eth0","event_type":"alert","src_ip":"10.0.2.15","dest_ip":"8.8.8.8","proto":"ICMP","icmp_type":8,"icmp_c
ode":0,"pkt_src":"wire/pcap","alert":{"action":"allowed","gid":1,"signature_id":1000001,"rev":1,"signature":"I detected ICMP request","category":"","severity":3},"direction":"to_server","fl
ow":{"pkts_toserver":1,"pkts_toclient":0,"bytes_toserver":98,"bytes_toclient":0,"start":"2025-04-13T13:47:04.705791-0400","src_ip":"10.0.2.15","dest_ip":"8.8.8.8"}}
{"timestamp":"2025-04-13T13:47:05.706435-0400","flow_id":216603112887902,"in_iface":"eth0","event_type":"alert","src_ip":"10.0.2.15","dest_ip":"8.8.8.8","proto":"ICMP","icmp_type":8,"icmp_c
ode":0,"pkt_src":"wire/pcap","alert":{"action":"allowed","gid":1,"signature_id":1000001,"rev":1,"signature":"I detected ICMP request","category":"","severity":3},"direction":"to_server","fl
ow":{"pkts_toserver":2,"pkts_toclient":1,"bytes_toserver":196,"bytes_toclient":98,"start":"2025-04-13T13:47:04.705791-0400","src_ip":"10.0.2.15","dest_ip":"8.8.8.8"}}
{"timestamp":"2025-04-13T13:47:06.718926-0400","flow_id":216603112887902,"in_iface":"eth0","event_type":"alert","src_ip":"10.0.2.15","dest_ip":"8.8.8.8","proto":"ICMP","icmp_type":8,"icmp_c
ode":0,"pkt_src":"wire/pcap","alert":{"action":"allowed","gid":1,"signature_id":1000001,"rev":1,"signature":"I detected ICMP request","category":"","severity":3},"direction":"to_server","fl
ow":{"pkts_toserver":3,"pkts_toclient":2,"bytes_toserver":294,"bytes_toclient":196,"start":"2025-04-13T13:47:04.705791-0400","src_ip":"10.0.2.15","dest_ip":"8.8.8.8"}}
{"timestamp":"2025-04-13T13:47:07.727799-0400","flow_id":216603112887902,"in_iface":"eth0","event_type":"alert","src_ip":"10.0.2.15","dest_ip":"8.8.8.8","proto":"ICMP","icmp_type":8,"icmp_c
ode":0,"pkt_src":"wire/pcap","alert":{"action":"allowed","gid":1,"signature_id":1000001,"rev":1,"signature":"I detected ICMP request","category":"","severity":3},"direction":"to_server","fl
ow":{"pkts_toserver":4,"pkts_toclient":3,"bytes_toserver":392,"bytes_toclient":294,"start":"2025-04-13T13:47:04.705791-0400","src_ip":"10.0.2.15","dest_ip":"8.8.8.8"}}
grep: (standard input): binary file matches
```

For detailed or structured logs (e.g., for SIEM ingestion), refer to:

```
/var/log/suricata/eve.json
```

Conclusion

This workflow demonstrates a successful Suricata deployment for basic threat detection. By installing and configuring Suricata, updating rules, adding a custom detection rule, and verifying alert functionality, I’ve built a foundation for further network defense. Suricata can now be expanded for full intrusion detection, threat hunting, and integration with tools such as ELK Stack, Splunk, or SIEM solutions.

Report Prepared by:

Nelson Mbua Mosisah

Cybersecurity Analyst