# SURICATA IDS/IPS INSTALLATION AND DETECTION RULES CREATION

This document demonstrates the installation of the Suricata IDS/IPS platform as well as the creation of detection rules to notify when malicious activities occur on the network

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## Installation:

I used the command sudo apt install suricata to install suricata.

```
(kali⊗kali-suricata)-[~]

$ <u>sudo</u> apt install suricata

[sudo] password for kali:

Reading package lists ... Done

Building dependency tree ... Done

Reading state information ... Done
```

# **Verify Suricata version:**

I used the command *sudo suricata –build-info* to ensure that the correct version of Suricata installed successfully.

```
___(kali⊕ kali-suricata)-[~]

$\frac{\sudo}{\suricata} \text{sudo} \text{suricata} \text{--build-info}

This is Suricata version 7.0.2 RELEASE
```

## **Start Service:**

I used the command *sudo service suricata start* to start the service.

```
___(kali⊕ kali-suricata)-[~]
$ <u>sudo</u> service suricata start
```

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## **Verify Suricata service status:**

I used the command systemctl status suricata to verify that the service was running.

## **View Suricata directory:**

I viewed the Suricata directory.

```
-(kali®kali-suricata)-[~]
└─$ ls -al /etc/suricata
total 116
            3 root root 4096 Feb 15 20:19 .
drwxr-xr-x
drwxr-xr-x 186 root root 12288 Feb 15 20:19 ...
            1 root root 3327 Oct 18 10:25 classification.config
-rw-r--r--
            1 root root 1375 Oct 18 10:25 reference.config
-rw-r--r--
drwxr-xr-x 2 root root 4096 Feb 15 20:19 rules
            1 root root 84915 Feb 2 14:35 suricata.yaml
-rw-r--r--
-rw-r--r--
            1 root root 1643 Oct 18 10:25 threshold.config
  -(kali®kali-suricata)-[~]
```

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## **View Suricata rules:**

I viewed the Suricata rules directory and its contents.

```
-(kali⊕kali-suricata)-[~]
$\text{ls -al /etc/suricata/rules}
total 152
drwxr-xr-x 2 root root 4096 Feb 15 20:19 .
drwxr-xr-x 3 root root 4096 Feb 15 20:19 ...
-rw-r--r-- 1 root root 1858 Oct 18 10:25 app-layer-events.rules
-rw-r--r-- 1 root root 20880 Oct 18 10:25 decoder-events.rules
-rw-r--r 1 root root 468 Oct 18 10:25 dhcp-events.rules
-rw-r--r-- 1 root root 1221 Oct 18 10:25 dnp3-events.rules
-rw-r--r-- 1 root root 1198 Oct 18 10:25 dns-events.rules
-rw-r--r-- 1 root root 4005 Oct 18 10:25 files.rules
-rw-r--r 1 root root 446 Oct 18 10:25 ftp-events.rules
-rw-r--r-- 1 root root 14256 Oct 18 10:25 http-events.rules
-rw-r--r-- 1 root root 2707 Oct 18 10:25 http2-events.rules
-rw-r--r-- 1 root root 2832 Oct 18 10:25 ipsec-events.rules
-rw-r--r-- 1 root root 585 Oct 18 10:25 kerberos-events.rules
-rw-r--r-- 1 root root 2077 Oct 18 10:25 modbus-events.rules
-rw-r--r-- 1 root root 2187 Oct 18 10:25 mqtt-events.rules
-rw-r--r-- 1 root root 729 Oct 18 10:25 nfs-events.rules
-rw-r--r-- 1 root root 558 Oct 18 10:25 ntp-events.rules
-rw-r--r-- 1 root root 544 Oct 18 10:25 quic-events.rules
-rw-r--r-- 1 root root 926 Oct 18 10:25 rfb-events.rules
-rw-r--r-- 1 root root 4607 Oct 18 10:25 smb-events.rules
-rw-r--r-- 1 root root 5393 Oct 18 10:25 smtp-events.rules
-rw-r--r-- 1 root root 719 Oct 18 10:25 ssh-events.rules
-rw-r--r 1 root root 14311 Oct 18 10:25 stream-events.rules
-rw-r--r-- 1 root root 6861 Oct 18 10:25 tls-events.rules
```

# **Update Suricata/download rules:**

I updated Suricata and ensured all up to date rules were downloaded.

```
(kali@ kali-suricata)-[/etc/suricata/rules]
$ sudo suricata-update
15/2/2024 -- 21:34:15 - <Info> -- Using data-directory /var/lib/suricata.
15/2/2024 -- 21:34:15 - <Info> -- Using Suricata configuration /etc/suricata/curicata.
```

# **Editing the Suricata .yaml file:**

I inspected the Suricata .yaml file and added in my own custom rules file which I named "custom.rules"

```
# Suricata configuration file. In addition to the comments describing all
# options in this file, full documentation can be found at:
# https://docs.suricata.io/en/latest/configuration/suricata-yaml.html

# This configuration file generated by Suricata 7.0.2.
suricata-version: "7.0"

##
## ## Step 1: Inform Suricata about your network
##

vars:
# more specific is better for alert accuracy and performance
address-groups:
HOME_NET: "192.168.0.0/16,10.0.0.0/8,172.16.0.0/12]"
#HOME_NET: "[192.168.0.0/16]"
#HOME_NET: "[19.168.0.0/16]"
#HOME_NET: "[172.16.0.0/12]"
#HOME_NET: "[172.16.0.0/12]"
#HOME_NET: "any"

EXTERNAL_NET: "1$HOME_NET"
#EXTERNAL_NET: "any"
```

# Modify custom rules file that I created:

I opened my custom rules file in VIM

```
(kali® kali-suricata)-[/etc/suricata/rules]
$ sudo vim /etc/suricata/rules/custom.rules
```

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#### **Create custom rule:**

I began to create custom rules.

# **Test that my rules load correctly in Suricata:**

This command will tell me if there are any basic errors in my custom rules.

```
(kali@kali-suricata)-[/etc/suricata/rules]
$ sudo suricata -T -c /etc/suricata/suricata.yaml -v
```

# **Testing rule from local machine:**

I sent a ping from my host machine to trigger the alert that I created.

```
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Jorda>ping 192.168.20.131

Pinging 192.168.20.131 with 32 bytes of data:
Reply from 192.168.20.131: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.20.131:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

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# Suricata log directory review:

I opened the logs directory and opened the fast.log file. I found that my rule worked and alerted that a Ping came from an external device (my host machine).

```
(kali⊗ kali-suricata)-[/etc/suricata/rules]

$ sudo cat /var/log/suricata/fast.log

02/15/2024-21:44:48.685133 [**] [1:2013028:7] ET POLICY curl User-Agent Outb ound [**] [Classification: Attempted Information Leak] [Priority: 2] {TCP} 19

2.168.20.131:40696 → 18.67.39.128:80

02/15/2024-21:45:38.135622 [**] [1:2013028:7] ET POLICY curl User-Agent Outb ound [**] [Classification: Attempted Information Leak] [Priority: 2] {TCP} 19

2.168.20.131:50920 → 18.67.39.97:80

02/15/2024-21:45:38.136771 [**] [1:2100498:7] GPL ATTACK_RESPONSE id check r eturned root [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TC P} 18.67.39.97:80 → 192.168.20.131:50920

02/15/2024-22:06:59.035735 [**] [1:1:1] ICMP Ping [**] [Classification: (null)] [Priority: 3] {ICMP} 192.168.20.1:8 → 192.168.20.131:0

02/15/2024-22:06:59.035992 [**] [1:1:1] ICMP Ping [**] [Classification: (null)] [Priority: 3] {ICMP} 192.168.20.131:0 → 192.168.20.1:0
```

# **IDS/IPS Rules**

## Screenshot of all rules that I created:

```
#Alert ICMP (ping) traffic
alert icmp only any → $HOME_NET any (msg: "Dossible DDOS attack"; flags; s; flow: stateless; threshold: type both, track
alert top any any → $HOME_NET and (msg: "Possible DDOS attack"; flags; s; flow: stateless; threshold: type both, track
alert top any any → $HOME_NET and (msg: "Possible DDOS attack"; flags; s; flow: stateless; threshold: type both, track
alert top any any → any any (msg: "Possible SQL Injection attack (Contains singlequote)"; flow: established, to_server; content: "'; mocase; http.uri; sids' si)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains SELECT)"; flow: established, to_server; content: "'; mocase; http.uri; sids' si)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains SELECT)"; flow: established, to_server; content: "'; mocase; http.uri; sids' si)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains singlequote POST DATA)"; flow: established, to_server; content: "'; mocase; http.client.body; sids: ")
alert http any any → any any (msg: "Possible SQL Injection attack (Contains SELECT)"; flow: established, to_server; content: union'; mocase; http.client.body; sids: ")
alert http any any → any any (msg: "Possible SQL Injection attack (Contains SELECT POST DATA)"; flow:established, to_server; content."
alert https://example.com/phishing: nocase; http.client.body; sids: ")
alert https://example.com/phishing: nocase; http.client.body; sids: ")
alert track any any → any any (msg: "Possible Phishing Attempt (Suspicious Mcyapords)"; flow: established, to_server; content: "injection attack (Contains SELECT POST DATA)"; flow: established, to_server; content: "injection attack (Contains SELECT POST DATA)"; flow: established, to_server; entent: "mark and attempt
alert http any any → any any (msg: "Possible Phishing Attempt (Suspicious Mcyapords)"; flow: established, to_server; content: "injection attack
it injection attack
alert transpar and any any any (msg: "Possible TOR network traffic detected";
```

## 1. Detect DDOS attack:

This rule will alert me if there is a DDOS attack if there are 200 or more SYN tcp packets in a second.

```
#Alert of DDOS Attack
alert tcp any any → $HOME_NET 80 (msg: "Possible DDoS attack"; flags: S; flow: stateless; threshold: type both, track
by_dst, count 200, seconds 1; sid: 2; rev:1;)
```

alert tcp any any -> \$HOME\_NET 80 (msg: "Possible DDoS attack"; flags: S; flow: stateless; threshold: type both, track by\_dst, count 200, seconds 1; sid: 2; rev: 1;)

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# 2. **Detect SQL injection:**

This set of rules will alert me if a SQL injection is attempted.

```
#Alert SQL Injection
alert http any any → any any (msg: "Possible SQL Injection attack (Contains singlequote)"; flow: established, to_serv
er; content: "'"; nocase; http_uri;sid: 3;)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains UNION)"; flow: established, to_server; co
ntent: "union"; nocase; http_uri; sid: 4;)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains SELECT)"; flow: established, to_server; c
ontent: "select"; nocase; http_uri; sid: 5;)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains singlequote POST DATA)"; flow: establishe
d, to_server; content: "'"; nocase; http_client_body; sid: 6;)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains UNION POST DATA)"; flow:established,to_se
rver; content: "union"; nocase; http_client_body; sid:7;)
alert http any any → any any (msg: "Possible SQL Injection attack (Contains SELECT POST DATA)"; flow:established,to_se
erver; content: "select"; nocase; http_client_body; sid:8;)
```

alert http any any -> any any ( msg: "Possible SQL Injection attack (Contains singlequote)"; flow: established, to\_server; content: "'"; nocase; http\_uri; sid: 3;)

alert http any any -> any any (msg: "Possible SQL Injection attack (Contains UNION)"; flow: established, to\_server; content: "union"; nocase; http\_uri; sid: 4;)

alert http any any -> any any (msg: "Possible SQL Injection attack (Contains SELECT)"; flow: established, to\_server; content: "select"; nocase; http\_uri; sid: 5;)

alert http any any -> any any (msg: "Possible SQL Injection attack (Contains singlequote POST DATA)"; flow: established, to\_server; content: "'"; nocase; http\_client\_body; sid: 6;)

alert http any any -> any any (msg: "Possible SQL Injection attack (Contains UNION POST DATA)"; flow: established, to\_server; content: "union"; nocase; http\_client\_body; sid: 7;)

alert http any any -> any any (msg: "Possible SQL Injection attack (Contains SELECT POST DATA)"; flow: established, to\_server; content: "select"; nocase; http\_client\_body; sid: 8;)

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## 3. Detect Phishing Attempts:

These two rules will alert me if a phishing attempt is attempted. If the email contains a malicious URL or a key word such as "password rest", a notification will be logged.

```
#Alert phishing attempt
alert http any any → any any (msg: "Possible Phishing Attempt (Suspicious URL)"; flow: established, to_server; content: "http://example.com/phishing"; nocase; http_uri; sid: 9; rev: 1;)
alert http any any → any any (msg: "Possible Phishing Attempt (Suspicious Keywords)"; flow: established, to_server; content: "password reset"; nocase; http_client_body; sid: 10; rev: 1;)
```

alert http any any -> any any (msg: "Possible Phishing Attempt (Suspicious URL)"; flow: established, to\_server; content: "http://example.com/phishing"; nocase; http\_uri; sid: 9; rev: 1;)

alert http any any -> any any (msg: "Possible Phishing Attempt (Suspicious Keywords)"; flow: established, to\_server; content: "password reset"; nocase; http\_client\_body; sid: 10; rev: 1;)

## 4. Detect Protocol Anomalies:

These rules will alert me if there are anomalies such as http traffic coming in through a port that is not port 80.

```
#Alert Protocol Anomolies

alert tcp any any → any !80 (msg: "SURICATA HTTP on unusual port"; flow: to_server; app-layer-protocol: http; threshold: type limit, track by_src, seconds 60, count 1; sid: 11; rev: 1;)

alert tcp any any → any any (msg: "Possible TCP flow anomaly if ACK or push flags detected within established flow with abnormal delay"; flags: AP; flow: established, to_server; detection_filter: track by_dst, count 2, seconds 30; sid: 12; rev: 1;)
```

alert tcp any any -> any !80 (msg: "SURICATA HTTP on unusual port"; flow: to\_server; app-layer-protocol: http; threshold: type limit, track by\_src, seconds 60, count 1; sid: 11; rev: 1;)

alert tcp any any -> any any (msg: "Possible TCP flow anomaly if ACK or push flags detected within established flow with abnormal delay"; flags: AP; flow: established, to\_server; detection\_filter: track by dst, count 2, seconds 30; sid: 12; rev: 1;)

# 5. Detect unauthorized protocols or traffic:

These rules detect and alert about unauthorized traffic. For example, someone using TOR.

```
#Alert Unauthorized Protocols
alert ip any any → any any (msg: "Possible TOR network traffic detected"; flow: established; content: "Tor"; nocase;
sid: 13; rev: 1;)
alert ip any any → any !31337 (msg: "Traffic on unusual port 31337"; flow: established; threshold: type limit, track
by_src, count 1, seconds 60; sid: 14; rev: 1;)
```

alert ip any any -> any any (msg: "Possible TOR network traffic detected"; flow: established; content: "Tor"; nocase; sid: 13; rev: 1;)

alert ip any any -> any !31337 (msg: "Traffic on unusual port 31337"; flow: established; threshold: type limit, track by\_src, count 1, seconds 60; sid: 14; rev: 1;)

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## 6. Detect TCP SYN Flood attacks:

This alert will let me know if there is a SYN flood attack, 5000 syn messages received in 5 seconds or less.

```
#Alert TCP SYN Flood Attack
alert tcp any any → $HOME_NET any (msg: "SYN Flood detected"; flags: S; flow: stateless; detection_filter: track by_d
st, count 5000, seconds 5; sid: 15; rev: 1;)
```

```
alert tcp any any -> $HOME_NET any (msg: "SYN Flood detected"; flags: S; flow: stateless; detection_filter: track by_dst, count 5000, seconds 5; sid: 15; rev: 1;)
```

# 7. Detecting and Blocking Brute Force Attacks:

This alert will notify me of a brute force attempt if SSH is tried 5 times within 30 seconds.

```
#Alert Brute Force Attack
alert tcp any any → $HOME_NET 22 (msg: "SSH Brute Force Attempt"; flags: S+; threshold: type both, track by_src, count 5, seconds 30; sid: 16; rev: 1;)
```

alert tcp any any -> \$HOME\_NET 22 (msg: "SSH Brute Force Attempt"; flags: S+; threshold: type both, track by\_src, count 5, seconds 30; sid: 16; rev: 1;)

## 8. Detect and Alerting on Malware Download:

For this alert I had to generate a file containing common maliscious Sha256 hashes and place it in the /etc/suricata/rules/ directory. When a file is downloaded, this files is referenced to check for malware in the download.

```
#Alert Malware Download
alert http any any → any any (msg: "Malware Download Detected"; flow: established; filesha256:/etc/suricata/rules/sha
256_iocs.list; classtype: trojan-activity; sid: 17; rev: 1;)
```

alert http any any -> any any (msg: "Malware Download Detected"; flow: established; filesha256:/etc/suricata/rules/sha256\_iocs.list; classtype: trojan-activity; sid: 17; rev: 1;)

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## 9. Block malicious IP addresses:

Suricata cant block malicious IP addresses on its own so I created an IPTABLES and added the IP 192.168.99.2 to it. I then added an alert in suricata to notify me if this IP attemps to contact my virtual machine.

alert ip any any -> any 80 (msg: "Malicious IP detected"; ip: 192.168.99.2; sid: 18; rev: 1;)

```
#Block Malicious IP Adresses
alert ip any any → $HOME_NET 80 (msg: "Malicious IP detected"; ip: 192.168.99.2; sid: 18; rev: 1;)
```

## 10. Detect ICMP Ping traffic:

This rule will alert you if someboy tries to PING the virtual machine.

```
kali@kali-suricata:/etc/suricata/rules

File Actions Edit View Help

alert icmp any any → $HOME_NET an (msg:"ICMP Ping"; sid:1; rev:1;)
```

Alert icmp any any -> \$HOME\_NET any (msg:"ICMP Ping"; sid:1; rev:1;)

I sent a ping from my host machine to trigger the alert that I created.

```
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Jorda>ping 192.168.20.131

Pinging 192.168.20.131 with 32 bytes of data:
Reply from 192.168.20.131: bytes=32 time<1ms TTL=64
Ping statistics for 192.168.20.131:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

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I opened the logs directory and opened the fast.log file. I found that my rule worked and alerted that a Ping came from an external device (my host machine).

```
(kali® kali-suricata)-[/etc/suricata/rules]
$ sudo cat /var/log/suricata/fast.log
02/15/2024-21:44:48.685133 [**] [1:2013028:7] ET POLICY curl User-Agent Outb
ound [**] [Classification: Attempted Information Leak] [Priority: 2] {TCP} 19
2.168.20.131:40696 → 18.67.39.128:80
02/15/2024-21:45:38.135622 [**] [1:2013028:7] ET POLICY curl User-Agent Outb
ound [**] [Classification: Attempted Information Leak] [Priority: 2] {TCP} 19
2.168.20.131:50920 → 18.67.39.97:80
02/15/2024-21:45:38.136771 [**] [1:2100498:7] GPL ATTACK_RESPONSE id check r
eturned root [**] [Classification: Potentially Bad Traffic] [Priority: 2] {TC
P} 18.67.39.97:80 → 192.168.20.131:50920
02/15/2024-22:06:59.035975 [**] [1:1:1] ICMP Ping [**] [Classification: (nul
l)] [Priority: 3] {ICMP} 192.168.20.1:8 → 192.168.20.131:0
02/15/2024-22:06:59.035992 [**] [1:1:1] ICMP Ping [**] [Classification: (nul
l)] [Priority: 3] {ICMP} 192.168.20.131:0 → 192.168.20.1:0
```