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SECURITY OPERATIONS
MODULE - 7

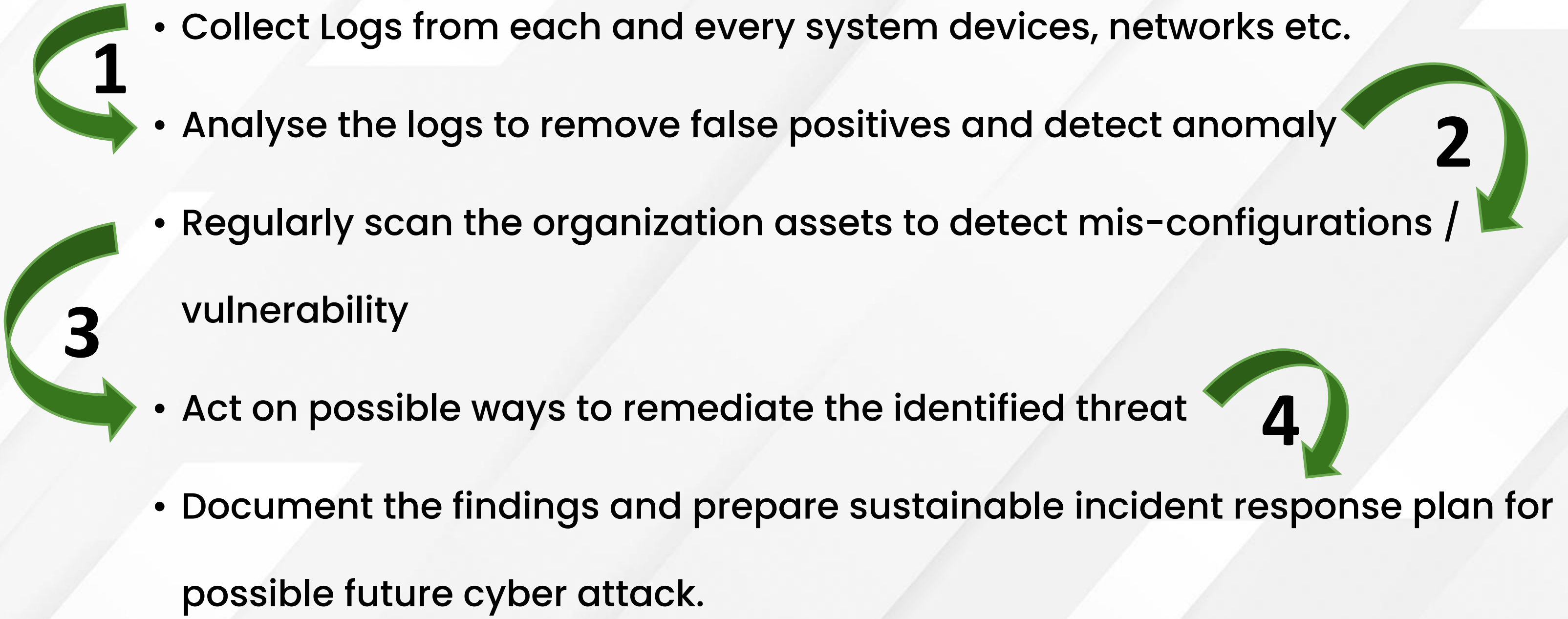
7. Security Operations

Basics of Security Operations

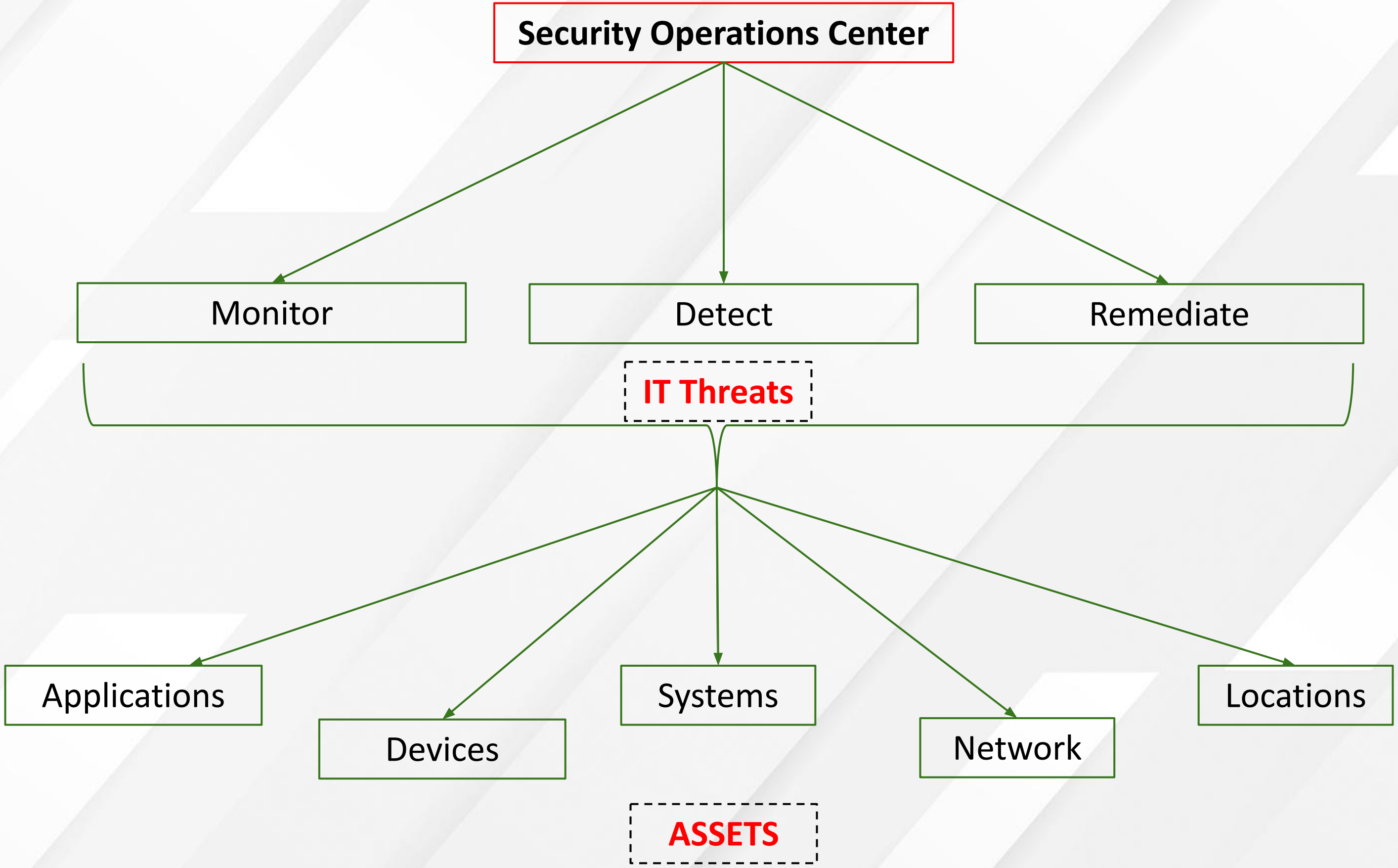
- Security Operations team is responsible for performing defensive activities for the organization
- They aim to protect critical organization assets from threat actors

- Employee equipped with different expertise work together on protecting the organization infrastructure

SOC procedural workflow :



- Collect Logs from each and every system devices, networks etc.
- Analyse the logs to remove false positives and detect anomaly
- Regularly scan the organization assets to detect mis-configurations / vulnerability
- Act on possible ways to remediate the identified threat
- Document the findings and prepare sustainable incident response plan for possible future cyber attack.



Security Operations Center

Monitor

Detect

Remediate

IT Threats

Applications

Devices

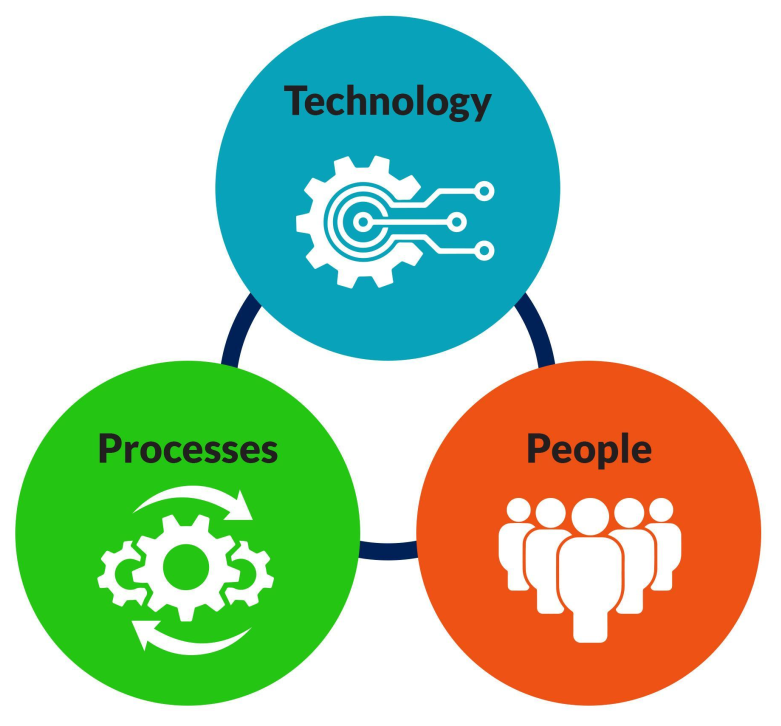
Systems

Network

Locations

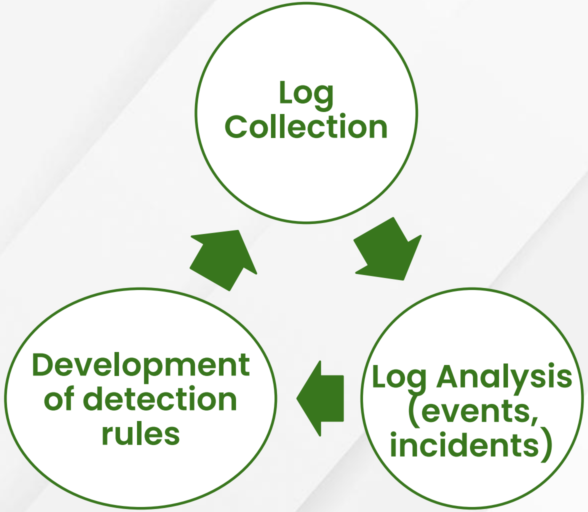
ASSETS

Three main functions of SOC

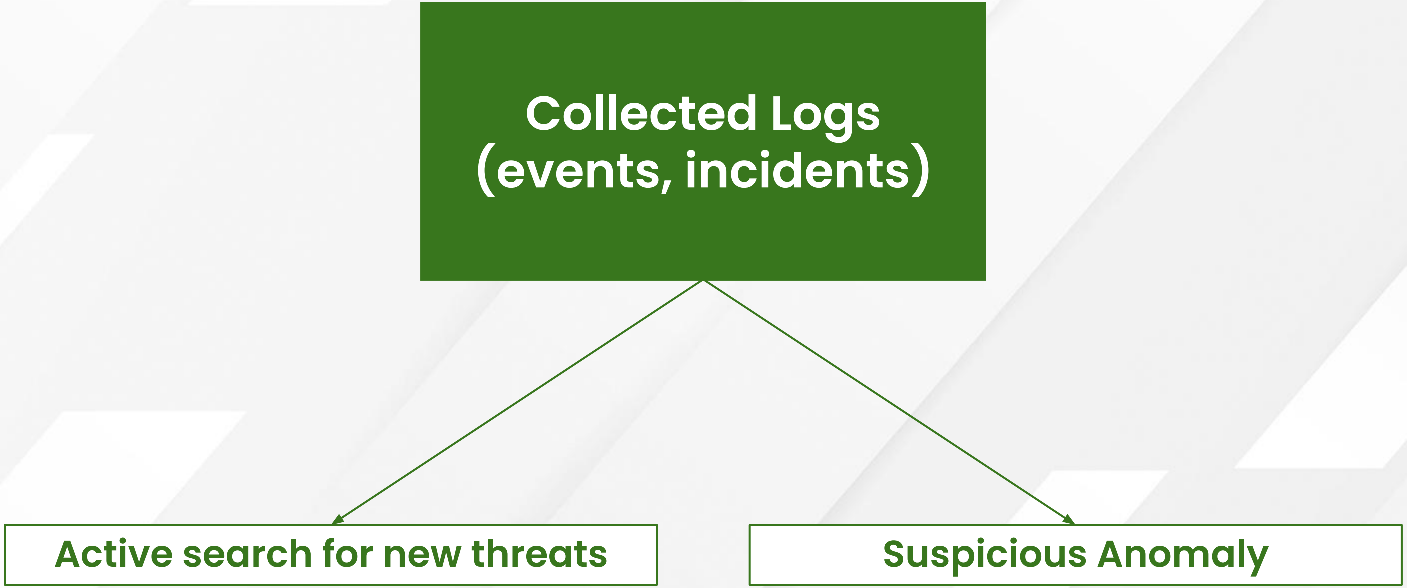


Technology

- For SOC Team members, technology is their weapon, they use it to collect different type of logs (login events, activities etc).
- Security Monitoring :


Log Collection
Log Analysis (events, incidents)
Development of detection rules

Threat Hunting:

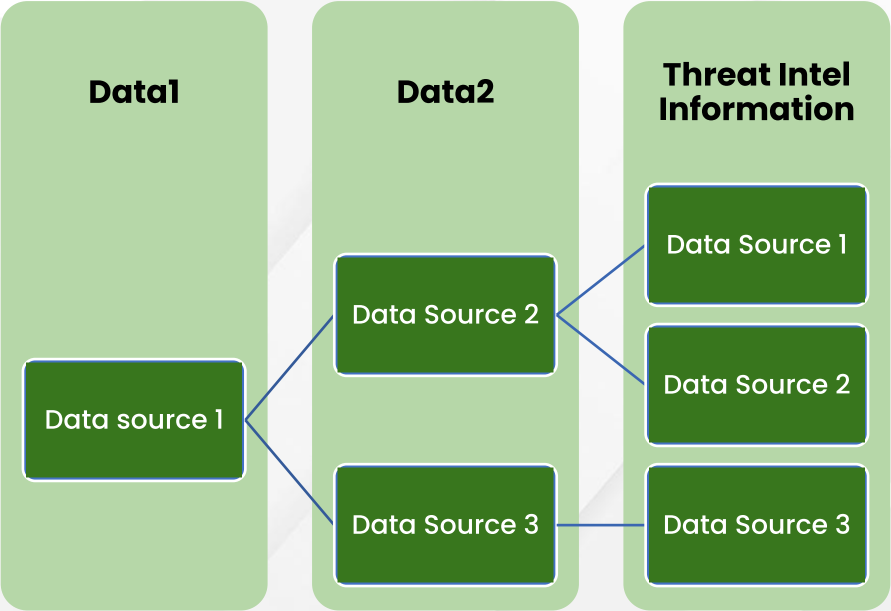


Collected Logs (events, incidents)

Active search for new threats

Suspicious Anomaly

Threat Intelligence:



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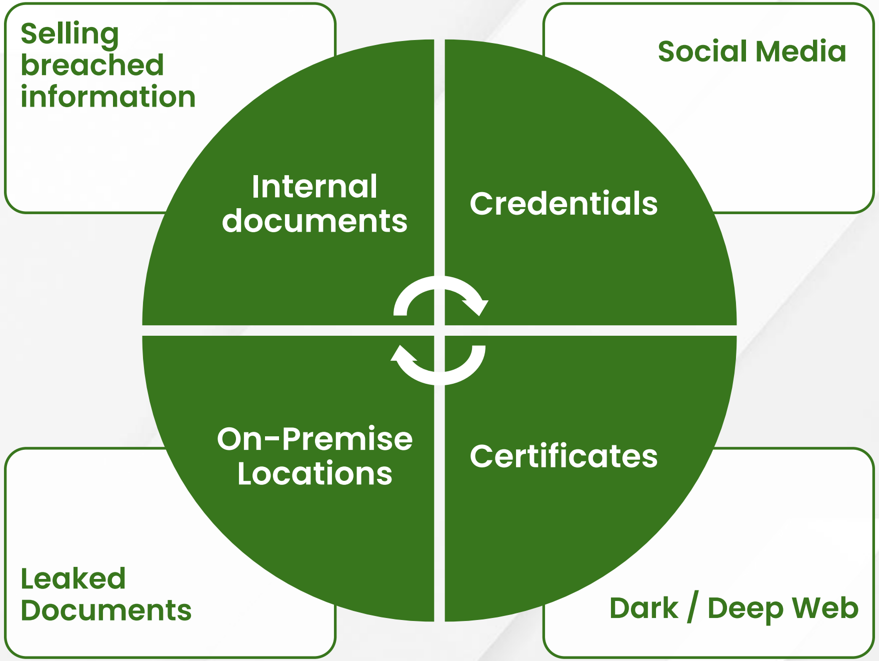
Continuous OSINT Gathering



People

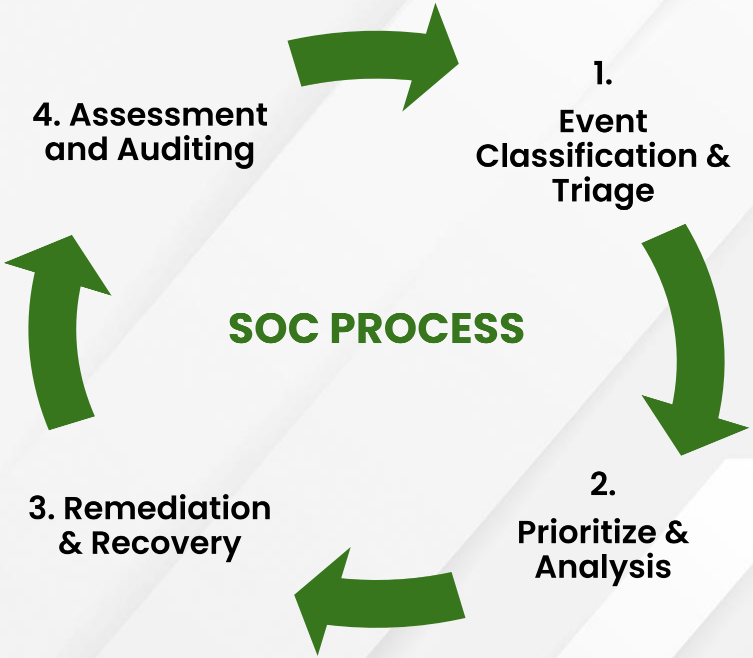
- Team comprises of people uses least amount of resources to get good visibility into active and emerging threats.

- Continuous consolidation of technologies and effectively organizing team is required

ROLE	DESCRIPTION	RESPONSIBILITIES
Jr. Security Analyst [Tier-1]	Triaging security incidents	Triage alerts acc. to urgency and relevancy. Manages & configures security monitoring tools
Security Analyst [Tier-2]	Incident Responder	Reviews triaged alerts, identify scope of the alert. Perform remediation and recovery efforts
Senior Security Analyst [Tier-3]	Threat Hunter	Conducts pentesting on production env. Optimizes SOC tools based on threat hunting
SOC Manager	Chief of SOC	Hiring, training & assessing staff. Measures SOC performance & communicates with CISOs

Processes

- Process ensures timely synchronization and execution of various activities performed by the SOC.



SOC PROCESS

1. Event Classification & Triage

2. Prioritize & Analysis

3. Remediation & Recovery

4. Assessment and Auditing

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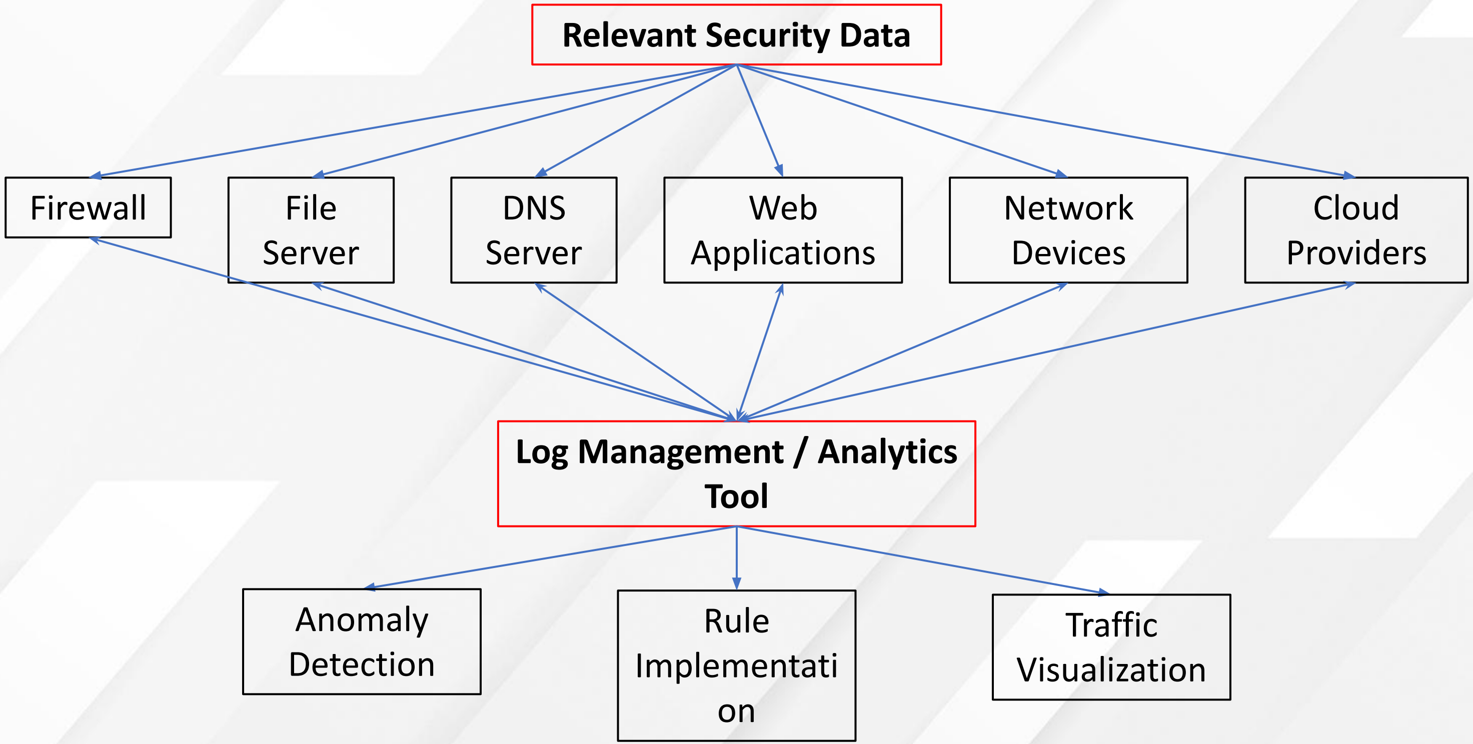
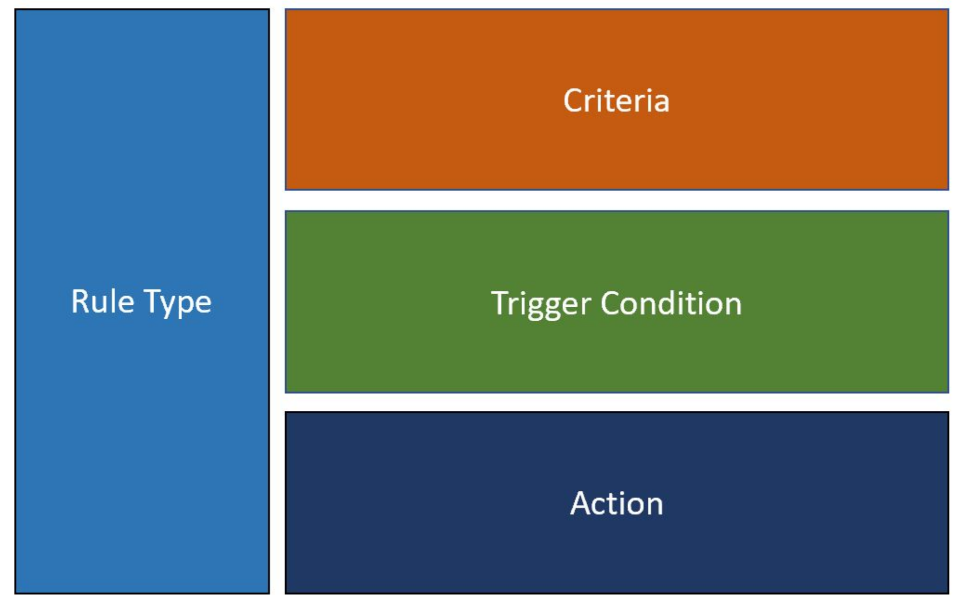
Security Information and Event Management (SIEM) WorkFlowD



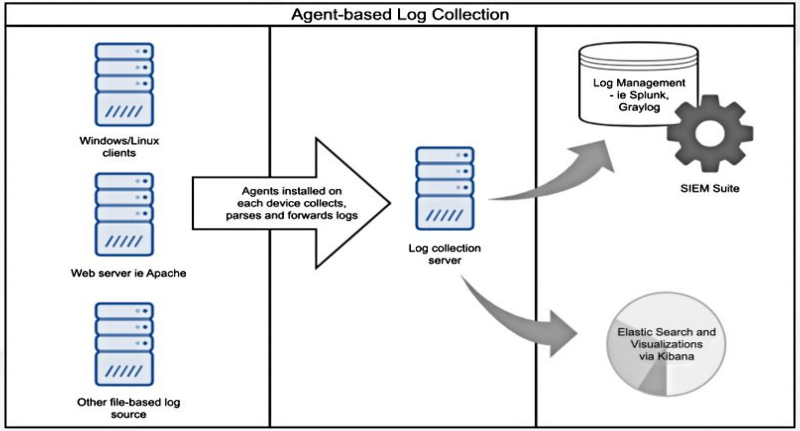
Industry recognized SIEM Tools

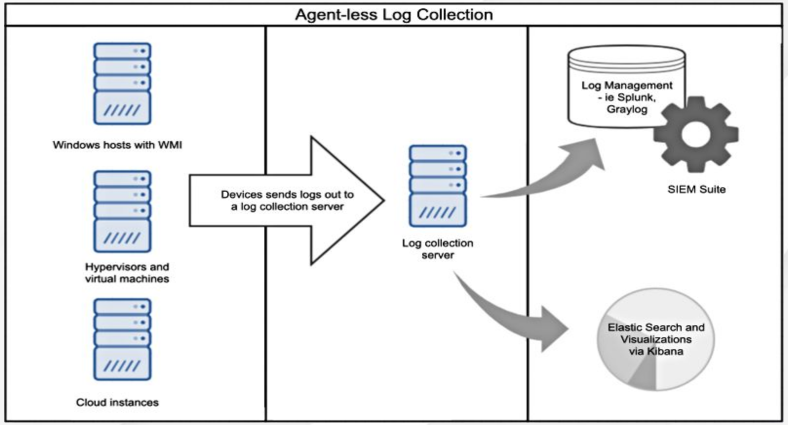
- Feed data from organization resources and they provide deep level insights of the assets day to day operations

SIEM Detection Rule



Device integration with SIEM Tools

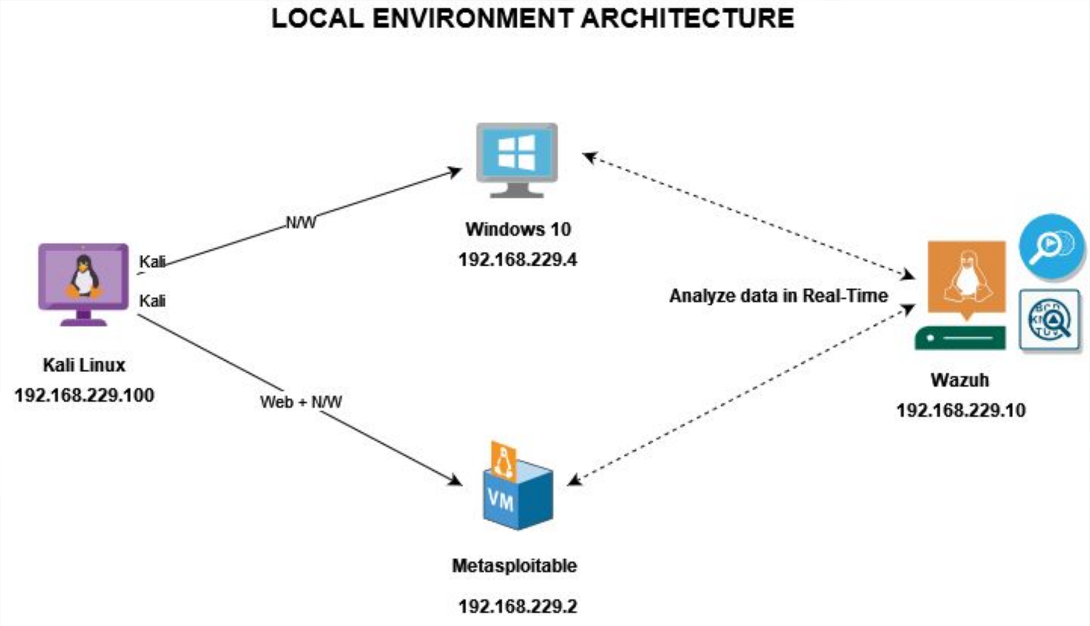

Agent-based Log Collection
Windows/Linux clients
Web server ie Apache
Other file-based log source
Agents installed on each device collects, parses and forwards logs
Log collection server
Log Management - ie Splunk, Graylog
SIEM Suite
Elastic Search and Visualizations via Kibana


Agent-less Log Collection
Windows hosts with WMI
Hypervisors and virtual machines
Cloud instances
Devices sends logs out to a log collection server
Log collection server
Log Management - ie Splunk, Graylog
SIEM Suite
Elastic Search and Visualizations via Kibana

Reference : https://nxlog.co/agent-based-versus-agent-less

Exercises :

- Setting-up the environment for attack and defense visualization



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Host based Defence

- Host includes physical / virtual OS that are allocated to the employee of organization
- Enterprise majorly have the following OS's:
  - Windows
  - Linux
  - Mac
- Tools like OSQuery (cross-platform), Sysmon (Windows) etc can be used to collect and transmit logs for analysing performance of hosts devices.

Host Firewall - Windows

- Defender host firewall present in Win Vista, 7, 8, 10, 11 & server edition.
- It helps secure the devices by in-bound & out-bound rules.
- The rules states which network traffic can go in and out from the device
- The firewall works on 3 different network types : Private, Public & Domain

Inbound Rules :

Network traffic coming from the external device. Ex : Someone tries to connect to FTP Server on host machine.

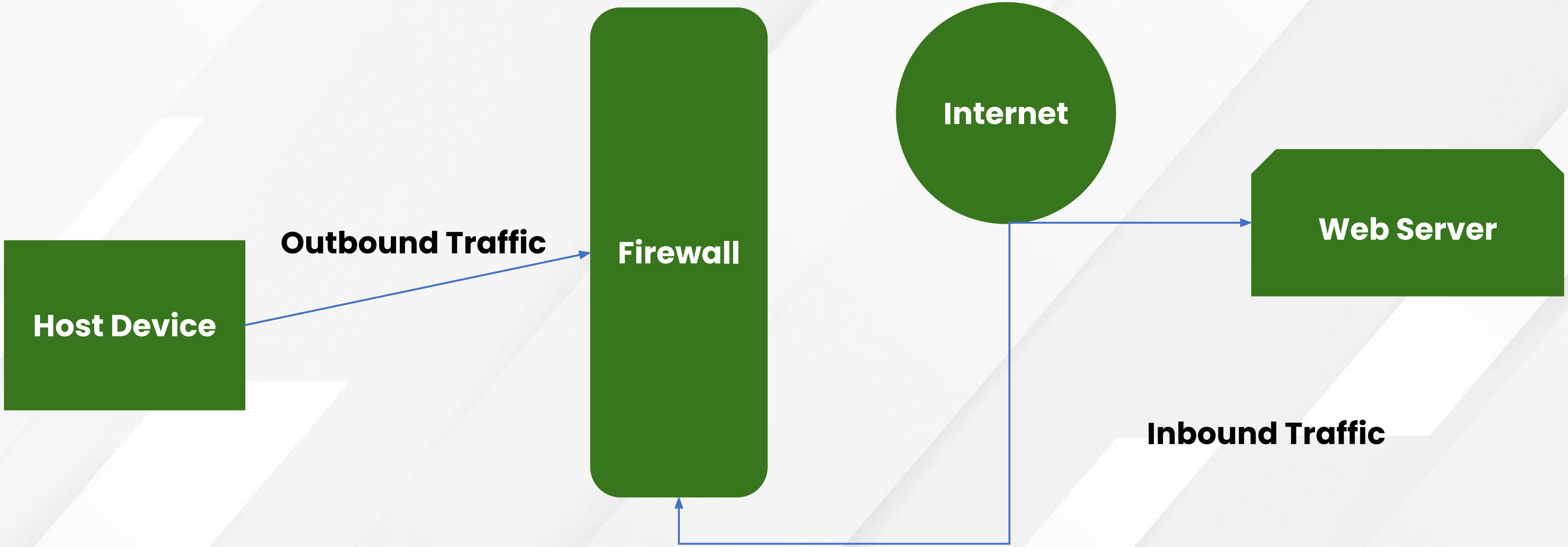
Outbound rules :

Network traffic originating from the host device. Ex : Host machine tries to connect to a web server.

Connection Rules :

Used to filter the network traffic going in and out the host device.

Traffic Flow Diagram



DEMO :

Block Google Chrome from accessing the internet

Outbound Setting

Exercise 1 : Isolate Machine from Internet

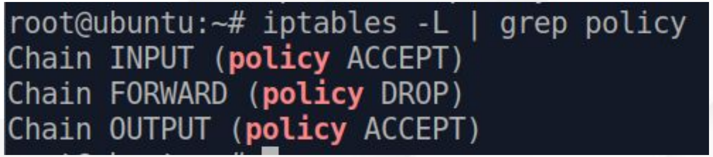
Inbound Setting

Exercise 2 : Block ICMP packets originating from Internet towards your hosts machine

Host Firewall – iptables

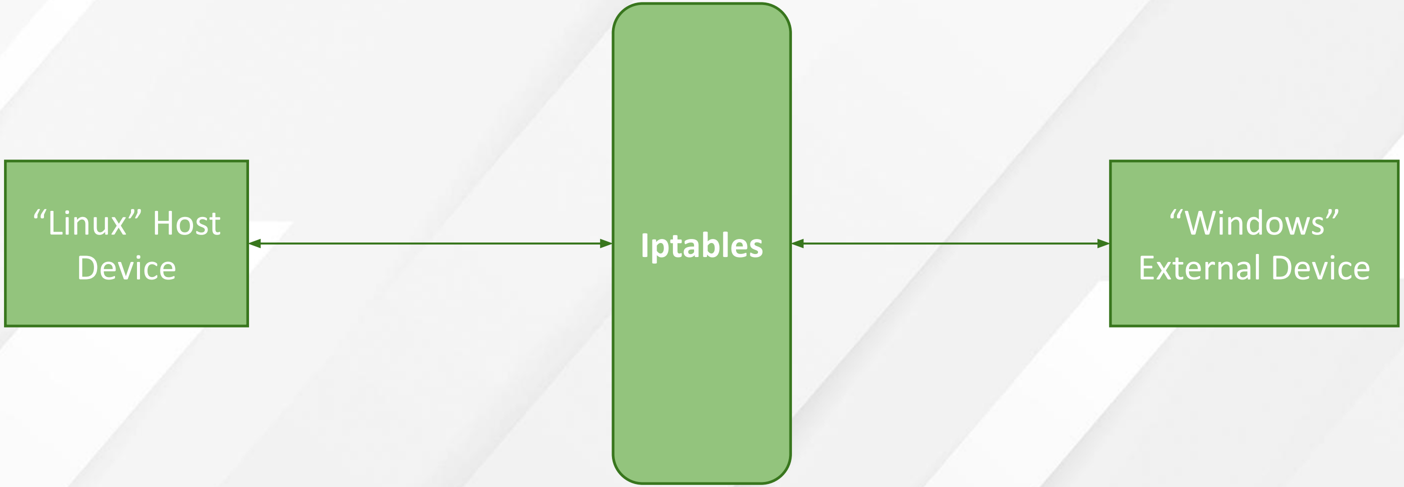
- Firewall utility that comes in-built in most Linux operating systems.
- It is a command line utility, that filters network traffic going-in or going-out of the system.
- Iptables has 3 different chains, namely:
  - Input : Controls incoming connections. Ex : SSH into host machine with iptables enabled
  - Output : Controls outgoing connections. Ex : Sending ICMP packets to a destination
  - Forward : Helpful during routing scenarios, utilizes traffic forwarding utilities to sent data to destined address.

Check the current configuration of iptables.

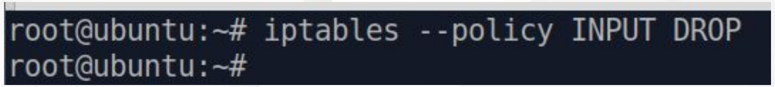


```
root@ubuntu:~# iptables -L | grep policy
Chain INPUT (policy ACCEPT)
Chain FORWARD (policy DROP)
Chain OUTPUT (policy ACCEPT)
```

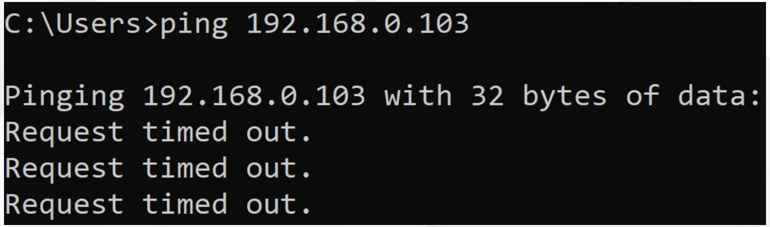
Iptable accept, deny chains:



DROP the connection in **INPUT** chain :

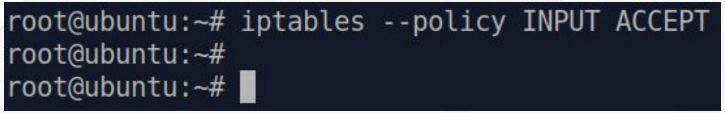


```
root@ubuntu:~# iptables --policy INPUT DROP
root@ubuntu:~#
```

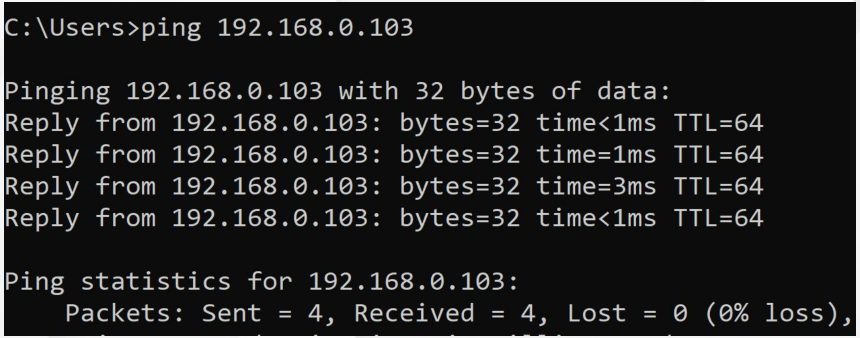


```
C:\Users>ping 192.168.0.103

Pinging 192.168.0.103 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
```

ACCEPT the connection in **INPUT** chain :

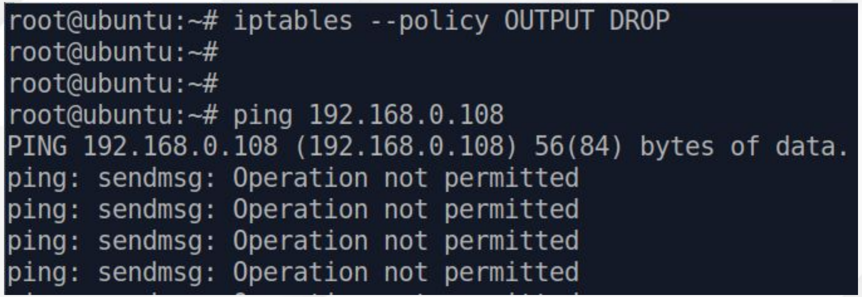


```
root@ubuntu:~# iptables --policy INPUT ACCEPT
root@ubuntu:~#
root@ubuntu:~#
```



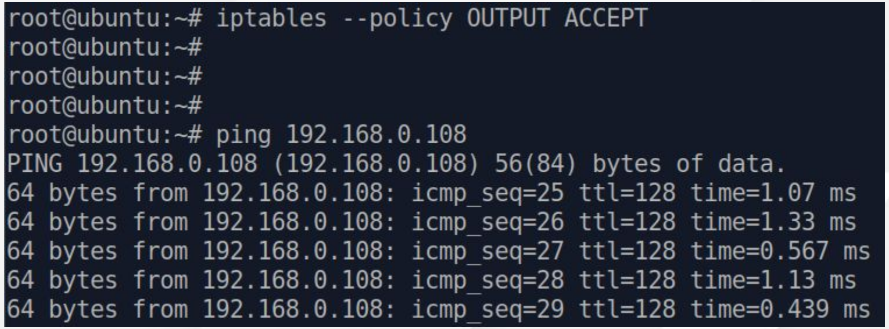
```
C:\Users>ping 192.168.0.103

Pinging 192.168.0.103 with 32 bytes of data:
Reply from 192.168.0.103: bytes=32 time<1ms TTL=64
Reply from 192.168.0.103: bytes=32 time=1ms TTL=64
Reply from 192.168.0.103: bytes=32 time=3ms TTL=64
Reply from 192.168.0.103: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.0.103:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

DROP the connection in **INPUT** chain :



```
root@ubuntu:~# iptables --policy OUTPUT DROP
root@ubuntu:~#
root@ubuntu:~#
root@ubuntu:~# ping 192.168.0.108
PING 192.168.0.108 (192.168.0.108) 56(84) bytes of data.
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
ping: sendmsg: Operation not permitted
```

ACCEPT the connection in **INPUT** chain :

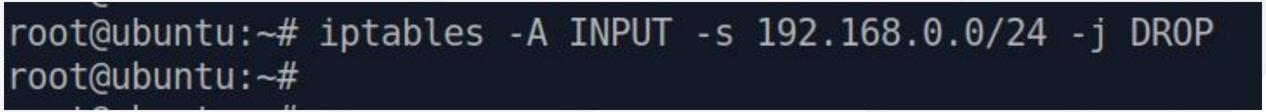


```
root@ubuntu:~# iptables --policy OUTPUT ACCEPT
root@ubuntu:~#
root@ubuntu:~#
root@ubuntu:~#
root@ubuntu:~# ping 192.168.0.108
PING 192.168.0.108 (192.168.0.108) 56(84) bytes of data.
64 bytes from 192.168.0.108: icmp_seq=25 ttl=128 time=1.07 ms
64 bytes from 192.168.0.108: icmp_seq=26 ttl=128 time=1.33 ms
64 bytes from 192.168.0.108: icmp_seq=27 ttl=128 time=0.567 ms
64 bytes from 192.168.0.108: icmp_seq=28 ttl=128 time=1.13 ms
64 bytes from 192.168.0.108: icmp_seq=29 ttl=128 time=0.439 ms
```

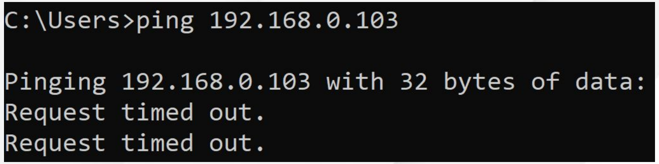
Connection Specific Responses :

- **ACCEPT :** Allow the connection
- **DROP :** Drop the connection without sending any errors
- **REJECT :** Drop the connection but send back an error response

Block connection from a range of IP address:

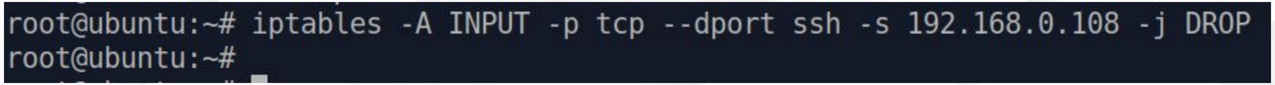


```
root@ubuntu:~# iptables -A INPUT -s 192.168.0.0/24 -j DROP
root@ubuntu:~#
```

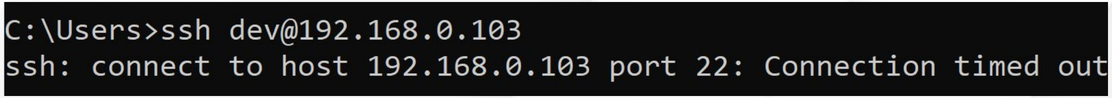


```
C:\Users>ping 192.168.0.103

Pinging 192.168.0.103 with 32 bytes of data:
Request timed out.
Request timed out.
```

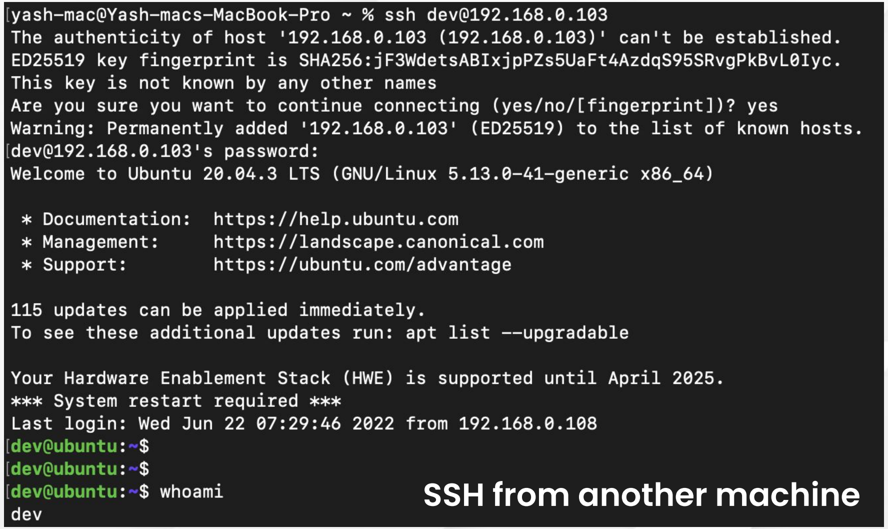
Block connection to a specific service port (SSH) over TCP



```
root@ubuntu:~# iptables -A INPUT -p tcp --dport ssh -s 192.168.0.108 -j DROP
root@ubuntu:~#
```



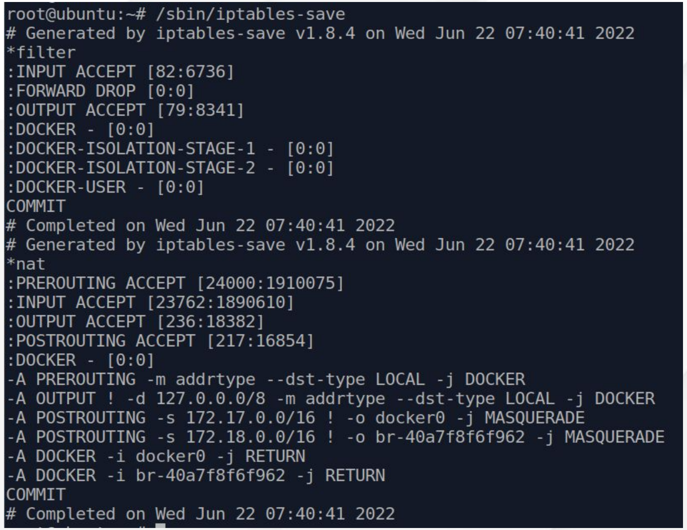
```
C:\Users>ssh dev@192.168.0.103
ssh: connect to host 192.168.0.103 port 22: Connection timed out
```



```
[yash-mac@Yash-macs-MacBook-Pro ~ % ssh dev@192.168.0.103
The authenticity of host '192.168.0.103 (192.168.0.103)' can't be established.
ED25519 key fingerprint is SHA256:jF3WdetsABIxjpPZs5UaFt4AzdqS95SRvgPkBvL0Iyc.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.0.103' (ED25519) to the list of known hosts.
[dev@192.168.0.103's password:
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.13.0-41-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

115 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.
*** System restart required ***
Last login: Wed Jun 22 07:29:46 2022 from 192.168.0.108
[dev@ubuntu:~$
[dev@ubuntu:~$
[dev@ubuntu:~$ whoami
dev
```

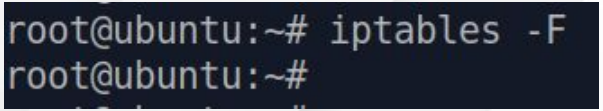
SSH from another machine

Save the configured rules:



```
root@ubuntu:~# /sbin/iptables-save
# Generated by iptables-save v1.8.4 on Wed Jun 22 07:40:41 2022
*filter
:INPUT ACCEPT [82:6736]
:FORWARD DROP [0:0]
:OUTPUT ACCEPT [79:8341]
:DOCKER - [0:0]
:DOCKER-ISOLATION-STAGE-1 - [0:0]
:DOCKER-ISOLATION-STAGE-2 - [0:0]
:DOCKER-USER - [0:0]
COMMIT
# Completed on Wed Jun 22 07:40:41 2022
# Generated by iptables-save v1.8.4 on Wed Jun 22 07:40:41 2022
*nat
:PREROUTING ACCEPT [24000:1910075]
:INPUT ACCEPT [23762:1890610]
:OUTPUT ACCEPT [236:18382]
:POSTROUTING ACCEPT [217:16854]
:DOCKER - [0:0]
-A PREROUTING -m addrtype --dst-type LOCAL -j DOCKER
-A OUTPUT ! -d 127.0.0.0/8 -m addrtype --dst-type LOCAL -j DOCKER
-A POSTROUTING -s 172.17.0.0/16 ! -o docker0 -j MASQUERADE
-A POSTROUTING -s 172.18.0.0/16 ! -o br-40a7f8f6f962 -j MASQUERADE
-A DOCKER -i docker0 -j RETURN
-A DOCKER -i br-40a7f8f6f962 -j RETURN
COMMIT
# Completed on Wed Jun 22 07:40:41 2022
```

Flush the rules:



```
root@ubuntu:~# iptables -F
root@ubuntu:~#
```

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OUTPUT Setting

Exercise 1 : Block ICMP packets using iptables

INPUT Setting

Exercise 2 : Block ICMP packets originating from Internet towards your hosts machine

Anti-Virus

- In General Terms, it is a computer program used to prevent, detect and remove malicious s/w.

- They continuously scan incoming files (coming to system from everywhere) and if any anomaly is detected, it is quarantined / removed.

- The Landscape of security has moved a lot from focusing only a single device to end-point devices like Cell-phone, Enterprise laptop, Tablet, Servers, Computers etc.

- End Point Security protects network, using a combination of FireWall, AntiVirus, Anti-Malware etc.

- They are explicitly designed for enterprise clients to protect all their endpoints devices like servers, computers, mobile etc.

Endpoint Detection & Response (EDR)

Understanding Naming Context, it is clear that EDR is a solution that continuously monitors, stores endpoint-devices behaviour to detect and block suspicious / malicious activities and also provides remediation facilities all at one place (single dashboard).

Some unique key features of EDR are :

- Visibility
- Continuously updating Telemetry Database
- EDR Focus more on Indicator of Attack (IOA, Detecting the intention of an Adversary)
- Detailed Insights to the environment
- Precision & Accuracy in response
- Integrated with Cloud Based Solution
- Real-Time Monitoring and insights on a single dashboard

Visibility
Real-Time Monitoring and insights on a single dashboard
Detailed Insights to the environment
Integrated with Cloud Based Solution
Precision & Accuracy in response
Continuously updating Telemetry Database
EDR Focus more on Indicator of Attack
(IOA, Detecting the intention of an Adversary)

But why?

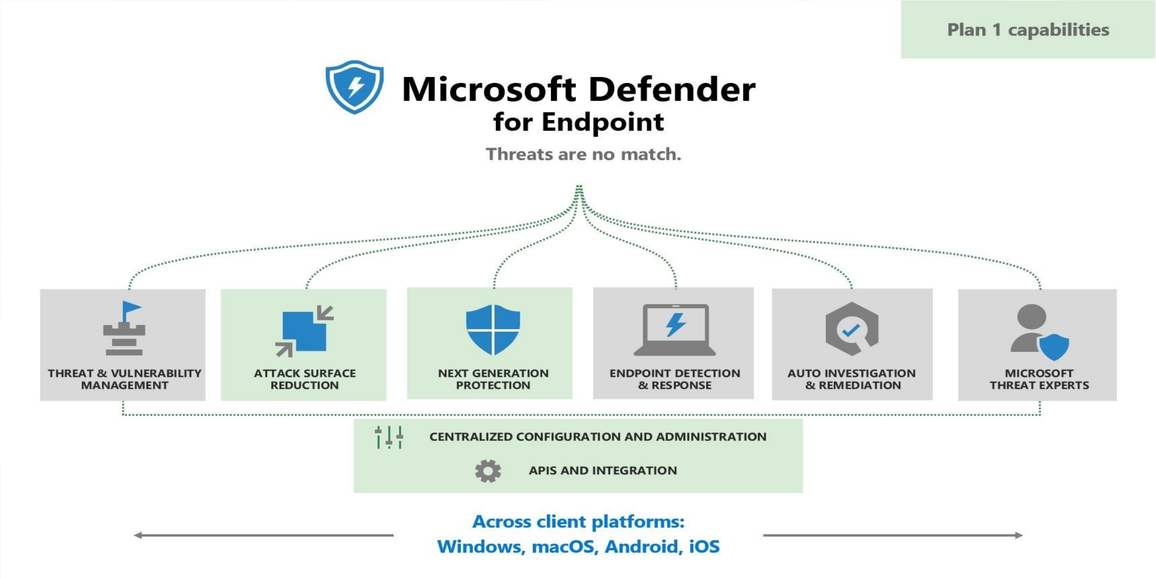
- Big enterprises with more endpoint devices have more sensitive data
- Adversaries targeting endpoint servers / computers to establish foothold
- Detailed Insights to the environment
- Enterprise Adoption of SaaS based solutions is growing
- More Scalability and ease of configuration
- EDR includes fine-tuned multiple security solutions (focus on consolidation)

Examples of EDR in market (not particularly in order of performance):

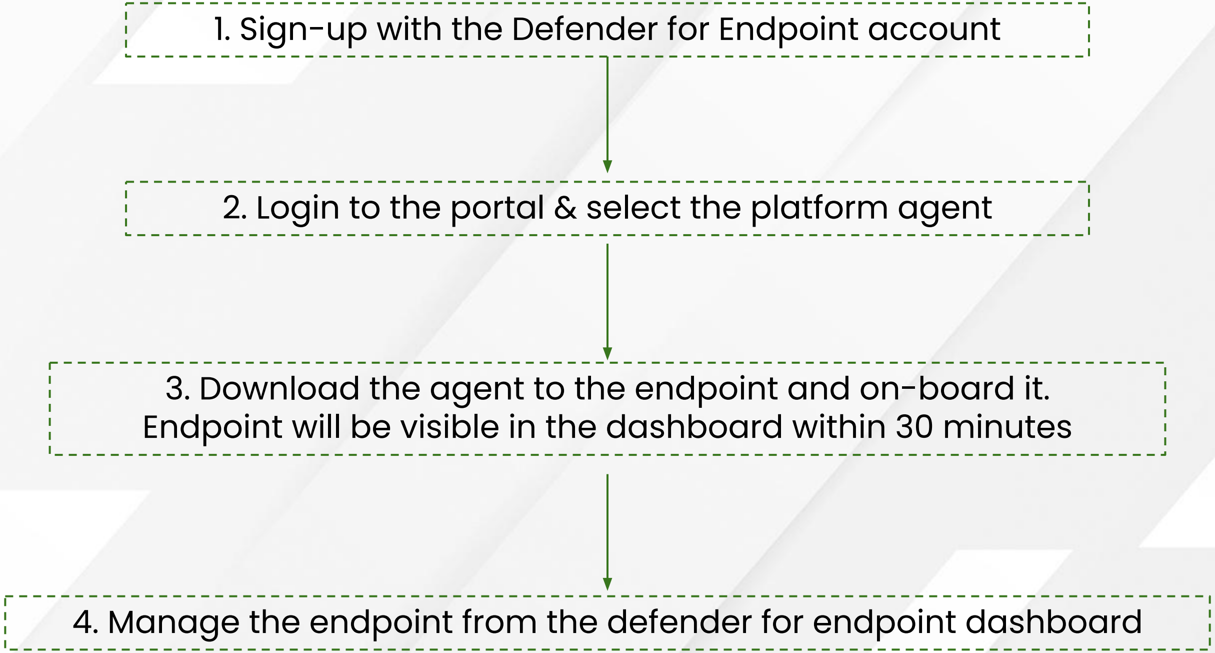
- FireEye Endpoint Security
- CrowdStrike Falcon Insight
- Microsoft Defender Advanced Threat Protection (ATP)
- VMware Carbon Black EDR
- Symantec Endpoint Protection
- SolarWinds Endpoint Detection and Response etc

Microsoft Defender for Endpoint

- Centralized platform to manage all the organization endpoint devices in a single dashboard
- Works on agent based methodology, it needs to be installed on endpoints which collects the data & send the telemetry to dashboard


Plan 1 capabilities
Microsoft Defender
for Endpoint
Threats are no match.
THREAT & VULNERABILITY MANAGEMENT
ATTACK SURFACE REDUCTION
NEXT GENERATION PROTECTION
ENDPOINT DETECTION & RESPONSE
AUTO INVESTIGATION & REMEDIATION
MICROSOFT THREAT EXPERTS
CENTRALIZED CONFIGURATION AND ADMINISTRATION
APIS AND INTEGRATION
Across client platforms:
Windows, macOS, Android, iOS

Microsoft Defender for Endpoint sign-up procedure

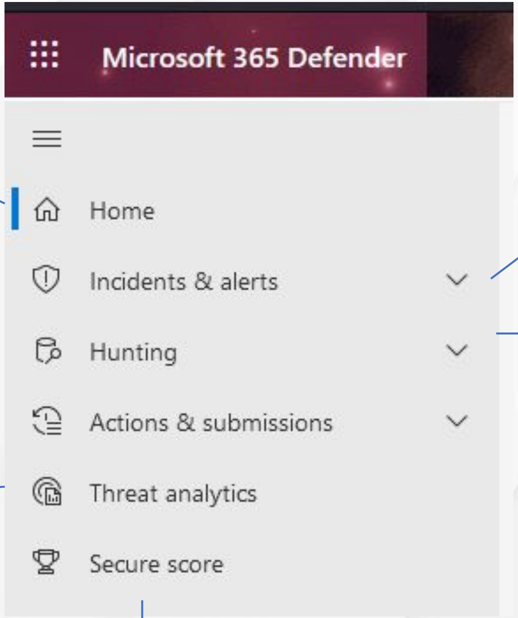


1. Sign-up with the Defender for Endpoint account

2. Login to the portal & select the platform agent

3. Download the agent to the endpoint and on-board it.
Endpoint will be visible in the dashboard within 30 minutes

4. Manage the endpoint from the defender for endpoint dashboard



Defender Dashboard

Prioritize Alerts &
Check incidents

Write custom queries to
track missed alerts

Overall threat Analytics
of on boarded endpoints

Score as per MS
recommendations

DEMO :
MS Defender for Endpoint Demonstration

Exercise 1

Onboard a Windows Machine and check it’s status in dashboard

Exercise 2

Onboard a Linux Machine and check it’s status in dashboard

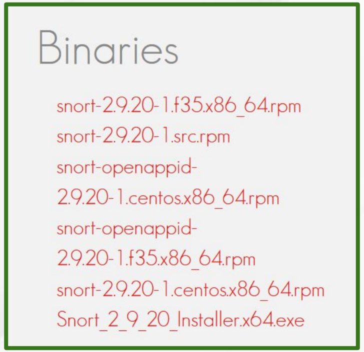
Network based Defence

- Network comprises of multiple hosts present in the organization
- Network are segregated using firewalls, switches etc
- Collecting logs from network devices becomes difficult as they have a ton of data regularly processing in the production

Snort

- Open-Source Intrusion prevention system (IPS) developed by Cisco
- This software is capable of performing real-time traffic analysis and packet logging on IP networks
- It can also be used to detect a variety of attacks and probes
- It has 3 modes:
  - Packet Sniffer (like tcpdump)
  - Packet Logger
  - Full-blown IPS

- Download the software from here: https://www.snort.org/downloads



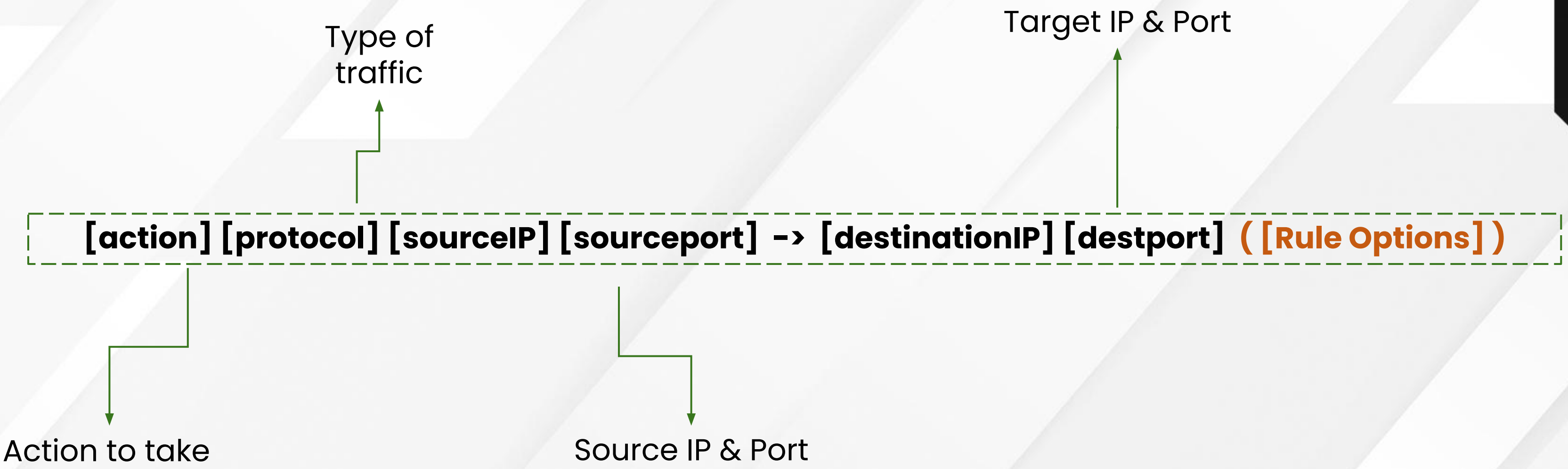
Binaries

snort-2.9.20-1.f35.x86_64.rpm
snort-2.9.20-1.src.rpm
snort-openappid-2.9.20-1.centos.x86_64.rpm
snort-openappid-2.9.20-1.f35.x86_64.rpm
snort-2.9.20-1.centos.x86_64.rpm
Snort_2_9_20_Installer.x64.exe

- The software can also be downloaded using the apt from already added repository

- Snort performs real-time monitoring of packets using rules that are present in the configuration file.

Snort Rule Header



Type of traffic

Target IP & Port

[action] [protocol] [sourceIP] [sourceport] -> [destinationIP] [destport] ([Rule Options])

Action to take

Source IP & Port

Snort Rule Header Example

```
alert tcp $sourceIP $sourceport -> $destinationIP any
```

Snort Rule Options

General Rule Options

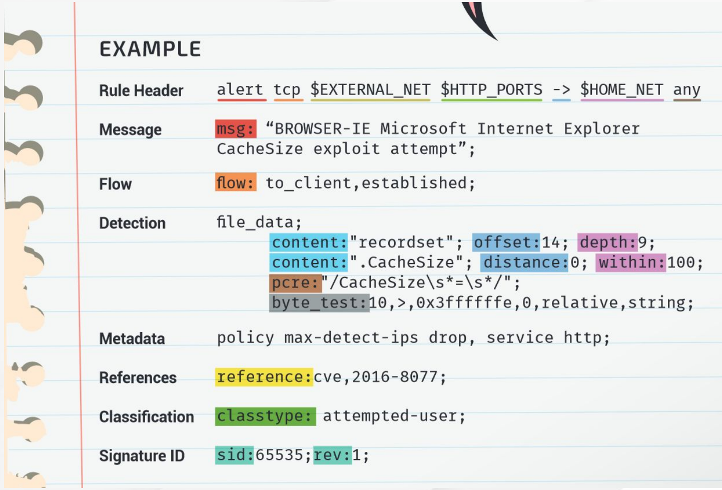
Message: Meaningful **msg** stating the purpose of rule

sid / rev: Unique identified for each rule

Classtype : What the effect of successful attack would be

Reference : External source of information

Reference : For the rule to fire, specifies which direction the network traffic is going.



EXAMPLE

Rule Header	`alert tcp $EXTERNAL_NET $HTTP_PORTS -> $HOME_NET any`
Message	`msg: “BROWSER-IE Microsoft Internet Explorer CacheSize exploit attempt”;`
Flow	`flow: to_client,established;`

Detection	`file_data;`
	`content:"recordset"; offset:14; depth:9;`
	`content:".CacheSize"; distance:0; within:100;`
	`pcre:"/CacheSize\s*=\s*/";`
	`byte_test:10,>,0x3ffffffe,0,relative,string;`

Metadata	`policy max-detect-ips drop, service http;`
References	`reference:cve,2016-8077;`
Classification	`classtype: attempted-user;`
Signature ID	`sid:65535;rev:1;`

Detection Rule Options

Content: Search for a specific content in the packet payload

pcre : Regular expresssions

Byte Test : It allows a rule to test a number of bytes
against a specific value in binar

[Snort Infographic]

- Snort configuration file location

```
/etc/snort/snort.conf
```

- Edit custom snort rules

```
/etc/snort/rules/local.rules
```

- Adding a rule in the **local.rules**

```
alert icmp any any -> 192.168.1.8 any (msg:”ICMP Test”; sid: 1000001; rev:1;)
```

- Starting snort and capturing traffic as per configured rules

```
sudo snort –T –i eth0 –c /etc/snort/snort.conf

sudo snort –A console –q –i eth0 –c /etc/snort/snort.conf
```

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DEMO :
Detect SSH Login Attempt

Exercise 1

Detect ICMP packet heading towards the snort installed machine

https://www.youtube.com/watch?v=8lOTUqfkAhQ

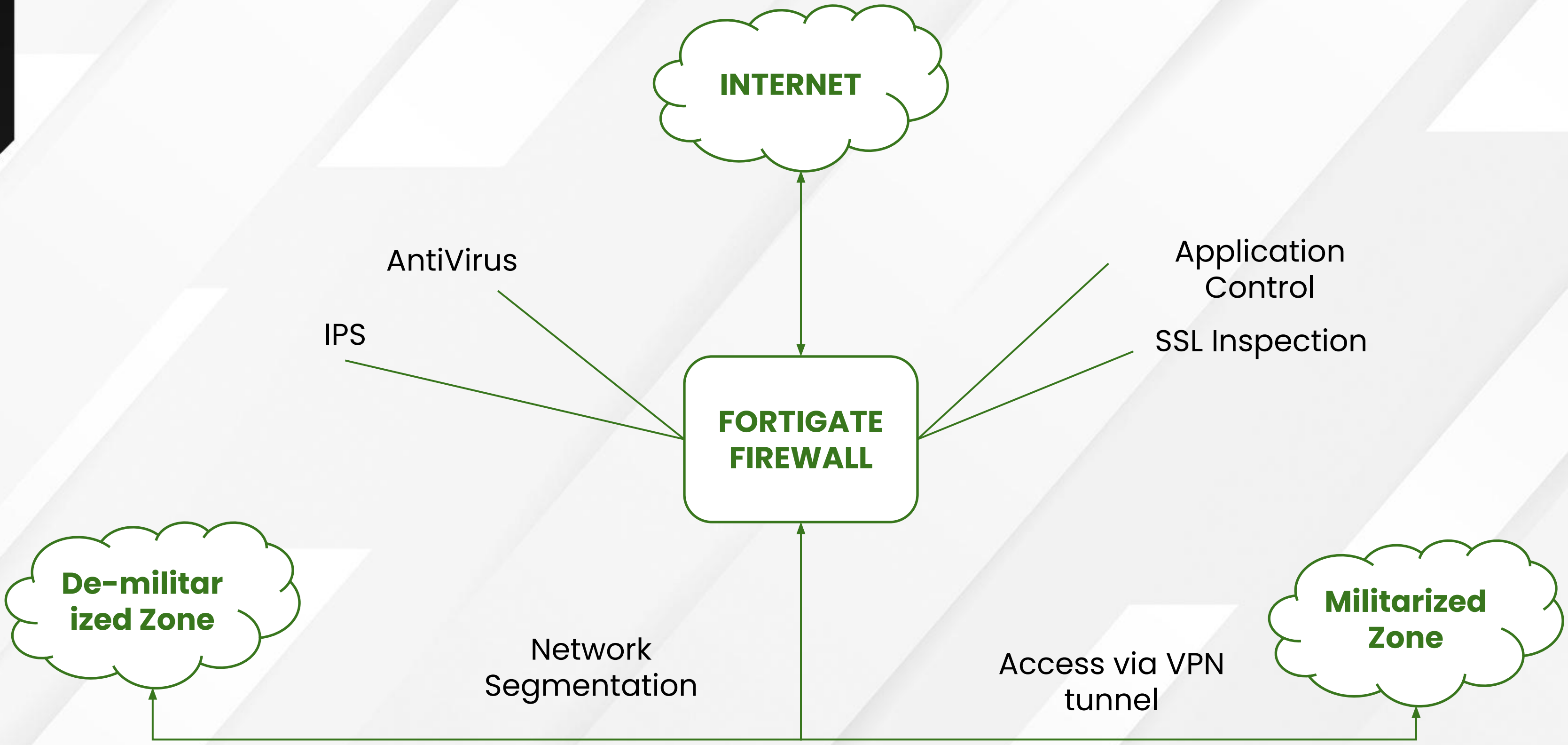
Exercise 2

Detect failed FTP attempt using alert type

Fortinet Fortigate Firewall

- Next-Generation firewall that provides ultimate threat protection for businesses

- Mainly used in enterprises for the following purposes:
  - VPN tunnels
  - Network segmentation
  - Web Filtering
  - Secure Firewall Portal Access
  - Easy integration with other Fortinet products


INTERNET
AntiVirus
IPS
Application Control
SSL Inspection
FORTIGATE FIREWALL
De-militarized Zone
Network Segmentation
Access via VPN tunnel
Militarized Zone

Exercise 1

Fortinet Fortigate Dashboard Demonstration

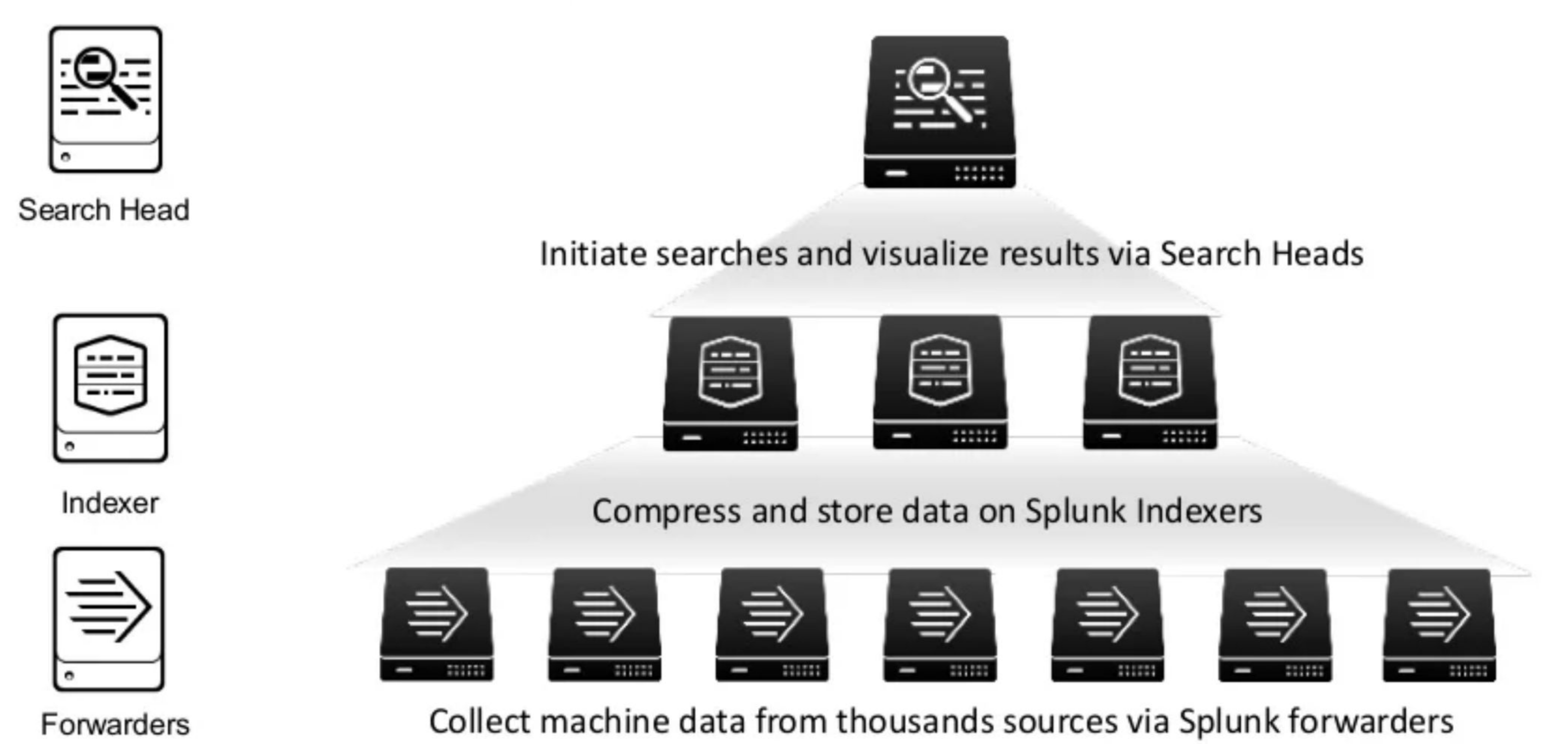
Exercise 2

Fortinet Fortigate Abuse Demonstration (RCE)

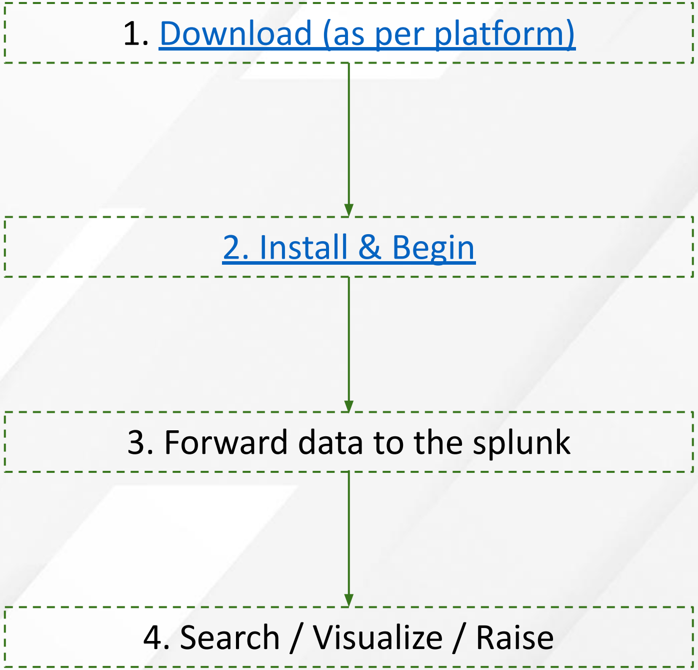
Security Information and Event Management – Splunk

- It provides real-time data to perform analysis based on security events
- Tools like Splunk matches collected events against rules & analytics engines to detect & analyse advanced threats
- Alert indexing is an important aspect that is covered by Splunk. It integrates the events into alert workflow procedure
- Splunk and SIEM can be deployed in
  - Single environment
  - Distributed environment

Splunk Working Modes


Search Head
Indexer
Forwarders
Initiate searches and visualize results via Search Heads
Compress and store data on Splunk Indexers
Collect machine data from thousands sources via Splunk forwarders

Configuring Splunk

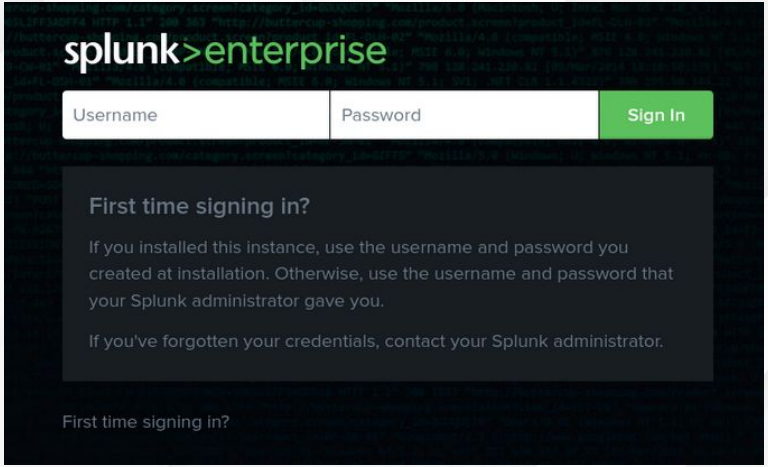


1. Download (as per platform)

2. Install & Begin

3. Forward data to the splunk

4. Search / Visualize / Raise



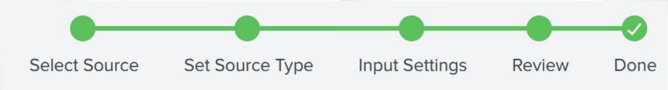
First time signing in?

If you installed this instance, use the username and password you created at installation. Otherwise, use the username and password that your Splunk administrator gave you.

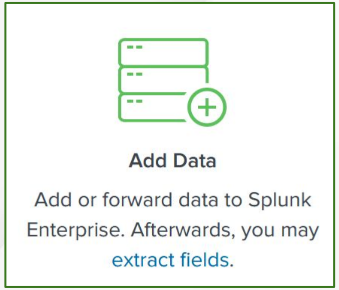
If you've forgotten your credentials, contact your Splunk administrator.

First time signing in?

Log Collection in Splunk (local setup)



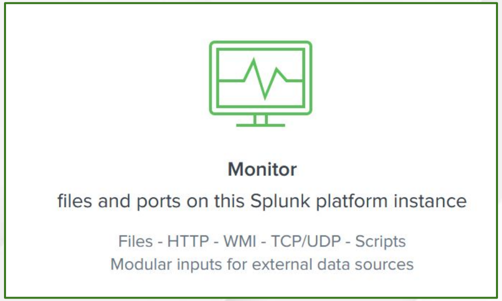
- Select the following icon after signing up



Add Data

Add or forward data to Splunk Enterprise. Afterwards, you may extract fields.

- Navigate and choose the "**Monitor"** option, it will monitor the local splunk platform instance

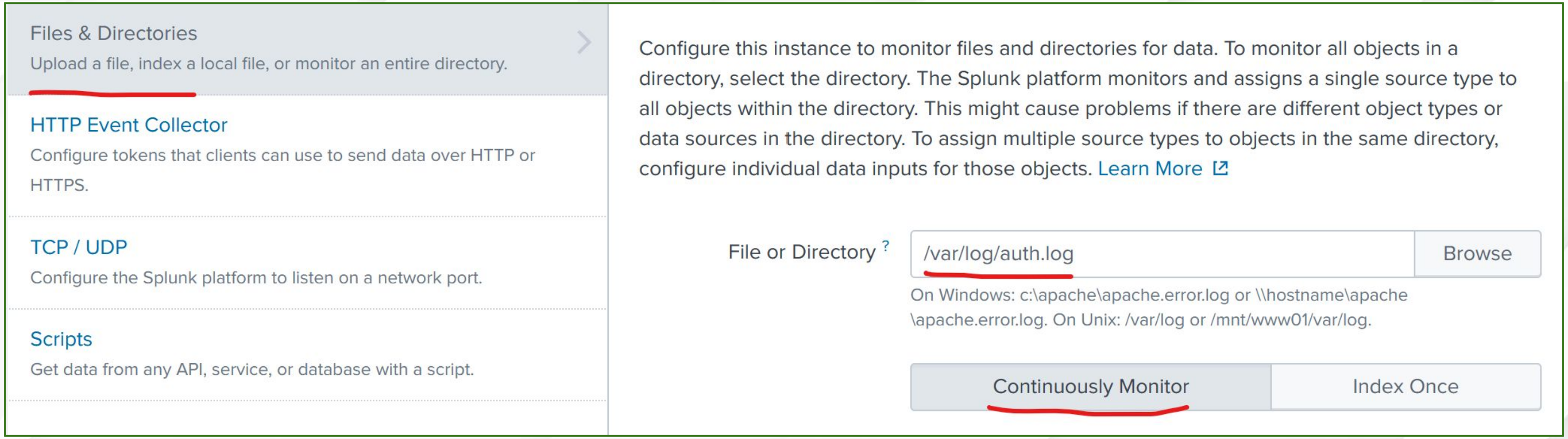


Monitor

files and ports on this Splunk platform instance

Files - HTTP - WMI - TCP/UDP - Scripts
Modular inputs for external data sources

- Choose the auth.log file that collects login attempts locally



Files & Directories
Upload a file, index a local file, or monitor an entire directory.

HTTP Event Collector
Configure tokens that clients can use to send data over HTTP or HTTPS.

TCP / UDP
Configure the Splunk platform to listen on a network port.

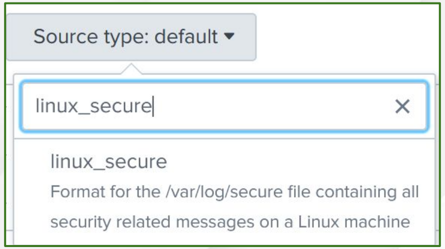
Scripts
Get data from any API, service, or database with a script.

Configure this instance to monitor files and directories for data. To monitor all objects in a directory, select the directory. The Splunk platform monitors and assigns a single source type to all objects within the directory. This might cause problems if there are different object types or data sources in the directory. To assign multiple source types to objects in the same directory, configure individual data inputs for those objects. Learn More

File or Directory ?: /var/log/auth.log

On Windows: c:\apache\apache.error.log or \\hostname\apache\apache.error.log. On Unix: /var/log or /mnt/www01/var/log.

- Select the source type as “**linux_secure**”

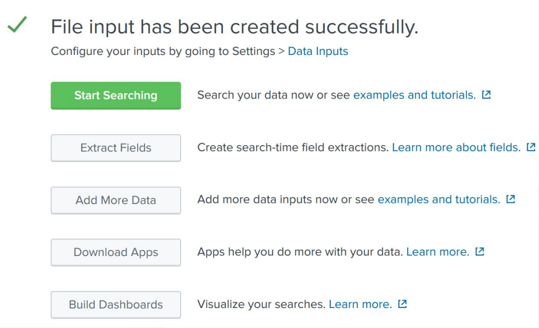


Source type: default

linux_secure

linux_secure
Format for the /var/log/secure file containing all security related messages on a Linux machine

- Perform the final review and then start searching



✓ File input has been created successfully.

Configure your inputs by going to Settings > Data Inputs

Search your data now or see examples and tutorials.

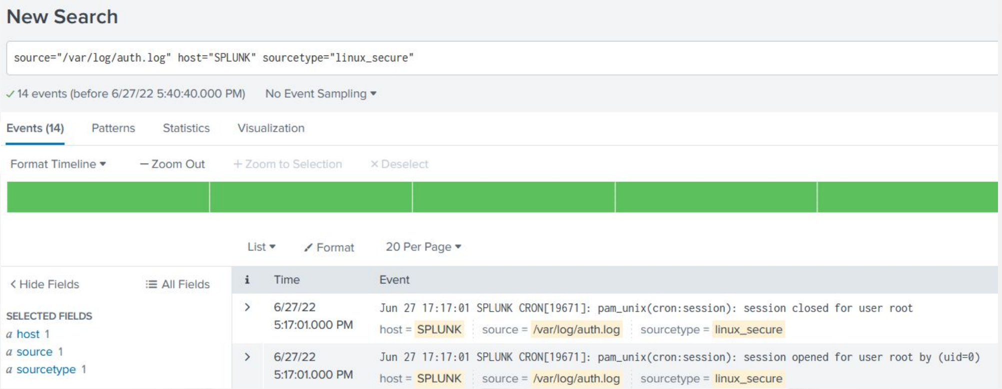
Create search-time field extractions. Learn more about fields.

Add more data inputs now or see examples and tutorials.

Apps help you do more with your data. Learn more.

Visualize your searches. Learn more.

- Monitor the events in real-time



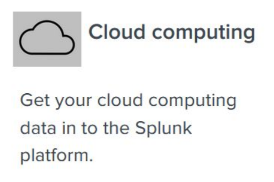
```
source="/var/log/auth.log" host="SPLUNK" sourcetype="linux_secure"
```

✓ 14 events (before 6/27/22 5:40:40.000 PM)   No Event Sampling ▾

```
6/27/22 5:17:01.000 PM   Jun 27 17:17:01 SPLUNK CRON[19671]: pam_unix(cron:session): session closed for user root
                         host = SPLUNK   source = /var/log/auth.log   sourcetype = linux_secure
6/27/22 5:17:01.000 PM   Jun 27 17:17:01 SPLUNK CRON[19671]: pam_unix(cron:session): session opened for user root by (uid=0)
                         host = SPLUNK   source = /var/log/auth.log   sourcetype = linux_secure
```

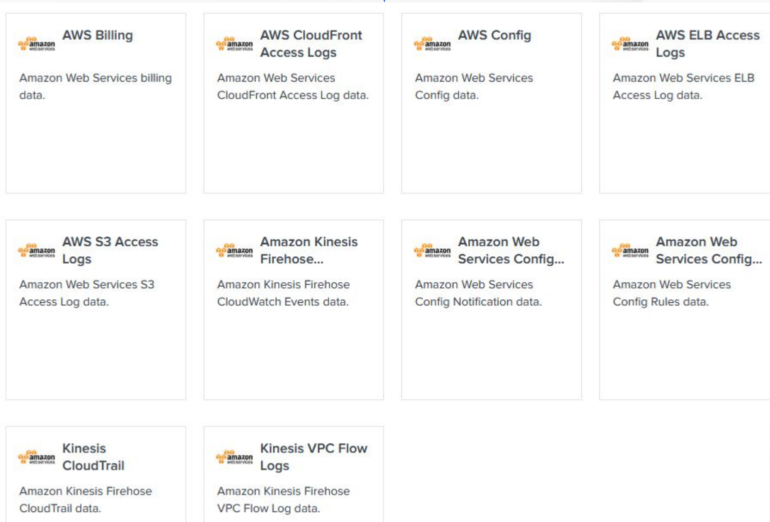
- Log collection other sources

1



Cloud computing

Get your cloud computing data in to the Splunk platform.



AWS Billing
Amazon Web Services billing data.

AWS CloudFront Access Logs
Amazon Web Services CloudFront Access Log data.

AWS Config
Amazon Web Services Config data.

AWS ELB Access Logs
Amazon Web Services ELB Access Log data.

AWS S3 Access Logs
Amazon Web Services S3 Access Log data.

Amazon Kinesis Firehose...
Amazon Kinesis Firehose CloudWatch Events data.

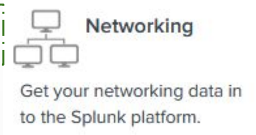
Amazon Web Services Config...
Amazon Web Services Config Notification data.

Amazon Web Services Config...
Amazon Web Services Config Rules data.

Kinesis CloudTrail
Amazon Kinesis Firehose CloudTrail data.

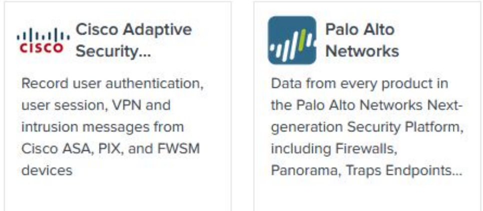
Kinesis VPC Flow Logs
Amazon Kinesis Firehose VPC Flow Log data.

2



Networking

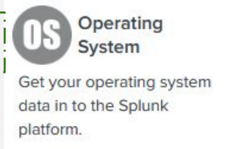
Get your networking data in to the Splunk platform.



Cisco Adaptive Security...
Record user authentication, user session, VPN and intrusion messages from Cisco ASA, PIX, and FWSM devices

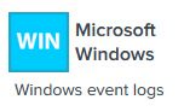
Palo Alto Networks
Data from every product in the Palo Alto Networks Next-generation Security Platform, including Firewalls, Panorama, Traps Endpoints...

3



Operating System

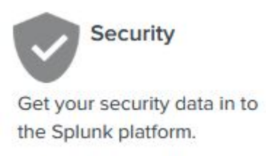
Get your operating system data in to the Splunk platform.



Microsoft Windows

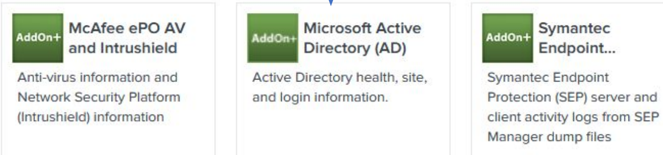
Windows event logs

4



Security

Get your security data in to the Splunk platform.



AddOn+ McAfee ePO AV and Intrushield

Anti-virus information and Network Security Platform (Intrushield) information

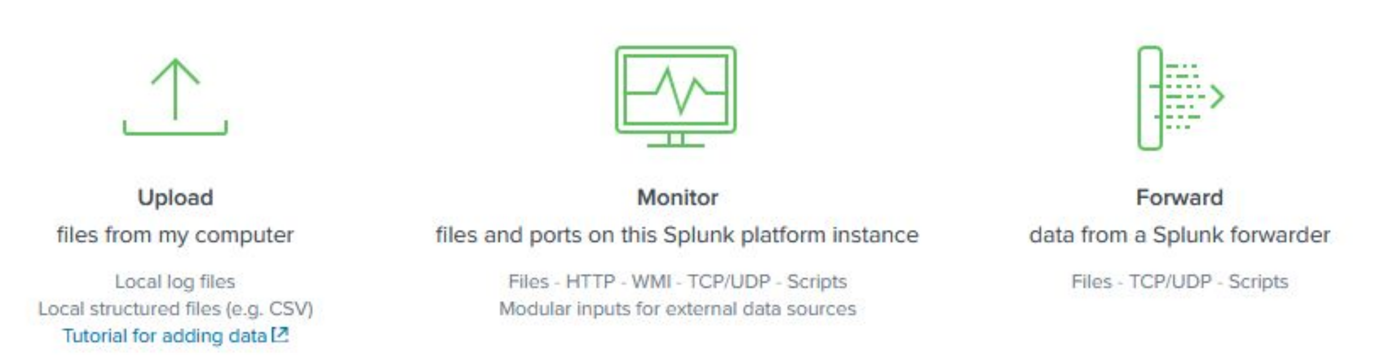
AddOn+ Microsoft Active Directory (AD)

Active Directory health, site, and login information.

AddOn+ Symantec Endpoint...

Symantec Endpoint Protection (SEP) server and client activity logs from SEP Manager dump files

5



Upload

files from my computer

Local log files
Local structured files (e.g. CSV)
Tutorial for adding data

Monitor

files and ports on this Splunk platform instance

Files - HTTP - WMI - TCP/UDP - Scripts
Modular inputs for external data sources

Forward

data from a Splunk forwarder

Files - TCP/UDP - Scripts

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DEMO :
Install Splunk in Linux Instance

DEMO :
Log forwarding to Splunk

1. Installing “sysmon” in Windows Machine
2. Collecting & Transferring logs via “Universal Forwarder (UF)”

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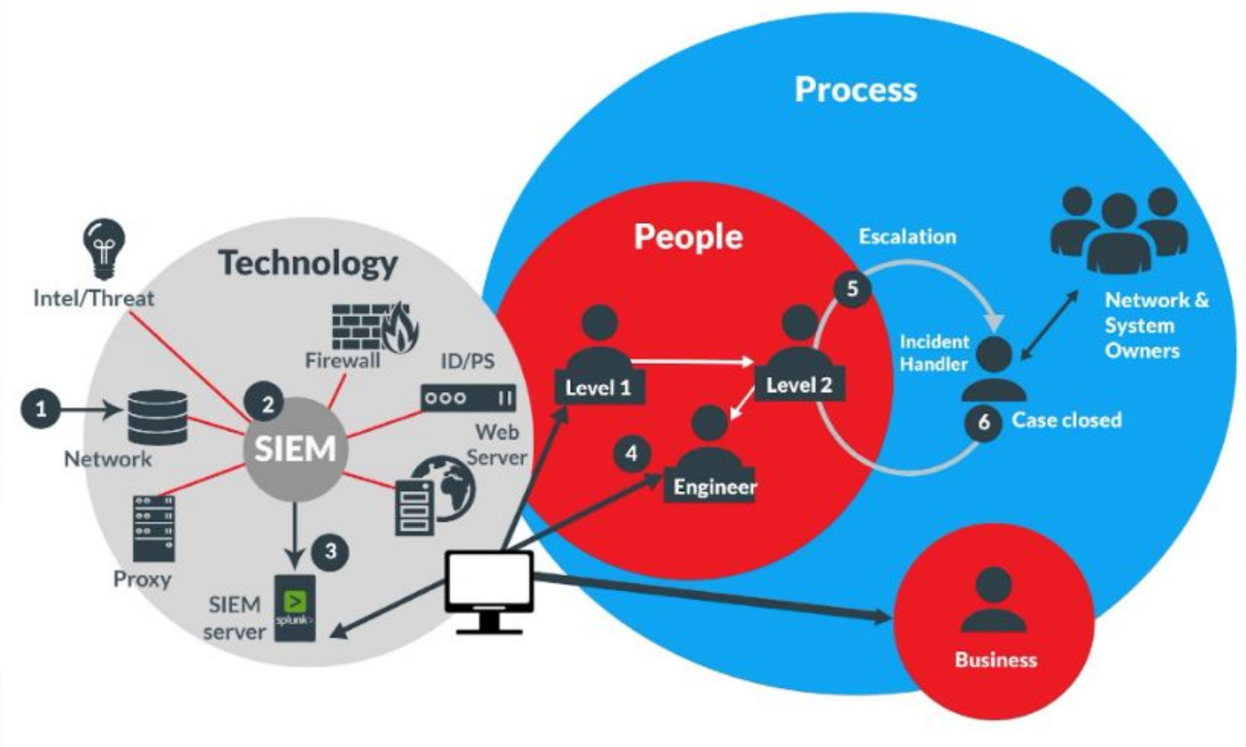
DEMO :
Log forwarding to Splunk

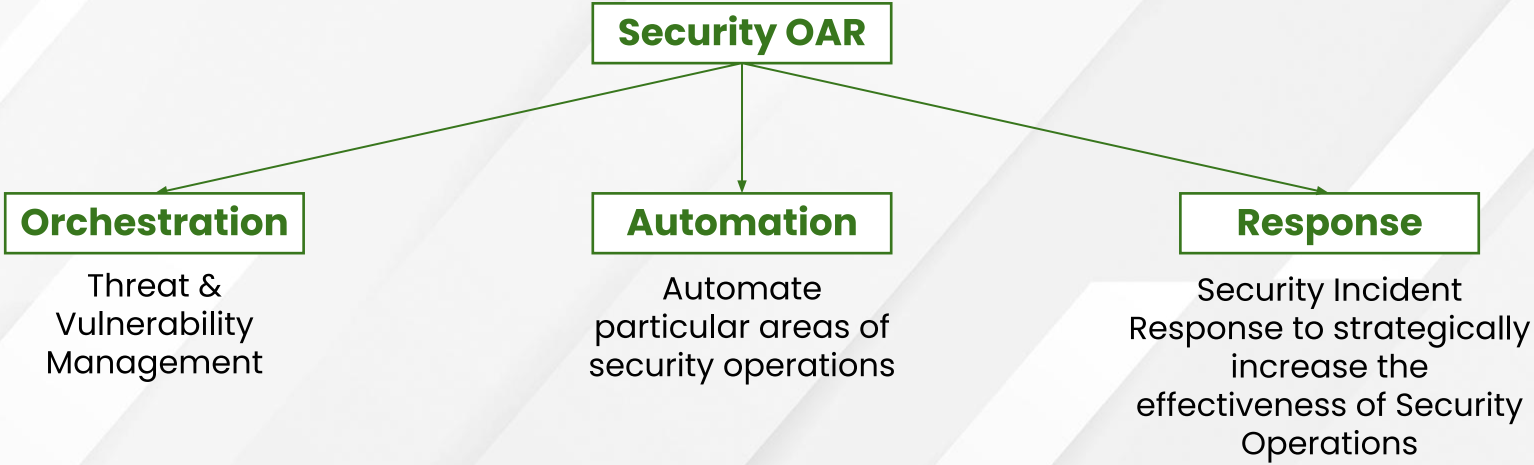
1. Installing “sysmon” in Windows Machine
2. Collecting & Transferring logs via “Universal Forwarder (UF)”

Concept of Operations



Security Orchestration, Automation and Response – Azure Sentinel

- It is a technology that allows organizations to collect data (alerts + events) & allows analysts to respond to threats in real-time using repetitive tasks



Security OAR

Orchestration

Threat & Vulnerability Management

Automation

Automate particular areas of security operations

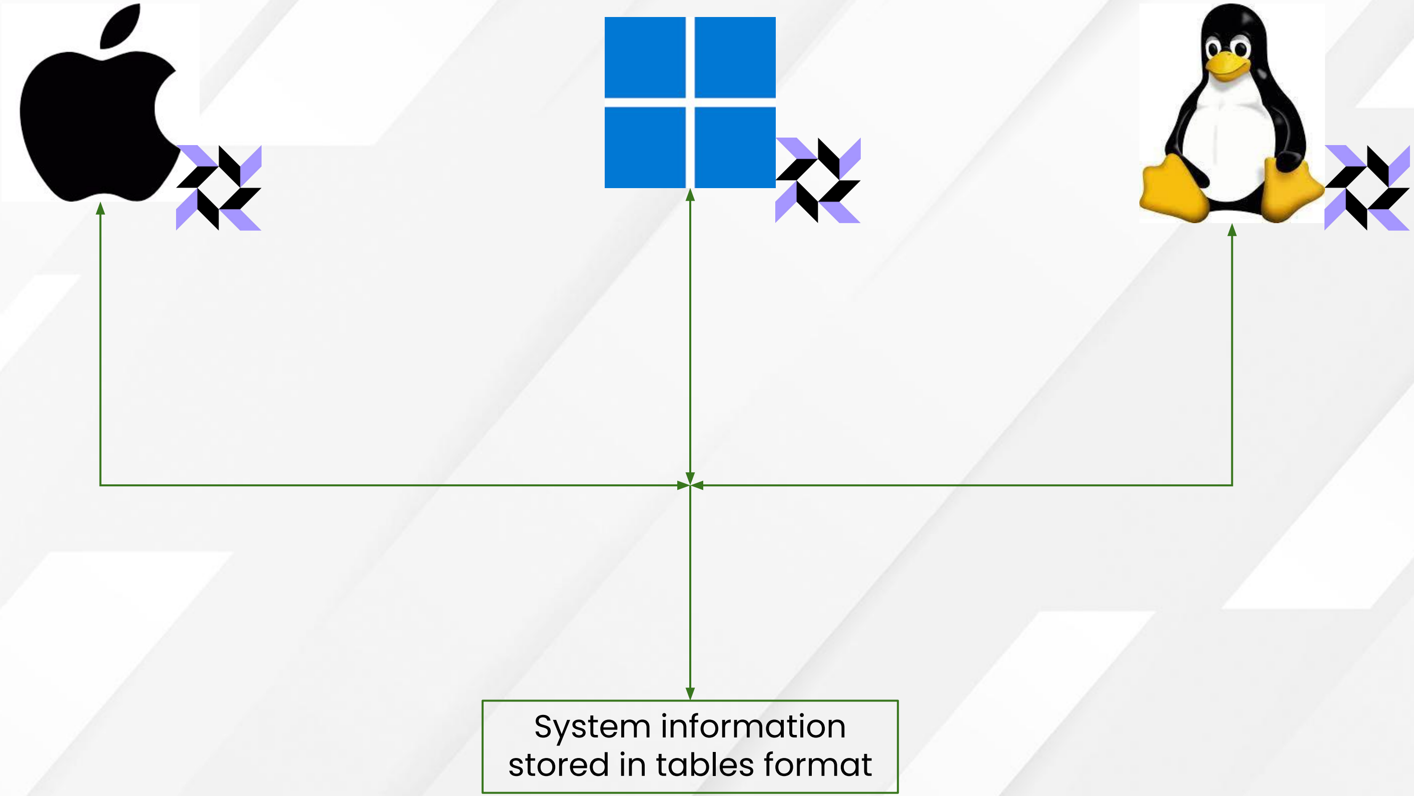
Response

Security Incident Response to strategically increase the effectiveness of Security Operations

OSQuery 101

- OSQuery framework originally developed by Meta, exposes an OS as a high-operational database.

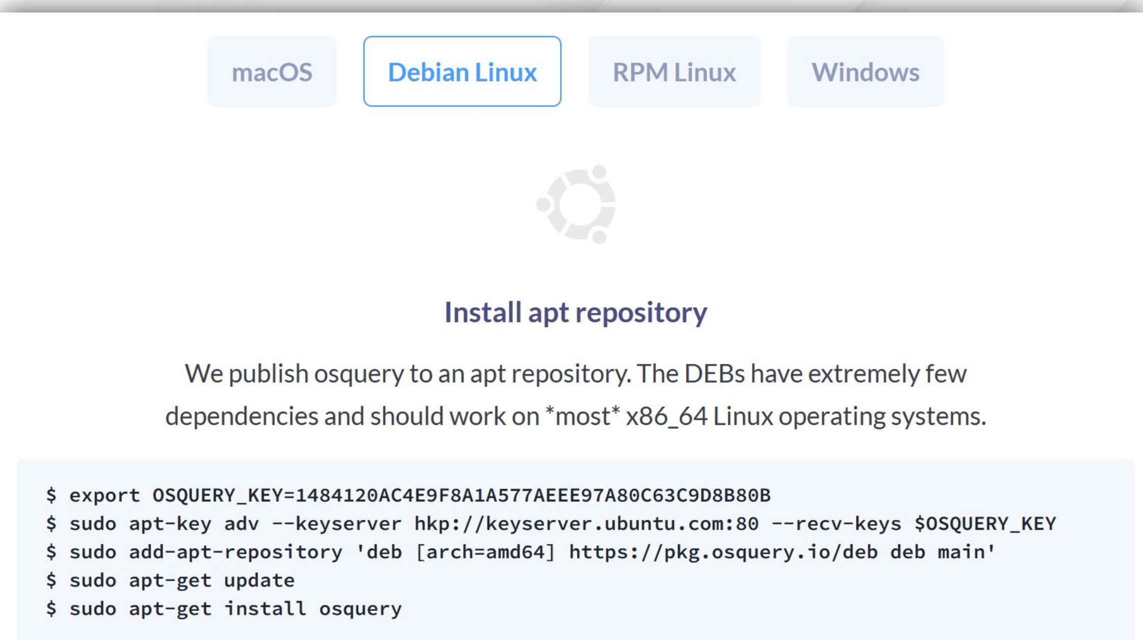
- Data like system network connection, running processes etc is stored in tables
- We can extract the system data using SQL queries from the tables
- Extracted information can then be feed to SIEM servers etc for further processing



System information stored in tables format

Install OSQuery (Linux)

Link : https://osquery.io/downloads/



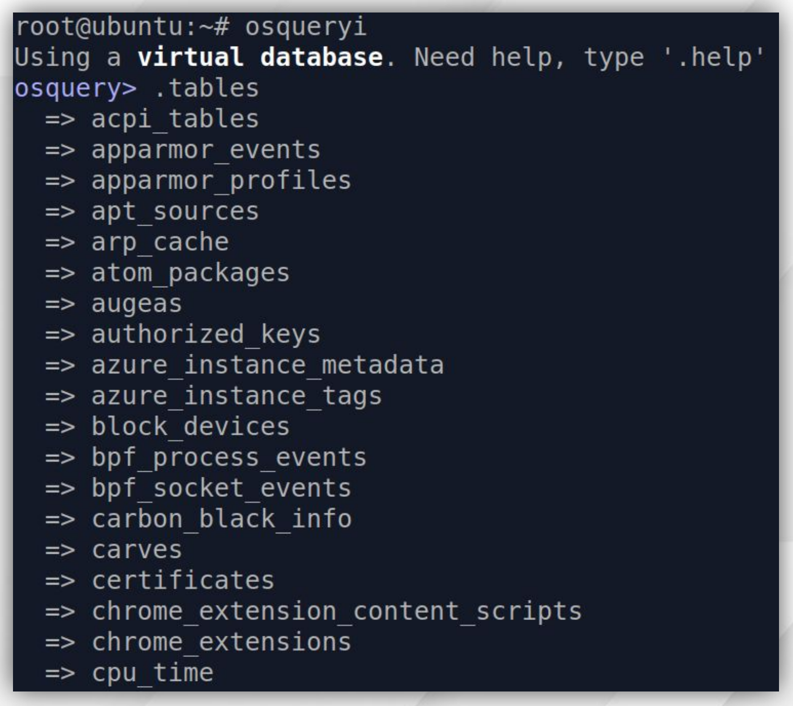
Install apt repository

We publish osquery to an apt repository. The DEBs have extremely few dependencies and should work on *most* x86_64 Linux operating systems.

```
$ export OSQUERY_KEY=1484120AC4E9F8A1A577AEEE97A80C63C9D8B80B
$ sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv-keys $OSQUERY_KEY
$ sudo add-apt-repository 'deb [arch=amd64] https://pkg.osquery.io/deb deb main'
$ sudo apt-get update
$ sudo apt-get install osquery
```

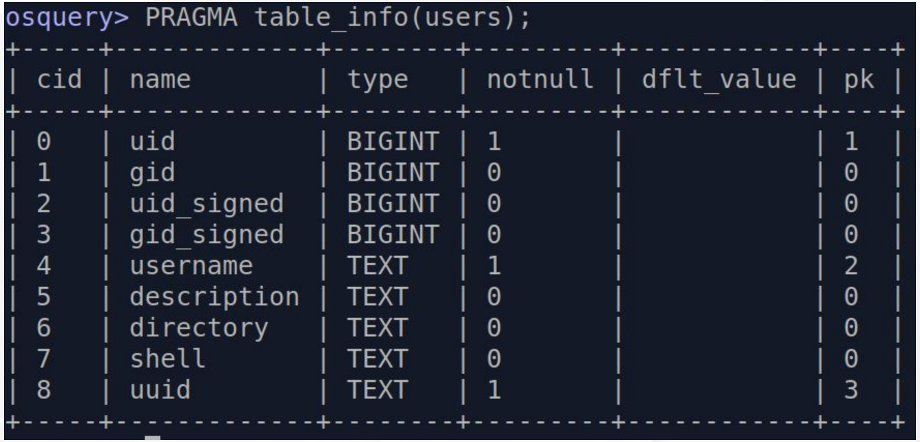
Exercise :
Install OSQUERY in Linux Instance

Run and check all the available tables:



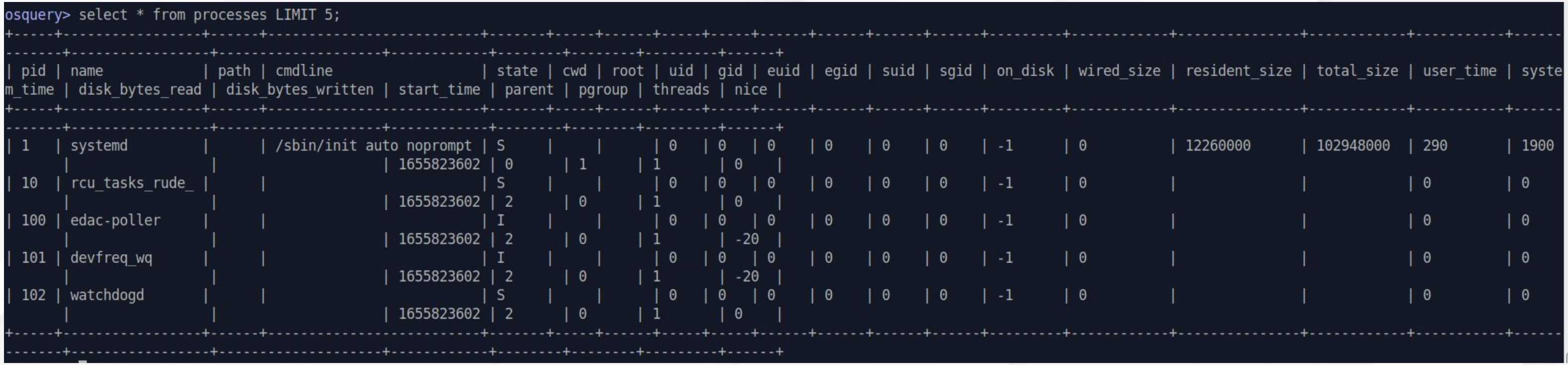
```
root@ubuntu:~# osqueryi
Using a virtual database. Need help, type '.help'
osquery> .tables
  => acpi_tables
  => apparmor_events
  => apparmor_profiles
  => apt_sources
  => arp_cache
  => atom_packages
  => augeas
  => authorized_keys
  => azure_instance_metadata
  => azure_instance_tags
  => block_devices
  => bpf_process_events
  => bpf_socket_events
  => carbon_black_info
  => carves
  => certificates
  => chrome_extension_content_scripts
  => chrome_extensions
  => cpu_time
```

Check the structure of each table



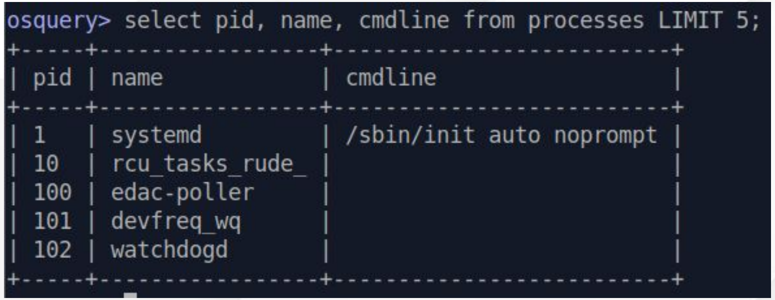
```
osquery> PRAGMA table_info(users);
+-----+-------------+--------+---------+------------+----+
| cid | name        | type   | notnull | dflt_value | pk |
+-----+-------------+--------+---------+------------+----+
| 0   | uid         | BIGINT | 1       |            | 1  |
| 1   | gid         | BIGINT | 0       |            | 0  |
| 2   | uid_signed  | BIGINT | 0       |            | 0  |
| 3   | gid_signed  | BIGINT | 0       |            | 0  |
| 4   | username    | TEXT   | 1       |            | 2  |
| 5   | description | TEXT   | 0       |            | 0  |
| 6   | directory   | TEXT   | 0       |            | 0  |
| 7   | shell       | TEXT   | 0       |            | 0  |
| 8   | uuid        | TEXT   | 1       |            | 3  |
+-----+-------------+--------+---------+------------+----+
```

Query from a table and limit the results



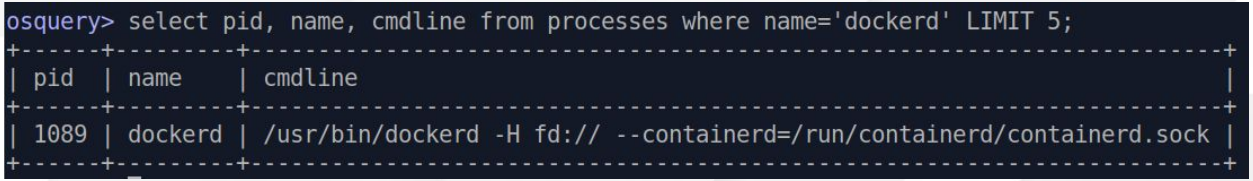
```
osquery> select * from processes LIMIT 5;
+-----+-----------------+------+--------------------------+-------+-----+------+-----+-----+------+------+------+------+---------+------------+---------------+------------+-----------+------
-------+-----------------+--------------------+------------+--------+--------+---------+------+
| pid | name            | path | cmdline                  | state | cwd | root | uid | gid | euid | egid | suid | sgid | on_disk | wired_size | resident_size | total_size | user_time | syste
m_time | disk_bytes_read | disk_bytes_written | start_time | parent | pgroup | threads | nice |
+-----+-----------------+------+--------------------------+-------+-----+------+-----+-----+------+------+------+------+---------+------------+---------------+------------+-----------+------
-------+-----------------+--------------------+------------+--------+--------+---------+------+
| 1   | systemd         |      | /sbin/init auto noprompt | S     |     |      | 0   | 0   | 0    | 0    | 0    | 0    | -1      | 0          | 12260000      | 102948000  | 290       | 1900
       |                 |                    | 1655823602 | 0      | 1      | 1       | 0    |
| 10  | rcu_tasks_rude_ |      |                          | S     |     |      | 0   | 0   | 0    | 0    | 0    | 0    | -1      | 0          |               |            | 0         | 0
       |                 |                    | 1655823602 | 2      | 0      | 1       | 0    |
| 100 | edac-poller     |      |                          | I     |     |      | 0   | 0   | 0    | 0    | 0    | 0    | -1      | 0          |               |            | 0         | 0
       |                 |                    | 1655823602 | 2      | 0      | 1       | -20  |
| 101 | devfreq_wq      |      |                          | I     |     |      | 0   | 0   | 0    | 0    | 0    | 0    | -1      | 0          |               |            | 0         | 0
       |                 |                    | 1655823602 | 2      | 0      | 1       | -20  |
| 102 | watchdogd       |      |                          | S     |     |      | 0   | 0   | 0    | 0    | 0    | 0    | -1      | 0          |               |            | 0         | 0
       |                 |                    | 1655823602 | 2      | 0      | 1       | 0    |
+-----+-----------------+------+--------------------------+-------+-----+------+-----+-----+------+------+------+------+---------+------------+---------------+------------+-----------+------
-------+-----------------+--------------------+------------+--------+--------+---------+------+
```

Selecting 2 columns from a table



```
osquery> select pid, name, cmdline from processes LIMIT 5;
+-----+----------------+--------------------------+
| pid | name           | cmdline                  |
+-----+----------------+--------------------------+
| 1   | systemd        | /sbin/init auto noprompt |
| 10  | rcu_tasks_rude_ |                          |
| 100 | edac-poller    |                          |
| 101 | devfreq_wq     |                          |
| 102 | watchdogd      |                          |
+-----+----------------+--------------------------+
```

With Filtering



```
osquery> select pid, name, cmdline from processes where name='dockerd' LIMIT 5;
+------+---------+------------------------------------------------------------------------+
| pid  | name    | cmdline                                                                |
+------+---------+------------------------------------------------------------------------+
| 1089 | dockerd | /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock |
+------+---------+------------------------------------------------------------------------+
```

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Exercise :
Explore the Tables & Replicate the above exercises

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Thank You

For Professional Red Team / Blue Team / Purple Team,
Cloud Cyber Range labs / Courses / Trainings, please contact

info@cyberwarfare.live

To know more about our offerings, please visit:

https://cyberwarfare.live