Implementation of Security Operations Center Based on Wazuh Tool

1. Goal and Tasks of the Project

Goal

- To build a fully functional Security Operations Center (SOC) using open-source tools (Wazuh (SIEM), AbusIPDB (Threat Intelligence Platform), IRIS (Ticketing System)).
- Enhance capabilities for detecting, analyzing, and responding to security incidents using SIEM, threat intelligence, and a ticketing system.

Tasks and Responsibilities

1. **Mohamad Nour Shahin & Mohammad Jaafar:** Infrastructure Setup.
    - Set up the virtual environment for the SOC.
    - Install and configure the Wazuh SIEM tool.
    - Document the installation and configuration process for Wazuh.
    - Create a basic incident dashboard in Wazuh for tracking events.
    - Ensure connectivity between Wazuh and other tools (e.g., AbusIPDB, IRIS).
    - Writing the readme section and overall evaluation of contents and reports.
2. **Yehia Sobeh:** Integration of AbusIPDB for threat intelligence.
    - Install and configure AbusIPDB as the threat intelligence platform.
    - Integrate AbusIPDB with Wazuh for contextual threat information.
    - Document the integration process and configuration steps.
    - Test threat intelligence data flow into Wazuh and provide sample scenarios.
    - Propose mechanisms to enrich threat data using AbusIPDB.

- **Ammar Meslmani:** Configuration of IRIS for case management and incident automation.
    - Install and configure IRIS as the ticketing system for incident tracking.
    - Link IRIS with Wazuh to automatically log security incidents.
    - Develop and test automated responses to at least two security incidents (e.g., failed login attempts, malware detection).
    - Document automation workflows and response mechanisms.

- Simulate the incident management process for the demo.

- **Ali Hamdan:** Testing, incident simulation, and documentation.
  - Test the overall integration and functionality of the SOC setup.
  - Identify and document potential issues during integration and solutions implemented.
  - Write scripts to simulate security incidents for testing (e.g., running a vulnerability scanner, mock phishing attacks).
  - Prepare the final demo presentation and record it for submission.
  - Organize and compile the documentation from all members into a cohesive report.

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2. Execution Plan and Methodology

Plan for the Solution

1. **Setup:**
   - Deploy virtual machines or Docker containers for Wazuh, AbusIPDB, and IRIS.
   - Establish network connectivity and API integrations.
2. **Integration:**
   - Configure Wazuh to collect logs and generate alerts.
   - Integrate AbusIPDB for threat intelligence enrichment.
   - Set up IRIS for incident tracking and automation workflows.
3. **Testing:**
   - Simulate real-world security incidents (e.g., brute force attacks, malware detection).
   - Automate responses and document workflows.

Methodology

- Follow official documentation for tool installations and configurations.
- Implement and test workflows for data flow, alert generation, and automated responses.
- Document challenges and solutions.

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3. Development of Solution and Tests (Proof of Concept)

Environment Preparation

Description of the SOC setup: VMs/containers, OS versions, and configurations.

1. Setup Wazuh server on Ubuntu 22.04 (Ali Device number one):
   - Download and run the Wazuh installation assistant:

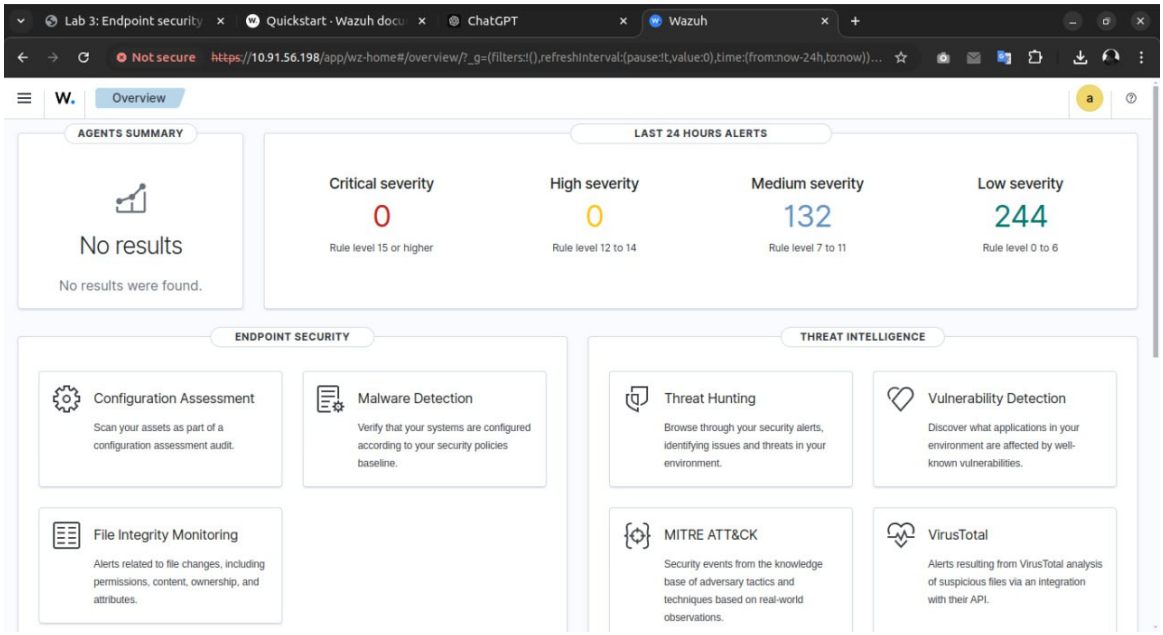
```
  curl -sO https://packages.wazuh.com/4.9/wazuh-install.sh && sudo
bash ./wazuh-install.sh -a -o
```

- Configure Wazuh, install Wazuh Indexer, install Wazuh Server, and install Wazuh Dashboard.

```
ali@ali-workstation: $ sudo curl -sO https://packages.wazuh.com/4.9/wazuh-install.sh && sudo bash ./wazuh-install.sh -a
05/12/2024 14:35:01 INFO: Starting Wazuh installation assistant. Wazuh version: 4.9.2
05/12/2024 14:35:01 INFO: Verbose logging redirected to /var/log/wazuh-install.log
05/12/2024 14:35:15 INFO: Verifying that your system meets the recommended minimum hardware requirements.
05/12/2024 14:35:15 INFO: Wazuh web interface port will be 443.
05/12/2024 14:35:34 INFO: Wazuh repository added.
05/12/2024 14:35:34 INFO: --- Configuration files ---
05/12/2024 14:35:34 INFO: Generating configuration files.
05/12/2024 14:35:35 INFO: Generating the root certificate.
05/12/2024 14:35:36 INFO: Generating Admin certificates.
05/12/2024 14:35:36 INFO: Generating Wazuh indexer certificates.
05/12/2024 14:35:36 INFO: Generating Filebeat certificates.
05/12/2024 14:35:36 INFO: Generating Wazuh dashboard certificates.
05/12/2024 14:35:37 INFO: Created wazuh-install-files.tar. It contains the Wazuh cluster key, certificates, and passwords necessary for installation.
05/12/2024 14:35:37 INFO: --- Wazuh indexer ---
05/12/2024 14:35:37 INFO: Starting Wazuh indexer installation.
05/12/2024 14:39:28 INFO: Wazuh indexer installation finished.
05/12/2024 14:39:28 INFO: Wazuh indexer post-install configuration finished.
05/12/2024 14:39:28 INFO: Starting service wazuh-indexer.
05/12/2024 14:39:47 INFO: wazuh-indexer service started.
05/12/2024 14:39:47 INFO: Initializing Wazuh indexer cluster security settings.
05/12/2024 14:39:53 INFO: Wazuh indexer cluster security configuration initialized.
05/12/2024 14:39:53 INFO: Wazuh indexer cluster initialized.
05/12/2024 14:39:53 INFO: --- Wazuh server ---
05/12/2024 14:39:53 INFO: Starting the Wazuh manager installation.
05/12/2024 14:42:28 INFO: Wazuh manager installation finished.
05/12/2024 14:42:28 INFO: Wazuh manager vulnerability detection configuration finished.
05/12/2024 14:42:28 INFO: Starting service wazuh-manager.
05/12/2024 14:42:46 INFO: wazuh-manager service started.
05/12/2024 14:42:46 INFO: Starting Filebeat installation.
05/12/2024 14:43:21 INFO: Filebeat installation finished.
05/12/2024 14:43:26 INFO: Filebeat post-install configuration finished.
05/12/2024 14:43:26 INFO: Starting service filebeat.
05/12/2024 14:43:28 INFO: filebeat service started.
05/12/2024 14:43:28 INFO: --- Wazuh dashboard ---
```

```
05/12/2024 14:43:28 INFO: --- Wazuh dashboard ---
05/12/2024 14:43:28 INFO: Starting Wazuh dashboard installation.
05/12/2024 14:45:33 INFO: Wazuh dashboard installation finished.
05/12/2024 14:45:33 INFO: Wazuh dashboard post-install configuration finished.
05/12/2024 14:45:33 INFO: Starting service wazuh-dashboard.
05/12/2024 14:45:34 INFO: wazuh-dashboard service started.
05/12/2024 14:45:36 INFO: Updating the internal users.
05/12/2024 14:45:42 INFO: A backup of the internal users has been saved in the /etc/wazuh-indexer/internalusers-backup folder.
05/12/2024 14:45:54 INFO: The filebeat.yml file has been updated to use the Filebeat Keystore username and password.
05/12/2024 14:46:29 INFO: Initializing Wazuh dashboard web application.
05/12/2024 14:46:29 INFO: Wazuh dashboard web application not yet initialized. Waiting...
05/12/2024 14:46:45 INFO: Wazuh dashboard web application not yet initialized. Waiting...
05/12/2024 14:47:00 INFO: Wazuh dashboard web application initialized.
05/12/2024 14:47:00 INFO: --- Summary ---
05/12/2024 14:47:00 INFO: You can access the web interface https://<wazuh-dashboard-ip>:443
    User: admin
    Password: sCZ.E3BKusUFJ8ZqKfTiyrxH4CRkLBL+
05/12/2024 14:47:00 INFO: Installation finished.
ali@ali-workstation: $
```

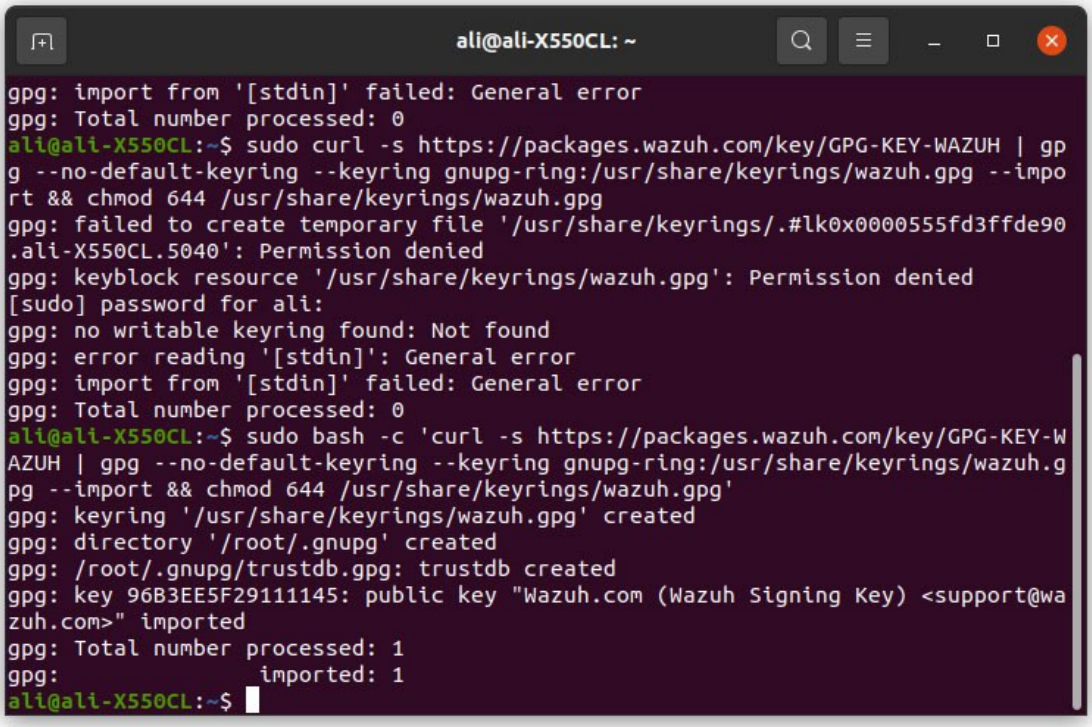
- Access the Wazuh web interface with `https://10.91.56.198:443` and my credentials:



2. Setup Wazuh Agent on Ubuntu 20.04 (Ali Device number two):

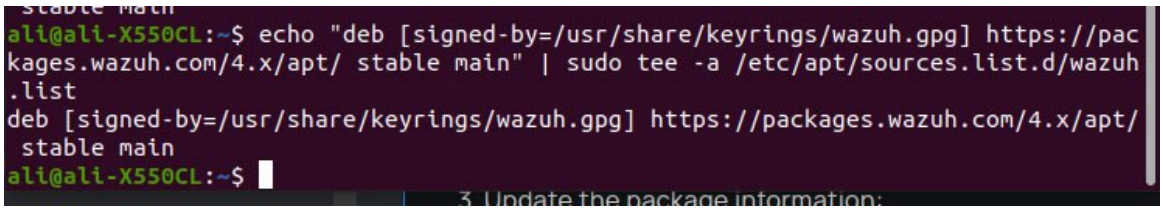
- Install the GPG key:

```
curl -s https://packages.wazuh.com/key/GPG-KEY-WAZUH | gpg --no-default-keyring --keyring gnupg-ring:/usr/share/keyrings/wazuh.gpg --import && chmod 644 /usr/share/keyrings/wazuh.gpg
```



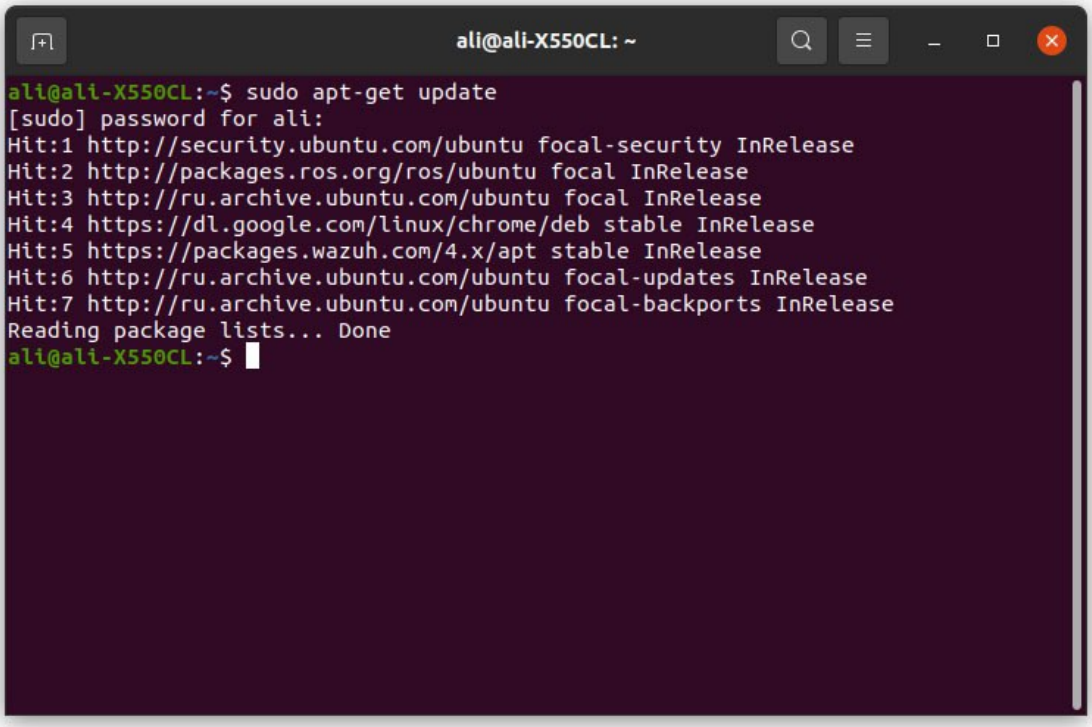
- Add the repository:

```
echo "deb [signed-by=/usr/share/keyrings/wazuh.gpg] https://packages.wazuh.com/4.x/apt/ stable main" | tee -a /etc/apt/sources.list.d/wazuh.list
```



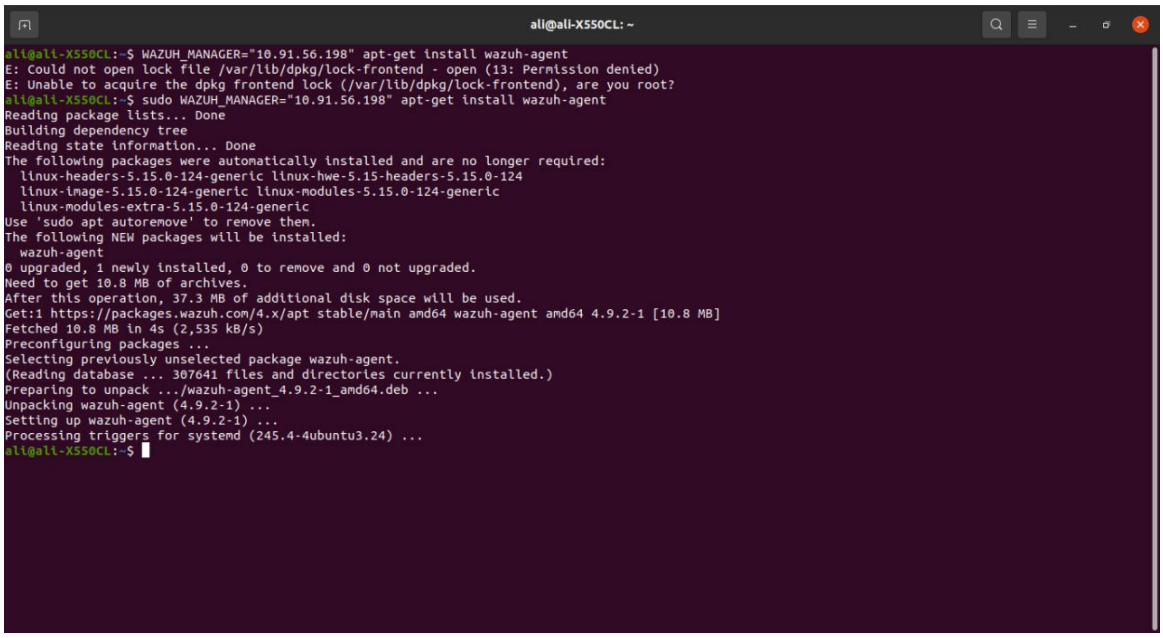
- Update the package information:

```
sudo apt-get update
```



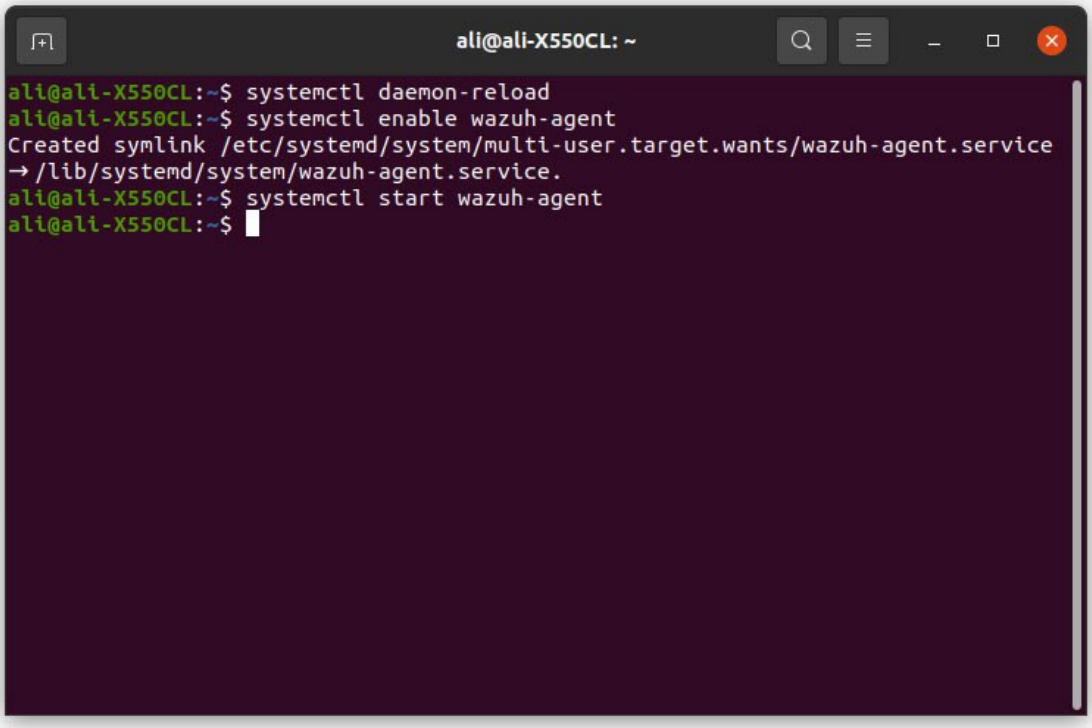
- Edit the WAZUH_MANAGER variable to contain our Wazuh manager IP address or hostname `10.91.56.198`:

```
WAZUH_MANAGER="10.91.56.198" apt-get install wazuh-agent
```



- Enable and start the Wazuh agent service:

```
systemctl daemon-reload
systemctl enable wazuh-agent
systemctl start wazuh-agent
```



3. Setup IRIS on Ubuntu 22.04 (Ammar Device):

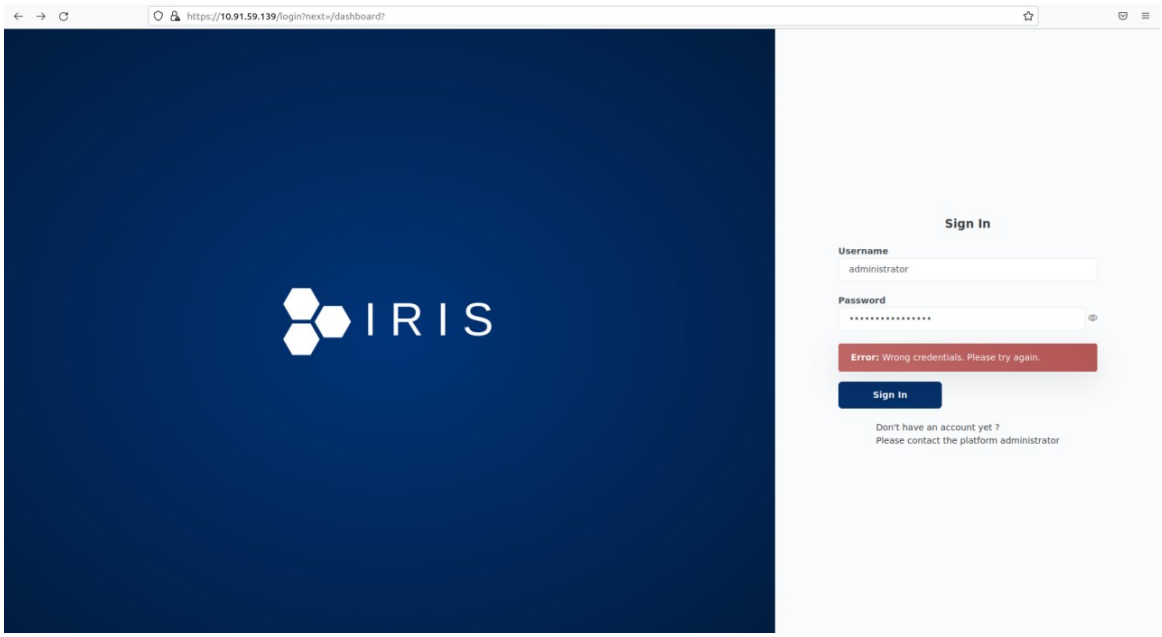
   - Setup Docker on the device:

```
(DOCKER PART)

# Add Docker's official GPG key:
sudo apt-get update
sudo apt-get install ca-certificates curl gnupg
sudo install -m 0755 -d /etc/apt/keyrings
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /etc/apt/keyrings/docker.gpg
sudo chmod a+r /etc/apt/keyrings/docker.gpg

# Add the repository to Apt sources:
echo \
  "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg] https://download.docker.com/linux/ubuntu \
  $(. /etc/os-release && echo "$VERSION_CODENAME") stable" | \
  sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
sudo apt-get update

sudo apt-get install docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin
sudo docker run hello-world
sudo groupadd docker
sudo gpasswd -a $USER docker
newgrp docker
docker run hello-world
```

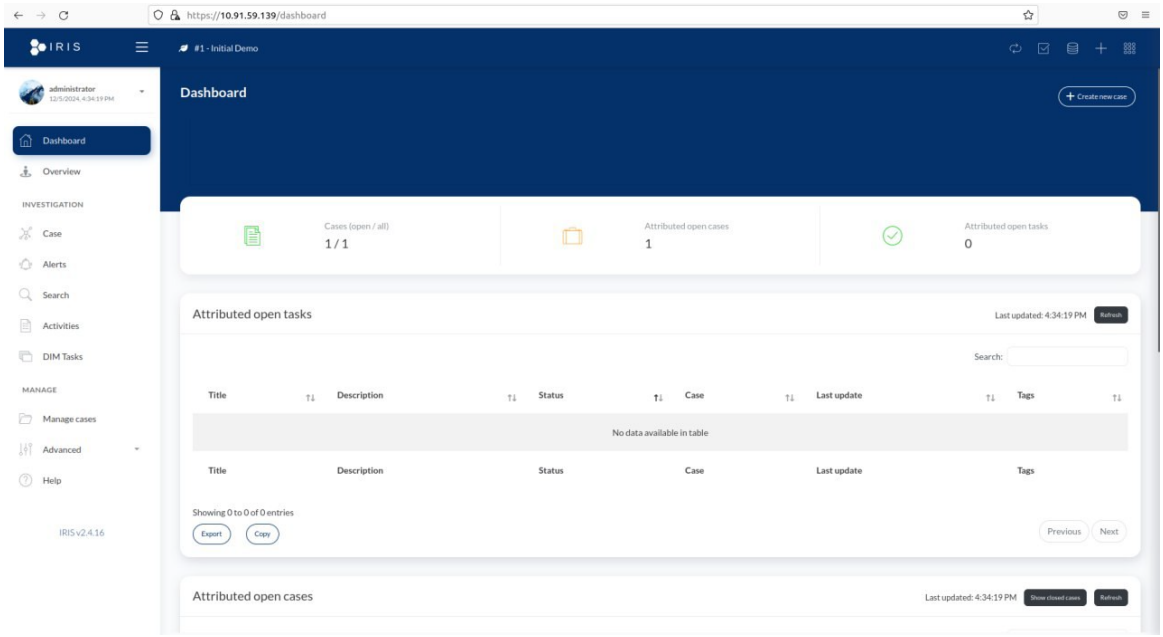
   - Intalling the IRIS on the device:

```
#  Clone the iris-web repository
git clone https://github.com/dfir-iris/iris-web.git
cd iris-web

# Checkout to the last tagged version
git checkout v2.4.16

# Copy the environment file
cp .env.model .env

# Pull the dockers
docker compose pull

# Run IRIS
docker compose up
```

- After Installing, Access the web interface:



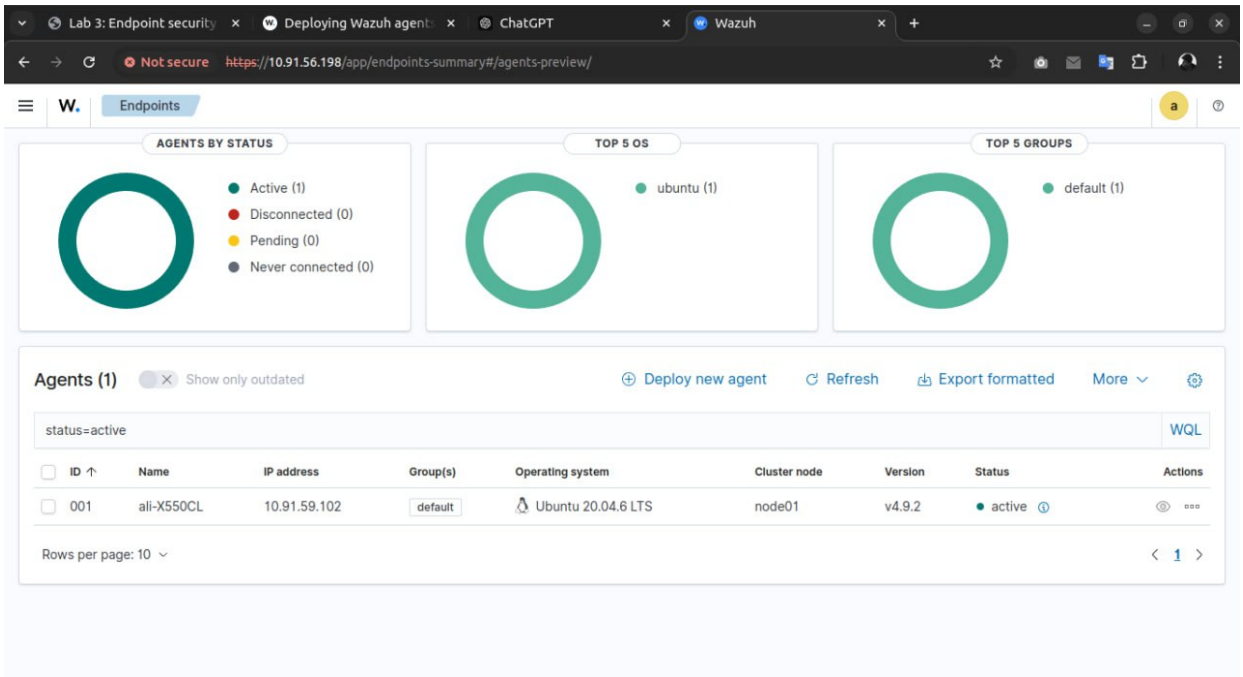
- Login and see the Dashboard of IRIS:



Working Instances of Tools

- **Wazuh:** Configured to collect logs, generate alerts, and display dashboards.

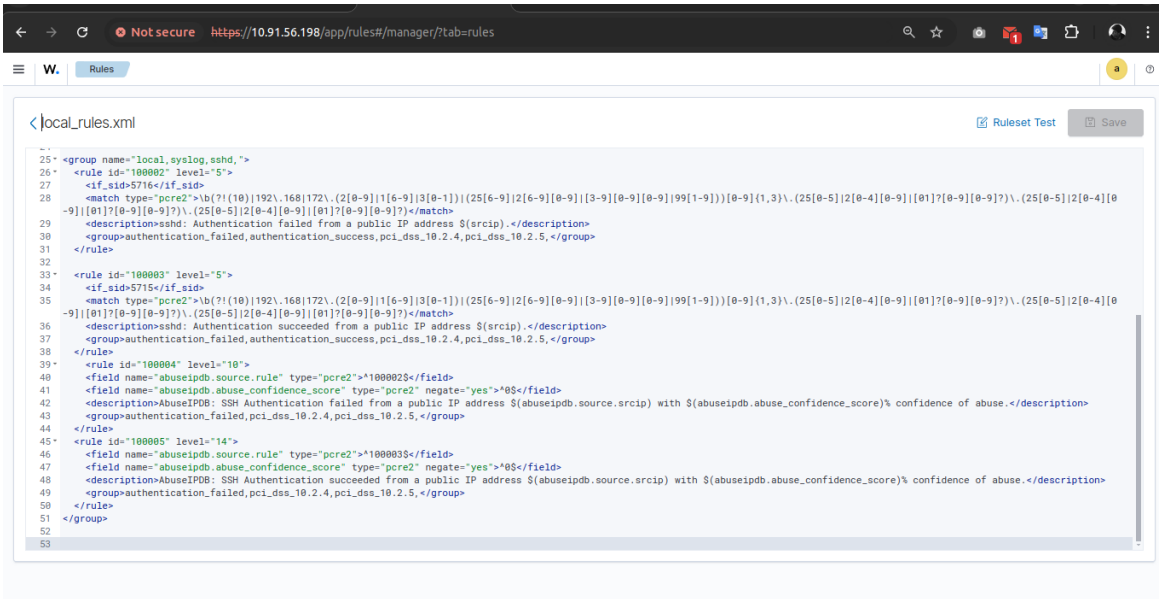
  here you can see the connection between the Wazuh Server and Wazuh Agent:



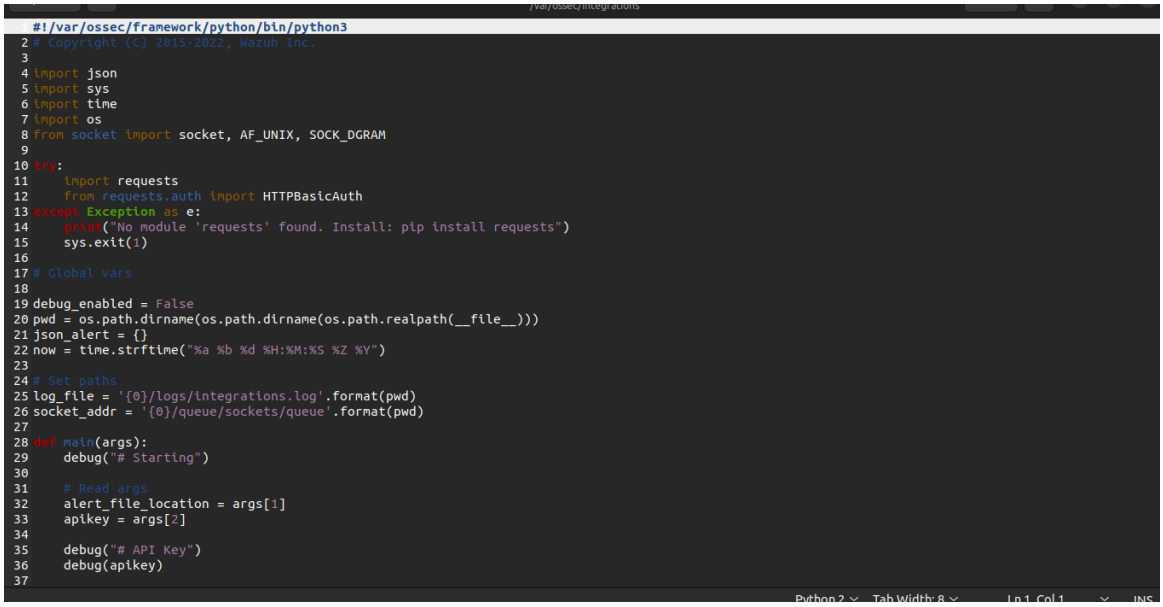
- **AbusIPDB:** Integrated with Wazuh for threat intelligence enrichment.
  - First I registered in AbusIPDB and creat a API key.
  - Then we follow this documentaion to configure wazuh to send request to check if an IP address is exist as a malicous.

steps

1. We add rules into var/ossec/etc/rules/local_rules.xml for
   trigger alert when using public ip and rules to accept the answer from AbusIPDB
   but we do it from the dashboard



2. we creat the custom-abuseipdb.py in `/var/ossec/integrations/custom-abuseipdb.py`



```
#!/var/ossec/framework/python/bin/python3
# Copyright (C) 2015-2022, Wazuh Inc.

import json
import sys
import time
import os
from socket import socket, AF_UNIX, SOCK_DGRAM

try:
    import requests
    from requests.auth import HTTPBasicAuth
except Exception as e:
    print("No module 'requests' found. Install: pip install requests")
    sys.exit(1)

# Global vars

debug_enabled = False
pwd = os.path.dirname(os.path.dirname(os.path.realpath(__file__)))
json_alert = {}
now = time.strftime("%a %b %d %H:%M:%S %Z %Y")

# Set paths
log_file = '{0}/logs/integrations.log'.format(pwd)
socket_addr = '{0}/queue/sockets/queue'.format(pwd)

def main(args):
    debug("# Starting")

    # Read args
    alert_file_location = args[1]
    apikey = args[2]
```

```
    debug("# API Key")
    debug(apikey)

    debug("# File location")
    debug(alert_file_location)

    # Load alert. Parse JSON object.
    with open(alert_file_location) as alert_file:
        json_alert = json.load(alert_file)
    debug("# Processing alert")
    debug(json_alert)

    # Request AbuseIPDB info
    msg = request_abuseipdb_info(json_alert,apikey)

    # If positive match, send event to Wazuh Manager
    if msg:
        send_event(msg, json_alert["agent"])

def debug(msg):
    if debug_enabled:
        msg = "{0}: {1}\n".format(now, msg)

        print(msg)

        f = open(log_file,"a")
        f.write(msg)
        f.close()

def collect(data):
  abuse_confidence_score = data['abuseConfidenceScore']
  country_code = data['countryCode']
  usage_type = data['usageType']
  isp = data['isp']
  domain = data['domain']
  total_reports = data['totalReports']
  last_reported_at = data['lastReportedAt']
  return abuse_confidence_score, country_code, usage_type, isp, domain,
total_reports, last_reported_at

def in_database(data, srcip):
  result = data['totalReports']
  if result == 0:
    return False
  return True

def query_api(srcip, apikey):
  params = {'maxAgeInDays': '90', 'ipAddress': srcip,}
  headers = {
  "Accept-Encoding": "gzip, deflate",
  'Accept': 'application/json',
  "Key": apikey
  }
```

```
  response =
requests.get('https://api.abuseipdb.com/api/v2/check',params=params,
headers=headers)
  if response.status_code == 200:
      json_response = response.json()
      data = json_response["data"]
      return data
  else:
      alert_output = {}
      alert_output["abuseipdb"] = {}
      alert_output["integration"] = "custom-abuseipdb"
      json_response = response.json()
      debug("# Error: The AbuseIPDB encountered an error")
      alert_output["abuseipdb"]["error"] = response.status_code
      alert_output["abuseipdb"]["description"] = json_response["errors"]
[0]["detail"]
      send_event(alert_output)
      exit(0)

def request_abuseipdb_info(alert, apikey):
    alert_output = {}
    # If there is no source ip address present in the alert. Exit.
    if not "srcip" in alert["data"]:

      return(0)

    # Request info using AbuseIPDB API
    data = query_api(alert["data"]["srcip"], apikey)

    # Create alert
    alert_output["abuseipdb"] = {}
    alert_output["integration"] = "custom-abuseipdb"
    alert_output["abuseipdb"]["found"] = 0
    alert_output["abuseipdb"]["source"] = {}
    alert_output["abuseipdb"]["source"]["alert_id"] = alert["id"]
    alert_output["abuseipdb"]["source"]["rule"] = alert["rule"]["id"]
    alert_output["abuseipdb"]["source"]["description"] = alert["rule"]
["description"]
    alert_output["abuseipdb"]["source"]["full_log"] = alert["full_log"]
    alert_output["abuseipdb"]["source"]["srcip"] = alert["data"]["srcip"]
    srcip = alert["data"]["srcip"]
    # Check if AbuseIPDB has any info about the srcip
    if in_database(data, srcip):
      alert_output["abuseipdb"]["found"] = 1

    # Info about the IP found in AbuseIPDB
    if alert_output["abuseipdb"]["found"] == 1:
        abuse_confidence_score, country_code, usage_type, isp, domain,
total_reports, last_reported_at = collect(data)


        # Populate JSON Output object with AbuseIPDB request
        alert_output["abuseipdb"]["abuse_confidence_score"] =
```

```
abuse_confidence_score
        alert_output["abuseipdb"]["country_code"] = country_code
        alert_output["abuseipdb"]["usage_type"] = usage_type
        alert_output["abuseipdb"]["isp"] = isp
        alert_output["abuseipdb"]["domain"] = domain
        alert_output["abuseipdb"]["total_reports"] = total_reports
        alert_output["abuseipdb"]["last_reported_at"] = last_reported_at

    debug(alert_output)

    return(alert_output)

def send_event(msg, agent = None):
    if not agent or agent["id"] == "000":
        string = '1:abuseipdb:{0}'.format(json.dumps(msg))
    else:
        string = '1:[{0}] ({1}) {2}->abuseipdb:{3}'.format(agent["id"],
agent["name"], agent["ip"] if "ip" in agent else "any", json.dumps(msg))

    debug(string)
    sock = socket(AF_UNIX, SOCK_DGRAM)
    sock.connect(socket_addr)
    sock.send(string.encode())
    sock.close()

if __name__ == "__main__":
    try:
        # Read arguments
        bad_arguments = False
        if len(sys.argv) >= 4:
            msg = '{0} {1} {2} {3} {4}'.format(now, sys.argv[1],
sys.argv[2], sys.argv[3], sys.argv[4] if len(sys.argv) > 4 else '')
            debug_enabled = (len(sys.argv) > 4 and sys.argv[4] ==
'debug')
        else:
            msg = '{0} Wrong arguments'.format(now)
            bad_arguments = True

        # Logging the call
        f = open(log_file, 'a')
        f.write(msg +'\n')
        f.close()

        if bad_arguments:
            debug("# Exiting: Bad arguments.")
            sys.exit(1)

        # Main function
        main(sys.argv)

    except Exception as e:
        debug(str(e))
        raise
```

3. we give the script the right permisions

```
chmod 750 /var/ossec/integrations/custom-abuseipdb.py
chown root:wazuh /var/ossec/integrations/custom-abuseipdb.py
```

```
root@ali-workstation:/home/ali# chmod 750 /var/ossec/integrations/custom-abuseipdb.py
root@ali-workstation:/home/ali# chown root:wazuh /var/ossec/integrations/custom-abuseipdb.py
root@ali-workstation:/home/ali#
root@ali-workstation:/home/ali# ls -llh  /var/ossec/integrations
total 84K
-rwxr-x--- 1 root wazuh 5.6K Dec 11 20:24 custom-abuseipdb.py
-rwxr-x--- 1 root wazuh 1.1K Oct 28 18:31 maltiverse
-rwxr-x--- 1 root wazuh  20K Oct 28 18:31 maltiverse.py
-rwxr-x--- 1 root wazuh 1.1K Oct 28 18:31 pagerduty
-rwxr-x--- 1 root wazuh 6.3K Oct 28 18:31 pagerduty.py
-rwxr-x--- 1 root wazuh 1.1K Oct 28 18:31 shuffle
-rwxr-x--- 1 root wazuh 7.1K Oct 28 18:31 shuffle.py
-rwxr-x--- 1 root wazuh 1.1K Oct 28 18:31 slack
-rwxr-x--- 1 root wazuh 6.7K Oct 28 18:31 slack.py
-rwxr-x--- 1 root wazuh 1.1K Oct 28 18:31 virustotal
-rwxr-x--- 1 root wazuh  11K Oct 28 18:31 virustotal.py
root@ali-workstation:/home/ali#
```

4. we ad the configureation /var/ossec/etc/ossec.conf

```
<integration>
  <name>custom-abuseipdb.py</name>
  <hook_url>https://api.abuseipdb.com/api/v2/check</hook_url>
  <api_key><YOUR_ABUSEIPDB_API_KEY></api_key>
  <rule_id>100002,100003</rule_id>
  <alert_format>json</alert_format>
</integration>
```

> note i replaced <YOUR_ABUSEIPDB_API_KEY> with a valid one

Open ossec.conf /var/ossec/etc Save

```
80    <add_labels>yes</add_labels>
81  </wodle>
82
83  <!-- System inventory -->
84  <wodle name="syscollector">
85    <disabled>no</disabled>
86    <interval>1h</interval>
87    <scan_on_start>yes</scan_on_start>
88    <hardware>yes</hardware>
89    <os>yes</os>
90    <network>yes</network>
91    <packages>yes</packages>
92    <ports all="no">yes</ports>
93    <processes>yes</processes>
94
95    <!-- Database synchronization settings -->
96    <synchronization>
97      <max_eps>10</max_eps>
98    </synchronization>
99
100 </wodle>
101
102 <integration>
103   <name>custom-abuseipdb.py</name>
104   <hook_url>https://api.abuseipdb.com/api/v2/check</hook_url>
105   <api_key>fa0d2a8f99cf7ca8ff953a38e64292c4c8e2b6fc5722e2a711a6502193311dc3733ba3816d28199a</api_key>
106   <rule_id>100002,100003</rule_id>
107   <alert_format>json</alert_format>
108 </integration>
109
110 <sca>
111   <enabled>yes</enabled>
112   <scan_on_start>yes</scan_on_start>
113   <interval>12h</interval>
114   <skip_nfs>yes</skip_nfs>
115 </sca>
116
```

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5. now we restart the wazuh manager to apply the new configureation

   `systemctl restart wazuh-manager`

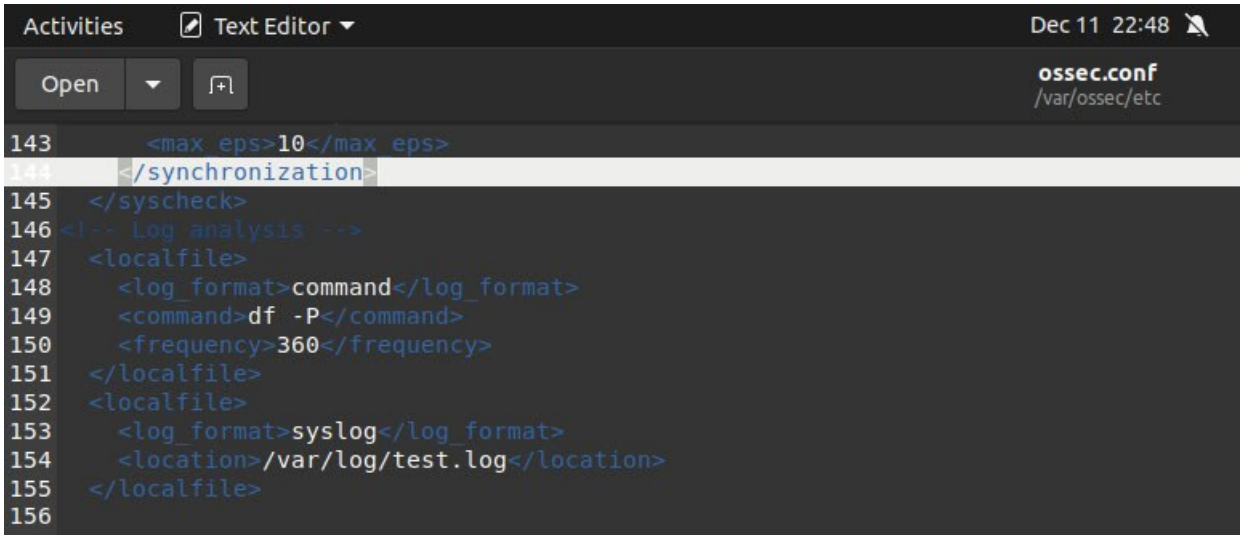
```
root@ali-workstation:/home/ali# systemctl restart wazuh-manager
root@ali-workstation:/home/ali#
```

6. we test from the agent

   we add

```
<localfile>
  <log_format>syslog</log_format>
  <location>/var/log/test.log</location>
</localfile>
```

to the file `/var/log/test.log`



now we restart the agent

`/var/ossec/bin/wazuh-control restart`

```
root@ali-X550CL:/home/ali# /var/ossec/bin/wazuh-control restart
2024/12/11 22:49:24 wazuh-agentd: INFO: Max time to reconnect can't be less than notify_time(10), using notify_time*3 (30)
Killing wazuh-modulesd...
Killing wazuh-logcollector...
Killing wazuh-syscheckd...
Killing wazuh-agentd...
Killing wazuh-execd...
Wazuh v4.9.2 Stopped
Starting Wazuh v4.9.2...
Started wazuh-execd...
2024/12/11 22:49:27 wazuh-agentd: INFO: Max time to reconnect can't be less than notify_time(10), using notify_time*3 (30)
Started wazuh-agentd...
Started wazuh-syscheckd...
Started wazuh-logcollector...
Started wazuh-modulesd...
Completed.
root@ali-X550CL:/home/ali#
```

now

```
echo "Dec 10 01:02:02 host sshd[1234]: Failed none for root from
45.159.112.120 port 1066 ssh2" >> injector
```

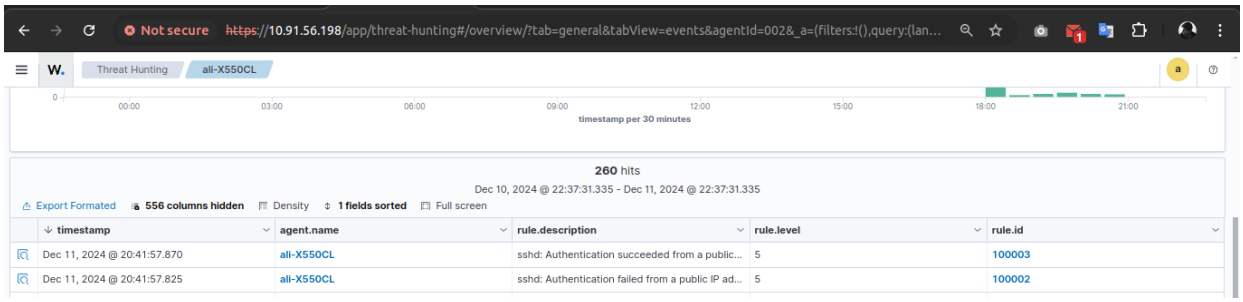
```
echo "Dec 10 01:02:02 host sshd[1234]: Accepted none for root from
64.62.197.132 port 1066 ssh2" >> injector
```

then Inject the log into `/var/log/test.log` to trigger the alert.

`cat injector >> /var/log/test.log`

```
root@ali-X550CL:/home/ali# echo "Dec 10 01:02:02 host sshd[1234]: Failed none for root from 45.159.112.120 port 1066 ssh2" >> injector
root@ali-X550CL:/home/ali#
root@ali-X550CL:/home/ali# echo "Dec 10 01:02:02 host sshd[1234]: Accepted none for root from 64.62.197.132 port 1066 ssh2" >> injector
root@ali-X550CL:/home/ali# cat injector >> /var/log/test.log
root@ali-X550CL:/home/ali#
```

now lets check on the dashboard



- **IRIS:** Configured for case management and linked with Wazuh.
  - Clone the repository of IRIS-Wazuh integration and update `verify=false` inside the script `custom-iris.py`.
  - Copy the updated script to `custom-iris.py` to the directory `/var/ossec/integrations/custom-iris.py`, Sets permissions for the file so the owner can read, write, and execute, and Changes the ownership of the file to the user root and group wazuh.

```
git clone https://github.com/nateuribe/Wazuh-IRIS-integration.git
cd Wazuh-IRIS-integration/
cp custom-iris.py /var/ossec/integrations/custom-iris.py
chmod 750 /var/ossec/integrations/custom-iris.py
chown root:wazuh /var/ossec/integrations/custom-iris.py
```

```
78 # Send request to IRIS
79 response = requests.post(hook_url, verify=False, data=payload, headers={"Authorization": "Bearer " + api_key, "content-type": "application/json"})
80
```

  - Add the following snippet into the `/var/ossec/etc/ossec.conf` config file, Adjust `<hook_url>` and `<api_key>` to your environment, and change `<level>` to the desired threshold for alerts.

```
<!-- ... Rest of config ... -->
    <!-- IRIS integration -->
    <integration>
      <name>custom-iris.py</name>
      <hook_url>http://10.91.59.139/alerts/add</hook_url>
      <level>4</level>
```

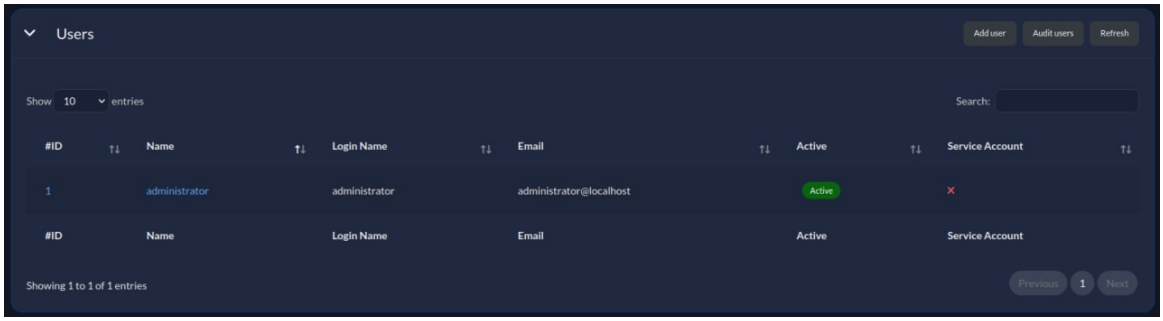
```
      <api_key>d1n0Dx-1qQvef982I8aAKY9R11CflVZrC0zlcNXqARXn5-
IdcOUNHZSiPbgBTStzmDDSGYw6Z8m3_KZ8p1P5Ww</api_key>
      <alert_format>json</alert_format>
    </integration>



<!-- ... Rest of config ... -->
```

```
<!-- IRIS integration -->
<integration>
<name>custom-iris.py</name>
<hook_url>https://10.91.59.139/alerts/add</hook_url>
<level>4</level>
<api_key>d1n0Dx-1qQvef982I8aAKY9R11CflVZrC0zlcNXqARXn5-
IdcOUNHZSiPbgBTStzmDDSGYw6Z8m3_KZ8p1P5Ww</api_key>
<alert_format>json</alert_format>
</integration>
```

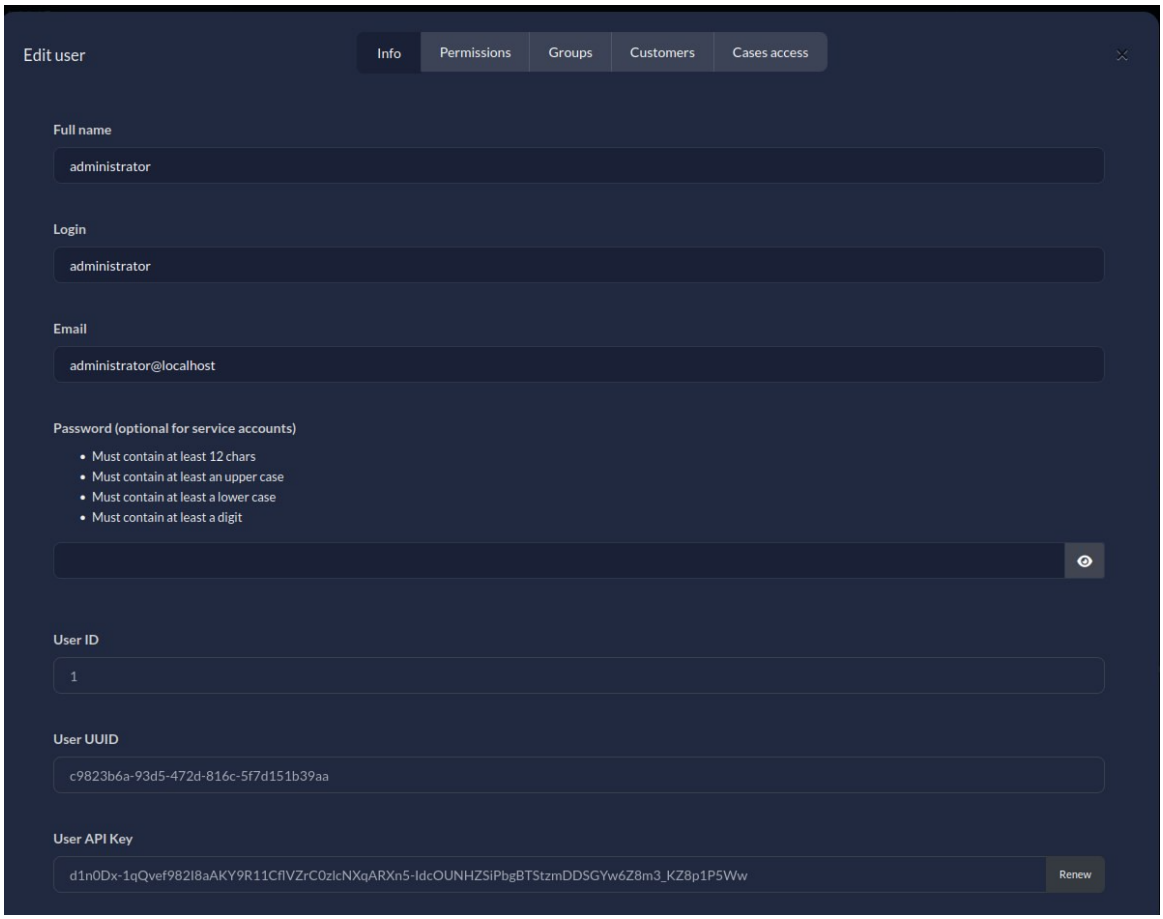
- Restart the wazuh-manager service after making the above settings, and check the status:

```
ali@ali-workstation: ~/Wazuh-IRIS-integration
ctory)
ali@ali-workstation:~/Wazuh-IRIS-integration$ sudo systemctl restart wazuh-manager.service
ali@ali-workstation:~/Wazuh-IRIS-integration$ sudo systemctl status wazuh-manager.service
● wazuh-manager.service - Wazuh manager
     Loaded: loaded (/lib/systemd/system/wazuh-manager.service; enabled; vendor preset: enabled)
     Active: active (running) since Thu 2024-12-05 22:57:30 MSK; 19s ago
    Process: 131021 ExecStart=/usr/bin/env /var/ossec/bin/wazuh-control start (code=exited, status=0/SUCCESS)
      Tasks: 174 (limit: 9330)
     Memory: 952.2M
        CPU: 51.747s
     CGroup: /system.slice/wazuh-manager.service
             ├─131149 /var/ossec/framework/python/bin/python3 /var/ossec/api/scripts/wazuh_apid.py
             ├─131150 /var/ossec/framework/python/bin/python3 /var/ossec/api/scripts/wazuh_apid.py
             ├─131153 /var/ossec/framework/python/bin/python3 /var/ossec/api/scripts/wazuh_apid.py
             ├─131156 /var/ossec/framework/python/bin/python3 /var/ossec/api/scripts/wazuh_apid.py
             ├─131179 /var/ossec/bin/wazuh-integratord
             ├─131200 /var/ossec/bin/wazuh-authd
             ├─131216 /var/ossec/bin/wazuh-db
             ├─131241 /var/ossec/bin/wazuh-execd
             ├─131263 /var/ossec/bin/wazuh-analysisd
             ├─131276 /var/ossec/bin/wazuh-syscheckd
             ├─131342 /var/ossec/bin/wazuh-remoted
             ├─131380 /var/ossec/bin/wazuh-logcollector
             ├─131400 /var/ossec/bin/wazuh-monitord
             ├─131430 /var/ossec/bin/wazuh-modulesd
             └─132693 python3 integrations/custom-iris.py /tmp/custom-iris.py-1733428668-779018942.alert d1n0Dx-1qQvef982I8aAKY9R11CflVZrC0zlcNXqARXn

Dec 05 22:57:22 ali-workstation env[131021]: Started wazuh-analysisd...
Dec 05 22:57:23 ali-workstation env[131021]: Started wazuh-syscheckd...
Dec 05 22:57:24 ali-workstation env[131021]: Started wazuh-remoted...
Dec 05 22:57:25 ali-workstation env[131021]: Started wazuh-logcollector...
Dec 05 22:57:26 ali-workstation env[131021]: Started wazuh-monitord...
Dec 05 22:57:27 ali-workstation env[131427]: 2024/12/05 22:57:27 wazuh-modulesd:router: INFO: Loaded router module.
Dec 05 22:57:27 ali-workstation env[131427]: 2024/12/05 22:57:27 wazuh-modulesd:content_manager: INFO: Loaded content_manager module.
Dec 05 22:57:28 ali-workstation env[131021]: Started wazuh-modulesd...
Dec 05 22:57:30 ali-workstation env[131021]: Completed.
Dec 05 22:57:30 ali-workstation systemd[1]: Started Wazuh manager.
lines 1-34/34 (END)
```

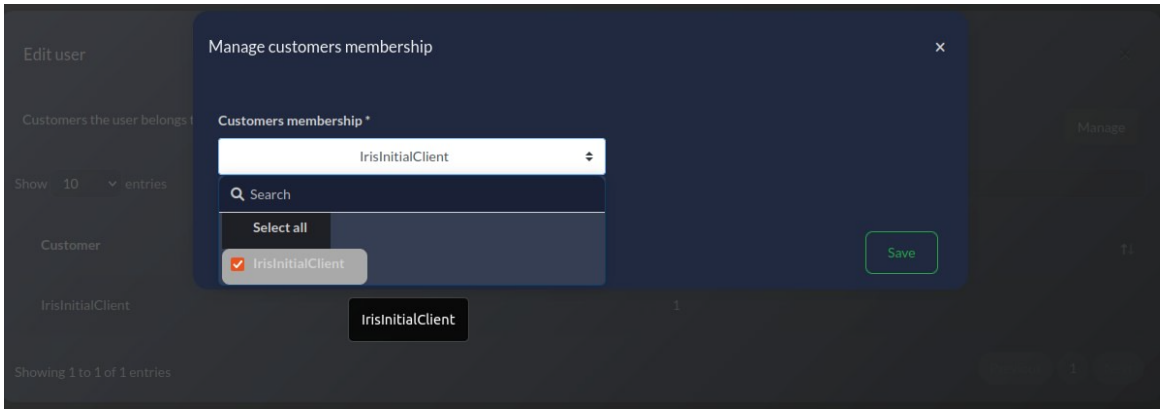
- Now eveything configured from Wazuh server side and we need to check it on the IRIS side:
- Navigate to the Advanced Settings in Iris, then Access Control Section:



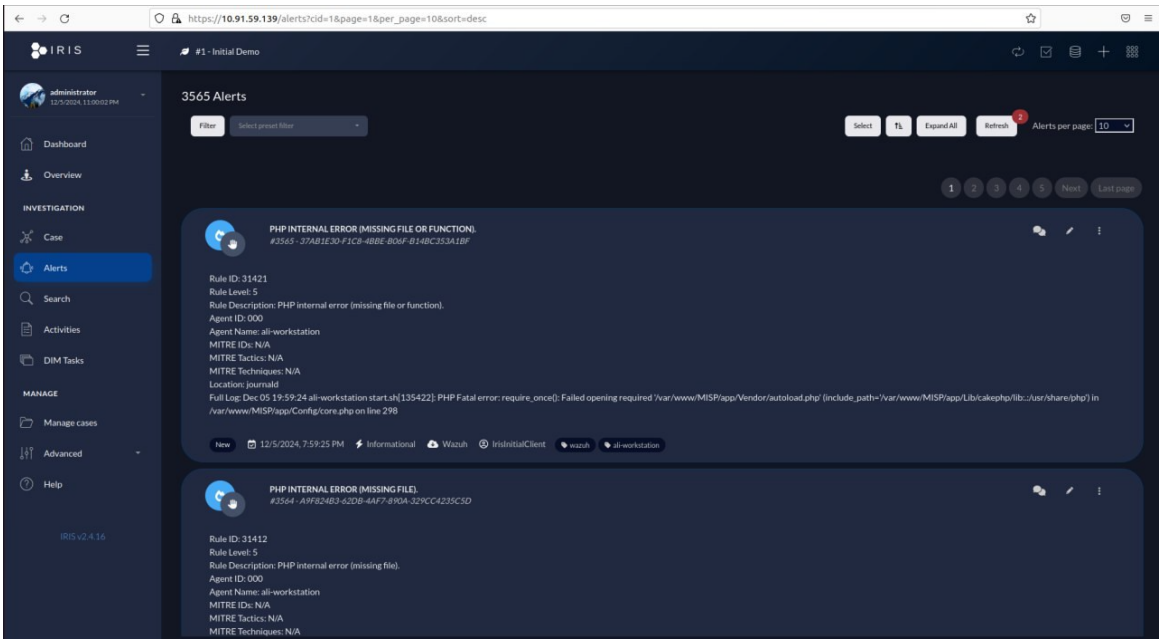
- Locate Customers Management:



- Assign Wazuh Server to a Customer:



- Showing the alerts of thats coming from wazuh agent:



Testing Scenarios

- **Incident 1:** Brute force attack simulation detected by Wazuh, automated IP block as response.
- **Incident 2:** Malware detection with alert escalation to IRIS.

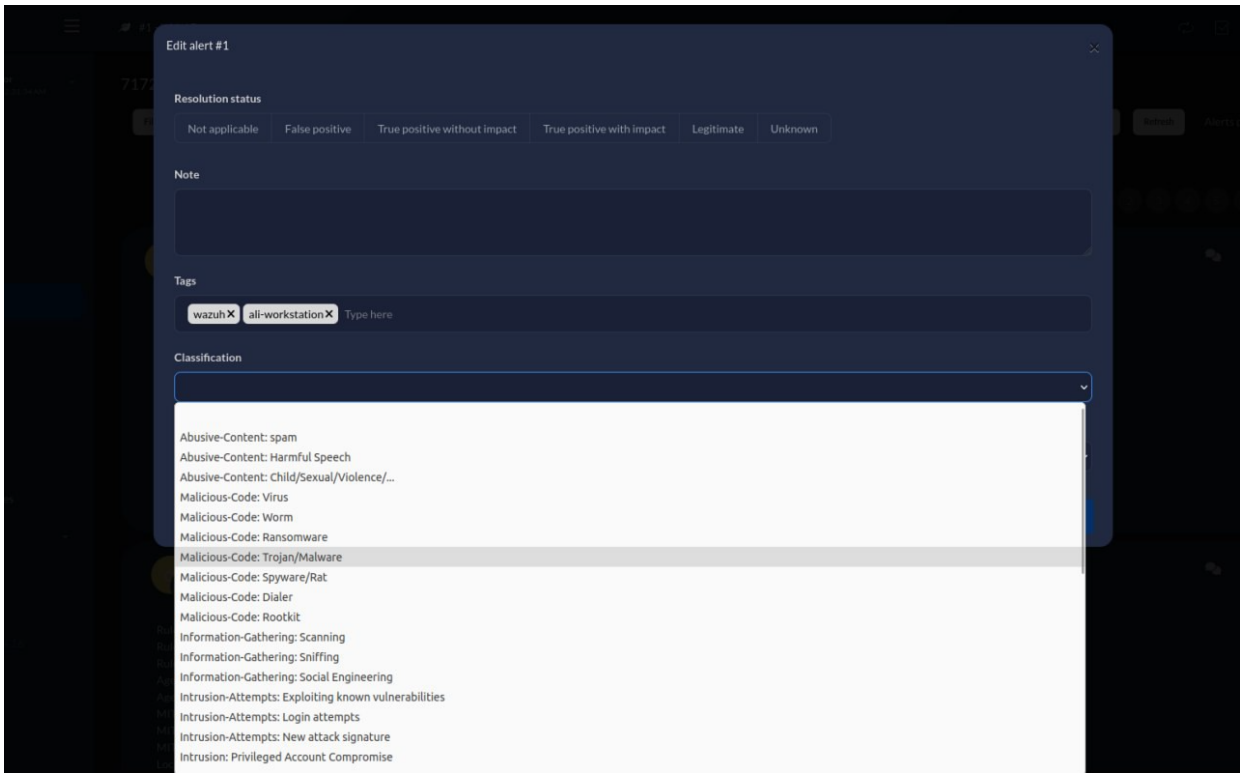
Test Results

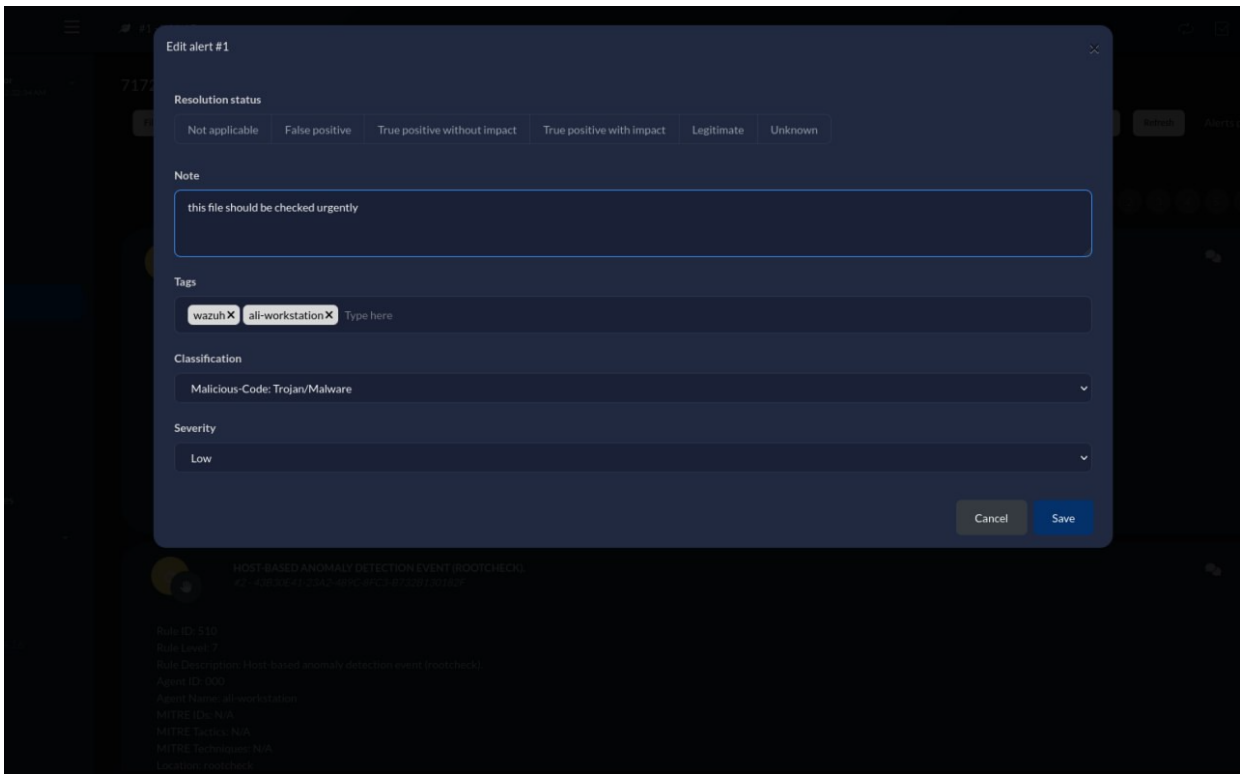
- Logs or screenshots demonstrating successful detection and automated responses.

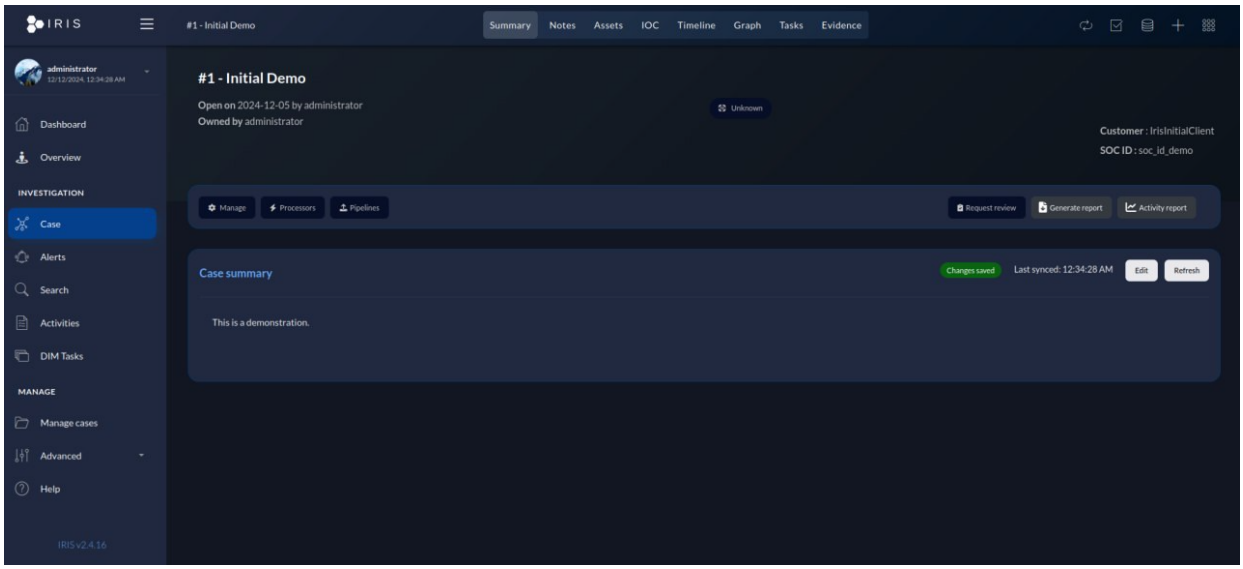
III. Case Management System Assigning a Case to an Analyst

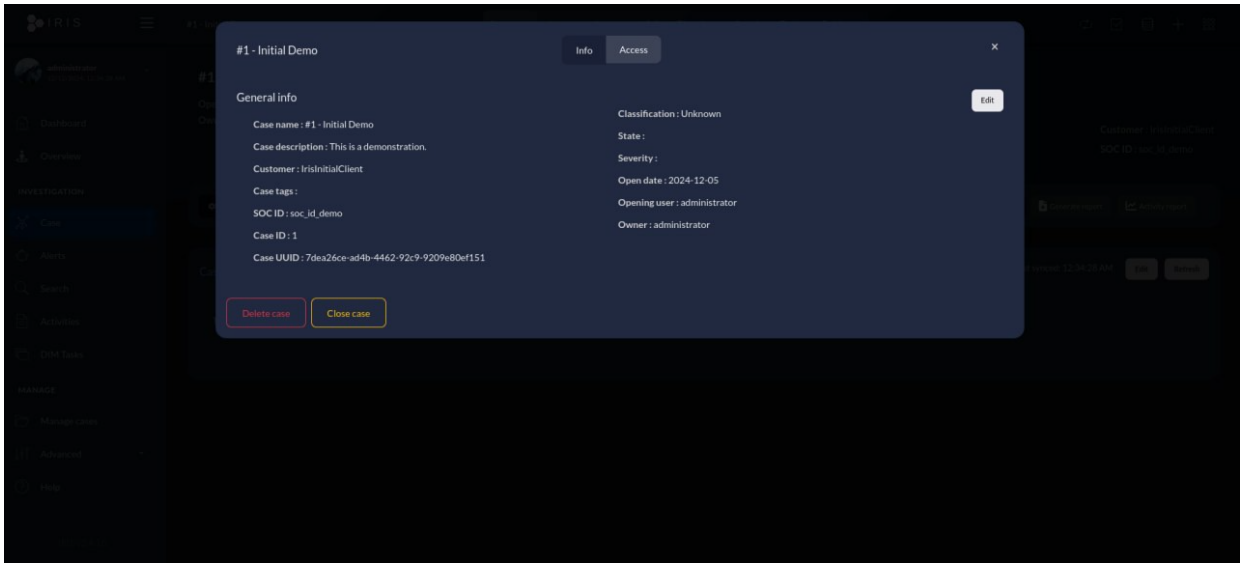
1. **Assigning Cases in IRIS:**
    - Log in to the IRIS web interface.
    - Navigate to the **Incident Dashboard**.
    - Open an alert generated from the Wazuh integration.
    - Assign the case to an analyst from the **Incident Details** section.
    - Save the changes to ensure the case is linked to the chosen analyst.

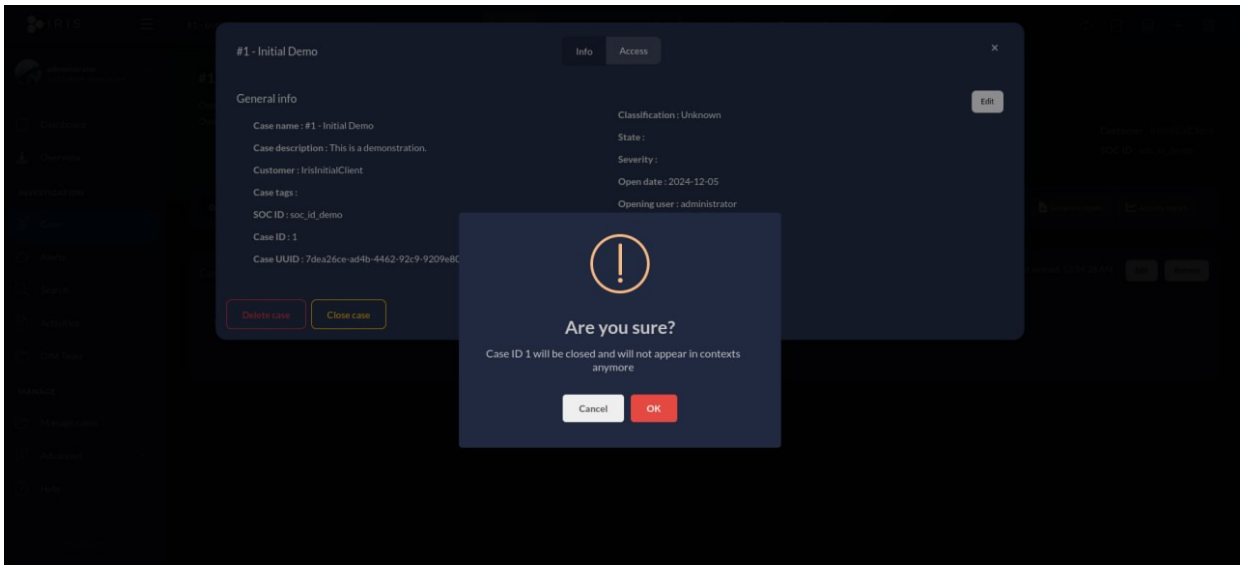
Screenshot Evidence:


Edit alert #1
Resolution status
Not applicable
False positive
True positive without impact
True positive with impact
Legitimate
Unknown
Note
Tags
wazuh
ali-workstation
Type here
Classification
Abusive-Content: spam
Abusive-Content: Harmful Speech
Abusive-Content: Child/Sexual/Violence/...
Malicious-Code: Virus
Malicious-Code: Worm
Malicious-Code: Ransomware
Malicious-Code: Trojan/Malware
Malicious-Code: Spyware/Rat
Malicious-Code: Dialer
Malicious-Code: Rootkit
Information-Gathering: Scanning
Information-Gathering: Sniffing
Information-Gathering: Social Engineering
Intrusion-Attempts: Exploiting known vulnerabilities
Intrusion-Attempts: Login attempts
Intrusion-Attempts: New attack signature
Intrusion: Privileged Account Compromise

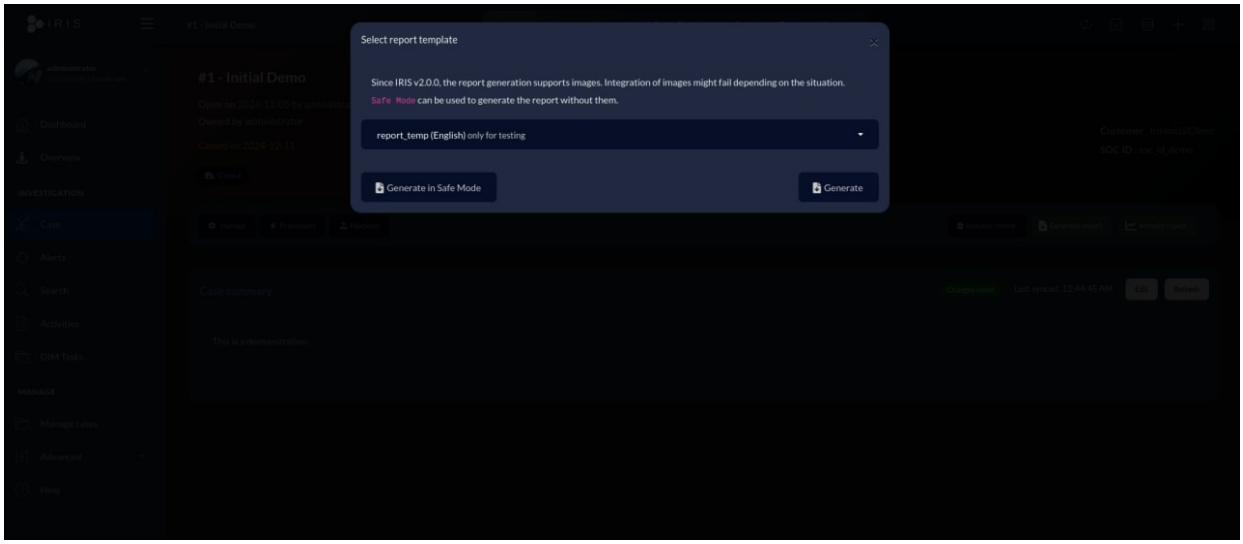

Edit alert #1
Resolution status
Not applicable
False positive
True positive without impact
True positive with impact
Legitimate
Unknown
Note
this file should be checked urgently
Tags
wazuh
ali-workstation
Type here
Classification
Malicious-Code: Trojan/Malware
Severity
Low
Cancel
Save


IRIS
#1 - Initial Demo
Summary
Notes
Assets
IOC
Timeline
Graph
Tasks
Evidence
administrator
Dashboard
Overview
INVESTIGATION
Case
Alerts
Search
Activities
DIM Tasks
MANAGE
Manage cases
Advanced
Help
IRIS v2.4.16
#1 - Initial Demo
Open on 2024-12-05 by administrator
Owned by administrator
Unknown
Customer : IrisInitialClient
SOC ID : soc_id_demo
Manage
Processors
Pipelines
Request review
Generate report
Activity report
Case summary
Changes saved
Last synced: 12:34:28 AM
Edit
Refresh
This is a demonstration.


#1 - Initial Demo
Info
Access
General info
Edit
Case name : #1 - Initial Demo
Case description : This is a demonstration.
Customer : IrisInitialClient
Case tags :
SOC ID : soc_id_demo
Case ID : 1
Case UUID : 7dea26ce-ad4b-4462-92c9-9209e80ef151
Classification : Unknown
State :
Severity :
Open date : 2024-12-05
Opening user : administrator
Owner : administrator
Delete case
Close case


#1 - Initial Demo
Info
Access
General info
Edit
Case name : #1 - Initial Demo
Case description : This is a demonstration.
Customer : IrisInitialClient
Case tags :
SOC ID : soc_id_demo
Case ID : 1
Classification : Unknown
State :
Severity :
Open date : 2024-12-05
Opening user : administrator
Delete case
Close case
Are you sure?
Case ID 1 will be closed and will not appear in contexts anymore
Cancel
OK

We generated a report and added it to Github.



2. **Verification:**
    - The assigned analyst can view the case in their dashboard.
    - Notifications are sent to the analyst based on the IRIS configuration.

IV. Simulation of Selected Security Incidents and Automated Response by the SIEM

1. **Incident Simulation:**
    - Simulate a **brute force attack** using a tool like Hydra or a Python script.
    - Configure Wazuh to detect failed login attempts by monitoring authentication logs.

    Example command for brute force simulation:

    ```
    hydra -l admin -P /path/to/password/list 10.91.56.198 ssh
    ```

2. **Active Responses Configured:**
    - `host-deny`**:** Blocks the attacking IP by adding it to the `/etc/hosts.deny` file.
    - `firewall-drop`**:** Blocks the attacking IP using an `iptables` rule.
    - `disable-account`**:** Disables the account being used for brute force attempts.

3. **Active Response Configuration Details:**

A. Host Deny

- **Configuration:**
  Add the following `<active-response>` block to the Wazuh configuration file (`/var/ossec/etc/ossec.conf`):

```
<active-response>
  <command>host-deny</command>
  <location>local</location>
  <level>7</level>
  <timeout>30</timeout>
</active-response>
```

B. Firewall Drop

- **Configuration:**
  Add the following `<active-response>` block to the Wazuh configuration file (`/var/ossec/etc/ossec.conf`):

```
<active-response>
  <command>firewall-drop</command>
  <location>local</location>
  <level>7</level>
  <timeout>30</timeout>
</active-response>
```

C. Disable Account

- **Configuration:**
  Add the following `<active-response>` block to the Wazuh configuration file (`/var/ossec/etc/ossec.conf`):

```
<active-response>
  <command>disable-account</command>
  <location>local</location>
  <level>7</level>
  <timeout>30</timeout>
</active-response>
```

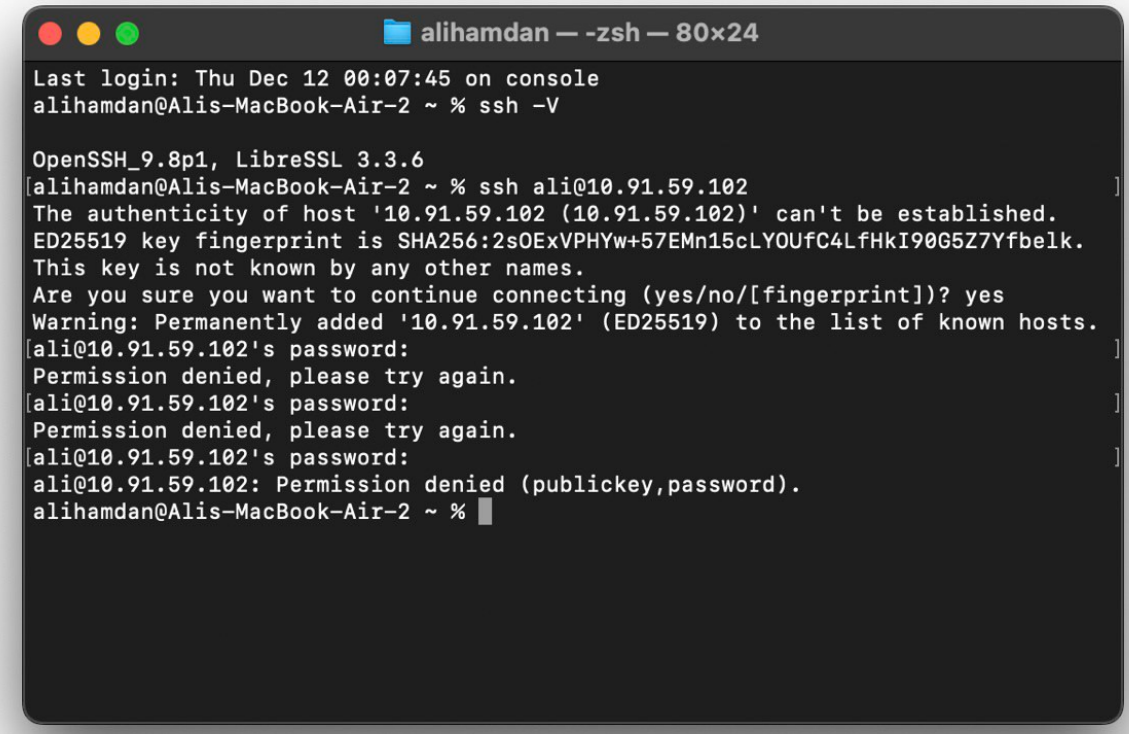
```
<active-response>
 <command>host-deny</command>
 <location>local</location>
 <level>7</level>
 <timeout>30</timeout>
</active-response>


  <active-response>
 <command>firewall-drop</command>
 <location>local</location>
 <level>7</level>
 <timeout>30</timeout>
</active-response>
  <active-response>
 <command>disable-account</command>
 <location>local</location>
 <level>7</level>
 <timeout>30</timeout>
</active-response>
```

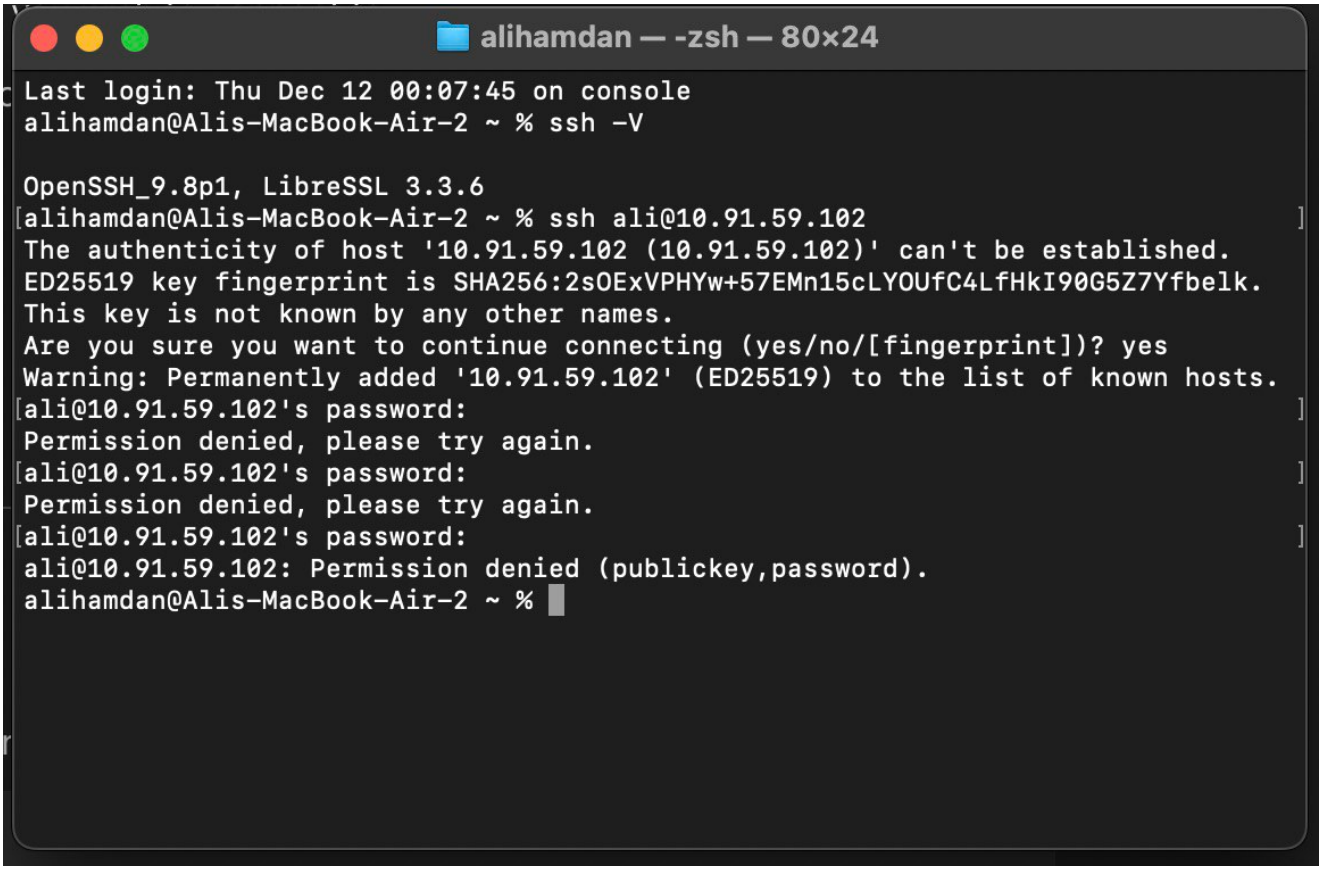
After adding every active response to the file `/var/ossec/etc/ossec.conf`, then restart the wazuh manager we can test the actions after that :

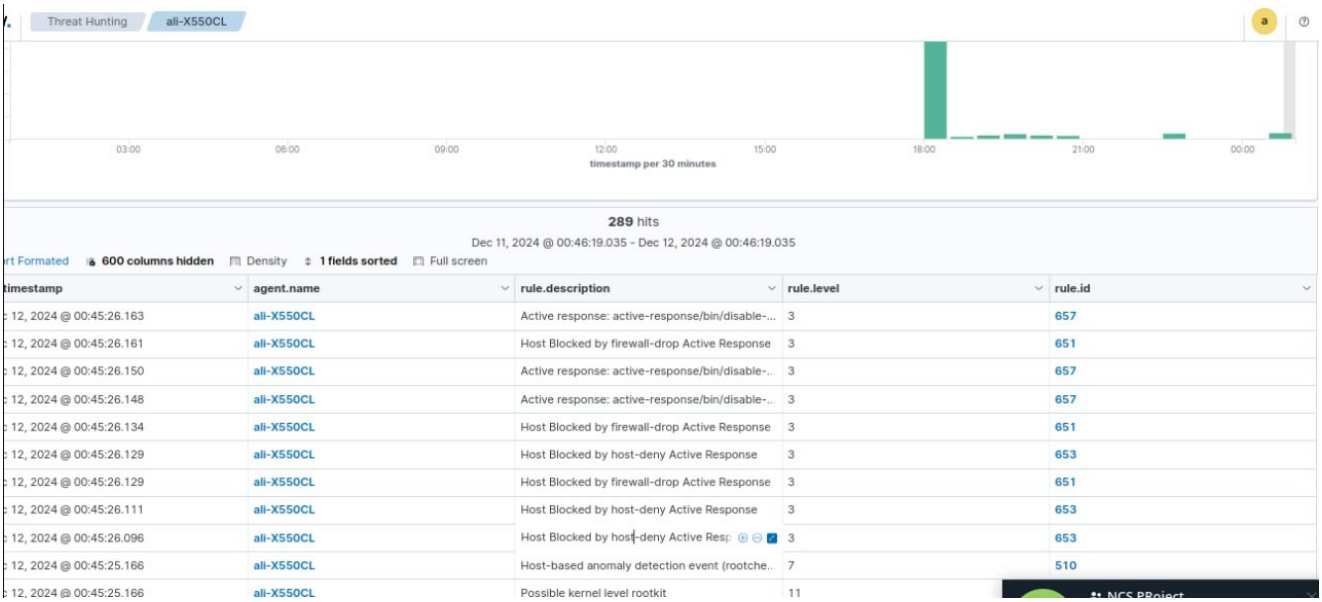
```
ali@ali-workstation:~$ sudo systemctl restart wazuh-manager.service
[sudo] password for ali:
```

4. **Testing the Active Responses:**

we tried the ssh connection with wrong password which will run all of above responses:


alihamdan — -zsh — 80×24
Last login: Thu Dec 12 00:07:45 on console
alihamdan@Alis-MacBook-Air-2 ~ % ssh -V
OpenSSH_9.8p1, LibreSSL 3.3.6
alihamdan@Alis-MacBook-Air-2 ~ % ssh ali@10.91.59.102
The authenticity of host '10.91.59.102 (10.91.59.102)' can't be established.
ED25519 key fingerprint is SHA256:2sOExVPHYw+57EMn15cLYOUfC4LfHkI90G5Z7Yfbelk.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.91.59.102' (ED25519) to the list of known hosts.
ali@10.91.59.102's password:
Permission denied, please try again.
ali@10.91.59.102's password:
Permission denied, please try again.
ali@10.91.59.102's password:
ali@10.91.59.102: Permission denied (publickey,password).
alihamdan@Alis-MacBook-Air-2 ~ %


alihamdan — -zsh — 80×24
Last login: Thu Dec 12 00:07:45 on console
alihamdan@Alis-MacBook-Air-2 ~ % ssh -V
OpenSSH_9.8p1, LibreSSL 3.3.6
alihamdan@Alis-MacBook-Air-2 ~ % ssh ali@10.91.59.102
The authenticity of host '10.91.59.102 (10.91.59.102)' can't be established.
ED25519 key fingerprint is SHA256:2sOExVPHYw+57EMn15cLYOUfC4LfHkI90G5Z7Yfbelk.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.91.59.102' (ED25519) to the list of known hosts.
ali@10.91.59.102's password:
Permission denied, please try again.
ali@10.91.59.102's password:
Permission denied, please try again.
ali@10.91.59.102's password:
ali@10.91.59.102: Permission denied (publickey,password).
alihamdan@Alis-MacBook-Air-2 ~ %



4. Difficulties Faced and New Skills Acquired

Difficulties Faced

- Challenges in tool integration and resolving API incompatibilities.
- Troubleshooting network configurations and performance issues.
- the main problem it was with MISP and integration with wazuh
    1. first problem there is poor documentaion that compatable with the updated versions
    2. we tried to install the MISP locally but alawys it damage the opearating system distrubution
    3. we find that we can do it with docker but still we needed to update a lot on the docker-compose.yaml file and on configuration with docker DNS to build and up MISP
    4. there are only documentaion to how to automat requesting from sysmon only (windows) and our agent is linux how ever we tried with windows agent and did not work

New Skills Acquired

- Hands-on experience with Wazuh, AbusIPDB, and IRIS.
- Skills in integrating SOC components and automating responses.
- Enhanced understanding of incident workflows and response automation.

---

5. Conclusion, Contemplations, and Judgement

Conclusion

- **Effectiveness of the SOC Setup**:
  The implemented SOC demonstrated its ability to detect and respond to various security incidents, such as brute force attacks and malware infections. By integrating Wazuh with AbuseIPDB, the system leveraged enriched threat intelligence, while IRIS streamlined case management and escalation processes. The automation of responses enhanced operational efficiency and reduced reaction times.

- **Strengths of the Tools Used**:
  The combination of Wazuh, AbuseIPDB, and IRIS showcased the potential of open-source tools to deliver robust and scalable solutions for security operations. Their flexibility, coupled with accessible documentation, allowed for seamless integration and configuration. Additionally, the cost-effectiveness of open-source software made it a practical choice for building a functional SOC.

- **Areas for Improvement**:
  Despite its successes, the project revealed some limitations, including challenges with API compatibility, insufficient documentation for advanced integrations (e.g., MISP), and scalability concerns under heavy traffic loads. Addressing these issues would further enhance the system's effectiveness and reliability.

Recommendations

- **Enhance Existing Workflows**:
  Fine-tune alerting and response workflows to improve detection accuracy and minimize false positives. Adjust Wazuh rules and thresholds to better align with real-world scenarios and emerging threats.

- **Expand the Toolset**:
  Integrate additional tools such as MISP for collaborative threat intelligence sharing or Elastic Stack for enhanced data visualization and analytics. These integrations would enrich the overall SOC ecosystem and provide deeper insights into security events.

- **Prepare for Larger Deployments**:
  Evaluate the system's performance in a high-traffic environment and make necessary adjustments to support scalability. This includes implementing redundancy for critical components and ensuring the infrastructure can handle increased demands.

- **Develop Advanced Automation**:
  Design and test automated responses for more complex threats, such as lateral movement or data exfiltration attempts. Incorporating advanced automation would strengthen the SOC's ability to respond rapidly to sophisticated attacks.

- **Focus on Training and Documentation**:
  Create detailed training resources for SOC analysts, including step-by-step playbooks for managing common incident types. Strengthen internal documentation with troubleshooting guides and instructions for advanced configurations, ensuring easier adoption and maintenance of the system.

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6. Appendices

A. Scripts and Configurations

- Links to all scripts and configuration files in the repository:
  GitHub Repository

B. Proof of Concept Demonstration Video

- YouTube Link to Demo Video

C. Extended Documentation

- Step-by-step installation and configuration details for all tools.
- Troubleshooting steps for resolving challenges.

Integration of New Sections with Previous Requirements:

This report structure includes:

1. **Goal and Tasks of the Project:** Describes what the project aims to solve and specifies the division of tasks among members.
2. **Execution Plan/Methodology:** Contains the solution plan, architecture diagram, and methodology for implementing and testing the solution.
3. **Development of Solution/Tests:** Explains the setup and PoC testing, including results and insights from incident simulations.
4. **Difficulties Faced/New Skills:** Reflects on challenges and the knowledge gained during the project.
5. **Conclusion and Judgement:** Wraps up with reflections, evaluations, and suggestions for improvement.
6. **Appendices:** Contains all important links to code, configuration files, and demonstration materials for proof of concept.