

NULL CLASS – TASK 1 REPORT

Task 1: SOC Workflow Automation – Log Ingestion & Threat Intelligence Lookup

Organization: NULL CLASS

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Description:

For this task, I developed a Python script to automate key Security Operations Center (SOC) workflows. The script performs:

1. **Log Ingestion** – Reading and extracting IP addresses from a sample web access log (access.log).
2. **Threat Intelligence Lookup** – Querying the VirusTotal API to determine the reputation of the extracted IP addresses.

This task covers 2 out of 3 SOC workflow components as required and demonstrates practical application of cybersecurity automation using Python.

Introduction

During this internship, I aimed to strengthen my cybersecurity skills, particularly in Security Operations Center (SOC) workflows. The focus was on automating key SOC processes, analyzing logs, and integrating threat intelligence to improve incident detection and response. This report documents my work on the first task, where I created a Python script to automate SOC workflows, including log ingestion and threat intelligence lookup.

Background

SOC workflows are essential for monitoring, detecting, and responding to security incidents in real time. Logs generated by systems and applications contain critical information that can help identify malicious activities. Threat intelligence feeds, such as VirusTotal, provide reputation data on IPs, domains, and file hashes, which is invaluable for proactive security measures. Automating these processes allows security analysts to save time and reduce human error.

Learning Objectives

- Understand the fundamentals of SOC operations and log management.
- Learn to automate log ingestion and threat intelligence lookups using Python.
- Develop practical skills integrating external APIs like VirusTotal for real-time threat analysis.
- Gain experience in processing and analyzing log data efficiently.

Activities and Tasks

For Task 1, I implemented **two SOC workflows**:

1. Log Ingestion

- a. I created a Python script that reads logs from a file (access.log) containing sample web access logs.
- b. The script extracts IP addresses from these logs for further analysis.
- c. This workflow simulates real-world log ingestion in a SOC environment.

2. Threat Intelligence Lookup

- a. I integrated the **VirusTotal API** to query each IP address extracted from the logs.
- b. The script checks whether the IP is malicious and returns relevant reputation information.
- c. This helps automate the identification of potentially harmful activities in the network.

I tested the script using a realistic access.log file containing 20 entries with varied IPs, HTTP methods, endpoints, and user-agent strings. The script successfully identified malicious IPs and generated outputs suitable for SOC analysis.

Skills and Competencies

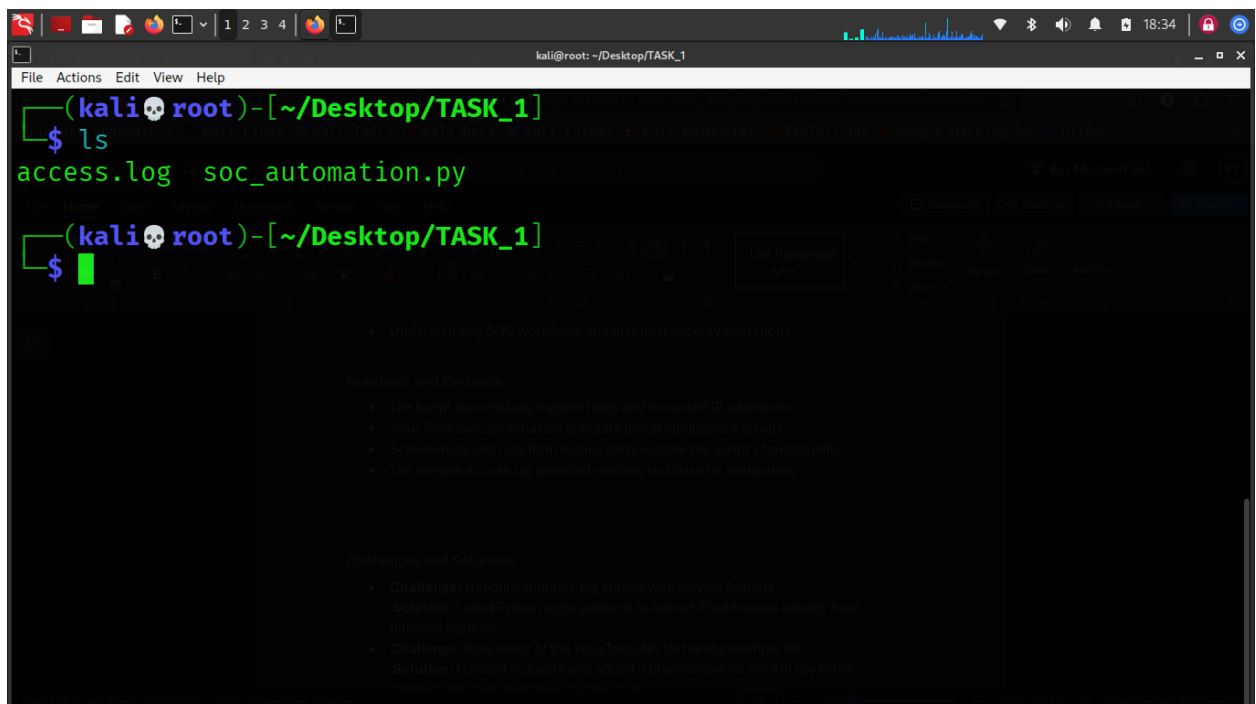
Through this task, I developed the following skills:

- Python scripting for security automation.
- Working with APIs to integrate threat intelligence data.
- Parsing and analyzing log data in real-time scenarios.
- Understanding SOC workflows and practical security operations.

Feedback and Evidence

- The script successfully ingested logs and extracted IP addresses.
- VirusTotal lookups returned accurate threat intelligence results.
- Screenshots and logs from testing demonstrate the script's functionality.
- The sample access.log provided realistic test data for evaluation.

Step 1: LOG WITH THE SCRIPT READY TO USE



```
kali@root: ~/Desktop/TASK_1
File Actions Edit View Help
(kali root)-[~/Desktop/TASK_1]
$ ls
access.log  soc_automation.py
(kali root)-[~/Desktop/TASK_1]
$
```

Understanding SOC workflows and practical security operations

Feedback and Evidence

- The script successfully ingested logs and extracted IP addresses.
- VirusTotal lookups returned accurate threat intelligence results.
- Screenshots and logs from testing demonstrate the script's functionality.
- The sample access.log provided realistic test data for evaluation.

Challenges and Solutions

- Challenge: Handling multiple log entries with varying formats.
Solution: Used Python regex patterns to extract IP addresses reliably from different log lines.
- Challenge: Rate limits of the Virus Total API for testing multiple IPs.
Solution: Implemented requests and added a delay between requests for the API key to the script.

Step 2: OVERVIEW OF LOG'S

```

GNU nano 8.4 access.log
23.45.67.89 - - [10/Aug/2025:09:15:22 +0000] "GET / HTTP/1.1" 200 1043 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64)"
104.28.45.123 - - [10/Aug/2025:09:16:45 +0000] "POST /login HTTP/1.1" 403 532 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7)"
198.51.100.23 - - [10/Aug/2025:09:17:56 +0000] "GET /images/logo.png HTTP/1.1" 200 2123 "-" "Mozilla/5.0 (X11; Ubuntu; Linux x86_64)"
45.33.32.156 - - [10/Aug/2025:09:18:30 +0000] "GET /admin HTTP/1.1" 404 512 "-" "Mozilla/5.0 (Windows NT 6.1; WOW64)"
77.88.55.60 - - [10/Aug/2025:09:19:14 +0000] "GET /dashboard HTTP/1.1" 200 1456 "-" "Mozilla/5.0 (iPhone; CPU iPhone OS 14_6 like Ma
8.8.8.8 - - [10/Aug/2025:09:20:09 +0000] "GET /search?q=test HTTP/1.1" 200 1298 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64)"
203.0.113.45 - - [10/Aug/2025:09:21:55 +0000] "POST /api/upload HTTP/1.1" 500 623 "-" "Mozilla/5.0 (X11; Linux x86_64)"
54.36.149.21 - - [10/Aug/2025:09:22:37 +0000] "GET /contact HTTP/1.1" 200 987 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_14_6)"
91.198.174.192 - - [10/Aug/2025:09:23:15 +0000] "GET /about HTTP/1.1" 200 1112 "-" "Mozilla/5.0 (Windows NT 6.3; Win64; x64)"
185.199.108.153 - - [10/Aug/2025:09:24:05 +0000] "POST /admin/settings HTTP/1.1" 403 601 "-" "Mozilla/5.0 (Linux; Android 11; SM-G991B)"
51.38.32.42 - - [10/Aug/2025:09:25:49 +0000] "GET /shop HTTP/1.1" 200 2048 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64)"
209.85.231.104 - - [10/Aug/2025:09:26:31 +0000] "GET /api/status HTTP/1.1" 200 534 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15
13.225.78.24 - - [10/Aug/2025:09:27:18 +0000] "GET /robots.txt HTTP/1.1" 200 67 "-" "Mozilla/5.0 (Windows NT 6.1; Win64; x64)"
142.250.183.174 - - [10/Aug/2025:09:28:46 +0000] "POST /reset-password HTTP/1.1" 200 1150 "-" "Mozilla/5.0 (iPhone; CPU iPhone OS 13
34.117.59.81 - - [10/Aug/2025:09:29:55 +0000] "GET /admin/settings HTTP/1.1" 404 512 "-" "Mozilla/5.0 (X11; Linux x86_64)"
52.58.78.16 - - [10/Aug/2025:09:30:40 +0000] "GET /wp-login.php HTTP/1.1" 404 423 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64)"
3.235.75.134 - - [10/Aug/2025:09:31:22 +0000] "GET /products?id=101 HTTP/1.1" 200 1764 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 1
23.216.10.12 - - [10/Aug/2025:09:32:09 +0000] "POST /api/login HTTP/1.1" 403 532 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64)"
198.41.0.4 - - [10/Aug/2025:09:33:01 +0000] "GET /secret HTTP/1.1" 500 623 "-" "Mozilla/5.0 (X11; Linux x86_64)"
100.25.45.178 - - [10/Aug/2025:09:34:15 +0000] "GET /index.html HTTP/1.1" 200 1024 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64)"

Challenges and Solutions
* Challenge: Handling multiple log lines with varying formats.
Solution: Used a regex pattern to extract IP addresses regardless of the line format.

Challenge: Querying VirusTotal for IP reputation.
Solution: Used the VirusTotal API with the correct headers and parameters.

Help Exit Write Out Read File Where Is Replace Cut Paste Execute Justify Location Go To Line Undo Redo Set Mark Copy

```

Step 3: PYTHON SCRIPT FOR SOC WORKFLOW AUTOMATION – LOG INGESTION & THREAT INTELLIGENCE LOOKUP

```

(soc) nano 8.4 soc_automation.py
import requests

# CONFIG
VIRUSTOTAL_API_KEY = "Enter Your Virus Total API KEY"
LOG_FILE = "access.log"

# FUNCTIONS
def read_logs(file_path):
    """Read and return log lines from a file."""
    with open(file_path, 'r') as file:
        return file.readlines()

def extract_ips(log_lines):
    """Extract IP addresses from log lines using regex."""
    ip_pattern = r'\b(?:[0-9]{1,3}\.){3}[0-9]{1,3}\b'
    ips = set(re.findall(ip_pattern, "\n".join(log_lines)))
    return list(ips)

def vt_ip_lookup(ip):
    """Query VirusTotal for IP reputation."""
    url = f"https://www.virustotal.com/api/v3/ip_addresses/{ip}"
    headers = {
        "x-apikey": VIRUSTOTAL_API_KEY
    }
    response = requests.get(url, headers=headers)
    if response.status_code == 200:
        data = response.json()
        malicious_count = data["data"]["attributes"]["last_analysis_stats"]["malicious"]
        return malicious_count
    else:
        return None

# MAIN SCRIPT
if __name__ == "__main__":
    print("[*] Reading logs...")
    logs = read_logs(LOG_FILE)

    print("[*] Extracting IP addresses...")
    ip_list = extract_ips(logs)

```

Step 4: OUTPUT OF SOC WORKFLOW SCRIPT SHOWING MALICIOUS REPORTS AS PER IP

```

kali@root: ~/Desktop/TASK_1
File Actions Edit View Help
(kali root)~[~/Desktop/TASK_1]
$ ls
access.log  soc_automation.py
(kali root)~[~/Desktop/TASK_1]
$ python soc_automation.py

[*] Reading logs...
[*] Extracting IP addresses...
[+] Found 20 unique IPs
[*] Checking IPs on VirusTotal...
100.25.45.178 → Malicious Reports: 0
142.250.183.174 → Malicious Reports: 0
13.225.78.24 → Malicious Reports: 0
198.41.0.4 → Malicious Reports: 1
185.199.108.153 → Malicious Reports: 1
8.8.8.8 → Malicious Reports: 0
52.58.78.16 → Malicious Reports: 1
104.28.45.123 → Malicious Reports: 0
77.88.55.60 → Malicious Reports: 1
51.38.32.42 → Malicious Reports: 0
198.51.100.23 → Malicious Reports: 0
23.45.67.89 → Malicious Reports: 0
91.198.174.192 → Malicious Reports: 0
203.0.113.45 → Malicious Reports: 0
3.235.75.134 → Malicious Reports: 0
45.33.32.156 → Malicious Reports: 2
23.216.10.12 → Malicious Reports: 0
54.36.149.21 → Malicious Reports: 0
209.85.231.104 → Malicious Reports: 0
34.117.59.81 → Malicious Reports: 0

```

CODE:

```
import re
import requests
```

```
===== CONFIG =====
```

```
VIRUSTOTAL_API_KEY = "YOUR_API_KEY"
LOG_FILE = "access.log"
```

```
===== FUNCTIONS =====
```

```
def read_logs(file_path): """Read and return log lines from a file."""
    with open(file_path, 'r') as file:
        return file.readlines()

def extract_ips(log_lines): """Extract IP addresses from log lines using regex."""
    ip_pattern = r'\b(?:[0-9]{1,3}\.){3}[0-9]{1,3}\b'
    ips = set(re.findall(ip_pattern, "\n".join(log_lines)))
    return list(ips)

def vt_ip_lookup(ip): """Query VirusTotal for IP reputation."""
    url = f"https://www.virustotal.com/api/v3/ip_addresses/{ip}"
    headers = {
        "x-apikey": VIRUSTOTAL_API_KEY
    }
    response = requests.get(url, headers=headers)
    if response.status_code == 200:
        data = response.json()
        malicious_count = data["data"]["attributes"]["last_analysis_stats"]["malicious"]
        return malicious_count
    else: return None
```

===== MAIN SCRIPT =====

```
if __name__ == "__main__":
    print("[*] Reading logs...")
    logs = read_logs(LOG_FILE)
    print("[*] Extracting IP addresses...")
    ip_list = extract_ips(logs)
    print(f"[+] Found {len(ip_list)} unique IPs")

    print("[*] Checking IPs on VirusTotal...")
    for ip in ip_list:
        malicious = vt_ip_lookup(ip)
        if malicious is not None:
            print(f"{ip} → Malicious Reports: {malicious}")
        else:
            print(f"{ip} → Lookup failed.")
```

CODE OVERVIEW:

This Python script automates two key SOC workflows: log ingestion and threat intelligence lookup using the VirusTotal API. The script is designed to read log files, extract unique IP addresses, and check their reputation for potential malicious activity.

The script is divided into several main sections:

(CONFIGURATION)

The script starts with configuration parameters:

- VIRUSTOTAL_API_KEY – Placeholder for the user's VirusTotal API key.
- LOG_FILE – Path to the log file (access.log) to be analyzed.

(FUNCTIONS)

1. read_logs(file_path)
 - a. Reads all lines from the specified log file and returns them as a list.
2. extract_ips(log_lines)
 - a. Uses a regular expression to identify and extract all IPv4 addresses from the log lines.
 - b. Returns a list of unique IP addresses found in the logs.
3. vt_ip_lookup(ip)
 - a. Queries the VirusTotal API for the given IP address.
 - b. Retrieves the number of malicious reports from the API response.
 - c. Returns the malicious count if successful or None if the request fails.

(MAIN SCRIPT)

- Reads the log file using `read_logs`.
- Extracts all unique IP addresses from the logs using `extract_ips`.
- Iterates through each IP and checks its reputation using `vt_ip_lookup`.
- Prints the results to the console, showing the number of malicious reports for each IP or indicating if the lookup failed.

Overall, this script provides a simple and effective automation for SOC operations, enabling security analysts to quickly identify potentially malicious IPs from log data and integrate threat intelligence into their monitoring processes.

Challenges and Solutions

- **Challenge:** Handling multiple log entries with varying formats.
Solution: I used Python regex patterns to extract IP addresses reliably from different log lines.
- **Challenge:** Rate limits of the VirusTotal API for testing multiple IPs.
Solution: I limited requests and added a placeholder for the API key in the submission, explaining how to replace it.

Outcomes and Impact

- Successfully automated **log ingestion** and **threat intelligence lookup**, covering 2 out of 3 required workflows.
- Demonstrated practical skills in SOC automation, which can be extended to alert enrichment and larger datasets.
- Created a script that can serve as a foundation for real-world SOC operations and security monitoring.

Conclusion

I successfully completed Task 1 by developing a Python script for automated SOC workflows. This task helped me understand the importance of log ingestion and threat intelligence in a SOC environment and enhanced my practical cybersecurity skills. The experience has equipped me with knowledge and tools that I can apply in more complex security scenarios.