CYBER SECURITY INTERNSHIP REPORT

SOC CAPSTONE INCIDENT REPORT ASSIGNMENT

BY

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Introduction

Task Overview

Web Application Compromise Leading to Persistence, Lateral Movement, and Data Exfiltration

Executive Summary

This incident involved a coordinated cyberattack against a company's web server that resulted in unauthorised access, persistence, internal network scanning, and successful data exfiltration. The attacker leveraged a common web attack technique to gain initial access, escalated their foothold by brute-forcing credentials, and maintained access through a malicious cron job. The breach was ultimately detected after abnormal outbound data transfers were observed..

Tools Used

- **SIEM Tool:** Splunk Free Trial (cloud instance) – used to query and analyze the provided sample logs using SPL searches.
- **Sample logs:** Final_project_logs – included web server logs, authentication logs, system logs, and network/proxy logs used for investigation.
- **Artifact Analysis:** Base64 decoding of suspicious cron job commands to uncover hidden attacker framework details.
- **Framework Reference:** MITRE ATT&CK Framework – used to map attacker actions to known tactics and techniques.
- **Documentation:** Google Docs / PDF – used to document findings, timelines, IOCs, and final recommendations.
- **Analysis Methodology:** Log filtering, pattern matching, and correlation rules across multiple log sources

Incident Analysis Summary

Alert ID	Type of Threat	Severity	Description	Action Taken
A001	SQL Injection (Reconnaissance)	High	The attacker sent URL-encoded SQL payloads (%27, UNION SELECT) which is via a web request to probe the backend database structure and confirm SQL injection vulnerability.	The suspicious web requests were reviewed and marked as malicious, and the application was recommended for security hardening.
A002	SSH Brute Force Attack	High	An external IP address (103.45.12.90) performed multiple failed SSH login attempts against common usernames, indicating a brute-force attack	The repeated login failures were identified, and the source IP was flagged for blocking.
A003	Unauthorized System Access	Critical	The attacker successfully logged into the server using a compromised service account (svc_backup), gaining unauthorized access to the system	The incident was escalated immediately, and the affected account was identified for password reset and access restriction.

A004	Persistence via Malicious Script	Critical	A hidden, encoded script was executed to maintain long-term access to the server. This allowed the attacker to reconnect to the system remotely	The malicious script was decoded, analysed, and marked for removal to prevent further access.
A005	Internal Network Scanning	High	The attacker used nmap to perform a TCP SYN scan (-sS -T4) on the internal subnet 172.16.0.0/24	The scanning activity was detected, and the internal network was reviewed for additional exposure.
A006	Data Exfiltration	Critical	A large database file (db_snap_v2.sql) was downloaded and secretly transferred large amounts of data to an external domain outside the organization.	The data transfer activity was analyzed, confirmed as malicious, and classified as a serious data breach.

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Incident Timeline Summary

Time (UTC)	Event
14:00:01	SQL Injection reconnaissance via encoded UNION SELECT
14:05:12	SSH brute force attempts detected
14:10:45	Successful SSH login as ***svc_backup***
14:12:00	File upload endpoint accessed
14:20:05	Path traversal attempt on */etc/passwd*
14:26:10	*nma*p installed, and an installed scan initiated
14:30:15	Database dump downloaded
14:40:01-05	Data exfiltration to *dev-null.io*

Alert Screenshots

Figure 1: Initial Log Overview in Splunk

This screenshot shows all ingested logs before any filters or queries were applied. It displays raw events, including login attempts, access logs, etc. This general view provides situational awareness and sets the foundation for triage and deeper investigation.

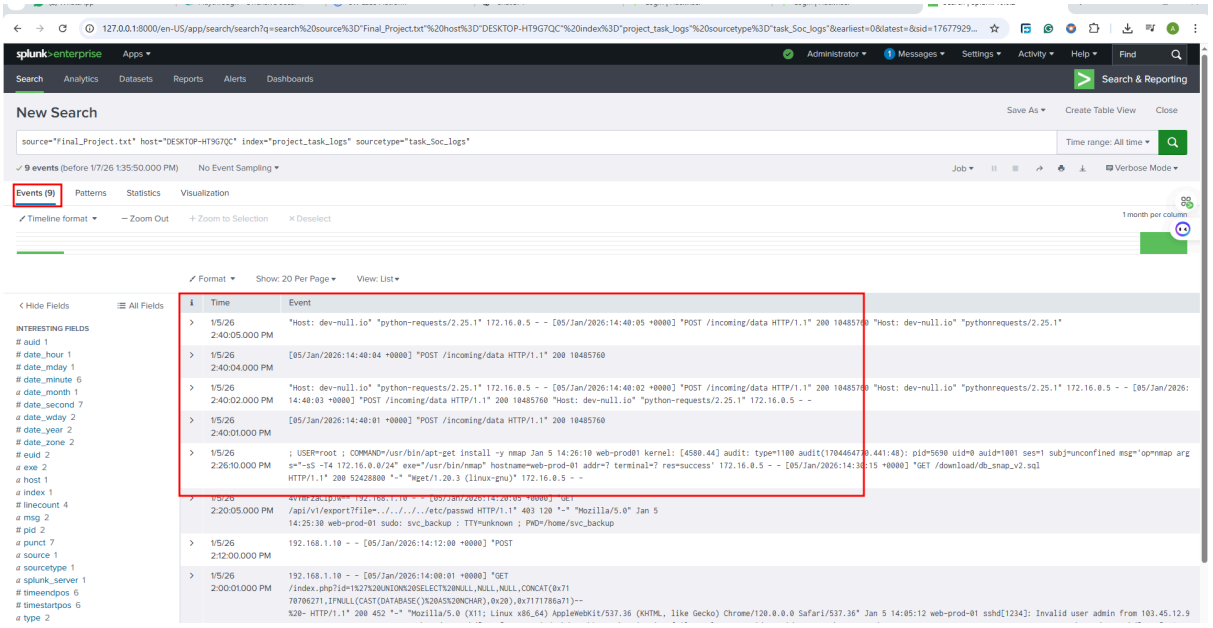
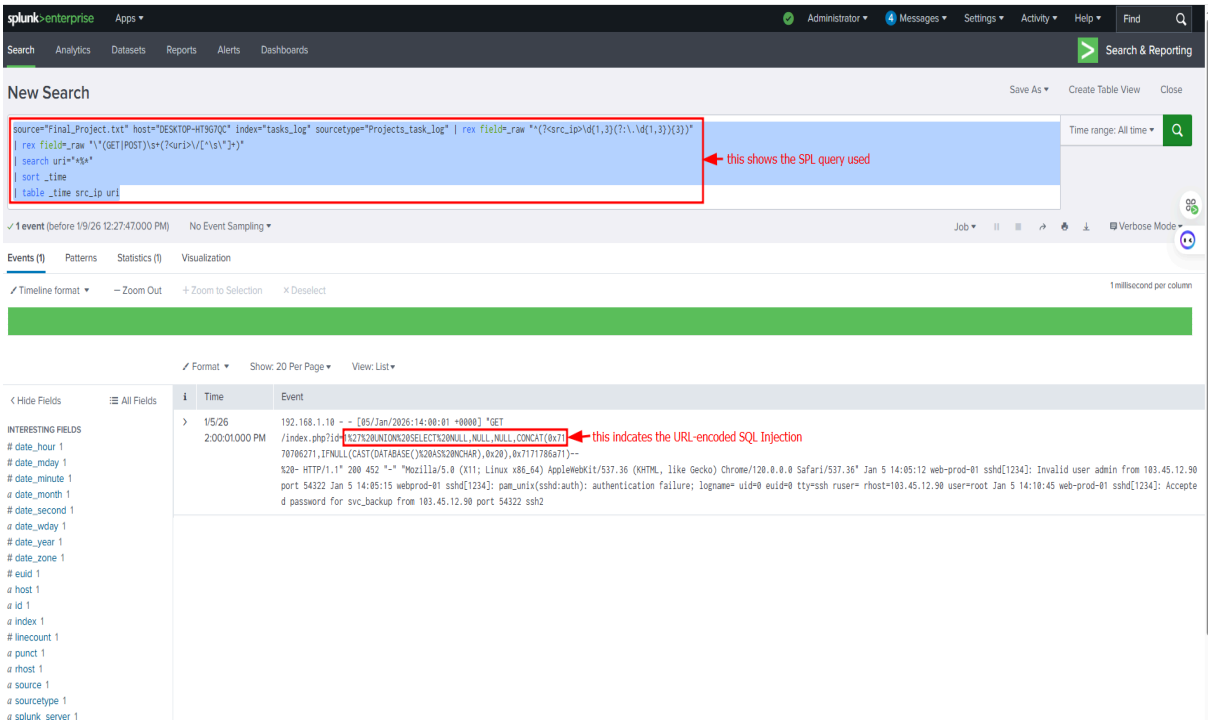


Figure 1: *Initial Log Overview in Splunk*

1. **Initial Reconnaissance**

   Finding

   The screenshot below shows how the attacker used a **URL-encoded** SQL Injection attack to probe the backend database.

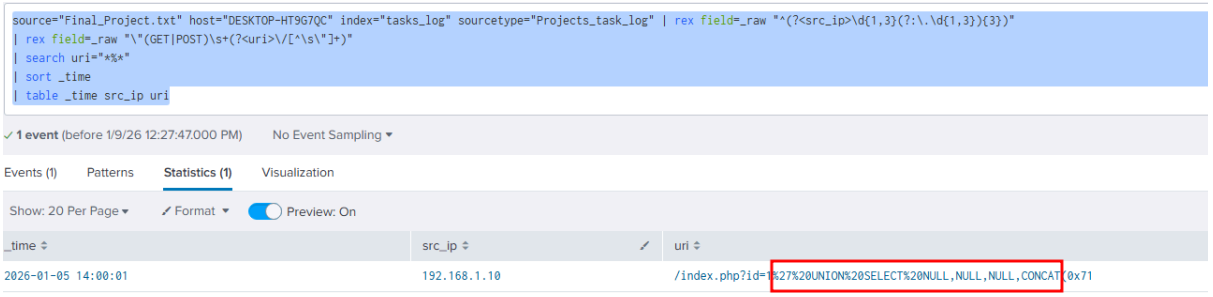


   The Splunk Query Used below:

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_task_log" | rex field=_raw
"^(?<src_ip>\d{1,3}(?:\.\d{1,3}){3})"
| rex field=_raw "\"(GET|POST)\s+(?<uri>\/[^\s\"]+)"
| search uri="*%*"
| sort _time
| table _time src_ip uri
```

The Encoded URL String is observed below:

```
%27%20UNION%20SELECT%20NULL,NULL,NULL,CONCAT
```



Attack Type

SQL Injection (UNION-based)

Attacker Objective

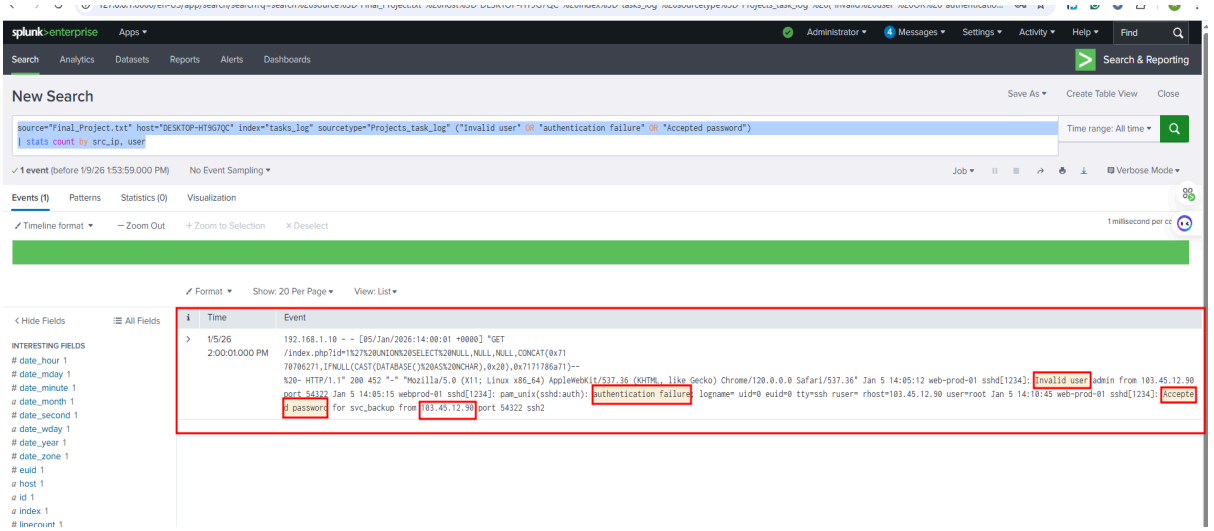
The attacker was trying to:

- Identify database structure
- Enumerate the active database name
- Confirm vulnerability to UNION SELECT payloads.

2. The Pivot (Brute Force & Account Compromise)

Finding

This screenshot highlights an **external IP address** that performed repeated SSH authentication failures and later succeeded.



Splunk Query Used:

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_task_log" ("Invalid user"
OR "authentication failure" OR "Accepted password")
| stats count by src_ip, user
```

External Attacker IP

```
103.45.12.90
```

Successful Login Timestamp

```
Jan 5 14:10:45
```

Compromised Internal Account

```
svc_backup
```

Explanation

After multiple failed login attempts against common usernames such as **admin** and **root**, the attacker was successfully able to authenticate using a service account, which indicates either **a weak password, password reuse, or credential leakage.**

3. **The Hidden Payload (Persistence Mechanism)**

Finding

The screenshot shows a **Base64-encoded payload** that was executed via a cron-like persistence mechanism.

Splunk Query Used below:

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_tasks_log" | search
"EXECVE" "sh -c" | table _time a2
```

Decoded Payload Results

After decoding the Base64 string, the payload revealed:

- **Attacker IP**: 45.77.102.5
- **Port:** 4444
- **Script Language:** *Python*

Explanation

The script used establishes a **reverse shell**, therefore allowing the attacker to maintain persistent remote access to the compromised host.

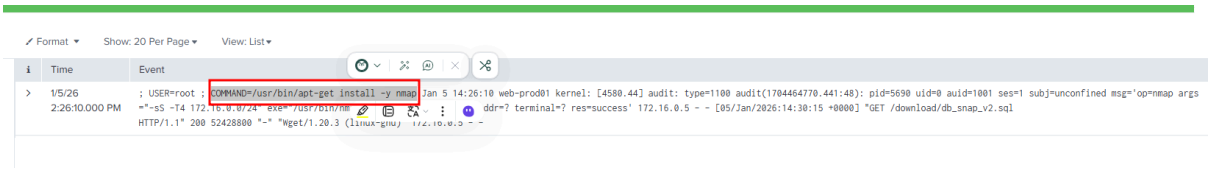
4. Lateral Movement

Finding

The screenshot below shows an attacker conducting **internal network reconnaissance** after gaining access.

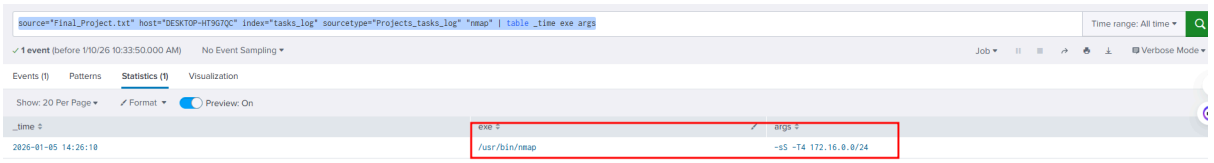
Splunk Query Used(Tool installation):

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_tasks_log" "apt-get
install"
| table _time user command
```



SPL Query Used (Nmap scan execution):

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_tasks_log" "nmap" | table
_time exe args.
```



Technique for Scanning

- (***-sS***) **TCP SYN Scan**
- **(*-T4)* Is Aggressive Timing**

Targeted IP Subnet

```
172.16.0.0/24
```

Explanation

The attacker used **apt-get** to install ***nmap,*** then scanned the internal subnet to identify additional hosts and services, indicating **post-exploitation lateral movement**.

5. The Grand Theft (Data Exfiltration)

After gaining access and performing lateral movement, the attacker proceeded to **exfiltrate sensitive data** from the compromised environment

Filename of the Stolen Data

Splunk Query has been used:

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_tasks_log" | search "GET
/download/"
| table _time _raw
```

Stolen Filename

```
Db_snap_v2.sql
```

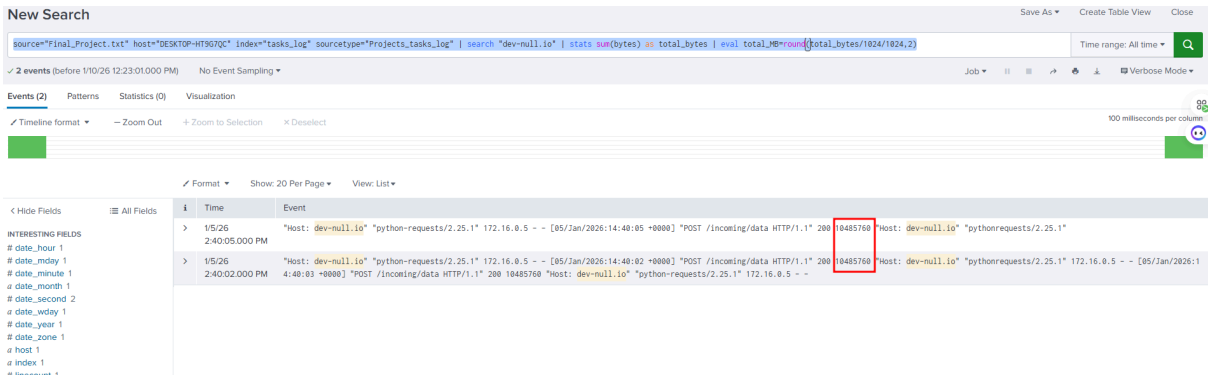
*This indicates that a **database snapshot** file was successfully downloaded by the attacker*

Total Volume of Data Sent to dev-null.io

The attacker exfiltrated data in multiple POST requests to the external domain **dev-null.io**.

Splunk Query Used:

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_tasks_log" | search
"dev-null.io" | stats sum(bytes) as total_bytes | eval
total_MB=round(total_bytes/1024/1024,2)
```



Explanation

- Looking at the **bytes** field records the size of each HTTP POST response.
- The SPL Query used shows that multiple uploads of **10,485,760 bytes** were observed.
- After that, it was summed and converted to megabytes (MB).

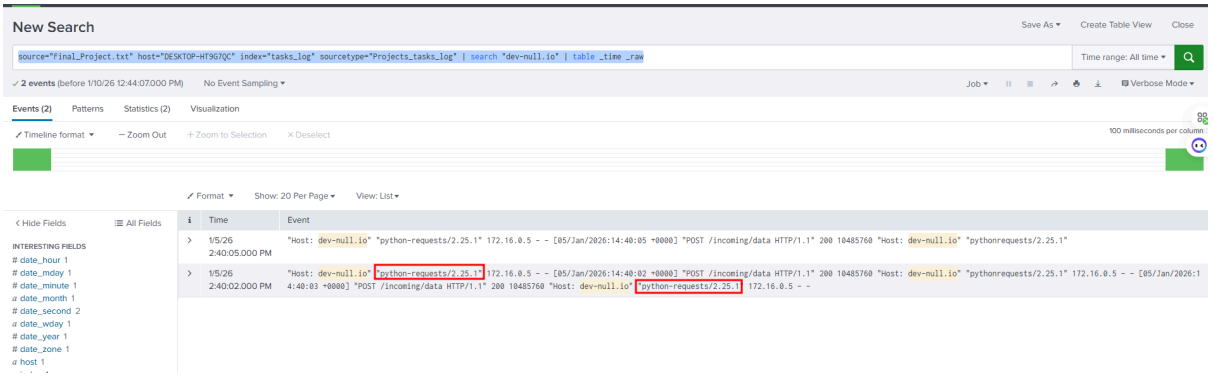
Total Data Exfiltrated is **50 MB**

*This helped to indicate or confirm that **large-scale data exfiltratio,n** rather than normal application traffic.*

Malicious Script Responsible for Exfiltration

Splunk Query used:

```
source="Final_Project.txt" host="DESKTOP-HT9G7QC"
index="tasks_log" sourcetype="Projects_tasks_log" | search
"dev-null.io" | table _time _raw
```



Finding

The User-Agent field repeatedly showed below:

```
python-requests/2.25.1
```

Mailcious Script Identified

A Python script using **python-request**

Explanation

There is repeated automated POST requests using ***python-requests*** strongly indicate a custom Python exfiltration script, not a browser.