Capstone Engagement

Assessment, Analysis, and Hardening of a Vulnerable System

Table of Contents

This document contains the following sections:

01 **Network Topology**

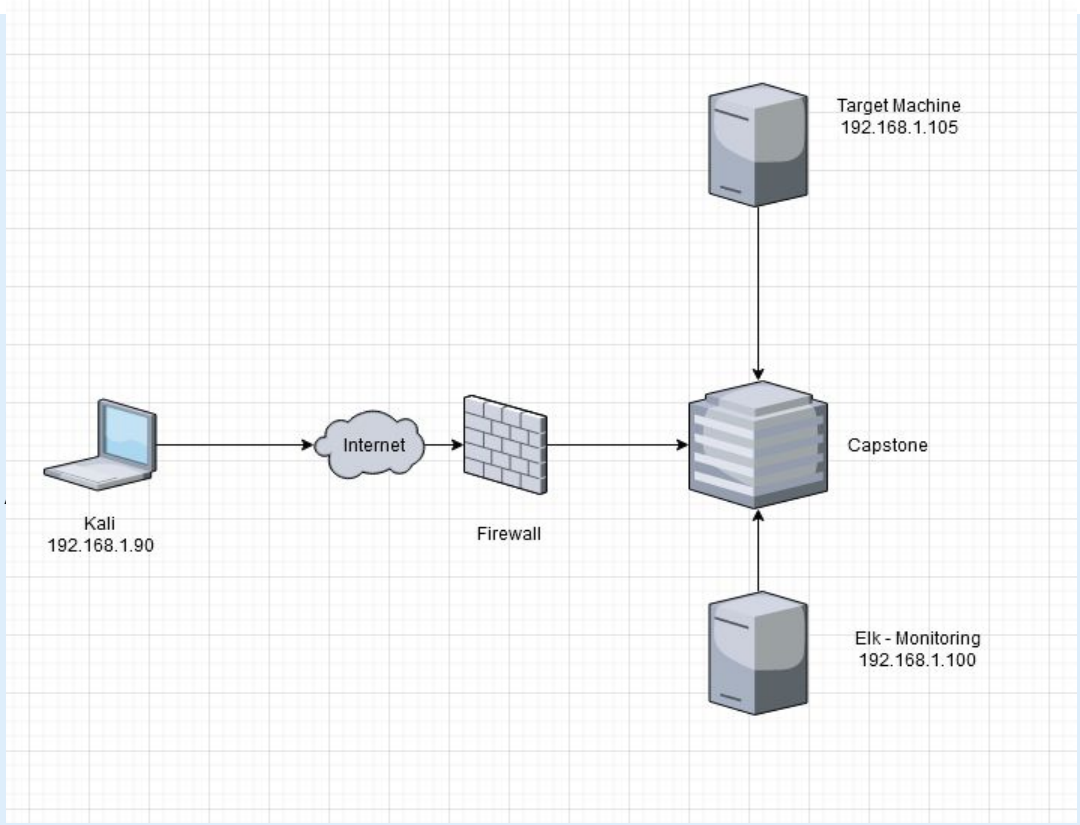
02 **Red Team**: Security Assessment

03 **Blue Team**: Log Analysis and Attack Characterization

04 **Hardening**: Proposed Alarms and Mitigation Strategies

Network Topology

Network Topology



Network
Address Range:192.168.1.0/24
Netmask:
Gateway:

Machines
IPv4: 192.168.1.90
OS: Linux
Hostname: Kali

IPv4: 192.168.1.100
OS: Microsoft
Hostname: Elk

IPv4: 192.168.1.105
OS: Microsoft
Hostname: Capstone

IPv4:
OS:
Hostname:

Red Team
Security Assessment

Recon: Describing the Target

Nmap identified the following hosts on the network:

Hostname	IP Address	Role on Network
Kali	192.168.1.90	Attacker machine.
Elk	192.168.1.100	Used for monitoring.
Capstone	192.168.1.105	Target machine.

Vulnerability Assessment

The assessment uncovered the following critical vulnerabilities in the target:

Vulnerability	Description	Impact
Use the CVE number if it exists. Otherwise, use the common name.	*Describe the vulnerability.*	*Describe what this vulnerability allows the attacker to do.*
Weak password(s)	Passwords for company folders were not strong enough.	Passwords were easily cracked in a short amount of time and company folders were accessible.
File uploads to company network	Malicious files can be uploaded without restriction.	Allows threat actors to initiate a backdoor(reverse shell) into the machine.
Information disclosure on login prompts	Employee name(s) being identified at the login prompt of certain directories.	Allows for threat actors to utilize Brute Force attacks to find the password.

Exploitation: [Name of First Vulnerability]

01

Tools & Processes
How did you exploit the vulnerability? Which tool (Nmap, etc.) or techniques (XSS, etc.) did you use?

Nmap

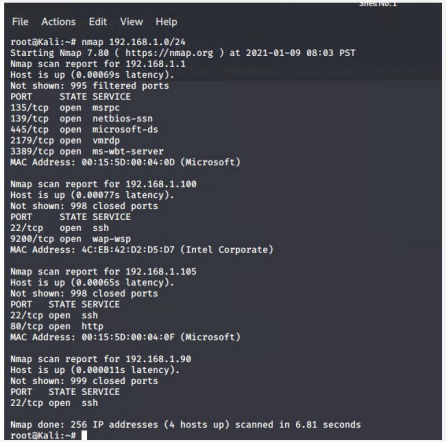
02

Achievements
What did the exploit achieve? For example: Did it grant you a user shell, root access, etc.?

Allowed me to find the ip addresses and ports associated with company network.

03

[INSERT: screenshot or command output illustrating the exploit.]



Exploitation: [Name of Second Vulnerability]

02

Tools & Processes
How did you exploit the vulnerability? Which tool (Nmap, etc.) or techniques (XSS, etc.) did you use?

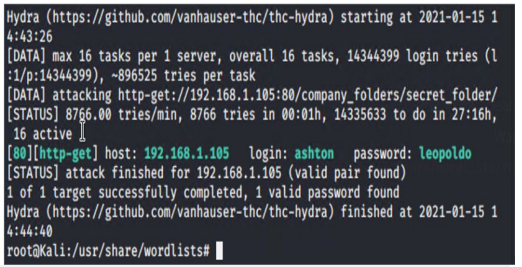
Hydra - wordlists - rockyou.txt

Achievements
What did the exploit achieve? For example: Did it grant you a user shell, root access, etc.?

The password was discovered for username - “ashton” using Hydra.

03

[INSERT: screenshot or command output illustrating the exploit.]



Exploitation: [Name of Third Vulnerability]

01

Tools & Processes

How did you exploit the vulnerability? Which tool (Nmap, etc.) or techniques (XSS, etc.) did you use?

- Webdav
- MSFConsole

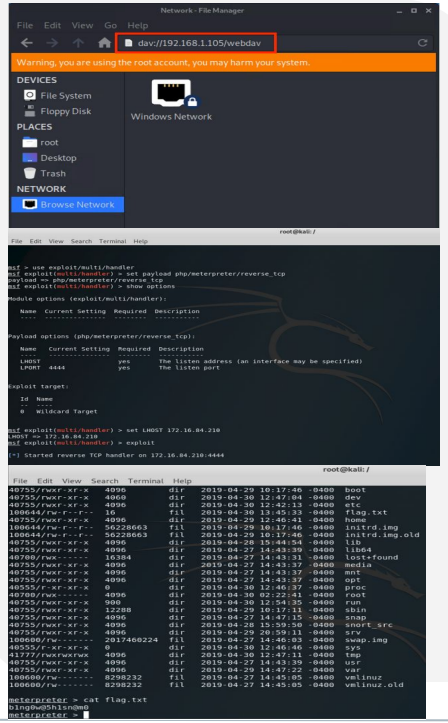
02

Achievements

What did the exploit achieve? For example: Did it grant you a user shell, root access, etc.?

- Webdav allowed access to victim's machine to upload shell.php file.
- Used msfconsole to create payload and initiate reverse shell. In which allowed access to capture the flag.

03

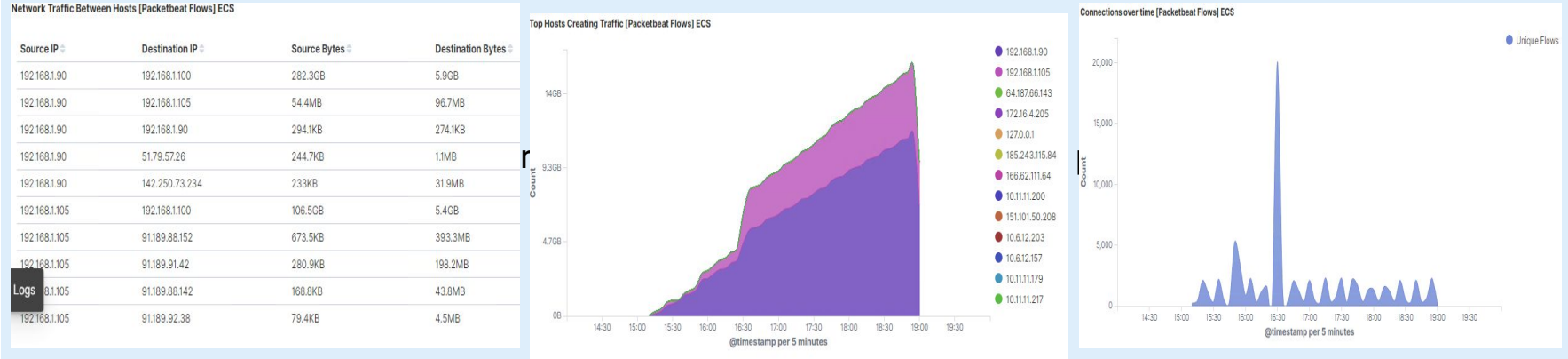


Blue Team
Log Analysis and Attack Characterization

Analysis: Identifying the Port Scan

Answer the following questions in bullet points under the screenshot if space allows. Otherwise, add the answers to speaker notes.

- What time did the port scan occur? 10:15am
- How many packets were sent, and from which IP? 15,965 packets sent from 192.168.1.90
- What indicates that this was a port scan? The spike in login attempts during a particular time period.



Network Traffic Between Hosts [Packetbeat Flows] ECS

Source IP	Destination IP	Source Bytes	Destination Bytes
192.168.1.90	192.168.1.100	282.3GB	5.9GB
192.168.1.90	192.168.1.105	54.4MB	96.7MB
192.168.1.90	192.168.1.90	294.1KB	274.1KB
192.168.1.90	51.79.57.26	244.7KB	1.1MB
192.168.1.90	142.250.73.234	233KB	31.9MB
192.168.1.105	192.168.1.100	106.5GB	5.4GB
192.168.1.105	91.189.88.152	673.5KB	393.3MB
192.168.1.105	91.189.91.42	280.9KB	198.2MB
192.168.1.105	91.189.88.142	168.8KB	43.8MB
192.168.1.105	91.189.92.38	79.4KB	4.5MB

Logs

Top Hosts Creating Traffic [Packetbeat Flows] ECS

Connections over time [Packetbeat Flows] ECS

Analysis: Finding the Request for the Hidden Directory

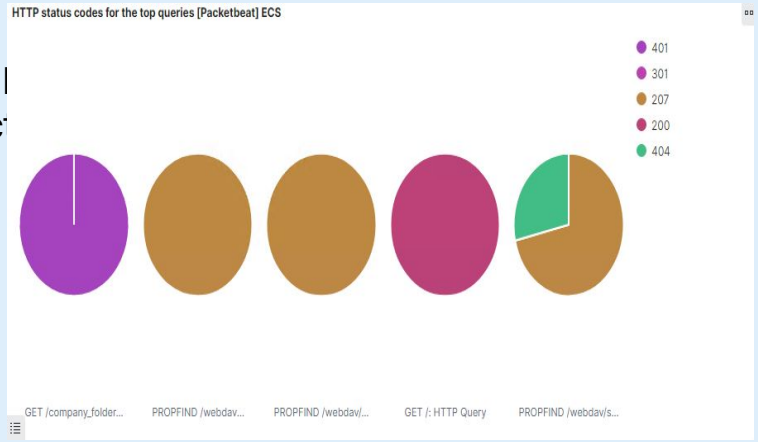
Answer the following questions in bullet points under the screenshot if space allows. Otherwise, add the answers to speaker notes.

- What time did the request occur? 10:15am How many requests were made? 15,969
- Which files were requested? Company_ folders What did they contain? secret_folder

Top 10 HTTP requests [Packetbeat] ECS

url.full: Descending	Count
http://192.168.1.105/company_folders/secret_folder	15,969
http://192.168.1.105/webdav	72
http://192.168.1.105/webdav/passwd.dav	24
http://192.168.1.105/webdav/shell.php	20
http://192.168.1.105/	16

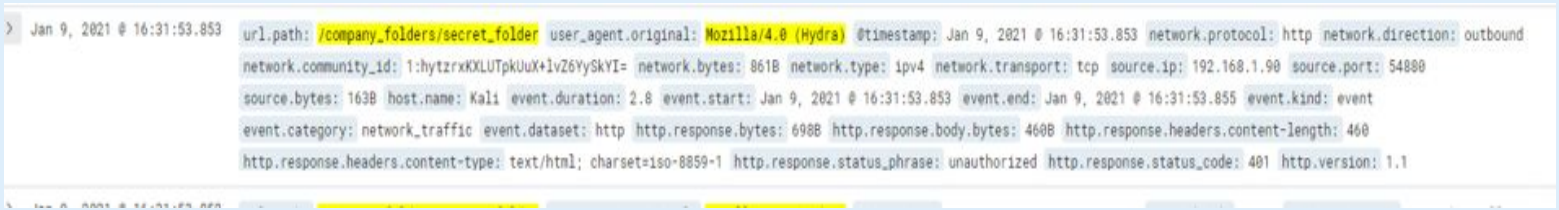
Export: Raw Formatted

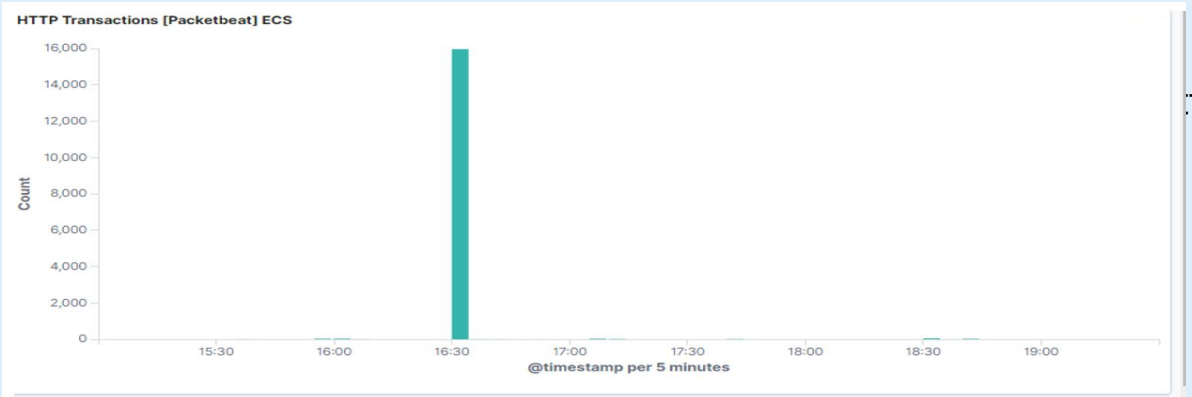


Analysis: Uncovering the Brute Force Attack

Answer the following questions in bullet points under the screenshot if space allows. Otherwise, add the answers to speaker notes.

- How many requests were made in the attack? 15,965
- How many requests had been made before the attacker discovered the password? 15,969





tack.

Analysis: Finding the WebDAV Connection

Answer the following questions in bullet points under the screenshot if space allows. Otherwise, add the answers to speaker notes.

- How many requests were made to this directory? 72
- Which files were requested? 1
  http://192.168.1.105/webdav/shell.php

Top 10 HTTP requests [Packetbeat] ECS

url.full: Descending	Count
http://192.168.1.105/webdav	72
http://192.168.1.105/webdav/passwd.dav	24
http://192.168.1.105/webdav/shell.php	20
http://192.168.1.105/webdav/	4

Export: Raw Formatted

Blue Team
Proposed Alarms and Mitigation Strategies

Mitigation: Blocking the Port Scan

Alarm

What kind of alarm can be set to detect future port scans?

- IDSs can be used to monitor your network and alarm you when an intrusion is taking place.
- You can turn on an intrusion method by using a snort rule.
- Firewalls can be configured to detect port scans happening.

What threshold would you set to activate this alarm? If up to 10 ports scanned within 5000 microseconds from the same source shut it down.

System Hardening

What configurations can be set on the host to mitigate port scans?

- Search for any open ports on your network that are not being used shut them down.
- Configure your firewall to stop port scans from happening.
- Disable ICMP.

Describe the solution. If possible, provide required command lines.
Snort rule - alert icmp any any -> 192.168.1.105 any (msg: "NMAP ping sweep Scan"; dsize:0;sid:100

Mitigation: Finding the Request for the Hidden Directory

Alarm

What kind of alarm can be set to detect future unauthorized access?

- After a number of unsuccessful attempts lock out the account and log the user behavior.

What threshold would you set to activate this alarm?

- Set up a group policy that will lock the account after three attempts.

System Hardening

What configuration can be set on the host to block unwanted access?

- Strong passwords.
- File encryption.
- Restrict external access to company folders.

Describe the solution. If possible, provide required command lines.

- In Windows - command prompt - net accounts /lockoutthreshold:3
- In Linux - ipa pwpolicy-mod examplegroup --maxfail=4 --lockouttime=600

Mitigation: Preventing Brute Force Attacks

Alarm

What kind of alarm can be set to detect future brute force attacks?

- Using a SIEM, create an alarm to identify attacks based on unsuccessful login attempts from a single source.

What threshold would you set to activate this alarm?

- The threshold should trigger an alarm if > 20 login attempts are made within one minute.

System Hardening

What configuration can be set on the host to block brute force attacks?

- Multi-factor authentication.
- Account lockout after three login failures.
- Strong passwords (8 - 16 characters).

Describe the solution. If possible, provide the required command line(s).

- Using an account lockout would slow down threat actors from trying to guess passwords. In the instance that you notice that account lockout is being bypassed implement multi-factor. Example - password, RSA key followed by a pin.

Mitigation: Detecting the WebDAV Connection

Alarm

What kind of alarm can be set to detect future access to this directory?

- Create an alert that would detect any attempt being made to access this server from outside the company network.

What threshold would you set to activate this alarm?

- This alarm would be triggered by any attempts being made from an external ip address.

System Hardening

What configuration can be set on the host to control access?

- Prevent this directory from being accessible through the web.
- Use the firewall to block access to this directory

Describe the solution. If possible, provide the required command line(s).

- Limited access to the company's internal network would prevent threat actors from accessing confidential information.

Mitigation: Identifying Reverse Shell Uploads

Alarm

What kind of alarm can be set to detect future file uploads?

- Create an alarm to detect or scan for any malicious file extensions being uploaded to the server.

What threshold would you set to activate this alarm?

- Implement a file type restriction so that .php files are not permitted.

System Hardening

What configuration can be set on the host to block file uploads?

- Use file type restrictions
- Anti-malware
- Restrict access to upload files to company_folders.

Describe the solution. If possible, provide the required command line.

- By restricting the ability to upload files to the company_folders reduces the chances for threat actors to upload backdoors into your networks.


The End