Capstone Engagement

Assessment, Analysis, and Hardening of a Vulnerable System

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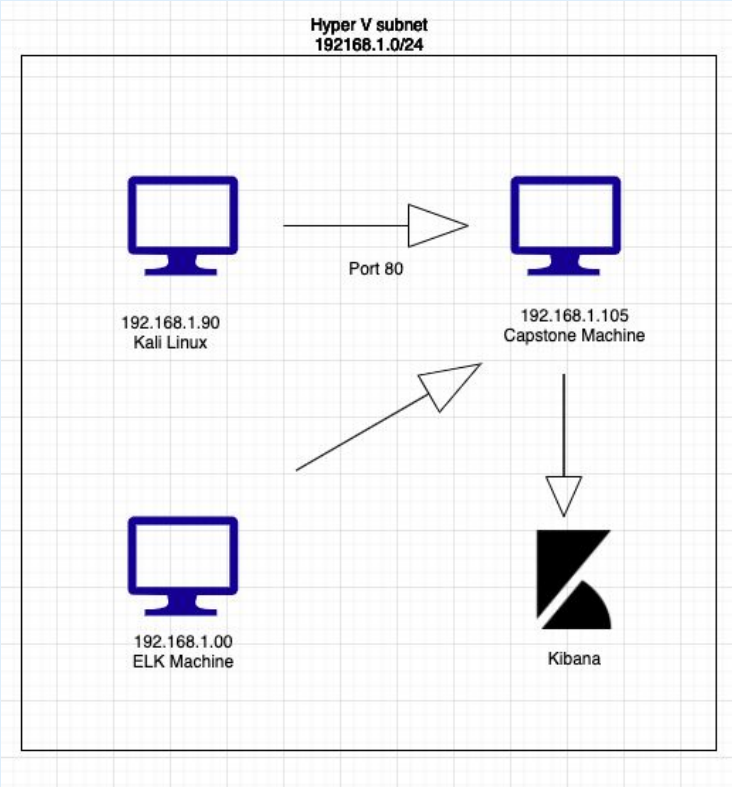
Network Topology



Network
Address Range: 192.168.1.0/24
Netmask: 255.255.255.0
Gateway: 192.168.1.1

Machines
IPv4: 192.168.1.90
OS: Kali
Hostname: Microsoft

IPv4: 192.168.1.100
OS: Windows
Hostname: Intel Corporate

IPv4: 192.168.1.105
OS: Windows
Hostname: Microsoft

Red Team
Security Assessment

Recon: Describing the Target

Nmap identified the following hosts on the network:

Hostname	IP Address	Role on Network
Capstone	192.168.1.105	Target Machine
Kali	192.168.1.90	Attack Machine
Elk	192.168.1.100	Log Server
HyperV	192.168.1.1	Network

Vulnerability Assessment

The assessment uncovered the following critical vulnerabilities in the target:

Vulnerability	Description	Impact
CVE-2017-15580 : Shell Exploit	Allowed uploading of msfvenom exploit	Allows cyber criminals to run exploits to gain access to hidden directories among other things
CVE-2014-3101 : Brute Force	Weak passwords and no limit on login attempts	Increases chances of cyber criminals having a successful brute force attack and gaining access to the system
CWE-311: Missing Encryption on Sensitive Data	Unencrypted confidential files and passwords	Allows cyber criminals to view files and gain information such as passwords to use for an attack

Exploitation: Shell Exploit

01

Tools & Processes

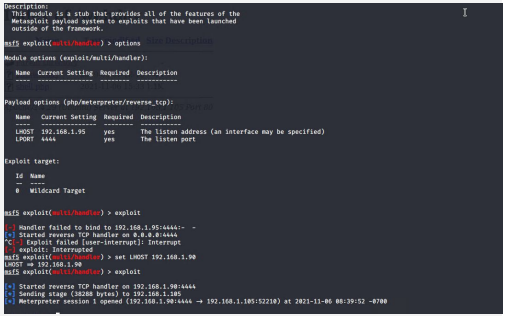
Used msfconsole and pushed an exploit to the webdav/ folder

02

Achievements

Used a shell.php exploit to gain access to the flag.

03



Exploitation: Brute Force

01

Tools & Processes

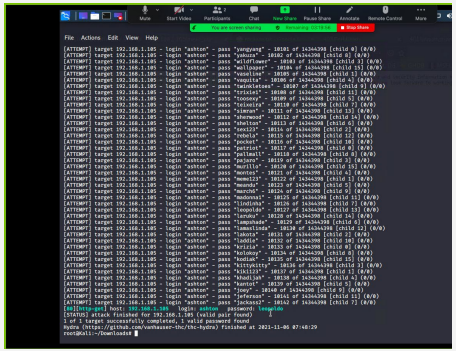
Used hydra and a rockyou.txt wordlist to conduct a brute force attack.

02

Achievements

Was able to log into Ashton's account to gain access to the webdav/ folder

03



Exploitation: Lack of Encryption

01

Tools & Processes

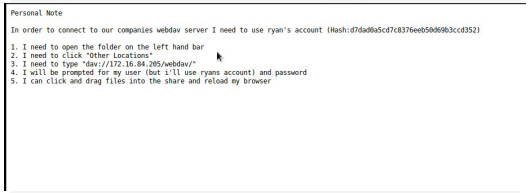
How did you exploit the vulnerability? Which tool (Nmap, etc.) or techniques (XSS, etc.) did you use? Was able to explore system

02

Achievements

What did the exploit achieve? For example: Did it grant you a user shell, root access, etc.? Was able to find information on how to access the webdav/ folder

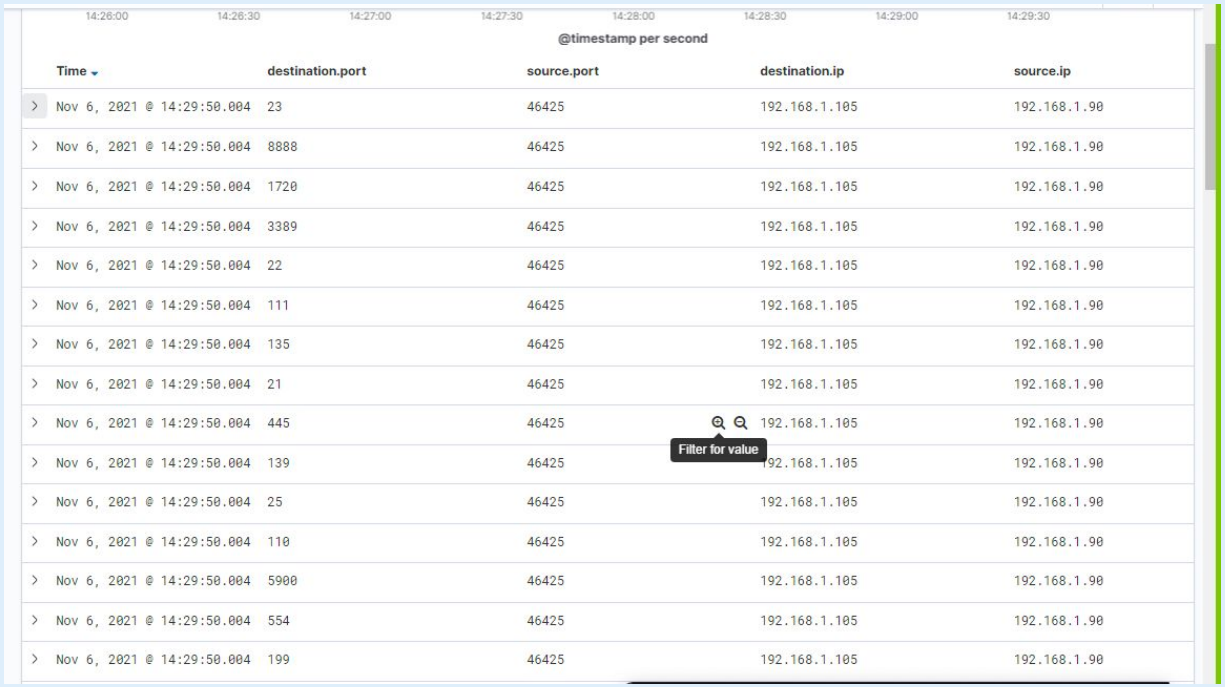
03



Blue Team
Log Analysis and Attack Characterization

Analysis: Identifying the Port Scan

- The port scan occurred 2:29 PM on November 6, 2021
- 8,000 packets were sent from 192.168.1.90
- We can tell that this is a port scan by the various sending of packets to random ports in no particular order



Time	destination.port	source.port	destination.ip	source.ip
Nov 6, 2021 @ 14:29:50.004	23	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	8888	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	1720	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	3389	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	22	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	111	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	135	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	21	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	445	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	139	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	25	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	110	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	5900	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	554	46425	192.168.1.105	192.168.1.90
Nov 6, 2021 @ 14:29:50.004	199	46425	192.168.1.105	192.168.1.90

Analysis: Finding the Request for the Hidden Directory

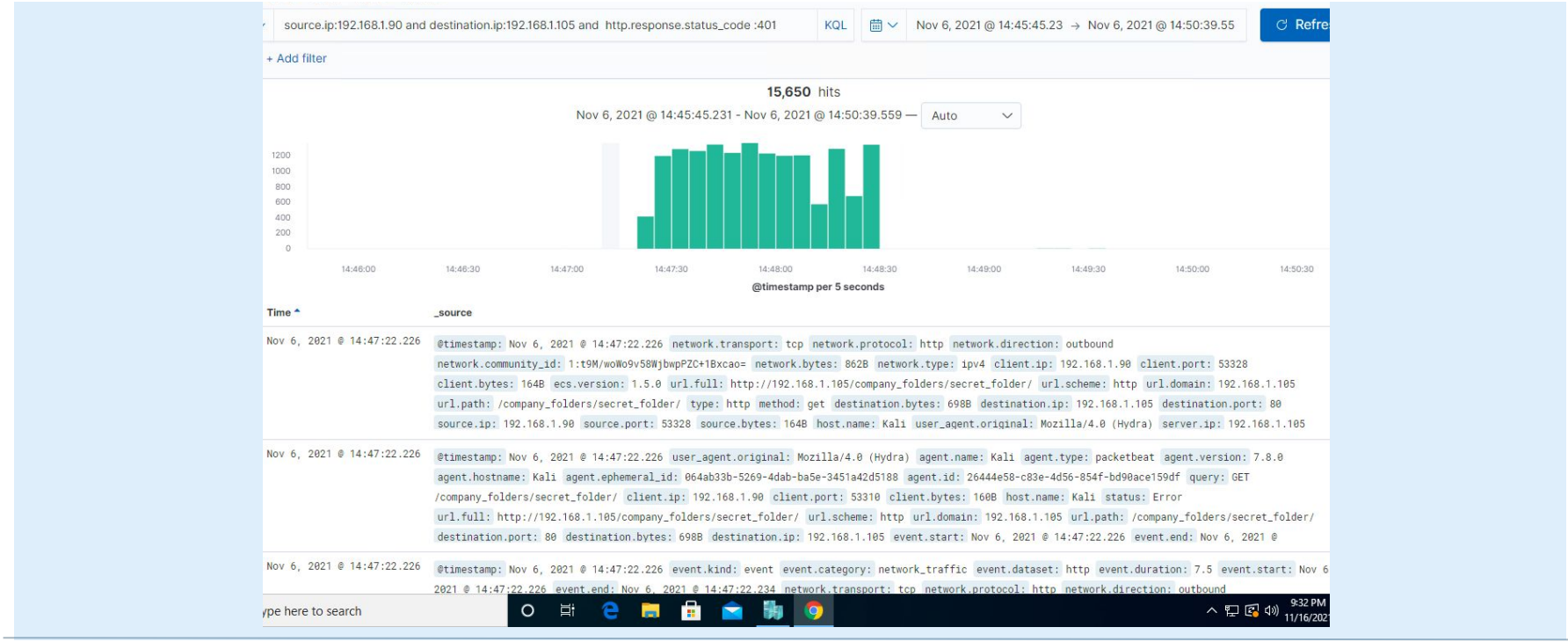
- There were 5,289 packets sent at 2:48 pm on November 6, 2021
- Which files were requested? What did they contain? It contained instruction how how to access the webdav/ folder

t	status	Error
t	type	http
t	url.domain	192.168.1.105
t	url.full	http://192.168.1.105/company_folders/secret_folder/
t	url.path	/company_folders/secret_folder/
t	url.scheme	http
t	user_agent.original	Mozilla/4.0 (Hydra)

> Nov 6, 2021 @ 14:48:29.648 460B
> Nov 6, 2021 @ 14:48:29.648 460B
> Nov 6, 2021 @ 14:48:29.639 460B
> Nov 6, 2021 @ 14:48:29.638 460B
> Nov 6, 2021 @ 14:48:29.628 460B
> Nov 6, 2021 @ 14:48:29.628 460B

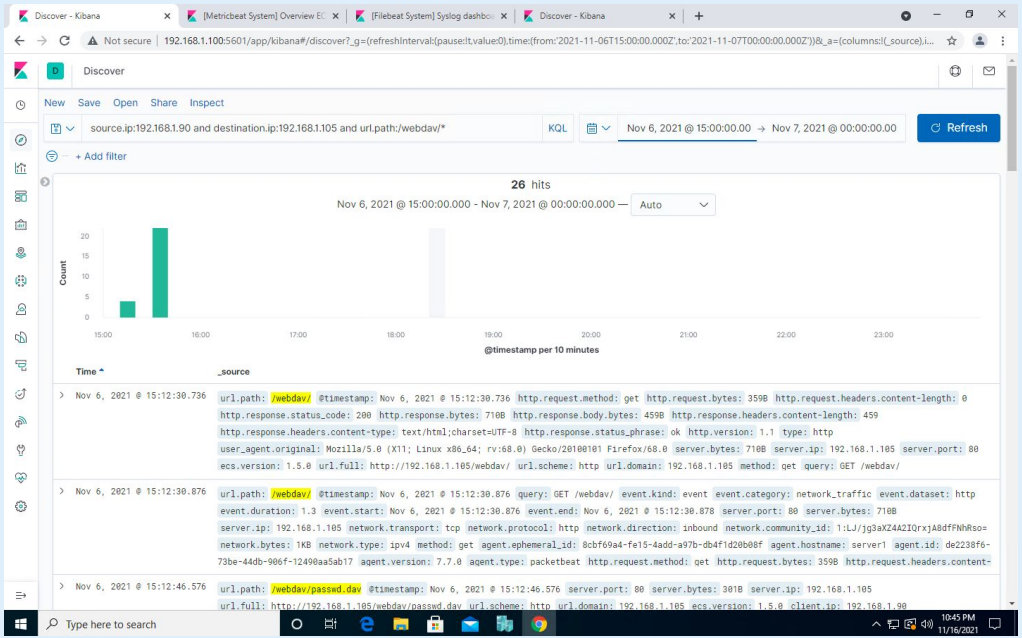
Analysis: Uncovering the Brute Force Attack

- There were 15,902 request in this attack
- 15,500 request were made before the attack found the password
-



Analysis: Finding the WebDAV Connection

- 26 request were made to this directory
- The passwd.dav file and shell.php file were found to be requested



Blue Team
Proposed Alarms and Mitigation Strategies

Mitigation: Blocking the Port Scan

Alarm

Using an alert that goes off when a specific IP address rapidly try to connect to closed ports

System Hardening

Installing a Firewall that controls what ports outside sources have access to as well control the visibility of those ports.

Mitigation: Finding the Request for the Hidden Directory

Alarm

Create an alarm when a non-authorized IP address tries to access the hidden directory. The threshold should be 1 attempt

System Hardening

Passwords should be at least 8 characters contain Upper and Lower case character, special characters, and numbers. Furthermore, the removal of the hidden directory from the web server should be implemented using the rmdir command

Mitigation: Preventing Brute Force Attacks

Alarm

Create a threshold of more than 20 failed login attempts per hour should trigger an alarm.

System Hardening

Limit the number of login attempts to 8 before locking out an account.

Mitigation: Detecting the WebDAV Connection

Alarm

Create an alarm when a non-authorized IP address tries to access the hidden directory. The threshold should be 1 attempt.

System Hardening

Passwords should be at least 8 characters contain Upper and Lower case character, special characters, and numbers. Additionally, external IP address should not have access to the folder.

Mitigation: Identifying Reverse Shell Uploads

Alarm

Any file uploaded from an unauthorized IP should trigger an alert.

System Hardening

Only allow certain IP addresses to upload files.


The End