Capstone Engagement

Assessment, Analysis, and Hardening of a Vulnerable System

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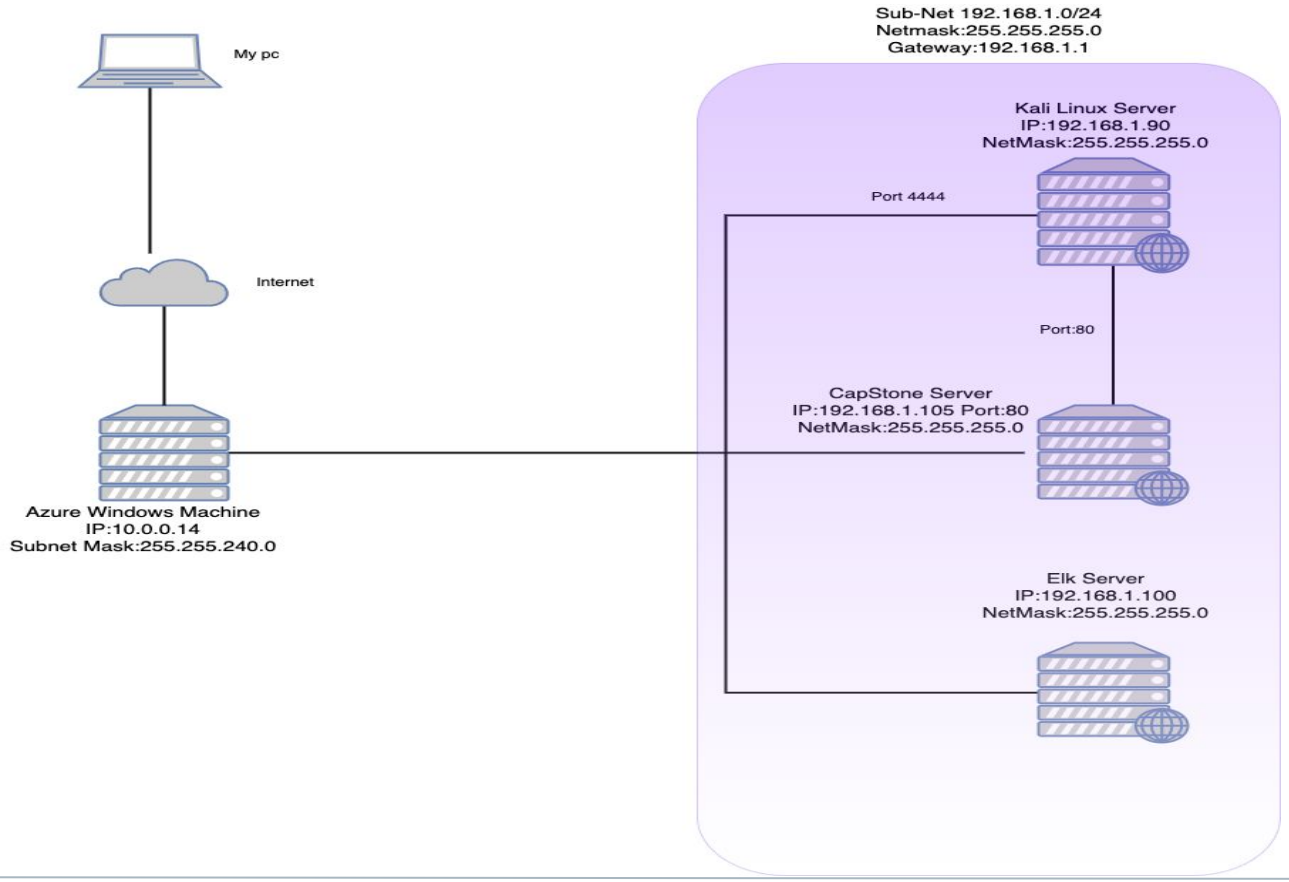
Network Topology

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:Linux
Hostname: **Kali**

IPv4:192.168.1.105
OS:Linux
Hostname:**Capstone**

IPv4:192.168.1.100
OS:Linux
Hostname:**ELK**

IPv4:192.168.1.1
OS:Windows
Hostname:ML-REFVM-684424 **AZURE**
:

Red Team
Security Assessment

Recon: Describing the Target

Nmap identified the following hosts on the network:

Hostname	IP Address	Role on Network
Hyper V (Manager)	192.168.1.1	Host of virtual machines used to attack, defend, and monitor activity.
Kali	192.168.1.90	Attacker Machine (Kali Linux)
Capstone	192.168.1.105	Victim Machine
ELK	192.168.1.100	Monitors the network and collects logs to be analyzed using Kibana

Vulnerability Assessment

The assessment uncovered the following critical vulnerabilities in the target:

Vulnerability	Description	Impact
Port 80 opened	Open ports are dangerous and has poor network security rules. This vulnerability makes sensitive data more publicly accessible	We (attackers) were able to access sensitive files.
Local File inclusion Vulnerability	LFI allows access into confidential files on a site. This is a web vulnerability on the programming side that a hacker can exploit to add malicious executable files.	We exploited this web vulnerability by adding a reverse shell script file to the website that when clicked, allowed us access to the victim's machine.

Exploitation: Nmap Scan - Open Port Vulnerability

01

Tools & Processes

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

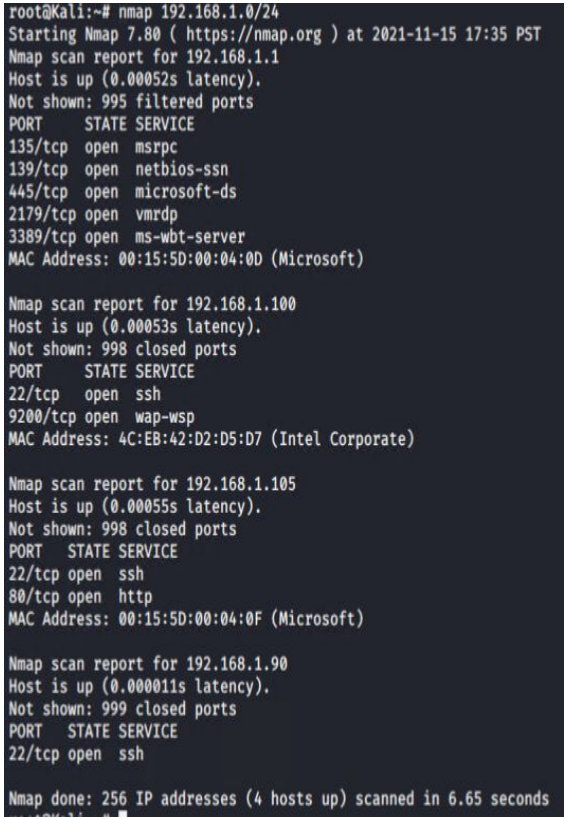
To find this vulnerability we used nmap to discover which ports are open and which services are being used.

02

Achievements

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

We discovered that our target machine with IP 192.168.1.105 had port 80 open. Through this port we were able to access the website's directory and find sensitive file data.



Exploitation: Brute Force

01

Tools & Processes
Hyrdra- used against directory to find secret folder and brute force into Capstone (victim's) machine

02

Achievements:
User: Ashton
Pw: leopoldo
With this information we were able to access system

```
[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 2021-11-15 18:38:52
root@Kali:~#
```

Exploitation: Accessible Files - Local File Inclusion

01

Tools & Processes

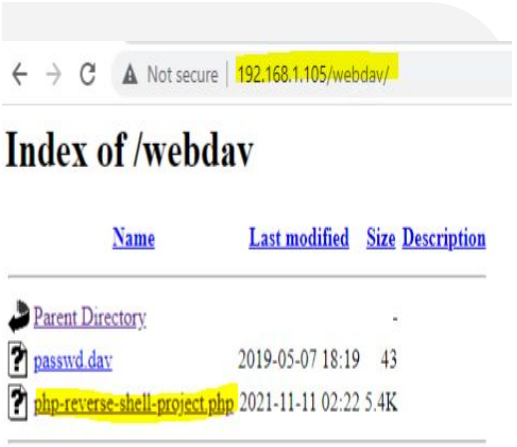
Using open port 80, we accessed the target IP address in a web browser to view the vulnerable directories.

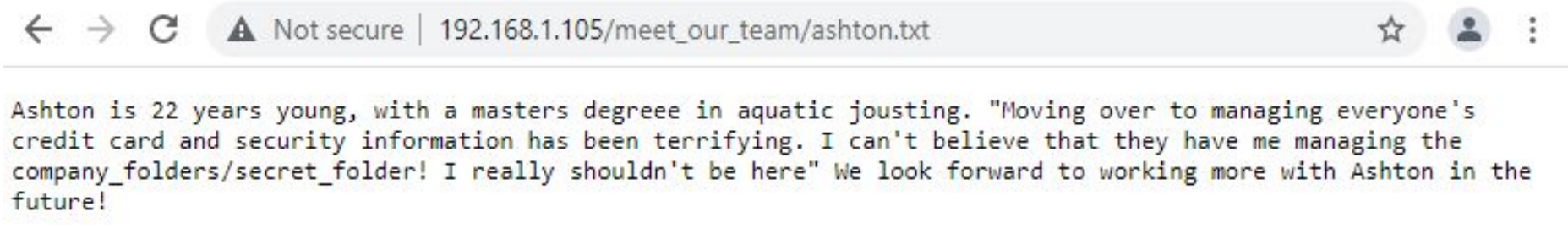
02

Achievements

This allowed us to find confidential login information and identify where important files were located.
Because the website has an LFI vulnerability, we are able to write a malicious executable file into the website's directory.

03

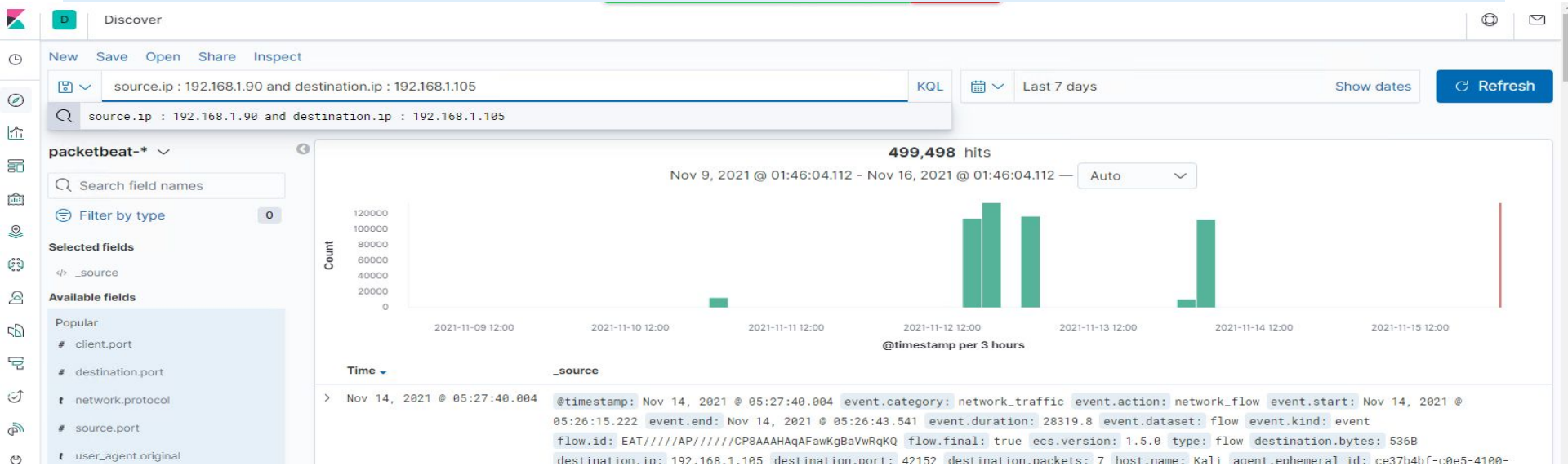




Blue Team
Log Analysis and Attack Characterization

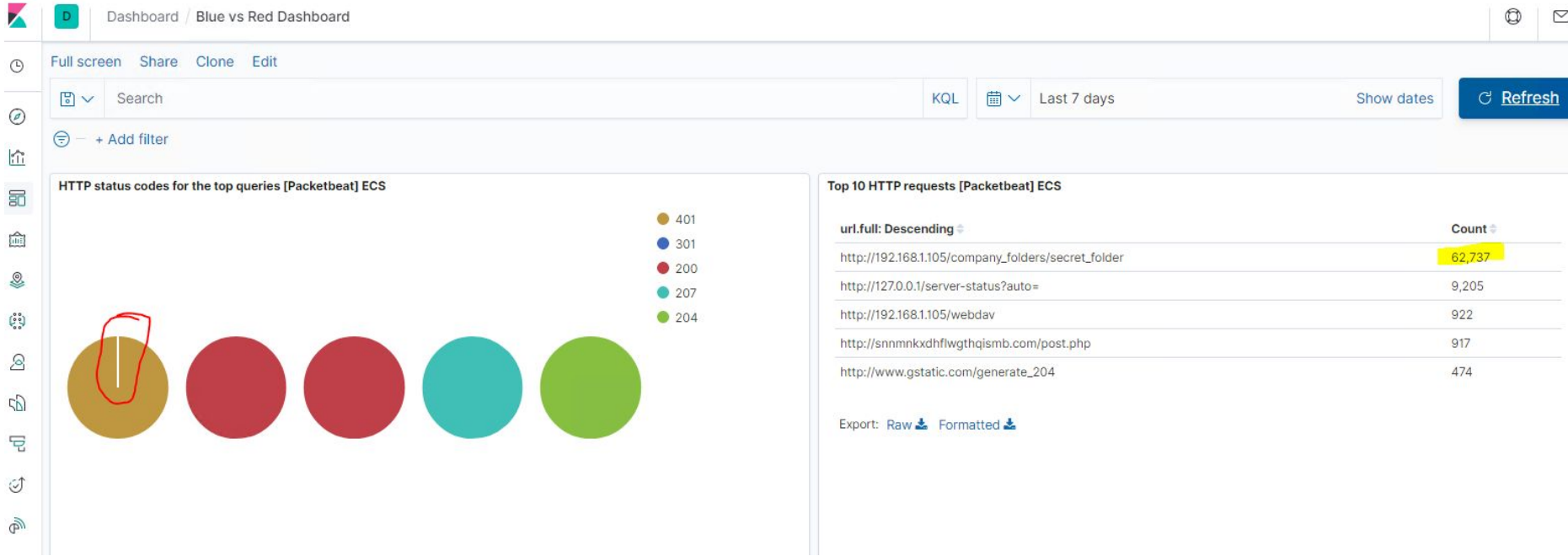
Analysis: Identifying the Port Scan

- What time did the port scan occur? Dashboard indicates the time as 6:00pm
- How many packets were sent, and from which IP? 499,498 hits from IP: 192.168.1.105
- What indicates that this was a port scan? Using scan source.ip : 192.168.1.90 and destination.port : 4444 demonstrates the port scan



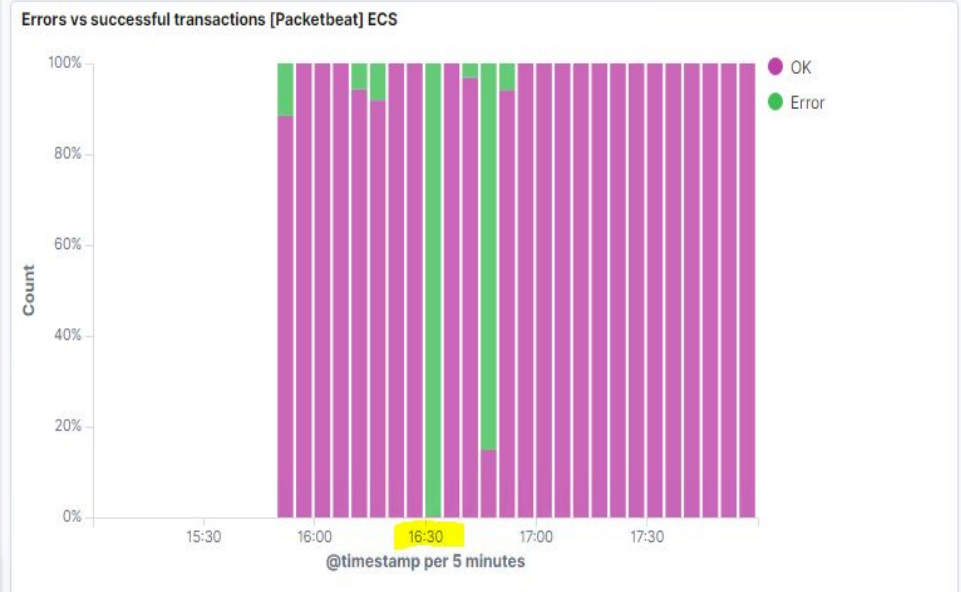
Analysis: Uncovering the Brute Force Attack

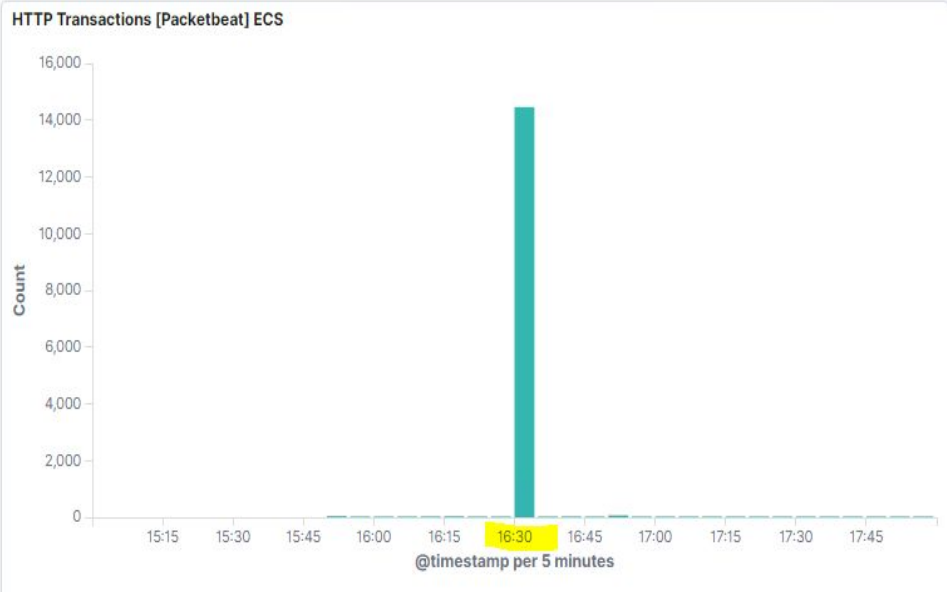
- How many requests were made in the attack? 14423
- How many requests had been made before the attacker discovered the password? 62737 total requests and only 1 user got through



Analysis: Finding the Request for the Hidden Directory

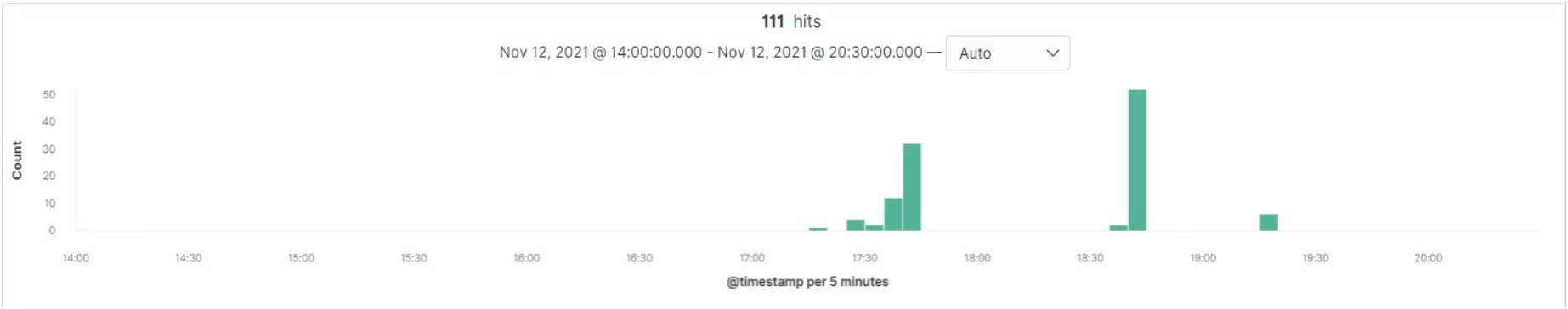
- What time did the request occur?4:30pm
- How many requests were made? 14423
- Which files were requested? http://192.168.1.105/company_folders/secret_folder
- What did they contain? The Secret Folder contained the HASH for Ryans Password





Analysis: Finding the WebDAV Connection

- 111 requests were made to the webDav directory.
- The shell.php file was requested 30 times and was a part of the red team's shell attack to start listening for activity on the victim



Top 10 HTTP requests [Packetbeat] ECS

url.full: Descending	Count
http://192.168.1.105/company_folders/secret_folder	7,698
http://192.168.1.105/webdav	111
http://192.168.1.105/webdav/passwd.dav	111
http://192.168.1.105/webdav/shell.php	30
http://192.168.1.105/.bash_history	4

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?

- Create an alarm anytime there is more than ONE Port scan in ONE Minute
- Threshold is greater than ONE attempt

System Hardening

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

- Enable only the traffic needed to access internal hosts and deny everything else.
- Configure Firewall Rules to cut off attacks if a certain threshold is reached, such as ONE port scan in one minute.

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

- Use your IDS like Kibana or SPLUNK for immediate alerting in order to initiate the rapid response team

Mitigation: Finding the Request for the Hidden Directory

Alarm

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

- Create an Alarm anytime restricted folders or directories are accessed by unauthorized users/machine
- Threshold is greater than ONE attempt

System Hardening

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

- Create user permissions restricting access to specific Directories
- Restrict traffic to specific directories by keeping them on secure servers that are not accessible via the internet (closed network)

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

- When a user access restricted directories an alert should be sent to the appropriate team or manager

Mitigation: Preventing Brute Force Attacks

Alarm

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

- Create an alarm after SIX unsuccessful login attempts
- Create an alarm notifying the appropriate team or manager after 35 401 error codes in ONE minute

System Hardening

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

- Create a rule that locks out a user after a password threshold has been met
- Create a rule establishing a multi-authentication process when resetting passwords
- Create a rule dropping http traffic after ONE minute

Mitigation: Detecting the WebDAV Connection

Alarm

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

Create Alert anytime the IDS detects any webdav, PHP, executable file, or remote access connection

What threshold would you set to activate this alarm?

- Threshold is Zero

System Hardening

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

- Establish a rule that blocks: webdav, PHP, or remote access connection

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

- Any remote access connection is unauthorized and requires immediate response

Mitigation: Identifying Reverse Shell Uploads

Alarm

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

- Establish alarm anytime a file is uploaded from outside the internal network

What threshold would you set to activate this alarm?

- Threshold is Zero

System Hardening

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

- Establish a rule that blocks all file uploads from outside the internal network.
- Establish rules that restrict users from uploading/downloading files without permission


The End