

Ethical hacking of a CTF-VM

Laboratory protocol Exercise 7: Ethical hacking of a CTF-VM $\,$



Figure 1: Grouplogo

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1 Task definition

2 Summary



3 Complete network topology of the exercise

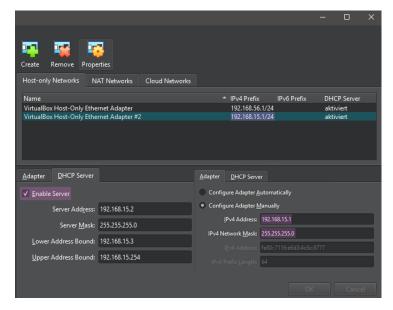


Figure 2: Complete network topology of the exercise



4 Exercise Execution

4.1 Setting up the virtual machines.

To get started with this CTF, make sure that VirtualBox version 7.1.4 is used. The VM to attack must be imported by double-clicking the provided .ova file. After the import is complete, the network settings must be changed to use Host-only Adapter mode. Since using the default Host-only network did not work, we had to create a new Host-only network. To do this, either press <C-h> or click on File > Tools > Network Manager, as shown in Figure 3.

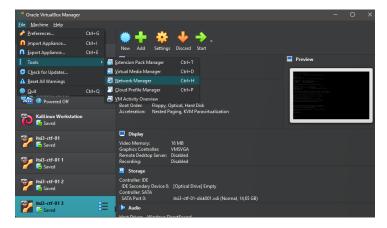


Figure 3: Opening VirtualBox Network Manager settings

In this menu, click on Create, then check the Enable Server box to enable the DHCP server so the target VM will receive an IP address. Then, click on Adapter to view the IP range of the network, which in our case is 192.168.15.0/24, which can be seen in Figure 4.

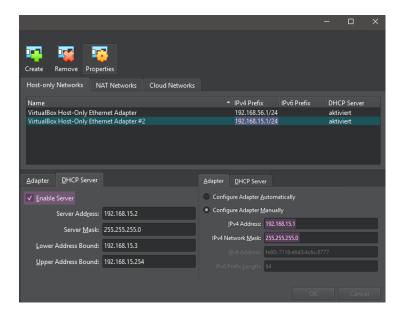


Figure 4: Showing the IP settings for the new Host-only network

Next, open the virtual machine settings by selecting the VM in the list and pressing <C-s>. Under the Network section, change the network adapter to use the Host-only Adapter and select the VirtualBox Host-only Ethernet Adapter #2, which was just created. Perform this step for both the target VM and the Kali VM, as detailed in Figure 5.



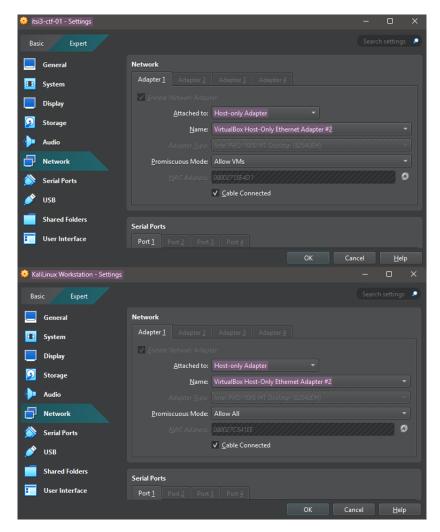


Figure 5: Showing the network configuration of the virtual machines



4.2 Reconnaissance: Scanning the Network

We use the Cyber Kill Chain to structure our steps for completing the CTF, with any attack beginning with reconnaissance, which in this case means scanning the network with nmap. Since we don't know the IP address of the target server yet, we need to scan the network to find it. For this, the command nmap 192.168.15.0/24 is used to scan the entire network for open ports, as illustrated in Figure 6.[1]

```
Starting Nmap 7.91 (https://nmap.org ) at 2025-01-17 17:56 CET mass_dns: warning: Unable to determine any DNS servers. Reverse DNS is disa bled. Try using —system-dns or specify valid servers with —dns-servers Nmap scan report for 192.168.15.1
HOST is up (0.0010s latency).
All 1000 scanned ports on 192.168.15.1 are filtered MAC Address: 0A:00:27:00:00:2F (Unknown)

Nmap scan report for 192.168.15.2
HOST is up (0.00025s latency).
All 1000 scanned ports on 192.168.15.2 are filtered MAC Address: 08:00:27:90:4C:27 (Oracle VirtualBox virtual NIC)

Nmap scan report for 192.168.15.3
HOST is up (0.00049s latency).
Not shown: 998 closed ports
PORT STATE SERVICE 22/tcp open socks
MAC Address: 08:00:27:15:E4:D1 (Oracle VirtualBox virtual NIC)

Nmap scan report for 192.168.15.4
HOST is up (0.0000020s latency).
Not shown: 999 closed ports
PORT STATE SERVICE
11/tcp open rpcbind

Nmap done: 256 IP addresses (4 hosts up) scanned in 5.92 seconds
```

Figure 6: Results of the nmap scan

We can determine that the target has the IP address 192.168.15.3, since, as seen in Figure 4, .1 is the network address, .2 is the DHCP server, and .4 is the IP address of the Kali VM. This can be verified by running ip a or by scanning the open ports, since ssh is not exposed. Now we can run another nmap scan to get fruther information abt the running servives and their version by using the sV flag and use the T4 flag which sets the timing to agressive with the value 4 and the p falg with - value to scan all ports. The results of the scan can be seen in Figure 7.[2, 3]

```
Starting Nmap 7.91 ( https://mmap.org ) at 2025-01-17 17:57 CET
mass dns: warning: Unable to determine any DNS servers. Reverse DNS is disabled. Try using --system-dns or specify valid servers with --dns-servers
Stats: 0:00:10 elapsed; 0 hosts completed (1 up), 1 undergoing SYN Stealth Scan
SYN Stealth Scan Timing: About 34.67% done; ETC: 17:57 (0:00:19 remaining)
Nmap scan report for 192.168.15.3
Host is up (0.00065s latency).
Not shown: 65530 closed ports
PORT STATE SERVICE VERSION
22/tcp open ssh OpenSSH 9.6p1 Ubuntu 3ubuntu13.5 (Ubuntu Linux; protocol 2.0)
1080/tcp open http BaseHTTPServer 0.6 (Python 3.12.3)
5155/tcp open http BaseHTTPServer 0.6 (Python 3.12.3)
10458/tcp open http BaseHTTPServer 0.6 (Python 3.12.3)
55487/tcp open http BaseHTTPServer 0.6 (Python 3.12.3)
MAC Address: 08:00:27:15:E4:D1 (Oracle VirtualBox virtual NIC)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 49.23 seconds
```

Figure 7: Results of the detailed nmap scan

From this scan, we can see that ssh and four http servers running Python 3.12.3 are active on the system.

4.3 Reconnaissance: Exploring the websites

If we open the websites in our web browser of choice, we can see that the one on port 1080 says that to get further, we need to scan deeper, which we already did. The website on port 5155 shows text from foreign languages, which is randomized and always prints out different text on refresh. The site on port 10458 prints out a message in base64, and lastly, the one on port 10448 has a basic authentication login prompt for a mini web shell. Figures 8 shows the content of each webpage.



```
root@kali:~# curl 192.168.15.3:1080; echo
Willkommen bei der HTL22-Mini-CTF! Um weiter zu kommen musst du genauer Scannen!
root@kali:~# curl 192.168.15.3:4220; echo
提示1: ② ②□□□□□□□□□□□□□□ ② ② ② ②
root@kali:~# curl 192.168.15.3:10465; echo
SGlud2VpcyAyOiBwb2JpZXJlIGRlbiBwb3J0IDU1NTM5
root@kali:~# curl 192.168.15.3:55539; echo
Authorization required
root@kali:~#
```

Figure 8: Showing the contents of each page using curl¹

```
~/itsi via ₫ v3.11.2
> echo "SGlud2VpcyAyOiBwb2JpZXJlIGRlbiBwb3J0IDU1NDg3" | base64 --decode
Hinweis 2: pobiere den port 55487₽
```

Figure 9: Decoding the base64 message

- 4.4 breaking the http authtication
- 4.5 sshing into the server
- 4.6 exploring the system
- 4.7 process flag
- 4.8 comment flag
- 4.9 sudo flag
- 4.10 history flag
- 4.11 tmp flag
- 4.12 it's over but actually not
- 4.13 trying to escalate privaledgs
- 4.13.1 smart enumeration
- 4.13.2 trying a kernel level exploit
- 4.13.3 checking suid binarys
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- 4.14 reseting the root password and exploring the vm
- 4.15 7 flags
- 4.16 talking abt the setup etc or sum idk :shruge:



5 References

References

- [1] "Cyber Kill Chain®," Jan. 2025, [Online; accessed 19. Jan. 2025]. [Online]. Available: https://www.lockheedmartin.com/en-us/capabilities/cyber/cyber-kill-chain.html
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- [3] "Timing Templates (-T) | Nmap Network Scanning," Jan. 2025, [Online; accessed 19. Jan. 2025]. [Online]. Available: https://nmap.org/book/performance-timing-templates.html



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