

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.

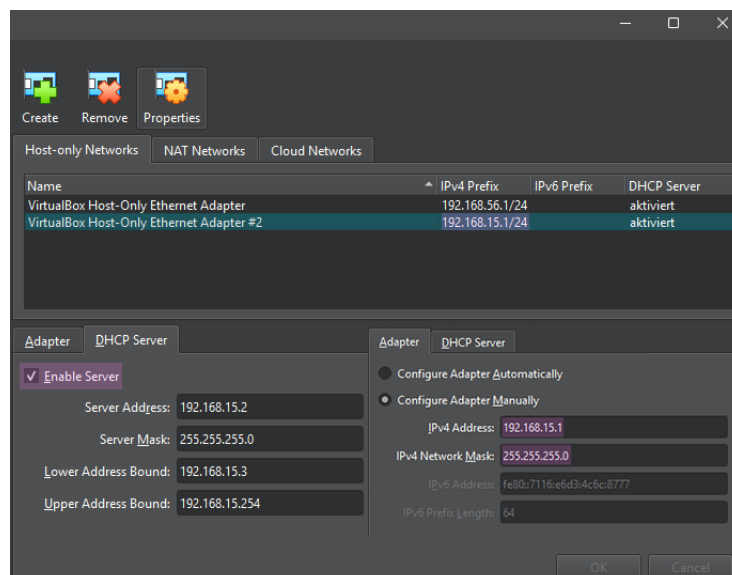


Figure 4: Showing the IP settings for the new Host-only network

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]

```
root@kali:~# nmap 192.168.15.0/24
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 disabled. 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: 08:00:27:9D: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  ssh
1080/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
111/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 further information abt the running servives and their version by using the **sV** flag and use the **T4** flag which sets the timing to aggressive 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]

```
root@kali:~# nmap -sV -T4 -p- 192.168.15.3
Starting Nmap 7.91 ( https://nmap.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
- 4.4 breaking the http authentication
- 4.5 sshing into the server
- 4.6 exploring the system
- 4.7 process flag
- 4.8 comment flag
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- 4.13 trying to escalate privileges
 - 4.13.1 smart enumeration
 - 4.13.2 trying a kernel level exploit
 - 4.13.3 checking suid binaries
 - 4.13.4 checking root processes
 - 4.13.5 trying metasploit
 - 4.13.6 trying other common ctf priv escalation ways
- 4.14 resetting the root password and exploring the vm
- 4.15 7 flags
- 4.16 talking abt the setup etc or sum idk :shrug:

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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