

Cybersecurity Internship Program

Task-2: BUILD YOUR PERSONAL CYBERSECURITY LAB

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1. Introduction

Cybersecurity practical learning requires a safe and isolated environment. This report documents the creation of a personal cybersecurity laboratory using virtualization technology. The lab consists of an attacker machine (**Kali Linux**) and a vulnerable web application (**DVWA / OWASP Juice Shop**). Proper network segmentation is implemented to ensure that testing remains contained and does not impact the host system or external networks.

2. Objective

The primary goal of this task is to establish a secure, isolated penetration-testing lab for practicing:

- **Vulnerability Assessment:** Identifying weaknesses in systems.
- **Web Application Testing:** Exploiting flaws in web services.
- **Network Scanning:** Discovering active hosts and open ports.
- **Security Tool Proficiency:** Mastering industry-standard tools.

3. Lab Architecture Overview

The lab is designed using a multi-adapter approach to balance connectivity and security.

- **Attacker Machine:** Kali Linux (Debian-based penetration testing suite).
- **Target Machine:** DVWA or OWASP Juice Shop (Deliberately insecure applications).
- **Network Logic:** The Attacker communicates with the Target via a **Host-Only Network**, while the Attacker maintains an external **NAT** connection for repository updates.

4. Prerequisites

Requirement	Recommendation
RAM	Minimum 8GB (16GB preferred)
Disk Space	40–60 GB

Requirement	Recommendation
CPU	Virtualization (VT-x/AMD-V) Enabled
Host OS	Windows / Linux / Mac

5. Tools & Technologies Used

- **Hypervisor:** Oracle VM VirtualBox
- **Operating Systems:** Kali Linux VM
- **Vulnerable Labs:** DVWA
- **Security Tools:** Nmap, Burp Suite, Wireshark

6. Network Configuration

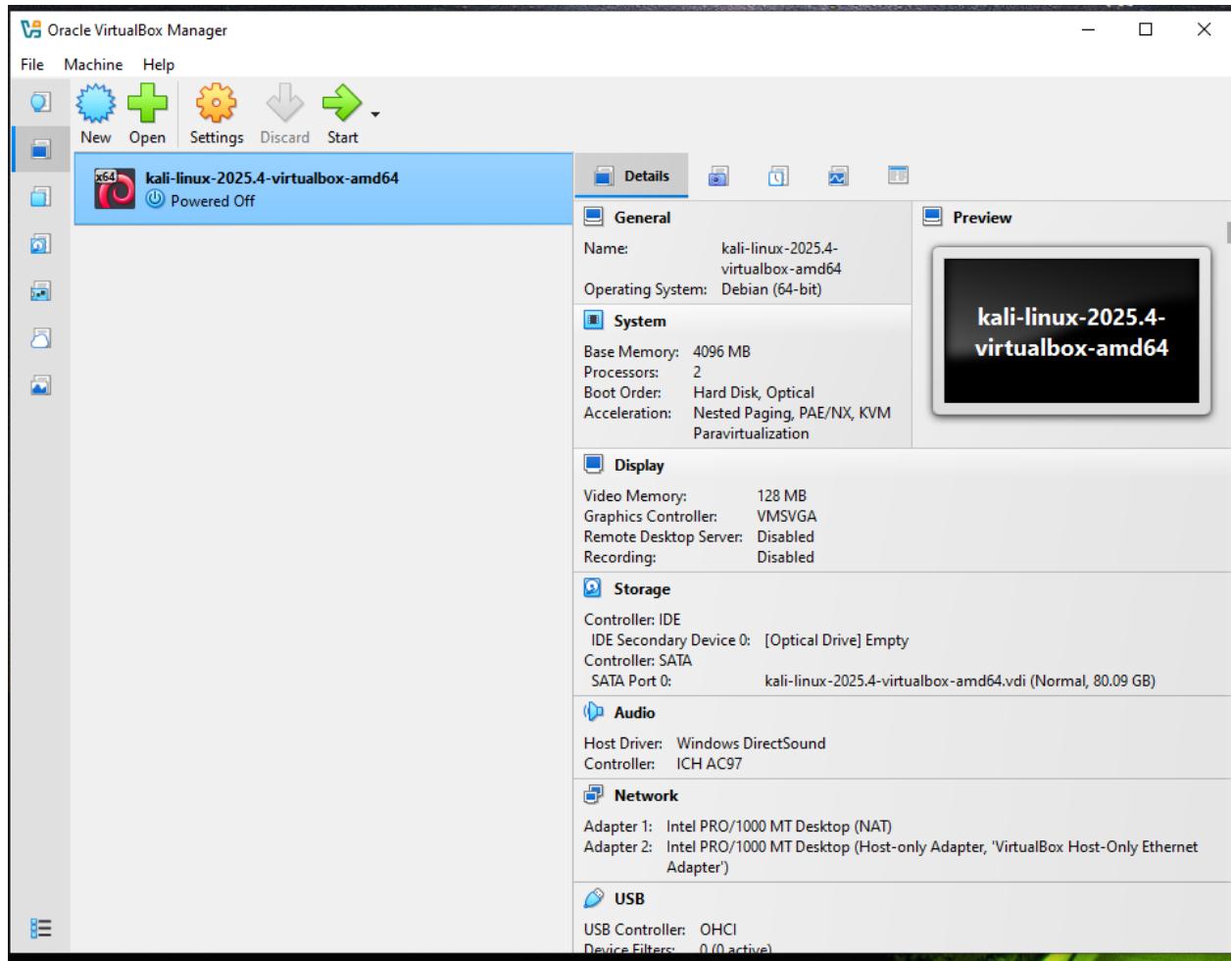
Two network adapters were configured for the Kali Linux environment:

1. **Adapter 1 – NAT:** Provides internet connectivity for downloading tools and security updates.
2. **Adapter 2 – Host-Only:** Creates a private "sandbox" network. This ensures that any exploits or scans are restricted to the virtual environment and cannot reach the local home network.

7. Step-by-Step Implementation

- **Step 1: VirtualBox Installation** – Installed the hypervisor and configured the "VirtualBox Host-Only Ethernet Adapter."

- **Step 2: Kali Linux Deployment** – Imported the Kali Linux .ova file, assigned 2 CPU cores and 4GB RAM, and attached both network adapters.



- **Step 3: Vulnerable Application Setup** – Deployed the target environment (DVWA) via a standalone VM .
- **Step 4: IP Verification** – Used ifconfig (or ip a) on both machines to ensure they were on the same Host-Only subnet.

```
kali@kali: ~
__(kali㉿kali)-[~]
└$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
      inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fd17:625c:f037:2:c477:300d:1bc4:c96  prefixlen 64  scopeid 0x0<br>
global>
      inet6 fe80::4a9c:4423:50cb:eb8b  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:63:b0:05  txqueuelen 1000  (Ethernet)
          RX packets 9  bytes 4203 (4.1 KiB)
          RX errors 0  dropped 0  overruns 0  frame 0
          TX packets 30  bytes 5511 (5.3 KiB)
          TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
      inet 192.168.56.101  netmask 255.255.255.0  broadcast 192.168.56.255
        inet6 fe80::daea:4668:19f4:108  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:14:5e:b2  txqueuelen 1000  (Ethernet)
          RX packets 7  bytes 950 (950.0 B)
          RX errors 0  dropped 0  overruns 0  frame 0
          TX packets 29  bytes 4684 (4.5 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 1000  (Local Loopback)
            RX packets 8  bytes 480 (480.0 B)
            RX errors 0  dropped 0  overruns 0  frame 0
```

8. Validation & Testing

To confirm the lab was operational, the following tests were conducted:

- **Connectivity:** Pinged the target machine from Kali Linux.

```
To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
No mail.
msfadmin@metasploitable:~$ ifconfig
eth0      Link encap:Ethernet HWaddr 08:00:27:c4:5c:c9
          inet addr:10.196.252.24  Bcast:10.196.252.255  Mask:255.255.255.0
            inet6 addr: 2402:3a80:806:cb27:a00:27ff:fea4:5cc9/64 Scope:Global
              inet6 addr: fe80::a00:27ff:fea4:5cc9/64 Scope:Link
                UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
                RX packets:43 errors:0 dropped:0 overruns:0 frame:0
                TX packets:69 errors:0 dropped:0 overruns:0 carrier:0
                collisions:0 txqueuelen:1000
                RX bytes:4628 (4.5 KB)  TX bytes:7178 (7.0 KB)
                Base address:0xd020  Memory:f0200000-f0220000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
            inet6 addr: ::1/128 Scope:Host
              UP LOOPBACK RUNNING  MTU:16436  Metric:1
              RX packets:91 errors:0 dropped:0 overruns:0 frame:0
              TX packets:91 errors:0 dropped:0 overruns:0 carrier:0
              collisions:0 txqueuelen:0
              RX bytes:19301 (18.8 KB)  TX bytes:19301 (18.8 KB)

msfadmin@metasploitable:~$
```

- **Reconnaissance:** Performed a basic nmap scan against the target IP.

The image shows two terminal windows side-by-side, both titled "Session Actions Edit View Help". The top window has a title bar "kali@kali: ~". It displays the command "\$ nmap -sn 10.196.252.24/24" followed by the output of an Nmap scan. The output shows 256 hosts up, with latency ranging from 0.0014s to 1.0s. The bottom window also has a title bar "kali@kali: ~". It displays the command "Nmap scan report for 10.196.252.244" followed by the output of an Nmap scan. This scan also reports 256 hosts up, with latency ranging from 0.0014s to 0.0018s. Both scans were completed in 2.93 seconds.

```

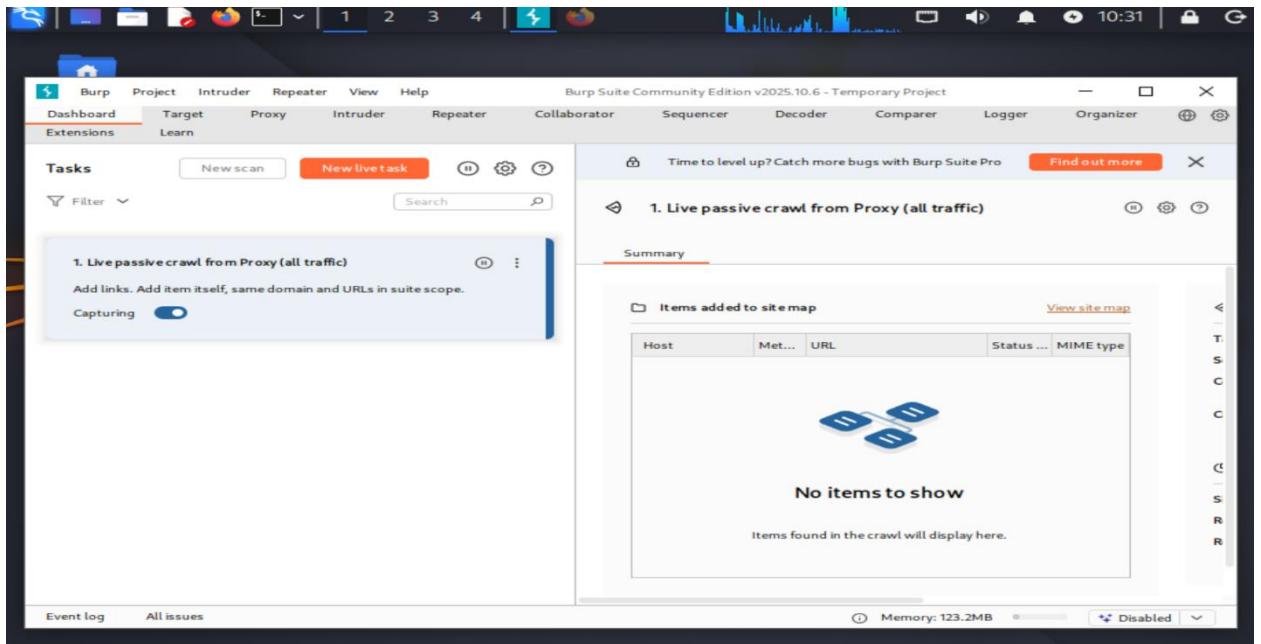
kali@kali: ~
Session Actions Edit View Help
└─(kali㉿kali)-[~]
$ nmap -sn 10.196.252.24/24
Starting Nmap 7.95 ( https://nmap.org ) at 2026-01-28 10:35 EST
Nmap scan report for 10.196.252.0
Host is up (0.0014s latency).
Nmap scan report for 10.196.252.1
Host is up (1.0s latency).
Nmap scan report for 10.196.252.2
Host is up (1.0s latency).
Nmap scan report for 10.196.252.3
Host is up (1.0s latency).
Nmap scan report for 10.196.252.4
Host is up (1.0s latency).
Nmap scan report for 10.196.252.5
Host is up (1.0s latency).
Nmap scan report for 10.196.252.6
Host is up (1.0s latency).
Nmap scan report for 10.196.252.7
Host is up (1.0s latency).
Nmap scan report for 10.196.252.8
Host is up (1.0s latency).
Nmap scan report for 10.196.252.9
Host is up (1.0s latency).
Nmap scan report for 10.196.252.10
Host is up (1.0s latency).
Nmap scan report for 10.196.252.11
Host is up (0.0014s latency).
Nmap scan report for 10.196.252.12

kali@kali: ~
Session Actions Edit View Help
Nmap scan report for 10.196.252.244
Host is up (0.0018s latency).
Nmap scan report for 10.196.252.245
Host is up (0.0017s latency).
Nmap scan report for 10.196.252.246
Host is up (0.0017s latency).
Nmap scan report for 10.196.252.247
Host is up (0.0016s latency).
Nmap scan report for 10.196.252.248
Host is up (0.0016s latency).
Nmap scan report for 10.196.252.249
Host is up (0.0016s latency).
Nmap scan report for 10.196.252.250
Host is up (0.0016s latency).
Nmap scan report for 10.196.252.251
Host is up (0.0015s latency).
Nmap scan report for 10.196.252.252
Host is up (0.0015s latency).
Nmap scan report for 10.196.252.253
Host is up (0.0015s latency).
Nmap scan report for 10.196.252.254
Host is up (0.0014s latency).
Nmap scan report for 10.196.252.255
Host is up (0.0014s latency).
Nmap done: 256 IP addresses (256 hosts up) scanned in 2.93 seconds

└─(kali㉿kali)-[~]
$ █

```

- **Interception:** Configured **Burp Suite** to capture traffic from the vulnerable web app.



- **Analysis:** Used **Wireshark** to monitor packet flow between the two machines.

9. Learning Outcomes

- Mastered **Virtual Machine** deployment and resource allocation.
- Understood the critical difference between **NAT** and **Host-Only** networking.
- Learned how to deploy and manage **vulnerable testing environments**.
- Gained hands-on experience in **basic reconnaissance** and environment hardening.

10. Conclusion

This task successfully established a functional and safe personal cybersecurity lab. The setup provides a robust platform for ethical hacking practice without risks to production systems. This environment serves as the foundation for all future penetration testing tasks in this internship.

11. References

- [VirtualBox Official Documentation](#)
- [Kali Linux Documentation](#)
- [OWASP Juice Shop Project](#)
- [Damn Vulnerable Web Application \(DVWA\)](#)