DEYINDE-PHILLIPS QUEEN OLUWAFADEKEMI

CYBERSECURITY DSA SQUAD 1

Report on Building a Fully Functional Cybersecurity Lab Using Kali Linux and Windows 7 on VirtualBox

Introduction

The purpose of this report is to document the process and outcome of creating a virtualized cybersecurity lab environment using Oracle VirtualBox. The lab consists of Kali Linux, used for penetration testing and ethical hacking tasks, and Windows 7, used as a vulnerable target machine for simulation and exploitation. This setup provides a safe, isolated, and reproducible platform to practice cybersecurity skills, perform malware analysis, and simulate attack-defense scenarios.

Objectives

- To build a virtual lab environment suitable for cybersecurity training and testing.
- To install and configure Kali Linux as the attacker machine.
- To install and configure Windows 7 as the target machine.
- To ensure both virtual machines (VMs) can communicate for attack simulation.
- To document installation steps, configurations, and key settings.

Tools and Resources Used

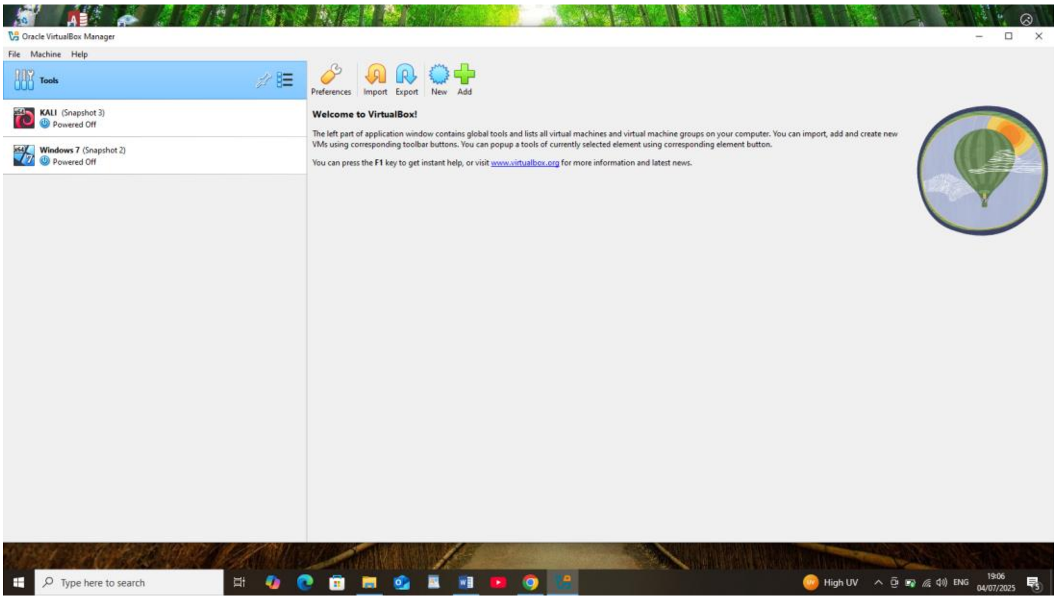
- **Host Machine OS:** Windows 10 (64-bit)
- **Virtualization Software:** Oracle VirtualBox 7.x
- **Guest Operating Systems:**
    - Kali Linux (Latest ISO image from https://www.kali.org)
    - Windows 7 Ultimate ISO (64-bit)
- **Network Configuration:** Host-only Adapter / Internal Network
- **RAM Allocation:**

    - Kali Linux: 1 GB
    - Windows 7: 1 GB
- **Disk Allocation:**
    - Kali Linux: 20 GB (Dynamic)
    - Windows 7: 20 GB (Dynamic)

Lab Setup Process

4.1 Installation of VirtualBox

- Downloaded and installed VirtualBox from the official website.

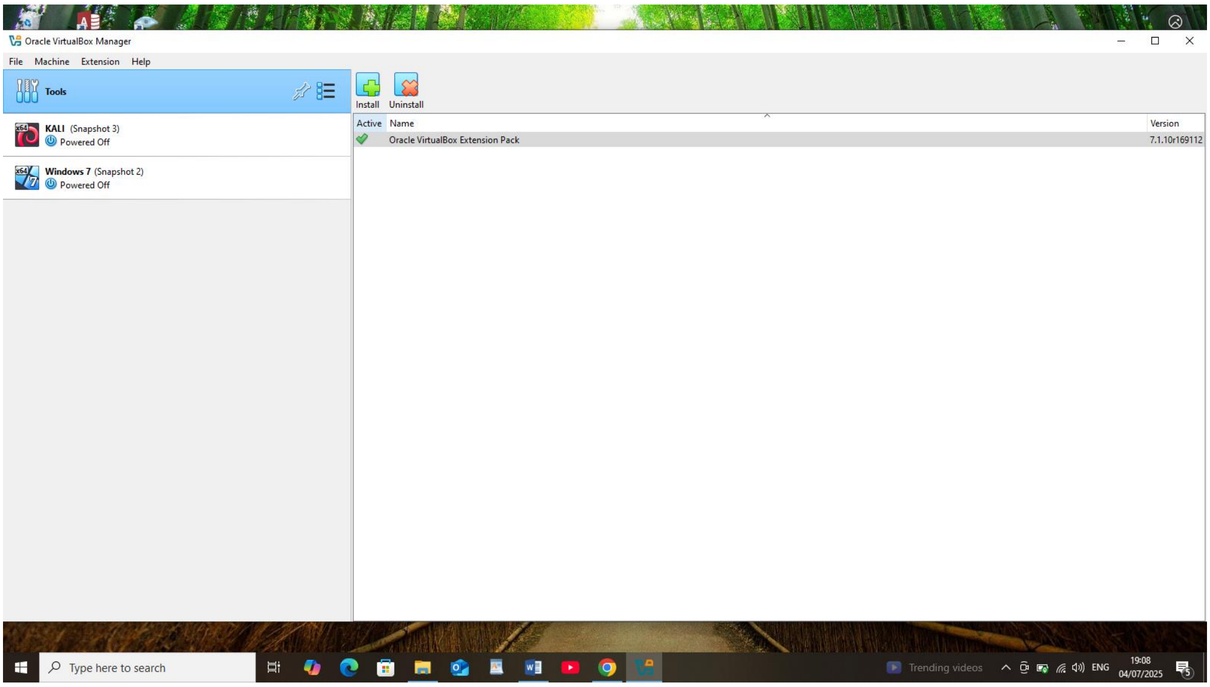


Welcome to VirtualBox!

The left part of application window contains global tools and lists all virtual machines and virtual machine groups on your computer. You can import, add and create new VMs using corresponding toolbar buttons. You can popup a tools of currently selected element using corresponding element button.

You can press the **F1** key to get instant help, or visit www.virtualbox.org for more information and latest news.

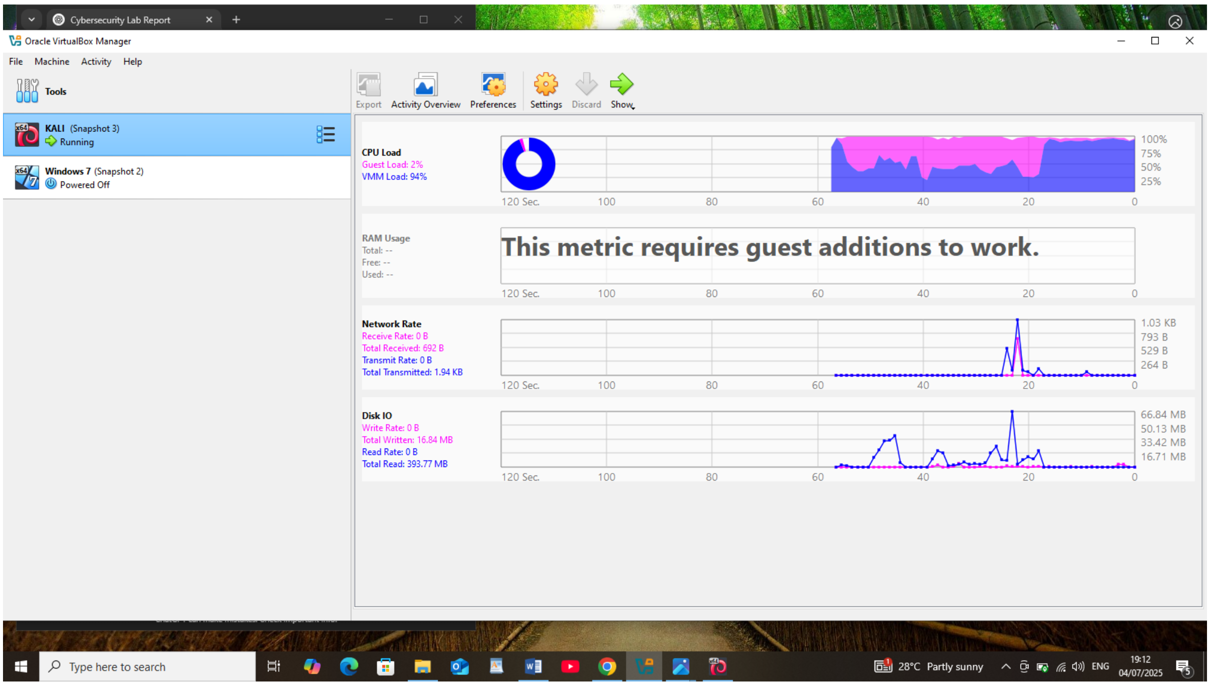
- Installed VirtualBox Extension Pack for USB and RDP support.



Active	Name	Version
✓	Oracle VirtualBox Extension Pack	7.1.10r169112

Creating Kali Linux Virtual Machine

- Created a new VM for Kali Linux with 2 GB RAM and 20 GB storage.



Cybersecurity Lab Report
Oracle VirtualBox Manager
File Machine Activity Help
Tools
Export Activity Overview Preferences Settings Discard Show
120 Sec. 100 80 60 40 20 0
100% 75% 50% 25%
1.03 KB 793 B 529 B 264 B
66.84 MB 50.13 MB 33.42 MB 16.71 MB
Type here to search
28°C Partly sunny ENG 19:12 04/07/2025

KALI (Snapshot 3)
Running

Windows 7 (Snapshot 2)
Powered Off

CPU Load
Guest Load: 2%
VMM Load: 94%

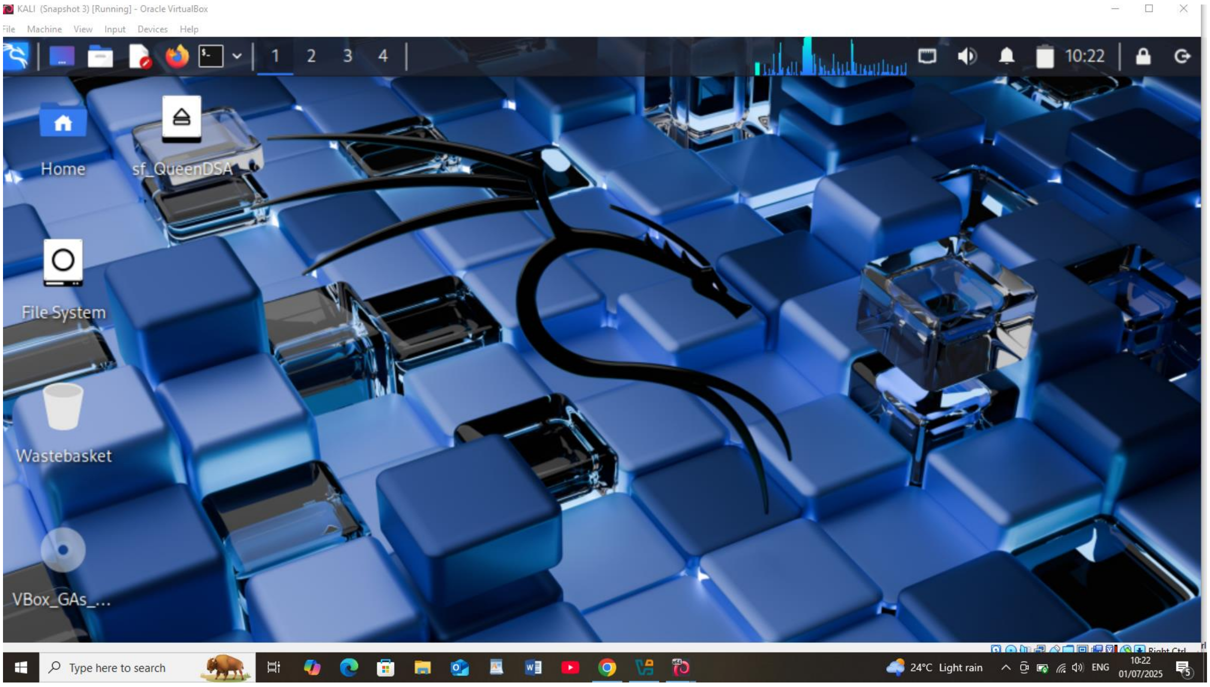
RAM Usage
Total: --
Free: --
Used: --

This metric requires guest additions to work.

Network Rate
Receive Rate: 0 B
Total Received: 692 B
Transmit Rate: 0 B
Total Transmitted: 1.94 KB

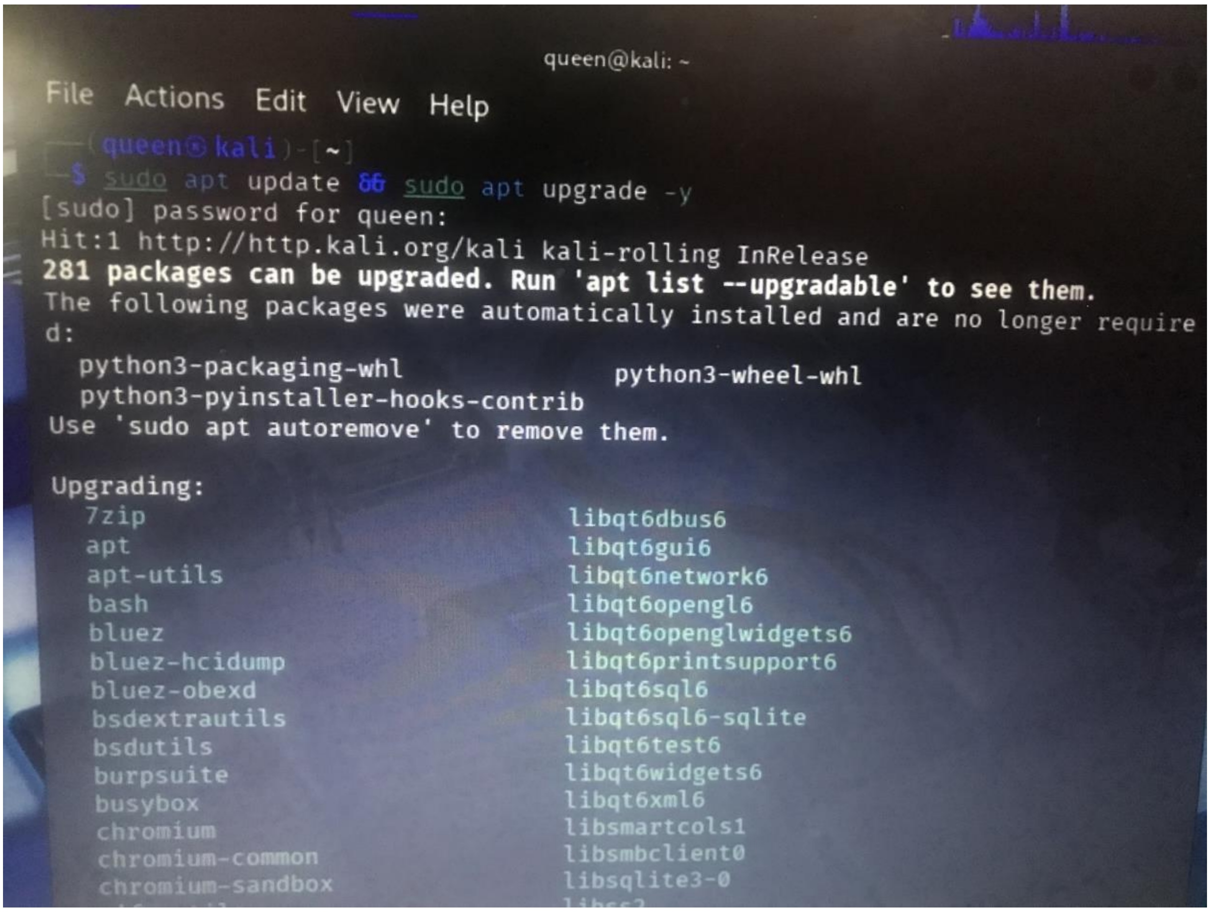
Disk IO
Write Rate: 0 B
Total Written: 16.84 MB
Read Rate: 0 B
Total Read: 393.77 MB

- Mounted Kali ISO and installed the OS.



KALI (Snapshot 3) [Running] - Oracle VirtualBox
File Machine View Input Devices Help
1 2 3 4
10:22
Home
sf_QueenDSA
File System
Wastebasket
VBox_GAs_...
Right Ctrl
Type here to search
24°C Light rain ENG 10:22 01/07/2025

- Installed VirtualBox Guest Additions for better performance.



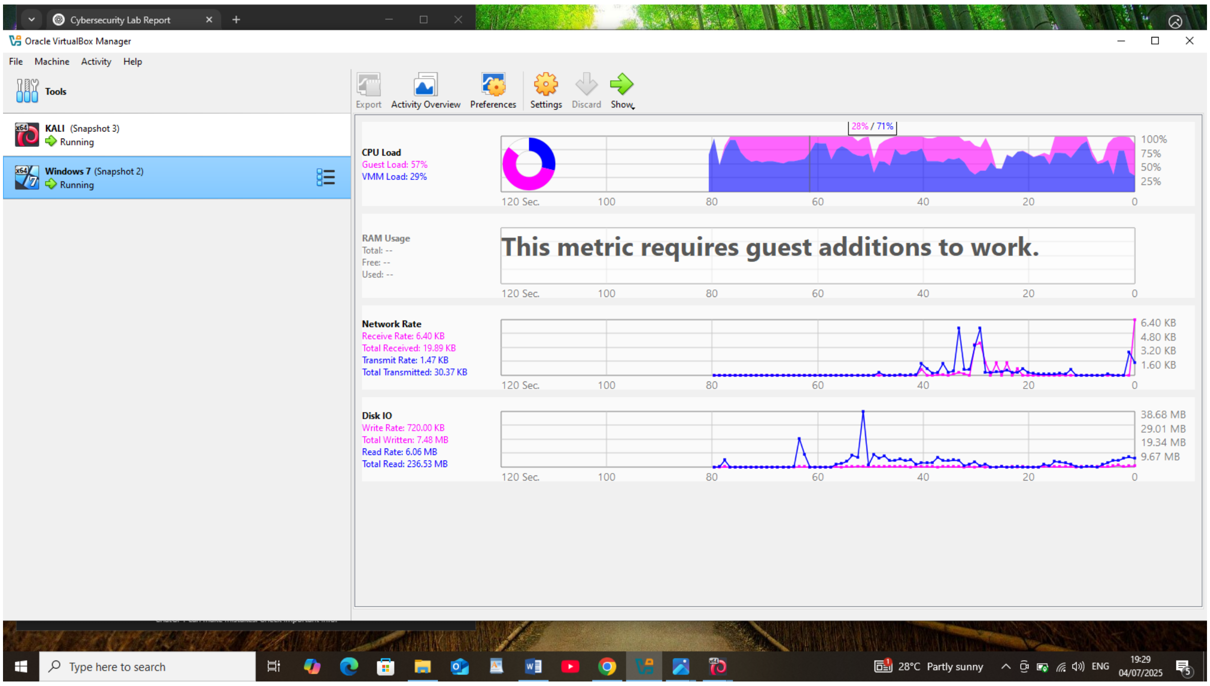
```
┌──(queen㉿kali)-[~]
└─$ sudo apt update && sudo apt upgrade -y
[sudo] password for queen:
Hit:1 http://http.kali.org/kali kali-rolling InRelease
281 packages can be upgraded. Run 'apt list --upgradable' to see them.
The following packages were automatically installed and are no longer require
d:
  python3-packaging-whl                python3-wheel-whl
  python3-pyinstaller-hooks-contrib
Use 'sudo apt autoremove' to remove them.

Upgrading:
  7zip                                 libqt6dbus6
  apt                                  libqt6gui6
  apt-utils                            libqt6network6
  bash                                 libqt6opengl6
  bluez                                libqt6openglwidgets6
  bluez-hcidump                        libqt6printsupport6
  bluez-obexd                          libqt6sql6
  bsdextrautils                        libqt6sql6-sqlite
  bsdutils                             libqt6test6
  burpsuite                            libqt6widgets6
  busybox                              libqt6xml6
  chromium                             libsmartcols1
  chromium-common                      libsmbclient0
  chromium-sandbox                     libsqlite3-0
```

- Updated system packages using sudo apt update && sudo apt upgrade.

Creating Windows 7 Virtual Machine

- Created a VM with 1 GB RAM and 25 GB storage



CPU Load
Guest Load: 57%
VMM Load: 29%

RAM Usage
Total: --
Free: --
Used: --

This metric requires guest additions to work.

Network Rate
Receive Rate: 6.40 KB
Total Received: 19.89 KB
Transmit Rate: 1.47 KB
Total Transmitted: 30.37 KB

Disk IO
Write Rate: 720.00 KB
Total Written: 7.48 MB
Read Rate: 6.06 MB
Total Read: 236.53 MB

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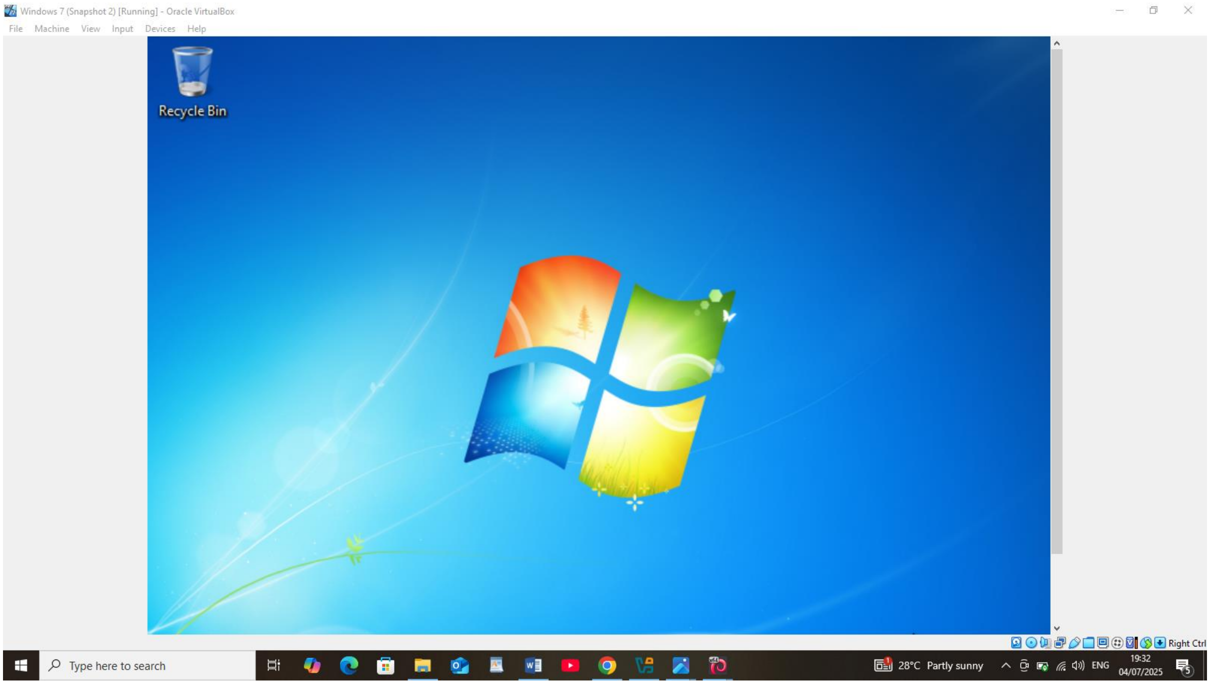
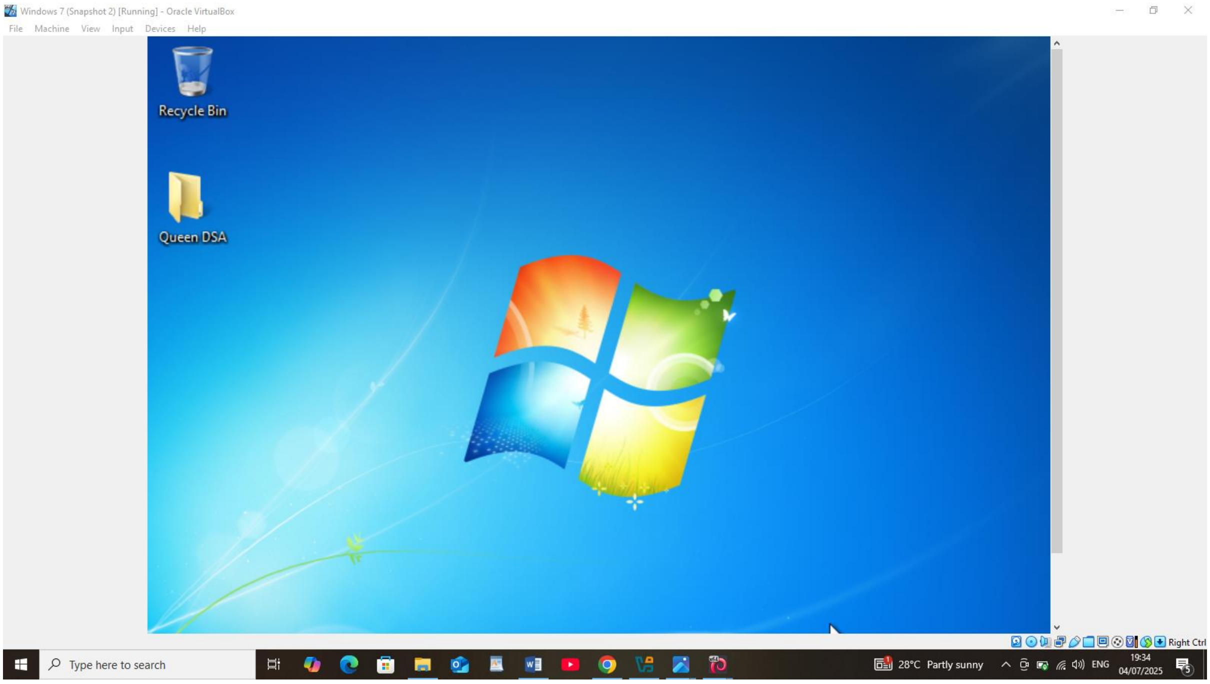
- Mounted Windows 7 ISO and installed the OS

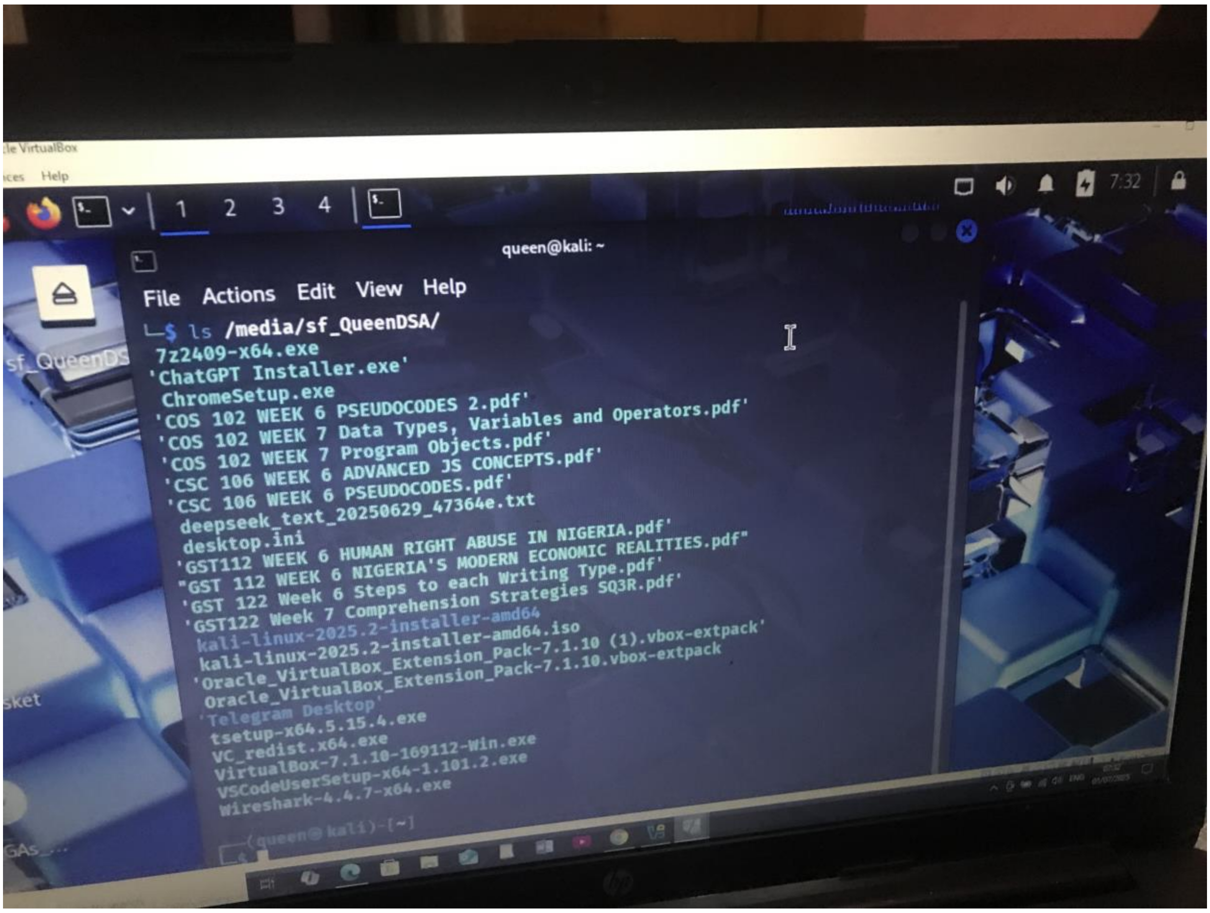


Windows 7 (Snapshot 2) [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Recycle Bin
Right Ctrl
Type here to search
28°C Partly sunny
ENG
19:32
04/07/2025

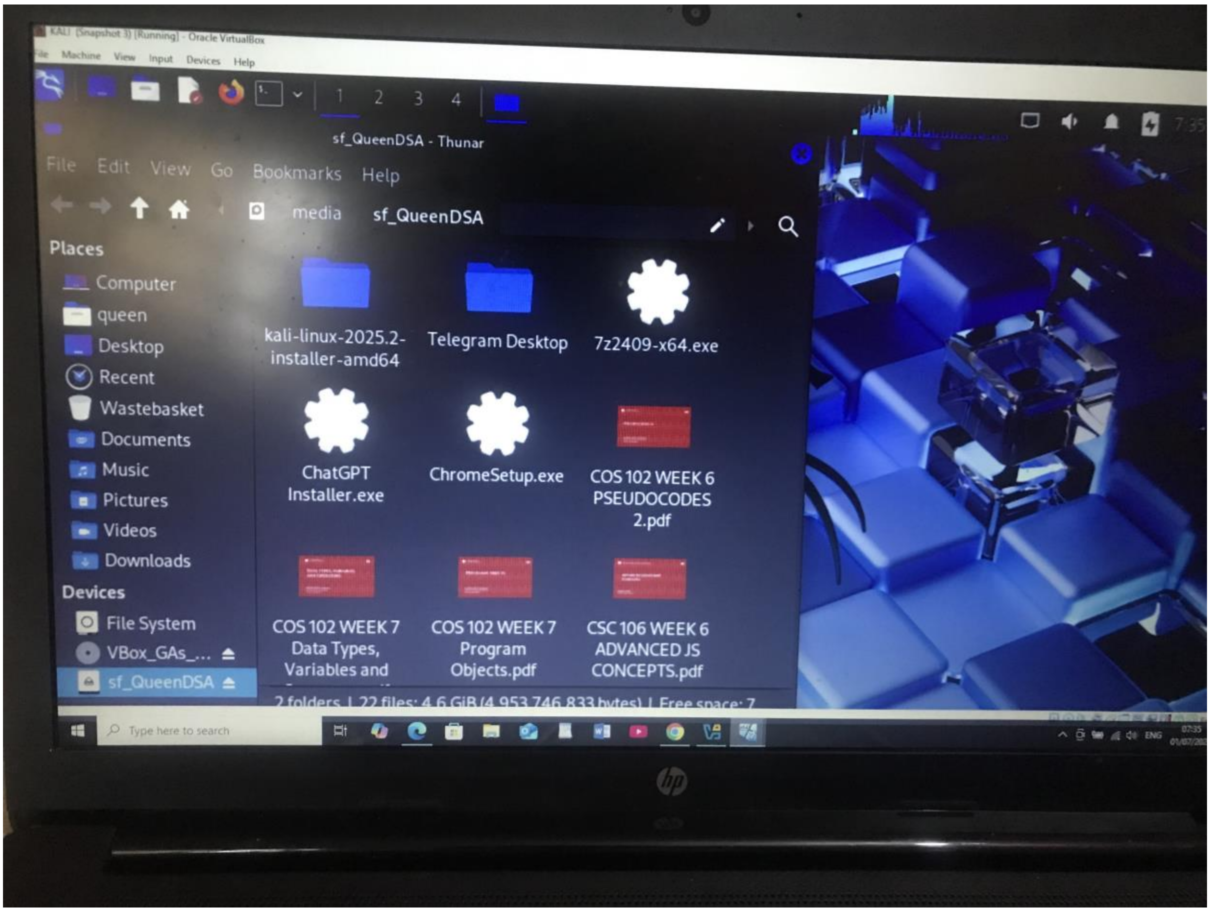
..

- Enabled file sharing


Windows 7 (Snapshot 2) [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Recycle Bin
Queen DSA
Right Ctrl
Type here to search
28°C Partly sunny
ENG
19:34
04/07/2025



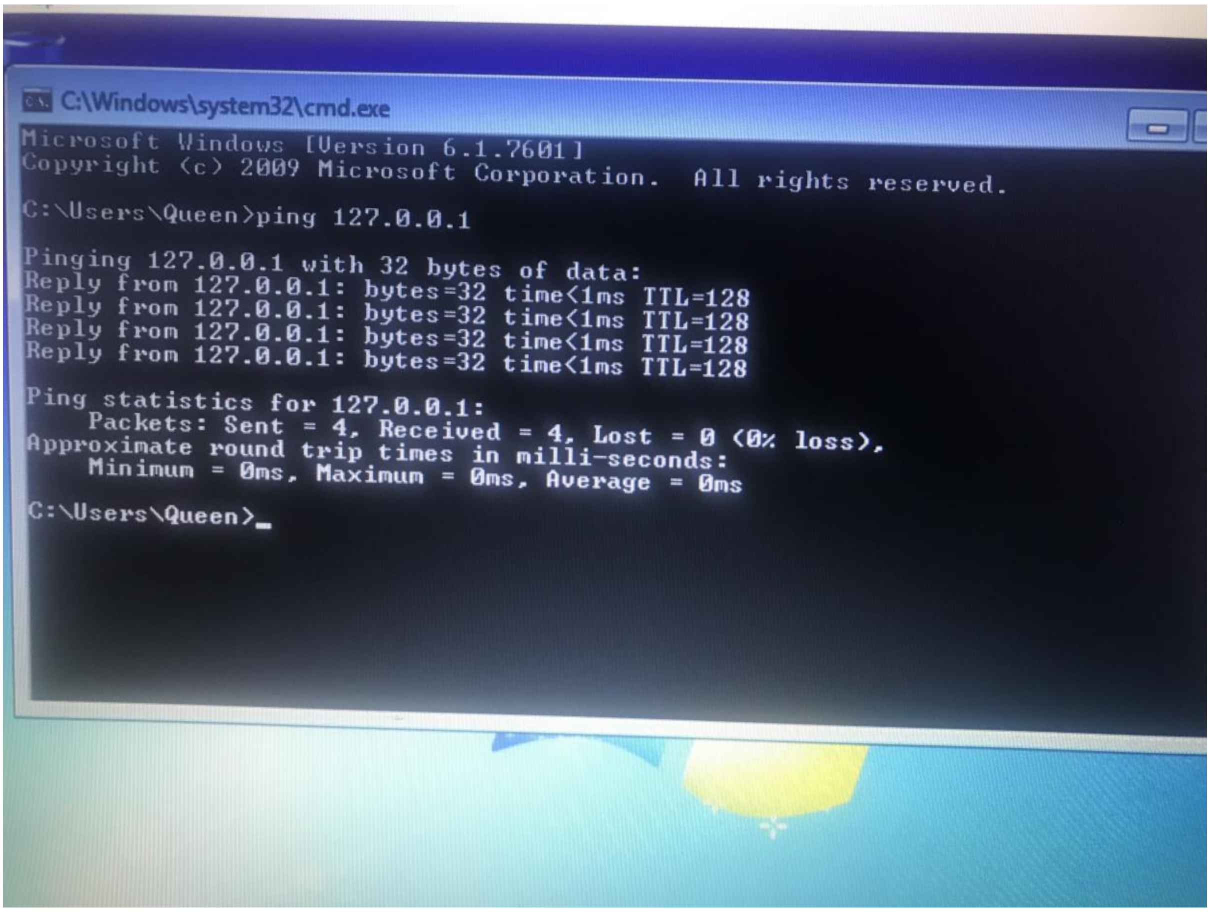
```
└─$ ls /media/sf_QueenDSA/
 7z2409-x64.exe
'ChatGPT Installer.exe'
 ChromeSetup.exe
'COS 102 WEEK 6 PSEUDOCODES 2.pdf'
'COS 102 WEEK 7 Data Types, Variables and Operators.pdf'
'COS 102 WEEK 7 Program Objects.pdf'
'CSC 106 WEEK 6 ADVANCED JS CONCEPTS.pdf'
'CSC 106 WEEK 6 PSEUDOCODES.pdf'
 deepseek_text_20250629_47364e.txt
 desktop.ini
'GST112 WEEK 6 HUMAN RIGHT ABUSE IN NIGERIA.pdf'
"GST 112 WEEK 6 NIGERIA'S MODERN ECONOMIC REALITIES.pdf"
'GST 122 Week 6 Steps to each Writing Type.pdf'
'GST122 Week 7 Comprehension Strategies SQ3R.pdf'
 kali-linux-2025.2-installer-amd64
 kali-linux-2025.2-installer-amd64.iso
'Oracle_VirtualBox_Extension_Pack-7.1.10 (1).vbox-extpack'
 Oracle_VirtualBox_Extension_Pack-7.1.10.vbox-extpack
'Telegram Desktop'
 tsetup-x64.5.15.4.exe
 VC_redist.x64.exe
 VirtualBox-7.1.10-169112-Win.exe
 VSCodeUserSetup-x64-1.101.2.exe
 Wireshark-4.4.7-x64.exe

┌──(queen㉿kali)-[~]
└─$
```


KALI (Snapshot 3) [Running] - Oracle VirtualBox
File Machine View Input Devices Help
1 2 3 4
sf_QueenDSA - Thunar
File Edit View Go Bookmarks Help
media sf_QueenDSA
Places
Computer
queen
Desktop
Recent
Wastebasket
Documents
Music
Pictures
Videos
Downloads
Devices
File System
VBox_GAs_...
sf_QueenDSA
kali-linux-2025.2-installer-amd64
Telegram Desktop
7z2409-x64.exe
ChatGPT Installer.exe
ChromeSetup.exe
COS 102 WEEK 6 PSEUDOCODES 2.pdf
COS 102 WEEK 7 Data Types, Variables and
COS 102 WEEK 7 Program Objects.pdf
CSC 106 WEEK 6 ADVANCED JS CONCEPTS.pdf
Type here to search
ENG

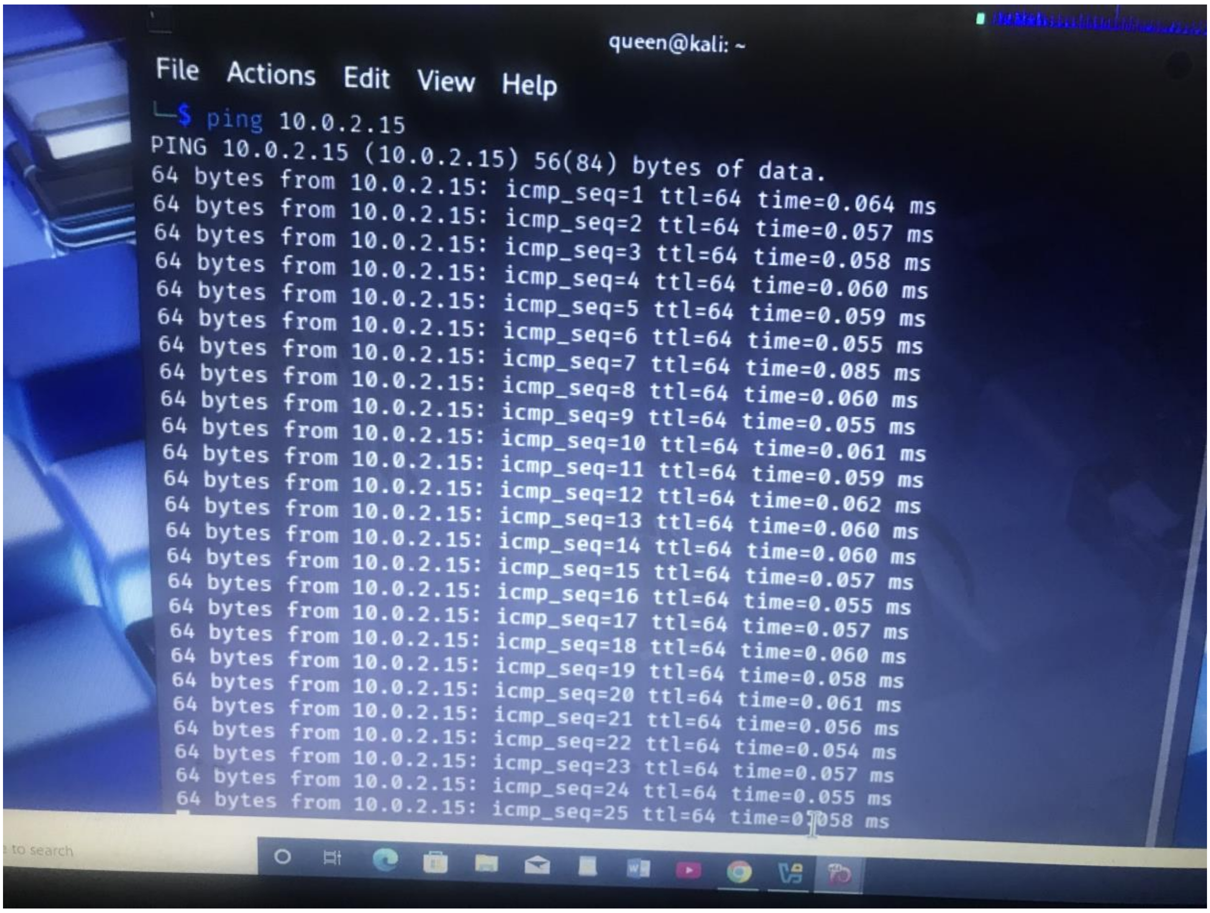
```
2 folders | 22 files: 4.6 GiB (4 953 746 833 bytes) | Free space: 7
```

Network Configuration

- **Selected "Host-only Adapter"** for both VMs to ensure communication within the virtual environment and prevent access to the external internet.
- Verified connectivity using `ping` commands from both VMs.



```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Queen>ping 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\Queen>_
```

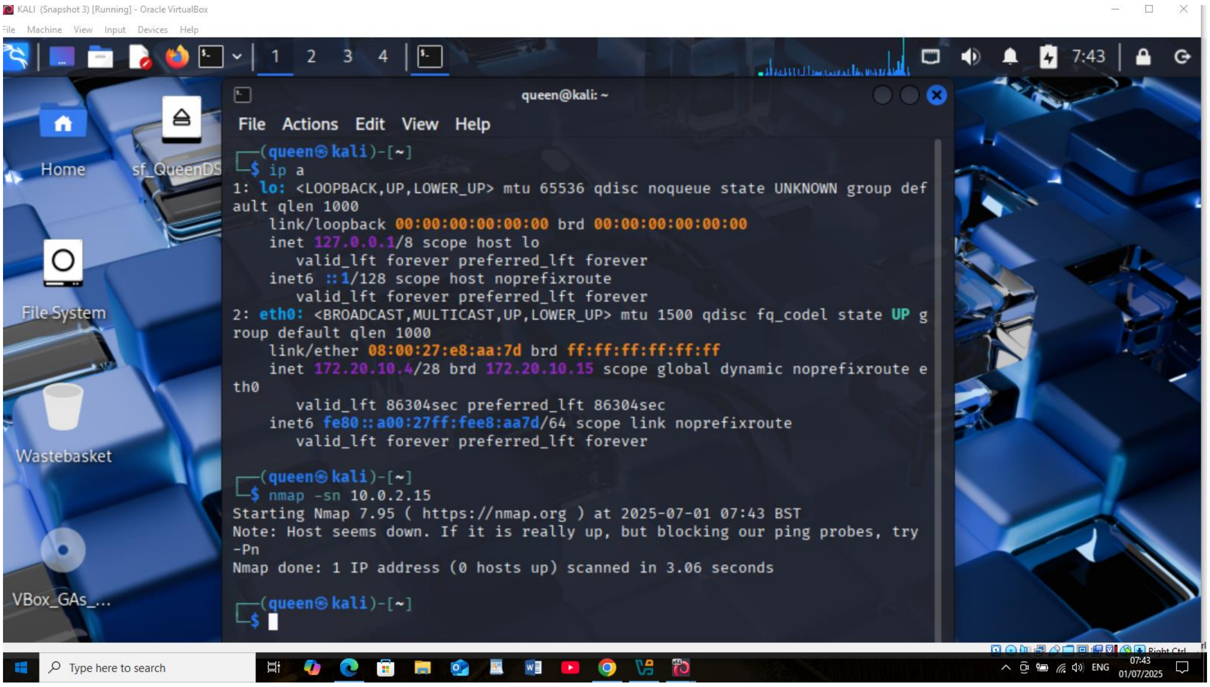


```
└─$ ping 10.0.2.15
PING 10.0.2.15 (10.0.2.15) 56(84) bytes of data.
64 bytes from 10.0.2.15: icmp_seq=1 ttl=64 time=0.064 ms
64 bytes from 10.0.2.15: icmp_seq=2 ttl=64 time=0.057 ms
64 bytes from 10.0.2.15: icmp_seq=3 ttl=64 time=0.058 ms
64 bytes from 10.0.2.15: icmp_seq=4 ttl=64 time=0.060 ms
64 bytes from 10.0.2.15: icmp_seq=5 ttl=64 time=0.059 ms
64 bytes from 10.0.2.15: icmp_seq=6 ttl=64 time=0.055 ms
64 bytes from 10.0.2.15: icmp_seq=7 ttl=64 time=0.085 ms
64 bytes from 10.0.2.15: icmp_seq=8 ttl=64 time=0.060 ms
64 bytes from 10.0.2.15: icmp_seq=9 ttl=64 time=0.055 ms
64 bytes from 10.0.2.15: icmp_seq=10 ttl=64 time=0.061 ms
64 bytes from 10.0.2.15: icmp_seq=11 ttl=64 time=0.059 ms
64 bytes from 10.0.2.15: icmp_seq=12 ttl=64 time=0.062 ms
64 bytes from 10.0.2.15: icmp_seq=13 ttl=64 time=0.060 ms
64 bytes from 10.0.2.15: icmp_seq=14 ttl=64 time=0.060 ms
64 bytes from 10.0.2.15: icmp_seq=15 ttl=64 time=0.057 ms
64 bytes from 10.0.2.15: icmp_seq=16 ttl=64 time=0.055 ms
64 bytes from 10.0.2.15: icmp_seq=17 ttl=64 time=0.057 ms
64 bytes from 10.0.2.15: icmp_seq=18 ttl=64 time=0.060 ms
64 bytes from 10.0.2.15: icmp_seq=19 ttl=64 time=0.058 ms
64 bytes from 10.0.2.15: icmp_seq=20 ttl=64 time=0.061 ms
64 bytes from 10.0.2.15: icmp_seq=21 ttl=64 time=0.056 ms
64 bytes from 10.0.2.15: icmp_seq=22 ttl=64 time=0.054 ms
64 bytes from 10.0.2.15: icmp_seq=23 ttl=64 time=0.057 ms
64 bytes from 10.0.2.15: icmp_seq=24 ttl=64 time=0.055 ms
64 bytes from 10.0.2.15: icmp_seq=25 ttl=64 time=0.058 ms
```

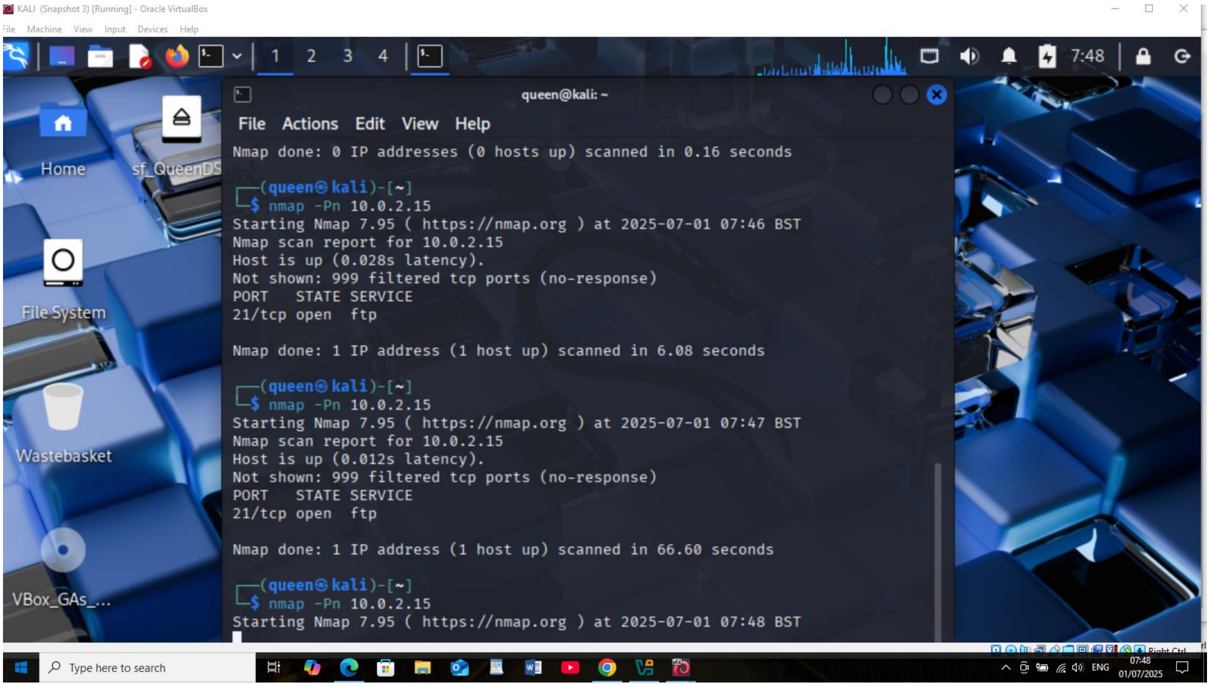
- Assigned static IPs to maintain consistent targeting in attack scenarios.

Testing the Lab Setup

- From Kali Linux, performed a basic network scan using `nmap`:


KALI (Snapshot 3) [Running] - Oracle VirtualBox
File Machine View Input Devices Help
7:43
queen@kali: ~
File Actions Edit View Help
Home
sf_QueenDS
File System
Wastebasket
VBox_GAs_...
Type here to search
ENG
07:43
01/07/2025

```
┌──(queen㉿kali)-[~]
└─$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group def
ault qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
roup default qlen 1000
    link/ether 08:00:27:e8:aa:7d brd ff:ff:ff:ff:ff:ff
    inet 172.20.10.4/28 brd 172.20.10.15 scope global dynamic noprefixroute e
th0
       valid_lft 86304sec preferred_lft 86304sec
    inet6 fe80::a00:27ff:fee8:aa7d/64 scope link noprefixroute
       valid_lft forever preferred_lft forever

┌──(queen㉿kali)-[~]
└─$ nmap -sn 10.0.2.15
Starting Nmap 7.95 ( https://nmap.org ) at 2025-07-01 07:43 BST
Note: Host seems down. If it is really up, but blocking our ping probes, try
-Pn
Nmap done: 1 IP address (0 hosts up) scanned in 3.06 seconds

┌──(queen㉿kali)-[~]
└─$ █
```


KALI (Snapshot 3) [Running] - Oracle VirtualBox
File Machine View Input Devices Help
7:48
queen@kali: ~
File Actions Edit View Help
Home
sf_QueenDS
File System
Wastebasket
VBox_GAs_...
Type here to search
ENG
07:48
01/07/2025

```
Nmap done: 0 IP addresses (0 hosts up) scanned in 0.16 seconds

┌──(queen㉿kali)-[~]
└─$ nmap -Pn 10.0.2.15
Starting Nmap 7.95 ( https://nmap.org ) at 2025-07-01 07:46 BST
Nmap scan report for 10.0.2.15
Host is up (0.028s latency).
Not shown: 999 filtered tcp ports (no-response)
PORT   STATE SERVICE
21/tcp open  ftp

Nmap done: 1 IP address (1 host up) scanned in 6.08 seconds

┌──(queen㉿kali)-[~]
└─$ nmap -Pn 10.0.2.15
Starting Nmap 7.95 ( https://nmap.org ) at 2025-07-01 07:47 BST
Nmap scan report for 10.0.2.15
Host is up (0.012s latency).
Not shown: 999 filtered tcp ports (no-response)
PORT   STATE SERVICE
21/tcp open  ftp

Nmap done: 1 IP address (1 host up) scanned in 66.60 seconds

┌──(queen㉿kali)-[~]
└─$ nmap -Pn 10.0.2.15
Starting Nmap 7.95 ( https://nmap.org ) at 2025-07-01 07:48 BST
█
```

- Detected Windows 7 machine successfully.
- Simulated attacks such as port scanning, enumeration, and vulnerability assessment.
- Confirmed that the Kali VM tools like Metasploit and Wireshark worked as expected.

Conclusion

A fully functional cybersecurity lab was successfully built using VirtualBox, Kali Linux, and Windows 7. This lab provides a flexible and secure environment to practice ethical hacking, vulnerability scanning, and system hardening. The configuration can be extended to include more machines or integrate tools like pfSense, Ubuntu servers, or intentionally vulnerable applications (e.g., DVWA, Metasploitable).