Experiment 1: Network Reconnaissance & Footprinting

Scenario:

An organization, "TechSecure Corp," suspects that its internal LAN might contain devices with unpatched services. As an external consultant with limited initial knowledge, your first step is to gain intelligence about the network. You have been given a subnet range and must map out devices and open ports.

Tasks:

- Use Nmap for host discovery, port scanning, and service enumeration.
- Employ Recon-ng or Amass for passive reconnaissance to discover hostnames, subdomains, or metadata.
- Document identified hosts, operating systems, and running services.

Deliverable:

A network inventory report listing IP addresses, OS guesses, and active services.

Reconnaissance: Active vs Passive

- Active Reconnaissance involves directly interacting with the target system by sending packets or requests (e.g., Nmap scans). This helps discover live hosts, open ports, services, and OS but can alert the target system of the scan.
- Passive Reconnaissance involves gathering information without directly interacting with the target system (e.g., using tools like Amass or Recon-ng). This method relies on publicly available data like DNS records and websites and is less likely to be detected.

TASK:1

Active Reconnaissance with Nmap

Nmap (Network Mapper) is a free and beginner-friendly tool used to scan networks. It helps you find devices (hosts), check which ports are open, what services are running (like web or FTP servers), and even guess the operating system. It's widely used in cybersecurity for network discovery and vulnerability checks.

Metasploitable 2

In this experiment, we are using Metasploitable 2 as the target for active reconnaissance. Metasploitable 2 is a purposely vulnerable machine that provides a safe environment for practicing penetration testing and vulnerability scanning. Active reconnaissance helps us discover the live devices, open ports, services, and operating systems on the Metasploitable 2 machine.

Steps for Active Reconnaissance:

1.Host Discovery:

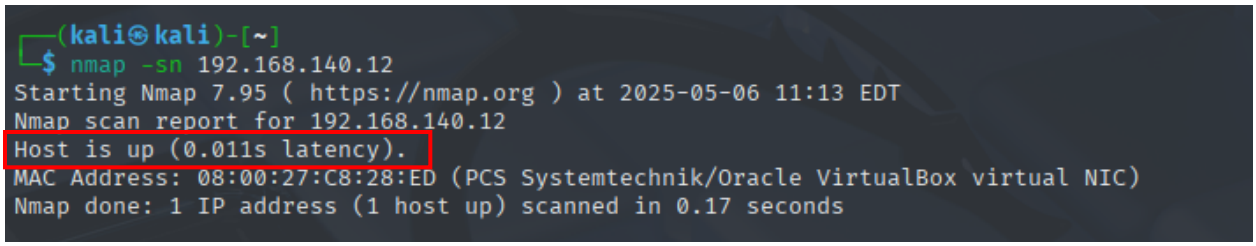
Command:

nmap -sn <metasploitable_IP>

-sn:

- Stands for Ping Scan (does not scan ports).
- It checks if a device is online without scanning ports.

Output:



2. Port Scanning:

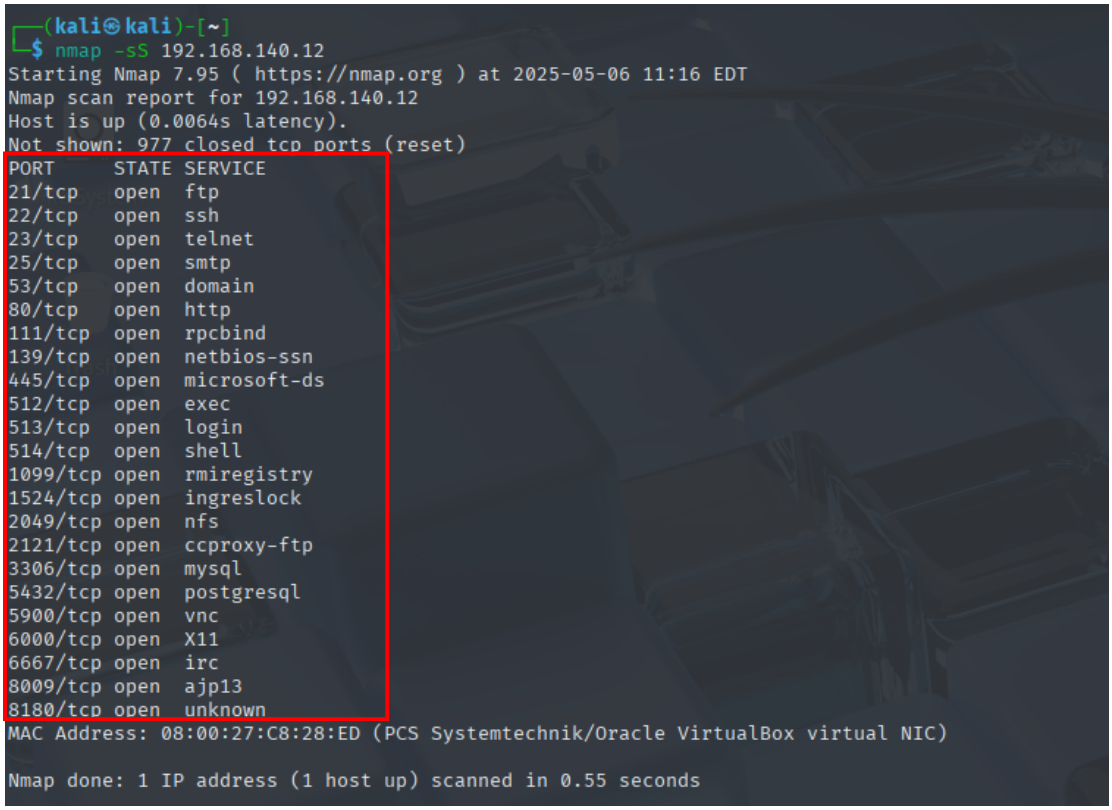
Command:

nmap -sS <metasploitable_IP>

-sS:

- Stands for SYN scan, also known as a half-open scan.
- It sends a request to check if a port is open without fully connecting, making it faster and harder to detect.

Output:



3. Service Enumeration:

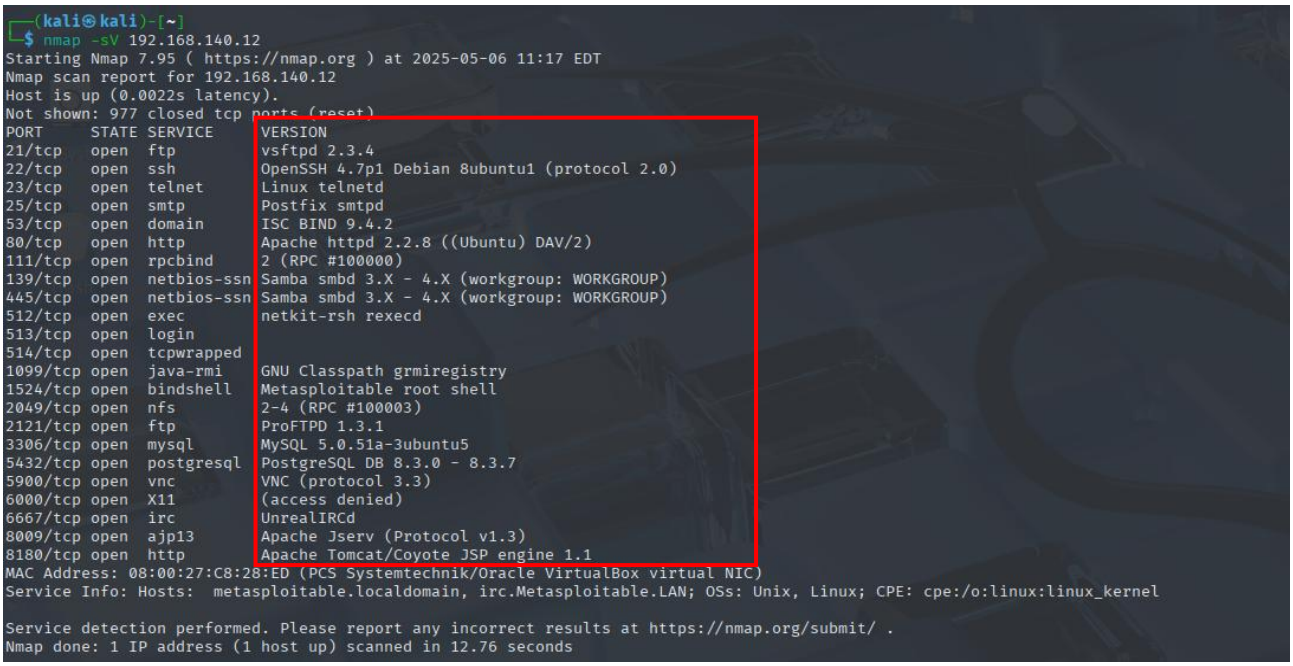
Command:

nmap -sV <metasploitable_IP>

-sV:

- Used for service version detection.
- Detects the versions of services running on open ports.

Output:



4. OS Detection:

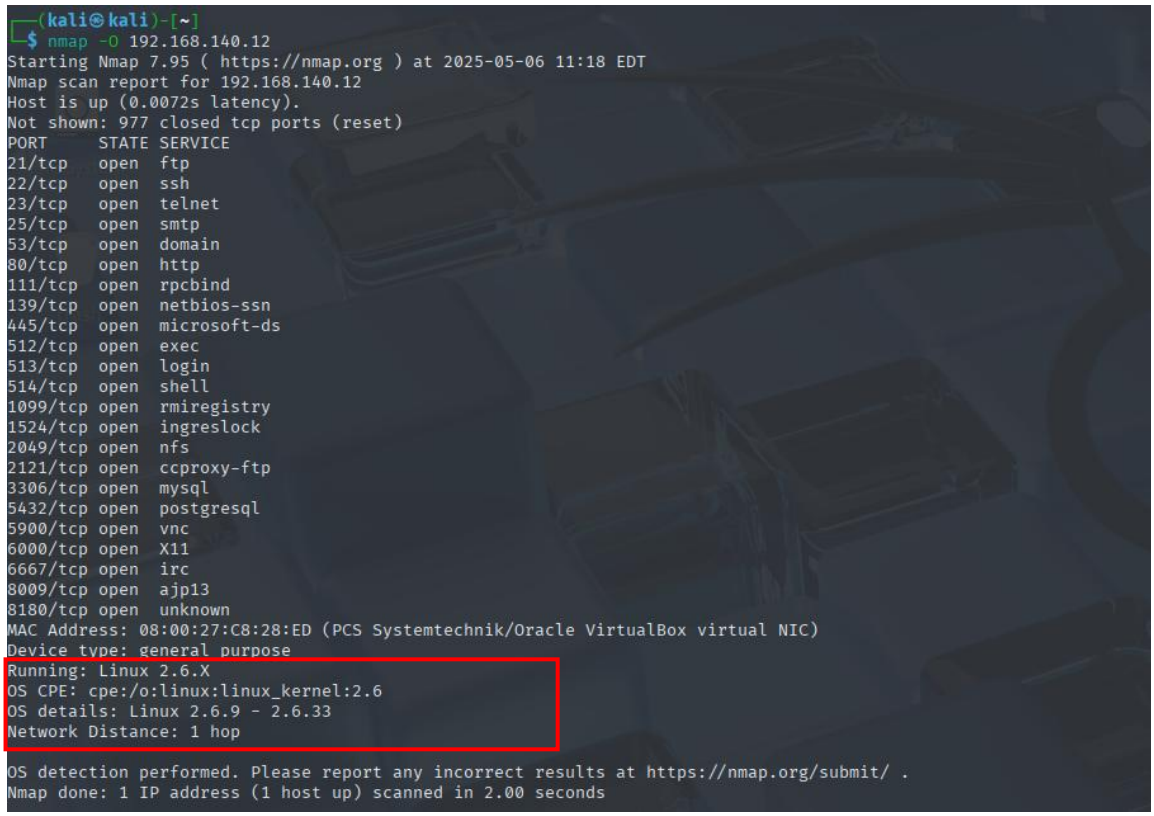
Command:

nmap -O <metasploitable_IP>

-O:

- Used to detect the operating system of the target machine.

Output:



TASK:2

Passive Reconnaissance with Amass

Amass is an open-source reconnaissance tool widely used in cybersecurity to discover subdomains, DNS records, and related metadata about a target domain. It performs passive information gathering by querying public sources such as search engines, SSL certificates, APIs, and DNS databases. Since it does not directly interact with the target system, it is stealthy and helps avoid detection. Amass is especially useful in the early stages of penetration testing, allowing security professionals and beginners to map the external structure of an organization's network safely.

In this task, we use Amass to discover:

- Hostnames
- Subdomains
- Metadata (like WHOIS, DNS records)

Command:

amass enum -passive -d demo.testfire.net

or

amass enum -d example.com

enum:

- Short for "enumerate" — it tells Amass to start finding subdomains.

-d example.com:

- The -d option means "domain", so you're telling Amass to search for subdomains of example.com.

Output:

```
┌──(kali㉿kali)-[~]
└─$ amass enum -passive -d demo.testfire.net
testfire.net (FQDN) --> a_record --> 65.61.137.117 (IPAddress)
testfire.net (FQDN) --> node --> demo.testfire.net (FQDN)
demo.testfire.net (FQDN) --> a_record --> 65.61.137.117 (IPAddress)
65.61.136.0/22 (Netblock) --> contains --> 65.61.137.117 (IPAddress)
33070 (ASN) --> managed_by --> RMH-14 - Rackspace Hosting (RIROrganization)
33070 (ASN) --> announces --> 65.61.136.0/22 (Netblock)

The enumeration has finished
```

```
┌──(kali㉿kali)-[~]
└─$ amass enum -d example.com
example.com (FQDN) --> ns_record --> a.iana-servers.net (FQDN)
example.com (FQDN) --> ns_record --> b.iana-servers.net (FQDN)
example.com (FQDN) --> a_record --> 23.215.0.136 (IPAddress)
example.com (FQDN) --> a_record --> 96.7.128.175 (IPAddress)
example.com (FQDN) --> a_record --> 96.7.128.198 (IPAddress)
example.com (FQDN) --> a_record --> 23.192.228.80 (IPAddress)
example.com (FQDN) --> a_record --> 23.192.228.84 (IPAddress)
example.com (FQDN) --> a_record --> 23.215.0.138 (IPAddress)
example.com (FQDN) --> aaaa_record --> 2600:1406:bc00:53::b81e:94ce (IPAddress)
example.com (FQDN) --> aaaa_record --> 2600:1408:ec00:36::1736:7f31 (IPAddress)
example.com (FQDN) --> aaaa_record --> 2600:1406:3a00:21::173e:2e65 (IPAddress)
example.com (FQDN) --> aaaa_record --> 2600:1406:3a00:21::173e:2e66 (IPAddress)
example.com (FQDN) --> aaaa_record --> 2600:1406:bc00:53::b81e:94c8 (IPAddress)
example.com (FQDN) --> aaaa_record --> 2600:1408:ec00:36::1736:7f24 (IPAddress)
b.iana-servers.net (FQDN) --> a_record --> 199.43.133.53 (IPAddress)
b.iana-servers.net (FQDN) --> aaaa_record --> 2001:500:8d::53 (IPAddress)
23.215.0.0/22 (Netblock) --> contains --> 23.215.0.136 (IPAddress)
23.215.0.0/22 (Netblock) --> contains --> 23.215.0.138 (IPAddress)
96.7.128.0/23 (Netblock) --> contains --> 96.7.128.175 (IPAddress)
96.7.128.0/23 (Netblock) --> contains --> 96.7.128.198 (IPAddress)
23.192.228.0/22 (Netblock) --> contains --> 23.192.228.80 (IPAddress)
23.192.228.0/22 (Netblock) --> contains --> 23.192.228.84 (IPAddress)
199.43.133.0/24 (Netblock) --> contains --> 199.43.133.53 (IPAddress)
2001:500:8d::/48 (Netblock) --> contains --> 2001:500:8d::53 (IPAddress)
20940 (ASN) --> managed_by --> AKAMAI-ASN1 (RIROrganization)
20940 (ASN) --> announces --> 23.215.0.0/22 (Netblock)
20940 (ASN) --> announces --> 96.7.128.0/23 (Netblock)
20940 (ASN) --> announces --> 23.192.228.0/22 (Netblock)
26710 (ASN) --> managed_by --> ICANN-ANYCASTED-SERVICES - ICANN (RIROrganization)
26710 (ASN) --> announces --> 199.43.133.0/24 (Netblock)
26710 (ASN) --> announces --> 2001:500:8d::/48 (Netblock)
example.com (FQDN) --> node --> www.example.com (FQDN)
www.example.com (FQDN) --> cname_record --> www.example.com-v4.edgesuite.net (FQDN)
2600:1406:bc00::/48 (Netblock) --> contains --> 2600:1406:bc00:53::b81e:94ce (IPAddress)
2600:1406:bc00::/48 (Netblock) --> contains --> 2600:1406:bc00:53::b81e:94c8 (IPAddress)
2600:1408:ec00::/48 (Netblock) --> contains --> 2600:1408:ec00:36::1736:7f31 (IPAddress)
2600:1408:ec00::/48 (Netblock) --> contains --> 2600:1408:ec00:36::1736:7f24 (IPAddress)
2600:1406:3a00::/48 (Netblock) --> contains --> 2600:1406:3a00:21::173e:2e66 (IPAddress)
2600:1406:3a00::/48 (Netblock) --> contains --> 2600:1406:3a00:21::173e:2e65 (IPAddress)
20940 (ASN) --> announces --> 2600:1406:bc00::/48 (Netblock)
20940 (ASN) --> announces --> 2600:1408:ec00::/48 (Netblock)
20940 (ASN) --> managed_by --> Akamai International B.V. (RIROrganization)
20940 (ASN) --> announces --> 2600:1406:3a00::/48 (Netblock)

The enumeration has finished
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Network Inventory: Open Ports & Services:

Port	Service	Description
21/tcp	FTP	File Transfer Protocol
22/tcp	SSH	Secure Shell
25/tcp	SMTP	Simple Mail Transfer Protocol
53/tcp	DNS	Domain Name System
80/tcp	HTTP	HyperText Transfer Protocol
139/tcp	NetBIOS-SSN	NetBIOS Session Service
445/tcp	Microsoft-DS	Microsoft Directory Services
3306/tcp	MySQL	MySQL Database Server
5432/tcp	PostgreSQL	PostgreSQL Database Server
5900/tcp	VNC	Virtual Network Computing

Conclusion:

This experiment involved performing active and passive reconnaissance to map out the network. Nmap was used for host discovery, port scanning, and service enumeration, while Amass was employed for passive reconnaissance to uncover subdomains and metadata. The results, including IP addresses, operating systems, and active services, were compiled into a network inventory report, aiding in the identification of potential security risks posed by unpatched services.

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