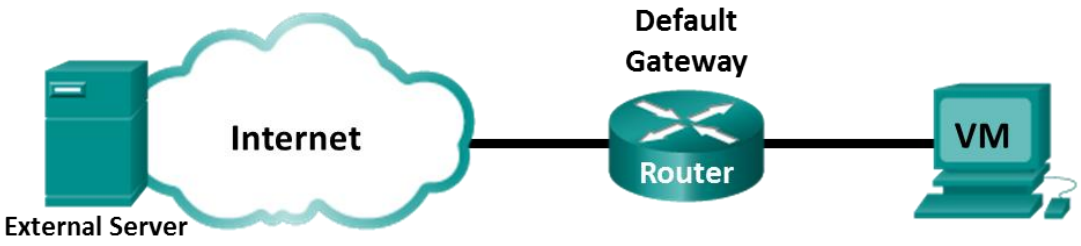
Lab - Exploring Nmap

Topology



Objectives

Part 1: Exploring Nmap

Part 2: Scanning for Open Ports

Background / Scenario

Port scanning is usually part of a reconnaissance attack. There are a variety of port scanning methods that can be used. We will explore how to use the Nmap utility. Nmap is a powerful network utility that is used for network discovery and security auditing.

Required Resources

- CyberOps Workstation virtual machine
- Internet access

Instructions

Part 1: Exploring Nmap

In this part, you will use manual pages (or man pages for short) to learn more about Nmap.

The **man** [*program* |*utility* | *function*] command displays the manual pages associated with the arguments. The manual pages are the reference manuals found on Unix and Linux OSs. These pages can include these sections: Name, Synopsis, Descriptions, Examples, and See Also.

a. Start CyberOps Workstation VM.

b. Open a terminal.

c. At the terminal prompt, enter **man nmap**.

```
[analyst@secOps ~]$ man nmap
```

What is Nmap?

What is nmap used for?

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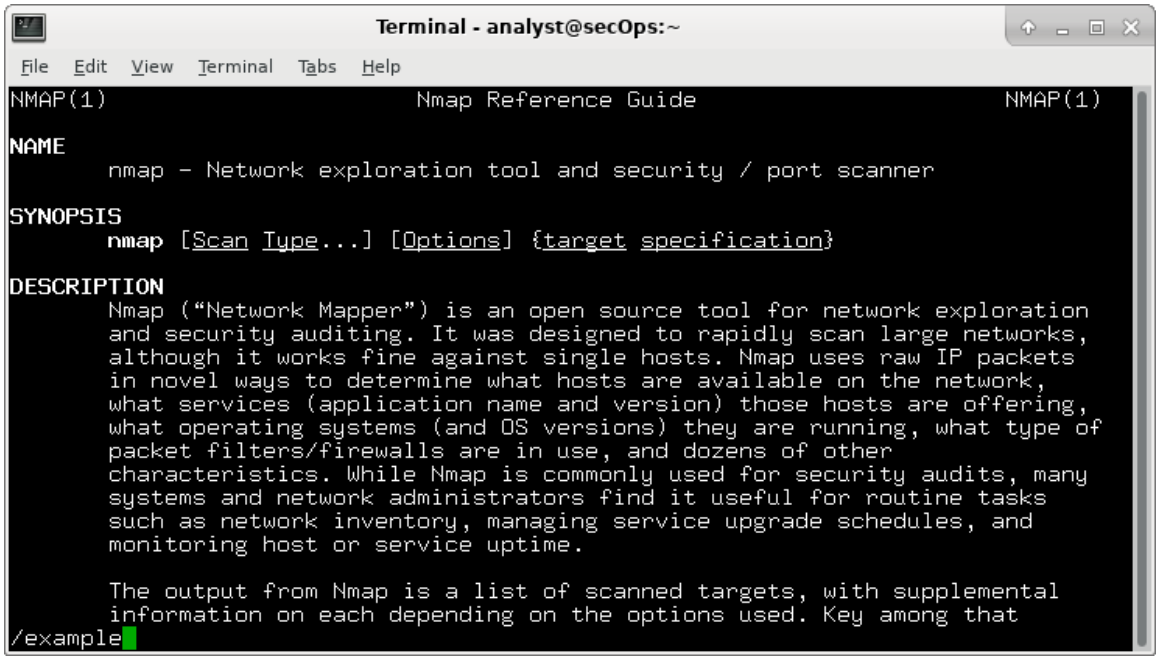
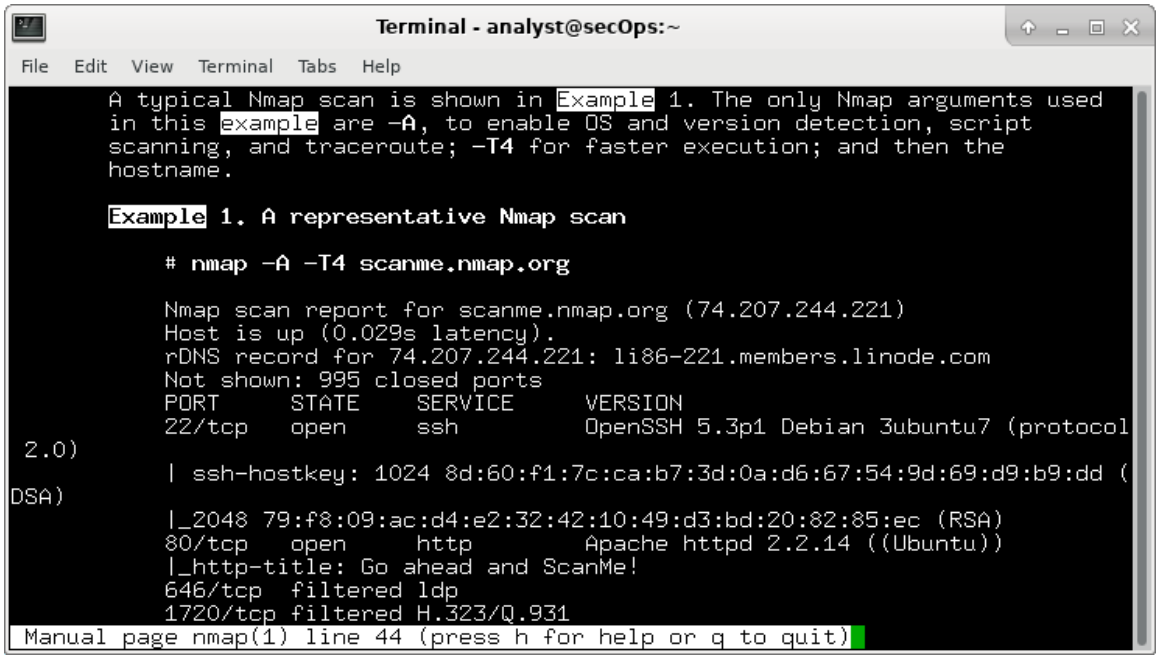
d. While in the man page, you can use the up and down arrow keys to scroll through the pages. You can also press the space bar to forward one page at a time.

To search for a specific term or phrase use enter a forward slash (/) or question mark (?) followed by the term or phrase. The forward slash searches forward through the document, and the question mark searches backward through the document. The key **n** moves to the next match.

Type ***/example*** and press ENTER. This will search for the word **example** forward through the man page.



e. In the first instance of example, you see three matches. To move to the next match, press **n**.



Look at Example 1.

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What is the **nmap** command used?

Use the search function to answer the following questions.

What does the switch -A do?

What does the switch -T4 do?

f. Scroll through the page to learn more about nmap. Type **q** when finished.

Part 2: Scanning for Open Ports

In this part, you will use the switches from the example in the Nmap man pages to scan your localhost, your local network, and a remote server at scanme.nmap.org.

Step 1: Scan your localhost.

a. If necessary, open a terminal on the VM. At the prompt, enter **nmap -A -T4 localhost**. Depending on your local network and devices, the scan will take anywhere from a few seconds to a few minutes.

```
[analyst@secOps ~]$ nmap -A -T4 localhost

Starting Nmap 7.40 ( https://nmap.org ) at 2017-05-01 17:20 EDT
Nmap scan report for localhost (127.0.0.1)
Host is up (0.000056s latency).
Other addresses for localhost (not scanned): ::1
rDNS record for 127.0.0.1: localhost.localdomain
Not shown: 996 closed ports
PORT   STATE SERVICE VERSION
21/tcp open  ftp     vsftpd 2.0.8 or later
| ftp-anon: Anonymous FTP login allowed (FTP code 230)
|_-rw-r--r--    1 0        0               0 Apr 19 15:23 ftp_test
<some output omitted>
```

b. Review the results and answer the following questions.

Which ports and services are opened?

21 - FTP, 22 - SSH, 23 - Telnet

For each of the open ports, record the software that is providing the services.

vsftpd 2.0.8 or later, OpenSSH 8.2, Openwall GNU/*/Linux telnetd

Step 2: Scan your network.

Warning: Before using Nmap on any network, please gain the permission of the network owners before proceeding.

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a. At the terminal command prompt, enter **ip address** to determine the IP address and subnet mask for this host. For this example, the IP address for this VM is 10.0.2.15 and the subnet mask is 255.255.255.0.

```
[analyst@secOps ~]$ ip address
<output omitted>
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP
group default qlen 1000
    link/ether 08:00:27:ed:af:2c brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic enp0s3
       valid_lft 85777sec preferred_lft 85777sec
    inet6 fe80::a00:27ff:feed:af2c/64 scope link
       valid_lft forever preferred_lft forever
```

Record the IP address and subnet mask for your VM. 192.168.157.133/24

Which network does your VM belong to? 192.168.157.0/24

b. To locate other hosts on this LAN, enter **nmap -A -T4 *network address/prefix***. The last octet of the IP address should be replaced with a zero. For example, in the IP address 10.0.2.15, the .15 is the last octet. Therefore, the network address is 10.0.2.0. The /24 is called the prefix and is a shorthand for the netmask 255.255.255.0. If your VM has a different netmask, search the internet for a "CIDR conversion table" to find your prefix. For example, 255.255.0.0 would be /16. The network address 10.0.2.0/24 is used in this example

Note: This operation can take some time, especially if you have many devices attached to the network. In one test environment, the scan took about 4 minutes.

```
[analyst@secOps ~]$ nmap -A -T4 10.0.2.0/24

Starting Nmap 7.40 ( https://nmap.org ) at 2017-05-01 17:13 EDT
<output omitted>
Nmap scan report for 10.0.2.15
Host is up (0.00019s latency).
Not shown: 997 closed ports
PORT   STATE SERVICE VERSION
21/tcp open  ftp     vsftpd 2.0.8 or later
| ftp-anon: Anonymous FTP login allowed (FTP code 230)
|_-rw-r--r--    1 0        0               0 Mar 26  2018 ftp_test
| ftp-syst:
|   STAT:
| FTP server status:
|      Connected to 10.0.2.15
|      Logged in as ftp
|      TYPE: ASCII
|      No session bandwidth limit
|      Session timeout in seconds is 300
|      Control connection is plain text
|      Data connections will be plain text
|      At session startup, client count was 1
|      vsFTPd 3.0.3 - secure, fast, stable
|_End of status
```

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```
22/tcp open  ssh     OpenSSH 8.2 (protocol 2.0)
23/tcp open  telnet  Openwall GNU/*/Linux telnetd
Service Info: Host: Welcome; OS: Linux; CPE: cpe:/o:linux:linux_kernel

Post-scan script results:
| clock-skew:
|   0s:
|     10.0.2.4
|     10.0.2.3
|_    10.0.2.2
Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
Nmap done: 256 IP addresses (4 hosts up) scanned in 346.89 seconds
```

How many hosts are up?

From your Nmap results, list the IP addresses of the hosts that are on the same LAN as your VM. List some of the services that are available on the detected hosts.

3 hosts were up (2VMs and one DNS service)

Step 3: Scan a remote server.

a. Open a web browser and navigate to **scanme.nmap.org**. Please read the message posted.

What is the purpose of this site?

b. At the terminal prompt, enter **nmap -A -T4 scanme.nmap.org**.

```
[analyst@secOps Desktop]$ nmap -A -T4 scanme.nmap.org

Starting Nmap 7.40 ( https://nmap.org ) at 2017-05-01 16:46 EDT
Nmap scan report for scanme.nmap.org (45.33.32.156)
Host is up (0.040s latency).
Other addresses for scanme.nmap.org (not scanned): 2600:3c01::f03c:91ff:fe18:bb2f
Not shown: 992 closed ports
PORT      STATE    SERVICE      VERSION
22/tcp    open     ssh          OpenSSH 6.6.1p1 Ubuntu 2ubuntu2.8 (Ubuntu Linux;
protocol 2.0)
| ssh-hostkey:
|   1024 ac:00:a0:1a:82:ff:cc:55:99:dc:67:2b:34:97:6b:75 (DSA)
|   2048 20:3d:2d:44:62:2a:b0:5a:9d:b5:b3:05:14:c2:a6:b2 (RSA)
|_  256 96:02:bb:5e:57:54:1c:4e:45:2f:56:4c:4a:24:b2:57 (ECDSA)
25/tcp    filtered smtp
80/tcp    open     http         Apache httpd 2.4.7 ((Ubuntu))
|_http-server-header: Apache/2.4.7 (Ubuntu)
|_http-title: Go ahead and ScanMe!
135/tcp   filtered msrpc
139/tcp   filtered netbios-ssn
```

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```
445/tcp   filtered microsoft-ds
593/tcp   filtered http-rpc-epmap
4444/tcp  filtered krb524
9929/tcp  open     nping-echo   Nping echo
31337/tcp open     tcpwrapped
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 23.96 seconds
```

c. Review the results and answer the following questions.

Which ports and services are opened? 22 SSH, 80 HTTP, 110 Email service, 9929 nping-echo, 31337 tcpwrapped

Which ports and services are filtered? 25 smtp

What is the IP address of the server? 45.33.32.156

What is the operating system? Ubuntu

Reflection Question

Nmap is a powerful tool for network exploration and management. How can Nmap help with network security? How can Nmap be used by a threat actor as a nefarious tool?

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