

# **Module 13: Hacking Web Servers**

## **Lab 1: Footprint the Web Server**

### **Lab Scenario**

The first step of hacking web servers for a professional ethical hacker or pen tester is to collect as much information as possible about the target web server and analyze the collected information in order to find lapses in its current security mechanisms. The main purpose is to learn about the web server's remote access capabilities, its ports and services, and other aspects of its security.

The information obtained in this step helps in assessing the security posture of the web server. Footprinting may involve searching the Internet, newsgroups, bulletin boards, etc. for gathering information about the target organization's web server. There are also tools such as Whois.net and Whois Lookup that extract information such as the target's domain name, IP address, and autonomous system number.

Web server fingerprinting is an essential task for any penetration tester. Before proceeding to hack or exploit a webserver, the penetration tester must know the type and version of the webserver as most of the attacks and exploits are specific to the type and version of the server being used by the target. These methods help any penetration tester to gain information and analyze their target so that they can perform a thorough test and can deploy appropriate methods to mitigate such attacks on the server.

An ethical hacker or penetration tester must perform footprinting to detect the loopholes in the web server of the target organization. This will help in predicting the effectiveness of additional security measures for strengthening and protecting the web server of the target organization.

The labs in this exercise demonstrate how to footprint a web server using various footprinting tools and techniques.

### **Lab Objectives**

- Footprint a web server using Netcat and Telnet
- Enumerate web server information using Nmap Scripting Engine (NSE)

### **Overview of Web Server Footprinting**

By performing web server footprinting, it is possible to gather valuable system-level data such as account details, OS, software versions, server names, and database schema details. Use Telnet utility to footprint a web server and gather information such as server name, server type, OSes, and applications running. Use footprinting tools such as Netcraft, ID Serve, and httprecon to perform web server footprinting. Web server footprinting tools such as Netcraft, ID Serve, and httprecon can extract information from the target server. Let us look at the features and the types of information these tools can collect from the target server.

Task 1: Footprint a Web Server using Netcat and Telnet

### **Netcat**

Netcat is a networking utility that reads and writes data across network connections, using the TCP/IP protocol. It is a reliable “back-end” tool used directly or driven by other programs and scripts. It is also a network debugging and exploration tool.

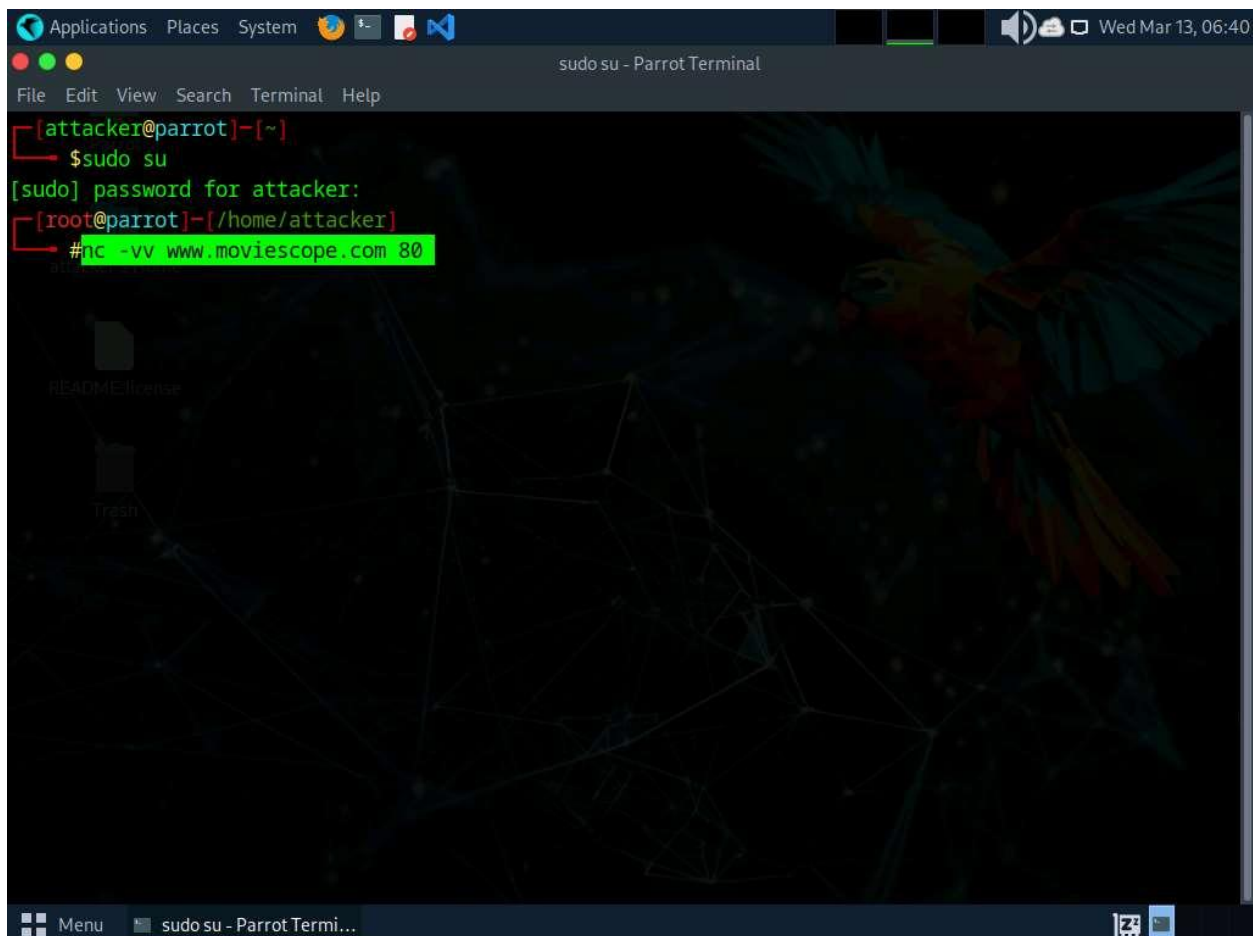
## Telnet

Telnet is a client-server network protocol. It is widely used on the Internet or LANs. It provides the login session for a user on the Internet. The single terminal attached to another computer emulates with Telnet. The primary security problems with Telnet are the following:

- It does not encrypt any data sent through the connection.
- It lacks an authentication scheme.

Telnet helps users perform banner-grabbing attacks. It probes HTTP servers to determine the Server field in the HTTP response header.

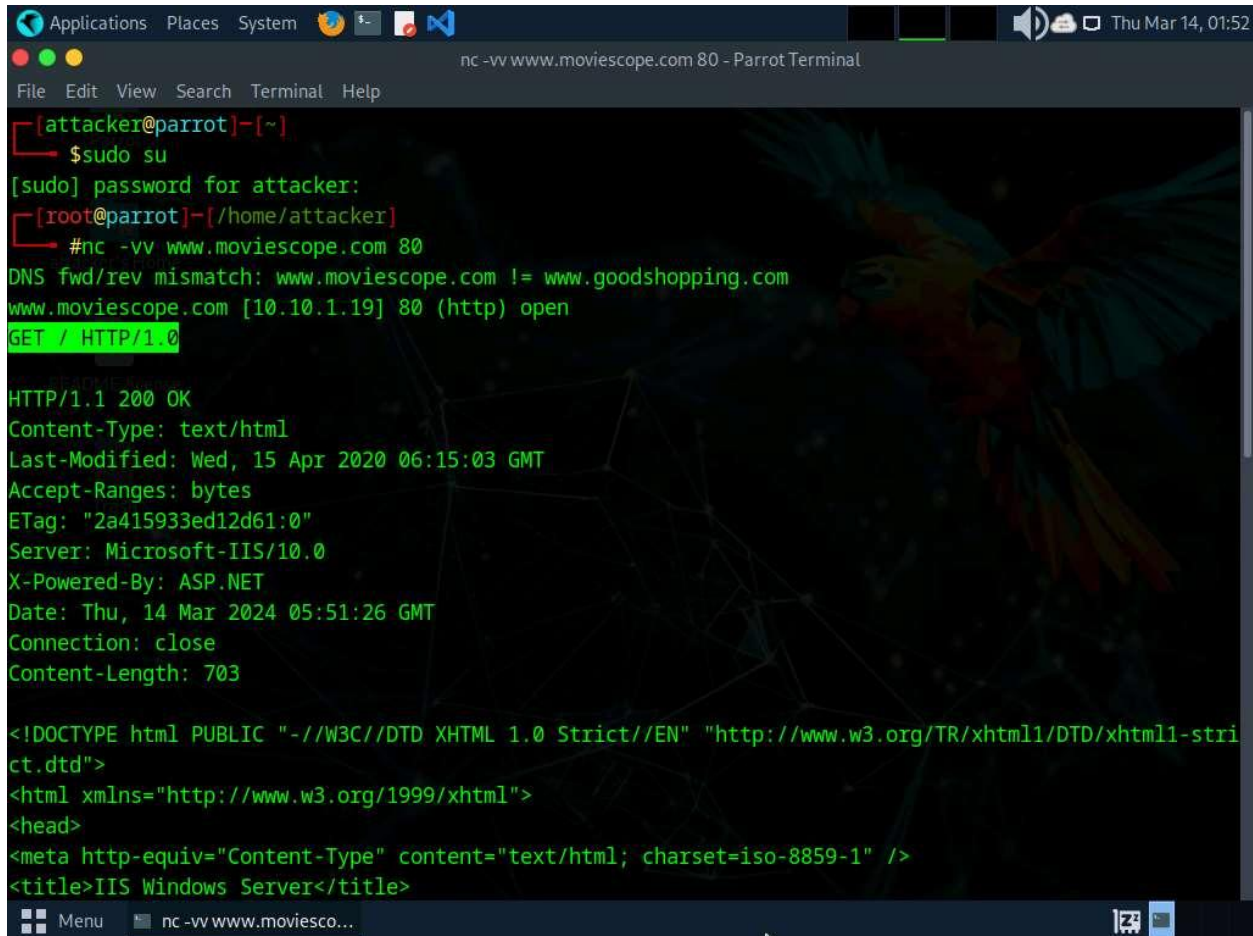
1. Click [Parrot Security](#) to switch to the **Parrot Security** machine.
2. In the **Parrot Security** machine, open a **Terminal** window and execute **sudo su** to run the programs as a root user (When prompted, enter the password **toor**).
3. In the terminal window, run **nc -vv www.moviescope.com 80**.

A screenshot of a Parrot Security Linux terminal window. The window title is "sudo su - Parrot Terminal". The terminal shows the following commands and output:

```
[attacker@parrot]~$ sudo su
[sudo] password for attacker:
[root@parrot]~# nc -vv www.moviescope.com 80
```

The terminal background features a dark theme with a parrot illustration on the right and a constellation pattern on the left. The desktop icons for "README.license" and "Trash" are visible in the background. The window's top bar includes standard Linux window controls and system status icons, with the date "Wed Mar 13, 06:40" displayed on the right. The bottom taskbar shows a "Menu" button and the window title "sudo su - Parrot Termi...".

4. Once you hit **Enter**, the netcat will display the hosting information of the provided domain.
5. Now, type **GET / HTTP/1.0** and press **Enter** twice.
6. Netcat will perform the banner grabbing and gather information such as content type, last modified date, accept ranges, ETag, and server information.

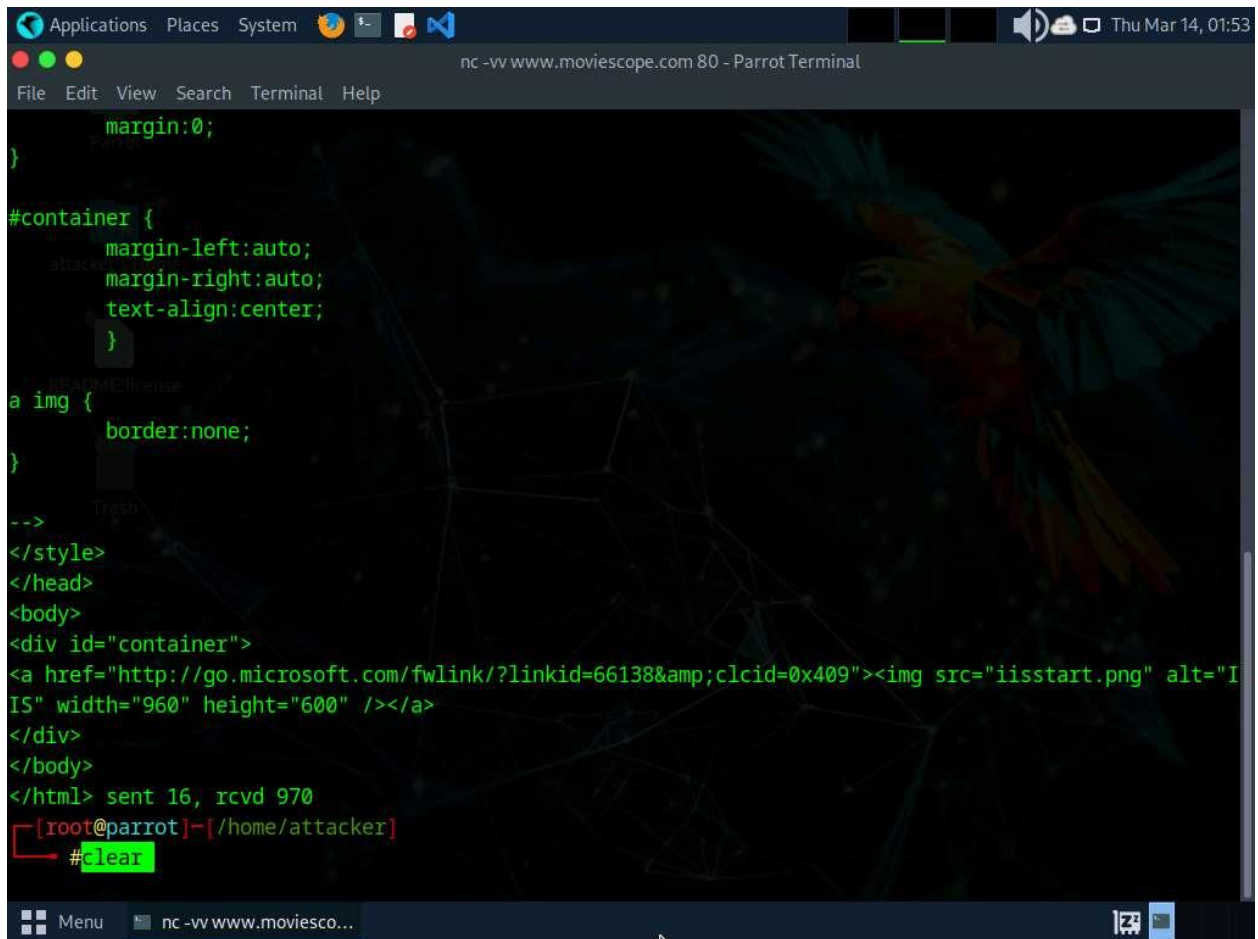


```
Applications Places System [Icons] [Terminal] [Help] Thu Mar 14, 01:52
nc -vv www.moviescope.com 80 - Parrot Terminal
File Edit View Search Terminal Help
[attacker@parrot]~$ sudo su
[sudo] password for attacker:
[root@parrot]~/home/attacker# #nc -vv www.moviescope.com 80
DNS fwd/rev mismatch: www.moviescope.com != www.goodshopping.com
www.moviescope.com [10.10.1.19] 80 (http) open
GET / HTTP/1.0

HTTP/1.1 200 OK
Content-Type: text/html
Last-Modified: Wed, 15 Apr 2020 06:15:03 GMT
Accept-Ranges: bytes
ETag: "2a415933ed12d61:0"
Server: Microsoft-IIS/10.0
X-Powered-By: ASP.NET
Date: Thu, 14 Mar 2024 05:51:26 GMT
Connection: close
Content-Length: 703

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>IIS Windows Server</title>
```

7. In the terminal windows, run **clear** to clear the netcat result in the terminal window.



```
Applications Places System nc -vv www.moviescope.com 80 - Parrot Terminal Thu Mar 14, 01:53
File Edit View Search Terminal Help

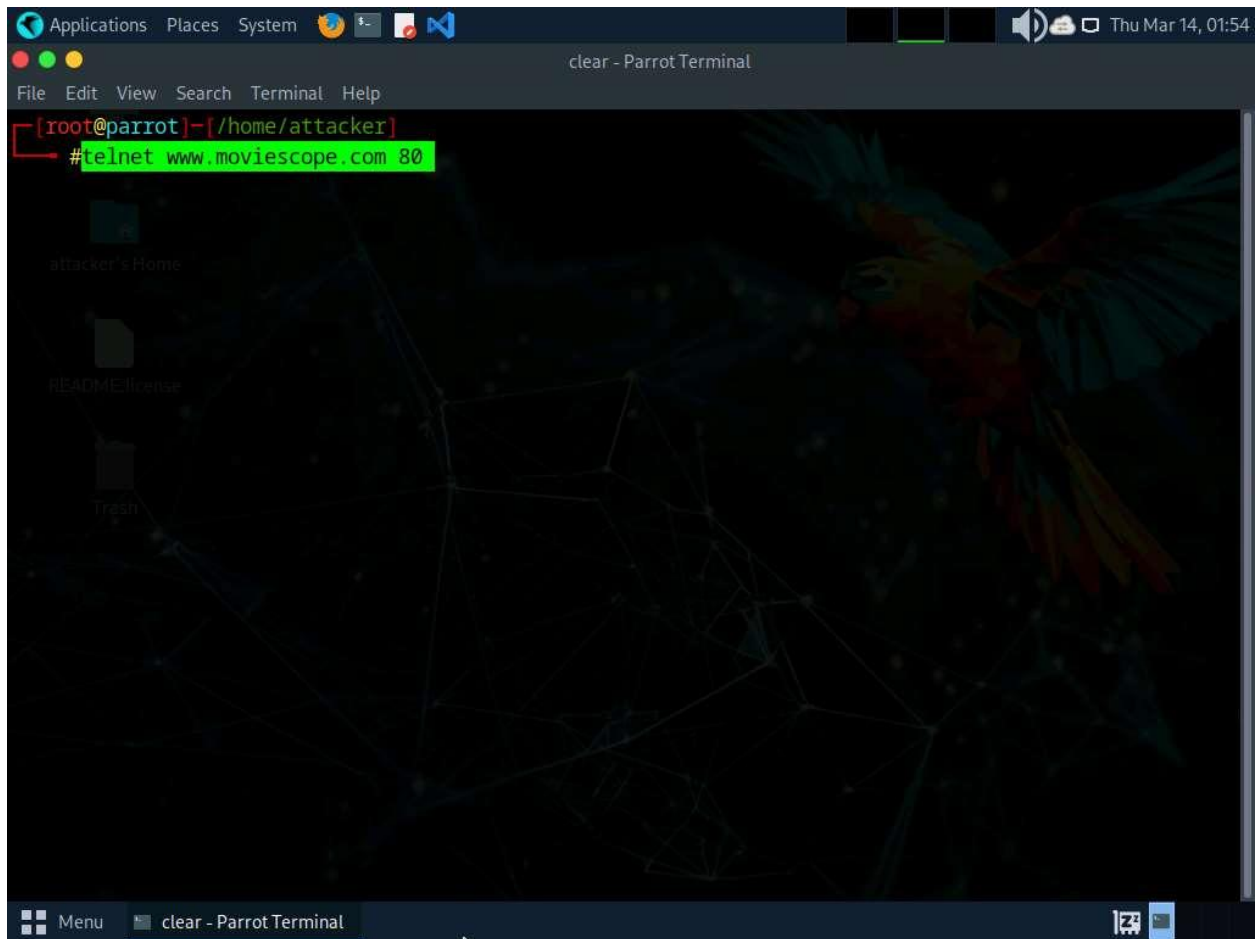
margin:0;
}

#container {
margin-left:auto;
margin-right:auto;
text-align:center;
}

a img {
border:none;
}

-->
</style>
</head>
<body>
<div id="container">
<a href="http://go.microsoft.com/fwlink/?linkid=66138&clcid=0x409"></a>
</div>
</body>
</html> sent 16, rcvd 970
[root@parrot]~/home/attacker
#clear
```

8. Now, perform banner grabbing using telnet. In the terminal window, run **telnet www.moviescope.com 80**.



9. Telnet will connect to the domain.
10. Type **GET / HTTP/1.0** and press **Enter** twice. Telnet will perform the banner grabbing and gather information such as content type, last modified date, accept ranges, ETag, and server information.

```
Applications  Places  System  [Icons]  [Volume]  [Network]  Thu Mar 14, 01:57
telnet www.moviescope.com 80 - Parrot Terminal
File Edit View Search Terminal Help
[root@parrot]~/home/attacker
#telnet www.moviescope.com 80
Trying 10.10.1.19...
Connected to www.moviescope.com.
Escape character is '^]'.
GET / HTTP/1.0

HTTP/1.1 200 OK
Content-Type: text/html
Last-Modified: Wed, 15 Apr 2020 06:15:03 GMT
Accept-Ranges: bytes
ETag: "2a415933ed12d61:0"
Server: Microsoft-IIS/10.0
X-Powered-By: ASP.NET
Date: Thu, 14 Mar 2024 05:57:02 GMT
Connection: close
Content-Length: 703

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>IIS Windows Server</title>
<style type="text/css">
<!--
```

11. This concludes the demonstration of how to gather information about the target web server using the Netcat and Telnet utilities.

12. Close the terminal window on the **Parrot Security** machine.

#### Question 13.1.1.1

Perform banner grabbing using Telnet on the website [www.moviescope.com](http://www.moviescope.com). Identify the web-server application used to host the website.

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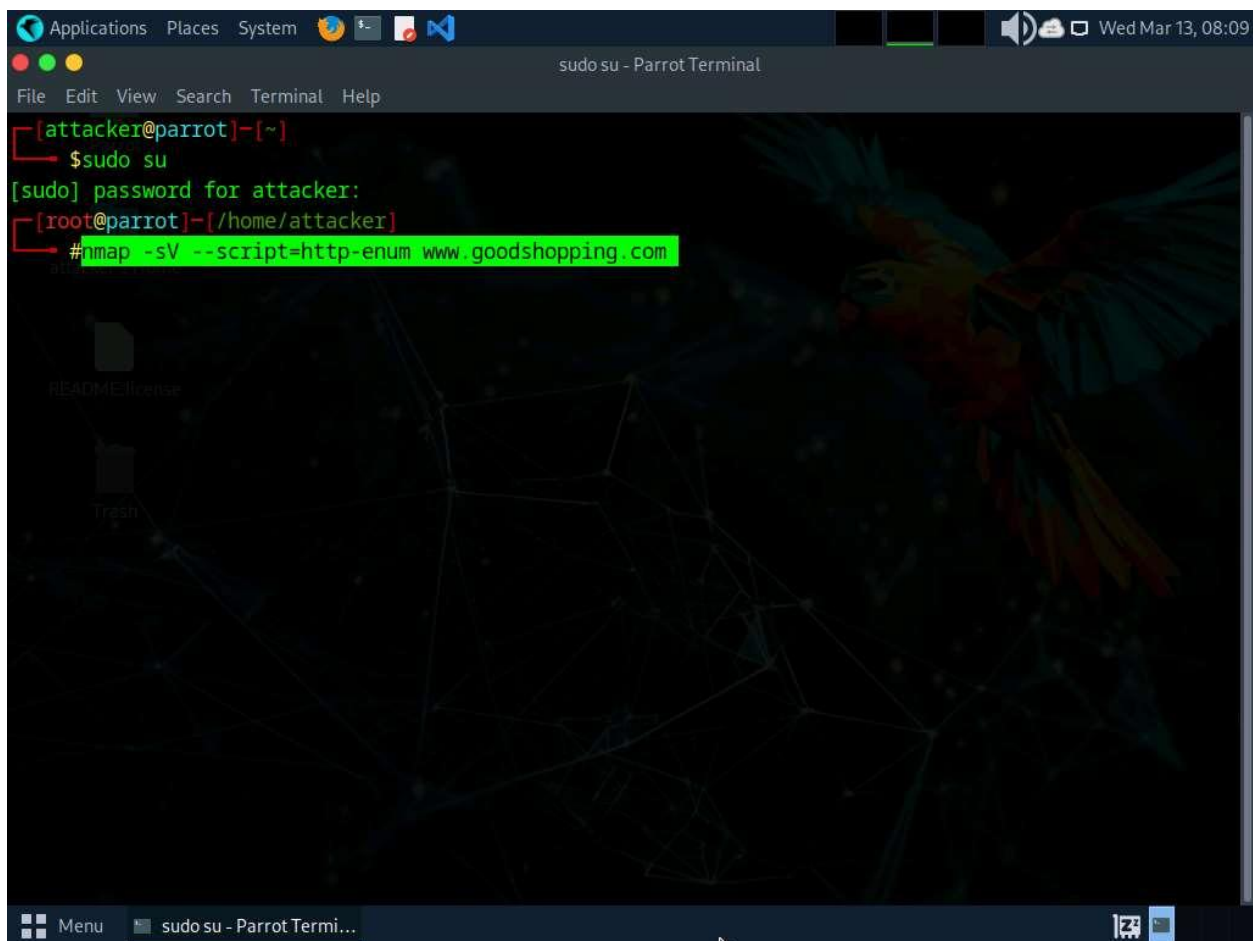
#### Task 2: Enumerate Web Server Information using Nmap Scripting Engine (NSE)

The web applications that are available on the Internet may have vulnerabilities. Some hackers' attack strategies may need the Administrator role on your server, but sometimes they simply need sensitive information about the server. Utilizing Nmap and `http-enum.nse` content returns a diagram of those applications, registries, and records uncovered. This way, it is possible to check for vulnerabilities or abuses in databases. Through this technique, it is possible to discover genuine (and extremely dumb) security imperfections on a site such as some sites (like WordPress and PrestaShop) that maintain

accessibility to envelopes that ought to be erased once the task has been settled. Once you have identified a vulnerability, you can discover a fix for it.

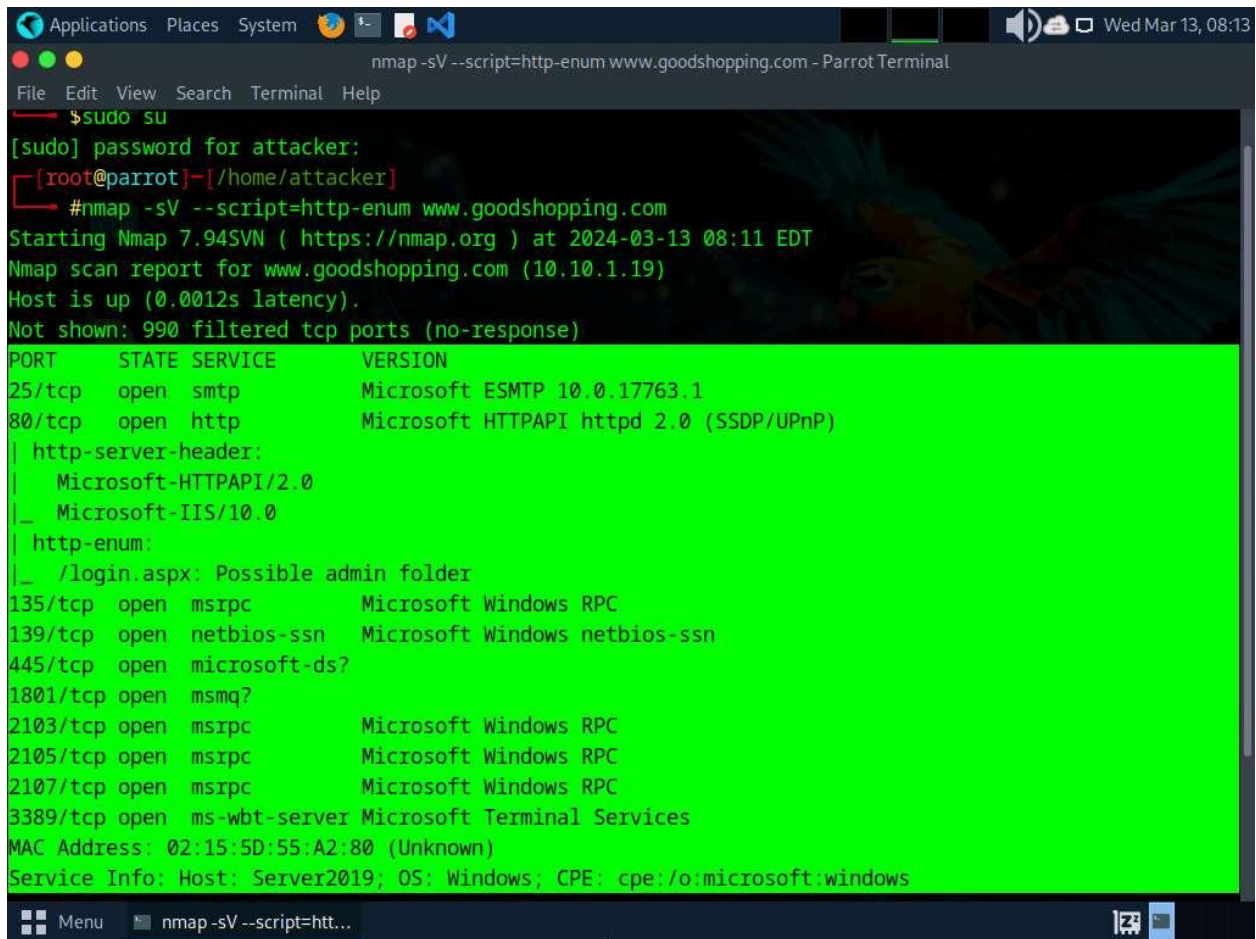
Nmap, along with Nmap Scripting Engine, can extract a lot of valuable information from the target web server. In addition to Nmap commands, Nmap Scripting Engine (NSE) provides scripts that reveal various useful information about the target web server to an attacker.

1. In the **Parrot Security** machine, open a **Terminal** window and execute **sudo su** to run the programs as a root user (When prompted, enter the password **toor**).
2. Enumerate the directories used by web servers and web applications, in the terminal window. Run **nmap -sV --script=http-enum [target website]**.
3. In this scan, we are enumerating the **www.goodshopping.com** website.

A screenshot of a Parrot Security Linux desktop environment. The terminal window is titled 'sudo su - Parrot Terminal'. The user 'attacker@parrot' is at the prompt '~'. They enter '\$sudo su', and the system prompts for the password 'attacker:'. After entering the password, the prompt changes to '[root@parrot]~[/home/attacker]'. The user then enters the command '#nmap -sV --script=http-enum www.goodshopping.com'. The terminal background features a dark theme with a parrot illustration and a network diagram. The desktop includes a menu bar with 'Applications', 'Places', and 'System', and a taskbar at the bottom with a 'Menu' button and the terminal window icon.

4. This script enumerates and provides you with the output details, as shown in the screenshot.





```
nmap -sV --script=http-enum www.goodshopping.com - Parrot Terminal
File Edit View Search Terminal Help
[sudo] $sudo su
[sudo] password for attacker:
[root@parrot]~[/home/attacker]
#nmap -sV --script=http-enum www.goodshopping.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-03-13 08:11 EDT
Nmap scan report for www.goodshopping.com (10.10.1.19)
Host is up (0.0012s latency).
Not shown: 990 filtered tcp ports (no-response)
PORT      STATE SERVICE      VERSION
25/tcp    open  smtp         Microsoft ESMT
80/tcp    open  http         Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
| http-server-header:
|   Microsoft-HTTPAPI/2.0
|_  Microsoft-IIS/10.0
| http-enum:
|_  /login.aspx: Possible admin folder
135/tcp   open  msrpc        Microsoft Windows RPC
139/tcp   open  netbios-ssn  Microsoft Windows netbios-ssn
445/tcp   open  microsoft-ds?
1801/tcp  open  msmq?
2103/tcp  open  msrpc        Microsoft Windows RPC
2105/tcp  open  msrpc        Microsoft Windows RPC
2107/tcp  open  msrpc        Microsoft Windows RPC
3389/tcp  open  ms-wbt-server Microsoft Terminal Services
MAC Address: 02:15:5D:55:A2:80 (Unknown)
Service Info: Host: Server2019; OS: Windows; CPE: cpe:/o:microsoft:windows
```

5. The next step is to discover the hostnames that resolve the targeted domain.
6. In the terminal window, run **nmap --script hostmap-bfk -script-args hostmap-bfk.prefix=hostmap- www.goodshopping.com**.



```
Applications Places System [Icons] [System Tray] Wed Mar 13, 08:20
nmap --script hostmap-bfk --script-args hostmap-bfk.prefix=hostmap- www.goodshopping.com - Parrot Terminal
File Edit View Search Terminal Help
[root@parrot]~/home/attacker
# nmap --script hostmap-bfk --script-args hostmap-bfk.prefix=hostmap- www.goodshopping.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-03-13 08:18 EDT
Nmap scan report for www.goodshopping.com (10.10.1.19)
Host is up (0.0013s latency).
Not shown: 990 filtered tcp ports (no-response)
PORT      STATE SERVICE
25/tcp    open  smtp
80/tcp    open  http
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
1801/tcp  open  msmq
2103/tcp  open  zephyr-clt
2105/tcp  open  eklogin
2107/tcp  open  msmq-mgmt
3389/tcp  open  ms-wbt-server
MAC Address: 02:15:5D:55:A2:80 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 4.93 seconds
[root@parrot]~/home/attacker
#
```

7. Perform an HTTP trace on the targeted domain. In the terminal window, run **nmap --script http-trace -d www.goodshopping.com**.
8. This script will detect a vulnerable server that uses the TRACE method by sending an HTTP TRACE request that shows if the method is enabled or not.

```
Applications Places System [Icons] [System Tray] Wed Mar 13, 08:28
nmap --script http-trace -d www.goodshopping.com - Parrot Terminal
File Edit View Search Terminal Help
[root@parrot]~[/home/attacker]
#nmap --script http-trace -d www.goodshopping.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-03-13 08:21 EDT
PORTS: Using ports open on 0% or more average hosts (TCP:1000, UDP:0, SCTP:0)
----- Timing report -----
  hostgroups: min 1, max 100000
  rtt-timeouts: init 1000, min 100, max 10000
  max-scan-delay: TCP 1000, UDP 1000, SCTP 1000
  parallelism: min 0, max 0
  max-retries: 10, host-timeout: 0
  min-rate: 0, max-rate: 0
-----
NSE: Using Lua 5.4.
NSE: Arguments from CLI:
NSE: Loaded 1 scripts for scanning.
NSE: Script Pre-scanning.
NSE: Starting runlevel 1 (of 1) scan.
Initiating NSE at 08:21
Completed NSE at 08:21, 0.00s elapsed
Initiating ARP Ping Scan at 08:21
Scanning www.goodshopping.com (10.10.1.19) [1 port]
Packet capture filter (device eth0): arp and arp[18:4] = 0x02155D55 and arp[22:2] = 0xA281
Completed ARP Ping Scan at 08:21, 0.05s elapsed (1 total hosts)
Overall sending rates: 18.99 packets / s, 797.75 bytes / s.
mass_rdns: Using DNS server 8.8.8.8
Initiating SYN Stealth Scan at 08:21
[Menu] nmap --script http-tra...
```

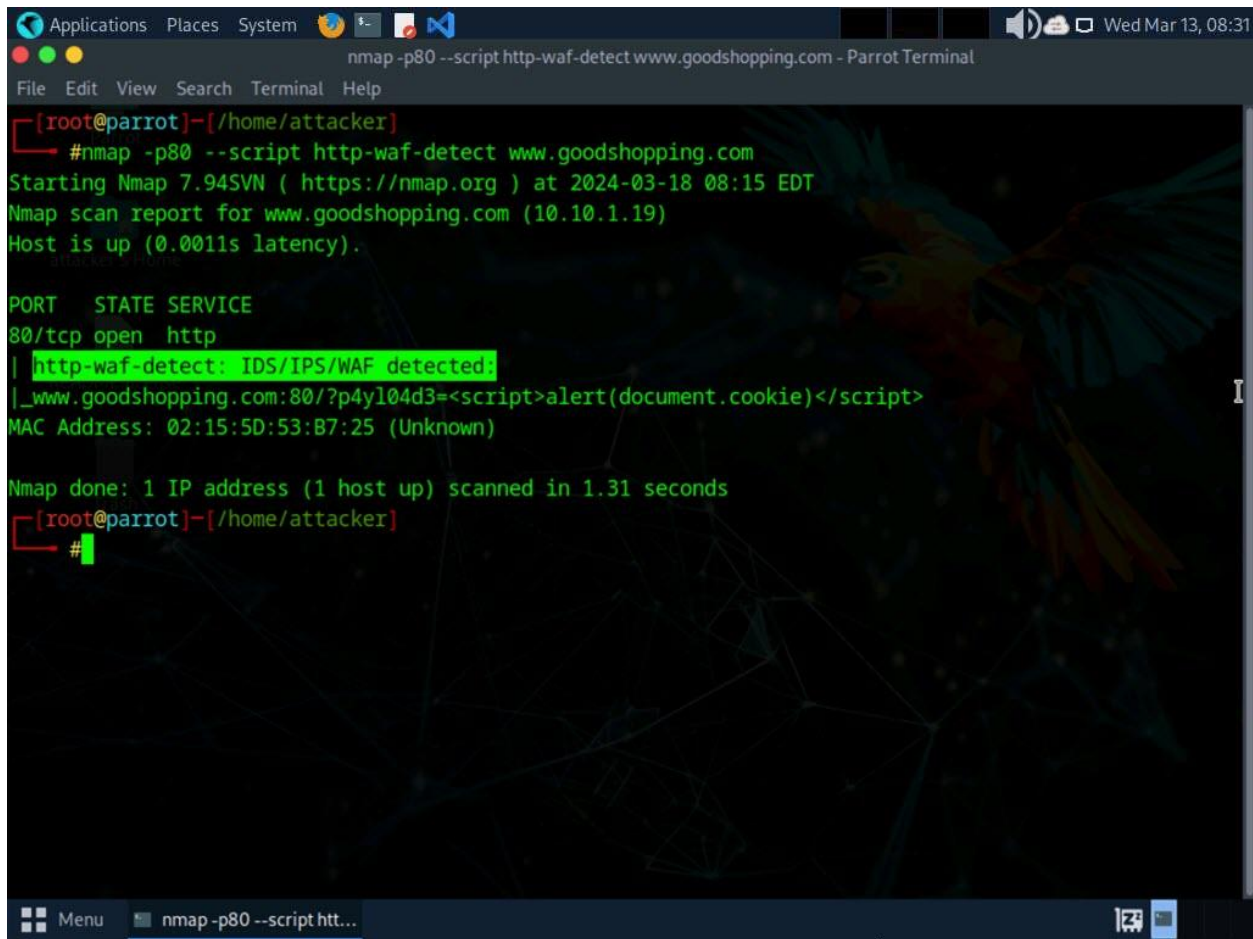
```
Applications Places System nmap --script http-trace -d www.goodshopping.com - Parrot Terminal
File Edit View Search Terminal Help
Initiating SYN Stealth Scan at 08:21
Scanning www.goodshopping.com (10.10.1.19) [1000 ports]
Packet capture filter (device eth0): dst host 10.10.1.13 and (icmp or icmp6 or ((tcp) and (src host 10.10.1.19)))
Discovered open port 80/tcp on 10.10.1.19
Discovered open port 139/tcp on 10.10.1.19
Discovered open port 445/tcp on 10.10.1.19
Discovered open port 3389/tcp on 10.10.1.19
Discovered open port 25/tcp on 10.10.1.19
Discovered open port 135/tcp on 10.10.1.19
Discovered open port 1801/tcp on 10.10.1.19
Discovered open port 2105/tcp on 10.10.1.19
Discovered open port 2103/tcp on 10.10.1.19
Discovered open port 2107/tcp on 10.10.1.19
Completed SYN Stealth Scan at 08:21, 4.66s elapsed (1000 total ports)
Overall sending rates: 426.96 packets / s, 18786.37 bytes / s.
NSE: Script scanning 10.10.1.19.
NSE: Starting runlevel 1 (of 1) scan.
Initiating NSE at 08:21
NSE: Starting http-trace against www.goodshopping.com (10.10.1.19:80).
NSE: Finished http-trace against www.goodshopping.com (10.10.1.19:80).
Completed NSE at 08:21, 0.01s elapsed
Nmap scan report for www.goodshopping.com (10.10.1.19)
Host is up, received arp-response (0.0010s latency).
Scanned at 2024-03-13 08:21:37 EDT for 5s
Not shown: 990 filtered tcp ports (no-response)
```

```
Applications Places System nmap --script http-trace -d www.goodshopping.com - Parrot Terminal
File Edit View Search Terminal Help
Scanned at 2024-03-13 08:21:37 EDT for 5s
Not shown: 990 filtered tcp ports (no-response)
PORT      STATE SERVICE      REASON
25/tcp    open  smtp         syn-ack ttl 128
80/tcp    open  http         syn-ack ttl 128
135/tcp   open  msrpc        syn-ack ttl 128
139/tcp   open  netbios-ssn  syn-ack ttl 128
445/tcp   open  microsoft-ds syn-ack ttl 128
1801/tcp  open  msmq         syn-ack ttl 128
2103/tcp  open  zephyr-clt   syn-ack ttl 128
2105/tcp  open  eklogin      syn-ack ttl 128
2107/tcp  open  msmq-mgmt    syn-ack ttl 128
3389/tcp  open  ms-wbt-server syn-ack ttl 128
MAC Address: 02:15:5D:55:A2:80 (Unknown)
Final times for host: srtp: 1002 rttvar: 627 to: 100000

NSE: Script Post-scanning.
NSE: Starting runlevel 1 (of 1) scan.
Initiating NSE at 08:21
Completed NSE at 08:21, 0.00s elapsed
Read from /usr/bin/./share/nmap: nmap-mac-prefixes nmap-protocols nmap-services.
Nmap done: 1 IP address (1 host up) scanned in 4.97 seconds
Raw packets sent: 1992 (87.632KB) | Rcvd: 12 (512B)
[root@parrot]~[/home/attacker]
#
```

9. Now, check whether Web Application Firewall is configured on the target host or domain. In the terminal window, run **nmap -p80 --script http-waf-detect www.goodshopping.com**.
10. This command will scan the host and attempt to determine whether a web server is being monitored by an IPS, IDS, or WAF.
11. This command will probe the target host with malicious payloads and detect the changes in the response code.





```
Applications Places System nmap -p80 --script http-waf-detect www.goodshopping.com - Parrot Terminal
File Edit View Search Terminal Help

[root@parrot]~/home/attacker
#nmap -p80 --script http-waf-detect www.goodshopping.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-03-18 08:15 EDT
Nmap scan report for www.goodshopping.com (10.10.1.19)
Host is up (0.0011s latency).

PORT      STATE SERVICE
80/tcp    open  http
| http-waf-detect: IDS/IPS/WAF detected:
|_www.goodshopping.com:80/?p4yl04d3=<script>alert(document.cookie)</script>
MAC Address: 02:15:5D:53:B7:25 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 1.31 seconds
[root@parrot]~/home/attacker
#
```

12. This concludes the demonstration of how to enumerate web server information using the Nmap Scripting Engine (NSE).

13. Close the terminal windows on the **Parrot Security** machine.

#### Question 13.1.2.1

Use Nmap Scripting Engine (NSE) to extract information about the website [www.goodshopping.com](http://www.goodshopping.com). Enter the port number of the ms-wbt-server service, which is open on the web server.

#### Question 13.1.2.2

Use Nmap Scripting Engine (NSE) to check whether a web-application firewall is configured for the website [www.goodshopping.com](http://www.goodshopping.com). Enter YES if a web-application firewall is configured for [www.goodshopping.com](http://www.goodshopping.com) or NO otherwise.