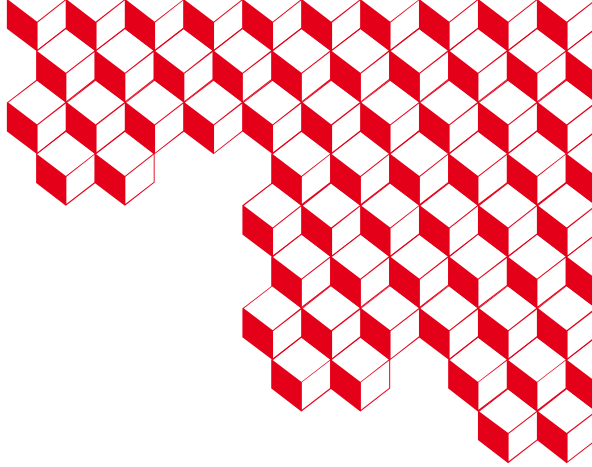


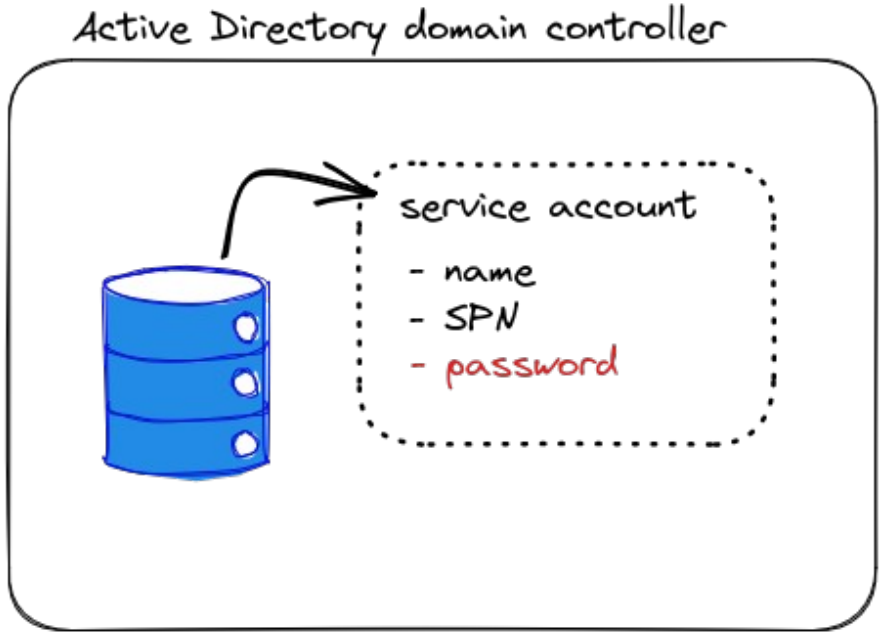
gmsad

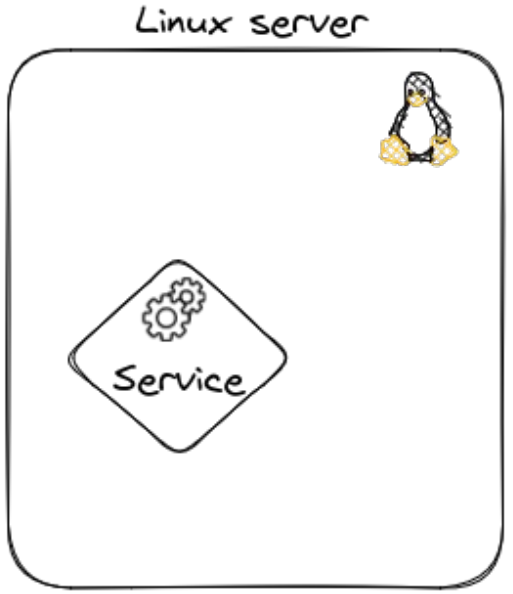
Use « group Managed Service Accounts » (gMSA) on Linux

William BRUNEAU & Vincent RUELLO – SSTIC 2023

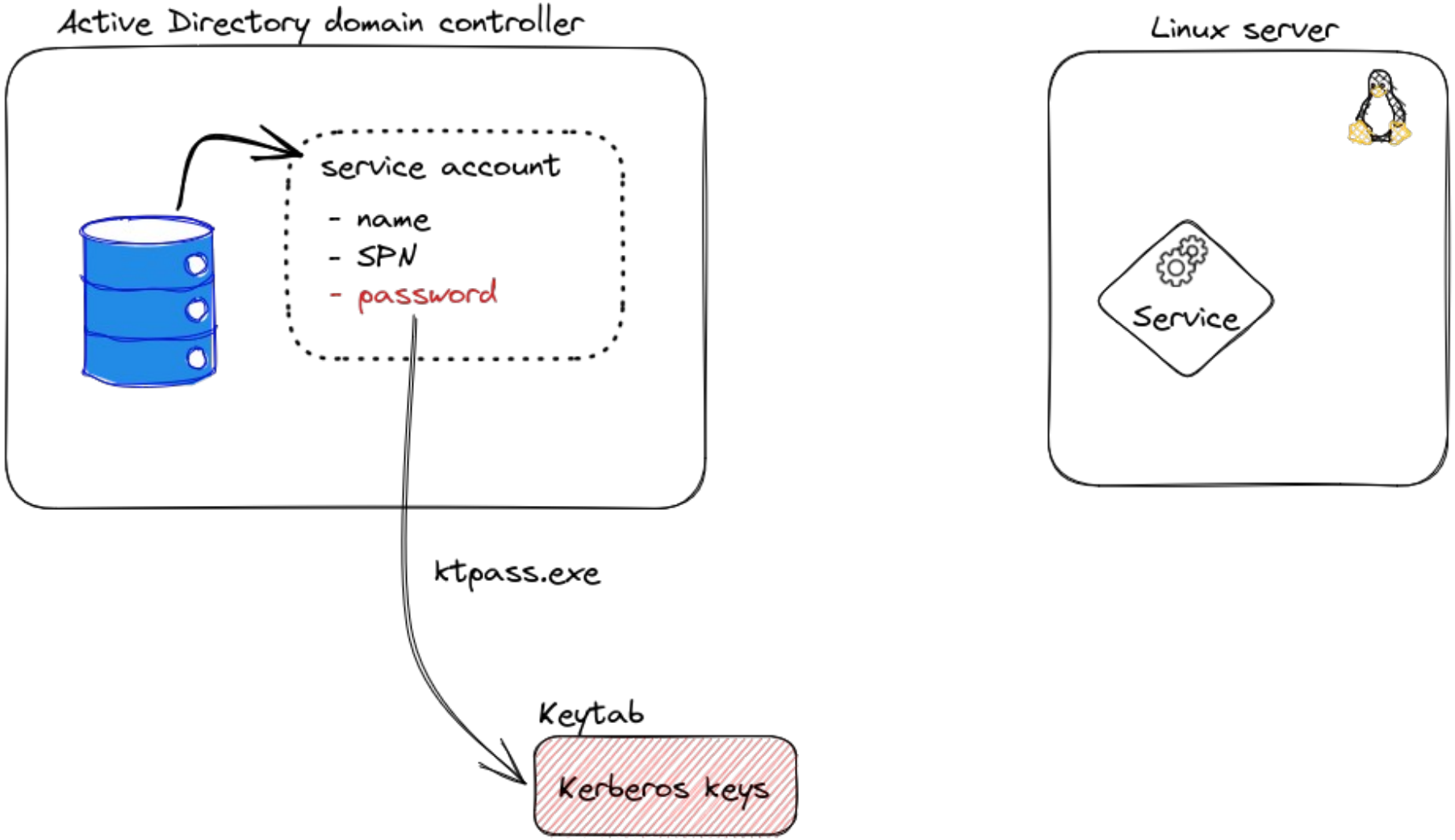
1. Kerberised service on Linux

Kerberised service on Linux

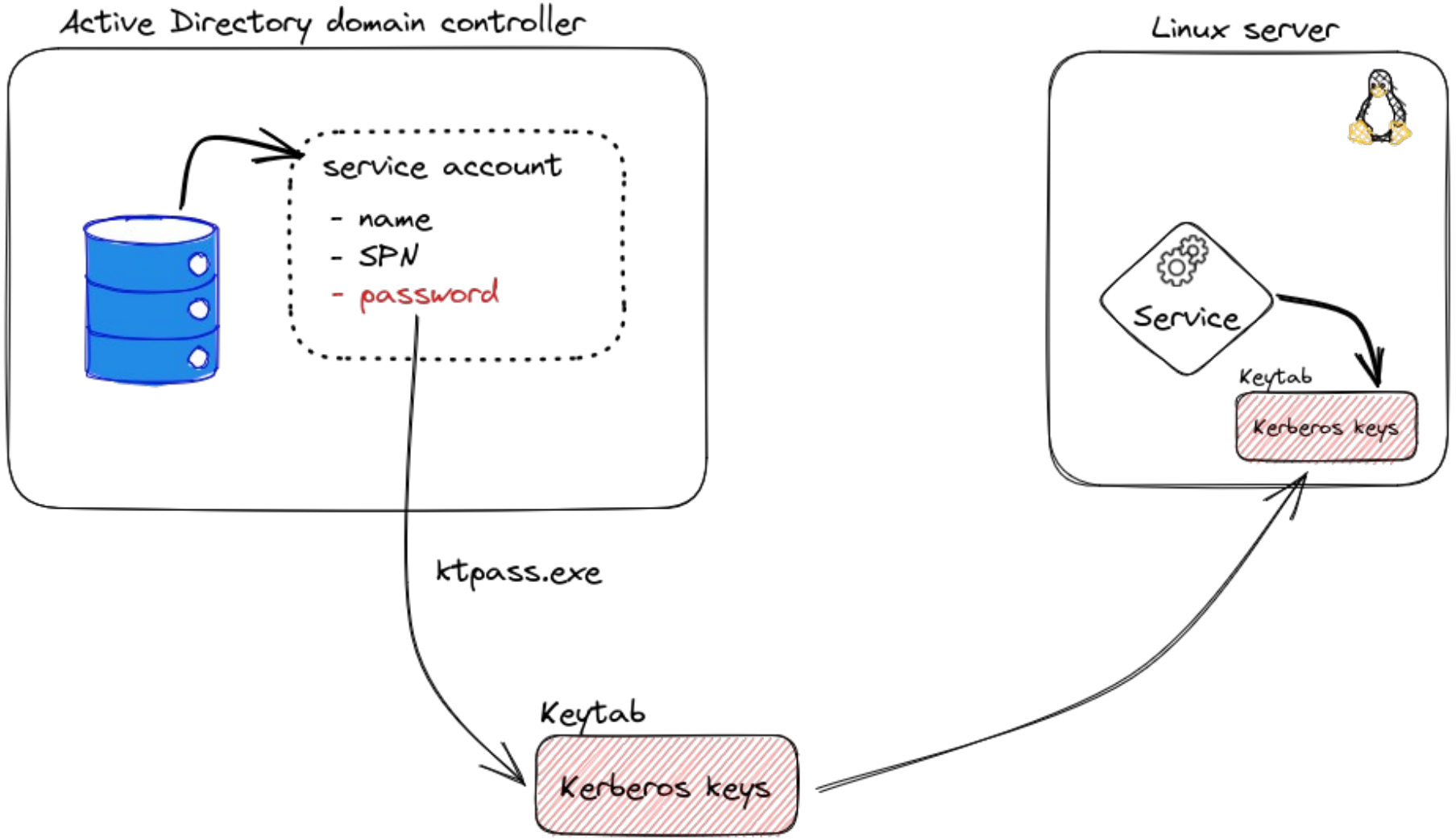




Kerberised service on Linux



Kerberised service on Linux

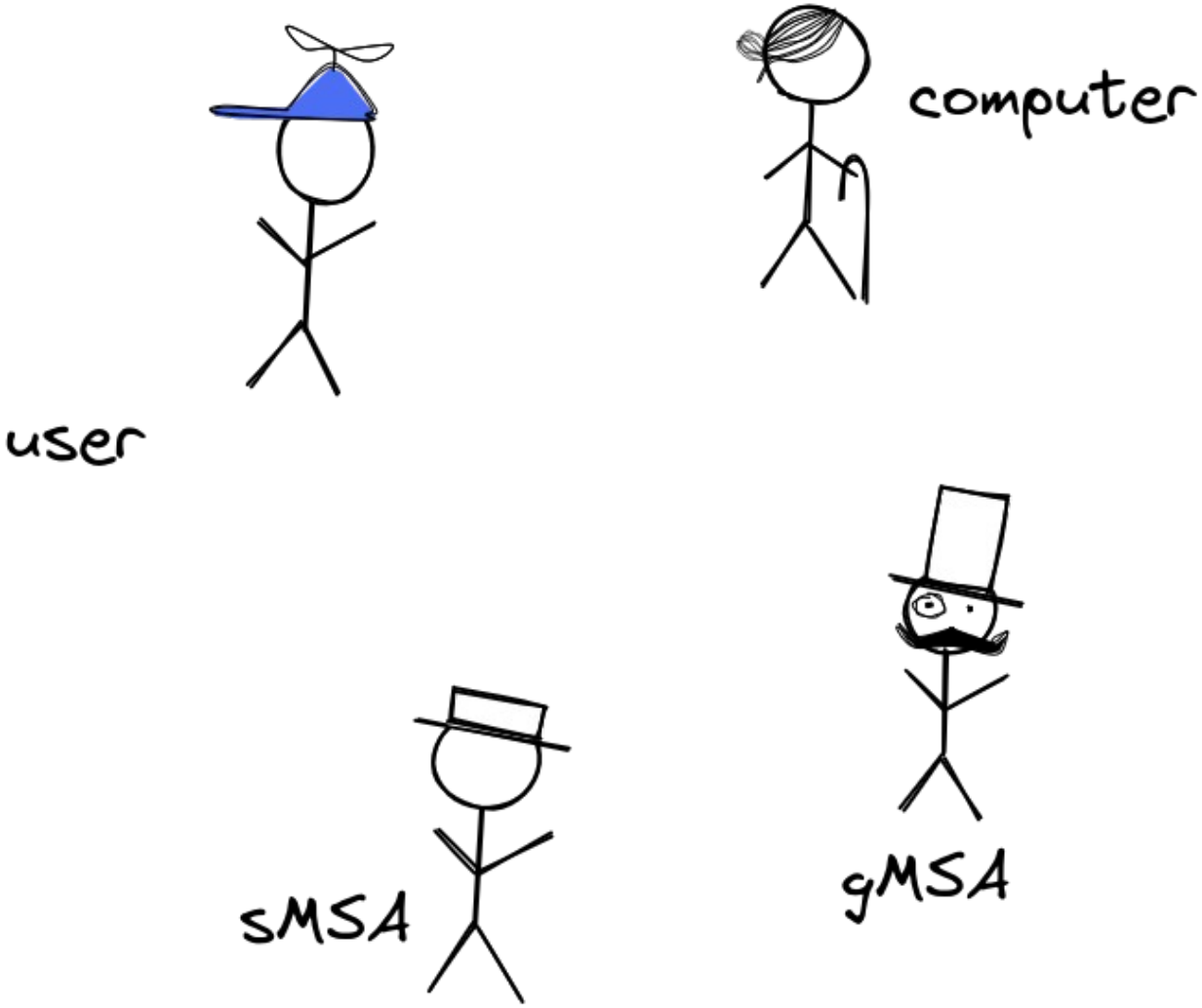


Configuration example

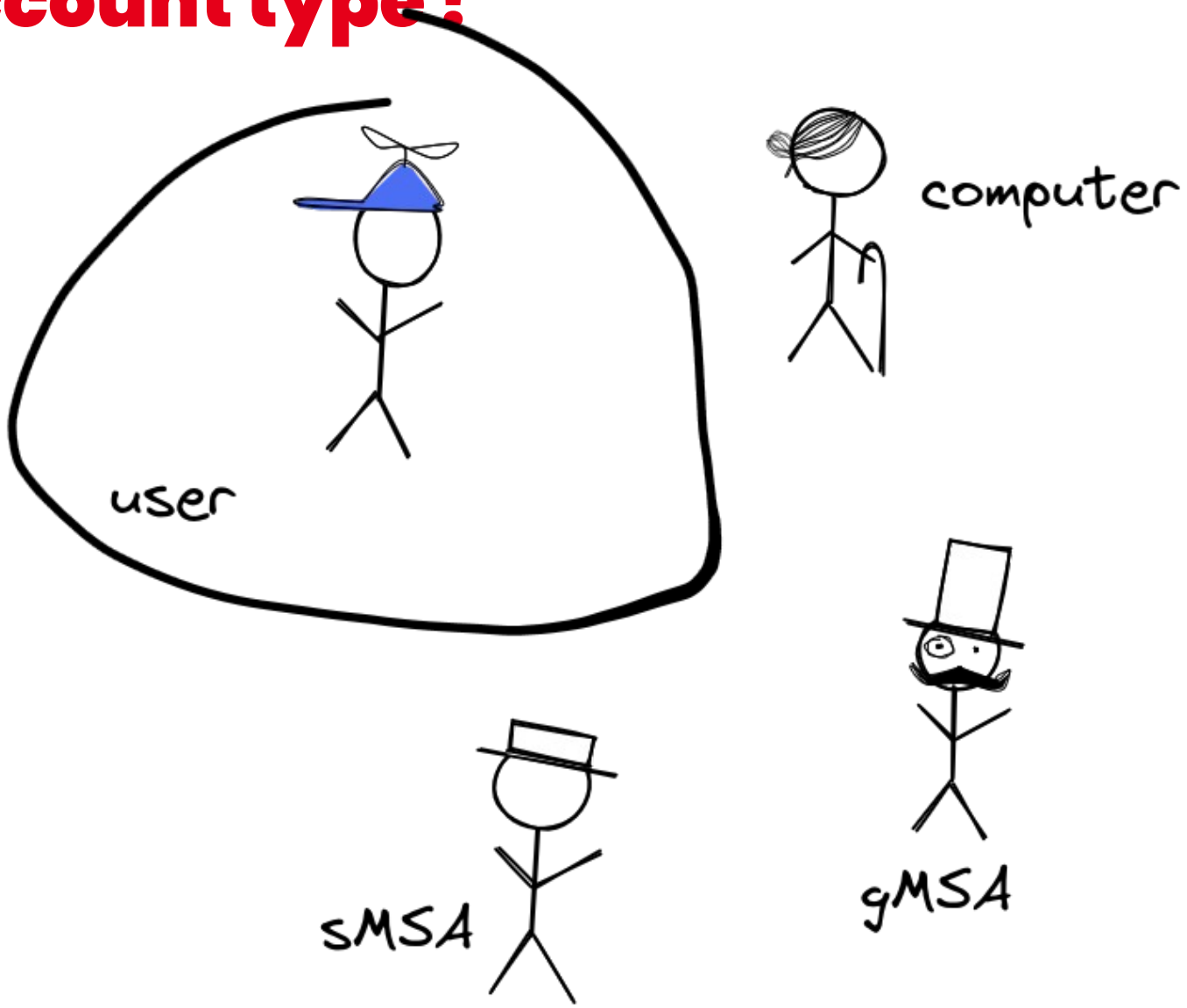
Apache configuration using `mod_auth_kerb` module:

```
<VirtualHost 10.1.2.3:443>
  ServerName super.domaine.fr

  <Location "/service">
    Require valid-user
    AuthType Kerberos
  </Location>

  KrbAuthRealms DOMAINE.FR
  Krb5Keytab /etc/service.keytab
  KrbServiceName HTTP
</VirtualHost>
```

Which account type ?



Which account type ?

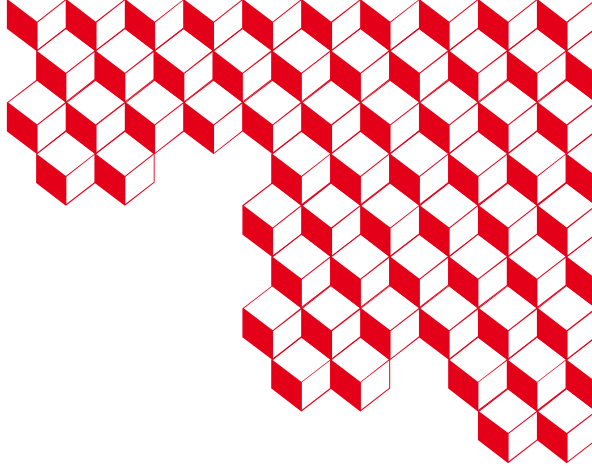


Legacy user account

- Setup
  - User account with a password which **never expires**
  - Use `ktpass.exe` to generate a **keytab**
- Issues
  - Not good to have a ”never expire” password
  - The password can be (poorly) chosen by the administrator

Legacy user account v2.0

- Setup
  - User account with a password which **expires**
    - Renew password and keytab using `msktutil` (or equivalent)
  - Use `ktpass.exe` to generate the keytab with **option +rndPass**
- Works well !



The end

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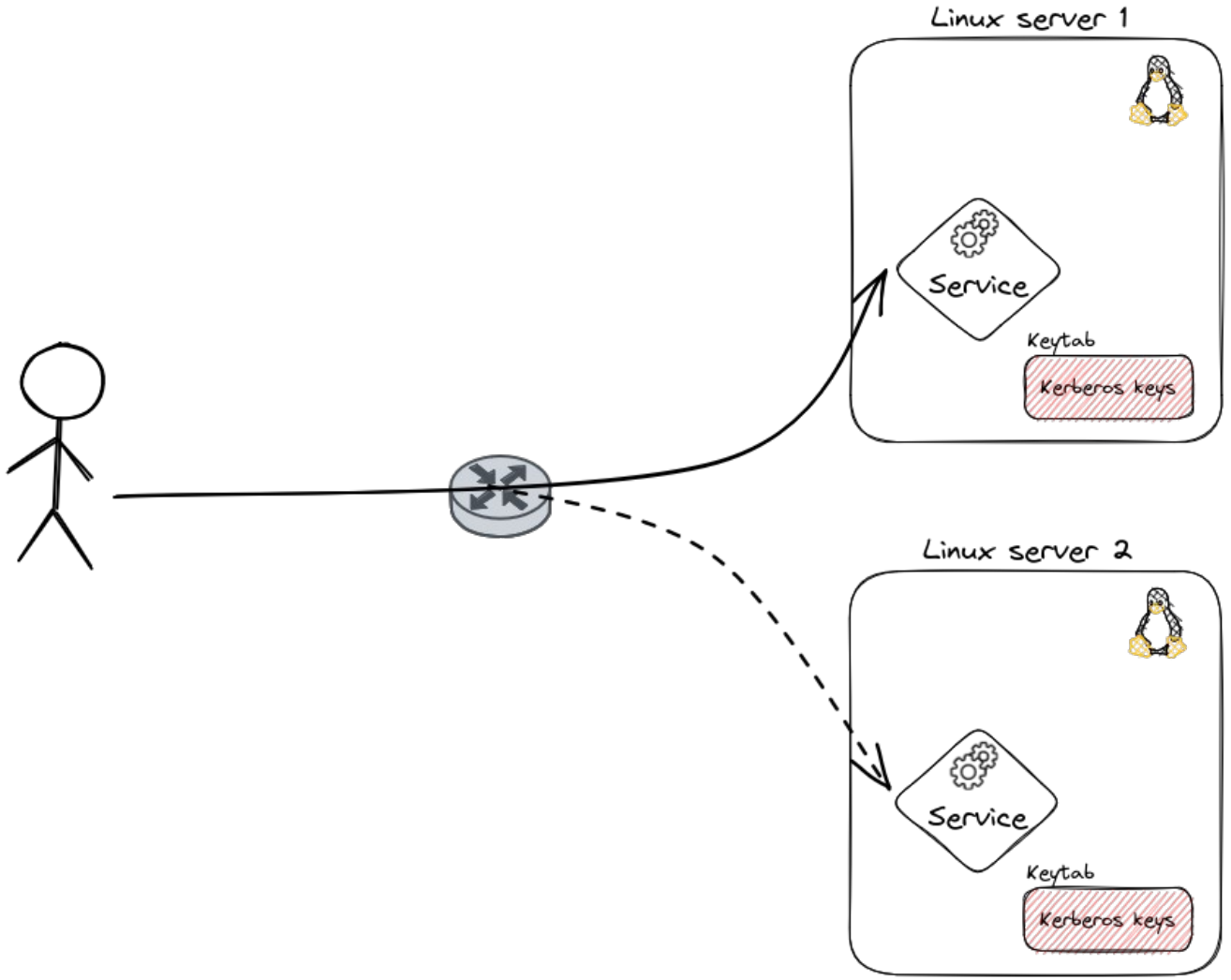
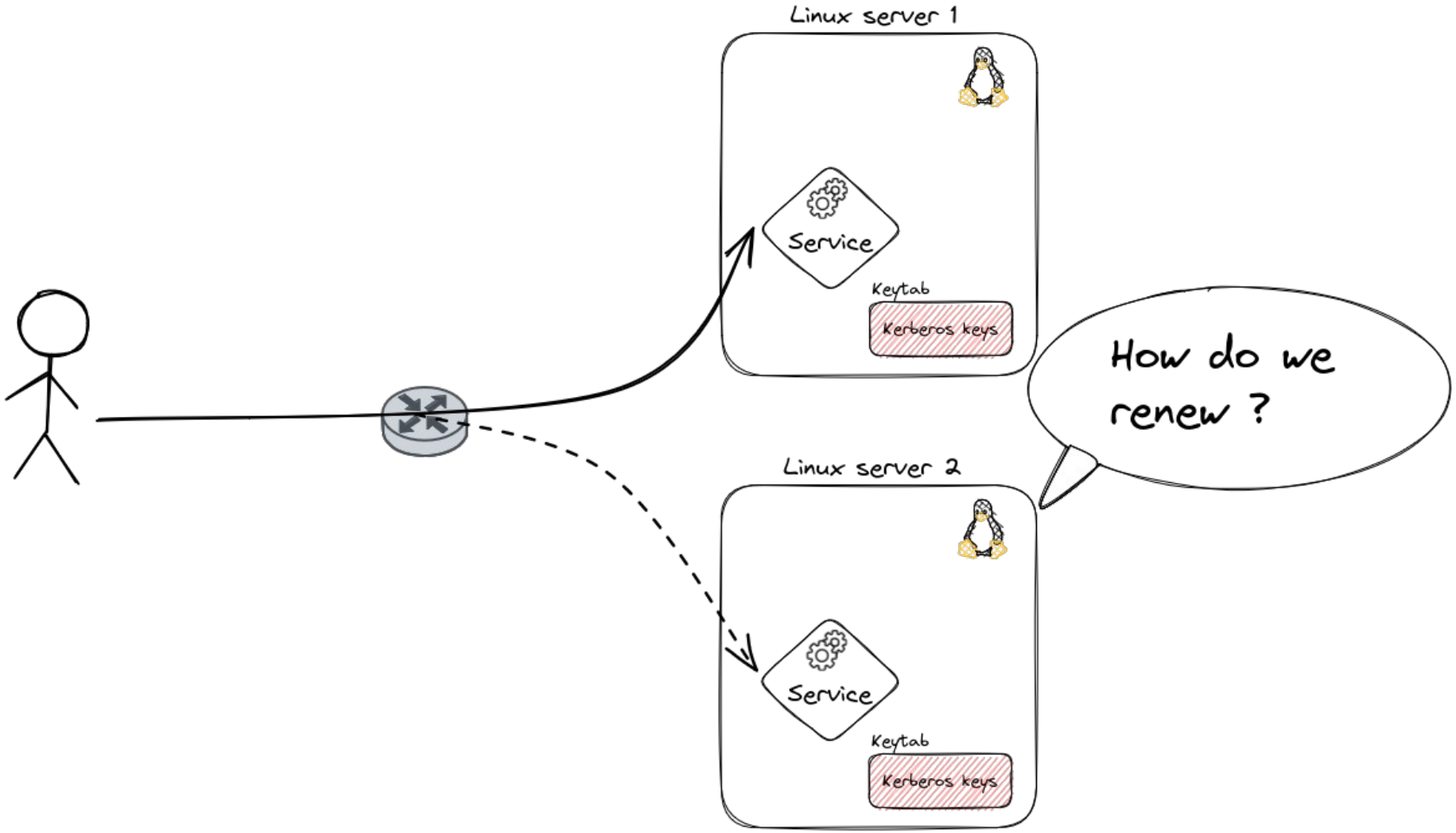
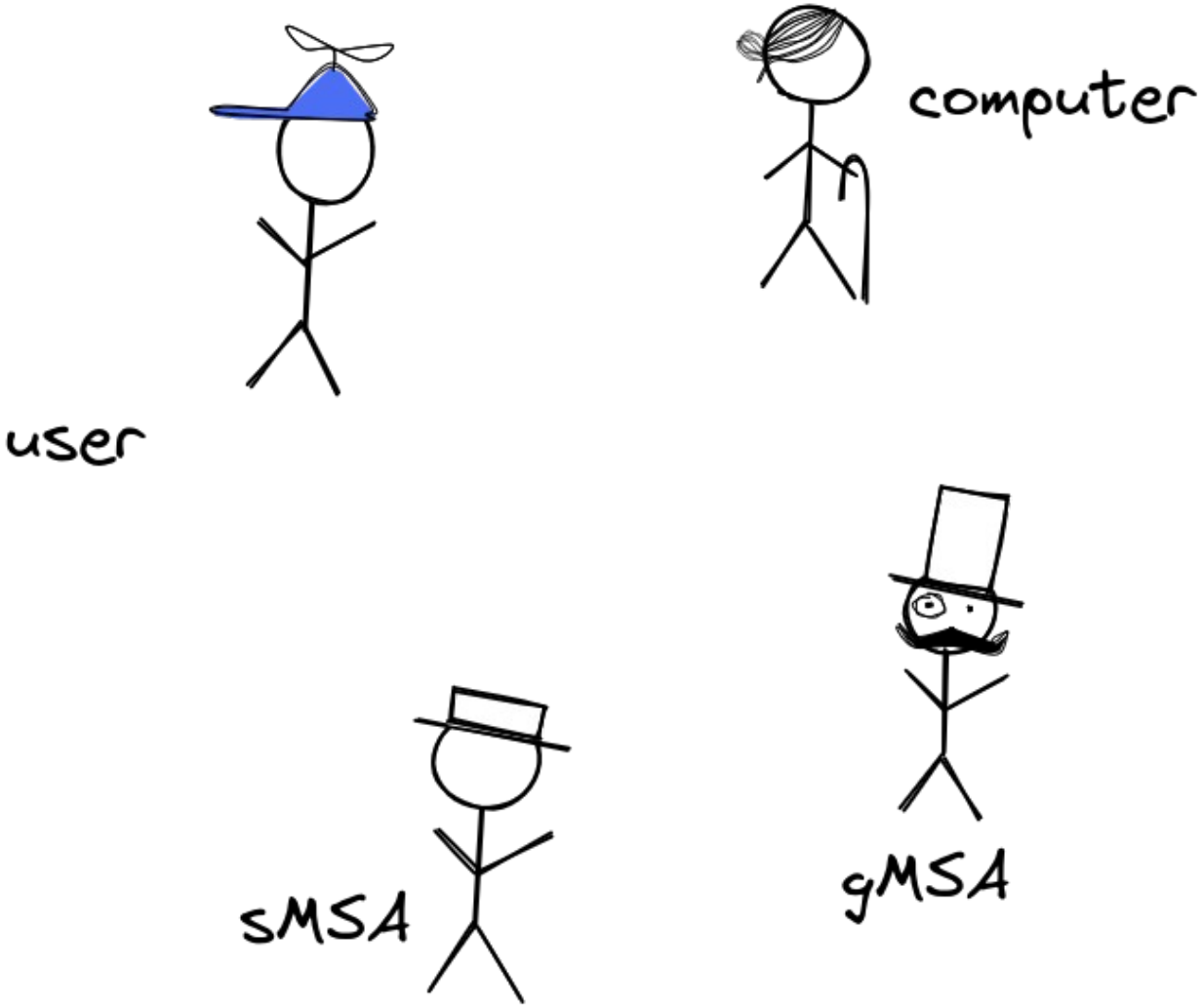
What about redundancy ?!



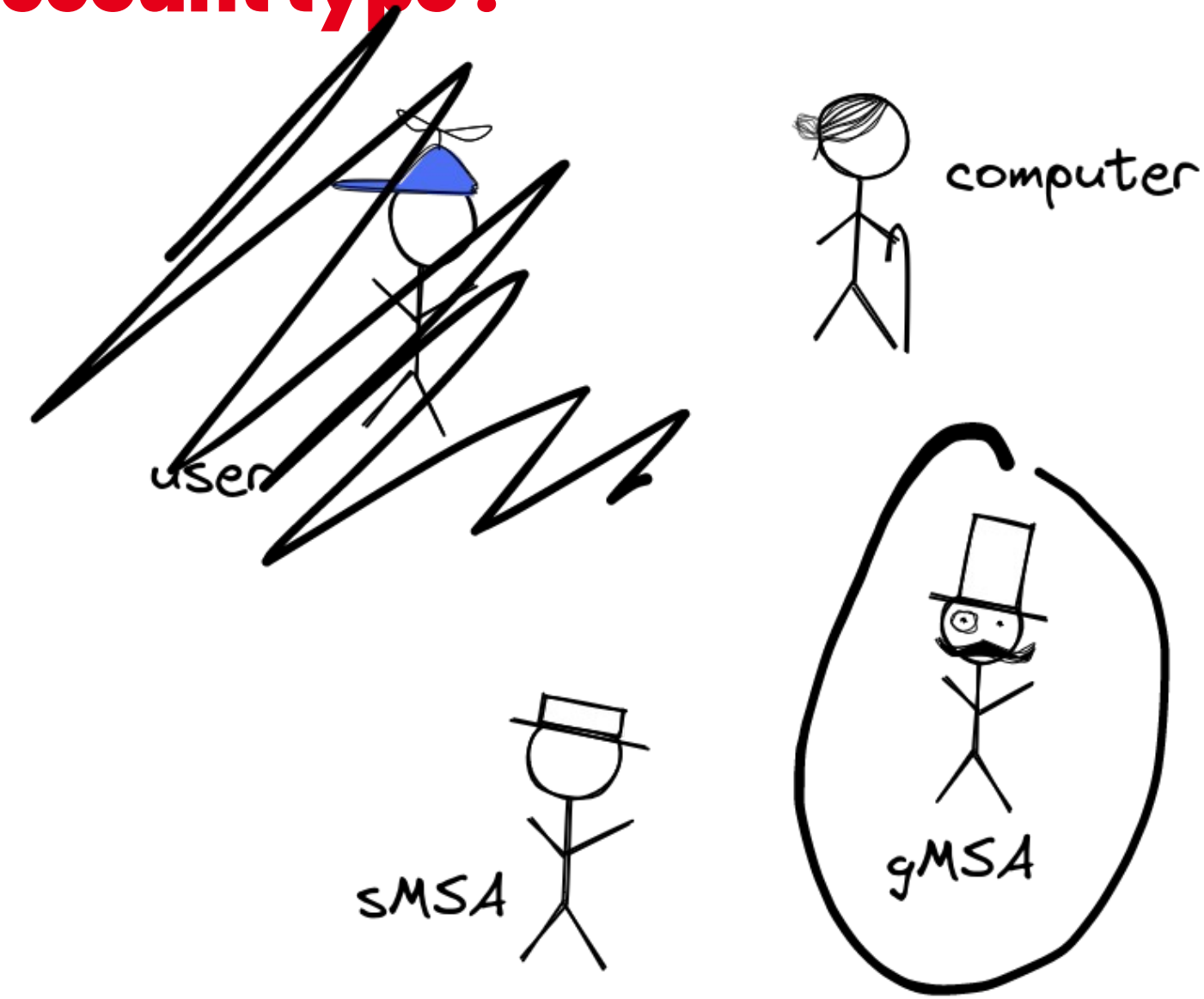
What about redundancy ?!



Which account type ?



Which account type ?



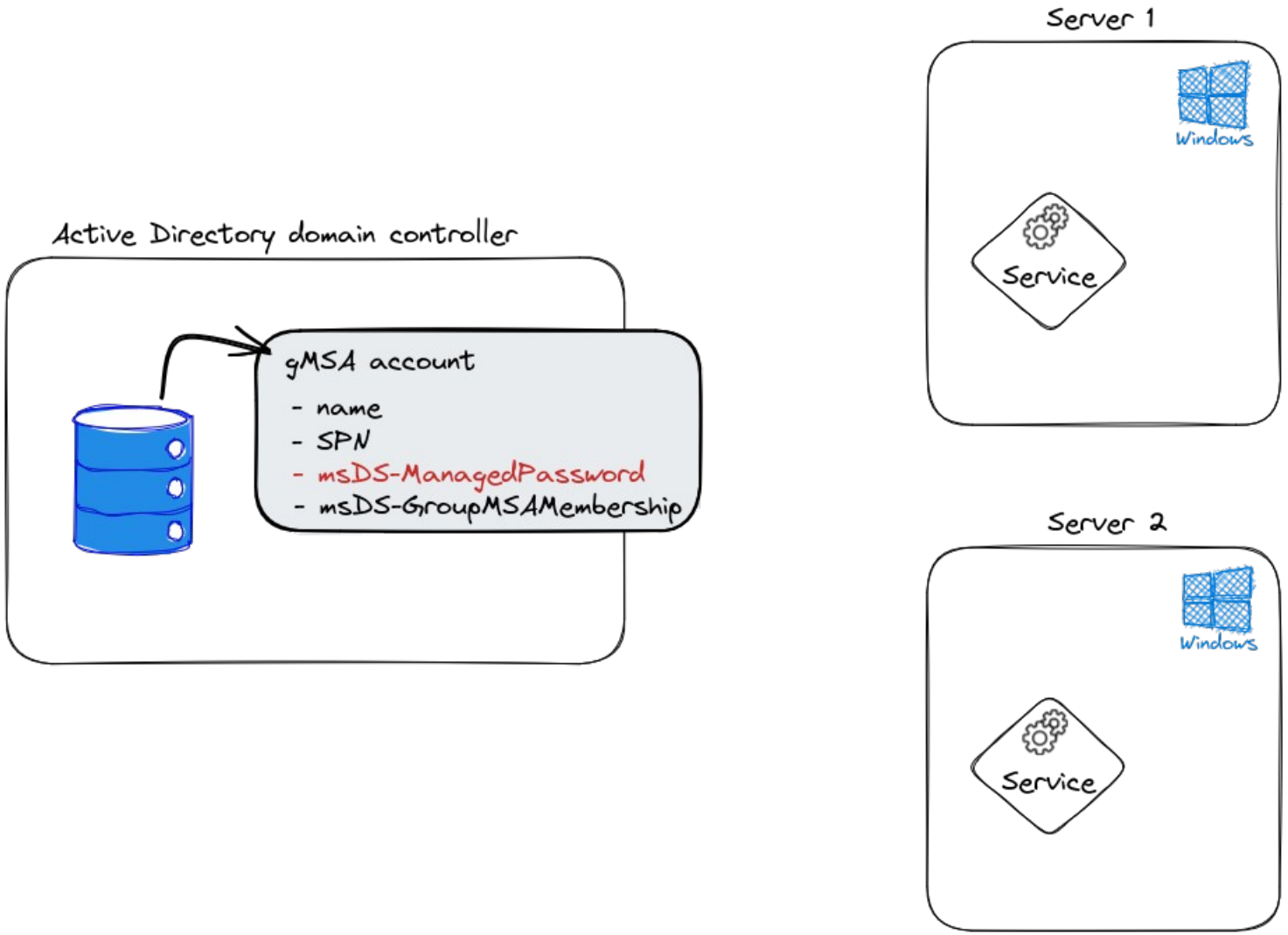
2. group Managed Service Account

group Managed Service Account

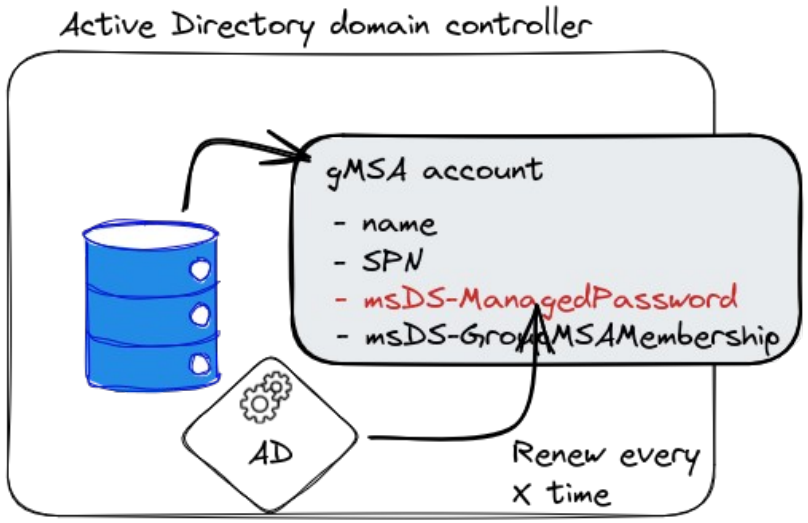
- Active Directory mechanism
- Enable the use of **one account on multiple computers**

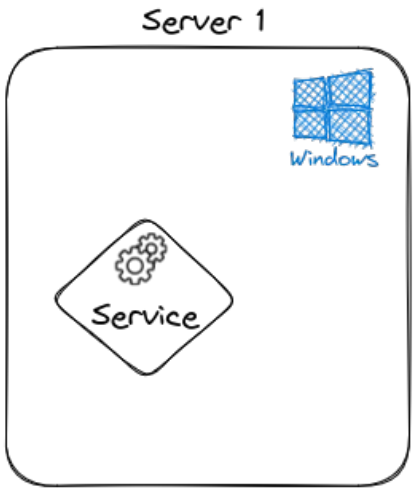
- Prerequisite:
  - KDS root key deployed
  - Schema updated to Windows Server 2012

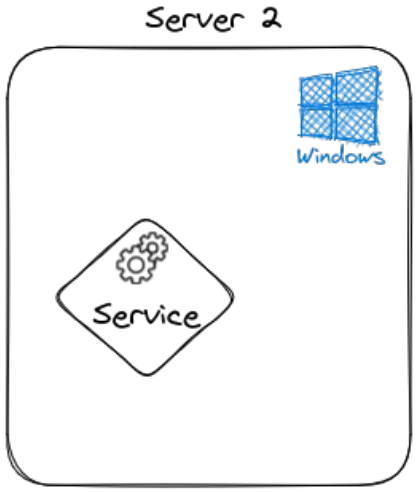
Basic gMSA life cycle



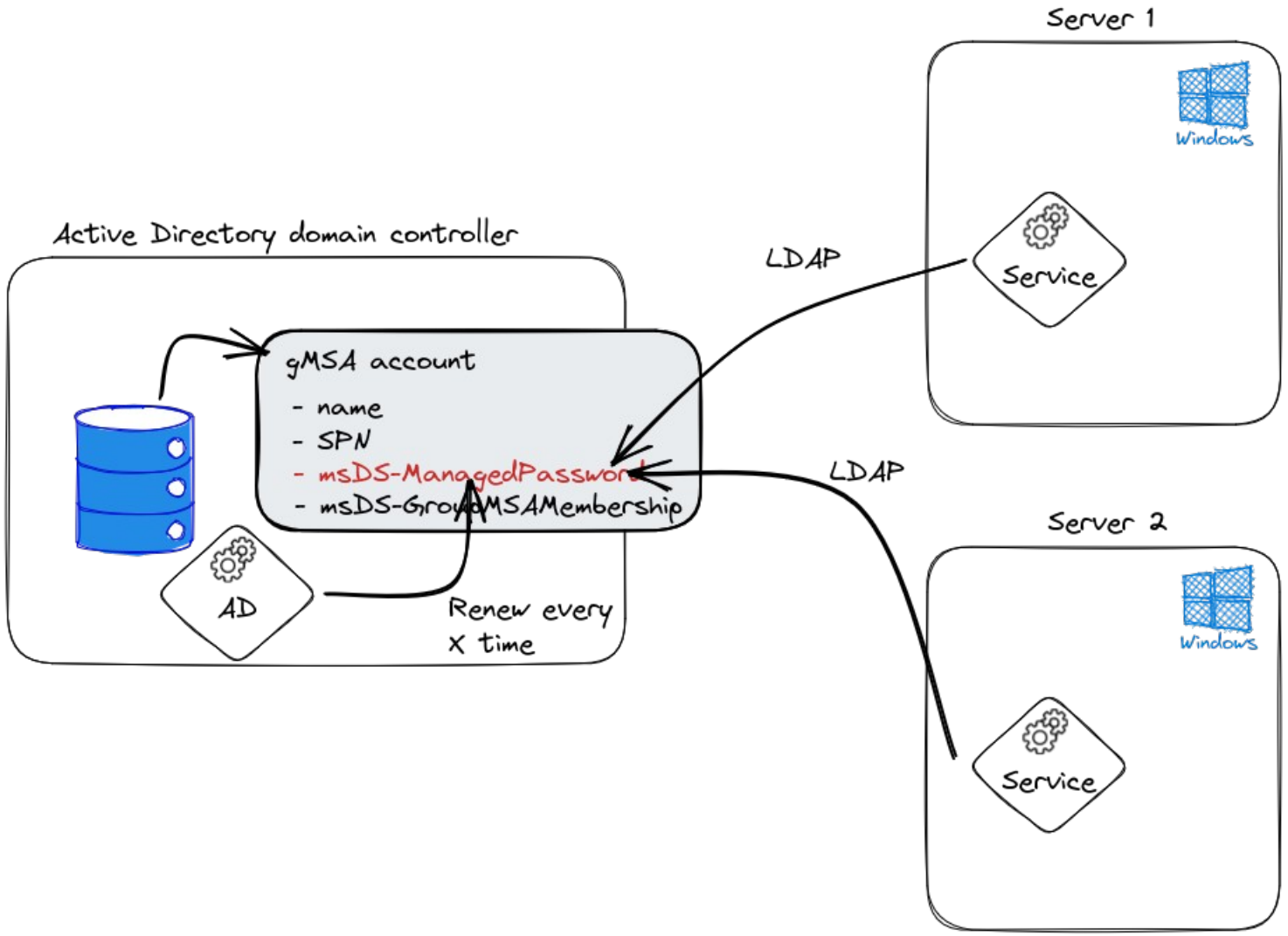
Basic gMSA life cycle







Basic gMSA life cycle

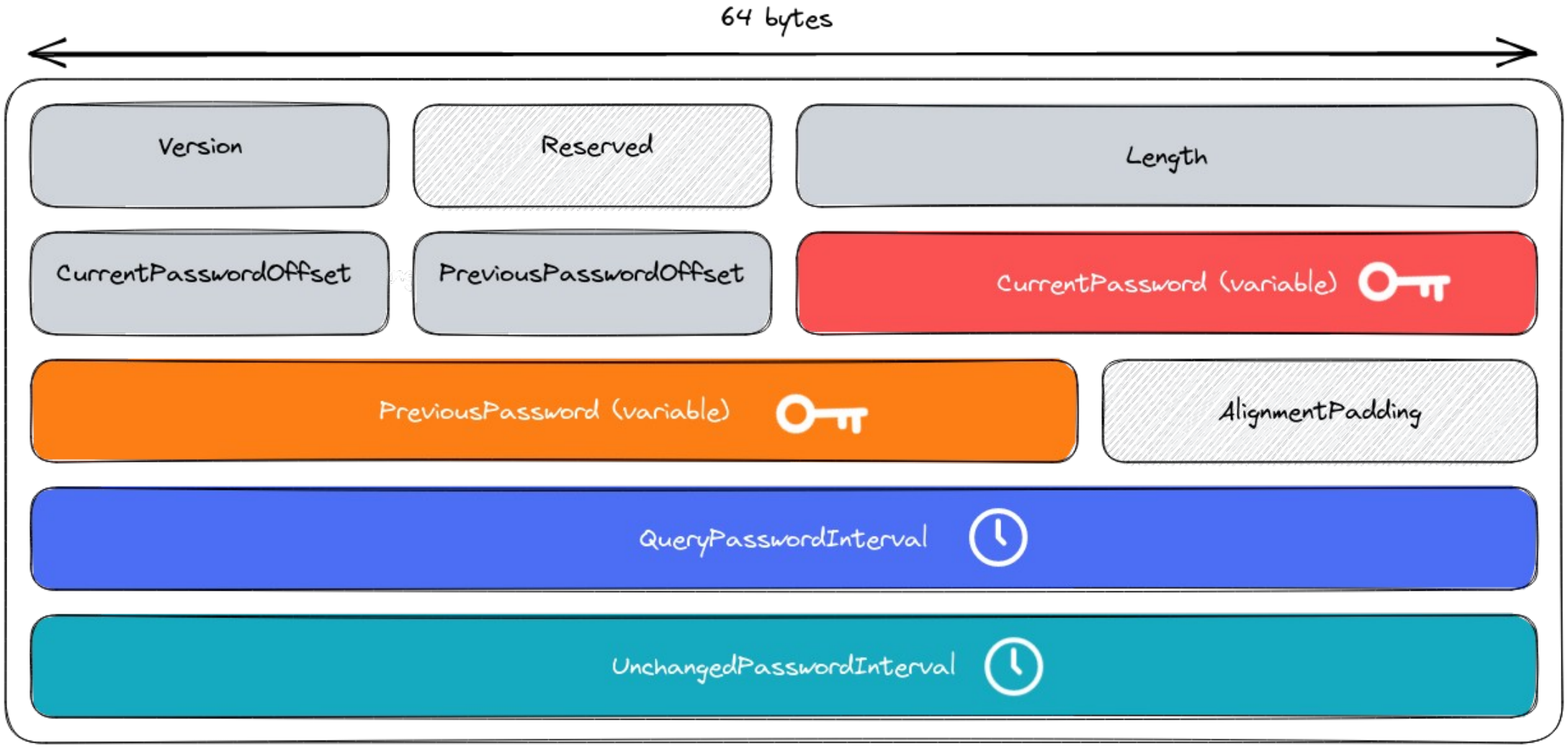


gMSA object

- **msDS-ManagedPassword** attribute
  - Gives access to the account password and some metadata
  - Accessible through an encrypted **LDAP** connection (LDAPs or Kerberos encrypted LDAP)

- **msDS-GroupMSAMembership** attribute
  - Contains the list of account who has access to msDS-ManagedPassword
  - Windows security descriptor format

msDS-ManagedPassword



MSDS-MANAGEDPASSWORD_BLOB

Microsoft « documentation »

a. Let StaleCount be zero.

b. Let NewKeyStartTime = CurrentKeyExpirationTime.

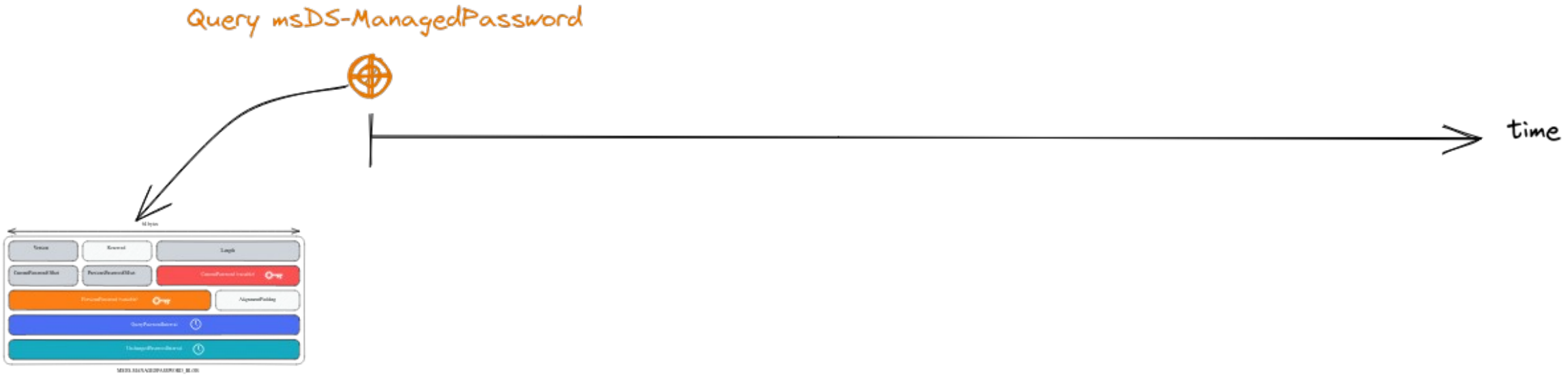
c. Let NewKeyStartTime = NewKeyStartTime + GDKIRolloverInterval and StaleCount = StaleCount +1 until NewKeyStartTime is greater than the current time.

d. Call GetPasswordBasedOnTimestamp() where:

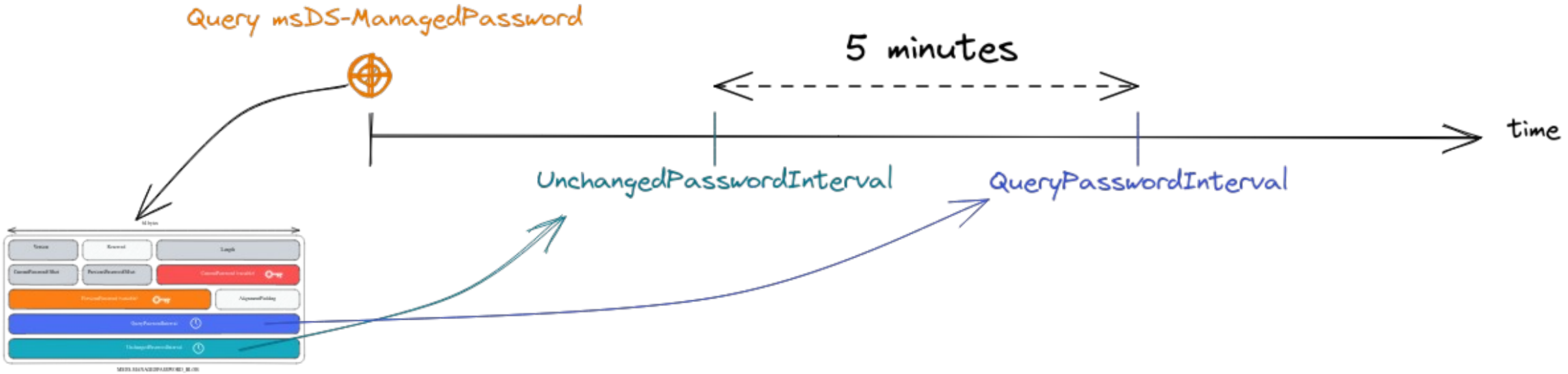
- *Timestamp* contains NewKeyStartTime.
- *AccountSID* contains the TO!objectSid attribute ([MS-ADA3] section 2.45).

Let NewKeyID be the returned KeyID. Let NewPassword be the returned password.

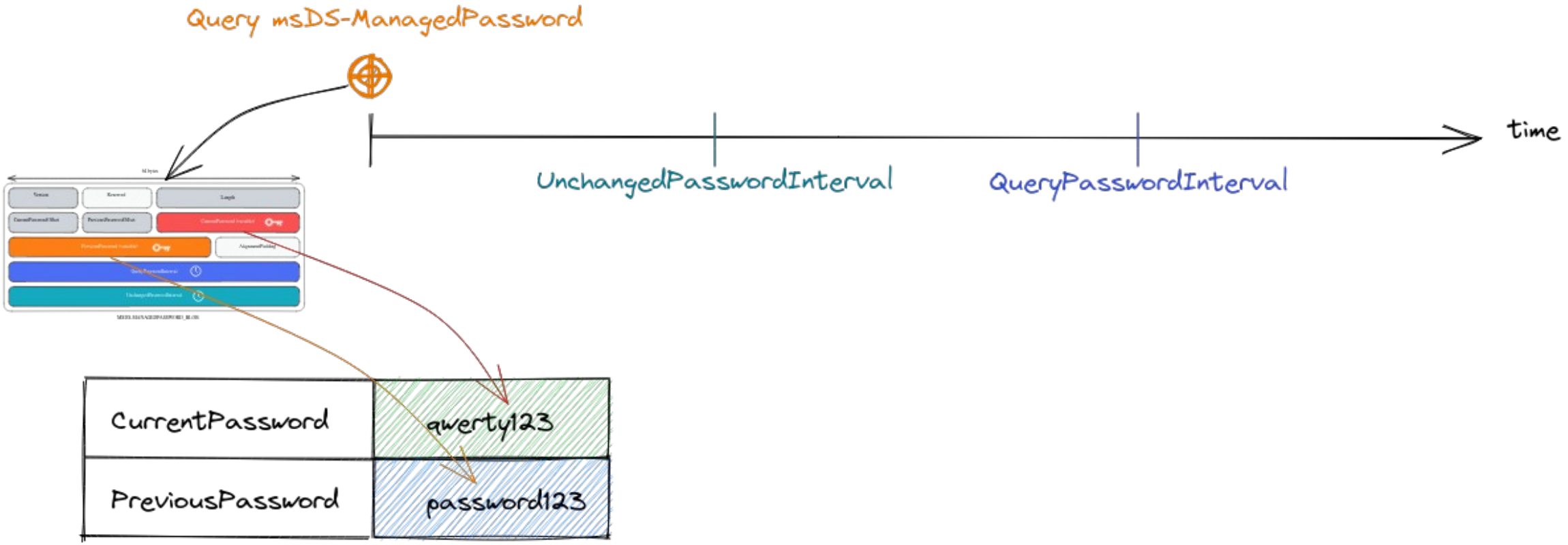
Update mechanism



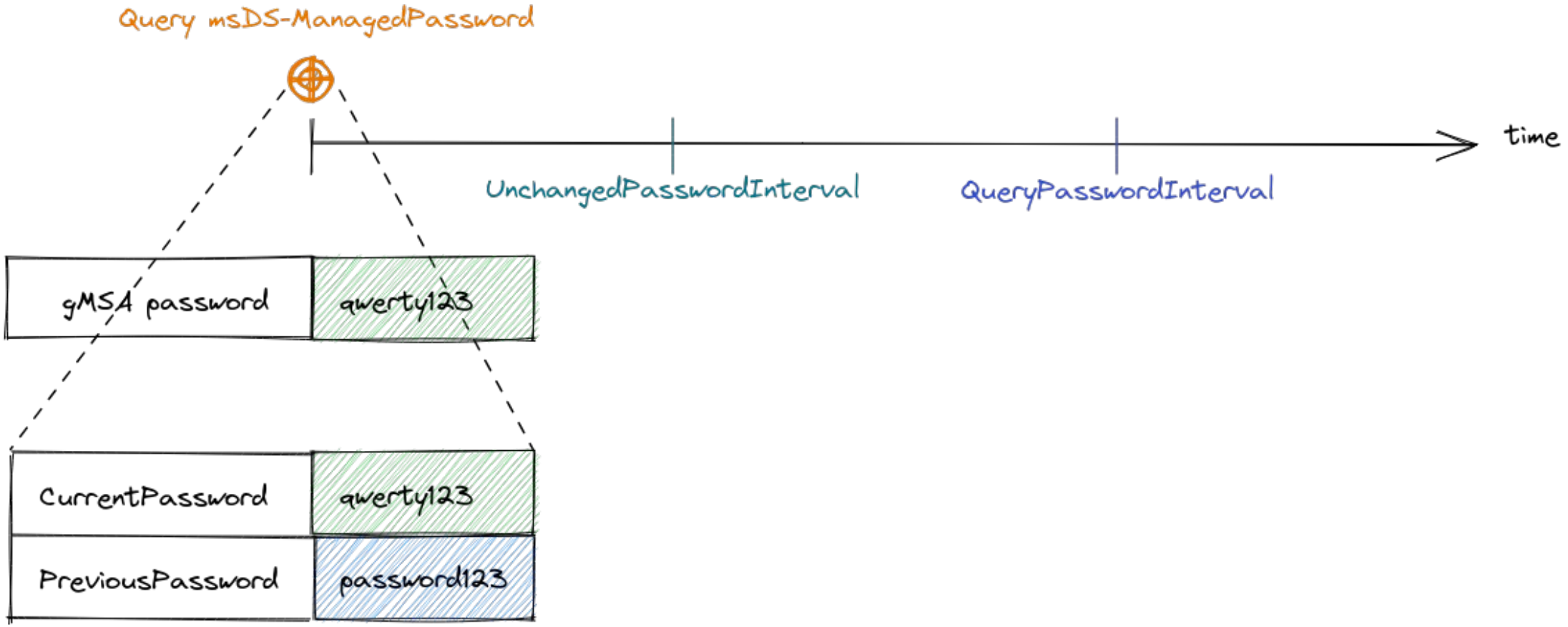
Update mechanism



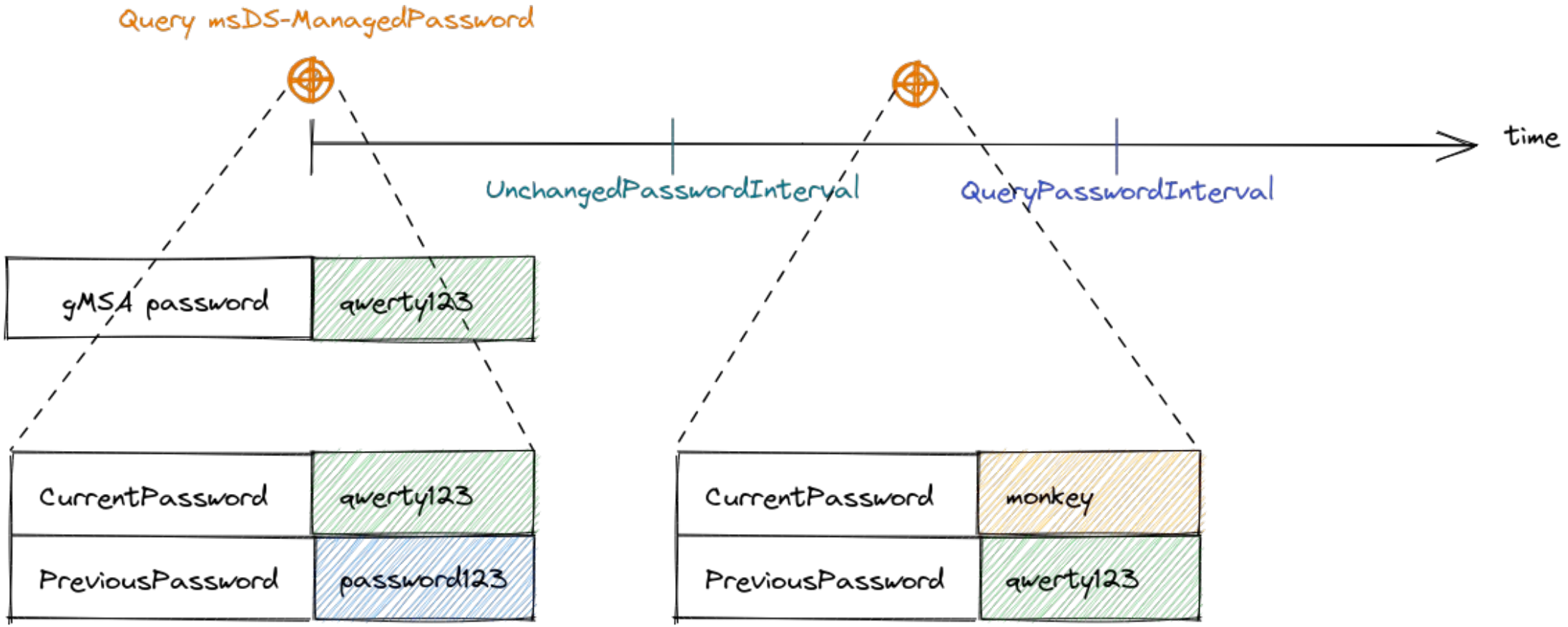
Update mechanism



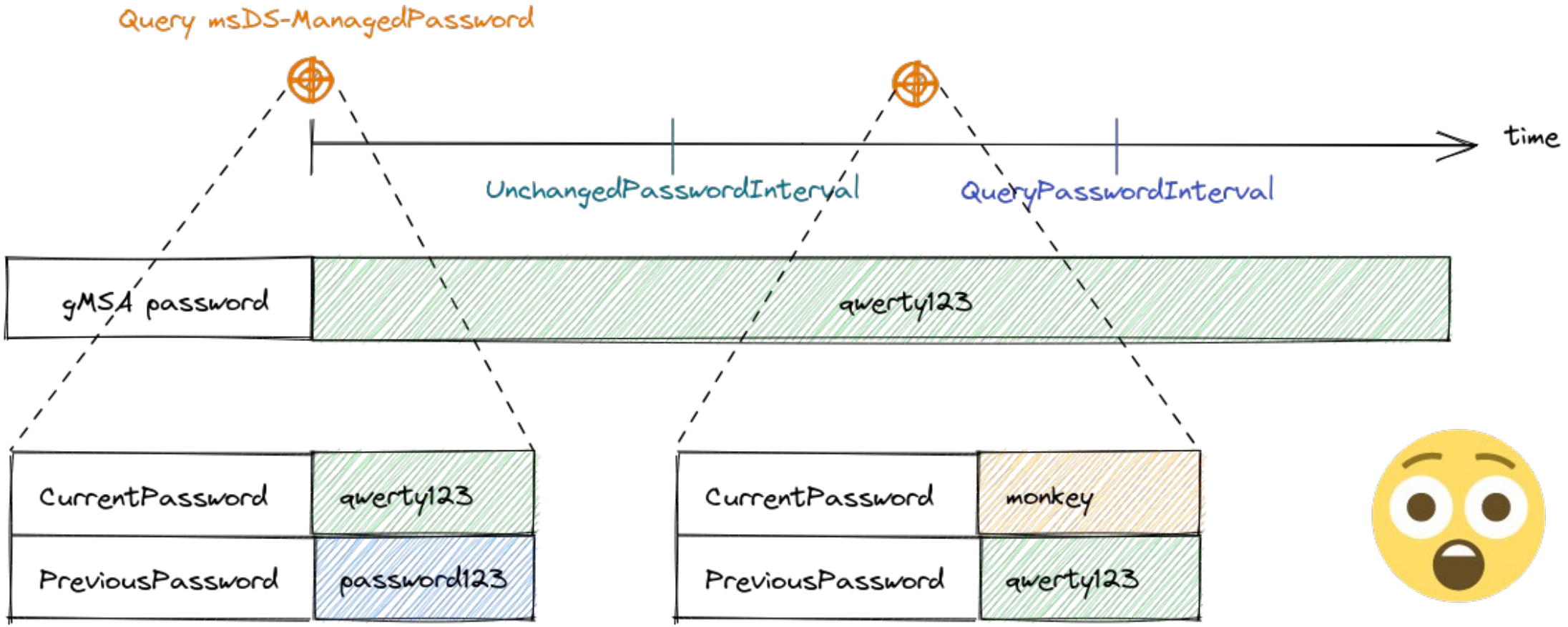
Update mechanism



Update mechanism



Update mechanism



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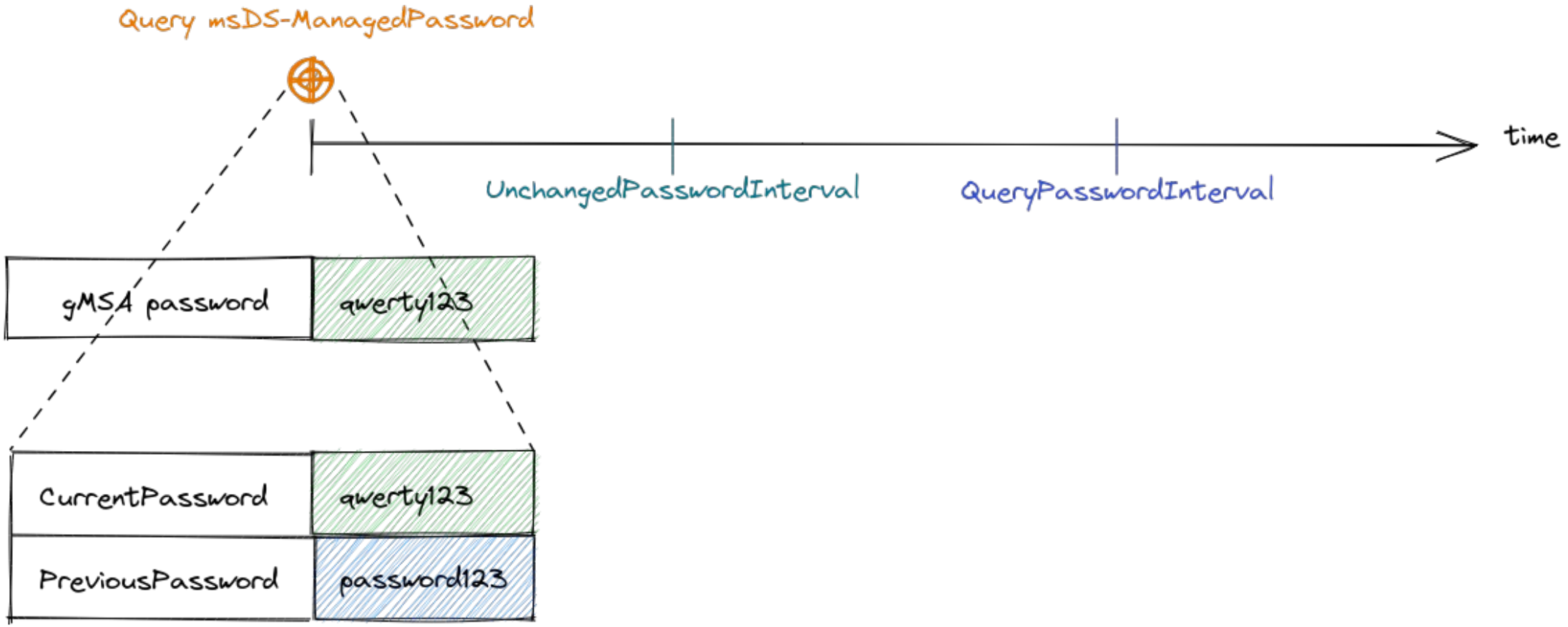
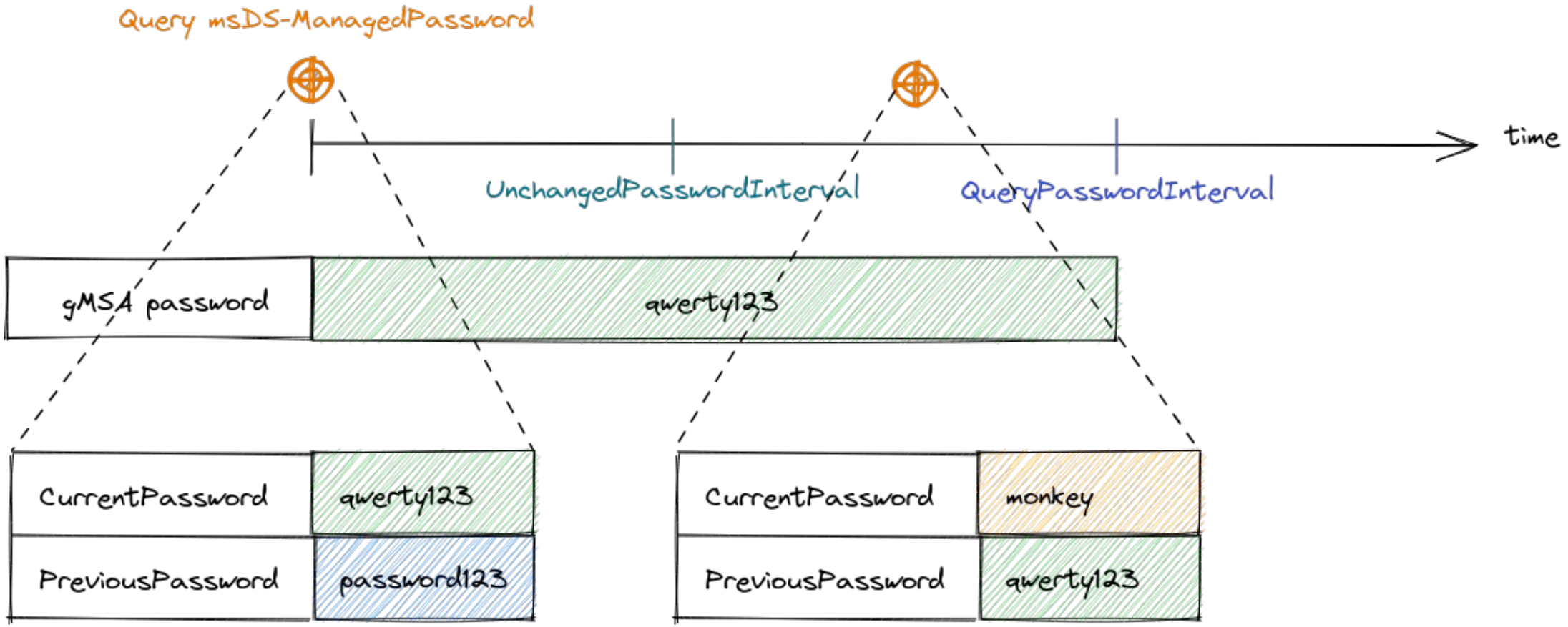
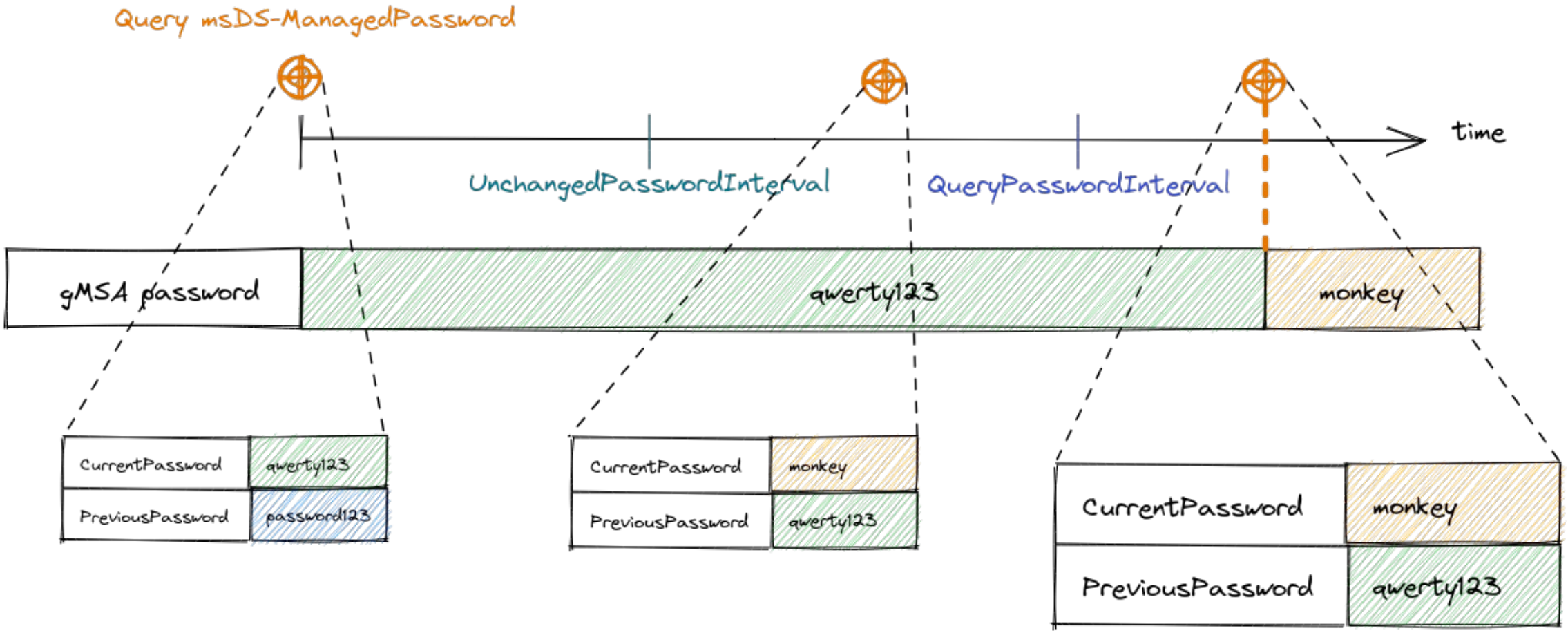


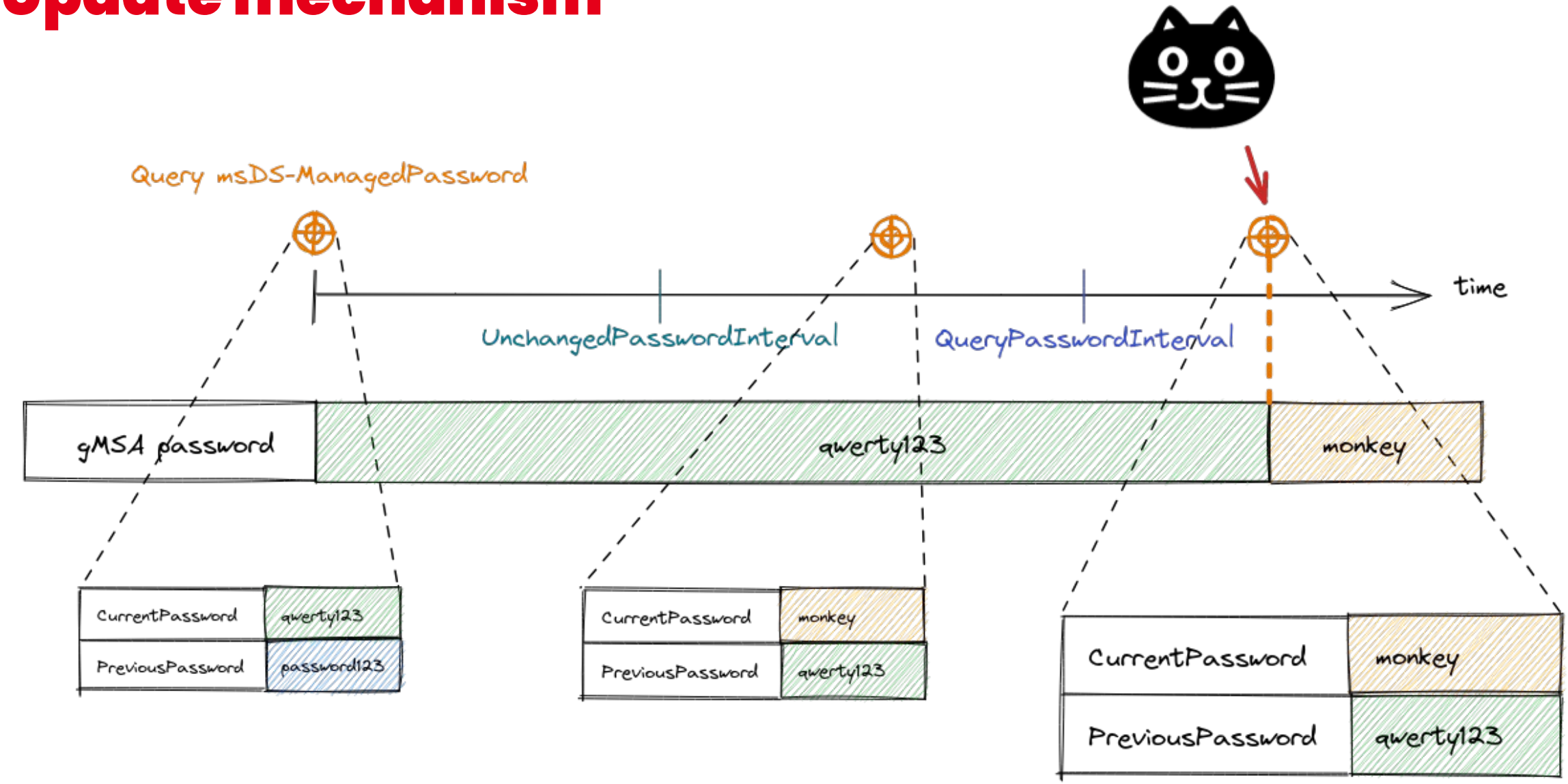
Update mechanism



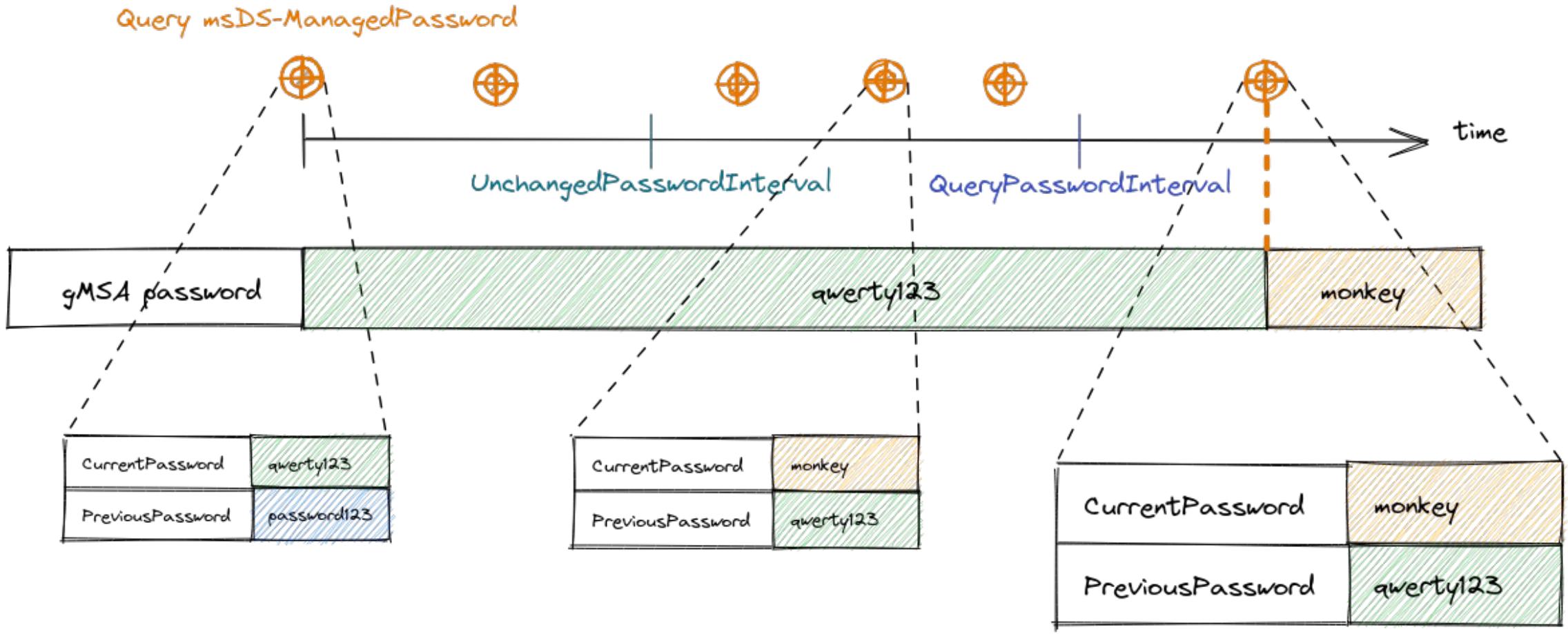
Update mechanism



Update mechanism

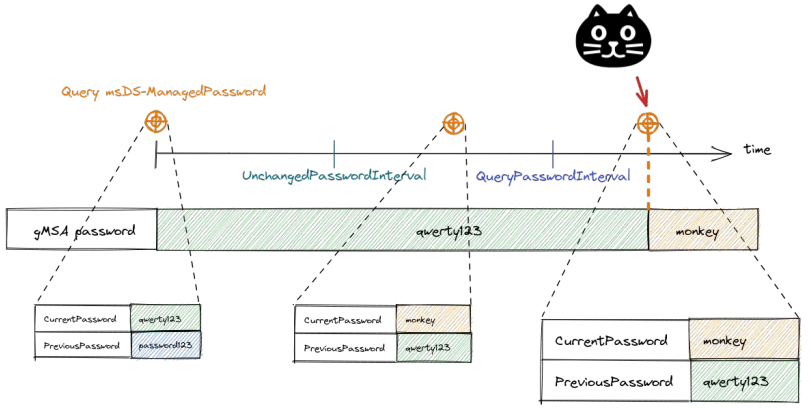


Update mechanism



Wrapping it up

- After **UnchangedPasswordInterval :**
  - We have access to the new password
  - But it is not yet changed for the account !
- After **QueryPasswordInterval**, we need to query the msDS-ManagedPassword attribute to **trigger** the password roll
- The time between these « interval » allow each computer using the gMSA to retrieve the new password before it is changed



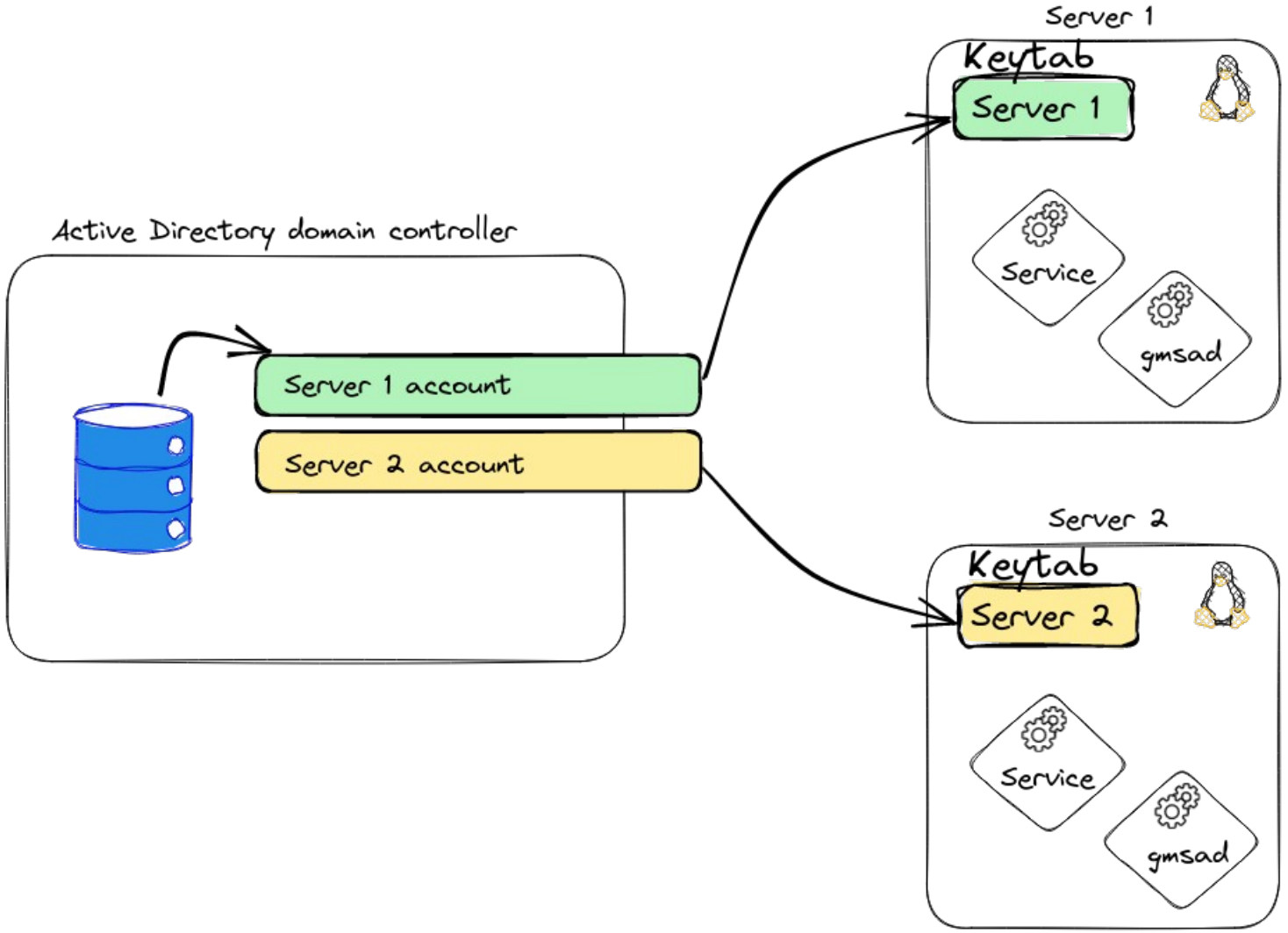
3. gmsad

gmsad

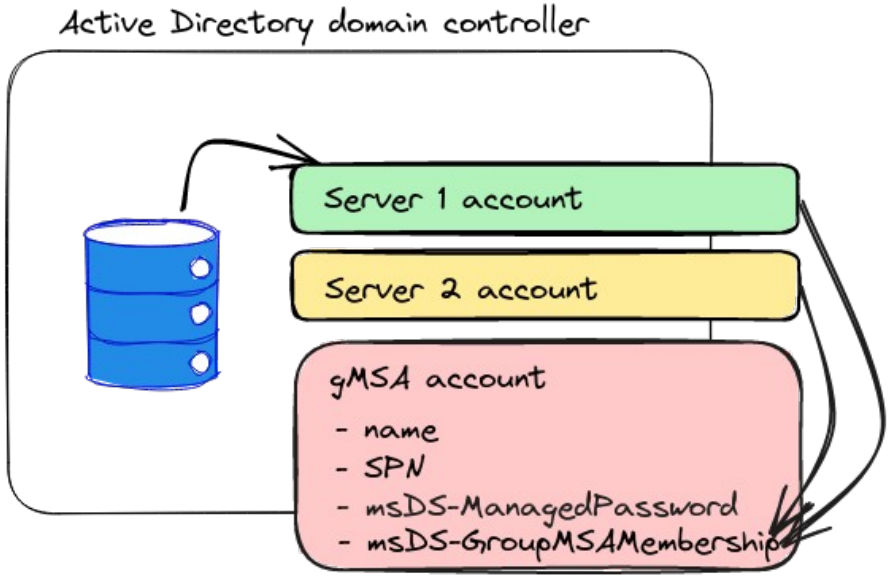
- Features :
  - Retrieve a gMSA password
  - Update mechanism
  - Manage a keytab
- Intended for use as a Linux service
- ~1000 lines of (typed) Python

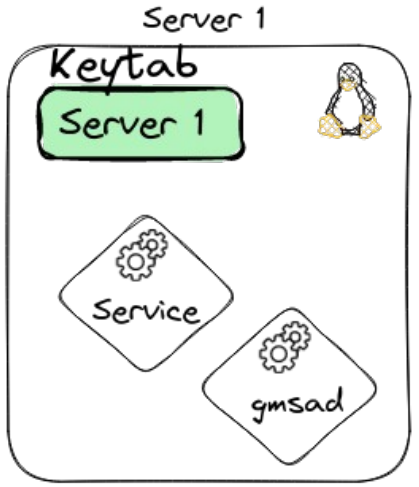
- Github: https://github.com/cea-sec/gmsad

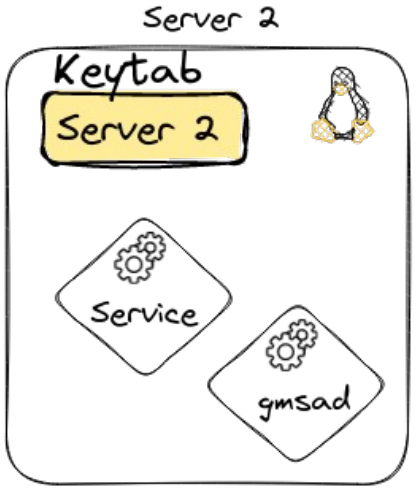
gmsad


Server 1
Keytab
Server 1
Service
gmsad
Active Directory domain controller
Server 1 account
Server 2 account
Server 2
Keytab
Server 2
Service
gmsad

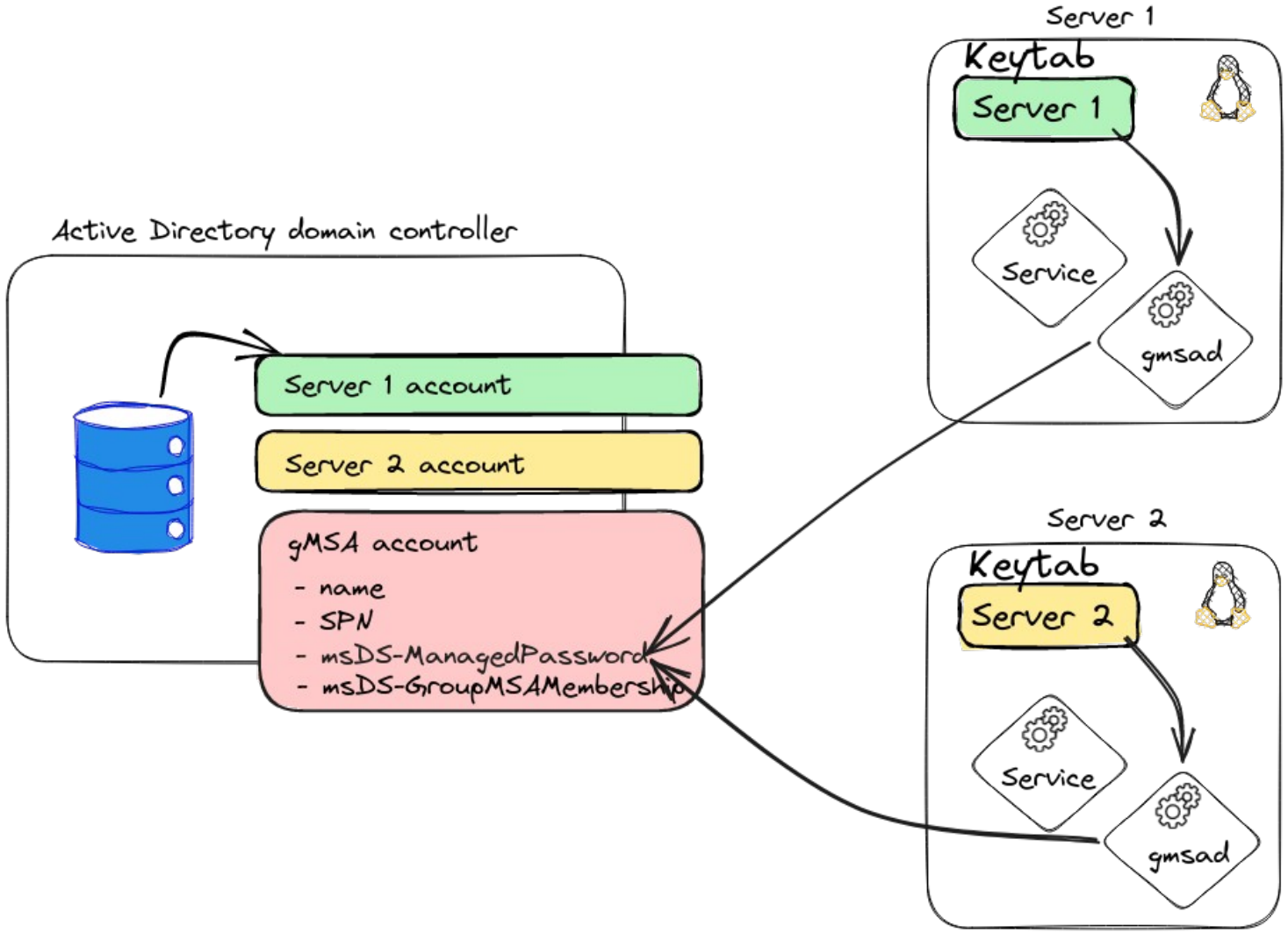
gmsad


Active Directory domain controller
Server 1 account
Server 2 account
gMSA account
- name
- SPN
- msDS-ManagedPassword
- msDS-GroupMSAMembership


Server 1
Keytab
Server 1
Service
gmsad


Server 2
Keytab
Server 2
Service
gmsad

gmsad


Server 1
Keytab
Server 1
Service
gmsad
Active Directory domain controller
Server 1 account
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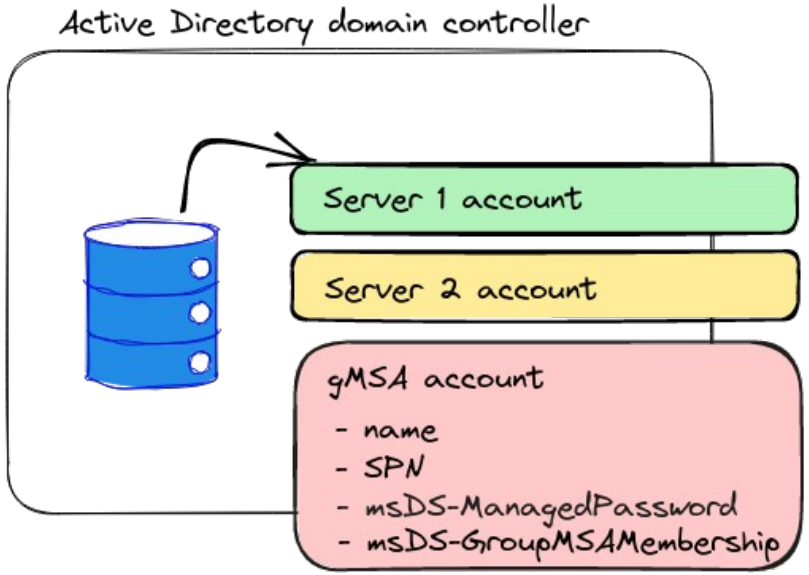
Server 2
Keytab
Server 2
Service
gmsad

gmsad


Active Directory domain controller
Server 1 account
Server 2 account
gMSA account
- name
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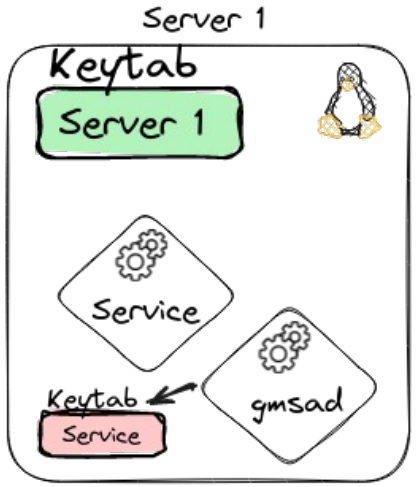
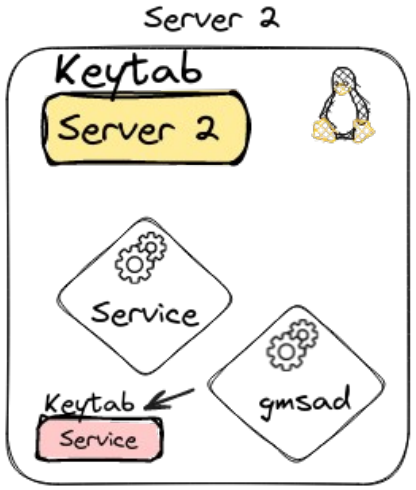
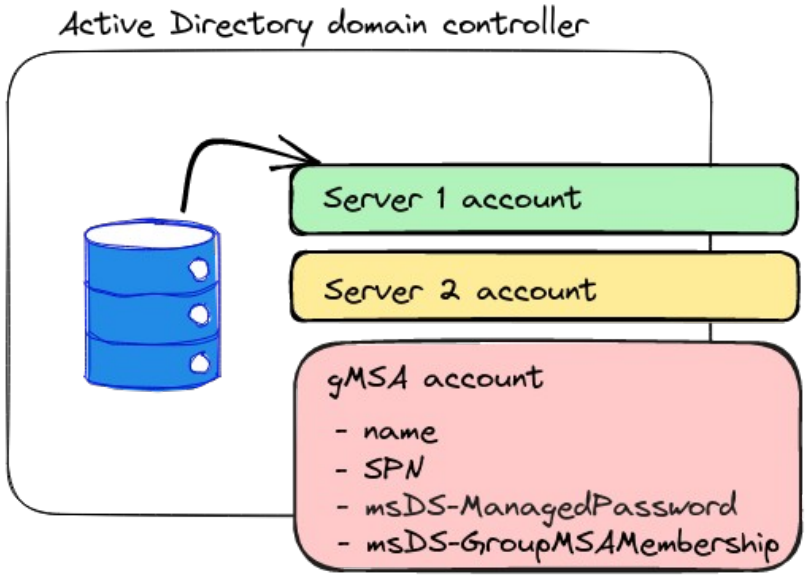

Server 1
Keytab
Server 1
Service
gmsad
Keytab
Service


Server 2
Keytab
Server 2
Service
gmsad
Keytab
Service

gmsad


Active Directory domain controller
Server 1 account
Server 2 account
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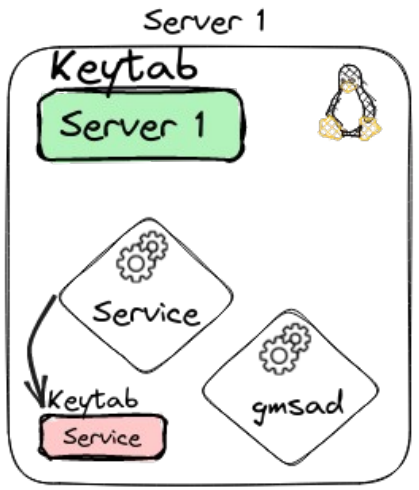
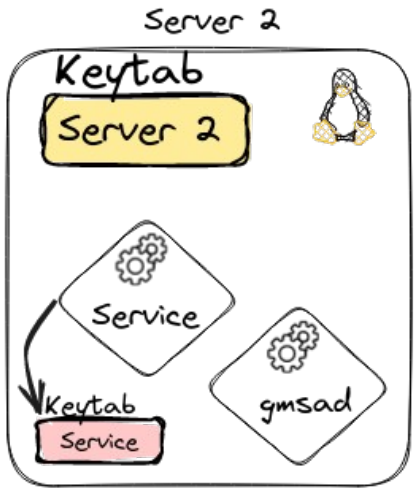
- name
- SPN
- msDS-ManagedPassword
- msDS-GroupMSAMembership


Server 1
Keytab
Server 1
Service
Keytab
Service
gmsad

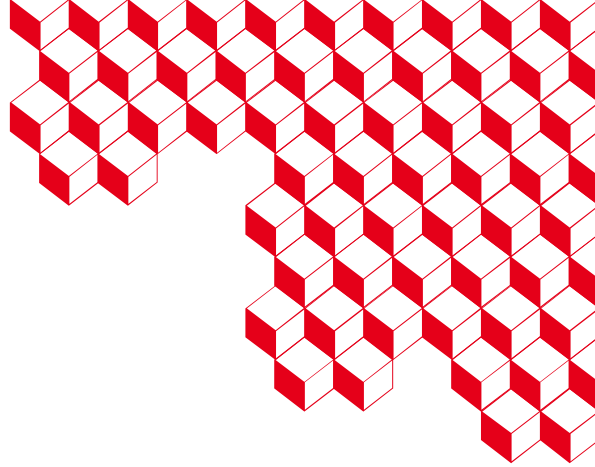

Server 2
Keytab
Server 2
Service
Keytab
Service
gmsad

Use cases

- In production:
  - Host a kerberised service on multiple Linux servers
  - Use an AD account for automated tasks from multiple machines
- In audit:
  - Retrieve the keytab of a gMSA
  - Easily generate and hack keytabs

TODO

- Packaging the tool in main Linux distributions



The end (for real)

https://github.com/cea-sec/gmsad

CEA DAM

Centre de Bruyères-le-Châtel

91297 Arpajon Cedex

Établissement public à caractère industriel et commercial

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