Red Hat Enterprise Linux 10

Integrating RHEL systems directly with Windows Active Directory

Joining RHEL hosts to AD and accessing resources in AD

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Abstract

You can join Red Hat Enterprise Linux (RHEL) hosts to an Active Directory (AD) domain by using the System Security Services Daemon (SSSD) or the Samba Winbind service to access AD resources. Alternatively, it is also possible to access AD resources without domain integration by using a Managed Service Account (MSA).

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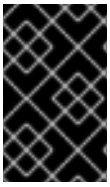
CHAPTER 1. CONNECTING RHEL SYSTEMS DIRECTLY TO AD USING SSSD

Integrate RHEL systems directly into an Active Directory (AD) forest using SSSD and **realmd**. This method supports both algorithmic POSIX ID mapping and the use of explicit AD-defined attributes.



IMPORTANT

Before joining your system to AD, ensure you configured your system correctly by following the procedure in the solution Basic Prechecks Steps: RHEL Join With Active Directory using 'adcli', 'realm' and 'net' commands (Red Hat Knowledgebase).

To connect a RHEL system to Active Directory (AD), use:

- System Security Services Daemon (SSSD) for identity and authentication
- **realmd** to detect available domains and configure the underlying RHEL system services.

1.1. OVERVIEW OF DIRECT INTEGRATION USING SSSD

SSSD provides a central framework for authentication and authorization, utilizing user caching for offline access. It integrates with Pluggable Authentication Modules (PAM) and Name Switch Service (NSS) to connect RHEL systems directly to AD forests.

SSSD is the recommended component to connect a RHEL system with one of the following types of identity server:

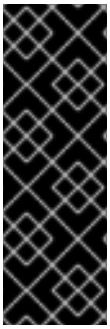
- Active Directory
- Identity Management (IdM) in RHEL
- Any generic LDAP or Kerberos server

NOTE

Direct integration with SSSD works only within a single AD forest by default.

The most convenient way to configure SSSD to directly integrate a Linux system with AD is to use the **realmd** service. It allows callers to configure network authentication and domain membership in a standard way. The **realmd** service automatically discovers information about accessible domains and realms and does not require advanced configuration to join a domain or realm.

You can use SSSD for both direct and indirect integration with AD and it allows you to switch from one integration approach to another. Direct integration is a simple way to introduce RHEL systems to an AD environment. However, as the share of RHEL systems grows, your deployments usually need a better centralized management of the identity-related policies such as host-based access control, sudo, or SELinux user mappings. Initially, you can maintain the configuration of these aspects of the RHEL systems in local configuration files. However, with a growing number of systems, distribution and management of the configuration files is easier with a provisioning system such as Red Hat Satellite. When direct integration does not scale anymore, you should consider indirect integration. For more information about moving from direct integration (RHEL clients are in the AD domain) to indirect integration (IdM with trust to AD), see Moving RHEL clients from AD domain to IdM Server.



IMPORTANT

If IdM is in FIPS mode, the IdM-AD integration does not work due to AD only supporting the use of AES HMAC-SHA1 encryption, while RHEL 9 in FIPS mode allows only AES HMAC-SHA2 by default. For more information, see the Red Hat Knowledgebase solution AD Domain Users unable to login in to the FIPS-compliant environment .

IdM does not support the more restrictive **FIPS:OSPP** crypto policy, which should only be used on Common Criteria evaluated systems.

Additional resources

- Guidelines for deciding between direct and indirect integration

1.2. SUPPORTED WINDOWS PLATFORMS FOR DIRECT INTEGRATION

Direct integration requires specific Windows Server versions and functional levels. Compatibility extends to forests operating at the Windows Server 2008 level through 2016.

- Forest functional level range: Windows Server 2008 - Windows Server 2016
- Domain functional level range: Windows Server 2008 - Windows Server 2016

Direct integration has been tested on the following supported operating systems:

- Windows Server 2022
- Windows Server 2019
- Windows Server 2016
- Windows Server 2012 R2

NOTE

Windows Server 2019 and Windows Server 2022 do not introduce a new functional level. The highest functional level Windows Server 2019 and Windows Server 2022 use is Windows Server 2016.

1.3. OPTIONS FOR INTEGRATING WITH AD: USING POSIX ID MAPPING OR POSIX ATTRIBUTES

Linux and Windows utilize different identity formats. SSSD reconciles these systems by assigning POSIX UIDs and GIDs to AD users through either algorithmic ID mapping or explicit AD attributes.

- Linux uses *user IDs* (UID) and *group IDs* (GID). See Introduction to managing user and group accounts. Linux UIDs and GIDs are compliant with the POSIX standard.
- Windows use *security IDs* (SID).

IMPORTANT

After connecting a RHEL system to AD, you can authenticate with your AD username and password. Do not create a Linux user with the same name as a Windows user, as duplicate names might cause a conflict and interrupt the authentication process.

To authenticate to a RHEL system as an AD user, you must have a UID and GID assigned. SSSD provides the option to integrate with AD either using POSIX ID mapping or POSIX attributes in AD. The default is to use POSIX ID mapping.

1.4. CONNECTING TO AD USING POSIX ID MAPPING

SSSD algorithmically transforms Active Directory Security Identifiers (SIDs) into POSIX IDs. This mapping ensures consistent UIDs and GIDs across all RHEL systems within the same ID range.

- When SSSD detects a new AD domain, it assigns a range of available IDs to the new domain.
- When an AD user logs in to an SSSD client machine for the first time, SSSD creates an entry for the user in the SSSD cache, including a UID based on the user's SID and the ID range for that domain.
- Because the IDs for an AD user are generated in a consistent way from the same SID, the user has the same UID and GID when logging in to any RHEL system.

NOTE

When all client systems use SSSD to map SIDs to Linux IDs, the mapping is consistent. If some clients use different software, choose one of the following:

- Ensure that the same mapping algorithm is used on all clients.
- Use explicit POSIX attributes defined in AD.

For more information, see the section on ID mapping in the **sssd-ad** man page.

1.4.1. Discovering and joining an AD Domain using SSSD

Use the **realmd** service to locate Active Directory domains and automate the enrollment of RHEL systems to the domain using SSSD. This process configures SSSD for identity and authentication.

Prerequisites

- Ensure that the required ports are open:
  - Ports required for direct integration of RHEL systems into AD using SSSD
- Ensure that you are using the AD domain controller server for DNS.
- Verify that the system time on both systems is synchronized. This ensures that Kerberos is able to work correctly.

Procedure

1. Install the following packages:

```
# dnf install samba-common-tools realmd oddjob oddjob-mkhomedir sssd adcli krb5-workstation
```

2. To display information for a specific domain, run **realm discover** and add the name of the domain you want to discover:

```
# realm discover ad.example.com
```

```
ad.example.com
  type: kerberos
  realm-name: AD.EXAMPLE.COM
  domain-name: ad.example.com
  configured: no
  server-software: active-directory
  client-software: sssd
  required-package: oddjob
  required-package: oddjob-mkhomedir
  required-package: sssd
  required-package: adcli
  required-package: samba-common
```

The **realmd** system uses DNS SRV lookups to find the domain controllers in this domain automatically.

NOTE

The **realmd** system can discover both Active Directory and Identity Management domains. If both domains exist in your environment, you can limit the discovery results to a specific type of server using the **--server-software=active-directory** option.

3. Configure the local RHEL system with the **realm join** command. The **realmd** suite edits all required configuration files automatically. For example, for a domain named **ad.example.com**:

```
# realm join ad.example.com
```

Verification

- Display an AD user details, such as the administrator user:

```
# getent passwd administrator@ad.example.com
```

```
administrator@ad.example.com:*:1450400500:1450400513:Administrator:/home/administrator@ad.example.com:/bin/bash
```

1.5. CONNECTING TO AD USING POSIX ATTRIBUTES DEFINED IN ACTIVE DIRECTORY

Active Directory stores POSIX attributes such as UIDs and home directories. SSSD creates local overrides by default. Disabling automatic ID mapping forces SSSD to use AD-defined values instead. For optimal performance, publish these attributes to the AD global catalog.

If POSIX attributes are not present in the global catalog, SSSD connects to the individual domain controllers directly on the LDAP port.

Prerequisites

- Ensure that the required ports are open:
  - Ports required for direct integration of RHEL systems into AD using SSSD
- Ensure that you are using the AD domain controller server for DNS.
- Verify that the system time on both systems is synchronized. This ensures that Kerberos is able to work correctly.

Procedure

1. Install the following packages:

```
# dnf install realmd oddjob oddjob-mkhomedir sssd adcli krb5-workstation
```

2. Configure the local RHEL system with POSIX ID mapping disabled using the **realm join** command with the **--automatic-id-mapping=no** option. The **realmd** suite edits all required configuration files automatically. For example, for a domain named **ad.example.com**:

```
# realm join --automatic-id-mapping=no ad.example.com
```

3. If you already joined a domain, you can manually disable POSIX ID Mapping in SSSD:
   a. Open the **/etc/sssd/sssd.conf** file.
   b. In the AD domain section, add the **ldap_id_mapping = false** setting.
   c. Remove the SSSD caches:

```
rm -f /var/lib/sss/db/*
```

   d. Restart SSSD:

```
systemctl restart sssd
```

   SSSD now uses POSIX attributes from AD, instead of creating them locally.

NOTE

You must have the relevant POSIX attributes (**uidNumber**, **gidNumber**, **unixHomeDirectory**, and **loginShell**) configured for the users in AD.

Verification

- Display an AD user details, such as the administrator user:

```
# getent passwd administrator@ad.example.com
```

```
administrator@ad.example.com:*:10000:10000:Administrator:/home/Administrator:/bin/bash
```

1.6. CONNECTING TO MULTIPLE DOMAINS IN DIFFERENT AD FORESTS WITH SSSD

You can use an Active Directory (AD) Managed Service Account (MSA) to access AD domains across separate forests. This approach bypasses the need for formal trust relationships between environments.

See Accessing AD with a Managed Service Account.

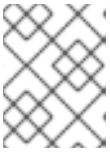
1.7. HOW THE AD PROVIDER HANDLES DYNAMIC DNS UPDATES

Active Directory (AD) removes inactive DNS records. SSSD prevents this data loss by automatically refreshing client records via secure GSS-TSIG updates. These updates occur during system reboots, provider restarts, or scheduled intervals.

AD actively maintains its DNS records by timing out (*aging*) and removing (*scavenging*) inactive records.

By default, the SSSD service refreshes a RHEL client's DNS record at the following intervals:

- Every time the identity provider comes online.
- Every time the RHEL system reboots.
- At the interval specified by the **dyndns_refresh_interval** option in the **/etc/sssd/sssd.conf** configuration file. The default value is **86400** seconds (24 hours).



NOTE

If you set the **dyndns_refresh_interval** option to the same interval as the DHCP lease, you can update the DNS record after the IP lease is renewed.

SSSD sends dynamic DNS updates to the AD server using Kerberos/GSSAPI for DNS (GSS-TSIG). This means that you only need to enable secure connections to AD.

1.8. MODIFYING DYNAMIC DNS SETTINGS FOR THE AD PROVIDER

The System Security Services Daemon (SSSD) service refreshes DNS records at default intervals. Modifying the **sssd.conf** configuration enables custom refresh schedules, controls PTR record updates, and defines specific Time To Live (TTL) values.

Prerequisites

- You have joined a RHEL host to an Active Directory environment with the SSSD service.
- You need **root** permissions to edit the **/etc/sssd/sssd.conf** configuration file.

Procedure

1. Open the **/etc/sssd/sssd.conf** configuration file in a text editor.

2. Add the following options to the **[domain]** section for your AD domain to set the DNS record refresh interval to 12 hours, disable updating PTR records, and set the DNS record Time To Live (TTL) to 1 hour.

```
[domain/ad.example.com]
id_provider = ad
...
dyndns_refresh_interval = 43200
dyndns_update_ptr = false
dyndns_ttl = 3600
```

3. Save and close the **/etc/sssd/sssd.conf** configuration file.

4. Restart the SSSD service to load the configuration changes.

```
[root@client ~]# systemctl restart sssd
```

NOTE

You can disable dynamic DNS updates by setting the **dyndns_update** option in the **sssd.conf** file to **false**:

```
[domain/ad.example.com]
id_provider = ad
...

dyndns_update = false
```

Additional resources

- How the AD provider handles dynamic DNS updates

1.9. HOW THE AD PROVIDER HANDLES TRUSTED DOMAINS

SSSD supports domain discovery exclusively within a single Active Directory (AD) forest. It attempts to resolve objects from all forest domains by default. Defining specific domains in **ad_enabled_domains** optimizes performance by excluding unreachable connections.

If you set the **id_provider = ad** option in the **/etc/sssd/sssd.conf** configuration file, SSSD handles trusted domains as follows:

- SSSD only supports domains in a single AD forest. If SSSD requires access to multiple domains from multiple forests, consider using IPA with trusts (preferred) or the **winbindd** service instead of SSSD.

- By default, SSSD discovers all domains in the forest and, if a request for an object in a trusted domain arrives, SSSD tries to resolve it.
  If the trusted domains are not reachable or geographically distant, which makes them slow, you can set the **ad_enabled_domains** parameter in **/etc/sssd/sssd.conf** to limit from which trusted domains SSSD resolves objects.

- By default, you must use fully-qualified user names to resolve users from trusted domains.

1.10. OVERRIDING ACTIVE DIRECTORY SITE AUTODISCOVERY WITH SSSD

Active Directory (AD) sites optimize traffic by grouping domain controllers geographically. SSSD automatically queries for the closest site to ensure low latency. Manually defining the site overrides this process and enforces connection to a specific location.

This section describes how SSSD uses autodiscovery to find an AD site to connect to, and how you can override autodiscovery and specify a site manually.

1.10.1. How SSSD handles AD site autodiscovery

SSSD locates the optimal Active Directory (AD) site through DNS SRV lookups and Connection-Less LDAP (CLDAP) pings. The service batches these requests to efficiently identify and cache the nearest domain controllers.

1. SSSD performs an SRV query to find Domain Controllers (DCs) in the domain. SSSD reads the discovery domain from the **dns_discovery_domain** or the **ad_domain** options in the SSSD configuration file.

2. SSSD performs Connection-Less LDAP (CLDAP) pings to these DCs in 3 batches to avoid pinging too many DCs and avoid timeouts from unreachable DCs. If SSSD receives site and forest information during any of these batches, it skips the rest of the batches.

3. SSSD creates and saves a list of site-specific and backup servers.

1.10.2. Overriding AD site autodiscovery

Define the **ad_site** parameter in **/etc/sssd/sssd.conf** to bypass automatic site detection. Explicitly configuring the site forces SSSD to direct authentication traffic to a specific location instead of the nearest detected site.

Prerequisites

- You have joined a RHEL host to an Active Directory environment using the SSSD service.
- You can authenticate as the **root** user so you can edit the **/etc/sssd/sssd.conf** configuration file.

Procedure

1. Open the **/etc/sssd/sssd.conf** file in a text editor.

2. Add the **ad_site** option to the **[domain]** section for your AD domain:

```
[domain/ad.example.com]
id_provider = ad
...
ad_site = ExampleSite
```

3. Save and close the **/etc/sssd/sssd.conf** configuration file.

4. Restart the SSSD service to load the configuration changes:

```
# systemctl restart sssd
```

1.11. REALM COMMANDS

The **realm** utility manages domain enrollment and enforces local access policies. Specific subcommands handle network discovery, join operations, and the authorization of domain users on the local host.

In **realmd** use the command line tool **realm** to run commands. Most **realm** commands require the user to specify the action that the utility should perform, and the entity, such as a domain or user account, for which to perform the action.

Table 1.1. realmd commands

Command	Description
Realm Commands	
discover	Run a discovery scan for domains on the network.
join	Add the system to the specified domain.
leave	Remove the system from the specified domain.
list	List all configured domains for the system or all discovered and configured domains.
Login Commands	
permit	Enable access for specific users or for all users within a configured domain to access the local system.
deny	Restrict access for specific users or for all users within a configured domain to access the local system.

1.12. PORTS REQUIRED FOR DIRECT INTEGRATION OF RHEL SYSTEMS INTO AD USING SSSD

Direct integration relies on specific network ports for DNS, Kerberos, LDAP, and SMB protocols. Firewalls must permit traffic between the RHEL host and Active Directory Domain Controllers to enable authentication and Group Policy processing.

The following ports must be open and accessible to the AD domain controllers and the RHEL host.

Table 1.2. Ports Required for Direct Integration of Linux Systems into AD Using SSSD

Service	Port	Protocol	Notes
DNS	53	UDP and TCP	

Service	Port	Protocol	Notes
LDAP	389	UDP and TCP	
LDAPS	636	TCP	Optional
Samba	445	UDP and TCP	For AD Group Policy Objects (GPOs)
Kerberos	88	UDP and TCP	
Kerberos	464	UDP and TCP	Used by **kadmin** for setting and changing a password
LDAP Global Catalog	3268	TCP	If the **id_provider = ad** option is being used
LDAPS Global Catalog	3269	TCP	Optional
NTP	123	UDP	Optional
NTP	323	UDP	Optional

CHAPTER 2. CONNECTING RHEL SYSTEMS DIRECTLY TO AD USING SAMBA WINBIND

Samba Winbind integrates RHEL systems with Active Directory to facilitate seamless SMB file and printer sharing. The **realmd** utility automates domain discovery and configures the underlying Winbind authentication services.

To connect a RHEL system to Active Directory (AD), use:

- Samba Winbind to interact with the AD identity and authentication source
- **realmd** to detect available domains and configure the underlying RHEL system services.

2.1. OVERVIEW OF DIRECT INTEGRATION USING SAMBA WINBIND

Samba Winbind emulates a Windows client to enable direct Active Directory communication. The **realmd** service automates the configuration of the **winbindd** service for NSS authentication. This approach simplifies SMB resource sharing but requires bidirectional trusts for multi-forest support.

You can use the **realmd** service to configure Samba Winbind by:

- Configuring network authentication and domain membership in a standard way.
- Automatically discovering information about accessible domains and realms.
- Not requiring advanced configuration to join a domain or realm.

Note that:

- Direct integration with Winbind in a multi-forest AD setup requires bidirectional trusts.
- Remote forests must trust the local forest to ensure that the **idmap_ad** plug-in handles remote forest users correctly.

Samba's **winbindd** service provides an interface for the Name Service Switch (NSS) and enables domain users to authenticate to AD when logging into the local system.

Using **winbindd** provides the benefit that you can enhance the configuration to share directories and printers without installing additional software.

Additional resources

- Using Samba as a server
- Supported Windows platforms for direct integration
- realm commands

2.2. CONNECTING A RHEL SYSTEM DIRECTLY TO AD USING SAMBA WINDBIND

The **realm** utility automates the configuration of Samba Winbind for Active Directory integration. This tool installs dependencies, generates the **smb.conf** file, and updates system authentication stacks to authorize domain users.

Procedure

1. If your AD requires the deprecated RC4 encryption type for Kerberos authentication, enable support for these ciphers in RHEL:

```
# update-crypto-policies --set DEFAULT:AD-SUPPORT
```

2. Install the following packages:

```
# dnf install realmd oddjob-mkhomedir oddjob samba-winbind-clients \
    samba-winbind samba-common-tools samba-winbind-krb5-locator \
    rb5-workstation
```

3. To share directories or printers on the domain member, install the **samba** package:

```
# dnf install samba
```

4. Backup the existing **/etc/samba/smb.conf** Samba configuration file:

```
# mv /etc/samba/smb.conf /etc/samba/smb.conf.bak
```

5. Join the domain. For example, to join a domain named **ad.example.com**:

```
# realm join --membership-software=samba --client-software=winbind ad.example.com
```

   Using the previous command, the **realm** utility automatically:

   - Creates a **/etc/samba/smb.conf** file for a membership in the **ad.example.com** domain
   - Adds the **winbind** module for user and group lookups to the **/etc/nsswitch.conf** file
   - Updates the Pluggable Authentication Module (PAM) configuration files in the **/etc/pam.d/** directory
   - Starts the **winbind** service and enables the service to start when the system boots

6. Optional: Set an alternative ID mapping back end or customized ID mapping settings in the **/etc/samba/smb.conf** file.
   For details, see Understanding and configuring Samba ID mapping .

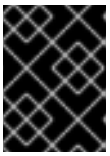
7. Edit the **/etc/krb5.conf** file and add the following section:

```
[plugins]
  localauth = {
    module = winbind:/usr/lib64/samba/krb5/winbind_krb5_localauth.so
    enable_only = winbind
  }
```

8. Verify that the **winbind** service is running:

```
# systemctl status winbind
```

```
Active: active (running) since Tue 2018-11-06 19:10:40 CET; 15s ago
```



IMPORTANT

To enable Samba to query domain user and group information, the **winbind** service must be running before you start **smb**.

9. If you installed the **samba** package to share directories and printers, enable and start the **smb** service:

```
# systemctl enable --now smb
```

Verification

1. Display an AD user's details, such as the AD administrator account in the AD domain:

```
# getent passwd "AD\administrator"
```

```
AD\administrator:*:10000:10000::/home/administrator@AD:/bin/bash
```

2. Query the members of the domain users group in the AD domain:

```
# getent group "AD\Domain Users"
```

```
AD\domain users:x:10000:user1,user2
```

3. Optional: Verify that you can use domain users and groups when you set permissions on files and directories. For example, to set the owner of the **/srv/samba/example.txt** file to **AD\administrator** and the group to **AD\Domain Users**:

```
# chown "AD\administrator":"AD\Domain Users" /srv/samba/example.txt
```

4. Verify that Kerberos authentication works as expected:

   a. On the AD domain member, obtain a ticket for the **administrator@AD.EXAMPLE.COM** principal:

   ```
   # kinit administrator@AD.EXAMPLE.COM
   ```

   b. Display the cached Kerberos ticket:

   ```
   # klist
   ```

   ```
   Ticket cache: KCM:0
   Default principal: administrator@AD.EXAMPLE.COM

   Valid starting       Expires              Service principal
   01.11.2018 10:00:00  01.11.2018 20:00:00
   krbtgt/AD.EXAMPLE.COM@AD.EXAMPLE.COM
           renew until 08.11.2018 05:00:00
   ```

5. Display the available domains:

```
# wbinfo --all-domains
```

```
BUILTIN
SAMBA-SERVER
AD
```

Additional resources

- realm commands
- Enabling the AES encryption type in Active Directory using a GPO

CHAPTER 3. JOINING RHEL SYSTEMS TO AN ACTIVE DIRECTORY BY USING RHEL SYSTEM ROLES

If your organization uses Microsoft Active Directory (AD) to centrally manage users, groups, and other resources, you can join your (RHEL) host to this AD. By using the **ad_integration** RHEL system role, you can automate the integration of Red Hat Enterprise Linux system into an Active Directory (AD) domain.

For example, if a host is joined to AD, AD users can then log in to RHEL and you can make services on the RHEL host available for authenticated AD users.

NOTE

The **ad_integration** role is for deployments using direct AD integration without an Identity Management (IdM) in Red Hat Enterprise Linux environment. For IdM environments, use the **ansible-freeipa** roles.

3.1. JOINING RHEL TO AN ACTIVE DIRECTORY DOMAIN BY USING THE AD_INTEGRATION RHEL SYSTEM ROLE

Deploy the **ad_integration** RHEL system role to automate the enrollment of RHEL hosts into Active Directory. This Ansible workflow handles package installation, service configuration, and secure domain joining via encrypted credentials.

Prerequisites

- You have prepared the control node and the managed nodes .
- You are logged in to the control node as a user who can run playbooks on the managed nodes.
- The account you use to connect to the managed nodes has **sudo** permissions for these nodes.
- The managed node uses a DNS server that can resolve AD DNS entries.
- Credentials of an AD account which has permissions to join computers to the domain.
- The managed node can establish connections to AD domain controllers by using the following ports:

Source Ports	Destination Port	Protocol	Service
1024 - 65535	53	UDP and TCP	DNS
1024 - 65535	389	UDP and TCP	LDAP
1024 - 65535	636	TCP	LDAPS
1024 - 65535	88	UDP and TCP	Kerberos
1024 - 65535	464	UDP and TCP	Kerberos password change requests
1024 - 65535	3268	TCP	LDAP Global Catalog

Source Ports	Destination Port	Protocol	Service
1024 - 65535	3269	TCP	LDAPS Global Catalog
1024 - 65535	123	UDP	NTP (if time synchronization is enabled)
1024 - 65535	323	UDP	NTP (if time synchronization is enabled)

Procedure

1. Store your sensitive variables in an encrypted file:

   a. Create the vault:

   ```
   $ ansible-vault create ~/vault.yml
   ```

   ```
   New Vault password: <vault_password>
   Confirm New Vault password: <vault_password>
   ```

   b. After the **ansible-vault create** command opens an editor, enter the sensitive data in the ***<key>: <value>*** format:

   ```
   usr: administrator
   pwd: <password>
   ```

   c. Save the changes, and close the editor. Ansible encrypts the data in the vault.

2. Create a playbook file, for example, ~/**playbook.yml**, with the following content:

```
---
- name: Active Directory integration
  hosts: managed-node-01.example.com
  vars_files:
    - ~/vault.yml
  tasks:
    - name: Join an Active Directory
      ansible.builtin.include_role:
        name: redhat.rhel_system_roles.ad_integration
      vars:
        ad_integration_user: "{{ usr }}"
        ad_integration_password: "{{ pwd }}"
        ad_integration_realm: "ad.example.com"
        ad_integration_allow_rc4_crypto: false
        ad_integration_timesync_source: "time_server.ad.example.com"
```

The settings specified in the example playbook include the following:

ad_integration_allow_rc4_crypto: *<true|false>*

Configures whether the role activates the **AD-SUPPORT** crypto policy on the managed

node. By default, RHEL does not support the weak RC4 encryption but, if Kerberos in your AD still requires RC4, you can enable this encryption type by setting **ad_integration_allow_rc4_crypto: true**.
Omit this the variable or set it to **false** if Kerberos uses AES encryption.

ad_integration_timesync_source: *<time_server>*

Specifies the NTP server to use for time synchronization. Kerberos requires a synchronized time among AD domain controllers and domain members to prevent replay attacks. If you omit this variable, the **ad_integration** role does not utilize the **timesync** RHEL system role to configure time synchronization on the managed node.

For details about all variables used in the playbook, see the **/usr/share/ansible/roles/rhel-system-roles.ad_integration/README.md** file on the control node.

3. Validate the playbook syntax:

```
$ ansible-playbook --ask-vault-pass --syntax-check ~/playbook.yml
```

Note that this command only validates the syntax and does not protect against a wrong but valid configuration.

4. Run the playbook:

```
$ ansible-playbook --ask-vault-pass ~/playbook.yml
```

Verification

- Check if AD users, such as **administrator**, are available locally on the managed node:

```
$ ansible managed-node-01.example.com -m command -a 'getent passwd administrator@ad.example.com'
```

```
administrator@ad.example.com:*:1450400500:1450400513:Administrator:/home/administrator@ad.example.com:/bin/bash
```

Additional resources

- Ansible vault

CHAPTER 4. MANAGING DIRECT CONNECTIONS TO AD

Post-connection management ensures security compliance and system stability. Administrators must configure Kerberos ticket renewals, enforce granular access controls, and apply Group Policy Objects (GPOs) to align RHEL systems with Active Directory standards.

4.1. PREREQUISITES

- You have connected your RHEL system to the Active Directory domain, either with SSSD or Samba Winbind.

4.2. MODIFYING THE DEFAULT KERBEROS HOST KEYTAB RENEWAL INTERVAL

SSSD uses **adcli** to automatically renew the machine account password every 30 days. Configuring the **ad_maximum_machine_account_password_age** parameter alters this default interval to align with specific security policies.

Procedure

1. Add the following parameter to the AD provider in your **/etc/sssd/sssd.conf** file:

```
ad_maximum_machine_account_password_age = value_in_days
```

2. Restart SSSD:

```
# systemctl restart sssd
```

3. To disable the automatic Kerberos host keytab renewal, set **ad_maximum_machine_account_password_age = 0**.

Additional resources

- SSSD service is failing with an error (Red Hat Knowledgebase)

4.3. REMOVING A RHEL SYSTEM FROM AN AD DOMAIN

The **realm leave** command unenrolls the system by clearing local SSSD configurations. Adding the **--remove** option also deletes the computer account from the Active Directory database.

Prerequisites

- You have used the System Security Services Daemon (SSSD) or Samba Winbind to connect your RHEL system to AD.

Procedure

1. Remove a system from an identity domain using the **realm leave** command. The command removes the domain configuration from SSSD and the local system.

```
# realm leave ad.example.com
```

NOTE

When a client leaves a domain, AD does not delete the account and only removes the local client configuration. To delete the AD account, run the command with the **--remove** option. Initially, an attempt is made to connect without credentials, but you are prompted for your user password if you do not have a valid Kerberos ticket. You must have rights to remove an account from Active Directory.

2. Use the **-U** option with the **realm leave** command to specify a different user to remove a system from an identity domain.
   By default, the **realm leave** command is executed as the default administrator. For AD, the administrator account is called **Administrator**. If a different user was used to join to the domain, it might be required to perform the removal as that user.

```
# realm leave [ad.example.com] -U [AD.EXAMPLE.COM\user]'
```

   The command first attempts to connect without credentials, but it prompts for a password if required.

Verification

- Verify the domain is no longer configured:

```
# realm discover [ad.example.com]
```

```
ad.example.com
  type: kerberos
  realm-name: EXAMPLE.COM
  domain-name: example.com
  configured: no
  server-software: active-directory
  client-software: sssd
  required-package: oddjob
  required-package: oddjob-mkhomedir
  required-package: sssd
  required-package: adcli
  required-package: samba-common-tools
```

4.4. SETTING THE DOMAIN RESOLUTION ORDER IN SSSD TO RESOLVE SHORT AD USER NAMES

SSSD mandates fully qualified names by default. Setting the **domain_resolution_order** enables short name resolution by forcing the daemon to search domains in a specific, prioritized sequence.

This procedure sets the domain resolution order in the SSSD configuration so you can resolve AD users and groups using short names, like **ad_username**. This example configuration searches for users and groups in the following order:

1. Active Directory (AD) child domain **subdomain2.ad.example.com**
2. AD child domain **subdomain1.ad.example.com**
3. AD root domain **ad.example.com**

Prerequisites

- You have used the SSSD service to connect the RHEL host directly to AD.

Procedure

1. Open the **/etc/sssd/sssd.conf** file in a text editor.
2. Set the **domain_resolution_order** option in the **[sssd]** section of the file.

```
domain_resolution_order = subdomain2.ad.example.com, subdomain1.ad.example.com, ad.example.com
```

3. Save and close the file.
4. Restart the SSSD service to load the new configuration settings.

```
[root@ad-client ~]# systemctl restart sssd
```

Verification

- Verify you can retrieve user information for a user from the first domain using only a short name.

```
[root@ad-client ~]# id <user_from_subdomain2>
```

```
uid=1916901142(user_from_subdomain2) gid=1916900513(domain users) groups=1916900513(domain users)
```

4.5. MANAGING LOGIN PERMISSIONS FOR DOMAIN USERS

Override default Active Directory policies with client-side access control. The **realm** utility enforces local allow and deny rules to restrict system access to specific domain users and groups.

If a domain applies client-side access control, you can use the **realmd** to configure basic allow or deny access rules for users from that domain.

NOTE

Access rules either allow or deny access to all services on the system. More specific access rules must be set on a specific system resource or in the domain.

4.5.1. Enabling access to users within a domain

The **realm permit** command creates a local allowlist for Active Directory users. Explicitly granting permissions to specific accounts automatically establishes a restrictive default-deny policy for the rest of the domain.

IMPORTANT

It is not recommended to allow access to all by default while only denying it to specific users with realm permit **-x**. Instead, Red Hat recommends maintaining a default no access policy for all users and only grant access to selected users using realm permit.

Prerequisites

- Your RHEL system is a member of the Active Directory domain.

Procedure

1. Grant access to all users:

```
# realm permit --all
```

2. Grant access to specific users:

```
$ realm permit aduser01@example.com
$ realm permit 'AD.EXAMPLE.COM\aduser01'
```

Currently, you can only allow access to users in primary domains and not to users in trusted domains. This is due to the fact that user login must contain the domain name and SSSD cannot currently provide **realmd** with information about available child domains.

Verification

1. Use SSH to log in to the server as the **aduser01@example.com** user:

```
$ ssh aduser01@example.com@server_name
```

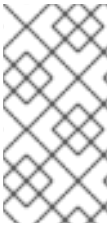
```
[aduser01@example.com@server_name ~]$
```

2. Use the ssh command a second time to access the same server, this time as the **aduser02@example.com** user:

```
$ ssh aduser02@example.com@server_name
```

```
Authentication failed.
```

Notice how the **aduser02@example.com** user is denied access to the system. You have granted the permission to log in to the system to the **aduser01@example.com** user only. All other users from that Active Directory domain are rejected because of the specified login policy.



NOTE

If you set **use_fully_qualified_names** to true in the **sssd.conf** file, all requests must use the fully qualified domain name. However, if you set **use_fully_qualified_names** to false, it is possible to use the fully-qualified name in the requests, but only the simplified version is displayed in the output.

4.5.2. Denying access to users within a domain

The **realm deny** command explicitly blocks login attempts from specified users or the entire domain. This local restriction prevents access regardless of permissions granted in Active Directory.

IMPORTANT

It is safer to only allow access to specific users or groups than to deny access to some, while enabling it to everyone else. Therefore, it is not recommended to allow access to all by default while only denying it to specific users with realm permit **-x**. Instead, Red Hat recommends maintaining a default no access policy for all users and only grant access to selected users using realm permit.

Prerequisites

- Your RHEL system is a member of the Active Directory domain.

Procedure

1. Deny access to all users within the domain:

```
# realm deny --all
```

   This command prevents **realm** accounts from logging into the local machine. Use **realm permit** to restrict login to specific accounts.

2. Verify that the domain user's **login-policy** is set to **deny-any-login**:

```
[root@replica1 ~]# realm list
```

```
example.net
  type: kerberos
  realm-name: EXAMPLE.NET
  domain-name: example.net
  configured: kerberos-member
  server-software: active-directory
  client-software: sssd
  required-package: oddjob
  required-package: oddjob-mkhomedir
  required-package: sssd
  required-package: adcli
  required-package: samba-common-tools
  login-formats: %U@example.net
  login-policy: deny-any-login
```

3. Deny access to specific users by using the **-x** option:

```
$ realm permit -x 'AD.EXAMPLE.COM\aduser02'
```

Verification

- Use SSH to log in to the server as the **aduser01@example.net** user.

```
$ ssh aduser01@example.net@server_name
```

```
Authentication failed.
```

NOTE

If you set **use_fully_qualified_names** to true in the **sssd.conf** file, all requests must use the fully qualified domain name. However, if you set **use_fully_qualified_names** to false, it is possible to use the fully-qualified name in the requests, but only the simplified version is displayed in the output.

4.6. APPLYING GROUP POLICY OBJECT ACCESS CONTROL IN RHEL

A *Group Policy Object* (GPO) is a collection of access control settings stored in Microsoft Active Directory (AD) that can apply to computers and users in an AD environment. SSSD applies these Windows-based login policies to RHEL hosts by mapping specific Logon Rights to Linux PAM services.

4.6.1. How SSSD interprets GPO access control rules

SSSD retrieves Group Policy Objects (GPOs) to validate user logins against Active Directory rules. By mapping Windows Logon Rights to Linux PAM services, the daemon enforces centralized access policies directly on the RHEL host.

SSSD maps AD *Windows Logon Rights* to Pluggable Authentication Module (PAM) service names to enforce those permissions in a GNU/Linux environment.

As an AD Administrator, you can limit the scope of GPO rules to specific users, groups, or hosts by listing them in a *security filter*.

Limitations on filtering by groups

SSSD currently does not support Active Directory's built-in groups, such as **Administrators** with Security Identifier (SID) **S-1-5-32-544**. Red Hat recommends against using AD built-in groups in AD GPOs targeting RHEL hosts.

Additional resources

- List of GPO settings that SSSD supports

4.6.2. List of GPO settings that SSSD supports

SSSD enforces a specific subset of Windows Logon Rights. The service maps these Active Directory policies directly to **sssd.conf** parameters to control interactive, remote, and network access.

The table shows the SSSD options that correspond to Active Directory GPO options as specified in the *Group Policy Management Editor* on Windows.

Table 4.1. GPO access control options retrieved by SSSD

GPO option	Corresponding **sssd.conf** option
Allow log on locally Deny log on locally	**ad_gpo_map_interactive**
Allow log on through Remote Desktop Services Deny log on through Remote Desktop Services	**ad_gpo_map_remote_interactive**

GPO option	Corresponding **sssd.conf** option
Access this computer from the network Deny access to this computer from the network	**ad_gpo_map_network**
Allow log on as a batch job Deny log on as a batch job	**ad_gpo_map_batch**
Allow log on as a service Deny log on as a service	**ad_gpo_map_service**

4.6.3. List of SSSD options to control GPO enforcement

SSSD parameters in **/etc/sssd/sssd.conf** regulate the application of Group Policy Objects (GPO). With these settings administrators can switch between strict enforcement and permissive auditing, or to enforce a default-deny security model.

The **ad_gpo_access_control** option

You can set the **ad_gpo_access_control** option in the **/etc/sssd/sssd.conf** file to choose between three different modes in which GPO-based access control operates.

Table 4.2. Table of **ad_gpo_access_control** values

Value of ad_gpo_access_control	Behavior
enforcing	GPO-based access control rules are evaluated and enforced. This is the default setting in RHEL 8.
permissive	GPO-based access control rules are evaluated but **not** enforced; a **syslog** message is recorded every time access would be denied. This is the default setting in RHEL 7. This mode is ideal for testing policy adjustments while allowing users to continue logging in.
disabled	GPO-based access control rules are neither evaluated nor enforced.

The **ad_gpo_implicit_deny** option

The **ad_gpo_implicit_deny** option is set to **False** by default. In this default state, users are allowed access if applicable GPOs are not found. If you set this option to **True**, you must explicitly allow users access with a GPO rule.

You can use this feature to harden security, but be careful not to deny access unintentionally. Red Hat recommends testing this feature while **ad_gpo_access_control** is set to **permissive**.

The following two tables illustrate when a user is allowed or rejected access based on the allow and deny login rights defined on the AD server-side and the value of **ad_gpo_implicit_deny**.

Table 4.3. Login behavior with **ad_gpo_implicit_deny** set to **False** (default)

allow-rules	deny-rules	result
missing	missing	all users are allowed
missing	present	only users not in deny-rules are allowed
present	missing	only users in allow-rules are allowed
present	present	only users in allow-rules and not in deny-rules are allowed

Table 4.4. Login behavior with **ad_gpo_implicit_deny** set to **True**

allow-rules	deny-rules	result
missing	missing	no users are allowed
missing	present	no users are allowed
present	missing	only users in allow-rules are allowed
present	present	only users in allow-rules and not in deny-rules are allowed

Additional resources

- Changing the GPO access control mode

4.6.4. Changing the GPO access control mode

Adjusting the Group Policy Objects (GPO) access control mode facilitates troubleshooting and policy testing. Switching SSSD to permissive mode logs access denials without blocking logins, allowing administrators to verify rules before enforcing them.

In this example, you will change the GPO operation mode from **enforcing** (the default) to **permissive** for testing purposes.

IMPORTANT

If you see the following errors, Active Directory users are unable to log in due to GPO-based access controls:

- In **/var/log/secure**:

```
Oct 31 03:00:13 client1 sshd[124914]: pam_sss(sshd:account): Access denied for user aduser1: 6 (Permission denied)
Oct 31 03:00:13 client1 sshd[124914]: Failed password for aduser1 from 127.0.0.1 port 60509 ssh2
Oct 31 03:00:13 client1 sshd[124914]: fatal: Access denied for user aduser1 by PAM account configuration [preauth]
```

- In **/var/log/sssd/sssd__example.com_.log**:

```
(Sat Oct 31 03:00:13 2020) [sssd[be[example.com]]] [ad_gpo_perform_hbac_processing] (0x0040): GPO access check failed: [1432158236](Host Access Denied)
(Sat Oct 31 03:00:13 2020) [sssd[be[example.com]]] [ad_gpo_cse_done] (0x0040): HBAC processing failed: [1432158236](Host Access Denied}
(Sat Oct 31 03:00:13 2020) [sssd[be[example.com]]] [ad_gpo_access_done] (0x0040): GPO-based access control failed.
```

If this is undesired behavior, you can temporarily set **ad_gpo_access_control** to **permissive** as described in this procedure while you troubleshoot proper GPO settings in AD.

Prerequisites

- You have joined a RHEL host to an AD environment using SSSD.
- Editing the **/etc/sssd/sssd.conf** configuration file requires **root** permissions.

Procedure

1. Stop the SSSD service.

```
[root@server ~]# systemctl stop sssd
```

2. Open the **/etc/sssd/sssd.conf** file in a text editor.
3. Set **ad_gpo_access_control** to **permissive** in the **domain** section for the AD domain.

```
[domain/example.com]
ad_gpo_access_control=permissive
...
```

4. Save the **/etc/sssd/sssd.conf** file.
5. Restart the SSSD service to load configuration changes.

```
[root@server ~]# systemctl restart sssd
```

Additional resources

- List of SSSD options to control GPO enforcement

4.6.5. Creating and configuring a GPO for a RHEL host in the AD GUI

A Group Policy Object (GPO) is a collection of access control settings stored in Microsoft Active Directory (AD) that can apply to computers and users in an AD environment. The example shows how to creates a GPO in the AD graphical user interface (GUI) to control logon access to a RHEL host that is integrated directly to the AD domain.

Prerequisites

- You have joined a RHEL host to an AD environment using SSSD.
- You have AD Administrator privileges to make changes in AD using the GUI.

Procedure

1. Within Active Directory Users and Computers, create an Organizational Unit (OU) to associate with the new GPO:
   a. Right-click the domain.
   b. Choose **New**.
   c. Choose **Organizational Unit**.
2. Click the name of the Computer Object that represents the RHEL host (created when it joined Active Directory) and drag it into the new OU. By having the RHEL host in its own OU, the GPO targets this host.
3. Within the Group Policy Management Editor, create a new GPO for the OU you created:
   a. Expand **Forest**.
   b. Expand **Domains**.
   c. Expand your domain.
   d. Right-click the new OU.
   e. Choose **Create a GPO in this domain**
4. Specify a name for the new GPO, such as **Allow SSH access** or **Allow Console/GUI access** and click **OK**.
5. Edit the new GPO:
   a. Select the OU within the Group Policy Management Editor.
   b. Right-click and choose **Edit**.
   c. Select **User Rights Assignment**.
   d. Select **Computer Configuration**.

e. Select **Policies**.

f. Select **Windows Settings**.

g. Select **Security Settings**.

h. Select **Local Policies**.

i. Select **User Rights Assignment**.

6. Assign login permissions:

   a. Double-Click **Allow log on locally** to grant local console/GUI access.

   b. Double-click **Allow log on through Remote Desktop Services**to grant SSH access.

7. Add the user(s) you want to access either of these policies to the policies themselves:

   a. Click **Add User or Group**.

   b. Enter the username within the blank field.

   c. Click **OK**.

Additional resources

- Group Policy Objects

CHAPTER 5. ACCESSING AD WITH A MANAGED SERVICE ACCOUNT

Active Directory (AD) Managed Service Accounts (MSAs) provide a mechanism for RHEL hosts to access domain resources without full domain enrollment. These accounts utilize specific user principals to authenticate secure LDAP connections and manage identity interactions independently of the system's primary domain membership.

5.1. THE BENEFITS OF A MANAGED SERVICE ACCOUNT

Managed Service Accounts (MSAs) enable RHEL hosts to access Active Directory without joining the domain. This approach overcomes one-way trust limitations, allowing specific clients to authenticate and query resources in an otherwise untrusted environment.

For example, if the AD domain **production.example.com** has a one-way trust relationship with the **lab.example.com** AD domain, the following conditions apply:

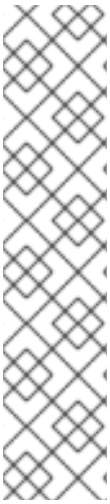
- The **lab** domain trusts users and hosts from the **production** domain.
- The **production** domain does **not** trust users and hosts from the **lab** domain.

This means that a host joined to the **lab** domain, such as **client.lab.example.com**, cannot access resources from the **production** domain through the trust.

If you want to create an exception for the **client.lab.example.com** host, you can use the **adcli** utility to create a MSA for the **client** host in the **production.example.com** domain. By authenticating with the Kerberos principal of the MSA, you can perform secure LDAP searches in the **production** domain from the **client** host.

5.2. CONFIGURING A MANAGED SERVICE ACCOUNT FOR A RHEL HOST

The **adcli** utility generates a Managed Service Account (MSA) and keytab to facilitate cross-domain authentication. Configuring SSSD with these credentials grants the RHEL host access to the target Active Directory domain without requiring full enrollment.



NOTE

If you need to access AD resources from a RHEL host, Red Hat recommends that you join the RHEL host to the AD domain with the **realm** command. See Connecting RHEL systems directly to AD using SSSD.

Only perform this procedure if one of the following conditions applies:

- You cannot join the RHEL host to the AD domain, and you want to create an account for that host in AD.
- You have joined the RHEL host to an AD domain, and you need to access another AD domain where the host credentials from the domain you have joined are not valid, such as with a one-way trust.

Prerequisites

- Ensure that the following ports on the RHEL host are open and accessible to the AD domain controllers.

Service	Port	Protocols
DNS	53	TCP, UDP
LDAP	389	TCP, UDP
LDAPS (optional)	636	TCP, UDP
Kerberos	88	TCP, UDP

- You have the password for an AD Administrator that has rights to create MSAs in the **production.example.com** domain.
- You have root permissions that are required to run the **adcli** command, and to modify the **/etc/sssd/sssd.conf** configuration file..
- Optional: You have the **krb5-workstation** package installed, which includes the **klist** diagnostic utility.

Procedure

1. Create an MSA for the host in the **production.example.com** AD domain.

```
[root@client ~]# adcli create-msa --domain=production.example.com
```

2. Display information about the MSA from the Kerberos keytab that was created. Make note of the MSA name:

```
[root@client ~]# klist -k /etc/krb5.keytab.production.example.com
```

```
Keytab name: FILE:/etc/krb5.keytab.production.example.com
KVNO Principal
---- --------------------------------------------------------------------
   2 CLIENT!S3A$@PRODUCTION.EXAMPLE.COM (aes256-cts-hmac-sha1-96)
   2 CLIENT!S3A$@PRODUCTION.EXAMPLE.COM (aes128-cts-hmac-sha1-96)
```

3. Open the **/etc/sssd/sssd.conf** file and choose the appropriate SSSD domain configuration to add:
   - If the MSA corresponds to an **AD domain from a different forest**, create a new domain section named **[domain/<name_of_domain>]**, and enter information about the MSA and the keytab. The most important options are **ldap_sasl_authid**, **ldap_krb5_keytab**, and **krb5_keytab**:

```
[domain/production.example.com]
ldap_sasl_authid = CLIENT!S3A$@PRODUCTION.EXAMPLE.COM
ldap_krb5_keytab = /etc/krb5.keytab.production.example.com
krb5_keytab = /etc/krb5.keytab.production.example.com
ad_domain = production.example.com
```

```
krb5_realm = PRODUCTION.EXAMPLE.COM
access_provider = ad
...
```

WARNING

Even with an existing trust relationship, **sssd-ad** requires a MSA in the second forest.

- If the MSA corresponds to an **AD domain from the local forest**, create a new sub-domain section in the format **[domain/root.example.com/sub-domain.example.com]**, and enter information about the MSA and the keytab. The most important options are **ldap_sasl_authid**, **ldap_krb5_keytab**, and **krb5_keytab**:

```
[domain/ad.example.com/production.example.com]
ldap_sasl_authid = CLIENT!S3A$@PRODUCTION.EXAMPLE.COM
ldap_krb5_keytab = /etc/krb5.keytab.production.example.com
krb5_keytab = /etc/krb5.keytab.production.example.com
ad_domain = production.example.com
krb5_realm = PRODUCTION.EXAMPLE.COM
access_provider = ad
...
```

Verification

- Verify you can retrieve a Kerberos ticket-granting ticket (TGT) as the MSA:

```
[root@client ~]# kinit -k -t /etc/krb5.keytab.production.example.com 'CLIENT!S3A$'
[root@client ~]# klist
```

```
Ticket cache: KCM:0:54655
Default principal: CLIENT!S3A$@PRODUCTION.EXAMPLE.COM

Valid starting       Expires              Service principal
11/22/2021 15:48:03  11/23/2021 15:48:03
krbtgt/PRODUCTION.EXAMPLE.COM@PRODUCTION.EXAMPLE.COM
```

- In AD, verify you have an MSA for the host in the Managed Service Accounts Organizational Unit (OU).

5.3. UPDATING THE PASSWORD FOR A MANAGED SERVICE ACCOUNT

The System Services Security Daemon (SSSD) automates routine password rotation for Managed Service Accounts. Administrators can preempt this schedule by running **adcli** to manually refresh credentials, ensuring the local keytab stays synchronized with Active Directory changes.

Prerequisites

- You have previously created an MSA for a host in the production.example.com AD domain.
- Optional: You have the **krb5-workstation** package installed, which includes the **klist** diagnostic utility.

Procedure

1. Optional: Display the current Key Version Number (KVNO) for the MSA in the Kerberos keytab. The current KVNO is 2.

```
[root@client ~]# klist -k /etc/krb5.keytab.production.example.com
```

```
Keytab name: FILE:/etc/krb5.keytab.production.example.com
KVNO Principal
---- --------------------------------------------------------
   2 CLIENT!S3A$@PRODUCTION.EXAMPLE.COM (aes256-cts-hmac-sha1-96)
   2 CLIENT!S3A$@PRODUCTION.EXAMPLE.COM (aes128-cts-hmac-sha1-96)
```

2. Update the password for the MSA in the **production.example.com** AD domain.

```
[root@client ~]# adcli update --domain=production.example.com --host-
keytab=/etc/krb5.keytab.production.example.com --computer-password-lifetime=0
```

Verification

- Verify that you have incremented the KVNO in the Kerberos keytab:

```
[root@client ~]# klist -k /etc/krb5.keytab.production.example.com
```

```
Keytab name: FILE:/etc/krb5.keytab.production.example.com
KVNO Principal
---- --------------------------------------------------------
   3 CLIENT!S3A$@PRODUCTION.EXAMPLE.COM (aes256-cts-hmac-sha1-96)
   3 CLIENT!S3A$@PRODUCTION.EXAMPLE.COM (aes128-cts-hmac-sha1-96)
```

5.4. MANAGED SERVICE ACCOUNT SPECIFICATIONS

The **adcli** utility enforces strict naming conventions to guarantee unique identity creation within Active Directory. The utility appends randomized suffixes to truncated hostnames and isolates credentials in specific keytabs to prevent conflicts with existing accounts.

The Managed Service Accounts (MSAs) that the **adcli** utility creates have the following specifications:

- They cannot have additional service principal names (SPNs).
- By default, the Kerberos principal for the MSA is stored in a Kerberos keytab named ***<default_keytab_location>.<Active_Directory_domain>***, like ***/etc/krb5.keytab.production.example.com***.
- MSA names are limited to 20 characters or fewer. The last 4 characters are a suffix of 3 random characters from number and upper- and lowercase ASCII ranges appended to the short host

name you provide, using a **!** character as a separator. For example, a host with the short name **myhost** receives an MSA with the following specifications:

Specification	Value
Common name (CN) attribute	**myhost!A2c**
NetBIOS name	**myhost!A2c$**
sAMAccountName	**myhost!A2c$**
Kerberos principal in the **production.example.com** AD domain	**myhost!A2c$@PRODUCTION.EXAMPLE.COM**

5.5. OPTIONS FOR THE ADCLI CREATE-MSA COMMAND

The **adcli create-msa** command accepts targeted arguments to customize account provisioning. These options enable administrators to specify Organizational Units (**OU**), override DNS naming conventions, define custom keytab paths, and enforce secure LDAPS communication.

In addition to the global options you can pass to the **adcli** utility, you can specify the following options to specifically control how it handles Managed Service Accounts (MSAs).

-N, --computer-name

The short non-dotted name of the MSA that will be created in the Active Directory (AD) domain. If you do not specify a name, the first portion of the **--host-fqdn** or its default is used with a random suffix.

-O, --domain-ou=OU=*<path_to_OU>*

The full distinguished name of the **OU** in which to create the MSA. If you do not specify this value, the MSA is created in the default location **OU=CN=Managed Service Accounts,DC=EXAMPLE,DC=COM**.

-H, --host-fqdn=host

Override the local machine's fully qualified DNS domain name. If you do not specify this option, the host name of the local machine is used.

-K, --host-keytab=*<path_to_keytab>*

The path to the host keytab to store MSA credentials. If you do not specify this value, the default location **/etc/krb5.keytab** is used with the lower-cased Active Directory domain name added as a suffix, such as **/etc/krb5.keytab.domain.example.com**.

--use-ldaps

Create the MSA over a Secure LDAP (LDAPS) channel.

--verbose

Print out detailed information while creating the MSA.

--show-details

Print out information about the MSA after creating it.

--show-password

Print out the MSA password after creating the MSA.