ONTAP® 9

Administrator Authentication and RBAC Power Guide

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Deciding whether to use the Administrator Authentication and RBAC Power Guide

This guide describes how to enable login accounts for ONTAP cluster administrators and storage virtual machine (SVM) administrators, and how to use role-based access control (RBAC) to define the capabilities of administrators.

You should use this guide if you want to enable login accounts and RBAC in the following way:

• You want to use the ONTAP command-line interface (CLI), not ONTAP System Manager or an automated scripting tool.
• You want to use best practices, not explore every available option.
• You do not want to read a lot of conceptual background.
• You are not using SNMP to collect information about the cluster.

If this guide is not suitable for your situation, you should see the following documentation instead:

• ONTAP 9 commands
• Cluster management using System Manager
• NetApp Documentation: OnCommand Workflow Automation (current releases)
You can enable authentication for local administrator accounts or remote administrator accounts. The account information for a local account resides on the storage system and the account information for a remote account resides elsewhere. Each account can have a predefined role or a custom role.

You can enable local administrator accounts to access an admin storage virtual machine (SVM) or a data SVM with the following types of authentication:

- Password
- SSH public key
- SSL certificate
- SSH multifactor authentication (MFA)

Starting with ONTAP 9.3, authentication with password and public key is supported.

You can enable remote administrator accounts to access an admin SVM or a data SVM with the following types of authentication:

- Active Directory
- SAML authentication (only for admin SVM)

Starting with ONTAP 9.3, Security Assertion Markup Language (SAML) authentication can be used for accessing the admin SVM by using any of the following web services: Service Processor Infrastructure, ONTAP APIs, or ONTAP System Manager.

Starting with ONTAP 9.4, SSH MFA can be used for remote users on LDAP or NIS servers. Authentication with nsswitch and public key is supported.
Before creating login accounts and setting up role-based access control (RBAC), you should gather information for each item in the configuration worksheets.

### Creating or modifying login accounts

You provide these values with the `security login create` command when you enable login accounts to access a storage virtual machine (SVM). You provide the same values with the `security login modify` command when you modify how an account accesses an SVM.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-vserver</td>
<td>The name of the SVM that the account accesses. The default value is the name of the admin SVM for the cluster.</td>
<td></td>
</tr>
<tr>
<td>-user-or-group-name</td>
<td>The user name or group name of the account. Specifying a group name enables access to each user in the group. You can associate a user name or group name with multiple applications.</td>
<td></td>
</tr>
<tr>
<td>-application</td>
<td>The application that is used to access the SVM:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• http</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ontapi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• snmp</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ssh</td>
<td></td>
</tr>
<tr>
<td>-authmethod</td>
<td>The method that is used to authenticate the account:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• cert for SSL certificate authentication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• domain for Active Directory authentication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• nsswitch for LDAP or NIS authentication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• password for user password authentication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• publickey for public key authentication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• community for SNMP community strings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• usm for SNMP user security model</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• saml for Security Assertion Markup Language (SAML) authentication</td>
<td></td>
</tr>
<tr>
<td>-remote-switch-ipaddress</td>
<td>The IP address of the remote switch. The remote switch can be a cluster switch monitored by the cluster switch health monitor (CSHM) or a Fibre Channel (FC) switch monitored by the MetroCluster health monitor (MCC-HM). This option is applicable only when the application is <code>snmp</code> and the authentication method is <code>usm</code>.</td>
<td></td>
</tr>
<tr>
<td>-role</td>
<td>The access control role that is assigned to the account:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For the cluster (the admin SVM), the default value is <code>admin</code>.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For a data SVM, the default value is <code>vsadmin</code>.</td>
<td></td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
<td>Your value</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td><code>-comment</code></td>
<td>Optional. Descriptive text for the account. You should enclose the text in double quotation marks (&quot;&quot;&quot;).</td>
<td></td>
</tr>
<tr>
<td><code>-is-ns-switch-group</code></td>
<td>Whether the account is an LDAP group account or NIS group account (yes or no).</td>
<td></td>
</tr>
</tbody>
</table>
| `-second-authentication-method` | Second authentication method in case of multifactor authentication in ONTAP 9.3:  
  • none if not using multifactor authentication, default value  
  • publickey for public key authentication when the authmethod is password or nsswitch  
  • password for user password authentication when the authmethod is public key  
  • nsswitch for user password authentication when the authmethod is publickey  
  
  **Note:** Support for nsswitch is available from ONTAP 9.4  
  The order of authentication is always public key followed by password. |            |

**Defining custom roles**

You provide these values with the `security login role create` command when you define a custom role.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-vserver</code></td>
<td>Optional. The name of the SVM that is associated with the role.</td>
<td></td>
</tr>
<tr>
<td><code>-role</code></td>
<td>The name of the role.</td>
<td></td>
</tr>
<tr>
<td><code>-cmddirname</code></td>
<td>The command or command directory to which the role gives access. You should enclose command subdirectory names in double quotation marks (&quot;&quot;&quot;&quot;). For example, &quot;volume snapshot&quot;. You must enter DEFAULT to specify all command directories.</td>
<td></td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
<td>Your value</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>-access</td>
<td>Optional. The access level for the role.</td>
<td>For command directories:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• none (the default value for custom roles) denies access to commands in the command directory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>•readonly grants access to the show commands in the command directory and its subdirectories</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• all grants access to all of the commands in the command directory and its subdirectories</td>
</tr>
<tr>
<td></td>
<td>For nonintrinsic commands (commands that do not end in create, modify, delete, or show):</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• none (the default value for custom roles) denies access to the command</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• readonly is not applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• all grants access to the command</td>
</tr>
<tr>
<td></td>
<td>To grant or deny access to intrinsic commands, you must specify the command directory.</td>
<td></td>
</tr>
<tr>
<td>-query</td>
<td>Optional. The query object that is used to filter the access level, which is specified in the form of a valid option for the command or for a command in the command directory. You should enclose the query object in double quotation marks (&quot;&quot;&quot;). For example, if the command directory is volume, the query object &quot;-aggr aggr0&quot; would enable access for the aggr0 aggregate only.</td>
<td></td>
</tr>
</tbody>
</table>

**Associating a public key with a user account**

You provide these values with the `security login publickey create` command when you associate an SSH public key with a user account.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-vserver</td>
<td>Optional. The name of the SVM that the account accesses.</td>
<td></td>
</tr>
<tr>
<td>-username</td>
<td>The user name of the account. The default value, <code>admin</code>, which is the default name of the cluster administrator.</td>
<td></td>
</tr>
<tr>
<td>-index</td>
<td>The index number of the public key. The default value is 0 if the key is the first key that is created for the account; otherwise, the default value is one more than the highest existing index number for the account.</td>
<td></td>
</tr>
<tr>
<td>-publickey</td>
<td>The OpenSSH public key. You should enclose the key in double quotation marks (&quot;&quot;&quot;).</td>
<td></td>
</tr>
<tr>
<td>-role</td>
<td>The access control role that is assigned to the account.</td>
<td></td>
</tr>
</tbody>
</table>
### Installing a CA-signed server digital certificate

You provide these values with the `security certificate generate-csr` command when you generate a digital certificate signing request (CSR) for use in authenticating an SVM as an SSL server.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-common-name</td>
<td>The name of the certificate, which is either a fully qualified domain name (FQDN) or a custom common name.</td>
<td></td>
</tr>
<tr>
<td>-size</td>
<td>The number of bits in the private key. The higher the value, the more secure the key. The default value is 2048. Possible values are 512, 1024, 1536, and 2048.</td>
<td></td>
</tr>
<tr>
<td>-country</td>
<td>The country of the SVM, in a two-letter code. The default value is US. See the man pages for a list of codes.</td>
<td></td>
</tr>
<tr>
<td>-state</td>
<td>The state or province of the SVM.</td>
<td></td>
</tr>
<tr>
<td>-locality</td>
<td>The locality of the SVM.</td>
<td></td>
</tr>
<tr>
<td>-organization</td>
<td>The organization of the SVM.</td>
<td></td>
</tr>
<tr>
<td>-unit</td>
<td>The unit in the organization of the SVM.</td>
<td></td>
</tr>
<tr>
<td>-email-addr</td>
<td>The email address of the contact administrator for the SVM.</td>
<td></td>
</tr>
<tr>
<td>-hash-function</td>
<td>The cryptographic hashing function for signing the certificate. The default value is SHA256. Possible values are SHA1, SHA256, and MD5.</td>
<td></td>
</tr>
</tbody>
</table>

You provide these values with the `security certificate install` command when you install a CA-signed digital certificate for use in authenticating the cluster or SVM as an SSL server. Only the options that are relevant to this guide are shown in the following table.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-vserver</td>
<td>The name of the SVM on which the certificate is to be installed.</td>
<td></td>
</tr>
</tbody>
</table>
### Field Description

<table>
<thead>
<tr>
<th>-type</th>
<th>The certificate type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• server for server certificates and intermediate certificates</td>
<td></td>
</tr>
<tr>
<td>• client-ca for the public key certificate of the root CA of the SSL client</td>
<td></td>
</tr>
<tr>
<td>• server-ca for the public key certificate of the root CA of the SSL server of which ONTAP is a client</td>
<td></td>
</tr>
<tr>
<td>• client for a self-signed or CA-signed digital certificate and private key for ONTAP as an SSL client</td>
<td></td>
</tr>
</tbody>
</table>

### Configuring Active Directory domain controller access

You provide these values with the `security login domain-tunnel create` command when you have already configured a CIFS server for a data SVM and you want to configure the SVM as a gateway or tunnel for Active Directory domain controller access to the cluster.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-vserver</td>
<td>The name of the SVM for which the CIFS server has been configured.</td>
<td></td>
</tr>
</tbody>
</table>

### Configuring LDAP or NIS server access

You provide these values with the `vserver services name-service ldap client create` command when you create an LDAP client configuration for the SVM.

**Note:** Starting with ONTAP 9.2, the `-ldap-servers` field replaces the `-servers` field. This new field can take either a host name or an IP address as the value for the LDAP server.

Only the options that are relevant to this guide are shown in the following table:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-vserver</td>
<td>The name of the SVM for the client configuration.</td>
<td></td>
</tr>
<tr>
<td>-client-config</td>
<td>The name of the client configuration.</td>
<td></td>
</tr>
<tr>
<td>-servers</td>
<td>ONTAP 9.0, 9.1: A comma-separated list of IP addresses for the LDAP servers to which the client connects.</td>
<td></td>
</tr>
<tr>
<td>-ldap-servers</td>
<td>ONTAP 9.2: A comma-separated list of IP addresses and host names for the LDAP servers to which the client connects.</td>
<td></td>
</tr>
<tr>
<td>-schema</td>
<td>The schema that the client uses to make LDAP queries.</td>
<td></td>
</tr>
<tr>
<td>-use-start-tls</td>
<td>Whether the client uses Start TLS to encrypt communication with the LDAP server (true or false). Note: Start TLS is supported for access to data SVMs only. It is not supported for access to admin SVMs.</td>
<td></td>
</tr>
</tbody>
</table>

You provide these values with the `vserver services name-service ldap create` command when you associate an LDAP client configuration with the SVM.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-vserver</td>
<td>The name of the SVM with which the client configuration is to be associated.</td>
<td></td>
</tr>
<tr>
<td>-client-config</td>
<td>The name of the client configuration.</td>
<td></td>
</tr>
<tr>
<td>-client-enabled</td>
<td>Whether the SVM can use the LDAP client configuration (true or false).</td>
<td></td>
</tr>
</tbody>
</table>

You provide these values with the `vserver services name-service nis-domain create` command when you create an NIS domain configuration on an SVM.

**Note:** Starting with ONTAP 9.2, the `-nis-servers` field replaces the `-servers` field. This new field can take either a host name or an IP address as the value for the NIS server.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Your value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-vserver</td>
<td>The name of the SVM on which the domain configuration is to be created.</td>
<td></td>
</tr>
<tr>
<td>-domain</td>
<td>The name of the domain.</td>
<td></td>
</tr>
<tr>
<td>-active</td>
<td>Whether the domain is active (true or false).</td>
<td></td>
</tr>
<tr>
<td>-servers</td>
<td>ONTAP 9.0, 9.1: A comma-separated list of IP addresses for the NIS servers that are used by the domain configuration.</td>
<td></td>
</tr>
</tbody>
</table>
### ONTAP 9.2

**-nis-servers**

ONTAP 9.2: A comma-separated list of IP addresses and host names for the NIS servers that are used by the domain configuration.

You provide these values with the `vserver services name-service ns-switch create` command when you specify the look-up order for name service sources.

### vserver

**-vserver**

The name of the SVM on which the name service look-up order is to be configured

### database

**-database**

The name service database:
- `hosts` for files and DNS name services
- `group` for files, LDAP, and NIS name services
- `passwd` for files, LDAP, and NIS name services
- `netgroup` for files, LDAP, and NIS name services
- `namemap` for files and LDAP name services

### sources

**-sources**

The order in which to look up name service sources (in a comma-separated list):
- `files`
- `dns`
- `ldap`
- `nis`

---

### Configuring SAML access

Starting with ONTAP 9.3, you provide these values with the `security saml-sp create` command to configure SAML authentication.

### idp-uri

**-idp-uri**

The FTP address or HTTP address of the Identity Provider (IdP) host from where the IdP metadata can be downloaded.

### sp-host

**-sp-host**

The host name or IP address of the SAML service provider host (ONTAP system). By default, the IP address of the cluster-management LIF is used.

### certificate

**[-cert-ca] and [-cert-serial] or [-cert-common-name]**

The server certificate details of the service provider host (ONTAP system).
<table>
<thead>
<tr>
<th><strong>Field</strong></th>
<th><strong>Description</strong></th>
<th><strong>Your value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><code>--verify-metadata-server</code></td>
<td>Whether the identity of the IdP metadata server must be validated (<strong>true</strong> or <strong>false</strong>). The best practice is to always set this value to <strong>true</strong>.</td>
<td></td>
</tr>
</tbody>
</table>
Creating login accounts

You can enable local or remote cluster and SVM administrator accounts. A local account is one in which the account information, public key, or security certificate resides on the storage system. AD account information is stored on a domain controller. LDAP and NIS accounts reside on LDAP and NIS servers.

Cluster and SVM administrators

A cluster administrator accesses the admin SVM for the cluster. The admin SVM and a cluster administrator with the reserved name `admin` are automatically created when the cluster is set up.

A cluster administrator with the default `admin` role can administer the entire cluster and its resources. The cluster administrator can create additional cluster administrators with different roles as needed.

An SVM administrator accesses a data SVM. The cluster administrator creates data SVMs and SVM administrators as needed.

SVM administrators are assigned the `vsadmin` role by default. The cluster administrator can assign different roles to SVM administrators as needed.


Merged roles

If you enable multiple remote accounts for the same user, the user is assigned the union of all roles specified for the accounts. That is, if an LDAP or NIS account is assigned the `vsadmin` role, and the AD group account for the same user is assigned the `vsadmin-volume` role, the AD user logs in with the more inclusive `vsadmin` capabilities. The roles are said to be merged.

Choices

- Enabling local account access on page 14
- Enabling Active Directory account access on page 17
- Enabling LDAP or NIS account access on page 18
- Configuring SAML authentication on page 19

Enabling local account access

A local account is one in which the account information, public key, or security certificate resides on the storage system. You can use the `security login create` command to enable local accounts to access an admin or data SVM.

Choices

- Enabling password account access on page 15
- Enabling SSH public key accounts on page 15
- Enabling SSH multifactor authentication (MFA) on page 16
- Enabling SSL certificate accounts on page 16
Enabling password account access

You can use the `security login create` command to enable administrator accounts to access an admin or data SVM with a password. You are prompted for the password after you enter the command.

**Before you begin**

You must be a cluster administrator to perform this task.

**About this task**

If you are unsure of the access control role that you want to assign to the login account, you can use the `security login modify` command to add the role later.

*Modifying the role assigned to an administrator* on page 21

**Step**

Enable local administrator accounts to access an SVM using a password:

```
security login create -vserver SVM_name -user-or-group-name user_or_group_name -application application -authmethod authentication_method -role role -comment comment
```

For complete command syntax, see the worksheet.

*Creating or modifying login accounts* on page 6

The following command enables the cluster administrator account `admin1` with the predefined `backup` role to access the admin SVM `engCluster` using a password. You are prompted for the password after you enter the command.

```
cluster1::>security login create -vserver engCluster -user-or-group-name admin1 -application ssh -authmethod password -role backup
```

Enabling SSH public key accounts

You can use the `security login create` command to enable administrator accounts to access an admin or data SVM with an SSH public key.

**Before you begin**

You must be a cluster administrator to perform this task.

**About this task**

- You must associate the public key with the account before the account can access the SVM.

  *Associating a public key with a user account*

  You can perform this task before or after you enable account access.

- If you are unsure of the access control role that you want to assign to the login account, you can use the `security login modify` command to add the role later.

  *Modifying the role assigned to an administrator* on page 21

**Step**

Enable local administrator accounts to access an SVM using an SSH public key:

```
security login create -vserver SVM_name -user-or-group-name user_or_group_name -application application -authmethod authentication_method -role role -comment comment
```

For complete command syntax, see the worksheet.

*Creating or modifying login accounts* on page 6

The following command enables the SVM administrator account `svmadmin1` with the predefined `vsadmin-volume` role to access the SVM `engData1` using an SSH public key:
Enabling SSH multifactor authentication (MFA)

Starting with ONTAP 9.3, you can use the `security login create` command to enhance security by requiring that administrators log in to an admin or data SVM with both an SSH public key and a user password.

**Before you begin**

You must be a cluster administrator to perform this task.

**About this task**

- You must associate the public key with the account before the account can access the SVM.
  
  *Associating a public key with a user account*
  
  You can perform this task before or after you enable account access.

- If you are unsure of the access control role that you want to assign to the login account, you can use the `security login modify` command to add the role later.
  
  *Modifying the role assigned to an administrator* on page 21

- The user is always authenticated with public key authentication followed by password authentication.

**Step**

Require local administrator accounts to access an SVM using SSH MFA:

```
security login create -vserver SVM -user-or-group-name user_name -application ssh -authentication-method password|publickey -role admin -second-authentication-method password|publickey
```

The following command requires the SVM administrator account `admin2` with the predefined `admin` role to log in to the SVM `engData1` with both an SSH public key and a user password:

```
cluster-1::> security login create -vserver engData1 -user-or-group-name admin2 -application ssh -authentication-method publickey -role admin -second-authentication-method publickey
```

Please enter a password for user 'admin2':
Please enter it again:

Warning: To use public-key authentication, you must create a public key for user "admin2".

**After you finish**

If you have not associated a public key with the administrator account, you must do so before the account can access the SVM.

*Associating a public key with a user account*

**Enabling SSL certificate accounts**

You can use the `security login create` command to enable administrator accounts to access an admin or data SVM with an SSL certificate.

**Before you begin**

You must be a cluster administrator to perform this task.
About this task

- You must install a CA-signed server digital certificate before the account can access the SVM.
  
  *Generating and installing a CA-signed server certificate* on page 26
  
  You can perform this task before or after you enable account access.

- If you are unsure of the access control role you want to assign to the login account, you can add the role later with the *security login modify* command.
  
  *Modifying the role assigned to an administrator* on page 21

Note: For cluster administrator accounts, certificate authentication is supported only with the http and ontapi applications. For SVM administrator accounts, certificate authentication is supported only with the ontapi application.

Step

Enable local administrator accounts to access an SVM using an SSL certificate:

```
security login create -vserver SVM_name -user-or-group-name user_or_group_name -application application -authmethod authentication_method -role role -comment comment
```

For complete command syntax, see the worksheet.

*Creating or modifying login accounts* on page 6

The following command enables the SVM administrator account svmadmin2 with the default vsadmin role to access the SVM engData2 using an SSL digital certificate.

```
cluster1::>security login create -vserver engData2 -user-or-group-name svmadmin2 -application ontapi -authmethod cert
```

After you finish

If you have not installed a CA-signed server digital certificate, you must do so before the account can access the SVM.

*Generating and installing a CA-signed server certificate* on page 26

Enabling Active Directory account access

You can use the *security login create* command to enable Active Directory (AD) user or group accounts to access an admin or data SVM. Any user in the AD group can access the SVM with the role that is assigned to the group.

Before you begin

- The cluster time must be synchronized to within five minutes of the time on the AD domain controller.
- You must be a cluster administrator to perform this task.

About this task

- You must configure AD domain controller access to the cluster or SVM before the account can access the SVM.
  
  *Configuring Active Directory domain controller access* on page 28
  
  You can perform this task before or after you enable account access.

- If you are unsure of the access control role that you want to assign to the login account, you can use the *security login modify* command to add the role later.
  
  *Modifying the role assigned to an administrator* on page 21

Note: AD group account access is supported only with the SSH and ontapi applications.
Step

Enable AD user or group administrator accounts to access an SVM:

```
security login create -vserver SVM_name -user-or-group-name user_or_group_name -application application -authmethod domain -role role -comment comment
```

For complete command syntax, see the worksheet.

Creating or modifying login accounts on page 6

The following command enables the AD cluster administrator account DOMAIN1\guest1 with the predefined backup role to access the admin SVM engCluster.

```
cluster1::>security login create -vserver engCluster -user-or-group-name DOMAIN1\guest1 -application ssh -authmethod domain -role backup
```

The following command enables the SVM administrator accounts in the AD group account DOMAIN1\adgroup with the predefined vsadmin-volume role to access the SVM engData.

```
cluster1::>security login create -vserver engData -user-or-group-name DOMAIN1\adgroup -application ssh -authmethod domain -role vsadmin-volume
```

After you finish

If you have not configured AD domain controller access to the cluster or SVM, you must do so before the account can access the SVM.

Configuring Active Directory domain controller access on page 28

Enabling LDAP or NIS account access

You can use the `security login create` command to enable LDAP or NIS user accounts to access an admin or data SVM. If you have not configured LDAP or NIS server access to the SVM, you must do so before the account can access the SVM.

Before you begin

You must be a cluster administrator to perform this task.

About this task

- Group accounts are not supported.
- You must configure LDAP or NIS server access to the SVM before the account can access the SVM.
  
  Configuring LDAP or NIS server access on page 30

  You can perform this task before or after you enable account access.

- If you are unsure of the access control role that you want to assign to the login account, you can use the `security login modify` command to add the role later.
  
  Modifying the role assigned to an administrator on page 21

- Beginning with ONTAP 9.4, multifactor authentication (MFA) is supported for remote users over LDAP or NIS servers.
- Because of a known LDAP issue, you should not use the ':' (colon) character in any field of LDAP user account information (for example, gecos, userPassword, and so on). Otherwise, the lookup operation will fail for that user.

Steps

1. Enable LDAP or NIS user or group accounts to access an SVM:

```
security login create -vserver SVM_name -user-or-group-name user_name -application application -authmethod nsswitch -role role -comment comment -is-ns-switch-group yes|no
```

For complete command syntax, see the worksheet.
Creating or modifying login accounts

The following command enables the LDAP or NIS cluster administrator account `guest2` with the predefined `backup` role to access the admin SVM `engCluster`.

```
cluster1::> security login create -vserver engCluster -user-or-group-name guest2 -application ssh -authmethod nsswitch -role backup
```

2. Enable MFA login for LDAP or NIS users:

```
security login modify -user-or-group-name rem_usr1 -application ssh -authentication-method nsswitch -role admin -is-ns-switch-group no -second-authentication-method publickey
```

The following example shows the MFA authentication being enabled:

```
cluster-1::*> security login modify -user-or-group-name rem_usr2 -application ssh -authentication-method nsswitch -vserver cluster-1 -second-authentication-method publickey
```

After you finish

If you have not configured LDAP or NIS server access to the SVM, you must do so before the account can access the SVM.

Configuring SAML authentication

Starting with ONTAP 9.3, you can configure Security Assertion Markup Language (SAML) authentication for web services. When SAML authentication is configured and enabled, users are authenticated by an external Identity Provider (IdP) instead of the directory service providers such as Active Directory and LDAP.

Before you begin

- You must have configured the IdP for SAML authentication.
- You must have the IdP URI.

About this task

- SAML authentication applies only to the `http` and `ontapi` applications.
- The `http` and `ontapi` applications are used by the following web services: Service Processor Infrastructure, ONTAP APIs, or ONTAP System Manager.
- SAML authentication is applicable only for accessing the admin SVM.

Steps

1. Create a SAML configuration so that ONTAP can access the IdP metadata:

   ```
   security saml-sp create -idp-uri idp_uri -sp-host ontap_host_name
   ```

   *`idp_uri` is the FTP or HTTP address of the IdP host from where the IdP metadata can be downloaded.*

   *`ontap_host_name` is the host name or IP address of the SAML service provider host, which in this case is the ONTAP system. By default, the IP address of the cluster-management LIF is used.*

   You can optionally provide the ONTAP server certificate information. By default, the ONTAP web server certificate information is used.
Creating login accounts

cluster_12::> security saml-sp create -idp-uri https://scspr023521001.gdl.englab.netapp.com/idp/shibboleth -verify-metadata-server false

Warning: This restarts the web server. Any HTTP/S connections that are active will be disrupted.
Do you want to continue? {y|n}: y

[Job 179] Job succeeded: Access the SAML SP metadata using the URL: https://10.63.56.150/saml-sp/Metadata

Configure the IdP and Data ONTAP users for the same directory server domain to ensure that users are the same for different authentication methods. See the "security login show" command for the Data ONTAP user configuration.

The URL to access the ONTAP host metadata is displayed.

2. From the IdP host, configure the IdP with the ONTAP host metadata.

   For more information about configuring the IdP, see the IdP documentation.

3. Enable SAML configuration:

   security saml-sp modify -is-enabled true

   Any existing user that accesses the http or ontpi application is automatically configured for SAML authentication.

4. If you want to create users for the http or ontpi application after SAML is configured, specify SAML as the authentication method for the new users.

   a. Create a login method for new users with SAML authentication:

      security login create -user-or-group-name user_name -application [http | ontpi] -authentication-method saml -vserver svm_name

      cluster_12::> security login create -user-or-group-name admin1 -application http -authentication-method saml -vserver cluster_12

   b. Verify that the user entry is created:

      security login show

      Vserver: cluster_12

      +---------------------------------+-----------------+-----------------+-----------+-----------------+-----------------+-----------------+
      | User/Group | Application | Authentication Method | Role Name | Acct Locked | Authentication Method |
      +----------------+-----------+------------------------+-----------+-----------------+-----------------+
      | admin          | console   | password               | admin     | no              | none            |
      | admin          | http      | password               | admin     | no              | none            |
      | admin          | http      | saml                   | admin     | -               | none            |
      | admin          | ontpi     | password               | admin     | no              | none            |
      | admin          | ontpi     | saml                   | admin     | -               | none            |
      | admin          | service-processor | password | admin | no | none |
      | admin          | ssh       | password               | admin     | no              | none            |
      | admin1         | http      | password               | backup    | no              | none            |
      | admin1         | http      | saml                   | backup    | -               | none            |

   Related information

   ONTAP 9 commands
Managing access-control roles

The role assigned to an administrator determines the commands to which the administrator has access. You assign the role when you create the account for the administrator. You can assign a different role or define custom roles as needed.

**Related concepts**
- **Predefined roles for cluster administrators** on page 23
  The predefined roles for cluster administrators should meet most of your needs. You can create custom roles as necessary. By default, a cluster administrator is assigned the predefined `admin` role.
- **Predefined roles for SVM administrators** on page 23
  The predefined roles for SVM administrators should meet most of your needs. You can create custom roles as necessary. By default, an SVM administrator is assigned the predefined `vsadmin` role.

**Related tasks**
- **Defining custom roles** on page 22
  You can use the `security login role create` command to define a custom role. You can execute the command as many times as necessary to achieve the exact combination of capabilities that you want to associate with the role.

**Modifying the role assigned to an administrator**

You can use the `security login modify` command to change the role of a cluster or SVM administrator account. You can assign a predefined or custom role.

**Before you begin**

You must be a cluster administrator to perform this task.

**Step**

Change the role of a cluster or SVM administrator:

```
security login modify -vserver SVM_name -user-or-group-name user_or_group_name -application application -authmethod authentication_method -role role -comment comment
```

For complete command syntax, see the worksheet.

**Creating or modifying login accounts** on page 6

The following command changes the role of the AD cluster administrator account `DOMAIN1\guest1` to the predefined `readonly` role.

```
cluster1::>security login modify -vserver engCluster -user-or-group-name DOMAIN1\guest1 -application ssh -authmethod domain -role readonly
```

The following command changes the role of the SVM administrator accounts in the AD group account `DOMAIN1\adgroup` to the custom `vol_role` role.

```
cluster1::>security login modify -vserver engData -user-or-group-name DOMAIN1\adgroup -application ssh -authmethod domain -role vol_role
```
Defining custom roles

You can use the `security login role create` command to define a custom role. You can execute the command as many times as necessary to achieve the exact combination of capabilities that you want to associate with the role.

**Before you begin**

You must be a cluster administrator to perform this task.

**About this task**

- A role, whether predefined or custom, grants or denies access to ONTAP commands or command directories.
  
  A command directory (`volume`, for example) is a group of related commands and command subdirectories. Except as described in this procedure, granting or denying access to a command directory grants or denies access to each command in the directory and its subdirectories.
- Specific command access or subdirectory access overrides parent directory access.
  
  If a role is defined with a command directory, and then is defined again with a different access level for a specific command or for a subdirectory of the parent directory, the access level that is specified for the command or subdirectory overrides that of the parent.

  **Note:** You cannot assign an SVM administrator a role that gives access to a command or command directory that is available only to the `admin` cluster administrator—for example, the `security` command directory.

**Step**

Define a custom role:

```
security login role create -vserver SVM_name -role role -cmddirname command_or_directory_name -access access_level -query query
```

For complete command syntax, see the worksheet.

**Defining custom roles** on page 7

The following commands grant the `vol_role` role full access to the commands in the `volume` command directory and read-only access to the commands in the `volume snapshot` subdirectory.

```
cluster1::>security login role create -role vol_role -cmddirname "volume" -access all
cluster1::>security login role create -role vol_role -cmddirname "volume snapshot" -access readonly
```

The following commands grant the `SVM_storage` role read-only access to the commands in the `storage` command directory, no access to the commands in the `storage encryption` subdirectory, and full access to the `storage aggregate plex offline` nonintrinsic command.

```
cluster1::>security login role create -role SVM_storage -cmddirname "storage" -access readonly
cluster1::>security login role create -role SVM_storage -cmddirname "storage encryption" -access none
cluster1::>security login role create -role SVM_storage -cmddirname "storage aggregate plex offline" -access all
```
Predefined roles for cluster administrators

The predefined roles for cluster administrators should meet most of your needs. You can create custom roles as necessary. By default, a cluster administrator is assigned the predefined `admin` role.

The following table lists the predefined roles for cluster administrators:

<table>
<thead>
<tr>
<th>This role...</th>
<th>Has this level of access...</th>
<th>To the following commands or command directories</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td>all</td>
<td>All command directories (DEFAULT)</td>
</tr>
<tr>
<td>autosupport</td>
<td>all</td>
<td>• set</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• system node autosupport</td>
</tr>
<tr>
<td></td>
<td>none</td>
<td>All other command directories (DEFAULT)</td>
</tr>
<tr>
<td>backup</td>
<td>all</td>
<td>vserver services ndmp</td>
</tr>
<tr>
<td></td>
<td>readonly</td>
<td>volume</td>
</tr>
<tr>
<td></td>
<td>none</td>
<td>All other command directories (DEFAULT)</td>
</tr>
<tr>
<td>readonly</td>
<td>all</td>
<td>• security login password</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• set</td>
</tr>
<tr>
<td></td>
<td>none</td>
<td>security</td>
</tr>
<tr>
<td></td>
<td>readonly</td>
<td>All other command directories (DEFAULT)</td>
</tr>
<tr>
<td>none</td>
<td>none</td>
<td>All command directories (DEFAULT)</td>
</tr>
</tbody>
</table>

Note: The `autosupport` role is assigned to the predefined `autosupport` account, which is used by AutoSupport OnDemand. ONTAP prevents you from modifying or deleting the `autosupport` account. ONTAP also prevents you from assigning the `autosupport` role to other user accounts.

Predefined roles for SVM administrators

The predefined roles for SVM administrators should meet most of your needs. You can create custom roles as necessary. By default, an SVM administrator is assigned the predefined `vsadmin` role.

The following table lists the predefined roles for SVM administrators:

<table>
<thead>
<tr>
<th>Role name</th>
<th>Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>vsadmin</td>
<td>• Managing own user account local password and key information</td>
</tr>
<tr>
<td></td>
<td>• Managing volumes, except volume moves</td>
</tr>
<tr>
<td></td>
<td>• Managing quotas, qtrees, Snapshot copies, and files</td>
</tr>
<tr>
<td></td>
<td>• Managing LUNs</td>
</tr>
<tr>
<td></td>
<td>• Performing SnapLock operations, except privileged delete</td>
</tr>
<tr>
<td></td>
<td>• Configuring protocols: NFS, CIFS, iSCSI, and FC. including FCoE</td>
</tr>
<tr>
<td></td>
<td>• Configuring services: DNS, LDAP, and NIS</td>
</tr>
<tr>
<td></td>
<td>• Monitoring jobs</td>
</tr>
<tr>
<td></td>
<td>• Monitoring network connections and network interface</td>
</tr>
<tr>
<td></td>
<td>• Monitoring the health of the SVM</td>
</tr>
<tr>
<td>Role name</td>
<td>Capabilities</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------</td>
</tr>
</tbody>
</table>
| vsadmin-volume   | • Managing own user account local password and key information  
|                  | • Managing volumes, including volume moves          
|                  | • Managing quotas, qtrees, Snapshot copies, and files  
|                  | • Managing LUNs                                     
|                  | • Configuring protocols: NFS, CIFS, iSCSI, and FC, including FCoE  
|                  | • Configuring services: DNS, LDAP, and NIS          
|                  | • Monitoring network interface                      
|                  | • Monitoring the health of the SVM                  |
| vsadmin-protocol | • Managing own user account local password and key information  
|                  | • Configuring protocols: NFS, CIFS, iSCSI, and FC, including FCoE  
|                  | • Configuring services: DNS, LDAP, and NIS          
|                  | • Managing LUNs                                     
|                  | • Monitoring network interface                      
|                  | • Monitoring the health of the SVM                  |
| vsadmin-backup   | • Managing own user account local password and key information  
|                  | • Managing NDMP operations                          
|                  | • Making a restored volume read/write                
|                  | • Managing SnapMirror relationships and Snapshot copies  
|                  | • Viewing volumes and network information            |
| vsadmin-snaplock | • Managing own user account local password and key information  
|                  | • Managing volumes, except volume moves              
|                  | • Managing quotas, qtrees, Snapshot copies, and files  
|                  | • Performing SnapLock operations, including privileged delete  
|                  | • Configuring protocols: NFS and CIFS                
|                  | • Configuring services: DNS, LDAP, and NIS          
|                  | • Monitoring jobs                                    
|                  | • Monitoring network connections and network interface |
| vsadmin-readonly | • Managing own user account local password and key information  
|                  | • Monitoring the health of the SVM                  
|                  | • Monitoring network interface                      
|                  | • Viewing volumes and LUNs                          
|                  | • Viewing services and protocols                     |
Managing administrator accounts

Depending on how you have enabled account access, you may need to associate a public key with a local account, install a CA-signed server digital certificate, or configure AD, LDAP, or NIS access. You can perform all of these tasks before or after enabling account access.

**Related tasks**

*Associating a public key with an administrator account* on page 25
For SSH public key authentication, you must associate the public key with an administrator account before the account can access the SVM. You can use the `security login publickey create` command to associate a key with an administrator account.

*Generating and installing a CA-signed server certificate* on page 26
On production systems, it is a best practice to install a CA-signed digital certificate for use in authenticating the cluster or SVM as an SSL server. You can use the `security certificate generate-csr` command to generate a certificate signing request (CSR), and the `security certificate install` command to install the certificate you receive back from the certificate authority.

*Configuring Active Directory domain controller access* on page 28
You must configure AD domain controller access to the cluster or SVM before an AD account can access the SVM. If you have already configured a CIFS server for a data SVM, you can configure the SVM as a gateway, or *tunnel*, for AD access to the cluster. If you have not configured a CIFS server, you can create a computer account for the SVM on the AD domain.

*Configuring LDAP or NIS server access* on page 30
You must configure LDAP or NIS server access to an SVM before LDAP or NIS accounts can access the SVM. The switch feature lets you use LDAP or NIS as alternative name service sources.

*Changing an administrator password* on page 32
You should change your initial password immediately after logging into the system for the first time. If you are an SVM administrator, you can use the `security login password` command to change your own password. If you are a cluster administrator, you can use the `security login password` command to change any administrator's password.

*Locking and unlocking an administrator account* on page 33
You can use the `security login lock` command to lock an administrator account, and the `security login unlock` command to unlock the account.

**Associating a public key with an administrator account**

For SSH public key authentication, you must associate the public key with an administrator account before the account can access the SVM. You can use the `security login publickey create` command to associate a key with an administrator account.

**Before you begin**

- You must have generated the SSH key.
- You must be a cluster or SVM administrator to perform this task.

**About this task**

If you authenticate an account over SSH with both a password and an SSH public key, the account is authenticated first with the public key.

**Step**

Associate a public key with an administrator account:
security login publickey create -vserver SVM_name -username user_name -index index -publickey certificate -comment comment

For complete command syntax, see the worksheet.

**Associating a public key with a user account** on page 8

The following command associates a public key with the SVM administrator account svmadmin1 for the SVM engData1. The public key is assigned index number 5.

```
cluster1::>security login publickey create -vserver engData1 -username svmadmin1 -index 5 -publickey "ssh-rsa AAAAB3NzaC1yc2EAAAABIwAAAIEAspH64CYbUsDQCDWZ2JnK6J/vU9upKzd2zzAk9C1f7YaWRUAFNs2Qe51UmQ31d18AD0Vfbr5T6H2PCixNAIzaFciDy7hgmndj9enNGedGr/JNrfQtBpLD1h2ybX+72DpQB0tYWBhe6eDJloPlobZBGfM1PZh8VjeU44i7W4+s0hG0E=tsmith@publickey.example.com"
```

### Generating and installing a CA-signed server certificate

On production systems, it is a best practice to install a CA-signed digital certificate for use in authenticating the cluster or SVM as an SSL server. You can use the `security certificate generate-csr` command to generate a certificate signing request (CSR), and the `security certificate install` command to install the certificate you receive back from the certificate authority.

**Related tasks**

- **Generating a certificate signing request** on page 26
  You can use the `security certificate generate-csr` command to generate a certificate signing request (CSR). After processing your request, the certificate authority (CA) sends you the signed digital certificate.

- **Installing a CA-signed server certificate** on page 27
  You can use the `security certificate install` command to install a CA-signed server certificate on an SVM. ONTAP prompts you for the certificate authority (CA) root and intermediate certificates that form the certificate chain of the server certificate.

### Generating a certificate signing request

You can use the `security certificate generate-csr` command to generate a certificate signing request (CSR). After processing your request, the certificate authority (CA) sends you the signed digital certificate.

**Before you begin**

You must be a cluster or SVM administrator to perform this task.

**Steps**

1. Generate a CSR:

```
security certificate generate-csr -common-name FQDN_or_common_name -size 512|1024|1536|2048 -country country -state state -locality locality -organization organization -unit unit -email-addr email_of_contact -hash-function SHA1|SHA256|MD5
```

The following command creates a CSR with a 2048-bit private key generated by the SHA256 hashing function for use by the Software group in the IT department of a company whose custom common name is server1.companyname.com, located in Sunnyvale, California, USA. The email address of the SVM contact administrator is web@example.com. The system displays the CSR and the private key in the output.

```
cluster1::>security certificate generate-csr -common-name server1.companyname.com -size 2048 -country US -state California -locality Sunnyvale -organization IT -unit Software -email-addr web@example.com -hash-function SHA256
```
Certificate Signing Request :
-----BEGIN CERTIFICATE REQUEST-----
MIIBGjCBxQIjBAdBGwMRgEydIQDQeWt1eGjtcGxlLMvTElMAgAUEhMCVMxCTAHbqNVBAqTA0EJACgAHUvXAMQxwBwQDQKEyAvxCTAHbqNVBAAsTADPEMAOgCSqGSIb3DQEJARYMFWdQYJKoIhvcNAQEEBIADw2AwSwAkJABPXFamN0APt1I7SxOCx1qmgIRRG2C7R7mTMyyqPSuTvfVtwdJmXuj6U3ala1wCuB13wFvQnHVFNCi2ninsJ8CAwEAAADGCQGSGb3DQEOBCwUAAE6EagLfsso5+g+ejirKKTUPOQUgOUEa0uvxhDyVc2Zw7b/fNFSsFhvXlogEOhYECn/NX9h8mbphCoM5YZ40fnKw==
-----END CERTIFICATE REQUEST-----

Private Key :
-----BEGIN RSA PRIVATE KEY-----
MIIB0IIBAAJXbAPXFanNoJApTlnzSx0CxcixqImRRG2CR7tVMYyqPSuVfHVtWdBmXuj6U3ala1woUsb13wFvQnHVFNCi2ninsJ8CAwEAAAJQAJW2AO+wJ3FKezEuIrQ1uKnMyRyK455wttKBrOyJfHysB20B28eifjYwRdJTOBeav99M7cEzgPv+5kaZTTMgQlAhsp+JhiXRb979LIJY0sNze39717V1 FKQWQ0cP/e/eAiEA+oDB0o0olVwuxj4aitxVBU6BYVcKU8LbsFeRmSzw8D8I0QCBZ/1/ENvmI3P7N9Exj2NCtEYxd0Q5cwbEZ5N2ZeMBpWq1hAPK0QWSLSadGfsROQ771tF+h9FGFWHbttNTrVeQsW3NaA0ApeMBQgE28y28Dr4dkYzxcXmz8J1uJSZ2Sic/wS6fa==
-----END RSA PRIVATE KEY-----

Note: Please keep a copy of your certificate request and private key for future reference.

2. Copy the certificate request from the CSR output, and send it in electronic form (such as email) to a trusted third-party CA for signing.

After processing your request, the CA sends you the signed digital certificate. You should keep a copy of the private key and the CA-signed digital certificate.

Installing a CA-signed server certificate

You can use the security certificate install command to install a CA-signed server certificate on an SVM. ONTAP prompts you for the certificate authority (CA) root and intermediate certificates that form the certificate chain of the server certificate.

Before you begin

You must be a cluster or SVM administrator to perform this task.

Step

Install a CA-signed server certificate:

security certificate install -vserver SVM_name -type certificate_type

For complete command syntax, see the worksheet.

Installing a CA-signed server digital certificate on page 9

Note: ONTAP prompts you for the CA root and intermediate certificates that form the certificate chain of the server certificate. The chain starts with the certificate of the CA that issued the server certificate, and can range up to the root certificate of the CA. Any missing intermediate certificates result in the failure of server certificate installation.

The following command installs the CA-signed server certificate and intermediate certificates on the SVM engData2.

cluster1:/>security certificate install -vserver engData2 -type server
Please enter Certificate: Press <Enter> when done
-----BEGIN CERTIFICATE-----
MIIB8TCCFgAwIBDAwIBADAGQCBgUCAg2nMDqTQwgcMQMGsEYDVsEw2AsTADPEMAOgCSqGSIb3DQEJARYMFWdQYJKoIhvcNAQEEBIADw2AwSwAkJABPXFamN0APt1I7SxOCx1qmgIRRG2C7R7mTMyyqPSuVfHVtWdBmXuj6U3ala1wCuB13wFvQnHVFNCi2ninsJ8CAwEAAADGCQGSGb3DQEOBCwUAAE6EagLfsso5+g+ejirKKTUPOQUgOUEa0uvxhDyVc2Zw7b/fNFSsFhvXlogEOhYECn/NX9h8mbphCoM5YZ40fnKw==
-----END CERTIFICATE-----
Do you want to continue entering root and/or intermediate certificates {y|n}: y

Do you want to continue entering root and/or intermediate certificates {y|n}: y

Do you want to continue entering root and/or intermediate certificates {y|n}: n

You should keep a copy of the private key and the CA-signed digital certificate for future reference.

---

**Configuring Active Directory domain controller access**

You must configure AD domain controller access to the cluster or SVM before an AD account can access the SVM. If you have already configured a CIFS server for a data SVM, you can configure the SVM as a gateway, or tunnel, for AD access to the cluster. If you have not configured a CIFS server, you can create a computer account for the SVM on the AD domain.

**Choices**

- [Configuring an authentication tunnel](#) on page 29
- [Creating an SVM computer account on the domain](#) on page 29
Configuring an authentication tunnel

If you have already configured a CIFS server for a data SVM, you can use the `security login domain-tunnel create` command to configure the SVM as a gateway, or tunnel, for AD access to the cluster.

Before you begin

- You must have configured a CIFS server for a data SVM.
- You must have enabled an AD domain user account to access the admin SVM for the cluster.
- You must be a cluster administrator to perform this task.

Step

Configure a CIFS-enabled data SVM as an authentication tunnel for AD domain controller access to the cluster:

```
security login domain-tunnel create -vserver SVM_name
```

For complete command syntax, see the worksheet.

Configuring Active Directory domain controller access on page 10

*Note:* The SVM must be running for the user to be authenticated.

The following command configures the CIFS-enabled data SVM `engData` as an authentication tunnel.

```
cluster1::>security login domain-tunnel create -vserver engData
```

Creating an SVM computer account on the domain

If you have not configured a CIFS server for a data SVM, you can use the `vserver active-directory create` command to create a computer account for the SVM on the domain.

Before you begin

You must be a cluster or SVM administrator to perform this task.

About this task

After you enter the `vserver active-directory create` command, you are prompted to provide the credentials for an AD user account with sufficient privileges to add computers to the specified organizational unit in the domain. The password of the account cannot be empty.

Step

Create a computer account for an SVM on the AD domain:

```
vserver active-directory create -vserver SVM_name -account-name NetBIOS_account_name -domain domain -ou organizational_unit
```

For complete command syntax, see the worksheet.

Configuring Active Directory domain controller access on page 10

The following command creates a computer account named `ADSERVER1` on the domain `example.com` for the SVM `engData`. You are prompted to enter the AD user account credentials after you enter the command.

```
cluster1::>vserver active-directory create -vserver engData -account-name ADSERVER1 -domain example.com
```

In order to create an Active Directory machine account, you must supply the name and password of a Windows account with sufficient privileges to add computers to the "CN=Computers" container within the "example.com" domain.
Enter the user name: Administrator
Enter the password:

Configuring LDAP or NIS server access

You must configure LDAP or NIS server access to an SVM before LDAP or NIS accounts can access the SVM. The switch feature lets you use LDAP or NIS as alternative name service sources.

Related tasks

**Configuring LDAP server access** on page 30
You must configure LDAP server access to an SVM before LDAP accounts can access the SVM. You can use the `vserver services name-service ldap client create` command to create an LDAP client configuration on the SVM. You can then use the `vserver services name-service ldap create` command to associate the LDAP client configuration with the SVM.

**Configuring NIS server access** on page 31
You must configure NIS server access to an SVM before NIS accounts can access the SVM. You can use the `vserver services name-service nis-domain create` command to create an NIS domain configuration on an SVM.

**Creating a name service switch** on page 32
The name service switch feature lets you use LDAP or NIS as alternative name service sources. You can use the `vserver services name-service ns-switch modify` command to specify the look-up order for name service sources.

Configuring LDAP server access

You must configure LDAP server access to an SVM before LDAP accounts can access the SVM. You can use the `vserver services name-service ldap client create` command to create an LDAP client configuration on the SVM. You can then use the `vserver services name-service ldap create` command to associate the LDAP client configuration with the SVM.

Before you begin

- You must have installed a CA-signed server digital certificate on the SVM.
  
  **Generating and installing a CA-signed server certificate** on page 26
- You must be a cluster or SVM administrator to perform this task.

About this task

Most LDAP servers can use the default schemas provided by ONTAP:

- MS-AD-BIS (the preferred schema for most Windows 2012 and later AD servers)
- AD-IDMU (Windows 2008, Windows 2012 and later AD servers)
- AD-SFU (Windows 2003 and earlier AD servers)
- RFC-2307 (UNIX LDAP servers)

It is best to use the default schemas unless there is a requirement to do otherwise. If so, you can create your own schema by copying a default schema and modifying the copy. For more information, see the following documents.

- **NFS configuration**
- **NetApp Technical Report 4835: How to Configure LDAP in ONTAP**

Steps

1. Create an LDAP client configuration on an SVM:
vserver services name-service ldap client create -vserver SVM_name -client-config client_configuration -servers LDAP_server_IPs -schema schema -use-start-tls true|false

Note: Start TLS is supported for access to data SVMs only. It is not supported for access to admin SVMs.

For complete command syntax, see the worksheet.

Configuring LDAP or NIS server access on page 10

The following command creates an LDAP client configuration named corp on the SVM engData. The client makes anonymous binds to the LDAP servers with the IP addresses 172.160.0.100 and 172.16.0.101. The client uses the RFC-2307 schema to make LDAP queries. Communication between the client and server is encrypted using Start TLS.

cluster1::>vserver services name-service ldap client create -vserver engData -client-config corp -servers 172.16.0.100,172.16.0.101 -schema RFC-2307 -use-start-tls true

Note: Starting in ONTAP 9.2, the field -ldap-servers replaces the field -servers. This new field can take either a hostname or an IP address for the LDAP server.

2. Associate the LDAP client configuration with the SVM:

vserver services name-service ldap create -vserver SVM_name -client-config client_configuration -client-enabled true|false

For complete command syntax, see the worksheet.

Configuring LDAP or NIS server access on page 10

The following command associates the LDAP client configuration corp with the SVM engData, and enables the LDAP client on the SVM.

cluster1::>vserver services name-service ldap create -vserver engData -client-config corp -client-enabled true

Note: Starting in ONTAP 9.2, the vserver services name-service ldap create command performs an automatic configuration validation and reports an error message if ONTAP is unable to contact the name server.

3. Validate the status of the name servers by using the vserver services name-service ldap check command.

The following command validates LDAP servers on the SVM vs0.

cluster1::> vserver services name-service ldap check -vserver vs0

| Vserver: vs0 |
| Client Configuration Name: cl |
| LDAP Status: up |
| LDAP Status Details: Successfully connected to LDAP server "10.11.12.13". |

The name service check command is available starting in ONTAP 9.2.

Configuring NIS server access

You must configure NIS server access to an SVM before NIS accounts can access the SVM. You can use the vserver services name-service nis-domain create command to create an NIS domain configuration on an SVM.

Before you begin

- All configured servers must be available and accessible before you configure the NIS domain on the SVM.
• You must be a cluster or SVM administrator to perform this task.

**About this task**

You can create multiple NIS domains. Only one NIS domain can be set to **active** at a time.

**Step**

Create an NIS domain configuration on an SVM:

```
vserver services name-service nis-domain create -vserver SVM_name -domain client_configuration -active true|false -nis-servers NIS_server_IPs
```

For complete command syntax, see the worksheet.

*Configuring LDAP or NIS server access* on page 10

**Note:** Starting in ONTAP 9.2, the field `-nis-servers` replaces the field `-servers`. This new field can take either a hostname or an IP address for the NIS server.

The following command creates an NIS domain configuration on the SVM `engData`. The NIS domain `nisdomain` is active on creation and communicates with an NIS server with the IP address `192.0.2.180`.

```
cluster1::>vserver services name-service nis-domain create -vserver engData -domain nisdomain -active true -nis-servers 192.0.2.180
```

**Creating a name service switch**

The name service switch feature lets you use LDAP or NIS as alternative name service sources. You can use the `vserver services name-service ns-switch modify` command to specify the look-up order for name service sources.

**Before you begin**

• You must have configured LDAP and NIS server access.
• You must be a cluster administrator or SVM administrator to perform this task.

**Step**

Specify the lookup order for name service sources:

```
vserver services name-service ns-switch modify -vserver SVM_name -database name_service_switch_database -sources name_service_source_order
```

For complete command syntax, see the worksheet.

*Configuring LDAP or NIS server access* on page 10

The following command specifies the lookup order of the LDAP and NIS name service sources for the `passwd` database on the `engData` SVM.

```
cluster1::>vserver services name-service ns-switch modify -vserver engData -database passwd -source files ldap,nis
```

**Changing an administrator password**

You should change your initial password immediately after logging into the system for the first time. If you are an SVM administrator, you can use the `security login password` command to change your own password. If you are a cluster administrator, you can use the `security login password` command to change any administrator's password.

**Before you begin**

• You must be a cluster or SVM administrator to change your own password.
• You must be a cluster administrator to change another administrator's password.
About this task

The new password must observe the following rules:

- It cannot contain the user name
- It must be at least eight characters long
- It must contain at least one letter and one number
- It cannot be the same as the last six passwords

Note: You can use the `security login role config modify` command to modify the password rules for accounts associated with a given role. For more information, see the man page.

`security login role config modify`

Step

Change an administrator password:

`security login password -vserver SVM_name -username user_name`

The following command changes the password of the administrator `admin1` for the SVM `vs1.example.com`. You are prompted to enter the current password, then enter and reenter the new password.

```
Vs1.example.com::>security login password -vserver engData -username admin1
Please enter your current password:
Please enter a new password:
Please enter it again:
```

Locking and unlocking an administrator account

You can use the `security login lock` command to lock an administrator account, and the `security login unlock` command to unlock the account.

Before you begin

You must be a cluster administrator to perform these tasks.

Steps

1. Lock an administrator account:

   `security login lock -vserver SVM_name -username user_name`

   The following command locks the administrator account `admin1` for the SVM `vs1.example.com`:

   ```
   Cluster1::>security login lock -vserver engData -username admin1
   ```

2. Unlock an administrator account:

   `security login unlock -vserver SVM_name -username user_name`

   The following command unlocks the administrator account `admin1` for the SVM `vs1.example.com`:

   ```
   Cluster1::>security login unlock -vserver engData -username admin1
   ```
Managing failed login attempts

Repeated failed login attempts sometimes indicate that an intruder is attempting to access the storage system. You can take a number of steps to ensure that an intrusion does not take place.

How you will know that login attempts have failed

The Event Management System (EMS) notifies you about failed login attempts every hour. You can find a record of failed login attempts in the `audit.log` file.

What to do if repeated login attempts fail

In the short term, you can take a number of steps to prevent an intrusion:

- Require that passwords be composed of a minimum number of uppercase characters, lowercase characters, special characters, and/or digits
- Impose a delay after a failed login attempt
- Limit the number of allowed failed login attempts, and lock out users after the specified number of failed attempts
- Expire and lock out accounts that are inactive for a specified number of days

You can use the `security login role config modify` command to perform these tasks.

Over the long term, you can take these additional steps:

- Use the `security ssh modify` command to limit the number of failed login attempts for all newly created SVMs.
- Migrate existing MD5-algorithm accounts to the more secure SHA-512 algorithm by requiring users to change their passwords.

Related tasks

- Enforcing SHA-2 on administrator account passwords on page 34

Administrator accounts created prior to ONTAP 9.0 continue to use MD5 passwords after the upgrade, until the passwords are manually changed. MD5 is less secure than SHA-2. Therefore, after upgrading, you should prompt users of MD5 accounts to change their passwords to use the default SHA-512 hash function.

Enforcing SHA-2 on administrator account passwords

Administrator accounts created prior to ONTAP 9.0 continue to use MD5 passwords after the upgrade, until the passwords are manually changed. MD5 is less secure than SHA-2. Therefore, after upgrading, you should prompt users of MD5 accounts to change their passwords to use the default SHA-512 hash function.

About this task

The password hash functionality enables you to do the following:

- Display user accounts that match the specified hash function.
- Expire accounts that use a specified hash function (for example, MD5), forcing the users to change their passwords in their next login.
- Lock accounts whose passwords use the specified hash function.
- When reverting to a release earlier than ONTAP 9, reset the cluster administrator's own password for it to be compatible with the hash function (MD5) that is supported by the earlier release.

ONTAP accepts pre-hashed SHA-2 passwords only by using NetApp Manageability SDK (security-login-create and security-login-modify-password).

Manageability enhancements
Steps

1. Migrate the MD5 administrator accounts to the SHA-512 password hash function:
   a. Expire all MD5 administrator accounts:

   ```bash
   security login expire-password -vserver * -username * -hash-function md5
   ```
   Doing so forces MD5 account users to change their passwords upon next login.
   
   b. Ask users of MD5 accounts to log in through a console or SSH session.
   The system detects that the accounts are expired and prompts users to change their
   passwords. SHA-512 is used by default for the changed passwords.

2. Optional: For MD5 accounts whose users do not log in to change their passwords within a
   period of time, force the account migration:
   a. Lock accounts that still use the MD5 hash function (advanced privilege level):

   ```bash
   security login expire-password -vserver * -username * -hash-function md5 -lock-after integer
   ```
   After the number of days specified by `–lock-after`, users cannot access their MD5
   accounts.
   
   b. Unlock the accounts when the users are ready to change their passwords:

   ```bash
   security login unlock -vserver vserver_name -username user_name
   ```
   c. Have users log in to their accounts through a console or SSH session and change their
      passwords when the system prompts them to do so.
Where to find additional information

After you have enabled login accounts for ONTAP cluster and SVM administrators, you can perform more advanced tasks.

- **ONTAP 9 commands**
  Describes additional commands for enabling administrator account access and for using RBAC to define administrator capabilities.

- **Cluster management using System Manager**
  Describes how to use ONTAP System Manager to perform tasks related to administrator authentication and RBAC.

- **NetApp Documentation: OnCommand Workflow Automation (current releases)**
  Describes how to use the OnCommand Workflow Automation scripting tool to perform tasks related to administrator authentication and RBAC.

- **System administration**
  Describes general system administration for storage systems running ONTAP.
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