Active Roles 8.1.4

Feature Guide

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Legend

> ⊗ **WARNING: A WARNING icon highlights a potential risk of bodily injury or property damage, for which industry-standard safety precautions are advised. This icon is often associated with electrical hazards related to hardware.**

> ⚠ **CAUTION: A CAUTION icon indicates potential damage to hardware or loss of data if instructions are not followed.**

Active Roles Feature Guide
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For the most recent documents and product information, see Online product documentation.

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Introduction

This document provides a detailed description of Active Roles and its major features available in Active Roles 8.1.4.

The document describes each feature in a separate section containing the following information:

- **Feature name**: The name of the feature, indicated in the section title.
- **Description**: A detailed description of the feature.
- **Getting started**: Information on how to start using the feature. In most cases, this includes references to other Active Roles documents, such as the Administration Guide or the available User Guides, depending on the target users of the feature.

  > NOTE: Consider the following regarding the **Getting started** information:
  >
  > - Unless indicated otherwise, using the described Active Roles features requires an Active Roles Admin account. By default, an Active Roles Admin is any member of the Administrators local group on the computer running the Active Roles Administration Service.
  > - When attempting to use features of the Active Roles Console, make sure that the Console interface is set to "Advanced view mode". To do so, in the **View** menu, click **Mode** > **Advanced Mode**.

About Active Roles

Active Roles delivers a reliable, policy-based administration and provisioning solution, allowing enterprises to fully benefit from Active Directory and Microsoft Exchange deployment.

One of the most valuable features of the product is the ability to automate provisioning tasks on directory objects in compliance with corporate administrative policies in corporate Active Directory and Exchange environments.

Active Roles provides consistent enforcement of corporate policies, a role-based administrative model, and flexible, rule-based administrative views, creating a reliable and secure environment for distributed administration and account provisioning.

> NOTE: For information on the Active Roles features, see the latest *Active Roles Release Notes*.

Main Active Roles features

Active Roles provides out-of-the-box user and group account management, strictly enforced administrator-based role security, day-to-day identity administration and built-in auditing and reporting for Active Directory and Azure Active Directory (AD) environments. The following features and capabilities make Active Roles a practical solution for secure management of objects in AD and AD-joined systems:

- Secure access: Acts as a virtual firewall around AD, enabling you to control access through delegation using a least privilege model. Based on defined administrative policies and associated permissions generates and strictly enforces access rules, eliminating the errors and inconsistencies common with native approaches to AD management. Plus, robust and personalized approval procedures establish an IT process and oversight consistent with business requirements, with responsibility chains that complement the automated management of directory data.
- Automate object creation: Automates a wide variety of tasks, including:
  - Creating user, groups, and contacts in AD and Azure AD.
  - Creating mailboxes on Exchange Server and assigning licenses in Microsoft 365.
  - Managing on-premises Exchange and Exchange Online properties.

  Active Roles also automates the process of reassigning and removing user access rights in AD and AD-joined systems (including user and group deprovisioning) to ensure an efficient and secure administrative process over the user and group lifetimes. When user accesses must be changed or removed, updates are made automatically in Active Directory, Azure AD, Exchange, Exchange Online, SharePoint, Skype for Business, and Windows, as well as any AD-joined systems such as Unix, Linux, and Mac OS X.

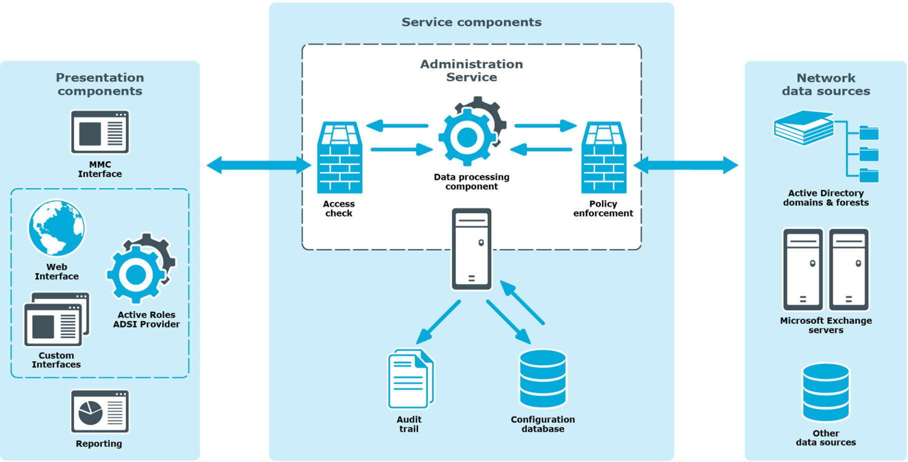
- Day-to-day directory management: Simplifies management of:
    - Exchange recipients, including mailbox assignment, creation, movement, deletion, permissions, and distribution list management.
    - Groups
    - IT resources, including computers, shared folders, printers, local users and groups.
    - AD, Azure AD, Exchange Online and AD LDS resources.

  Active Roles also includes intuitive interfaces for improving day-to-day administration and help desk operations via an MMC snap-in known as the Active Roles Console and a Web Interface.
- Manage users, groups, and contacts in a hosted environment: Provides Synchronization Service to operate in hosted environments where accounts from client AD domains are synchronized with host domains. Active Roles enables user, group, and contact management from the client domain to the hosted domain, while also synchronizing attributes and passwords.
- Consolidate management points through integration: Complements your existing technology and identity and access management strategy. Simplifies and consolidates management points by ensuring easy integration with many One Identity products and Quest products, including One Identity Manager, Safeguard Authentication Services, Defender, ChangeAuditor, and GPO Admin. Active Roles also automates and extends the capabilities of PowerShell, ADSI Provider, SPML Provider and the customizable Web Interface.

Technical overview of Active Roles

Active Roles divides the workload of directory administration and provisioning into three functional layers—presentation components, service components, and network data sources.

Figure 1: Active Roles Components



The presentation components include client interfaces for the Windows platform and the web, which allow regular users to perform a precisely defined set of administrative activities. The reporting solution facilitates automated generation of reports on management activities.

The service components constitute a secure layer between administrators and managed data sources. This layer ensures consistent policy enforcement, provides advanced automation capabilities, and enables the integration of business processes for administration of Active Directory, Microsoft Exchange, and other corporate data sources.

The Administration Database stores information about all permission and policy settings, and other data related to the Active Roles configuration.

On a very high level, the Active Roles components work together as follows to manipulate directory data:

1. An administrator uses the Active Roles Console or Web Interface to access Active Roles.
2. The administrator submits an operation request, such as a query or data change to the Administration Service.
3. On receipt of the operation request, the Administration Service checks whether the administrator has sufficient permissions to perform the requested operation (access check).
4. The Administration Service ensures that the requested operation does not violate the corporate policies (policy enforcement).
5. The Administration Service performs all actions required by the corporate policies, before committing the request (policy enforcement).
6. The Administration Service issues operating system function calls to perform the requested operation on network data sources.
7. The Administration Service performs all related actions required by the corporate policies, after the request is processed by the operating system (policy enforcement).
8. The Administration Service generates an audit trail that includes records about all operations performed or attempted with Active Roles. Directory-change tracking reports are based on the audit trail.

Presentation components

The presentation components include user interfaces to serve a variety of needs. The user interfaces accept commands, display communication, and give results in a clear, concise fashion.

Active Roles Console (MMC Interface)

The Active Roles Console, also referred to as MMC Interface, is a comprehensive administrative tool that you can use to:

- Manage Active Directory and Microsoft Exchange resources.
- Configure organization-level access and administration policies.
- Set up or work with automation or approval workflows for your administrators or helpdesk personnel.

The Active Roles Console window is divided into two panes. The left pane contains the Console tree, showing the items that are available in the Console. The right pane, known as the details pane, displays information about items you select in the Console tree. You can perform most management tasks from this pane using commands on the **Action** menu.

Additional information is displayed in the lower sub-pane of the details pane when you check the **Advanced Details Pane** command on the **View** menu. You can perform management tasks from the lower sub-pane using commands on the **Action** menu.

Console tree

The left pane of the Active Roles Console contains the Console tree.

The Console tree root is labeled **Active Roles**. The name of the Administration Service is shown in square brackets. If you have Advanced view mode selected for Active Roles console display (**View** > **Mode**), the following folders are shown under the Console tree root:

- **Configuration**: Contains all Active Roles proprietary objects held in containers with appropriate names.
- **Active Directory**: Contains a list of domains registered with Active Roles. In this folder, you can browse domains for directory objects (users, group, computers), and perform management tasks on those objects.
- **AD LDS (ADAM)**: Contains a list of AD LDS directory partitions registered with Active Roles. In this folder, you can browse partitions for directory objects (users, group, containers), and perform management tasks on those objects.
- **Applications**: Contains a list of applications integrated with Active Roles, such as Reporting, and allows for quick access to those applications.

The Console display mode determines which folders are displayed in the Console tree. For more information, see View mode.

Details pane

When you select an item in the **Console tree**, the details pane changes accordingly. To perform administrative tasks, click items in the details pane and use commands on the **Action** menu. The **Action** menu commands also appear on the shortcut menu that you can access by right-clicking items in the console tree or details pane.

By default, the objects listed in the details pane are sorted in ascending order by object name. You can change the sorting order by clicking a column heading. You can add and remove columns in the details pane using the **Choose Columns** command on the **View** menu.

In the Active Roles Console, you can apply filters to the details pane in order to search for directory objects. To configure a filter, select a domain, then click **Filter Options** on the **View** menu. It is also possible to find an object in the details pane by typing a few characters. This will select the first item in the sorted column that matches what you typed.

Advanced pane

The advanced pane appears at the bottom of the details pane if you check **Advanced Details Pane** on the **View** menu. You can use the advanced pane to administer an object selected in the **Console tree** or the **Details pane**: right-click an existing entry in the list to administer it, or right-click a blank area of the advanced pane to add a new entry.

The **Advanced details pane** is composed of a number of tabbed pages. The selected object determines which tabs are displayed. The possible tabs in the **Advanced details pane** and their descriptions are as follows:

- **Active Roles Security**: Lists the Active Roles Access Templates applied to the selected object. Under this tab, you can perform the following operations:
  - Apply additional Access Templates to the selected object.
  - Display Access Templates that affect the selected object owing to inheritance.
  - Synchronize from Active Roles security to Active Directory security.
- **Links**: Lists the objects to which the selected Access Template is applied.
- **Active Roles Policy**: Lists the Active Roles Policy Objects applied to the selected object. Under this tab, you can perform the following actions:
  - Apply additional Policy Objects to the selected object.
  - Display Policy Objects that affect the selected object owing to inheritance.
- **Native Security**: Lists the Active Directory permission entries specified for the selected object. Under this tab, you can perform the following actions:
  - Display permission entries that are inherited from parent objects.
  - Display default permission entries specified by the AD schema.
- **Member Of**: Lists the groups to which the selected object belongs. Under this tab, you can perform the following operations:
  - Add the selected object to groups.
  - Set the group as the primary group for the selected object.
- **Members**: Lists the members of the selected group. Under this tab, you can perform the following operations:
  - Add the selected object to groups.
  - Set the group as the primary group for the selected object.

> NOTE: The Console displays the **Active Roles Security**, **Active Roles Policy**, and **Native Security** tabs for a selected object only if your user account has the **Read Control** right to the selected object.

Depending on the tab you have selected in the **Advanced details pane**, the toolbar displays the following buttons to help you work with the entries on the tab.

View mode

In the Active Roles console you can choose view mode—Basic, Advanced, or Raw. Changing view mode makes it possible to filter out advanced objects and containers from the display.

Basic mode displays Active Directory objects and Managed Units, and filters out objects and containers related to the Active Roles configuration. Basic mode should normally be used by delegated administrators and help-desk operators.

Advanced mode displays all objects and containers except those reserved for Active Roles internal use. Advanced mode is designed for administrators who are responsible for configuring the system and managing Active Roles proprietary objects.

Raw mode displays all objects and containers defined in the Active Roles namespace. This mode is primarily designed for troubleshooting.

With Raw mode, the console displays all data it receives from the Administration Service. With Basic or Advanced mode, some data is filtered out. For example, the **Configuration** folder is not shown in the console tree with Basic mode. Another example is the **Configuration Container** folder used to display the Active Directory configuration naming context, which is displayed with Raw mode only. In addition, there are some commands and property pages that are only displayed when the console is in Raw mode.

In short, when you choose Raw mode, the snap-in displays everything it is able to display. Otherwise, some items are hidden. Note that changing view mode does not modify any items. Rather, this only shows or hides particular items from the display.

To change view mode, click **Mode** on the **View** menu. In the **View Mode** dialog box, click **Basic Mode**, **Advanced Mode**, or **Raw Mode**.

Controlled objects

The Active Roles Console provides for visual indication of the objects to which Access Templates or Policy Objects are linked. The console marks those objects by adding an arrow icon at the lower-left corner of the icon that represents the object in the console tree or details pane. As a result, the icon looks similar to the following image: .

To enable this feature, click **Mark Controlled Objects** on the **View** menu, and select check boxes to specify the category of object to be marked.

Trustees, permissions, roles and Managed Units

Active Roles offers three main security and administration elements:

- **Trustees**: Users or groups that have permissions to administer users, groups, computers, or other directory objects.
- **Permissions and Roles**: Permissions are grouped in Access Templates (roles) to define how a Trustee can manage directory objects.

- **Managed Units**: Collections of directory objects delegated to Trustees for administration.

The directory administrator defines which users or groups are designated as Trustees, which roles and permissions are assigned to Trustees, and what objects are included in Managed Units.

Managed Units are used to determine the directory objects that a Trustee can administer. As a Trustee, you can administer Managed Units for which you have assigned permissions. Managed Units containing objects you are authorized to administer are displayed under **Managed Units** in the **Console tree**.

When you select a Managed Unit in the **Console tree**, the details pane displays a list of objects included in that Managed Unit. To administer objects, select them from the list and use the commands on the **Action** menu.

If a Managed Unit includes a container, such as an Organizational Unit, the container is displayed under the Managed Unit in the **Console tree**. When you select a container in the **Console tree**, the details pane lists all child objects and sub-containers held in that container.

Finding directory objects

In the Active Roles Console you can search for objects of different types using the **Find** window. To access the **Find** window, right-click a container and click **Find**.

From the **In** list, you can select the container or Managed Unit you want to search. The list includes the container that you selected before activating the **Find** window. To add containers to the list, click **Browse**. From the **Find** list, you can select the type of the objects you want to find.

When you select an object type, the **Find** window changes accordingly. For example, **Users, Contacts, and Groups** searches for users, contacts, or groups using criteria such as user name, a note describing a contact, or the name of a group. In the **Find** list, Active Roles splits the **Users, Contacts, and Groups** category into three, providing the option for a more streamlined search.

By selecting **Custom Search** from the **Find** list, you can build custom search queries using advanced search options.

Using the **Find** window, you can search for any directory objects, such as users, groups, computers, Organizational Units, printers or shared folders. It is also possible to search for Active Roles configuration objects such as Access Templates, Managed Units, and Policy Objects. When you search for Access Templates, Policy Objects or Managed Units and select an appropriate object type from the **Find** list, the relevant container appears in the **In** list.

Once the search has completed, the objects matching the search criteria (search results) are listed at the bottom of the **Find** window. You can quickly find an object in the search results list by typing a few characters. This will select the first name that matches what you typed.

Once you have found the object, you can manage it by right-clicking the entry in the search results list, and clicking the applicable commands on the shortcut menu.

Active Roles Web Interface

The Active Roles Web Interface is a highly customizable web application providing administrative coverage for all aspects of Active Directory (AD) and Azure Active Directory (Azure AD) data management. The Web Interface provides clarity, and a consistent look and feel to improve user experience and ease of use. The Web Interface also provides several several navigation options and optimized search pages, along with an enhanced point-and-click interface to create and reuse search conditions.

Key features and benefits

The key features of the Active Roles Web Interface include the following:

- **Single-page lists**: All search results are listed on a single page, making it easier to sort, filter, locate and select the objects you want to manage.
- **Enhanced search tools**: To further facilitate searches, the Web Interface features a unified toolbar for configuring search conditions and filter conditions. This includes a flexible condition builder, allowing you to choose predefined conditions, configure a wide variety of property-based conditions, or specify complex conditions using LDAP syntax.
- **Pop-up property pages**: The pages for creating, viewing or changing objects appear on the top of the object list, allowing you to keep the list visible while selecting and managing individual objects.
- **Views**: The Web Interface allows you to create, save and reuse personal views for the various AD and Azure AD containers. Each view is essentially a search query for objects contained in a particular container, and returns the list of objects matching the specified search conditions, with the specified set of list columns and list sorting order.

In addition, the Web Interface also provides the following benefits:

- Individually customizable Web Interface sites, shipping with separate Administrator, Helpdesk, and Self-Service sites by default.
- User permission-based views for each page.
- Self-administration support.
- Attractive design with superior flexibility.
- Easy navigation with a simple layout and large UI elements, with most UI elements supporting resizing, collapsing or expanding. This allows you to adapt your UI workspace to your needs.

All this results in a web application that you can tailor to any type of organizational use case and administrative personnel, regardless of whether your target users are day-to-day administrators, business data owners, helpdesk operators, or regular end-users.

Getting started

To open the Active Roles Web Interface, you must know:

- The name of the web server running the Web Interface component.
- The name of the Web Interface site you want to access.

When configuring the Web Interface, the Administration Service creates the following Web Interface sites by default:

- **ARWebAdmin**: The Administration Site, supporting a broad range of administrative tasks.
- **ARWebHelpDesk**: The Helpdesk Site, supporting the most common administrative tasks, typically performed by helpdesk personnel in an organization.
- **ARWebSelfService**: The Self-Service Site, allowing users to manage their own personal accounts.

To connect to a Web Interface site

1. In the web browser, enter the URL of the Web Interface site.

   For example, to connect to the default Administration Site, specify the following URL:

   ```
   http://<server>/ARWebAdmin
   ```

   In the above example, `<server>` is the name of the web server running the Web Interface.

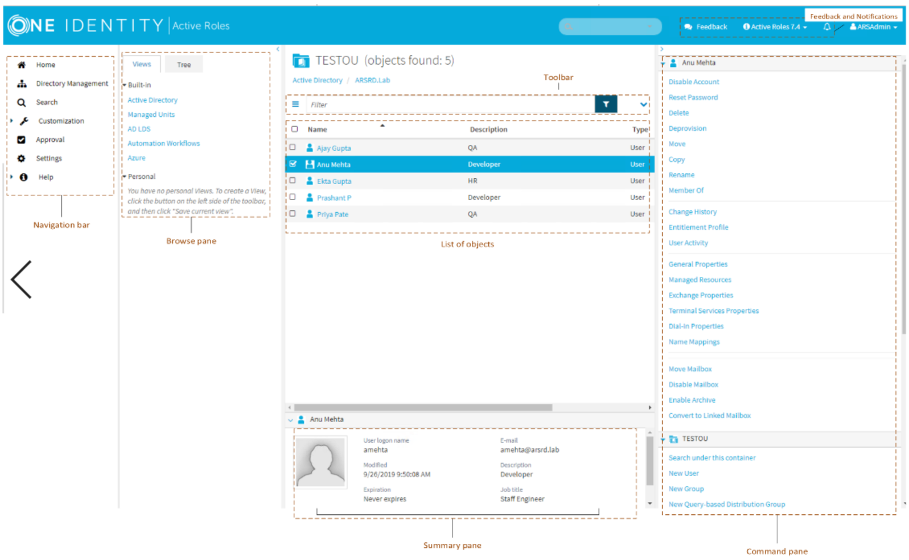
2. To connect, press **Enter**.

Web Interface parts

The Web Interface UI consists of the following main parts:

- The **Header** area at the top of the page, containing the **Quick Search bar**, the **Feedback** button, the **About** button, and the **Logout** option for your currently logged-in user.
- The **Navigation bar** and the **Browse pane** on the left side. The **Navigation bar** lets you navigate between the main Web Interface components, while the **Browse pane** shows the available **View** and **Tree** settings.
- The **Object list** next to the **Browse pane**.
- The **Toolbar** above the **Object list**, allowing you to manage the loaded **Object list**.
- The **Command pane** on the right side, containing the available administration actions for the selected object(s).
- The **Summary pane** under the list of objects, containing a short summary of data about the selected object(s).

Figure 2: UI Elements



You have no personal Views. To create a View, click the button on the left side of the toolbar, and then click "Save current view".

☐	Name	Description	Type
☐	Ajay Gupta	QA	User
☑	Anu Mehta	Developer	User
☐	Ekta Gupta	HR	User
☐	Prashant P	Developer	User
☐	Priya Pate	QA	User

Anu Mehta

User logon name: amehta
E-mail: amehta@arsrd.lab
Modified: 9/26/2019 9:50:08 AM
Description: Developer
Expiration: Never expires
Job title: Staff Engineer

The following sub-sections describe each UI component in more detail.

Web Interface Navigation bar

Located on the left side of the Web Interface UI, the **Navigation bar** provides the first level of navigation for most of the tasks you can perform with the Web Interface. The **Navigation bar** lists all major Web Interface areas, and provides access to the following pages and features:

- **Home**: Opens the Web Interface home page.
- **Directory Management**: Allows you to browse and administer the AD and Azure AD objects in your organization.
- **Search**: Allows you to search and administer the AD and Azure AD objects in your organization.
- **Customization**: Allows you to customize your Web Interface pages.

  NOTE: This option is available for Active Roles Admin users only.
- **Approval**: Allows you to perform tasks related to the approval of administrative operations.
- **Settings**: Contains your personal settings related to displaying the Web Interface.

Web Interface Browse pane

Located next to the **Navigation bar**, the **Browse pane** lists the built-in **Views** and **Personal views**, and also lets you access the **Tree** view:

- Built-in **Views** are default entry points for browsing objects in your AD and Azure AD environment. **Personal views**, on the other hand, are filter or search queries that you can build and save to use later.

- The **Tree** view helps you browse AD and Azure AD objects via the hierarchical directory tree structure of the containers.

Web Interface Object list

When you select a container or view in the **Browse pane**, a list of objects appears. If you select a container (such as an Organizational Unit, or OU), the list includes the objects held in that container. If you select a view, the list includes the objects that match the view settings. The object list appears on a single page, allowing you to search the entire contents of the container or view easily.

In addition to browsing the object list, you can also:

- Use various built-in conditions or create custom conditions to filter the object list. You can also customize the list by sorting and filtering, and by adding or removing list columns.
- Select objects from the list and apply administration commands to the selected object(s). When you click the name of a container object, such as a domain or an OU, the list changes to display the objects held in that container, allowing you to browse through containers in the directory.

Web Interface Toolbar

Located above the list of objects, the **Toolbar** contains a number of controls allowing you to manage the current **Object list**:

- To save the current object list as a **Personal view**, add or remove list columns, or export the list to a text file, click **Menu** on the left side of the **Toolbar**.
- To filter the results of the **Object list**, enter your filtering conditions in the **Filter** field, then click the button next to the field.
- To configure filtering criteria based on object properties, click **Expand/Collapse** on the right side of the **Toolbar**. To have the list include only the objects that match your filtering criteria, click the button next to the **Filter** field.

Web Interface Command pane

Located to the right of the **Object list**, the **Command pane** provides administrative commands you can apply to the objects you select from the list, as well as commands you can apply to the current container.

- If no objects are selected in the **Object list**, the **Command pane** includes only the commands that apply to the current container. These commands are grouped under a heading that shows the name of the current container.
- If a single object is selected in the list, the **Command pane** also contains the set of commands that are applicable to the selected object, under a heading that shows the name of the object.

- If multiple objects are selected from the list, the **Command pane** contains a set of batch commands that apply to all of the objects, under a heading that shows the number of the selected objects.

Web Interface Summary pane

The **Summary pane** provides information about the selected object under the **Object list**. The information shown on the pane includes the commonly used properties of the object, and depends on the object type.

For example, user properties provide more detailed information about a user account, such as the login name, email address, description, job title, department, expiration date, and the date and time when the account was last changed.

TIP: If you do not see the **Summary pane**, click the area below the **Object list**.

Web Interface Personal views

Personal views provide a filter-based object list, with the objects either belonging to the same container, or to the same search query. When searching a container (such as an OU), you can filter the search using either via search conditions or filter conditions as you need, then save the resulting search or filter query as your **Personal view**.

The **Personal view** shows the list of objects that match your specified conditions, with the specified list sorting order and set of list columns. **Personal views** are stored on a per-user basis, so each user can have their own views.

Using Personal views

To locate directory objects, the Active Roles Web Interface lets you use search or filter queries. When creating a query, you specify a set of rules that determine the contents of the resulting **Object list**. You can, for instance, specify to list only user accounts from a specific OU. In addition, you can adjust the set of columns and the sort order in the list of search or filtering results.

Locating objects quickly and easily is a critical Web Interface feature, as you need to focus your attention only on the objects you actually need to manage. However, creating a search or filter query that displays the objects you are interested in for a particular task can be time-consuming.

Personal views provide a way for you to save that work. Once you created a query that shows just the objects you need, you can set a name for the query and save it for use later. That saved query is a **Personal view**. Each view saves the following settings that you specify:

- The container to search or filter.
- The search or filtering criteria.
- The set of columns and the sort order in the list of search or filtering results.

Creating a Personal view

Personal views are like search or filter queries that you named and saved. After creating a **Personal view**, you can reuse it without re-creating its underlying search or filter query. To reuse a personal view, click the name of the view on the **Views** tab in the **Browse pane**. The Web Interface then applies the search or filter query saved in the view, and displays the results in the list with the same set of columns and sort order with which you created the view.

To create a personal view

1. Configure and perform a search, or create a filtered list of objects.
2. On the left side of the **Toolbar**, click **Menu**, then click **Save current view**.
3. In the dialog that appears, specify a name for the **Personal view**, then click **Save**.

Locating directory objects in the Web Interface

The Active Roles Web Interface provides search and filtering tools to help you locate directory objects quickly and easily. By creating and applying a proper search or filter query, you can build shorter object lists, which makes it easier to select the objects needed to accomplish your administrative tasks.

You can also save search and filter queries as your **Personal views**, and use them again at a later time. Each view saves the following settings that you specify:

- The container to search or filter.
- The search or filtering criteria.
- The set of columns.
- The sort order in the list of search or filtering results.

Searching for directory objects in the Web Interface

To search for directory objects, use the **Search** page that allows you to select the container to search and specify criteria for the objects you want to find. The Web Interface runs searches both in the selected containers and their subcontainers.

The Web Interface opens the **Search** page when you do any of the following:

- Type in the **Search** field located in the upper right corner of the **Web Interface** window, then press **Enter** or click the magnifying glass icon in the **Search** field. In this case, the Web Interface will search all managed AD or Azure AD domains for objects whose naming properties match what you specified, and the **Search** page will list the search results accordingly. The naming properties include name, first name, last name, display name, and login name.
- Click **Search** on the **Navigation bar**. This will open the **Search** page, allowing you to configure and start a search.

To configure and start a search

1. On the **Toolbar** of the Web Interface, click **Search in**, then select the container that you want to search. You can select more than one container.
2. Specify the criteria for the objects that you want to find:
   - To search by naming properties, enter them in the **Search** field on the **Toolbar**. The Web Interface will then search for objects whose naming properties match your criteria. The naming properties include name, first name, last name, display name, and logon name.
   - To search by other properties, expand the **Toolbar** by clicking the button on the right side of the **Toolbar**, click **Add criteria**, choose the properties by which you want to search, and click **Add**. Then, configure the criteria as appropriate. The Web Interface will search for objects that match the criteria you configured.
3. To start the search, press **Enter**.

The search results then appear on the **Search** page.

> TIP: You can customize the list by adding or removing list columns and sorting the list by column data. To add or remove list columns, click **Menu** on the left side of the **Toolbar**, then click **Choose columns**. To sort the list by column data, click the column headings.

Example: Searching by object type

This example procedure shows how to use the **Search** option to list all groups that exist in the AD domains managed by Active Roles.

To list all groups in all AD environments managed by Active Roles

1. On the **Navigation bar** of the Web Interface, click **Search**.
2. Expand the **Toolbar** by clicking the button on the right side of the **Toolbar**, click **Add criteria**, select **Object type is User/InetOrgPerson/Computer/Group/Organizational Unit**, then click **Add**.
3. On the **Toolbar**, click **Group** in the list next to **The object type is**, then press **Enter**.

Filtering the contents of a container in the Web Interface

If a container, such as an OU in an AD, holds many objects, you can narrow down the displayed list of objects by filtering them.

To filter the objects held in a container

1. In the Active Roles Web Interface, navigate to the container whose contents you want to filter.

   To navigate to a container:

   - Search the container object, then click its name in the list of search results on the **Search** page.

   - Alternatively, browse the container objects with the **Browse pane** and the **Object list**.

   > NOTE: The scope of filtering is always set to the current container, and does not include any subcontainers of that container. Filtering is essentially a search for objects stored in a given container only. If you want to search the current container and all of its subcontainers, click **Search under this container** in the **Command pane**, and configure a search instead.

2. Specify how you want to filter the objects of the container.

   - To filter objects by naming properties, specify your criteria in the **Filter** field on the **Toolbar**, then press **Enter**. Alternatively, click the button next to the **Filter** field. The list of objects will include only the objects whose naming properties match what you typed. The naming properties include name, first name, last name, display name, and login name.

   - To filter objects by other properties, expand the **Toolbar** by clicking the button on the right side of the **Toolbar**, click **Add criteria**, choose the properties by which you want to filter, and click **Add**. Then, configure the criteria as you need. The list of objects will include only the objects that match the criteria you configured.

3. To apply the filter, press **Enter** or click the button next to the **Filter** field on the **Toolbar**.

When the Active Roles Web Interface applies the configured filter, it lists a subset of all objects held in that container.

> TIP: To view all objects again, remove the filter.
>
> - If you did not specify any criteria, clear the **Filter** field on the **Toolbar**, and press **Enter**.
>
> - If you specified any criteria, expand the **Toolbar**, click **Clear all**, and press **Enter**.

Example: Filtering by object type

This example procedure shows how to configure a filter that lists only user accounts in a specific OU, removing all other objects from the list.

To filter to user accounts in a specific OU

1. In the Active Roles Web Interface, navigate to the OU.
2. To expand the **Toolbar**, click the button on the right side of the Toolbar. Then, click **Add criteria**, select **Object type is User/InetOrgPerson/Computer/Group/Organizational Unit**, and click **Add**.
3. On the **Toolbar**, confirm that the field next to **The object type is** reads **User**, then either click the button next to the **Filter** field, or press **Enter**.

Active Roles Management Shell

Part of the Active Roles Management Tools, the Management Shell provides Windows PowerShell-based command-line tools (cmdlets), allowing you to run and automate administrative tasks in Active Roles.

These Management Shell cmdlets are shipped in two modules.

ActiveRolesManagementShell

The **ActiveRolesManagementShell** module provides cmdlets for the following administration operations:

- Managing users, groups, computers and other Active Directory (AD) objects via Active Roles.
- Managing digital certificates.
- Administering certain Active Roles objects.

The names of the cmdlets provided by this module start with the `QAD` or `QARS` prefixes, such as `New-QADUser`, `Add-QADCertificate`, or `New-QARSAccessTemplateLink`.

ActiveRolesConfiguration

The **ActiveRolesConfiguration** module (also known as the "Configuration Shell") provides cmdlets for configuring Active Roles Administration Service instances and Web Interface sites. The names of the cmdlets provided by this module start with the `AR` prefix, such as `New-ARDatabase`, `New-ARService`, or `New-ARWebSite`.

> NOTE: Consider the following when planning to use the **ActiveRolesConfiguration** module:
>
> - This module is available on 64-bit operating systems only.
> - You can only install this module on computers where the Administration Service or Web Interface modules are also installed. Otherwise, the module will not provide all cmdlets.

For more information, see Active Roles Configuration Shell.

Getting started

You can start using the Management Shell component from the Windows Start menu or the Apps page, depending on the version of the operating system.

To start the Active Roles Management Shell

1. Log in to the computer where the Administration Service or the Management Shell is installed.
2. To start the Active Roles Management Shell, in the Windows Start menu or the Apps page, click **Active Roles 8.1.4 Management Shell**.
3. To view the reference manual providing detailed information about the available cmdlets, in the Management Shell command-line interface, enter `QuickRef`, then press **Enter**.
4. To load the available modules and access their cmdlets, enter the `Import-Module` command, then press **Enter**.

Custom interfaces

In addition to the Active Roles Console and the Web Interface, Active Roles enables the development of custom interfaces that use the Active Roles ADSI Provider to access the features of Active Roles. Administrators familiar with scripting and programming can create custom interfaces to meet the specific needs of their network administration.

Active Roles ADSI Provider

The Active Roles ADSI Provider operates as part of the presentation components to enable custom user interfaces and applications to access Active Directory services through Active Roles. The Active Roles ADSI Provider translates client requests into DCOM calls and interacts with the Active Roles Administration Service.

The Active Roles ADSI Provider allows custom scripts and applications, such as web-based applications, to communicate with Active Directory, while taking full advantage of the security, workflow integration and reporting benefits of Active Roles. For example, using the Active Roles ADSI Provider, you can create web-based helpdesk operator pages for property modifications, restricted by the corporate rules enforced with Active Roles.

Active Roles Reporting

Active Roles offers comprehensive reporting to monitor administrative actions, corporate policy compliance, and the state of directory objects. The Active Roles reporting solution includes Data Collector and Report Pack.

Report Pack provides report definitions for creating reports based on the data gathered by Data Collector. Active Roles comes with an extensive suite of report definitions that cover all administrative actions available in this product.

Report Pack is deployed on Microsoft SQL Server Reporting Services (SSRS). You can use the tools included with SSRS to view, save, print, publish, and schedule Active Roles reports.

Data Collector is used to gather data required for reporting. The Data Collector Wizard allows you to configure and schedule data collection jobs.

Once configured, Data Collector retrieves data from various sources, accessing them via the Active Roles Administration Service, and stores the data in a SQL Server database. Data Collector also provides a means for managing the gathered data, including the ability to export or delete obsolete data.

Service components

At the core of Active Roles lies the Administration Service. It features advanced delegation capabilities and ensures the reliable enforcement of administrative policies that keep data current and accurate. The Administration Service acts as a bridge between the presentation components and network data sources. In large networks, multiple Administration Service instances can be deployed to improve performance and ensure fault tolerance.

Data processing component

The data processing component accepts administrative requests and validates them by checking permissions and rules stored in the Administration Database. This component manages the network data sources, retrieving or changing the appropriate network object data based on administrative requests and policy definitions.

The data processing component operates as a secure service. It logs on with domain user accounts having sufficient privileges to access the domains registered with Active Roles (managed domains). The access to the managed domains is limited by the access rights of those user accounts.

Configuration database

The Administration Service uses the configuration database to store configuration data. The configuration data includes definitions of objects specific to Active Roles, assignments of administrative roles and policies, and procedures used to enforce policies. The configuration database is only used to store Active Roles configuration data. It does not store copies of the objects that reside in the managed data sources, nor is it used as an object data cache.

Active Roles uses Microsoft SQL Server to host the configuration database. The replication capabilities of SQL Server facilitate implementation of multiple equivalent configuration databases used by different Administration Service.

Active Roles now supports database configuration on on-premises databases and Azure SQL databases. You can configure Azure SQL database variants, such as Azure SQL database, Azure SQL Managed instance and Azure SQL Elastic Pool in Active Roles.

> NOTE: Active Roles supports database configuration over encrypted SQL Server configurations. For more information, see Knowledge Base Article Is SQL Server encryption supported? on the *One Identity Support Portal*.

Audit trail

The data processing component provides a complete audit trail by creating records in the event log on the computer running the Administration Service. The log shows all actions performed and by whom, including actions that were not permitted. The log entries display the success or failure of each action, as well as which attributes were changed.

Network data sources

Through the Administration Service, Active Roles accesses and controls the object data stored in the following data sources:

- Active Directory domains and forests: Provides the directory object information in Active Directory domains.
- Microsoft Exchange Server: Provides information about mailboxes maintained by Microsoft Exchange.
- Azure AD: Provides information about users in Azure Active Directory.
- Microsoft 365: Provides information about users in Microsoft 365.
- Exchange Online: Provides information about users in Exchange Online.
- Other data sources: Provides information about objects that exist outside of Active Directory. This includes information from corporate databases, such as human resources databases, and information about computer resources, such as services, printers, and network file shares.

Active Roles is designed to help with the use and management of these data sources. Directory administrators can define and enforce business rules and policies to ensure that the data in the managed data sources remains current and accurate.

With Active Roles, you can utilize the information stores from a wide variety of data sources in your network, such as human resource data or inventories. You can use scripting to integrate these important data sources. This reduces the duplication of work, reduces data pollution, and allows for the validation of information that is often stored in more than one database.

Active Roles makes it possible for a custom script to receive control upon a request to perform an administrative operation, such as object creation, modification, or deletion. Custom scripts can be invoked through Policy Objects, which Active Roles uses to enforce corporate rules. For example, you could implement a Policy Object containing a custom script that will receive control whenever Active Roles is requested to create a user object in a certain OU.

The Policy Object could be configured so that Active Roles continues with the user creation only after a certain piece of the script (the pre-create event handler) has successfully executed. In this way, the script prohibits the creation of user objects whose properties violate corporate rules. It prevents the population of object properties with values taken from external data sources, and generates default property values in accordance with the corporate rules.

The Policy Object may also be configured to pass control to another piece of the script (the post-create event handler) immediately after a user object is successfully created. This enables the script to trigger additional actions, required by corporate rules, after the object has been created. For example, it can update external data stores, provision the user with access to resources, and notify that the user object has been created.

Security and administration elements

Active Roles offers three key security and administration elements, which are stored as objects in the Administration Database:

- Access Templates
- Policy Objects
- Managed Units

These elements enable any user or group in Active Directory to be given limited and effectively controlled administrative privileges.

Users and groups that are given administrative permissions in Active Roles are referred to as **Trustees**. Trustees can be assigned to Managed Units or directory objects and containers.

Trustees do not need special administrative rights within Active Directory. To give Trustees access to Active Directory, Active Roles implements proxy mechanisms that use Access Templates to specify the level of access. When Trustees exercise their access permissions, these mechanisms use Policy Objects to trigger additional actions, such as running integration scripts and validating input data.

When designating a user or group as a Trustee, you must specify the Access Templates that control what the Trustee can do. Permissions granted to a group are extended to all members of that group. To reduce administration time, administrative control should be delegated to groups, rather than to individual users.

To implement policy constraints and automation, you must configure and apply Policy Objects that invoke built-in or custom procedures upon administrative requests. Policy procedures may include running custom scripts to synchronize Active Directory data with other data sources, performing a data validity checkup, and initiating additional administrative operations.

Access Templates for role-based administration

An **Access Template** is a collection of permissions that define what actions can be performed by an administrative role. Active Roles applies Access Templates to directory objects, containers, and administrative views (Managed Units) in relation to groups and users designated as Trustees.

Active Roles offers an extensive suite of preconfigured Access Templates that represent typical administrative roles, enabling the correct level of administrative authority to be delegated quickly and consistently. Access Templates significantly simplify the delegation and administration of management rights, speed up the deployment of the delegation model, and reduce management costs. For more information on the built-in Access Templates available in Active Roles, see the *Active Roles Built-in Access Templates Reference Guide* document.

Access Templates enable centralized administrators to define administrative roles with various levels of authority, speeding up the deployment of access control and streamlining change tracking of permission settings across the enterprise.

It is also possible to create custom Access Templates based on business requirements. Custom Access Templates can be modified at any time. When an Access Template is modified, the permission settings on all objects where that Access Template is applied change accordingly.

Policy Objects to enforce corporate rules

A Policy Object is a collection of administrative policy definitions that specify corporate rules to be enforced. Access Templates define who can make changes to a piece of data, and Policy Objects control what changes can be made to the data. Active Roles enforces corporate rules by linking Policy Objects to:

- Administrative views (Managed Units)
- Active Directory containers
- Individual (leaf) directory objects

Policy Objects define the behavior of the system when directory objects are created, modified, moved, or deleted. Policies are enforced regardless of the Trustee permissions.

A Policy Object includes stored policy procedures and specifications of events that activate each procedure. Based on policy requirements, a policy procedure could:

- Validate specific property values.
- Allow or deny entire operations.
- Trigger additional actions.

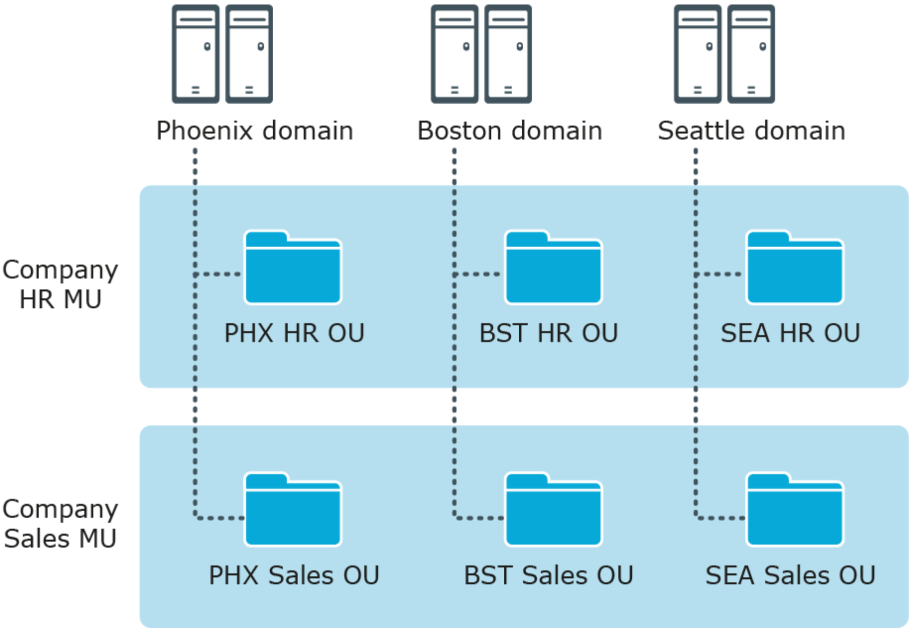
A Policy Object associates specific events with its policy procedures, which can be built-in procedures or custom scripts. This provides an easy way to implement sophisticated validation criteria, synchronize different data sources, and combine a number of administrative tasks into a single batch.

Managed Units to provide administrative views

A Managed Unit is a collection of objects collectively managed with Active Roles, created for the distribution of administrative responsibilities, enforcement of business rules and corporate standards, and management of complex network environments. Using Managed Units, the management framework can be separated from the Active Directory design. Directory objects can easily be grouped into administrative views, regardless of their location in Active Directory.

For example, the Active Directory design might be based on geographic location, with domains named after cities or regions and Organizational Units named after corporate departments or groups. However, Managed Units could be designed to manage specific departments or groups that are divided across multiple geographic locations.

Figure 3: Managed Units



In this example, each AD domain has a Human Resources (HR) OU and a Sales OU. The Active Roles design has an HR MU and a Sales MU. The HR MU enables administrators to configure the policies and security restrictions needed for all HR users regardless of their location, while the Sales MU enables the same for all Sales users.

Managed Units are defined with the use of membership rules—criteria used by Active Roles to evaluate whether or not an object belongs to a given Managed Unit. This enables Managed Units to dynamically change as the network environment changes. For example, you can define a Managed Unit by specifying rules that include all objects whose properties match specific conditions. The specified rules will force the new or modified objects to be members of the correct Managed Unit.

Managed Units extend the functionality of Organizational Units (OUs), providing convenient scope to delegate administration and enforce corporate rules. A Managed Unit has the following characteristics:

- Represents a collection of objects (one object can belong to more than one Managed Unit).
- Supports rule-based specifications for its members (a Managed Unit only holds objects that satisfy the membership rules specified for the Managed Unit).
- Can hold directory objects that reside in different Organizational Units, domains, forests, and other Managed Units.

Active Roles ensures that permission and policy settings specified for a Managed Unit are inherited by all objects that belong to that Managed Unit. When a directory container belongs to a Managed Unit, all child objects in that container inherit the permission and policy settings defined at the Managed Unit level. This inheritance continues down the directory tree within all container objects that are members of the Managed Unit.

Active Directory security management

The Active Roles Console makes it easy to examine and manage permission entries in Active Directory, by showing the access available to each user, along with the scope of their access. A centralized view of all permission entries for any given object helps with the analysis and administration of permissions in Active Directory. For each permission entry, the view displays a number of entry properties, including the permission description, origin, and security principal. From the main window, additional properties can be displayed and the native security editor can be accessed.

The centralized display of native security allows the administrator to quickly view permissions assigned to objects in Active Directory, and to determine whether the permission is inherited. The list of permission entries can be sorted by security principal name to determine who has access to the selected object. If a permission entry is inherited, Active Roles identifies the object from which the permission originates, so that the administrator can easily find and edit the permission entry for that object.

The Active Roles Console provides the capability to view the permissions for an object by simply clicking the object to display the permission entries in a centralized view. This makes it easier for the administrator to verify the permissions on security-sensitive objects, and to identify possible security problems.

Management of native security

Active Roles Access Templates can be used to specify permissions in Active Directory. Designed to support the role-based grouping of permissions, Access Templates provide an efficient mechanism for setting and maintaining access control, simplifying and enhancing the management of permissions in Active Directory.

To provide this capability, Active Roles gives the administrator the option to keep Active Directory native security updated with selected permissions specified using Access Templates. This option, referred to as Permissions Propagation, is intended to provision users and applications with native permissions to Active Directory. The normal operation of Active Roles does not rely on this option.

For Active Roles permission entries with the Permissions Propagation option set, Active Roles generates Active Directory native permission entries in accordance with the Active Roles permissions. Once set, the option ensures that every time Active Roles permission assignments or templates change, the associated native permission entries change accordingly.

Customization using ADSI Provider and script policies

Active Roles offers the facility to customize its off-the-shelf functionality using scripts and applications that interact with the Administration Service. It allows a high degree of customer modification to meet specific business and organizational needs. This gives customers greater flexibility when using the product, and enables them to build solutions that can easily be integrated with existing systems and data.

The following list shows some of the ways in which the product can be customized:

- Using the Active Roles ADSI Provider, the existing proprietary applications or custom web-based interfaces could communicate with Active Roles to perform administration and provisioning tasks on user accounts and groups.
- Using policy scripts, custom corporate rules could be enforced to regulate data format and administrative workflows.
- Using policy scripts, the data stored in an HR database or ERP system could be incorporated into the administration and provision of users.

Active Roles makes it possible for user-developed scripts and applications to manipulate directory objects through the Administration Service (known as **persistent objects**), and to take control of objects that are in the process of being created, modified, or deleted with Active Roles (**in-process objects**).

Having programmatic access to persistent and in-process objects makes it easy for developers to customize Active Roles in these two areas:

- Creating custom applications and user interfaces.
- Enforcing corporate administrative policies by running custom scripts (known as **script policies**).

Custom applications and user interfaces

A custom application or user interface can be created to manipulate directory objects in Active Roles. Active Roles offers the ADSI Provider to communicate with the Administration

Service using standard COM interfaces that conform to the Microsoft ADSI 2.5 specification.

Custom applications are executables that provide, retrieve and process data to or from the Administration Service. For example, an organization with a separate human resources database could develop and deploy a custom application that extracts personal information from the database, then passes it to the Administration Service to facilitate user account provisioning.

Custom user interfaces are usually web-based interfaces that distribute certain tasks to users. Custom user interfaces can also be used to streamline the workflow of network administrators and help-desk operators. For example, web-based pages could be created so that helpdesk operators only see the fields related to user properties that they can view and modify, according to their corporate standards.

Both custom applications and user interfaces rely on the Active Roles ADSI Provider to access the functionality of Active Roles.

Custom script policies

Active Roles provides the ability to implement administrative policies by running user-developed scripts. This makes it possible to:

- Facilitate the provisioning of user accounts: Populate user properties through external database integration and automate multi-step provisioning tasks.
- Maintain the integrity of directory content: Prevent inconsistency of Active Directory data by enforcing update-sequence and data-format policies across the enterprise.
- Enforce business rules: Maintain security design and capture administration expertise by integrating business rules into the administrative workflow.

Once configured, the custom script-based policies are enforced without user interaction. Active Roles automatically handles the execution of policy scripts that supplement particular administrative operations and trigger additional administrative actions. For example, policy scripts can be used to:

- Perform a sophisticated validity check on input data.
- Synchronously change information in multiple data sources, such as the Active Directory store, Microsoft Exchange Server, and HR or ERP-system database.
- Ensure that delegated administrators follow a prescribed administrative workflow.
- Link multiple administrative tasks into one operator transaction.

Dynamic groups

Active Roles helps streamline group maintenance by defining group membership dynamically, with rule-based membership criteria. Dynamic group membership eliminates the need to manually update membership lists for security and distribution groups.

To automate the maintenance of group membership lists, Active Roles provides:

- Rule-based mechanism that automatically adds and removes objects to groups whenever object attributes change in Active Directory.
- Flexible membership criteria that enable both query-based and static population of groups.

The membership criteria fall into these categories:

- **Include Explicitly**: Ensures that specified objects are included in the membership list, regardless of any changes made to the objects.
- **Include by Query**: Populates the membership list with objects that have certain properties. When an object is created, or when its properties are changed, Active Roles adds or removes it from the membership list (depending on whether the object's properties match the search criteria).
- **Include Group Members**: Populates the membership list with members of specified selected groups. When an object is added or removed from the selected groups, Active Roles adds or removes that object from the membership list.
- **Exclude Explicitly**: Ensures that specified objects are not in the membership list, regardless of any changes made to the objects.
- **Exclude by Query**: Ensures that objects with certain properties are not in the membership list. Active Roles automatically removes objects from the membership list (depending on whether the objects' properties match the search criteria).
- **Exclude Group Members**: Ensures that members of specified groups are not in the membership list. When an object is added to any one of the selected groups, Active Roles automatically removes that object from the membership list.

These membership criteria are also applicable to Managed Units.

Workflows

Active Roles provides a rich workflow system for directory data management automation and integration. Based on the Microsoft Windows Workflow Foundation technology, this workflow system enables IT to define, automate and enforce management rules quickly and easily. Workflows extend the capabilities of Active Roles by delivering a framework that enables combining versatile management rules such as provisioning and deprovisioning of identity information in the directory, enforcement of policy rules on changes to identity data, routing data changes for approval, e-mail notifications of particular events and conditions, as well as the ability to implement custom actions using script technologies such as Microsoft Windows PowerShell or VBScript.

Suppose you need to provision user accounts based on data from external systems. The data is retrieved and then conveyed to the directory by using feed services that work in conjunction with Active Roles. A workflow can be created to coordinate the operations in account provisioning. For example, different rules can be applied for creating or updating accounts held in different containers.

Workflows may also include approval rules that require certain changes to be authorized by designated persons (approvers). When designing an approval workflow, the administrator specifies which kind of operation causes the workflow to start, and adds approval rules to the workflow. The approval rules determine who is authorized to approve the operation, the required sequence of approvals, and who needs to be notified of approval tasks or decisions.

By delivering email notifications, workflows extend the reach of management process automation throughout the enterprise. Notification activities in a workflow let people be notified via email about events, conditions or tasks awaiting their attention. For example, approval rules can notify of change requests pending approval, or separate notification rules can be applied to inform about data changes in the directory. Notification messages include all necessary supporting information, and provide hyperlinks enabling message recipients to take actions using a standard web browser.

The logic of an automated management process can be implemented by using administrative policies in Active Roles. Yet creating and maintaining complex, multi-step processes in that way can be challenging. Workflows provide a different approach, enabling IT administrators to define a management process graphically. This can be faster than building the process by applying individual policies, and it also makes the process easier to understand, explain and change.

Workflow features and activities

Active Roles supports the following major workflow features and activities:

- Saving object properties
- Modifying requested changes
- Using initialization scripts
- Searching for expiring users
- Sending plain-text notification messages

Getting started

To get started with workflows, see the following resources:

- For more information on the listed workflow features and activities, see the linked sections.
- For more information on workflows in general, see *Workflows* in the *Active Roles Administration Guide*.

Workflows – Saving object properties

Workflows configured in the Active Roles Console support saving object properties when running the workflow with the **Saving Object Properties** activity. The properties are saved in the workflow data context and can be retrieved by other workflow activities either before or after the object changed.

Saving object properties is useful for situations that require knowing not only the current state or properties of the changed object, but also its previous states or property values.

Such earlier states or property values may be required for informational, archival or decision making purposes.

For example, to notify users and administrators of object deletions, you can create a workflow that:

1. Starts when requesting the deletion of the object.
2. Saves the name of the object to be deleted.
3. After the object is deleted, it sends a notification message with the saved name of the deleted object.

Workflow configuration options

The **Saving Object Properties** activity has the following configuration options:

- **Activity target**: Specifies the object whose properties will be saved. The available settings are the following:
    - **Workflow target object**: Specifies the target object of the request in a change workflow that started the workflow.

      For example, in case of a change workflow starting with the delete request of an object, selecting this setting will result in the activity saving the properties of the object to be deleted.
    - **Fixed object in directory**: Specifies a particular object that you select in Active Directory.
    - **Object identified by workflow parameter**: Specifies the object via the value of a certain parameter in the workflow. You can select the parameter from the workflow definition.
    - **Object from workflow data context**: When selected, the activity will select the object based on the workflow environment data collected while running the workflow. You can select the object for the activity when the workflow is initiated.
    - **Object identified by DN-value rule expression**: Specifies the object via its Distinguished Name (DN) by the string value of a certain rule expression. By using a rule expression, you can compose a string value based on the properties of various objects found in the workflow environment when running the workflow. You can create the desired rule expression when you configure the activity.
- **Target properties**: Specifies the object properties you want the activity to save. The Workflow Designer contains a default list of properties; however, you can change the list as you need.

  By default, the activity saves all single-value non-constructed attributes found in the directory schema of the target object, including custom virtual attributes added to the directory schema by Active Roles.

- **Notification**: Configures notifications for the runs of the activity, and subscribes recipients to the following notification events:
  - **Activity completed successfully**: Sends a notification email if no significant errors occurred during the run of the activity.
  - **Activity encountered an error**: Sends a notification email if significant errors occurred during the run of the activity.

  The notification settings specify the notification events and recipients. When run by the workflow, the activity prepares a notification message according to the specified event. Active Roles retains the message prepared by the activity, and sends the message to the specified recipients when the event occurs.
- **Error handling**: Specifies the action to take when detecting any errors. Selecting **Continue workflow even if this activity encounters an error** will suppress any errors detected by Active Roles during the workflow run. Leaving this setting clear will result in Active Roles stopping the workflow if the activity detects any errors. By default, this setting is not selected.

Retrieving saved properties

If you use any workflows that include the **Save Object Properties** activity, you can configure additional activities to retrieve the object property information saved by the **Save Object Properties** activity. You can do this by three means:

- Using a **Script** activity with the following expression:

  ```
  $workflow.SavedObjectProperties("activityName").get("attributeName")
  ```

  In this expression, `activityName` is the name of the **Save Object Properties** activity, while `attributeName` is the LDAP display name of the attribute representing the property you want the script to retrieve.

  > NOTE: You must specify an attribute listed in the **Target properties** setting of the **Save Object Properties** activity. Otherwise, the expression will return no property value during runtime.
- Adding the **Workflow - Saved Object Properties** token to the notification message template. To do so:
  1. In the **Insert Token** dialog, in the list of tokens, click **Workflow - Saved Object Properties**, then click **OK**.
  2. In the dialog that appears, select the name of the **Save Object Properties** activity and the saved property you want the token to retrieve.

  > NOTE: You must specify an attribute listed in the **Target properties** setting of the **Save Object Properties** activity. Otherwise, the token you configured will return no property value during runtime.
- If you use an **If-Else** branch condition, a **Search** filter, or a **Create**, **Update** or **Add Report Section** activity, by selecting the **Property of object from workflow data context** configuration option. To do so:

1. In the **Object Property** dialog, click the link in the **Target object** field, then click **More choices**.
2. In the dialog that appears, click **Saved Object Properties**. Then, in the **Activity** list, select the name of the **Save Object Properties** activity and click **OK**.
3. In the **Object Property** dialog, click the link in the **Target property** field, then select the property you want.

> NOTE: You must specify an attribute listed in the **Target properties** setting of the **Save Object Properties** activity. Otherwise, the entry you configured will return no property value during runtime.

Getting started

For more information on how to configure object property saving in a workflow, see *Configuring a Save Object Properties activity* in the Active Roles Administration Guide.

Workflows – Modifying requested changes

Change workflows configured in the Active Roles Console support updating change requests that started a workflow with the **Modify Requested Changes** activity. This activity lets you add or remove changes to the properties of the workflow target object while the workflow is running.

For example:

- In a workflow that starts when requesting the creation of an object, you can use the **Modify Requested Changes** activity to either modify the properties that will be assigned to the new object, or change the container in which the object will be created.
- In a workflow that starts when requesting the change an object, you can use the **Modify Requested Changes** activity to modify the requested property changes of the object.

> NOTE: The **Modify Requested Changes** activity is not available in automation workflows.

Workflow configuration options

The **Modify Requested Changes** activity has the following configuration options:

- **Target changes**: Specifies the property changes to add or remove from the change request. Use this setting to select:
  - The **Property** (or properties) you want the activity to change.
  - The **Action** to perform for each property (for example, adding, setting or removing the value of the property, or removing the property itself from the

request).

- The **Value** to add, remove or modify.

You can add, remove and modify values both for single-value and multi-value properties, with the following options.

NOTE: The various properties may only support some of the following settings.

- **Fixed object in directory**: Specifies a particular object that you select in Active Directory.
- **Text string**: Lets you specify the value of the property manually via a string.
- **Workflow target object**: Specifies the target object of the request in a change workflow that started the workflow.
- **Property of workflow target object**: Uses the value of a specific property of the target object in the request that started the workflow. When selecting this option, you can select the property from a list of object properties.
- **Workflow initiator object**: Uses the object that initiated the workflow. When selecting this option, you can select the object from a list.
- **Property of workflow initiator**: Uses the value of a specific property of the user who initiated the workflow. When selecting this option, you can select the property from a list of object properties.
- **Object identified by workflow parameter**: Specifies the object via the value of a certain parameter in the workflow. You can select the parameter from the workflow definition.
- **Object from workflow data context**: When selected, the activity will select the object based on the workflow environment data collected while running the workflow. You can select the object for the activity when the workflow is initiated.
- **Object identified by DN-value rule expression**: Specifies the object via its Distinguished Name (DN) by the string value of a certain rule expression. By using a rule expression, you can compose a string value based on the properties of various objects found in the workflow environment when running the workflow. You can create the desired rule expression when you configure the activity.
- **Changed value of workflow target object property**: Uses the value that the workflow requests to be assigned to a certain property of the workflow target object. When selecting this option, you can select the property from a list of object properties.
- **Workflow parameter value**: Uses the value of a certain parameter of the workflow. When selecting this option, you can select the property from a list of workflow parameters.
- **Property of object from workflow data context**: Uses the value of a certain object property selected by the activity on the basis of the data found in the workflow run-time environment. You can choose the desired property and

specify which object you want the activity to select when the workflow runs.

    - **Value generated by rule expression**: Uses the string value of a certain rule expression. By using a rule expression you can compose a string value based on properties of various objects found in the workflow runtime environment. You can create the desired rule expression when you configure the activity.

- **Notification**: Configures notifications for the runs of the activity, and subscribes recipients to the following notification events:

    - **Activity completed successfully**: Sends a notification email if no significant errors occurred during the run of the activity.
    - **Activity encountered an error**: Sends a notification email if significant errors occurred during the run of the activity.

  The notification settings specify the notification events and recipients. When run by the workflow, the activity prepares a notification message according to the specified event. Active Roles retains the message prepared by the activity, and sends the message to the specified recipients when the event occurs.

- **Error handling**: Specifies the action to take when detecting any errors. Selecting **Continue workflow even if this activity encounters an error** will suppress any errors detected by Active Roles during the workflow run. Leaving this setting clear will result in Active Roles stopping the workflow if the activity detects any errors. By default, this setting is not selected.

- **Additional settings**: The **Modify Requested Changes** activity also contains the following settings:

    - **Modify object creation requests so as to create objects in this container**: Allows you to change the container where Active Roles creates the new objects, while ensuring that the policies and workflows will be applied from the container where the object will be created (rather than from the container that was originally specified in the object creation request).
    - **Include or exclude these controls from the change request**: Allows you to add or remove Active Roles controls from the request. "Controls" are pieces of data that provide additional information for Active Roles on how to process the request.

      If you do not specify any controls in the request, Active Roles will process the request based on the type of the request only. You can either configure the activity to add certain controls to the request (include controls) or to ensure that certain controls never occur in the request (exclude controls). For more information about adding Active Roles controls to a request, see the *Active Roles SDK documentation*.

Getting started

For more information on how to configure object property saving in a workflow, see *Configuring a Modify Requested Changes activity* in the Active Roles Administration Guide.

Workflows – Initialization scripts

When running a workflow instance, Active Roles uses a single PowerShell operating environment (called "runspace") for all script activities held in that workflow. The workflow runtime engine creates a runspace once the workflow instance started, and maintains the runspace during the run of the workflow instance.

When you configure a workflow, you can specify PowerShell commands you want the workflow runtime engine to initialize immediately after creating the runspace. These commands are part of an **initialization script** that the workflow engine runs prior to performing the script activities.

With an initialization script, you can define runspace configuration data separately from the logic of other script activities, and you can use it to initialize the environment for initializing script activities. Specifically, you can:

- Load PowerShell modules and snap-ins. All activity scripts can use the modules and snap-ins loaded in the initialization script without having to load the prerequisite modules or snap-ins on a per-activity basis.

  The modules and snap-ins loaded in the initialization script are available to all script activities at workflow runtime. For example, the `Import-Module 'SmbShare'` command added to the initialization script makes the Server Message Block (SMB) Share-specific cmdlets available to all script activities within the workflow.

- Initialize environment-specific variables, referred to as "global variables". All activity scripts can retrieve and update global variables, which makes it possible to exchange data between different activity scripts.

  The global variables are visible to all script activities at workflow runtime. For example, the `$rGuid = [Guid]::NewGuid()` command added to the initialization script makes the `$rGuid` variable available to all script activities within the workflow. To reference a variable defined in the initialization script, the activity script must use the `$global:` qualifier, such as `$global:rGuid`.

  > TIP: If the run of the workflow instance is suspended (for example, because it is waiting for approval), then resumed (for example, after receiving approval), the runspace is reinitialized, so the global variables may change.
  >
  > In such cases, if you need to preserve the value of a global variable, add the `[Persist()]` attribute to the variable name in the initialization script, such as `[Persist()]$rGuid = [Guid]::NewGuid()`. Global variables defined this way are saved to a persistent storage when the workflow instane is suspended, then restored from the storage when the workflow instance is resumed.

  To save a variable, Active Roles creates and stores an XML-based representation of the object represented by the variable, similarly to the `Export-Clixml` command in Windows PowerShell. When restoring the variable, Active Roles retrieves the XML data that represents the object, and creates the object based on that data, similarly to the `Import-Clixml` command.

Getting started

You can create new initialization scripts in the Workflow Designer of the Active Roles Console.

To start creating a new initialization script

1. In the Active Roles Console, navigate to **Configuration** > **Policies** > **Workflow**.
2. To open the Workflow Designer, select the workflow you want to configure.
3. In the details pane, click **Workflow options and start conditions** > **Configure**.
4. To open the initialization script editor, click **Initialization script**.

The **Initialization script** tab then displays the currently used script (if it exists). To add a new script or modify the existing one, use the editor.

Workflows – Searching for expiring users

You can use the **Search** activity in an Active Roles workflow to search directory objects (such as users or groups), that match the criteria you specify with your search terms. Active Roles can then pass the search results to other workflow activities to perform additional actions.

The **Search** activity also supports searching for user accounts that will expire within the specified amount of time.

Getting started

To search for user accounts that expire within a certain amount of days, use the **Search** activity of the Workflow Designer in the Active Roles Console.

To search for expiring user accounts with a workflow

1. In the Active Roles Console, navigate to **Configuration** > **Policies** > **Workflow**.
2. To open the Workflow Designer, select the workflow you want to configure.
3. Add a **Search** activity to the workflow, or right-click an existing one, and select **Properties**.
4. To filter the search to user accounts that will expire, select **Retrieve only expiring user accounts**.
5. In the dialog that opens, specify the number of days to check. The **Search** activity will list user accounts that expire within the specified number of days.

Workflows – Sending plain-text notification messages

When configuring an Active Roles workflow, you can set email notification messages for the workflow based on a message template. The template specifies the format and contents of the notification message, including its subject and body.

The notification messages are created (and by default, sent) in HTML format. However, when configuring a **Notification** or **Approval** activity, you can also send them in plain-text format. Sending notification messages in plain-text format is useful for integration solutions that use mail flow for data exchange between Active Roles and other solution components in your organization.

Getting started

To configure a plain-text notification message for a **Notification** or **Approval** activity, use the Workflow Designer in the Active Roles Console.

To configure plain-text notification messages for a workflow

1. In the Active Roles Console, navigate to **Configuration** > **Policies** > **Workflow**.
2. To open the Workflow Designer, select the workflow you want to configure.
3. Right-click the **Notification** or **Approval** activity you want the notification for, or add them to the workflow from the Workflow Designer options.
4. In the **Notification Message** page, select **Format notification message as plain text**.

Operation in multi-forest environments

Active Directory organizes network elements into a hierarchical structure based on the concept of containers, with the top-level container being referred to as a forest. Today, many real-world Active Directory implementations consist of several forests. Common reasons for multi-forest deployments are the isolation of the administrative authority, organizational structure issues (for example, autonomous business units and decentralized IT departments), business policy, or legal and regulatory requirements.

This section provides information on the features and benefits of Active Roles as applied to environments where multiple Active Directory forests have been deployed.

With Active Roles, you can create a scalable, secure, and manageable infrastructure that simplifies user and resource management in a multi-forest environment. Benefits of deploying Active Roles in such environments include:

- Centralized management of directory data in domains that belong to different forests.
- Administrative views spanning forest boundaries.
- The ability to delegate administrative control of directory data where appropriate, without regard to forest boundaries.
- Policy-based control and automation of directory data management across forest boundaries.

By registering Active Directory domains with Active Roles, you form a collection of managed domains that represents an Active Roles security and administrative boundary in Active Directory. The collection need not be restricted to domains from a single forest. Rather, you can register domains from any forest in your environment, configuring the

Active Roles Administration Service to use the appropriate administrative credentials on a per-domain basis.

To centralize management of directory data across the managed domains, Active Roles retrieves and consolidates the Active Directory schema definitions from all forests to which those domains belong. The consolidated schema description is stored in the Active Roles configuration database, and contains information about the object classes and the attributes of the object classes that can be stored in the managed domains. By using the consolidated schema, Active Roles extends the scope of its administrative operations to cover the entire collection of managed domains regardless of forest boundaries.

Active Roles allows administrators to organize directory objects (such as users, groups, computers, and so on) into a relational structure made up of rule-based administrative views (referred to as Managed Units), each of which includes only the objects that meet certain membership criteria defined by the administrator. This structure can be designed independently from the logical model of Active Directory, which is based on the concept of containers and thus implies rigid boundaries between containers, be it forests, domains or Organizational Units. Administrators can configure Managed Units so that each Unit represents the appropriate collection of directory objects that reside in the same Active Directory container or in different containers, with different forests not being the exception.

To facilitate the management of directory data, Active Roles provides for administrative delegation at the Managed Unit level as well as at the level of individual containers in Active Directory. Through delegation, authority over directory objects held in a given Unit or container can be transferred to certain users or groups. Delegation of control over Managed Units provides the ability to distribute administration of directory data among individuals trusted to perform management of specific groups and types of objects, without taking into account the location of the objects in the Active Directory structure. Thus, Active Roles makes it easy to delegate control of directory data from one forest to users or groups located in the same forest or in a different forest.

Active Roles also allows policy-based control and automation of directory data management to be implemented at the Managed Unit level. By applying policy and automation rules to Managed Units, administrators can ensure consistent control of the well-defined collections of directory objects located in different Organizational Units, domains, or forests. In addition, policy and automation rules can be consistently applied to different containers, whether in the same forest or in different forests, which provides the platform for complex automation scenarios that involve cross-forest operations. An example could be provisioning users from one forest with resources in another forest.

When adding objects to a group, Active Roles allows you to select objects from different managed domains, including those that belong to different forests. This operation requires a trust relationship between the domain that holds the group and the domain that holds the object you want to add to the group. Otherwise, Active Directory denies the operation and, therefore, Active Roles does not allow you to select the object. Note that Active Directory automatically establishes trust relationships between domains within one forest. As for domains in different forests, administrators must explicitly establish trust relationships as needed.

The rule-based mechanisms that Active Roles provides for auto-populating groups can also be freely used in multi-forest environments. You can configure rules to have Active Roles populate groups with objects that reside in different domains, whether in the same forest or in different forests. However, the capabilities of Active Roles to automatically manage group membership lists are also restricted by the Active Directory constraints that only allow a group to include objects from the domain that holds the group or from the domains trusted by that domain. In other words, unless a trust relationship is established between the domain that holds the group and the domain that holds a given object, the object cannot be added to the group, neither manually nor automatically by Active Roles.

Examples of use

Active Roles can be configured to provide a wide range of directory management solutions, allowing organizations to create more secure, productive, and manageable Active Directory and Microsoft Exchange environments. This section highlights how Active Roles helps to address the challenges faced by enterprises today.

Distributing administration

Suppose a large company wants to introduce distributed administration, but wants to avoid the large costs involved in training their helpdesk and business units to correctly use complex administrative tools. In this situation, there is the need for an easy-to-use tool, to control what actions the helpdesk and business units can perform, and to enforce company policies and procedures.

Solution

Active Roles allows organizations to create Managed Units and to designate Trustees over those Managed Units. Trustees only see the objects to which they have access. They are given only the rights they need for the objects within these Managed Units, down to individual properties. Unlike native Active Directory Organizational Units, Managed Units provide virtual boundaries that span across domains and forests, offering more flexible delegation capabilities.

Delegating limited control over Managed Units efficiently eliminates the need for high-level administrative user ID's, allowing organizations to securely distribute administrative authority to local management. To improve network security and make distributed administration safe, Active Roles defines and enforces customizable administrative polices.

Active Roles allows organizations to safely implement administration for business units. If a company has a number of different business units, each of equal importance and each located in a separate office, a single network administrator could support all of the sites. Active Roles allows the company to create a single Managed Unit, giving an administrator control over users and resources that span multiple domains.

Integrating with other systems

Suppose a company wants to integrate its HR system, administration, and physical security to provide a workflow that reduces repetitive data. Normally, the HR team creates a user profile, the IT team also creates a user profile in Windows and Exchange, and the security team activates an access card for the new employee. The three teams do not synchronize with each another and instead duplicate their work. This results in increased administration costs and introduces security issues. For example, some individuals may no longer work for the company but may still have valid user IDs and access cards. In this scenario, there is a need to integrate the HR system and other systems of the company, and to automate performing user provisioning tasks.

Solution

With Active Roles, a suitable property set can be established to include data from network data sources other than Active Directory. For instance, a property set might be configured to retrieve the personal information of a user from an HR database. When the user account is created, this data could then be passed to Active Directory and Microsoft Exchange. If these property values change, an update could be made to both Active Directory and to the HR system.

Active Roles also provides the ability to set up administrative policies that reduce the amount of input required to carry out a task. For example, when a user moves to a different location, Active Roles could automatically update the user profile in the HR system, based only on the change to the site code or department of the user in Active Directory. Additionally, when a user joins or leaves the company, their access card could automatically be enabled or disabled.

Managing multi-forest Active Directory design

Suppose a host company has client customers who need to place domain controllers on their premises. In Active Directory, every domain controller holds a writable copy of the schema and configuration of the entire forest. Anyone with administrative or backup/restore rights on any domain controller, or physical access to any domain controller, could potentially disrupt the entire forest. For instance, they could attempt to circumvent Windows security, or they could edit the Active Directory database, and the changes would be propagated to all domains in the forest. To avoid such an incident, the company needs to create a separate forest for each client who requires domain controllers on their premises. Otherwise, the actions of one malicious user could affect directory service delivery for other clients in the same forest.

Having multiple forests increases the complexity of the Active Directory structure. This in turn leads to increased administration, as each forest needs separate directory service administration. In this case, there is a need for an administrative system that enables the cross-forest management of Active Directory.

Solution

Active Roles provides a unified management structure that can extend across multiple Active Directory forests. The Active Roles user interface provides a single interface for the management of Active Directory domains that belong to different forests. It offers administrative views (Managed Units) that can hold objects from multiple forests, thereby enabling the unified application of corporate rules and roles across forest boundaries.

With its ability to safely delegate administration in multi-forest environments, Active Roles provides the necessary level of control for the host company’s customers, while enabling the company to implement role-based security, and restrict the customers’ administrative actions based on corporate policies.

For security reasons, it may be unacceptable to have an administrative tool with the same level of rights as a domain administrator. This is because administrative access to an entire domain in a forest may be used to gain administrative access to the whole forest, via the elevation of privileges attack. Active Roles can operate in a multi-forest environment within a precisely defined scope of access to domains, with no special requirement to have administrative access to entire domains or security-sensitive containers. This addresses the need for a product that provides advanced administrative capabilities, while effectively preventing the elevation of privileges.

Simplifying Active Directory structure

Suppose a company wants to design an Active Directory structure based on physical location. As a rule, the administration/IT department, business units, and Exchange team would each prefer to have a different structure. As a result, they agree to a compromise that does not fully satisfy their requirements. Clearly, there is a need to simplify the Active Directory structural requirements.

Solution

In Active Roles, Managed Units allow organizations to achieve acceptable security boundaries without setting up extra domains or Organizational Units. This significantly simplifies the Active Directory structure and reduces security risks.

By using Managed Units for delegation purposes, Active Roles creates a rule-based overlay of Active Directory for administration. This simplifies the process of choosing an Active Directory structure. Different administrative tasks often require different OU structures. For instance, an OU structure designed purely for the delegation of administration differs from an OU structure shaped purely for Group Policy. It becomes much easier to design an Active Directory structure by using Managed Units to handle delegation issues.

Handling organizational changes

Consider a company in the process of reorganization. Multiple departments are changing names, merging, or separating from one another. Such reorganization involves an increase in administrative, security, and business liabilities, as well as the high cost of manually updating data. This situation demands a means to automatically update and move data.

Solution

Active Roles provides the ability to define administrative policies that make organizational changes easier to handle. By using Managed Units, rule-based overlays of the actual data in Active Directory can be set up for both the current and planned organizational structures. Administrative policies can be specified so that when data moves from one Managed Unit to another, policy definitions will automatically be applied, based on the change. This will update user properties, such as the manager, department, group memberships and OU memberships.

As another example, consider a user who changes departments. Depending on the department to which the user moves, Active Roles could automatically move user data, change user group memberships, and specify the manager of the user.

User account management

Suppose a company provides services based on Active Directory and Microsoft Exchange. The company relies on the Active Directory infrastructure as a basis for their service offerings.

Configuration of Active Directory involves setting security and partitioning the directory, so that any user has proper access to directory resources. It is paramount to have a framework that facilitates the creation of new user accounts and the assignment of appropriate access rights. There is a need for a robust system that maintains user creation and management with minimal administrative effort.

Solution

Active Roles offers a reliable solution to simplify and safely distribute user account management. It addresses the need to create and manage a large number of user accounts, and to ensure that each user can only access their own resources. By implementing an administrative model based on business rules, Active Roles allows domain-level administrators to easily establish and maintain very tight security, while facilitating the provisioning of new users with the appropriate access to IT resources.

Active Roles has the ability to safely delegate routine user-management tasks to designated persons. By incorporating policy enforcement and role-based security, Active Roles allows the organization to restrict the administrative actions according to the corporate policies defined by the high-level administrators. In addition, it allows the administrators to change the policies, ensuring that new policy settings are automatically propagated and enforced without additional development.

Active Roles makes it simpler for the organization to delegate authority to administrative and support groups, while enhancing the overall security. The Web Interface can serve as an administrative tool that allows the assistant administrators to manage users, groups, and mailboxes. Active Roles ensures that all actions performed by a Web Interface user are in compliance with the corporate security policies.

Administrative rules and roles

The following sections provide an overview of the Active Roles features related to:

- Workflow capabilities.
- Policies (that is, administrative rules).
- Delegation model (that is, administrative roles).

Managed Units

Enterprises usually design their Organizational Unit-based (OU-based) network structure on geographical or departmental boundaries, restricting the ability to delegate administration outside these boundaries. However, they may face situations that require directory objects to be grouped together by logic that does not align with the OU structure.

Both Active Directory (AD) and Azure Active Directory (Azure AD) offer a comprehensive delegation model. However, since the scope of delegation is defined using OUs, distributed administration is constrained by the OU structure. For example, in AD, without changing the directory structure, you cannot regroup objects so that new groups support inheritance for their members when delegating control or enforcing policy.

To solve this problem and provide more flexibility in managing AD and Azure AD resources, Active Roles provides special administrative views that can meet any directory management needs. These securable, flexible, rule-based administrative views, known as Managed Units or MUs, allow configuring distributed administration independent of the OU hierarchy. As such, MUs are dynamic virtual collections of AD or Azure AD directory objects, and may include them regardless of their location in the organization network.

While Managed Units allow organizations to implement OU structures on a geographical basis, it distributes administration on a functional basis. This means that, for example, all users or Azure users of a particular department could be grouped into a single MU to delegate access control and enforce administrative policies regardless of their location in different OUs. However, grouping said users or Azure users into an MU still keeps the geographically-defined OUs of the users intact, leaving the OU-based structure unaffected.

As such, MUs make it possible to organize an enterprise by any custom logic without changing the underlying domain and OU structure, resulting in a secure and easy-to-manage administration environment.

MUs can include:

- AD objects from different domains, trees, or forests, provided that they are configured in Active Roles.
- Azure users, Azure guest users, Azure contacts, Microsoft 365 (M365) groups, Azure distribution groups and Azure security groups from any Azure tenant configured in Active Roles.

  > NOTE: MUs do not support any Azure mailbox types and dynamic distribution groups.

MU membership is not exclusive: You can include AD or Azure AD objects in an MU even if they are already members of another MU.

How Managed Units work

Managed Units (MUs) use membership rules to determine whether an object is a member of a specific MU. For example, you can specify an MU membership rule which states that all users or Azure users who are geographically located in the United States can belong to a certain MU. The configured membership rule then works as a query in Active Roles, searching for users or Azure users located in the United States, and populating the MU accordingly. Active Roles stores the MU membership rules as part of the MU properties, ensuring that:

- Whenever a new directory object that meets the membership requirements is created, it is added to the MU.
- Whenever an existing member object changes in a way that it does not meet the membership requirements, it is removed from the MU.

Active Roles allows configuring MU-level permissions and policy settings, with their inheritance also working seamlessly across the Active Directory (AD) and Azure Active Directory (Azure AD) environment. Similarly to the MU membership of directory objects, these object permissions and policy settings can also change as well, so that the MU can dynamically adapt to the changing organization, simplifying administration maintenance.

Once configured, MUs are ideal for delegated administration for several reasons:

- When using MUs, delegated administrators no longer have to browse OUs to search for managed objects.
- You can delegate the administrative control of MUs to specific users or groups, similarly to OUs.
- With MUs, you can locate all objects managed by the same user or group in one place.

Deployment considerations for Managed Units

Managed Units (MUs) are virtual Organizational Units (OUs), allowing you to group directory objects and configure delegation and policy settings for them by a logic that may not correspond to your Active Directory (AD) or Azure Active Directory (Azure AD) structure. However, technically, they are LDAP queries stored in the Active Roles Configuration Database. As such, MUs can only be configured and accessed via Active Roles interfaces.

Managed Unit membership rules

It is membership rules that determine the list of objects to be included in a Managed Unit. Although several types of membership rule are available, there are two that are most commonly used. These are query-based inclusion or exclusion rules and explicit inclusion or exclusion rules.

Typically you would use query-based rules to include objects that span multiple Organizational Units or Organizational Unit structures. An example is a Managed Unit that includes all disabled user accounts or a Managed Unit that includes all user accounts without mailboxes. Query-based rules are also used to build logical structures from a flat Organizational Unit structure.

You have to be careful with query-based rules because in essence these are conditions imposed on object attributes. If the value of an object’s attribute does not meet the specified conditions, the object is not included in the Managed Unit. The opposite is also true. If you, for example, configure a Managed Unit to include all users whose name begins with letter A, the Managed Unit would include the Administrator account. If the Helpdesk had delegated control over that Managed Unit, Helpdesk operators could gain control over the Administrator account. This brings in the use for explicit rules.

Explicit rules allow you to include or exclude objects based upon their identifier (GUID), so no matter how the object is changed or renamed, as long as that object exists in the directory, the rule will be in effect. Explicit rules normally complement query-based rules to include an object the query does not cover or to exclude an object that may meet the conditions of the query. Other uses are to statically include an object so no matter what that object is named it will always be included. Most typically this is Organizational Units. You can build a logical structure of Organizational Units from any part of the directory tree by explicitly adding them to a Managed Unit. This makes delegation and policy application much easier, since either can be done at the Managed Unit level instead of each individual Organizational Unit.

The following table lists some useful examples of membership rules. These examples demonstrate how to control membership rules by using LDAP filters. You can apply an LDAP filter under the **Custom Search** option in either of the query-based rule types.

Table 1: Managed Unit membership rules

Managed Unit Contents	LDAP Filter
Groups hidden from the Exchange Address List	`(&(objectCategory=group)(mailnickName=*)(msExchHideFromAddressLists=True))`
Mail-enabled groups	`(&(objectCategory=group)(mailNickName=*))`
Mail-enabled users with forwarders set	`(&(sAMAccountType=805306368)(mailNickName=*)(altRecipient=*))`
Users who do not have an Exchange mailbox	`(&(sAMAccountType=805306368)(!(homeMDB=*)))`
Distribution groups	`(&(objectCategory=group)(!(groupType:1.2.840.113556.1.4.803:=2147483648)))`
Security groups	`(&(objectCategory=group)(groupType:1.2.840.113556.1.4.803:=2147483648))`
Disabled user accounts	`(&(objectCategory=user)(userAccountControl:1.2.840.113556.1.4.803:=2))`
Users from the Sales department	`(&(objectCategory=user)(department=Sales))`

Delegation of Managed Units

You can delegate Managed Units exactly like Organizational Units or an entire domain, by applying Access Templates in Active Roles. This can drastically expedite deployment, ease administrative burden for Active Roles, and simplify the training and job processes for the administrators using this tool.

For example, by grouping all disabled and locked out accounts within a single Managed Unit, you can delegate control to a Helpdesk group so that they can quickly and easily perform a large part of their job function by only having to enumerate and look through a single structure. Also, when delegating control of a Managed Unit, you do not have to give your delegated administrators access to any Organizational Unit: all objects that meet the membership rules are in the Managed Unit regardless of what Organizational Units hold those objects.

One more example would be where Active Directory has a very flat structure of Organizational Units, however different administrators are responsible for different locations. As long as the location code is stored in an attribute of the objects to be managed, you can create Managed Units based on that attribute, and delegate to each set of administrators a Managed Unit containing their respective objects that meet a particular location code. Since Managed Units are merely groupings of objects based on certain attributes, the objects will move in and out of Managed Units regardless of how their attributes change, either through Active Roles interfaces or natively.

An important feature of Managed Units is the fact that a single Managed Unit can include objects from any domains managed by Active Roles (managed domains). As long as a given domain is registered with Active Roles, regardless of the domain's forest, any object from that domain can be added to a Managed Unit. When doing delegation of a Managed Unit that holds objects from different domains, it is recommended to use domain local groups from the domain where the Active Roles installation exists, or universal groups. This is because Active Roles allows you to do delegation to any security group within the managed domains; however, if the Active Roles installation exists in domain A and a delegation was done to a domain local group in domain B, an administrator who authenticates against Active Roles in domain A will never have the local group from domain B added to his security token, therefore he will not have his delegated rights. Also global groups can be used as long as all administrative users reside in the domain where Active Roles is installed.

One precaution you must consider with delegating control of Managed Units is the ability to synchronize the delegated permissions to Active Directory. When you apply an Access Template to a Managed Unit and do not sync the permissions with Active Directory, the permission settings are only stored within Active Roles' configuration database. Active Roles maintains the parent-child relationship for the objects held in the Managed Unit, thus allowing permission inheritance to work. If you choose to sync the permissions with Active Directory, there is no way to maintain that parent-child relationship in Active Directory since a Managed Unit is not truly an object within Active Directory so to Active Directory that parent does not exist. As a result, every permission entry found in the Access Template will be included into the native Access Control List of every object held in the Managed Unit. Potentially this could cause performance issues.

Access Templates

Active Roles provides safe, distributed administration through advanced delegation of rights with high granularity to individual users or groups. This relieves highly skilled administrators from routine day-to-day tasks, saving time and increasing productivity. For example, an administrator can allow helpdesk to perform specific tasks, such as resetting passwords or managing group memberships, without granting full administrative privileges.

As you develop your administration and security design, you define delegated administrators (Trustees) and administrative roles (Access Templates). Then, you define Managed Units and apply Access Templates, designating Trustees for each Managed Unit. You can also apply Access Templates to objects and folders in Active Directory, assigning the permissions to the necessary Trustees. This three-way relationship between Trustees, Access Templates, and managed objects is central to the implementation of your role-based administration model.

The Active Directory Users and Computers tool provides the facility to delegate administrative responsibilities. However, every time you want to delegate rights, you need to define a set of permissions. This makes the delegation procedure time-consuming and prone to errors. Active Roles overcomes this problem by consolidating permissions into customizable administrative roles, known as Access Templates. The logical grouping of permissions simplifies the management of delegation settings.

Access Templates are collections of permissions representing administrative roles. Permissions are used to allow or deny certain administrative operations to a user or group. You can create an Access Template that incorporates all permissions required to perform a particular administrative role.

To assign the role to a user or group, link the the Access Template to a Managed Unit, Organizational Unit, domain, or individual object, depending on the scope of the role, and then select a user or group to designate as a Trustee. As a result, the individual user, or each member of the group, acquires the rights specified by the role to administer objects that reside in the collection or folder to which the Access Template has been linked.

How Access Templates work

Active Roles implements delegated administration by linking Access Templates to collections of objects (Managed Units), directory folders (containers), or individual (leaf) objects.

When applied to a directory object, an Access Template specifies permission settings for that object and its child objects. Applying Access Templates to Managed Units is a convenient way to manage permissions on collections of directory objects.

Each Access Template is applied in relation to some users and/or groups (Trustees), and the permissions specified in the Access Template determine their access to managed objects. When an Access Template is modified or no longer applied, permissions set for the directory objects are modified accordingly.

When permissions on a Managed Unit change, Active Roles recalculates the permission settings on all the Managed Unit members. Likewise, the permission information is modified whenever the list of objects in a Managed Unit changes. When objects join or leave a Managed Unit (due to object property changes, for example), all permission settings on those objects are recalculated.

Every object inherits its permission settings from the Managed Units in which it resides. For example, if a Trustee has permissions to access multiple Managed Units that hold a given object, the permissions of the Trustee to access that object are simply defined as a union of all permissions specified at the Managed Unit level.

Applying Access Templates to a container object (directory folder) establishes the access of the Trustee to both the container and its child objects. The Trustee, having permissions specified over a container, possesses inherited permissions for the child objects residing in the container.

Applying permissions with Access Template

You can assign permissions to Active Directory (AD) objects with Access Templates (ATs) in the Active RolesConsole.

Delegating permissions with ATs is an effective method to grant specific types of access for specific users or groups to specific organizational resources. For example, directory administrators of a domain can receive full control for managing that domain, while helpdesk operators can quickly receive permission to reset passwords for domain users.

Active Roles supports specifying ATs to all AD object types: administrative views (Managed Units), directory folders (containers), or individual (leaf) objects as well. When applying an AT to an AD object, you:

1. Designate a **trustee** (also known as **security principal**) who will receive the permissions granted by the AT. Trustees are typically users or groups.
2. Assign permissions to that trustee for the AD object in the scope of the AT. Such AD objects are called **securable objects**.

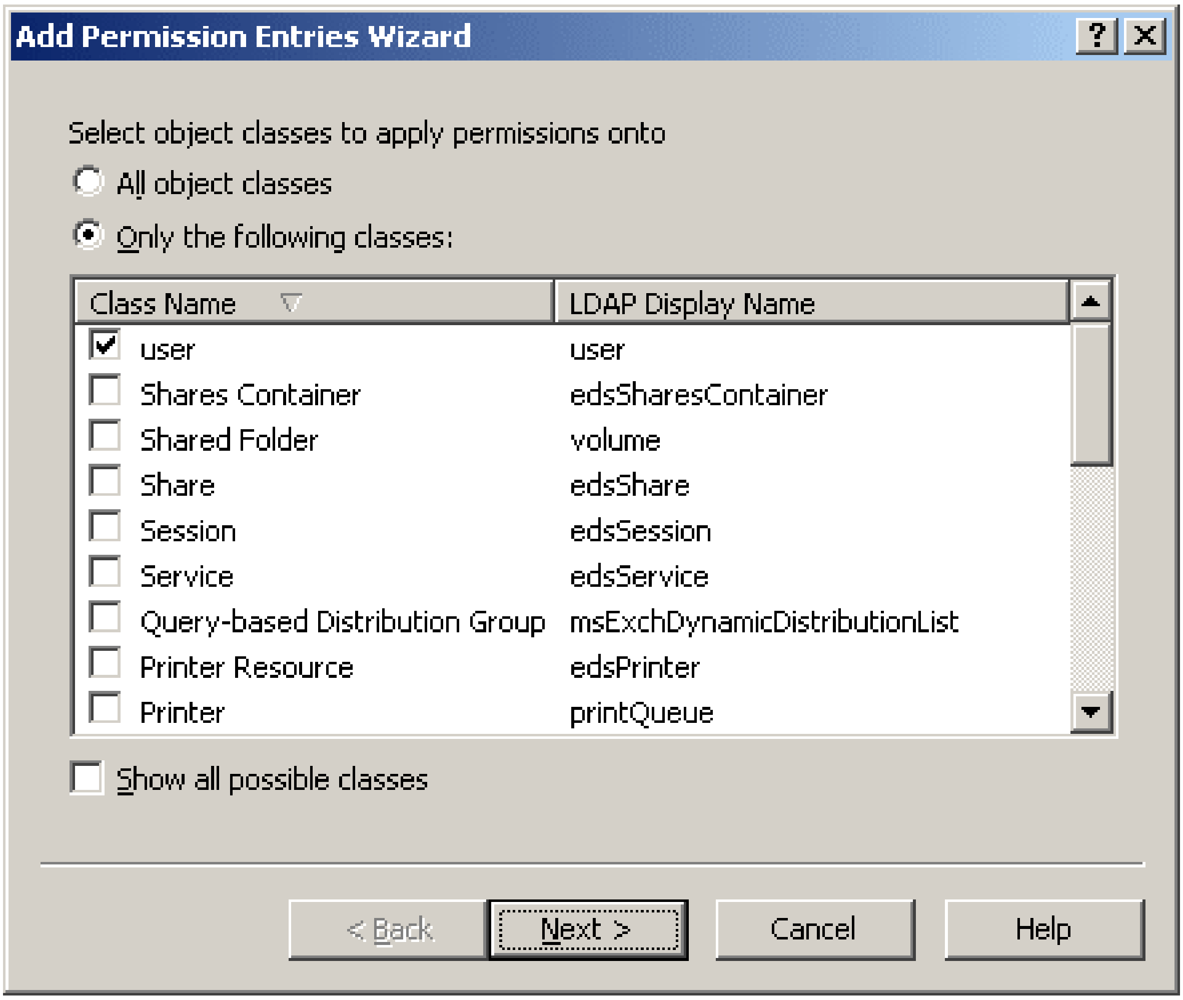
   As a result, the trustee receives access to the securable object according to the permissions defined in the AT.

For the steps of applying Access Templates to directory objects, see *Applying Access Templates* in the *Active Roles Administration Guide*.

Add Permission Entries wizard

The **Add Permission Entries Wizard** lets you specify the permission to be added into the Access Template. The first page of the wizard looks as shown in the following figure.

Figure 4: Add Permission Entries



Select object classes to apply permissions onto

○ All object classes

● Only the following classes:

Class Name	LDAP Display Name
☑ user	user
□ Shares Container	edsSharesContainer
□ Shared Folder	volume
□ Share	edsShare
□ Session	edsSession
□ Service	edsService
□ Query-based Distribution Group	msExchDynamicDistributionList
□ Printer Resource	edsPrinter
□ Printer	printQueue

□ Show all possible classes

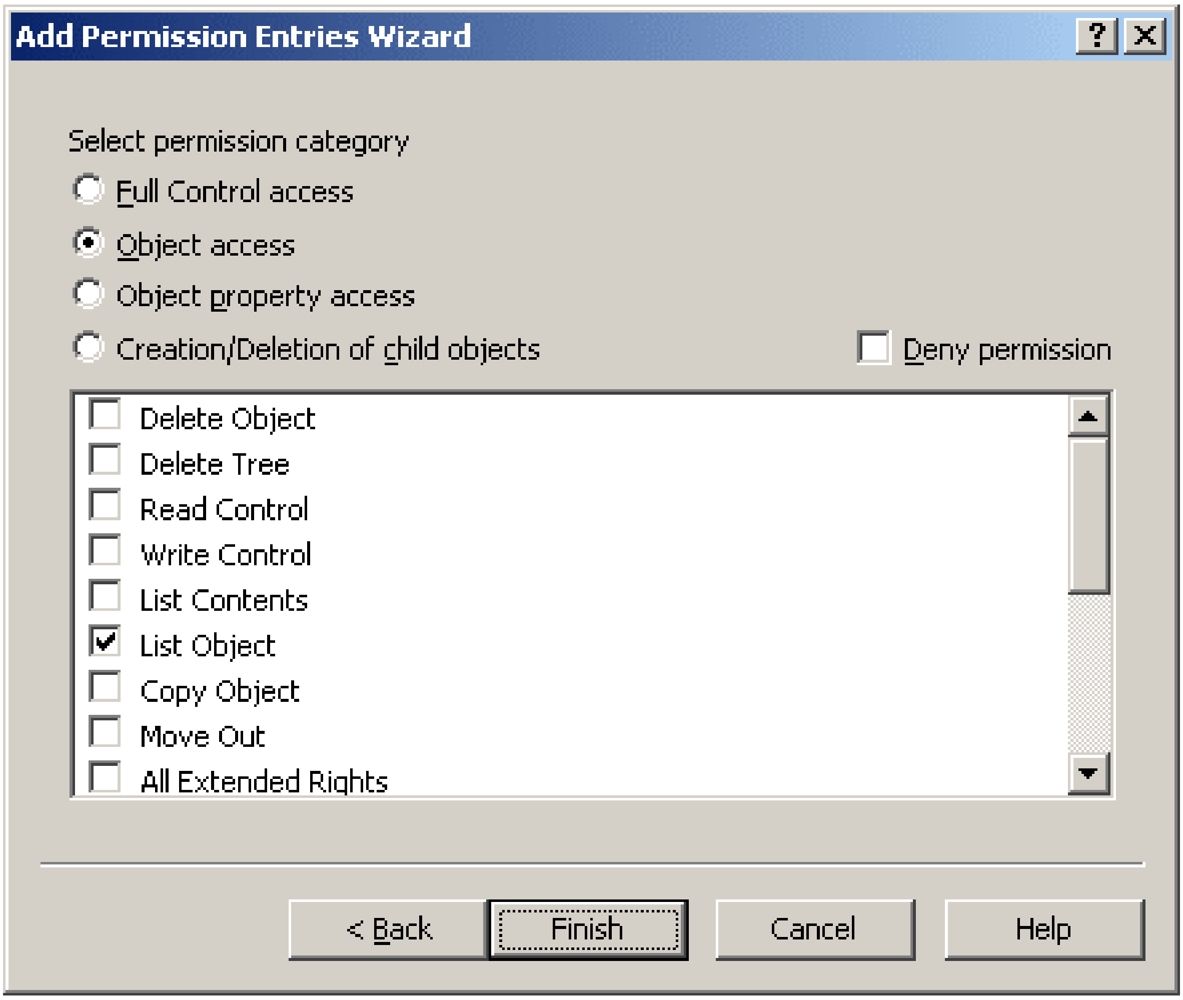
On this page, you select the types of objects to which you want the permission to allow (or deny) access. You can select one of these options:

- **All object classes**: With this option, the permission controls access to objects of any type.
- **Only the following classes**: With this option, the permission controls access to objects of the type you choose by selecting the appropriate check boxes in the list.

NOTE: By default, all object classes are not displayed in the list. To display all object classes, select the **Show all possible classes** check box.

After you have selected the object classes you want, click **Next**. The next page of the wizard looks as shown in the following figure.

Figure 5: Permission category



Add Permission Entries Wizard

Select permission category

○ Full Control access

● Object access

○ Object property access

○ Creation/Deletion of child objects

□ Deny permission

- □ Delete Object
- □ Delete Tree
- □ Read Control
- □ Write Control
- □ List Contents
- ☑ List Object
- □ Copy Object
- □ Move Out
- □ All Extended Rights

On this page, you select a permission category, and specify whether you want the permission to allow or deny certain administrative actions.

You can select one of the following permission categories:

- **Full Control access**: Allows or denies all administrative actions on an object.
- **Object access**: Controls how an object is accessed and controlled.
- **Object property access**: Controls access to an object’s attributes.
- **Creation/Deletion of child objects**: Allows or denies creation or deletion of objects in a container.

If you want the permission to deny certain administrative actions, select the **Deny permission** check box.

The following sections elaborate on the permission categories you can select in the **Add Permission Entries Wizard**.

Full Control access

Permissions in this category grant access to all object (and object property) administrative operations for the classes selected in the previous step of the **Add Permission Entries Wizard**.

After you select **Full Control access** and click **Finish**, the permission is added to the newly-created Access Template.

Object access

Permissions in this category grant access to object (but not object property) administrative operations for the classes selected in the previous step of the **Add Permission Entries Wizard**.

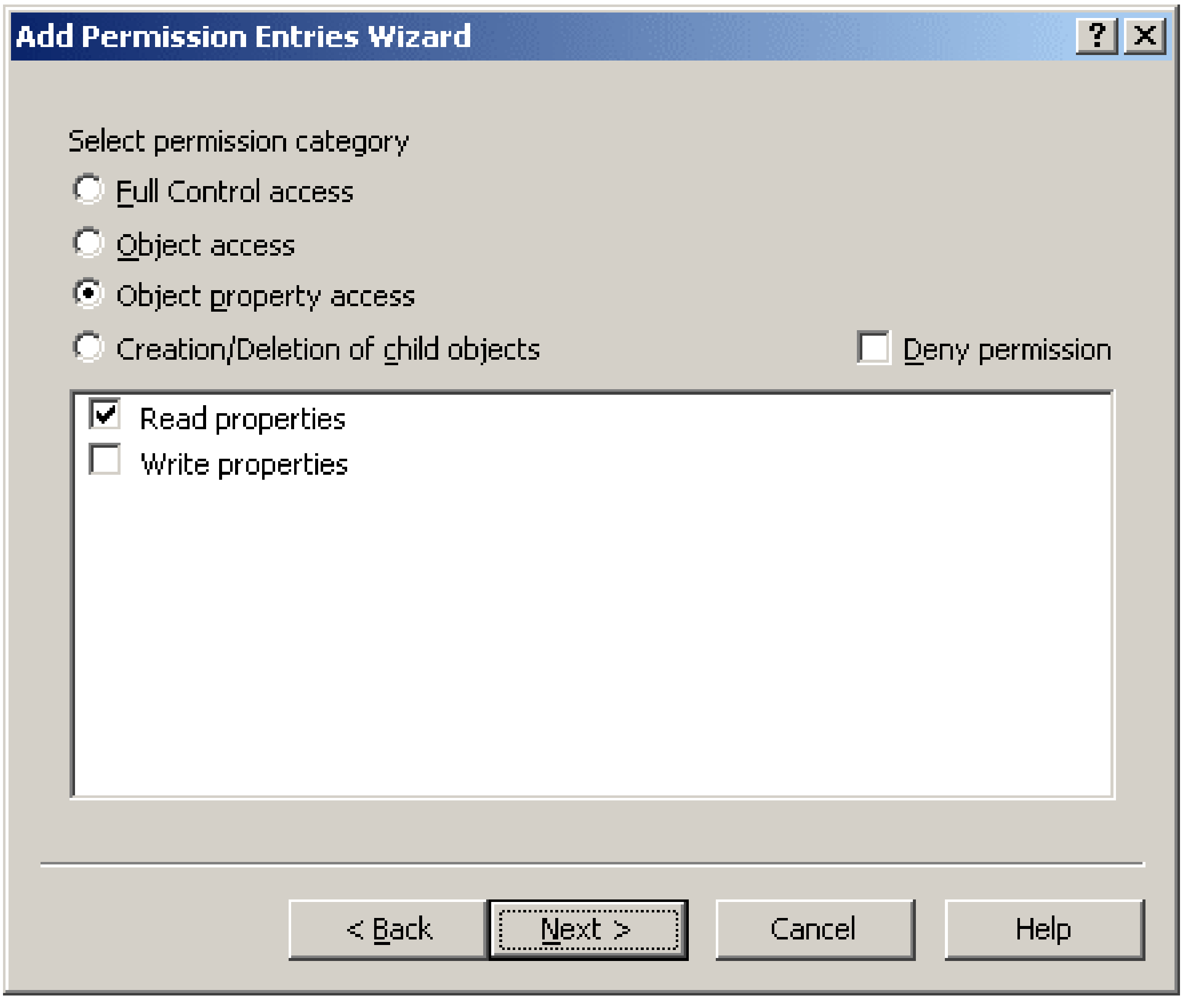
Administrative operations are selected from the list, which is displayed when you select **Object access**. You select the necessary operations by selecting the appropriate check boxes. For example, you might select **List Object** to allow viewing objects of certain types.

After you have selected the operations, click **Finish** to complete the **Add Permission Entries Wizard**. The permission is added to the newly-created Access Template.

Object property access

Permissions in this category grant access to object property administrative operations for the classes selected in the **Add Permission Entries Wizard**.

When you select **Object property access**, you specify access to object properties. You can select **Read properties** and **Write properties**, as shown in the following figure.


Add Permission Entries Wizard

Select permission category

○ Full Control access

○ Object access

● Object property access

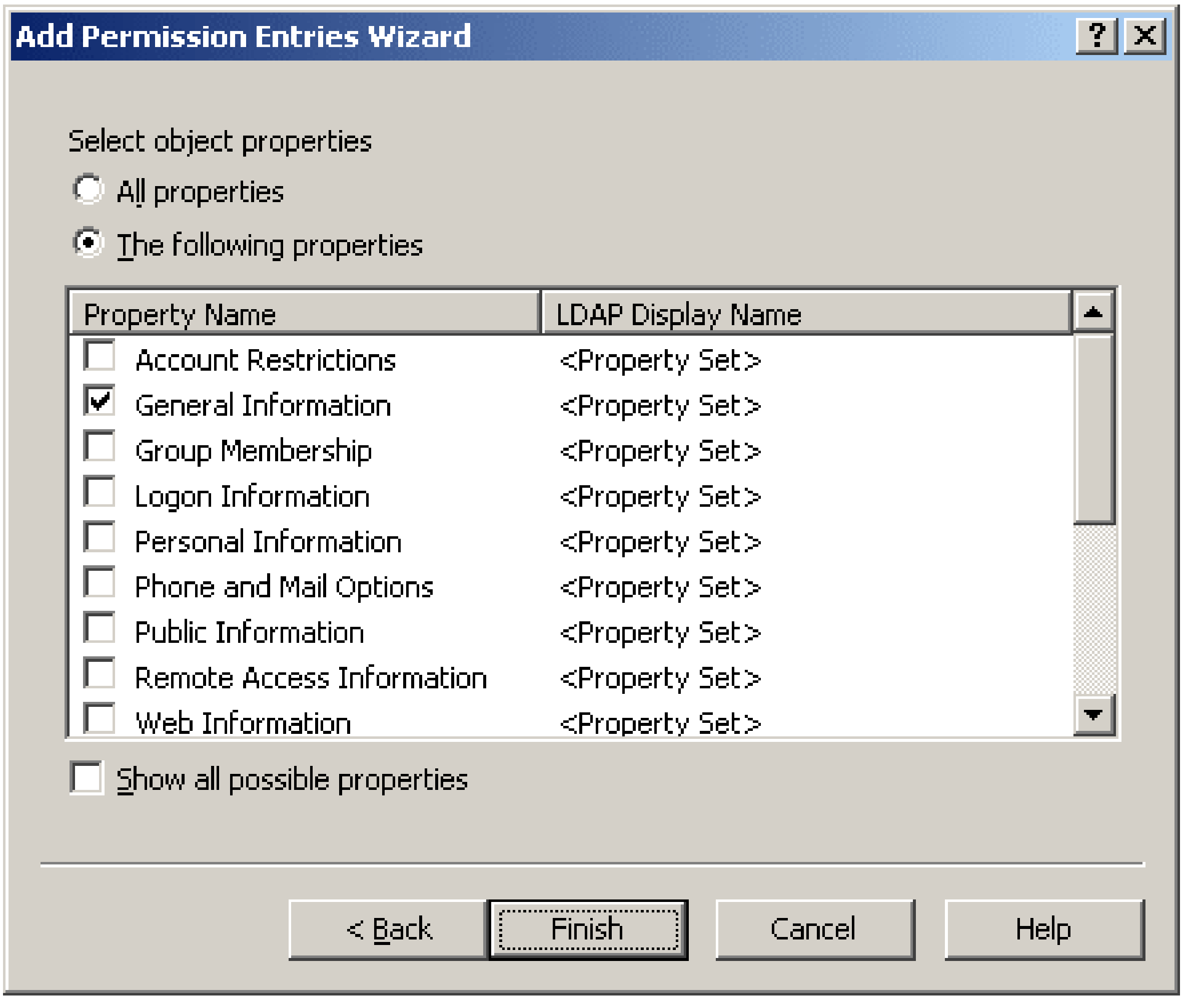
○ Creation/Deletion of child objects

□ Deny permission

☑ Read properties

□ Write properties

After you click **Next**, the wizard displays a page where you can select the properties to which you want the permission to allow (or deny) access. The page is similar to the following figure.



Add Permission Entries Wizard

Select object properties

○ All properties

● The following properties

Property Name	LDAP Display Name
□ Account Restrictions	<Property Set>
☑ General Information	<Property Set>
□ Group Membership	<Property Set>
□ Logon Information	<Property Set>
□ Personal Information	<Property Set>
□ Phone and Mail Options	<Property Set>
□ Public Information	<Property Set>
□ Remote Access Information	<Property Set>
□ Web Information	<Property Set>

□ Show all possible properties

On that page, you can select one of the following options:

- **All properties**: With this option, the permission controls access to all properties.
- **The following properties**: With this option, the permission controls access to the properties you select from the list by selecting the appropriate check boxes.

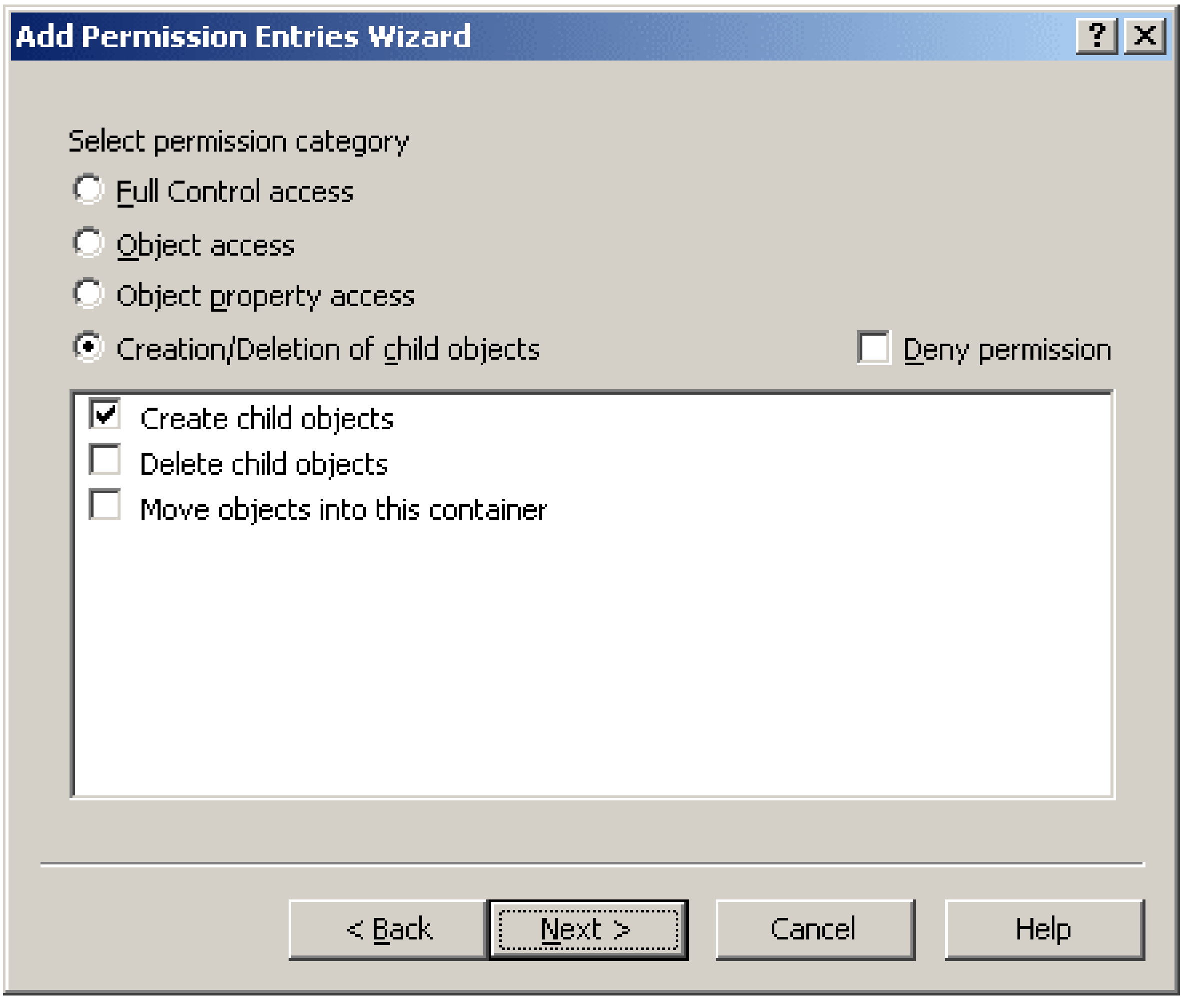
NOTE: By default, not all object properties appear in the list. To display all object properties, select the **Show all possible properties** check box.

After you have selected the properties you want, click **Finish** to complete the **Add Permission Entries Wizard**. The permission is added to the Access Template.

Creating or deleting child object permissions

Permissions in this category provide for creation and deletion of child objects in container objects of the classes you selected in the previous step of the **Add Permission Entries Wizard**.

When you select **Creation/Deletion of child objects**, you specify the creation, deletion, and move operations you want the permission to allow (or deny). The list of operations looks as shown in the following figure.



Add Permission Entries Wizard

Select permission category

○ Full Control access

○ Object access

○ Object property access

● Creation/Deletion of child objects

□ Deny permission

☑ Create child objects

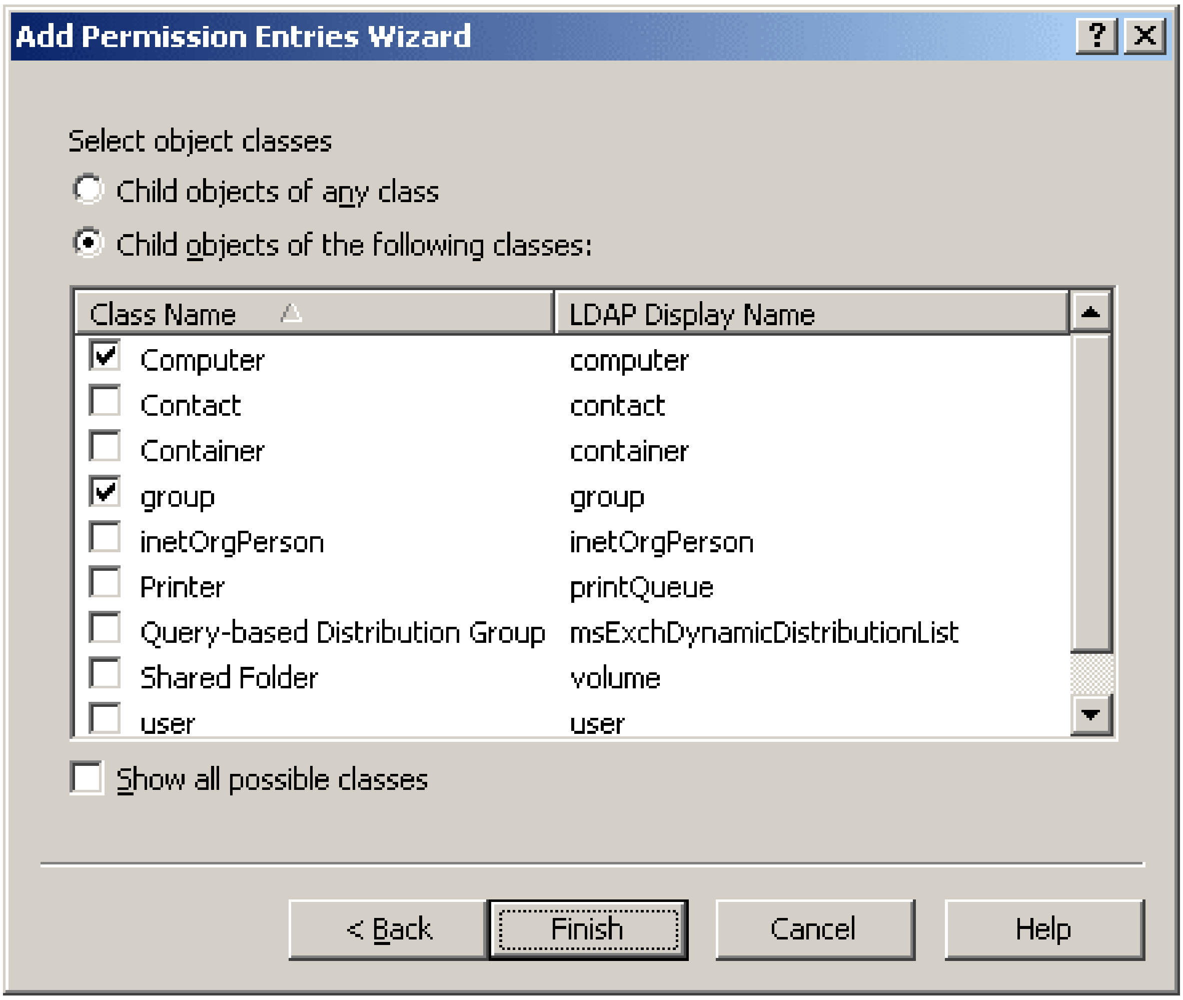
□ Delete child objects

□ Move objects into this container

You can select the following operations:

- **Create child objects**: Controls the creation of child objects of the classes you select in the next step.
- **Delete child objects**: Controls the deletion of child objects of the classes you select in the next step.
- **Move objects into this container**: Controls the relocation of object of the classes you select in the next step. This operation assumes moving objects from one container to another without permission to delete existing objects or create new objects.

After you click **Next**, the wizard displays the page where you can select the types of objects on which you want the permission to allow (or deny) the operations you selected in the previous step. The page is similar to the following figure.



Add Permission Entries Wizard

Select object classes

○ Child objects of any class

● Child objects of the following classes:

	Class Name	LDAP Display Name
☑	Computer	computer
□	Contact	contact
□	Container	container
☑	group	group
□	inetOrgPerson	inetOrgPerson
□	Printer	printQueue
□	Query-based Distribution Group	msExchDynamicDistributionList
□	Shared Folder	volume
□	user	user

□ Show all possible classes

On that page, you select the types of objects for which you want the permission to allow (or deny) the creation, deletion, or move operation. You can select one of these options:

- **Child objects of any class**: With this option, the permission controls the operations on objects of any type.
- **Child objects of the following classes**: With this option, the permission controls the operations on objects of the type you select from the list by selecting the appropriate check boxes.

NOTE: By default, all object classes are not displayed in the list. To display all object classes, select the **Show all possible classes** check box.

After you selected the object classes, click **Finish** to complete the **Add Permission Entries Wizard**. The permission is added to the Access Template.

Access Template link management

When applying an Access Template, Active Roles creates an Access Template link. Thus, administrative rights are specified by linking Access Templates to securable objects, such as Managed Units, directory folders (containers), or individual (leaf) objects.

Each Access Template link includes the identifier (SID) of the security principal—user or group—to which the specified administrative rights are assigned. When an Access Template link is created, the user or group becomes a Trustee over the collection of objects or the folder to which the Access Template is linked, with permissions specified by that Access Template.

When an Access Template is modified or no longer applied, the permission information on objects affected by the Access Template changes accordingly.

You can display a list of Access Template links starting from one of the following points:

- **Access Template**: Right-click an Access Template and click **Links**.

  This displays the links in which the Access Template occurs.
- **Security principal (Trustee)**: Right-click a group or user, and click **Delegated Rights**.

  This displays the links in which the group or user occurs as a Trustee either directly or due to group memberships.
- **Securable object**: Right-click a container object or Managed Unit and click **Delegate Control**. For a leaf object, open the **Properties** dialog, go to the **Administration** tab, and click **Security**.

  This displays the links in which the selected object occurs as a securable object (referred to as **Directory Object**).

Another way to see a list of Access Template links is to use the **Advanced Details Pane**. Select the setting in in the **View** menu, then select one of the following:

- Access Template

  The **Links** tab lists the links in which the selected Access Template occurs.
- Other object (Managed Unit, container, or leaf object).

  The **Active Roles Security** tab lists the links in which the selected object occurs as a securable object (referred to as **Directory Object**).

The Active Roles Console displays a list of Access Template links in a separate window. Thus, the **Active Roles Security** window is displayed when you start from a securable object (for example, by clicking a Managed Unit or Organizational Unit and then clicking **Delegate Control**).

Each entry in the list of the Access Template links includes the following information:

- **Trustee**: The link defines administrative rights of this security principal (group or user).
- **Access Template**: The Access Template that determines the rights of the Trustee.

- **Directory Object**: The link defines the rights of the Trustee to this securable object.
- **Sync to Native Security**: Indicates whether the permissions are synced to Active Directory.
- **Disabled**: Indicates whether the link is disabled. If a link is disabled, the permissions defined by that link have no effect.
- **Access Rule**: Indicates whether an Access Rule is applied to this link. For more information, see Management of Windows claims.

The **Active Roles Security** window (as well as the **Active Roles Security** tab in the advanced details pane) lists the links of these categories:

- **Direct links**: The Access Template is applied (linked) directly to the securable object you have selected.
- **Inherited links**: The Access Template is applied (linked) to a container in the hierarchy of containers above the securable object you have selected, or to a Managed Unit to which the securable object belongs.

The links inherited from parent objects can be filtered out of the list:

- When using the **Active Roles Security** window, clear the **Show inherited** check box.
- When using the **Active Roles Security** tab, right-click the list and then click **Show Inherited** to deselect the menu item.

A window or tab that displays Access Template links allows you to manage links. In a window, you can use buttons beneath the list. In a tab, you can right-click a list entry or a blank area, and then use commands on the shortcut menu. For example, the following buttons appear in the **Active Roles Security** window:

- **Add**: Starts the **Delegation of Control Wizard** to create apply Access Templates.
- **Remove**: Deletes the selected entries from the list of links. Available for direct links only.
- **View/Edit**: Displays the dialog to view or modify link properties such as permissions inheritance and propagation options.
- **Sync to AD**: Toggles the permissions propagation option of the links selected in the list.
- **Disable**: Disables or enables the link. If a link is disabled, the permissions specified by the link takes no effect.

> TIP: In the **Active Roles Security** dialog box, the **Remove** button is available on direct links only. When you need to delete links, it is advisable to manage them using the **Links** command on the Access Template.

Synchronizing Access Template permissions to Active Directory

Permissions defined in an Access Template can be propagated to Active Directory, with all changes made to them in Active Roles being automatically synchronized to Active Directory.

By enabling synchronization from Active Roles security to Active Directory native security, Active Roles provides the facility to specify Active Directory security settings with Access Templates. Access Templates simplify and enhance the management of permissions in Active Directory, enable the logical grouping of permissions, and providing an efficient mechanism for setting and maintaining access control.

For each permission entry defined in Active Roles and configured with the **Permissions Propagation** option set, Active Roles generates native Active Directory permission entries based on the Active Roles permission entry.

The **Permissions Propagation** option (also referred to as **Sync to Native Security** or **Sync to AD** in the user interface) ensures that every time Active Roles permissions change, the associated native permission entries change accordingly.

Disabling the **Permissions Propagation** option on existing Active Roles permissions, or deleting Active Roles permissions with this option set, deletes all native permission entries specified through those Active Roles permissions.

If a propagated permission entry is deleted or modified in Active Directory, whether intentionally or by mistake, Active Roles restores that entry based on Access Template information, thus ensuring the correct permission settings in Active Directory. The **Sync of Permissions to Active Directory** scheduled task is used in Active Roles to create or update permission entries in Active Directory based on the Access Template links that have the **Permissions Propagation** option enabled.

Managing Active Directory permission entries

The **Native Security** tab in the advanced details pane lists the native Active Directory permission entries for the securable object (for example, an Organizational Unit) selected in the Console tree.

By analyzing information in the **Type** and **Source** columns on the **Native Security** tab, you can determine whether a given entry is synchronized from Active Roles.

In the **Type** column, the synchronized entries are marked with the 🟩 icon. This icon changes to 🟥 if synchronization of the entry is invalid or unfinished. For example, if you delete a synchronized entry from Active Directory, Active Roles detects the deletion and re-creates the entry. Until the entry is re-created, the **Type** column marks the entry with the 🟩 icon.

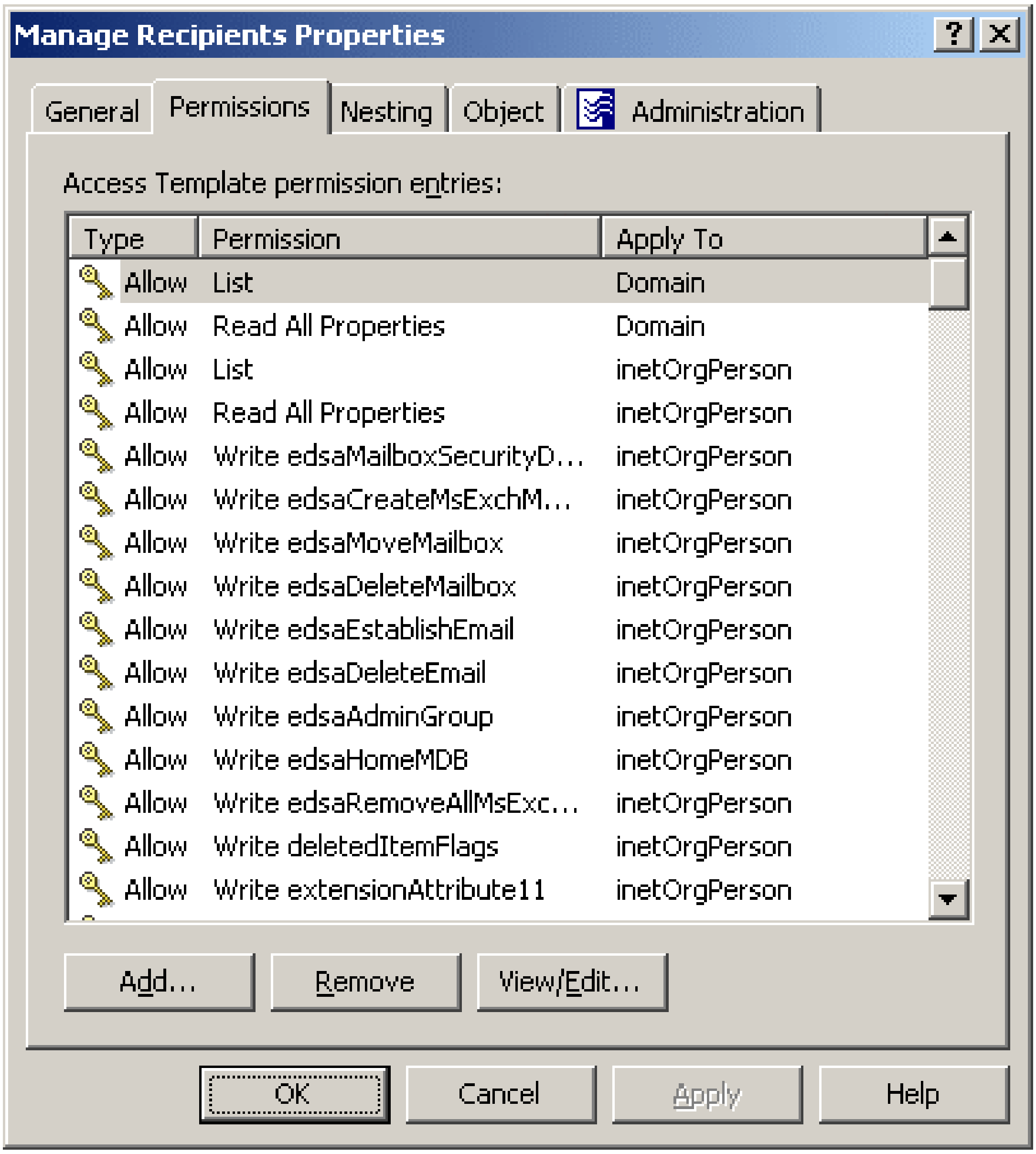
For each synchronized entry, the **Source** column displays the name of the Access Template that defines the permissions synchronized to that entry.

From the **Native Security** tab, you can manage permission entries: right-click an entry, and click **Edit Native Security**. This displays the **Permissions** dialog where you can add, remove and modify Active Directory permission entries for the securable object you selected.

Adding, modifying, or removing permissions to Access Templates

When you add, remove, or modify permissions in an Access Template, permission settings automatically change on all objects to which the Access Template is applied (linked), including those that are affected by the Access Template because of inheritance.

Figure 6: Access Template - Manage permissions



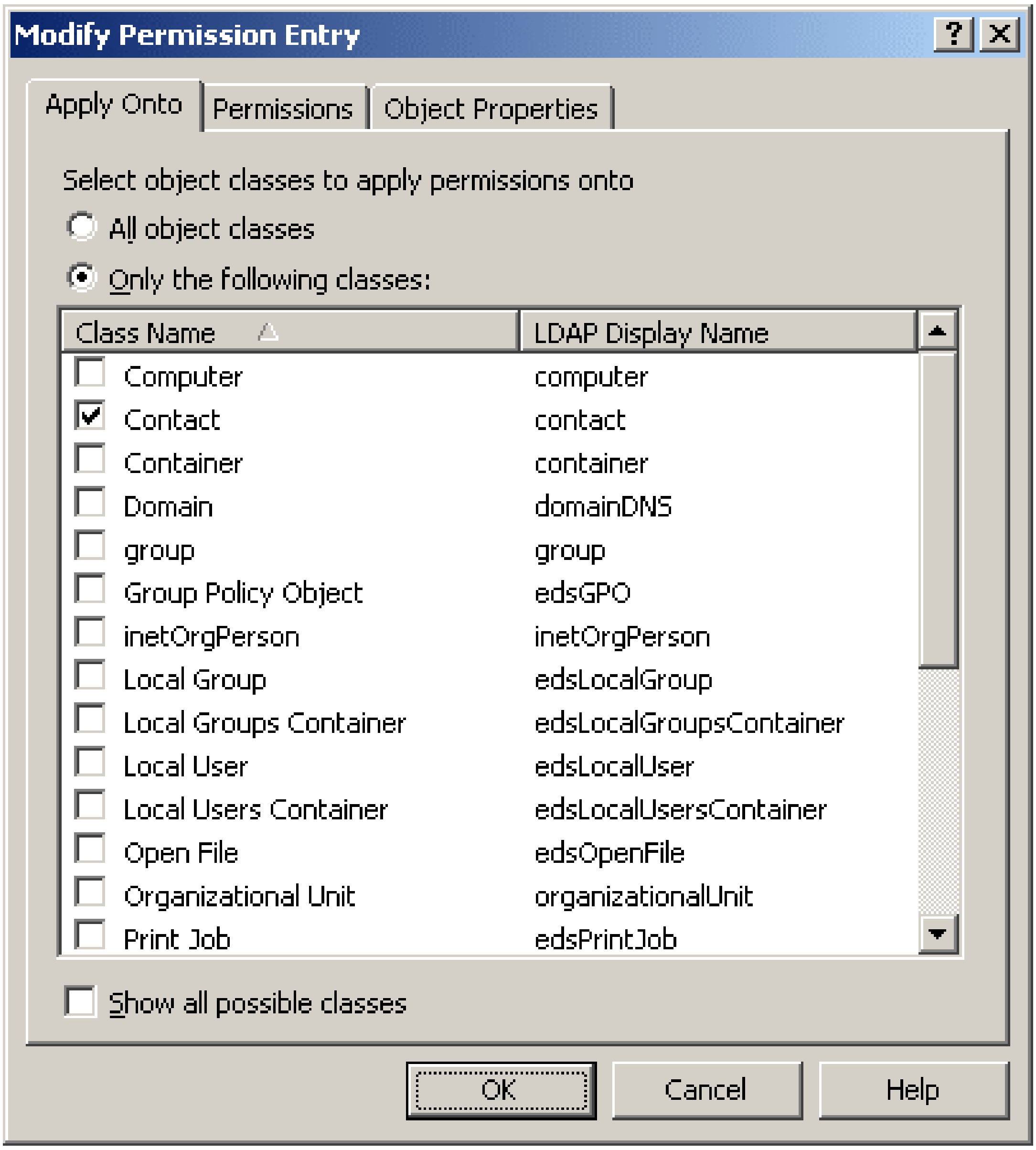
Access Template permission entries:

Type	Permission	Apply To
Allow	List	Domain
Allow	Read All Properties	Domain
Allow	List	inetOrgPerson
Allow	Read All Properties	inetOrgPerson
Allow	Write edsaMailboxSecurityD...	inetOrgPerson
Allow	Write edsaCreateMsExchM...	inetOrgPerson
Allow	Write edsaMoveMailbox	inetOrgPerson
Allow	Write edsaDeleteMailbox	inetOrgPerson
Allow	Write edsaEstablishEmail	inetOrgPerson
Allow	Write edsaDeleteEmail	inetOrgPerson
Allow	Write edsaAdminGroup	inetOrgPerson
Allow	Write edsaHomeMDB	inetOrgPerson
Allow	Write edsaRemoveAllMsExc...	inetOrgPerson
Allow	Write deletedItemFlags	inetOrgPerson
Allow	Write extensionAttribute11	inetOrgPerson

The **Permissions** tab in the **Properties** dialog lists permission entries defined in the Access Template. Each entry in the list includes the following information:

- **Type**: Specifies whether the permission allows or denies access.
- **Permission**: Name of the permission.
- **Apply To**: Type of objects that are subject to the permission.

Figure 7: Access Template - Modify permissions



Select object classes to apply permissions onto

○ All object classes

● Only the following classes:

Class Name	LDAP Display Name
□ Computer	computer
☑ Contact	contact
□ Container	container
□ Domain	domainDNS
□ group	group
□ Group Policy Object	edsGPO
□ inetOrgPerson	inetOrgPerson
□ Local Group	edsLocalGroup
□ Local Groups Container	edsLocalGroupsContainer
□ Local User	edsLocalUser
□ Local Users Container	edsLocalUsersContainer
□ Open File	edsOpenFile
□ Organizational Unit	organizationalUnit
□ Print Job	edsPrintJob

□ Show all possible classes

You can use the tabs in that dialog to modify the permission as needed. The tabs are similar to the pages in the **Add Permission Entries Wizard**, discussed in Add Permission Entries wizard.

For the steps of how to add, remove or delete permissions from an Access Template, see *Adding, modifying, or removing Access Template permissions* in the *Active Roles Administration Guide*.

Nesting Access Templates

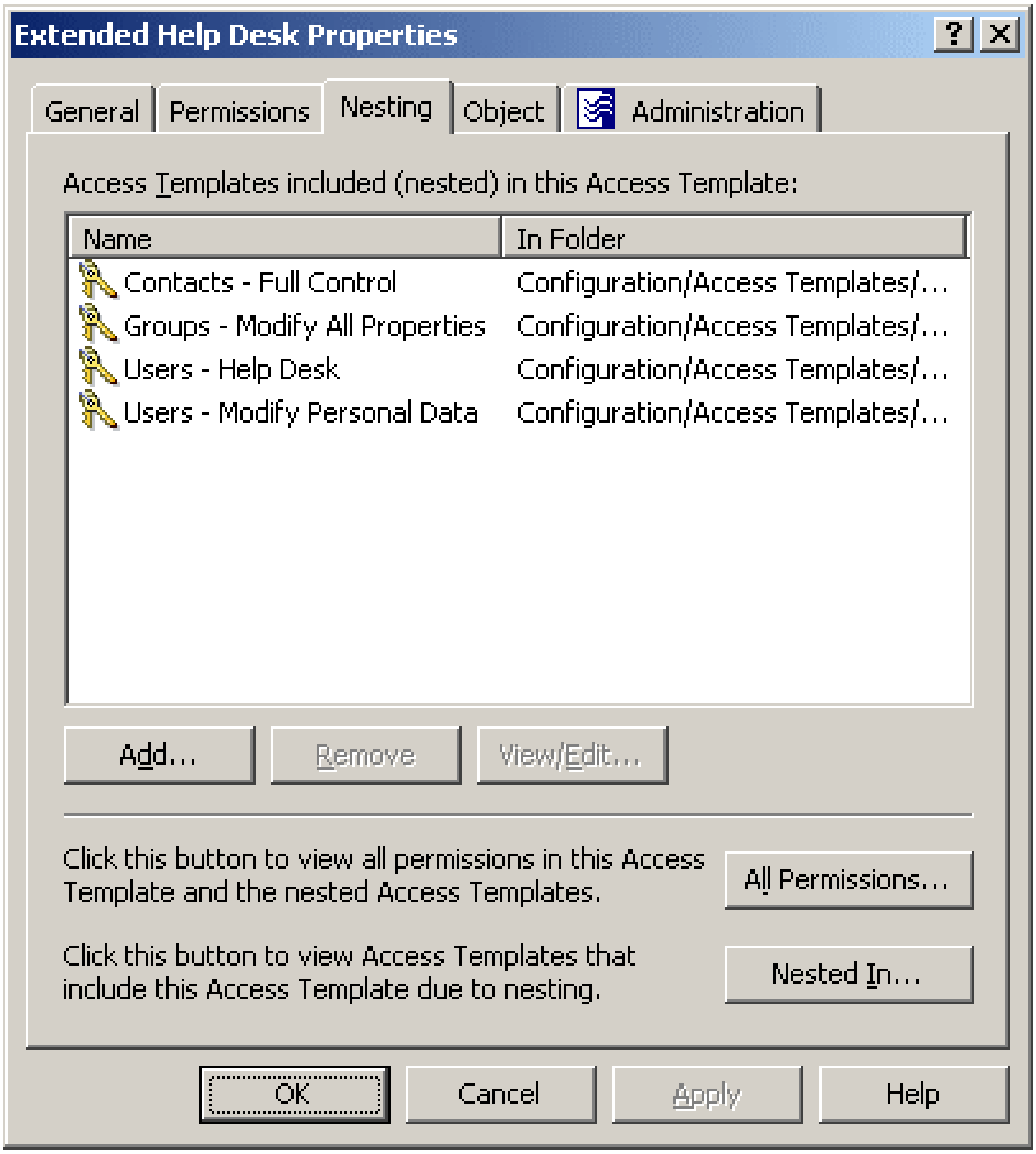
You can define permissions in an Access Template (AT) by including (nesting) other ATs. This reduces the work required if you need to create a new AT that is similar to an existing one. Instead of modifying an existing Template to add new permissions, you can nest it into a new AT.

This feature simplifies Access Template management by re-using the existing preconfigured or custom Access Templates. For example, if you need to add permissions to the predefined Help Desk Access Template, you can create a new Access Template, nest the Help Desk Access Template into the new Access Template, and add permissions to the new Access Template as needed.

To nest Access Templates to a given Access Template, use the **Nesting** tab in the **Properties** dialog for that Access Template.

The **Nesting** tab lists all Access Templates that are included (nested) in the selected Access Template, similar to the following figure:

Figure 8: Nesting Access Templates



Access Templates included (nested) in this Access Template:

Name	In Folder
Contacts - Full Control	Configuration/Access Templates/...
Groups - Modify All Properties	Configuration/Access Templates/...
Users - Help Desk	Configuration/Access Templates/...
Users - Modify Personal Data	Configuration/Access Templates/...

Click this button to view all permissions in this Access Template and the nested Access Templates.

Click this button to view Access Templates that include this Access Template due to nesting.

Each entry in the list provides the following information:

- **Name**: The name of the nested Access Template.
- **In Folder**: Path to the container that holds the nested Access Template.

You can manage the list on the **Nesting** tab by using the button beneath the list:

- **Add**: Click this button to select Access Templates you want to nest into the Access Template being administered.
- **Remove**: Select Access Templates from the list and click this button to remove them from the Access Template being administered.

- **View/Edit**: Select an Access Template from the list and click this button to view or modify the selected Access Template.

From the **Nesting** tab, you can also access the following information:

- **All Permissions**: Displays all permissions in the Access Template, including those that come from the nested Access Templates.
- **Nested In**: Displays a list of Access Templates in which the Access Template is included due to nesting.

Examples of using Access Templates

This section discusses scenarios to help you understand and use the role-based administration features available in Active Roles. The following scenarios are covered:

- Scenario 1: Implementing a helpdesk
- Scenario 2: Implementing Self-Administration

Scenario 1: Implementing a helpdesk

This scenario shows how to use an Access Template that allows a helpdesk service to perform day-to-day operations on user accounts, such as resetting passwords, viewing user properties, locking and unlocking user accounts.

The scenario also involves a group to hold helpdesk operators. The Access Template is applied so that the group is designated as a Trustee, thus giving the administrative rights to the helpdesk operators. When both the Access Template and group are prepared, you can implement a helpdesk administration in your organization.

For example, if you need to authorize the helpdesk to manage user accounts in the **Sales** Organizational Unit, you must perform the following steps:

1. Prepare a **Helpdesk** Access Template that defines the help desk operator permissions on user accounts.
2. Create and populate a **Helpdesk** group to hold the helpdesk operators.
3. Apply the **Helpdesk** Access Template to the **Sales** Organizational Unit, selecting the **Helpdesk** group as a Trustee.

As a result of these steps, each member of the **Helpdesk** group is authorized to perform management tasks on user accounts in the **Sales** Organizational Unit. The **Helpdesk** Access Template determines the scope of the tasks.

The following sections elaborate on each of these steps.

Preparing a helpdesk Access Template

For the purposes of this scenario, you can use the predefined Access Template **Users – Help Desk**, located in the **Configuration** > **Access Templates** > **Active Directory** container. The **Users – Help Desk** Access Template specifies the necessary permissions to reset user passwords, unlock user accounts, and view properties of user accounts.

If you want to add or remove permissions from the **Users – Help Desk** Access Template, you need to first create a copy of that Access Template, then modify and apply the copy.

This scenario assumes that you apply the predefined Access Template **Users – Help Desk**.

Creating a helpdesk group

To create a group, right-click an Organizational Unit (OU) in the **Console tree**, select **New** > **Group**, and follow the instructions of the **New Object - Group** wizard. The wizard includes the page where you can add members (in this case, helpdesk operators) to the group you are creating.

For step-by-step instructions on how to create groups, see *Creating a Group* in the *Active Roles User Guide*.

Applying the Help Desk Access Template

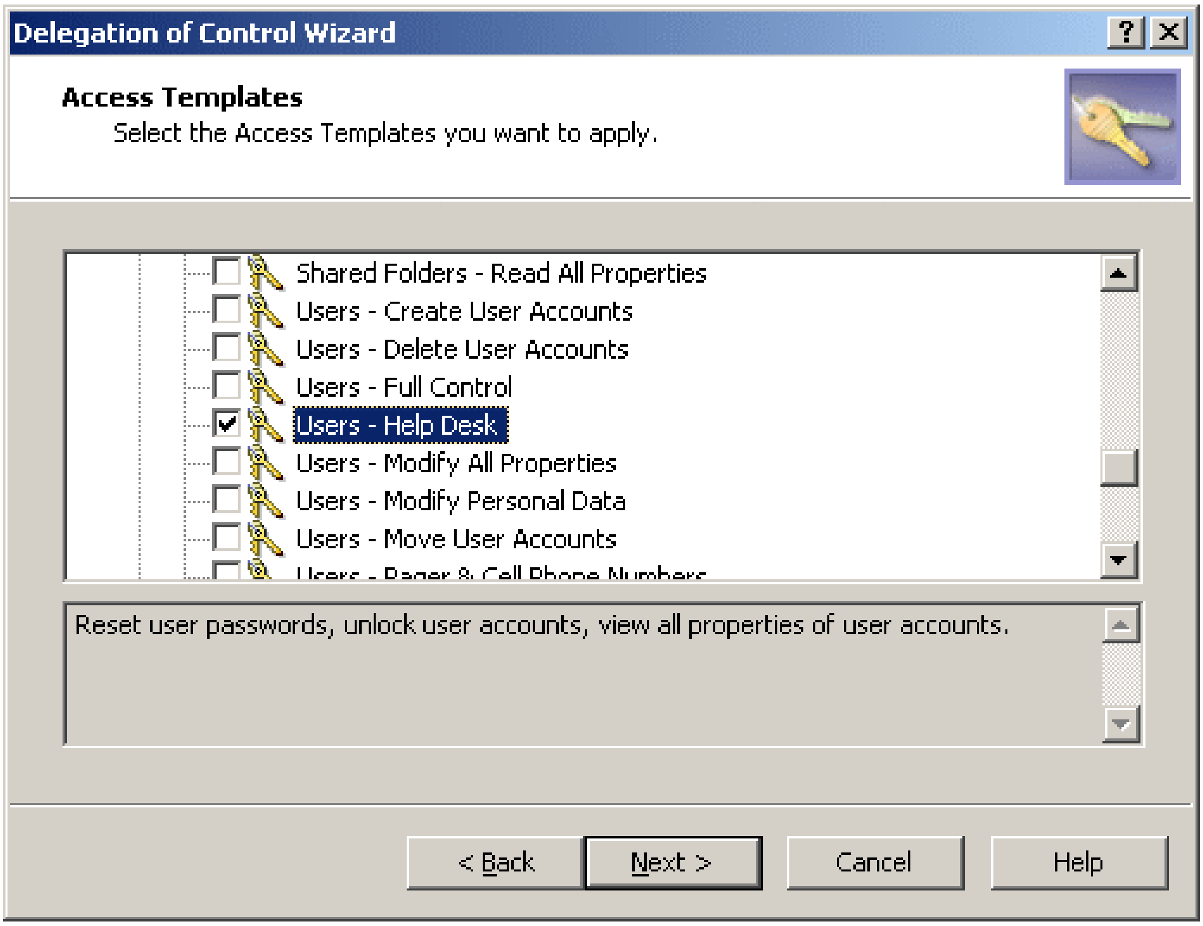
You can apply the Access Template using the **Delegation of Control Wizard**.

First, you start the wizard on the **Sales** Organizational Unit: right-click the Organizational Unit, click **Delegate Control**, and then, in the **Active Roles Security** window, click **Add**.

Next, on the **Users or Groups** page of the wizard, add the **Help Desk** group to the list.

Next, on the **Access Templates** page of the wizard, expand **Access Templates** > **Active Directory** and select the check box next to **Users - Help Desk**, as shown in the following figure.

Figure 9: Access Template – Delegation of control



Delegation of Control Wizard

Access Templates

Select the Access Templates you want to apply.

- □ Shared Folders - Read All Properties
- □ Users - Create User Accounts
- □ Users - Delete User Accounts
- □ Users - Full Control
- ☑ Users - Help Desk
- □ Users - Modify All Properties
- □ Users - Modify Personal Data
- □ Users - Move User Accounts
- □ Users - Pager & Cell Phone Numbers

Reset user passwords, unlock user accounts, view all properties of user accounts.

Click **Next** and accept the default settings in the wizard. On the completion page, click **Finish**. Finally, click **OK** to close the **Active Roles Security** window.

For more information about the **Delegation of Control Wizard**, see *Applying Access Templates* in the *Active Roles Administration Guide*.

Scenario 2: Implementing Self-Administration

This scenario shows how to use an Access Template that allows users to modify certain portions of their personal information in Active Directory.

The Active Roles Web Interface provides the Site for Self-Administration to manage user accounts. The site displays users their personal information, such as the first and last names, address information, phone numbers, and other data. By default, Web Interface users are only authorized to view their personal information. To enable the users to also modify their personal information, you must give them additional permissions.

Suppose you need to authorize the users in the **Sales** Organizational Unit to perform self-administration. To implement this scenario, you should perform the following steps:

1. Prepare a **Self-Administration** Access Template that defines the appropriate permissions on user accounts.
2. Apply the **Self-Administration** Access Template to the **Sales** Organizational Unit, selecting the **Self** object as a Trustee.

As a result of these steps, users from the **Sales** Organizational Unit are authorized to perform self-management tasks on their personal accounts. The **Self-Administration** Access Template determines what data the users are permitted to modify. Users can manage their personal information via the Site for Self-Administration. For information about the Site for Self-Administration, refer to the *Active Roles Web Interface User Guide*.

The following sections elaborate on the steps involved in this scenario.

Preparing a self-administration Access Template

For the purposes of this scenario, you can use the predefined **Self - Account Management** Access Template, located in the **Configuration** > **Access Templates** > **User Self-management** container. This Access Template specifies the necessary permissions to view a basic set of user properties and modify telephone numbers.

If you want to add or remove permissions from the **Self - Account Management** Access Template, you need to first create a copy of that Access Template, then modify and apply the copy.

This scenario assumes that you apply the predefined **Self - Account Management** Access Template.

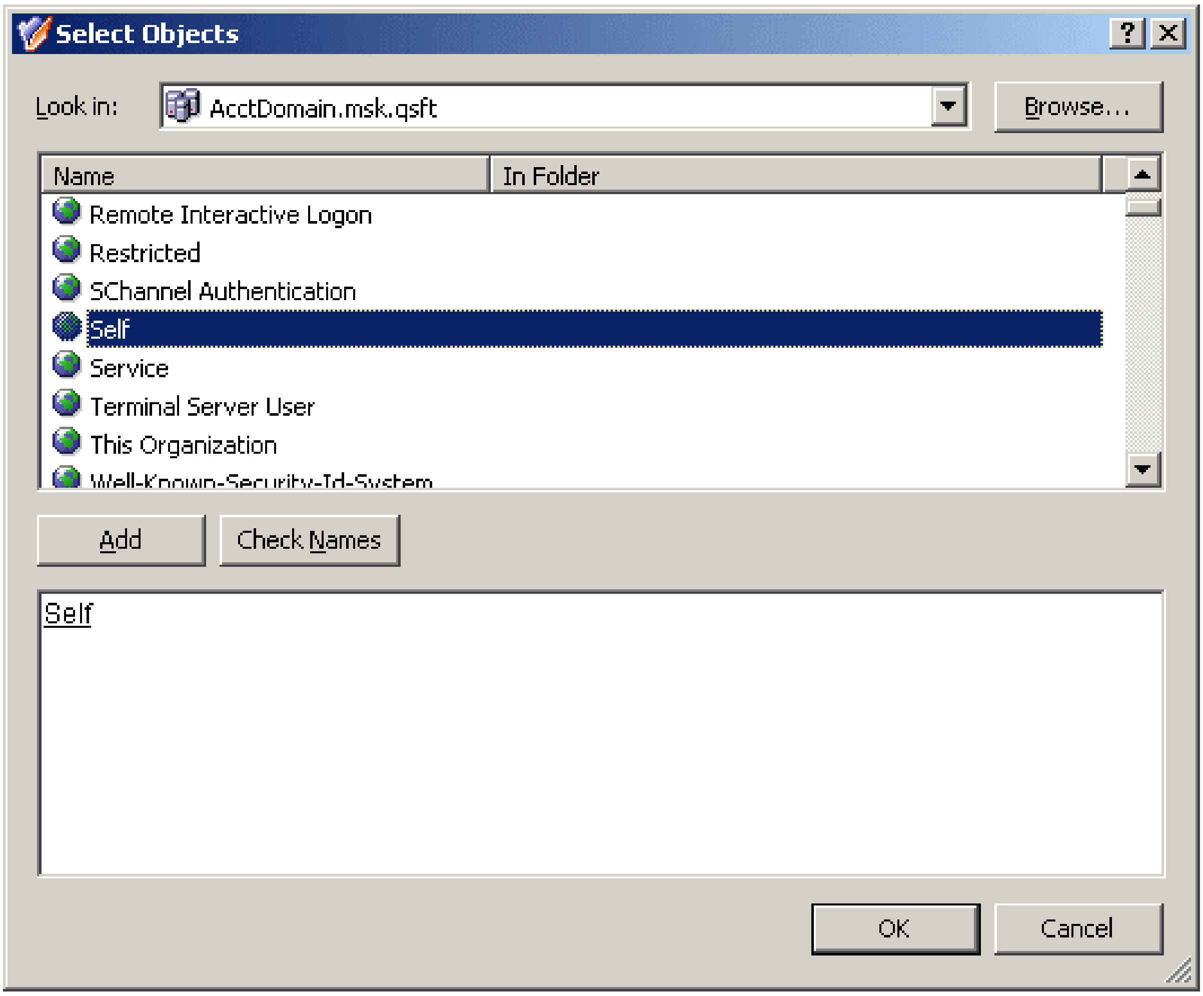
Applying the self-administration Access Template

You can apply the Access Template using the **Delegation of Control Wizard**.

First, you start the wizard on the **Sales** Organizational Unit (OU): right-click the OU, click **Delegate Control**, and then, in the **Active Roles Security** window, click **Add**.

Next, on the **Users or Groups** page of the wizard, click **Add**. In the **Select Objects** window, select the **Self** object, as shown in the following figure, click **Add**, and then click **OK**.

Figure 10: Access Template – Self administration



Next, on the **Access Templates** page of the wizard, expand **Access Templates** > **User Self-management** and select the check box next to **Self - Account Management**.

Click **Next** and accept the default settings in the wizard. On the completion page, click **Finish**. Finally, click **OK** to close the **Active Roles Security** window.

For more information about the **Delegation of Control Wizard**, see *Applying Access Templates* in the *Active Roles Release Notes*.

Deployment considerations for Access Templates

Active Roles utilizes role-based delegation for assigning administrative permissions. The advantage of this model is that a role can be created once and delegated to multiple groups of users that fit that role. If a change is needed, an update to the role will take effect for everyone. These roles are known in Active Roles as **Access Templates**.

When doing delegation with Active Roles, consider the following:

- Active Roles administrators (Active Roles Admins) have full control throughout the system and cannot be denied access anywhere within Active Roles. Everyone else starts with nothing and permissions are added from the ground up.
- Permissions are cumulative. You must adhere to the following permission precedence. The permission on top has the highest precedence:
    1. Explicit Deny
    2. Explicit Allow
    3. Inherited Deny
    4. Inherited Allow
- Keep your permission model as simple as possible. Sometimes this means giving users all read/write permissions and denying the ability to write a few fields.
- Do not use the default (built-in) Access Templates as they cannot be modified. Instead, copy those Access Templates and move them to a new container. This way all of the Access Templates you are using are stored within a particular structure.

There are three basic types of permissions that can be added to an Access Template:

- **Object access**: With this permission type, you can set permissions that affect an object as a whole. For example, `Move`, `List` and `Deprovision` are object permissions.
- **Object property access**: These are used to control access to individual attributes of an object, such as the object description, `samAccountName`, or `homeFolder`. With this permission type, you can delegate granular rights over an object. However just because the rights that can be delegated can be granular does not mean that they should. For instance, if a helpdesk operator needs to be able to manage a large set of user properties, it makes more sense to delegate read/write for all properties as this is one permission entry instead of delegating read/write for every individual attribute since each attribute would need to have its own permission entry.
- **Child object creation/deletion**: With this permission type, you can set permissions for creation or deletion of objects. For instance, to set up an Access Template that allows creation of users, you should add a permission entry that applies to the Organizational Unit and Container object classes, and contains a `Create child objects` permission for the User object class.

The following sections give a sample set of the permissions necessary for certain delegation scenarios:

- Delegating Organizational Unit administration duties
- Delegation of group administration

Delegating Organizational Unit administration duties

The following table lists a sample set of permission entries for a scenario of delegating administration duties for Organizational Units:

Table 2: Permission entries for delegating administration of Organizational Units

Object Class	Permission Type	Attribute or Permission
Domain	Object Access	Allow List
Domain	Object Property Access	Allow Read All Properties
Domain	Object Property Access	Allow Write LDAP Server (permission to change Operational Domain Controller)
Organizational Unit	Object Access	Allow List
Organizational Unit	Object Property Access	Allow Read All Properties
Organizational Unit	Child Object Creation/Deletion	Allow Create/Delete Users
User	Object Access	Allow List
User	Object Property Access	Allow Read/Write All Properties
User	Object Property Access	Deny Write Employee ID

This set of permission entries has several important characteristics:

- It allows access to the Domain and the Organizational Unit object classes. This is because without access to the domain and the Organizational Units a delegated administrator cannot see the users beneath. This access must include the `List` and `Read All Properties` permissions.
- It gives a delegated administrator the ability to create and delete user objects. This permission applies to the Organizational Unit object class.
- It gives a delegated administrator the ability to see (List) users and modify any property except `Employee ID`.

Delegation of group administration

The following table lists a sample set of permission entries for a scenario of delegating administration of groups:

Table 3: Permission entries for delegating administration of groups

Object Class	Permission Type	Attribute or Permission
Domain	Object Access	Allow List
Domain	Object Property Access	Allow Read All Properties
Domain	Object Property Access	Allow Write LDAP Server (permission to change Operational Domain Controller)
Organizational Unit	Object Access	Allow List
Organizational Unit	Object Property Access	Allow Read All Properties
Organizational Unit	Child Object Creation/Deletion	Allow Create/Delete Groups
Group	Object Access	Allow List
Group	Object Property Access	Allow Read All Properties
Group	Object Property Access	Allow Write Members
User	Object Access	Allow List
User	Object Property Access	Allow Read All Properties

This set of permission entries has several important characteristics:

- It allows access to the Domain and the Organizational Unit object classes. This is because without access to the domain and the Organizational Units a delegated administrator cannot see the groups and users beneath. This access should always include the `List` and `Read All Properties` permissions.
- It gives a delegated administrator the ability to create and delete group objects. This permission applies to the Organizational Unit object class.
- It gives a delegated administrator the ability to see (`List`) groups, view any property of a group (`Read All Properties`), and add or remove members from a group (`Write Members`).
- It gives a delegated administrator the ability to see (`List`) users and view any

property of a user (`Read All Properties`). This is necessary for a delegated administrator to add users to a group.

Delegation in a functional vs. hosted environment

For your delegation model to work correctly, you need to determine whether you have a functional or hosted environment.

Delegation in a functional environment

In a functional environment there is a separate group of administrators for each function. So there may be a group for managing users, a helpdesk, domain administrators, and Exchange administrators. In case of a functional environment, you need to decide on a certain role for each function. These roles usually cross Organizational Unit boundaries so delegation is typically done at the root of the domain or domains. Typically a delegation model for this scenario would look something like the following:

Table 4: Delegation model in a functional environment

Location / Template	Permission	Delegate (Trustee)
Domain / Read All Objects	• All Objects - List • All Objects - Read All Properties • Domain - Write LDAP Server Property (permission to change Operational Domain Controller)	Authenticated Users
Domain / User Admin	• User Objects - Full Control • Organizational Unit - Create/Delete User Objects	User Admin group
Domain / Group Admin	• Group Objects - Full Control • Organizational Unit - Create/Delete Group Objects	Group Admin group

Delegation in a hosted environment

In a hosted environment there is an admin group or set of admin groups responsible for each top-level Organizational Unit (OU). In this case administrators may not want others to see what is going on in their OU structure. Active Roles can accommodate this easily. Since except for the Active Roles administrators no one has any default rights, a delegation model may look something like the following:

Table 5: Delegation model in a hosted environment

Location / Template	Permission	Delegate (Trustee)
Domain / Read Domain	• Domain - List • Domain - Read All Properties • Domain - Write LDAP Server Property	Authenticated Users
Top-level OU / OU Admin	• All Objects - List • All Objects - Read all Properties • Organizational Unit - Create/Delete User/Group Objects • User Objects - Full Control • Group Objects - Full Control	OU Admin

With this delegation model, everyone can see the domain and change the domain controller they are using for management. However, below that only the OU admin can see their associated OU. This keeps administrators from seeing or managing anything outside of their control.

More than likely a delegation model would incorporate features of both. For instance, you may have a hosted environment where each business unit is responsible for their own Active Directory management, with a central helpdesk to perform basic user and group management tasks.

Lastly is the issue of syncing permission to Active Directory. Although Active Roles enables you to accomplish this task, it is a better idea to keep all of the permissions within Active Roles for the following reasons:

- This protects your Active Directory. Directory-enabled applications can be modified to use the Active Roles ADSI Provider allowing for granular access to only the data and areas that are needed. Doing so helps prevent malicious software from destroying data in Active Directory.
- This ensures directory integrity. By forcing all administrators to use Active Roles, you ensure that all policies, such as naming standards, are correctly enforced.
- This gives a complete auditing picture. By having all applications and administrators use Active Roles interfaces, you ensure that the Active Roles Data Collector can gather every action that happens in the directory, down to the attribute level.

Access Rules

Active Roles introduces claims-based authorization rules (access rules) to allow or deny access to Active Directory objects depending on the attributes of the identity attempting to access those objects. Built on the concept of Dynamic Access Control (DAC), this feature enables Active Roles to recognize and evaluate the attribute-based claims of the identity that requests access to data held in Active Directory.

Access rules improve access control management for Active Directory administration. With access rules, Active Roles adds more flexibility and precision in delegating control of Active Directory objects, such as users, computers or groups, through the use of claims (the Active Directory user and computer properties) in the Active Roles authorization model.

By using access rules, you can control access to Active Directory objects based on the characteristics of both the objects and the delegated administrators requesting access to the objects. This feature enables you to define and enforce very specific requirements for granting administrative access to Active Directory data. For example, you can easily restrict access of delegated administrators to user accounts whose properties (such as **Department** or **Country**) match the properties of the delegated administrator’s account in Active Directory.

Access rules help you create more complete access controls on Active Directory objects by comparing object properties with user and device claims. A domain controller issues claims to an identity that consist of assertions based on the properties of that identity retrieved from Active Directory. When an identity requests access to a particular object, Active Roles evaluates the claims of that identity and the properties of that object against the access rules, and then, depending upon the evaluation results, applies the appropriate Access Templates to make an authorization decision.

Understanding Access Rules

Access Rules enable administrators to apply access-control permissions and restrictions based on well-defined conditions that can include the properties of the target objects, the properties of the user who requests access to target objects, and the properties of the device from which the user requests access to target objects. For example, when the role or the job of a user changes (resulting in changes to the attributes of the user account in Active Directory), Access Rules can cause the user permissions to change dynamically without additional intervention from the administrator.

An Access Rule is an expression of authorization rules that can include conditions that involve user groups, user claims, device groups, device claims, and target object properties. When you apply an Access Template, you can use an Access Rule to determine the conditions that must be satisfied for the permissions resulting from the Access Template to take effect.

Conditional Access Template links

Active Roles enhances its authorization model by introducing conditional Access Template links, and takes advantage of conditional links by inserting user claims, device claims, and target object properties, into conditional expressions specified in Access Rules. An Access Rule can be applied to an Access Template link, causing the link to have an effect only if the condition of the access rule evaluates to `True`. During permission check, Active Roles inserts the claims and properties into conditional expressions found in the Access Rule, evaluates these expressions, and enables or disables the Access Template link based on results of the evaluation. In this way, the Access Rule determines the results of the permission check.

Access Rules, along with conditional Access Template links, enable Active Roles to leverage claims for authorization to securable objects. This authorization mechanism (known as claims-based access control) supplements Access Template based access control to provide an additional layer of authorization that is flexible to the varying needs of the enterprise environment.

Management of Windows claims

Claims are statements about an authenticated user or device, issued by an Active Directory domain controller running Windows Server 2016 or later. Claims can contain information about the user or device retrieved from Active Directory.

Dynamic Access Control (DAC), a feature of Windows Server 2012, employs claims-based authorization to create versatile and flexible access controls on sensitive resources by using access rules that evaluate information about the user who accesses those resources and about the device from which the user accesses those resources. By leveraging claims in the authentication token of the user, DAC makes it possible to allow or deny access to resources based on the Active Directory attributes of the user or device.

Active Roles uses claims-based access rules to improve authorization management for Active Directory administration. With claims-based access rules, Active Roles adds more flexibility and precision in delegating control of Active Directory objects, such as users, computers or groups, by extending the Active Roles authorization model to recognize and evaluate the claims specific to the user who requests access to those objects or device used to request access.

For the steps of managing Windows claims in Active Roles, see *Managing Windows claims* in the *Active Roles Administration Guide*.

Claim Type management overview

After you enable the **KDC support for claims, compound authentication and Kerberos armoring** Group Policy setting, your Windows Server 2012 (or later) domain controllers are ready to issue claims in response to authentication requests. However, you need to configure claim types before the domain controller can issue claims.

You can use Active Roles to create attribute-based claim types that source their information from user and computer attributes. The claim types you create are stored in the configuration partition of the Active Directory forest. All domains within that forest share the claim types and domain controllers from those respective domains issue claim information during user authentication.

It is important that the Active Directory attributes intended to source claim types contain accurate information. Incorrect attribute information can lead to unexpected access to data using claims-based authorization. You can ensure the accuracy of information held in claim source attributes by leveraging property generation and validation policies provided by Active Roles.

You can use the Active Roles Console to create, modify and delete user and computer claim types. The claim type objects are stored in the configuration partition of the Active Directory forest, and appear under the **Active Directory** > **Claim Types** node in the Active Roles Console. If you have domains from multiple forests registered with Active Roles, then the Console tree provides a separate **Claim Types** node for each forest. The forest to which a given **Claim Types** node applies is identified by the name (or a part of the name) of the forest root domain shown in brackets next to the name of the node.

The Active Roles Console provides the following pages for creating and modifying claim types:

- **Source Attribute**: On this page you can select the Active Directory attribute from which the claim value is obtained, specify the display name and description for the claim type, and choose whether the claim type applies to a user, computer, or both.
- **Suggested Values**: This page allows you to configure predetermined selectable values from which you can choose when using the claim type in a conditional expression for an access rule.

On these pages you can view or change the following configuration settings.

Source attribute setting

On the **Source Attribute** page you can select, view or change the source attribute for the claim type. The source attribute is the Active Directory attribute from which the value is obtained for claims of this claim type.

The page provides a list allowing you to select the desired attribute. The list includes the attributes for the `User`, `Computer`, `InetOrgPerson`, `ManagedServiceAccount`, `GroupManagedServiceAccount` and `Auxiliary` classes of object, with the exception of:

- Attributes marked as defunct in the Active Directory schema.
- Password attributes such as `dBCSPwd`, `lmPwdHistory`, and `unicodePwd`.
- Attributes that are not replicated among domain controllers.
- Attributes that are not available on read-only domain controllers.
- Attributes with an Active Directory syntax type other than:
  - String: `DN String`, `Unicode`, `NT Security Descriptor`, or `Object ID`.
  - `Integer` or `Large Integer`.
  - `Boolean`.

For an existing claim type, the page displays the current source attribute of the claim type, and allows you to select a different attribute of the same syntax type. However, changing the source attribute does not change the ID of the claim type.

Claim type identifier setting

The claim type identifier (ID) determines the Common Name (cn) of the claim type object in Active Directory. Normally, Active Roles automatically generates an ID when creating a claim type. The automatically generated ID has the following format:

`ad://ext/attributeName:uniqueHexidecimalNumber`

In this format, `attributeName` stands for the LDAP display name of the source attribute of the claim type, while `uniqueHexidecimalNumber` is a random-generated string of hexadecimal characters that ensures the uniqueness of the claim type ID.

To enable authorization scenarios where claims are used across a forest trust, you need to create claim types in both the trusted forest and trusting forest with the same claim type ID. Domain controllers in a trusting forest receiving claims from a trusted forest cannot understand these claims unless:

- Each claim has a claim type object created in both forests.
- The claim type ID in the trusting forest is identical to the claim type ID in the trusted forest.
- A Claim Transformation Policy Object is applied to allow incoming claims across the forest trust.

Therefore, when you create a claim type object, you may need to specify the appropriate claim type ID by hand. The option **Set ID to a semantically identical claim type in a trusted forest** serves this purpose, allowing you to type in an ID instead of having it created automatically. If you choose to enter an ID by hand, ensure that your ID string specifies a unique ID and conforms to the following format:

- Starts with the `ad://ext/` prefix.
- The prefix is followed by 1 to 32 characters.
- Does not contain space characters or these characters: `\ * ? " < > |`.
- If a slash mark (`/`) occurs after the `ad://ext/` prefix, then the slash mark must be surrounded by a character on each side. The surrounding character must not be a colon (`:`) or slash mark.

A valid example of an ID string is `ad://ext/BusinessImpact`.

The option **Set ID to a semantically identical claim type in a trusted forest** is available only when you create a claim type object. The ID should not be changed on existing claim type objects. When you create a claim type object, it is advisable to let an ID be generated automatically unless a business need justifies otherwise, such as the use of claim transformation policies in a multi-forest environment. This ensures that the newly created claim type has a valid, unique ID.

Display name setting

The display name of the claim type object is used to represent the claim type as a choice throughout the user interface. Thus, when you configure a conditional expression for an access rule, the condition builder allows you to select a claim type from a list where each list item is the display name of a certain claim type object. For this reason, each claim type object must be given a unique display name. The display name accepts alphanumeric characters as valid data.

Description setting

You can use the description of the claim type object to specify a short comment about the claim type. Comments typically include purpose, department usage, or business justification.

User or computer claim issuance setting

You have the option to choose whether claims of the given claim type can be issued for user or computer object class, or both. With the option to issue claims for the user object class, the claim type causes domain controllers (DCs) to issue user claims based on the attribute of the authenticating user. With the option to issue claims for the computer object class, the claim type causes DCs to issue device claims based the attribute of the computer of the authenticating user. You can configure a claim type to issue both user and device claims. When you create a conditional expression for an access rule, and choose the claim type to evaluate, the condition builder allows you to distinguish between user and device claims of the same claim type.

Protection from accidental deletion

By default, claim type objects are protected from accidental deletion. This option prohibits all users, including domain and enterprise administrators, from deleting the claim type object. Protection is achieved by adding an explicit permission entry to the claim type object that denies everyone the right to delete the object. When you create a claim type object, the option to protect the object from accidental deletion is selected by default. As a best practice, it is advisable to leave this option selected.

Suggested values setting

The suggested values setting allows you to configure predefined values from which you can choose when using the claim type in a conditional expression. If you create a claim type without suggested values, you will have to type rather than select values in the condition builder. Another option is to create one or more suggested values for the claim type. These values will appear in a list provided by the condition builder.

You can add, edit or remove suggested values for a given claim type when creating or modifying the respective claim type object. When you add or edit a suggested value, you are prompted to complete the following fields:

- **Value**: This value data will be used when evaluating conditional expressions that include the suggested value you are configuring.
- **Display name**: This is the name of the suggested value that appears in the list when you configure a conditional expression.

Populating claim source attributes

Creating a claim type object makes the Active Directory forest aware of the claim type. However, claim type objects do not provide information held in the actual claims. When issuing claims, domain controllers (DCs) retrieve that information from user and computer objects. Hence, in addition to claim type objects, user and computer objects must contain the information necessary for DCs to issue claims.

Attribute-based claim types define the attributes from which to source the claims. These are attributes of user and computer objects. Each claim type object specifies a certain attribute that the DC retrieves when creating and issuing claims of that type. During authentication of a user, the claim-aware DC reads all enabled claim types from the user's Active Directory forest, and maps them to the attributes of the authenticating user or computer. Then, the DC retrieves information from the mapped attributes, and issues claims containing that information.

As DCs do not issue blank claims, you may encounter a situation where you have created a valid claim type but the DC does not issue the claim during authentication. This is because a claim type object merely maps claims to a certain attribute, directing the DC to issue claims based on the information present in that attribute. If the attribute of the authenticating user or computer does not contain information, the DC does not issue the claim.

Therefore, it is important that claim source attributes contain information. Additionally, as authorization decisions depend upon information found in claims, claim source attributes must contain valid information. Incorrect attribute information can lead to unexpected access to data using claims-based authorization.

To ensure that claim source attributes contain valid information, you could periodically inspect and, if needed, set or correct the properties of users and computers by using the Active Roles Console or Web Interface. However, it would be more practical to leverage property generation and validation policies provided by Active Roles. You can use policies to:

- Auto-generate the appropriate values for user and computer properties upon creation of user and computer objects.
- Prevent invalid values from being assigned to user and computer properties, by applying validation rules or creating immutable lists of suggested values.

Property generation and validation policies allow you to specify, and enforce, conditions that the property values must meet, and determine default property values. For further information, see *Property Generation and Validation* in the *Active Roles Administration Guide*.

Conditional expression editor

The Access Rule management pages provide a built-in editor for configuring conditional expressions. Each Access Rule holds a certain conditional expression that evaluates during permission check. A conditional expression is composed of conditions combined using AND/OR logic. Each condition is a certain statement that specifies criteria allowing permission check to determine whether to apply a given Access Template.

When you configure a conditional expression, you need to add at least one condition, but you are not limited in the number of conditions that you can add. You can add, delete and group conditions using various operators. It is possible to nest condition groups within other condition groups to achieve the results that you want.

A condition group contains one or more conditions connected by the same logical operator. By grouping conditions, you specify that those conditions should be evaluated as a single unit. The effect is the same as if you put parentheses around an expression in a mathematical equation or logic statement.

By default, a single condition group is created when you add a condition. You can create additional condition groups to group a set of conditions and nest grouped conditions within other condition groups.

In a condition group, conditions are connected using the **AND** or **OR** logical operator:

- An **AND** group evaluates to **TRUE** if all conditions in the group are **TRUE**.
- An **OR** group evaluates to **TRUE** if any condition in the group is **TRUE**.

By default, **AND** is the logical operator between the conditions in a condition group. You can change the logical operator by converting the condition group to a different group type.

When you add a condition, the conditional expression editor first prompts you to specify what you want the condition to evaluate. The following options are available:

- **Device claim**: Evaluate a computer claim, or groups the computer account is a member of. You can choose one of the existing computer claim types or, to evaluate groups, you can select the **Group** item in the claim type list provided by the condition builder.
- **Target object property**: Evaluate a certain property of the object to which the authorizing user requests access. You can select the desired property from a list provided by the condition builder.
- **User claim**: Evaluate a user claim, or groups the user account is a member of. You can select one of the existing user claim types or, to evaluate groups, you can select the **Group** item in the claim type list provided by the condition builder.

Once you have specified what you want the condition to evaluate, you can choose a comparison operator and specify a comparison value. The comparison operator determines the operation of comparing the claim, group membership, or property with the comparison value you specified, and causes the condition to evaluate to **TRUE** or **FALSE** depending on the outcome of that operation.

The following comparison operators are available:

- **equals**: The condition evaluates to **True** if the comparison value evaluates to the exact value of the claim or property; otherwise, the condition evaluates to **False**.
- **does not equal**: The condition evaluates to **False** if the comparison value evaluates to the exact value of the claim or property; otherwise, the condition evaluates to **True**.
- **member of any**: The condition evaluates to **True** if the comparison value lists any of the groups the user (or computer) is a member of. If the user (or computer) is not a member of any of the groups listed in the comparison value, the condition evaluates to **False**.
- **member of each**: The condition evaluates to **True** if the comparison value lists only the groups the user (or computer) is a member of. If the user (or computer) is not a member of each group listed in the comparison value, the condition evaluates to **False**.
- **not member of any**: The condition evaluates to **False** if the comparison value lists any of the groups the user (or computer) is a member of. If the user (or computer) is not a member of any of the groups listed in the comparison value, the condition evaluates to **True**.
- **not member of each**: The condition evaluates to **False** if the comparison value lists only the groups the user (or computer) is a member of. If the user (or computer) is not a member of each group listed in the comparison value, the condition evaluates to **True**.

You can choose from the following options to specify a comparison value:

- **Device claim**: The comparison value is the value of a certain computer claim. You can select one of the existing computer claim types from the claim type list provided by the condition builder.
- **Target object property**: The comparison value is the value of a certain property of the object to which the authorizing user requests access. You can select the desired property from a list provided by the condition builder.
- **User claim**: The comparison value is the value of a certain user claim. You can select one of the existing user claim types from the claim type list provided by the condition builder.
- **Value**: Depending on what the condition is intended to evaluate, this option allows you to specify a particular text string, integer, Boolean value (`True` or `False`), or a list of groups. In case of a claim type that provides a list of suggested values, the condition builder prompts you to select a value from the list.

Active Roles Synchronization Service

Identity information can be stored in various data systems, such as directories, databases, or even formatted text files. However, managing and synchronizing such identity information among several different data systems have several challenges:

- The synchronization process can require considerable time and effort.
- Performing data synchronization tasks manually is error-prone and can lead to duplicate information or incompatible data formats.

Active Roles Synchronization Service helps you avoid these problems by automating the process of identity data synchronization among various data systems used in your enterprise environment.

Synchronization Service increases the efficiency of identity data management by allowing you to automate the creation, deprovisioning, and update operations between the data systems you use. For example, when an employee joins or leaves the organization, the identity information managed by Synchronization Service is automatically updated in the managed data systems, reducing administrative workload and getting the new users up and running faster.

Synchronization Service also supports scripting capabilities, providing a flexible way to automate administrative tasks and integrate the administration of managed data systems with other business processes. By automating conventional tasks, Synchronization Service helps your organization to concentrate on strategic issues, such as planning the directory, increasing enterprise security, and supporting business-critical applications.

For more information on the main features of Synchronization Service, see the following sections.

Getting started

For more information on how to install, configure and use Synchronization Service, see the *Active Roles Synchronization Service Administration Guide*.

Bidirectional synchronization

Bidirectional synchronization allows you to synchronize all changes to identity information between your data systems. Using this feature, you can prevent potential identity information conflicts between different data sources.

> NOTE: This feature is only supported by certain data systems. For more information, see the relevant data connector documentation in the *Active Roles Synchronization Service Administration Guide*.

Delta processing

Delta processing allows you to synchronize identities faster by processing only data that has changed in the source and target connected systems since the last synchronization run.

By offering both full synchronization or quick delta processing methods between two data systems, Synchronization Service provides you the flexibility of choosing the appropriate method for your synchronization tasks.

> NOTE: This feature is only supported by certain data systems. For more information, see the relevant data connector documentation in the *Active Roles Synchronization Service Administration Guide*.

Group membership synchronization

Synchronization Service ensures that group membership information is synchronized across all connected data systems. For example, when creating a group object from an Active Directory (AD) domain to an AD LDS (ADAM) instance, you can configure rules to synchronize the **Member** attribute from the AD domain to the AD LDS (ADAM) instance.

Windows PowerShell scripting

Synchronization Service supports Windows PowerShell-based scripting for data synchronization. The shell is implemented as a Windows PowerShell module, allowing you to automate synchronization tasks via PowerShell scripts.

For more information and examples, see the following sections of the *Active Roles Synchronization Service Administration Guide*:

- *Developing PowerShell scripts for attribute synchronization rules*
- *Using PowerShell script to transform passwords*

Attribute synchronization rules

Synchronization Service allows you to create and configure synchronization rules to generate values for target object attributes. These rules support three synchronization types:

- **Direct synchronization**: Assigns the value of a source object attribute to the target object attribute you specify.
- **Script-based synchronization**: Uses your custom Windows PowerShell script to generate the target object attribute value.
- **Rule-based synchronization**: Uses your custom synchronization rules to generate the target object attribute value you want.

Rule-based generation of Distinguished Names

Synchronization Service provides flexible rules for generating the Distinguished Names (DNs) for the created objects. These DN generation rules allow you to ensure that the created objects are named in full compliance with the naming conventions existing in your organization.

Synchronization scheduling

To meet your organizational policies and save both time and effort, you can schedule and automate the configured data synchronization tasks with Synchronization Service.

Extensive data system support

To access external data systems, Synchronization Service uses so-called "connectors", enabling Synchronization Service to read and synchronize identity data from the specific data systems.

Active Roles Synchronization Service can connect to the following data systems:

- Data sources accessible via an OLE DB provider.
- Delimited text files.
- IBM AS/400, IBM Db2, and IBM RACF systems.
- LDAP directory service.
- Micro Focus NetIQ Directory systems.
- The following Microsoft services and resources:
    - Active Directory Domain Services (AD DS) with the domain or forest functional level of Windows Server 2016 or higher.
    - Active Directory Lightweight Directory Services (AD LDS) running on any Windows Server operating system supported by Microsoft.
    - Azure Active Directory (Azure AD) using Microsoft Graph API version 1.0.
    - Exchange Online services.
    - Exchange Server with the following versions:
        - Microsoft Exchange Server 2019
        - Microsoft Exchange Server 2016
    - Lync Server version 2013 with limited support.

    - SharePoint 2019, 2016, or 2013.
    - SharePoint Online service.
    - Skype for Business 2019, 2016 or 2015.
    - Skype for Business Online service.
    - SQL Server, any version supported by Microsoft.
- One Identity Active Roles version 7.4.3, 7.4.1, 7.3, 7.2, 7.1, 7.0, and 6.9.
- One Identity Manager version 8.0 and 7.0 (D1IM 7.0).
- OpenLDAP directory service.
- Oracle Database, Oracle Database User Accounts, and Oracle Unified Directory data systems.
- MySQL databases.
- Salesforce systems.
- SCIM-based data systems.
- ServiceNow systems.

For more information on using these connectors, see *External data systems supported with built-in connectors* in the *Active Roles Synchronization Service Administration Guide*.

Exchange Resource Forest Management

The Exchange Resource Forest Management (ERFM) feature of Active Roles allows you to automate mailbox provisioning for on-premises users in environments where the mailboxes and the user accounts are managed in different Active Directory (AD) forests. Such multi-forest environments are based on the resource forest model, and mailboxes provisioned in such environments are called linked mailboxes.

Multi-forest AD deployments have higher administrative and support costs. However, they offer the highest level of security isolation between AD objects and the Exchange service. As such, One Identity recommends configuring the resource forest model for use with Active Roles in organizations that:

- Aim for an extra layer of data security.
- Frequently experience organizational changes (for example, buying companies, or consolidating and breaking off branch companies, departments and other business units).
- Abide by certain legal or regulatory requirements.

AD deployments following the resource forest model use two types of AD forests:

- **Account forests**: These AD forests store the user objects. Organizations can use one or more account forests in the resource forest model.

- **Resource forest**: This AD forest contains the Exchange server and stores the mailboxes of the user objects.

With ERFM, you can automate the **provisioning**, **synchronization** and **deprovisioning** of linked mailboxes in the resource forest for user accounts in the account forest(s).

- During **provisioning**, Active Roles can automatically create linked mailboxes for new users (if you select to create a mailbox for the user), or create linked mailboxes for existing users without a mailbox.

  In both cases, Active Roles creates a disabled **shadow user** account in the resource forest for the user, then links it to the user account of the user in the account forest (also known as the **master account**).

  > NOTE: By default, the shadow user account has the same name as the master user account in the account forest. However, if a shadow account with the same name already exists (for example, because Active Roles has already created a linked mailbox for a user in a different account forest), Active Roles uses a different shadow account name to maintain uniqueness.

- Once a linked mailbox is created, Active Roles automatically **synchronizes** the properties of the master user accounts with their shadow accounts, whenever you modify them.
- Finally, if the master user account is **deprovisioned**, Active Roles automatically deprovisions its shadow account as well, provided that you applied mailbox deprovisioning policies to the container that holds the shadow accounts in the resource forest.

  > NOTE: Like other AD objects, you can un-deprovision master user accounts as well. However, their shadow accounts are un-deprovisioned automatically only if the container of the deprovisioned master accounts has the **ERFM - Mailbox Management** built-in policy applied on them.

Getting started

For more information on the prerequisites and configuration of ERFM and linked mailboxes, see *Configuring linked mailboxes with Exchange Resource Forest Management* in the *Active Roles Administration Guide*.

Skype for Business Server User Management

To provision Skype for Business Server user accounts in single-forest and multi-forest Active Directory (AD) environments, Active Roles offers the Skype for Business User Management feature.

The Skype for Business Server User Management feature provides built-in Active Roles policies that synchronize user account information between Active Roles and Skype for

Business Server, allowing you to perform Skype for Business Server user management tasks via the Active Roles Web Interface.

Skype for Business Server User Management lets you use Active Roles to:

- Add and enable new Skype for Business users.
- View or change Skype for Business Server user properties and policy assignments.
- Move Skype for Business Server users from one Skype for Business Server pool to another.
- Disable or re-enable user accounts for Skype for Business Server.
- Remove users from Skype for Business Server.

To perform these administration tasks, the feature adds the following elements to Active Roles:

- Built-in Policy Objects that enable Active Roles to perform user management tasks on Skype for Business Server, either in a single-forest or a multi-forest AD environment.
- Additional commands and pages in the Active Roles Web Interface for managing Skype for Business Server users.
- Access Templates (ATs) to delegate Skype for Business Server user management tasks.

The Skype for Business Server User Management policy allows you to control the following factors of creating and managing Skype for Business Server users:

- **SIP user name generation rules**. When adding and enabling a new Skype for Business Server user, Active Roles can generate a SIP user name based on other properties of the user account.
- **SIP domain selection rules**. When configuring the SIP address for a Skype for Business Server user, Active Roles can restrict the list of selectable SIP domains and suggest which SIP domain to select by default.
- **Telephony selection rules**. When configuring telephony for a Skype for Business Server user, Active Roles can restrict the list of selectable telephony options and can suggest default options to select.
- **Pool selection rules**. When adding and enabling a new Skype for Business Server user, Active Roles can restrict the list of selectable registrar pools and suggest which pool to select by default. This rule also applies to selecting the destination pool when moving a Skype for Business Server user from one pool to another.

Skype for Business Server User Management provides a number of ATs allowing you to delegate the following tasks in Active Roles:

- Add and enable new Skype for Business Server users.
- View existing Skype for Business Server users.
- View or change the SIP address for Skype for Business Server users.
- View or change the telephony option and related settings for Skype for Business Server users.

- View or change Skype for Business Server user policy assignments.
- Disable or re-enable user accounts for Skype for Business Server.
- Move users from one Skype for Business Server pool to another.
- Remove users from Skype for Business Server.

Getting started

For more information on the prerequisites and configuration of Skype for Business Server User Management, see *Skype for Business Server Solution* in the *Active Roles Administration Guide*.

Active Directory topologies supported by Skype for Business Server User Management

Skype for Business Server User Management supports the following Active Directory Domain Services (AD DS) topologies.

Single forest with single tree or multiple trees

In a single forest topology, the login-enabled user accounts managed by Active Roles are stored in the same Active Directory forest in which Skype for Business Server is deployed.

Skype for Business Server user management tasks have two main steps in a single-forest configuration:

1. First, Active Roles makes changes to the attributes of the configured user account.
2. Then, based on the attribute changes, the Skype for Business Server User Management policy requests the Skype for Business Server remote shell to update the user account accordingly.

For example, when creating a new Skype for Business Server user, Active Roles sets a virtual attribute on that user account directing the policy to invoke the remote shell command for enabling the new user for Skype for Business Server. When making changes to an existing Skype for Business Server user, Active Roles populates the attributes of the user account with the desired changes, causing the policy to apply those changes via the remote shell.

Multiple forests in a resource forest topology

In a resource forest topology, the servers running Skype for Business Server are hosted in a separate Skype for Business Server forest that does not host any login-enabled user accounts. Instead, the user accounts are stored in a user forest (or forests) where no Skype for Business Server instances are hosted.

1. When creating a Skype for Business Server account for a user from an external forest, Active Roles:
2. Creates an inactive user account (known as the "shadow account") in the Skype for Business Server forest.
3. Links the associated user account in the user forest ("master account") with the inactive shadow account.
4. Activates the shadow account for Skype for Business Server.

The policies of the Skype for Business Server User Management feature then work as follows:

The Master Account Management policy ensures that the attributes of the shadow account are synchronized with the attributes of the master account, so that you can administer Skype for Business Server user properties on the master account via Active Roles.

The User Management policy detects the attribute changes replicated from the master account to the shadow account in the Skype for Business Server forest, and translates them to remote shell commands on Skype for Business Server, similarly to how synchronization is performed in a single-forest configuration.

Multiple forests in a central forest topology

In a central forest topology, the servers running Skype for Business Server are hosted in a separate Skype for Business Server forest. However, unlike in a resource forest topology, this forest can also host login-enabled accounts. Outside the Skype for Business Server forest, user forests host login-enabled user accounts, but no servers running Skype for Business Server.

In this forest configuration, the Skype for Business Server User Management policy is applied to login-enabled user accounts in the Skype for Business Server forest. As a result, Active Roles can enable and administer those user accounts for Skype for Business Server in the same way as in case of using a single-forest configuration.

When creating a Skype for Business Server account for a user from an external forest, Active Roles performs the following actions:

1. Creates a contact in the Skype for Business Server forest.
2. Links the user account in the user forest (that is, the "master account") and the contact in the Skype for Business Server forest (that is, the "shadow account").
3. Activates the contact for Skype for Business Server.
4. The Master Account Management policy then ensures that the attributes of the contact are synchronized with the attributes of the user account, so that Skype for Business Server user properties can be administered on the user account via Active Roles.
5. In the Skype for Business Server forest, the User Management policy detects the attribute changes replicated from the user account to the contact, and translates them to remote shell commands on Skype for Business Server, similarly to how synchronization is performed in a single-forest configuration.

Configuring and administering Active Roles

This section summarizes the major configuration, deployment, and maintenance features of Active Roles.

Active Roles Setup wizard

The Active Roles Setup wizard facilitates the evaluation, deployment, upgrade and configuration of Active Roles. The key highlights of the wizard include the following:

- **Unified setup process**: Active Roles is shipped with a single wizard for installing all core product components, including the Administration Service, the Web Interface, and the Console (also known as the MMC Interface).
- **Configuration Center**: After installation, Active Roles launches the Configuration Center, an application that you can use to perform the core configuration tasks after installation, or to finish upgrading Active Roles. As such, the Configuration Center lets you configure Administration Service instances and deploy Web Interface sites. For more information on the Configuration Center, see Active Roles Configuration Center.
- **Side-by-side deployment**: The Active Roles Setup allows you to deploy new Active Roles versions side-by-side on the same computers with Active Roles 6.9. This allows you to use the same hardware and infrastructure to run newer versions of Active Roles while also keeping Active Roles 6.9 deployed for your business needs.

⚠ **CAUTION: Upgrading from Active Roles 6.9 to a newer version is only meant to be a temporary solution, as the side-by-side installation of two different Active Roles versions can have a negative impact on the environment.**

Different versions of Active Roles are not supported in the same Active Directory domain. Different versions of Active Roles servers in the same AD domain will cause issues with dynamic groups, policies, workflows, or custom scripts, and can also cause conflicts in product functionality.

When upgrading Active Roles to a later version, One Identity recommends to upgrade all servers running Active Roles components to the same version to be in a supported configuration.

For more information, see Knowledge Base Article 4307177.

NOTE: To avoid potential conflicts with Active Roles 6.9, newer versions of the product use a different name for the Windows service of the Administration Service and for the default Web Interface sites.

- **Separate component installation files**: Although the Active Roles Setup allows you to install every major product component at once, the installation `*.iso` delivers each component (such as the Administration Service, the Web Interface, the Add-on Manager, the SPML Provider, or the Management Shell) in separate `*.msi` files. This allows you to install the various Active Roles components individually without the need of running the Active Roles Setup.

Active Roles Configuration Center

The Active Roles Configuration Center is a configuration application that provides a unified configuration platform for the Active Roles Administration Service and the Web Interface component. This allows administrators to perform the core Active Roles configuration tasks from a single application, including the following:

- Performing the initial configuration of Active Roles, such as setting up the Administration Service instances and the default Web Interface sites.
- Importing the configuration database and the management history database from earlier Active Roles versions.
- Managing the core Administration Service resources, such as the Active Roles Admin account, service account, and database connections.
- Creating new Web Interface sites either based on the site configuration objects of the current Active Roles version, or by importing site configuration objects from earlier Active Roles versions.
- Managing core Web Interface site settings, such as site addresses on the web server, or the configuration object in the Administration Service.

- Configuring secure communication for the Active Roles Web Interface through forced SSL redirection.
- Integrating Active Roles with One Identity Starling. For more information, see *One Identity Starling Join and configuration through Active Roles* in the *Active Roles Administration Guide*.
- Managing user login settings for the Active Roles Console (also known as the MMC Interface).
- Configuring Federated Authentication, allowing you to access an application or website by authenticating against a certain set of rules, known as "claims".
- Configuring log management and Solution Intelligence.

For more information on these features, see the following subsections.

Getting Started

Active Roles Configuration Center is automatically installed and started by default if you select to install either the Administration Service or the Web Interface components to a computer. Later, you can start Configuration Center again either from the Windows Start menu, or from the Apps page of the operating system.

Configuration Center components

The Configuration Center provides a unified, single, simple, wizard-based user interface for all core Active Roles configuration tasks, making it a single point of access to all management wizards for all configuration tasks.

The Configuration Center consists of the following elements.

Initial configuration wizards

After installing Active Roles, the Configuration Center allows administrators to run the initial configuration wizards and create the new Active Roles instance, including the Administration Service and the Web Interface.

Hub pages and management wizards

Once the initial configuration is completed, the Configuration Center provides a consolidated view of the core Active Roles configuration settings, and offers tools for changing those settings.

The hub pages of the Configuration Center show the current settings specific to the Administration Service and the Web Interface, including the commands to start the management wizards for changing those settings. The available hub pages are the following:

- **Administration Service**: This page allows administrators to:
  - View or change the Active Roles Admin account, service account, and databases.
  - Import the configuration data and management history data either from an earlier Active Roles version or from the current Active Roles database.
  - View status information, such as whether the Administration Service is started and ready for use, stopped, or being restarted (along with the options to start, stop and restart the service).
- **Web Interface**: This page allows administrators to:
  - View, create, modify or delete Web Interface sites. The configurable site settings include the site address, and the configuration object that stores the site configuration data in the Administration Service.

    When creating or modifying a Web Interface site, administrators can either reuse an existing configuration object, or create a new one based on a template or by importing data from another configuration object or from an export file.
  - Export the configuration of any existing Web Interface site to a file.
  - Open each site in a web browser.

Configuration Shell

The `ActiveRolesConfiguration` module (also known as the Configuration Shell) of the Active Roles Management Shell allows administrators to access all Configuration Center features and functions from a Windows PowerShell command-line interface or with scripts, facilitating the unattended configuration of Active Roles components. The `ActiveRolesConfiguration` module provides cmdlets for key configuration tasks, such as:

- Creating the Active Roles database.
- Creating or modifying the Administration Service instances and the Web Interface sites.
- Performing data exchange between Active Roles databases and between site configuration objects.
- Querying the current state of the Administration Service.
- Starting, stopping or restarting the Administration Service.

Configuring a local or remote Active Roles instance

Configuration Center is installed as part of the Management Tools component if you install Active Roles on a 64-bit system. You can use the Management Tools package to perform configuration tasks on the local or remote computer that has the current version of the Administration Service or Web Interface installed.

Once installed, the Configuration Center looks for these components on the local computer, and if it does not find any of these components, it prompts you to connect to a remote computer. However, you can also connect to a remote computer by clicking the drop-down menu in the Configuration Center header.

> NOTE: Consider the following when planning to use the Configuration Center on a remote computer:
>
> - When connecting to a remote computer, Configuration Center prompts you for a user name and password. The account you use to log in must match the domain user account belonging to the Administrators group on the remote computer. In addition, whether you are going to perform configuration tasks on the local computer or on a remote computer, your login account must be a member of the Administrators group on the computer running Configuration Center.
> - To perform configuration tasks on a remote computer, Configuration Center requires Windows PowerShell remoting to be enabled on that computer. PowerShell remoting is enabled by default on Microsoft Windows Server 2016 or newer operating systems; however, if it is turned off for any reason on the remote computer, you can enable it by running the `Enable-PSRemoting` command in Windows PowerShell. For more information, see Enable-PSRemoting in the *Microsoft PowerShell documentation*.

Running the Configuration Center

The Configuration Center is installed and, by default, automatically started after installing the Active Roles Administration Service or Web Interface component on a computer, allowing you to perform the initial configuration tasks for these components. If you close the Configuration Center, you can start it again later from the Windows Start menu or the Apps page of the operating system.

As the Configuration Center can manage Active Roles not only on the local computer but also on remote computers, you can run it both on client and server operating systems. However, you can only install the Configuration Center on a 64-bit operating system. Once the component is installed on a client operating system, you must start and connect it to the remote server where the Administration Service or Web Interface instances you want to configure are installed. Similarly to a server operating system, you can launch the Active Roles Configuration Center either from the Windows Start menu or from the Apps page.

> NOTE: To run the Configuration Center on a client computer, you must be logged in with Administrator privileges.

If neither the Administration Service nor the Web Interface is installed on the local computer, the Configuration Center will prompt you to select a remote computer. In the **Select Server** dialog that appears, supply the fully qualified domain name of a server on which the Administration Service or the Web Interface instance is installed, then enter the name and password of a domain user account that has administrator rights on that server. You can connect to a remote server at any time by clicking the **Connect to another server** option in the header of the Active Roles Configuration Center.

Supported Configuration Center tasks

The Configuration Center lets administrators perform:

- Initial configuration tasks, such as creating the Administration Service instance and the default Web Interface sites. For more information, see Initial configuration tasks.
- Configuration management tasks, that is managing existing Administration Service and Web Interface instances. For more information, see Configuration management tasks.
- Managing user access to the Active Roles Console. For more information, see Delegating user access to the Active Roles Console.
- Managing the logging settings of Active Roles. For more information, see Configuring Active Roles logging settings.
- Configuring Solution Intelligence. For more information, see Configuring Solution Intelligence.

Initial configuration tasks

Once the Active Roles Setup wizard installs Active Roles, the Configuration Center starts automatically so that administrators can create an Administration Service instance and deploy the default Web Interface sites. The following sections describe these tasks in detail.

Configuring the Administration Service

The **Configure Administration Service** wizard creates the Administration Service instance, preparing it for use. The wizard needs the following data for configuration:

- The login name and password of the account in which the configured Administration Service instance will be running (service account). In case of a Group Managed Service account, you must specify the service account details.
- The name of the group or user account that will have full access to all Active Roles features and functions through the configured Administration Service instance. This group or account is known as the Active Roles Admin.
- The database in which the configured Administration Service instance will store the configuration data and management history data. When specifying the database, you can either create a new database, or use an existing database compatible with the current Active Roles version. You can use the same database for multiple Administration Service instances.
- The authentication mode that the configured Administration Service instance will use when connecting to the database:
  - When using **Windows authentication**, the Administration Service will use the credentials of the service account.

When using **SQL Server authentication**, the Administration Service will use the SQL login name and password you specify in the wizard.

To start the wizard, in the **Administration Service** tab, click **Configure**.

Configuring the Web Interface

The **Configure Web Interface** wizard creates the default Web Interface sites, getting the Web Interface component ready for use. The wizard prompts you to choose which Administration Service instance will be used by the Web Interface instance you are configuring. The Web Interface can:

- Use the Administration Service instance running on the same computer as the Web Interface.
- Use an Administration Service instance running on a different computer. In this case, you must supply the fully qualified domain name of the computer running the preferred instance of the Administration Service.
- Let the Web Interface choose any Administration Service instance that has the same configuration as the specified one. In this case, you must supply the fully qualified domain name of the computer running the Administration Service instance of the desired configuration.

  > NOTE: If your environment uses Active Roles replication, you must specify the computer running the Administration Service instance whose database server acts as the Publisher of the Active Roles configuration database.

You can access the **Configure Web Interface** wizard from the **Configure** > **Web Interface** menu of the Configuration Center **Dashboard**.

After configuring the Web Interface, you can perform the following additional Web Interface configuration steps in the Configuration Center:

- **Forcing SSL redirection**: By default, Active Roles users can connect to the configured Web Interface sites via HTTP protocol that does not encrypt data during communication. To enable secure communication for the Web Interface on local and remote servers, One Identity recommends enabling the HTTPS protocol with the **Force SSL Redirection** option.
- **Federated authentication**: You can authenticate the Web Interface sites against a certain set of rules (known as "claims"), by using the federated authentication. The implementation in Active Roles uses Security Assertion Markup Language (SAML), through which you can sign in to an application via single sign-on, then authenticate to access the configured Web Interface sites. For more information, see *Working with federated authentication* in the *Active Roles Administration Guide*.

Configuring join to Starling

Active Roles supports integration with One Identity Starling via the Starling Join feature. Joining Active Roles to Starling enables access to the various Starling services, including Identity Analytics and Risk Intelligence, and Connect. For more information, see *One*

Identity Starling Join and configuration through Active Roles in the *Active Roles Administration Guide*.

Configuration management tasks

Once you completed the initial configuration of Active Roles in the Configuration Center as described in Initial configuration tasks, you can check the state of the Administration Service and Web Interface components anytime, and can also perform various management tasks on them. The following sections describe these tasks in detail.

Administration Service management tasks

After installing Active Roles, first you must create the Administration Service instance as described in Configuring the Administration Service. Then, you can use the Configuration Center to:

- View or change the core Administration Service settings, such as the Active Roles Admin account, Active Roles service account, and the Active Roles databases.

  For more information, see Viewing the core Administration Service settings and Modifying the core Administration Service settings.
- Import configuration data from another (current version or earlier version) Active Roles database to the current database of the Administration Service. For more information, see Importing configuration data.
- Import Management History data from another (current version or earlier version) Active Roles database to the current database of the Administration Service. For more information, see Importing Management History data.
- Check the state of the Administration Service. For more information, see Checking the state of the Administration Service.
- Start, stop or restart the Administration Service. For more information, see Starting, stopping or restarting the Administration Service.

Viewing the core Administration Service settings

On the **Administration Service** page of the Configuration Center, you can check:

- The login name of the Active Roles service account.
- The name of the group or user account that has the Active Roles Admin rights.
- The SQL Server instance that hosts the Active Roles database and the name of the Active Roles database.
- The database connection authentication mode (Windows authentication or SQL Server authentication).

Modifying the core Administration Service settings

On the **Administration Service** page of the Configuration Center, you can change:

- The service account. To do so, click **Service account** > **Change**. Then, in the wizard that appears, specify the login name and password of the domain user account, or if using a group Managed Service Account (gMSA), the service account details in which you want the Administration Service to run.
- The Active Roles Admin account. To do so, click **Active Roles Admin** > **Change**. Then, in the wizard that appears, specify the group or user account you want to have the Active Roles Admin rights.
- The Active Roles database. To do so, click **Active Roles database** > **Change**. Then, in the wizard that appears, specify the SQL Server instance and the database you want the Administration Service to use, and select the database connection authentication mode (Windows authentication or SQL Server login). You can also specify a separate database for storing management history data.

Importing configuration data

The configuration operations available in the Configuration Center are fully scriptable using the Windows PowerShell command-line tools of the Active Roles Management Shell. For more information, see Active Roles Management Shell.

When upgrading the Administration Service, you must import configuration data from the earlier version of Active Roles to the new version of the product. To do so, in the Configuration Center, click **Administration Service** > **Import Configuration**, then follow the steps in the wizard that appears. For more information, see *Importing configuration data* in the *Active Roles Upgrade Guide*.

During the import operation, the wizard retrieves and upgrades the data from the source database, and replaces the data in the destination database with the upgraded data from the source database.

Importing Management History data

A part of the Active Roles database, the Management History data storage is empty after you have configured the Administration Service with the option to create a new database. During import of configuration data, Configuration Center transfers only the administrative right assignments, policy definitions, administrative view settings, workflow definitions and other parameters that determine the Active Roles work environment. Management history data is excluded from the import operation to reduce the time it takes to upgrade the configuration of the Administration Service.

The Management History data describes the changes that were made to directory data via Active Roles. This includes information about who did what and when it was done as applied to the directory data management tasks. The Management History data is used as a source of information for the change history and user activity reports. In addition, the Management History data storage holds information about various tasks related to approval workflow and temporal group membership.

After configuring the Administration Service with the option to create a new database, and importing the configuration data from an existing database, you must take additional steps to transfer the Management History data from that database to the new database. Configuration Center provides the **Import Management History** wizard to perform this task.

The **Import Management History** wizard populates a new storage of Management History data with the data found in an existing Active Roles database, to make the data available to the Active Roles user interfaces after your configure a new Administration Service instance. The wizard merges the Management History data from the source database with the data stored in the destination database.

> NOTE: The **Import Management History** wizard only adds new data, keeping intact any data that already exists in the destination database. You may import your legacy Management History data at any time after you have configured the Administration Service, without the risk of losing any data.

Although importing Management History data looks similar to the task of importing configuration data, there are important differences:

- Due to a much larger volume of Management History data compared to configuration data, importing Management History data takes much longer than importing configuration data.
- As Management History data has dependencies on configuration data (but not vice versa), you must import configuration data first. You can import Management History data after that if needed.

Because of these considerations, Configuration Center provides a different wizard for importing Management History. The distinctive features of the **Import Management History** wizard are the following:

- The wizard does not replace the existing data in the destination database. It only retrieves and upgrades Management History records from the source database, and then adds the upgraded records to the destination database.
- The wizard allows you to specify the date range for the Management History records you want to import, so you can import only records that occurred within a particular time frame instead of importing all records at a time.
- Canceling the wizard while the import operation is in progress does not cause you to lose the import results, so you can stop the import operation at any time. The records imported by the time that you cancel the wizard are retained in the destination database. If you start the wizard again, the wizard imports only records that were not imported earlier.

To start the **Import Management History** wizard, click **Import Management History** on the **Administration Service** page in the Configuration Center main window. During the import operation, the wizard retrieves and upgrades Management History records from the source database, and adds the upgraded records to the destination database.

For more information, see *Importing Management History data* in the *Active Roles Quick Start Guide*.

Checking the state of the Administration Service

You can check the state of the Administration Service in the **Administration Service** page of the Active Roles Configuration Center. The page indicates the states of the service with the following status labels:

- **Ready for use**: Administration Service is running and is ready to process requests.
- **Getting ready**: Administration Service just started and is preparing to process client requests.
- **Stopping**: Administration Service is preparing to stop.
- **Stopped**: Administration Service is not running.
- **Unknown**: Configuration Center cannot check the state of Administration Service.

Starting, stopping or restarting the Administration Service

You can start, stop or restart the Administration Service in the **Administration Service** page of the Configuration Center by clicking the **Start**, **Stop** or **Restart** buttons.

Web Interface management tasks

After installing Active Roles, you can perform the initial configuration of the Web Interface in the Configuration Center, preparing the component for use. Then, you can use the Configuration Center to:

- Identify the Web Interface sites currently deployed on the web server running the Web Interface. For more information, see Identifying the Web Interface sites.
- Create, modify or delete Web Interface sites. For more information, see:
  - Creating a Web Interface site
  - Modifying a Web Interface site
  - Deleting a Web Interface site
- Export the configuration object of a Web Interface site to a file. For more information, see Exporting the configuration of a Web Interface site to a file.

Identifying the Web Interface sites

You can use the **Web Interface** page of the Configuration Center to identify the Web Interface sites deployed on the web server running the Web Interface. For each Web Interface site, the list provides the following information:

- **IIS Web site**: The name of the website holding the web application that runs the Web Interface site.
- **Web app alias**: The alias of the web application that runs the Web Interface site. Tha alias defines the virtual path of that application on the web server.
- **Configuration**: The object which holds the site configuration and customization data of the Web Interface site in the Active Roles Administration Service.

> TIP: You can also open the configured Web Interface sites from the **Web Interface** page of the Configuration Center. To open any of the configured sites, click the site in the list, then click **Open in Browser**.

Creating a Web Interface site

You can create a new Web Interface site with the **Web Interface** > **Create** option of the Configuration Center. This opens the **Create Web Interface Site** wizard, allowing you to:

- Choose the IIS website configuration that will contain the web application which implements the Web Interface site.
- Specify the alias of the web application, defining the virtual path for the URL of the Web Interface site.

The wizard then lets you specify the object that will hold the configuration and customization data of the new Web Interface site in the Active Roles Administration Service. You can choose from the following options:

- **Create from a template**: If you select this option, Active Roles will create the new site from the configuration and customization settings of the template you select.
- **Use an existing configuration**: If you select this option, the new site will have the same configuration and customization as any existing Web Interface site that also uses the configuration object you select.

  > TIP: Use this option if you want to create an additional instance of an existing Web Interface site on a different web server.

- **Import from an existing configuration**: If you select this option, the new Web Interface site will have the same configuration and customization as the site you select as a baseline. In this case, Active Roles imports the configuration data from the previous version of the configuration to the new Administration Service instance, then creates the new Web Interface configuration objects based on that earlier version.

  > TIP: Use this option during upgrades if you want to create the new Web Interface sites based on the sites of the Active Roles version you upgraded from.

- **Import from a file**: If you select this option, the new Web Interface site will use the configuration and customization stored in the browsed export file.

  > TIP: Use this option during upgrades if you want to create the new Web Interface sites from a previously exported configuration.

Modifying a Web Interface site

You can modify existing Web Interface sites with the **Web Interface** > **Modify** option of the Configuration Center. This opens the **Modify Web Interface Site** wizard, allowing you to:

- Modify the IIS website configuration that will contain the web application which implements the Web Interface site.
- Modify the alias of the web application, defining the virtual path for the URL of the Web Interface site.

The wizard then lets you specify the object that will hold the configuration and customization data of the modified Web Interface site in the Active Roles Administration Service. You can choose from the following options:

- **Keep the current configuration**: If you select this option, the wizard will keep the current configuration of the modified website.

  > TIP: Use this option if you plan no further changes in the website configuration apart from changing the IIS website configuration or the site alias.

- **Create from a template**: If you select this option, Active Roles will change the configuration and customization settings of the modified Web Interface site to those of the template you select.
- **Use an existing configuration**: If you select this option, Active Roles will change the configuration and customization settings of the modified website to those of the site you select.

  > TIP: Use this option if you want to align the configuration and customization of an existing Web Interface site with that of another existing website.

- **Import from an existing configuration**: If you select this option, Active Roles will change the configuration and customization of the modified Web Interface site to that of the configuration you select as baseline. In this case, Active Roles imports the configuration data from the previous version of the configuration to the new Administration Service instance, then creates the new Web Interface configuration objects based on that earlier version.

  > TIP: Use this option during upgrades if you want to modify an existing Web Interface site based on another site of the Active Roles version you upgraded from.

- **Import from a file**: If you select this option, Active Roles will change the configuration and customization of the existing Web Interface site to that of the exported configuration you select.

  > TIP: Use this option during upgrades if you want to align the configuration and customization of an existing Web Interface site with that of a previously exported configuration.

Deleting a Web Interface site

You can delete existing Web Interface sites with the **Web Interface** > **Delete** option of the Configuration Center. This opens the **Delete Web Interface Site** wizard, deleting the selected Web Interface site from the web server.

> NOTE: The wizard does not delete the site configuration object from the Administration Service. This allows you to set up new Web Interface sites later even with the configuration of the deleted site.

Exporting the configuration of a Web Interface site to a file

You can export the configuration object of an existing Web Interface site with the **Web Interface** > **Export Configuration** option of the Configuration Center. This opens the **Export Web Interface Site Configuration** wizard, allowing you to save the configuration of the site from the Administration Service into an `*.xml` file with the specified name to the specified location.

> TIP: Use this option to back up the configuration of existing Web Interface sites, then use them as a baseline for creating additional Web Interface sites in your organization.

Delegating user access to the Active Roles Console

By default, after installing Active Roles, every user can log in to the Active Roles Console (also known as the MMC Interface). To restrict user access to the Console, in the Configuration Center, use the **MMC Interface Access** > **Modify** menu, then select the **Restrict Console (MMC Interface) access for all users** option.

Doing so restricts all non-Active Roles Admin users from using the Active Roles Console.

> TIP: You can give Active Roles Console access later to selected users with the **User Interface Management - MMC Full control** Access Template (AT) of the Active Roles Console. This AT gives access permission to the **Server Configuration** > **User Interfaces** > **MMC Interface** object.
>
> For more information on how to use ATs, see *Applying Access Templates* in the *Active Roles Administration Guide*.

Configuring Active Roles logging settings

The Active Roles Configuration Center also allows you to manage the logging settings of the various Active Roles components. As part of this, you can:

- Enable or disable logging for each Active Roles component.
- Open the location of the various component log files.
- Open the component logs directly in the Active Roles Log Viewer utility.

To view, configure and manage Active Roles logs, in the Configuration Center, navigate to the **Logging** page. Once opened, the page lists the following information:

- **Component**: The name of the Active Roles component producing the log, such as the Administration Service or the Active Roles Console.
- **Logging**: Indicates whether logging is enabled or disabled for the component, and shows the logging level (**Basic** or **Verbose**). While **Basic** logging includes only errors, warnings and informational messages in the log files, **Verbose** logging also adds debugging and tracing messages.
- **Log location**: Indicates the full path of the log file.

The toolbar of the **Logging** page allows you to perform the following log management tasks:

- To enable or disable logging for a component, or change the logging level, select the component in the list, then click **Modify**.
- To open the folder that contains the log file(s) of a component, select the component in the list, then click **Browse with Explorer**.
- To open the Administration Service log in the Active Roles Log Viewer utility, select Administration Service in the list of components, then click **Open in Log Viewer**. For more information, see Active Roles Log Viewer.

Configuring Solution Intelligence

You can enable or disable **Solution Intelligence** in the Active Roles Configuration Center for your Web Interface sites. Solution Intelligence is an optional Active Roles feature used by One Identity to gather standard telemetry data about your Active Roles deployment, containing load, performance and usage metrics, exception reports, and other diagnostic information used to improve Active Roles.

Solution Intelligence is disabled by default.

Active Roles Configuration Shell

The **ActiveRolesConfiguration** module (also known as the "Configuration Shell") provides cmdlets for configuring Active Roles Administration Service instances and Web Interface sites. The names of the cmdlets provided by this module start with the `AR` prefix, such as `New-ARDatabase`, `New-ARService`, or `New-ARWebSite`.

> NOTE: Consider the following when planning to use the **ActiveRolesConfiguration** module:
>
> - This module is available on 64-bit operating systems only.
> - You can only install this module on computers where the Administration Service or Web Interface modules are also installed. Otherwise, the module will not provide all cmdlets.

The following table lists the cmdlets of the Configuration Shell.

Table 6: Configuration Shell Cmdlets

Command	Description
Get-ARComponentStatus	Returns the installation and configuration status of the Active Roles components.
New-ARDatabase	Creates a new Active Roles database.
Import-ARDatabase	Transfers Active Roles configuration data or management history data from one database to another.
Backup-AREncryptionKey	Backs up the current encryption key of the configuration database in the local Administration Service instance into a file.
Restore-AREncryptionKey	Restores the configuration database encryption key from a backup file to the local Administration Service instance.
Reset-AREncryptionKey	Creates a new encryption key for the configuration database in the local Administration Service instance.
New-ARService	Creates the Active Roles Administration Service instance

Command	Description
	on the local computer.
Get-ARService	Gets the status of the Active Roles Administration Service instance from the local computer.
Set-ARService	Modifies the Active Roles Administration Service instance on the local computer.
Start-ARService	Starts the Active Roles Administration Service instance on the local computer.
Stop-ARService	Stops the Active Roles Administration Service instance on the local computer.
Restart-ARService	Stops and starts the Active Roles Administration Service instance on the local computer.
Remove-ARService	Deletes the Active Roles Administration Service instance from the local computer.
Test-ARServiceDatabaseSettings	Verifies whether the specified Active Roles database settings would cause Management History issues due to setting separate Configuration and Management History databases.
Get-ARServiceStatus	Gets the Active Roles Administration Service status information from the local computer.
Get-ARVersion	Gets the version of the local Active Roles installation.
New-ARWebSite	Creates a new Active Roles Web Interface site.
Get-ARWebSite	Gets the Active Roles Web Interface sites from the web server.
Set-ARWebSite	Modifies the specified Active Roles Web Interface site on the web server.
Remove-ARWebSite	Deletes the specified Active Roles Web Interface site from the web server.
Get-ARWebSiteConfig	Gets Web Interface site configuration objects from the Active Roles Administration Service.
Export-ARWebSiteConfig	Exports the specified Web Interface site configuration to a file.

Using the System Checker

You can start the System Checker by running the **Active Roles System Checker** application from the **Start** menu or **Apps** page, depending upon your version of the

Windows operating system.

From the **System Checker** main window, you can perform the following tasks:

- To check your computer, click **System Readiness Checks**, then select the appropriate Active Roles version for which to perform the checks.
- To check a particular SQL Server instance, click **SQL Server Checks** and specify the SQL Server instance to check. You can also specify the authentication method and connection credentials for access to the SQL Server instance.
- To check a particular Active Directory domain or a particular Domain Controller (DC), click **Active Directory Checks** and specify the name of the domain or the name of the DC. You can also specify connection credentials for access to the domain or DC.

System Checker then creates a report of the selected action, and displays it in its report viewer. Reports are divided into sections, each of which represents the results of a single check. If a report section includes any errors or warning messages, you can view the messages by expanding the section in the report viewer.

The report viewer also allows you to:

- Print the report.
- Export the report to an HTML file, so that you can open the report in a web browser later.
- Save the report to a report file, so that you can open the saved report in the report viewer later.
- Open a saved report by clicking **Open** in the main menu of System Checker, and selecting the report file.
- Rebuild the report, and optionally also changing the report options.

  To rebuild the report, click **Recheck** on the toolbar of the report viewer.

Active Roles Log Viewer

The Active Roles Log Viewer tool allows you to browse and analyze:

- Diagnostic log files created by the Active Roles Administration Service.
- Event log files created by saving the Active Roles event logs in the Windows Event Viewer on the computer running the Administration Service.

The Log Viewer tool can help you to:

- Check the sequence or hierarchy of requests processed by the Administration Service.
- Identify error conditions that the Administration Service encountered during request processing.
- Find Knowledge Base (KB) Articles for specific log messages and errors.

You can open Active Roles diagnostic log files (`ds.log`) or saved event log files (`*.evtx`) with the Log Viewer tool, allowing you to check:

- The errors encountered by the Administration Service and recorded in the log file.
- Requests processed by the Administration Service and traced in the log file.
- All trace records found in the diagnostic log file.
- All events found in the event log file.

When you select an error from the list, you can also look for applicable One Identity KB Articles to learn more about the log entry or troubleshoot selected errors.

In addition, the Active Roles Log Viewer tool also allows you to:

- Search in the loaded log file for a particular text string, such as an error message.
- Filter the list by various conditions to narrow the listed items to those you are actually interested in.
- View detailed information about each list item, such as error details, request details or stack trace.

Getting started

To start using Active Roles Log Viewer, see the following resources:

- For more information on how to install Active Roles Log Viewer, see *Steps to install Diagnostic Tools* in the *Active Roles Quick Start Guide*.
- For more information on using Active Roles Log Viewer, see *Using the Log Viewer tool* in the *Active Roles Administration Guide*.

Voluntary threshold for managed object count

By default, Active Roles does not limit the number of managed objects you can manage. However, as the license fee is based on the managed object count, you may need to verify that the object count stays under a certain threshold. To do so, you must specify a threshold value for the number of managed objects.

Once you configure this voluntary threshold, the scheduled task that counts the managed objects will raise an alert whenever it detects that the current number of managed objects exceeds the configured threshold value. Active Roles will indicate this alert in the **Product Usage Statistics** page of the Active Roles Console, and can also send a notification over email.

Getting started

For more information on how to configure the threshold, see *Voluntary thresholds for the managed object count* in the *Active Roles Administration Guide*.

Installation label

To identify your Active Roles installation in the Managed Object Statistics report, you can set a label for your deployment in the Active Roles Console.

This is useful, for example, if you have several Active Roles deployments installed in your organization (for example, separate pilot, non-production and production environments) and you want to easily distinguish them visually.

Once configured, the installation label appears in the title of the Managed Object Statistics report.

Getting started

For more information on how to configure an installation label for Active Roles, see *Installation label* in the *Active Roles Administration Guide*.

Safe mode

Active Roles provides a troubleshooting mode called "Safe mode" that starts Administration Service in a limited state.

When you enable Safe mode, Administration Service:

- Disregards all custom policies, workflows, scripts, scheduled tasks and other custom-made assets that may prevent Active Roles from starting and operating normally.
- Rejects connections from any users that do not have Active Roles Admin privileges.

While Safe mode is active, only Active Roles Admins can connect to Administration Service, so that they can troubleshoot problems by changing the existing Active Roles configuration or removing any customizations that could cause issues. Once troubleshooting is finished, Active Roles Admins can also turn off Safe mode and resume normal Active Roles operation.

Getting started

You can enable Safe mode from the Active Roles Management Shell.

To enable or disable Safe mode

1. On the computer running the Active Roles Administration Service, log in with a user account that has administrator rights on the computer.

   > NOTE: You can enable or disable Safe mode only with a user account that has local administrator rights on the computer running Administration Service.

2. Start the Active Roles Management Shell from the Windows Start menu or the Apps page of the operating system.
3. To enable safe mode, enter the following commands in the Management Shell command-line interface:

   ```
   Set-ARService -SafeModeEnabled $true
   ```

   ```
   Restart-ARService
   ```
4. To enable safe mode, enter the following commands in the Management Shell command-line interface:

   ```
   Set-ARService -SafeModeEnabled $false
   ```

   ```
   Restart-ARService
   ```

Support for AWS Managed Microsoft AD

NOTE: This feature is officially supported starting from Active Roles 8.1.3 SP1 (build 8.1.3.10). It is not supported on Active Roles 8.1.3 (build 8.1.3.2) and earlier versions.

Active Roles supports deployment and configuration in the Amazon cloud to manage AWS Managed Microsoft AD instances hosted via AWS Directory Service.

This allows you to:

- Perform Active Directory management tasks in your AWS Managed Microsoft AD environment.
- Synchronize directory data from an on-premises AD environment to AWS Managed Microsoft AD.
- Synchronize passwords from an on-premises Active Directory to AWS Managed Microsoft AD (with certain limitations).

For more information on configuring Active Roles to manage AWS Managed Microsoft AD environments, see *Configuring Active Roles for AWS Managed Microsoft AD* in the *Active Roles Quick Start Guide* or *Active Roles Administration Guide* documents.

For more information on configuring Active Roles Synchronization Service to synchronize resources to or from AWS Managed Microsoft AD, see *Installing and configuring Synchronization Service for use with AWS Managed Microsoft AD* in the *Active Roles Synchronization Service Administration Guide*.

Supported AWS Managed Microsoft AD deployment configuration

To manage AWS Managed Microsoft AD environments, you must deploy Active Roles in Amazon Web Services (AWS) in the following configuration:

- Active Roles must be deployed on an Amazon Elastic Compute Cloud (EC2) instance or instances. For more information, see the *Amazon Elastic Compute Cloud documentation*.
- The SQL Server required by Active Roles Administration Service must run on a separate Amazon Relational Database Service for Microsoft SQL Server (RDS for SQL Server) instance. For more information, see the *Amazon RDS documentation*.
- The Active Directory environment must be hosted in AWS via AWS Directory Service. For more information, see the *AWS Directory Service documentation*.

NOTE: Support for AWS Managed Microsoft AD by Active Roles was tested only in this configuration. Active Roles does not officially support managing AWS Managed Microsoft AD environments in a hybrid deployment, that is, using an on-premises Active Roles and/or SQL Server installation and hosting AD via AWS Directory Service.

Supported Active Roles features with AWS Managed Microsoft AD

If configured to manage AWS Managed Microsoft AD, Active Roles offers a feature set similar to managing an on-premises AD service. This includes:

- Performing the day-to-day administration tasks of AD objects (users, contacts, computers, distribution and security groups, Organizational Units, shared folders) in the Active Roles Console or the Web Interface.
- Rule-based and role-based administrative views and permissions for AD objects (Managed Units and Access Templates).
- Automation and approval workflows for AD objects.
- Importing the Management History database and/or Configuration database from an on-premises Active Roles installation of the same version. This is useful if you want to migrate the configuration of an existing on-premises Active Roles installation to your Active Roles installation running in an EC2 instance to manage AWS Managed Microsoft AD.
- Synchronization Service connections and sync workflows based on the following Active Roles Synchronization Service connectors:
    - Active Directory Connector
    - Active Roles Connector
    - Delimited Text File Connector
- Synchronizing passwords with Active Roles Synchronization Service from on-premises AD to AWS Managed Microsoft AD.

NOTE: For the limitations of password synchronization from on-premises AD to AWS Managed Microsoft AD, see Active Roles feature limitations when using AWS Managed Microsoft AD.

Active Roles feature limitations when using AWS Managed Microsoft AD

When using Active Roles to manage AWS Managed Microsoft AD resources, consider the following limitations.

Amazon Web Services limitations

For Active Roles installations deployed in Amazon Elastic Compute Cloud (EC2) instances and SQL Servers hosted on Amazon Relational Database Service for SQL Server (RDS for SQL Server) instances, the known EC2 and RDS limitations apply.

- For more information about the known EC2 limitations, see Launch template restrictions, Hibernation limitations and (if applicable) Constraints on the size and configuration of an EBS volume in the *Amazon EC2 documentation*.
- For more information about the known Amazon RDS limitations, see Quotas and constraints in the *Amazon RDS documentation*.

AD LDS, Azure AD, Exchange and Exchange Online support

Active Roles components (such as the Active Roles Console or Web Interface) that also support directory services other than AD (AD LDS, Azure AD, Exchange, or Exchange Online) were only tested to support AD-related configuration and administration tasks.

Likewise, Active Roles features (such as Managed Units or Access Templates) that also support managing objects from directory services other than AD (AD LDS, Azure AD, Exchange, or Exchange Online) were only tested to support AD object and permission management.

Domain Admin account management

As AWS has exclusive control over Domain Admin accounts, managing such accounts with Active Roles is not possible in AWS Managed Microsoft AD.

For more information, see Admin account in the *AWS Directory Service documentation*.

Federated authentication support

Federated authentication with WS-Fed was not tested to work with AWS Managed Microsoft AD.

Non-AD specific Active Roles features

Active Roles features used to manage non-AD directory services (such as Exchange Resource Forest Management) were not tested to work with AWS Managed Microsoft AD.

Service Connection Point discovery

Active Roles connected services (such as the Active Roles Console) rely on AD Discovery to create Service Connection Points (SCPs) and find other Active Roles services.

As AWS Directory Service does not support AD Discovery, Active Roles services installed on an EC2 instance to manage AWS Managed Microsoft AD may not be able to automatically discover the Active Roles Administration Service, impacting the user experience.

Synchronization Service limitations

- When synchronizing directory data or passwords from on-premises Active Directory to AWS Managed Microsoft AD, Active Roles Synchronization Service has the following limitations:
    - Active Roles Synchronization Service was only tested to work with connections and sync workflows based on the following connectors:
        - Active Directory Connector
        - Active Roles Connector
        - Delimited Text File Connector

      Sync workflows and connections based on other connectors are not officially supported.
    - When synchronizing passwords from an on-premises Active Directory to AWS Managed Microsoft AD, synchronizing the `pwdHash` attribute and synchronizing then populating the `SIDHistory` attribute to AWS Managed Microsoft AD is not supported. This is because the Synchronization Service Capture Agent cannot be installed in an AWS Managed Microsoft AD environment.
- Synchronizing passwords from AWS Managed Microsoft AD to on-premises AD with Active Roles Synchronization Service is not supported. This is because the Synchronization Service Capture Agent cannot be installed in an AWS Managed Microsoft AD environment.

SQL Server replication support

As Active Roles uses RDS for SQL Server when managing AWS Managed Microsoft AD, the SQL server replication feature of Active Roles is not supported.

Usable Organizational Unit in the AD domain

After you connect the Active Roles Console to your AWS Managed Microsoft AD environment, the AD domain and its containers will appear in the Active Roles Console (and if configured, in the Web Interface as well). By default, the AWS Managed Microsoft AD environment contains three types of containers:

- AWS-specific containers.
- The default AD-specific containers (such as `Builtin`, `Computers`, `Domain Controllers`, `ForeignSecurityPrincipals`, and so on).
- An Organizational Unit container matching the NetBIOS (or shortname) of the AWS Managed Microsoft AD deployment. For example, if the shortname of your AD domain is **ARDEMO**, the name of this container will also be **ARDEMO**.

Consider that out of these three container types, you can manage AD resources only in the Organizational Unit with the name matching the shortname of your AWS Managed Microsoft AD environment. All other containers will be read-only.

FIPS compliance

Active Roles 8.1.4 supports cryptography libraries and algorithms compliant with Federal Information Processing Standards (FIPS) 140-2. For more information on FIPS-compliant libraries and algorithms, see FIPS 140-2: Security Requirements for Cryptographic Modules.

> NOTE: Consider the following when planning to use FIPS-compliant cryptography libraries or algorithms:
>
> - Although Active Roles continues to support non-FIPS compliant cryptography libraries and algorithms, it will not work properly if it is configured to use non-FIPS compliant solutions in a FIPS-compliant environment.
> - If you already use FIPS-compliant security algorithms in your environment (such as the TripleDES security algorithm, or the SHA256 hash algorithm), you must export your existing configuration, and import it in a new Active Roles installation.

LSA protection support

The Active Roles Synchronization Service Capture Agent supports Local Security Authority (LSA). For more information, see Configuring Additional LSA Protection in the *Microsoft Windows Server documentation*.

About us

One Identity solutions eliminate the complexities and time-consuming processes often required to govern identities, manage privileged accounts and control access. Our solutions enhance business agility while addressing your IAM challenges with on-premises, cloud and hybrid environments.

Contacting us

For sales and other inquiries, such as licensing, support, and renewals, visit https://www.oneidentity.com/company/contact-us.aspx.

Technical support resources

Technical support is available to One Identity customers with a valid maintenance contract and customers who have trial versions. You can access the Support Portal at https://support.oneidentity.com/.

The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request
- View Knowledge Base articles
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- View how-to videos at www.YouTube.com/OneIdentity
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- View services to assist you with your product