

# Active Roles 8.1.5

## Release Notes

**11 April 2024, 15:27**

These release notes provide information about the Active Roles 8.1.5 release. For the most recent documents and product information, see [Active Roles Technical Documents](#) on the *One Identity support portal*.

## About this release

Active Roles 8.1.5 is a patch release with no new functionality.

- For more information on the enhancements, see [Enhancements](#).
- For more information on the resolved issues, see [Resolved issues](#).
- For more information on the list of known issues, see [Known issues](#).

## Enhancements

The following enhancement has been implemented in Active Roles 8.1.5.

**Table 1: General Active Roles enhancements**

<b>Enhancement</b>	<b>Issue ID</b>
General security enhancements in all Active Roles components.	444729, 426064

# Resolved issues

The following is a list of issues addressed in this release.

**Table 2: General Active Roles resolved issues**

Resolved Issue	Issue ID
<p>Previously, when upgrading Active Roles from any version to 8.1.4, the upgrade step of importing custom Script Modules could silently fail, with the failure indicated only in the upgrade log.</p> <p>This issue was caused by a fix introduced in the now-deprecated Active Roles 8.1.3 release, which changed the GUID of the <b>UpdateServicesToExecute</b> module. This resulted in the in-place upgrade process not recognizing the module anymore as a built-in Script Module and attempting to insert it, resulting in its DN not being unique, and halting the upgrade process.</p> <p>The issue was fixed by implementing a safeguard which prevents the duplication of DN values.</p> <p><b>NOTE:</b> Although the issue has been fixed, importing custom Script Modules during upgrade may still result in the following error generated in the build log:</p> <pre>Error: Violation of UNIQUE KEY constraint 'UQ_ScriptModules_distinguishedName'. Cannot insert duplicate key in object 'dbo.ScriptModules'. The duplicate key value is (CN=UpdateServicesToExecute,CN=Builtin,CN=Script Modules,CN=Configuration).</pre> <p>If this error occurs, verify that your custom Script Modules have been imported from your previous configuration. If not, import your previous configuration again.</p>	452818
<p>Previously, Active Roles forced rebuilding dynamic groups each time a member was added to or removed from the dynamic group.</p> <p>This issue is now fixed, so Active Roles now rebuilds dynamic groups only if the rebuild is triggered manually or with a Scheduled Task.</p>	443493

**Table 3: Active Roles Console resolved issues**

Resolved Issue	Issue ID
<p>Previously, when checking the group membership of hybrid Azure users, it could occur that their <b>Advanced properties &gt; Member Of</b> page or their <b>edsaAzureMemberOf</b> attribute did not list all the groups in which the user was a member.</p> <p>This issue is now fixed.</p>	432835

Resolved Issue	Issue ID
Previously, when selecting multiple hybrid users, an intrusive error message appeared and the <b>Member Of</b> view of the users were not created properly. The issue is now fixed.	432427
Previously, in case of a hybrid user, the email address displayed in the <b>Properties</b> window of the user did not match the email address displayed in the list of OU users. The issue has been fixed and now the correct email address appears.	432127
Previously, attempting to run the <b>Update Services To ExecuteOn</b> built-in scheduled task failed, as Active Roles ran the <b>ReauthenticatedTenantsUpdater</b> built-in script module for the task instead of the <b>UpdateServicesToExecute</b> built-in script module. This issue occurred because the GUID of the <b>UpdateServicesToExecute</b> built-in script module was tied to the <b>ReauthenticatedTenantsUpdater</b> script module. The issue was fixed by changing the GUID of the <b>UpdateServicesToExecute</b> built-in script module to a new unique value. <b>NOTE:</b> You can only run the <b>UpdateServicesToExecute</b> built-in script module in a scheduled task named <b>Update Services To ExecuteOn</b> . Attempting to run the <b>UpdateServicesToExecute</b> built-in script in a scheduled task with a different name will result in an error.	317060

**Table 4: Active Roles Synchronization Service resolved issues**

Resolved Issue	Issue ID
Previously, the Azure AD Connector could fail finding all objects in Azure during import tasks. This issue could occur if <code>HttpClient</code> timed out during Graph API requests, for example because of network issues. In such cases, the Azure AD Connector could not handle the timeout correctly. The issue was fixed by: <ul style="list-style-type: none"> <li>• Modifying the import process so that it stops when a timeout occurs, preventing the successful import of incomplete data.</li> <li>• Implementing a new retry policy which retries the request up to 3 times before timeout, minimizing the chance of the issue occurring.</li> </ul>	437816
Previously, synchronizing (adding) a group member from a plain text source to the <code>members</code> attribute of a group with the Azure AD Connector, the procedure failed with the following error: <pre>Invalid property 'members'</pre>	414643

Resolved Issue	Issue ID
The issue was fixed by modifying the Azure AD Connector to use the proper Graph API calls and ExchangeOnlineManagement PowerShell module cmdlets when synchronizing Azure groups.	

**Table 5: Active Roles Web Interface resolved issues**

Resolved Issue	Issue ID
<p>Previously, when using Active Roles in a forest topology with:</p> <ul style="list-style-type: none"> <li>• One root domain,</li> <li>• Several child domains,</li> <li>• Active Directory Federation Services and Active Roles with federated authentication configured on one of the child domains,</li> </ul> <p>Then users registered in another child domain of the forest could not log in to the Active Roles Web Interface.</p> <p>This issue was fixed by making sure that if Active Roles does not find the user in the current domain, then it continues searching for them in the forest using wider referral scopes each time it fails.</p>	447483
<p>Previously, when listing all attributes of an on-premises or hybrid user in the Active Roles Console or the Web Interface, users could experience performance degradation after some time.</p> <p>This issue could occur if:</p> <ul style="list-style-type: none"> <li>• Active Roles was not connected to any Azure tenants (as the Active Roles Service still attempted fetching data from Azure AD regardless).</li> <li>• The on-premises Exchange Server was unavailable (as Active Roles still attempted to repeatedly call Exchange Server regardless).</li> </ul> <p>To solve this problem, Active Roles now:</p> <ul style="list-style-type: none"> <li>• No longer attempts fetching data from Azure AD if Active Roles is not connected to any Azure tenants.</li> <li>• Has a 10-minute-long timeout in place in between calls to the on-premises Exchange Server if the first call attempt to Exchange Server fails.</li> </ul> <p><b>  NOTE:</b> The duration of this timeout cannot be modified.</p>	438247
<p>Previously, authentication failed under the following conditions:</p> <ul style="list-style-type: none"> <li>• When using WS-Federation authentication to the Web Interface.</li> <li>• When authenticating a user from an Active Directory forest or domain that was trusted by the AD domain that Active Roles was joined to.</li> </ul>	437298

## Resolved Issue

## Issue ID

- When that authenticated user in the trusted AD domain had a UPN suffix that existed in both AD domains.

The issue has been fixed.

Previously, when creating a new cloud-only or hybrid Azure user, the **Create Azure Account > Usage Location** field was a text box instead of a drop-down box (as in the **Azure Properties** page of existing Azure users).

To maintain consistency between Web Interface pages, this is fixed, and the **Create Azure Account > Usage Location** field is now also a drop-down box.

## Known issues

The following is a list of issues, including those attributed to third-party products, known to exist at the time of release.

**Table 6: General known issues**

Known Issue	Issue ID
Activating the EnableAntiForgery key ( <code>&lt;add key="EnableAntiForgery" value="true"/&gt;</code> in web.config) may cause the following error message:	91977

```
Session timeout due to inactivity. Please reload the page to continue.
```

### Workaround

Update the **IgnoreValidation** key in the `<appSettings>` section by adding a property value in lowercase:

1. Open **IIS Manager**.
2. In the left pane, under **Connections**, expand the tree view to **Sites > Default Web Site**.
3. Under **Default Web Site**, click on the Active Roles application (**ARWebAdmin** by default).
4. Double-click **Configuration Editor**.
5. From the **Section** drop-down, select **appSettings**.
6. Find the **IgnoreForValidation** key.
7. Append the comma-separated value to **IgnoreForValidation**, for

Known Issue	Issue ID
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example: `lowercasecontrolname`.

8. In the right pane, under **Actions**, click **Apply**.
9. Recycle the App pool.

**Table 7: Configuration Center known issues**

Known Issue	Issue ID
<p>If you upgrade Active Roles to a newer version, starting the Active Roles Configuration Center to perform the in-place upgrade can fail with the following error messages:</p> <ul style="list-style-type: none"> <li>• Connect failed: The system cannot find the file specified.</li> <li>• Delegate to an instance method cannot have null 'this'.</li> </ul> <p>At the same time, Active Roles logs the following error in the Event Viewer: Critical error occurred upon starting Active Roles Administration Service. Details: Database &lt;active-roles-database&gt; on SQL Server &lt;sql-server-name&gt; is unavailable.</p> <p>This issue occurs if the SQL Server used by Active Roles is not already running when attempting to start the Active Roles Configuration Center after a restart to perform the upgrade process. The issue is more likely to occur if the SQL Server and Active Roles are installed on the same machine.</p> <p><b>Workaround</b></p> <p>To avoid this issue from occurring:</p> <ul style="list-style-type: none"> <li>• Install SQL Server and Active Roles on different machines.</li> <li>• Make sure that the SQL Server installation used by Active Roles is up and running before starting the upgrade process.</li> </ul> <p>If you have your SQL Server and Active Roles installed on the same machine, and the error occurs, then close and reopen the Active Roles Configuration Center after the SQL Server started running.</p>	448694
<p>When configured for Groups and Contacts, the <b>Office 365 and Azure Tenant Selection</b> policy displays additional tabs.</p>	229031
<p>Tenant selection supports selecting only a single tenant.</p>	229030
<p>In the <b>Starling Connect Connection Settings</b> link, clicking <b>Next</b> displays progress, but the functionality is not affected, so the button is not required.</p>	126892

**Table 8: Console (MMC Interface) known issues**

Known Issue	Issue ID
<p>The format of the <code>edsaAzureSubscribedSKUs</code> attribute for hybrid Active Directory users has changed between Active Roles 7.6 and 8.0. As a result of this change, from Active Roles 8.1, in the Active Roles Console, you cannot modify this attribute to assign licenses to hybrid AD users.</p> <p><b>Workaround</b></p> <p><i>To automate assigning licenses to hybrid AD users using a workflow</i></p> <ol style="list-style-type: none"> <li>1. Create a new, example hybrid user for the purpose of copying its <code>edsaAzureSubscribedSKUs</code> attribute, with the license(s) that you need.</li> <li>2. Copy the value of this <code>edsaAzureSubscribedSKUs</code> attribute.</li> <li>3. To automate assigning licenses to hybrid users using a workflow, in that workflow, paste this previously copied value as the <code>edsaAzureSubscribedSKUs</code> attribute.</li> </ol> <p>For more information, see <i>Workflows</i> in the <i>Active Roles Administration Guide</i>.</p>	440896
<p>If you configure a Managed Unit with an <b>Include by Query</b> rule, the following condition operators cannot query Azure objects due to Graph API limitations:</p> <ul style="list-style-type: none"> <li>• <b>Contains</b></li> <li>• <b>Present</b></li> </ul> <p>In addition, the <b>Ends with</b> condition returns results only if you specify whole words. The only exceptions to this behavior are the <b>mail</b>, <b>otherMails</b>, <b>userPrincipalName</b> and <b>proxyAddresses</b> attributes, where <b>Ends with</b> can properly query the values that end with your specified string.</p> <p>For more information, see <a href="#">Support for filter by properties of Microsoft Entra ID (directory) objects</a> in the <i>Microsoft Graph documentation</i>.</p>	420917
<p>Azure objects cannot be deleted.</p> <p><b>Workaround</b></p> <p>In the Delete Access Templates, grant the user Read right on the <code>ObjectClass</code> property.</p>	392597
<p>Automation workflows with the Microsoft 365 script fail, if multiple workflows share the same script and the script is scheduled to execute at the same time.</p> <p><b>Workaround</b></p> <p>One Identity recommends scheduling the workflows with different scripts or at a different time.</p>	200328
<p>When a workflow is copied from a built-in workflow, it may not run as expected.</p>	153539

Known Issue	Issue ID
Azure Group Properties are not available if they are added to the Microsoft 365 Portal or Hybrid Exchange Properties from the forwarding address attribute of Exchange online users.	98186
In Active Roles with the <b>Office 365 Licenses Retention</b> policy applied, after deprovisioning the Azure AD user, the Deprovisioning Results for the <b>Office 365 Licenses Retention</b> policy are not displayed in the same window.	91901
<b>Workaround</b>	
To view the deprovisioning results of an Azure AD user:	
<ul style="list-style-type: none"> <li>• In the Active Roles Console, right-click and select <b>Deprovisioning Results</b>.</li> <li>• In the right pane of the Active Roles Web Interface, click <b>Deprovisioning Results</b>.</li> <li>• To refresh the form, press <b>F5</b>.</li> </ul>	

**Table 9: Installer known issues**

Known Issue	Issue ID
After upgrading Active Roles, the pending approval tasks are not displayed in the Active Roles Web Interface.	91933

**Table 10: Language Pack known issues**

Known Issue	Issue ID
In the Active Roles Configuration Center, changing the language in <b>Global settings</b> does not work properly.	125880
<b>Workaround</b>	
To change the language of the Web Interface, configure the language with the <b>Active Roles 8.1.5 &gt; Settings &gt; User interface language</b> option of the Web Interface.	
In the Active Roles Console, the <b>O365 script execution configuration</b> activity of the Workflow Designer is not completely localized to German.	151392
In the Active Roles Console, the German localization may contain visual issues and truncated texts.	91946
In the Active Roles Console, some strings are displayed in English instead of German in the German localization.	91942
In the Active Roles Synchronization Service, the <b>Event Viewer</b> messages are not translated to German.	91753

Known Issue	Issue ID
In the Active Roles Synchronization Service, the German localization does not have all connector strings translated.	91709
In the Active Roles Web Interface, some Azure-related strings are translated incorrectly for the supported languages. Translated texts may also contain link inconsistencies.	257995
In Active Roles, several German localization issues are present.	164713
In Active Roles, strings on the notification page are not localized.	153695
In the Language Pack installer, the link of the online EULA agreement in the EULA text does not work.	91925

**Table 11: Synchronization Service known issues**

Known Issue	Issue ID
<p>In the Synchronization Service, the following attributes of the <b>Microsoft Azure AD Connector</b> are currently not supported and cannot be queried via the Microsoft Graph API:</p> <ul style="list-style-type: none"> <li>• <b>user</b> attributes: <ul style="list-style-type: none"> <li>• aboutMe</li> <li>• birthday</li> <li>• contacts</li> <li>• hireDate</li> <li>• interests</li> <li>• mySite</li> <li>• officeLocation</li> <li>• pastProjects</li> <li>• preferredName</li> <li>• responsibilities</li> <li>• schools</li> <li>• skills</li> </ul> </li> <li>• <b>group</b> attributes: <ul style="list-style-type: none"> <li>• acceptedSenders</li> <li>• allowExternalSenders</li> <li>• autoSubscribeNewMembers</li> <li>• hasMembersWithLicenseErrors</li> </ul> </li> </ul>	304074

Known Issue	Issue ID
<ul style="list-style-type: none"> <li>hideFromAddressLists</li> <li>hideFromOutlookClients</li> <li>isSubscribedByMail</li> <li>membersWithLicenseErrors</li> <li>rejectedSenders</li> <li>unseenCount</li> </ul> <p>This means that although these attributes are visible, they cannot be set in a mapping rule.</p>	
After running the <code>get-qcworkflowstatus</code> cmdlet in the Synchronization Service, the workflow status is not accurate.	125768

**Table 12: Web Interface known issues**

Known Issue	Issue ID
<p>If using Active Roles in a hybrid environment, the <b>Search</b> menu may return less results than the <b>Quick Search</b> bar in the Web Interface header, because the <b>Search</b> menu does not list cloud objects.</p> <p><b>Workaround</b></p> <p>To get accurate and complete search results in a hybrid environment, use the <b>Quick Search</b> bar in the Web Interface header instead of the <b>Search</b> menu.</p>	440220
<p>Using a personal view to open an Active Directory (AD) Organizational Unit (OU) whose name contains the &lt; special character results in the following error:</p> <div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p>An error occurred during the last operation.  Error: A potentially dangerous Request.Query.String was detected from the client (DN="OU\&lt;name-property&gt;").</p> </div> <p>The issue is caused by the special character in the request URL of the Web Interface, causing failures in the web functionality of Active Roles.</p> <p><b>Workaround</b></p> <p>One Identity recommends avoiding the use of the &lt; character in the name property of an AD object.</p>	415590
<p>When attempting to modify or delete Azure users, contacts, or groups synchronized from an on-premises Active Directory to an Azure Active Directory, the operation either appears to be successful, but silently fails, or the operation fails with a generic error message.</p> <p>If the operation appears to be successful, the following message appears:</p>	388062, 388063

Known Issue	Issue ID
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The operation is successfully completed.

However, the operation silently fails, no error message appears, and the Azure user, contact or group is not deleted or modified.

If the operation fails, the following generic error message appears instead of a specific error message:

An error occurred during the last operation.

**NOTE:** Similar failures with either no error message or a generic error message may occur due to an architectural issue in the Active Roles Web Interface.

If you click <b>Azure &gt; Resource Mailboxes</b> to query room mailboxes after being idle for approximately 15-20 minutes, the Active Roles Web Interface will not list any room mailboxes.	293380
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**Workaround**

Restart the Administration Service.

In the Active Roles Web Interface, Azure roles are not restored automatically after performing an <b>Undo Deprovision</b> action on a user.	172655
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**Workaround**

After the **Undo Deprovision** action is completed, assign the Azure roles to the user manually.

Active Roles does not support creating Azure groups for existing groups.	117015
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Active Roles Web Interface does not support setting the <b>Exchange Online Property</b> of the <b>ProhibitSendQuota</b> value in <b>Storage Quotas</b> .	91905
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**Table 13: Add-on Manager known issues**

Known Issue	Defect ID
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After installing an add-on that creates Web Interface customization items, the Web Interface may not display the customization items created by the add-on.	179835
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**Workaround**

In the Web Interface, click **Reload**.

After installing an add-on that creates a virtual attribute, the virtual attribute may not appear in the <b>Advanced Properties</b> dialog of the affected object.	180508
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**Workaround**

After installing the add-on, reconnect to the Administration Service.

## Known Issue

## Defect ID

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After installing an add-on that creates a virtual attribute and a Web Interface customization item using that virtual attribute, an error may occur when opening any Web Interface site. 180524

### Workaround

Restart Internet Information Services (IIS) on the web server running the Web Interface (for example, by running the `iisreset` command in the Windows command prompt).

If there is a replication group in your Active Roles environment, do the following:

1. After the changes are propagated to all replication partners, click **Reload** in the Web Interface.
2. If the Web Interface does not open, enter the following in the address bar of your browser to reload the Web Interface:  
`<site url>/customization/metadata-Reload.aspx?ReloadFromWorkingCopy=1`
3. After the changes are propagated to all replication partners, restart Internet Information Services (IIS) on the web server running the Web Interface (for example, by running the `iisreset` command in the Windows command prompt).

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When you use Add-on Manager to uninstall an add-on, the following error may occur: 180700

```
Object 'objectDN' was not found.
```

This error can occur if the add-on modifies an existing object during installation, and then the modified object is deleted by a user after the add-on has been installed.

### Workaround

Uninstall the add-on from the command line using the `/ForceUninstall` parameter. For example:

```
AddOnManager.exe /UninstallAddon /AddonName:"my-addon" /ForceUninstall /Service:"servicename" /User:"domain\user" /Password:"password"
```

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After uninstalling an add-on that creates a virtual attribute and a Web Interface customization item that uses that virtual attribute, the Web Interface customization item created by the add-on may not be removed, and the Web Interface may return the following error: 180721

```
An error occurred during the last operation.
```

---

**Workaround**

Perform the following steps:

1. In the Web Interface, click the **Reload** command.

If the Web Interface does not open, reload the Web Interface by entering the following URL in the address bar of your browser:

```
<site url>/customization/metadata-  
Reload.aspx?ReloadFromWorkingCopy=1
```

**NOTE:** If there is a replication group in your Active Roles environment, reload the Web Interface only after the changes are propagated to all replication partners.

2. Restart Internet Information Services (IIS) on the web server running the Web Interface (for example, by running the `iisreset` command in the Windows command prompt).

**NOTE:** If there is a replication group in your Active Roles environment, restart IIS only after the changes are propagated to all replication partners.

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After installing an add-on that creates Web Interface customization items, the Web Interface customization items created by the add-on may not be displayed. 180808

This issue may occur if you provide incorrect user name and password for reloading Web Interface sites.

**Workaround**

In the Web Interface, click the **Reload** command.

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When you install Add-on Manager from the command-line, you may encounter the following error: 183252

```
Command line option syntax error. Type Command /? for Help.
```

This error may occur if one or several parameters of the command contain more than 255 characters.

**Workaround**

Edit the command-line parameters (for example, the path to a file) so that each parameter is not longer than 255 characters.

# System requirements

Before installing Active Roles 8.1.5 in an on-premises environment, ensure that your system meets the following minimum hardware and software requirements.

**NOTE:** When setting up a virtual environment, carefully consider the configuration aspects such as CPU, memory availability, I/O subsystem, and network infrastructure to ensure the virtual layer has the necessary resources available. For more information about environment virtualization, see [One Identity's Product Support Policies](#).

To authenticate and communicate with Azure, the Active Roles Service must have access to the following Microsoft endpoints:

- <https://login.microsoftonline.com/>
- <https://developer.microsoft.com/graph>
- <https://graph.windows.net/>

To manage Azure Active Directory resources, you must install the following prerequisites in the Active Roles Configuration Center.

**TIP:** To run the PowerShell commands of the following modules, use the 64-bit version of Windows PowerShell.

Requirement	Version	Details
NuGet package provider	Minimum: 2.8.5.201  Maximum: 3.0.0.1	You must install the NuGet package provider on the computer(s) running Active Roles Administration Service.  For installation instructions, see <a href="#">Install-PackageProvider</a> in the <i>Microsoft Package Management documentation</i> .
Exchange Online PowerShell V3 module	Minimum: 3.0.0  Maximum: 3.1.0	You must install the Exchange Online PowerShell module on the computer(s) running Active Roles Administration Service.  For installation instructions, see <a href="#">About the Exchange Online PowerShell module</a> in the <i>Microsoft Exchange PowerShell documentation</i> .
Az.Accounts PowerShell module	Maximum: 2.10.3	You must install the Az.Accounts PowerShell module on the computer(s) running Active Roles Administration Service and Active Roles Synchronization Service.  For installation instructions, see <a href="#">Az.Accounts</a> in the <i>Microsoft PowerShell Gallery</i> .
Az.Resources PowerShell module	Maximum: 6.4.1	You must install the Az.Resources PowerShell module on the computer(s) running Active Roles Administration Service.  For installation instructions, see <a href="#">Az.Resources</a> in the

Requirement	Version	Details
		<i>Microsoft PowerShell Gallery.</i>
Microsoft Graph PowerShell module	Maximum: 1.17.0	You must install the Microsoft Graph PowerShell module on the computer(s) running Active Roles Administration Service. For installation instructions, see <a href="#">Microsoft Graph</a> in the <i>Microsoft PowerShell Gallery</i> .
Microsoft Edge WebView2 Runtime	N/A	You must install <a href="#">Microsoft Edge WebView2 Runtime</a> on the computer running Active Roles Administration Service. For more information, see <a href="#">Introduction to Microsoft Edge WebView2</a> in the <i>Microsoft Edge Developer documentation</i> .
(Optional) One Identity certificate	N/A	If your organization enforces the AllSigned policy, you must install the One Identity certificate during the installation of Active Roles.

**⚠ CAUTION: When importing PowerShell modules with the `$context.0365ImportModules` function, they are imported with the versions specified in the configuration of the Azure-specific prerequisites.**

**However, after importing the specified versions of the required PowerShell modules, running PowerShell cmdlets without passing them as a string to the `$context.0365ImportModules` function can cause inconsistent behavior in Active Roles. This is because if there are multiple versions of the same PowerShell module installed on the computer running the Active Roles server, PowerShell modules containing the script to run can be imported automatically with different versions.**

**To avoid inconsistent behavior in Active Roles by importing different PowerShell versions, run PowerShell modules only by passing them as a string to the `$context.0365ImportModules` function.**

## Hardware requirements

**Table 14: Hardware requirements**

Requirement	Details
Processor <b>NOTE:</b> The number of cores required depends on the size of the environment and the total number of managed objects.	For Administration Service, Web Interface and Synchronization Service, any of the following: <ul style="list-style-type: none"> <li>• Intel 64 (EM64T)</li> <li>• AMD64</li> <li>• Minimum 2 cores</li> <li>• CPU speed: 2.0 GHz or faster</li> </ul>

Requirement	Details
	<p><b>NOTE:</b> For Active Roles Synchronization Service, One Identity recommends using a multi-core CPU for the best performance.</p>
	<p>For Console, SPML Provider and Management Tools, any of the following:</p> <ul style="list-style-type: none"> <li>• Intel x86</li> <li>• Intel 64 (EM64T)</li> <li>• AMD64</li> <li>• CPU speed: 1.0 GHz or faster.</li> </ul>
<p>Memory</p> <p><b>NOTE:</b> The amount of RAM required depends on the size of the environment and the total number of managed objects.</p>	<p>Administration Service: A minimum of 4 GB of RAM.</p> <p>Web Interface, Synchronization Service: A minimum of 2 GB of RAM.</p> <p>Console, SPML Provider and Management Tools: A minimum of 1 GB of RAM.</p>
<p>Hard disk space</p>	<p>Administration Service, Web Interface, Console, SPML Provider and Management Tools: A minimum of 100 MB of free disk space.</p> <p>Synchronization Service: A minimum of 250 MB of free disk space.</p> <p><b>NOTE:</b> If SQL Server and Synchronization Service are installed on the same computer, the amount required depends on the size of the Synchronization Service database.</p>
<p>Operating system</p>	<p>You can install any of the Active Roles components on a computer running:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server 2022</li> <li>• Microsoft Windows Server 2019</li> <li>• Microsoft Windows Server 2016</li> </ul> <p>Active Roles supports the Standard or Datacenter edition of these operating systems.</p> <p>In addition, you can install the Active Roles Console and Management Tools on a computer running:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows 10, Professional or Enterprise edition, 32-bit (x86) or 64-bit (x64).</li> </ul>

Requirement	Details
	<ul style="list-style-type: none"> <li>Microsoft Windows 8.1, Professional or Enterprise edition, 32-bit (x86) or 64-bit (x64).</li> </ul>

## Component requirements

**⚠ CAUTION:** To avoid inconsistent behavior in Active Roles when managing Azure Active Directory resources, you must enable Transport Layer Security (TLS) protocol version 1.2. For more information, see [TLS 1.2 enforcement for Azure AD Connect](#) in the *Microsoft Azure documentation*.

All Active Roles components require:

- Microsoft .NET Framework 4.8. For more information, see [Installing .NET Framework for developers](#) in the *Microsoft .NET documentation*.
- Visual C++ 2017 Redistributable.

**Table 15: Administration Service requirements**

Requirement	Details
SQL Server	<p>You can host the Active Roles database on the following SQL Server versions:</p> <ul style="list-style-type: none"> <li>Microsoft SQL Server 2022, any edition.</li> <li>Microsoft SQL Server 2019, any edition.</li> <li>Microsoft SQL Server 2017, any edition.</li> <li>Microsoft SQL Server 2016, any edition.</li> <li>Microsoft SQL Server 2014, any edition, 32-bit (x86) or 64-bit (x64), with or without any Service Pack.</li> <li>Azure SQL hosted databases.</li> <li>Azure SQL hosted databases.</li> </ul> <p>To connect Active Roles to a Microsoft SQL Server deployment, install Microsoft OLE DB Driver for SQL Server (MSOLEDBSQL).</p>
Windows Management Framework	Windows Management Framework 5.1 ( <a href="#">available for download</a> ) is required on all supported operating systems.
Operating system on domain controllers	<p>The product retains all of its features and functions when managing Active Directory on domain controllers running any of these operating systems, any edition, with or without any Service Packs:</p> <ul style="list-style-type: none"> <li>Microsoft Windows Server 2022</li> </ul>

Requirement	Details
	<ul style="list-style-type: none"> <li>• Microsoft Windows Server 2019</li> <li>• Microsoft Windows Server 2016</li> </ul> <p><b>NOTE:</b> The supported domain functional level is Windows Server 2008 R2 or higher.</p>
Exchange Server	<p>Active Roles is capable of managing Exchange recipients on:</p> <ul style="list-style-type: none"> <li>• Microsoft Exchange Server 2019</li> <li>• Microsoft Exchange Server 2016</li> </ul>

**Table 16: Web Interface requirements**

Requirement	Details
Internet Services	<p>Active Roles Web Interface requires the Web Server (IIS) server role with the following role services:</p> <ul style="list-style-type: none"> <li>• Web Server/Common HTTP Features/ <ul style="list-style-type: none"> <li>• Default Document</li> <li>• HTTP Errors</li> <li>• Static Content</li> <li>• HTTP Redirection</li> </ul> </li> <li>• Web Server/Security/ <ul style="list-style-type: none"> <li>• Request Filtering</li> <li>• Basic Authentication</li> <li>• Windows Authentication</li> </ul> </li> <li>• Web Server/Application Development/ <ul style="list-style-type: none"> <li>• .NET Extensibility</li> <li>• ASP</li> <li>• ASP.NET</li> <li>• ISAPI Extensions</li> <li>• ISAPI Filters</li> </ul> </li> <li>• Management Tools/IIS 6 Management Compatibility/ <ul style="list-style-type: none"> <li>• IIS 6 Metabase Compatibility</li> </ul> </li> </ul>
Feature delegation	<p>Internet Information Services (IIS) must provide <b>Read/Write</b> delegation for the following features:</p> <ul style="list-style-type: none"> <li>• Handler Mappings</li> <li>• Modules</li> </ul>

Requirement	Details
	To confirm that these features have the <b>Read/Write</b> delegation configured, use the <b>Feature Delegation</b> option of the native Internet Information Services (IIS) Manager tool of the operating system.
.NET Trust Levels	<p>The .NET Trust Level must be set to <b>Full (internal)</b> on every computer where the Web Interface component is installed.</p> <p>To configure this setting:</p> <ol style="list-style-type: none"> <li>1. In the system-provided Internet Information Services (IIS) Manager tool, under <b>Connections</b>, expand the node of the computer, and navigate to <b>Sites &gt; Default Web Site</b>.</li> <li>2. On the <b>Default Web Site Home</b> page, double-click <b>.NET Trust Levels</b>.</li> <li>3. Under <b>Trust level</b>, select <b>Full (internal)</b>.</li> </ol> <p><b>NOTE:</b> Setting the .NET Trust Level to any other value will result in a failure when attempting to load any of the configured Active Roles Web Interface sites.</p>
Web browser	<p>You can access Active Roles Web Interface using:</p> <ul style="list-style-type: none"> <li>• Mozilla Firefox 36 (or newer) on Windows.</li> <li>• Google Chrome 61 (or newer) on Windows.</li> <li>• Microsoft Edge 79 (or newer), based on Chromium on Windows 10.</li> </ul> <p>You can use a later version of Firefox and Google Chrome to access Active Roles Web Interface. However, the Active Roles Web Interface was tested only with the browser versions listed above.</p>
Minimum screen resolution	<p>Active Roles Web Interface is optimized for screen resolutions of 1280x800 or higher.</p> <p>The minimum supported screen resolution is 1024x768.</p>

**Table 17: Console requirements**

Requirement	Details
Web browser	Active Roles Console requires Microsoft Edge 79 (or newer), based on Chromium.

**Table 18: Management Tools requirements**

Requirement	Details
Windows Management Framework	Windows Management Framework 5.1 ( <a href="#">available for download</a> ) is required on all supported operating systems.

Requirement	Details
Remote Server Administration Tools (RSAT)	<p>To manage Terminal Services user properties by using Active Roles Management Shell, Active Roles Management Tools requires Remote Server Administration Tools (RSAT) for Active Directory.</p> <p>For more information on installing the RSAT version applicable to your operating system, see <a href="#">Remote Server Administration Tools (RSAT) for Windows</a> in the <i>Microsoft Windows Server documentation</i>.</p>

**Table 19: Synchronization Service requirements**

Requirement	Details
Operating system on domain controllers	<p>The product retains all of its features and functions when managing Active Directory on domain controllers running any of these operating systems, any edition, with or without any Service Packs:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server 2022</li> <li>• Microsoft Windows Server 2019</li> <li>• Microsoft Windows Server 2016</li> </ul> <p><b>NOTE:</b> The supported domain functional level is Windows Server 2008 R2 or higher.</p>
SQL Server	<p>You can host the Active Roles Synchronization Service database on:</p> <ul style="list-style-type: none"> <li>• Microsoft SQL Server 2022, any edition.</li> <li>• Microsoft SQL Server 2019, any edition.</li> <li>• Microsoft SQL Server 2017, any edition.</li> <li>• Microsoft SQL Server 2016, any edition.</li> <li>• Microsoft SQL Server 2014, any edition, 32-bit (x86) or 64-bit (x64), with or without any Service Pack.</li> <li>• Azure SQL hosted databases.</li> </ul>
Windows Management Framework	<p>Windows Management Framework 5.1 (<a href="#">available for download</a>) is required on all supported operating systems.</p>
Supported connections	<p>Active Roles Synchronization Service can connect to the following data systems:</p> <ul style="list-style-type: none"> <li>• Data sources accessible via an OLE DB provider.</li> <li>• Delimited text files.</li> <li>• IBM AS/400, IBM Db2, and IBM RACF systems.</li> <li>• LDAP directory service.</li> <li>• Micro Focus NetIQ Directory systems.</li> <li>• The following Microsoft services and resources:</li> </ul>

Requirement	Details
	<ul style="list-style-type: none"> <li>Active Directory Domain Services (AD DS) with the domain or forest functional level of Windows Server 2016 or higher.</li> <li>Active Directory Lightweight Directory Services (AD LDS) running on any Windows Server operating system supported by Microsoft.</li> <li>Azure Active Directory (Azure AD) using Microsoft Graph API version 1.0.</li> <li>Exchange Online services.</li> <li>Exchange Server with the following versions:               <ul style="list-style-type: none"> <li>Microsoft Exchange Server 2019</li> <li>Microsoft Exchange Server 2016</li> </ul> </li> <li>Lync Server version 2013 with limited support.</li> <li>SharePoint 2019, 2016, or 2013.</li> <li>SharePoint Online service.</li> <li>Skype for Business 2019, 2016 or 2015.</li> <li>Skype for Business Online service.</li> <li>SQL Server, any version supported by Microsoft.</li> <li>One Identity Active Roles version 7.4.3, 7.4.1, 7.3, 7.2, 7.1, 7.0, and 6.9.</li> <li>One Identity Manager version 8.0 and 7.0 (D1IM 7.0).</li> <li>OpenLDAP directory service.</li> <li>Oracle Database, Oracle Database User Accounts, and Oracle Unified Directory data systems.</li> <li>MySQL databases.</li> <li>Salesforce systems.</li> <li>SCIM-based data systems.</li> <li>ServiceNow systems.</li> </ul>
Legacy Active Roles ADSI Provider	To connect to Active Roles version 6.9, install the Active Roles ADSI Provider. For more information, see <i>Installing additional components</i> in the <i>Active Roles Quick Start Guide</i> .
One Identity Manager API	To connect to One Identity Manager 7.0, install One Identity Manager Connector on the computer running Active Roles Synchronization Service. This connector works with the RESTful web service and no SDK installation is required.
Internet connection	To connect to cloud directories or online services, the machine running Active Roles Synchronization Service must have a stable Internet connection.

**Table 20: Synchronization Service Capture Agent requirements**

Requirement	Details
Operating system	<p>The DCs on which you install Active Roles Synchronization Service Capture Agent must run one of the following operating systems with or without any Service Pack:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server 2022</li> <li>• Microsoft Windows Server 2019</li> <li>• Microsoft Windows Server 2016</li> </ul> <p>For more information, see the <i>Active Roles Synchronization Service Administration Guide</i>.</p>

**Table 21: Language Pack requirements**

Requirement	Details
Active Roles version	<p>The Active Roles 8.1.5 Language Pack requires Active Roles version 8.1.5 of the Administration Service, Configuration Center, Console, Synchronization Service or the Web Interface installed on the target machine.</p> <p>The Active Roles 8.1.5 Language Pack will not work properly with earlier versions of Active Roles.</p>
Operating system	You can install the Active Roles Language Pack on 64-bit operating systems only.

**Table 22: Add-on Manager requirements**

Requirement	Details
Processor	<p>Any of the following:</p> <ul style="list-style-type: none"> <li>• Intel 64 (EM64T)</li> <li>• AMD64</li> <li>• CPU speed: 1.0 GHz or faster</li> </ul>
Memory	A minimum of 1 GB of RAM.
Hard Disk Space	A minimum of 100 MB of free disk space.
Operating System	<p>Any of the following Windows Server operating systems:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server 2022</li> <li>• Microsoft Windows Server 2019</li> <li>• Microsoft Windows Server 2016</li> </ul> <p>In addition, you can also install Add-on Manager on a computer running:</p>

Requirement	Details
	<ul style="list-style-type: none"> <li>Microsoft Windows 10, Professional or Enterprise edition, 64-bit (x64)</li> </ul>
Active Roles Console	Add-on Manager requires Active Roles 8.1.5 Console installed.
Microsoft Windows PowerShell	Windows PowerShell 5.1 or later
Web Browser	Microsoft Edge 79 or newer (based on Chromium)

**Table 23: Diagnostic Tools requirements**

Requirement	Details
Processor	1.0 GHz or faster 32-bit (x86) or 64-bit (x64) CPU.
Memory	A minimum of 1 GB of RAM. <b>NOTE:</b> The amount of RAM required depends on the size of the log file opened with the Log Viewer tool.
Hard disk space	A minimum of 10 MB of free disk space.
Operating system	Any of the following Windows Server operating systems: <ul style="list-style-type: none"> <li>Microsoft Windows Server 2022</li> <li>Microsoft Windows Server 2019</li> <li>Microsoft Windows Server 2016</li> </ul>

**Table 24: Data Collector and Reporting Pack requirements**

Requirement	Details
Processor	Any of the following: <ul style="list-style-type: none"> <li>Intel x86</li> <li>Intel 64 (EM64T)</li> <li>AMD64</li> <li>CPU speed: 2.0 GHz or faster.</li> </ul>
Memory	A minimum of 2 GB of RAM.
Hard disk space	<ul style="list-style-type: none"> <li>12 MB for the Data Collector and Reporting Pack.</li> </ul>

Requirement	Details
	<ul style="list-style-type: none"> <li>• 10 GB for the SQL Server Reporting Services.</li> </ul>
Operating system	<p>Any of the following Windows Server operating systems:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server 2022</li> <li>• Microsoft Windows Server 2019</li> <li>• Microsoft Windows Server 2016</li> </ul>
SQL Server and SQL Server Reporting Services	<p>You can host the Active Roles Data Collector and Reporting Pack on the following SQL Server versions:</p> <ul style="list-style-type: none"> <li>• Microsoft SQL Server 2022, any edition.</li> <li>• Microsoft SQL Server 2019, any edition.</li> <li>• Microsoft SQL Server 2017, any edition.</li> <li>• Microsoft SQL Server 2016, any edition.</li> <li>• Microsoft SQL Server 2014, any edition, 32-bit (x86) or 64-bit (x64), with or without any Service Pack.</li> <li>• Azure SQL hosted databases.</li> <li>• Azure SQL hosted databases.</li> </ul> <p>To connect Active Roles to a Microsoft SQL Server deployment, install Microsoft OLE DB Driver for SQL Server (MSOLEDBSQL).</p>
Active Roles ADSI Provider	Active Roles 8.1.5 Management Tools must be installed.

## Deployment requirements for AWS Managed Microsoft AD

Before deploying Active Roles 8.1.5 in Amazon Web Services (AWS) to manage AWS Managed Microsoft AD via AWS Directory Service, ensure that the following prerequisites are met.

### Connectivity requirements

You must have:

- Stable network connectivity to Amazon Web Services (AWS).
- Port **1433** open and available for the Amazon Relational Database Service (RDS) service.
- Access to the AWS service with the **AWSAdministratorAccess** permission.

**NOTE:** Make sure that you have **AWSAdministratorAccess** permission, as it is required for certain configuration steps. The **AWSPowerUserAccess** permission is not sufficient for completing the entire configuration procedure.

## Infrastructure requirements

To deploy and configure Active Roles for AWS Managed Microsoft AD, you must have access to the following AWS services and resources:

- AWS Managed Microsoft AD deployed via AWS Directory Service.
- One or more Amazon Elastic Compute Cloud (EC2) instance(s) hosting the Active Roles services and components.

The EC2 instance(s) must have, at minimum:

- 2 vCPUs running at 2.0 GHz.
- 4 GB of RAM.

**TIP:** One Identity recommends hosting the main Active Roles services and components (the Active Roles Service and Console, and the Active Roles Web Interface) on separate EC2 instances. If you deploy all Active Roles services and components in a single EC2 instance, use a more powerful instance to ensure a better user experience for the product.

**NOTE:** AWS Managed Microsoft AD support was tested with a single **t2.large** EC2 instance.

- An Amazon Relational Database Service for SQL Server (RDS for SQL Server).

**NOTE:** AWS Managed Microsoft AD support was tested with an RDS instance running the latest version of Microsoft SQL Server.

Make sure that all these components are discoverable or visible to each other.

## Product licensing

Use of this software is governed by the Software Transaction Agreement found at <https://www.oneidentity.com/legal/sta.aspx>. This software does not require an activation or license key to operate.

## Upgrade and installation instructions

This section contains information about the upgrade and installation changes affecting Active Roles 8.1.5.

**NOTE:** You must run the Active Roles installer with administrator privileges.

## Supported Active Roles upgrade paths

You can upgrade the following versions of Active Roles to Active Roles 8.1.5:

- Active Roles 7.5
- Active Roles 7.5.3
- Active Roles 7.5.4
- Active Roles 7.6.1
- Active Roles 7.6.2
- Active Roles 7.6.3
- Active Roles 8.0 LTS
- Active Roles 8.0.1 LTS
- Active Roles 8.1.1
- Active Roles 8.1.2
- Active Roles 8.1.3
- Active Roles 8.1.3 SP1
- For instructions on how to upgrade from an earlier version of Active Roles, see the *Active Roles Quick Start Guide*.
- For instructions on how to install the Active Roles Language Pack, see *Active Roles Language Pack* in the *Active Roles Administration Guide*.
- For special considerations regarding the installation of Active Roles 8.1.5, see the following information.

**NOTE:** Consider the following before upgrading to a new version of Active Roles:

- Components of an earlier Active Roles version may not work with the components of the new version you are upgrading to.
- Custom solutions (scripts or other modifications) that rely on Active Roles features may fail to work after an upgrade due to compatibility issues. Therefore, before starting the upgrade, test your existing solutions with the new version of Active Roles in a lab environment to verify that your custom solutions will continue to work.

**TIP:** When upgrading to a new Active Roles version, One Identity recommends upgrading the Active Roles Administration Service first, and the client components (Active Roles Console and Active Roles Web Interface) afterwards.

## Changes related to Azure tenants

**NOTE:** If your organization has any Azure tenants that are managed with Active Roles, you need to reauthenticate and reauthorize them after installing Active Roles 8.1.5. Otherwise, Active Roles will not receive the required permissions for managing existing Azure tenants, and tenant administration in Active Roles 8.1.5 will not work correctly. For more information, see *Reconfiguring Azure tenants during upgrade configuration* in the

## Upgrade information related to Active Roles Synchronization Service

**NOTE:** Active Roles 7.5 introduced support for Modern Authentication in the Azure BackSync workflows of the Active Roles Synchronization Service. After upgrading to Active Roles 8.1.5 from an earlier version, if you previously had an Azure BackSync workflow configured, you will be prompted to reconfigure it in the Active Roles Synchronization Service Console.

**⚠ CAUTION:** If you previously had an Azure BackSync workflow configured in Active Roles Synchronization Service, and you use more than one Azure Active Directory (Azure AD) service in your deployment, you must specify the Azure AD for which you want to configure Azure BackSync. Failure to do so may either result in directory objects not synchronized at all, or synchronized to unintended locations.

For more information on how to specify the Azure AD used for back-synchronization, see *Configuring automatic Azure BackSync in the Active Roles Synchronization Service Administration Guide*.

If you have sync workflows configured and run by Quick Connect (the predecessor of Synchronization Service), or earlier versions of Active Roles Synchronization Service, then you can transfer those sync workflows to the current version of Active Roles Synchronization Service.

You can transfer sync workflows from the following Quick Connect or Active Roles Synchronization Service versions:

- Quick Connect for Active Directory 6.1
- Quick Connect for AS400 1.4
- Quick Connect for Base Systems 2.4
- Quick Connect for Cloud Services 3.7
- Quick Connect for RACF 1.3
- Quick Connect Sync Engine 5.5 and 6.1
- Synchronization Service 7.5 and later

For more information, see *Transferring sync workflows from Quick Connect* in the *Active Roles Synchronization Service Administration Guide*.

## Rolling back the 8.1.5 installation

Active Roles 8.1.5 is delivered as a full Active Roles product installation instead of a patch or hotfix. Because of this, if you upgraded Active Roles 8.1.3 to 8.1.5, you cannot roll back 8.1.5 to Active Roles 8.1.3.

## More resources

Additional information is available from the following:

- Online product documentation (<https://support.oneidentity.com/active-roles/>)
- Active Roles community (<https://www.oneidentity.com/community/active-roles>)

## Globalization

This section contains information about installing and operating this product in non-English configurations, such as those needed by customers outside of North America. This section does not replace the materials about supported platforms and configurations found elsewhere in the product documentation.

This release is Unicode-enabled and supports any character set. It supports simultaneous operation with multilingual data. This release is targeted to support operations in the following regions: North America, Western Europe and Latin America, Central and Eastern Europe, Far-East Asia, Japan.

## Active Roles Language Pack

Available for download from the [One Identity Support Portal](#), the Active Roles Language Pack provides product localization for Active Roles. To enable localization, install the Language Pack on the machine(s) running the Active Roles Administration Service, Configuration Center, Console, Synchronization Service or Web Interface components.

The Active Roles Language Pack supports the following languages:

- For the Active Roles Administration Service, Configuration Center, Console and Synchronization Service components, the Language Pack provides support for German language.
- For the Active Roles Web Interface component, the Language Pack provides support for the following languages:
  - Chinese (Simplified and Traditional)
  - French
  - German
  - Portuguese (Brazilian and European)
  - Spanish

For more information on the features, limitations and installation steps of the Language Pack, see *Active Roles Language Pack* in the *Active Roles Administration Guide*.

## 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
- Sign up for product notifications
- Download software and technical documentation
- View how-to videos at [www.YouTube.com/OneIdentity](http://www.YouTube.com/OneIdentity)
- Engage in community discussions
- Chat with support engineers online
- View services to assist you with your product

## Third-party contributions

This product contains some third-party components (listed below). Copies of their licenses may be found at referencing <https://www.oneidentity.com/legal/license-agreements.aspx>. Source code for components marked with an asterisk (\*) is available at <http://opensource.quest.com>.

**Table 25: List of Third-Party Contributions**

<b>Component</b>	<b>License or Acknowledgment</b>
Active Directory Authentication Library 5.2.9.0	Copyright (c) Microsoft Corporation. All rights reserved.  Licensed under the MIT license. For the license terms, see: <a href="https://github.com/AzureAD/azure-activedirectory-library-for-dotnet/blob/dev/LICENSE">https://github.com/AzureAD/azure-activedirectory-library-for-dotnet/blob/dev/LICENSE</a>
AngleSharpCss 0.16.4	Licensed under the MIT license. For the license terms, see: <a href="https://www.nuget.org/packages/AngleSharp/0.16.0?_src=template">https://www.nuget.org/packages/AngleSharp/0.16.0?_src=template</a>
Azure.Core 1.25.0	Licensed under the MIT license. For the license terms, see: <a href="https://licenses.nuget.org/MIT">https://licenses.nuget.org/MIT</a>
Azure.Identity 1.6.0	Licensed under the MIT license. For the license terms, see: <a href="https://github.com/Azure/azure-sdk-for-net/blob/Azure.Identity_1.6.0/LICENSE.txt">https://github.com/Azure/azure-sdk-for-net/blob/Azure.Identity_1.6.0/LICENSE.txt</a>
Bootstrap 3.2	Licensed under the MIT license. For the license terms, see: <a href="https://github.com/twbs/bootstrap/blob/v5.3.3/LICENSE">https://github.com/twbs/bootstrap/blob/v5.3.3/LICENSE</a>
BouncyCastle 1.8.9	Licensed under the MIT license. For the license terms, see: <a href="https://www.bouncycastle.org/csharp/licence.html">https://www.bouncycastle.org/csharp/licence.html</a>
HtmlSanitizer 7.1.488	Licensed under the MIT license. For the license terms, see: <a href="https://licenses.nuget.org/MIT">https://licenses.nuget.org/MIT</a>
jquery 3.6.0	Copyright JS Foundation and other contributors, <a href="https://js.foundation/">https://js.foundation/</a>  Licensed under the MIT license. For the license terms, see: <a href="https://jquery.com/license/">https://jquery.com/license/</a>
JQuery UI 1.12.1	Copyright 2007, 2014 jQuery Foundation and other contributors, <a href="https://jquery.org/">https://jquery.org/</a>

Component	License or Acknowledgment
	Licensed under the MIT license. For the license terms, see: <a href="https://licenses.nuget.org/MIT">https://licenses.nuget.org/MIT</a>
MediatR 9.0.0	Copyright © Jimmy Bogard Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
MediatR.Extensions.Microsoft.DependencyInjection 9.0.0	Copyright © Jimmy Bogard Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.AspNet.SignalR.Core 2.4.3	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.AspNetCore 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Bcl.AsyncInterfaces 6.0.0	Copyright © The Microsoft Corporation Licensed under the MIT license. For the license terms, see: <a href="https://github.com/dotnet/runtime?tab=MIT-1-ov-file#readme">https://github.com/dotnet/runtime?tab=MIT-1-ov-file#readme</a>
Microsoft.DotNet.PlatformAbstractions 2.1.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Caching.Abstractions 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Caching.Memory 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license

Component	License or Acknowledgment
Microsoft.Extensions.Configuration 2.2.0	terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Configuration.Abstractions 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Configuration.Binder 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Configuration.CommandLine 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Configuration.EnvironmentVariables 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Configuration.FileExtensions 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Configuration.Json 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.Configuration.UserSecrets 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>

Component	License or Acknowledgment
Microsoft.Extensions.DependencyInjection 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.DependencyInjection.Abstractions 2.2.0	Copyright © The Microsoft Corporation Licensed under Apache 2.0. For the license terms, see: <a href="https://licenses.nuget.org/Apache-2.0">https://licenses.nuget.org/Apache-2.0</a>
Microsoft.Extensions.DependencyModel 2.1.0	Copyright © The Microsoft Corporation Licensed under the MIT license. For the license terms, see: <a href="https://licenses.nuget.org/MIT">https://licenses.nuget.org/MIT</a>
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