

# IDOL Exchange Web Service Connector

Software Version 12.11

## Administration Guide



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# Chapter 1: Introduction

This section provides an overview of the Micro Focus Exchange Web Service Connector.

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## Exchange Web Service Connector

The Exchange Web Service Connector retrieves messages, appointments, contacts, and other items from Microsoft Exchange. The Exchange Web Service Connector uses the Exchange Web Service to retrieve data.

The connector first obtains a list of mailboxes that it can synchronize. If you are connecting to an Exchange Server, the connector can retrieve a list of mailboxes through LDAP. If you are connecting to Exchange Online, you can either provide a list of mailboxes to synchronize, or configure the connector to obtain a list through the Microsoft Graph API.

After it has a list of mailboxes to synchronize, the connector retrieves all the items from each mailbox, and all the items in public folders. You can configure the connector to retrieve items from specific mailboxes or folders. The connector can authenticate with the Exchange Web Service using either basic authentication or OAuth authentication.

The connector can:

- Keep IDOL up-to-date with the information in the Exchange repository. The connector retrieves the information and sends it to Connector Framework Server (CFS), so that it can be enriched and indexed into IDOL.
- Collect documents from the Exchange repository and send them, with metadata, to a specified location such as a shared folder on disk.
- Insert e-mail message (.eml) files into the Exchange repository.
- Delete messages from the Exchange repository.
- Retrieve a document from the repository in its original format.

## Features and Capabilities

The Exchange Web Service Connector retrieves data from a Microsoft Exchange repository.

<b>Repositories</b>	Microsoft Exchange Online. Microsoft Exchange 2019. Microsoft Exchange 2016. Microsoft Exchange 2013. Microsoft Exchange 2010 SP2. Microsoft Exchange 2010 SP1. Microsoft Exchange 2010. Microsoft Exchange 2007 SP1.
<b>Data the connector can retrieve</b>	The connector can retrieve the following items: <ul style="list-style-type: none"> <li>• e-mail messages.</li> <li>• e-mail attachments.</li> <li>• metadata for non-routable message items (tasks, contacts, and appointments).</li> <li>• Skype for Business Online conversations that have been archived to Exchange Online mailboxes.</li> </ul>
<b>Data the connector cannot retrieve</b>	The connector cannot retrieve: <ul style="list-style-type: none"> <li>• files attached to non-routable message items (such as appointments)</li> </ul>

## Supported Actions

The Exchange Web Service Connector supports the following actions:

Action	Supported	Further Information
Synchronize	✓	
Synchronize (identifiers)	✓	
Synchronize Groups	✗	The SynchronizeGroups action is not required because Exchange uses NT/LDAP security. OmniGroupServer can retrieve the group information.
Collect	✓	



Identifiers	✓	
Insert	✓	You can use the insert fetch action to insert e-mail message (.eml) files into the repository. The insert action does not support attachments.  This action is not supported for Exchange Online.
Delete/Remove	✓	You can use the delete fetch action to delete messages from the Exchange repository. You cannot delete folders or mailboxes.  This action is not supported for Exchange Online.
Hold/ReleaseHold	✗	
Update	✓	<a href="#">Update Items in Exchange, on page 59</a>
Stub	✗	
GetURI	✗	
View	✓	

## Mapped Security

You can use *Mapped Security* to protect documents that you retrieve from Exchange using the Exchange Web Service Connector.

The connector can retrieve Access Control Lists that are attached to items in the repository. The connector adds an Access Control List to each document that is indexed into IDOL.

To use mapped security, you must also configure OmniGroupServer to extract LDAP group information from Active Directory.

For information about how to configure Mapped Security, see [Exchange Mapped Security, on page 63](#).

## OEM Certification

Exchange Web Service Connector works in OEM licensed environments.

## Connector Framework Server

Connector Framework Server (CFS) processes the information that is retrieved by connectors, and then indexes the information into IDOL.

A single CFS can process information from any number of connectors. For example, a CFS might process files retrieved by a File System Connector, web pages retrieved by a Web Connector, and e-mail messages retrieved by an Exchange Connector.

To use the Exchange Web Service Connector to index documents into IDOL Server, you must have a CFS. When you install the Exchange Web Service Connector, you can choose to install a CFS or point the connector to an existing CFS.

For information about how to configure and use Connector Framework Server, refer to the *Connector Framework Server Administration Guide*.

## Filter Documents and Extract Subfiles

The documents that are sent by connectors to CFS contain only metadata extracted from the repository, such as the location of a file or record that the connector has retrieved. CFS uses KeyView to extract the file content and file specific metadata from over 1000 different file types, and adds this information to the documents. This allows IDOL to extract meaning from the information contained in the repository, without needing to process the information in its native format.

CFS also uses KeyView to extract and process sub-files. Sub-files are files that are contained within other files. For example, an e-mail message might contain attachments that you want to index, or a Microsoft Word document might contain embedded objects.

## Manipulate and Enrich Documents

CFS provides features to manipulate and enrich documents before they are indexed into IDOL. For example, you can:

- add additional fields to a document.
- divide long documents into multiple sections.
- run tasks including Education, Optical Character Recognition, or Face Recognition, and add the information that is obtained to the document.
- run a custom Lua script to modify a document.

## Index Documents

After CFS finishes processing documents, it automatically indexes them into one or more indexes. CFS can index documents into:

- **IDOL Server** (or send them to a *Distributed Index Handler*, so that they can be distributed across multiple IDOL servers).
- **Vertica**.

## Import Process

This section describes the import process for new files that are added to IDOL through CFS.



1. Connectors aggregate documents from repositories and send the files to CFS. A single CFS can process documents from multiple connectors. For example, CFS might receive HTML files from HTTP Connectors, e-mail messages from Exchange Connector, and database records from ODBC Connector.
2. CFS runs pre-import tasks. Pre-Import tasks occur before document content and file-specific metadata is extracted by KeyView.
3. KeyView filters the document content, and extracts sub-files.
4. CFS runs post-import tasks. Post-Import tasks occur after KeyView has extracted document content and file-specific metadata.
5. The data is indexed into IDOL.

## The IDOL Platform

At the core of Exchange Web Service Connector is the *Intelligent Data Operating Layer (IDOL)*.

IDOL gathers and processes unstructured, semi-structured, and structured information in any format from multiple repositories using IDOL connectors and a global relational index. It can automatically form a contextual understanding of the information in real time, linking disparate data sources together based on the concepts contained within them. For example, IDOL can automatically link concepts contained in an email message to a recorded phone conversation, that can be associated with a stock trade. This information is then imported into a format that is easily searchable, adding

advanced retrieval, collaboration, and personalization to an application that integrates the technology.

For more information on IDOL, see the *IDOL Getting Started Guide*.

## System Architecture

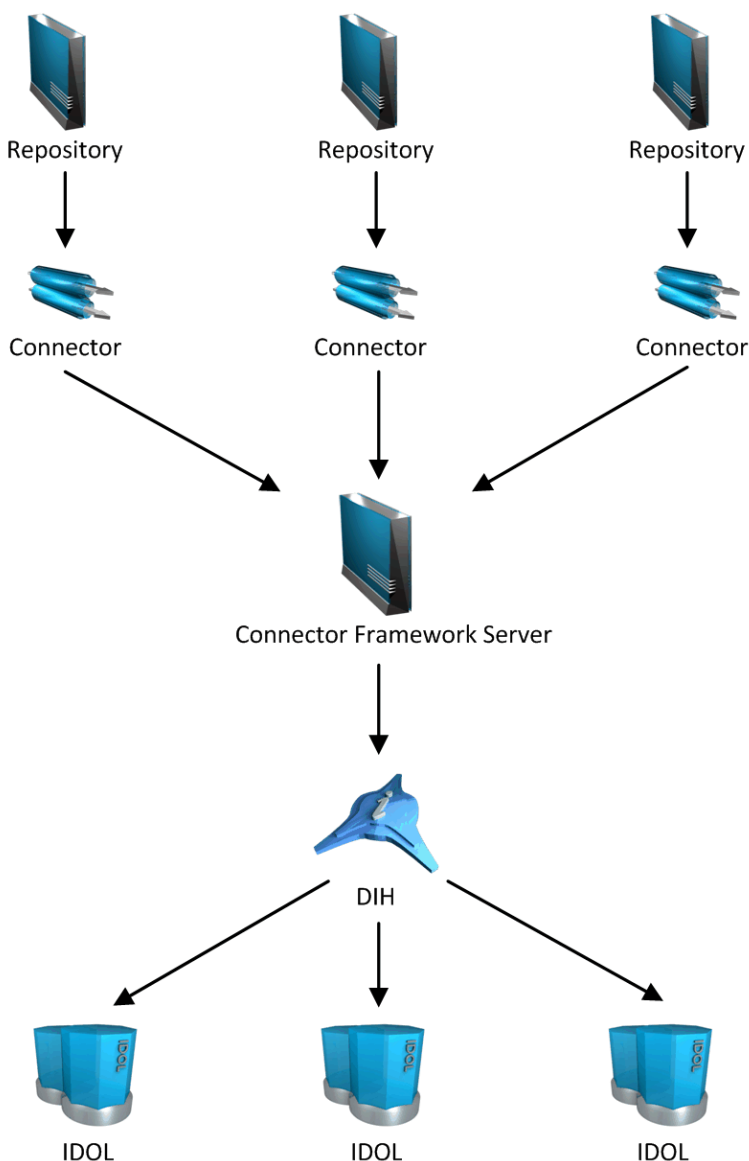
An IDOL infrastructure can include the following components:

- **Connectors.** Connectors aggregate data from repositories and send the data to CFS.
- **Connector Framework Server (CFS).** Connector Framework Server (CFS) processes and enriches the information that is retrieved by connectors.
- **IDOL Server.** IDOL stores and processes the information that is indexed into it by CFS.
- **Distributed Index Handler (DIH).** The Distributed Index Handler distributes data across multiple IDOL servers. Using multiple IDOL servers can increase the availability and scalability of the system.
- **License Server.** The License server licenses multiple products.

These components can be installed in many different configurations. The simplest installation consists of a single connector, a single CFS, and a single IDOL Server.



A more complex configuration might include more than one connector, or use a Distributed Index Handler (DIH) to index content across multiple IDOL Servers.



## Display Online Help

You can display the Exchange Web Service Connector Reference by sending an action from your web browser. The Exchange Web Service Connector Reference describes the actions and configuration parameters that you can use with Exchange Web Service Connector.

For Exchange Web Service Connector to display help, the help data file (he1p.dat) must be available in the installation folder.

## To display help for Exchange Web Service Connector

1. Start Exchange Web Service Connector.
2. Send the following action from your web browser:

```
http://host:port/action=Help
```

where:

*host* is the IP address or name of the machine on which Exchange Web Service Connector is installed.

*port* is the ACI port by which you send actions to Exchange Web Service Connector (set by the Port parameter in the [Server] section of the configuration file).

For example:

```
http://12.3.4.56:9000/action=help
```

## Related Documentation

The following documents provide further information related to Exchange Web Service Connector.

- *IDOL NiFi Ingest Help*

The *IDOL NiFi Ingest Help* describes how to ingest data using IDOL NiFi Ingest, a set of IDOL components for data retrieval and enrichment, that run within an open-source framework called Apache NiFi. NiFi Ingest provides a new way to ingest data into IDOL, and can be used instead of a Connector Framework Server.

- *Connector Framework Server Administration Guide*

Connector Framework Server (CFS) processes documents that are retrieved by connectors. CFS then indexes the documents into an IDOL index. The *Connector Framework Server Administration Guide* describes how to configure and use CFS.

- *IDOL Getting Started Guide*

The *IDOL Getting Started Guide* provides an introduction to IDOL. It describes the system architecture, how to install IDOL components, and introduces indexing and security.

- *IDOL Server Administration Guide*

The *IDOL Server Administration Guide* describes the operations that IDOL server can perform with detailed descriptions of how to set them up.

- *IDOL Document Security Administration Guide*

The *IDOL Document Security Administration Guide* describes how to protect the information that you index into IDOL Server.

- *License Server Administration Guide*

This guide describes how to use a License Server to license multiple services.

# Chapter 2: Install Exchange Web Service Connector

This section describes how to install the Exchange Web Service Connector.

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## System Requirements

Exchange Web Service Connector can be installed as part of a larger system that includes an IDOL Server and an interface for the information stored in IDOL Server. To maximize performance, Micro Focus recommends that you install IDOL Server and the connector on different machines.

For information about the minimum system requirements required to run IDOL components, including Exchange Web Service Connector, refer to the *IDOL Getting Started Guide*.

Additional requirements for Exchange Web Service Connector are:

- Microsoft .NET Framework, version 4.5.
- Exchange Web Services Managed API 2.0 DLL. (This is installed automatically with the connector).

## IDOL Content

The Exchange Web Service Connector produces documents where the document reference (DRREFERENCE) is case-sensitive. Micro Focus recommends that you set `NormalizeReferences=FALSE` in the [Server] section of your IDOL Content component configuration file. Otherwise, if the connector produces documents with the same reference (in different case), IDOL Content de-deduplicates the documents.

## OmniGroupServer

To use Mapped Security for documents extracted from Exchange, you must extract LDAP security group information from Active Directory. You can do this using OmniGroupServer.

## Permissions

To use the synchronize, collect, or view fetch actions, you must grant the following permissions.

### Access to LDAP

To retrieve a list of mailboxes through LDAP, the user that accesses LDAP (specified by the Username or LDAPUsername parameter in the Exchange Web Service Connector configuration file) must have read access to the directory.

### Access to Mailboxes

The user that connects to the Exchange Web Service (specified by the Username or WSUsername parameter in the Exchange Web Service Connector configuration file) requires the following permissions:

- The user must have their own mailbox.
- The user must have permission to read messages from the mailboxes that you want to retrieve. To grant this permission, use one of the following methods:
  - In Exchange, grant the user permission to impersonate other users. Then, in the connector's configuration file, set `ImpersonateMailboxOwner=true` (true is the default value).
  - In Exchange, grant the user "Full Access Permissions" on each mailbox that you want to retrieve. Then, in the connector's configuration file, set `ImpersonateMailboxOwner=false`.
  - In Exchange, grant the user "Reviewer" access to each folder in each mailbox that you want to index. The user must have "Reviewer" access on all folders below the root of the mailbox (or the folder specified by the connector's `BaseMailboxFolder` configuration parameter). If the user does not have access to a mailbox folder, that folder and its contents cannot be indexed. In the connector's configuration file, set `ImpersonateMailboxOwner=false`.

### Access to Mailboxes (using OAuth)

The connector can authenticate with the Exchange Web Service using Basic Authentication or using OAuth. To use OAuth, you must register an application in Azure Active Directory. The application must be granted the following Application API permissions by an administrator:

- Exchange - full\_access\_as\_app
- Exchange - Calendars.Read
- Exchange - Mail.Read
- Exchange - User.Read.All



# Install Exchange Web Service Connector

To install the Exchange Web Service Connector on Windows, use the following procedure.

## To install the Exchange Web Service Connector

1. Run the Exchange Web Service Connector installation program.  
The installation wizard opens.
2. Read the installation instructions and click **Next**.  
The License Agreement dialog box opens.
3. Read the license agreement. If you agree to its terms, click **I accept the agreement** and click **Next**.  
The Installation Directory dialog box opens.
4. Choose an installation folder for Exchange Web Service Connector and click **Next**.  
The Service Name dialog box opens.
5. In the **Service name** box, type a name to use for the connector's Windows service and click **Next**.  
The Service Port and ACI Port dialog box opens.
6. Type the following information, and click **Next**.  

<b>Service port</b>	The port used by the connector to listen for service actions.
<b>ACI port</b>	The port used by the connector to listen for actions.

  
The License Server Configuration dialog box opens.
7. Type the following information, and click **Next**.  

<b>License server host</b>	The host name or IP address of your License server.
<b>License server port</b>	The ACI port of your License server.

  
The IDOL database dialog box opens.
8. In the **IDOL Database** box, type the name of the IDOL database into which you want to index documents, and click **Next**.  
The Proxy Server dialog box opens.
9. If a proxy server is necessary to access the Exchange Server (or Exchange Online) from the connector machine, type the following information and click **Next**.

<b>Proxy host</b>	The host name or IP address of the proxy server to use to access the repository.
<b>Proxy port</b>	The port of the proxy server to use to access the repository.
<b>Proxy username</b>	The user name to use to authenticate with the proxy server.
<b>Proxy password</b>	The password to use to authenticate with the proxy server.

10. Choose whether you want to connect to Exchange Online.

- To connect to Exchange Online, click **Yes** and then click **Next**.

The Exchange Online dialog box opens. Type the **Username** and **Password** to use to access Exchange Online and click **Next**. Then, type either a comma-separated list of **Mailboxes** to synchronize or specify the application key and application secret for your Microsoft Graph OAuth application. Then, click **Next** and go to step 14.

- To connect to an Exchange Server click **No** and then click **Next**.

The Exchange Server dialog box opens. Go to the next step.

11. Enter the following information and click **Next**.

<b>Hostname</b>	The hostname or IP address of the machine running Exchange.
<b>Port</b>	The port on which the Exchange web service is listening.
<b>Exchange version</b>	In the list, click the version of Exchange that is running on the server you want to connect to.

12. Enter the following information and click **Next**.

<b>Enable mapped security</b>	To enable mapped security and add access control lists (ACLs) to documents, select this check box.
<b>Username</b>	The user name to use to connect to the Exchange web service.
<b>Password</b>	The password to use to connect to the Exchange web service.
<b>Domain</b>	The domain name of the user specified by <b>Username</b> .

The LDAP Server dialog box opens.

13. The Exchange Web Service Connector can connect to LDAP and retrieve a list of mailboxes to synchronize. Enter the following information and then click **Next**.

<b>LDAP hostname</b>	The hostname or IP address of the LDAP server.
<b>LDAP port</b>	The port of the LDAP server.
<b>LDAP</b>	The user name for authentication with the LDAP server. The user name must

- username**      be in the format Domain\Username.
- LDAP password**      The password for authentication with the LDAP server.
- LDAP filter**      An LDAP filter to limit the mailboxes that are processed. For example, (&(objectClass=user)(mail=\*))

The CFS dialog box opens.

14. Choose whether to install a new CFS or use an existing CFS.
- To install a new CFS, select the **Install a new CFS** check box and click **Next**.  
The Installation directory dialog box opens. Go to the next step.
  - To use an existing CFS, clear the **Install a new CFS** check box and click **Next**.  
The CFS dialog box opens. Type the **Hostname** and **Port** of your existing CFS installation. Then, click **Next** and go to Step 19.

15. Choose an installation folder for the Connector Framework Server and then click **Next**.

The Installation name dialog box opens.

16. In the **Service name** box, type a unique name for the Connector Framework service and click **Next**. The name must not contain any spaces.

The CFS dialog box opens.

17. Type the following information, and click **Next**.

**Service port**      The port used by CFS to listen for service actions.

**ACI port**          The port used by CFS to listen for actions.

18. Type the following information and click **Next**.

**IDOL Server hostname**      The host name or IP address of the IDOL server that you want to index documents into.

**ACI port**          The ACI port of the IDOL server.

The Pre-Installation Summary dialog box opens.

19. Review the installation settings. If necessary, click **Back** to go back and change any settings. If you are satisfied with the settings, click **Next**.

The connector is installed.

20. Complete the installation procedure.
- If you are retrieving information from Exchange Online and want to configure OAuth authentication with the Microsoft Graph API, select the **Run OAuth tool** check box and click **Next**. The OAuth tool creates a file named `oauth.cfg`, in the connector's installation folder. This contains the tokens required by the connector to authenticate with the API.

- If you are retrieving information from Exchange Online but want to run the OAuth tool at a later time or do not need the features provided by the Microsoft Graph API, clear the **Run OAuth tool** check box. Then click **Next** followed by **Finish**. For information about how to run the OAuth tool at a later time, see [Configure OAuth Authentication \(Graph API\)](#), below.
- If you are not retrieving information from Exchange Online there is no need to run the OAuth tool. Click **Finish**.

## Configure the License Server Host and Port

Exchange Web Service Connector is licensed through License Server. In the Exchange Web Service Connector configuration file, specify the information required to connect to the License Server.

### To specify the license server host and port

1. Open your configuration file in a text editor.
2. In the [License] section, modify the following parameters to point to your License Server.

LicenseServerHost	The host name or IP address of your License Server.
LicenseServerACIPort	The ACI port of your License Server.

For example:

```
[License]  
LicenseServerHost=licenses  
LicenseServerACIPort=20000
```

3. Save and close the configuration file.

## Configure OAuth Authentication (Graph API)

The following features require the connector to make requests to the Microsoft Graph API:

- Retrieving a list of mailboxes from Exchange Online (`CrawlExchangeOnlineMailboxes=TRUE`). If you are connecting to Exchange Online but do not want to use the Graph API, you must list the mailboxes to synchronize by setting the configuration parameter `ExchangeOnlineMailbox`.
- Resolving Exchange Online e-mail addresses into domain user names before generating ACLs for Mapped Security (`ExchangeOnlineAcIUseOnPremiseSID=TRUE`).

To use the Microsoft Graph API, you must go to the Azure portal and register an application to represent the connector. Full instructions about how to create an application are available in the [Microsoft documentation](#).

The Exchange Web Service Connector has the following requirements:

- **Register an application > Redirect URI.** Configure the redirect URI to match the value that you use with the OAuth configuration tool (by default, `http://localhost:7878/oauth`). The "type" of the redirect URI should be "Web".
- **Client ID and Secret.** After you register the application, make a note of the Application (client) ID. Then, go to the **Certificates & secrets** page and generate a client secret. You will need these to configure OAuth authentication.
- **API Permissions.** The connector requires the following delegated permissions for the Microsoft Graph API:
  - `Directory.Read.All`
  - `Group.Read.All`
  - `User.Read.All`

**NOTE:** The connector installation program can help you configure the connector. There is no need to complete this procedure if you ran the OAuth configuration tool when the connector was installed.

### To configure OAuth authentication

1. Open the folder where you installed the connector.
2. Open the file `oauth_tool.cfg` in a text editor.
3. In the `[Default]` section, specify any SSL or proxy settings required to access the Microsoft Graph API:

<code>SSLMethod</code>	The version of SSL/TLS to use.
<code>ProxyHost</code>	The host name or IP address of the proxy server that the connector must use.
<code>ProxyPort</code>	The port of the proxy server that the connector must use.

For example:

```
SSLMethod=NEGOTIATE
ProxyHost=10.0.0.1
ProxyPort=8080
```

4. In the `[OAuthTool]` section, set the following parameters:

<code>AppKey</code>	The application key you obtained when you created the application to represent the connector.
<code>AppSecret</code>	The application secret you obtained when you created the application to represent the connector.

5. Save and close the file.

6. Open a command-line window and run `oauth_tool.exe`.

Your default web browser opens to the Microsoft web site.

7. Authorize the application to access the API. You must use the username and password of an account that has permission to view everything that you want to ingest (such as an administrator account).

Microsoft provides the OAuth tokens, and the OAuth configuration tool creates a file named `oauth.cfg`. This contains the parameters that the connector requires to authenticate. These parameters are automatically included in the connector configuration file, because the connector configuration file includes the following line to import the parameters into the task configuration section:

```
[MyTask1] < "oauth.cfg" [OAUTH]
```

For more information about including parameters from another file, see [Include an External Configuration File, on page 26](#). The OAuth tool also prints the parameters it has set to the command-line window so that you can set these directly in the connector's configuration file if you prefer.

# Chapter 3: Configure Exchange Web Service Connector

This section describes how to configure the Exchange Web Service Connector.

- [Exchange Web Service Connector Configuration File](#) ..... 23
- [Modify Configuration Parameter Values](#) ..... 26
- [Include an External Configuration File](#) ..... 26
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- [Configure Client Authorization](#) ..... 32
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## Exchange Web Service Connector Configuration File

You can configure the Exchange Web Service Connector by editing the configuration file. The configuration file is located in the connector's installation folder. You can modify the file with a text editor.

The parameters in the configuration file are divided into sections that represent connector functionality.

Some parameters can be set in more than one section of the configuration file. If a parameter is set in more than one section, the value of the parameter located in the most specific section overrides the value of the parameter defined in the other sections. For example, if a parameter can be set in "*TaskName* or *FetchTasks* or *Default*", the value in the *TaskName* section overrides the value in the *FetchTasks* section, which in turn overrides the value in the *Default* section. This means that you can set a default value for a parameter, and then override that value for specific tasks.

For information about the parameters that you can use to configure the Exchange Web Service Connector, refer to the *Exchange Web Service Connector Reference*.

### Server Section

The [Server] section specifies the ACI port of the connector. It can also contain parameters that control the way the connector handles ACI requests.

## Service Section

The [Service] section specifies the service port of the connector.

## Actions Section

The [Actions] section contains configuration parameters that specify how the connector processes actions that are sent to the ACI port. For example, you can configure event handlers that run when an action starts, finishes, or encounters an error.

## Logging Section

The [Logging] section contains configuration parameters that determine how messages are logged. You can use *log streams* to send different types of message to separate log files. The configuration file also contains a section to configure each of the log streams.

## Connector Section

The [Connector] section contains parameters that control general connector behavior. For example, you can specify a schedule for the fetch tasks that you configure.

## Default Section

The [Default] section is used to define default settings for configuration parameters. For example, you can specify default settings for the tasks in the [FetchTasks] section.

## FetchTasks Section

The [FetchTasks] section lists the fetch tasks that you want to run. A *fetch task* is a task that retrieves data from a repository. Fetch tasks are usually run automatically by the connector, but you can also run a fetch task by sending an action to the connector's ACI port.

In this section, enter the total number of fetch tasks in the `Number` parameter and then list the tasks in consecutive order starting from 0 (zero). For example:

```
[FetchTasks]
Number=2
0=MyTask0
1=MyTask1
```



## [*TaskName*] Section

The [*TaskName*] section contains configuration parameters that apply to a specific task. There must be a [*TaskName*] section for every task listed in the [*FetchTasks*] section.

## Ingestion Section

The [*Ingestion*] section specifies where to send the data that is extracted by the connector.

You can send data to a Connector Framework Server, IDOL NiFi Ingest, or another connector. For more information about ingestion, see [Ingestion, on page 80](#).

## DistributedConnector Section

The [*DistributedConnector*] section configures the connector to operate with the Distributed Connector. The Distributed Connector is an ACI server that distributes actions (synchronize, collect and so on) between multiple connectors.

For more information about the Distributed Connector, refer to the *Distributed Connector Administration Guide*.

## ViewServer Section

The [*ViewServer*] section contains parameters that allow the connector's *view* action to use a View Server. If necessary, the View Server converts files to HTML so that they can be viewed in a web browser.

## License Section

The [*License*] section contains details about the License server (the server on which your license file is located).

## Document Tracking Section

The [*DocumentTracking*] section contains parameters that enable the tracking of documents through import and indexing processes.

### **Related Topics**

- [Modify Configuration Parameter Values, on the next page](#)
- [Customize Logging, on page 94](#)

## Modify Configuration Parameter Values

You modify Exchange Web Service Connector configuration parameters by directly editing the parameters in the configuration file. When you set configuration parameter values, you must use UTF-8.

**CAUTION:** You must stop and restart Exchange Web Service Connector for new configuration settings to take effect.

This section describes how to enter parameter values in the configuration file.

### Enter Boolean Values

The following settings for Boolean parameters are interchangeable:

TRUE = true = ON = on = Y = y = 1

FALSE = false = OFF = off = N = n = 0

### Enter String Values

To enter a comma-separated list of strings when one of the strings contains a comma, you can indicate the start and the end of the string with quotation marks, for example:

```
ParameterName=cat,dog,bird,"wing,beak",turtle
```

Alternatively, you can escape the comma with a backslash:

```
ParameterName=cat,dog,bird,wing\,beak,turtle
```

If any string in a comma-separated list contains quotation marks, you must put this string into quotation marks and escape each quotation mark in the string by inserting a backslash before it. For example:

```
ParameterName="<font face=\"arial\" size=\"+1\"><b>\", \"<p>\"
```

Here, quotation marks indicate the beginning and end of the string. All quotation marks that are contained in the string are escaped.

## Include an External Configuration File

You can share configuration sections or parameters between ACI server configuration files. The following sections describe different ways to include content from an external configuration file.

You can include a configuration file in its entirety, specified configuration sections, or a single parameter.

When you include content from an external configuration file, the `GetConfig` and `ValidateConfig` actions operate on the combined configuration, after any external content is merged in.

In the procedures in the following sections, you can specify external configuration file locations by using absolute paths, relative paths, and network locations. For example:

```
../sharedconfig.cfg  
K:\sharedconfig\sharedsettings.cfg  
\\example.com\shared\idol.cfg  
file://example.com/shared/idol.cfg
```

Relative paths are relative to the primary configuration file.

**NOTE:** You can use nested inclusions, for example, you can refer to a shared configuration file that references a third file. However, the external configuration files must not refer back to your original configuration file. These circular references result in an error, and Exchange Web Service Connector does not start.

Similarly, you cannot use any of these methods to refer to a different section in your primary configuration file.

## Include the Whole External Configuration File

This method allows you to import the whole external configuration file at a specified point in your configuration file.

### To include the whole external configuration file

1. Open your configuration file in a text editor.
2. Find the place in the configuration file where you want to add the external configuration file.
3. On a new line, type a left angle bracket (<), followed by the path to and name of the external configuration file, in quotation marks (""). You can use relative paths and network locations. For example:

```
< "K:\sharedconfig\sharedsettings.cfg"
```

4. Save and close the configuration file.

## Include Sections of an External Configuration File

This method allows you to import one or more configuration sections (including the section headings) from an external configuration file at a specified point in your configuration file. You can include a whole configuration section in this way, but the configuration section name in the external file must exactly match what you want to use in your file. If you want to use a configuration section from the external file with a different name, see [Merge a Section from an External Configuration File, on page 29](#).

### To include sections of an external configuration file

1. Open your configuration file in a text editor.
2. Find the place in the configuration file where you want to add the external configuration file section.
3. On a new line, type a left angle bracket (<), followed by the path of the external configuration file, in quotation marks (""). You can use relative paths and network locations. After the configuration file path, add the configuration section name that you want to include. For example:

```
< "K:\sharedconfig\extrasettings.cfg" [License]
```

**NOTE:** You cannot include a section that already exists in your configuration file.

4. Save and close the configuration file.

## Include Parameters from an External Configuration File

This method allows you to import one or more parameters from an external configuration file at a specified point in your configuration file. You can import a single parameter or use wildcards to specify multiple parameters. The parameter values in the external file must match what you want to use in your file. This method does not import the section heading, such as [License] in the following examples.

### To include parameters from an external configuration file

1. Open your configuration file in a text editor.
2. Find the place in the configuration file where you want to add the parameters from the external configuration file.
3. On a new line, type a left angle bracket (<), followed by the path of the external configuration file, in quotation marks (""). You can use relative paths and network locations. After the configuration file path, add the name of the section that contains the parameter, followed by the parameter name. For example:

```
< "license.cfg" [License] LicenseServerHost
```

To specify a default value for the parameter, in case it does not exist in the external configuration file, specify the configuration section, parameter name, and then an equals sign (=) followed by the default value. For example:

```
< "license.cfg" [License] LicenseServerHost=localhost
```

You can use wildcards to import multiple parameters, but this method does not support default values. The \* wildcard matches zero or more characters. The ? wildcard matches any single character. Use the pipe character | as a separator between wildcard strings. For example:

```
< "license.cfg" [License] LicenseServer*
```

4. Save and close the configuration file.

## Merge a Section from an External Configuration File

This method allows you to include a configuration section from an external configuration file as part of your Exchange Web Service Connector configuration file. For example, you might want to specify a standard SSL configuration section in an external file and share it between several servers. You can use this method if the configuration section that you want to import has a different name to the one you want to use.

### To merge a configuration section from an external configuration file

1. Open your configuration file in a text editor.
2. Find or create the configuration section that you want to include from an external file. For example:

```
[SSLOptions1]
```

3. After the configuration section name, type a left angle bracket (<), followed by the path to and name of the external configuration file, in quotation marks (""). You can use relative paths and network locations. For example:

```
[SSLOptions1] < "../sharedconfig/ssloptions.cfg"
```

If the configuration section name in the external configuration file does not match the name that you want to use in your configuration file, specify the section to import after the configuration file name. For example:

```
[SSLOptions1] < "../sharedconfig/ssloptions.cfg" [SharedSSLOptions]
```

In this example, Exchange Web Service Connector uses the values in the [SharedSSLOptions] section of the external configuration file as the values in the [SSLOptions1] section of the Exchange Web Service Connector configuration file.

**NOTE:** You can include additional configuration parameters in the section in your file. If these parameters also exist in the imported external configuration file, Exchange Web Service Connector uses the values in the local configuration file. For example:

```
[SSLOptions1] < "ssloptions.cfg" [SharedSSLOptions]  
SSLCACertificatesPath=C:\IDOL\HTTPConnector\CACERTS\
```

4. Save and close the configuration file.

## Encrypt Passwords

Micro Focus recommends that you encrypt all passwords that you enter into a configuration file.

**NOTE:** The AES encryption method has been hardened in version 12.9.0 and later. Micro Focus strongly recommends that you reencrypt all passwords in configuration files by using the updated

tool.

The older AES encryption format and basic encryption methods are now deprecated. Passwords that you have encrypted with older versions continue to work, but Exchange Web Service Connector logs a warning. Support for these older encryption methods will be removed in future.

## Create a Key File

A key file is required to use AES encryption.

### To create a new key file

1. Open a command-line window and change directory to the Exchange Web Service Connector installation folder.
2. At the command line, type:

```
autpassword -x -tAES -oKeyFile=./MyKeyFile.ky
```

A new key file is created with the name `MyKeyFile.ky`

**CAUTION:** To keep your passwords secure, you must protect the key file. Set the permissions on the key file so that only authorized users and processes can read it. Exchange Web Service Connector must be able to read the key file to decrypt passwords, so do not move or rename it.

## Encrypt a Password

The following procedure describes how to encrypt a password.

### To encrypt a password

1. Open a command-line window and change directory to the Exchange Web Service Connector installation folder.
2. At the command line, type:

```
autpassword -e -tEncryptionType [-oKeyFile] [-cFILE -sSECTION -pPARAMETER] PasswordString
```

where:

Option	Description
- <i>tEncryptionType</i>	The type of encryption to use: <ul style="list-style-type: none"><li>• <b>AES</b> - AES256</li><li>• <b>Basic</b></li></ul> <p><b>DEPRECATED:</b> The basic encryption type is deprecated in version 12.9.0 and later. Use the more secure AES encryption</p>

Option	Description
	<p>instead.</p> <p>Passwords that you have encrypted with older versions continue to work, but Exchange Web Service Connector logs a warning. Support for this older encryption method will be removed in future.</p> <p>For example: <b>-tAES</b></p>
<p><i>-oKeyFile</i></p>	<p>AES encryption requires a key file. This option specifies the path and file name of a key file. The key file must contain 64 hexadecimal characters.</p> <p>For example: <b>-oKeyFile=./key.ky</b></p> <p><b>NOTE:</b> The full (absolute) path of the key file is included in the encrypted value, because Exchange Web Service Connector requires the key to decrypt the password. If you move or rename the key file, this path becomes invalid and you must update the encrypted value.</p>
<p><b>-cFILE -sSECTION -pPARAMETER</b></p>	<p>(Optional) You can use these options to write the password directly into a configuration file. You must specify all three options.</p> <ul style="list-style-type: none"> <li>• <b>-c.</b> The configuration file in which to write the encrypted password.</li> <li>• <b>-s.</b> The name of the section in the configuration file in which to write the password.</li> <li>• <b>-p.</b> The name of the parameter in which to write the encrypted password.</li> </ul> <p>For example:</p> <p><b>-c./Config.cfg -sMyTask -pPassword</b></p>
<p><i>PasswordString</i></p>	<p>The password to encrypt.</p>

For example:

```
autpassword -e -tBASIC MyPassword
```

```
autpassword -e -tAES -oKeyFile=./key.ky MyPassword
```

```
autpassword -e -tAES -oKeyFile=./key.ky -c./Config.cfg -sDefault -pPassword MyPassword
```

The password is returned, or written to the configuration file.

## Decrypt a Password

The following procedure describes how to decrypt a password.

### To decrypt a password

1. Open a command-line window and change directory to the Exchange Web Service Connector installation folder.
2. At the command line, type:

```
autopassword -d -tEncryptionType PasswordString
```

where:

Option	Description
<code>-tEncryptionType</code>	The type of encryption: <ul style="list-style-type: none"><li>• <b>Basic</b></li><li>• <b>AES - AES256</b></li></ul> For example: <b>-tAES</b>
<code>PasswordString</code>	The password to decrypt.

For example:

```
autopassword -d -tBASIC 9t3M3t7awt/J8A
```

```
autopassword -d -tAES PasswordString
```

The password is returned in plain text.

## Configure Client Authorization

You can configure Exchange Web Service Connector to authorize different operations for different connections.

Authorization roles define a set of operations for a set of users. You define the operations by using the `StandardRoles` configuration parameter, or by explicitly defining a list of allowed actions in the `Actions` and `ServiceActions` parameters. You define the authorized users by using a client IP address, SSL identities, and GSS principals, depending on your security and system configuration.

For more information about the available parameters, see the *Exchange Web Service Connector Reference*.

**IMPORTANT:** To ensure that Exchange Web Service Connector allows only the options that you configure in `[AuthorizationRoles]`, make sure that you delete any deprecated `RoleClients` parameters from your configuration (where `Role` corresponds to a standard role name, for



```
example AdminClients).
```

### To configure authorization roles

1. Open your configuration file in a text editor.
2. Find the [AuthorizationRoles] section, or create one if it does not exist.
3. In the [AuthorizationRoles] section, list the user authorization roles that you want to create. For example:

```
[AuthorizationRoles]
0=AdminRole
1=UserRole
```

4. Create a section for each authorization role that you listed. The section name must match the name that you set in the [AuthorizationRoles] list. For example:

```
[AdminRole]
```

5. In the section for each role, define the operations that you want the role to be able to perform. You can set StandardRoles to a list of appropriate values, or specify an explicit list of allowed actions by using Actions, and ServiceActions. For example:

```
[AdminRole]
StandardRoles=Admin,ServiceControl,ServiceStatus
```

```
[UserRole]
Actions=GetVersion
ServiceActions=GetStatus
```

**NOTE:** The standard roles do not overlap. If you want a particular role to be able to perform all actions, you must include all the standard roles, or ensure that the clients, SSL identities, and so on, are assigned to all relevant roles.

6. In the section for each role, define the access permissions for the role, by setting Clients, SSLIdentities, and GSSPrincipals, as appropriate. If an incoming connection matches one of the allowed clients, principals, or SSL identities, the user has permission to perform the operations allowed by the role. For example:

```
[AdminRole]
StandardRoles=Admin,ServiceControl,ServiceStatus
Clients=localhost
SSLIdentities=admin.example.com
```

7. Save and close the configuration file.
8. Restart Exchange Web Service Connector for your changes to take effect.

**IMPORTANT:** If you do not provide any authorization roles for a standard role, Exchange Web Service Connector uses the default client authorization for the role (localhost for Admin and ServiceControl, all clients for Query and ServiceStatus). If you define authorization only by actions, Micro Focus recommends that you configure an authorization role that disallows all users

for all roles by default. For example:

```
[ForbidAllRoles]  
StandardRoles=*  
Clients=""
```

This configuration ensures that Exchange Web Service Connector uses only your action-based authorizations.

## Register with a Distributed Connector

To receive actions from a Distributed Connector, a connector must register with the Distributed Connector and join a *connector group*. A connector group is a group of similar connectors. The connectors in a group must be of the same type (for example, all HTTP Connectors), and must be able to access the same repository.

To configure a connector to register with a Distributed Connector, follow these steps. For more information about the Distributed Connector, refer to the *Distributed Connector Administration Guide*.

### To register with a Distributed Connector

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. In the [DistributedConnector] section, set the following parameters:

RegisterConnector	(Required) To register with a Distributed Connector, set this parameter to <b>true</b> .
HostN	(Required) The host name or IP address of the Distributed Connector.
PortN	(Required) The ACI port of the Distributed Connector.
DataPortN	(Optional) The data port of the Distributed Connector.
ConnectorGroup	(Required) The name of the connector group to join. The value of this parameter is passed to the Distributed Connector.
ConnectorPriority	(Optional) The Distributed Connector can distribute actions to connectors based on a priority value. The lower the value assigned to ConnectorPriority, the higher the probability that an action is assigned to this connector, rather than other connectors in the same connector group.
SharedPath	(Optional) The location of a shared folder that is accessible to all of the connectors in the ConnectorGroup. This folder is used to store the connectors' datastore files, so that whichever connector in the

group receives an action, it can access the information required to complete it. If you set the `DataPortN` parameter, the datastore file is streamed directly to the Distributed Connector, and this parameter is ignored.

4. Save and close the configuration file.
5. Start the connector.

The connector registers with the Distributed Connector. When actions are sent to the Distributed Connector for the connector group that you configured, they are forwarded to this connector or to another connector in the group.

## Set Up Secure Communication

You can configure Secure Socket Layer (SSL) connections between the connector and other ACI servers.

### Configure Outgoing SSL Connections

To configure the connector to send data to other components (for example Connector Framework Server) over SSL, follow these steps.

#### To configure outgoing SSL connections

1. Open the Exchange Web Service Connector configuration file in a text editor.
2. Specify the name of a section in the configuration file where the SSL settings are provided:
  - To send data to an ingestion server over SSL, set the `IngestSSLConfig` parameter in the `[Ingestion]` section. To send data from a single fetch task to an ingestion server over SSL, set `IngestSSLConfig` in a `[TaskName]` section.
  - To send data to a Distributed Connector over SSL, set the `SSLConfig` parameter in the `[DistributedConnector]` section.
  - To send data to a View Server over SSL, set the `SSLConfig` parameter in the `[ViewServer]` section.

You can use the same settings for each connection. For example:

```
[Ingestion]  
IngestSSLConfig=SSLOptions
```

```
[DistributedConnector]  
SSLConfig=SSLOptions
```

3. Create a new section in the configuration file. The name of the section must match the name you specified in the `IngestSSLConfig` or `SSLConfig` parameter. Then specify the SSL settings to use.

<code>SSLMethod</code>	The SSL protocol to use.
<code>SSLCertificate</code>	(Optional) The SSL certificate to use (in PEM format).
<code>SSLPrivateKey</code>	(Optional) The private key for the SSL certificate (in PEM format).

For example:

```
[SSLOptions]
SSLMethod=TLV1.3
SSLCertificate=host1.crt
SSLPrivateKey=host1.key
```

4. Save and close the configuration file.
5. Restart the connector.

#### **Related Topics**

- [Start and Stop the Connector, on page 39](#)

## **Configure Incoming SSL Connections**

To configure a connector to accept data sent to its ACI port over SSL, follow these steps.

#### **To configure an incoming SSL Connection**

1. Stop the connector.
2. Open the configuration file in a text editor.
3. In the `[Server]` section set the `SSLConfig` parameter to specify the name of a section in the configuration file for the SSL settings. For example:

```
[Server]
SSLConfig=SSLOptions
```

4. Create a new section in the configuration file (the name must match the name you used in the `SSLConfig` parameter). Then, use the SSL configuration parameters to specify the details for the connection. You must set the following parameters:

<code>SSLMethod</code>	The SSL protocol to use.
<code>SSLCertificate</code>	The SSL certificate to use (in PEM format).
<code>SSLPrivateKey</code>	The private key for the SSL certificate (in PEM format).

For example:

```
[SSLOptions]  
SSLMethod=TLSV1.3  
SSLCertificate=host1.crt  
SSLPrivateKey=host1.key
```

5. Save and close the configuration file.
6. Restart the connector.

### **Related Topics**

- [Start and Stop the Connector, on page 39](#)

## **Backup and Restore the Connector's State**

After configuring a connector, and while the connector is running, you can create a backup of the connector's state. In the event of a failure, you can restore the connector's state from the backup.

To create a backup, use the backupServer action. The backupServer action saves a ZIP file to a path that you specify. The backup includes:

- a copy of the actions folder, which stores information about actions that have been queued, are running, and have finished.
- a copy of the configuration file.
- a copy of the connector's datastore files, which contain information about the files, records, or other data that the connector has retrieved from a repository.

### **Backup a Connector's State**

#### **To create a backup of the connectors state**

- In the address bar of your Web browser, type the following action and press **ENTER**:

```
http://host:port/action=backupServer&path=path
```

where,

*host* The host name or IP address of the machine where the connector is running.

*port* The connector's ACI port.

*path* The folder where you want to save the backup.

For example:

```
http://localhost:1234/action=backupServer&path=./backups
```

## Restore a Connector's State

### To restore a connector's state

- In the address bar of your Web browser, type the following action and press **ENTER**:

`http://host:port/action=restoreServer&filename=filename`

where,

*host*            The host name or IP address of the machine where the connector is running.

*port*            The connector's ACI port.

*filename*        The path of the backup that you created.

For example:

`http://localhost:1234/action=restoreServer&filename=./backups/filename.zip`

## Validate the Configuration File

You can use the `ValidateConfig` service action to check for errors in the configuration file.

**NOTE:** For the `ValidateConfig` action to validate a configuration section, Exchange Web Service Connector must have previously read that configuration. In some cases, the configuration might be read when a task is run, rather than when the component starts up. In these cases, `ValidateConfig` reports any unread sections of the configuration file as unused.

### To validate the configuration file

- Send the following action to Exchange Web Service Connector:

`http://Host:ServicePort/action=ValidateConfig`

where:

*Host*            is the host name or IP address of the machine where Exchange Web Service Connector is installed.

*ServicePort*    is the service port, as specified in the [Service] section of the configuration file.

# Chapter 4: Start and Stop the Connector

This section describes how to start and stop the Exchange Web Service Connector.

- [Start the Connector](#) ..... 39
- [Verify that Exchange Web Service Connector is Running](#) ..... 39
- [Stop the Connector](#) ..... 40

**NOTE:** You must start and stop the Connector Framework Server separately from the Exchange Web Service Connector.

## Start the Connector

After you have installed and configured a connector, you are ready to run it. Start the connector using one of the following methods.

### To start the connector using Windows Services

1. Open the Windows Services dialog box.
2. Select the connector service, and click **Start**.
3. Close the Windows Services dialog box.

### To start the connector by running the executable

- In the connector installation directory, double-click the connector executable file.

## Verify that Exchange Web Service Connector is Running

After starting Exchange Web Service Connector, you can run the following actions to verify that Exchange Web Service Connector is running.

- [GetStatus](#)
- [GetLicenseInfo](#)

## GetStatus

You can use the `GetStatus` service action to verify the Exchange Web Service Connector is running. For example:

```
http://Host:ServicePort/action=GetStatus
```

**NOTE:** You can send the `GetStatus` action to the ACI port instead of the service port. The `GetStatus` ACI action returns information about the Exchange Web Service Connector setup.

## GetLicenseInfo

You can send a `GetLicenseInfo` action to Exchange Web Service Connector to return information about your license. This action checks whether your license is valid and returns the operations that your license includes.

Send the `GetLicenseInfo` action to the Exchange Web Service Connector ACI port. For example:

```
http://Host:ACIport/action=GetLicenseInfo
```

The following result indicates that your license is valid.

```
<autn:license>  
  <autn:validlicense>true</autn:validlicense>  
</autn:license>
```

As an alternative to submitting the `GetLicenseInfo` action, you can view information about your license, and about licensed and unlicensed actions, on the **License** tab in the Status section of IDOL Admin.

## Stop the Connector

You must stop the connector before making any changes to the configuration file.

### To stop the connector using Windows Services

1. Open the Windows Services dialog box.
2. Select the *ConnectorInstallName* service, and click **Stop**.
3. Close the Windows Services dialog box.

### To stop the connector by sending an action to the service port

- Type the following command in the address bar of your Web browser, and press ENTER:

```
http://host:ServicePort/action=stop
```



<i>host</i>	The IP address or host name of the machine where the connector is running.
<i>ServicePort</i>	The connector's service port (specified in the [Service] section of the connector's configuration file).

# Chapter 5: Send Actions to Exchange Web Service Connector

This section describes how to send actions to Exchange Web Service Connector.

- [Send Actions to Exchange Web Service Connector](#) ..... 42
- [Asynchronous Actions](#) ..... 43
- [Store Action Queues in an External Database](#) ..... 44
- [Store Action Queues in Memory](#) ..... 47
- [Use XSL Templates to Transform Action Responses](#) ..... 48

## Send Actions to Exchange Web Service Connector

Exchange Web Service Connector actions are HTTP requests, which you can send, for example, from your web browser. The general syntax of these actions is:

```
http://host:port/action=action&parameters
```

where:

- |                   |  |
|-------------------|--|
| <i>host</i>       | is the IP address or name of the machine where Exchange Web Service Connector is installed.  |
| <i>port</i>       | is the Exchange Web Service Connector ACI port. The ACI port is specified by the Port parameter in the [Server] section of the Exchange Web Service Connector configuration file. For more information about the Port parameter, see the <i>Exchange Web Service Connector Reference</i> . |
| <i>action</i>     | is the name of the action you want to run.   |
| <i>parameters</i> | are the required and optional parameters for the action.   |

**NOTE:** Separate individual parameters with an ampersand (&). Separate parameter names from values with an equals sign (=). You must percent-encode all parameter values.

For more information about actions, see the *Exchange Web Service Connector Reference*.

## Asynchronous Actions

When you send an asynchronous action to Exchange Web Service Connector, the connector adds the task to a queue and returns a token. Exchange Web Service Connector performs the task when a thread becomes available. You can use the token with the `QueueInfo` action to check the status of the action and retrieve the results of the action.

Most of the features provided by the connector are available through `action=fetch`, so when you use the `QueueInfo` action, query the `fetch` action queue, for example:

```
/action=QueueInfo&QueueName=Fetch&QueueAction=GetStatus
```

### Check the Status of an Asynchronous Action

To check the status of an asynchronous action, use the token that was returned by Exchange Web Service Connector with the `QueueInfo` action. For more information about the `QueueInfo` action, refer to the *Exchange Web Service Connector Reference*.

#### To check the status of an asynchronous action

- Send the `QueueInfo` action to Exchange Web Service Connector with the following parameters.

<code>QueueName</code>	The name of the action queue that you want to check.
<code>QueueAction</code>	The action to perform. Set this parameter to <b>GetStatus</b> .
<code>Token</code>	(Optional) The token that the asynchronous action returned. If you do not specify a token, Exchange Web Service Connector returns the status of every action in the queue.

For example:

```
/action=QueueInfo&QueueName=fetch&QueueAction=getstatus&Token=...
```

### Cancel an Asynchronous Action that is Queued

To cancel an asynchronous action that is waiting in a queue, use the following procedure.

#### To cancel an asynchronous action that is queued

- Send the `QueueInfo` action to Exchange Web Service Connector with the following parameters.

<code>QueueName</code>	The name of the action queue that contains the action to cancel.
<code>QueueAction</code>	The action to perform . Set this parameter to <b>Cancel1</b> .
<code>Token</code>	The token that the asynchronous action returned.

For example:

```
/action=QueueInfo&QueueName=fetch&QueueAction=Cancel&Token=...
```

## Stop an Asynchronous Action that is Running

You can stop an asynchronous action at any point.

### To stop an asynchronous action that is running

- Send the QueueInfo action to Exchange Web Service Connector with the following parameters.

QueueName	The name of the action queue that contains the action to stop.
QueueAction	The action to perform. Set this parameter to <b>Stop</b> .
Token	The token that the asynchronous action returned.

For example:

```
/action=QueueInfo&QueueName=fetch&QueueAction=Stop&Token=...
```

## Store Action Queues in an External Database

Exchange Web Service Connector provides asynchronous actions. Each asynchronous action has a queue to store requests until threads become available to process them. You can configure Exchange Web Service Connector to store these queues either in an internal database file, or in an external database hosted on a database server.

The default configuration stores queues in an internal database. Using this type of database does not require any additional configuration.

You might want to store the action queues in an external database so that several servers can share the same queues. In this configuration, sending a request to any of the servers adds the request to the shared queue. Whenever a server is ready to start processing a new request, it takes the next request from the shared queue, runs the action, and adds the results of the action back to the shared database so that they can be retrieved by any of the servers. You can therefore distribute requests between components without configuring a Distributed Action Handler (DAH).

**NOTE:** You cannot use multiple servers to process a single request. Each request is processed by one server.

**NOTE:** Although you can configure several connectors to share the same action queues, the connectors do not share fetch task data. If you share action queues between several connectors and distribute synchronize actions, the connector that processes a synchronize action cannot determine which items the other connectors have retrieved. This might result in some documents being ingested several times.

## Prerequisites

- Supported databases:
  - PostgreSQL 9.0 or later.
  - MySQL 5.0 or later.
- On each machine that hosts Exchange Web Service Connector, you must install an ODBC driver for your chosen database. On Linux you must also install the unixODBC driver manager and configure the name and path of the ODBC driver in the unixODBC `odbcinst.ini` configuration file.
- If you use PostgreSQL, you must set the PostgreSQL ODBC driver setting `MaxVarChar` to 0 (zero). If you use a DSN, you can configure this parameter when you create the DSN. Otherwise, you can set the `MaxVarcharSize` parameter in the connection string.

## Configure Exchange Web Service Connector

To configure Exchange Web Service Connector to use a shared action queue, follow these steps.

### To store action queues in an external database

1. Stop Exchange Web Service Connector, if it is running.
2. Open the Exchange Web Service Connector configuration file.
3. Find the relevant section in the configuration file:
  - To store queues for all asynchronous actions in the external database, find the `[Actions]` section.
  - To store the queue for a single asynchronous action in the external database, find the section that configures that action.
4. Set the following configuration parameters.

`AsyncStoreLibraryDirectory`      The path of the directory that contains the library to use to connect to the database. Specify either an absolute path, or a path relative to the server executable file.

`AsyncStoreLibraryName`          The name of the library to use to connect to the database. You can omit the file extension. The following libraries are available:

- `postgresAsyncStoreLibrary` - for connecting to a PostgreSQL database.
- `mysqlAsyncStoreLibrary` - for connecting to a MySQL database.

**ConnectionString** The connection string to use to connect to the database. The user that you specify must have permission to create tables in the database. For example:

```
ConnectionString=DSN=ActionStore
```

or

```
ConnectionString=Driver={PostgreSQL};  
Server=10.0.0.1; Port=9876;  
Database=SharedActions; Uid=user; Pwd=password;  
MaxVarcharSize=0;
```

If your connection string includes a password, Micro Focus recommends encrypting the value of the parameter before entering it into the configuration file. Encrypt the entire connection string. For information about how to encrypt parameter values, see [Encrypt Passwords, on page 29](#).

For example:

```
[Actions]  
AsyncStoreLibraryDirectory=acidlls  
AsyncStoreLibraryName=postgresAsyncStoreLibrary  
ConnectionString=DSN=ActionStore
```

5. You can use the same database to store action queues for more than one type of IDOL component (for example, a group of File System Connectors and a group of Media Servers). To use a database for more than one type of component, set the following parameter in the [Actions] section of the configuration file.

**DatastoreSharingGroupName** The group of components to share actions with. You can set this parameter to any string, but the value must be the same for each server in the group. For example, to configure several Exchange Web Service Connectors to share their action queues, set this parameter to the same value in every Exchange Web Service Connector configuration. Micro Focus recommends setting this parameter to the name of the component.

**CAUTION:** Do not configure different components (for example, two different types of connector) to share the same action queues. This will result in unexpected behavior.

For example:

```
[Actions]  
...  
DatastoreSharingGroupName=MediaServer
```

6. Save and close the configuration file.

When you start Exchange Web Service Connector it connects to the shared database.

## Store Action Queues in Memory

Exchange Web Service Connector provides asynchronous actions. Each asynchronous action has a queue to store requests until threads become available to process them. These queues are usually stored in a datastore file or in a database hosted on a database server, but in some cases you can increase performance by storing these queues in memory.

**NOTE:** Storing action queues in memory improves performance only when the server receives large numbers of actions that complete quickly. Before storing queues in memory, you should also consider the following:

- The queues (including queued actions and the results of finished actions) are lost if Exchange Web Service Connector stops unexpectedly, for example due to a power failure or the component being forcibly stopped. This could result in some requests being lost, and if the queues are restored to a previous state some actions could run more than once.
- Storing action queues in memory prevents multiple instances of a component being able to share the same queues.
- Storing action queues in memory increases memory use, so please ensure that the server has sufficient memory to complete actions and store the action queues.

If you stop Exchange Web Service Connector cleanly, Exchange Web Service Connector writes the action queues from memory to disk so that it can resume processing when it is next started.

To configure Exchange Web Service Connector to store asynchronous action queues in memory, follow these steps.

### To store action queues in memory

1. Stop Exchange Web Service Connector, if it is running.
2. Open the Exchange Web Service Connector configuration file and find the [Actions] section.
3. If you have set any of the following parameters, remove them:
  - AsyncStoreLibraryDirectory
  - AsyncStoreLibraryName
  - ConnectionString
  - UseStringentDatastore
4. Set the following configuration parameters.

UseInMemoryDatastore

A Boolean value that specifies whether to keep

	the queues for asynchronous actions in memory. Set this parameter to <b>TRUE</b> .
InMemoryDatastoreBackupIntervalMins	(Optional) The time interval (in minutes) at which the action queues are written to disk. Writing the queues to disk can reduce the number of queued actions that would be lost if Exchange Web Service Connector stops unexpectedly, but configuring a frequent backup will increase the load on the datastore and might reduce performance.

For example:

```
[Actions]  
UseInMemoryDatastore=TRUE  
InMemoryDatastoreBackupIntervalMins=30
```

5. Save and close the configuration file.

When you start Exchange Web Service Connector, it stores action queues in memory.

## Use XSL Templates to Transform Action Responses

You can transform the action responses returned by Exchange Web Service Connector using XSL templates. You must write your own XSL templates and save them with either an `.xsl` or `.tmp1` file extension.

After creating the templates, you must configure Exchange Web Service Connector to use them, and then apply them to the relevant actions.

### To enable XSL transformations

1. Ensure that the `autnxs1t` library is located in the same directory as your configuration file. If the library is not included in your installation, you can obtain it from Micro Focus Support.
2. Open the Exchange Web Service Connector configuration file in a text editor.
3. In the `[Server]` section, ensure that the `XSLTemplates` parameter is set to `true`.

**CAUTION:** If `XSLTemplates` is set to `true` and the `autnxs1t` library is not present in the same directory as the configuration file, the server will not start.

4. (Optional) In the `[Paths]` section, set the `TemplateDirectory` parameter to the path to the directory that contains your XSL templates. The default directory is `acitemplates`.



5. Save and close the configuration file.
6. Restart Exchange Web Service Connector for your changes to take effect.

### To apply a template to action output

- Add the following parameters to the action:

Template	The name of the template to use to transform the action output. Exclude the folder path and file extension.
ForceTemplateRefresh	(Optional) If you modified the template after the server started, set this parameter to <b>true</b> to force the ACI server to reload the template from disk rather than from the cache.

For example:

```
action=QueueInfo&QueueName=Fetch
      &QueueAction=GetStatus
      &Token=...
      &Template=myTemplate
```

In this example, Exchange Web Service Connector applies the XSL template `myTemplate` to the response from a `QueueInfo` action.

**NOTE:** If the action returns an error response, Exchange Web Service Connector does not apply the XSL template.

## Example XSL Templates

Exchange Web Service Connector includes the following sample XSL templates, in the `acitemplates` folder:

XSL Template	Description
FetchIdentifiers	Transforms the output from the <code>Identifiers</code> fetch action, to show what is in the repository.
FetchIdentifiersTreeview	Transforms the output from the <code>Identifiers</code> fetch action, to show what is in the repository. This template produces a tree or hierarchical view, instead of the flat view produced by the <code>FetchIdentifiers</code> template.
LuaDebug	Transforms the output from the <code>LuaDebug</code> action, to assist with debugging Lua scripts.

# Chapter 6: Use the Connector

This section describes how to use the connector.

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## Retrieve Data from Exchange

The Exchange Web Service Connector retrieves messages, appointments, contacts, and other items from an Exchange Server, and sends them for ingestion.

To automatically retrieve content from Exchange, create a new fetch task by following these steps. The connector runs each fetch task automatically, based on the schedule that is configured in the configuration file.

### To create a new Fetch Task

1. Stop the connector.
2. Open the configuration file in a text editor.
3. In the [FetchTasks] section of the configuration file, specify the number of fetch tasks using the **Number** parameter. If you are configuring the first fetch task, type **Number=1**. If one or more fetch tasks have already been configured, increase the value of the **Number** parameter by one (1). Below the **Number** parameter, specify the names of the fetch tasks, starting from zero (0). For example:

```
[FetchTasks]
Number=1
0=MyTask
```

4. Below the [FetchTasks] section, create a new *TaskName* section. The name of the section must match the name of the new fetch task. For example:

```
[FetchTasks]
```

```
Number=1
```

```
0=MyTask
```

```
[MyTask]
```

5. In the task section, set the following parameters:

**Username**     The user name to use to connect to LDAP and the Exchange Web service.

If you need to use different credentials to log on to LDAP and the Exchange Web service, you can override this parameter with the `LDAPUsername` and `WSUsername` parameters.

**Password**     The password to use to connect to LDAP and the Exchange Web service.

If you need to use different credentials to log on to LDAP and the Exchange Web service, you can override this parameter with the `LDAPPassword` and `WSPassword` parameters.

**Domain**        (Optional) The domain of the user specified by `Username`. You can override this parameter by setting `WSDomain`.

**WSURL**         The URL of the Exchange Web Service.

**LDAPPath**      (Optional) The LDAP path to search. The connector uses LDAP to obtain a list of mailboxes to synchronize.

For more information about the parameters that you can use to configure the connector, and to restrict the items that are retrieved, refer to the *Exchange Web Service Connector Reference*.

6. Save and close the configuration file.

You can now start the connector.

**TIP:** The connector saves or updates a data file for each completed fetch task. If you make changes to the configuration and want to reset the connector so that it retrieves all of your data again, use the `PurgeDatastore` action.

## Retrieve Data from Exchange Online

To retrieve information from Exchange Online, follow these steps.

### To create a new Fetch Task

1. Stop the connector.
2. Open the configuration file in a text editor.

3. In the [FetchTasks] section of the configuration file, specify the number of fetch tasks using the Number parameter. If you are configuring the first fetch task, type **Number=1**. If one or more fetch tasks have already been configured, increase the value of the Number parameter by one (1). Below the Number parameter, specify the names of the fetch tasks, starting from zero (0). For example:

```
[FetchTasks]
Number=1
0=MyTask
```

4. Below the [FetchTasks] section, create a new *TaskName* section. The name of the section must match the name of the new fetch task. For example:

```
[FetchTasks]
Number=1
0=MyTask
```

```
[MyTask]
```

5. In the task section, set the following parameters:

ExchangeOnline	A Boolean value that specifies whether the repository is an instance of Exchange Online. Set this parameter to <b>true</b> .
WSURL	The URL of the Exchange Web Service.

For example:

```
[MyTask]
ExchangeOnline=true
WSURL=https://outlook.office365.com/EWS/Exchange.asmx
```

6. Specify the list of mailboxes to synchronize, using one of the following methods:

- The connector can obtain a list of mailboxes to synchronize through the Microsoft Graph API. To do this, set the configuration parameter `CrawlExchangeOnlineMailboxes` to `TRUE`. The Graph API requires OAuth authentication so you must create an application to represent the connector and run the OAuth configuration tool. For more information, see [Configure OAuth Authentication \(Graph API\), on page 20](#). The OAuth configuration tool creates a file named `oauth.cfg` that contains the OAuth tokens required by the connector. You can import this information into the connector configuration as in the following example:

```
[MyTask] < "oauth.cfg" [OAUTH]
ExchangeOnline=TRUE
CrawlExchangeOnlineMailboxes=TRUE
```

For more information about including parameters from another file, see [Include an External Configuration File, on page 26](#).

- You can specify a list of mailboxes to synchronize by setting the configuration parameter `ExchangeOnlineMailbox`. This parameter accepts a comma-separated list of mailbox addresses. For example:

```
ExchangeOnlineMailbox=user1@domain.com,user2@domain.com
```

7. Set the configuration parameters that are required to authenticate with the Exchange Web Service:

- To authenticate using basic authentication:

WSUsername      The user name to use to connect to the Exchange Web service.

WSPassword      The password to use to connect to the Exchange Web service.

- To authenticate using OAuth authentication create an app registration in Azure Active Directory. This application must be granted some permissions by an administrator. For information about the permissions that are required, see [Permissions, on page 16](#). Then, using the tokens that are generated when the application is created, set the configuration parameters WSTenantID, WSCliientID, and WSCliientSecret. There is no need to run the OAuth configuration tool for configuring authentication with the Exchange Web Service.

8. Save and close the configuration file.

You can now start the connector.

**TIP:** The connector saves or updates a data file for each completed fetch task. If you make changes to the configuration and want to reset the connector so that it retrieves all of your data again, use the PurgeDatastore action.

## Choose the Content to Index

This section explains how to configure the connector so that it retrieves the content that you want to index, and nothing else.

The content in Microsoft Exchange is organized in the following structure. There is one message store for each user.

```
Message Store
|- Folder
  |- Folder
  |   |- Item(s)
  |   |- Folder
  |       |- Item(s)
  |- Item(s)
```

You can restrict the content to retrieve by setting the configuration parameters FolderMustHaveRegex, FolderCantHaveRegex, FolderMustHaveRegexToCrawl, and FolderCantHaveRegexToCrawl.

The difference between these two pairs of parameters is the behavior of the connector when a folder is excluded.

- When a folder is excluded by FolderMustHaveRegexToCrawl or FolderCantHaveRegexToCrawl, that folder and all of its subfolders are ignored.

- When a folder is excluded by `FolderMustHaveRegex` or `FolderCantHaveRegex`, the folder is ignored but its subfolders are still processed, unless they also fail to pass the filter.

This means that if you want to exclude a large part of a structure, it can be more efficient to use `FolderMustHaveRegexToCrawl` and `FolderCantHaveRegexToCrawl`. For example, consider the following folder structure:

```
/
/Inbox
/Inbox/folder1
/Inbox/folder2
/Sent Items
/Sent Items/folder1
/Sent Items/folder2
```

To configure the connector to retrieve content only from `/Inbox` and its subfolders, you could use the following configuration:

```
FolderMustHaveRegex=.*Inbox.*
```

However, the connector has to process all of the folders and attempt to match their paths to the regular expression. The following configuration is more efficient because the connector only has to process the root folder and folders that have paths starting with `/Inbox`:

```
FolderMustHaveRegex=.*Inbox.*
FolderMustHaveRegexToCrawl=/(Inbox.*)?
```

## Retrieve Skype For Business Online Conversations

You can use the Exchange Web Service Connector to retrieve Skype for Business Online conversations that have been archived to Exchange Online mailboxes.

**TIP:** You can synchronize deleted conversations by placing an in-place hold on a mailbox. The hold ensures that deleted items are archived in the `RecoverableItems` folder, which is hidden from the user. For information about how to apply holds, refer to the Exchange Online documentation.

### To retrieve Skype for Business Online conversations

1. Stop the connector.
2. Open the connector configuration file in a text editor.
3. In the `[FetchTasks]` section of the configuration file, specify the number of fetch tasks using the `Number` parameter. If you are configuring the first fetch task, type `Number=1`. If one or more fetch tasks have already been configured, increase the value of the `Number` parameter by one (1). Below the `Number` parameter, specify the names of the fetch tasks, starting from zero (0). For example:

```
[FetchTasks]
Number=2
0=ExchangeOnline
1=SkypeForBusinessOnline
```

4. Below the [FetchTasks] section, create a new *TaskName* section. The name of the section must match the name of the new fetch task. For example:

```
[FetchTasks]
Number=2
0=ExchangeOnline
1=SkypeForBusinessOnline
```

```
[SkypeForBusinessOnline]
```

5. Set the following parameters:

ExchangeOnline	A Boolean that specifies whether the repository is an instance of Exchange Online. Set this parameter to <b>TRUE</b> .
Username	The user name to use to connect to the Exchange Web service.
Password	The password to use to connect to the Exchange Web service. For information about how to encrypt the password before adding it to the configuration file, see <a href="#">Encrypt Passwords, on page 29</a> .
WSURL	The URL of the Exchange Web Service.
ExchangeOnlineMailbox	A comma-separated list of mailbox addresses from which you want to retrieve information.
SkypeForBusinessOnline	A Boolean value that specifies whether to retrieve only Skype for Business Online conversations. When you set this parameter to <b>TRUE</b> the connector retrieves only Skype for Business Online conversations.

For example:

```
[SkypeForBusinessOnline]
ExchangeOnline=TRUE
Username=user
Password=encrypted_password
WSURL=https://outlook.office365.com/EWS/Exchange.asmx
ExchangeOnlineMailbox=user1@domain.com,user2@domain.com
SkypeForBusinessOnline=TRUE
```

Additional folder and message selection parameters are available, but in most cases Micro Focus recommends setting only `SkypeForBusinessOnline=TRUE`. If you have applied in-place holds to mailboxes to capture deleted conversations, do not exclude the `RecoverableItems` folder.

6. Save and close the configuration file.

You can now start the connector.

## Schedule Fetch Tasks

The connector automatically runs the fetch tasks that you have configured, based on the schedule in the configuration file. To modify the schedule, follow these steps.

### To schedule fetch tasks

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. Find the [Connector] section.
4. The `EnableScheduledTasks` parameter specifies whether the connector should automatically run the fetch tasks that have been configured in the [FetchTasks] section. To run the tasks, set this parameter to `true`. For example:

```
[Connector]
EnableScheduledTasks=True
```

5. In the [Connector] section, set the following parameters:

<code>ScheduleStartTime</code>	<p>The start time for the fetch task, the first time it runs after you start the connector. The connector runs subsequent synchronize cycles after the interval specified by <code>ScheduleRepeatSecs</code>.</p> <p>Specify the start time in the format <code>H[H]:MM[:SS]</code>. To start running tasks as soon as the connector starts, do not set this parameter or use the value <code>now</code>.</p> <p>Tasks scheduled to start at the same time run in the order that they are enumerated by the <code>N</code> parameter (in the [FetchTasks] section of the configuration file).</p>
<code>ScheduleRepeatSecs</code>	<p>The interval (in seconds) from the start of one scheduled synchronize cycle to the start of the next. If a previous synchronize cycle is still running when the interval elapses, the connector queues a maximum of one action.</p>
<code>ScheduleCycles</code>	<p>The number of times that each fetch task is run. To run the tasks continuously until the connector is stopped, set this parameter to <code>-1</code>. To run each task only one time, set this parameter to <code>1</code>.</p>

For example:

```
[Connector]
EnableScheduledTasks=True
ScheduleStartTime=15:00:00
```



```
ScheduleRepeatSecs=3600  
ScheduleCycles=-1
```

6. (Optional) To run a specific fetch task on a different schedule, you can override these parameters in a *TaskName* section of the configuration file. For example:

```
[Connector]  
EnableScheduledTasks=TRUE  
ScheduleStartTime=15:00:00  
ScheduleRepeatSecs=3600  
ScheduleCycles=-1
```

...

```
[FetchTasks]  
Number=2  
0=MyTask0  
1=MyTask1
```

...

```
[MyTask1]  
ScheduleStartTime=16:00:00  
ScheduleRepeatSecs=60  
ScheduleCycles=-1
```

In this example, *MyTask0* follows the schedule defined in the `[Connector]` section, and *MyTask1* follows the scheduled defined in the `[MyTask1]` *TaskName* section.

7. Save and close the configuration file. You can now start the connector.

### **Related Topics**

- [Start and Stop the Connector, on page 39](#)

## **Synchronize from Identifiers**

The connector's synchronize action searches a repository for document updates and sends these updates for ingestion (for example, to CFS, for indexing into IDOL Server).

You can use the `identifiers` parameter to synchronize a specific set of documents, whether they have been updated or not, and ignore other files. For example:

```
/action=fetch&fetchaction=synchronize&identifiers=<identifiers>
```

(where `<identifiers>` is a comma-separated list of identifiers that specifies the documents to synchronize).

For example, if some documents fail the ingestion process, and are indexed into an IDOL Error Server, you can use the `identifiers` parameter with the `synchronize` action to retrieve those documents again. You can retrieve a list of identifiers for the failed documents by sending a query to the IDOL Error Server. For more information about IDOL Error Server, refer to the *IDOL Error Server*

*Technical Note.* For more information about the synchronize action, refer to the *Exchange Web Service Connector Reference*.

## Insert Messages into the Exchange Repository

You can use the `insert fetch` action to insert e-mail message (.eml) files into the Exchange repository. The insert action does not support attachments.

To insert a message into the repository, you must specify the following properties using the `insertXML` parameter of the `insert fetch` action.

Mailbox	The mailbox in which to insert the message, for example, <code>someone@example.com</code> .
FolderPath	(Optional) The path of the folder in which to insert the message, for example <code>Inbox/MyFolder</code> . The default value is <code>""</code> .
RootFolderId	(Optional). The ID of the folder that <code>FolderPath</code> is relative to. This property accepts the same values as the <code>BaseMailboxFolder</code> configuration parameter. The default value of this property is the folder specified by the <code>BaseMailboxFolder</code> configuration parameter.  For more information about the <code>BaseMailboxFolder</code> parameter, refer to the <i>Exchange Web Service Connector Reference</i> .

For example, the value of your `insertXML` action parameter might look like this:

```
<insertXML>
<insert>
  <reference>reference</reference>
  <property name="Mailbox" value="someone@example.com"/>
  <property name="FolderPath" value="Inbox/MyFolder"/>
  <property name="RootFolderId" value="MsgFolderRoot"/>
  <metadata name="fieldname" value="fieldvalue"/>
  <!-- ... -->
  <file>
    <type>file</type>
    <content>C:\My Folder\Message_to_insert.eml</content>
  </file>
</insert>
</insertXML>
```

The XML must be URL-encoded before being used in the action command. For example:

```
http://host:port/action=Fetch&FetchAction=Insert
      &ConfigSection=MyTask
      &InsertXML=[URL-encoded XML]
```

For more information about using the insert fetch action, refer to the *Exchange Web Service Connector Reference*.

## Delete Documents from the Exchange Repository

You can use the delete fetch action to delete messages from the Exchange repository. You cannot use the action to delete folders or mailboxes.

The delete action accepts a comma-separated list of document identifiers. Specify the identifiers for the documents that you want to delete:

```
http://host:port/action=Fetch&FetchAction=Delete
      &Identifiers=Identifier_CSV
```

For more information about using the delete fetch action, refer to the *Exchange Web Service Connector Reference*.

## Update Items in Exchange

The connector's update fetch action updates the metadata of items in the Exchange repository.

You can update the Access Control List (ACL) for a folder. This means that you can grant a user permissions on a folder or remove permissions.

To use the update action, you must construct some XML that specifies the identifiers of the items to update and provides the new metadata. You must add the XML to the action as the value of the `identifiersXML` action parameter. The XML must be URL-encoded before being used in the action command. For example:

```
http://host:port/action=Fetch&FetchAction=update
      &IdentifiersXML=URL-encoded XML
```

For more information about how to construct the XML, see [Construct XML to Update Access Control Lists, below](#).

### Construct XML to Update Access Control Lists

To update the Access Control Lists of items in Exchange, you must construct some XML that specifies the items to update, and provides information about how to change the ACL.

```
<identifiersXML>
  <identifier value="...">
    <acl_update>
      ...
    </acl_update>
  </identifier>
</identifiersXML>
```

```

    </identifier>
  </identifiersXML>

```

In the `identifier` value attribute, replace `"..."` with the identifier of the item that you want to update. Identifiers can be found using the `identifiers` fetch action. You can update the ACLs of several items by including more than one `identifier` element in your XML:

```

<identifiersXML>
  <identifier value="...">
    <acl_update>
      ...
    </acl_update>
  </identifier>
  <identifier value="...">
    <acl_update>
      ...
    </acl_update>
  </identifier>
</identifiersXML>

```

The following table describes the XML elements that you can use in the `acl_update` element to specify how to change the ACL.

XML Element	Description	Permitted Occurrences
<code>&lt;ace action="..."&gt;</code>	<p>Add or remove an entry from the ACL. The <code>action</code> attribute must be specified and accepts the value <code>add</code> or <code>remove</code>.</p> <p>The following child elements must all appear exactly once:</p> <ul style="list-style-type: none"> <li>• <code>principal</code> - the user whose permissions you want to modify in the ACL. The value you set must correspond to <code>principalType</code>.</li> <li>• <code>principalType</code> - the type of principal specified by the <code>principal</code> element:           <ul style="list-style-type: none"> <li>◦ <code>Email</code> - an e-mail address.</li> </ul> </li> <li>• <code>level</code> - a comma-separated list of permissions to add or remove:           <ul style="list-style-type: none"> <li>◦ <code>read</code></li> <li>◦ <code>edit</code></li> <li>◦ <code>delete</code></li> <li>◦ <code>visible</code></li> <li>◦ <code>createItems</code></li> </ul> </li> </ul>	0 or more

	<ul style="list-style-type: none"><li>◦ createSubFolders</li><li>◦ folderOwner</li><li>◦ folderContact</li><li>◦ * - denotes all permissions, allowed only when removing permissions.</li></ul>	
--	---	--

The following example demonstrates how to change the ACL for a folder in Exchange. It makes the following changes:

- removes all permissions from someuser@mydomain.com
- grants the specified list of permissions to otheruser@mydomain.com

```
<identifiersXML>
  <identifier value="BASE64IDENTIFIER==">
    <acl_update>
      <ace action="remove">
        <principal>someuser@mydomain.com</principal>
        <principalType>Email</principalType>
        <level>*</level>
      </ace>
      <ace action="add">
        <principal>otheruser@mydomain.com</principal>
        <principalType>Email</principalType>
        <level>read, edit, delete, visible, createItems, createSubFolders,
folderOwner, folderContact</level>
      </ace>
    </acl_update>
  </identifier>
</identifiersXML>
```

## Reset the Connector

When the connector runs the `synchronize` action, it updates a datastore file that stores information about the data retrieved from the repository. The next time the connector runs the `synchronize` action, it retrieves only data that is new or has been modified. The connector can also determine whether files or records have been deleted, so that related documents can be removed from the IDOL index.

When you are configuring the connector and you make a change to the configuration, you might want to purge all information from the datastore so that the connector retrieves all of your data again.

### To purge the datastore for a fetch task

- To purge the datastore for a fetch task, use the `PurgeDatastore` action. Specify the name of the task as the value of the `section` parameter, for example:

```
/action=PurgeDatastore&section=MyTask
```

In some cases you might want to delete all queued actions.

#### **To delete the actions queue**

1. Stop the connector.
2. Delete the actions folder. This ensures that information about incomplete and queued actions is deleted.
3. Restart the connector.

## **Troubleshoot the Connector**

This section describes how to troubleshoot common problems that might occur when you set up the Exchange Web Service Connector.

#### ***The Connector does not Retrieve a Mailbox***

ERROR: Unable to retrieve chosen root folder for mailbox: user@domain ... Server error message: Connection did not succeed. Try again later.

ERROR: Unable to retrieve chosen root folder for mailbox: user@domain ... Server error message: The specified object was not found in the store.

If you encounter one of these errors, the user configured to access the Exchange Web Services might not have sufficient permissions to access a mailbox.

#### ***Permissions Error when using Impersonation***

ERROR: Unable to retrieve chosen root folder for mailbox: user@domain ... Server error message: The account does not have permission to impersonate the requested user.

If you encounter this error, the connector is configured to retrieve messages by impersonating other users but the user configured to access the Exchange Web Service does not have permission to impersonate the owner of the specified mailbox. Consider granting the user permission to impersonate the mailbox owner. Alternatively, set the connector's `ImpersonateMailboxOwner` configuration parameter to `FALSE`, and grant permissions to the Exchange user through a different method.

#### ***Error when Accessing Public Folders***

ERROR: Failed to process Public Folders ... Server error message: In order to access a public folder, the effective caller must have a mailbox.

This error occurs when the user configured to access the Exchange Web Service does not have a mailbox and therefore cannot access public folders. To prevent this error, create a mailbox for the user. After creating the mailbox, you might have to wait for the change to take effect.

# Chapter 7: Exchange Mapped Security

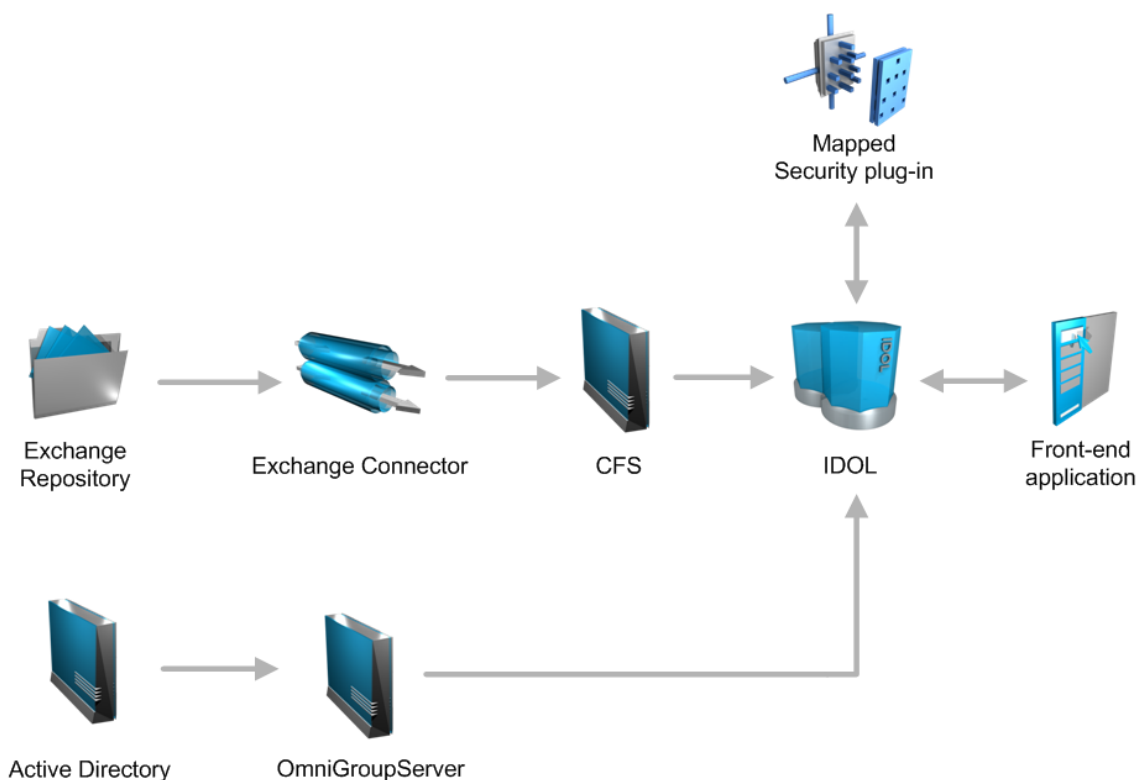
This section describes how to set up mapped security for information that is extracted from Exchange.

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- [Set up Exchange Mapped Security](#) ..... 65
- [Retrieve and Index Access Control Lists](#) ..... 65
- [Retrieve Security Group Information](#) ..... 66

## Introduction

The Exchange mapped security architecture includes the following components:

- Active Directory
- Exchange repository
- Exchange Web Service Connector
- Micro Focus OmniGroupServer
- Micro Focus IDOL server
- Micro Focus IDOL Mapped Security plug-in
- A front-end application



Items in the Exchange repository have an Access Control List (ACL) that lists the users and groups who are permitted, and are not permitted, to view the item.

The Exchange Connector retrieves information from the repository and sends documents to CFS to be indexed into IDOL Server. The connector extracts the ACL for each item, and writes it to a document field. Each time the connector synchronizes with the repository, it extracts updated ACLs.

IDOL needs the ACL to determine whether a user can view a document that is returned as a result to a query. However, IDOL must also consider the groups that the user belongs to. A user might not be permitted to view a document, but they could be a member of a group that has permission. Exchange uses NT security. This means that IDOL requires the user and group information from your Active Directory.

OmniGroupServer extracts the security group information from Active Directory using LDAP, and stores it.

When a user logs on to a front-end application, the application requests the user's security information and group memberships from IDOL server. IDOL returns a token containing the information. The front-end application includes this token in all queries the user sends to IDOL.

After a user submits a query, IDOL sends the result documents and the user's security token to the Mapped Security plug-in. The Mapped Security plug-in compares the user's security information and group memberships to each document's ACL. The plug-in determines which documents the user is permitted to view and returns the results. IDOL server then sends only the documents that the user is permitted to view to the front-end application.



## Set up Exchange Mapped Security

To use mapped security to protect information that was extracted from an Exchange repository, set up the following components:

- IDOL server. You must set up IDOL server to process the security information contained in each document. You must also configure user security, so that IDOL sends user and group information to the front-end application when a user logs on. For information about how to set up IDOL Server, refer to the *IDOL Document Security Administration Guide*.
- Exchange Web Service Connector. You must set up the connector to include security information (Access Control Lists) in the documents that are indexed into IDOL server. You must also add a field to each document that identifies the security type. For information about how to do this, see [Retrieve and Index Access Control Lists, below](#).
- OmniGroupServer. You must set up OmniGroupServer to retrieve user and group information from Active Directory. For information about how to configure OmniGroupServer, see [Retrieve Security Group Information, on the next page](#).
- A front-end application for querying IDOL server.

## Retrieve and Index Access Control Lists

To configure the Exchange Web Service Connector to retrieve and index Access Control Lists (ACLs), follow these steps.

### To retrieve and index Access Control Lists

1. If the connector is running, stop the connector.
2. Open the connector's configuration file.
3. Set the MappedSecurity parameter to **true**.
  - To index ACLs for all fetch tasks, set this parameter in the [FetchTasks] section.
  - To index ACLs for a single fetch task, set this parameter in the TaskName section for the task.

For example:

```
[FetchTasks]
MappedSecurity=True
```

4. Add a field to each document to specify the security type. To do this, create an ingest action or run a Lua script. For example:

```
[Ingestion]
IngestActions=META:SecurityType=NT
```

**NOTE:** The field name and value that you specify must match the name and value you used to identify NT security in your IDOL Server configuration file.

5. Save and close the configuration file.

## Retrieve Security Group Information

To retrieve security groups from Active Directory, follow these steps.

### To retrieve security groups from Active Directory

1. Open the OmniGroupServer configuration file.
2. In the [Repositories] section, create a repository to store the Active Directory groups. For example:

```
[Repositories]
Number=1
0=NT
```

3. In the new section, configure a task to extract the information from the directory using LDAP. You can use the following configuration parameters (for a complete list of configuration parameters, refer to the *OmniGroupServer Reference*).

GroupServerLibrary	The path (including the file name) to the library file that allows the group server to access the repository. Use the LDAP group server library.
LDAPServer	The host name or IP address of the machine that hosts the LDAP directory.
LDAPPort	The port to use to access the LDAP directory.
LDAPBase	The distinguished name of the search base.
LDAPType	The type of LDAP server (for example, Microsoft Active Directory).
LDAPSecurityType	The type of security to use when communicating with the LDAP server (for example, SSL or TLS).
LDAPBindMethod	The type of authentication to use to access the LDAP directory. To log on as the same user that is running OmniGroupServer, set this parameter to NEGOTIATE.

For example:

```
[NT]
GroupServerLibrary=ogs_ldap.dll
LDAPServer=myLDAPserver
LDAPPort=636
LDAPBase=DC=DOMAIN,DC=COM
```

```
LDAPType=MAD  
LDAPSecurityType=SSL  
LDAPBindMethod=NEGOTIATE
```

4. (Optional) You can set further parameters to define the schedule for the task. You can set these parameters in the task section (to schedule only the current task), or in the [Default] section (to provide a default schedule for all OmniGroupServer tasks).

GroupServerStartTime	The time when a task starts.
GroupServerRepeatSecs	The number of seconds that elapse before the Group Server repeats a task.

For example:

```
[NT]  
GroupServerLibrary=ogs_ldap.dll  
LDAPServer=myLDAPserver  
LDAPPort=636  
LDAPBase=DC=DOMAIN,DC=COM  
LDAPType=MAD  
LDAPSecurityType=SSL  
LDAPBindMethod=NEGOTIATE  
GroupServerStartTime=12:00  
GroupServerRepeatSecs=3600
```

5. Save and close the OmniGroupServer configuration file.

# Chapter 8: Manipulate Documents

This section describes how to manipulate documents that are created by the connector and sent for ingestion.

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• <a href="#">Add a Field to Documents using an Ingest Action</a> .....	68
• <a href="#">Customize Document Processing</a> .....	69
• <a href="#">Standardize Field Names</a> .....	70
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## Introduction

IDOL Connectors retrieve data from repositories and create documents that are sent to Connector Framework Server or another connector. You might want to manipulate the documents that are created. For example, you can:

- Add or modify document fields, to change the information that is indexed into IDOL Server.
- Add fields to a document to customize the way the document is processed by CFS.
- Convert information into another format so that it can be inserted into another repository by a connector that supports the `Insert` action.

When a connector sends documents to CFS, the documents only contain metadata extracted from the repository by the connector (for example, the location of the original files). To modify data extracted by KeyView, you must modify the documents using CFS. For information about how to manipulate documents with CFS, refer to the *Connector Framework Server Administration Guide*.

## Add a Field to Documents using an Ingest Action

To add a field to all documents retrieved by a fetch task, or all documents sent for ingestion, you can use an Ingest Action.

**NOTE:** To add a field only to selected documents, use a Lua script (see [Run Lua Scripts, on page 75](#)). For an example Lua script that demonstrates how to add a field to a document, see [Add a Field to a Document, on page 78](#).

### To add a field to documents using an Ingest Action

1. Open the connector's configuration file.
2. Find one of the following sections in the configuration file:
  - To add the field to all documents retrieved by a specific fetch task, find the [TaskName] section.
  - To add a field to all documents that are sent for ingestion, find the [Ingestion] section.

**NOTE:** If you set the IngestActions parameter in a [TaskName] section, the connector does not run any IngestActions set in the [Ingestion] section for documents retrieved by that task.

3. Use the IngestActions parameter to specify the name of the field to add, and the field value. For example, to add a field named AUTN\_NO\_EXTRACT, with the value SET, type:

```
IngestActions0=META:AUTN_NO_EXTRACT=SET
```

4. Save and close the configuration file.

## Customize Document Processing

You can add the following fields to a document to control how the document is processed by CFS. Unless stated otherwise, you can add the fields with any value.

### **AUTN\_FILTER\_META\_ONLY**

Prevents KeyView extracting file content from a file. KeyView only extracts metadata and adds this information to the document.

### **AUTN\_NO\_FILTER**

Prevents KeyView extracting file content and metadata from a file. You can use this field if you do not want to extract text from certain file types.

### **AUTN\_NO\_EXTRACT**

Prevents KeyView extracting subfiles. You can use this field to prevent KeyView extracting the contents of ZIP archives and other container files.

### **AUTN\_NEEDS\_MEDIA\_SERVER\_ANALYSIS**

Identifies media files (images, video, and documents such as PDF files that contain embedded images) that you want to send to Media Server for analysis, using a MediaServerAnalysis import task. You do not need to add this field if you are using a Lua script to run media analysis. For more information about running analysis on media, refer to the *Connector Framework Server Administration Guide*.

## Standardize Field Names

Field standardization modifies documents so that they have a consistent structure and consistent field names. You can use field standardization so that documents indexed into IDOL through different connectors use the same fields to store the same type of information.

For example, documents created by the File System Connector can have a field named `FILEOWNER`. Documents created by the Documentum Connector can have a field named `owner_name`. Both of these fields store the name of the person who owns a file. Field standardization renames the fields so that they have the same name.

Field standardization only modifies fields that are specified in a dictionary, which is defined in XML format. A standard dictionary, named `dictionary.xml`, is supplied in the installation folder of every connector. If a connector does not have any entries in the dictionary, field standardization has no effect.

## Configure Field Standardization

IDOL Connectors have several configuration parameters that control field standardization. All of these are set in the `[Connector]` section of the configuration file:

- `EnableFieldNameStandardization` specifies whether to run field standardization.
- `FieldNameDictionaryPath` specifies the path of the dictionary file to use.
- `FieldNameDictionaryNode` specifies the rules to use. The default value for this parameter matches the name of the connector, and Micro Focus recommends that you do not change it. This prevents one connector running field standardization rules that are intended for another.

To configure field standardization, use the following procedure.

**NOTE:** You can also configure CFS to run field standardization. To standardize all field names, you must run field standardization from both the connector and CFS.

### To enable field standardization

1. Stop the connector.
2. Open the connector's configuration file.
3. In the `[Connector]` section, set the following parameters:

<code>EnableFieldNameStandardization</code>	A Boolean value that specifies whether to enable field standardization. Set this parameter to <b>true</b> .
<code>FieldNameDictionaryPath</code>	The path to the dictionary file that contains the rules to use to standardize documents. A standard

dictionary is included with the connector and is named `dictionary.xml`.

For example:

```
[Connector]
EnableFieldNameStandardization=true
FieldNameDictionaryPath=dictionary.xml
```

4. Save the configuration file and restart the connector.

## Customize Field Standardization

Field standardization modifies documents so that they have a consistent structure and consistent field names. You can use field standardization so that documents indexed into IDOL through different connectors use the same fields to store the same type of information. Field standardization only modifies fields that are specified in a dictionary, which is defined in XML format. A standard dictionary, named `dictionary.xml`, is supplied in the installation folder of every connector.

In most cases you should not need to modify the standard dictionary, but you can modify it to suit your requirements or create dictionaries for different purposes. By modifying the dictionary, you can configure the connector to apply rules that modify documents before they are ingested. For example, you can move fields, delete fields, or change the format of field values.

The following examples demonstrate how to perform some operations with field standardization.

The following rule renames the field `Author` to `DOCUMENT_METADATA_AUTHOR_STRING`. This rule applies to all components that run field standardization and applies to all documents.

```
<FieldStandardization>
  <Field name="Author">
    <Move name="DOCUMENT_METADATA_AUTHOR_STRING"/>
  </Field>
</FieldStandardization>
```

The following rule demonstrates how to use the `Delete` operation. This rule instructs CFS to remove the field `KeyviewVersion` from all documents (the `Product` element with the attribute `key="ConnectorFramework"` ensures that this rule is run only by CFS).

```
<FieldStandardization>
  <Product key="ConnectorFramework">
    <Field name="KeyviewVersion">
      <Delete/>
    </Field>
  </Product>
</FieldStandardization>
```

There are several ways to select fields to process using the `Field` element.

Field element attribute	Description	Example
-------------------------	-------------	---------

<p>name</p>	<p>Select a field where the field name matches a fixed value.</p>	<p>Select the field MyField:</p> <pre>&lt;Field name="MyField"&gt; ... &lt;/Field&gt;</pre> <p>Select the field Subfield, which is a subfield of MyField:</p> <pre>&lt;Field name="MyField"&gt;   &lt;Field name="Subfield"&gt;     ...   &lt;/Field&gt; &lt;/Field&gt;</pre>
<p>path</p>	<p>Select a field where its path matches a fixed value.</p>	<p>Select the field Subfield, which is a subfield of MyField.</p> <pre>&lt;Field path="MyField/Subfield"&gt; ... &lt;/Field&gt;</pre>
<p>nameRegex</p>	<p>Select all fields at the current depth where the field name matches a regular expression.</p>	<p>In this case the field name must begin with the word File:</p> <pre>&lt;Field nameRegex="File.*"&gt; ... &lt;/Field&gt;</pre>
<p>pathRegex</p>	<p>Select all fields where the path of the field matches a regular expression.</p> <p>This operation can be inefficient because every metadata field must be checked. If possible, select the fields to process another way.</p>	<p>This example selects all subfields of MyField.</p> <pre>&lt;Field pathRegex="MyField/[^/]*"&gt; ... &lt;/Field&gt;</pre> <p>This approach would be more efficient:</p> <pre>&lt;Field name="MyField"&gt;   &lt;Field nameRegex=".*"&gt;     ...   &lt;/Field&gt; &lt;/Field&gt;</pre>

You can also limit the fields that are processed based on their value, by using one of the following:

Field element attribute	Description	Example
<p>matches</p>	<p>Process a field if its value matches a fixed value.</p>	<p>Process a field named MyField, if its value matches abc.</p> <pre>&lt;Field name="MyField" matches="abc"&gt;</pre>



		<pre>         ...       &lt;/Field&gt;     </pre>
matchesRegex	Process a field if its entire value matches a regular expression.	<pre>       Process a field named MyField, if its value matches       one or more digits.       &lt;Field name="MyField" matchesRegex="\d+"&gt;         ...       &lt;/Field&gt;     </pre>
containsRegex	Process a field if its value contains a match to a regular expression.	<pre>       Process a field named MyField if its value contains       three consecutive digits.       &lt;Field name="MyField" containsRegex="\d{3}"&gt;         ...       &lt;/Field&gt;     </pre>

The following rule deletes every field or subfield where the name of the field or subfield begins with temp.

```

<FieldStandardization>
  <Field pathRegex="(.*\/)?temp[^\/*]*">
    <Delete/>
  </Field>
</FieldStandardization>
  
```

The following rule instructs CFS to rename the field Author to DOCUMENT\_METADATA\_AUTHOR\_STRING, but only when the document contains a field named DocumentType with the value 230 (the KeyView format code for a PDF file).

```

<FieldStandardization>
  <Product key="ConnectorFrameWork">
    <IfField name="DocumentType" matches="230"> <!-- PDF -->
      <Field name="Author">
        <Move name="DOCUMENT_METADATA_AUTHOR_STRING"/>
      </Field>
    </IfField>
  </Product>
</FieldStandardization>
  
```

**TIP:** In this example, the IfField element is used to check the value of the DocumentType field. The IfField element does not change the current position in the document. If you used the Field element, field standardization would attempt to find an Author field that is a subfield of DocumentType, instead of finding the Author field at the root of the document.

The following rules demonstrate how to use the ValueFormat operation to change the format of dates. The first rule transforms the value of a field named CreatedDate. The second rule transforms the value of an attribute named Created, on a field named Date.

```

<FieldStandardization>
  <Field name="CreatedDate">
    <ValueFormat type="autndate" format="YYYY-SHORTMONTH-DD HH:NN:SS"/>
  </Field>
</FieldStandardization>
  
```

```

</Field>
<Field name="Date">
  <Attribute name="Created">
    <ValueFormat type="autndate" format="YYYY-SHORTMONTH-DD HH:NN:SS"/>
  </Attribute>
</Field>
</FieldStandardization>
    
```

The ValueFormat element has the following attributes:

type	To convert the date into the IDOL AUTNDATE format, specify autndate. To convert the date into a custom format, specify customdate and then set the attribute targetformat.
format	The format to convert the date from. Specify the format using standard IDOL date formats.
targetformat	The format to convert the date into, when you set the type attribute to customdate. Specify the format using standard IDOL date formats.

As demonstrated by the previous example, you can select field attributes to process in a similar way to selecting fields.

You must select attributes using either a fixed name or a regular expression:

Select a field attribute by name `<Attribute name="MyAttribute">`

Select attributes that match a regular expression `<Attribute nameRegex=".*">`

You can then add a restriction to limit the attributes that are processed:

Process an attribute only if its value matches a fixed value `<Attribute name="MyAttribute" matches="abc">`

Process an attribute only if its value matches a regular expression `<Attribute name="MyAttribute" matchesRegex=".*">`

Process an attribute only if its value contains a match to a regular expression `<Attribute name="MyAttribute" containsRegex="\w+">`

The following rule moves all of the attributes of a field to sub fields, if the parent field has no value. The id attribute on the first Field element provides a name to a matching field so that it can be referred to by later operations. The GetName and GetValue operations save the name and value of a selected field or attribute (in this case an attribute) into variables (in this case \$'name' and \$'value') which can be used by later operations. The AddField operation uses the variables to add a new field at the selected location (the field identified by id="parent").

```

<FieldStandardization>
  <Field pathRegex=".*" matches="" id="parent">
    <Attribute nameRegex=".*">
    
```

```
<GetName var="name"/>
<GetValue var="value"/>
<Field fieldId="parent">
  <AddField name="$'name'" value="$'value'"/>
</Field>
<Delete/>
</Attribute>
</Field>
</FieldStandardization>
```

The following rule demonstrates how to move all of the subfields of `UnwantedParentField` to the root of the document, and then delete the field `UnwantedParentField`.

```
<FieldStandardization id="root">
  <Product key="MyConnector">
    <Field name="UnwantedParentField">
      <Field nameRegex=".*">
        <Move destId="root"/>
      </Field>
      <Delete/>
    </Field>
  </Product>
</FieldStandardization>
```

## Run Lua Scripts

IDOL Connectors can run custom scripts written in Lua, an embedded scripting language. You can use Lua scripts to process documents that are created by a connector, before they are sent to CFS and indexed into IDOL Server. For example, you can:

- Add or modify document fields.
- Manipulate the information that is indexed into IDOL.
- Call out to an external service, for example to alert a user.

There might be occasions when you do not want to send documents to a CFS. For example, you might use the `Collect` action to retrieve documents from one repository and then insert them into another. You can use a Lua script to transform the documents from the source repository so that they can be accepted by the destination repository.

To run a Lua script from a connector, use one of the following methods:

- Set the `IngestActions` configuration parameter in the connector's configuration file. For information about how to do this, see [Run a Lua Script using an Ingest Action, on page 77](#). The connector runs ingest actions on documents before they are sent for ingestion.
- Set the `IngestActions` action parameter when using the `Synchronize` action.
- Set the `InsertActions` configuration parameter in the connector's configuration file. The

connector runs insert actions on documents before they are inserted into a repository.

- Set the `CollectActions` action parameter when using the `Collect` action.

## Write a Lua Script

A Lua script that is run from a connector must have the following structure:

```
function handler(config, document, params)
    ...
end
```

The handler function is called for each document and is passed the following arguments:

Argument	Description
<code>config</code>	A <code>LuaConfig</code> object that you can use to retrieve the values of configuration parameters from the connector's configuration file.
<code>document</code>	A <code>LuaDocument</code> object. The document object is an internal representation of the document being processed. Modifying this object changes the document.
<code>params</code>	The <code>params</code> argument is a table that contains additional information provided by the connector: <ul style="list-style-type: none"><li>• <b>TYPE.</b> The type of task being performed. The possible values are <code>ADD</code>, <code>UPDATE</code>, <code>DELETE</code>, or <code>COLLECT</code>.</li><li>• <b>SECTION.</b> The name of the section in the configuration file that contains configuration parameters for the task.</li><li>• <b>FILENAME.</b> The document filename. The Lua script can modify this file, but must not delete it.</li><li>• <b>OWNFILE.</b> Indicates whether the connector (and CFS) has ownership of the file. A value of <code>true</code> means that CFS deletes the file after it has been processed.</li></ul>

The following script demonstrates how you can use the `config` and `params` arguments:

```
function handler(config, document, params)
    -- Write all of the additional information to a log file
    for k,v in pairs(params) do
        log("logfile.txt", k..": "..tostring(v))
    end

    -- The following lines set variables from the params argument
    type = params["TYPE"]
    section = params["SECTION"]
    filename = params["FILENAME"]

    -- Read a configuration parameter from the configuration file
    -- If the parameter is not set, "DefaultValue" is returned
```

```
val = config:getValue(section, "Parameter", "DefaultValue")

-- If the document is not being deleted, set the field FieldName
-- to the value of the configuration parameter
if type ~= "DELETE" then
    document:setFieldValue("FieldName", val)
end

-- If the document has a file (that is, not just metadata),
-- copy the file to a new location and write a stub idx file
-- containing the metadata.
if filename ~= "" then
    copytofilename = "./out/"..create_uuid(filename)
    copy_file(filename, copytofilename)
    document:writeStubIdx(copytofilename..".idx")
end

return true
end
```

For the connector to continue processing the document, the handler function must return **true**. If the function returns **false**, the document is discarded.

**TIP:** You can write a library of useful functions to share between multiple scripts. To include a library of functions in a script, add the code `dofile("library.lua")` to the top of the lua script, outside of the handler function.

## Run a Lua Script using an Ingest Action

To run a Lua script on documents that are sent for ingestion, use an Ingest Action.

### To run a Lua script using an Ingest Action

1. Open the connector's configuration file.
2. Find one of the following sections in the configuration file:
  - To run a Lua script on all documents retrieved by a specific task, find the [TaskName] section.
  - To run a Lua script on all documents that are sent for ingestion, find the [Ingestion] section.

**NOTE:** If you set the IngestActions parameter in a [TaskName] section, the connector does not run any IngestActions set in the [Ingestion] section for that task.

3. Use the IngestActions parameter to specify the path to your Lua script. For example:

```
IngestActions=LUA:C:\Autonomy\myScript.lua
```

4. Save and close the configuration file.

### **Related Topics**

- [Write a Lua Script, on page 76](#)

## **Example Lua Scripts**

This section contains example Lua scripts.

- [Add a Field to a Document, below](#)
- [Merge Document Fields, below](#)

### **Add a Field to a Document**

The following script demonstrates how to add a field named “MyField” to a document, with a value of “MyValue”.

```
function handler(config, document, params)
    document:addField("MyField", "MyValue");
    return true;
end
```

The following script demonstrates how to add the field `AUTN_NEEDS_MEDIA_SERVER_ANALYSIS` to all JPEG, TIFF and BMP documents. This field indicates to CFS that the file should be sent to a Media Server for analysis (you must also define the `MediaServerAnalysis` task in the CFS configuration file).

The script finds the file type using the `DRREFERENCE` document field, so this field must contain the file extension for the script to work correctly.

```
function handler(config, document, params)
    local extensions_for_ocr = { jpg = 1 , tif = 1, bmp = 1 };
    local filename = document:getFieldValue("DRREFERENCE");
    local extension, extension_found = filename:gsub("^.*%.(%w+)$", "%1", 1);

    if extension_found > 0 then
        if extensions_for_ocr[extension:lower()] ~= nil then
            document:addField("AUTN_NEEDS_MEDIA_SERVER_ANALYSIS", "");
        end
    end

    return true;
end
```

### **Merge Document Fields**

This script demonstrates how to merge the values of document fields.

When you extract data from a repository, the connector can produce documents that have multiple values for a single field, for example:

```
#DREFIELD ATTACHMENT="attachment.txt"  
#DREFIELD ATTACHMENT="image.jpg"  
#DREFIELD ATTACHMENT="document.pdf"
```

This script shows how to merge the values of these fields, so that the values are contained in a single field, for example:

```
#DREFIELD ATTACHMENTS="attachment.txt, image.jpg, document.pdf"
```

## Example Script

```
function handler(config, document, params)  
    onefield(document,"ATTACHMENT","ATTACHMENTS")  
    return true;  
end  
  
function onefield(document,existingfield,newfield)  
    if document:hasField(existingfield) then  
        local values = { document:getFieldValues(existingfield) }  
  
        local newfieldvalue=""  
        for i,v in ipairs(values) do  
            if i>1 then  
                newfieldvalue = newfieldvalue ..", "  
            end  
  
            newfieldvalue = newfieldvalue..v  
        end  
  
        document:addField(newfield,newfieldvalue)  
    end  
  
    return true;  
end
```

# Chapter 9: Ingestion

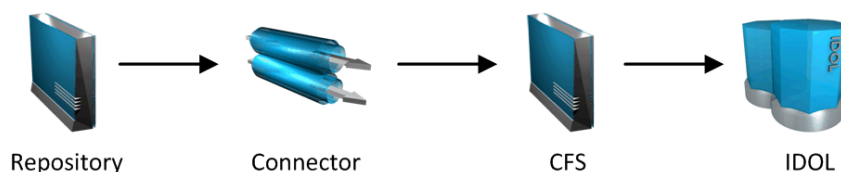
After a connector finds new documents in a repository, or documents that have been updated or deleted, it sends this information to another component called the *ingestion target*. This section describes where you can send the information retrieved by the Exchange Web Service Connector, and how to configure the ingestion target.

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- [Send Data to Connector Framework Server](#) ..... 81
- [Send Data to Another Repository](#) ..... 82
- [Index Documents Directly into IDOL Server](#) ..... 83
- [Index Documents into Vertica](#) ..... 84
- [Send Data to a MetaStore](#) ..... 87
- [Run a Lua Script after Ingestion](#) ..... 88

## Introduction

A connector can send information to a single ingestion target, which could be:

- **Connector Framework Server.** To process information and then index it into IDOL or Vertica, send the information to a Connector Framework Server (CFS). Any files retrieved by the connector are *imported* using KeyView, which means the information contained in the files is converted into a form that can be indexed. If the files are containers that contain *subfiles*, these are extracted. You can manipulate and enrich documents using Lua scripts and automated tasks such as field standardization, image analysis, and speech-to-text processing. CFS can index your documents into one or more indexes. For more information about CFS, refer to the *Connector Framework Server Administration Guide*.



- **Another Connector.** Use another connector to keep another repository up-to-date. When a connector receives documents, it inserts, updates, or deletes the information in the repository. For example, you could use an Exchange Connector to extract information from Microsoft Exchange, and send the documents to a Notes Connector so that the information is inserted, updated, or deleted in the Notes repository.

**NOTE:** The destination connector can only insert, update, and delete documents if it supports the insert, update, and delete fetch actions.



In most cases Micro Focus recommends ingesting documents through CFS, so that KeyView can extract content from any files retrieved by the connector and add this information to your documents. You can also use CFS to manipulate and enrich documents before they are indexed. However, if required you can configure the connector to index documents directly into:

- **IDOL Server.** You might index documents directly into IDOL Server when your connector produces metadata-only documents (documents that do not have associated files). In this case there is no need for the documents to be imported. Connectors that can produce metadata-only documents include ODBC Connector and Oracle Connector.
- **Vertica.** The metadata extracted by connectors is structured information held in structured fields, so you might use Vertica to analyze this information.
- **MetaStore.** You can index document metadata into a MetaStore for records management.

## Send Data to Connector Framework Server

This section describes how to configure ingestion into Connector Framework Server (CFS).

### To send data to a CFS

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. In the [Ingestion] section, set the following parameters:

<code>EnableIngestion</code>	To enable ingestion, set this parameter to <code>true</code> .
<code>IngesterType</code>	To send data to CFS, set this parameter to <code>CFS</code> .
<code>IngestHost</code>	The host name or IP address of the CFS.
<code>IngestPort</code>	The ACI port of the CFS.

For example:

```
[Ingestion]
EnableIngestion=True
IngesterType=CFS
IngestHost=localhost
IngestPort=7000
```

4. (Optional) If you are sending documents to CFS for indexing into IDOL Server, set the `IndexDatabase` parameter. When documents are indexed, IDOL adds each document to the database specified in the document's `DREDBNAME` field. The connector sets this field for each document, using the value of `IndexDatabase`.

<code>IndexDatabase</code>	The name of the IDOL database into which documents are indexed. Ensure that this database exists in the IDOL Server configuration file.
----------------------------	--

- To index all documents retrieved by the connector into the same IDOL database, set this parameter in the [Ingestion] section.
  - To use a different database for documents retrieved by each task, set this parameter in the *TaskName* section.
5. Save and close the configuration file.

## Send Data to Another Repository

You can configure a connector to send the information it retrieves to another connector. When the destination connector receives the documents, it inserts them into another repository. When documents are updated or deleted in the source repository, the source connector sends this information to the destination connector so that the documents can be updated or deleted in the other repository.

**NOTE:** The destination connector can only insert, update, and delete documents if it supports the insert, update, and delete fetch actions.

### To send data to another connector for ingestion into another repository

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. In the [Ingestion] section, set the following parameters:

<code>EnableIngestion</code>	To enable ingestion, set this parameter to <code>true</code> .
<code>IngesterType</code>	To send data to another repository, set this parameter to <code>Connector</code> .
<code>IngestHost</code>	The host name or IP address of the machine hosting the destination connector.
<code>IngestPort</code>	The ACI port of the destination connector.
<code>IngestActions</code>	Set this parameter so that the source connector runs a Lua script to convert documents into form that can be used with the destination connector's insert action. For information about the required format, refer to the Administration Guide for the destination connector.

For example:

```
[Ingestion]
EnableIngestion=True
IngesterType=Connector
IngestHost=AnotherConnector
IngestPort=7010
IngestActions=Lua:transformation.lua
```

4. Save and close the configuration file.

## Index Documents Directly into IDOL Server

This section describes how to index documents from a connector directly into IDOL Server.

**TIP:** In most cases, Micro Focus recommends sending documents to a Connector Framework Server (CFS). CFS extracts metadata and content from any files that the connector has retrieved, and can manipulate and enrich documents before they are indexed. CFS also has the capability to insert documents into more than one index, for example IDOL Server and a Vertica database. For information about sending documents to CFS, see [Send Data to Connector Framework Server, on page 81](#)

### To index documents directly into IDOL Server

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. In the [Ingestion] section, set the following parameters:

EnableIngestion	To enable ingestion, set this parameter to <b>true</b> .
IngesterType	To send data to IDOL Server, set this parameter to <b>Indexer</b> .
IndexDatabase	The name of the IDOL database to index documents into.

For example:

```
[Ingestion]
EnableIngestion=True
IngesterType=Indexer
IndexDatabase=News
```

4. In the [Indexing] section of the configuration file, set the following parameters:

IndexerType	To send data to IDOL Server, set this parameter to <b>IDOL</b> .
Host	The host name or IP address of the IDOL Server.
Port	The IDOL Server ACI port.
SSLConfig	(Optional) The name of a section in the connector's configuration file that contains SSL settings for connecting to IDOL.

For example:

```
[Indexing]
IndexerType=IDOL
Host=10.1.20.3
Port=9000
```

```
SSLConfig=SSLOptions
```

```
[SSLOptions]
```

```
SSLMethod=SSLV23
```

5. Save and close the configuration file.

## Index Documents into Vertica

Exchange Web Service Connector can index documents into Vertica, so that you can run queries on structured fields (document metadata).

Depending on the metadata contained in your documents, you could investigate the average age of documents in a repository. You might want to answer questions such as: How much time has passed since the documents were last updated? How many files are regularly updated? Does this represent a small proportion of the total number of documents? Who are the most active users?

**TIP:** In most cases, Micro Focus recommends sending documents to a Connector Framework Server (CFS). CFS extracts metadata and content from any files that the connector has retrieved, and can manipulate and enrich documents before they are indexed. CFS also has the capability to insert documents into more than one index, for example IDOL Server and a Vertica database. For information about sending documents to CFS, see [Send Data to Connector Framework Server, on page 81](#)

## Prerequisites

- Exchange Web Service Connector supports indexing into Vertica 7.1 and later.
- You must install the appropriate Vertica ODBC drivers (version 7.1 or later) on the machine that hosts Exchange Web Service Connector. If you want to use an ODBC Data Source Name (DSN) in your connection string, you will also need to create the DSN. For more information about installing Vertica ODBC drivers and creating the DSN, refer to the [Vertica documentation](#).

## New, Updated and Deleted Documents

When documents are indexed into Vertica, Exchange Web Service Connector adds a timestamp that contains the time when the document was indexed. The field is named `VERTICA_INDEXER_TIMESTAMP` and the timestamp is in the format `YYYY-MM-DD HH:NN:SS`.

When a document in a data repository is modified, Exchange Web Service Connector adds a new record to the database with a new timestamp. All of the fields are populated with the latest data. The record describing the older version of the document is not deleted. You can create a projection to make sure your queries only return the latest record for a document.

When Exchange Web Service Connector detects that a document has been deleted from a repository, the connector inserts a new record into the database. The record contains only the `DRREFERENCE` and the field `VERTICA_INDEXER_DELETED` set to `TRUE`.

## Fields, Sub-Fields, and Field Attributes

Documents that are created by connectors can have multiple levels of fields, and field attributes. A database table has a flat structure, so this information is indexed into Vertica as follows:

- Document fields become columns in the flex table. An IDOL document field and the corresponding database column have the same name.
- Sub-fields become columns in the flex table. A document field named `my_field` with a sub-field named `subfield` results in two columns, `my_field` and `my_field.subfield`.
- Field attributes become columns in the flex table. A document field named `my_field`, with an attribute named `my_attribute` results in two columns, `my_field` holding the field value and `my_field.my_attribute` holding the attribute value.

## Prepare the Vertica Database

Indexing documents into a standard database is problematic, because documents do not have a fixed schema. A document that represents an image has different metadata fields to a document that represents an e-mail message. Vertica databases solve this problem with *flex tables*. You can create a flex table without any column definitions, and you can insert a record regardless of whether a referenced column exists.

You must create a flex table before you index data into Vertica.

When creating the table, consider the following:

- Flex tables store entire records in a single column named `__raw__`. The default maximum size of the `__raw__` column is 128K. You might need to increase the maximum size if you are indexing documents with large amounts of metadata.
- Documents are identified by their DRREFERENCE. Micro Focus recommends that you do not restrict the size of any column that holds this value, because this could result in values being truncated. As a result, rows that represent different documents might appear to represent the same document. If you do restrict the size of the DRREFERENCE column, ensure that the length is sufficient to hold the longest DRREFERENCE that might be indexed.

To create a flex table without any column definitions, run the following query:

```
create flex table my_table();
```

To improve query performance, create real columns for the fields that you query frequently. For documents indexed by a connector, this is likely to include the DRREFERENCE:

```
create flex table my_table(DRREFERENCE varchar NOT NULL);
```

You can add new column definitions to a flex table at any time. Vertica automatically populates new columns with values for existing records. The values for existing records are extracted from the `__raw__` column.

For more information about creating and using flex tables, refer to the [Vertica Documentation](#) or contact Vertica technical support.

## Send Data to Vertica

To send documents to a Vertica database, follow these steps.

### To send data to Vertica

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. In the [Ingestion] section, set the following parameters:

<code>EnableIngestion</code>	To enable ingestion, set this parameter to <code>true</code> .
<code>IngesterType</code>	To send data to a Vertica database, set this parameter to <code>Indexer</code> .

For example:

```
[Ingestion]
EnableIngestion=TRUE
IngesterType=Indexer
```

4. In the [Indexing] section, set the following parameters:

<code>IndexerType</code>	To send data to a Vertica database, set this parameter to <code>Library</code> .
<code>LibraryDirectory</code>	The directory that contains the library to use to index data.
<code>LibraryName</code>	The name of the library to use to index data. You can omit the <code>.dll</code> or <code>.so</code> file extension. Set this parameter to <code>verticaIndexer</code> .
<code>ConnectionString</code>	The connection string to use to connect to the Vertica database.
<code>TableName</code>	The name of the table in the Vertica database to index the documents into. The table must be a flex table and must exist before you start indexing documents. For more information, see <a href="#">Prepare the Vertica Database, on the previous page</a> .

For example:

```
[Indexing]
IndexerType=Library
LibraryDirectory=indexerdlls
LibraryName=verticaIndexer
ConnectionString=DSN=VERTICA
TableName=my_flex_table
```

5. Save and close the configuration file.

## Send Data to a MetaStore

You can configure a connector to send documents to a MetaStore. When you send data to a Metastore, any files associated with documents are ignored.

**TIP:** In most cases, Micro Focus recommends sending documents to a Connector Framework Server (CFS). CFS extracts metadata and content from any files that the connector has retrieved, and can manipulate and enrich documents before they are indexed. CFS also has the capability to insert documents into more than one index, for example IDOL Server and a MetaStore. For information about sending documents to CFS, see [Send Data to Connector Framework Server, on page 81](#)

### To send data to a MetaStore

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. In the [Ingestion] section, set the following parameters:

`EnableIngestion`      To enable ingestion, set this parameter to **true**.

`IngestionType`        To send data to a MetaStore, set this parameter to **Indexer**.

For example:

```
[Ingestion]
EnableIngestion=True
IngestionType=Indexer
```

4. In the [Indexing] section, set the following parameters:

`IndexerType`        To send data to a MetaStore, set this parameter to **MetaStore**.

`Host`                The host name of the machine hosting the MetaStore.

`Port`                The port of the MetaStore.

For example:

```
[Indexing]
IndexerType=Metastore
Host=MyMetaStore
Port=8000
```

5. Save and close the configuration file.

## Run a Lua Script after Ingestion

You can configure the connector to run a Lua script after batches of documents are successfully sent to the ingestion server. This can be useful if you need to log information about documents that were processed, for monitoring and reporting purposes.

To configure the file name of the Lua script to run, set the `IngestBatchActions` configuration parameter in the connector's configuration file.

- To run the script for all batches of documents that are ingested, set the parameter in the `[Ingestion]` section.
- To run the script for batches of documents retrieved by a specific task, set the parameter in the `[TaskName]` section.

**NOTE:** If you set the parameter in a `[TaskName]` section, the connector does not run any scripts specified in the `[Ingestion]` section for that task.

For example:

```
[Ingestion]
IngestBatchActions=LUA:./scripts/myScript.lua
```

For more information about this parameter, refer to the *Exchange Web Service Connector Reference*.

The Lua script must have the following structure:

```
function batchhandler(documents, ingesttype)
    ...
end
```

The `batchhandler` function is called after each batch of documents is sent to the ingestion server. The function is passed the following arguments:

Argument	Description
<code>documents</code>	A table of document objects, where each object represents a document that was sent to the ingestion server.  A document object is an internal representation of a document. You can modify the document object and this changes the document. However, as the script runs after the documents are sent to the ingestion server, any changes you make are not sent to CFS or IDOL.
<code>ingesttype</code>	A string that contains the ingest type for the documents. The <code>batchhandler</code> function is called multiple times if different document types are sent.

For example, the following script prints the ingest type (ADD, DELETE, or UPDATE) and the reference for all successfully processed documents to `stdout`:



```
function batchhandler(documents, ingesttype)
  for i,document in ipairs(documents) do
    local ref = document:getReference()
    print(ingesttype..": "..ref)
  end
end
```

# Chapter 10: Monitor the Connector

This section describes how to monitor the connector.

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• <a href="#">View Connector Statistics</a> .....	92
• <a href="#">Use the Connector Logs</a> .....	93
• <a href="#">Monitor the Progress of a Task</a> .....	95
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## IDOL Admin

IDOL Admin is an administration interface for performing ACI server administration tasks, such as gathering status information, monitoring performance, and controlling the service. IDOL Admin provides an alternative to constructing actions and sending them from your web browser.

### Prerequisites

Exchange Web Service Connector includes the `admin.dat` file that is required to run IDOL Admin.

IDOL Admin supports the following browsers:

- Edge
- Chrome (latest version)
- Firefox (latest version)

### Install IDOL Admin

You must install IDOL Admin on the same host that the ACI server or component is installed on. To set up a component to use IDOL Admin, you must configure the location of the `admin.dat` file and enable Cross Origin Resource Sharing.

#### To install IDOL Admin

1. Stop the ACI server.
2. Save the `admin.dat` file to any directory on the host.

3. Using a text editor, open the ACI server or component configuration file. For the location of the configuration file, see the ACI server documentation.
4. In the [Paths] section of the configuration file, set the AdminFile parameter to the location of the admin.dat file. If you do not set this parameter, the ACI server attempts to find the admin.dat file in its working directory when you call the IDOL Admin interface.
5. Enable Cross Origin Resource Sharing.
6. In the [Service] section, add the Access-Control-Allow-Origin parameter and set its value to the URLs that you want to use to access the interface.

Each URL must include:

- the http:// or https:// prefix

**NOTE:** URLs can contain the https:// prefix if the ACI server or component has SSL enabled.

- The host that IDOL Admin is installed on
- The ACI port of the component that you are using IDOL Admin for

Separate multiple URLs with spaces.

For example, you could specify different URLs for the local host and remote hosts:

```
Access-Control-Allow-Origin=http://localhost:9010  
http://Computer1.Company.com:9010
```

Alternatively, you can set Access-Control-Allow-Origin=\*, which allows you to access IDOL Admin using any valid URL (for example, localhost, direct IP address, or the host name). The wildcard character (\*) is supported only if no other entries are specified.

If you do not set the Access-Control-Allow-Origin parameter, IDOL Admin can communicate only with the server's ACI port, and not the index or service ports.

7. Start the ACI server.

You can now access IDOL Admin (see [Access IDOL Admin, below](#)).

## Access IDOL Admin

You access IDOL Admin from a web browser. You can access the interface only through URLs that are set in the Access-Control-Allow-Origin parameter in the ACI server or component configuration file. For more information about configuring URL access, see [Install IDOL Admin, on the previous page](#).

### To access IDOL Admin

- Type the following URL into the address bar of your web browser:

```
http://host:port/action=admin
```

where:

*host* is the host name or IP address of the machine where the IDOL component is installed.

*port* is the ACI port of the IDOL component you want to administer.

## View Connector Statistics

Exchange Web Service Connector collects statistics about the work it has completed. The statistics that are available depend on the connector you are using, but all connectors provide information about the number and frequency of ingest-adds, ingest-updates, and ingest-deletes.

### To view connector statistics

- Use the `GetStatistics` service action, for example:

```
http://host:serviceport/action=GetStatistics
```

where *host* is the host name or IP address of the machine where the connector is installed, and *serviceport* is the connector's service port.

For information about the statistics that are returned, refer to the documentation for the `GetStatistics` service action.

The connector includes an XSL template (`ConnectorStatistics.tpl`) that you can use to visualize the statistics. You can use the template by adding the `template` parameter to the request:

```
http://host:serviceport/action=GetStatistics&template=ConnectorStatistics
```

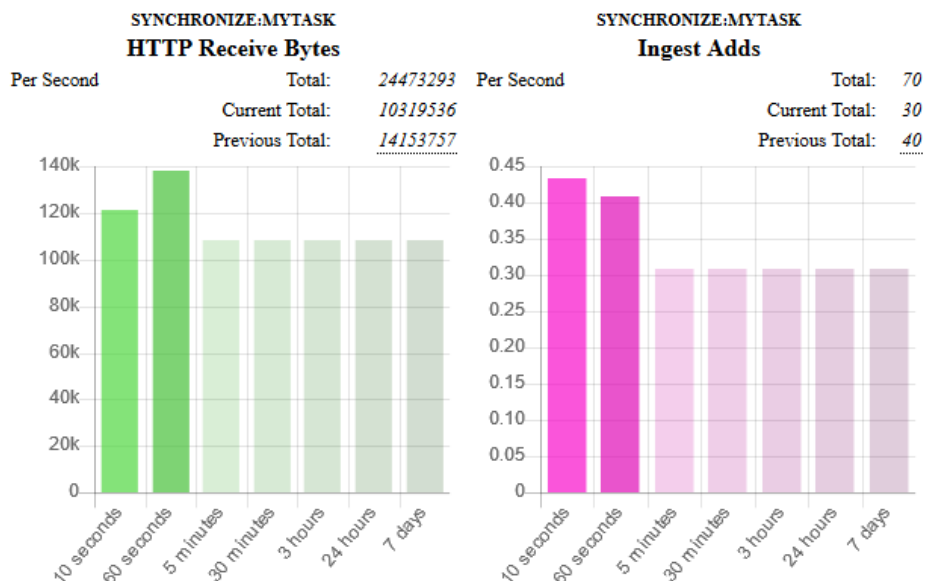
When you are using the `ConnectorStatistics` template, you can also add the `filter` parameter to the request to return specific statistics. The `filter` parameter accepts a regular expression that matches against the string `autnid::name`, where `autnid` and `name` are the values of the corresponding attributes in the XML returned by the `GetStatistics` action. For example, the following request returns statistics only for synchronize actions:

```
http://host:serviceport/action=GetStatistics&template=ConnectorStatistics  
&filter=^synchronize:
```

The following request returns statistics only for the task `mytask`:

```
http://host:serviceport/action=GetStatistics&template=ConnectorStatistics  
&filter=:mytask:
```

The following image shows some example statistics returned by a connector:



Above each chart is a title, for example SYNCHRONIZE:MYTASK, that specifies the action and task to which the statistics belong.

You can see from the example that in the last 60 seconds, the connector has generated an average of approximately 0.4 ingest-adds per second. In the charts, partially transparent bars indicate that the connector has not completed collecting information for those time intervals. The information used to generate statistics is stored in memory, so is lost if you stop the connector.

The following information is presented above the chart for each statistic:

- **Total** is a running total since the connector started. In the example above, there have been 70 ingest-adds in total.
- **Current Total** is the total for the actions that are currently running. In the example above, the synchronize action that is running has resulted in 30 ingest-adds being sent to CFS.
- **Previous Total** provides the totals for previous actions. In the example above, the previous synchronize cycle resulted in 40 ingest-adds. To see the totals for the 24 most recent actions, hover the mouse pointer over the value.

## Use the Connector Logs

As the Exchange Web Service Connector runs, it outputs messages to its logs. Most log messages occur due to normal operation, for example when the connector starts, receives actions, or sends documents for ingestion. If the connector encounters an error, the logs are the first place to look for information to help troubleshoot the problem.

The connector separates messages into the following message types, each of which relates to specific features:

Log Message Type	Description
Action	Logs actions that are received by the connector, and related messages.
Application	Logs application-related occurrences, such as when the connector starts.
Collect	Messages related to the Collect fetch action.
Delete	Messages related to the Delete fetch action.
Identifiers	Messages related to the Identifiers fetch action.
Insert	Messages related to the Insert fetch action.
Synchronize	Messages related to the Synchronize fetch action.
Update	Messages related to the Update fetch action.
View	Messages related to the View action.

## Customize Logging

You can customize logging by setting up your own *log streams*. Each log stream creates a separate log file in which specific log message types (for example, action, index, application, or import) are logged.

### To set up log streams

1. Open the Exchange Web Service Connector configuration file in a text editor.
2. Find the [Logging] section. If the configuration file does not contain a [Logging] section, add one.
3. In the [Logging] section, create a list of the log streams that you want to set up, in the format *N=LogStreamName*. List the log streams in consecutive order, starting from 0 (zero). For example:

```
[Logging]
LogLevel=FULL
LogDirectory=logs
0=ApplicationLogStream
1=ActionLogStream
```

You can also use the [Logging] section to configure any default values for logging configuration parameters, such as `LogLevel`. For more information, see the *Exchange Web Service Connector Reference*.

4. Create a new section for each of the log streams. Each section must have the same name as the log stream. For example:

```
[ApplicationLogStream]
[ActionLogStream]
```

5. Specify the settings for each log stream in the appropriate section. You can specify the type of logging to perform (for example, full logging), whether to display log messages on the console, the maximum size of log files, and so on. For example:

```
[ApplicationLogStream]
LogTypeCSVs=application
LogFile=application.log
LogHistorySize=50
LogTime=True
LogEcho=False
LogMaxSizeKBs=1024
```

```
[ActionLogStream]
LogTypeCSVs=action
LogFile=logs/action.log
LogHistorySize=50
LogTime=True
LogEcho=False
LogMaxSizeKBs=1024
```

6. Save and close the configuration file. Restart the service for your changes to take effect.

## Monitor the Progress of a Task

This section describes how to monitor the progress of a task.

**NOTE:** Progress reporting is not available for every action.

### To monitor the progress of a task

- Send the following action to the connector:

```
action=QueueInfo&QueueName=fetch&QueueAction=progress&Token=...
```

where,

Token	The token of the task that you want to monitor. If you started the task by sending an action to the connector, the token was returned in the response. If the connector started the task according to the schedule in its configuration file, you can use the QueueInfo action to find the token (use /action=QueueInfo&QueueName=fetch&QueueAction=getstatus).
-------	---

The connector returns the progress report, inside the <progress> element of the response. The following example is for a File System Connector synchronize task.

```
<autnresponse>
  <action>QUEUEINFO</action>
```

```
<response>SUCCESS</response>
<responsedata>
  <action>
    <token>MTAuMi4xMDUuMTAzOjEyMzQ6RkVUQ0g6MTAxNzM0MzgzOQ==</token>
    <status>Processing</status>
    <progress>
      <building_mode>>false</building_mode>
      <percent>7.5595</percent>
      <time_processing>18</time_processing>
      <estimated_time_remaining>194</estimated_time_remaining>
      <stage title="MYTASK" status="Processing" weight="1"
percent="7.5595">
        <stage title="Ingestion" status="Processing" weight="999"
percent="7.567">
          <stage title="C:\Test Files\" status="Processing" weight="6601"
percent="7.567" progress="0" maximum="6601">
            <stage title="Folder01" status="Processing" weight="2317"
percent="43.116" progress="999" maximum="2317"/>
              <stage title="Folder02" status="Pending" weight="2567"/>
              <stage title="Folder03" status="Pending" weight="1715"/>
              <stage title="." status="Pending" weight="2"/>
            </stage>
          </stage>
        <stage title="Deletion" status="Pending" weight="1"/>
      </stage>
    </progress>
  </action>
</responsedata>
</autnresponse>
```

### To read the progress report

The information provided in the progress report is unique to each connector and each action. For example, the File System Connector reports the progress of a synchronize task by listing the folders that require processing.

A progress report can include several *stages*:

- A *stage* represents part of a task.
- A stage can have sub-stages. In the previous example, the stage "C:\Test Files\" has three stages that represent sub-folders ("Folder01", "Folder02", and "Folder03") and one stage that represents the contents of the folder itself ("."). You can limit the depth of the sub-stages in the progress report by setting the MaxDepth parameter in the QueueInfo action.
- The *weight* attribute indicates the amount of work included in a stage, relative to other stages at the same level.
- The *status* attribute shows the status of a stage. The status can be "Pending", "Processing", or "Finished".
- The *progress* attribute shows the number of items that have been processed for the stage.



- The `maximum` attribute shows the total number of items that must be processed to complete the stage.
- The `percent` attribute shows the progress of a stage (percentage complete). In the previous example, the progress report shows that MYTASK is 7.5595% complete.
- Finished stages are grouped, and pending stages are not expanded into sub-stages, unless you set the action parameter `AllStages=true` in the `QueueInfo` action.

## Monitor Asynchronous Actions using Event Handlers

The fetch actions sent to a connector are asynchronous. Asynchronous actions do not run immediately, but are added to a queue. This means that the person or application that sends the action does not receive an immediate response. However, you can configure the connector to call an event handler when an asynchronous action starts, finishes, or encounters an error.

You can use an event handler to:

- return data about an event back to the application that sent the action.
- write event data to a text file, to log any errors that occur.

You can also use event handlers to monitor the size of asynchronous action queues. If a queue becomes full this might indicate a problem, or that applications are making requests to Exchange Web Service Connector faster than they can be processed.

Exchange Web Service Connector can call an event handler for the following events.

<b>OnStart</b>	The <code>OnStart</code> event handler is called when Exchange Web Service Connector starts processing an asynchronous action.
<b>OnFinish</b>	The <code>OnFinish</code> event handler is called when Exchange Web Service Connector successfully finishes processing an asynchronous action.
<b>OnError</b>	The <code>OnError</code> event handler is called when an asynchronous action fails and cannot continue.
<b>OnErrorReport</b>	The <code>OnErrorReport</code> event is called when an asynchronous action encounters an error, but the action continues. This event is not available for every connector.
<b>OnQueueEvent</b>	The <code>OnQueueEvent</code> handler is called when an asynchronous action queue becomes full, becomes empty, or the queue size passes certain thresholds. <ul style="list-style-type: none"><li>• A <code>QueueFull</code> event occurs when the action queue becomes full.</li><li>• A <code>QueueFilling</code> event occurs when the queue size exceeds a configurable threshold (<code>QueueFillingThreshold</code>) and the last event was a <code>QueueEmpty</code> or <code>QueueEmptying</code> event.</li></ul>

- A `QueueEmptying` event occurs when the queue size falls below a configurable threshold (`QueueEmptyingThreshold`) and the last event was a `QueueFull` or `QueueFilling` event.
- A `QueueEmpty` event occurs when the action queue becomes empty.

Exchange Web Service Connector supports the following types of event handler:

- The `TextFileHandler` writes event data to a text file.
- The `HttpHandler` sends event data to a URL.
- The `LuaHandler` runs a Lua script. The event data is passed into the script.

## Configure an Event Handler

To configure an event handler, follow these steps.

### To configure an event handler

1. Stop the connector.
2. Open the connector's configuration file in a text editor.
3. Set the `OnStart`, `OnFinish`, `OnErrorReport`, `OnError`, or `OnQueueEvent` parameter to specify the name of a section in the configuration file that contains the event handler settings.
  - To run an event handler for all asynchronous actions, set these parameters in the `[Actions]` section. For example:

```
[Actions]
OnStart=NormalEvents
OnFinish=NormalEvents
OnErrorReport=ErrorEvents
OnError=ErrorEvents
```
  - To run an event handler for specific actions, use the action name as a section in the configuration file. The following example calls an event handler when the *Fetch* action starts and finishes successfully:

```
[Fetch]
OnStart=NormalEvents
OnFinish=NormalEvents
```
4. Create a new section in the configuration file to contain the settings for your event handler. You must name the section using the name you specified with the `OnStart`, `OnFinish`, `OnErrorReport`, `OnError`, or `OnQueueEvent` parameter.
5. In the new section, set the `LibraryName` parameter.

`LibraryName`    The type of event handler to use to handle the event:

- To write event data to a text file, set this parameter to `TextFileHandler`, and then set the `FilePath` parameter to specify the path of the file.
- To send event data to a URL, set this parameter to `HttpHandler`, and then use the HTTP event handler parameters to specify the URL, proxy server settings, credentials and so on.
- To run a Lua script, set this parameter to `LuaHandler`, and then set the `LuaScript` parameter to specify the script to run. For information about writing the script, see [Write a Lua Script to Handle Events](#), below.

For example:

```
[NormalEvents]
LibraryName=TextFileHandler
FilePath=./events.txt
```

```
[ErrorEvents]
LibraryName=LuaHandler
LuaScript=./error.lua
```

6. Save and close the configuration file. You must restart Exchange Web Service Connector for your changes to take effect.

## Write a Lua Script to Handle Events

The Lua event handler runs a Lua script to handle events. The Lua script must contain a function named `handler` with the arguments `request` and `xml`, as shown below:

```
function handler(request, xml)
    ...
end
```

- `request` is a table holding the request parameters. For example, if the request was `action=Example&MyParam=Value`, the table will contain a key `MyParam` with the value `Value`. Some events, for example queue size events, are not related to a specific action and so the table might be empty.
- `xml` is a string of XML that contains information about the event.

## Set Up Performance Monitoring

You can configure a connector to pause tasks temporarily if performance indicators on the local machine or a remote machine breach certain limits. For example, if there is a high load on the CPU or memory of the repository from which you are retrieving information, you might want the connector to pause until the machine recovers.

**NOTE:** Performance monitoring is available on Windows platforms only. To monitor a remote machine, both the connector machine and remote machine must be running Windows.

## Configure the Connector to Pause

### To configure the connector to pause

1. Open the configuration file in a text editor.
2. Find the [FetchTasks] section, or a [TaskName] section.
  - To pause all tasks, use the [FetchTasks] section.
  - To specify settings for a single task, find the [TaskName] section for the task.
3. Set the following configuration parameters:

PerfMonCounterNameN	The names of the performance counters that you want the connector to monitor. You can use any counter that is available in the Windows perfmon utility.
PerfMonCounterMinN	The minimum value permitted for the specified performance counter. If the counter falls below this value, the connector pauses until the counter meets the limits again. This parameter is optional but you should set a minimum value, maximum value (with PerfMonCounterMaxN), or both.
PerfMonCounterMaxN	The maximum value permitted for the specified performance counter. If the counter exceeds this value, the connector pauses until the counter meets the limits again. This parameter is optional but you should set a maximum value, minimum value (with PerfMonCounterMinN), or both.
PerfMonAvgOverReadings	(Optional) The number of readings that the connector averages before checking a performance counter against the specified limits. For example, if you set this parameter to 5, the connector averages the last five readings and pauses only if the average breaches the limits. Increasing this value makes the connector less likely to pause if the limits are breached for a short time. Decreasing this value allows the connector to continue working faster following a pause.
PerfMonQueryFrequency	(Optional) The amount of time, in seconds, that the connector waits between taking readings from a performance counter.

For example:

```
[FetchTasks]
PerfMonCounterName0=\\machine-hostname\Memory\Available MBytes
PerfMonCounterMin0=1024
```

```
PerfMonCounterName1=\\machine-hostname\Processor(_Total)\% Processor Time  
PerfMonCounterMax1=70
```

```
PerfMonAvgOverReadings=5  
PerfMonQueryFrequency=10
```

4. Save and close the configuration file.

## Determine if an Action is Paused

To determine whether an action has been paused for performance reasons, use the QueueInfo action:

```
/action=queueInfo&queueAction=getStatus&queueName=fetch
```

You can also include the optional token parameter to return information about a single action:

```
/action=queueInfo&queueAction=getStatus&queueName=fetch&token=...
```

The connector returns the status, for example:

```
<autnresponse>  
  <action>QUEUEINFO</action>  
  <response>SUCCESS</response>  
  <responsedata>  
    <actions>  
      <action owner="2266112570">  
        <status>Processing</status>  
        <queued_time>2016-Jul-27 14:49:40</queued_time>  
        <time_in_queue>1</time_in_queue>  
        <process_start_time>2016-Jul-27 14:49:41</process_start_time>  
        <time_processing>219</time_processing>  
        <documentcounts>  
          <documentcount errors="0" task="MYTASK"/>  
        </documentcounts>  
        <fetchaction>SYNCHRONIZE</fetchaction>  
        <pausedforperformance>true</pausedforperformance>  
        <token>...</token>  
      </action>  
    </actions>  
  </responsedata>  
</autnresponse>
```

When the element `pausedforperformance` has a value of `true`, the connector has paused the task for performance reasons. If the `pausedforperformance` element is not present in the response, the connector has not paused the task.

## Set Up Document Tracking

Document tracking reports metadata about documents when they pass through various stages in the indexing process. For example, when a connector finds a new document and sends it for ingestion, a document tracking event is created that shows the document has been added. Document tracking can help you detect problems with the indexing process.

You can write document tracking events to a database, log file, or IDOL Server. For information about how to set up a database to store document tracking events, refer to the *IDOL Server Administration Guide*.

### To enable Document Tracking

1. Open the connector's configuration file.
2. Create a new section in the configuration file, named [DocumentTracking].
3. In the new section, specify where the document tracking events are sent.
  - To send document tracking events to a database through ODBC, set the following parameters:

Backend	To send document tracking events to a database, set this parameter to <b>Library</b> .
LibraryPath	Specify the location of the ODBC document tracking library. This is included with IDOL Server.
ConnectionString	The ODBC connection string for the database.

For example:

```
[DocumentTracking]
Backend=Library
LibraryPath=C:\Autonomy\IDOLServer\IDOL\modules\dt_odbc.d11
ConnectionString=DSN=MyDatabase
```

- To send document tracking events to the connector's synchronize log, set the following parameters:

Backend	To send document tracking events to the connector's logs, set this parameter to <b>Log</b> .
DatabaseName	The name of the log stream to send the document tracking events to. Set this parameter to <b>synchronize</b> .

For example:

```
[DocumentTracking]  
Backend=Log  
DatabaseName=synchronize
```

- To send document tracking events to an IDOL Server, set the following parameters:

Backend	To send document tracking events to an IDOL Server, set this parameter to <b>IDOL</b> .
TargetHost	The host name or IP address of the IDOL Server.
TargetPort	The index port of the IDOL Server.

For example:

```
[DocumentTracking]  
Backend=IDOL  
TargetHost=idol  
TargetPort=9001
```

For more information about the parameters you can use to configure document tracking, refer to the *Exchange Web Service Connector Reference*.

4. Save and close the configuration file.

# Appendix A: Document Fields

The connector adds the following fields to each document that it ingests:

Field Name	Description
AUTN_IDENTIFIER	An identifier that allows a connector to extract the document from the repository again, for example during the collect or view actions.
AUTN_MODIFICATIONS	<p>Provides information about how many times an item has been modified. For example:</p> <pre>&lt;AUTN_MODIFICATIONS modified="3" modified_history="F09"/&gt;</pre> <p>This field is not supported by all connectors, so it might not be present, and might not include all of the attributes described below:</p> <ul style="list-style-type: none"> <li> <p><b>modified</b> - the number of modifications that have been observed by the connector. This might be a minimum number; if an item is modified more than once between synchronize cycles the connector might only observe a single change (this depends on the information available from the repository).</p> </li> <li> <p><b>modified_history</b> - the time intervals between recent modifications (up to 50, one character per interval, with the most recent change at the end of the list).</p> <p>To convert a character into a time duration:</p> <ol style="list-style-type: none"> <li>Convert the character to an integer, <math>n</math>, (0 to 61) by the position in this string: 0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz.</li> <li>Calculate using floating point arithmetic <math>(13/9)^n</math>.</li> <li>Read the resulting number as a number of seconds giving the minimum duration. Due to rounding the actual value will be in the range <math>(13/9)^n</math> to <math>(13/9)^{(n+1)}</math>.</li> </ol> <p>For example, to read "F":</p> <ul style="list-style-type: none"> <li><math>n=15</math>, because "F" is the 16th character in the string above.</li> <li><math>(13/9)^{15} = (1.44444\dots)^{15} = 248.6\dots</math>. This gives a minimum duration of 0:04:08. The full range would be 248.6 to 359.1 seconds, or a duration between 0:04:08 and 0:05:59.</li> </ul> </li> <li> <p><b>attributesmodified</b> - the number of times the attributes of a file have been modified. This might be a minimum number; if an item is modified more than once between synchronize cycles the connector might only observe a single change (this depends on the information available from</p> </li> </ul>



Field Name	Description
	<p>the repository).</p> <ul style="list-style-type: none"><li>• <code>attributesmodified_history</code> - the time intervals between attributes being modified. This field has the same format as <code>modified_history</code>.</li></ul>
<code>DocTrackingId</code>	An identifier used for document tracking functionality.
<code>DRREFERENCE</code>	A reference for the document. This is the standard IDOL reference field, which is used for deduplication.
<code>source_connector_run_id</code>	(Added only when <code>IngestSourceConnectorFields=TRUE</code> ). The asynchronous action token of the <code>fetch</code> action that ingested the document.
<code>source_connector_server_id</code>	(Added only when <code>IngestSourceConnectorFields=TRUE</code> ). A token that identifies the instance of the connector that retrieved the document (different installations of the same connector populate this field with different IDs). You can retrieve the UID of a connector through <code>action=GetVersion</code> .

# Glossary

## A

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### **ACI (Autonomy Content Infrastructure)**

A technology layer that automates operations on unstructured information for cross-enterprise applications. ACI enables an automated and compatible business-to-business, peer-to-peer infrastructure. The ACI allows enterprise applications to understand and process content that exists in unstructured formats, such as email, Web pages, Microsoft Office documents, and IBM Notes.

### **ACI Server**

A server component that runs on the Autonomy Content Infrastructure (ACI).

### **ACL (access control list)**

An ACL is metadata associated with a document that defines which users and groups are permitted to access the document.

### **action**

A request sent to an ACI server.

### **active directory**

A domain controller for the Microsoft Windows operating system, which uses LDAP to authenticate users and computers on a network.

## C

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### **Category component**

The IDOL Server component that manages categorization and clustering.

### **Community component**

The IDOL Server component that manages users and communities.

### **connector**

An IDOL component (for example File System Connector) that retrieves information from a local or remote repository (for example, a file system, database, or Web site).

### **Connector Framework Server (CFS)**

Connector Framework Server processes the information that is retrieved by connectors. Connector Framework Server uses KeyView to extract document content and metadata from over 1,000 different file types. When the information has been processed, it is sent to an IDOL Server or Distributed Index Handler (DIH).

### **Content component**

The IDOL Server component that manages the data index and performs most of the search and retrieval operations from the index.

## D

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### **DAH (Distributed Action Handler)**

DAH distributes actions to multiple copies of IDOL Server or a component. It allows you to use failover, load balancing, or distributed content.

### **DIH (Distributed Index Handler)**

DIH allows you to efficiently split and index extremely large quantities of data into multiple copies of IDOL Server or the Content component. DIH allows you to create a scalable solution that delivers high performance and high availability. It provides a flexible way to batch, route, and categorize the indexing of internal and external content into IDOL Server.

## I

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### **IDOL**

The Intelligent Data Operating Layer (IDOL) Server, which integrates unstructured, semi-structured and structured information from multiple repositories through an understanding of the content. It delivers a real-time environment in which operations across applications and content are automated.

### **IDOL Proxy component**

An IDOL Server component that accepts incoming actions and distributes them to the appropriate subcomponent. IDOL Proxy also performs some maintenance operations to make sure that the subcomponents are running, and to start and stop them when necessary.

### **Import**

Importing is the process where CFS, using KeyView, extracts metadata, content, and sub-files from items retrieved by a connector. CFS adds the information to documents so that it is indexed into IDOL Server. Importing allows IDOL server to use the information in a repository, without needing to process the information in its native format.

### **Ingest**

Ingestion converts information that exists in a repository into documents that can be indexed into IDOL Server. Ingestion starts when a connector finds new documents in a repository, or documents that have been updated or deleted, and sends this information to CFS. Ingestion includes the import process, and processing tasks that can modify and enrich the information in a document.

### **Intellectual Asset Protection System (IAS)**

An integrated security solution to protect your data. At the front end, authentication checks that users are allowed to access the system that contains the result data. At the back end, entitlement checking and authentication combine to ensure that query results contain only documents that the user is allowed to see, from repositories that the user has permission to access. For more information, refer to the IDOL Document Security Administration Guide.

## K

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### **KeyView**

The IDOL component that extracts data, including text, metadata, and subfiles from over 1,000 different file types. KeyView can also convert documents to HTML format for viewing in a Web browser.

## L

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### **LDAP**

Lightweight Directory Access Protocol. Applications can use LDAP to retrieve information from a server. LDAP is used for directory services (such as corporate email and telephone directories) and user authentication. See also: active directory, primary domain controller.

### **License Server**

License Server enables you to license and run multiple IDOL solutions. You must have a License Server on a machine with a known, static IP address.

## O

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### **OmniGroupServer (OGS)**

A server that manages access permissions for your users. It communicates with your repositories and IDOL Server to apply access permissions to documents.

## P

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### **primary domain controller**

A server computer in a Microsoft Windows domain that controls various computer resources. See also: active directory, LDAP.

## V

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### **View**

An IDOL component that converts files in a repository to HTML formats for viewing in a Web browser.

## W

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### **Wildcard**

A character that stands in for any character or group of characters in a query.

## X

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### **XML**

Extensible Markup Language. XML is a language that defines the different attributes of document content in a format that can be read by humans and machines. In IDOL Server, you can index documents in XML format. IDOL Server also returns action responses in XML format.

# Send documentation feedback

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