FatWire

Content Integration Platform for EMC Documentum

Version 2.0

Creating a Java Connector and Plug-In

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FatWire® SOFTWARE

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Chapter 1

Integrating with Custom Source Systems

This chapter outlines methods for extending FatWire Content Integration Platform to support delivery from custom source systems to FatWire Content Server.

This chapter contains the following sections:

Customizing FatWire Content Integration Platform

FatWire Content Integration Platform (CIP) brings content from EMC Documentum to FatWire Content Server. CIP can also be customized to deliver content from any source system to Content Server.

Developers can extend Content Integration Platform to publish from systems of their own choice, such as database or custom content management systems, by writing a Java-based implementation: a source connector and plug-in(s) or just the plug-in(s). Both the connector and the plug-ins are supported by the Content Integration Agent component (Figure 1, on page 7).

A Java source connector must be written for each source system. The connector queries the source system to retrieve its metadata and binary content. (The connector must be registered within the Content Integration Agent by the addition of a statement to the `catalog.xml` file.)

A plug-in is required only if items retrieved by the connector must be processed before they are published to Content Server. Processing an item could include for example, extracting thumbnails from image files or performing a validation step while publishing. Typically, plug-ins are written to support different file formats or to filter selected items from the publishing process. Any number of plug-ins can be used with *any* connector. Like the connector, a plug-in must be registered with the Content Integration Agent (in the `types.xml` file).

Content Integration Agent

Content Integration Agent is written in C++ and provides the following components to support Java-based custom connectors and plug-ins:

- Solid runtime system.
- Pluggable interfaces, used to implement Java-based source connectors and plug-ins.
- XML files named `catalog.xml` and `types.xml`, both used to register the custom source connector and plug-ins.
- Native source connector (`javaconnector` library) and native plug-in (`javaplugin` library). Both are written in C++. They are used to make calls to Java code.
- Facilities, which are construction blocks providing some set of functionality to the Agent runtime. Content Integration Agent hosts the Java Virtual Machine in its process space in order to delegate calls from the C++ runtime environment to Java code. The JVM is enabled by registering `javafacility` in `facilities.xml`.

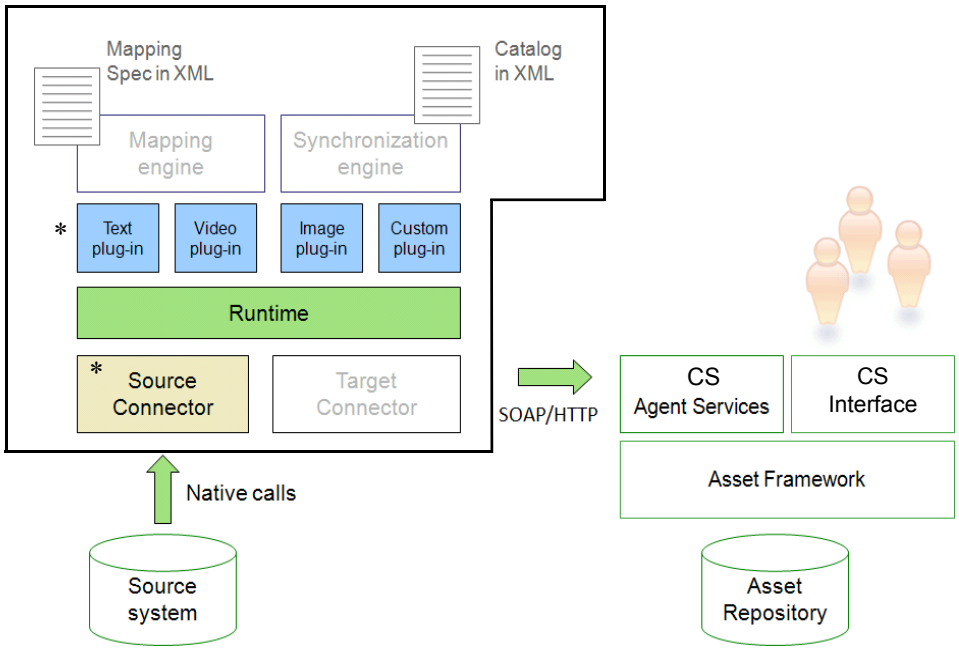
Once the Java-based connector is created and the JVM is enabled, the C++ Agent runtime system can use the JVM to call Java code via the native connector (similar process for plug-ins). For system architecture, see Figure 1B, on page 7.

Procedures for creating Java-based connectors and plug-ins are given in chapter 2, along with instructions for completing the integration.

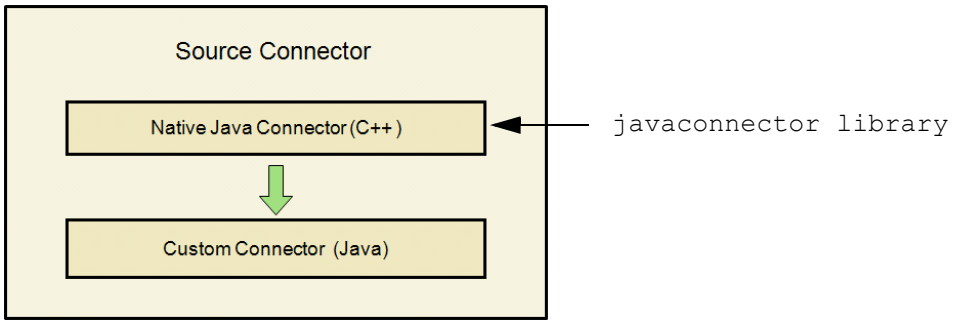
More information about Content Integration Agent can be found in the *CIP 2.0 for EMC Documentum Administrator's Guide*, available on our e-docs site at `http://support.fatwire.com`.

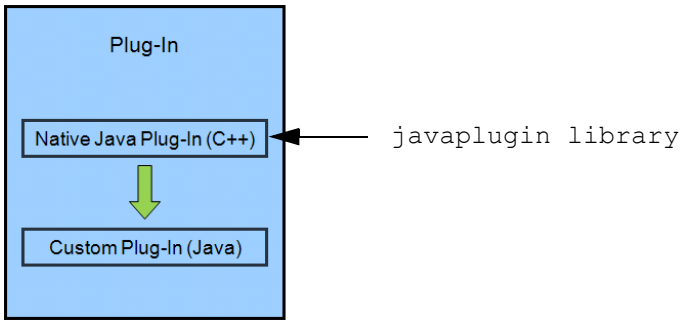
Figure 1: Content Integration Platform

A. Content Integration Agent



B. Source Connector and Plug-In





Chapter 2

Creating Connectors and Plug-Ins

This chapter provides instructions for creating a complete integration solution to support content delivery from any source system to FatWire Content Server.

This chapter contains the following sections:

Overview

Creating a connector and plug-in involves the following steps:

1. Implementing the pluggable interfaces that are provided within Content Integration Agent.
2. Registering the implementation(s) with the Content Integration Agent runtime system.
3. Registering `javafacility` in order to enable the Java Virtual Machine to delegate calls from the C++ Agent runtime to Java code.

Note

A custom plug-in can be used with *any* connector. You can implement and deploy as many plug-ins as necessary.

Before a custom connector (or plug-in) can be successfully used, the data model for the publishable objects must exist on the Content Server system and be mapped to the Content Server system. The following steps are required:

1. Reproduce the objects' metadata in Content Server by creating a dedicated flex family (or re-using an existing flex family) to store the object types, their attributes, and the objects themselves.
2. Map object types and attributes to their respective flex family asset instances (created in the previous step). The map can be created directly in the connector implementation, or in the `mappings.xml` file.

I. Creating a Java Source Connector

Publishing from an unsupported source system to Content Server requires you to create a Java-based source connector. (A plug-in is not required unless objects retrieved by the connector must be processed before they are published.)

Note

If you are using a relational database, implement custom views or custom queries in order for the connector to work.

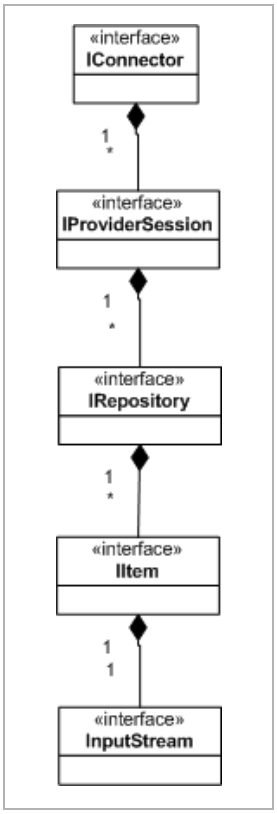
To create a Java source connector

1. Implement the connector:

   Implement the `IConnector`, `IProviderSession`, `IRepository`, and `IItem` interfaces. You can optionally implement the `InputStream` interface if items on your source system have primary binary content.

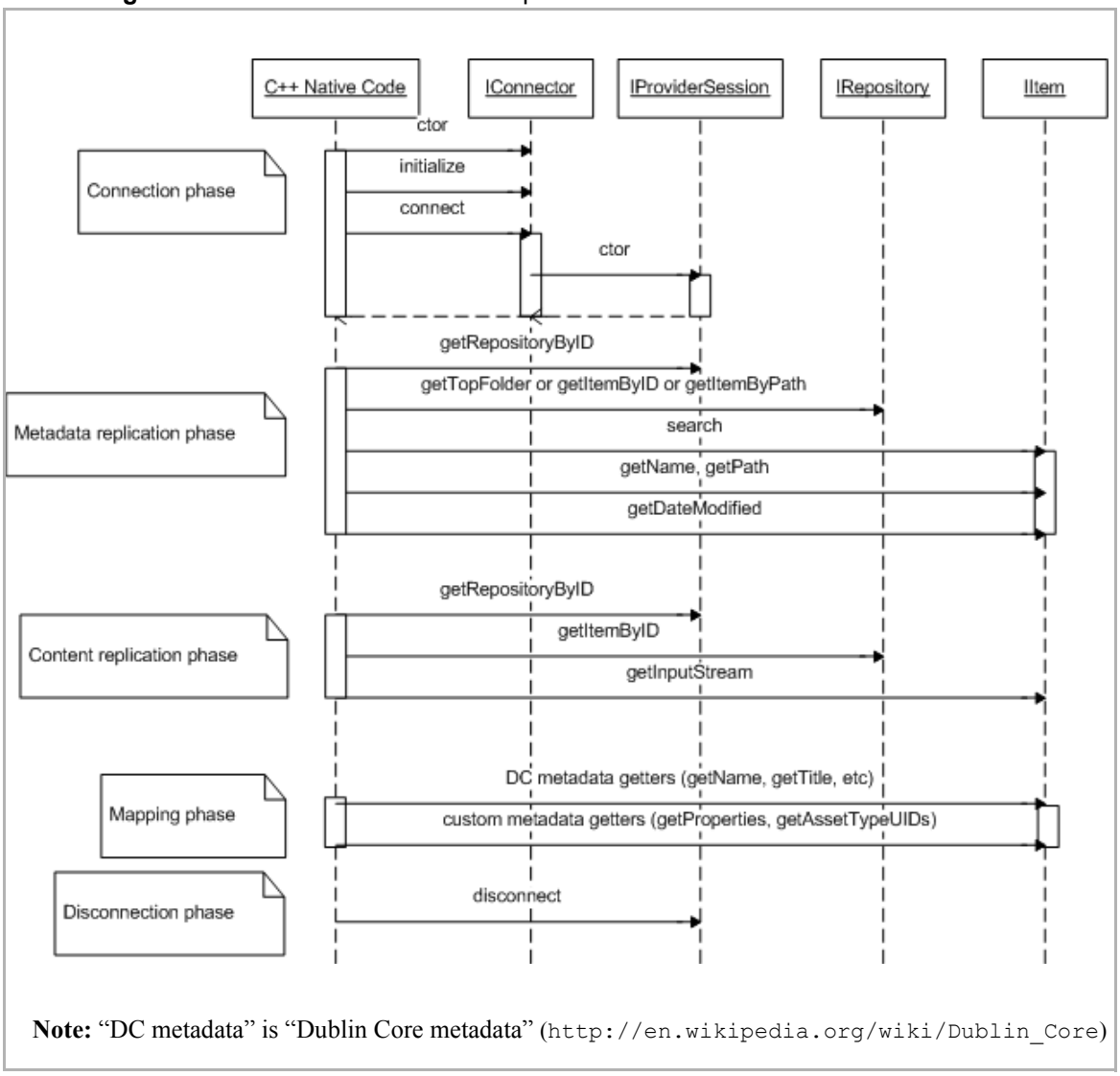
   Figure 2 shows the relationships among the interfaces. The entry point for the connector's code is a factory class: the `IConnector` interface implementation.

   Figure 2: Connector and plug-in class diagram



   There are different phases in a connector's lifetime. Depending on the phase, different methods are invoked. Figure 3 shows the sequence of calls during each phase.

Figure 3: Source connector calls sequence



Note: "DC metadata" is "Dublin Core metadata" (`http://en.wikipedia.org/wiki/Dublin_Core`)

Analyzing Figure 3**:** Source connector calls sequence

The ID, which is passed to the `getRepositoryByID` function, is taken from one of the corresponding workspace elements in the `catalog.xml` file.

Depending on what you pass to the `cipcommander`, one of the following functions is invoked:

- If `-source_itemid` is passed, then `getItemByID` is invoked passing the `itemid`.
- If `-source_itemid` is omitted, and `-source_path` is specified, then the `getItemByPath` function is invoked.
- If neither `-source_itemid` or `-source_path` is specified, then the `getTopFolder` function is invoked. (In this case, the entire repository is published.)

To ensure uniqueness, maintain a different `versionid`, `itemid`, and `path` for all items inside the same repository, and keep the names different for all items inside the same folder. The `path` must be in the form: `<parent path>/<this item name>`.

2. Register the connector:

   a. Register the `IConnector` interface implementation with Content Integration Agent by adding a 'connector' element to `catalog.xml` (located in `integration_agent/conf/`):

```
<connector id="connector_id"
   name="connector_descriptive_name">
   <library>javaconnector</library>
      <init-params>
      <param name="className">connector_class_name</param>
         connector-specific_parameters
      </init-params>
   </connector>
```

Parameter	Description
connector_id	Any unique identifier.
connector_descriptive_name	Any descriptive name (does not have to be unique).
connector_class_name	Name of the `IConnector` implementation created.
connector-specific_parameters	Set of parameters that will be passed to `IConnector.initialize` during the call.

   b. Enable publishing by adding a new 'provider' element to `catalog.xml`:

```
<provider id="provider_id" name="provider_descriptive_name">
   <connector-ref refid="connector_id"/>
      <init-params/>
         provider-specific_parameters
      </init-params>
</  provider >
```

Parameter	Description
provider_id	Any unique identifier.
provider_descriptive_name	Any descriptive name (doesn't have to be unique).
connector_id	Connector's unique identifier.
provider-specific_parameters	Set of parameters that will be passed to `IConnector.login` during the call.

c. Deploy the connector:

Place the connector's `jar` files into the folder `<resource>/java/<connector_id>/lib`, and the `class` files into `<resource>/java/<connector_id>/classes`.

The `<resource>` folder is located within Content Integration Agent.

On Windows: `<resource>` is `<%INSTALLDIR%>`

On Unix: `<resource>` is `<$INSTALLDIR/shared/cipagent>`

Note

Connector classes are loaded by different class loaders to prevent collisions with different implementations and loading/unloading features. We strongly advise placing all connector `jar` and `class` files into the `<connector_id>` folder, instead of including them into the `CLASSPATH` environment variable, or the `java.class.path` property, or the `jre/lib/ext` folder.

3. If you require a Java plug-in (to process items retrieved by the connector), continue to section "II. Creating a Java Plug-In." Otherwise, enable `javafacility` (to allow the Java Virtual Machine to delegate calls to Java code from the C++ Agent runtime). For instructions, see "III. Enabling javafacility," on page 17.

II. Creating a Java Plug-In

A plug-in is not required unless objects retrieved by the connector must be processed before they are published to the Content Server system. The main purpose of a plug-in is to modify the metadata of retrieved items, add metadata to retrieved items, and reject items.

Note

A custom plug-in can be used with *any* connector. You can create and deploy as many plug-ins as necessary.

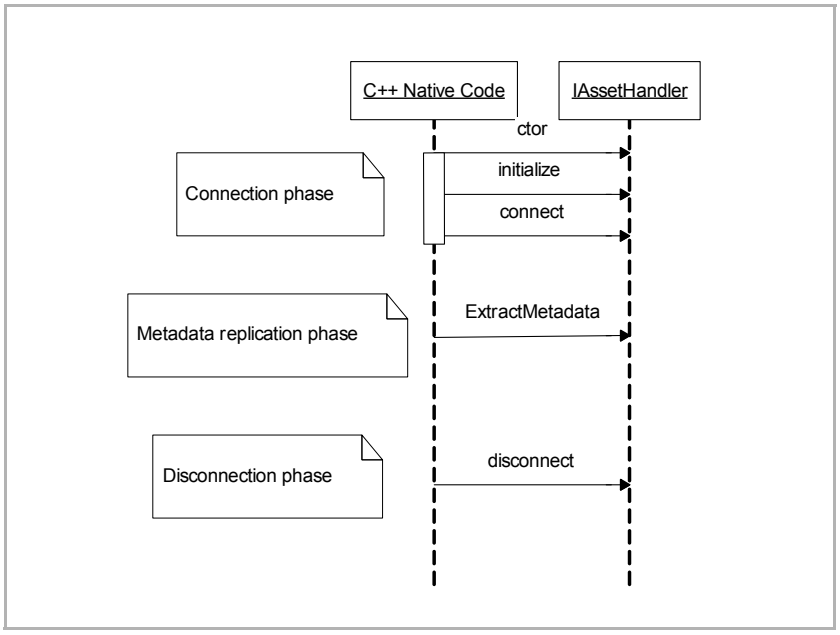
Creating a plug-in is similar to creating a connector. The steps are as follows:

To create a Java plug-in

1. Implement the plug-in by implementing the `IAssetHandler` interface (in Content Integration Agent).

The entry point for a plug-in is the `IAssetHandler` interface. This is the only interface which is directly used by the runtime system. In most cases `ExtractMetadata` is the only method you need to implement. Figure 4 shows the calls sequence in a plug-in's lifetime.

Figure 4: Plug-in calls sequence



2. Register the plug-in with Content Integration Agent.

   a. Add a new plug-in '`handler`' element to the `types.xml` file (located in the `integration_agent/conf/` folder):

```
<handler id="handler_id">
   <library>javaplugin</library>
      <init-params/>
         plugin-specific_parameters
      </init-params>
</handler>
```

Parameter	Description
`handler_id`	Custom plug-in's unique identifier.
`plugin-specific parameters`	Plugin-specific parameters that are passed when the plug-in is initialized.

   b. Enable the handler for the selected handler sets. Which handler set to use is specified during the publication initiation process. Each handler set contains the list of handlers, which are invoked during the metadata extraction phase in the Integration Agent. Handlers are matched by either MIME type or asset type.

   MIME type has the following form: `<major type>/<minor type>` (`image/jpeg`, for example). There is an option to use '`*`' for MIME types. It can be applied either to the `minor` part or the whole MIME type. For example, `*/*` matches all assets, while `text/*` matches only text files.

   When using the `IConnectorContext.guessMIMEType` function, it will look into `mimetypes.xml` to get the corresponding MIME type for the supplied file

extension. For example the call with "`txt`" parameter will produce the "`text/plain`" result.

Asset types also support the '`*`' notation, which matches all asset types.

If more then one handler matches a specific item, then both are invoked in the same sequence in which they are registered within the handler set used. If any of the matching handlers returns the null object from the `IItem.extracMetadata` call, then the item is discarded from future processing and not sent to the target connector.

c. Enable the custom plug-in for selected object types by adding "`asset-type`" elements to the `types.xml` file. Items for which this plug-in is invoked will be filtered according to MIME type.

> **Note**
>
> The `asset-type` element in the context of a plug-in is a MIME type group.

```
<asset-type type="MIME_type">
   <extensions>
      <ext>ext</ext>
      …
   </extensions>
   <handler-ref refid="handler_id" />
</asset-type>
```

Parameter	Description
`MIME type`	MIME type of the item for which this plug-in will be invoked. *`MIMEtype`* must be of the form `<major_type/minor_type>`, e.g., `text/plain`. A wild-card symbol (`*`) can also be used. For example: • To enable the plug-in for all text files, specify: `text/*` • To enable the plug-in for all items, specify: `*/*`
`ext`	File extension, e.g., `.txt` for text files. The file extension does not directly affect the plug-in selection process. However, it is used to "guess' the MIME type for those systems where MIME type is not directly available (e.g., file system).
`handler_id`	Custom plug-in's unique identifier (specified in the `handler` element, in the previous step).

d. Deploy the plug-in:

Place the plug-in's `jar` files into the folder `<resource>/java/<plugin_id>/lib`, and the `class` files into `<resource>/java/<plugin_id>/classes`.

The `<resource>` folder is located within Content Integration Agent.

On Windows: `<resource>` is `<%INSTALLDIR%>`

On Unix: `<resource>` is `<$INSTALLDIR/shared/cipagent>`

> **Note**
>
> Plug-in classes are loaded by different class loaders to prevent collisions with different implementations and loading/unloading features. We strongly advise placing all plug-in `jar` and `class` files into the `<plugin_id>` folder, instead of including them into the `CLASSPATH` environment variable, or the `java.class.path` property, or the `jre/lib/ext` folder.

3. If you created a custom connector but have not enabled `javafacility`, continue to the next section, "III. Enabling javafacility."

III. Enabling javafacility

Calling Java code from C++ Agent runtime requires a special facility named `java` to be registered in `facilities.xml`.

To enable javafacility

1. Make sure `facilities.xml` is not commented (`facilities.xml` is located in the `integration_agent/conf/` folder).
2. Add the following lines:

```
<facility name="javafacility">
   <library>java</library>
      <init-params>
         <param name="VMArgparam_id">Java_VM_argument
          </param>
         <param name="VMLibraryPath">VM_library_path</param>
      </init-params>
</facility>
```

Parameter	Description
`param_id`	Parameter's unique id (any unique value). In order to pass multiple arguments to the JVM, construct multiple parameters with different *`param_id`*'s.
`Java_VM_argument`	Java VM argument to be passed to the Java VM created within the Agent runtime process. **Example:** `<param name="VMArg0">-Xmx256m </param>`

`VM_library_path`	Full path to the Java VM library (DLL or shared library) within the JRE/JDK installation.
	For example, for Sun JDK on Windows, `VM_library_path` is either:
	`%JAVA_HOME%\jre\bin\server\jvm.dll`
	- or -
	`%JAVA_HOME%\jre\bin\client\jvm.dll`

Troubleshooting and Debugging

When developing custom components for CIP, it is often helpful to see more than just the default logging messages displayed in the production environment. Therefore, CIP Agent supports five different logging levels:

- `fatal`
- `error`
- `warning`
- `info`
- `debug`

Use the instructions below to debug custom components in CIP.

Note

Do not use the settings shown below on a production system, as they can slow down the system's performance.

- **Escalating the logging level in CIP Agent**

  CIP is set to `error` by default. To increase the logging level, CIP Agent must run as a console executable:

  1. Stop the CIP Agent system service.
  2. Run the **`cipagent -t debug`** command.

- **Debugging Java custom components**

  To debug custom Java implementations hosted within the Agent runtime, enable remote debugging in CIP Agent. For example, to start the remote debugger on port 7007 and suspend CIP Agent to wait until a debugger attaches, add the following lines to `javafacility`:

  ```
  <param name="VMArg1">-Xdebug</param>
  <param name="VMArg2">-Xrunjdwp:transport=dt_socket,
     address=7007,server=y,suspend=y</param>
  ```

- **Escalating the logging level for CS Agent Services**

  To get more data about an error in the CS Agent Services application, set the `DEBUG` level in the `commons-logging.properties` file for the `com.fatwire.logging.csagentservices` category. We also recommend setting the `DEBUG` logging level in the `commons-logging.properties` file for the `com.fatwire.logging.cs.db` category.