



IMiS®/StorageConnector Services CMIS Manual

Version 1.1.1711

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1 INTRODUCTION

1.1 About this guide

The IMiS®/StorageConnector Services Manual describe the CMIS API operations and provide examples of use.

1.2 Target audience

This IMiS®/StorageConnector Services CMIS manual is intended for administrators and application developers with adequate prior knowledge who require information about installing, configuring and administering the IMiS®/StorageConnector Services interface.

It is also intended for integrating applications with IMiS®/ARChive Server.

Application developers have at their disposal development documentation with a detailed description of the IMiS®/StorageConnector interface, which is a part of the *Developer Edition* installation package.

2 GENERAL

IMiS®/StorageConnector Services provides a powerful, convenient, and simple Web services API for interacting with digital archive IMiS®/ARChive Server. The advantages include ease of integration and development, and it's an excellent choice of technology for use with mobile and web-based applications.

2.1 Integration with applications

IMiS®/StorageConnector Services is built around the widely-used Java EE software environment. It contains a wealth of data objects with an easy-to-use interface (API). This makes it possible to quickly design functionally advanced applications for accessing IMiS®/ARChive Server. A binary protocol is used for communication with the archive server, which essentially speeds up communication and ensures high responsiveness and throughput. Users of applications (DMS, ERP, CRM, BPM ...) view the delivered objects in these applications' integrated browsers.

IMiS®/StorageConnector Services API is a service layer of IMiS®/StorageConnector, available for system integrators to perform create, retrieve, update and delete operations, ensuring seamless integration of their application with external systems, such as digital archive IMiS®/ARChive Server.

The Service API operations and their formats are described in detail below.

They can be implemented on Apache Tomcat application server as REST, SOAP or CMIS (currently not available) interfaces and accessed via HTTP/HTTPS.

With the SOAP API you can streamline communication between existing applications (eg. MFERAC) and IMiS®/ARChive Server digital archive through web services.

RESTfull API web services lets you integrate archive server with your application using simple HTTP methods, in JSON format, making this an ideal API for developing mobile applications (e.g. IMiS®/mClient) or external clients (eg. IMiS®/wClient). While REST API is based on open standards, you can use any web development language to access the API.

The CMIS API web service enables the integration of the archive server with different content management systems, as well as data and information exchange and harmonization of functionalities with other tools, apps and services via the internet.

Specifies a standard domain and model, a standardized form of access to web services, and connection using various methods (Web Services, AtomPub, Browser) from different environments.

IMiS®/StorageConnector Services is open to different APIs as well.

In order to provide secure service, we also plan to support Kerberos SSO, which prompts the user to login only for initial access to the network. After initial login, the user can access any browser-based service in the network.

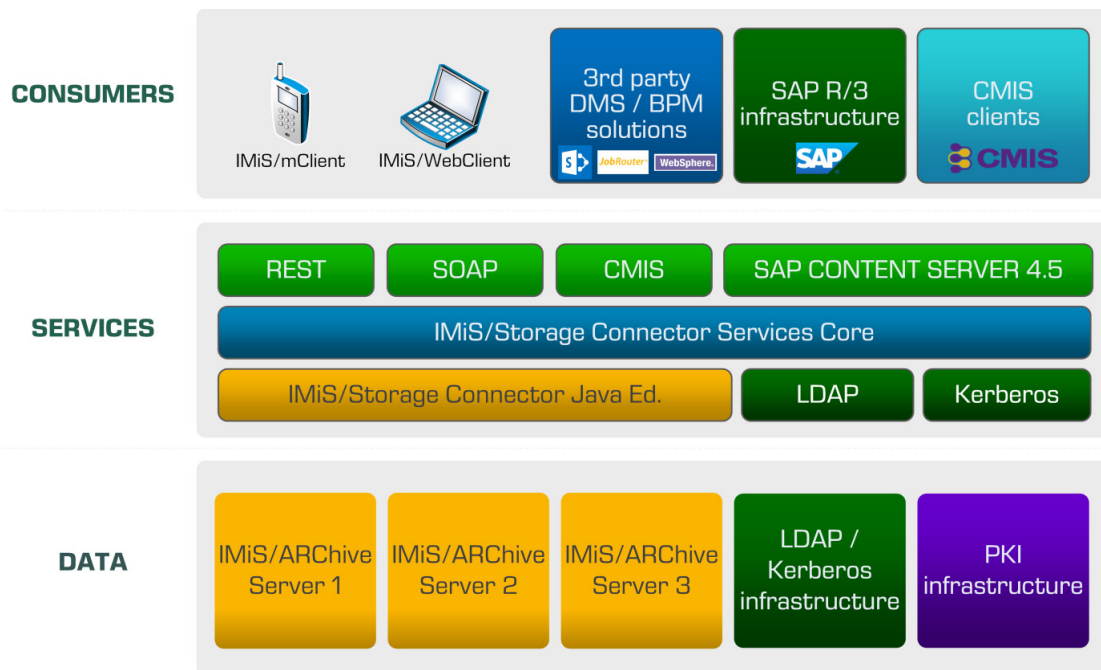


Image 1: IMiS®/StorageConnector Services architecture

2.2 Security

Since HyperText Transfer Protocol (HTTP) is not safe for data exchange, we need to use HyperText Transfer Protocol Secure (HTTPS), which ensures server authentication and protection of exchanged data to IMiS®/StorageConnector REST, SOAP and CMIS.

This setting is available on the Apache Tomcat server.

The security of the IMiS®/ARChive Server access is set by the administrator in the application settings (see [chapter 4.1.2 Archives settings](#)) on the individual archive.

To establish a secure connection with the IMiS®/ARChive server, the administrator sets:

- Trusted issuers of digital certificates, which the framework uses to determine the validity of remote digital certificates.
- A digital certificate with which the IMiS®/StorageConnector Services presents itself to the remote service.

More detailed information on Kerberos authentication you can find in the [chapter 3.8.5.2.2 Kerberos in IMiS®/ARChive Server Manual](#).

2.3 Advanced functionalities

IMiS®/Storage Connector Services CMIS ensure highly-loaded application servers are responsive and permeable by using advanced algorithms for simultaneous session pooling. The object model ensures all necessary implementation components for applications that require streaming functionalities.

The use of advanced caching algorithms reduces the communication needs between the application and archive server, thus contributing to the greater system permeability.

2.4 Use in SOA architecture

IMiS®/StorageConnector Services are used via the REST, SOAP or CMIS interface. These enable access to the objects on the IMiS®/ARChive Server version 9 via the web server as a web service. The communication between the interface and the archive server takes place via a binary protocol, and via the REST, SOAP or CMIS interface when using the application.

2.5 Versions

Product version labeling is based on a scheme that includes the following:

- An identifier for the installation package edition (EDITION).
- Four separate numerical identifiers (MAJOR, MINOR, RELEASE, BUILD).

The example of the scheme:

IMiS.StorageConnector.Services.EDITION.MAJOR.MINOR.RELEASE.BUILD.war

The example of installation package names for the CMIS interface:

IMiS.StorageConnector.Services.CMIS.9.1.1711.100.war

The scheme consists of the name of the IMiS®/StorageConnector Services product and the following elements:

- **EDITION:** This identifier represents the product interface version. The value is CMIS.
- **MAJOR:** This identifier represents the major product version or product generation. It rarely changes in terms of changes in the system and features. A change indicates a considerable difference in the product compared to the previously released version. This identifier has a range of values from 1 to n; it is continuous and the values can only increase.
- **MINOR:** This identifier indicates a minor version of the product. It changes more frequently than the main version in terms of changes to the system, features and fixes. A change in the minor version represents smaller changes and fixes in the framework of the same product generation (indicated by the main or major version). The range of values is from 1 to n. This number is not continuous. It resets to its base value (1) with each new MAJOR version.
- **RELEASE:** This identifier represents the time component of the product release in accordance with the YYMM scheme. MM indicates the month of the release (range of values from 01 to 12), and YY indicates the last two digits of the year.

Example: The RELEASE identifier for a product released in November 2017 will read 1711.

- **BUILD:** The identifier in this position indicates the unique serial number of the product build; this number never repeats. If smaller changes are made to the product within a single month, this identifier may change. In this case, all other identifiers remain the same. The range of values is from 1 to n. This number is not continuous and can only increase.

3 SYSTEM REQUIREMENTS

For successful installation and execution, the IMiS®/StorageConnector Services CMIS have the following hardware and software requirements.

3.1 Hardware

Practically all computers currently available on the market meet the hardware requirements for running IMiS®/StorageConnector Services CMIS.

Minimum and recommended requirements are listed below.

3.1.1 Minimum requirements

Minimum requirements for IMiS®/StorageConnector Services CMIS:

- 266 MHz Intel Pentium 2 processor*
- 200 MB RAM*
- 150 MB of unused hard disk space *
- Network access using the TCP/IP protocol (IPv4 or IPv6).

Notes:

** This is a brief summary of the minimum hardware requirements for Java 8 Runtime Environment as listed on Oracle's website:*

<https://www.java.com/en/download/help/sysreq.xml>

3.1.2 Recommended requirements

Recommended requirements for IMiS®/Storage Connector Services CMIS:

- Intel Pentium 1 GHz processor (or faster)
- 2 GB RAM (or more)
- 250 MB of unused hard disk space
- Network access using the TCP/IP protocol (IPv4 or IPv6).

3.2 Software

Requirements for IMiS®/Storage Connector Services CMIS:

- Java 8 Runtime Environment version 1.8.0_121,
- Apache Tomcat 8.5.x

- Supported operating systems:*
- Solaris 11.x, 10 update 9;
- Windows 10; Windows 8.x; Windows 7 SP1; Windows Vista SP2;
- Windows server 2012 R2 (64-bit); Windows server 2012 (64-bit); Windows server 2008 R2 SP1 (64-bit);
- Oracle Linux 7.x (64-bit), 6.x, 5.5+;
- Red Hat Enterprise Linux 7.x (64-bit), 6.x, 5.5+;
- Suse Linux Enterprise Linux 12.x (64-bit), 11.x, 10 SP2;
- Ubuntu Linux 15.10, 15.04, 14.x, 13.x, 12.04 - LTS;
- OS X 10.9 and above (64-bit), 10.8.3+ (64-bit).

Notes:

** This is a brief summary of the minimum hardware requirements for Java 8 Runtime Environment as listed on Oracle's website:*

<http://www.oracle.com/technetwork/java/javase/certconfig-2095354.html>

4 ADMINISTRATION

The IMiS®/Storage Connector Services CMIS interface can be administered by administrators and/or application developers. Administration encompasses installation, start up, shut down, upgrading and removal of the software.

4.1 Installation

Installation can be performed by an administrator in an environment that meets the minimum installation requirements. The minimum requirements can be upgraded if the need to do so is foreseen.

IMiS®/Storage Connector Services CMIS is available as a ZIP package containing interface libraries. Installation of the Java package is performed manually and requires the installation of libraries to the appropriate location.

To install the IMiS®/Storage Connector Services, administrator can use the Apache Tomcat server application manager (<https://tomcat.apache.org/tomcat-8.0-doc/manager-howto.html>).

4.1.1 Installation process

IMiS®/Storage Connector Services CMIS installation can be performed by an administrator.

Before the beginning of the installation, administrator must shut down the Apache Tomcat server and complete the following steps:

1. Extract WAR file in the directory located at .../webapps/<project name>/.
2. Add the project to the .../conf/server.xml file.
3. Configure archives .../webapps/<project name>/WEB-INF/config/config.xml.
4. Run the Apache Tomcat server.

4.1.2 Archives settings

To access archive servers from CMIS interface, the settings need to be defined. Archives are defined in the config.xml file.

Default location of the configuration file: .../webapps/.../WEB-INF/config/config.xml

The location of the configuration file is set in WEB-INF/web.xml with parameter `com.imis.storageconnector.services.config`.

An example of setting the location of the configuration:

```
<web app ...>

  <context-param>
    <param-name>com.imis.storageconnector.services.config</param-name>
    <param-value>C:/Program Data/Imaging Systems/scsvc/config.xml</param-value>
  </context-param>

  ...

</web-app>
```

Example of the configuration (config.xml):

```

<services>
  <config>
    <storage
      id="ARC1"
      defaultEntityIdType="ID256"
      host="arc1.imis.si"
      port="16807"
      name="arc1.imis.si"
      description="Corporate archive server"
      idleTimeout="3600000" />
    <storage
      id="ARC2"
      defaultEntityIdType="ID256"
      name="arc2.imis.si"
      description="Subsidiary archive server"
      host="arc2.imis.si"
      port="16807"
      idleTimeout="3600000" />
    </config>
  </services>

```

services / config / storage - Attributes

Id	String	Unique identifier of the archive.
Name	String	Unique name of the archive.
Description	String	A description of the archive (optional).
Host	String	The address of the archive server.
Port	Integer	Archive server port.
defaultEntityIdEncoding	String	Entity identifier encoding (optional). The set of values: - BASE16, - BASE64, - BASE85. Default value is BASE64.
idleTimeout	Integer	Session timeout (in ms). After a certain time, the session is deleted (optional, default value is 300.000).
trustStoreFilePath	String	Absolute path to the jks. Sets the trust anchors used for remote certificate verification that can be set in session initialization stage (optional).
trustStorePassword	String	Password of the trustStore (optional).
remoteCertificateFingerprint	String	Fingerprint certificate of the archive server (optional).
keyStoreFilePath	String	Absolute path to the jks. Sets the local certificate used for establishing an SSL connection in the local certificate selection stage (optional).
keyStorePassword	String	Passwod of the keyStore (optional).
certificateAlias	String	The alias name in the keyStore (optional).

services / config / storage – Attributes (cont.)

certificatePassword	String	Password of the localCertificateAlias (optional).
defaultEntityIdType	String	Entity identifier type (optional; default value: ID192). The set of types: - ID192, - ID265.
maxSessionsPerUser	Integer	Maximum number of the sessions per user (optional; default value: 10).
maxStorageSessionsPerUser	Integer	Maximum number of sessions per user from the service to the archive (optional; default value: 10).
entityCollectionPageCount	Integer	The number of the entity collection pages. (optional).
entityCollectionPageSize	Integer	The size of the entity collection page (optional).
defaultMoveReason	String	The reason to move an entity (default).
defaultContentMoveReason	String	The reason to move a content (default).
defaultDeleteReason	String	The reason to delete entity (default).
defaultDeleteDescription	String	The reason to delete entity description (default).
defaultStatusChangeReason	String	The reason to change entity status (default).
defaultSecurityClassChangeReason	String	The reason to change entity security class (default).

4.2 Start up and shut down

IMiS®/StorageConnector Services start through the start of the Apache Tomcat server.

The interface shuts down by the Apache Tomcat server shut down.

4.3 Upgrading

If an administrator would like to upgrade a past version of the IMiS®/StorageConnector Services interface to a newer version, follow the upgrade process described below or use the Apache Tomcat server application manager (<https://tomcat.apache.org/tomcat-8.0-doc/manager-howto.html>).

4.3.1 Upgrading process

Before starting upgrading the administrator must shut down the Apache Tomcat server and complete the following steps:

1. Make a copy of the current configuration located at .../webapps/<project name>/WEB-INF/config/config.xml in the temporary directory .../webapps/<project name>/ (if accessible from the outside).
2. Remove directory .../webapps/<project name>.
3. Expand .war file in the directory .../webapps/<project name>.
4. Replace .../webapps/<project name>/WEB-INF/config/config.xml with the previous file (see Step 1).
5. Run the server.

4.4 Removal

Before removal the IMiS®/StorageConnector Services administrator must shut down the Apache Tomcat server and complete the following steps:

1. Remove directory .../webapps/<project name>.
2. Remove project from the .../conf/server.xml file.
3. Run the Apache Tomcat server.

5 CMIS

CMIS is an open standard that enables access to various content management systems via the internet. Three different methods of accessing web services are supported:

- Web Services (SOAP)
- AtomPub (REST AtomPub)
- Browser (REST JSON).

It is recommended to use the Browser access method.

5.1 Service addresses

Addresses specify different access possibilities. Actual addresses are also located on the start page of the service (e.g. <https://apps.imis.eu/scsvc/cmisis>).

Address	Type	Description
../browser	Browser	Uses JSON to exchange data. Example: https://apps.imis.eu/scsvc/cmisis/browser
../atom11	AtomPub	Uses XML to exchange data. Example: https://apps.imis.eu/scsvc/cmisis/atom11
../services11/cmisis?wsdl	Web Services	Uses SOAP protocol. Example: https://apps.imis.eu/scsvc/cmisis/services11/cmisis?wsdl

5.2 Types

CMIS supports definition of types that are derived from basic types. Currently, only reading of definitions is supported.

Hierarchy of type definitions:

- Document (cmis:document)
 - Object (iarc:object)
- Folder (cmis:folder)
 - <entity types defined to the repository>
- Secondary (cmis:secondary)
 - Retention (cmis:rm_repMgtRetention)
 - Retention policies (iarc:retentionPolicy)
 - <retention policies defined to the repository>
 - Disposition holds (iarc:dispositionHold)
 - <disposition holds defined to the repository>

5.2.1 CMIS types

Identifier	Type	Description
cmis:allowedChildObjectTypelds	id[]	Allowed templates for child entity creation.
cmis:baseTypeld	id	Unique identifier of the entity type definition.
cmis:changeToken	string	Change token (currently not supported).
cmis:createdBy	string	The custodian of the entity.
cmis:creationDate	datetime	Date and time of the entity creation.
cmis:description	string	A description of the entity.
cmis:lastModificationDate	datetime	Date and time of the entity modification.
cmis:lastModifiedBy	string	A user, who last modified the entity (currently not supported).
cmis:name	string	Entity name.
cmis:objectId	id	Unique identifier of the entity.
cmis:objectTypeld	id	Entity type (subordinate type: cmis:folder).
cmis:parentId	id	Identifier of the parent entity.
cmis:path	string	Unique path to the entity.
cmis:secondaryObjectTypelds	id[]	Entity retention policies and disposition holds.

5.2.2 IARC types

Identifier	Type	Description
iarc:accessed	datetime	Date and time of access to the entity.
iarc:childCount	integer	The number of child entities.
iarc:classificationCode	string	The canonical form of the full classification code.
iarc:classificationCodeGenerated	boolean	Child classification code generation. Valid for entities types CLASS only.
iarc:closed	datetime	Date and time of the entity status update to Closed.
iarc:externalIds	string[]	External identifier of the entity (unique value).
iarc:keywords	string[]	Keywords of the entity.
iarc:opened	datetime	Date and time of the entity status update to Opened.
iarc:owner	string	The owner of the entity.
iarc:permanent	boolean	The permanent entity.

Identifier (cont.)	Type	Description
iarc:publicClassificationCode	string	Entity classification code in the classification scheme.
iarc:securityClass	string	The security class of the entity. The set of values: - Unspecified - Top Secret - Secret - Confidential - Restricted - Unclassified.
iarc:significance	string	The significance of the entity. The set of values: - Vital - Permanent - Retain - Delete
iarc:status	string	The status of the entity. The set of the values: - Opened - Closed
iarc:template	string	The type of the entity template.
iarc:email:bcc	string[]	Email addresses of the hidden recipients.
iarc:email:cc	string[]	Email addresses of the carbon copy recipients.
iarc:email:date	datetime	Date and time email was sent or received.
iarc:email:from	string	Email address of the sender.
iarc:email:messageId	string	Automatically generated message identifier.
iarc:email:priority	string	The priority status of the email.
iarc:email:signed	boolean	A value that registers if the email message was electronically signed.
iarc:email:subject	string	Email subject.
iarc:email:to	string[]	Email addresses of the recipients.
iarc:physical:currentLocation	string	Current location of the physical content.
iarc:physical:custodian	string	The custodian of the content.
iarc:physical:description	string	A description of the content.
iarc:physical:homeLocation	string	The home location of the content.
iarc:physical:id	string	Identifier of the physical content.
iarc:physical:returnDue	datetime	The return date of the issued content.

Identifier (cont.)	Type	Description
iarc:physical:status	string	Physical content status. The set of values: - CheckedIn - CheckedOut.
iarc:physical:statusChange	datetime	Date and time of physical content status change.

5.3 Repository Services

The Repository Services are used to discover information about the repository, including information about the repository and the object-types defined for the repository.

Functionalities:

Operation	Description	Supported
getRepositories	Returns a list of CMIS repositories available from this CMIS service endpoint.	Yes
getRepositoryInfo	Returns information about the CMIS repository, the optional capabilities it supports and its access control information if applicable.	Yes
getTypeChildren	Returns the list of object-types defined for the repository that are children of the specified type.	Yes
getTypeDescendants	Returns the set of the descendant object-types defined for the Repository under the specified type.	Yes
getTypeDefinition	Gets the definition of the specified object-type.	Yes
createType	Creates a new type definition that is a subtype of an existing specified parent type.	No
updateType	Updates a type definition.	No
deleteType	Deletes a type definition.	No

5.4 Navigation Services

The Navigation Services are used to traverse the folder hierarchy in a CMIS repository, and to locate documents that are checked out.

Functionalities:

Operation	Description	Supported
getChildren	Gets the list of child objects contained in the specified folder.	Yes
getDescendants	Gets the set of descendant objects contained in the specified folder or any of its child-folders.	Yes
getFolderTree	Gets the set of descendant folder objects contained in the specified folder.	Yes
getFolderParent	Gets the parent folder object for the specified folder object.	Yes
getObjectParents	Gets the parent folder(s) for the specified fileable object.	Yes
getCheckedOutDocs	Gets the list of documents that are checked out that the user has access to.	No

5.5 Object Services

CMIS provides id-based CRUD (Create, Retrieve, Update, Delete) operations on objects in a repository.

Functionalities:

Operation	Description	Supported
createDocument	Creates a document object of the specified type (given by the cmis:objectId property) in the specified location.	Yes
createDocumentFromSource	Creates a document object as a copy of the given source document in the (optionally) specified location.	Yes
createFolder	Creates a folder object of the specified type in the specified location.	Da
createRelationship	Creates a relationship object of the specified type.	No
createPolicy	Creates a policy object of the specified type.	No
createItem	Creates an item object of the specified type.	No
getAllowableActions	Gets the list of allowable actions for an object.	Yes
getObject	Gets the specified information for the object	Yes
getProperties	Gets the list of properties for the object.	Yes
getObjectByPath	Gets the specified information for the object.	Yes

Operation (cont.)	Description	Supported
getContentStream	Gets the content stream for the specified document object, or gets a rendition stream for a specified rendition of a document or folder object.	Yes
getRenditions	Gets the list of associated renditions for the specified object. Only rendition attributes are returned, not rendition stream.	No
updateProperties	Updates properties and secondary types of the specified object. Type iarc:object only enables changing cmis:name. By changing iarc:status or iarc:securityClass, only changes to this value will be applied. Other values need an additional call where they will be updated.	Yes
bulkUpdateProperties	Updates properties and secondary types of one or more objects.	Yes
moveObject	Moves the specified file-able object from one folder to another.	Yes
deleteObject	Deletes the specified object.	Yes
deleteTree	Deletes the specified folder object and all of its child- and descendant-objects.	Yes
setContentStream	Sets the content stream for the specified document object.	Yes
appendContentStream	Appends to the content stream for the specified document object.	Yes
deleteContentStream	Deletes the content stream for the specified document object.	Yes

5.6 Multi-filing Services

Functionality is currently not supported.

5.7 Discovery Services

Functionality is currently not supported.

5.8 Versioning Services

Functionality is currently not supported.

5.9 Relationship Services

Functionality is currently not supported.

5.10 Policy Services

Functionality is currently not supported.

5.11 ACL Services

The ACL Services are used to discover and manage Access Control Lists.

Functionalities:

Operation	Description	Supported
applyACL	Adds or removes the given ACEs to or from the ACL of an object.	Yes
getACL	Get the ACL currently applied to the specified object.	Yes

6 TROUBLESHOOTING

6.1 Problems using IMiS®/StorageConnector Services

CMIS

Bellow, issues frequently encountered when using IMiS®/StorageConnector Services with CMIS interface are described and instructions for resolving them are given.

6.1.1 Bad authorization

Problem:

org.apache.chemistry.opencmis.commons.exceptions.**CmisPermissionDeniedException**:
javax.security.auth.login.LoginException: No authentication method is available.

Cause of the problem

The issue could be caused by invalid username or password.

Resolving the problem

Try sending a different username and password again.

6.1.2 Error when creating an entity below the root of the archive

Problem:

org.apache.chemistry.opencmis.commons.exceptions.**CmisConstraintException**: Server reported an error processing request (Reason: code=ERR_IAS_ERROR, message='Entity cannot be commit (there is no effective retention and disposition schedules).')

Cause of the problem

The cause of the error is a lack of retention policies or disposition holds.

Resolving the problem

Another attempt of sending with cmis:secondaryObjectTypelds, which contains a collection of retention policies and disposition holds.

6.1.3 Error when deleting an entity

Problem:

org.apache.chemistry.opencmis.commons.exceptions.**CmisConstraintException**: Server reported an error processing request (Reason: code=ERR_IAS_ERROR, message='Reason for deletion required but missing or empty.')

Cause of the problem

The cause of the error is a lack of reason for the deletion of the entity.

Resolving the problem

A DefaultReason attribute, where the value specifies the reason for the deletion of the entity is added to the configuration of the archive. Another attempt to delete will send a reason for deletion.