

# [MS-UPSMODS]: User Profile Synchronization (UPS): Management Objects Data Structure

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# 1 Introduction

The User Profile Synchronization (UPS): Management Objects Data Structure specifies the format for the objects used to execute and determine status for synchronization between data sources.

## 1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

**Base 64**  
**code page**  
**Coordinated Universal Time (UTC)**  
**distinguished name (DN)**  
**domain**  
**domain account**  
**domain controller (DC)**  
**globally unique identifier (GUID)**  
**naming context (NC)**

The following terms are specific to this document:

**anchor:** An attribute value or series of attribute values of an object used to uniquely identify an object.

**assembly:** A collection of one or more files that is versioned and deployed as a unit. An assembly is the primary building block of a .NET Framework application. All managed types and resources are contained within an assembly and are marked either as accessible only within the assembly or as accessible from code in other assemblies. Assemblies also play a key role in security. The code access security system uses information about an assembly to determine the set of permissions that is granted to code in the assembly.

**change log:** A log of changes, such as add and delete, that are made to objects that are stored on a back-end database server. Applications can use this information to identify changes that occurred on those objects.

**data source:** A database, Web service, disk, file, or other collection of information from which data is queried or submitted. Supported data sources can vary based on application and the data provider that is specified.

**delete-add:** A pending import type that occurs when the synchronization engine finds a staging object in the connector space with the same distinguished name but a different object types.

**delta import:** An import from a connected directory where only the changes that have occurred since the last import are imported.

**delta synchronization:** A synchronization process which process only those objects which have pending imports.

**disconnecter object:** A staging object that is not linked to a metaverse object.

**explicit connector object:** A connector object which cannot transition to a disconnecter object.

**explicit disconnecter object:** A disconnecter object which cannot transition to a connector object.

**export attribute flow:** An action which transfers attribute values from a metaverse object to an export object.

**export batch number:** A counter which is incremented each time an export run-step is executed for a management agent.

**flow:** The application of a set of rules to copy or transform one or more source attributes, or a constant value, from a source object to a single destination attribute on a destination object.

**full import:** An import from a connected directory where all objects and attributes are imported.

**full synchronization:** A synchronization process which processes all staging objects.

**import attribute flow:** An action which transfers attribute values from an import object to a metaverse object.

**inbound synchronization process:** The process that creates the integrated view in the metaverse of the information that is received from the connected data sources.

**LDIF:** A standard plain text data interchange format for representing LDAP (Lightweight Directory Access Protocol) directory content and update requests.

**management agent (MA):** An object that translates the operation of the synchronization engine into the format that a connected data source understands.

**metaverse:** A storage area that contains the aggregated information from multiple connected data sources.

**metaverse retry:** A status of a metaverse object which marks the object as requiring synchronization.

**normal connector objects:** Alternate term for a connector object, used to distinguish a connector object from an explicit connector object.

**normal disconnector objects:** Alternate term for a disconnector object, used to distinguish a disconnector object from an explicit disconnector object.

**obsolescence:** The process of the synchronization engine marking objects in the connector space that were not imported with a delete pending import type.

**outbound synchronization process:** The process that updates export objects as a result of metaverse object changes.

**partition:** An area within a shared services database, such as an area that isolates different tenants within a service, or the process of creating such an area in a shared services database.

**pending export:** A status used to mark a staging object with information that has not yet been exported to the connected data source.

**pending import:** A status used to mark a staging object with information that has not yet been synchronized with the metaverse.

**placeholder:** A staging object which represents a component of another staging object's hierarchical name that has not yet been imported.

**projection:** An action that creates a metaverse object and establishes a link between import objects and an existing metaverse object.

**provision:** An action that creates a connector space object and establishes a link with an existing metaverse object.

**referential updates:** The action of ensuring that objects that refer to other objects via attribute value are correctly linked.

**run profile:** An object composed of a series of steps that define the type of synchronization operations that should occur when the object is executed.

**script-based synchronization rule:** A synchronization rule implemented in a programming language.

**staging object:** A representation of an instance of a connected data source object.

**synchronization engine:** An object that performs synchronization.

**transient state:** A state of a staging object that occurs when a staging object has the same distinguished name but a different anchor attribute value than an imported object.

**MAY, SHOULD, MUST, SHOULD NOT, MUST NOT:** These terms (in all caps) are used as described in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

## 1.2 References

### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com). We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[MS-SECO] Microsoft Corporation, "[Windows Security Overview](#)", January 2007.

[MS-UPSCDS] Microsoft Corporation, "[User Profile Synchronization \(UPS\): Configuration Data Structure](#)", August 2009.

[MS-WMI] Microsoft Corporation, "[Windows Management Instrumentation Remote Protocol Specification](#)", September 2007.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.ietf.org/rfc/rfc2119.txt>

[RFC4648] Josefsson, S., "The Base16, Base32, and Base64 Data Encodings", RFC 4648, October 2006, <http://www.ietf.org/rfc/rfc4648.txt>

[XMLSCHEMA1] Thompson, H.S., Ed., Beech, D., Ed., Maloney, M., Ed., and Mendelsohn, N., Ed., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>

### 1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)", March 2007.



### 1.3 Protocol Overview (Synopsis)

The Management Objects Data Structures are responsible for initiating synchronization run profiles and determining the status of the profile run. Synchronization is controlled by management agent data objects and the metaverse data object. A management agent data object specifies a set of run profiles. Each run profile is composed of a series of steps which define the type of synchronization operation, such as import, synchronization, or export, and the data source partition on which to execute the profile. To perform synchronization with one or more data sources, Synchronization Management Objects are used to execute run profiles and determine the status of the run profile.

The synchronization engine creates an integrated view of objects that are stored in multiple data sources and manages information in those data sources. This integrated view is determined by the information retrieved from data sources and a set of rules that determine how to process this information.

The synchronization engine processes information from different data sources. The synchronization engine encapsulates interaction with a data source through an abstraction of a component termed a management agent. Each management agent translates an operation requested by the synchronization engine into the format that the data source understands.

Each management agent exchanges information with a data source. A management agent can be configured to allow data to flow from the data source to the synchronization engine, from the synchronization engine to the data source, or in both directions, although only imports or exports can occur at any one time for a given management agent.

The synchronization engine database contains two tables that store the information. The tables contain 1) the connector spaces and 2) the metaverse. The synchronization engine maintains a distinct connector space as a staging area for each management agent, that is, each row in the connector space table indicates which management agent's configuration defines the synchronization engine's behavior for importing, synchronizing, and exporting that connector space object. Although physically all the connector space objects are stored in the same table, logically, this table is partitioned and referred to as if they were distinct and separate connector spaces. Where this document describes a characteristic of a connector space, it refers to the logical partition, and not the table that stores the physical union of all logical connector spaces.

Each connector space is a staging area that contains representations of the objects from a data source. The synchronization engine uses the connector space to determine what has changed in the data source and to stage incoming changes. The synchronization engine also uses the connector space to stage outgoing changes for export to the data source.

The metaverse is a storage area that contains the aggregated information from multiple data sources, providing a single global, integrated view of all combined objects. Metaverse objects are created based on the information that is retrieved from the data sources and a set of rules.

When the synchronization engine communicates with a connected data source, it reads the information in the data source and uses that information to create a representation of the object in the connector space. Each object in a connector space has at least two connector space attributes:

- A **globally unique identifier (GUID)**
- A **distinguished name (DN)**

Objects in the connector space can also have an anchor attribute if the data source assigns a unique attribute to the object. The anchor attribute uniquely identifies an object in the data source. The synchronization engine uses the anchor to locate the corresponding representation of this object in

the data source. The synchronization engine assumes that the anchor of an object never changes over the lifetime of the object.

One or more of the management agents can be configured to use a unique identifier to generate an anchor automatically for each object when it is imported. For data sources that do not provide a unique identifier, an anchor generation rule can specify as part of the management agent configuration.

A connector space object can have one of the following states:

- A staging object
- A placeholder object

A staging object represents an instance of an object type as defined in the data source. In addition to the GUID and the DN, a staging object always has an attribute with a value that indicates the object type. Staging objects that have been imported always have a value for the anchor attribute. Staging objects that have been newly created by the synchronization engine and are in the process of being created in the data source do not have a value for the anchor attribute.

Staging objects carry current values of attributes and operational information needed by the synchronization engine. Operational information flags indicate the types of updates that are staged on the staging object. If a staging object is updated with new information from the data source that has not yet been processed by the synchronization engine, the object is marked as pending import. If a staging object has any new information that has not yet been exported to the data source, the staging object is marked as pending export.

A staging object can have a pending import and/or a pending export. The synchronization engine creates a pending import by using object information received from the data source. When the synchronization engine receives information about the existence of a new object that matches one of the object types selected in the management agent, the synchronization engine creates a pending import in the connector space as a representation of the object in the data source.

The synchronization engine creates a pending export by using object information in the metaverse. Pending exports are exported by the management agent to the data source during the next communication session. Pending exports do not yet exist in the data source. Therefore, the anchor attribute for a pending export is not available in connector space. After the connected data source receives the object from the synchronization engine, the data source creates a unique value for the anchor attribute of the object.

The synchronization engine confirms the export of the pending export by importing the object from the data source. Pending exports become pending imports as soon as the synchronization engine receives them during the next import from that data source.

To preserve the naming hierarchy of the data source, the synchronization engine creates placeholder objects in the connector space. Each placeholder object represents an object in the data source that has not been imported into the synchronization engine, but whose name is a component of another data source object's hierarchical name that is being imported into the synchronization engine and is needed to construct that object's hierarchical name. Placeholder objects fill gaps created by references in the data source to objects that are not staging objects in the connector space. Placeholder objects are stored in the connector space but are never further processed by the synchronization engine. The synchronization engine also uses placeholder objects to store referenced objects that have not been imported.

A metaverse object contains the aggregated view that the synchronization engine has of all the staging objects in all the connector spaces. The synchronization engine creates metaverse objects

by using the information in staging objects. One or more staging objects can be linked to a single metaverse object, but a staging object cannot be linked to more than one metaverse object.

To map objects within a data source to a corresponding object type within the metaverse, the synchronization engine provides an extensible schema with a predefined set of object types and associated attributes. Attributes can be single-value properties or multivalue properties, and the attribute value types can be strings, references, numbers, and Boolean values.

A staging object that is linked to a metaverse object is called a connector object. A staging object that is not linked to a metaverse object is called a disconnecter object. Placeholder objects are never linked to a metaverse object.

When a staging object becomes a connector object during synchronization, attributes and their values can flow between the staging object and the metaverse object. Attribute flow can be configured in either direction, or in both directions, and is configured by using import attribute flow rules and export attribute flow rules.

A single staging object can be linked to only one metaverse object. However, each metaverse object can be linked to multiple staging objects in the same or in different connector spaces. The linked relationship between the staging object and a metaverse object is persistent and can be removed only by management agent rules.

A disconnecter object is a staging object that is not linked to any metaverse object. The attribute values of a disconnecter object are not processed any further within the metaverse. This means that the attribute values of the corresponding object in the data source are not updated by the synchronization engine.

An object with pending imports is initially created as a disconnecter object. The synchronization engine connector filter rule prevents an object changing from a disconnecter object to a connector object. The connector filter can also cause a connector object to change to a disconnecter object if the object meets the conditions specified in the rule.

However, an object can be marked as an explicit connector object. When an object is an explicit connector object, the object will not transition from a connector object to a disconnecter object even if a change to that object makes it satisfy the conditions of the connector filter. Connector objects are also known as normal connector objects to distinguish them from explicit connector objects.

To prevent changing an object from a Disconnecter object to a connector object, an object can be marked as an explicit disconnecter object. Disconnecter objects are also known as normal disconnecter objects to distinguish them from explicit disconnecter objects. When an object is an explicit disconnecter object, the synchronization engine continues to store information about the staging object, but it does not process the object until the object is converted to a normal disconnecter object.

Synchronization with one or more data sources is performed using run profiles. Synchronization occurs in three processes, applied to a single management agent at a specific time:

- staging process
- synchronization process
- export process

During the staging process, the synchronization engine evaluates updates to information. The synchronization engine compares the information received from the data source with the information about a staging object and determines whether the staging object requires updates. If it is necessary to update the staging object with new data, the staging object is marked as pending

import. The staging process is triggered by a run profile with an Import step. The import step can be either delta import, which imports only the changes that occurs in a data source since the last import, or full import, which imports the current state of all objects from a data source.

For each object imported by the management agent, the synchronization engine first tries to locate a representation of the object in the connector space of the management agent by finding a staging object that has anchor attributes with values equal to the same attribute values being read from the data source. If no existing staging object has matching anchor attribute values, the synchronization engine tries to find a corresponding staging object with the same DN. When the synchronization engine finds a staging object that matches by DN but not by anchor, the following behavior occurs:

- If the object located in the connector space has no anchor, then the synchronization engine removes this object from the connector space and marks the metaverse object it is linked to as metaverse retry.
- If the object located in the connector space has an anchor, then the synchronization engine assumes that this object has either been renamed or deleted in the data source. It assigns a temporary, new DN for the connector space object so that it can stage the incoming object. The old object then moves to a transient state, waiting for the management agent to import the rename or deleted object to resolve the situation.

Once the synchronization engine locates a staging object that corresponds to the object imported by the management agent, the synchronization engine determines the changes to apply. A staging object in the connector space has one of the following types of pending import:

- None: No changes to any of the attributes of the staging object are available.
- Add: The staging object is a new import object in the connector space. The synchronization engine marks this as pending import for additional processing in the metaverse.
- Update: The synchronization engine finds a corresponding staging object in the connector space and marks this as pending import so that updates to the attributes can be processed in the metaverse. Any renamed objects imported by the management agent are processed as updates.
- Delete: The synchronization engine finds a corresponding staging object in the connector space and marks this as pending import so that the connector object can be deleted.
- Delete-add: The synchronization engine finds a corresponding staging object in the connector space, but the object types do not match. In this case, a delete-add modification is staged. A delete-add modification indicates to the synchronization engine that a complete resynchronization of this object is needed because different sets of rules will apply to this object when the object type changes.

After all objects imported by the management agent have been processed and no errors occurred during processing, the synchronization engine deletes the objects in the connector space which were not imported. This procedure of deleting objects is known as obsolescence. During obsolescence, any object not updated with a pending import type listed in the preceding sections is marked with a pending import type of delete.

The synchronization process is triggered by a run profile with a synchronization step. The synchronization step can be either delta synchronization, which process only those objects which have pending imports, or a full synchronization, which process all objects within the connector space associated with the management agent which executed the run profile. A third type, which combines delta import and delta synchronization into a single step, processes only the objects with pending imports which were imported during the step.

The synchronization process consists of two additional processes:

- inbound synchronization process: The content of the metaverse is updated by using the data in the connector space.
- outbound synchronization process: The content of the connector space is updated by using data in the metaverse.

The inbound synchronization process creates the integrated view in the metaverse from the information that is received from the data sources. The synchronization engine can process information by using the information that it has imported from the data source. The inbound synchronization process includes the following actions:

- projection
- join
- import attribute flow

Projection is the only action that creates objects in the metaverse. Projection uses normal disconnector objects as its source. For projection, the synchronization engine creates a metaverse object and establishes a link between the two objects.

The join action also establishes a link between staging objects and a metaverse object. A difference between join and projection is that join requires that the staging object be linked to an existing metaverse object. In a join action, synchronization engine tries to link a staging object to a metaverse object by using criteria that is specified in the management agent configuration.

During a projection action, as well as during a join action, the synchronization engine links a disconnector object to a metaverse object, changing the disconnector object to a connector object. After these actions are completed, the synchronization engine updates the attribute values of the linked metaverse object. This action is called import attribute flow. Import attribute flow occurs on all staging objects that are linked to a metaverse object.

Outbound synchronization updates staging objects when a metaverse object changes but is not deleted. The objective of outbound synchronization is to evaluate whether changes to metaverse objects require updates to staging objects in the connector spaces. Staging objects that are changed are marked as pending export. These objects are subsequently exported out to the data source.

The outbound synchronization process includes the following actions:

- provisioning
- deprovisioning
- export attribute flow

Provisioning is triggered when changes are applied to objects in the metaverse. When changes are made to metaverse objects, the synchronization engine can perform any of the following tasks as part of the provisioning action:

- Create connector objects, and then link them to the metaverse object.
- Rename connector objects, that is, change their DNs.
- Remove links between a metaverse object and staging objects, thereby creating disconnector objects.

When the synchronization engine creates a new staging object, the staging object to which the metaverse object is linked is always marked as pending export, because the object will not yet exist in the data source.

When the synchronization engine removes the link to a connector object, thereby creating a disconnecter object, deprovisioning is triggered. The deprovisioning action determines how the synchronization engine processes the disconnecter object. The synchronization engine can either keep the staging object as a normal disconnecter object or explicit disconnecter object in the connector space, or stage a delete for export.

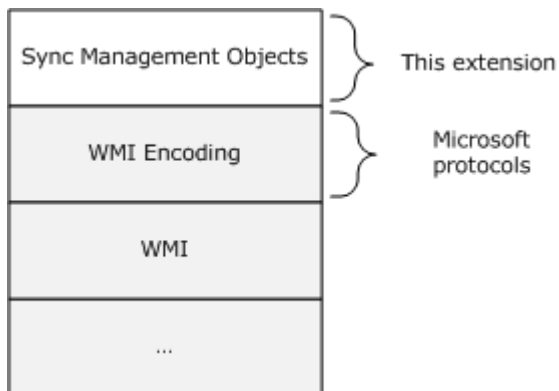
Export attribute flow also occurs during the outbound synchronization process, with the same source-to-destination attribute mapping with which import attribute flow occurs during inbound synchronization. Export attribute flow occurs only between metaverse and linked staging objects.

During the export process, the synchronization engine examines all pending exports in the connector space, and then exports the updates to the data source.

The synchronization engine stores export and import status information about each staging object in the connector space. If values of the attributes have changed since the most recent export, the stored import and export status information is used by the synchronization engine. The synchronization engine compares the imported and exported information to determine whether the export was successful, or if the export was not successful and needs to be repeated.

## 1.4 Relationship to Other Protocols

Synchronization Management Objects are transmitted between client and server using Windows Management Instrumentation Remote Protocol and Windows Management Instrumentation Encoding Version 1.0 Protocol, as demonstrated in the following figure.



**Figure 1: Synchronization Management Objects protocol stack**

This implies that Synchronization Management Objects uses all underlying protocols as specified in Windows Management Instrumentation Remote Protocol and Windows Management Instrumentation Encoding Version 1.0 Protocol.

Synchronization Management Objects relies on Run Profiles defined in the Management Agent data object as defined in [\[MS-UPSCDS\]](#) section 2.2.32.

## 1.5 Prerequisites/Preconditions

Synchronization Management Objects require that the user obtain a synchronization service object.

In addition, the MIISAdmins, MIISOperator and MIISBrowser security groups are required to grant permissions.

## **1.6 Applicability Statement**

Synchronization Management Objects are appropriate for initiating and checking the status of synchronization Run Profiles.

## **1.7 Versioning and Capability Negotiation**

None.

## **1.8 Vendor-Extensible Fields**

None.

## **1.9 Standards Assignments**

None.

## 2 Messages

### 2.1 Transport

Synchronization Management Objects MUST be transported over [\[MS-WMI\]](#).

The client connection MUST be secured at an authentication level as specified in [\[MS-WMI\]](#) section 3.2.3.

### 2.2 Message Syntax

Synchronization Management Objects are transported using the syntax described in [\[MS-WMI\]](#).

#### 2.2.1 Run Profile Results

The following return values are returned by the Execute and RunStatus methods and are present in the run-history/run-details/step-details/step-result element defined in Run Details. All strings are case sensitive. For each result, the server MUST perform the following except where noted:

- The next step in the run profile will not run and data will not be obsoleted.
- If an import run step returned this value, the processing of retries and cleanup of placeholder objects will not be performed.

**completed-discovery-errors:** The full import run step stopped because of discovery errors between the data source and the connector space.

**completed-export-errors:** The run step completed with export errors. The next step in the run profile will run and data will be obsoleted.

**completed-no-objects:** The full import run step found no objects to import. The next step in the run profile will run and data will be obsoleted.

**completed-sync-errors:** The run step completed with synchronization errors or warnings. The next step in the run profile will run and data will be obsoleted.

**completed-transient-objects:** The run step completed with objects in the connector space in a transient state. The next step in the run profile will run and data will be obsoleted.

**completed-warnings:** The run step completed with synchronization warnings. The next step in the run profile will run and data will be obsoleted.

**completing-obsoletion:** The synchronization engine is in the process of marking objects in the connector space that no longer exist in the data source as obsolete.

**completing-referential-updates:** The synchronization engine is in the process of completing its referential updates, ensuring that object that refer to other object via attribute value are correctly linked.

**in-progress:** The synchronization engine is currently executing a run profile for the management agent.

**no-start-bad-ma-configuration:** The run step failed to start because the management agent configuration is invalid.



**no-start-change-log-not-enabled:** The delta import run step failed to start because the change log in the data source was not enabled.

**no-start-connection:** The run step failed to start because of connection problems with the data source.

**no-start-credentials:** The run step failed to start the credential were not accepted by the data source.

**no-start-database-permission:** The management agent does not have the permissions needed to access the connected directory database.

**no-start-database-table:** The management agent could not read or write the database table.

**no-start-database-schema-mismatch:** The database schema does not match the schema defined for the management agent.

**no-start-delta-step-type-not-configured:** The delta import run step failed to start because the management agent is not configured for a delta import. The next step in the run profile will not run and data will not be obsoleted. If an import run step returned this value, the processing of retries and cleanup of placeholder objects will not be performed.

**no-start-file-access-denied:** The run step failed to start because access to the input file in the management agent configuration was denied.

**no-start-file-code-page:** The run step failed to start because the selected **code page** does not match the code page of the file specified in the management agent properties.

**no-start-file-not-found:** The run step failed to start because the input file specified the management agent configuration could not be found.

**no-start-file-open:** The run step failed to start because the input file specified in the management agent configuration could not be opened.

**no-start-file-sharing-violation:** The run step failed to start because of a sharing violation on the input file specified in the management agent configuration.

**no-start-full-import-required:** The delta import run step failed to start because a full import step is required prior to running a delta import step.

**no-start-notes-api-not-available:** The Notes API is in use by another process.

**no-start-notes-client-init-failure:** The Notes Client failed to initialize.

**no-start-header-row-mismatch:** The header row in the file does not match the definition specified in the management agent.

**no-start-ma:** The run step failed to start because of an unknown management agent error.

**no-start-ma-working-directory:** The run step failed to start because there is no directory or a directory could not be created for the management agent.

**no-start-no-domain-controller:** The run step failed to start because the domain controller could not be contacted by the synchronization engine.

**no-start-no-partition-delete:** The run step failed to start because **domain** or **naming context (NC)** specified in the run step has been deleted.

**no-start-partition-not-configured:** The run step failed to start because the required partition is not selected in the management agent properties.

**no-start-partition-rename:** The run step failed to start because the partition selected in the management agent properties has been renamed in the data source.

**no-start-server:** The run step failed to start because of an unknown synchronization engine error.

**no-start-no-steps-in-profile:** The run step failed because the run profile contains a step that refers to a partition that has been deleted.

**stopped-bad-ma-configuration:** The run step stopped because of an invalid management agent configuration.

**stopped-change-log-out-of-order:** The run step stopped because the data source change log entries are not numbered sequentially.

**stopped-code-page-conversion:** The import run step stopped because of a code page conversion error.

**stopped-connectivity:** The run step stopped because of connectivity loss with the data source.

**stopped-database-connection-lost:** The run step stopped because the server is not connected to the database used by the synchronization engine.

**stopped-database-disk-full:** The run stopped because the database used by the synchronization engine is full.

**stopped-deadlocked:** The run step stopped because of an internal server deadlock between multiple currently executing management agent run profiles.

**stopped-disk-full:** The run step stopped because of a full disk.

**stopped-error-limit:** The run step stopped because the run profile encountered more than the configured maximum number of errors. The default maximum number of errors is 5000.

**stopped-export-write:** The export run step stopped because of an error writing to the data source.

**stopped-extension-dll-access:** The run step stopped because the synchronization engine service account does not have the required permissions to access the Extensions folder.

**stopped-extension-dll-ambiguous:** The run step stopped because the rules extension contains multiple implementations of the script-based synchronization rule interfaces.

**stopped-extension-dll-exception:** The run step stopped because of an exception was returned during the initialization of a script-based synchronization rule.

**stopped-extension-dll-file-not-found:** The run step stopped because the assembly name of a script-based synchronization rule specified in the management agent properties cannot be found.

**stopped-extension-dll-instantiation:** The run step stopped because the constructor of a script-based synchronization rule threw an exception.

**stopped-extension-dll-invalid-assembly:** The run step stopped because the specified assembly name of a script-based synchronization rule is not a valid .NET assembly.

**stopped-extension-dll-load:** The run step stopped because the specified assembly name of a script-based synchronization rule cannot be loaded due to an unknown error.

**stopped-extension-dll-missing-dependency:** The run step stopped because the extension object cannot be instantiated because the script-based synchronization rule extension is missing a dependency file.

**stopped-extension-dll-no-implementation:** The run step stopped because the class that is implementing the required interface cannot be found in the specified assembly name of a script-based synchronization rule.

**stopped-extension-dll-not-configured-for-ma:** The run step stopped because the specified assembly name of a script-based synchronization rule is not a management agent rules extension.

**stopped-extension-dll-not-configured-for-mv:** The run step stopped because the specified assembly name of a script-based synchronization rule is not a metaverse rules extension.

**stopped-extension-dll-updated-version:** The run step failed because the Extensions folder was updated when the run step executed.

**stopped-file-embedded-nulls:** The import run step stopped because the input file contains embedded null characters.

**stopped-import-read:** The import run step stopped because of a read error on the data source.

**stopped-ma:** The run step stopped because of an unknown error from the management agent.

**stopped-object-limit:** The run step stopped because the object limit specified in threshold property of the management agent properties was reached.

**stopped-out-of-memory:** The run step stopped because of insufficient server memory.

**stopped-parsing-errors:** The run step stopped because the program could not parse the input file or Sun ONE Directory Server change log.

**stopped-server:** The run step stopped because of an unknown server error.

**stopped-service-shutdown:** The run step stopped because the synchronization engine service stopped.

**stopped-user-termination-from-extension:** The run step stopped because the rules extension of a script-based synchronization rule terminated the run by signaling that an error occurred.

**stopped-user-termination-from-wmi-or-ui:** The run step stopped because the user stopped running the run profile using the Stop method.

**success:** The operation completed with no errors. The next step in the run profile will run and data will be obsoleted.

## 2.2.2 Run Detail Schema

This section defines a Run Detail 'run-history' element used to describe the details of a profile run. The Run Detail MUST conform to the following XML Schema ([XMLSCHEMA11](#)) definition.

### 2.2.2.1 run-history

The run-history type is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="run-historyType">
  <xs:sequence>
    <xs:element name="run-details" minOccurs="1" maxOccurs="1">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="ma-id" type="guidType" minOccurs="1" maxOccurs="1" />
          <xs:element name="ma-name" type="xs:string" minOccurs="1" maxOccurs="1" />
          <xs:element name="run-number" type="numberType" minOccurs="1" maxOccurs="1" />
          <xs:element name="run-profile-name" type="xs:string" minOccurs="1" maxOccurs="1" />
          <xs:element name="security-id" type="security-idType" minOccurs="1" maxOccurs="1" />
          <xs:element name="step-details" type="step-detailsType" minOccurs="1"
maxOccurs="unbounded" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

The run-history element contains information about one or more management agent executed run profiles, in the order that the run profiles were executed.

The run-history/run-details element stores information about a single management agent executed run profiles.

The run-history/run-details/ma-id element contains the globally unique identifier (GUID) of the management agent.

The run-history/run-details/ma-name element contains the current display name of the management agent.

The run-history/run-details/run-number element contains the sequence number of the run, starting with run-number = 1.

The run-history/run-details/run-profile-name element contains the display name of the executed run profile.

The run-history/run-details/security-id element contains the "domain/account name" of the **domain account** executing the run profile.

The run-history/run-details/step-details element stores information about one step of the executed run profile. A step-detail element **MUST** be present for each step in the run profile. See section [2.2.2.2](#) for details on run-details.

### 2.2.2.2 step-details

The step-details element is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="step-detailsType">
  <xs:sequence>
    <xs:element name="start-date" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>
```

```

<xs:element name="end-date" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
<!-- add enum -->
<xs:element name="step-result">
  <xs:complexType>
    <xs:simpleContent>
      <xs:restriction base="stepResultType">
        <xs:enumeration value="completed-discovery-errors"/>
        <xs:enumeration value="completed-export-errors"/>
        <xs:enumeration value="completed-no-objects"/>
        <xs:enumeration value="completed-sync-errors"/>
        <xs:enumeration value="completed-transient-objects"/>
        <xs:enumeration value="completed-warnings"/>
        <xs:enumeration value="completing-obsolation"/>
        <xs:enumeration value="completing-referential-updates"/>
        <xs:enumeration value="in-progress"/>
        <xs:enumeration value="no-start-bad-ma-configuration"/>
        <xs:enumeration value="no-start-change-log-not-enabled"/>
        <xs:enumeration value="no-start-connection"/>
        <xs:enumeration value="no-start-credentials"/>
        <xs:enumeration value="no-start-database-permission"/>
        <xs:enumeration value="no-start-database-schema-mismatch"/>
        <xs:enumeration value="no-start-database-table"/>
        <xs:enumeration value="no-start-delta-step-type-not-configured"/>
        <xs:enumeration value="no-start-file-access-denied"/>
        <xs:enumeration value="no-start-file-code-page"/>
        <xs:enumeration value="no-start-file-contains-incorrect-step-type"/>
        <xs:enumeration value="no-start-file-not-found"/>
        <xs:enumeration value="no-start-file-open"/>
        <xs:enumeration value="no-start-file-sharing-violation"/>
        <xs:enumeration value="no-start-full-import-required"/>
        <xs:enumeration value="no-start-header-row-mismatch"/>
        <xs:enumeration value="no-start-ma"/>
        <xs:enumeration value="no-start-ma-working-directory"/>
        <xs:enumeration value="no-start-no-domain-controller"/>
        <xs:enumeration value="no-start-no-partition-delete"/>
        <xs:enumeration value="no-start-partition-not-configured"/>
        <xs:enumeration value="no-start-partition-rename"/>
        <xs:enumeration value="no-start-server"/>
        <xs:enumeration value="no-start-no-steps-in-profile"/>
        <xs:enumeration value="stopped-bad-ma-configuration"/>
        <xs:enumeration value="stopped-change-log-out-of-order"/>
        <xs:enumeration value="stopped-code-page-conversion"/>
        <xs:enumeration value="stopped-connectivity"/>
        <xs:enumeration value="stopped-database-connection-lost"/>
        <xs:enumeration value="stopped-database-disk-full"/>
        <xs:enumeration value="stopped-deadlocked"/>
        <xs:enumeration value="stopped-disk-full"/>
        <xs:enumeration value="stopped-error-limit"/>
        <xs:enumeration value="stopped-export-write"/>
        <xs:enumeration value="stopped-extension-dll-access"/>
        <xs:enumeration value="stopped-extension-dll-ambiguous"/>
        <xs:enumeration value="stopped-extension-dll-exception"/>
        <xs:enumeration value="stopped-extension-dll-file-not-found"/>
        <xs:enumeration value="stopped-extension-dll-instantiation"/>
        <xs:enumeration value="stopped-extension-dll-invalid-assembly"/>
        <xs:enumeration value="stopped-extension-dll-load"/>
        <xs:enumeration value="stopped-extension-dll-missing-dependency"/>
        <xs:enumeration value="stopped-extension-dll-no-implementation"/>
        <xs:enumeration value="stopped-extension-dll-not-configured-for-ma"/>
      </xs:restriction>
    </xs:simpleContent>
  </xs:complexType>
</xs:element>

```

```

        <xs:enumeration value="stopped-extension-dll-not-configured-for-mv"/>
        <xs:enumeration value="stopped-extension-dll-updated-version"/>
        <xs:enumeration value="stopped-file-embedded-nulls"/>
        <xs:enumeration value="stopped-file-error"/>
        <xs:enumeration value="stopped-import-read"/>
        <xs:enumeration value="stopped-ma"/>
        <xs:enumeration value="stopped-object-limit"/>
        <xs:enumeration value="stopped-out-of-memory"/>
        <xs:enumeration value="stopped-parsing-errors"/>
        <xs:enumeration value="stopped-server"/>
        <xs:enumeration value="stopped-service-shutdown"/>
        <xs:enumeration value="stopped-user-termination-from-extension"/>
        <xs:enumeration value="stopped-user-termination-from-wmi-or-ui"/>
        <xs:enumeration value="success"/>
    </xs:restriction>
</xs:simpleContent>
</xs:complexType>
</xs:element>
<xs:element name="step-description" type="xs:anyType" minOccurs="1" maxOccurs="1" />
<xs:element name="current-export-step-counter" type="numberType" minOccurs="1"
maxOccurs="1" />
<xs:element name="last-successful-export-step-counter" type="numberType" minOccurs="1"
maxOccurs="1" />
<xs:element name="ma-connection" type="ma-connectionType" minOccurs="1" maxOccurs="1" />
<xs:element name="ma-discovery-errors" type="ma-discovery-errorsType" minOccurs="1"
maxOccurs="1" />
<xs:element name="ma-discovery-counters" type="ma-discovery-countersType" minOccurs="1"
maxOccurs="1" />
<xs:element name="synchronization-errors" type="synchronization-errorsType" minOccurs="1"
maxOccurs="1" />
<xs:element name="mv-retry-errors" type="mv-retry-errorsType" minOccurs="1" maxOccurs="1"
/>
<xs:element name="outbound-flow-counters" type="outbound-flow-countersType" minOccurs="0"
maxOccurs="unbounded" />
<xs:element name="staging-counters" type="staging-countersType" minOccurs="1"
maxOccurs="1" />
<xs:element name="inbound-flow-counters" type="inbound-flow-countersType" minOccurs="1"
maxOccurs="unbounded" />
<xs:element name="export-counters" type="export-countersType" minOccurs="1" maxOccurs="1"
/>
</xs:sequence>
<xs:attribute name="step-number" type="numberType" use="required" />
<xs:attribute name="step-id" type="guidType" use="required" />
</xs:complexType>

```

The run-details/step-details element stores information about one step of the executed run profile.

The run-details/step-details/@step-number attribute is the run profile step number starting at 1.

The run-details/step-details/@step-id attribute is the run profile step GUID of the run profile step as specified in the management agent properties.

The run-details/step-details/start-date element contains the date and time at which the step began.

The run-details/step-details/end-date element contains the date and time at which the step completed.

The run-details/step-details/step-result element contains the current run profile step status and MUST be one of the values defined in section [2.2.1](#).

The run-details/step-details/@progress attribute contains information about the progress for given synchronization and staging tasks in the form "x/y" where x is the number of objects processed and y is the total number of items to be processed. This attribute MUST NOT be present unless the run-details/step-details one of the following:

- completing-referential-updates
- completing-obsoleteion

The run-details/step-details/@file attribute contains the name of the file in certain step failures involving files and MUST NOT be present unless the run-history/run-details/step-details is one of the following as defined in [2.2.1](#):

- completed-no-objects
- no-start-file-access-denied
- no-start-file-contains-incorrect-step-type
- no-start-file-not-found
- no-start-file-open
- no-start-file-sharing-violation
- stopped-extension-dll-access
- stopped-extension-dll-ambiguous
- stopped-extension-dll-exception
- stopped-extension-dll-file-not-found
- stopped-extension-dll-instantiation
- stopped-extension-dll-invalid-assembly
- stopped-extension-dll-load
- stopped-extension-dll-missing-dependency
- stopped-extension-dll-no-implementation
- stopped-extension-dll-updated-version
- stopped-file-embedded-nulls
- stopped-disk-full

The run-details/step-details/step-description element contains the SyncConfig-ma-run-data/ run-configuration/configuration/step value for this step as specified in [\[MS-UPSCDS\]](#) section 2.2.32.7.1.

The run-details/step-details/current-export-step-counter element contains the current export batch number associated with the management agent. It is incremented each time an export run-step is run for this management agent.

The run-details/step-details/last-successful-export-step-counter element contains the last successful export batch number, which is the export batch number of the last export run step which completed without error.

The run-details/step-details/ma-connection element stores information about the connection between the management agent and the data source. The management agent reports the server it connected to, in addition to any servers it failed to connect to. See section [2.2.2.3](#) for details on ma-connection.

The run-details/step-details/ma-discovery-errors element stores a list of errors on objects the management agent tries to discover during import. See section [2.2.2.4](#) for details on ma-discovery-errors.

The run-details/step-details/ma-discovery-counters element contains the values of some management agent counters relating to imported objects. See section [2.2.2.5](#) for details on ma-discovery-counters.

The run-details/step-details/synchronization-errors element lists the problems encountered while synchronizing data source objects through the metaverse. These errors may be the result of a problem synchronizing a data source object to the metaverse and out to other data sources, or the result of a problem exporting a metaverse object out to a data source. See section [2.2.2.6](#) for details on synchronization-errors.

The run-details/step-details/mv-retry-errors element contains information about metaverse objects that the synchronization engine could not synchronize. See section [2.2.2.7](#) for details on mv-retry-errors.

The run-details/step-details/outbound-flow-counters element contains information about the number of provisioning changes and exported attributes. An outbound-flow-counters element MUST be present if the run profile step resulted in export attribute flow. See section [2.2.2.8](#) for details on outbound-flow-counters.

The run-details/step-details/staging-counters element contains information on the staging of the entries that were imported. See section [2.2.2.9](#) for details on staging-counters.

The run-details/step-details/inbound-flow-counters element contains information about the number of disconnectors which became connectors during this run and the disposition of existing connectors. The inbound-flow-counters element MUST be present if the run profile step resulted in inbound attribute flow. See section [2.2.2.10](#) for details on inbound-flow-counters.

The run-details/step-details/export-counters element contains information about object changes during a management agent export. See section [2.2.2.11](#) for details on export-counters.

### 2.2.2.3 ma-connection

The ma-connection element is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="ma-connectionType">
  <xs:sequence>
    <xs:element name="connection-result" type="connectionResultType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="server" type="xs:string" minOccurs="0" maxOccurs="1" />
    <xs:element name="connection-log" minOccurs="0" maxOccurs="1" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="incident" minOccurs="1" maxOccurs="1" >
            <xs:complexType>
              <xs:sequence>
                <xs:element name="connection-result" type="connectionResultType" minOccurs="1"
maxOccurs="1" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```



```

<xs:element name="date" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
<xs:element name="server" type="xs:string" minOccurs="1" maxOccurs="1" />
<xs:element name="cd-error" minOccurs="0" maxOccurs="1" >
  <xs:complexType>
    <xs:sequence>
      <xs:element name="error-code" type="xs:string" minOccurs="1" maxOccurs="1" />
      <xs:element name="error-literal" type="xs:string" minOccurs="1" maxOccurs="1" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>

```

The ma-connection/connection-result element contains the current status of the connection and MUST be present if an attempt to connect to the server has completed. The element value MUST be one of the following:

**success:** Successful connection to the data source.

**failed-connection:** Connection to the data source has failed for a reason other than authentication. Generally, the data source error element will be present to assist in troubleshooting.

**dropped-connection:** The connection between the management agent and the data source no longer exists.

**failed-authentication:** Authentication is not possible using the supplied credentials.

**failed-search:** A container or table search failed with an unexpected error.

**warning-no-watermark:** The management agent cannot read the watermark when doing a full import for a data source.

The ma-connection/server element is the name of the server the management agent connected to. This element MUST be present if the management agent successfully connected to a server.

The ma-connection/connection-log element contains a sequential list of the connection attempts against the servers, including cases where the connectivity dropped. The sequential list of run-history/run-details/step-details/connection-log/incident elements MUST be in order of occurrence. A connection-log element MUST be present for each attempted connection to a server.

The ma-connection/connection-log/incident element contains an attempt to connect with the server.

The ma-connection/connection-log/incident/connection-result element is the string giving the current status of the connection.

The ma-connection/connection-log/incident/date element is the date and time, in **Coordinated Universal Time (UTC)**, when the incident occurred.

The ma-connection/connection-log/incident/server element is the name of the server this incident refers to.

The ma-connection/connection-log/incident/cd-error/ element contain management agent information about the data source error. This element MUST be present if an error occurred while connected to the data source.

The ma-connection/connection-log/incident/cd-error/error-code element is a management agent-specific error value. This element MUST be present if an error occurred while connected to the data source.

The ma-connection/connection-log/incident/cd-error/error-literal element is a management agent specific error literal. This element MUST be present if an error occurred while connected to the data source.

#### 2.2.2.4 ma-discovery-errors

The ma-discovery-errors element is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="ma-discovery-errorsType">
  <xs:sequence>
    <xs:element name="ma-object-error" minOccurs="0" maxOccurs="unbounded" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="error-type" minOccurs="1" maxOccurs="1">
            <xs:simpleType>
              <xs:restriction base="xs:string">
                <xs:enumeration value="missing-change-type"/>
                <xs:enumeration value="invalid-change-type"/>
                <xs:enumeration value="multi-valued-change-type"/>
                <xs:enumeration value="need-full-object"/>
                <xs:enumeration value="missing-dn"/>
                <xs:enumeration value="dn-not-ldap-conformant"/>
                <xs:enumeration value="invalid-dn"/>
                <xs:enumeration value="missing-anchor-component"/>
                <xs:enumeration value="multi-valued-anchor-component"/>
                <xs:enumeration value="anchor-too-long"/>
                <xs:enumeration value="duplicate-object"/>
                <xs:enumeration value="missing-object-class"/>
                <xs:enumeration value="missing-object-type"/>
                <xs:enumeration value="unmappable-object-type"/>
                <xs:enumeration value="parse-error"/>
                <xs:enumeration value="read-error"/>
                <xs:enumeration value="staging-error"/>
                <xs:enumeration value="invalid-modification-type"/>
                <xs:enumeration value="conflicting-modification-types"/>
                <xs:enumeration value="multi-single-mismatch"/>
                <xs:enumeration value="invalid-attribute-value"/>
                <xs:enumeration value="invalid-base64-value"/>
                <xs:enumeration value="invalid-numeric-value"/>
                <xs:enumeration value="invalid-boolean-value"/>
                <xs:enumeration value="reference-value-not-ldap-conformant"/>
                <xs:enumeration value="invalid-reference-value"/>
                <xs:enumeration value="unsupported-value-type"/>
              </xs:restriction>
            </xs:simpleType>
          </xs:element>
          <xs:element name="entry-number" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
          <xs:element name="line-number" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

```

<xs:element name="column-number" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
<xs:element name="dn" type="dnType" minOccurs="0" maxOccurs="1" />
<xs:element name="anchor" type="binaryAnchorType" minOccurs="0" maxOccurs="1" />
<xs:element name="attribute-name" type="xs:string" minOccurs="0" maxOccurs="1" />
<xs:element name="cd-error" minOccurs="0" maxOccurs="1" >
  <xs:complexType>
    <xs:sequence>
      <xs:element name="error-code" type="xs:string" minOccurs="1" maxOccurs="1" />
      <xs:element name="error-literal" type="xs:string" minOccurs="1" maxOccurs="1" />
      <xs:element name="server-error-detail" type="xs:string" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>

```

The `ma-discovery-errors/ma-object-error` element stores information about a parsing error or an object error. An instance of this element **MUST** be present if any object error occurred during import.

The `ma-discovery-errors/ma-object-error/error-type` element is a description of the discovery error and **MUST** be one of the following:

**missing-change-type:** Returned during a delta import run when the change type value is not present.

**invalid-change-type:** Returned during an import when the change type column value does not match the list of valid changes types.

**multi-valued-change-type:** Returned during a delta import run when more than one value for the change type is present.

**need-full-object:** Returned during a delta import run when management agent has submitted a modification on an object which cannot be located in the Connector Space.

**missing-dn:** Returned during import when there is no distinguished name (DN) value.

**dn-not-ldap-conformant:** Returned when a management agent reports a distinguished name (DN) value that does not conform to the LDAP specification.

**invalid-dn:** Returned when an management agent reports that a distinguished name (DN) does not meet the minimum requirements for a DN.

**missing-anchor-component:** Returned by a management agent when the anchor could not be constructed because one or more anchor construction rule attributes did not have values.

**multi-valued-anchor-component:** Returned by the management agent when the anchor could not be constructed because an anchor construction rule attribute had more than one value.

**anchor-too-long:** Returned by a management agent indicating the management agent anchor construction produced an anchor which exceeded the maximum size limit.

**duplicate-object:** Returned during an import when an object with the same anchor has already been reported to the synchronization engine during this execution of a run profile.

**missing-object-class:** Returned during an import when the management agent could not read a value for the object class attribute.

**missing-object-type:** Returned during an import when the management agent could not read a value for the object type attribute.

**unmappable-object-type:** Returned by a file management agent when it reads an object which has a set of object class values that cannot be matched to any of the prefix mappings.

**parse-error:** Returned by the management agent when it cannot parse an object entry.

**read-error:** Returned by a management agent when there is a generic error reading a particular object.

**staging-error:** Returned by a management agents indicating the synchronization engine could not stage the delta in the connector space.

**invalid-reference-value:** Returned by a management agent indicating a distinguished name value imported to a reference attribute value does not meet the minimum requirements for a distinguished name (DN).

**invalid-modification-type:** Returned during a delta import of management agent when either:

- The value modification type is not one of the standard **LDIF** modification types
- or
- There is a non-replace LDIF delta on **objectclass**, such as **add: objectclass** or **delete: objectclass**.

**conflicting-modification-types:** Returned during a delta import of an management agent when reading an LDIF file when either:

- There are different attribute level modification types in the same record.
- or
- Multiple replace LDIF objectclass deltas are seen in the same file, such as: **replace: objectclass** or **objectclass: group.- replace: objectclassobjectclass: user**.

**multi-single-mismatch:** Returned by a management agent when more than one value add or more than one value delete for an attribute that is defined in the management agent properties as a single valued attribute.

**invalid-attribute-value:** Returned by a management agent when an attribute value is read that does not conform to the attribute type declared in schema.

**invalid-base64-value:** Returned by the management agent when a failure to parse a value encoded using **base 64**-encoding occurs.

**invalid-numeric-value:** Returned by a management agent when a failure to parse a numeric value occurs.

**invalid-boolean-value:** Returned by a management agent when a failure to parse a Boolean value occurs.

**reference-value-not-ldap-conformant:** Returned by a management agent indicating a distinguished name (DN) value does not conform to the LDAP specification.

**unsupported-value-type:** Returned by a management agent when a file reference is specified for an attribute which is not of the string attribute type or when a URI reference is specified for an attribute which is not of the string attribute type.

The ma-discovery-errors/ma-object-error/entry-number element indicates which record the error refers to and MUST be present if the run-history/run-details/step-details/ma-discovery-errors/ma-object-error/error-type is one of the following value:

- parse-error

The ma-discovery-errors/ma-object-error/line-number element indicates the line number at or near where the problem occurred and MUST be present if the management agent is reading import data from a file and the run-history/run-details/step-details/ma-discovery-errors/ma-object-error/error-type is one of the following value:

- parse-error

The ma-discovery-errors/ma-object-error/column-number element indicates the column number at or near where the problem occurred and MUST be present if the Management Agent is reading import data from a file and the ma-discovery-errors/ma-object-error/error-type is one of the following value:

- parse-error

The ma-discovery-errors/ma-object-error/dn element indicates the DN of the object for which the error occurred. This element MUST be present if the DN is available for the object.

The ma-discovery-errors/ma-object-error/anchor element indicates the anchor of the object with error on it. This value MUST be encoded using base 64 encoding as defined in [\[RFC4648\]](#) section 4. This element MUST be present if the anchor is available for the object.

The run-history/run-details/step-details/ma-discovery-errors/ma-object-error/anchor/@encoding attribute specifies the encoding of the anchor. This attribute MUST be one of the following values:

- base64

The ma-discovery-errors/ma-object-error/attribute-name element gives the context for the case of a mismatch on either the type of attribute or whether an attribute contains a single value. The attribute-name MUST NOT be present unless run-history/run-details/step-details/ma-discovery-errors/ma-object-error/error-type is one of the following as defined in ma-discovery-errors/ma-object-error/error-type:

- invalid-modification-type
- conflicting-modification-types
- multi-single-mismatch
- invalid-attribute-value
- invalid-base64-value
- invalid-numeric-value
- invalid-boolean-value

- reference-value-not-ldap-conformant
- unsupported-value-type

The ma-discovery-errors/ma-object-error/error-type/cd-error element contains management agent information about the data source error. This element MUST be present if an error occurred while connecting to the data source.

The ma-discovery-errors/ma-object-error/error-type/cd-error/error-code element is a management agent-specific error value. This element MUST be present if an error occurred while connecting to the data source.

The ma-discovery-errors/ma-object-error/error-type/cd-error/error-literal element is a management agent specific error literal. This element MUST be present if an error occurred while connecting to the data source.

The ma-discovery-errors/ma-object-error/error-type/cd-error/server-error-detail element is a string reported by the management agent which contain a change log entry number. This element MUST be present if the management agent encounters a discovery error while running a delta import against a Sun One Directory Server.

The ma-discovery-errors/ma-object-error/error-type/cd-error/value element is an invalid distinguished name value was discovered for the attribute. This element MUST be present if an invalid distinguished name value was discovered for the attribute.

#### 2.2.2.5 ma-discovery-counters

The ma-discovery-counters element is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="ma-discovery-countersType" >
  <xs:sequence>
    <xs:element name="filtered-deletions" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
    <xs:element name="filtered-objects" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>
```

The ma-discovery-counters/filtered-deletions element is the number of deletions reported in delta import that do not apply to any object in connector space. This element MUST be present if the value is greater than 0.

The ma-discovery-counters/filtered-objects element is the number of objects that were read from the data source but were filtered out by the management agent. This element MUST be present if the value is greater than 0.

#### 2.2.2.6 synchronization-errors

The synchronization-errors element is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="synchronization-errorsType">
  <xs:sequence>
    <xs:element name="import-error" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

```

<xs:complexType>
  <xs:sequence>
    <xs:element name="first-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
    <xs:element name="retry-count" type="numberType" minOccurs="1" maxOccurs="1" />
    <xs:element name="date-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
    <xs:element name="error-type" type="importAndMVRetryErrorType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="algorithm-step" type="algorithmStepRestrictedType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="change-not-reimported" minOccurs="0" maxOccurs="1" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="delta" minOccurs="1" maxOccurs="1" >
            <xs:complexType>
              <xs:sequence>
                <xs:element name="anchor" type="binaryAnchorType" minOccurs="0" maxOccurs="1"
/>
                <xs:element name="dn-attr" type="dnAttributeDeltaType" minOccurs="0"
maxOccurs="unbounded" />
                <xs:element name="attr" type="attributeDeltaType" minOccurs="0"
maxOccurs="unbounded" />
              </xs:sequence>
              <xs:attribute name="operation" use="required">
                <xs:simpleType>
                  <xs:restriction base="xs:string">
                    <xs:enumeration value="add"/>
                    <xs:enumeration value="replace"/>
                    <xs:enumeration value="update"/>
                    <xs:enumeration value="delete"/>
                    <xs:enumeration value="obsolete"/>
                    <xs:enumeration value="delete-add"/>
                  </xs:restriction>
                </xs:simpleType>
              </xs:attribute>
              <xs:attribute name="dn" type="dnType" use="required" />
            </xs:complexType>
          </xs:element>
          <xs:element name="entry" minOccurs="1" maxOccurs="1" >
            <xs:complexType>
              <xs:sequence>
                <xs:element name="anchor" type="binaryAnchorType" minOccurs="1" maxOccurs="1" />
                <xs:element name="parent-anchor" type="binaryAnchorType" minOccurs="1"
maxOccurs="1" />
                <xs:element name="primary-objectclass" type="xs:string" minOccurs="1"
maxOccurs="1" />
                <xs:element name="objectclass">
                  <xs:complexType>
                    <xs:sequence>
                      <xs:element minOccurs="1" maxOccurs="unbounded" name="oc-value"
type="xs:string" />
                    </xs:sequence>
                  </xs:complexType>
                </xs:element>
                <xs:element name="dn-attr" type="dnAttributeType" minOccurs="0"
maxOccurs="unbounded" />
                <xs:element name="attr" type="attributeType" minOccurs="0" maxOccurs="unbounded"
/>
              </xs:sequence>
              <xs:attribute name="dn" type="dnType" use="required" />
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="dn" type="dnType" use="required" />
</xs:complexType>

```

```

        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="extension-error-info" type="extensionErrorInfoType" minOccurs="0"
maxOccurs="1" />
  <xs:element name="rules-error-info" type="rulesErrorInfoType" minOccurs="0"
maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="cs-guid" type="xs:string" use="required" />
  <xs:attribute name="dn" type="xs:string" use="required" />
</xs:complexType>
</xs:element>
<xs:element name="export-error" minOccurs="0" maxOccurs="unbounded" >
  <xs:complexType>
    <xs:sequence>
      <xs:element name="date-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
      <xs:element name="first-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
      <xs:element name="retry-count" type="numberType" minOccurs="1" maxOccurs="1" />
      <xs:element name="error-type" minOccurs="1" maxOccurs="1">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:enumeration value="ambiguous-update"/>
            <xs:enumeration value="anchor-too-long"/>
            <xs:enumeration value="cd-connectivity-error"/>
            <xs:enumeration value="cd-error"/>
            <xs:enumeration value="cd-existing-attribute-or-value"/>
            <xs:enumeration value="cd-existing-object"/>
            <xs:enumeration value="cd-missing-object"/>
            <xs:enumeration value="certifier-ou-not-configured"/>
            <xs:enumeration value="code-page-conversion"/>
            <xs:enumeration value="constraint-violation"/>
            <xs:enumeration value="dn-attributes-failure"/>
            <xs:enumeration value="duplicate-anchor"/>
            <xs:enumeration value="encrypted-attributes"/>
            <xs:enumeration value="encryption-not-enabled"/>
            <xs:enumeration value="error-code"/>
            <xs:enumeration value="error-literal"/>
            <xs:enumeration value="insufficient-columns"/>
            <xs:enumeration value="insufficient-field-width"/>
            <xs:enumeration value="invalid-attribute-value"/>
            <xs:enumeration value="invalid-dn"/>
            <xs:enumeration value="invalid-provisioning-attribute-value"/>
            <xs:enumeration value="kerberos-no-logon-server"/>
            <xs:enumeration value="kerberos-time-skew"/>
            <xs:enumeration value="locking-error-needs-retry"/>
            <xs:enumeration value="missing-anchor-component"/>
            <xs:enumeration value="missing-provisioning-attribute"/>
            <xs:enumeration value="modify-naming-attribute"/>
            <xs:enumeration value="no-export-to-this-object-type"/>
            <xs:enumeration value="non-existent-parent"/>
            <xs:enumeration value="partial-success"/>
            <xs:enumeration value="password-policy-violation"/>
            <xs:enumeration value="password-set-disallowed"/>
            <xs:enumeration value="permission-issue"/>
            <xs:enumeration value="provision-to-secondary-nab"/>
            <xs:enumeration value="readonly-attribute"/>
            <xs:enumeration value="rename-to-existing-dn"/>
            <xs:enumeration value="schema-violation"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
</xs:element>

```



```

        <xs:enumeration value="syntax-violation"/>
        <xs:enumeration value="temporary-certifier-file-creation-failure"/>
        <xs:enumeration value="type-mismatch"/>
        <xs:enumeration value="unexpected-error"/>
        <xs:enumeration value="unexpected-provisioning-attribute"/>
    </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="cd-error" minOccurs="0" maxOccurs="1" >
    <xs:complexType>
        <xs:sequence>
            <xs:element name="error-code" type="xs:string" minOccurs="1" maxOccurs="1" />
            <xs:element name="error-literal" type="xs:string" minOccurs="1" maxOccurs="1" />
            <xs:element name="server-error-detail" type="xs:string" minOccurs="0" maxOccurs="1"
/>
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:sequence>
<xs:attribute name="cs-guid" type="guidType" use="required" />
<xs:attribute name="dn" type="dnType" use="required" />
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>

```

The `synchronization-errors/import-error` element lists an error importing a connector space delta into the metaverse. An instance of this element **MUST** be present for each object that encountered an error during import.

The `synchronization-errors/import-error/@cs-guid` attribute is the GUID for the connector space object which encountered the import error.

The `synchronization-errors/import-error/@dn` attribute is the distinguished name identifying the connector space object which encountered the import error.

The `synchronization-errors/import-error/first-occurred` element is the date, in Coordinated Universal Time (UTC), when this error first occurred. This date differs from `synchronization-errors/import-error/date-occurred` if the same error has been encountered on a previous run. If the same error had not been encountered on a previous run, this date is the same as `synchronization-errors/import-error/date-occurred`.

The `synchronization-errors/import-error/retry-count` element is the run number of previously executed run profile for which the same error has been encountered. If the same error was not encountered on a previous run, this value is 0.

The `synchronization-errors/import-error/date-occurred` element is the date, in Coordinated Universal Time (UTC), when this instance of the error occurred.

The `synchronization-errors/import-error/error-type` element is the value that indicates the type of error that occurred and **MUST** be one of the following:

**ambiguous-export-flow-to-single-valued-attribute:** The export flow rule for a management agent attempted to flow values from a multi-valued attribute of a metaverse object to a single-valued attribute in the connector space.

**ambiguous-import-flow-from-multiple-connectors:** When applying an import attribute flow rule for a management agent where multiple connector objects joined to a metaverse object, the synchronization engine was unable to execute the import attribute flow.

**ambiguous-reference-value-for-export-flow:** An export attribute flow rule for a management agent attempted to flow reference values from a multi-valued attribute of a metaverse object to a single-valued attribute in the connector space.

**app-store-import-exception:** An exception occurred while performing an import staging operation from the application store.

**cannot-parse-dn-component:** The dn-part mapping rule cannot flow an improperly formatted distinguished name component to the metaverse object.

**cannot-parse-object-id:** The string value used to search for a metaverse object in a join rule is not in the correct globally unique identifier (GUID) format.

**connector-filter-rule-violation:** A connector object became a filtered disconnector object as a result of a connector-filter configuration during provisioning or export attribute flow.

**cs-attribute-type-mismatch:** The type of the imported attribute does not match the attribute type specified in the management agent schema.

**datetime-string-format-incorrect:** The format of a datetime value received during inbound staging from the application store is incorrect.

**dn-index-out-of-bounds:** The distinguished name component index value used in an import attribute flow is larger than the number of components in the distinguished name (DN) of the source object.

**dre-missing-required-attribute:** The DetectedRuleEntry object does not have all of the required attributes.

**encryption-key-lost:** The synchronization server encountered encrypted data for which it no longer has access to the encryption keys.

**exported-change-not-reimported:** Changes exported to a management agent were not reconfirmed during this import management agent run.

**extension-deprovisioning-invalid-result:** The implementation of the script-based synchronization deprovision rule returned an invalid result.

**extension-dll-crash:** The process executing the script-based synchronization rule unexpectedly terminated.

**extension-dll-exception:** The script-based synchronization rule caused an exception.

**extension-dll-timeout:** The script-based synchronization rule contains an extension timeout value and the call to the extension exceeds this timeout value.

**extension-entry-point-not-implemented:** The script-based synchronization rule rules extension specified that it does not implement an entry point.

**extension-join-resolution-index-out-of-bounds:** The implementation of the script-based synchronization join rule in the rules extension set an index value that is less than zero or greater than the number of metaverse entry objects.

**extension-join-resolution-invalid-object-type:** The implementation of the script-based synchronization join rule in the rules extension sets the value of the outbound metaverse object type to a value that is not listed in the metaverse schema.

**extension-projection-invalid-object-type:** The implementation of the script-based synchronization projection rule in the rules extension sets the value of the outbound metaverse object type to a value that is not listed in the metaverse schema.

**extension-projection-object-type-not-set:** The implementation of the script-based synchronization projection rule in the rules extension does not specify the metaverse object type.

**extension-provisioning-call-limit-reached:** The script-based synchronization provision method is called more than 10 times during the synchronization of a single object.

**extension-unexpected-attribute-value:** The extension for the script-based synchronization rule specifies that it encountered an unexpected attribute value.

**failed-app-store-access:** The synchronization engine had a failure while trying to access the application store.

**failed-creation-via-web-services:** The synchronization engine failed to create an object using the web service interface to the application store.

**failed-deletion-via-web-services:** The synchronization engine failed to delete an object using the web service interface to the application store.

**failed-impersonation:** The synchronization engine failed to impersonate using the specified account of a management agent.

**failed-modification-via-web-services:** The synchronization engine failed to modify an object using the Web service interface to the application store.

**failed-schema-access:** The synchronization engine had a failure while trying to access the schema in the application store.

**flow-multi-values-to-single-value:** The synchronization engine attempted to import or export a multi-valued attribute to a single-valued attribute.

**invalid-boolean-constant-flow:** A synchronization rule for a Boolean attribute contains an invalid constant value.

**invalid-reference-constant-flow:** A synchronization rule for a reference attribute contains an invalid constant value.

**join-object-id-must-be-single-valued:** The data source attribute value used to join a metaverse object through a join rule contains more than one value. The data source attribute value used in the join rule can only contain a single value.

**locking-error-needs-retry:** Returned by a management agent when another management agent is trying to synchronize the same connector space object.

**mv-constraint-violation:** The attribute value from the connector space exceeds the length restrictions of the metaverse attribute.

**sync-config-operation-not-supported:** The requested synchronization configuration operation is not supported.

**sync-rule-flow-attribute-not-found:** An attribute specified in the synchronization rule flow definition was not found in the schema, or is not a member of the object class or any of its auxiliary classes.

**sync-rule-flow-provisioning-failed:** An exception is returned while a synchronization rule is provisioning and performing initial attribute flow to a new connector space object.

**sync-rule-inbound-flow-rules-invalid:** The inbound flow rules of a synchronization rule definition are invalid.

**sync-rule-invalid-export-scoping-xml:** The synchronization rule's flow defines a export scoping element that does not adhere to the standard format for <scoping>.

**sync-rule-invalid-expression:** The synchronization rule defines an invalid or incomplete expression.

**sync-rule-invalid-function-xml:** The synchronization rule's flow defines a function call that does not adhere to the standard format for <fn>.

**sync-rule-invalid-relationship-criteria-xml:** The synchronization rule's relationship criteria does not adhere to the standard format for <conditions>.

**sync-rule-invalid-xml-attribute-flow:** The synchronization rule defines an invalid or incomplete attribute flow.

**sync-rule-outbound-flow-rules-invalid:** The synchronization rule's outbound flow rule is invalid.

**sync-rule-relationship-criteria-attribute-not-found:** The synchronization rule's relationship criteria references an attribute that is not defined within the schema.

**sync-rule-required-attr-not-found:** The synchronization rule requires an attribute that was not found.

**sync-rule-scoping-filter-invalid-operator:** The synchronization rule specified a scope operator that cannot be applied.

**sync-rule-scoping-filter-invalid-xml:** The synchronization rule specified invalid XML format for the scoping rule.

**sync-rule-validation-parsing-error:** An error was encountered while parsing or validating a synchronization rule.

**unexpected-error:** An unexpected error occurred during an apply-change management agent run.

**unique-index-violation:** The synchronization engine detected an invalid index for an attribute in the metaverse.

**unsupported-attribute-type:** An unsupported attribute type was found while importing objects from the application store.

**unsupported-container-delete:** The management agent is attempting to delete a container object during deprovisioning.

**unsupported-container-rename:** The management agent is attempting to rename a container object during deprovisioning.

**write-locking-error-needs-retry:** Returned by a management agent when another management agent is trying to synchronize the same connector space object.

The synchronization-errors/import-error/algorithm-step element identifies the stage of synchronization when the error occurred and MUST be one of the following:

**staging:** The connector space object was imported into the connector space.

**connector-filter:** The connector space object was being processed to see if it met the conditions of the connector filter.

**join:** The connector space object was being processed to see if it met the conditions of the join rule.

**projection:** The connector space object was being processed to see if it met the conditions of the projection rule.

**import-flow:** The pending imports for the connector space object were being processed.

**provisioning:** A new connector space object was being created from a metaverse object.

**validate-connector-filter:** The synchronization engine was validating the connector filter.

**deprovisioning:** The connector space object was being processed for deletion in a connector space.

**export-flow:** The pending exports for the connector space object were being processed.

**mv-deletion:** The metaverse object associated with this connector space object was being deleted.

**recall:** An attribute value associated with this connector space object was being removed from the linked metaverse object.

**mv-object-type-change:** The object type of the metaverse object associated with this connector space object changed.

The synchronization-errors/import-error/algorithm-step/@ma-id attribute is the management agent GUID and MUST NOT be present unless synchronization-errors/import-error/algorithm-step is one of the following values:

- validate-connector-filter
- deprovisioning
- export-flow
- recall

The synchronization-errors/import-error/algorithm-step/@dn attribute is the DN of the connector space object and MUST NOT be present unless synchronization-errors/import-error/algorithm-step is one of the following values:

- validate-connector-filter
- deprovisioning
- export-flow

- recall

The synchronization-errors/import-error/change-not-reimported element contains information about an exported change that was not confirmed on import and MUST be present if any change previously exported by the synchronization engine was not re-imported during this run profile step.

The synchronization-errors/import-error/change-not-reimported/delta element is the delta that was exported to the data source on the last export run.

The synchronization-errors/import-error/change-not-reimported/delta/@operation attribute is the operation that was attempted and MUST be one of the following:

- add
- replace
- update
- delete
- obsolete
- delete-add

The synchronization-errors/import-error/change-not-reimported/delta/@dn attributes is the DN of the connector spec object for this delete entry and MUST NOT be present if synchronization-errors/import-error/change-not-reimported/delta is one of the following values:

- obsolete

The synchronization-errors/import-error/change-not-reimported/delta/anchor element specifies the anchor of the object. The value of the element MUST be encoded using base 64 encoding as defined in [\[RFC4648\]](#) section 4. This element MUST be present if the anchor is available for this object.

The synchronization-errors/import-error/change-not-reimported/delta/anchor/@encoding attribute specifies the encoding of the anchor and MUST be one of the following values:

- base64

The synchronization-errors/import-error/change-not-reimported/delta/dn-attr element is the attribute which has a value that was not confirmed. This element MUST be present if the DN is available for this object.

The synchronization-errors/import-error/change-not-reimported/delta/dn-attr/@name attribute is the attribute name.

The synchronization-errors/import-error/change-not-reimported/delta/dn-attr/@operation attribute is the operation being performed and MUST be one of the following values:

- required
- add
- update
- replace
- delete

The synchronization-errors/import-error/change-not-reimported/delta/dn-attr/@multi-valued attribute is whether the attribute is multi-valued.

The synchronization-errors/import-error/change-not-reimported/delta/dn-value element is the value which was not confirmed.

The synchronization-errors/import-error/change-not-reimported/delta/dn-value/@operation attribute is the operation for the attribute and MUST be one of the following values:

- add
- delete

The synchronization-errors/import-error/change-not-reimported/delta/dn-value/dn element is the DN value.

The synchronization-errors/import-error/change-not-reimported/delta/dn-value/anchor element specifies the anchor of the object. The value of the element MUST be encoded using base 64 encoding as defined in [\[RFC4648\]](#) section 4.

The synchronization-errors/import-error/change-not-reimported/delta/dn-value/anchor/@encoding attribute specifies the encoding of the anchor and MUST be one of the following values:

- base64

The synchronization-errors/import-error/change-not-reimported/delta/attr element is the attribute which has a value that was not confirmed. An instance of the element MUST be present for every attribute containing values that were previously exported by the synchronization engine, and that were not imported in this run profile step.

The synchronization-errors/import-error/change-not-reimported/delta/attr/@name attribute is the attribute name.

The synchronization-errors/import-error/change-not-reimported/delta/attr/@operation attribute is the operation being performed and MUST be one of the following values:

- required
- add
- update
- replace
- delete

The synchronization-errors/import-error/change-not-reimported/delta/attr/@type attribute is the attribute type and MUST be one of the following values:

- binary
- string
- integer
- boolean

The synchronization-errors/import-error/change-not-reimported/delta/attr/value element is the value which was not confirmed. This value MUST be encoded using base 64 encoding if the value contains any control characters other than null, tab, carriage-return or line-feed, or if synchronization-errors/import-error/change-not-reimported/delta/attr/@type is one of the following values:

- binary

The synchronization-errors/import-error/change-not-reimported/delta/attr/value/@operation is the operation being performed and MUST be one of the following values:

- add
- update

The synchronization-errors/import-error/change-not-reimported/delta/attr/value/@encoding attribute specifies the encoding of the attribute MUST be present if synchronization-errors/import-error/change-not-reimported/delta/attr/@type is one of the following values:

- binary

The synchronization-errors/import-error/change-not-reimported/delta/attr/value/@encoding attribute MUST NOT be present if synchronization-errors/import-error/change-not-reimported/delta/attr/value is not encoded using base 64 encoding or one of the following if synchronization-errors/import-error/change-not-reimported/delta/attr/value contains any control characters other than null, tab, carriage-return or line-feed:

- base64

The synchronization-errors/import-error/change-not-reimported/entry element is the pending import received from the data source during the last import.

The following elements have identical syntax with previously described elements with the exception that they apply to the import object received from the data source during the last import instead of the delta that was exported to the data source on the last export run:

Element	Same syntax as:
synchronization-errors/import-error/change-not-reimported/entry and all child elements not specified in the following sections.	synchronization-errors/import-error/change-not-reimported/delta

The synchronization-errors/import-error/change-not-reimported/entry/parent-anchor element specifies the parent's anchor of the object. The value of the element MUST be encoded using base 64 encoding as defined in [RFC4648](#) section 4.

The synchronization-errors/import-error/change-not-reimported/entry/parent-anchor/@encoding attribute specifies the encoding of the anchor and MUST be one of the following values:

- base64

The synchronization-errors/import-error/change-not-reimported/entry/primary-object-class element specifies the primary object class for the object.

The synchronization-errors/import-error/change-not-reimported/entry/object-class element specifies the object class for the object.



The synchronization-errors/import-error/change-not-reimported/entry/object-class/oc-value element specifies the object class values for the object. This element **MUST** be present if the object class is available in the object.

The synchronization-errors/import-error/extension-error-info element gives the contextual information about an exception and in some cases the call stack of an exception. This element **MUST** be present if an error occurred during the processing of a script-based synchronization rule.

The synchronization-errors/import-error/extension-error-info/extension-name element is the name of the script-based synchronization rule implementation file.

The synchronization-errors/import-error/extension-error-info/extension-callsite element contains the name of the import step that was running when the error occurred. The element **MUST** be one of the following values:

**initialize:** The initialize method of the script-based synchronization rule interface is being called.

**join-mapping:** The join method of the script-based synchronization rule is being called.

**join-resolution:** The join resolution method of the script-based synchronization rule is being called.

**projection:** The projection method of the script-based synchronization rule is being called.

**import-flow:** The import flow method of the script-based synchronization rule is being called.

**export-flow:** The export flow method of the script-based synchronization rule is being called.

**provisioning:** The connector space object creation method of the script-based synchronization rule is being called.

**mv-deletion:** The metaverse object deletion method of the script-based synchronization rule is being called.

**cs-deprovisioning:** The connector space object deletion method of the script-based synchronization rule is being called.

**disconnecter-filter:** The connector filter method of the script-based synchronization rule is being called.

The synchronization-errors/import-error/extension-error-info/extension-context element is the context string passed to the extension script-based synchronization rule.

The synchronization-errors/import-error/extension-error-info/call-stack element is a call stack of the rules extension call stack at the time of the import error.

The synchronization-errors/import-error/rules-error-info element identifies the rule that caused the import error. This element **MUST** be present if an error occurs in a synchronization rule during import.

The synchronization-errors/import-error/rule-error-info/context element contains information used to identify the rule that failed during the import

The synchronization-errors/import-error/rule-error-info/context/@ma-id attribute is the GUID for the management agent.

The synchronization-errors/import-error/rule-error-info/context/@ma-name attribute is the name of the management agent.

The synchronization-errors/import-error/rule-error-info/context/@cs-object-id attribute is the GUID for the object in the connector space where the error occurred.

The synchronization-errors/import-error/rule-error-info/context/@dn attribute is the distinguished name for the object in the connector space where the error occurred.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping element contains information about the mapping type and source attributes.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/@dest-attr attribute is the name of the destination attribute.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/@context-id attribute is the GUID of the attribute.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/direct-mapping element contains the mapping for a direct mapping.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/direct-mapping/src-attribute element is the name of the source attribute.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/direct-mapping/src-attribute@/intrinsic attribute MUST be true if synchronization-errors/import-error/rule-error-info/context/attribute-mapping/direct-mapping/src-attribute is one of the following values:

- dn

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/scripted-mapping element contains the mapping for a scripted mapping.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/scripted-mapping/src-attribute element is the name of the source attribute.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/scripted-mapping/src-attribute@/intrinsic attribute MUST be true if synchronization-errors/import-error/rule-error-info/context/attribute-mapping/scripted-mapping/src-attribute is one of the following:

- dn

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/constant-mapping element contains the mapping for a constant mapping.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/constant-mapping/constant-value element is the value to flow.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/dn-part-mapping element contains the mapping for a dn parts mapping.

The synchronization-errors/import-error/rule-error-info/context/attribute-mapping/dn-part-mapping/dn-part element with the dn element index, where 1 is the right-most element of the DN, from the DN to flow.

The synchronization-errors/export-error element lists an error that occurs when exporting a metaverse delta out to a data source. An instance of the element MUST be preset when an error that occurs exporting a metaverse delta out to a data source.

The synchronization-errors/export-error/@cs-guid attribute is the GUID for the data source object.

The synchronization-errors/export-error/@dn attribute is the distinguished name identifying the data source object.

The synchronization-errors/export-error/date-occurred element is the date, in Coordinated Universal Time (UTC), when this instance of the error occurred.

The synchronization-errors/export-error/first-occurred element is the date, in Coordinated Universal Time (UTC), when this error first occurred. This date differs from synchronization-errors/export-error/date-occurred if the same error has been encountered on a previous run. If the same error had not been encountered on a previous run, this date is the same as the synchronization-errors/export-error/date-occurred.

The synchronization-errors/export-error/retry-count element is the number of previous runs for which the same error has been encountered. If the same error was not encountered on a previous run, this value is zero.

The synchronization-errors/export-error/error-type element is the value that indicates the type of error that occurred and **MUST** be one of the following:

**ambiguous-update:** The management agent cannot fulfill an update or delete request because the anchor is not unique.

**anchor-too-long:** An attempt is made to construct an anchor that exceeded the maximum size limit.

**cd-connectivity-error:** An error is encountered while attempting to connect with a connected data source, but there is no specialized error type for this error.

**cd-error:** An error is encountered while attempting to communicate with a data source, but there is no specialized error type for this error.

**cd-existing-attribute-or-value:** A request to add an attribute or value is exported to the connected data source, but the attribute or value is already present in the connected data source.

**cd-existing-object:** A request to add an object is exported to the data source, but the object is already present in the data source.

**cd-missing-object:** A request to modify an object is exported to the data source, but the object cannot be found in the data source.

**certifier-ou-not-configured:** A certifier organizational unit could not be located in the connected data source.

**code-page-conversion:** An attempt is made to export an attribute value, which is stored in Unicode to the code page of the export file, but fails because of conversion errors.

**constraint-violation:** An attempt is made to export an add, modify, or delete request that violates the constraints of a data source.

**dn-attributes-failure:** An attempt is made to export an add or modify request that sets a reference value for which there is no corresponding data source object.

**duplicate-anchor:** The anchor on a newly created object is not unique.

**encrypted-attributes:** One or more attributes in the connected data source are encrypted and cannot be written as clear text.

**error-code:** The connected data source returned an error that could not be translated into a specific error. Refer to the error code and the connected data source documentation for specific details on the error.

**error-literal:** The connected data source returned a literal error string.

**insufficient-columns:** The number of columns in the connected data source schema did not match the management agent schema.

**insufficient-field-width:** The width of a field in the connected data source was not sufficient to accept the data from the management agent.

**invalid-attribute-value:** An attempt is made to flow out an attribute value that contains characters which are not valid for the data source.

**invalid-dn:** An attempt is made to export a newly created object or rename an existing object, and the distinguished name is incompatible with the data source naming requirements.

**invalid-provisioning-attribute-value:** An attempt is made to export a newly created object, but certain attributes for provisioning set by the script-based synchronization rules are not valid.

**kerberos-no-logon-server:** An attempt is made to set or change a password attribute, and the management agent cannot resolve a server for the domain part of the logon credentials.

**kerberos-time-skew:** The password attribute is being set or changed, and the time on the synchronization engine server differs from the time on the **domain controller (1)** by more than the amount defined in the Kerberos policy.

**locking-error-needs-retry:** Returned by a management agent when another management agent is trying to synchronize the same connector space object.

**missing-anchor-component:** An attempt is made to export a newly created object, but an anchor cannot be generated because a value required for constructing the anchor is not available.

**missing-provisioning-attribute:** An attempt is made to export a newly provisioned object, but a required attribute is missing.

**modify-naming-attribute:** An attempt is made to export a request where a naming attribute.

**no-export-to-this-object-type:** An attempt is made to create or modify an object in a connected data source but the connected data source does not permit additions or modifications to objects of that type.

**non-existent-parent:** An attempt is made to export an add or a rename request but the parent object does not exist in the data source.

**partial-success:** The export operations succeeded but it is necessary to retry some reference attributes later after the referenced objects are exported to the connected data source.

**password-policy-violation:** The password attribute is set or changed to a value which does not meet the administrator-defined password policy of the data source.

**password-set-disallowed:** The password encryption is set to either no encryption or less than 128-bit SSL and the administrator has not explicitly made an override to allow password sets.

**permission-issue:** An attempt is made to export an add, modify, or delete a request and the management agent has insufficient permissions to perform the operation against the data source.

**provision-to-secondary-nab:** An attempt is made to export a new object to a secondary address book in a connected data source that requires additions to be made in the primary address book.

**readonly-attribute:** An attempt is made to modify an attribute that is read-only in the connected data source.

**rename-to-existing-dn:** An attempt is made to change the distinguished name of the object at the time of export but there is already an object in the connector space with that distinguished name. The distinguished name of an object can be changed on export when the data source applies certain normalization rules that cause the distinguished name to change.

**syntax-violation:** An attempt is made to export a request where the value for an attribute violates certain value constraints.

**temporary-certifier-file-creation-failure:** A management agent was unable to write the certifier information to a temporary file. This step is required before the certifier can be sent to the connected data source.

**type-mismatch:** An attempt is made to export an attribute to a connected data source where the attribute type in the connector space does not match the attribute type in the connected data source.

**unexpected-error:** An attempt is made to export a change and an unexpected error is encountered.

**unexpected-provisioning-attribute:** An attempt is made to export a new object to a connected data source and the object contains an attribute that is unexpected at the time object creation.

The synchronization-errors/export-error/cd-error element contains management agent information about the data source error and MUST be present if synchronization-errors/export-error/error-type is one of the following values:

- cd-error

The synchronization-errors/export-error/cd-error/error-code element is a management agent-specific error value.

The synchronization-errors/export-error/cd-error/error-literal element is a management agent-specific error literal.

### 2.2.2.7 mv-retry-errors

The mv-retry-errors element is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="mv-retry-errorsType">
  <xs:sequence>
    <xs:element name="retry-error" minOccurs="0" maxOccurs="unbounded" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="date-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

```

        <xs:element name="error-type" type="importAndMVRetryErrorType" minOccurs="1"
maxOccurs="1" />
        <xs:element name="algorithm-step" type="algorithmStepRestrictedType" minOccurs="1"
maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="displayName" type="xs:string" use="required" />
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>

```

The mv-retry-errors/retry-error element contains information about an object that could not be synchronized. An instance of the element MUST be present for each object that could not be synchronized.

The mv-retry-errors/retry-error/@displayName attribute is the display name of the metaverse object which requires retrying.

The mv-retry-errors/retry-error/date-occurred element is the date, in Coordinated Universal Time (UTC), when this instance of the error occurred.

The mv-retry-errors/retry-error/error-type element is the value indicates the type of error that occurred and MUST be one of the values specified in section [2.2.2.6](#) for synchronization-errors/import-error/error-type.

The mv-retry-errors/retry-error/algorithm-step element identifies the stage of synchronization when the error occurred and MUST be one of the following values:

- connector-filter
- deprovisioning
- export-flow
- import-flow
- join
- mv-deletion
- mv-object-type-change
- projection
- provisioning
- recall
- staging
- validate-connector-filter

The mv-retry-errors/retry-error//algorithm-step/@ma attribute is the management agent name.

The mv-retry-errors/retry-error/algorithm-step/@dn is the DN of the connector space object.

The following elements have identical syntax with previously described elements with the exception that they apply to the metaverse objects that the synchronization engine could not synchronize instead of the delta that was exported to the data source on the last export run:

Element	Same syntax as:
mv-retry-errors/retry-error/extension-error-info and all child elements	synchronization-errors/import-error/retry-error/extension-error-info
mv-retry-errors-retry-error/rule-error-info and all child elements and attributes	synchronization-errors/import-error/retry-error/rule-error-info

### 2.2.2.8 outbound-flow-counters

The outbound-flow-counters element is specified via the following XML Schema ([\[XMLSCHEMA11\]](#)) definition:

```
<xs:complexType name="outbound-flow-countersType">
  <xs:sequence>
    <xs:element name="provisioned-add-no-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="provisioned-add-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="provisioned-rename-no-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="provisioned-rename-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="provisioned-disconnect" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="connector-flow" type="counterDetailTrueType" minOccurs="0" maxOccurs="1"
/>
    <xs:element name="connector-no-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="provisioned-delete-add-no-flow" type="counterDetailTrueType"
minOccurs="0" maxOccurs="1" />
    <xs:element name="provisioned-delete-add-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="ma" type="xs:string" use="required" />
  <xs:attribute name="ma-id" type="guidType" use="required" />
</xs:complexType>
```

The outbound-flow-counters/@ma attribute is the name of the management agent.

The outbound-flow-counters/@ma-guid attribute is the management agent GUID.

The outbound-flow-counters/provisioned-add-no-flow element contains information about the number of newly created connectors that were added to the connector space of this management agent. These connectors might not have export attribute flow from metaverse to connector space; the provisioning process might have set some initial values at the time of provisioning. This element **MUST** be present if the number of newly created connectors without attribute flow is greater than 0.

The outbound-flow-counters/provisioned-add-no-flow/@detail attribute **MUST** be true.

The outbound-flow-counters/provisioned-add-flow element contains information about the number of newly created connectors that were added to the connector space of this management agent. These connectors might contain some actual export attribute flow from metaverse to connector space, in addition to initial values the provisioning process might have set at the time of provisioning. This element MUST be present if the number of newly created connectors with attribute flow is greater than 0.

The outbound-flow-counters/provisioned-add-flow/@detail attribute MUST be true.

The outbound-flow-counters/provisioned-rename-flow element contains information about the number of distinguished name renames during this management agent run where export attributes flowed from the metaverse to the connector space. This element MUST be present if the number of distinguished name renames with attribute flow is greater than 0.

The outbound-flow-counters/provisioned-renamed-flow/@detail attribute MUST be true.

The outbound-flow-counters/provisioned-rename-no-flow element contains information about the number of distinguished name renames during this management agent run where there was no actual export attribute flow from metaverse to connector space. This element MUST be present if the number of distinguished name renames without attribute flow is greater than 0.

The outbound-flow-counters/provisioned-renamed-no-flow/@detail attribute MUST be true.

The outbound-flow-counters/provisioned-disconnect element contains information about the number of provisioning rule disconnects during this run. This element MUST be present if the number of provisioning rule disconnects is greater than 0.

The outbound-flow-counters/provisioned-disconnect/@detail attribute MUST be true.

The outbound-flow-counters/connector-flow element contains information about the number of connectors where export-attribute flowed attributes from the metaverse to this object. This element MUST be present if the number of connectors with export attribute flow is greater than 0. The outbound-flow-counters/connector-flow/@detail attribute MUST be true.

The outbound-flow-counters/connector-no-flow element contains information about the number of connectors where export attribute flow was attempted but there was no attribute flow. This element MUST be present if the number of connectors without export attribute flow is greater than 0.

The outbound-flow-counters/connector-no-flow/@detail attribute MUST be true.

The outbound-flow-counters/provisioned-delete-add-no-flow element contains information about the number of provisioning rule delete-adds where export attribute flow was attempted but there was no attribute flow. This element MUST be present if the number of provisioning rule delete-adds without export attribute flow is greater than 0.

The outbound-flow-counters/provisioned-delete-add-no-flow/@detail attribute MUST be true.

The outbound-flow-counters/provisioned-delete-add-flow element contains information about the number of provisioning rule delete-adds where export-attribute flowed attributes from the metaverse to this object. This element MUST be present if the number of provisioning rule delete-adds with export attribute flow is greater than 0.

The outbound-flow-counters/provisioned-delete-add-flow/@detail attribute MUST be true.



### 2.2.2.9 staging-counters

The staging-counters element is specified via the following XML Schema ([XMLSCHEMA1](#)) definition:

```
<xs:complexType name="staging-countersType">
  <xs:sequence>
    <xs:element name="stage-no-change" type="counterDetailFalseType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="stage-add" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
    <xs:element name="stage-update" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="stage-rename" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="stage-delete" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="stage-delete-add" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="stage-failure" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
  </xs:sequence>
</xs:complexType>
```

The staging-counters/stage-no-change element contains information about the number of imported entries that were not changed.

The staging-counters/stage-no-change/@detail attribute MUST be false.

The staging-counters/stage-add element contains information about the number of imported entries that were added to the connector space.

The staging-counters/stage-add element/@detail attribute MUST be true.

The staging-counters/stage-update element contains information about the number of imported entries that were updated that were updated in the Connector Space.

The staging-counters/stage-update/@detail attribute MUST be true.

The staging-counters/stage-rename element contains information about the number of imported entries that were renamed in the Connector Space.

The staging-counters/stage-rename/@detail attribute MUST be true.

The staging-counters/stage-delete element contains information about the number of imported entries that were deleted from the Connector Space.

The staging-counters/stage-delete/@detail attribute MUST be true.

The staging-counters/stage-delete-add element contains information about the number of imported entries that were deleted, then added in the Connector Space.

The staging-counters/stage-delete-add/@detail attribute MUST be true.

The staging-counters/stage-failure element contains information about the number of import entry failures.

The staging-counters/stage-failure/@detail attribute MUST be true.

### 2.2.2.10 inbound-flow-counters

The inbound-flow-counters element is specified via the following XML Schema ([IXMLSCHEMA11](#)) definition:

```
<xs:complexType name="inbound-flow-countersType">
  <xs:sequence>
    <xs:element name="disconnecter-filtered" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-joined-no-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-joined-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-joined-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnecter-projected-no-flow" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnecter-projected-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-projected-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnecter-remains" type="counterDetailFalseType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-filtered-remove-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-filtered-leave-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-flow" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="connector-flow-remove-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-no-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-delete-remove-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-delete-leave-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-delete-add-processed" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="flow-failure" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
  </xs:sequence>
</xs:complexType>
```

The inbound-flow-counters/disconnector-filtered element contains information about the number of disconnectors that were run through the connector filter and marked as filtered disconnectors.

The inbound-flow-counters/disconnector-filtered/@detail attribute MUST be true.

The inbound-flow-counters/disconnector-projected-no-flow element contains information about the number of disconnectors that were projected by the synchronization engine for which there was no import attribute flow to the metaverse.

The inbound-flow-counters/disconnector-projected-no-flow/@detail attribute MUST be true.

The inbound-flow-counters/disconnector-projected-flow element contains information about the number of disconnectors that were projected by the synchronization engine for which attribute changes flowed to the metaverse.

The inbound-flow-counters/disconnector-projected-flow/@detail attribute MUST be true.

The inbound-flow-counters/disconnector-projected-remove-mv element contains the number of disconnectors that the synchronization engine tried to project to the metaverse, but the process of provisioning disconnected the connectors.

The inbound-flow-counters/disconnector-projected-remove-mv/@detail attribute MUST be true.

The inbound-flow-counters/disconnector-joined-no-flow element contains information about the number of disconnectors that were successfully joined by the synchronization engine for which there was no attribute changes flowed to the metaverse.

The inbound-flow-counters/disconnector-joined-no-flow/@detail attribute MUST be true.

The inbound-flow-counters/disconnector-joined-flow element contains information about the number of disconnectors that were successfully joined by the synchronization engine for which attribute changes flowed to the metaverse.

The inbound-flow-counters/disconnector-joined-flow/@detail attribute MUST be true.

The inbound-flow-counters/disconnector-joined-remove-mv element contains the number of disconnectors that the synchronization engine joined to metaverse objects in the first part of the synchronization process, but removed during deprovisioning.

The inbound-flow-counters/disconnector-joined-remove-mv/@detail attribute MUST be true.

The inbound-flow-counters/disconnector-remains element contains information about the number of disconnectors that successfully passed the connector filter test, but for which there were no rules calling for them to project or join, and hence now remain as normal disconnectors in the connector space.

The inbound-flow-counters/disconnector-remains/@detail attribute MUST be false.

The inbound-flow-counters/connector-no-flow element contains information about the number of connectors that passed the connector filter test and remained connectors. When import attribute flow was applied to these connectors, no attributes flowed to the metaverse.

The inbound-flow-counters/connector-no-flow/@detail attribute MUST be true.

The inbound-flow-counters/connector-flow element contains information about the number of connectors that passed the connector filter test and remained connectors and contained new or changed values which flowed to the metaverse.

The inbound-flow-counters/connector-flow/@detail attribute MUST be true.

The inbound-flow-counters/connector-flow-remove-mv element contains the number of existing connectors that meet the following conditions:

- Passed the connector filter test.
- Import attribute flow rules applied to these connectors.
- Their metaverse object removed because the provisioning extension disconnected the connectors joined to that metaverse object.

The inbound-flow-counters/connector-flow-remove-mv/@detail attribute MUST be true.

The inbound-flow-counters/connector-filtered-leave-mv element contains information about the number of connectors that were disconnected by the connector filter on this pass but the metaverse object was left in place.

The inbound-flow-counters/connector-filtered-leave-mv/@detail attribute MUST be true.

The inbound-flow-counters/connector-filtered-remove-mv element contains information about the number of connectors that were disconnected by the connector filter on this pass where the metaverse object was removed.

The inbound-flow-counters/connector-filtered-remove-mv/@detail attribute MUST be true.

The inbound-flow-counters/connector-delete-leave-mv element contains information about the number of connectors that were deleted on this pass where the metaverse object was left in place.

The inbound-flow-counters/connector-delete-leave-mv/@detail attribute MUST be true.

The inbound-flow-counters/connector-delete-remove-mv element contains information about the number of connectors that were deleted on this pass where the metaverse object was removed.

The inbound-flow-counters/connector-delete-remove-mv /@detail attribute MUST be true.

The inbound-flow-counters/connector-delete-add-processed element contains information about the number of connectors for which delete-add processing was performed.

The inbound-flow-counters/connector-delete-add-processed/@detail attribute MUST be true.

The inbound-flow-counters/flow-failure element contains information about the number of synchronization failures.

The inbound-flow-counters/ flow-failure/@detail attribute MUST be true.

### 2.2.2.11 export-counters

The export-flow-counters element is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```
<xs:complexType name="export-countersType">
  <xs:sequence>
    <xs:element name="export-add" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
    <xs:element name="export-update" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
  />
  <xs:element name="export-rename" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
  <xs:element name="export-delete" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
  <xs:element name="export-delete-add" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
  <xs:element name="export-failure" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
</xs:sequence>
</xs:complexType>
```

The export-counters/export-add element contains information about the number of new object creations that the management agent has processed successfully.

The export-counters/export-add/@detail attribute MUST be true.

The export-counters/export-update element contains information about the number of object updates which the management agent has processed successfully.

The export-counters/export-update/@detail attribute MUST be true.

The export-counters/export-rename element contains information about the number of object renames which the management agent has processed successfully.

The export-counters/export-rename/@detail attribute MUST be true.

The export-counters/export-delete element contains information about the number of object updates not involving renaming the object that the management agent has processed successfully.

The export-counters/export-delete/@detail attribute MUST be true.

The export-counters/export-delete-add element contains information about the number of modifications involving deleting the existing object and adding a new object with the same distinguished name that the management agent has processed successfully.

The export-counters/export-delete-add/@detail attribute MUST be true.

The export-counters/export-failure element contains information about the number of operation failures.

The export-counters/export-failure/@detail attribute MUST be true.

## 3 Protocol Details

### 3.1 Client Details

This section specifies the client side of this protocol.

#### 3.1.1 Abstract Data Model

This section specifies a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations adhere to this model as long as their external behavior is consistent with that described in this document.

In order to execute and determine status for synchronization between data sources, the client obtains a management agent object. The client uses this management agent object to execute and determine status for synchronization between data sources on the server. Synchronization is performed on the server as indicated in section [3.2.1](#).

The client also uses the management agent to control operations on the server. The client can use the management agent to request operations as indicated in section [3.2.1](#).

#### 3.1.2 Timers

None.

#### 3.1.3 Initialization

In order to interact with Synchronization Management Objects, the client MUST obtain a Service object using the `IWbemLevel1Login::NTLMLogin` and `IWbemServices::GetObject` methods as defined in [\[MS-WMI\]](#) section 3.1.4.1.4 and [\[MS-WMI\]](#) section 3.1.4.3.4 with the following parameters:

Namespace: winmgmts:

Object Path: \root\MicrosoftIdentityIntegrationServer

The client connection MUST be secured at an authentication level that is negotiated as defined in [\[MS-WMI\]](#) section 3.1.4.1.4. The authentication level is used by the server to determine if the client has the permission to execute the methods described in the following sections.

#### 3.1.4 Higher-Layer Triggered Events

None.

#### 3.1.5 Message Processing Events and Sequencing Rules

The Synchronization Management Objects client calls methods that provide management services.

##### 3.1.5.1 Obtain Management Agent Object

In order to interact with Synchronization Management Objects, the client MUST obtain a management agent object by executing a `Get` command on the Service object using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: Get
- Input Parameters: "MIIS\_ManagementAgent.Name = <name of management agent>"

where <name of management agent> is the name of the management agent against which the client intends to operate. This method requires MIISOperators or MIISAdmins permissions.

### 3.1.5.2 Execute

The Execute method executes a management agent run profile. The client MUST pass the name of a management agent run profile. The client calls the Execute method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: Execute
- Input Parameters: <name of management agent run profile>

where <name of management agent run profile> is the name of the management agent run profile the client intends to execute. This method requires MIISOperators or MIISAdmins permissions.

### 3.1.5.3 GetServerStatus

The GetServerStatus method returns the connection state to a given partition of the data source associated with a management agent. The client MUST pass the GUID of a management agent partition. The client can call the GetServerStatus method on a management agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: GetServerStatus
- Input Parameters: <management agent partition GUID>

where <management agent partition GUID> is the GUID of the partition of the management agent for which client intends to determine status. This method requires MIISOperators or MIISAdmins permissions.

### 3.1.5.4 NumConnectors

The NumConnectors method returns the number of connector objects that are under this management agent. The client can call the NumConnectors method on a management agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumConnectors
- Input Parameters: none

The value returned by the server does not include the number explicit connector objects. This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

### 3.1.5.5 NumCSObjects

The NumCSObjects method returns the total number of connector, disconnecter, and placeholder objects in this management agent's connector space. The client can call the NumCSObjects method

on a Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: `NumCSObjects`
- Input Parameters: none

This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.6 NumDisconnectors

The `NumDisconnectors` property returns the number of disconnector objects. The client can call the `NumDisconnectors` method on a Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: `NumDisconnectors`
- Input Parameters: none

The value returned by the server does not include explicit disconnector or filtered disconnector objects. This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.7 NumExplicitConnectors

The `NumExplicitConnectors` method returns the number of explicit connector objects under this management agent. The client can call the `NumExplicitConnectors` method on a Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: `NumExplicitConnectors`
- Input Parameters: none

The value returned by the server does not include connector objects. This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.8 NumExplicitDisconnectors

The `NumExplicitDisconnectors` method returns the number of explicit disconnector objects in this management agent's connector space. The client can call the `NumExplicitDisconnectors` method on a Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: `NumExplicitDisconnectors`
- Input Parameters: none

The value returned by the server does not include disconnector or filtered disconnector objects. This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.9 NumExportAdd

The `NumExportAdd` method returns the number of objects that will be added to the data source on the next export. The client can call the `NumExportAdd` method on a Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:



- Method Name: NumExportAdd
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.10 NumExportDelete**

The NumExportDelete method returns the number of objects that will be deleted from the data source on the next export. The client can call the NumExportDelete method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumExportDelete
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.11 NumExportUpdate**

The NumExportUpdate method returns the number of objects that will be updated in the data source on the next export. The client can call the NumExportUpdate method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumExportUpdate
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.12 NumFilteredDisconnectors**

The NumFilteredDisconnectors method returns the number of filtered disconnector objects. This value does not include disconnector or explicit disconnector objects. The client can call the NumFilteredDisconnectors method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumFilteredDisconnectors
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.13 NumImportAdd**

The NumImportAdd method returns the number of objects that are candidates for joining or projecting to the metaverse. The client can call the NumImportAdd method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumImportAdd
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.14 NumImportDelete**

The NumImportDelete method returns the number of connector or explicit connector objects that will be deleted from the connector space. The client can call the NumImportDelete method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumImportDelete
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.15 NumImportNoChange**

The NumImportNoChange method returns the number of connector or explicit connector objects that have no pending changes. The client can call the NumImportNoChange method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumImportNoChange
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.16 NumImportUpdate**

The NumImportUpdate method returns the number of connector or explicit connector objects that contain attribute changes to be applied to the joined metaverse object. The client can call the NumImportUpdate method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumImportUpdate
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

#### **3.1.5.17 NumPlaceHolders**

The NumPlaceHolders method returns the number of placeholder objects. The client can call the NumPlaceHolders method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumPlaceHolders
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

### 3.1.5.18 NumTotalConnectors

The NumTotalConnectors method returns the number of connector and explicit connector objects. The client can call the NumTotalConnectors method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumTotalConnectors
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

### 3.1.5.19 NumTotalDisconnectors

The NumTotalDisconnectors method returns the number of disconnector, explicit disconnector, and filtered disconnector objects. The client can call the NumTotalDisconnectors method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: NumTotalDisconnectors
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

### 3.1.5.20 ResyncSyncConfigObjects

The ResyncSyncConfigObjects initiates the synchronization of the synchronization configuration data from the synchronization engine database to the synchronization configuration database. The client can call the ResyncSyncConfigObjects method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: ResyncSyncConfigObjects
- Input Parameters: none

This method requires MIISAdmins permissions.

### 3.1.5.21 RunDetails

The RunDetails method returns the details of the last management agent run in an XML format. The client can call the RunDetails method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: RunDetails
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

### 3.1.5.22 RunEndTime

The RunEndTime method returns the date and time, in Coordinated Universal Time (UTC), when the last management agent run profile completed. The client can call the RunEndTime method on a

Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: `RunEndTime`
- Input Parameters: none

The method returns a value only if the management agent is not currently running a profile. This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.23 RunNumber

The `RunNumber` method is a counter that returns the sequence number for the current run profile. The `RunNumber` indicates the total number of run profiles that have been executed for this management agent based on stored history. The client can call the `RunNumber` method on a Management Agent object by using the `IWbemServices::ExecMethod` as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 method with the following parameters:

- Method Name: `RunNumber`
- Input Parameters: none

If the management agent has never executed a run profile or if the history of run profiles has been cleared, the value return by the server is an empty string. This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.24 RunProfile

The `RunProfile` method returns the name of the run profile that was used in the current or previous management agent run. The client can call the `RunProfile` method on a Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: `RunProfile`
- Input Parameters: none

If the management agent has never executed a run profile or if the history of run profiles has been cleared, the value return by the server is an empty string. This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.25 RunStartTime

The `RunStartTime` method returns the date and time, in Coordinated Universal Time (UTC), when the last management run profile was started. The client can call the `RunStartTime` method on a Management Agent object by using the `IWbemServices::ExecMethod` method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: `RunStartTime`
- Input Parameters: none

The method returns a value only if the management agent is not currently running a profile. This method requires `MIISBrowse`, `MIISOperators`, or `MIISAdmins` permissions.

### 3.1.5.26 RunStatus

The RunStatus method returns the status of the last management agent run. The client can call the RunStatus method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: RunStatus
- Input Parameters: none

This method requires MIISBrowse, MIISOperators, or MIISAdmins permissions.

### 3.1.5.27 Stop

The Stop method terminates the currently executing run profile. The client can call the Stop method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: Stop
- Input Parameters: none

This method requires MIISOperators, or MIISAdmins permissions.

### 3.1.5.28 SuppressFullSyncWarning

The SuppressFullSyncWarning method suppresses any warnings the server provides indicating that a full synchronization run profile is required for this management agent. The client can call the SuppressFullSyncWarning method on a Management Agent object by using the IWbemServices::ExecMethod method as defined in [\[MS-WMI\]](#) section 3.1.4.3.22 with the following parameters:

- Method Name: SuppressFullSyncWarning
- Input Parameters: none

This method requires MIISOperators, or MIISAdmins permissions.

## 3.1.6 Timer Events

None.

## 3.1.7 Other Local Events

None.

## 3.2 Server Details

This section specifies the server side of this protocol.

### 3.2.1 Abstract Data Model

This section specifies a conceptual model of possible data organization that an implementation maintains to participate in this protocol. The described organization is provided to facilitate the explanation of how the protocol behaves. This document does not mandate that implementations

adhere to this model as long as their external behavior is consistent with that described in this document.

The server uses methods provided by the management agent to accept requests from the client. For information on client usage of the management agent, see section [3.1.1](#).

The server can receive a request to execute a run profile using the management agent's Execute method. When this request is received the server performs synchronization. During the execution of a run profile, the server keeps track of all statistics, and keeps detailed status of the operations that occur during synchronization. The server makes this information available to the client via the management agents' properties, such as NumConnectors and RunDetails.

The server also accepts run profile control requests using the management agent's methods. The server can be requested to:

- Stop the currently executing run profile.
- Check connectivity to the data source associated with the management agent.
- Suppress any warnings the synchronization engine presents. The warnings that are suppressed are presented when a request is received to execute a run profile using a delta synchronization, but a full synchronization is required in order to complete the synchronization.

### 3.2.2 Timers

None.

### 3.2.3 Initialization

In order to initialize the Synchronization Management Objects, the server MUST register the Service provider object with the [\[MS-WMI\]](#) implementation.

In addition, the MIISAdmins, MIISOperator and MIISBrowser security groups MUST be initialized as defined in [\[MS-SECO\]](#) section 2.4.

### 3.2.4 Higher-Layer Triggered Events

None.

### 3.2.5 Message Processing Events and Sequence

The Synchronization Management Objects interface exposes methods that MUST provide management services to client processes. The implementation MUST implement all methods and return errors if the semantics of the operation cannot be completed.

The server MUST accept multiple parallel invocations from different clients running under different security principals. On each interface, the server MUST support multiple outstanding calls. The server MUST perform an access check against all operations.

In addition, the MIISAdmins, MIISOperator and MIISBrowser security groups MUST be initialized as defined in [\[MS-SECO\]](#) section 2.4. The server MUST determine if the client has the correct permissions before executing the requested methods described in the following sections. If the client does not have permission required to execute a method, the server MUST return the literal string **access-denied**.

### 3.2.5.1 Obtain Management Agent Object

In order to interact with Synchronization Management Objects, the client MUST obtain a Management Agent object by executing a Get command on the Service object using the `IWbemServices::ExecMethod` method with the following parameters:

Method Name: Get

Input Parameters: "MIIS\_ManagementAgent.Name = <name of management agent>"

where <name of management agent> is the name of the management agent against which the client intends to operate.

If the client does not have permission required to execute a method or the management agent name does not correspond to an existing management agent, the server MUST return **NULL**. Otherwise, the server MUST return a management agent object which supports the methods listed in [3.2.5.2](#) through [3.2.5.28](#).

### 3.2.5.2 Execute

The Execute method executes a management agent run profile. The client MUST pass the name of a run profile. The server MAY return one of the following status messages:

If the client has not authenticated with MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If the run profile failed to start because the run profile name specified is not recognized or does not exist, the server MUST return **no-start-unknown-profile-name**.

If the run profile failed to start because a run profile of the management agent is already running, the server MUST return **no-start-ma-already-running**.

If the run profile failed to start because a new management agent is being created or an existing management agent is being modified or deleted, the server MUST return **no-start-ma-update-in-progress**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return a value listed in section [2.2.1](#).

### 3.2.5.3 GetServerStatus

The GetServerStatus method returns the connection state to a given partition of the data source associated with the management agent. The client MUST pass the GUID of the partition for which to return status. The server MAY return one of the following status messages:

If the client has not authenticated with MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If the data source server is running with a secure communication link, the server MUST return **success**.

If the data source server is running but the security between the server and the data source server is low (40-bit), the server MUST return **success-low-security**.

If the data source server is running but the password synchronization setting for the management agent is not enabled, the server MUST return **password-sync-disabled**.

If the PartitionGuid parameter is not in a GUID format, the server MUST return **incorrect-partition-id-format**.

If the management agent was unable to log on to the data source server with the stored credentials, the server MUST return **ma-credentials-failure**.

If the management agent type does not support password changes, the server MUST return **ma-feature-not-supported**.

If the partition corresponding to the partition GUID has not been configured, the server MUST return **partition-not-configured**.

If the server could not connect to the data source server, the server MUST return **server-down**.

If the partition GUID parameter cannot be matched to a partition in the data source server that belongs to the management agent, the server MUST return **unknown-partition-id**.

Otherwise, the server MUST return **call-failure**.

#### 3.2.5.4 NumConnectors

The NumConnectors method returns the number of connector objects that are under this management agent.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return the number of connectors from the connector space associated with the management agent. The server MUST NOT include the number of explicit connector objects in the return value.

#### 3.2.5.5 NumCSObjects

The NumCSObjects property returns the total number of connector, disconnecter, and placeholder objects in this management agent's connector space.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.



If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

Otherwise, the server MUST return the number of total number of connector, disconnecter, and placeholder objects from the connector space associated with the management agent.

### 3.2.5.6 NumDisconnectors

The NumDisconnectors property returns the number of disconnecter objects in this management agent's connector space.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return ***access-denied***.

If the server is unable to communicate to any underlying components, the server MUST return ***connection-failure***.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

Otherwise, the server MUST return the number of disconnecter objects from the connector space associated with the management agent. The server MUST NOT include the number of explicit disconnecter or filtered disconnecter objects in the return value.

### 3.2.5.7 NumExplicitConnectors

The NumExplicitConnectors method returns the number of explicit connector objects in this management agent's connector space.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return ***access-denied***.

If the server is unable to communicate to any underlying components, the server MUST return ***connection-failure***.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

Otherwise, the server MUST return the number of explicit connector objects from the connector space associated with the management agent. The server MUST NOT include the number of connector objects in the return value.

### 3.2.5.8 NumExplicitDisconnectors

The NumExplicitDisconnectors method returns the number of explicit disconnecter objects in this management agent's connector space.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return ***access-denied***.

If the server is unable to communicate to any underlying components, the server MUST return ***connection-failure***.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

Otherwise, the server MUST return the number of explicit disconnector objects from the connector space associated with the management agent. The server MUST NOT include the number of disconnector or filtered disconnector objects in the return value.

### 3.2.5.9 NumExportAdd

The NumExportAdd method returns the number of objects that will be added to the data source on the next export.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return the number of objects that will be added to the data source on the next export.

### 3.2.5.10 NumExportDelete

The NumExportDelete method returns the number of objects that will be deleted from the data source on the next export.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return the number of connector space objects that will be deleted from the data source on the next export.

### 3.2.5.11 NumExportUpdate

The NumExportUpdate method returns the number of objects that will be updated in the data source on the next export.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return the number of connector space objects that will be updated in the data source on the next export.

### 3.2.5.12 NumFilteredDisconnectors

The NumFilteredDisconnectors method returns the number of filtered disconnector objects.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return the number of explicit disconnector objects from the connector space associated with the management agent. The server MUST NOT include the number of disconnector or explicit disconnector objects in the return value.

### 3.2.5.13 NumImportAdd

The NumImportAdd method returns the number of objects that are candidates for joining or projecting to the metaverse.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return the number of objects that are candidates for joining or projecting to the metaverse from the connector space associated with the management agent.

### 3.2.5.14 NumImportDelete

The NumImportDelete method returns the number of connector or explicit connector objects that will be deleted from the connector space.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return the number of connector or explicit connector objects that will be deleted from the connector space associated with the management agent.

### 3.2.5.15 NumImportNoChange

The NumImportNoChange method returns the number of connector or explicit connector objects that have no pending changes.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return number of connector or explicit connector objects that have no pending changes from the connector space associated with the management agent.

#### 3.2.5.16 NumImportUpdate

The NumImportUpdate method returns the number of connector or explicit connector objects that contain attribute changes to be applied to the joined metaverse object.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return number of connector or explicit connector objects that contain attribute changes to be applied to the joined metaverse object from the connector space associated with the management agent.

#### 3.2.5.17 NumPlaceHolders

The NumPlaceHolders method returns the number of placeholder objects.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return number of connector or explicit connector objects that contain attribute changes to be applied to the joined metaverse object from the connect space associated with the management agent.

#### 3.2.5.18 NumTotalConnectors

The NumTotalConnectors method returns the number of connector and explicit connector objects.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

Otherwise, the server MUST return the number of connector and explicit connector objects from the connector space associated with the management agent.

### 3.2.5.19 NumTotalDisconnectors

The NumTotalDisconnectors method returns the number of disconnector, explicit disconnector, and filtered disconnector objects.

If the client has not authenticated with MIISBrowse, MIISOperator or MIISAdmins permissions, the server MUST return ***access-denied***.

If the server is unable to communicate to any underlying components, the server MUST return ***connection-failure***.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

Otherwise, the server MUST return number of disconnector, explicit disconnector, and filtered disconnector objects from the connector space associated with the management agent.

### 3.2.5.20 ResyncSyncConfigObjects

The ResyncSyncConfigObjects initiates the synchronization of the synchronization configuration data from the synchronization engine database to the synchronization configuration database.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return ***access-denied***.

If the server is unable to communicate to any underlying components, the server MUST return ***connection-failure***.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

Otherwise, the server MUST synchronize the synchronization configuration objects with the data source and return ***success***.

### 3.2.5.21 RunDetails

The RunDetails method returns the details of the last management agent run profile.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return ***access-denied***.

If the server is unable to communicate to any underlying components, the server MUST return ***connection-failure***.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return ***call-failure***.

If the server is executing a run profile for this management agent or the server does not contains a result for the last run profile, the server MUST return an empty string.

Otherwise, the server MUST return a string containing the run details associated with the last run profile as defined in section [2.2.2](#).

### 3.2.5.22 RunEndTime

The RunEndTime method returns the date and time, in Coordinated Universal Time (UTC), when the last management agent run profile completed.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

If the management agent is not currently running a profile and the server contains a result for the last run profile, the server MUST return date and time in the format described by the datetimeNoT type defined in section [6](#), in Coordinated Universal Time (UTC), when the last management agent run profile completed.

Otherwise, the server MUST return an empty string.

### 3.2.5.23 RunNumber

The RunNumber method is a counter that returns the sequence number for the current run profile. The RunNumber indicates the total number of run profiles that have been executed for this management agent based on stored history.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

If the server contains a result for the last run profile, the server MUST return the run number associated with the last run profile.

Otherwise, the server MUST return an empty string.

### 3.2.5.24 RunProfile

The RunProfile method returns the name of the run profile that was used in the current or previous management agent run.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

If the management agent is currently executing a run profile, the server MUST return the name of the currently executing run profile.

If the management agent is not currently executing a run profile and the server contains a result for the last run profile, the server MUST return the run profile name associated with the last run profile.

Otherwise, the server MUST return an empty string.

#### 3.2.5.25 RunStartTime

The RunStartTime method returns the date and time, in Coordinated Universal Time (UTC), when the last management run profile was started.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

If the management agent is not currently running a profile and the server contains a result for the last run profile, the server MUST return date and time in the format described by the datetimeNoT type defined in section 6, in Coordinated Universal Time (UTC), when the last management agent run profile was started.

Otherwise, the server MUST return an empty string.

#### 3.2.5.26 RunStatus

The RunStatus method returns the status of the last management agent run.

If the client has not authenticated with MIISBrowser, MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

If the server is executing a run profile for this management agent or the server does not contains a result for the last run profile, the server MUST return an empty string.

Otherwise, the server MUST return a value listed in section 2.2.1.

#### 3.2.5.27 Stop

The Stop method terminates the currently executing run profile.

If the client has not authenticated with MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If the server is not executing a run profile for the management agent, the server MUST return **ma-not-running**.

If the server stops the currently executing run profile successfully, the server MUST return **success**.

Otherwise, the server MUST return **call-failure**.

### 3.2.5.28 SuppressFullSyncWarning

The SuppressFullSyncWarning method suppresses any warnings the server provides indicating that a full synchronization run profile is required for this management agent.

If the client has not authenticated with MIISOperator or MIISAdmins permissions, the server MUST return **access-denied**.

If the server is unable to communicate to any underlying components, the server MUST return **connection-failure**.

If a failure occurs for which there is no other more-specific SOAP fault specified in this document, the server MUST return **call-failure**.

Otherwise, the server MUST return **success** and suppress warnings indicating that a full synchronization run profile is required for this management agent.

### 3.2.6 Timer Events

None.

### 3.2.7 Other Local Events

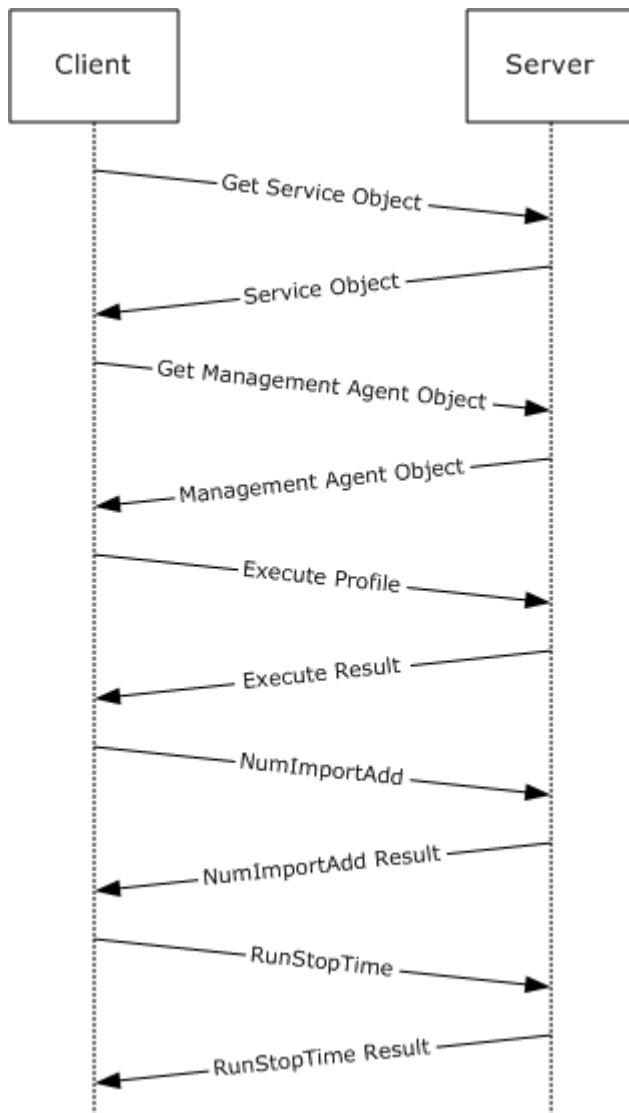
None.



## 4 Protocol Examples

### 4.1 Message Flow Example

To execute a management agent run profile and check the status of the profile run, the client first obtains a service object and then obtains a management agent object corresponding to the management on which the client will execute a run profile and determine the status. Next, the client performs the Execute method for the run profile, the result of which provides the status of the run profile. The client can then obtain additional information about the run profile, such as the number of new (added) objects imported and the time at which the run profile completed. The following figure demonstrates this message flow.



**Figure 2: Protocol Sequence**

## **5 Security**

### **5.1 Security Considerations for Implementers**

None.

### **5.2 Index of Security Parameters**

None.

## 6 Appendix A: Run Details XSD

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <!-- GUID with leading { and trailing }-->
  <xs:simpleType name="guidType">
    <xs:restriction base="xs:string">
      <xs:pattern value="(\{([0-9a-fA-F]){8}-([0-9a-fA-F]){4}-([0-9a-fA-F]){4}-([0-9a-fA-F]){4}-([0-9a-fA-F]){12}\})"/>
    </xs:restriction>
  </xs:simpleType>

  <!-- DN -->
  <xs:simpleType name="dnType">
    <xs:restriction base="xs:string">
      <xs:pattern value="(.*=.*,){0,}.*=."/>
    </xs:restriction>
  </xs:simpleType>

  <!-- domain\username-->
  <xs:simpleType name="security-idType">
    <xs:restriction base="xs:string">
      <xs:pattern value=".*\\.*"/>
    </xs:restriction>
  </xs:simpleType>

  <!-- x/y -->
  <xs:simpleType name="progressType">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9]*/[0-9]*"/>
    </xs:restriction>
  </xs:simpleType>

  <!-- number-->
  <xs:simpleType name="numberType">
    <xs:restriction base="xs:unsignedInt">
      <xs:maxInclusive value="2147483647"/>
    </xs:restriction>
  </xs:simpleType>

  <!-- yyyy-mm-dd hh:mm:ss.fff -->
  <xs:simpleType name="dateTimeNoT">
    <xs:restriction base="xs:string">
      <xs:pattern value="([0-9]){4}-([0-9]){2}-([0-9]){2} ([0-9]){2}:([0-9]){2}:([0-9]){2}.([0-9]){1,3}"/>
    </xs:restriction>
  </xs:simpleType>

  <!-- step result types -->
  <xs:complexType name="stepResultType">
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute name="progress" type="progressType" use="optional" />
        <xs:attribute name="file" type="xs:string" use="optional" />
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
```

```

<!-- connection results -->
<xs:simpleType name="connectionResultType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="success"/>
    <xs:enumeration value="failed-connection"/>
    <xs:enumeration value="dropped-connection"/>
    <xs:enumeration value="failed-authentication"/>
    <xs:enumeration value="failed-search"/>
    <xs:enumeration value="warning-no-watermark"/>
  </xs:restriction>
</xs:simpleType>

<!--algorithm step type -->
<xs:complexType name="algorithmStepType">
  <xs:simpleContent>
    <xs:extension base="xs:string">
      <xs:attribute name="ma-id" type="guidType" use="optional" />
      <xs:attribute name="dn" type="dnType" use="optional" />
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<!-- algorithm step type restricted -->
<xs:complexType name="algorithmStepRestrictedType">
  <xs:simpleContent>
    <xs:restriction base="algorithmStepType">
      <xs:enumeration value="staging"/>
      <xs:enumeration value="connector-filter"/>
      <xs:enumeration value="join"/>
      <xs:enumeration value="projection"/>
      <xs:enumeration value="import-flow"/>
      <xs:enumeration value="provisioning"/>
      <xs:enumeration value="validate-connector-filter"/>
      <xs:enumeration value="deprovisioning"/>
      <xs:enumeration value="export-flow"/>
      <xs:enumeration value="mv-deletion"/>
      <xs:enumeration value="recall"/>
      <xs:enumeration value="mv-object-type-change"/>
    </xs:restriction>
  </xs:simpleContent>
</xs:complexType>

<!-- Binary anchor -->
<xs:complexType name="binaryAnchorType">
  <xs:simpleContent>
    <xs:extension base="xs:string">
      <xs:attribute name="encoding" type="xs:string" use="optional" fixed="base64" />
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<!-- DN value -->
<xs:complexType name="dn-valueType">
  <xs:sequence>
    <xs:element name="dn" type="dnType" minOccurs="1" maxOccurs="1" />
    <xs:element name="anchor" type="binaryAnchorType" minOccurs="1" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

```

```

<!-- DN value delta -->
<xs:complexType name="dn-valueDeltaType">
  <xs:complexContent>
    <xs:extension base="dn-valueType">
      <xs:attribute name="operation" use="required">
        <xs:simpleType>
          <xs:restriction base="xs:string">
            <xs:enumeration value="add"/>
            <xs:enumeration value="delete"/>
          </xs:restriction>
        </xs:simpleType>
      </xs:attribute>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<!-- DN Attribute Type -->
<xs:complexType name="dnAttributeType">
  <xs:sequence>
    <xs:element name="dn-value" type="dn-valueType" minOccurs="1" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="name" type="xs:string" use="required" />
  <xs:attribute name="multivalued" type="xs:boolean" use="required" />
</xs:complexType>

<!-- DN Attribute Type for Delta -->
<xs:complexType name="dnAttributeDeltaType">
  <xs:sequence>
    <xs:element name="dn-value" type="dn-valueDeltaType" minOccurs="1" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="operation" use="required">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="add"/>
        <xs:enumeration value="replace"/>
        <xs:enumeration value="update"/>
        <xs:enumeration value="delete"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="name" type="xs:string" use="required" />
  <xs:attribute name="multivalued" type="xs:boolean" use="required" />
</xs:complexType>

<!-- value type -->
<xs:complexType name="valueType">
  <xs:simpleContent>
    <xs:extension base="xs:string">
      <xs:attribute name="encoding" type="xs:string" use="optional" fixed="base64" />
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<!-- value delta -->
<xs:complexType name="valueDeltaType">
  <xs:complexContent>
    <xs:extension base="valueType">

```

```

    <xs:attribute name="operation" use="required">
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:enumeration value="add"/>
          <xs:enumeration value="delete"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
  </xs:extension>
</xs:complexContent>
</xs:complexType>

<!-- Attribute type -->
<xs:complexType name="attributeType">
  <xs:sequence>
    <xs:element name="value" type="valueType" minOccurs="1" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="name" type="xs:string" use="required" />
  <xs:attribute name="type" use="required">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="binary"/>
        <xs:enumeration value="string"/>
        <xs:enumeration value="integer"/>
        <xs:enumeration value="boolean"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="multivalued" type="xs:boolean" use="required" />
</xs:complexType>

<!-- Attribute delta type -->
<xs:complexType name="attributeDeltaType">
  <xs:sequence>
    <xs:element name="value" type="valueDeltaType" minOccurs="1" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="name" type="xs:string" use="required" />
  <xs:attribute name="type" use="required">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="binary"/>
        <xs:enumeration value="string"/>
        <xs:enumeration value="integer"/>
        <xs:enumeration value="boolean"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="multivalued" type="xs:boolean" use="required" />
  <xs:attribute name="operation" use="required">
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="add"/>
        <xs:enumeration value="replace"/>
        <xs:enumeration value="update"/>
        <xs:enumeration value="delete"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
</xs:complexType>

```

```

<!-- error types for import and MV retry errors -->
<xs:simpleType name="importAndMVRetryErrorType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="ambiguous-export-flow-to-single-valued-attribute"/>
    <xs:enumeration value="ambiguous-import-flow-from-multiple-connectors"/>
    <xs:enumeration value="ambiguous-reference-value-for-export-flow"/>
    <xs:enumeration value="app-store-import-exception"/>
    <xs:enumeration value="cannot-parse-dn-component"/>
    <xs:enumeration value="cannot-parse-object-id"/>
    <xs:enumeration value="connector-filter-rule-violation"/>
    <xs:enumeration value="cs-attribute-type-mismatch"/>
    <xs:enumeration value="datetime-string-format-incorrect"/>
    <xs:enumeration value="dn-index-out-of-bounds"/>
    <xs:enumeration value="dre-missing-required-attribute"/>
    <xs:enumeration value="exported-change-not-reimported"/>
    <xs:enumeration value="extension-deprovisioning-invalid-result"/>
    <xs:enumeration value="extension-dll-crash"/>
    <xs:enumeration value="extension-dll-exception"/>
    <xs:enumeration value="extension-dll-timeout"/>
    <xs:enumeration value="extension-entry-point-not-implemented"/>
    <xs:enumeration value="extension-join-resolution-index-out-of-bounds"/>
    <xs:enumeration value="extension-join-resolution-invalid-object-type"/>
    <xs:enumeration value="extension-projection-invalid-object-type"/>
    <xs:enumeration value="extension-projection-object-type-not-set"/>
    <xs:enumeration value="extension-provisioning-call-limit-reached"/>
    <xs:enumeration value="extension-unexpected-attribute-value"/>
    <xs:enumeration value="failed-app-store-access"/>
    <xs:enumeration value="failed-creation-via-web-services"/>
    <xs:enumeration value="failed-deletion-via-web-services"/>
    <xs:enumeration value="failed-impersonation"/>
    <xs:enumeration value="failed-modification-via-web-services"/>
    <xs:enumeration value="failed-schema-access"/>
    <xs:enumeration value="flow-multi-values-to-single-value"/>
    <xs:enumeration value="invalid-boolean-constant-flow"/>
    <xs:enumeration value="invalid-reference-constant-flow"/>
    <xs:enumeration value="join-object-id-must-be-single-valued"/>
    <xs:enumeration value="locking-error-needs-retry"/>
    <xs:enumeration value="mv-constraint-violation"/>
    <xs:enumeration value="sync-config-operation-not-supported"/>
    <xs:enumeration value="sync-rule-flow-attribute-not-found"/>
    <xs:enumeration value="sync-rule-flow-provisioning-failed"/>
    <xs:enumeration value="sync-rule-inbound-flow-rules-invalid"/>
    <xs:enumeration value="sync-rule-invalid-export-scoping-xml"/>
    <xs:enumeration value="sync-rule-invalid-expression"/>
    <xs:enumeration value="sync-rule-invalid-function-xml"/>
    <xs:enumeration value="sync-rule-invalid-relationship-criteria-xml"/>
    <xs:enumeration value="sync-rule-invalid-xml-attribute-flow"/>
    <xs:enumeration value="sync-rule-outbound-flow-rules-invalid"/>
    <xs:enumeration value="sync-rule-relationship-criteria-attribute-not-found"/>
    <xs:enumeration value="sync-rule-required-attr-not-found"/>
    <xs:enumeration value="sync-rule-scoping-filter-invalid-operator"/>
    <xs:enumeration value="sync-rule-scoping-filter-invalid-xml"/>
    <xs:enumeration value="sync-rule-validation-parsing-error"/>
    <xs:enumeration value="unexpected-error"/>
    <xs:enumeration value="unique-index-violation"/>
    <xs:enumeration value="unsupported-attribute-type"/>
    <xs:enumeration value="unsupported-container-delete"/>
    <xs:enumeration value="unexported-container-rename"/>
  </xs:restriction>
</xs:simpleType>

```

```

    <xs:enumeration value="write-locking-error-needs-retry"/>
  </xs:restriction>
</xs:simpleType>

<!--extension callsites -->
<xs:simpleType name="extensionCallsiteType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="initialize"/>
    <xs:enumeration value="disconnecter-filter"/>
    <xs:enumeration value="join-mapping"/>
    <xs:enumeration value="join-resolution"/>
    <xs:enumeration value="projection"/>
    <xs:enumeration value="import-flow"/>
    <xs:enumeration value="export-flow"/>
    <xs:enumeration value="provisioning"/>
    <xs:enumeration value="mv-deletion"/>
    <xs:enumeration value="cs-deprovisioning"/>
  </xs:restriction>
</xs:simpleType>

<!-- extension error info type -->
<xs:complexType name="extensionErrorInfoType">
  <xs:sequence>
    <xs:element name="extension-name" type="xs:string" minOccurs="1" maxOccurs="1" />
    <xs:element name="extension-callsite" type="extensionCallsiteType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="extension-context" type="xs:string" minOccurs="1" maxOccurs="1" />
    <xs:element name="call-stack" type="xs:string" minOccurs="1" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

<!-- direct-mapping type -->
<xs:complexType name="directMappingType" >
  <xs:sequence>
    <xs:element name="src-attribute" minOccurs="1" maxOccurs="1" >
      <xs:complexType>
        <xs:simpleContent>
          <xs:extension base="xs:string">
            <xs:attribute name="intrinsic" type="xs:boolean" use="optional" />
          </xs:extension>
        </xs:simpleContent>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<!-- scripted-mapping type -->
<xs:complexType name="scriptedMappingType" >
  <xs:sequence>
    <xs:element name="src-attribute" minOccurs="1" maxOccurs="unbounded" >
      <xs:complexType>
        <xs:simpleContent>
          <xs:extension base="xs:string">
            <xs:attribute name="intrinsic" type="xs:boolean" use="optional" />
          </xs:extension>
        </xs:simpleContent>
      </xs:complexType>
    </xs:element>
    <xs:element name="script-context" type="xs:string" minOccurs="1" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

```



```

</xs:sequence>
</xs:complexType>

<!--constant-mapping type-->
<xs:complexType name="constantMappingType" >
  <xs:sequence>
    <xs:element name="constant-value" type="xs:string" minOccurs="1" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

<!-- dn-part-mapping type -->
<xs:complexType name="dnPartMappingType" >
  <xs:sequence>
    <xs:element name="dn-part" type="xs:unsignedByte" minOccurs="1" maxOccurs="1" />
  </xs:sequence>
</xs:complexType>

<!-- rules error info type -->
<xs:complexType name="rulesErrorInfoType">
  <xs:sequence>
    <xs:element name="context" minOccurs="1" maxOccurs="1" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="attribute-mapping" minOccurs="1" maxOccurs="1">
            <xs:complexType>
              <xs:sequence>
                <xs:choice>
                  <xs:element name="direct-mapping" type="directMappingType" minOccurs="1"
maxOccurs="1" />
                  <xs:element name="scripted-mapping" type="scriptedMappingType" minOccurs="1"
maxOccurs="1" />
                  <xs:element name="constant-mapping" type="constantMappingType" minOccurs="1"
maxOccurs="1" />
                  <xs:element name="dn-part-mapping" type="dnPartMappingType" minOccurs="1"
maxOccurs="1" />
                </xs:choice>
              </xs:sequence>
              <xs:attribute name="dest-attr" type="xs:string" use="required" />
              <xs:attribute name="context-id" type="xs:string" use="required" />
            </xs:complexType>
          </xs:element>
        </xs:sequence>
        <xs:attribute name="ma-id" type="guidType" use="required" />
        <xs:attribute name="ma-name" type="xs:string" use="required" />
        <xs:attribute name="cs-object-id" type="guidType" use="required" />
        <xs:attribute name="dn" type="dnType" use="required" />
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<!-- counter with detail false -->
<xs:complexType name="counterDetailFalseType">
  <xs:simpleContent>
    <xs:extension base="xs:unsignedInt">
      <xs:attribute name="detail" type="xs:string" use="required" fixed="false" />
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

```

```

<!-- counter with detail true -->
<xs:complexType name="counterDetailTrueType">
  <xs:simpleContent>
    <xs:extension base="xs:unsignedInt">
      <xs:attribute name="detail" type="xs:string" use="required" fixed="true" />
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>

<!-- ma connection -->
<xs:complexType name="ma-connectionType">
  <xs:sequence>
    <xs:element name="connection-result" type="connectionResultType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="server" type="xs:string" minOccurs="0" maxOccurs="1" />
    <xs:element name="connection-log" minOccurs="0" maxOccurs="1" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="incident" minOccurs="1" maxOccurs="1" >
            <xs:complexType>
              <xs:sequence>
                <xs:element name="connection-result" type="connectionResultType" minOccurs="1"
maxOccurs="1" />
                <xs:element name="date" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
                <xs:element name="server" type="xs:string" minOccurs="1" maxOccurs="1" />
                <xs:element name="cd-error" minOccurs="0" maxOccurs="1" >
                  <xs:complexType>
                    <xs:sequence>
                      <xs:element name="error-code" type="xs:string" minOccurs="1" maxOccurs="1" />
                      <xs:element name="error-literal" type="xs:string" minOccurs="1" maxOccurs="1" />
                    </xs:sequence>
                  </xs:complexType>
                </xs:element>
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<!-- ma discovery errors -->
<xs:complexType name="ma-discovery-errorsType">
  <xs:sequence>
    <xs:element name="ma-object-error" minOccurs="0" maxOccurs="unbounded" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="error-type" minOccurs="1" maxOccurs="1">
            <xs:simpleType>
              <xs:restriction base="xs:string">
                <xs:enumeration value="missing-change-type"/>
                <xs:enumeration value="invalid-change-type"/>
                <xs:enumeration value="multi-valued-change-type"/>
                <xs:enumeration value="need-full-object"/>
                <xs:enumeration value="missing-dn"/>
                <xs:enumeration value="dn-not-ldap-conformant"/>
                <xs:enumeration value="invalid-dn"/>
              </xs:restriction>
            </xs:simpleType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

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        <xs:enumeration value="missing-anchor-component"/>
        <xs:enumeration value="multi-valued-anchor-component"/>
        <xs:enumeration value="anchor-too-long"/>
        <xs:enumeration value="duplicate-object"/>
        <xs:enumeration value="missing-object-class"/>
        <xs:enumeration value="missing-object-type"/>
        <xs:enumeration value="unmappable-object-type"/>
        <xs:enumeration value="parse-error"/>
        <xs:enumeration value="read-error"/>
        <xs:enumeration value="staging-error"/>
        <xs:enumeration value="invalid-modification-type"/>
        <xs:enumeration value="conflicting-modification-types"/>
        <xs:enumeration value="multi-single-mismatch"/>
        <xs:enumeration value="invalid-attribute-value"/>
        <xs:enumeration value="invalid-base64-value"/>
        <xs:enumeration value="invalid-numeric-value"/>
        <xs:enumeration value="invalid-boolean-value"/>
        <xs:enumeration value="reference-value-not-ldap-conformant"/>
        <xs:enumeration value="invalid-reference-value"/>
        <xs:enumeration value="unsupported-value-type"/>
    </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="entry-number" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
<xs:element name="line-number" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
<xs:element name="column-number" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
<xs:element name="dn" type="dnType" minOccurs="0" maxOccurs="1" />
<xs:element name="anchor" type="binaryAnchorType" minOccurs="0" maxOccurs="1" />
<xs:element name="attribute-name" type="xs:string" minOccurs="0" maxOccurs="1" />
<xs:element name="cd-error" minOccurs="0" maxOccurs="1" >
    <xs:complexType>
        <xs:sequence>
            <xs:element name="error-code" type="xs:string" minOccurs="1" maxOccurs="1" />
            <xs:element name="error-literal" type="xs:string" minOccurs="1" maxOccurs="1" />
            <xs:element name="server-error-detail" type="xs:string" minOccurs="0" maxOccurs="1" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>

<!-- ma discovery errors -->
<xs:complexType name="ma-discovery-countersType" >
    <xs:sequence>
        <xs:element name="filtered-deletions" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
</xs:complexType>

<xs:element name="filtered-objects" type="xs:unsignedInt" minOccurs="0" maxOccurs="1" />
</xs:sequence>
</xs:complexType>

<!-- synchronization errors -->
<xs:complexType name="synchronization-errorsType">
    <xs:sequence>
        <xs:element name="import-error" minOccurs="0" maxOccurs="unbounded" >

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<xs:complexType>
  <xs:sequence>
    <xs:element name="first-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
    <xs:element name="retry-count" type="numberType" minOccurs="1" maxOccurs="1" />
    <xs:element name="date-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
    <xs:element name="error-type" type="importAndMVRetryErrorType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="algorithm-step" type="algorithmStepRestrictedType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="change-not-reimported" minOccurs="0" maxOccurs="1" >
      <xs:complexType>
        <xs:sequence>
          <xs:element name="delta" minOccurs="1" maxOccurs="1" >
            <xs:complexType>
              <xs:sequence>
                <xs:element name="anchor" type="binaryAnchorType" minOccurs="0" maxOccurs="1"
/>
                <xs:element name="dn-attr" type="dnAttributeDeltaType" minOccurs="0"
maxOccurs="unbounded" />
                <xs:element name="attr" type="attributeDeltaType" minOccurs="0"
maxOccurs="unbounded" />
              </xs:sequence>
              <xs:attribute name="operation" use="required">
                <xs:simpleType>
                  <xs:restriction base="xs:string">
                    <xs:enumeration value="add"/>
                    <xs:enumeration value="replace"/>
                    <xs:enumeration value="update"/>
                    <xs:enumeration value="delete"/>
                    <xs:enumeration value="obsolete"/>
                    <xs:enumeration value="delete-add"/>
                  </xs:restriction>
                </xs:simpleType>
              </xs:attribute>
              <xs:attribute name="dn" type="dnType" use="required" />
            </xs:complexType>
          </xs:element>
          <xs:element name="entry" minOccurs="1" maxOccurs="1" >
            <xs:complexType>
              <xs:sequence>
                <xs:element name="anchor" type="binaryAnchorType" minOccurs="1" maxOccurs="1" />
                <xs:element name="parent-anchor" type="binaryAnchorType" minOccurs="1"
maxOccurs="1" />
                <xs:element name="primary-objectclass" type="xs:string" minOccurs="1"
maxOccurs="1" />
                <xs:element name="objectclass">
                  <xs:complexType>
                    <xs:sequence>
                      <xs:element minOccurs="1" maxOccurs="unbounded" name="oc-value"
type="xs:string" />
                    </xs:sequence>
                  </xs:complexType>
                </xs:element>
                <xs:element name="dn-attr" type="dnAttributeType" minOccurs="0"
maxOccurs="unbounded" />
                <xs:element name="attr" type="attributeType" minOccurs="0" maxOccurs="unbounded"
/>
              </xs:sequence>
              <xs:attribute name="dn" type="dnType" use="required" />
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="dn" type="dnType" use="required" />
</xs:complexType>

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        </xs:element>
    </xs:sequence>
</xs:complexType>
</xs:element>
    <xs:element name="extension-error-info" type="extensionErrorInfoType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="rules-error-info" type="rulesErrorInfoType" minOccurs="0"
maxOccurs="1" />
</xs:sequence>
    <xs:attribute name="cs-guid" type="xs:string" use="required" />
    <xs:attribute name="dn" type="xs:string" use="required" />
</xs:complexType>
</xs:element>
<xs:element name="export-error" minOccurs="0" maxOccurs="unbounded" >
    <xs:complexType>
        <xs:sequence>
            <xs:element name="date-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
            <xs:element name="first-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
            <xs:element name="retry-count" type="numberType" minOccurs="1" maxOccurs="1" />
            <xs:element name="error-type" minOccurs="1" maxOccurs="1">
                <xs:simpleType>
                    <xs:restriction base="xs:string">
                        <xs:enumeration value="ambiguous-update"/>
                        <xs:enumeration value="anchor-too-long"/>
                        <xs:enumeration value="cd-connectivity-error"/>
                        <xs:enumeration value="cd-error"/>
                        <xs:enumeration value="cd-existing-attribute-or-value"/>
                        <xs:enumeration value="cd-existing-object"/>
                        <xs:enumeration value="cd-missing-object"/>
                        <xs:enumeration value="certifier-ou-not-configured"/>
                        <xs:enumeration
value="code-page-conversion"/>
                        <xs:enumeration value="constraint-violation"/>
                        <xs:enumeration value="dn-attributes-failure"/>
                        <xs:enumeration value="duplicate-anchor"/>
                        <xs:enumeration value="encrypted-attributes"/>
                        <xs:enumeration value="error-code"/>
                        <xs:enumeration value="error-literal"/>
                        <xs:enumeration value="insufficient-columns"/>
                        <xs:enumeration value="insufficient-field-width"/>
                        <xs:enumeration value="invalid-attribute-value"/>
                        <xs:enumeration value="invalid-dn"/>
                        <xs:enumeration value="invalid-provisioning-attribute-value"/>
                        <xs:enumeration value="kerberos-no-logon-server"/>
                        <xs:enumeration value="kerberos-time-skew"/>
                        <xs:enumeration value="locking-error-needs-retry"/>
                        <xs:enumeration value="missing-anchor-component"/>
                        <xs:enumeration value="missing-provisioning-attribute"/>
                        <xs:enumeration value="modify-naming-attribute"/>
                        <xs:enumeration value="no-export-to-this-object-type"/>
                        <xs:enumeration value="non-existent-parent"/>
                        <xs:enumeration value="partial-success"/>
                        <xs:enumeration value="password-policy-violation"/>
                        <xs:enumeration value="password-set-disallowed"/>
                        <xs:enumeration value="permission-issue"/>
                        <xs:enumeration value="provision-to-secondary-nab"/>
                        <xs:enumeration value="readonly-attribute"/>
                        <xs:enumeration value="rename-to-existing-dn"/>
                        <xs:enumeration value="syntax-violation"/>
                        <xs:enumeration value="temporary-certifier-file-creation-failure"/>

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        <xs:enumeration value="type-mismatch"/>
        <xs:enumeration value="unexpected-error"/>
        <xs:enumeration value="unexpected-provisioning-attribute"/>
    </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="cd-error" minOccurs="0" maxOccurs="1" >
    <xs:complexType>
        <xs:sequence>
            <xs:element name="error-code" type="xs:string" minOccurs="1" maxOccurs="1" />
            <xs:element name="error-literal" type="xs:string" minOccurs="1" maxOccurs="1" />
            <xs:element name="server-error-detail" type="xs:string" minOccurs="0" maxOccurs="1" />
        </xs:sequence>
    </xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>

<!-- my retry errors -->
<xs:complexType name="mv-retry-errorsType">
    <xs:sequence>
        <xs:element name="retry-error" minOccurs="0" maxOccurs="unbounded" >
            <xs:complexType>
                <xs:sequence>
                    <xs:element name="date-occurred" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
                    <xs:element name="error-type" type="importAndMVRetryErrorType" minOccurs="1"
maxOccurs="1" />
                    <xs:element name="algorithm-step" type="algorithmStepRestrictedType" minOccurs="1"
maxOccurs="1" />
                    <xs:element name="extension-error-info" type="extensionErrorInfoType" minOccurs="0"
maxOccurs="1" />
                    <xs:element name="rules-error-info" type="rulesErrorInfoType" minOccurs="0"
maxOccurs="1" />
                </xs:sequence>
                <xs:attribute name="displayName" type="xs:string" use="required" />
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>

<!-- outbound flow counters -->
<xs:complexType name="outbound-flow-countersType">
    <xs:sequence>
        <xs:element name="provisioned-add-no-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="provisioned-add-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="provisioned-rename-no-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="provisioned-rename-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="provisioned-disconnect" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    </xs:sequence>
</xs:complexType>

```

```

    <xs:element name="connector-flow" type="counterDetailTrueType" minOccurs="0" maxOccurs="1"
  />
    <xs:element name="connector-no-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
    <xs:element name="provisioned-delete-add-no-flow" type="counterDetailTrueType"
minOccurs="0" maxOccurs="1" />
    <xs:element name="provisioned-delete-add-flow" type="counterDetailTrueType" minOccurs="0"
maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="ma" type="xs:string" use="required" />
  <xs:attribute name="ma-id" type="guidType" use="required" />
</xs:complexType>

<!-- staging counters -->
<xs:complexType name="staging-countersType">
  <xs:sequence>
    <xs:element name="stage-no-change" type="counterDetailFalseType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="stage-add" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
    <xs:element name="stage-update" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
  />
    <xs:element name="stage-rename" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
  />
    <xs:element name="stage-delete" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
  />
    <xs:element name="stage-delete-add" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="stage-failure" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
  />
  </xs:sequence>
</xs:complexType>

<!-- inbound flow counters -->
<xs:complexType name="inbound-flow-countersType">
  <xs:sequence>
    <xs:element name="disconnecter-filtered" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-joined-no-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-joined-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-joined-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnecter-projected-no-flow" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnecter-projected-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnecter-projected-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnecter-remains" type="counterDetailFalseType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-filtered-remove-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-filtered-leave-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-flow" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
  />
    <xs:element name="connector-flow-remove-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />

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    <xs:element name="connector-no-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-delete-remove-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-delete-leave-mv" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="connector-delete-add-processed" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="flow-failure" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
  </xs:sequence>
</xs:complexType>

<!-- export counters -->
<xs:complexType name="export-countersType">
  <xs:sequence>
    <xs:element name="export-add" type="counterDetailTrueType" minOccurs="1" maxOccurs="1" />
    <xs:element name="export-update" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="export-rename" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="export-delete" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="export-delete-add" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="export-failure" type="counterDetailTrueType" minOccurs="1" maxOccurs="1"
/>
  </xs:sequence>
</xs:complexType>

<!-- step details -->
<xs:complexType name="step-detailsType">
  <xs:sequence>
    <xs:element name="start-date" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
    <xs:element name="end-date" type="dateTimeNoT" minOccurs="1" maxOccurs="1" />
    <!-- add enum -->
    <xs:element name="step-result">
      <xs:complexType>
        <xs:simpleContent>
          <xs:restriction base="stepResultType">
            <xs:enumeration value="completed-discovery-errors"/>
            <xs:enumeration value="completed-export-errors"/>
            <xs:enumeration value="completed-no-objects"/>
            <xs:enumeration value="completed-sync-errors"/>
            <xs:enumeration value="completed-transient-objects"/>
            <xs:enumeration value="completed-warnings"/>
            <xs:enumeration value="completing-obsolete"/>
            <xs:enumeration value="completing-referential-updates"/>
            <xs:enumeration value="in-progress"/>
            <xs:enumeration value="no-start-bad-ma-configuration"/>
            <xs:enumeration value="no-start-change-log-not-enabled"/>
            <xs:enumeration value="no-start-connection"/>
            <xs:enumeration value="no-start-credentials"/>
            <xs:enumeration value="no-start-database-permission"/>
            <xs:enumeration value="no-start-database-schema-mismatch"/>
            <xs:enumeration value="no-start-database-table"/>
            <xs:enumeration value="no-start-delta-step-type-not-configured"/>
            <xs:enumeration value="no-start-file-access-denied"/>
            <xs:enumeration value="no-start-file-code-page"/>
            <xs:enumeration value="no-start-file-contains-incorrect-step-type"/>
          </xs:restriction>
        </xs:simpleContent>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```



```

<xs:enumeration value="no-start-file-not-found"/>
<xs:enumeration value="no-start-file-open"/>
<xs:enumeration value="no-start-file-sharing-violation"/>
<xs:enumeration value="no-start-full-import-required"/>
<xs:enumeration value="no-start-header-row-mismatch"/>
<xs:enumeration value="no-start-ma"/>
<xs:enumeration value="no-start-ma-working-directory"/>
<xs:enumeration value="no-start-no-domain-controller"/>
<xs:enumeration value="no-start-no-partition-delete"/>
<xs:enumeration value="no-start-partition-not-configured"/>
<xs:enumeration value="no-start-partition-rename"/>
<xs:enumeration value="no-start-server"/>
<xs:enumeration value="no-start-no-steps-in-profile"/>
<xs:enumeration value="stopped-bad-ma-configuration"/>
<xs:enumeration value="stopped-change-log-out-of-order"/>
<xs:enumeration value="stopped-code-page-conversion"/>
<xs:enumeration value="stopped-connectivity"/>
<xs:enumeration value="stopped-database-connection-lost"/>
<xs:enumeration value="stopped-database-disk-full"/>
<xs:enumeration value="stopped-deadlocked"/>
<xs:enumeration value="stopped-disk-full"/>
<xs:enumeration value="stopped-error-limit"/>
<xs:enumeration value="stopped-export-write"/>
<xs:enumeration value="stopped-extension-dll-access"/>
<xs:enumeration value="stopped-extension-dll-ambiguous"/>
<xs:enumeration value="stopped-extension-dll-exception"/>
<xs:enumeration value="stopped-extension-dll-file-not-found"/>
<xs:enumeration value="stopped-extension-dll-instantiation"/>
<xs:enumeration value="stopped-extension-dll-invalid-assembly"/>
<xs:enumeration value="stopped-extension-dll-load"/>
<xs:enumeration value="stopped-extension-dll-missing-dependency"/>
<xs:enumeration value="stopped-extension-dll-no-implementation"/>
<xs:enumeration value="stopped-extension-dll-not-configured-for-ma"/>
<xs:enumeration value="stopped-extension-dll-not-configured-for-mv"/>
<xs:enumeration value="stopped-extension-dll-updated-version"/>
<xs:enumeration value="stopped-file-embedded-nulls"/>
<xs:enumeration value="stopped-file-error"/>
<xs:enumeration value="stopped-import-read"/>
<xs:enumeration value="stopped-ma"/>
<xs:enumeration value="stopped-object-limit"/>
<xs:enumeration value="stopped-out-of-memory"/>
<xs:enumeration value="stopped-parsing-errors"/>
<xs:enumeration value="stopped-server"/>
<xs:enumeration value="stopped-service-shutdown"/>
<xs:enumeration value="stopped-user-termination-from-extension"/>
<xs:enumeration value="stopped-user-termination-from-wmi-or-ui"/>
<xs:enumeration value="success"/>
</xs:restriction>
</xs:simpleContent>
</xs:complexType>
</xs:element>
<xs:element name="step-description" type="xs:anyType" minOccurs="1" maxOccurs="1" />
<xs:element name="current-export-step-counter" type="numberType" minOccurs="1"
maxOccurs="1" />
<xs:element name="last-successful-export-step-counter" type="numbertype" minOccurs="1"
maxOccurs="1" />
<xs:element name="ma-connection" type="ma-connectionType" minOccurs="1" maxOccurs="1" />
<xs:element name="ma-discovery-errors" type="ma-discovery-errorsType" minOccurs="1"
maxOccurs="1" />

```

```

    <xs:element name="ma-discovery-counters" type="ma-discovery-countersType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="synchronization-errors" type="synchronization-errorsType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="mv-retry-errors" type="mv-retry-errorsType" minOccurs="1" maxOccurs="1"
/>
    <xs:element name="outbound-flow-counters" type="outbound-flow-countersType" minOccurs="0"
maxOccurs="unbounded" />
    <xs:element name="staging-counters" type="staging-countersType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="inbound-flow-counters" type="inbound-flow-countersType" minOccurs="1"
maxOccurs="unbounded" />
    <xs:element name="export-counters" type="export-countersType" minOccurs="1" maxOccurs="1"
/>
  </xs:sequence>
  <xs:attribute name="step-number" type="numberType" use="required" />
  <xs:attribute name="step-id" type="guidType" use="required" />
</xs:complexType>

<!-- history type -->
<xs:complexType name="run-historyType">
  <xs:sequence>
    <xs:element name="run-details" minOccurs="1" maxOccurs="1">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="ma-id" type="guidType" minOccurs="1" maxOccurs="1" />
          <xs:element name="ma-name" type="xs:string" minOccurs="1" maxOccurs="1" />
          <xs:element name="run-number" type="numberType" minOccurs="1" maxOccurs="1" />
          <xs:element name="run-profile-name" type="xs:string" minOccurs="1" maxOccurs="1" />
          <xs:element name="security-id" type="security-idType" minOccurs="1" maxOccurs="1" />
          <xs:element name="step-details" type="step-detailsType" minOccurs="1"
maxOccurs="unbounded" />
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

<!-- instance of history-type -->
<xs:element name="run-history" type="run-historyType" />
</xs:schema>

```

## 7 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products:

- Microsoft® SharePoint® Server 2010 Technical Preview

Exceptions, if any, are noted below. If a service pack number appears with the product version, behavior changed in that service pack. The new behavior also applies to subsequent service packs of the product unless otherwise specified.

Unless otherwise specified, any statement of optional behavior in this specification prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that product does not follow the prescription.

## 8 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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