

[MS-UPSMODS]:

User Profile Synchronization (UPS): Management Objects Data Structure

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Revision Summary

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1 Introduction

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

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

anchor: A set of qualifiers and quantifiers that specifies the location of an element or object within a document. These values are typically relative to another element or known location in the document, such as the edge of a page or margin.

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.

base64 encoding: A binary-to-text encoding scheme whereby an arbitrary sequence of bytes is converted to a sequence of printable ASCII characters, as described in [\[RFC4648\]](#).

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.

code page: An ordered set of characters of a specific script in which a numerical index (code-point value) is associated with each character. Code pages are a means of providing support for character sets and keyboard layouts used in different countries. Devices such as the display and keyboard can be configured to use a specific code page and to switch from one code page (such as the United States) to another (such as Portugal) at the user's request.

Coordinated Universal Time (UTC): A high-precision atomic time standard that approximately tracks Universal Time (UT). It is the basis for legal, civil time all over the Earth. Time zones around the world are expressed as positive and negative offsets from UTC. In this role, it is also referred to as Zulu time (Z) and Greenwich Mean Time (GMT). In these specifications, all references to UTC refer to the time at UTC-0 (or GMT).

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

delta import: A step in the staging process that reads in only the changes that have occurred in a connected data source since the last import.

delta synchronization: A staging step that processes only those objects that have pending imports.

disconnecter object: A staging object that is not linked to an object in the **metaverse**.

distinguished name (DN): In Lightweight Directory Access Protocol (LDAP), an LDAP Distinguished Name, as described in [\[RFC2251\]](#) section 4.1.3. The DN of an object is the DN of its parent, preceded by the RDN of the object. For example: CN=David Thompson, OU=Users, DC=Microsoft, DC=COM. For definitions of CN and OU, see [\[RFC2256\]](#) sections 5.4 and 5.12, respectively.

domain: A set of users and computers sharing a common namespace and management infrastructure. At least one computer member of the set must act as a **domain controller (DC)** and host a member list that identifies all members of the domain, as well as optionally hosting the Active Directory service. The domain controller provides authentication of members, creating a unit of trust for its members. Each domain has an identifier that is shared among its members. For more information, see [\[MS-AUTHSOD\]](#) section 1.1.1.5 and [\[MS-ADTS\]](#).

domain account: A stored set of attributes representing a principal used to authenticate a user or machine to an Active Directory domain.

domain controller (DC): The service, running on a server, that implements Active Directory, or the server hosting this service. The service hosts the data store for objects and interoperates with other **DCs** to ensure that a local change to an object replicates correctly across all **DCs**. When Active Directory is operating as Active Directory Domain Services (AD DS), the **DC** contains full NC replicas of the configuration naming context (config NC), schema naming context (schema NC), and one of the domain NCs in its forest. If the AD DS **DC** is a global catalog server (GC server), it contains partial NC replicas of the remaining domain NCs in its forest. For more information, see [\[MS-AUTHSOD\]](#) section 1.1.1.5.2 and [\[MS-ADTS\]](#). When Active Directory is operating as Active Directory Lightweight Directory Services (AD LDS), several AD LDS **DCs** can run on one server. When Active Directory is operating as AD DS, only one AD DS **DC** can run on one server. However, several AD LDS **DCs** can coexist with one AD DS **DC** on one server. The AD LDS **DC** contains full NC replicas of the config NC and the schema NC in its forest. The domain controller is the server side of Authentication Protocol Domain Support [\[MS-APDS\]](#).

encryption: In cryptography, the process of obscuring information to make it unreadable without special knowledge.

encryption key: One of the input parameters to an **encryption** algorithm. Generally speaking, an encryption algorithm takes as input a clear-text message and a key, and results in a cipher-text message. The corresponding decryption algorithm takes a cipher-text message, and the key, and results in the original clear-text message.

explicit connector object: A staging object that 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.

explicit disconnecter object: A staging object that will not transition from a disconnecter object to a connector object even if a change to that object makes it satisfy the conditions of the connector filter.

export attribute flow: The process of updating the **metaverse** attribute values of the current metaverse object during an export operation.

flow: The direction in which text in a cell is rendered.

globally unique identifier (GUID): A term used interchangeably with universally unique identifier (UUID) in Microsoft protocol technical documents (TDs). Interchanging the usage of these terms does not imply or require a specific algorithm or mechanism to generate the value. Specifically, the use of this term does not imply or require that the algorithms described in [\[RFC4122\]](#) or [\[C706\]](#) must be used for generating the **GUID**. See also universally unique identifier (UUID).

import attribute flow: The process of updating the **metaverse** attribute values of the current metaverse object during an import operation.

LDAP Data Interchange Format (LDIF): A standard that defines how to import and export directory data between directory servers that use the Lightweight Directory Access Protocol (LDAP), as described in [\[RFC2849\]](#).

management agent: A component that consists of properties, rules, and rules extensions that determine how an object is processed in the metadirectory. A single management agent can have one or more run profiles that determine the management agent's behavior, such as how or when the management agent runs.

metaverse: A storage area that contains the aggregated information from multiple connected data sources, providing a single global, integrated view of all combined objects.

naming context (NC): An **NC** is a set of objects organized as a tree. It is referenced by a DSName. The **DN** of the DSName is the distinguishedName attribute of the tree root. The **GUID** of the DSName is the objectGUID attribute of the tree root. The security identifier (SID) of the DSName, if present, is the objectSid attribute of the tree root; for Active Directory Domain Services (AD DS), the SID is present if and only if the **NC** is a domain naming context (domain NC). Active Directory supports organizing several **NCs** into a tree structure.

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.

placeholder: A character or symbol that is used in place of an actual value, text, or object. The actual value that the placeholder represents is unknown or unavailable at the current time, or is not displayed for security reasons.

rules extension: A .NET assembly that is located on the server in the synchronization engine's "extensions" folder and implements the IMASynchronization interface.

Secure Sockets Layer (SSL): A security protocol that supports confidentiality and integrity of messages in client and server applications that communicate over open networks. SSL uses two keys to encrypt data—a public key known to everyone and a private or secret key known only to the recipient of the message. SSL supports server and, optionally, client authentication using X.509 certificates. For more information, see [\[X509\]](#). The SSL protocol is precursor to **Transport Layer Security (TLS)**. The TLS version 1.0 specification is based on SSL version 3.0 [\[SSL3\]](#).

synchronization engine: A code module that creates an integrated view of objects that are stored in multiple, connected data sources, and manages information in those data sources.

Transport Layer Security (TLS): A security protocol that supports confidentiality and integrity of messages in client and server applications communicating over open networks. **TLS** supports server and, optionally, client authentication by using X.509 certificates (as specified in [\[X509\]](#)). **TLS** is standardized in the IETF TLS working group.

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

1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the [Errata](#).

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. We will assist you in finding the relevant information.

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

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

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

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

[XMLSCHEMA1] Thompson, H., Beech, D., Maloney, M., and Mendelsohn, N., Eds., "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-WMIO] Microsoft Corporation, "[Windows Management Instrumentation Encoding Version 1.0 Protocol](#)".

1.3 Overview

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 as specified in [MS-UPSCDS] section 2. 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 concepts and processing steps of the **synchronization engine** are described in [MS-UPSCDS] section 1.3.

The Management Objects Data Structures define a management agent object, which provides access to a method to execute a run profile as specified in [MS-UPSCDS] section 2.2.32. The management agent object provides methods that provide status of the most recently executed run profile, such as the time at which the run profile was started and the status of the run profile. The management agent object also provides methods to access statistics of the of the connector space associated with the management agent, such as the total number of objects in the connector space.

The management agent object can therefore be used to execute the import, export and synchronization run profiles configured for the synchronization engines' management agents as specified in [MS-UPSCDS] section 2.2.32 and provide the status of those run profiles using the methods associated with the run profiles, such as start time and end time, as well as the management agent statistics, such as the number of connectors in the connector space before or after the run profile was executed.

1.4 Relationship to Other Protocols

Synchronization Management Objects are transmitted between client and server using [MS-WMI] and [MS-WMIO], as demonstrated in the following figure.

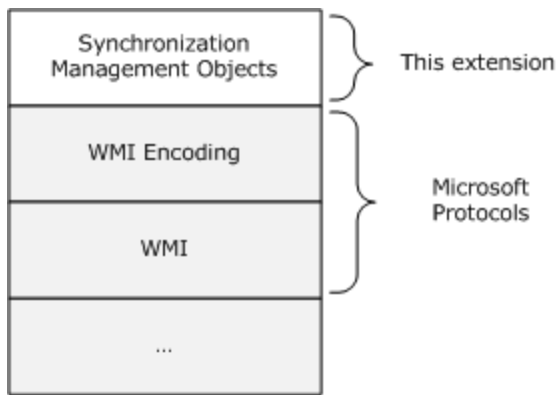


Figure 1: This protocol in relation to other protocols

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.

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 initialize the transport as specified in [\[MS-WMI\]](#) section [3.2.3](#).

2.2 Message Syntax

Synchronization Management Objects are transported using the syntax specified in [\[MS-WMI\]](#) section [2](#).

2.2.1 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 ([\[XMLSCHEMA1\]](#)) definition:

```
<?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>
```

```

</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>

```

```

    </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>

```

```

    </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:restriction>
</xs:simpleType>

```

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<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-expression"/>
<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: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>

```



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<!-- 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" type="xs:string" minOccurs="1" maxOccurs="unbounded" />
    <xs:element name="script-context" type="xs:string" minOccurs="1" maxOccurs="1" />
  </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:complexType>
          </xs:element>
          <xs:attribute name="dest-attr" type="xs:string" use="required" />
          <xs:attribute name="context-id" type="xs:string" use="required" />
        </xs:sequence>
        <xs:attribute name="ma-id" type="guidType" use="optional" />
        <xs:attribute name="ma-name" type="xs:string" use="optional" />
        <xs:attribute name="cs-object-id" type="guidType" use="optional" />
        <xs:attribute name="dn" type="dnType" use="optional" />
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

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<!-- 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="0" maxOccurs="unbounded" >
            <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>
</xs:element>
<!-- 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" >
      <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" >

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    <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: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:sequence>
    </xs:complexType>
  </xs:element>

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<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"/>
      <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>

<!-- 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="mv-guid" type="guidType" use="required" />
      <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:element name="connector-flow" type="counterDetailTrueType" minOccurs="0" maxOccurs="1"
/>
    <xs:element name="connector-no-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:sequence>
</xs:complexType>

```

```

    <xs:element name="disconnector-joined-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnector-joined-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnector-projected-no-flow" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnector-projected-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnector-projected-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnector-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>

<!-- 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="completed-skipped-already-completed"/>
            <xs:enumeration value="completing-obsolation"/>
            <xs:enumeration value="completing-referential-updates"/>
          </xs:restriction>
        </xs:simpleContent>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

```

<xs:enumeration value="completing-recomputation"/>
<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-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-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>

```

2.2.1.1 run-history

The run-history element 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>

```

```

    </xs:complexType>
  </xs:element>
</xs:sequence>
</xs:complexType>
<!-- instance of history-type -->
<xs:element name="run-history" type="run-historyType" />

```

The **run-history** element contains information about one management agent executed run profile.

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 **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-details element **MUST** be present for each step in the run profile. See section [2.2.1.1.1](#) for information about the run-details element.

2.2.1.1.1 step-details

The step-details element is an instance of the step-**DetailsType** type, which is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) definition:

```

<!-- 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>

<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="completed-skipped-already-completed"/>
          </xs:restriction>
        </xs:simpleContent>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

```

<xs:enumeration value="completing-obsolation"/>
<xs:enumeration value="completing-referential-updates"/>
<xs:enumeration value="completing-recomputation"/>
<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-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-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 following values:

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.

completed-skipped-already-completed: The run step was skipped because the run profile was executed in resume mode and the step had completed in the most recent previous attempt. 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 objects that refer to other objects via attribute values are correctly linked.

completing-recomputation: The synchronization engine is in the process of evaluating further metaverse attribute value changes as the result of changes to metaverse attribute values.

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 because the credentials were not accepted by the data source.

no-start-database-permission: The management agent does not have the permissions needed to access the data source.

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.

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 in 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-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 (DC)** could not be contacted by the synchronization engine.

no-start-no-partition-delete: The run step failed to start because the **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** 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 of a script-based synchronization rule is not a valid .NET assembly.

stopped-extension-dll-load: The run step stopped because the specified assembly 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 of a script-based synchronization rule.

stopped-extension-dll-not-configured-for-ma: The run step stopped because the specified assembly 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 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 the 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 the 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.

The run-details/step-details/step-result/@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/step-result is one of the following:

- completing-referential-updates
- completing-obsolation
- completing-recomputation

The **run-details/step-details/step-result/@file** attribute contains the name of the file configured in the management agent configuration for the step as specified in [\[MS-UPSCDS\]](#) section 2.2.32 and MUST NOT be present unless the **run-history/run-details/step-details/step-result** is one of the following:

- completed-no-objects
- no-start-file-access-denied
- 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 2.2.32.6.1.

The **run-details/step-details/current-export-step-counter** element MUST be 0.

The **run-details/step-details/last-successful-export-step-counter** element MUST be 0.

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 [2.2.1.1.1.1](#) for details about `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 [2.2.1.1.1.2](#) for details about `ma-discovery-errors`.

The **run-details/step-details/ma-discovery-counters** element contains the management agent counters relating to imported objects. See section [2.2.1.1.1.3](#) for details about `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 could 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 [2.2.1.1.1.4](#) for details about 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 [2.2.1.1.1.5](#) for details about 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 [2.2.1.1.1.6](#) for details about outbound-flow-counters.

The run-details/step-details/staging-counters element contains information about the staging of the entries that were imported. See section [2.2.1.1.1.7](#) for details about 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 and only if the run profile step resulted in inbound attribute flow. See section [2.2.1.1.1.8](#) for details about inbound-flow-counters.

The run-details/step-details/export-counters element contains information about object changes during a management agent export. See section [2.2.1.1.1.9](#) for details about export-counters.

2.2.1.1.1.1 ma-connection

The ma-connection element is an instance of the **ma-connectionType** type, which 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="0" maxOccurs="unbounded" >
            <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>
```

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

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-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.

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

success: Successful connection to the data source.

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 and only if the management agent successfully connected to a server.

The ma-connection/connection-log element contains one or more connection incidents. A connection-log element MUST be present if one or more connections to a server were attempted.

The ma-connection/connection-log/incident element represents an attempt to connect with the server. An incident element MUST be present for each attempted connection to a server. The incident elements MUST be in order of occurrence.

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 contains management agent information about the data source error. This element MUST be present if and only 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 and only 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 and only if an error occurred while connected to the data source.

2.2.1.1.1.2 ma-discovery-errors

The **ma-discovery-errors** element is an instance of the **ma-discovery-errorsType** type, which 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: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:element name="value" type="xs:string" minOccurs="0" maxOccurs="unbounded" />
</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 and only 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:

anchor-too-long: Returned by a management agent when the management agent **anchor** construction produced an anchor that was too large.

conflicting-modification-types: Returned during a delta import of a management agent when reading an **LDAP Data Interchange Format (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
objectclass: group
-
replace: objectclass
objectclass: user
...
```

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

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.

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 **base64** occurs.

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

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

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

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

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).

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.

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

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

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.

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.

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.

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.

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.

reference-value-not-ldap-conformant: Returned by a management agent indicating a distinguished name (DN) (4) value does not conform to the LDAP specification.

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

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

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 and only 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 and only 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 and only 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 and only 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 and only 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 indicates the name of the attribute on which the error occurred. 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`
- `missing-anchor-component`

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

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

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

The `ma-discovery-errors/ma-object-error/cd-error/server-error-detail` element is a string reported by the management agent which contains a change log entry number. This element **MUST** be present if and only 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/cd-error/value` element is an invalid distinguished name value which was discovered for the attribute. This element **MUST** be present if and only if an invalid distinguished name value was discovered for the attribute.

2.2.1.1.1.3 ma-discovery-counters

The **ma-discovery-counters** element is an instance of the **ma-discovery-countersType** type, which 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 and only if the value is greater than zero.

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 and only if the value is greater than zero.

2.2.1.1.1.4 synchronization-errors

The **synchronization-errors** element is an instance of the **synchronization-errorsType** type, which 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: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:complexType>
          </xs:element>
          <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:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

```

        </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: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:restriction>
                </xs:simpleType>
            </xs:element>
        </xs:sequence>
    </xs:complexType>
</xs:element>

```



```

        <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: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 GUID format.

connector-filter-rule-violation: A connector object became a filtered **disconnecter 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.

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

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.

unexported-container-rename: The implementation of the provision method or the deprovision method is trying to rename a container object that has one or more unexported child objects.

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:

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

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

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

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

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

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

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

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

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

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

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 and only 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` attribute is the DN of the connector space object.

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 and only 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 and only 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:

- `add`
- `update`
- `replace`
- `delete`

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

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

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

The `synchronization-errors/import-error/change-not-reimported/delta/dn-attr/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-attr/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:

- 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 and MUST be present if and only 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-objectclass element specifies the primary object class for the object.

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

The synchronization-errors/import-error/change-not-reimported/entry/objectclass/oc-value element specifies the object class values for the object. This element MUST be present if and only if the objectclass 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 and only 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:

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.

export-flow: The export flow 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.

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.

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

projection: The projection 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.

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 and only if an error occurs in a synchronization rule during import.

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

The `synchronization-errors/import-error/rules-error-info/context/@ma-id` attribute is the GUID for the management agent and **MUST** be present if `synchronization-errors/import-error/algorithm-step` is one of the following:

- `import-flow`

The `synchronization-errors/import-error/rules-error-info/context/@ma-name` attribute is the name of the management agent and **MUST** be present if `synchronization-errors/import-error/algorithm-step` is one of the following:

- `import-flow`

The `synchronization-errors/import-error/rules-error-info/context/@cs-object-id` attribute is the GUID for the object in the connector space where the error occurred and **MUST** be present if `synchronization-errors/import-error/algorithm-step` is one of the following:

- `import-flow`

The `synchronization-errors/import-error/rules-error-info/context/@dn` attribute is the distinguished name for the object in the connector space where the error occurred and **MUST** be present if `synchronization-errors/import-error/algorithm-step` is one of the following:

- `import-flow`

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

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

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

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

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

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

- `dn`

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

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

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

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

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

The `synchronization-errors/import-error/rules-error-info/context/attribute-mapping/dn-part-mapping/dn-part` element with the `dn` element index, where index 1 is the top level 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 present if and only if 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.

encryption-not-enabled: An attempt is made to set or change the password attribute and the connection that the management agent uses to communicate to the connected data source has not been configured with an appropriate encryption mechanism that is either 128-bit **Secure Sockets Layer (SSL)** or **Transport Layer Security (TLS)**.[<1>](#)

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 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.

schema-violation: An attempt is made to export an object modification that would add an attribute that is not in the connected data source schema, or remove an attribute from an object that is required by the schema. This error is returned by LDAP management agents.

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 and only 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.

The synchronization-errors/export-error/cd-error/server-error-detail element is a human readable error string reported by the management agent used for informational purposes. This element MUST be present if and only if the management agent encounters a discovery error while synchronizing.

2.2.1.1.1.5 mv-retry-errors

The **mv-retry-errors** element is an instance of the **mv-retry-errorsType** type, which 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: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="mv-guid" type="guidType" use="required" />
        <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/@mv-guid attribute is the GUID for the metaverse object which requires retrying.

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 [2.2.1.1.1.4](#) 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-id attribute is the management agent GUID.

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/extension-error-info |
| mv-retry-errors/retry-error/rules-error-info and all child elements and attributes | synchronization-errors/import-error/rules-error-info |

2.2.1.1.1.6 outbound-flow-counters

The **outbound-flow-counters** element is an instance of the **outbound-flow-countersType** type, which is specified via the following XML Schema ([XMLSCHEMA1](#)) 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: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-id 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 and only 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 and only 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 and only 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 and only 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 and only 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 and only 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 and only 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.

2.2.1.1.1.7 staging-counters

The **staging-counters** element is an instance of the **staging-countersType** type which 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.

2.2.1.1.1.8 inbound-flow-counters

The **inbound-flow-counters** element is an instance of the **inbound-flow-countersType** type which is specified via the following XML Schema ([\[XMLSCHEMA1\]](#)) 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="disconnector-joined-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnector-projected-no-flow" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnector-projected-flow" type="counterDetailTrueType" minOccurs="1"
maxOccurs="1" />
    <xs:element name="disconnector-projected-remove-mv" type="counterDetailTrueType"
minOccurs="1" maxOccurs="1" />
    <xs:element name="disconnector-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 deletion or addition 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.

2.2.1.1.1.9 export-counters

The **export-counters** element is an instance of the **export-countersType** type, which 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 ExecQuery call 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.

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>, <resume>
where <name of management agent run profile> is the name of the management agent run profile the client intends to execute and <resume> is a Boolean indicating if the profile will be resumed.

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 the client intends to determine status.

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 of **explicit connector objects**.

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

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.

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.

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.

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

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

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

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

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

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

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

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

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

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

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

3.1.5.20 ResumeState

The **ResumeState** method returns the resume status of a management agent run profile. The client MUST pass the name of a management agent run profile. The client calls the **ResumeState** 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: ResumeState
- Input Parameters: <name of management agent run profile>

where <name of management agent run profile> is the name of the management agent run profile for which the client intends to check resume status.

3.1.5.21 ResyncSyncConfigObjects

The **ResyncSyncConfigObjects** method initiates the internal synchronization of the synchronization configuration data. 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

3.1.5.22 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

3.1.5.23 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.

3.1.5.24 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 returned by the server is an empty string.

3.1.5.25 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 returned by the server is an empty string.

3.1.5.26 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.

3.1.5.27 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

3.1.5.28 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

3.1.5.29 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

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 about 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.

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.

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 an ExecQuery command on the Service object using the ExecQuery method with the following parameters:

Query: "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, the server MUST return the literal string "access-denied" <2>. If 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 [3.2.5.29](#).

3.2.5.2 Execute

The **Execute** method executes a management agent run profile. The client MUST pass the name of a run profile. Optionally, the client can pass a Boolean indicating that the profile will be resumed from a previous attempt. For each result, the server MUST perform the following except where noted:

- The server will not continue to process additional run profile steps as defined in [\[MS-UPSCDS\]](#) section 2.2.32.6.1.
- The server will not perform the obsolescence process.
- If the step is of type "full-import" or "delta-import" as defined in [\[MS-UPSCDS\]](#) section 2.2.32.6.1.1, the server MUST NOT complete the process of resolving references to placeholder objects that were converted to disconnector objects during the import process and MUST NOT remove any placeholder objects that are no longer referenced by other objects.

The server MUST return one of the following status messages:

- If the client is not permitted to perform this operation, the server MUST return **access-denied**. <3>
- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**. <4>
- 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 status message specified in this document, the server MUST return **call-failure**.
- If a full import run step stopped because of discovery errors between the data source and the connector space, the server MUST return **completed-discovery-errors**.
- If the run step completed with export errors, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-export-errors**.

- If the full import run step found no objects to import, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-no-objects**.
- If the run step completed with synchronization errors or warnings, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-sync-errors**.
- If the run step completed with objects in the connector space in a transient state, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-transient-objects**.
- If the run step completed with synchronization warnings, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-warnings**.
- If the synchronization engine is in the process of marking objects in the connector space that no longer exist in the data source as obsolete, the server MUST return **completing-obsolescence**.
- If the synchronization engine is in the process of completing its referential updates, ensuring that objects that refer to other objects via attribute values are correctly linked, the server MUST return **completing-referential-updates**.
- If the synchronization engine is in the process of evaluating further metaverse attribute value changes as the result of changes to metaverse attribute values, the server MUST return **completing-recomputation**.
- If the synchronization engine is currently executing a run profile for the management agent, the server MUST return **in-progress**.
- If the run step failed to start because the management agent configuration is invalid, the server MUST return **no-start-bad-ma-configuration**.
- If the delta import run step failed to start because the change log in the data source was not enabled, the server MUST return **no-start-change-log-not-enabled**.
- If the run step failed to start because of connection problems with the data source, the server MUST return **no-start-connection**.
- If the run step failed to start because the credential were not accepted by the data source, the server MUST return **no-start-credentials**.
- If the management agent does not have the permissions needed to access the data source, the server MUST return **no-start-database-permission**.
- If the management agent could not read or write the database table, the server MUST return **no-start-database-table**.
- If the database schema does not match the schema defined for the management agent, the server MUST return **no-start-database-schema-mismatch**.
- If 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, data will not be obsoleted, the processing of retries and cleanup of placeholder objects will not be performed, and the server MUST return **no-start-delta-step-type-not-configured**.
- If the run step failed to start because access to the input file in the management agent configuration was denied, the server MUST return **no-start-file-access-denied**.
- If 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, the server MUST return **no-start-file-code-page**.

- If the run step failed to start because the input file specified the management agent configuration could not be found, the server MUST return **no-start-file-not-found**.
- If the run step failed to start because the input file specified in the management agent configuration could not be opened, the server MUST return **no-start-file-open**.
- If the run step failed to start because of a sharing violation on the input file specified in the management agent configuration, the server MUST return **no-start-file-sharing-violation**.
- If the delta import run step failed to start because a full import step is required prior to running a delta import step, the server MUST return **no-start-full-import-required**.
- If the header row in the file does not match the definition specified in the management agent, the server MUST return **no-start-header-row-mismatch**.
- If the run step failed to start because of an unknown management agent error, the server MUST return **no-start-ma**.
- If the run step failed to start because there is no directory or a directory could not be created for the management agent, the server MUST return **no-start-ma-working-directory**.
- If the run step failed to start because the domain controller could not be contacted by the synchronization engine, the server MUST return **no-start-no-domain-controller**.
- If the run step failed to start because domain or naming context (NC) specified in the run step has been deleted, the server MUST return **no-start-no-partition-delete**.
- If the run step failed to start because the required **partition** is not selected in the management agent properties, the server MUST return **no-start-partition-not-configured**.
- If the run step failed to start because the partition selected in the management agent properties has been renamed in the data source, the server MUST return **no-start-partition-rename**.
- If the run step failed to start because of an unknown synchronization engine error, the server MUST return **no-start-server**.
- If the run step failed because the run profile contains a step that refers to a partition that has been deleted, the server MUST return **no-start-no-steps-in-profile**.
- If the run step stopped because of an invalid management agent configuration, the server MUST return **stopped-bad-ma-configuration**.
- If the run step stopped because the data source change log entries are not numbered sequentially, the server MUST return **stopped-change-log-out-of-order**.
- If the import run step stopped because of a code page conversion error, the server MUST return **stopped-code-page-conversion**.
- If the run step stopped because of connectivity loss with the data source, the server MUST return **stopped-connectivity**.
- If the run step stopped because the server is not connected to the database used by the synchronization engine, the server MUST return **stopped-database-connection-lost**.
- If the run stopped because the database used by the synchronization engine is full, the server MUST return **stopped-database-disk-full**.
- If the run step stopped because of an internal server deadlock between multiple currently executing management agent run profiles, the server MUST return **stopped-deadlocked**.
- If the run step stopped because of a full disk, the server MUST return **stopped-disk-full**.

- If the run step stopped because the run profile encountered more than the configured maximum number of errors, where the default maximum number of errors is 5000, the server MUST return **stopped-error-limit**.
- If the export run step stopped because of an error writing to the data source, the server MUST return **stopped-export-write**.
- If the run step stopped because the synchronization engine service account does not have the required permissions to access the Extensions folder, the server MUST return **stopped-extension-dll-access**.
- If the run step stopped because the rules extension contains multiple implementations of the script-based synchronization rule interfaces, the server MUST return **stopped-extension-dll-ambiguous**.
- If the run step stopped because of an exception was returned during the initialization of a script-based synchronization rule, the server MUST **return stopped-extension-dll-exception**.
- If the run step stopped because the assembly of a script-based synchronization rule specified in the management agent properties cannot be found, the server MUST return **stopped-extension-dll-file-not-found**.
- If the run step stopped because the constructor of a script-based synchronization rule threw an exception, the server MUST return **stopped-extension-dll-instantiation**.
- If the run step stopped because the specified assembly of a script-based synchronization rule is not a valid .NET assembly, the server MUST return **stopped-extension-dll-invalid-assembly**.
- If the run step stopped because the specified assembly of a script-based synchronization rule cannot be loaded due to an unknown error, the server MUST return **stopped-extension-dll-load**.
- If the run step stopped because the extension object cannot be instantiated because the script-based synchronization rule extension is missing a dependency file, the server MUST return **stopped-extension-dll-missing-dependency**.
- If the run step stopped because the class that is implementing the required interface cannot be found in the specified assembly of a script-based synchronization rule, the server MUST return **stopped-extension-dll-no-implementation**.
- If the run step stopped because the specified assembly of a script-based synchronization rule is not a management agent rules extension, the server MUST return **stopped-extension-dll-not-configured-for-ma**.
- If the run step stopped because the specified assembly of a script-based synchronization rule is not a metaverse rules extension, the server MUST return **stopped-extension-dll-not-configured-for-mv**.
- If the run step failed because the Extensions folder was updated when the run step executed, the server MUST return **stopped-extension-dll-updated-version**.
- If the import run step stopped because the input file contains embedded null characters, the server MUST return **stopped-file-embedded-nulls**.
- If the import run step stopped because of a read error on the data source, the server MUST return **stopped-import-read**.
- If the run step stopped because of an unknown error from the management agent, the server MUST return **stopped-ma**.
- If the run step stopped because the object limit specified in threshold property of the management agent properties was reached, the server MUST return **stopped-object-limit**.

- If the run step stopped because of insufficient server memory, the server MUST return **stopped-out-of-memory**.
- If the run step stopped because the program could not parse the input file or Sun ONE Directory Server change log, the server MUST return **stopped-parsing-errors**.
- If the run step stopped because of an unknown server error, the server MUST return **stopped-server**.
- If the run step stopped because the synchronization engine service stopped, the server MUST return **stopped-service-shutdown**.
- If the run step stopped because the rules extension of a script-based synchronization rule terminated the run by signaling that an error occurred, the server MUST return **stopped-user-termination-from-extension**.
- If the run step stopped because the user stopped running the run profile using the Stop method, the server MUST return **stopped-user-termination-from-wmi-or-ui**.
- If the resume parameter is set to true and the profile cannot be resumed because the most recent attempt to execute the run profile result completed, the server MUST return **no-start-resume-already-completed**.
- If the resume parameter is set to true and the profile cannot be resumed because the completion status of the most recent attempt to execute the run profile cannot be determined, the server MUST return **no-start-resume-no-history**.
- If the resume parameter is set to true and the profile cannot be resumed because the profile has changed since the most recent attempt to execute the run profile, the server MUST return **no-start-resume-profile-modified**.

Otherwise, the server MUST return success. The server MUST complete all steps of the run profile, complete the obsolescence process, complete the process of resolving references to placeholder that were converted to disconnector objects during the import process and remove any placeholder object that are no longer referenced by another object.

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 will return one of the following status messages:

- If the client is not permitted to perform this operation, the server MUST return **access-denied<5>**.
- If the server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure <6>**.
- 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 uses encryption where the **encryption key** length is 40 bits or fewer, 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 **success-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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure<7>**.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure<8>**.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure<9>**.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**<10>.
- 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 disconnector objects in this management agent's connector space.

- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**<11>.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**<12>.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**[<13>](#).
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**[<14>](#).
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**[<15>](#).
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**[<16>](#).
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**<17>.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**<18>.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**<19>.
- 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 server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**<20>.
- 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 server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**<21>.
- 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 ResumeState

The **ResumeState** method returns the resume status of a management agent run profile. The client MUST pass the name of a run profile.

- If the client is not permitted to perform this operation, the server MUST return **access-denied**<22>.
- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**<23>.
- 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 resume parameter is set to true and the profile cannot be resumed because the most recent attempt to execute the run profile completed, the server MUST return **no-start-resume-already-completed**.
- If the resume parameter is set to true and the profile cannot be resumed because the completion status of the most recent attempt to execute the run profile cannot be determined, the server MUST return **no-start-resume-no-history**.
- If the resume parameter is set to true and the profile cannot be resumed because the profile has changed since the most recent attempt to execute the run profile, the server MUST return **no-start-resume-profile-modified**.

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

3.2.5.21 ResyncSyncConfigObjects

The **ResyncSyncConfigObjects** initiates the internal synchronization of the synchronization configuration data.

- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**<24>.
- 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.

3.2.5.22 RunDetails

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

- If the server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**<25>.
- 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 [2.2.1](#).

3.2.5.23 RunEndTime

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

- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**<26>.
- 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 [2.2.1](#), in Coordinated Universal Time (UTC), when the last management agent run profile completed.

Otherwise, the server MUST return in-progress.

3.2.5.24 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 server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**<27>.
- 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.

3.2.5.25 RunProfile

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

- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**<28>.

- 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.

3.2.5.26 RunStartTime

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

- If a failure occurs for which there is no other 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 [2.2.1](#), in Coordinated Universal Time (UTC), when the last management agent run profile was started.
- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**[<29>](#).

Otherwise, the server MUST return an empty string.

3.2.5.27 RunStatus

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

- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**[<30>](#).
- If a failure occurs for which there is no other status message specified in this document, the server MUST return **call-failure**.
- If the server does not contain a result for the last run profile, the server MUST return an empty string.
- If a full import run step stopped because of discovery errors between the data source and the connector space, the server MUST return **completed-discovery-errors**.
- If the run step completed with export errors, the next step in the run profile will run and data will be obsoleted and the server MUST return **completed-export-errors**.
- If the full import run step found no objects to import, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-no-objects**.
- If the run step completed with synchronization errors or warnings, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-sync-errors**.
- If the run step completed with objects in the connector space in a transient state, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-transient-objects**.

- If the run step completed with synchronization warnings, the next step in the run profile will run, data will be obsoleted, and the server MUST return **completed-warnings**.
- If the synchronization engine is in the process of marking objects in the connector space that no longer exist in the data source as obsolete, the server MUST return **completing-obsolation**.
- If the synchronization engine is in the process of completing its referential updates, ensuring that objects that refer to other objects via attribute values are correctly linked, the server MUST return **completing-referential-updates**.
- If the synchronization engine is in the process of evaluating further metaverse attribute value changes as the result of changes to metaverse attribute values, the server MUST return **completing-recomputation**.
- If the synchronization engine is currently executing a run profile for the management agent, the server MUST return **in-progress**.
- If the run step failed to start because the management agent configuration is invalid, the server MUST return **no-start-bad-ma-configuration**.
- If the delta import run step failed to start because the change log in the data source was not enabled, the server MUST return **no-start-change-log-not-enabled**.
- If the run step failed to start because of connection problems with the data source, the server MUST return **no-start-connection**.
- If the run step failed to start the credential were not accepted by the data source, the server MUST return **no-start-credentials**.
- If the management agent does not have the permissions needed to access the data source, the server MUST return **no-start-database-permission**.
- If the management agent could not read or write the database table, the server MUST return **no-start-database-table**.
- If the database schema does not match the schema defined for the management agent, the server MUST return **no-start-database-schema-mismatch**.
- If 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, data will not be obsoleted, the processing of retries and cleanup of placeholder objects will not be performed, and the server MUST return **no-start-delta-step-type-not-configured**.
- If the run step failed to start because access to the input file in the management agent configuration was denied, the server MUST return **no-start-file-access-denied**.
- If 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, the server MUST return **no-start-file-code-page**.
- If the run step failed to start because the input file specified the management agent configuration could not be found, the server MUST return **no-start-file-not-found**.
- If the run step failed to start because the input file specified in the management agent configuration could not be opened, the server MUST return **no-start-file-open**.
- If the run step failed to start because of a sharing violation on the input file specified in the management agent configuration, the server MUST return **no-start-file-sharing-violation**.
- If the delta import run step failed to start because a full import step is required prior to running a delta import step, the server MUST return **no-start-full-import-required**.

- If the header row in the file does not match the definition specified in the management agent, the server MUST return **no-start-header-row-mismatch**.
- If the run step failed to start because of an unknown management agent error, the server MUST return **no-start-ma**.
- If the run step failed to start because there is no directory or a directory could not be created for the management agent, the server MUST return **no-start-ma-working-directory**.
- If the run step failed to start because the domain controller could not be contacted by the synchronization engine, the server MUST return **no-start-no-domain-controller**.
- If the run step failed to start because the domain or naming context (NC) specified in the run step has been deleted, the server MUST return **no-start-no-partition-delete**.
- If the run step failed to start because the required **partition** is not selected in the management agent properties, the server MUST return **no-start-partition-not-configured**.
- If the run step failed to start because the partition selected in the management agent properties has been renamed in the data source, the server MUST return **no-start-partition-rename**.
- If the run step failed to start because of an unknown synchronization engine error, the server MUST return **no-start-server**.
- If the run step failed because the run profile contains a step that refers to a partition that has been deleted, the server MUST return **no-start-no-steps-in-profile**.
- If the run step stopped because of an invalid management agent configuration, the server MUST return **stopped-bad-ma-configuration**.
- If the run step stopped because the data source change log entries are not numbered sequentially, the server MUST return **stopped-change-log-out-of-order**.
- If the import run step stopped because of a code page conversion error, the server MUST return **stopped-code-page-conversion**.
- If the run step stopped because of connectivity loss with the data source, the server MUST return **stopped-connectivity**.
- If the run step stopped because the server is not connected to the database used by the synchronization engine, the server MUST return **stopped-database-connection-lost**.
- If the run step stopped because the database used by the synchronization engine is full, the server MUST return **stopped-database-disk-full**.
- If the run step stopped because of an internal server deadlock between multiple currently executing management agent run profiles, the server MUST return **stopped-deadlocked**.
- If the run step stopped because of a full disk, the server MUST return **stopped-disk-full**.
- If the run step stopped because the run profile encountered more than the configured maximum number of errors, where the default maximum number of errors is 5000, the server MUST return **stopped-error-limit**.
- If the export run step stopped because of an error writing to the data source, the server MUST return **stopped-export-write**.
- If the run step stopped because the synchronization engine service account does not have the required permissions to access the Extensions folder, the server MUST return **stopped-extension-dll-access**.

- If the run step stopped because the rules extension contains multiple implementations of the script-based synchronization rule interfaces, the server MUST return **stopped-extension-dll-ambiguous**.
- If the run step stopped because of an exception was returned during the initialization of a script-based synchronization rule, the server MUST return **stopped-extension-dll-exception**.
- If the run step stopped because the assembly of a script-based synchronization rule specified in the management agent properties cannot be found, the server MUST return **stopped-extension-dll-file-not-found**.
- If the run step stopped because the constructor of a script-based synchronization rule threw an exception, the server MUST return **stopped-extension-dll-instantiation**.
- If the run step stopped because the specified assembly of a script-based synchronization rule is not a valid .NET assembly, the server MUST return **stopped-extension-dll-invalid-assembly**.
- If the run step stopped because the specified assembly of a script-based synchronization rule cannot be loaded due to an unknown error, the server MUST return **stopped-extension-dll-load**.
- If the run step stopped because the extension object cannot be instantiated because the script-based synchronization rule extension is missing a dependency file, the server MUST return **stopped-extension-dll-missing-dependency**.
- If the run step stopped because the class that is implementing the required interface cannot be found in the specified assembly of a script-based synchronization rule, the server MUST return **stopped-extension-dll-no-implementation**.
- If the run step stopped because the specified assembly of a script-based synchronization rule is not a management agent rules extension, the server MUST return **stopped-extension-dll-not-configured-for-ma**.
- If the run step stopped because the specified assembly of a script-based synchronization rule is not a metaverse rules extension, the server MUST return **stopped-extension-dll-not-configured-for-mv**.
- If the run step failed because the Extensions folder was updated when the run step executed, the server MUST return **stopped-extension-dll-updated-version**.
- If the import run step stopped because the input file contains embedded null characters, the server MUST return **stopped-file-embedded-nulls**.
- If the import run step stopped because of a read error on the data source, the server MUST return **stopped-import-read**.
- If the run step stopped because of an unknown error from the management agent, the server MUST return **stopped-ma**.
- If the run step stopped because the object limit specified in threshold property of the management agent properties was reached, the server MUST return **stopped-object-limit**.
- If the run step stopped because of insufficient server memory, the server MUST return **stopped-out-of-memory**.
- If the run step stopped because the program could not parse the input file or Sun ONE Directory Server change log, the server MUST return **stopped-parsing-errors**.
- If the run step stopped because of an unknown server error, the server MUST return **stopped-server**.

- If the run step stopped because the synchronization engine service stopped, the server MUST return **stopped-service-shutdown**.
- If the run step stopped because the rules extension of a script-based synchronization rule terminated the run by signaling that an error occurred, the server MUST return **stopped-user-termination-from-extension**.
- If the run step stopped because the user stopped running the run profile using the Stop method, the server MUST return **stopped-user-termination-from-wmi-or-ui**.
- If the resume parameter is set to true and the profile cannot be resumed because the most recent attempt to execute the run profile result completed, the server MUST return **no-start-resume-already-completed**.
- If the resume parameter is set to true and the profile cannot be resumed because the completion status of the most recent attempt to execute the run profile cannot be determined, the server MUST return **no-start-resume-no-history**.
- If the resume parameter is set to true and the profile cannot be resumed because the profile has changed since the most recent attempt to execute the run profile, the server MUST return **no-start-resume-profile-modified**.

Otherwise, the server MUST return **success**.

3.2.5.28 Stop

The **Stop** method terminates the currently executing run profile.

- If the client is not permitted to perform this operation, the server MUST return **access-denied**[<31>](#).
- If the server is unable to communicate to any implementation specific components, the server SHOULD return **connection-failure**[<32>](#).
- 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**.

3.2.5.29 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 is not permitted to perform this operation, the server MUST return **access-denied**[<33>](#).
- If the server is unable to communicate to any implementation-specific components, the server SHOULD return **connection-failure**[<34>](#).
- If a failure occurs for which there is no other 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.

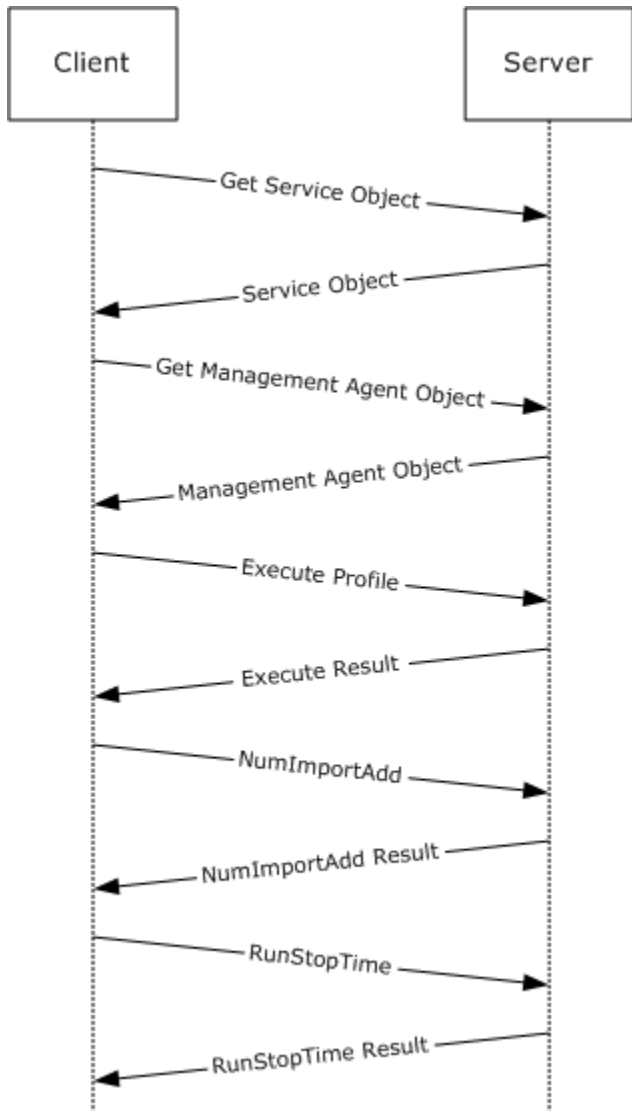


Figure 2: Protocol Sequence

5 Security

5.1 Security Considerations for Implementers

None.

5.2 Index of Security Parameters

None.

6 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

- Microsoft SharePoint Server 2010
- Microsoft SharePoint Server 2013
- Microsoft SharePoint Server 2016

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is 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 the product does not follow the prescription.

[<1> Section 2.2.1.1.1.4](#): SharePoint Server 2013 does not support **encryption-not-enabled**.

[<2> Section 3.2.5.1](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 define three security roles.

FIMSyncBrowser: A role for reading statistics and information from Management Agent Objects

FIMSyncOperator: A role for performing operations and reading statistics and information from Management Agent Objects.

WSS_ADMIN_WPG: A role for performing operations and reading statistics and information from Management Agent Objects.

Protocol server uses these roles to allow access to the server methods using the following mapping from method to authorized roles:

- **Obtain Management Agent Object**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Execute**: FIMSyncOperator or WSS_ADMIN_WPG
- **GetServerStatus**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumConnectors**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumCSObjects**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumDisconnectors**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitConnectors**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitDisconnectors**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportAdd**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportDelete**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportUpdate**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumFilteredDisconnectors**: FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG

- **NumImportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportNoChange:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumPlaceHolders:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **ResyncSyncConfigObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunDetails:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunEndTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunNumber:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunProfile:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStartTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Stop:** FIMSyncOperator or WSS_ADMIN_WPG
- **SuppressFullSyncWarning:** WSS_ADMIN_WPG

<3> [Section 3.2.5.2](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 define three security roles.

FIMSyncBrowser: A role for reading statistics and information from Management Agent Objects

FIMSyncOperator: A role for performing operations and reading statistics and information from Management Agent Objects.

WSS_ADMIN_WPG: A role for performing operations and reading statistics and information from Management Agent Objects.

Protocol server uses these roles to allow access to the server methods using the following mapping from method to authorized roles:

- **Obtain Management Agent Object:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Execute:** FIMSyncOperator or WSS_ADMIN_WPG
- **GetServerStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumCSObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG

- **NumExportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumFilteredDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportNoChange:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumPlaceHolders:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **ResyncSyncConfigObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunDetails:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunEndTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunNumber:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunProfile:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStartTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Stop:** FIMSyncOperator or WSS_ADMIN_WPG
- **SuppressFullSyncWarning:** WSS_ADMIN_WPG

<4> [Section 3.2.5.2](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<5> [Section 3.2.5.3](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 define three security roles.

FIMSyncBrowser: A role for reading statistics and information from Management Agent Objects

FIMSyncOperator: A role for performing operations and reading statistics and information from Management Agent Objects.

WSS_ADMIN_WPG: A role for performing operations and reading statistics and information from Management Agent Objects.

Protocol server uses these roles to allow access to the server methods using the following mapping from method to authorized roles:

- **Obtain Management Agent Object:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Execute:** FIMSyncOperator or WSS_ADMIN_WPG
- **GetServerStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG

- **NumCSObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumFilteredDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportNoChange:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumPlaceHolders:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **ResyncSyncConfigObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunDetails:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunEndTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunNumber:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunProfile:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStartTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Stop:** FIMSyncOperator or WSS_ADMIN_WPG
- **SuppressFullSyncWarning:** WSS_ADMIN_WPG

<6> [Section 3.2.5.3](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<7> [Section 3.2.5.4](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<8> [Section 3.2.5.5](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<9> [Section 3.2.5.6](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<10> [Section 3.2.5.7](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<11> [Section 3.2.5.8](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<12> [Section 3.2.5.9](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<13> [Section 3.2.5.11](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<14> [Section 3.2.5.12](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<15> [Section 3.2.5.13](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<16> [Section 3.2.5.14](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<17> [Section 3.2.5.15](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<18> [Section 3.2.5.16](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<19> [Section 3.2.5.17](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<20> [Section 3.2.5.18](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<21> [Section 3.2.5.19](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<22> [Section 3.2.5.20](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 define three security roles.

FIMSyncBrowser: A role for reading statistics and information from Management Agent Objects

FIMSyncOperator: A role for performing operations and reading statistics and information from Management Agent Objects.

WSS_ADMIN_WPG: A role for performing operations and reading statistics and information from Management Agent Objects.

Protocol server uses these roles to allow access to the server methods using the following mapping from method to authorized roles:

- **Obtain Management Agent Object:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Execute:** FIMSyncOperator or WSS_ADMIN_WPG
- **GetServerStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumCSObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumFilteredDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportNoChange:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumPlaceHolders:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **ResyncSyncConfigObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunDetails:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunEndTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunNumber:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunProfile:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStartTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Stop:** FIMSyncOperator or WSS_ADMIN_WPG
- **SuppressFullSyncWarning:** WSS_ADMIN_WPG

<23> [Section 3.2.5.20](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<24> [Section 3.2.5.21](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<25> [Section 3.2.5.22](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<26> [Section 3.2.5.23](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<27> [Section 3.2.5.24](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<28> [Section 3.2.5.25](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<29> [Section 3.2.5.26](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<30> [Section 3.2.5.27](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<31> [Section 3.2.5.28](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 define three security roles.

FIMSyncBrowser: A role for reading statistics and information from Management Agent Objects

FIMSyncOperator: A role for performing operations and reading statistics and information from Management Agent Objects.

WSS_ADMIN_WPG: A role for performing operations and reading statistics and information from Management Agent Objects.

Protocol server uses these roles to allow access to the server methods using the following mapping from method to authorized roles:

- **Obtain Management Agent Object:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Execute:** FIMSyncOperator or WSS_ADMIN_WPG
- **GetServerStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumCSObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumFilteredDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG

- **NumImportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportNoChange:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumPlaceHolders:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **ResyncSyncConfigObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunDetails:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunEndTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunNumber:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunProfile:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStartTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Stop:** FIMSyncOperator or WSS_ADMIN_WPG
- **SuppressFullSyncWarning:** WSS_ADMIN_WPG

<32> [Section 3.2.5.28](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

<33> [Section 3.2.5.29](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 define three security roles.

FIMSyncBrowser: A role for reading statistics and information from Management Agent Objects

FIMSyncOperator: A role for performing operations and reading statistics and information from Management Agent Objects.

WSS_ADMIN_WPG: A role for performing operations and reading statistics and information from Management Agent Objects.

Protocol server uses these roles to allow access to the server methods using the following mapping from method to authorized roles:

- **Obtain Management Agent Object:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Execute:** FIMSyncOperator or WSS_ADMIN_WPG
- **GetServerStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumCSObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExplicitConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG

- **NumExplicitDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumExportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumFilteredDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportAdd:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportDelete:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportNoChange:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumImportUpdate:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumPlaceHolders:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalConnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **NumTotalDisconnectors:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **ResyncSyncConfigObjects:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunDetails:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunEndTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunNumber:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunProfile:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStartTime:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **RunStatus:** FIMSyncBrowser, FIMSyncOperator, or WSS_ADMIN_WPG
- **Stop:** FIMSyncOperator or WSS_ADMIN_WPG
- **SuppressFullSyncWarning:** WSS_ADMIN_WPG

<34> [Section 3.2.5.29](#): SharePoint Server 2010, SharePoint Server 2013 and SharePoint Server 2016 return **connection-failure** when the User Profile Synchronization Server is not running or if communication to the User Profile Database fails.

7 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

| Section | Description | Revision class |
|------------------------------------|---|----------------|
| 3.1.5.2 Execute | Updated usage of lowercase version of keyword for Execute method. | Minor |
| 3.2.5.2 Execute | Added product behavior note for server returning access-denied for Execute. | Major |

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