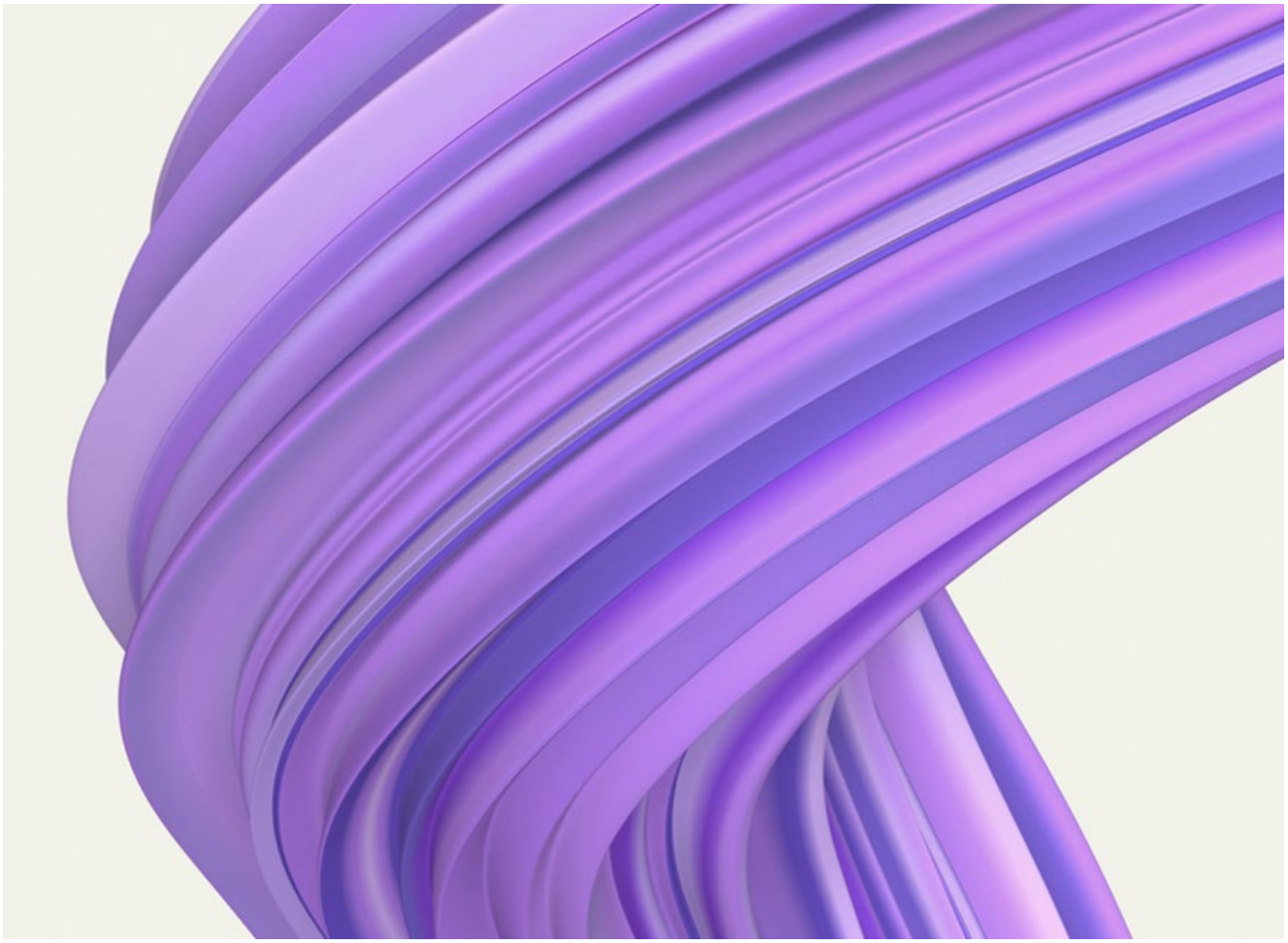

WEBMETHODS CLOUDSTREAMS PROVIDER FOR SAP S/4 HANA CLOUD ODATA V2.0

Version 10.4 | July 2020

CONTENTS

1 Document Change History

Document revision date	Summary of Changes
July 2020	First release of this document.
June 2024	Support for custom endpoint.

2 About this Guide

This guide describes how to configure and use webMethods CloudStreams Provider for SAP S/4 HANA Cloud OData v2.0. It contains information for administrators and application developers who want to interact with SAP S/4 HANA Cloud OData.

To use this guide effectively, you should be familiar with:

- OData Specifications

OData Specification	Description
[OData:URI]	Conventions for constructing URIs to identify the resources and metadata exposed by an OData service.
[OData:Terms]	Glossary of terms used by OData.
[OData:Operations]	Defines the request types (retrieve, insert, update, delete, and so on) and associated responses used by the OData protocol. An implementation can support some or all of the request types.
[OData:ATOM]	Defines an AtomPub representation for the payload of an OData request/response.

- Terminology and basic operations of your operating system
- Setup and operation of the webMethods Integration Server
- Basic concepts and tasks of Software AG Designer

3 webMethods CloudStreams Provider for SAP S/4 HANA Cloud OData v2.0

webMethods CloudStreams Provider for SAP S/4 HANA Cloud OData v2.0 contains predefined CloudStreams connectors that you can use to connect to the SAP S/4 HANA CLOUD endpoint, which exposes its service using the OData Version 2.0 Specification.

IMPORTANT! webMethods CloudStreams Provider for SAP S/4 HANA Cloud OData v2.0 strictly adheres to the OData Version 2.0 Specifications. SAP S/4 HANA Cloud OData do not follow date time pattern, date time offset precision, and Entity UUID as per the OData Specification for primitive data types such as Edm.DateTime, Edm.DateTimeOffset, and UUID. In such cases, the SAP S/4 HANA Cloud OData connector service execution fails because of a pattern mismatch. There is no workaround for these kinds of issues because the OData Version 2.0 connector strictly follows the OData Specification.

This release supports only “application/json” as “Content-Type” of the Request and “application/xml” as “Content-Type” for the Response.

For more information about how to configure and use the CloudStreams connectors with webMethods CloudStreams, see the *Administering webMethods CloudStreams* document available in the **webMethods** section of the Software AG Documentation web page.

4 Managing Cloud Connections

You can create and manage the cloud connections for each CloudStreams connector using Integration Server Administrator.

Note: For more information on the connection details, see the *webMethods CloudStreams Connector Concepts Guide*.

4.1 Creating the SAP S/4 HANA Cloud Connection

You can create the cloud connection for the installed and enabled CloudStreams connectors using Integration Server Administrator. For information on how to create a connection, see Creating Cloud Connections section in the *webMethods CloudStreams Connector Concepts Guide.*

Use the following parameters to create a connection:

1. To go to the Basic view, go to the Integration Server (IS) Admin page -> Solutions -> CloudStreams -> Providers. Click on the provider, for example, SAP. Click on the connector name, for example, SAP S/4 HANA Cloud OData v2.0. Click on Configure New Connection. By default, you are on the Basic view.

Section	Field	Description
	Package	The package in which to create the connection. You must create the package using Designer before you can specify it using this parameter. For general information about creating and managing packages, see the *Designer Service Development online help*. By default, the connection is created in the Integration Server Default package. **Note:** It is recommended that you configure the connection in a user-defined package. The custom package that you create must have a dependency on the WmCloudStreams package.
	Folder Name	The folder in which to create the connection. When the folder does not already exist in the package, Integration Server creates the folder automatically.
	Connection Name	The name of the new connection. Connection names cannot have spaces or use special characters reserved by Integration Server or Designer. For more information about the use of special characters in package, folder, and element names, see the *Designer Service Development online help*.

Section	Field	Description
Connection Groups: Connection	Server URL	The OData service endpoint to initiate communication with the SAP S/4 HANA Cloud OData provider.
Connection Groups: Credentials	Username	The name of the user account on the SAP S/4 HANA Cloud OData provider that the connection will use to connect to the SAP S/4 HANA Cloud OData provider.
	Password	The password for the username provided in the **Username** field.
	Authorization Type	The type of HTTP authorization scheme to use for the connection. If you do not specify a value for this field, no additional authorization scheme will be executed at run time. For example, when you specify a Username and Password, but you do not specify a value for the **Authorization Type**, the user credentials are not inserted into an Authorization header. Valid values: • basic • none **Note**: OData v2.0 connector supports only basic authentication or none. Default: none
Connection Groups: Transport Protocol	Element Character Set	The encoding to use for the HTTP message components, such as request line and headers. Default: **US-ASCII**
	Strict Transfer Encoding	Whether the connection validates the HTTP Transfer Encoding header. Valid values: **true**: The connection validates the Transfer Encoding header and returns an error when the header is invalid. **false:** The connection does not validate the Transfer Encoding header. Default: false

Section	Field	Description
Connection Groups: Custom	SAP Client	Allows you to set the value for the sap-client header. If not specified, SAP uses the default value. **Note**: Each new SAP Client value requires a separate connection. The sap-client header is applicable only to the **Custom Service** and does not apply to standard functional areas or services.
	Service Name	Enables you to use a custom endpoint or service. To use a custom endpoint or service that is not included in the standard connector service list, leverage the specific connection parameter. To use a custom endpoint or service, for example, https://host:port-api.s4hana.ondemand.com/sap/opu/odata/sap/<function_Name>, populate the following connection configuration fields as: Server URL: https://host:port-api.s4hana.ondemand.com/sap/opu/odata Service Name: sap/<function_Name>

Section	Field	Description
	Caching	Allows to cache the $metadata (edmx) as Object. Valid values: • **true**: $metadata stream is cached as Object. If set to true, then the back end's $metadata (EDM string) will be cached for 12 hours and used for the OData cloud service design time and runtime flow. • **false**: $metadata stream is not cached as Object. Instead, $metadata string will be parsed every time during design time and runtime. If set to false, then the back end's $metadata (EDM string) will be called every time during cloud service design time and runtime. Default value is **false**. This option is added because some OData endpoint $metadata calls are time consuming. $metadata is needed during each cloud service design time and runtime. It is recommended to enable this option for those OData back ends that return a huge list of entities and take a long time to return. The SAP S/4 HANA CLOUD OData connector has added 'ODataConnectorsCache' Ehcache for caching the metadata stream as a Java object. The connector uses the $metatata stream to a great extent for every OData cloud service execution in addition to the cloud service design time. It is recommended to turn on the caching for improving performance if your OData services execution is slow. By default, the cache timeout is 12 hours. You can configure it using the Integration Server Administration screen. This is in memory cache and would not write on disk. **Note**: If service performance is slow, it is recommended to switch on caching. If the back-end metadata is changed after the connection is enabled, the cached connection level metadata will not be refreshed automatically. To refresh the connection metadata, disable and enable the connection again.

Section	Field	Description
	Use CSRF Token	Whether to use CSRF token or not. SAP S/4 HANA Cloud needs CSRF token to perform POST, PUT and DELETE calls. For GET calls CSRF token will not be used. • **true**: CSRF token will be sent in header. • **false**: CSRF token will not be sent in header. Default: **true**
	Validate Metadata	Whether to validate the metadata. • **true**: Metadata will be validated. • **false**: Metadata will not be validated. Default: **False**
Connection Management Properties	Enable Connection Pooling	Whether connection pooling is enabled for a connection. Valid values: • **true**: Connection pooling is enabled for this connection. • **false**: Connection pooling is disabled for this connection. Default: **true**
	Initial Pool Size	The minimum number of connection objects that always remain in the connection pool, if connection pooling is enabled. When the connector creates the pool, it creates this number of connections. Default: **1**
	Maximum Pool Size	The maximum number of connection objects that can exist in the connection pool if connection pooling is enabled. When the connection pool has reached its maximum number of connections, the connector will reuse any inactive connections in the pool, or, if all connections are active, it will wait for a connection to become available. Default:**10**

Section	Field	Description
	Pool Increment Size	The number of connections by which the pool will be incremented, up to the maximum pool size, if connection pooling is enabled and connections are needed. Default:**1**
	Block Timeout (msec)	The number of milliseconds that Integration Server will wait to obtain a connection with the SaaS provider before the connection times out and returns an error. For example, you have a pool with **Maximum Pool Size** of 20. If you receive 30 simultaneous requests for a connection, 10 requests will be waiting for a connection from the pool. If you set the **Block Timeout** to 5000, the 10 requests will wait for a connection for 5 seconds before they time out and return an error. If the services using the connections require 10 seconds to complete and return connections to the pool, the pending requests will fail and return an error message stating that no connections are available. If you set the **Block Timeout** value too high, you may encounter problems during error conditions. If a request contains errors that delay the response, other requests will not be sent. This setting should be tuned in conjunction with the **Maximum Pool Size** to accommodate such bursts in processing. Default: **1000**
	Expire Timeout (msec)	The number of milliseconds that an inactive connection can remain in the pool before it is closed and removed from the pool, if connection pooling is enabled. The connection pool will remove inactive connections until the number of connections in the pool is equal to the **Initial Pool Size**. The inactivity timer for a connection is reset when the connection is used by the connector. This setting should be tuned in conjunction with the **Initial Pool Size** to avoid excessive opening/closing of connections during normal processing. Default: **1000**

Section	Field	Description
	Startup Retry Count	The number of times that the system should attempt to initialize the connection pool at startup if the initial attempt fails. **Note**: The retry mechanism is invoked only when the connection is configured correctly, but the target server URL cannot be reached, or a network issue occurs while attempting to initialize the connection. Default: **0** (a single attempt)
	Startup Backoff Timeout (sec)	The number of seconds that the system should wait between attempts to initialize the connection pool. This value is ignored if **Startup Retry Count** is 0. Default: **10**
	Session Management **Note:** Currently, Session Management is not applicable for the OData v2.0 connector because it uses only Basic Authentication. Session Management parameters will be applicable, if in future, SAP S/4 HANA Cloud OData connectors support OAuth.	The type of timeout for the connection session. Select the type of session management that fits the requirements of your SaaS provider back end. It is recommended that you set this field to **idle** if you want the CloudStreams server to manage the session. Valid values: • **none**: The CloudStreams server does not manage session timeout. The session times out based on the settings of the SaaS provider back end. • **idle**: If no activity happens for the time specified in **Session Timeout**, the session times out. If the session is not idle (it is used actively), the session will not timeout. The CloudStreams server takes into account the idle timeout. For example, if the session is idle for the time specified in **Session Timeout**, the server renews the session before making the service call. • **fixed**: The session will timeout at a fixed time interval (specified in **Session Timeout**) irrespective of the session usage or current activity. The CloudStreams server renews the session as soon as the **fixed** timeout value expires. • **auto**: In case of OAuth 2.0 refresh access token call will be invoked based on expires_in field sent by SaaS to fetch the access token before it gets expired.

Section	Field	Description
	Session Timeout (min)	The maximum number of minutes a session can remain active (in other words, how long you want the server to wait before terminating a session). The value should be equal to the session timeout value specified at the SaaS provider back end.

2. If you selected the **Advanced view**, complete the following fields in addition to the fields you have configured in the **Basic view**:

   To go to the Advanced view, go to the Integration Server (IS) Admin page -> Solutions -> CloudStreams -> Providers. Click on the provider, for example, SAP. Click on the connector name, for example, SAP S/4 HANA Cloud OData v2.0. Click on Configure New Connection. Click on Advanced View on the upper-right corner.

Note: If you do not want to use the **Advanced view**, skip this step, and proceed.

Section	Field	Description
Connection Groups: Connection	Connection Timeout	The number of milliseconds a connection waits before canceling its attempt to connect to the resource. If you specify 0, the connection waits indefinitely. **Note:** It is recommended that you specify a value other than 0 to avoid using a socket with no timeout. Default: **120000**
	Socket Read Timeout	The number of milliseconds in which the client must read a response message from the server. If you specify 0, the connection waits indefinitely. **Note:** It is recommended that you specify a value other than 0 to avoid using a socket with no timeout. Default: **120000**

Section	Field	Description
	Use Stale Checking	Whether the connection performs additional processing to test if the socket is still functional each time the socket is used. Valid values: • **true**: The connection tests the socket. • **false**: The connection does not test the socket. **Note:** The additional testing of the socket adds a little performance overhead. Default: **false**
	Connection Retry Count	The number of times the system should attempt to initialize the connection at startup if the initial attempt fails. The system retries to establish a connection when an I/O error occurs while sending the request message to the back end. If an I/O exception occurs when the system is reading a response back from the back end, the system will only retry if **Retry on Response Failure** is set to true. Default: **1**
	Retry on Response Failure	Whether the system should attempt to resend the request when the response has failed, even though the request was sent successfully. Valid values: • **true**: The system attempts to reestablish the connection. • **false**: The system does not attempt to re-establish the connection. Default: **false**
	Use TCP NoDelay	Whether to use algorithm to reduce the number of packets that need to be sent over the network. Valid values: • **true**: Do not optimize the bandwidth consumption. • **false**: Use Nagle's algorithm to optimize the socket usage. Default: **false**

Section	Field	Description
	Socket Linger	The number of seconds before a client socket closes. Valid values: • **-1**: Use the Java VM default. • **0**: Close the socket connection immediately. • *n* > **0**: Wait for *n* seconds before closing the socket connection. Default: **-1**
	Socket Buffer Size	The size of the read and write socket buffers in bytes. Default: **8192**
	Socket Reuse Address	Whether the socket will be reused even if it is in the TIME_WAIT state because of a previous socket closure. Valid values: • **true**: The socket will be reused. • **false**: The socket will not be reused. Default: **false**
	Proxy Server Alias	The alias name of an enabled proxy server configuration on Integration Server that will be used to route the connection. **Note**: When the corresponding proxy server configuration on Integration Server is updated, the changes are detected automatically. You do not need to re-enable the connection to use the updated proxy server configuration.

Section	Field	Description
	Trust Store Alias	The alias name of an Integration Server trust store configuration. The trust store contains trusted certificates used to determine trust for the remote server peer certificates. **Note**: Setting the Integration Server watt.security.cert.wmChainVerifier.trustByDefault property to “true” overrides the value in this field. In this case, the server will trust all remote server peer certificates. If you want to use the **Trust Store Alias** field, set the Integration Server watt.security.cert.wmChainVerifier.trustByDefault property to “false”.
	Hostname Verifier	The fully qualified classname of the Apache X509HostnameVerifier interface. Default: **org.apache.http.conn.ssl.StrictHostnameVerifier** When you configure strict hostname enforcement, the connection verifies whether the server certificate matches the server host. If you do not specify a value in this field, the connection uses the org.apache.http.conn.ssl.AllowAllHostnameVerifier that disables hostname enforcement.
	Keystore Alias	A text identifier for an Integration Server keystore alias. A keystore file contains the credentials (private key/signed certificate) that a client needs for SSL authentication.
	Client Key Alias	The alias to the private key in the Integration Server keystore file specified in the **Keystore Alias** field. The outbound connections use this key to send client credentials to a remote server. **Note**: To send the client’s identity to a remote server, you must specify values in both the **Keystore Alias** and the **Client Key Alias** fields.

Section	Field	Description
Connection Groups: Credentials	Preemptive Auth	Whether authentication credentials are included when sending a request. Valid values: • **true**: Basic authentication credentials are included when sending requests. • **false**: Authentication credentials are not included when sending requests. Default: **true** **Note**: When this field is set to true, Authorization header is sent with the initial request.
	Domain Name	The name of the security domain used for the connection.
Connection Groups: Transport Protocol	HTTP Content Character Set	The encoding to use for the HTTP request message. Default: **ISO-8859-1**
	HTTP Protocol Version	The version of the HTTP transport protocol that the connection will use. Valid values: • HTTP/0.9 • HTTP/1.0 • HTTP/1.1 Default: **HTTP/1.1**
	User Agent	The name of the client that the connection includes in the HTTP User Agent request header to identify the origin of the request. Default: **CloudStreams**

Section	Field	Description
	Use Expect Continue	Whether to use the Expect/Continue HTTP/1.1 handshake and send the Expect request header. When the client sends the Expect request header, the client waits for the server to confirm that it will accept the request before the client sends the request body. Valid values: • **true**: Use the Expect/Continue handshake. • **false**: Do not use the Expect/Continue handshake. Default: **false**
	Wait for Continue Time	The number of milliseconds that the client connection should wait for a **100 Continue** response from the server when the Expect/Continue handshake is used. Default: **3000**
	Use Chunking	Whether to use HTTP/1.1 chunking with a chunk size that matches the socket buffer size. Valid values: • **true**: Use HTTP/1.1 chunking. • **false**: Do not use HTTP/1.1 chunking. Default: **false**
	Follow Server Redirects	Whether the connection follows server redirects. Valid values: • **true**: The connection follows server redirects. • **false:** The connection does not follow server redirects. Default: **true**
	Server Redirect Maximum Tries	The number of times to allow a request to be redirected before the server returns an I/O exception to the client. Default: **5**

3. Click **Save**.

You must enable a cloud connection before you can use it. For information about how to enable a connection, see Enabling Cloud Connections section in *webMethods CloudStreams Connector Concepts Guide.*

5 webMethods CloudStreams Provider for SAP S/4 HANA Cloud OData v2.0 Connector

5.1 Overview

The following sections describe only the basic information you need to design or use the OData operations supported with the webMethods CloudStreams Provider for SAP S/4 HANA Cloud OData v2.0.

For detailed information about each OData operation, see the OData documentation.

5.2 Connector Details

The connector details include:

- **SaaS Provider**: SAP S/4 HANA Cloud
- **Connector Name:** SAP S/4 HANA Cloud OData v2.0
- **API Version**: 1.0
- **API Type**: REST
- **Developer**: Software AG
- **Group**: SAP
- **CloudStreams Minimum Version Compatibility**: 10.4
- **Provider Package Name**: WmSAPS4HANACloudProvider

5.3 Manage OData Connections

You can manage the OData connection by enabling the connection pool. Set the **Session Management** field to “none”.

5.4 REST Resources

In OData terminology, the OData service interface has a fixed number of operations that have uniform meaning across all the resources it can act on. These operations are retrieve, create, update, and delete and they map to the GET, POST, PUT/PATCH, and DELETE HTTP methods. Each of them acts on a resource that is indicated using a URI.

5.4.1 Request and Response Processing

For a CloudStreams connector, the request and response processing types can be set to either **Document** or **Binary Stream**. See Editing a Cloud Connector Service for a REST-Based Provider for information on setting **Request Processing** and **Response Processing** types.

For the CloudStreams SAP S/4 HANA Cloud OData connector, the request and response processing types are always set to **Binary Stream**.

5.4.2 Input and Output Signature

The CloudStreams SAP S/4 HANA CLOUD OData connector contains an IS document that maps to the request or response data for an OData operation's REST resource.

The input values to the fields in the service signature map directly to the input values required by the OData operations. For information about the required fields to configure for a request, see the SAP S/4 HANA Cloud OData documentation.

5.4.3 Error and Fault Handling

For most of the REST resources, the output signature refers to an IS document when the response is successful and to an error document when the response fails. For example, when the OData back end returns the HTTP error code 400 response for a bad request, the output signature refers to an error document.

When the SAP S/4 HANA CLOUD OData back end returns an error code that cannot be mapped, for example, HTTP error code 404 for a wrong server URL, the SAP S/4 HANA Cloud OData connector returns a fault document with details about the error response. Further, the SAP S/4 HANA Cloud OData connector does not throw a Service Exception if a processing failure occurs. The SAP S/4 HANA Cloud OData connector returns a fault document if the processing fails for any reason during an outbound request or inbound response. You can view the fault document in the service execution output pipeline in the Software AG Designer.

5.4.4 OData Primitive types

While feeding data for invoking any connector service, you need to feed data types that are aligned to primitive types supported by SAP S/4 HANA Cloud OData as defined by the Abstract Type System. All the fields of an entity are of type string and you should enter input values in proper format.

For information about all the supported data types by OData, see the OData documentation.

5.4.5 Usage Notes

The CloudStreams server uses the OData service Metadata Document that describes the data model exposed as HTTP endpoints by the service provider to locate the available entities, entity properties, navigation properties, and so on. A Service Metadata Document describes its data in EDM terms using an XML language for describing models called the Conceptual Schema Definition Language (CSDL).

The SAP S/4 HANA Cloud OData connector uses services that expose the service metadata document to generate IS documents that have all the required resource definitions for a given resource. The IS documents are mapped and used by a specific REST resource to send requests and receive responses.

For information about how to access the description of a REST resource along with its details in Designer, see Editing a Cloud Connector Service for a REST-Based Provider.

5.4.6 Supported OData Operations

The following sections describe the OData operations that are currently supported by the CloudStreams SAP S/4 HANA Cloud OData v2.0 connector. For detailed information about all the OData operations, see the OData documentation [OData:Operations].

Note: All OData cloud service signatures are designed to take/return String values for all OData (EDM) abstract data types. The connector user needs to ensure that the values for the entity properties are in the expected format so that data type validation is successful.

Note: Currently once the cloud service is created, the native data types are not shown in the field properties section. In this release, field native data types are visible only in the entity/business object selection section of the wizard.

5.4.6.1 Create

The following variation of the ***Create*** operation is supported:

- Creates a single entity.
- Creating links between entries

Signature details

Input

- requestBody/<EntityName>: Entity that needs to be created.
- requestBody/<EntityName>/InlineEntityLinks: An entity that needs to be created along with the relationship with other entries that are not present and needs to be newly created in SAP S/4 HANA Cloud.
- requestBody/<EntityName>/LinkedEntityIDs: An entity that needs to be created along with the relationship with other entries that are present in SAP S/4 HANA Cloud.

Output

- responseBody/status: Success if successful, Failure otherwise.
- responseBody/<EntityName>/<Primary Key/Composite Keys>: Key properties once the entity is created successfully.
- responseBody/error: Error document. innererror structure is not a standard error document structure. The actual innererror structure will vary from back end to back end. Depending on the back end, the SAP S/4 HANA Cloud OData connector user will have to parse the innererror.
- fault: This is a generic fault structure for all CloudStreams services. This fault occurs if there is an internal error while processing the outgoing request or incoming response.

Usage notes and limitations

You cannot create multiple entities of different types. You should create a separate service for each business object. For a single create connector service invocation, you can create only a single entity. This is as per the OData Specification.

SAP S/4 HANA does not allow creating a relationship of one entity to another entity, whereas in certain cases the relationship is mandatory. Based on API behavior, you need to make the right selection for an entity's InlineEntityLinks and LinkedEntityIDs in create operation while creating a cloud connector service. For more details, visit SAP S/4 HANA API documentation.

Note: In the create service signature, some business object properties are auto selected. Auto selected properties are those properties that are required or whose values cannot be null.

EDM metadata does not have operation (Create, Update, Delete, and so on) specific property/field level metadata, hence the OData cloud service signature is not completely context aware.

For example, there may be few entity properties whose values are system generated and you will not be able to enter those values. But the cloud service signature requires you to fill values for system generated fields; else the service execution will fail because of failure in the field data validation. As the OData service metadata does not provide additional field facet level metadata information, so in such cases, during service execution time, you can specify the user defined values for the system generated fields. But when the entity is created/updated, the back end will populate these field values on its own. And, some properties which are of complex type does not match the parent property/field attributes like creatable/updatable, hence the connector will honour the parent property/field attributes instead of the complex type properties' attributes.

So in some cases, the connector user needs to figure out the expected CRUD operation behavior based on the OData endpoint and the OData back end documentation.

5.4.6.2 Read

Reads a single entity based on the specified key properties.

Signature details

Input

- requestBody/keyProperties/<Primary Key/Composite Keys>: Key properties of the selected entity.

Output

- responseBody/<EntityName>: Entity properties if the entity is found.
- responseBody/<EntityName>/$expand/<linkedEntityName>: Linked entity properties if selected.
- responseBody/error: Error document. innererror structure is not a standard error document structure. The actual innererror structure will vary from back end to back end. Depending on the back end, the SAP S/4 HANA Cloud OData connector user will have to parse the innererror.
- fault: This is a generic fault structure for all CloudStreams services. This fault occurs if there is any internal error while processing the outgoing request or incoming response.

5.4.6.3 Query

Executes a query for a selected entity and all its related resources expressed using the $expand system query option and returns data that matches the specified criteria.

Signature details

Input

- *skip*: This parameter is mapped to $skip query option. This is an optional property. Default value of skip is 0. Use this to request the number of items in the queried collection that are to be skipped and not included in the result.
- *top*: This parameter is mapped to $top query option. This is an optional property. Default value is 10. This is added to avoid fetching thousands of records in one go. Use this to request the number of items in the queried collection to be included in the result.
- *filter*: Use this parameter to filter a collection of resources that are addressed by a request URL. This is an optional property. The expression specified with filter and which is mapped to $filter is evaluated for each resource in the collection, and only items where the expression evaluates to true are included in the response. For example, to get people with FirstName “Scott”, specify a $filter as FirstName equals “Scott”.
- *orderby*: This parameter is mapped to $orderby query option. This is an optional property. Use this to request resources in either ascending order using asc or descending order using desc. If asc or desc is not specified, then the resources will be ordered in ascending order.

Output

- responseBody/<EntityName>: List of entities.
- responseBody/<EntityName>/$expand/<linkedEntityName>: Optional linked entity properties if selected under $expand while selecting the entity fields through the wizard.

  Note: The *$expand* system query option specifies the related resources to be included in line with retrieved resources. While creating the connector service of type query, if you opt for retrieving all related resources along with the parent entity, the related resources will be part of the response signature under the $expand field.

- responseBody/totalRecords: Number of total records as per the specified query.
- responseBody/error: Error document. Note that innererror structure is not a standard error document structure. The actual innererror structure will vary from back end to back end. Depending on the back end, the SAP S/4 HANA Cloud OData connector user will have to parse the innererror.
- fault: This is a generic fault structure for all CloudStreams services. This fault occurs if there is any internal error while processing the outgoing request or incoming response.

Usage notes and limitations

- You must specify the filter criteria in a syntax that is well supported by the expression language of the query option. To see the list of operators supported in the expression language, see [OData:URI].
- OData v2.0 does not support nested filters in $expand.
- If you opt for $expand to fetch related resources, it becomes a part of the response signature of the connector service.
- If your query is expected to return large number of records, it is recommended that you specify the top value to a reasonable number. Otherwise, the back end may return lots of records and the OData query service may run out of memory.

Each time a query is run, the total number of available records will also be returned in the response which is not affected by any query expression except $filter.

5.4.6.4 Update

Updates an existing entity with new properties. The update operation resets all properties mentioned in the request to their default values and updates all the dynamic properties mentioned in that request.

The following variation of the ***Update*** operation is supported:

- Updates a single entity
- Updating links between entries

Signature details

Input

- requestBody/<EntityName>: Entity that needs an update.
- requestBody/<EntityName>/InlineEntityLinks: Entity that needs to be updated along with the relationship with other entries that are not present and needs to be newly created in SAP S/4 HANA Cloud.
- requestBody/<EntityName>/LinkedEntityIDs: Entity that needs to be updated along with the relationship with other entries which are present in SAP S/4 HANA Cloud.

Output

- responseBody/status: Success if successful, Failure otherwise.
- responseBody/error: Error document. innererror structure is not a standard error document structure. The actual innererror structure will vary from back end to back end. Depending on the back end, the SAP S/4 HANA Cloud OData connector user will have to parse the innererror.
- fault: This is a generic fault structure for all CloudStreams services. This fault occurs if there is any internal error while processing the outgoing request or incoming response.

Note: In the update service signature, some business object properties are auto selected. Auto selected properties are those properties that are required or whose values cannot be null.

SAP S/4 HANA does not allow updating the relationship of one entity to another entity, whereas in certain cases the relationship is mandatory. Based on API behavior, you need to make the right selection for an entity's InlineEntityLinks and LinkedEntityIDs in update operation, while creating a cloud connector service. For more details, visit SAP S/4 HANA API documentation.

5.4.6.5 Delete

Deletes a single entity from a collection of existing entities.

Signature details

Input

- requestBody/keyProperties/<Primary Key/Composite Keys>: Key properties of the selected entity.

Output

- responseBody/status: Success or Failure.
- responseBody/error: Error document. innererror structure is not a standard error document structure. The actual innererror structure will vary from back end to back end. Depending on the back end, the SAP S/4 HANA Cloud OData connector user will have to parse the innererror.
- fault: Note that this is generic fault structure for all CloudStreams services. This fault occurs if there is any internal error while processing the outgoing request or incoming response.

5.4.7 Usage of Custom Endpoints

To use a custom endpoint or service that is not included in the standard connector service list, leverage the specific connection parameter, **Service Name**, while defining a connection.

To use a custom endpoint, for example, https://host:port-api.s4hana.ondemand.com/sap/opu/odata/sap/<function_Name>, populate the following connection configuration fields as:

Server URL: https://host:port-api.s4hana.ondemand.com/sap/opu/odata

Service Name: sap/<function_Name>

Save and close the connection.

While configuring a cloud connector service, choose **Custom Service** from the service list to access operations on the specified endpoint within the connection. Choose the Entity and required fields from the available options.

5.4.7.1 Notes

- Each new custom endpoint or service requires a separate connection, enabling operations solely on the specified endpoint. The "Custom Service" function will work only when using a connection that has explicitly defined the "Service Name".
- Not all entity operations, Query, Update, Delete, Create, and Read, visible in the connector, may be enabled for the custom endpoint. Ensure that you choose the permissible operation allowed in your backend service definitions.
- Ensure an accurate Service Name entry in the connection, as connection validation is not enabled. Custom endpoint validation is not performed while saving the connection.
- It is not recommended to use the standard service definition, where Service Name is populated in the connection configuration and intended to be used with a custom endpoint or service.
- It is not recommended to populate the Service Name value in the connection configuration, when using a standard functional area or service.

- Populate the SAP Client while creating the connection with the sap-client you want to connect. Each new SAP Client value requires a separate connection. The sap-client header is applicable only to the **Custom Service** and does not apply to standard functional areas or services.

5.4.8 Unsupported Operations

The following operations are not supported:

- Creating links between entries
- Removing links between entries
- Replacing links between entries
- Invoking service operations
- Batch operations

5.4.9 Unsupported Features

Batch processing of different entities is not supported.

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