OData Service in the SAP Backend System for CRUDQ Operations in Purchase Order Scenario

Applies to:
Duet Enterprise 2.0 SP01

Summary
This guide describes in detail how to create and test OData service for CRUDQ operations in Purchase Order scenario. This guide explains the creation of the service in the SAP backend system using SAP NetWeaver Gateway Service Builder tool.

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1. Introduction

This guide describes the Purchase Order scenario for CRUDQ calls. The sample scenario used in this guide has two entities: purchase order header and purchase order item. The following diagram shows the Entity data model used in this guide:

![Entity data model diagram]

The OData service is generated using the SAP NetWeaver Gateway Service Builder. Using this, the metadata and data provider classes, the model and the service is generated. In the OData Channel based development, the entities of the data model are defined in the metadata provider class. The run time behavior of the OData service is handled by the data provider class that is assigned to the object models. The methods in the metadata and data provider extension classes can be redefined according to the requirements.

This document describes in detail the procedure to create the OData service and also steps to test it.

2. Prerequisites

1. SAP NetWeaver Gateway 2.0 SP5 (or higher) installed and configured.
2. SAP backend system with IW_BEP software component installed.
3. SAP backend system is connected to the SAP NetWeaver Gateway system.
4. It should be possible to create Purchase Order from the transaction me21n in the SAP backend system.
5. Knowledge of ABAP Object Oriented programming is required.
3. **Procedure**

The following diagram gives an overview of the steps to be performed in the creation of the OData service:

![Diagram showing the steps for creating an OData service in SAP Backend System](image)

### 3.1 Creating SAP NetWeaver Gateway Project

In this step, we will be creating a new SAP NetWeaver Gateway project to build the OData service.

Ensure the following authorization object required to create a new SAP NetWeaver Gateway project is assigned to the user in the SAP backend system:

<table>
<thead>
<tr>
<th>Authorization Object</th>
<th>Authorization Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>/IWBEP/SB</td>
<td>/IWBEP/PRJ</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>ACTVT</td>
<td>01, 02, 03, 07, 60</td>
</tr>
<tr>
<td></td>
<td>DEVCLASS</td>
<td>$tmp</td>
</tr>
</tbody>
</table>

Refer to Security guide of Duet Enterprise 2.0 for more information on how to create a role and assign to users.

1. In the SAP system where IW_BEP component is installed, go to transaction `segw`.
2. Create a new project by clicking the **Create Project** option.
3. Give the following details and click on Local Object
   - Project: Z_PURCHASE_ORDER
   - Description: Purchase Order
   - Generation Strategy: Standard

4. The following success message is displayed.

```
Project 'Z_PURCHASE_ORDER' created
```

5. Click on Save.
6. The project created will contain the folders as shown below:
3.2 Import Data Model

This step involves importing the edmx data model and creating the data model. An edmx file is an xml file that defines a data model and is used as a common interface between the SharePoint developer and the SAP developer. This data model was created using Visual Studio.

Refer to the model file at <<Link to:POrder.txt>> that is used as a sample in this guide. Copy the contents into a file and save it as a .edmx file.

1. From the project folder in the service builder transaction segw, right click on the Data Model folder and click on Import-> Data model. Browse for the edmx file and import the file.

2. In the browse screen, choose EDMX as the files of type and browse for the edmx file and click on Open.
3. In the SAP GUID Security screen, choose **Allow this one time** and click on OK.

4. The following success message is displayed.

   ![Success Message](image)
5. The entities and their properties can be viewed from the Data Model folder.

### Data Model
- **Entity Types**
  - PurchaseOrderHeader
  - PurchaseOrderItem
- **Complex Types**
- **Associations**
  - POHeaderRelatedItem
- **Entity Sets**
  - PurchaseOrderHeaderCollection
  - PurchaseOrderItemCollection
- **Association Sets**
  - POHeaderRelatedItem
- **Function Imports**
- **Service Implementation**
- **Runtime Artifacts**
- **Service Maintenance**

### 3.3 Generate OData service

The run time objects – model, service, metadata provider class and the data provider class are generated at the end of this step. The service maintenance in the backend system is also done at the end of this step.
1. The OData service is generated by clicking on the **Generate Runtime Objects** option.

2. In the Model and Service Definition screen, press enter.

3. Select Local Object option in the new window.
4. The following message showing the successful creation of runtime objects is displayed.

```
Run time objects for project 'Z_PURCHASE_ORDER' were generated sucessfully
- Synchronization of entity sets was completed successfully
- Model Provider Base Class 'ZCL_Z_PURCHASE_ORDER_MPC' generated sucessfully
- Model Provider Extension Class 'ZCL_Z_PURCHASE_ORDER_MPC_EXT' generated sucessfully
- Data provider base class ZCL_Z_PURCHASE_ORDER_DPC generated sucessfully
- Data provider implementation class ZCL_Z_PURCHASE_ORDER_DPC_EXT generated sucessfully
- Data provider base class ZCL_Z_PURCHASE_ORDER_DPC implemented sucessfully
- Service Z_PURCHASE_ORDER_SRV was registered sucessfully
- Model Z_PURCHASE_ORDER_MDL was registered sucessfully
```

5. The following are the runtime artifacts generated after this step.

```
Z_PURCHASE_ORDER
  - Data Model
  - Service Implementation
  - Runtime Artifacts
    - ZCL_Z_PURCHASE_ORDER_DPC
    - ZCL_Z_PURCHASE_ORDER_DPC_EXT
    - ZCL_Z_PURCHASE_ORDER_MPC
    - ZCL_Z_PURCHASE_ORDER_MPC_EXT
    - Z_PURCHASE_ORDER_MDL
    - Z_PURCHASE_ORDER_SRV
```

3.4 Modifying the Metadata Provider Class

This section describes customizing the metadata provider class.

The runtime artifacts generated contains two MPC (metadata provider class) classes 
zcl_z_purchase_order_mpc and zcl_z_purchase_order_mpc_ext. To make changes to the model, the DEFINE method in the extension class zcl_z_purchase_order_mpc_ext has to be re-defined.

1. Go to the runtime artifacts folder in the project folder.

2. Right click on the MPC_EXT class and click on **Workbench** from the options.

3. Click on **Edit** option for the class.

4. Select the DEFINE method and click on **Redefine** option.

1. Write suitable code here to include filterable properties for the properties or setting the creatable, updatable, deletable flags for the entities. The creatable, updatable, deletable flags on the entities have to be set to true to enable the Create, Update and Delete operations on these entities. Sample code can be found at <<link to:define_method.txt>>

2. Activate the MPC_EXT class.

3. Select all the inactive objects in the MPC_EXT class and click enter.
8. Click on back and navigate back to Service Builder screen.

3.5 Implementing Data Provider Class

This section describes implementing the runtime behavior of the OData service.

The runtime behavior of the service is implemented in the data provider class. Similar to the MPC classes, there are two DPC classes zcl_z_purchase_order_dpc and zcl_z_purchase_order_dpc_ext. The methods in the extension class have to be redefined.

1. Go to the runtime artifacts folder in the project folder.
2. Right click on the **ZCL_Z_PURCHASE_ORDER_DPC_EXT** class and click on **Workbench** from the options.

3. Click on **Edit** option for the class.
4. For each of the entities in the model, methods for CRUDQ are generated by the Service Builder as shown below in the screenshot:
Include the custom code for each of the methods. Save and activate the methods once modified.

**Note:** If the service name is different from Z_PURCHASE_ORDER, ensure that you replace the MPC class name with the appropriate one in the code below.

The following section gives the sample implementation required for the CRUDQ operations for the Purchase Order Header and the Purchase Order Item entity. Follow the steps similar to section 3.4 to redefine each of the methods below.

`/IWBEP/IF_MGW_APPL_SRV_RUNTIME~CREATE_DEEP_ENTITY` in `ZCL_Z_PURCHASE_ORDER_DPC_EXT`
Sample code at [deep_entity.txt](#)

`PURCHASEORDERHEA_GET_ENTITYSET` in `ZCL_Z_PURCHASE_ORDER_DPC_EXT`
Sample code at [POHeader_GetEntitySet.txt](#)

`PURCHASEORDERITE_GET_ENTITYSET` in `ZCL_Z_PURCHASE_ORDER_DPC_EXT`
Sample code at [POItem_GetEntitySet.txt](#)

`PURCHASEORDERHEA_UPDATE_ENTITY` in `ZCL_Z_PURCHASE_ORDER_DPC_EXT`
Sample code at [POHeader_Update.txt](#)

`PURCHASEORDERITE_UPDATE_ENTITY` in `ZCL_Z_PURCHASE_ORDER_DPC_EXT`
Sample code at [POItem_Update.txt](#)

`PURCHASEORDERHEA_DELETE_ENTITY` in `ZCL_Z_PURCHASE_ORDER_DPC_EXT`
Sample code at [POHeader_Delete.txt](#)

`PURCHASEORDERITE_DELETE_ENTITY` in `ZCL_Z_PURCHASE_ORDER_DPC_EXT`
Sample code at [POItem_Delete.txt](#)

### 3.6 Register Service in SAP NetWeaver Gateway system

This section describes the steps in registering the service in the SAP NetWeaver Gateway system.
1. Go to transaction SPRO in the SAP NetWeaver Gateway system.
2. Navigate to the path SAP NetWeaver → Gateway → OData Channel Development with IW_BEP → Registration → Activate and Maintain Services.

3. Click on Add service.

4. Enter the system alias of the SAP system with IW_BEP installed where the service was implemented and the service name as shown below.

5. Click on service name.
6. Enter $tmp in the package and click on enter.
7. Click on the tick mark in the screen.

8. The service added can be now found in the list of services
This completes the creating, implementing and registering the OData service for Purchase Order CRUDQ calls.

4 Test OData Service

This section describes the steps to test the various calls in the service. In this document, we will consume the OData service using a SharePoint application. Customers can also build similar applications to use the service according to their requirements.

Note: 1. Replace <host> and <port> with the actual values in the request URLs.

4.1 Service Document

Service document lists all the available entities and collections. It describes the underlying data model.

Steps to view the Service document:

1. Go to transaction spro in the SAP NetWeaver Gateway system.
2. Navigate to the path SAP NetWeaver → Gateway → OData Channel Development with IW_BEP → Registration → Activate and Maintain Services

3. Select the row with the Technical Service Name Z_PURCHASE_ORDER_SRV.
4. Click on the Call Browser option in the ICF node area for the service.

5. Select **Allow this one time** in the SAP GUI Security screen and click on OK.

6. The service Document is now displayed in the browser. Enter the user credentials of the SAP NetWeaver Gateway system when prompted.
The Service document can be accessed through the URL
http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/?$format=xml

4.2 Metadata

The format of the URL is http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/$metadata.

The screenshot below shows the Purchase order header and Purchase order item entities in the metadata along with the properties.

---

4.3 SharePoint Purchase Order Application

**Note:** The SharePoint application mentioned in this guide is just for showcasing how we can use the Purchase Order service. However, this document doesn’t contain steps to build a SharePoint 2013 application which will be documented in another guide.

Following is the screen-shot of the Purchase Order SharePoint Application using which we will be testing the service. The application has been built to consume the Purchase Order service created in this guide using Duet Enterprise 2.0 as a platform.
The application showcases the various purchase orders existing in the SAP Business Suite system along with the details for each purchase order including Vendor, Created At, Currency, Net Value, etc. The application also lists the Total Order, Number of Order, Average Order, Largest Order, etc. The top 5 Vendors as well as the Orders per Quarter are also retrieved and showcased in the application both in a list as well as in a graphical format.
OData Service in the SAP Backend System for CRUD Operations in Purchase Order Scenario

- Total Order: $82440000000
- Number of Order: 101
- Average Order: $81623762
- Largest Order: $3900000000

Top 5 Vendor:
- 00001000073: 0
- JRT-00: 8244000...

Orders per Quarter:
- 1st Quarter: 684000...
- 3rd Quarter: 820000...
- 4th Quarter: 675000...

Net Value per month for 4th Quarter:

- Purchase Order:
  - 4500017429: Vendor 3000, Created At: March 13, 2012, Currency: USD, Net Value: $36000000.00
  - 4500017430: Vendor 3000, Created At: March 13, 2012, Currency: USD, Net Value: $36000000.00
  - 4500017431: Vendor 3000, Created At: March 14, 2012, Currency: USD, Net Value: $36000000.00
  - 4500017432: Vendor 3000, Created At: March 14, 2012, Currency: USD, Net Value: $36000000.00
  - 4500017433: Vendor 3000, Created At: March 14, 2012, Currency: USD, Net Value: $36000000.00
4.4 Create (Deep Insert) operation

4.4.1 Execute the Create operation

1. In order to create a Purchase Order, click on the “Add” button.
2. This opens up a form in the application in which the details of the Purchase Order to be created has to be entered.
3. In order to enter the Billing Address of the Purchase Order, click on the Billing Address which opens up a list of addresses from which the Billing Address can be selected. Similarly the Dispatch Address can be chosen.
4. In order to enter the Item, Description, Quantity and Net Value details, click on the Item column. This displays a form from which you can choose the Item ID and the description.
OData Service in the SAP Backend System for CRUDQ Operations in Purchase Order Scenario

Billing Address
Exotic Liquids
49 Gilbert St.
London E15 4SD
(174) 555-2222

Dispatch Address
Exotic Liquids
49 Gilbert St.
London LA1 E15 4SD
(174) 555-2222
#CAJUN.HTM#
Similarly, you can also enter the Quantity and the Net Value.
5. Now we have to select the “SAVE” button at the top which will create the Purchase Order in the SAP Business Suite system using the Purchase Order service.
6. The SharePoint application should use the following URL and make a HTTP POST call in this case:
   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderHeaderCollection

7. The details of the Purchase Order to be created should be passed as xml value to the SAP system. The file `<link_to: createPO.txt>` gives a sample deep create request body which can be used to create a purchase order.

8. To check the Purchase Order created in the SAP backend system, go to transaction **ME21N** in the SAP backend system.

9. Choose **Purchase Order -> Other Purchase Order**.

10. Enter the PO Number generated in step 5 and click on **Other Document**.

11. This displays the Purchase Order created in this section.
4.5 Query operation

Note: Ensure you change the host and port values in the Request URL.

4.5.1 Read all Purchase Order Header entries

1. In case of the Query operation, the SharePoint application uses the URL
   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderHeaderCollection

To fetch the list of all the Purchase Orders (for the particular user in whose context the call is fired) from the SAP Business Suite system through the SAP NetWeaver Gateway system.

<table>
<thead>
<tr>
<th>Total Order</th>
<th>Number of Order</th>
<th>Average Order</th>
<th>Largest Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>8244000000$</td>
<td>101</td>
<td>81623762$</td>
<td>3900000000$</td>
</tr>
</tbody>
</table>

Orders per Quarter
- 1st Quarter: 684000...
- 3rd Quarter: 810000...
- 4th Quarter: 675000...

4.5.2 Read all Purchase Order Item entries

1. Similarly, in order to fetch all the Purchase Order items from the SAP Business Suite system, the application should use the URL
   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderItemCollection

This will fetch the list of the Purchase Order items from the SAP Business Suite system.

4.6 Read operation

4.6.1 Read specific Purchase Order Header entry

1. In order to read a specific Purchase Order Header entry the SharePoint application should use the following URL
   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderHeaderCollection
In this case, the Header details of a specific Purchase Order (4500017519 in this case) is fetched.

2. In order to view a specific Purchase Order entry from the SharePoint application, click on any of the Purchase Orders from the list which will show the details of the order in a new window.

4.6.2 Read specific Purchase Order Item entry

1. In order to read a specific Purchase Order Item entry the SharePoint application should use the following URL:

   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderItemCollection(POitem='00001',PONumber='4500017519')

   In this case, the details of Item '0001' of the Purchase Order 4500017519 is fetched.

4.7 Update operation

4.7.1 Purchase Order Header Update

1. The SharePoint application can also be used to update an existing Purchase Order Header in the SAP Business Suite system. In this case, the application should use the following URL:

   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderHeaderCollection('4500017519')

   as a HTTP PUT call (Here the Purchase Order 4500017519 is being updated).

2. A sample request body for the Purchase Order Header update call is at <<link to: POHeaderUpdate.txt>>.

3. To check the updated Purchase Order go to transaction me21n in the SAP backend system.

4. Choose Purchase Order-> Other Purchase Order.

5. Enter the PO Number obtained from step 6 and click on Other Document.

6. This displays the Purchase Order.

7. Choose the Org.Data tab in the screen.
8. The updated Purchase Organization Group can be found here if we tried to update the organisation group for the Purchase Order from the SharePoint application.

4.7.2 Purchase Order Item update

1. Similarly, the SharePoint application can also be used to update an existing Purchase Order Item in the SAP Business Suite system. In this case, the application should use the following URL http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderItemCollection(POItem='00001',PONumber='4500017519') as a HTTP PUT call (Here the item 00001 of the Purchase Order 4500017519 is being updated).

2. A sample request body for the Purchase Order Item update is at <<link to: POItemUpdate.txt>>.

3. To check the updated Purchase Order go to transaction me21n in the SAP backend system.

4. Choose Purchase Order -> Other Purchase Order.

5. Enter the PO Number obtained from step 6 and click on Other Document.
6. This displays the Purchase Order.
7. Choose the Status tab in the screen.

<table>
<thead>
<tr>
<th>PO</th>
<th>Vendor</th>
<th>100073 Proveedor 1</th>
<th>Doc. date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4500017519</td>
<td></td>
<td></td>
<td>09.10.2012</td>
</tr>
</tbody>
</table>

Ordered | 10 | PC | 28,20 ARS |

8. The updated Purchase Order Quantity can be found here.

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
<th>Short Text</th>
<th>PO Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1108</td>
<td>2222</td>
<td>10</td>
</tr>
</tbody>
</table>

4.8 Delete operation

4.8.1 Purchase Order Item Delete

1. Similarly, the application can be used to delete an already existing Purchase Order entry in the SAP Business Suite system. A DELETE HTTP call should be used in this case:
   
   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderItemCollection(P OItem='00001',PONumber='4500017519') (The call will delete the Item 00001 of the Purchase Order 4500017519 in this case).

2. To check the deleted Purchase Order Item, go to transaction me21n in the SAP backend system.
3. Choose Purchase Order-> Other Purchase Order.
4. Enter the PO Number obtained from step 6 and click on Other Document.

5. This displays the Purchase Order.

6. Choose the Status tab in the screen.

7. The information of the deleted Purchase Order item can be found here.
4.8.2 Purchase Order Header Delete

1. In order to delete a Purchase Order Header entry, the URL call to the SAP system should be similar to the following:

   http://<host>:<port>/sap/opu/odata/sap/Z_PURCHASE_ORDER_SRV/PurchaseOrderHeaderCollection('4500017519')

   (This call will delete the Purchase Order Header 4500017519 in this case)
5 Glossary

**Metadata Provider Class**: This is one of the run time objects that is created when the OData service is generated. This class contains the generated metadata definition of the OData service.

**Metadata Provider Extension Class**: This is one of the run time objects that is created when the OData service is generated. Additional code to refine the model has to be written in the metadata provider extension class.

**Data Provider Class**: This is one of the run time objects that is created when the OData service is generated. This is called during the runtime when the OData service is being executed.

**Data Provider Extension Class**: This is one of the run time objects that is created when the OData service is generated. For each of the entities, the methods corresponding to CRUD operations can be implemented in the data provider extension class.
Related Content

How to Install and Configure Duet Enterprise 2.0

Video - How to create OData service