How to Implement a SAP HANA Database Procedure and consume it from an ABAP Program
Step-by-Step Tutorial
Table of Contents

Prerequisites .............................................................................................................................................3
Benefits of using SAP HANA Procedures .............................................................................................3
Objectives ................................................................................................................................................3
Use Case Description .............................................................................................................................3
Procedure Overview ................................................................................................................................4
Step-by-Step Procedure ..........................................................................................................................4
Step 1: Create and implement a SAP HANA Procedure with Input and Output Parameters .............. 4
Step 2: Create a Database Procedure Proxy in the ABAP Dictionary to expose the HANA Procedure. 8
Step 3: Create and implement an ABAP Report consuming Procedure.................................................10
Summary ................................................................................................................................................12
Related Content ......................................................................................................................................12
This tutorial demonstrates how easy it is to use the new AS ABAP built-in possibilities provided with SAP NetWeaver 7.4 to leverage the power of SAP HANA in your ABAP applications.

You will get to know step-by-step, how to create and implement a SAP HANA Procedure, expose it in the application server ABAP using the new dictionary features and then easily consume it in an ABAP report.


**Prerequisites**

SAP NetWeaver AS ABAP 7.4 SP2, SAP HANA Appliance Software SPS 04 (or higher), SAP HANA DB SQLScript V2.0 (or higher), SAP HANA Studio, ABAP Development Tools for SAP NetWeaver

**Benefits of using SAP HANA Procedures**

SAP HANA procedures enable you to embed data-intensive application logic into the database, where it can be optimized for performance.

Some of the advantages of using SAP HANA procedures instead of standard SQL are:

- Large data are not transferred to the application server whenever possible resulting in less network and processor load (e.g. in case of data-intensive aggregations).
- Less roundtrips by returning multiple result sets while only one result set can be returned with standard SQL queries.
- Local variables are possible, eliminating the need to explicitly create temporary tables for intermediate results.
- Easy and advanced parameterization of queries using input parameters (e.g. versus standard SQL SELECT)
- Advanced features like parallel execution or complex calculation – such as for financials - are supported on the database

More information about Procedures can be found in the [SAP HANA Developer Guide](http://scn.sap.com/docs/DOC-35518).

**Objectives**

After completing this tutorial, you will be able to:

- Create and implement a SAP HANA Database Procedure
- Expose a SAP HANA Procedure in the ABAP dictionary as Database Procedure Proxy
- Consume a Database Procedure Proxy in an ABAP program

**Use Case Description**

The Account Receivables accountant of your company want to be able to display the so-called top and flop customers in regards to their payment ability based on the open invoices.

The company accountant should be able to select how many customers have to be displayed per category and due to the regular update of the business data, the categorization have to be executed on-the-fly.

More information about the **Open Items Analytics** reference scenario underlying this use case is available [here](http://scn.sap.com/docs/DOC-35518).
How to create a SAP HANA Database Procedure and consume it from an ABAP Program

Procedure Overview

Step-by-Step Procedure

Step 1: Create and implement a SAP HANA Procedure with Input and Output Parameters

Note: You need a database user in order to create and manipulate objects in the SAP HANA DB. It is recommended to create your test objects in package system-local.private located under the Content folder of the SAP HANA Modeler.

a. Start the SAP HANA Studio and go the Modeler perspective

b. Optional: First create a new package (e.g. demo) for your demo objects under package system-local.private which is located under the Content folder

Now create a new database procedure by right-clicking on package system-local.private.demo and selecting menu path New -> Procedure …

Enter a Name (e.g. ZDP_OIA_TOPANDFLOP) and a description (“OIA demo: Top and flop Customers”).

Select the required Schema from the Default Schema dropdown list, for unqualified access in SQL.
How to create a SAP HANA Database Procedure and consume it from an ABAP Program

**Note:** An application server ABAP is installed in the database in a schema, the so-called `SAP<SID>`, so you can work in the database with multiple schemas. For example, the schema SAPABC belongs to the system whose SID is ‘ABC’.

In order to not specify the `SAP<SID>` directly in the procedure’s script, a default schema has to be specified. For example:
- Procedure with SAPABC specified as Default Schema: `SELECT company_name FROM snwd_bpa`
- Procedure with no Default Schema specified: `SELECT company_name FROM SAPABC.snwd_bpa`

Select ‘Invoker’s Rights’ from the Run With dropdown list.

**Note:** The option selected from the Run With dropdown list identifies whose rights are to be considered while executing the scenario.
- Invoker’s right: If you want the standard database user `SAP<SID>` to use the rights of the current user while executing the view or procedure.
- Definer's right: If you want `SAP<SID>` to use the rights of the definer while executing the view or procedure for any user.

Press on Finish.

c. Create the output parameter ET_TOP

Go to the Output Pane, right-click on the root folder Output Parameters and select New… from the context menu. Now enter the name “ET_TOP” and add two columns (by clicking on the + icon) with following values and confirm:

- **Column 1**
  - Name: COMPANY_NAME
  - Data Type: NVARCHAR
  - Length: 80
- **Column 2**
  - Name: GROSS_AMOUNT
  - Data Type: DECIMAL
  - Length: 15
  - Scale: 2
d. Create the output parameter ET_FLOP
   Just repeat the steps performed previously for ET_TOP.

e. Create the input parameter IV_NUMBER
   Go to the Input Pane, right-click on the root folder Input Parameters and select New Scalar Parameter… from the context menu. Enter following values and confirm
   - Name : IV_NUMBER
   - Data Type : INTEGER

f. Implement the procedure.
   Copy & paste the SQLScript below into the Procedure Script View Editor
How to create a SAP HANA Database Procedure and consume it from an ABAP Program

**Procedure DP_OIA_TOPANDFLOP**

```plaintext
BEGIN
   // retrieve the best customers
   et_top = select top :iv_number b.company_name as company_name, sum(i.gross_amount)
     as gross_amount from snwd_so_i as i
     inner join snwd_so as h on h.node_key = i.parent_key
     inner join snwd_bpa as b on b.node_key = h.buyer_guid
   group by company_name
   order by gross_amount desc;

   // retrieve the worst customers
   et_flop = select top :iv_number b.company_name as company_name, sum(i.gross_amount)
     as gross_amount from snwd_so_i as i
     inner join snwd_so as h on h.node_key = i.parent_key
     inner join snwd_bpa as b on b.node_key = h.buyer_guid
   group by company_name
   order by gross_amount ASC;
END;
```

Note: Showing how complex the logic of a procedure can be is not the main purpose of the present exercise. The above procedure implements a relatively simple data-intensive function, but of course very complex logic can be implemented instead by making use of the advanced native SAP HANA features and functions.

g. Save and activate the procedure.
How to create a SAP HANA Database Procedure and consume it from an ABAP Program

Step 2: Create a Database Procedure Proxy in the ABAP Dictionary to expose the HANA Procedure

We will now expose the created HANA procedure `DP_OIA_TOPANDFLOP` as Database Procedure Proxy in the application server using the new ABAP dictionary features.

**Note:** The new ABAP dictionary features are only available in the ABAP Development Tools for SAP NetWeaver (aka ABAP in Eclipse) and not in the ABAP Workbench (transaction SE80).

a. First switch to the ABAP perspective

![ABAP perspective](image1.png)

b. Select the package of your choice (e.g. your $TMP package under Favorite Packages), right-click on it and select New -> Other ABAP Repository Object from the context menu.

Filter for “Database Procedure Proxy”, select it and press on Next.

![Repository Object](image2.png)
c. Enter a name (e.g. ZDPP_OIA_TOPANDFLOP) and a description (e.g. “Database Procedure Proxy for ZDP_OIA_TOPANDFLOP”) for the new Database Procedure Proxy.

Enter the name of the SAP HANA Procedure previously created in Step 1 (e.g. system-local.private.demo.ZDP_OIA_TOPANDFLOP).

**Note:** You can use shortcut Ctrl+Space for the Search-Help (Content Assist Available)

A name is proposed for the **Parameter Type Interface** which contains the data type definition of the input and output parameters defined in the HANA Procedures. The interface will automatically be created together with the database procedure proxy.

Now press on **Next** and then on **Finish** on the next dialog step.

d. You can now have a look at the created objects: Database Procedure Proxy and its interface. Activate both of them (or Ctrl+Shift+F3).

**Note:** Press the “Synchronize” button to reload the metadata of the Database Procedure if the procedure was changed in the SAP HANA repository and do not forget to activate the updated dictionary object afterwards.
How to create a SAP HANA Database Procedure and consume it from an ABAP Program

Step 3: Create and implement an ABAP Report consuming Procedure

We will now call the database procedure proxy from an ABAP program. We will implement a simple report which will just output the result with a WRITE statement.

The following steps are performed in the ABAP perspective.

a. Create a new ABAP Program in the package of your choice by just right-clicking on it and selecting "New -> ABAP Program" from the context menu.
   Enter a name (e.g. ZR_OIA_TOPANDFLOP) and a description (e.g. "Display Top and Flop Customers").
   Press on Next and then on Finish on the dialog step.

![Create ABAP Program](image)

b. Implement the report.
   Copy & paste the source code below into the ABAP Editor.

```
REPORT ZR_OIA_TOPANDFLOP.

* input parameter: how many tops/flops should be displayed
PARAMETER pnumber TYPE i DEFAULT 10.

* define parameters using the created DPP interface ZIF_ZDPP_OIA_TOPANDFLOP
DATA: lv_number TYPE zif_zdpp_oia_topandflop=>lv_number,
    lt_top TYPE STANDARD TABLE OF zif_zdpp_oia_topandflop=>et_top,
    lt_flop TYPE STANDARD TABLE OF zif_zdpp_oia_topandflop=>et_flop.

* set the value of the procedure input parameter
lv_number = pnumber.

* call the created database procedure proxy
CALL DATABASE PROCEDURE zdpp_oia_topandflop
  EXPORTING iv_number = lv_number
  IMPORTING et_top = lt_top
                   et_flop = lt_flop.

* display the returned itab with TOP customers
WRITE: / 'Tops:' COLOR COL_POSITIVE.
LOOP AT lt_top ASSIGNING FIELD-SYMBOL(<f>).
  WRITE: / <f>-company_name , <f>-gross_amount .
ENDLOOP.

* display the returned itab with FLOP customers
ULINE. WRITE: 'Flops:' COLOR COL_NEGATIVE.
LOOP AT lt_flop ASSIGNING FIELD-SYMBOL(<g>).
  WRITE: / <g>-company_name , <g>-gross_amount .
ENDLOOP.
```
How to create a SAP HANA Database Procedure and consume it from an ABAP Program

**Note:** The new ABAP statement "CALL DATABASE PROCEDURE <NAME>" is used to read data from the SAP HANA database. The name of the Database Procedure Proxy defined in the ABAP dictionary is expected. Database Procedure Proxy can be called in the same manner from other development objects such as classes, function modules and Web Dynpro applications.

c. Save and Activate your report

d. You can now run the report (press on F8) – and by the way see the result of your effort 😊
Summary

Congratulations, you have just experienced how easy it is to consume SAP HANA procedures from an ABAP programs. You can now create a SAP HANA Database Procedure, expose it as Database Procedure Proxy in the ABAP dictionary and easily consume it in an ABAP program.

The following illustration provides the high level architecture underlying this tutorial.

Related Content


