Planning Functions and Characteristic Relationship in Integrated Planning

Applies to:
SAP BI 7.0 developers and Reporting Users. For more information, visit the [EDW homepage](http://www.sdn.sap.com).

Summary
This document explains about planning functions used in BI Integrated planning. It focuses on advantages and scope of each planning function for execution with examples. It also explains about advantages of characteristic relationship in planning modeler.

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Introduction

Planning is done in two ways. 1. Manual planning  2. Automatic planning. In case of manual planning Users will be given an interface either workbook or Web application to enter the plan data manually and Save to the targets. In Case of automatic planning we configure certain planning functions and sequence them for execution of required planning. Here we will know more information about how to use planning functions and characteristic relationships.

Planning Functions

SAP has provided several standard functions for execution of planning with ready to use. In case, standard functions not able to serve our purpose then FOX formula is used to configure the requirement. FOX is a programming language; here we can customize the coding according to our requirement. If FOX is also not able to serve our purpose, then it is recommended to create Custom planning functions.

The scope and complexity of these three types of functions are given below.

Pre requisites to configure the planning function

- Aggregation level: Planning function must be created only on aggregation level.
- Filter: Filters determine the data that planning function is performed for. So planning function locks the in the filter in the real time cube.

Note: There are important options we need to configure while defining the planning functions. They are

Characteristic Usage: Here we will tell the characteristics to be changed and unchanged during the planning execution and we can also mention conditions for characteristics.

Parameters: Here we will tell the values for the planning function.

For example: if you wanted to copy data from Version 01 to Version 02. Then select the version as field to be changed and set the parameters as from value 01 and to value 02.

Creating Planning Functions

1. To create a planning function, choose Create. The Create Planning Function dialog box appears.
2. Choose the planning function type.
3. Enter a technical name and a description for the planning function.
4. Select the aggregation level where you want the planning function to work.
5. Choose For Characteristic Usage and determine which characteristics to change and (if required) to use in conditions.
6. Choose For Parameters. In the Conditions with Parameters screen area, you can create, delete and copy conditions. On the Selected Conditions tab pages, you can use input help to select the
conditions values that you want the condition to apply to. On the Associated Parameter Set tab page, you maintain the parameter sets.

Copy function

Copy function is used to copy the keyfigures from one characteristic combination to other. For example: if you wanted to copy the data from 2010 to 2011 and 2012 without changing the other characteristic, we will set Characteristic ‘cal year’ as “field to be changed” and in the parameters select the keyfigures that are to be copied; we need to mention from and to values for copy function.

Below screen shows the data in the real time cube before executing the planning function.

"ZRC_PLAN4", List output

<table>
<thead>
<tr>
<th>Product</th>
<th>COMP_CODE</th>
<th>Material</th>
<th>Version</th>
<th>CALYEAR</th>
<th>Currency</th>
<th>UNIT</th>
<th>Amount</th>
<th>PRICE</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEER</td>
<td>ALCM</td>
<td>ACT</td>
<td>2010</td>
<td>USD</td>
<td>100.00</td>
<td>0.00</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now we wanted to copy the Amount keyfigure value from 2010 to 2011 and 2012. Other Characteristics remain same.

We go to planning modeler and choose appropriate aggregation level defined on the real time cube.
Next, define filter for calendar year, select the values 2011 and 2012.

Then create a planning function of type Copy, in characteristic usage choose field to be changed 'cal year'.

In To parameters tab; choose the keyfigures to be copied. In our example, we wanted to copy only amount. In From values, keep 2010 and To values 2011, 2012.

In the next tab, create a planning sequence, add planning function which was created just now, also choose filter and aggregation level.
And then execute the planning function. It displays message as 0 records read, 2 generated. Since we did not keep 2010 in the filter it is considered as reference data. We get 2 new records one for 2011 and other for 2012.

We can display the output the real time cube after saving plan data.

"ZRC_PLAN4", List output

<table>
<thead>
<tr>
<th>Product</th>
<th>Product Category</th>
<th>OCCOMP_CODE</th>
<th>Material</th>
<th>Version</th>
<th>CALYEAR</th>
<th>Currency</th>
<th>BKUN</th>
<th>Amount</th>
<th>OPRICE</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEER</td>
<td></td>
<td>6100</td>
<td>M1</td>
<td>ACT</td>
<td>2011</td>
<td>USD</td>
<td>KG</td>
<td>100,00</td>
<td>0,00</td>
<td>0</td>
</tr>
<tr>
<td>BEER</td>
<td></td>
<td>6100</td>
<td>M1</td>
<td>ACT</td>
<td>2010</td>
<td>USD</td>
<td>KG</td>
<td>100,00</td>
<td>0,00</td>
<td>30</td>
</tr>
<tr>
<td>BEER</td>
<td></td>
<td>6103</td>
<td>M1</td>
<td>ACT</td>
<td>2012</td>
<td>USD</td>
<td>KG</td>
<td>100,00</td>
<td>0,00</td>
<td>0</td>
</tr>
</tbody>
</table>

new records are generated, only amount keyfigure value is copied to 2011 and 2012. Quantity value did not get copied, this is because in planning function parameters we selected only amount. All the characteristic values are copied except product category, it got blank for new records. This is because aggregation level we are executing planning function does not have product category field. So planning is not done at this level.

Similarly we can copy data for more one characteristic combination also. For example: we can copy data from 2010 and version 'ACT' to 2011 and version V1; 2012 and version V2.

In this case, field to be changed will be cal year and version. In parameters tab, specify the 2 rows one for copying version V1 other for V2.

We can also copy data from one infoprovider to other. For example: you have one standard cube which holds actual data and wanted to copy certain data to planning cube. Then create a multiprovider on these 2 cubes, configure planning application on multiprovider.

0infoprovider characteristic will be used as field to be changed in planning function and parameters will be from infoprovider is standard cube and to is real time cube.

**Revaluation Function**

Revaluation function is used to increase or decrease keyfigure values by a percentage. Characteristic usage, no characteristic will be changed and only we can condition option.

In the parameters, we can specify the revaluation percentage is common to all keyfigures or apply with individual percentages for each keyfigure.

For example: after copying the data from 2010 to 2011 and 2012. We wanted to revaluate amount by incrementing 2011 revenue by 10% and 2012 revenue by 20%.

So here, there is no characteristic getting changed, so field to be changed option. We need to specify the 'used in condition', we are applying the planning function differently for each characteristic. So in conditions, choose Calendar year and in the parameters specify the revaluation percentage for both years.
Create a planning function of type revaluation in planning modeler,

Since we defined calendar year in conditions, we get several rows to configure revaluation percentages. In the first row, Cal year 2011 and keyfigure amount should be incremented by 10%. If we select ‘combined percentages for all keyfigures’ option then the revaluation percentage is applicable to all keyfigures.

In the second row, we will specify the revaluation percentage for 2012 i.e. 20%.

Note: we can even use the variable for the percentages, the variable created here is a formula variable and we can pass the values dynamically at run time.

Then add planning function to planning sequence along with filter and execute with trace to see how the delta records generated.

The first block is for 2011, amount is incremented with 10%, so it became 110. Record before is 100 and after change is 110. So the difference goes to cube and add another record with 10.

The second block is for 2012, amount is incremented by 20%. The difference of 20 will go and add to the cube as a delta record. After saving the data into cube, it displays as below.
Delete Function:

Delete function is used to delete the keyfigure values for the selected records.

No Characteristic value to be changed, we can select characteristics in conditions. In the parameters we can select figures which are to be deleted.

Create a planning function of type delete, choose calendar year in conditions; this is because I wanted to delete amount keyfigure for 2011 and quantity keyfigure for 2012. This is possible if I keep cal year in conditions.

In the parameters, I will choose the keyfigure to be deleted for 2011 and 2012 respectively.

After executing the planning function, block 1 is for 2011, which deletes the data of amount. There is no after image for this.

Second block is for 2012, amount unchanged, since quantity did not have any value, there is no value to be deleted. So both and after records are same in this example.
Repost function:
It is like Copy function, posts the keyfigure values from a char combination to other. In contrast to copy, it deletes the keyfigures for the from values are deleted.

Following rules apply,
- Both from and to values should be single values.
- Both from and to values should be in filters. Unlike copy function, where it is required to have only to values in filters.

For Example: Wanted to cancel the keyfigure values for 2012 and post the same to 2013. In this characteristic to be changed is Cal year and parameters will be from 2012 and to 2013.

After executing planning function and saving the data, you will see the output in the real time cube as below.

**"ZRC_PLAN4", List output**

<table>
<thead>
<tr>
<th>Product Category</th>
<th>0COMP_CODE</th>
<th>Material</th>
<th>Version</th>
<th>0CALYEAR</th>
<th>Currency</th>
<th>UNIT</th>
<th>Amount</th>
<th>0PRICE</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCH</td>
<td>6100</td>
<td>M1</td>
<td>Y1</td>
<td>2011</td>
<td>USD</td>
<td>KG</td>
<td>200.00</td>
<td>0.00</td>
<td>100</td>
</tr>
<tr>
<td>NON ALCH</td>
<td>6100</td>
<td>M1</td>
<td>Y1</td>
<td>2011</td>
<td>USD</td>
<td>KG</td>
<td>1000.00</td>
<td>0.00</td>
<td>500</td>
</tr>
<tr>
<td>ALCH</td>
<td>6100</td>
<td>M1</td>
<td>Y1</td>
<td>2011</td>
<td>USD</td>
<td>KG</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
</tbody>
</table>

Distribution by Keys Function:
By using this, we can generate new char combinations and distribute the keyfigure values to these according to master data and Char relationships.

Example: Revenue is planned at product group level, we wanted to distribute the planned revenue to the products which are under each product group.

**"ZRC_PLAN4", List output**

<table>
<thead>
<tr>
<th>Product Category</th>
<th>0COMP_CODE</th>
<th>Material</th>
<th>Version</th>
<th>0CALYEAR</th>
<th>Currency</th>
<th>UNIT</th>
<th>Amount</th>
<th>0PRICE</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCH</td>
<td>6100</td>
<td>M1</td>
<td>Y1</td>
<td>2011</td>
<td>USD</td>
<td>KG</td>
<td>200.00</td>
<td>0.00</td>
<td>100</td>
</tr>
<tr>
<td>NON ALCH</td>
<td>6100</td>
<td>M1</td>
<td>Y1</td>
<td>2011</td>
<td>USD</td>
<td>KG</td>
<td>1000.00</td>
<td>0.00</td>
<td>500</td>
</tr>
<tr>
<td>ALCH</td>
<td>6100</td>
<td>M1</td>
<td>Y1</td>
<td>2011</td>
<td>USD</td>
<td>KG</td>
<td>0.00</td>
<td>0.00</td>
<td>0</td>
</tr>
</tbody>
</table>

After planning at product category, the cube has got 2 records, ALCH and NON ALCH. For ALCH the amount is 200 $, for non alcohol 1000 $. 
Under ALCH group, we have 2 products, let us say BEER & WINE; under NON ALCH, we have 2 products WATER & MILK.

Now we wanted to distribute 200 $ to BEER & WINE; 1000 $ to WATER & MILK.

Create a planning function, in Characteristic usage, field to be changed would be product. Because planning product has got # values, after planning it is going to product names in there.

Note: In this example, product is getting changed, I should keep the possible product values in the filters. So in filters restrict with BEER, WINE, MILK and WATER.

In the parameters tab, select keyfigures which are to be distributed. Then we need to control the distribution process. We have 2 ways.

- Distribution with Top-down
  Distribute all: the entire block is selected for distribution.
  Only distribute not assigned: values are distributed, if the characteristic values is # for the current records.

- Distribute manually
  You can create distribution operation by manually entering from and to values.

So we distribute, Not assigned to ALCH products, they are BEER & WINE.

And distribute to NON ALCH products also, MILK & WATER.

After executing the planning function and saving the data into cube, it looks like below.
ALCH revenue is 200 $, it posted 2 entries for BEER and WINE according to the proportion of 4 and 6 respectively. So for BEER it got 80 $ and WINE it got 120 $. Lastly total revenue record is reversed with an entry of -200 $.

Similarly we can see the data distribution for NON ALCH products, WATER & MILK with 7 & 3 factors.

Distribution by Reference

This function is used to generate combination of Characteristics that correspond to reference data. Keyfigure values are distributed in percentages according to the reference data.

Example: Revenue is planned for the year 2011, at product group level and distribution was happened to the products according to the groups, now we wanted to plan 2012, at product group level and the distribution to products but by taking the reference data of 2011.

The real time cube data is displayed below,

Here, we have 2 records for 2012, ALCH and NON ALCH, now wanted to distribute 2012 revenue to the products by taking the reference of 2011. Now 5000 $ and 6000 $ should be distributed.

Create a planning function; choose the product as field to be changed, in the parameters tab,

Select the reference data, Calendar year 2011 and product groups ALCH and NON ALCH, execute the planning function and save the data. The revenue will be distributed to products in the year 2012. You can see below how the distribution happened for products.

The revenue is distributed into products in 2012.
FOX Formula:

Formula function comes up with a simple programming language for manipulating transaction data. FOX is just like any other programming language; we can customize our requirements for planning.

So we can use FOX, if we do not find any standard function.

Some of the important points:

- Use { } to access the transaction data, if you wanted to read data use this operand on right hand side, to write the data back to cube use in the left hand side.

  For example: to copy the revenue from 2011 to 2012.

  \{ 0AMOUNT, 2012 \} = \{ 0AMOUNT, 2011 \}.

- Using FOREACH Statement to loop the records.

  Ex: DATA Year type 0CALYEAR.
  FOREACH YEAR.
  \{0amount, year\} = \{0amount,2010\} * 5
  ENDFOR.

  In the source data, if you have 4 years, this loop will run 4 times.

- Use of variables in FOX

  In planning application, we have two types of variables, Global and local variables. Global ones are created and used in the filters or query, local variables are declared in FOX code.

  To read the values of the variables we have several statements.

  VARC(VAR1) : which gives no.of values are available in Variable VAR1.
  VARI(VAR1,i) : which gives ith position value, that means if i = 1, then first value is read. 2 then second value and so on.
  VARV(VAR1) : Always give the first value of the variable.

- We can call the function module in FOX, but with limited no of functionalities. We can’t export or import internal tables from FOX to FM.

  The syntax: CALL FUNCTION ZCB_BW_IP_CUST_SALES_RETRIEVAL.

  EXPORTING
  Field1 = var1

  IMPORTING
  Field2 = var2.

To use the FM in FOX, we must do a setting in BI system. Maintain an entry in RSPLF_DIR.

Go to SE11 --> RSPLF_FDIR --> Utilities menu --> Create new entries --> Enter the function module name and save.

More information on FOX code is explained in the below documents.


Delete Invalid Combinations
This is used to delete the keyfigure values whose values do not have the valid char combination derived for that real time cube. Since, the Cube does not allow you to delete the records; this function resets the keyfigure values to 0 by posting - entries. So you can compress the cube with 0 elimination

Note: This function can only be created on simple aggregation level.

Characteristic Relationships
It is used to test valid combination of records generated and derive the char values for other chars. This is at infoprovider level; it is applicable to all the aggregation levels of real time cube.

Invalid combination: this is applicable in manual planning, when we are trying to generate a new combination which is not part of Char relation, it is assumed as invalid combination.

Derive Characteristic: we can derive values for characteristics in real time cube, we define source and target characteristics in planning modeler.

We have 4 types of char relationships,
1. Master data attributes.
2. Hierarchy
3. Data store object
4. Exit class.

Invalid combination check; let us say with derivation, choose master data attributes relation and company code as source and currency key as target.

So, in the input ready query, it will not allow a new combination other than the entry which we have in company code master data table.

For ex: for comp code 6100, currency is CHF, then if I try to plan for 6100 and USD combination it will not allow me in the input ready query.

Derivation:
Let us say, your real time cube has got value for product, but not for product group. You wanted to fill the product group after executing the planning function and before saving the data into Real time cube.

Define with derivation, source as product and target as product group. It gets the value for product group after execution of planning function.

Exit class: it is created when you do not have any relation between those 2 chars, we define entire relation in an ABAP class use that in this place.

Note: It is always recommended to copy the example class CL_RSPLS_CR_EXIT_BASE modify your code according to your requirement.
Related Contents

Business Intelligence

For more information, visit the EDW homepage
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